Bruce J. Donald
Reclamation Manager

March 31, 2004

Prairie & Northern Region
Environment Canada
Room 200, 4999 98th Ave.
Edmonton, AB T6B 2X3

Attention: Peter Blackall, Regional Director of Environmental Protection

Dear Sir;

Re: Polaris Mine – 2003 ANNUAL Metal Mining Effluent Regulations Summary Report

Please find attached a **revised** Polaris Mine annual MMER summary report as the original report submitted January 27, 2004 was not complete and contained errors. There were no non-compliant concentrations related to Schedule 4 limits and no non-compliant results of the acute lethality tests during the year.

The following is included in our revised 2003 Annual Submission:

1. Requirements under Schedule 6
   - Identification of Site, Owner, Location, etc.
   - Non-Compliance information
   - Table 1 – Monthly Mean Concentrations, pH Range and Volume of Effluent
   - Table 2 – Results of Acute Lethality Tests and Daphnia Magna Monitoring Tests

2. Requirements under Part 1 Section 8
   - Results of studies conducted under Part 1, Section 4 (Effluent Characterization)
   - Results of studies conducted under Part 1, Section 5 (Sublethal Toxicity Testing)
   - Part 1, Section 6 Required Frequency of Effluent Characterization
   - Results of studies conducted under Part 1, Section 7 (Water Quality Monitoring)

During 2003, Teck Cominco conducted only one series of sublethal effluent testing in error contrary to the requirements of Part 1, Section 6 of the MMER. The report contains a letter from our consultants explaining the error. Teck Cominco intends to comply with section of the regulations as part of our monitoring program planned for 2004 and 2005.

The monitoring data required to be reported in electronic format has been emailed to you along with an electronic copy of this report (emailed March 31, 2004).

Please note that the location of the final discharge point previously submitted had a typographical error which has been corrected in this report.

If you have any questions regarding the annual report or aspects of the application of the MMER to the Polaris Mine, please feel free to contact me at any time.

Yours truly,

Original signed by B. Donald
Bruce Donald

Attachments: Revised 2003 MMER Annual Report
cc: Walter Kuit (Teck Cominco Limited)
Joe Dahoy (Cascade Management)
Patrick Allard (Azimuth Consulting Group)

SCHEDULE 6

(Section 22)

SCHEDULE 6

(Section 22)

Mine Name : Polaris Mine

Mine Operator: Cominco Mining Partnership and Teck Cominco Ltd.

Mine Address: Box 188, Resolute, NU X0A 0B0

Telephone: (867) 253-2201 (Site Manager, Joe Dahoy)

E-mail: joe.dahoy@teckcominco.com

Location of Final Discharge Point:
Garrow Lake Siphons at 75^0 22' 32" N, 96^0 48' 37" W.

Reporting Period: January 1, 2003 to December 31, 2003

Date of Report: **Revised** March 31, 2003

Non-Compliance Information:

There were no non-compliant effluent discharges during 2003. All effluent sample results were within Schedule 4 limits.

There were no non-compliant acute lethality tests during 2003.

SCHEDULE 6

TABLE 1

MONTHLY MEAN CONCENTRATIONS, pH RANGE AND VOLUME OF EFFLUENT (1)(2)

MONTH	As (mg/L)	Cu (mg/L)	CN (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)	TSS (mg/L)	Ra (Bq/L)	pH	Effluent Volume (m^3)
January	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
February	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
March	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
April	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
May	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
June	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
July	0.000	0.001	0.005	0.006	0.001	0.055	3.00	0.005	7.77 - 7.84	1,555,704
August	0.001	0.001	0.005	0.001	0.002	0.137	4.25	0.005	7.85 - 8.10	2,909,048
September	0.001	0.001	0.005	0.002	0.003	0.165	8.67	0.007	7.94 - 8.06	2,824,710
October	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
November	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
December	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]

Note [1] - "ND" refers to any measurement not taken because there was no deposit from the final discharge point.

Note [2] - "NMR" refers to any measurement not taken because no measurement was required in accordance with the conditions set out in Section 13 of the regulations.

SCHEDULE 6
TABLE 2

RESULTS OF ACUTE LETHALITY TESTS AND DAPHNIA MAGNA MONITORING TESTS

DATE SAMPLE COLLECTED	EFFLUENT ACUTELY LETHAL TO RAINBOW TROUT (Yes or No)	EFFLUENT ACUTELY LETHAL TO DAPHNIA MAGNA (Yes or No)
30-Jul-03	No	No
20-Aug-03	No	No
16-Sep-03	No	No

REQUIREMENTS UNDER SECTION 4 OF PART 1

EFFLUENT CHARACTERIZATION

Monthly Sampling of Effluent in Garrow Creek for EEM

(Lat 75°22'32", Long 96°48'37")

	Conventional Water Chemistry and Water Quality Parameters									
Sample Date	Lab pH	Field pH	Field Temperature	Dissolved Oxygen	Hardness	Alkalinity	Ammonia	Cyanide	Nitrate	TSS
2003-07-29	7.84	7.69	0.30	10.53	459	46	0.08	*0.005*	0.102	*3*
2003-08-19	8.10	8.70	1.22	4.94	1130	103	0.03	*0.005*	0.225	8
2003-09-16	7.96	8.75	0.19	3.95	1540	122	0.04	NA	0.217	5

	Dissolved Metal Concentrations										
Sample Date	Aluminum	Cadmium	Iron	Mercury	Molybdenum	Arsenic	Copper	Lead	Nickel	Zinc	Radium ^{226}
2003-07-29	*0.1*	0.00016	0.02	*0.00005*	*0.002*	*0.0004*	0.00057	0.00319	0.00115	0.0625	*0.005*
2003-08-19	*0.1*	0.00037	0.03	*0.00005*	*0.002*	*0.0010*	0.00097	0.00046	0.00265	0.1460	*0.005*
2003-09-16	*0.1*	0.00047	0.04	*0.00005*	*0.005*	*0.0010*	0.00099	0.00046	0.00365	0.1860	*0.005*

NA - Not Available (no sample).

Note[1] - All concentrations are in mg/L, except pH which is in pH units and temperature which is in °C

Concentrations in *red italics* were set to the detection limit.

POLARIS MINE ANNUAL MMER REPORT

REQUIREMENTS UNDER SECTION 5, PART 1

APPENDIX A

i. Information specified in Schedule 5 of the MMER (June 2002) for Reference Method EPAW 95-EPA West Coast: 7-day Topsmelt Survival and Growth Test.

APPENDIX B

i. Information specified in Schedule 5 of the MMER (June 2002) for Reference Method EPS 1/Rm/27-EC: 92 hr Echinoderm (sand dollar) Fertilization Test (Annual)

APPENDIX C

i. Information specified in Schedule 5 of the MMER (June 2002) for Reference Method EPA/600/4-91-003, Method 1009.0: Algae (*Champia parvula*) 7-day Sublethal Growth Test (Annual).

APPENDIX A

7-d Topsmelt Growth and Survival Toxicity Test

Reporting Requirements for Reference Method EPA/600/R-95/136

Effluent Sample

i. Name & location of operation generating the effluent
   - Polaris Mine, Little Cornwallis Island, Nunavut
   - Final Discharge Point for Garrow Lake is geo referenced as 75° 22' 32" N, 97° 48' 37" W.

ii. Date & time of sampling
   - Samples for yearly sublethal toxicity testing were collected:
     Wednesday August 20, 2003 - 12:30 AM

iii. Type of sample
   - Final effluent water

iv. Brief description of sampling point
   - 20m downstream of the siphon discharge point at Garrow Lake dam

v. Sampling method
   - Water was collected from at least 15cm below the surface using a water pump with silicon tubing
   - Water was collected from the upstream direction
   - The pump was flushed with site water for at least one minute prior to sample collection
   - 4 x 20L sample bottles were filled

vi. Name of person submitting samples
   - Dennis Lu (Gartner Lee)

Test Organisms Imported from External Supplier

i. Species of test organism
   - Topsmelt (*Atherinops affinis*)

ii. Name and city of testing laboratory
   - EVS Environment Consultants, North Vancouver, BC

iii. Source of test species
   - Aquatic Bio Systems (ABS), Fort Collins, Colorado

iv. Date test species acquired on
   - August 21, 2003

v. Indications of deviations from EC guidance on the importation of test organisms
   - No deviations from EC requirements

vi. Percent mortality of fish in 24-hour period preceding the test
   - <10% mortality

vii. Age at start of test
   - 10 days post-hatch

viii. Unusual appearance, behaviour, or treatment of larvae before their use in the test
   - Nothing unusual, no excessive crowding of larvae, larvae appear healthy, disease-free, stress free,

ix. Confirmation that larvae are actively feeding and swimbladders are not inflated
   - Larvae actively feeding and swimbladders not inflated

x. Confirmation that temperature change was <3°C and dissolved oxygen was maintained at >6mg/L during transport
   - Temperature change was <2°C and dissolved oxygen supersaturated mg/L during transport

xi. Test organism acclimation rate at the testing laboratory
   - Holding water conditions upon arrival were DO=supersaturated, pH=7.3, T=22°C
   - Organisms were acclimated slowly overnight
   - Addition of EVS lab seawater at intervals of 30 – 60min to reach acceptable conditions
   - Organisms were acclimated to DO=8mg/L, salinity=28ppt,T=20°C

Reporting Requirements for Reference Method EPA/600/R-95/136

Test Facilities and Conditions

i. Test type & method
   - 7-day Topsmelt (*Atherinops affinis*) Survival and Growth Toxicity Test
   - Static renewal
   - Sample water was renewed daily
   - Reference Method - EPA/600/R-95/136 (EPAW 95-EPA West Coast)

ii. Indications of deviations from requirements in Sections 11 of Method EPA/600/R-95/136 (EPAW 95-EPA West Coast)
   - No deviations from requirements
   - Salinity controls were run
   - Sample water salinity was 5.3ppt

iii. Date and time for start of definitive test
   - Friday August 22, 2003 - 5:00 PM

iv. Test vessel description
   - 600mL beaker

v. Person(s) performing the test and verifying the results
   - Kevin Goodearle, Julianna Kalocai, Sioe Lie Kwee, Rachel DeWynter, Edmund Canaria, and Armando Tang

vi. pH, temperature, dissolved oxygen, and conductivity of unadjusted, undiluted effluent
   - pH - 7.9, T - 20.0°C, DO - 11.0mg/L, C - 9570µmhos/cm, (salinity - 5.3 ppt)

vii. Confirmation that no adjustment of sample or solution pH occurred
   - No pH adjustment

viii. Indication of aeration of test solutions before introduction of fish
   - Pre-aeration at 6.5mL/min/L for 30mins due to supersaturation of sample with O_2 when sample was heated to 20°C
   - DO was reduced from 11.0mg/L to 7.8 mg/L

ix. Indication that EC guidance document for salinity adjustment was followed
   - No deviations from EC guidance document on preparation of hypersaline brine
   - HSB prepared from natural seawater concentrated to 90ppt (by freezing/refreezing to remove frozen layer and concentrate salts)
   - No deviations from EC guidance document for salinity adjustment of sample
   - HSB was added to samples to salinity adjust them from 5.3ppt to 30ppt

x. Type and source of control/dilution water
   - UV-sterilized, 0.45µm-filtered natural seawater from the Vancouver Aquarium

xi. Concentrations and volumes tested
   - Concentrations (% effluent volume / total volume) tested and total volumes used were:
   - Control (0%) - 200 mL
   - Salinity Control (0%) - 200 mL
   - 4.5% - 200mL
   - 9.0% - 200mL
   - 18.1% - 200mL
   - 36.2% - 200mL
   - 72.3% - 200mL

xii. Number of replicated per concentration
   - 5 replicates per concentration

xiii. Number of organisms added to each test vessel
   - 5 fish per vessel

xiv. Manner and rate of exchange of test solutions
   - Daily renewal

Reporting Requirements for Reference Method EPA/600/R-95/136

xv. Measurements of dissolved oxygen, pH and temperature
- DO: 6.6 - 7.8 mg/L, pH: 7.7 - 8.2, T: 19.0 - 20.0 °C, salinity: 29 - 31 ppt

Results

i. Number and % of mortalities of fish in each test solution
- Totals from all 5 replicates are presented:
- Control (0%) - 1/25 = 4%
- Salinity Control - 0/25 = 0%
- 4.5% - 0/25 = 0%
- 9.0% - 0/25 = 0%
- 18.1% - 0/25 = 0%
- 36.2% - 0/25 = 0%
- 72.3% - 1/25 = 4%

ii. Average dry weight per original fish in test vessel
- Means from all 5 replicates are presented:
- Control (0%) - 1.18 mg
- Salinity Control - 1.14 mg
- 4.5% - 1.13 mg
- 9.0% - 1.32 mg
- 18.1% - 1.09 mg
- 36.2% - 1.11 mg
- 72.3% - 1.14 mg

iii. Estimate of 7-d LC_{50} (95% CL)
- 7-d LC_{50} concentration > 72.3% effluent (highest concentration tested due to dilution for salinity adjustment)
- Quantal statistic methods not applicable

iv. Estimate of 7-d IC_{25} (95% CL) for growth
- 7-d IC_{25} concentration > 72.3% effluent (highest concentration tested due to dilution for salinity adjustment)
- Quantal statistic methods not applicable

v. Current reference toxicity tests (95% CL) for 7-d LC_{50} for survival and 7-d IC_{50} for growth
- Reference toxicity tests for Toxicant: Copper
- Test conducted on August 22, 2003, same day as effluent test
- Reference toxicant test was conducted on the same batch of externally supplied topsmelt used in the effluent test and under the same experimental conditions as the effluent test
- 7-d LC_{50} survival = 122mg/L Cu, 95% CL = 111-135mg/L
- 7-d IC_{50} growth = 122mg/L Cu, 95% CL = 106-132mg/L

vi. Reference toxicity warning limits (+/- SD) for 7-d LC_{50} for survival and 7-d IC_{50} for growth
- Reference toxicity tests for Toxicant: Copper
- 7-d LC_{50} survival = 139 ± 63mg/L Cu,
- 7-d IC_{50} growth = 136 ± 52mg/L Cu

APPENDIX B

92-h Echinoderm Fertilization Test

Reporting Requirements for Reference Method EPS1/RM/27-EC 92 (Sperm Cell)

Effluent Sample

i. Name & location of operation generating the effluent
   - Polaris Mine, Little Cornwallis Island, Nunavut
   - Final Discharge Point for Garrow Lake is geo referenced as 75° 22' 32" N, 97° 48' 37" W.

ii. Date & time of sampling
   - Samples for yearly sublethal toxicity testing were collected:
     Wednesday August 20, 2003 - 12:30 AM

iii. Type of sample
   - Final effluent water

iv. Brief description of sampling point
   - 20m downstream of the siphon discharge point at Garrow Lake dam

v. Sampling method
   - Water was collected from at least 15cm below the surface using a water pump with silicon tubing
   - Water was collected from the upstream direction
   - The pump was flushed with site water for at least one minute prior to sample collection
   - 4 x 20L sample bottles were filled

vi. Name of person submitting samples
   - Dennis Lu (Gartner Lee)

Test Organisms

i. Species of test organism
   - Sandollar Echinoid (*Dendraster excentricus*)

ii. Name and city of testing laboratory
   - EVS Environment Consultants, North Vancouver, BC

iii. Source of test species
   - M-REP, Escondido, California
   - All adults providing gametes are from the same population and source
   - Gametes are spawned in-house at EVS

iv. Date test species acquired on
   - August 22, 2003

v. Holding time and conditions for adults
   - Adults received at the testing laboratory the day of the test, shipped overnight

vi. Indications of deviations from EC guidance on the importation of test organisms
   - No deviations from EC requirements

vii. Weekly percent mortality of adults being held over 7d preceding test
   - <2% per day over the 7 days preceding the test

viii. Age of test organisms
   - < 4 hours after spawning

ix. Unusual appearance, behaviour, or treatment of adults or gametes before test start
   - Organisms appear healthy

Test Facilities and Conditions

i. Test type & method
   - Echinoderm (*Dendraster excentricus*) Fertilization Toxicity Test
   - Static
   - Reference Method – EPS/1/RM/27 with 1997 amendments

ii. Test duration
   - 10:10 min (10min sperm + 10min sperm & egg)

iii. Date and time for start of definitive test

Reporting Requirements for Reference Method EPS1/RM/27-EC 92 (Sperm Cell)

- Friday August 22, 2003 - 5:00 PM

iv. Test vessel description
- 16 x 125mm test tubes

v. Person(s) performing the test and verifying the results
- Kevin Goodearle, Julianna Kalocai, Sioe Lie Kwee, Rachel DeWynter, Edmund Canaria, and Armando Tang

vi. Indication of rate and duration of pre-aeration of test solutions before initiation of test
- No pre-aeration

vii. Confirmation that no adjustment of sample or solution pH occurred
- No pH adjustment

viii. Procedure for sample filtration
- No sample filtration

ix. Procedure for preparation of hypersaline brine (HSB) as per EC guidance document on salinity adjustment – July 1997
- No deviations from EC guidance for salinity adjustment

x. Procedure for salinity adjustment as per EC guidance document on salinity adjustment – July 1997
- No deviations from EC guidance for salinity adjustment
- Salinity adjusted from 5ppt to 29ppt

xi. Type and source of control/dilution water
- UV-sterilized, 0.45µm-filtered natural seawater from the Vancouver Aquarium

xii. Concentrations and volumes tested
- Concentrations (% effluent volume / total volume) tested and total volumes used were:
- Control (0%) - 10mL
- Salinity Control (0%) - 10mL
- 4.6% - 10mL
- 9.1% - 10mL
- 18.2% - 10mL
- 36.5% - 10mL
- 73.0% - 10mL

xiii. Number of replicated per concentration
- 4 replicates per treatment concentration

xiv. Number of organisms per container
- 2000 eggs per 10mL vessel

xv. Measurements of pH and dissolved oxygen in sample water before use
- pH - 8.3, DO - 8.4mg/L

xvi. Measurements of pH, temperature, dissolved oxygen, and salinity during test
- pH - 7.9-8.4, T - 15.0-15.5°C, DO - 8.1-8.4mg/L, salinity - 29ppt

Results

i. Number and % of fertilized eggs in each test concentration
- (Number is equal to percent since totals were 100)
- Control (0%): #F = 51, 50, 52, 54 #UF = 49, 50, 49, 46
- Salinity Control: #F = 51, 52, 50, 51 #UF = 49, 48, 50, 49
- 4.6%: #F = 35, 40, 29, 45 #UF = 65, 60, 71, 55
- 9.1%: #F = 36, 28, 33, 25 #UF = 64, 72, 67, 75
- 18.2%: #F = 22, 24, 18, 20 #UF = 78, 78, 82, 80
- 36.5%: #F = 12, 8, 7, 10 #UF = 88, 92, 93, 90
- 73.0%: #F = 1, 0, 2, 0 #UF = 99, 100, 98, 100

Reporting Requirements for Reference Method EPS1/RM/27-EC 92 (Sperm Cell)

ii. Estimate of IC_{25} (95% CL) for fertilization success
- IC_{25} concentration = 3.8 (1.1 - 7.2)% v/v effluent
- Quantal statistic method = log linear interpolation

iii. Current reference toxicity tests (95% CL) for IC_{50} for fertilization
- Reference toxicity tests for Toxicant: Sodium Dodecyl Sulfate
- Test conducted on August 22, 2003, same day as effluent test
- Reference test conducted under same conditions
- IC_{50} for fertilization = 1.3mg/L SDS, 95% CL = 1.1-1.5mg/L

APPENDIX C

7-d Sublethal *Champia* (Algae) Toxicity Test

Reporting Requirements for Reference Method EPA/600/4-91/003 Method 1009.0

Effluent Sample

i. Name & location of operation generating the effluent
   - Polaris Mine, Little Cornwallis Island, Nunavut
   - Final Discharge Point for Garrow Lake is geo referenced as 75° 22' 32" N, 97° 48' 37" W.

ii. Date & time of sampling
   - Samples for yearly sublethal toxicity testing were collected:
     Wednesday August 20, 2003 - 12:30 AM

iii. Type of sample
   - Final effluent water

iv. Brief description of sampling point
   - 20m downstream of the siphon discharge point at Garrow Lake dam

v. Sampling method
   - Water was collected from at least 15cm below the surface using a water pump with silicon tubing
   - Water was collected from the upstream direction
   - The pump was flushed with site water for at least one minute prior to sample collection
   - 1 x 4L sample bottles were filled

vi. Name of person submitting samples
   - Dennis Lu (Gartner Lee)

vii. Temperature of water upon receipt at lab
   - 13°C

Test Organisms

i. Species of test organism
   - Algae (*Champia parvula*)

ii. Name and city of testing laboratory
   - Saskatchewan Research Council [SRC], Saskatoon, SK

iii. Source of test species
   - Sexually mature male and female branches
   - Obtained from USEPA, Hatfield Marine Science Center, Newport Oregon, 1995
   - Appear in good health
   - Females have trichogynes, males have sori with spermatia

Test Facilities and Conditions

i. Test type & method
   - *Champia parvula* sexual reproduction test
   - Static, non-renewal
   - 2-day exposure, followed by 5-7 day recovery period for cystocarp development
   - Reference Method - EPA/600/4-91/003, Method 1009.0

ii. Date and time for start of definitive test
   - Friday August 22, 2003 – 10:00 AM

iii. Test vessel description
   - 270mL transparent polystyrene cups with polystyrene lids

iv. Person(s) performing the test and verifying the results
   - Mary Moody

v. Indication of pre-aeration of test solutions
   - No pre-aeration

vi. Confirmation that no pH adjustment of sample or solution occurred
   - No pH adjustment

Reporting Requirements for Reference Method EPA/600/4-91/003 Method 1009.0

vii. Indication that EC guidance document for salinity adjustment was followed
- No deviations from EC guidance document on preparation of hypersaline brine
- HSB prepared from natural seawater at 90ppt
- No deviations from EC guidance document for salinity adjustment of sample
- Salinity adjustment: 642mL effluent + 258mL HSB + 9mL test nutrient solution
- Salinity of samples adjusted from 5ppt to 30ppt

viii. Type and source of control/dilution water
- Natural seawater collected at the Pacific Environmental Center, Environment Canada, North Vancouver, BC
- Filtered to 0.2µm and autoclaved prior to use
- Salinity adjusted as per EC guidance document to 30ppt with HSB from the same source

ix. Concentrations and volumes of test solutions
- Concentrations (% effluent volume / total volume) tested and total volumes used were:
- Control (Natural Seawater) (0%) - 100mL, 4.5cm depth
- Salinity Control Brine (0%) - 100mL, 4.5cm depth
- 4.5% - 100mL, 4.5cm depth
- 8.9% - 100mL, 4.5cm depth
- 17.8% - 100mL, 4.5cm depth
- 35.6% - 100mL, 4.5cm depth
- 71.3% - 100mL, 4.5cm depth

x. Number of replicated per concentration
- 3 replicates per concentration

xi. Number of organisms per test chamber
- 5 female branches + 2 male branches per chamber

xii. Measurements of pH, temperature, dissolved oxygen, and salinity of sample before use
- pH - 7.93, T - 23.5°C, DO - 9.4mg/L, salinity - 5ppt

xiii. Measurements of pH, temperature, dissolved oxygen, and salinity of sample during test
- DO: 7.8 - 8.0 mg/L, pH: 7.74 - 8.98, T: 23°C, salinity: 30ppt

Results

i. Number and % mortality of female plants after recovery in each test solution
- Totals from all 3 replicates are presented:
- Control (0%): 0 (0%) mortality
- Salinity Control (0%): 0 (0%) mortality
- 4.5%: 0 (0%) mortality
- 8.9%: 0 (0%) mortality
- 17.8%: 0 (0%) mortality
- 35.6%: 0 (0%) mortality
- 71.3%: 0 (0%) mortality

ii. Mean number of cystocarps per plant in each test concentration
- Control (0%): 57.4; 49.6; 44.2
- Salinity Control (0%): 66.4; 44.0; 45.2
- 4.5%: 52.2; 51.4; 57.4
- 8.9%: 61.2; 63.6; 41.2
- 17.8%: 30.4; 34.4; 18.6
- 35.6%: 6.6; 6.0; 7.6
- 71.3%: 0.0; 2.4; 1.4

Reporting Requirements for Reference Method EPA/600/4-91/003 Method 1009.0

iii. Estimate of IC_{25} (95% CL) for cystocarp development
- IC_{25} concentration = 13.6 (9.0-16.0)% effluent v/v
- Quantal statistic method was linear interpolation

iv. Current reference toxicity tests (95% CL) for IC_{50} for cystocarp development
- Reference toxicity tests for Toxicant: Sodium Dodecyl Sulfate
- Test conducted on July 29, 2003, within 30 days of effluent test
- Reference toxicant test was conducted under the same experimental conditions as the effluent test
- IC_{50} cystocarp development = 1.19mg/L SDS, 95% CL = 1.14-1.23mg/L

v. Reference toxicity warning limits (+/- 2SD) for IC_{50} for cystocarp development
- Reference toxicity tests for Toxicant: SDS
- 7-d IC_{50} growth = 1.47 (1.17-1.84) mg/L SDS

REQUIREMENTS UNDER SECTION 6 OF PART 1

SUBLETHAL TOXICITY TESTING FREQUENCY

Azimuth Consulting Group Inc.
218-2902 West Broadway
Vancouver, BC V6K 2G8

Phone: 604-730-1220
Fax: 604-739-8511

Our File #: TC-03-03

March 18, 2004

Sidney F. Bruinsma
Enforcement/Emergencies Officer, Nunavut
Northern Division, Environmental Protection Branch
Environment Canada
Box 1870, Iqaluit
Nunavut X0A 0H0

Dear Mr. Bruinsma:

Re: Polaris Mine EEM – Missed Sublethal Toxicity Test Sampling Event

Further to our recent discussion, we are pleased to document the issues and circumstances surrounding the missed 2003 sampling event for sublethal toxicity testing (SLTT) of effluent at Teck Cominco's Polaris Mine.

First, Azimuth Consulting Group (Azimuth) takes full responsibility for the missed sampling event, which resulted from an oversight on our part. Our staff have considerable experience conducting environmental effects monitoring (EEM) programs under the Pulp and Paper Effluent Regulations (PPER), which have been in place for some years. We understand the importance of the SLTT as an EEM investigative tool and would not knowingly miss a sampling event. The oversight comes from our interpretation of the new Metal Mining Effluent Regulations (MMER) and how they apply to the Polaris Mine, which has a unique discharge situation (i.e., limited to approximately 60 days per calendar year). Under both the PPER and MMER, two sampling events are required for the SLTT. However, if the discharge period is less than 120 days, the PPER require only one sampling event. We mistakenly assumed that these terms would also apply to the MMER, which provide less detail pertaining to the requirements of this test than the PPER. This issue was compounded by the unique discharge characteristics and receiving environment of the Polaris Mine, which make the MMER more difficult to interpret and apply compared to mines discharging under more usual conditions.

We became aware of the missed SLTT event during a December 2003 workshop intended to present results of 2003 reconnaissance studies carried out at the mine and to seek feedback from the Technical Advisory Committee (TAP) on our proposed study design for the Polaris Mine. Following our presentation, Ms. Sandra Blenkinsopp pointed out that two sampling events were indeed required under MMER. She then indicated that Environment Canada would contact us to further discuss the implications of this matter.

We agree that the missed SLTT event is unfortunate and will ensure that this test is carried out twice during the 2004 and 2005 discharge periods.

Please do not hesitate to contact us if you have any questions or require further clarification.

Sincerely,

Azimuth Consulting Group Inc.

Patrick Allard, M.Sc., R.P.Bio.

cc: Randy Baker (Azimuth)
Bruce Donald (Teck Cominco)

REQUIREMENTS UNDER SECTION 7 OF PART 1

WATER QUALITY MONITORING

Monthly Sampling of Exposure Station in Garrow Bay at mouth of Garrow Creek

(Lat 75°22'15", Long 96°48'30")

	Conventional Water Chemistry and Water Quality Parameters									
Sample Date	Lab pH	Field pH	Field Temperature	Dissolved Oxygen	Hardness	Alkalinity	Ammonia	Cyanide	Nitrate	TSS
2003-07-29	7.86	7.75	0.47	10.29	456	46	0.04	*0.005*	0.098	4
2003-08-19	8.13	8.36	1.08	5.01	1120	104	0.03	*0.005*	0.229	8
2003-09-16	7.85	8.38	-0.76	5.45	3620	117	0.03	*0.005*	0.159	10

	Dissolved Metal Concentrations										
Sample Date	Aluminum	Cadmium	Iron	Mercury	Molybdenum	Arsenic	Copper	Lead	Nickel	Zinc	Radium ^{226}
2003-07-29	*0.1*	0.00015	0.03	*0.00005*	*0.002*	*0.0004*	0.00080	0.00435	0.00121	0.0594	*0.005*
2003-08-19	*0.1*	0.00038	0.05	*0.00005*	*0.002*	*0.001*	0.00106	0.00108	0.00304	0.1490	*0.005*
2003-09-16	*0.1*	0.00024	0.03	*0.00005*	0.006	0.001	0.00059	0.00043	0.00169	0.0881	0.005

Note[1] - All concentrations are in mg/L, except pH which is in pH units, Radium ^{226} which is in Bq/L and temperature which is in °C

Concentrations in *red italics* were set to the detection limit.

Monthly Sampling of Reference Station in Garrow Bay (1 km NE of Exposure Station)

(Lat 75°22'40", Long 96°47'12")

	Conventional Water Chemistry and Water Quality Parameters									
Sample Date	Lab pH	Field pH	Field Temperature	Dissolved Oxygen	Hardness	Alkalinity	Ammonia	Cyanide	Nitrate	TSS
2003-07-29	7.67	7.13	-0.27	9.27	989	33	0.03	*0.005*	*0.005*	*3*
2003-08-19	7.87	8.32	0.18	5.50	5830	115	*0.02*	*0.005*	*0.005*	32
2003-09-16	7.78	8.35	-1.36	3.42	5930	113	0.08	*0.005*	*0.005*	9

	Dissolved Metal Concentrations										
Sample Date	Aluminum	Cadmium	Iron	Mercury	Molybdenum	Arsenic	Copper	Lead	Nickel	Zinc	Radium ^{226}
2003-07-29	*0.1*	*0.00002*	0.01	*0.00005*	*0.002*	*0.0004*	0.00023	0.00032	0.00021	0.0010	*0.005*
2003-08-19	*0.1*	0.00003	*0.01*	*0.00005*	0.010	0.0020	0.00044	0.00021	0.00033	0.0007	*0.005*
2003-09-16	*0.1*	0.00003	0.02	*0.00005*	0.011	*0.0010*	0.00028	0.00052	0.00026	0.0011	*0.005*

Note[1] - All concentrations are in mg/L, except pH which is in pH units, Radium ^{226} which is in Bq/L and temperature which is in ^{o}C

Concentrations in *red italics* were set to the detection limit.