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MEMORANDUM

TO: **Nunavut Water Board**
FROM: **Larry Connell, MHBL**
DATE: **July 19, 2007**
SUBJECT: **Doris North Water License Pre-Hearing Technical Meeting Information Supplement Item #9 – Cyanide Destruction**

Background

Item #9 (Page 16) in MHBL's Water License Pre-Hearing Technical Meeting Information Supplement submitted to the Nunavut Water Board on June 25th discussed the additional cyanide destruction testwork that was conducted by CyPlus on a bulk sample of Doris North flotation concentrate. A copy of the CyPlus report on this testing program was previously submitted to the NWB as Appendix B to the letter describing project modifications dated June 08th, 2007. In the June 25th Supplement MHBL indicated that it had arranged for CyPlus to courier the residual solutions to the Cantest Laboratory in Vancouver (the former BC Research lab) for the following analysis:

Cyanide Leach Residue Solution (prior to CN Destruction)
pH, ICP-MS Scan for Total Metals, Hg by CVAA, SO4, Total Phosphate and TDS (we do not have sufficient volume of solution to run the CN species and so will have to rely on the CyPlus analysis as quoted in their report)

Treated CN Leach Residue Solution (after CN Destruction)
pH, Total CN, WAD CN, CNO, SCN, SO4, Chloride, Total Ammonia, Nitrate, Nitrite, Alkalinity, Total Phosphate, Total Dissolved Phosphorous, Organic Carbon, Total Dissolved Organic Carbons, ICP-MS Scan for Total Metals, Hg by CVAA, Hardness and TDS.

Ageing Test – 500 mL of slurry – let it sit exposed to air at room temperature for one month the filter and analyze the clear solution for pH, ICP-MS Scan, Hg by CVAA, Total Ammonia, and Total Phosphate.

CN Leach Residue Solids (after CN destruction)
Modified ABA using the Sobek Method, Sulphur Speciation, Inorganic CO2 (Carbonate NP), Peroxide Siderite Correction for NP ABA Procedure, Static NAG testing, an ICP for total metals (strong acid digestion) and a BC SFE test with ICP for total metals on the leachate.

CyPlus Samples Shipped to Cantest

The following samples were received by Cantest from CyPlus. The sample identifier labels are those provided by CyPlus to Cantest:

Sample 1: “Filtered Treated Sample” - 495 ml
Sample 2: “Filtered Barren Sample” – 511 ml
Sample 3: “Treated Slurry” – Bottle 1 generated 663 ml of supernatant solution
Sample 4: “Treated Slurry” – Bottle 2 generated 656 ml of supernatant solution
Sample 5: “Treated Slurry” – Bottle 3 generated 702 ml of supernatant solution
Sample 6: “Treated Slurry” – Bottle 4 generated 670 ml of supernatant solution

The CyPlus “Barren Sample” refers to the Cyanide Leach Residue slurry before cyanide destruction or in other words the feed to the cyanide destruction circuit.

The CyPlus “Treated Sample” refers to the Cyanide Leach Residue slurry after cyanide destruction or in other words the post cyanide destruction slurry.

CyPlus reported the following analytical results on the post cyanide destruction solution (Treated Sample - sample of slurry filtered on a #10 Whatmann filter paper to separate solids from solution and the resulting solution then filtered at 0.45 microns before analysis):

pH	8.56
CN_{WAD}:	0.43 ppm
Cu:	0.090 ppm
Fe:	0.068 ppm
Ni:	0.071 ppm

Cantest Analytical Results

A copy of the full Cantest analytical results is attached to this memo as Appendix A. The volumes of sample available for analysis were limited and thus in consultation with MHBL, Cantest processed the samples as follows:

Sample 1: “Filtered Treated Sample” - a 60 ml aliquot was removed and analyzed for pH and metals by ICP with the results as shown in the fifth column in Table 1 of the Cantest results. The remaining 435 ml was saved.

Sample 2: “Filtered Barren Sample” – a 285 ml aliquot was removed and analyzed for pH, sulphate, TDS and metals by ICP with the results as shown in the seventh column in Table 1 of the Cantest results. The remaining 226 ml was saved. This remaining sample was filtered by Cantest at 0.45 microns and re-assayed with the test results shown in column 8 in Table 1 of the Cantest results.

Samples 3, 4, 5 and 6: “Treated Slurry” – these four samples were combined, the supernatant removed and the solids filtered and then dried. The total vilume of supernatant was 2,692 ml of which 500 ml was removed for an ageing test. The balance of the supernatant (2,192 ml) was combined with the saved 435 ml of solution from Sample 1 to make up a total volume of 2,627 ml. An aliquot of 1,977 ml was removed and analyzed for a full suite of parameters including cyanide species and metals by ICP with the results as shown in column 6 of Table 1 of the Cantest results. The remaining 650 ml was saved. The dry weight of the solids from these four samples was 515 grams (dried at 20 to 30 degrees Celsius). These solids were sent for the following analyses:

ABA Test results – Table 3a of the Cantest results
Modified Sobek – Peroxide Siderite Correction for Sobek Method – Table 3b of the Cantest Results

Trace Metals Using Aqua Regia Digestion with ICP-MS Finish – Table 5 of the Cantest results
Whole Rock Analysis by XRF – Table 6 of the Cantest results
BCMEM Shake Flask Extraction – Table 7 of the Cantest results
Static NAG Test – Table 8 of the Cantest results

Ageing Test – Table 2 of the Cantest Results
A 500 ml aliquot of the combined supernatant from Samples 3, 4, 5 and 6 was put aside for a solution ageing test. A 60 ml aliquot was removed and analyzed for pH, Total Phosphate, Total Ammonia and metals by ICP with the results as shown in column 5 in Table 2 of the Cantest results. The solution was then left exposed to air and allowed to age. The ageing test was terminated on Day 13th and the remaining solution analyzed for a full range of parameters (excluding cyanide speciation due to volume constraints) with the results as shown in column 6 in Table 2. A duplicate anaysis was run on this sample with the results as shown in column 7 in Table 2.

It was quickly apparent that the results from Cantest were significantly different from those reported by Cantest for the treated solution:

	CyPlus	**Cantest (Table 1 Column 5)**	**Cantest (Table 1 Column 6)**
pH	8.56	6.9	7.6
CN_{WAD}:	0.43 ppm	NA	0.031 ppm
Cu:	0.090 ppm	0.55 ppm	0.39 ppm
Fe:	0.068 ppm	0.36 ppm	0.09 ppm
Ni:	0.071 ppm	0.003 ppm	0.016 ppm

Investigation led to the following observations:

1. The CyPlus samples were labeled as being filtered. Cantest and MHBL had presumed that this meant the samples were filtered through a 0.45 micron filter prior to shipment, however CyPlus indicated after the samples had been analyzed that the samples had only been filtered through a #10 Whatman filter to separate solids from solution prior to shipment and had not been filtered through a 0.45 micron filter. Consequently the metals reported by Cantest as being Dissolved Metals in column 5, 6 and 7 are in fact Total Metals while the metals reported by CyPlus are Dissolved Metals.

2. The pH of the solutions had changed in transit dropping from 8.56 to 6.9 probably due to the extended contact with the fine solids while in transit from the CyPlus lab in New Jersey to the Cantest lab in Vancouver. The drop in pH is sufficient to resolubilize some of the copper precipitated during the cyanide destruction treatment as hydroxide, hence the probable cause for the observed increase in copper.

3. Unfortunately once this difference was discovered the volume of solutions remaining was insufficient to allow for a total re-run of the analysis after filtering through a 0.45 micron filter. The volumes of solution required by analysis are shown in the following table.

Parameter	DL	Unit	Method	Volume of Sample needed	Preservation
pH	1	pH Units	pH Meter	20 mL	Nil
EC	1	umhos/cm	meter	0	Nil
Free CN	same as WAD-CN (not any different - just a different terminology)				-
Total CN	0.01/0.002	mg/L	BC Std Methods	500 mL (for low DL need 1L)	Unfil., 2-3 pellets of NaOH
WAD-CN	0.01/0.002	mg/L	BC Std Methods	500 mL (for low DL need 1L)	Unfil., 2-3 pellets of NaOH
CNO (Cyanate)	1	mg/L	BC Std Methods	500 mL	Unpre., Unfil.
SCN (Thio cyanate)	0.02	mg/L	BC Std Methods	500 mL	Unpre., Unfil.
SO4	1	mg/L	Turbidimetry	25 mL	Fil., Unpre.
Chloride	0.5	mg/L	IC	25 mL	Fil., Unpre.
Total Ammonia	0.01	mgN/L	Colorimetry	75 mL	Unfil., pre. with 1:1 H2SO4
Nitrate (NO3-N)	0.05	mg/L	IC	50 mL	Fil., Unpre.
Nitrite (NO2-N)	0.002	mg/L	Colorimetry	Can be combined with NO3-N	
Alkalinity	0.10	mgCaCO3/L	Titration	100 mL	Nil
Total Phosphate	0.02	mgP/L	Colorimetry	250 mL	Unfil., pre with 1:1 H2SO4
Total Dissolved Phosphorous	0.02	mgP/L	Colorimetry	250 mL	Fil., pre with 1:1 H2SO4
Total Organic Carbons	1	mg/L	BC Std Methods	250 mL (amber bottle)	Unfil., pre. with Conc. HCl
Total Diss. Organic Carbons	1	mg/L	BC Std Methods	250 mL (amber bottle)	Unfil., Unpre.
Hardness-CaCO3				0	
ICPMS scan				40 mL	
Hg by CVAF				20 mL	
Total				**3335 mL**	

Given the uncertainty in the accuracy of the copper concentrations as measured at Cantest, MHBL asked John Chapman to re-run the Doris North Tail Lake water quality model using a combination of the Cantest analytical results taken from the “Treated Slurry Supernatant + Filtered Treated Sample” (Column 6 in Table 1) and the “Treated Slurry Supernatant 14-Jun-07 Day 0” from the Ageing Test (Column 5 in Table 2) to determine how the water quality model responded to these numbers. A copper value of 0.77 ppm was used for the treated barren bleed solution component of the tailings stream to be sent to Tail Lake. The model was run under the Base Case Condition, the Base Case Low Yield Condition and Extreme Dry Initial Condition. A copy of a memo from John Chapman presenting the model predictions from these runs is attached as Appendix B. The conclusions from this assessment are summarized as follows:

1. Copper remains the discharge limiting parameter;

2. Water and load balance calculations repeated for the higher copper concentrations resulting from the Cantest results indicate that the proposed discharge strategy will remain essentially unchanged for the Base Case and Base Case Low Yield Conditions.

3. The results however indicate that there may be a small risk that, for the extreme dry initial conditions, one additional year of active management beyond that estimated for the baseline conditions may be required.

It is MHBL’s belief that the higher copper concentrations as measured by Cantest are an aberration of how the samples chemically changed in transit (drop in pH) and the CyPlus values represent the results to be expected from an operational plant operating under optiumized conditions. The results do provide some comfort in observing how the water management strategy remains viable under possible upset conditions where copper values are higher than predicted.

Acid Generating Potential (Table 3a and 3b)

The leach residue solids from this test contained 3.96 wt% total Sulphur (3.51% sulphide sulphur) and was predicted by ABA testing to be net acid generating (NNP of -56.1 kg $CaCO_3$/Tonne and an NPR of 0.5. Using the Peroxide Siderite Correction method this leach residue solid sample was still predicted to be net acid generating however the NNP increased to -38.4 kg $CaCO_3$/Tonne and the NPR increased to

0.65. Static NAG testing indicated a NAG pH of 6.31 and 6.60 with a NAG Acidity at pH 4.5 of 0 and at pH 7 of 0.6 kg H_2SO_4.

Cyanide in Solids (Table 9)

The leach residue solids following cyanide destruction were analyzed for Total and Weak Acid Dissociable cyanide with the following results:

Parameter	**Units**	
Total Cyanide	ug/g	193
Cyanide, Weak Acid Dissociable	ug/g	113

It should be remembered that MHBL is planning to place these leach residue solids into the underground mine as backfill where they will become encapsulated by permafrost thus preventing any future contact with water.

Appendix A

CANTEST Analytical Results

CANTEST Ltd. 3650 Wesbrook Mall, Vancouver, BC Canada V6S 2L2 Tel: 604 224 4331 Fax: 604 224 0540 www.cantest.com

Miramar Mining Corp., Doris North Detoxification Samples, 13-Jun-07

Table 1: Results on Filtered Treated, Filtered Barren & Composite of Treated Slurry Supernatant & Filtered Treated Sample - July 2007

Parameter	Units	Method	Detection Limit	Filtered Treated Sample	Treated Slurry Supernatant + Filtered Treated Sample	Filtered Barren Sample	Filtered Barren 0.45um Filtered Sample 26-Jun-07
pH	pH Units	Meter	1	6.9	7.6	10.5	10.6
Alkalinity	mgCaCO3/L	Titration	1	-	88.5	-	-
Sulphate	mg/L	Turbidimetry	1	-	2533	1724	1647
Total Phosphate	mg/L as P	Colorimetry	0.02	-	0.07*	-	0.04
Total Dissolved Phosphorous	mgP/L	Colorimetry	0.02	-	< 0.02	-	-
Total Dissolved Solids	mg/L	Gravimetry	10	-	3310	5560	5820
Total Ammonia	mgN/L	Colorimetry	0.01	-	2.46	-	-
Total Cyanide	BC Std Methods	mg/L	0.01/0.002	-	0.046	-	-
WAD Cyanide	BC Std Methods	mg/L	0.01/0.002	-	0.031	-	-
Cyanate (CNO)	BC Std Methods	mg/L	1	-	3.54	-	-
Thio Cyanate (SCN)	BC Std Methods	mg/L	0.02	-	0.323	-	-
Chloride	IC	mg/L	0.5	-	54	-	-
Nitrate (NO3-N)	IC	mg/L	0.05	-	1.35	-	-
Nitrite (NO2-N)	Colorimetry	mg/L	0.002	-	0.006	-	-
Total Organic Carbon	BC Std Methods	mg/L	1	-	2.2	-	-
Total Dissolved Organic Carbon	BC Std Methods	mg/L	1	-	2.1	-	-
Hardness CaCO3	mg/L	Calculation from Mg/Ca	0.2 (for total or diss. metals	125	1120	39	14
Dissolved Metals (Cantest)							
Dillution				**x5**	**x5**	**x5**	**x5**
Dissolved Aluminum Al	mg/L	ICP-MS	0.005	0.047	0.008	0.074	0.051
Dissolved Antimony Sb	mg/L	ICP-MS	0.001	< 0.001	0.003	0.025	0.026
Dissolved Arsenic As	mg/L	ICP-MS	0.001	0.002	0.007	0.096	0.09
Dissolved Barium Ba	mg/L	ICP-MS	0.001	0.042	0.019	0.003	0.003
Dissolved Beryllium Be	mg/L	ICP-MS	0.001	< 0.001	< 0.001	<0.001	<0.001
Dissolved Bismuth Bi	mg/L	ICP-MS	0.001	< 0.001	< 0.001	<0.001	<0.001
Dissolved Boron B	mg/L	ICP-MS	0.05	0.06	< 0.05	<0.05	<0.05
Dissolved Cadmium Cd	mg/L	ICP-MS	0.0002	< 0.0002	< 0.0002	0.011	0.0034
Dissolved Calcium Ca	mg/L	ICP-MS	0.05	31.7	398	9.65	5.53
Dissolved Chromium Cr	mg/L	ICP-MS	0.001	< 0.001	< 0.001	0.021	0.02
Dissolved Cobalt Co	mg/L	ICP-MS	0.001	< 0.001	0.005	1.01	0.99
Dissolved Copper Cu	mg/L	ICP-MS	0.001	0.55	0.39	86.7	81.4
Dissolved Iron Fe	mg/L	ICP-MS	0.05	0.36	0.09	55.5	51.7
Dissolved Lead Pb	mg/L	ICP-MS	0.001	0.002	< 0.001	<0.001	<0.001
Dissolved Lithium Li	mg/L	ICP-MS	0.005	< 0.005	< 0.005	<0.005	<0.005
Dissolved Magnesium Mg	mg/L	ICP-MS	0.05	11	30.4	0.32	0.31
Dissolved Manganese Mn	mg/L	ICP-MS	0.001	0.015	0.76	0.45	0.29
Dissolved Molybdenum Mo	mg/L	ICP-MS	0.0005	0.0021	0.054	0.815	0.787
Dissolved Nickel Ni	mg/L	ICP-MS	0.001	0.003	0.016	0.36	0.36
Dissolved Phosphorus P	mg/L	ICP-MS	0.15	0.2	< 0.15	<0.15	<0.15
Dissolved Potassium K	mg/L	ICP-MS	0.15	3.2	2.6	87.4	86.6
Dissolved Selenium Se	mg/L	ICP-MS	0.001	< 0.001	0.003	0.018	0.016
Dissolved Silicon Si	mg/L	ICP-MS	0.15	4.3	5.1	10.8	11
Dissolved Silver Ag	mg/L	ICP-MS	0.00025	0.0003	< 0.00025	0.14	0.137
Dissolved Sodium Na	mg/L	ICP-MS	0.25	1040	528	2210	2090
Dissolved Strontium Sr	mg/L	ICP-MS	0.001	0.14	0.34	0.022	0.02
Dissolved Tellurium Te	mg/L	ICP-MS	0.001	< 0.001	< 0.001	<0.001	<0.001
Dissolved Thallium Tl	mg/L	ICP-MS	0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001
Dissolved Thorium Th	mg/L	ICP-MS	0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005
Dissolved Tin Sn	mg/L	ICP-MS	0.001	0.002	< 0.001	<0.001	<0.001
Dissolved Titanium Ti	mg/L	ICP-MS	0.001	< 0.001	< 0.001	<0.001	<0.001
Dissolved Uranium U	mg/L	ICP-MS	0.0005	< 0.0005	0.0007	<0.0005	<0.0005
Dissolved Vanadium V	mg/L	ICP-MS	0.001	< 0.001	< 0.001	0.03	0.032
Dissolved Zinc Zn	mg/L	ICP-MS	0.005	0.075	0.016	2.36	0.39
Dissolved Zirconium Zr	mg/L	ICP-MS	0.01	< 0.01	< 0.01	<0.01	<0.01
Dissolved Mercury Hg	ug/L	CVAF	0.02	< 0.02	< 0.02	1.26	1.2

*Unfiltered sample from
Treated Slurry was combined
with Filtered Barren Sample
(as rec'd by us).

Table 2: Results on Ageing Test on Treated Slurry - June 2007

Parameter	Units	Method	Detection Limit	Treated Slurry - Supernatant 14-Jun-07; Day 0	Treated Slurry- Supernatant 27-Jun-07; Day 13	Treated Slurry- Supernatant 27-Jun-07; Day 13 (Duplicate)
pH	pH Units	Meter	1	7.3	6.79	-
Conductivity	us/cm	Meter	1	-	3070	-
Alkalinity	mgCaCO3/L	Titration	1	-	-	-
Sulphate	mg/L	Turbidimetry	1	-	2190	-
Total Phosphate	mg/L as P	Colorimetry	0.02	0.06	< 0.02	-
Total Dissolved Phosphorous	mgP/L	Colorimetry	0.02	-	-	-
Total Dissolved Solids	mg/L	Gravimetry	10	-	-	-
Total Ammonia	mgN/L	Colorimetry	0.01	0.84	2.43	-
Total Cyanide	BC Std Methods	mg/L	0.01/0.002	-	-	-
WAD Cyanide	BC Std Methods	mg/L	0.01/0.002	-	-	-
Cyanate (CNO)	BC Std Methods	mg/L	1	-	-	-
Thio Cyanate (SCN)	BC Std Methods	mg/L	0.02	-	-	-
Chloride	IC	mg/L	0.5	-	24.5	-
Nitrate (NO3-N)	IC	mg/L	0.05	-	2.47	-
Nitrite (NO2-N)	Colorimetry	mg/L	0.002	-	<0.002	-
Total Organic Carbon	BC Std Methods	mg/L	1	-	-	-
Total Dissolved Organic Carbon	BC Std Methods	mg/L	1	-	-	-
Hardness CaCO3	mg/L	Calculation from Mg/Ca	0.2 (for total or diss. metals	1690	1630	-
Dissolved Metals (Cantest)						
Dillution				**x1**	**x1**	**x5**
Dissolved Aluminum Al	mg/L	ICP-MS	0.005	< 0.005	0.029	0.035
Dissolved Antimony Sb	mg/L	ICP-MS	0.001	0.004	0.0017	0.002
Dissolved Arsenic As	mg/L	ICP-MS	0.001	0.004	0.0023	0.002
Dissolved Barium Ba	mg/L	ICP-MS	0.001	0.029	0.0077	0.009
Dissolved Beryllium Be	mg/L	ICP-MS	0.001	< 0.001	<0.0002	< 0.001
Dissolved Bismuth Bi	mg/L	ICP-MS	0.001	< 0.001	<0.0002	< 0.001
Dissolved Boron B	mg/L	ICP-MS	0.05	< 0.05	<0.01	< 0.05
Dissolved Cadmium Cd	mg/L	ICP-MS	0.0002	< 0.0002	<0.00004	< 0.0002
Dissolved Calcium Ca	mg/L	ICP-MS	0.05	524	615	464
Dissolved Chromium Cr	mg/L	ICP-MS	0.001	< 0.001	0.0007	< 0.001
Dissolved Cobalt Co	mg/L	ICP-MS	0.001	0.012	0.013	0.012
Dissolved Copper Cu	mg/L	ICP-MS	0.001	0.77	1.14	1.14
Dissolved Iron Fe	mg/L	ICP-MS	0.05	< 0.05	0.57	< 0.05
Dissolved Lead Pb	mg/L	ICP-MS	0.001	< 0.001	<0.0002	< 0.001
Dissolved Lithium Li	mg/L	ICP-MS	0.001	0.013	0.002	< 0.005
Dissolved Magnesium Mg	mg/L	ICP-MS	0.05	91.8	21.4	17.4
Dissolved Manganese Mn	mg/L	ICP-MS	0.001	1.18	0.038	0.033
Dissolved Molybdenum Mo	mg/L	ICP-MS	0.0005	0.145	0.083	0.078
Dissolved Nickel Ni	mg/L	ICP-MS	0.001	0.013	0.0012	0.001
Dissolved Phosphorus P	mg/L	ICP-MS	0.15	< 0.15	<0.03	< 0.15
Dissolved Potassium K	mg/L	ICP-MS	0.15	6.2	3	2.3
Dissolved Selenium Se	mg/L	ICP-MS	0.001	0.003	0.0037	0.003
Dissolved Silicon Si	mg/L	ICP-MS	0.15	6.7	2.15	1.6
Dissolved Silver Ag	mg/L	ICP-MS	0.00025	0.0008	0.0017	0.0015
Dissolved Sodium Na	mg/L	ICP-MS	0.25	1180	290	246
Dissolved Strontium Sr	mg/L	ICP-MS	0.001	0.72	0.347	0.32
Dissolved Tellurium Te	mg/L	ICP-MS	0.001	< 0.001	<0.0002	< 0.001
Dissolved Thallium Tl	mg/L	ICP-MS	0.0001	< 0.0001	<0.00002	< 0.0001
Dissolved Thorium Th	mg/L	ICP-MS	0.0005	< 0.0005	<0.0001	< 0.0005
Dissolved Tin Sn	mg/L	ICP-MS	0.001	< 0.001	<0.0002	< 0.001
Dissolved Titanium Ti	mg/L	ICP-MS	0.001	< 0.001	<0.0002	< 0.001
Dissolved Uranium U	mg/L	ICP-MS	0.0005	0.0017	0.0001	< 0.0005
Dissolved Vanadium V	mg/L	ICP-MS	0.001	< 0.001	<0.0002	< 0.001
Dissolved Zinc Zn	mg/L	ICP-MS	0.005	< 0.005	0.02	0.027
Dissolved Zirconium Zr	mg/L	ICP-MS	0.01	< 0.01	<0.002	< 0.01
Dissolved Mercury Hg	ug/L	CVAF	0.02	< 0.02	<0.02	-

Table 6: Results of Whole Rock Analysis by XRF for 1 Treated Slurry Sample - July 2007

S. No:	Sample ID	SiO2 %	TiO2 %	Al2O3 %	Fe2O3 %	MnO %	MgO %	CaO %	Na2O %	K2O %	P205 %	Ba(F) %	LOI %	Total %
1	Treated Slurry - Solids	71.48	0.27	5.01	8.75	0.07	1.02	3.03	0.42	0.55	0.08	0.01	7.64	98.33
	QA/QC													
-	STD: SY-4	49.83	0.28	20.70	6.13	0.11	0.52	7.99	6.85	1.67	0.13	0.03	4.80	99.04
-	True Value Std SY-4	49.90	0.29	20.69	6.21	0.11	0.54	8.05	7.10	1.66	0.13	0.03	-	-
-	Percent Difference	0.1	3.4	0.0	1.3	0.0	3.7	0.7	3.5	-0.6	0.0	11.8	-	-
	Detection Limits	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-

ANALYTICAL METHODS

Other elements by Li borate fusion/XRF. Where no FeO value shown "Fe2O3" is total Fe as Fe2O3

-Jun-07

Table 3a: ABA Test Results for Treated Slurry Solids - July 2007

S. No:	Sample ID	Paste pH	CO2 (Wt.%)	CaCO3 Equiv. (Kg CaCO3/Tonne)	Total Sulphur (Wt.%)	Sulphate Sulphur (Wt.%)	Sulphide Sulphur* (Wt.%)	Maximum Potential Acidity** (Kg CaCO3/Tonne)	Neutralization Potential (Kg CaCO3/Tonne)	Net Neutralization Potential (Kg CaCO3/Tonne)	Fizz
1	Treated Slurry - Solids	8.0	3.4	78.0	3.96	0.45	3.51	109.7	53.6	-56.1	Moderate
Detection Limits		*0.1*	*0.01*	*0.2*	*0.02*	*0.01*					
CANTEST Method Number		7160	LECO	Calculation	LECO	7410	Calculation	Calculation	7150	Calculation	7150

NP Method Used: Modified ABA Method (Lawrence et al., 1989)

Table 3b: Modified Sobek - Peroxide Siderite Correction for Sobek method Test Results for Treated Slurry Solids - July 2007

S. No:	Sample ID	Paste pH	CO2 (Wt.%)	CaCO3 Equiv. (Kg CaCO3/Tonne)	Total Sulphur (Wt.%)	Sulphate Sulphur (Wt.%)	Sulphide Sulphur* (Wt.%)	Maximum Potential Acidity** (Kg CaCO3/Tonne)	Neutralization Potential (Kg CaCO3/Tonne)	Net Neutralization Potential (Kg CaCO3/Tonne)	Fizz
1	Treated Slurry - Solids	8.0	3.4	78.0	3.96	0.45	3.51	109.7	71.3	-38.4	Moderate
Detection Limits		*0.1*	*0.01*	*0.2*	*0.02*	*0.01*					
CANTEST Method Number		7160	LECO	Calculation	LECO	7410	Calculation	Calculation	7120	Calculation	7120

*Based on difference between total sulphur and sulphate-sulphur
**Based on sulphide-sulphur
Total Sulphur by LECO furnace

Method Used for NP: Modified Sobek - Peroxide Siderite Correction for Sobek method (Skousen 1997).

Table 4a: QA/QC for Paste pH & NP Determination (Treated Slurry Solids) - July 2007

Sample ID	Paste pH (pH Units)	Paste pH (pH Units)
Duplicates - Paste pH		
Treated Slurry -Solids	7.98	8.0
Sample ID	**Neutralization Potential (kgCaCO3/Tonne)**	**Neutralization (kgCaCO3/Tonne)**
Duplicates - NP (Modified ABA NP)		
Treated Slurry -Solids	53.6	53.2
KZK-1 Reference (NP = 59.0)	55.9	-
Duplicates - NP (Modified Sobek-Peroxide Siderite Correction for Sobek method)		
Treated Slurry -Solids	71.3	66.3
KZK-1 Reference (NP = 64.8)	70.0	-

Table 4b: QA/QC for Sulphur Speciation

Sample ID	Sulphur (Wt.%)	Sulphur (Wt.%)
QA/QC - Total Sulphur		
CANTEST Ref. (0.11% S)	0.12	-
STD CSC (4.19% S)	4.15	-
Duplicates - Sulphate-Sulphur		
Treated Slurry	0.45	0.45
CANTEST Ref. (0.27% SO4-S)	0.27	-

Table 4c: QA/QC for CO2 Determination

Sample ID	CO2 (Wt.%)	CO2 (Wt.%)
QA/QC - CO2		
STD CSC (1.50% CO2)	1.47	-

Table 5: Trace Metals Using Aqua Regia Digestion with ICP-MS Finish for 1 Treated Slurry Sample - July 2007

S. No:	Sample ID	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppb	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Hg ppm	Sc ppm	Tl ppm	Ga ppm	Se ppm
1	Treated Slurry - Solids	21.4	1803	7	38	0.9	203	57.2	500	5.6	122.4	<.1	649.6	0.1	11	0.1	1	0.4	10	2	0.017	1	500	0.5	8	0.001	<1	0.23	0.036	0.03	0.9	0.02	2.9	<.1	1	1.9
	QA/QC																																			
-	STANDARD DS7	20.2	104.9	75.7	409	0.9	56.2	9.7	612	2.35	49.3	5.3	61.3	4.8	75	6.6	5.5	4.8	82	0.93	0.08	14	178	1.04	377	0.12	27	0.96	0.08	0.43	3.8	0.21	2.6	4.3	5	4
-	True Value STD DS7	20.92	109	70.6	411	0.89	56	9.7	627	2.39	48.2	4.9	70	4.4	68.7	6.38	5.86	4.51	86	0.93	0.08	12.7	163	1.05	370.3	0.124	38.6	0.959	0.073	0.44	3.8	0.2	2.5	4.19	4.6	3.5
-	Percent Difference	-3.44	-3.76	7.22	-0.49	1.12	0.36	0.00	-2.39	-1.67	2.28	8.16	-12.43	9.09	9.17	3.45	-6.14	6.43	-4.65	0.00	5.00	10.24	9.20	-0.95	1.81	-3.23	-30.05	0.10	9.59	-2.27	0.00	5.00	4.00	2.63	8.70	14.29
-	Detection Limits	0.1	0.1	0.1	1	0.1	0.1	0.1	1	0.01	0.5	0.1	0.5	0.1	1	0.1	0.1	0.1	2	0.01	0.001	1	1	0.01	1	0.001	1	0.01	0.001	0.01	0.1	0.01	0.1	0.1	1	0.5
-	Method	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX

Table 6: Results of Whole Rock Analysis by XRF for 1 Treated Slurry Sample - July 2007

S. No:	Sample ID	SiO2 %	TiO2 %	Al2O3 %	Fe2O3 %	MnO %	MgO %	CaO %	Na2O %	K2O %	P205 %	Ba(F) %	LOI %	Total %
1	Treated Slurry - Solids	71.48	0.27	5.01	8.75	0.07	1.02	3.03	0.42	0.55	0.08	0.01	7.64	98.33
	QA/QC													
-	STD: SY-4	49.83	0.28	20.70	6.13	0.11	0.52	7.99	6.85	1.67	0.13	0.03	4.80	99.04
-	True Value Std SY-4	49.90	0.29	20.69	6.21	0.11	0.54	8.05	7.10	1.66	0.13	0.03	-	-
-	Percent Difference	0.1	3.4	0.0	1.3	0.0	3.7	0.7	3.5	-0.6	0.0	11.8	-	-
	Detection Limits	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-

ANALYTICAL METHODS
Other elements by Li borate fusion/XRF. Where no FeO value shown "Fe2O3" is total Fe as Fe2O3

Table 7: Results of BCMEM Shakeflask Extraction on 1 Treated Slurry Sample - July 2007

Parameter	Units	Method	Detection Limit	Treated Slurry - Solids	Method Blank
pH (24h)	pH Units	Meter	1	7.6	5.7
Conductivity (24h)	µs/cm	Meter	1	2990	0.7
Hardness CaCO3	mg/L	Calculation from Mg/Ca	0.2 (for total or diss. metals	1450	< 1
Dissolved Metals (Cantest)					
Dilution				**x1**	**x1**
Dissolved Aluminum Al	mg/L	ICP-MS	0.005	< 0.005	< 0.005
Dissolved Antimony Sb	mg/L	ICP-MS	0.001	0.002	< 0.001
Dissolved Arsenic As	mg/L	ICP-MS	0.001	0.002	< 0.001
Dissolved Barium Ba	mg/L	ICP-MS	0.001	0.009	< 0.001
Dissolved Beryllium Be	mg/L	ICP-MS	0.001	< 0.001	< 0.001
Dissolved Bismuth Bi	mg/L	ICP-MS	0.001	< 0.001	< 0.001
Dissolved Boron B	mg/L	ICP-MS	0.05	< 0.05	< 0.05
Dissolved Cadmium Cd	mg/L	ICP-MS	0.0002	< 0.0002	< 0.0002
Dissolved Calcium Ca	mg/L	ICP-MS	0.05	550	< 0.05
Dissolved Chromium Cr	mg/L	ICP-MS	0.001	0.004	< 0.001
Dissolved Cobalt Co	mg/L	ICP-MS	0.001	0.043	< 0.001
Dissolved Copper Cu	mg/L	ICP-MS	0.001	0.39	< 0.001
Dissolved Iron Fe	mg/L	ICP-MS	0.05	< 0.05	< 0.05
Dissolved Lead Pb	mg/L	ICP-MS	0.001	< 0.001	< 0.001
Dissolved Lithium Li	mg/L	ICP-MS	0.001	< 0.005	< 0.005
Dissolved Magnesium Mg	mg/L	ICP-MS	0.05	17.4	< 0.05
Dissolved Manganese Mn	mg/L	ICP-MS	0.001	0.16	< 0.001
Dissolved Molybdenum Mo	mg/L	ICP-MS	0.0005	0.055	< 0.0005
Dissolved Nickel Ni	mg/L	ICP-MS	0.001	0.004	< 0.001
Dissolved Phosphorus P	mg/L	ICP-MS	0.15	< 0.15	< 0.15
Dissolved Potassium K	mg/L	ICP-MS	0.15	2.2	< 0.1
Dissolved Selenium Se	mg/L	ICP-MS	0.001	0.003	< 0.001
Dissolved Silicon Si	mg/L	ICP-MS	0.15	2.4	< 0.25
Dissolved Silver Ag	mg/L	ICP-MS	0.00025	0.0009	< 0.00025
Dissolved Sodium Na	mg/L	ICP-MS	0.25	67.2	< 0.05
Dissolved Strontium Sr	mg/L	ICP-MS	0.001	0.3	< 0.001
Dissolved Tellurium Te	mg/L	ICP-MS	0.001	< 0.001	< 0.001
Dissolved Thallium Tl	mg/L	ICP-MS	0.0001	< 0.0001	< 0.0001
Dissolved Thorium Th	mg/L	ICP-MS	0.0005	< 0.0005	< 0.0005
Dissolved Tin Sn	mg/L	ICP-MS	0.001	< 0.001	< 0.001
Dissolved Titanium Ti	mg/L	ICP-MS	0.001	< 0.001	< 0.001
Dissolved Uranium U	mg/L	ICP-MS	0.0005	< 0.0005	< 0.0005
Dissolved Vanadium V	mg/L	ICP-MS	0.001	< 0.001	< 0.001
Dissolved Zinc Zn	mg/L	ICP-MS	0.005	< 0.005	< 0.005
Dissolved Zirconium Zr	mg/L	ICP-MS	0.01	< 0.01	< 0.01
Dissolved Mercury Hg	ug/L	CVAA	0.02	< 0.02	< 0.02

Extraction Method Used: Bottle: Using Rotary Extractor for 24h.
Liquid:Solid Ratio Used = 3:1; 750ml DI H2O:250g Cone Crushed Sample (-6mm).

Table 8: Results of Static NAG on 1 Treated Slurry Sample - July 2007

S. No	Sample ID	NAG pH	NaOH to pH 4.5 (ml)	NaOH to pH 7.0 (ml)	NaOH Conc. (N)	Sample Weight (g)	NAG Acidity pH 4.5 (kg H_2SO_4/tonne)	NAG Acidity pH 7.0 (kg H_2SO_4/tonne)
1	Treated Slurry - Solids	6.60	0.00	0.30	0.1	2.5	0.0	0.6
	QA/QC (Duplicates)							
1	Treated Slurry	6.31	0.00	0.30	0.1	2.5	0.0	0.6

Note:
Initial H2O2 pH : 5.54
Volume of 15% H2O2 used for each test = 250mL.
Solid:Liquid ratio used = 1:100; 2.5g solids:250mL 15% H2O2.
Procedure: Miller et al., May 1998.

Dup = is a repeat of the entire NAG procedure.

CANTEST Ltd. 3650 Wesbrook Mall, Vancouver, BC Canada V6S 2L2 Tel: 604 224 4331 Fax: 604 224 0540 www.cantest.com

Project Name: Doris North Detox Testing
Project Number: 2-21-900

TABLE 9: Results of Sample Analyses

Sample ID		Slurry solids from Ageing Test
CANTEST ID		707130374
Parameter	**Units**	
Total Cyanide	ug/g	193
Cyanide, Weak Acid Dissociable	ug/g	113

Sample Summary

Date Samples Rec'd: 13-Jun-07

Number of Samples: **1) 2 Water Samples**

a) Post Detox Sample (rec'd as 'Filtered Treated Sample'): 495mL.
Note: 60mL from 495mL was used for analysis and saved 435mL for further use.

b) Detox Feed Sample (rec'd as 'Filtered Barren Sample'): 511mL.
Note: 285mL from 511mL was used for analysis and saved 226mL for any further use.

2) 4 x 1L bottles of Post Detox Sample (Slurry samples- rec'd as 'Treated Slurry')
(separated supernatant from solids by vacuum filteration)

a) Supernatant volume from bottle 1 of 4 = 663.29mL.
b) Supernatant volume from bottle 2 of 4 = 655.88mL.
c) Supernatant volume from bottle 3 of 4 = 702.44mL.
d) Supernatant volume from bottle 4 of 4 = 670.14mL.
Total volume of supernatant = 2691.75mL.
Total dry weight of solids = 515g (Note: The samples were oven dried over the week end (16th and 17th of Jun07) at 20-30˚C.

3) 500mL of the supernatant from 2691.75mL was used for the Ageing Test (Note: This test was set up on 14-Jun-07, will be terminated on 13-Jul-07).

4) The balance of the supernatant from 'Treated Slurry' (i.e. 2691.75mL - 500mL = 2191.75mL) was combined with 435mL from the 'Filtered Treated Sample' to make up a total volume of 2626.75mL.
Note: Used 1976.75mL (from 2626.75mL) for various analyses requested and saved 650mL for any further use.

Client Project Name: Doris North Detoxification Test
Sample Prep: Rolled dry solid sample and split 250g for BCMEM-SFE; split and pulverized for the ABA & metals.
Date of analysis: Water Analysis: Samples and analysed on 15-Jun-07 (with 48h TAT for results); BCMEM-SFE = 18-Jun-07; ABA analysis:

Name of Customer:	Miramar Mining Corporation
Contact Person:	Larry Connell
E-mail Address:	lconnell@miramarmining.com
Address:	899 Harbourside Drive, Suite 300 North Vancouver, BC Canada V7P 3S1
Contact No:	604-985-2572 (Direct Line: 604-904-5579; Cell 604-374-4142)
Fax No:	604-980-0731

	Sign:
Report Released by:	Ivy Rajan
Position:	Lab Manager
CANTEST Project No:	2-21-900
Contact No:	604-224-4331 Extn. 230

Appendix B

SRK Memorandum Dated July 18, 2007
Additional Water Quality Modeling

SRK Consulting (Canada) Inc.
Suite 2200 – 1066 West Hastings Street
Vancouver, B.C. V6E 3X2
Canada

vancouver@srk.com
www.srk.com

Tel: 604.681.4196
Fax: 604.687.5532

Memorandum

To:	File	**Date:**	18 July 2007
cc:	Maritz Rykaart, SRK Lawrence Connell, MIRAMAR	**From:**	John Chapman
Subject:	Water License Pre-Hearing Technical Meeting Information Supplement Item #9 – Cyanide Destruction	**Project #:**	SRK007

1 Terms of Reference

In response to the Table of Issues generated during the Doris North Pre-Hearing Technical Meeting held in Cambridge Bay on June 11th and 12th, 2007, and in response to submissions made to the Water Board by the registered interveners, resulting from their technical review of the Doris North Water License Application, this memorandum has been prepared to indicate the potential impacts, if any, on the proposed water management strategy for the Doris North Project Tail Lake Tailings Storage Facility (TSF).

MIRAMAR had commissioned CyPlus to undertaken an assessment of SO_2-Air cyanide destruction testwork as an alternative to the originally proposed Caro's Acid process. At the time of the technical meeting the test results were incomplete. The results have since been received and the water quality results have been input to the overall water and load balance to assess potential changes in Tail Lake water quality and implications with respect to the water management strategy for the Tail Lake TSF. The results are discussed below.

2 Analytical Results

The analytical results from the cyanide destruction test program are shown in Table 1. The last column in the table represents the numerical values that were used as input to the water and load balance calculations. The assumed concentrations represent the maximum values from the two sets of results. Most significant, the copper concentration in these results are about four times higher than that used in the modelling presented in Supporting Document 6 (SD6) of the water licence application document submitted by Miramar.

The results from the water and load balance are discussed in the next section.

Table 1 Summary of Cyanide Destruction Test Results and Assumed Water Quality Modelling Input Concentrations

Parameter	Units	Detection Limit	Treated Slurry Supernatant + Filtered Treated Sample	Treated Slurry - Supernatant 14-Jun-07; Day 0	Model Input Data
pH	pH Units	1	7.6	7.3	7.30
Alkalinity	mgCaCO3/L	1	88.5	-	88.5
Sulphate	mg/L	1	2533	-	2533
Total Phosphate	mg/L as P	0.02	0.07	0.06	0.07
Total Dissolved Phosphorous	mgP/L	0.02	< 0.02	-	0.02
Total Dissolved Solids	mg/L	10	3310	-	3310
Total Ammonia	mgN/L	0.01	2.46	0.84	2.46
Total Cyanide	mg/L	0.01/0.002	0.046	-	0.046
WAD Cyanide	mg/L	0.01/0.002	0.031	-	0.031
Cyanate (CNO)	mg/L	1	3.54	-	3.54
Thio Cyanate (SCN)	mg/L	0.02	0.323	-	0.323
Chloride	mg/L	0.5	54	-	54
Nitrate (NO3-N)	mg/L	0.05	1.35	-	1.35
Nitrite (NO2-N)	mg/L	0.002	0.006	-	0.006
Total Organic Carbon	mg/L	1	2.2	-	2.2
Total Dissolved Organic Carbon	mg/L	1	2.1	-	2.1
Hardness CaCO3	mg/L	0.2	1120	1690	
Dissolved Metals (Cantest)					
Dissolved Aluminum Al	mg/L	0.005	0.008	< 0.005	0.008
Dissolved Antimony Sb	mg/L	0.001	0.003	0.004	0.004
Dissolved Arsenic As	mg/L	0.001	0.007	0.004	0.007
Dissolved Barium Ba	mg/L	0.001	0.019	0.029	0.029
Dissolved Beryllium Be	mg/L	0.001	< 0.001	< 0.001	0.001
Dissolved Bismuth Bi	mg/L	0.001	< 0.001	< 0.001	0.001
Dissolved Boron B	mg/L	0.05	< 0.05	< 0.05	0.05
Dissolved Cadmium Cd	mg/L	0.0002	< 0.0002	< 0.0002	0.0002
Dissolved Calcium Ca	mg/L	0.05	398	524	524
Dissolved Chromium Cr	mg/L	0.001	< 0.001	< 0.001	0.001
Dissolved Cobalt Co	mg/L	0.001	0.005	0.012	0.012
Dissolved Copper Cu	mg/L	0.001	0.39	0.77	0.77
Dissolved Iron Fe	mg/L	0.05	0.09	< 0.05	0.09
Dissolved Lead Pb	mg/L	0.001	< 0.001	< 0.001	0.001
Dissolved Lithium Li	mg/L	0.001	< 0.005	0.013	0.013
Dissolved Magnesium Mg	mg/L	0.05	30.4	91.8	91.8
Dissolved Manganese Mn	mg/L	0.001	0.76	1.18	1.18
Dissolved Molybdenum Mo	mg/L	0.0005	0.054	0.145	0.145
Dissolved Nickel Ni	mg/L	0.001	0.016	0.013	0.016
Dissolved Phosphorus P	mg/L	0.15	< 0.15	< 0.15	0.15
Dissolved Potassium K	mg/L	0.15	2.6	6.2	6.2
Dissolved Selenium Se	mg/L	0.001	0.003	0.003	0.003
Dissolved Silicon Si	mg/L	0.15	5.1	6.7	6.7
Dissolved Silver Ag	mg/L	0.00025	< 0.00025	0.0008	0.0008
Dissolved Sodium Na	mg/L	0.25	528	1180	1180
Dissolved Strontium Sr	mg/L	0.001	0.34	0.72	0.72
Dissolved Tellurium Te	mg/L	0.001	< 0.001	< 0.001	0.001
Dissolved Thallium Tl	mg/L	0.0001	< 0.0001	< 0.0001	0.0001
Dissolved Thorium Th	mg/L	0.0005	< 0.0005	< 0.0005	0.0005
Dissolved Tin Sn	mg/L	0.001	< 0.001	< 0.001	0.001
Dissolved Titanium Ti	mg/L	0.001	< 0.001	< 0.001	0.001
Dissolved Uranium U	mg/L	0.0005	0.0007	0.0017	0.0017
Dissolved Vanadium V	mg/L	0.001	< 0.001	< 0.001	0.001
Dissolved Zinc Zn	mg/L	0.005	0.016	< 0.005	0.016
Dissolved Zirconium Zr	mg/L	0.01	< 0.01	< 0.01	0.01
Dissolved Mercury Hg	ug/L	0.02	< 0.02	< 0.02	0.02

3 Water and Load Balance Model Results

3.1 Approach

The water and load balance calculations were completed for the three base case scenarios as described in SD6 of the water licence application document submitted by Miramar. In all but the input concentrations for the treated cyanide leach bleed stream, the simulations were exactly the same and were as follows:

- Base Case Conditions
- Base Case Low Yield Conditions
- Extreme Dry Initial Conditions

3.2 Results

3.2.1 Base Case Conditions

The results indicate that copper remains the discharge limiting parameter. The anticipated discharge schedule is shown in Figure 1. As shown the discharge rate would peak at about 1.084 million m^3 in Year 2; this is marginally lower than the 1.18 million m^3 indicated in SD6 in the original submission. As before, the discharge rate will equal the inflow rates from Year 5 onwards. Tail Lake will not reach the full supply level (FSL) but would peak at about the same elevation as previously estimated (29.34m compared to 29.33 m). The concentration profiles for selected metals in Tail Lake are shown in Figure 2. Copper is predicted to peak at a concentration of about 9 ug/L compared to the previous estimate of 6 ug/L.

The results for Doris Creek are summarised in Table 2.

Since the discharge strategy will return Tail Lake to the outflow elevation within four years as before, the increased copper concentration in the treated bleed stream will not have any significant impact on the operating strategy for the base case conditions.

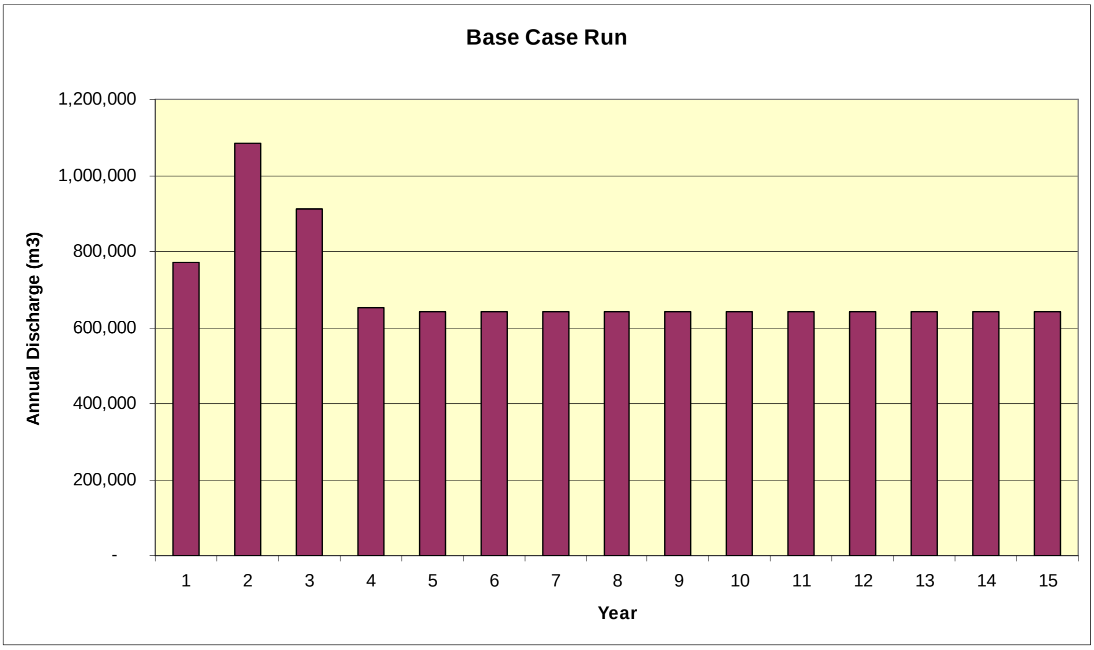

Figure 1 Discharge Schedule for Base Case Conditions

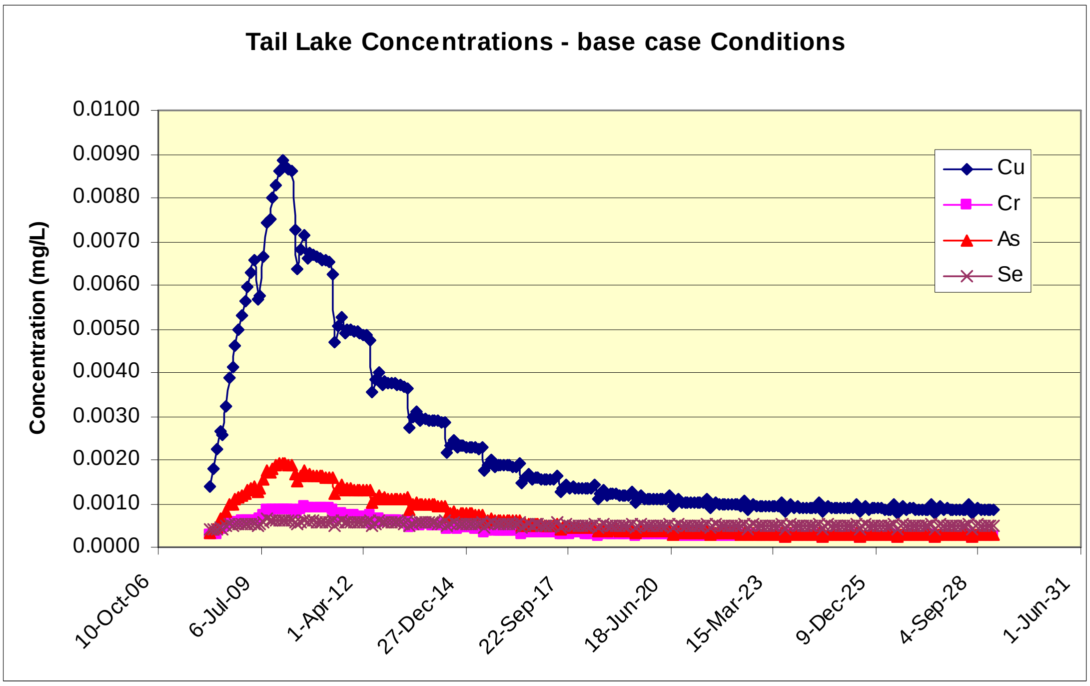

Figure 2 Estimated Metal Concentrations in Tail Lake for Base Case Conditions

Table 2 Summary of Estimated Maximum Concentrations in Tail Lake and Doris Creek for Base Case Conditions

					Maximum in Doris Creek		Doris Creek	
Parameter Max. Concentration	**Units**	**MMER**	**CCME**	**Tail Lake Year 2**	**Upstream**	**Downstream Year 2**	**Above Background %**	**Fraction of CCME (%)**
pH			6 to 9	7 to 8	7.6	7 to 8		
TSS	mg/L	15		2.0	4.0	3.8		
Free CN	mg/L		0.005	0.0005		0.00003		1%
Total CN	mg/L	1.0		0.001	0.001	0.001		
Total Ammonia-N	mg/L		1.27	0.36	0.02	0.034	128%	3%
Nitrate-N	mg/L		2.9	6.4	0.006	0.55	9002%	19%
Nitrite-N	mg/L		0.060	0.27	0.0020	0.019	827%	31%
Total Metals								
Aluminium Al	mg/L		0.1	0.042	0.08	0.0767	0%	77%
Arsenic As	mg/L	0.5	0.005	0.0019	0.00047	0.0005		11%
Cadmium Cd	mg/L		0.000017	0.00006	0.000002	0.000007	245%	44%
Chromium Cr	mg/L		0.001	0.0009	0.0003	0.0003	9%	34%
Copper Cu	mg/L	0.3	0.002	0.009	0.0014	0.0019	24%	89%
Iron Fe	mg/L		0.3	0.11	0.11	0.11	0%	38%
Lead Pb	mg/L	0.2	0.001	0.00035	0.00012	0.00013		13%
Mercury Hg	**ug/L**		0.026	0.0050867	0.0006	0.00089		3%
Molybdenum Mo	mg/L		0.073	0.0069	0.0001	0.00058		1%
Nickel Ni	mg/L	0.5	0.025	0.003	0.001	0.0007		3%
Selenium Se	mg/L		0.001	0.00063	0.0011	0.0011	0%	112%
Silver Ag	mg/L		0.0001	0.00006	0.000001	0.0000065	361%	6%
Thallium Tl	mg/L		0.0008	0.000033	0.000022	0.000022	4%	3%
Zinc Zn	mg/L	0.5	0.03	0.008	0.003	0.0031	9%	10%

Note: Shaded cells exceed CCME Guidelines for the Protection of Freshwater Aquatic Life

3.2.2 Base Case Low Yield Conditions

As for the base case conditions, copper remains the discharge limiting parameter. The anticipated discharge schedule is shown in Figure 3. As shown the discharge rate would peak at about 900,000 million m^3 in Year 2 which is about the same as that indicated in SD6 in the original submission. As before, the discharge rate will equal the inflow rates from Year 5 onwards. Tail Lake will not reach the FSL level but would peak at about the same elevation as previously estimated (~ 29.1 m). The concentration profiles for selected metals in Tail Lake are shown in Figure 4. Copper is predicted to peak at a concentration of about 9.4 ug/L compared to the previous estimate of 7 ug/L.

The results for Doris Creek are summarised in Table 3. As for the base case conditions, the discharge strategy is not impacted by the increased copper concentration.

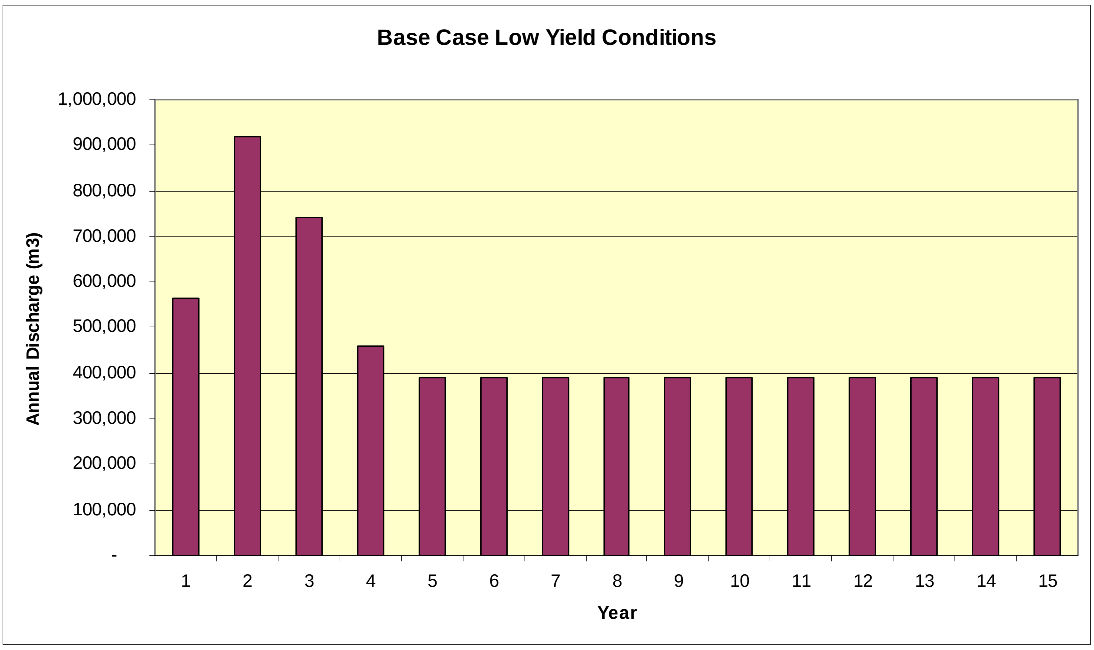

Figure 3 Discharge Schedule for Base Case Low Yield Conditions

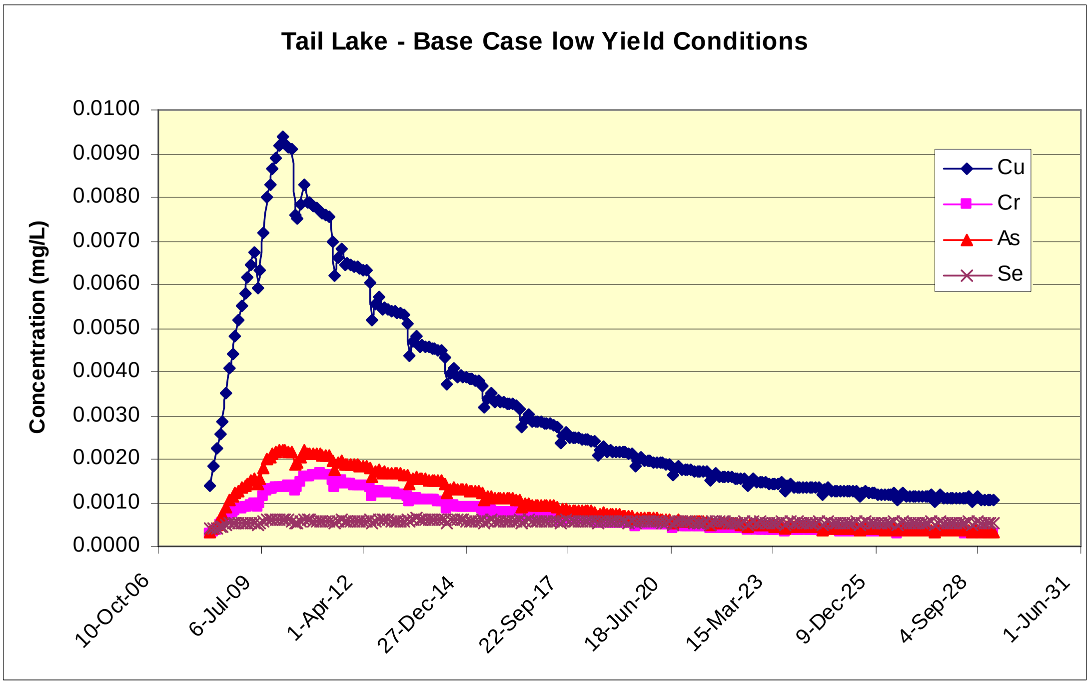

Figure 4 Estimated Metal Concentrations in Tail Lake for Base Case Low Yield Conditions

Table 3 Summary of Estimated Maximum Concentrations in Tail Lake and Doris Creek for Base Case Low Yield Conditions

					Maximum in Doris Creek		Doris Creek	
Parameter Max. Concentration	Units	MMER	CCME	Tail Lake Year 2	Upstream	Downstream Year 3	Increase Above Background %	Fraction of CCME (%)
pH			6 to 9	7 to 8	7.6	7 to 8		
TSS	mg/L	15		2.0	4.0	3.8		
Free CN	mg/L		0.005	0.0005		0.00004		1%
Total CN	mg/L	1.0		0.001	0.001	0.001		
Total Ammonia-N	mg/L		1.27	0.36	0.02	0.045	200%	4%
Nitrate-N	mg/L		2.9	7.1	0.006	0.55	9087%	19%
Nitrite-N	mg/L		0.060	0.27	0.0020	0.025	1151%	42%
Total Metals								
Aluminum Al	mg/L		0.1	0.054	0.08	0.0771	1%	77%
Arsenic As	mg/L	0.5	0.005	0.0022	0.00047	0.0006		12%
Cadmium Cd	mg/L		0.000017	0.00006	0.000002	0.000008	275%	47%
Chromium Cr	mg/L		0.001	0.0017	0.0003	0.000	29%	40%
Copper Cu	mg/L	0.3	0.002	0.009	0.0014	0.0019	33%	95%
Iron Fe	mg/L		0.3	0.12	0.11	0.11	0%	38%
Lead Pb	mg/L	0.2	0.001	0.00049	0.00012	0.00015		15%
Mercury Hg	**ug/L**		0.026	0.0052619	0.0006	0.0009529		4%
Molybdenum Mo	mg/L		0.073	0.0073	0.0001	0.00066		1%
Nickel Ni	mg/L	0.5	0.025	0.004	0.001	0.0008		3%
Selenium Se	mg/L		0.001	0.00063	0.0011	0.0011	0%	113%
Silver Ag	mg/L		0.0001	0.00009	0.00000	0.0000090	545%	9%
Thallium Tl	mg/L		0.0008	0.000034	0.000022	0.000023	5%	3%
Zinc Zn	mg/L	0.5	0.03	0.011	0.003	0.0034	18%	11%

Note: Shaded cells exceed CCME Guidelines for the Protection of Freshwater Aquatic Life

3.2.3 Extreme Dry Initial Conditions

The anticipated schedule for annual discharge from Tail Lake is shown in Figure 5. Consistent with the outcomes presented in SD6, the discharge rate is very much dependent on the average climatic conditions. In the first year, the discharge volume would again be about 300,000 m^3 (but slightly lower than the previous estimate). In Year 2 the discharge would increase to marginally above 800,000 (but again it would be marginally lower than the SD6 estimate). In Year 3 the discharge would decrease to about 180,000 m^3 which is significantly lower than the previous estimate of 250,000 m3. In Year 4; the discharge would increase to about 570,000 m^3 (above the previous estimate of 500,000 m^3), however, it would not completely lower the lake elevation to the outflow elevation. This means that in Year 5, a very small amount of water in excess of the annual inflow would be discharged. For practical purposes it is anticipated that active management could cease in Year 4. The water elevation in Tail Lake would not reach FSL but would peak at about 29.1 m. The concentration profiles for selected metals in Tail Lake are shown in Figure 6. Copper is predicted to peak at a concentration of about 10 ug/L compared to the previous estimate of 7 ug/L.

The results for Doris Creek are summarised in Table 3. The discharge strategy for extreme dry initial conditions may require one additional year of active management beyond that estimated for the baseline conditions.

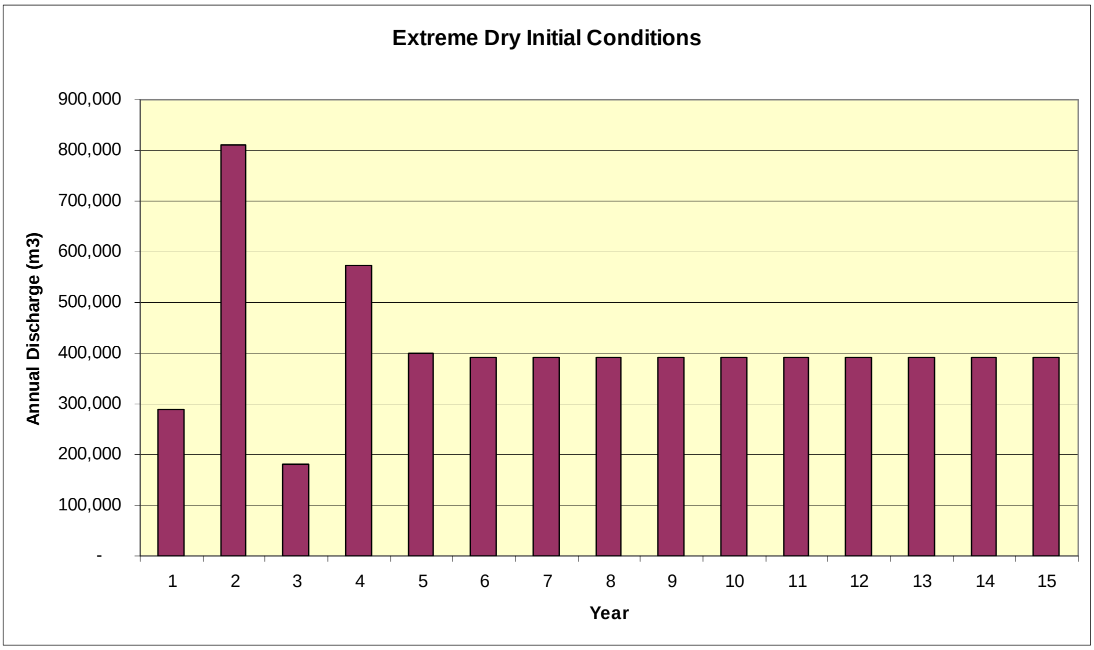

Figure 5 Discharge Schedule for Extreme Dry Initial Conditions

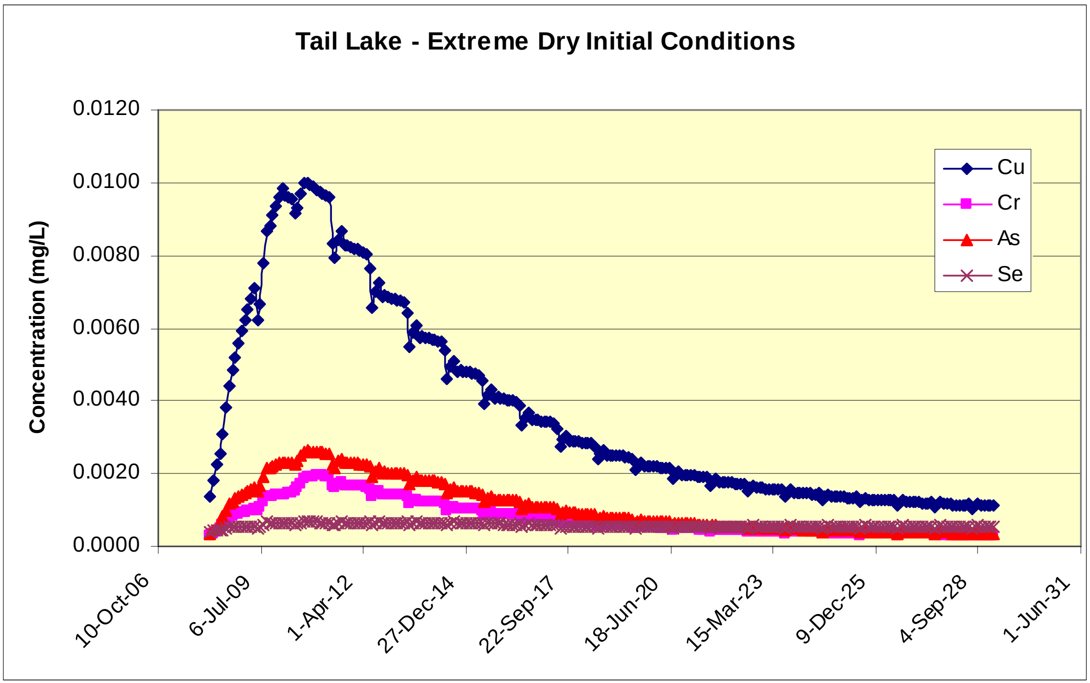

Figure 6 Estimated Metal Concentrations in Tail Lake for Extreme Dry Initial Conditions

4 Summary and Conclusions

The more recent results for the CyPlus cynide destruction tests indicated copper concentrations somewhat higher than previously indicated. These results however appear to have been impacted by a lower than treatment target pH in the samples tested. Optimum performance is expected to yield significantly better results. Nonetheless, water and load balance calculations repeated for the higher copper concentrations indicated that the proposed discharge strategy will remain essentially unchanged for the Base Case and Base Case Low Yield Conditions. The results however indicate that there may be a small risk that, for the extreme dry initial conditions, one additional year of active management beyond that estimated for the baseline conditions may be required.