Mackenzie Valley Land and Water Board
7th Floor - 4910 50th Avenue • P.O. Box 2130
YELLOWKNIFE, NT X1A 2P6
Phone (867) 669-0506 • FAX (867) 873-6610

May 20, 2005 File: MV2004L8-0001

Mr. David Livingstone
Director Renewable Resources and Environment
Department of Indian and Northern Affairs Canada
Contaminants and Remediation Directorate
NWT Region
P.O. Box 1500
Yellowknife, NT X1A 2R3 Fax: (867) 669-2721

Dear Mr. Livingstone:

**ISSUANCE OF A TYPE "A" WATER LICENSE**

Attached is Water License No. MV2004L8-0001 granted by the Mackenzie Valley Land and Water Board (MVLWB) in accordance with the *Northwest Territories Waters Act*. A copy of this License has been filed in the Public Registry at the office of the MVLWB. The MVLWB approved Water License MV2004L8-0001 for a period of five (5) years commencing February 25, 2005 and expiring February 24, 2010.

Attached are general procedures for the administration of licenses in the Northwest Territories. The MVLWB requests that you review these and address any questions to the MVLWB office.

Please be advised that this letter, with attached procedures, all inspection reports, and correspondence related thereto, are part of the Public Registry, and are intended to keep all interested parties informed of the manner in which the License requirements are being met. All Public Registry material will be considered if an amendment to the License is requested.

The full cooperation of the Department of Indian and Northern Affairs Canada, Contaminants and Remediation Directorate, is anticipated and appreciated.

Yours sincerely,

Todd Burlingame
Chair

Attachments

Copy to: Ed Hornby, South Mackenzie District, DIAND, Yellowknife
Kathleen Racher, Water Resources Division, DIAND
Adrian Paradis, Regulatory Officer, MVLWB
Distribution List of Reviewers

## GENERAL PROCEDURES FOR THE ADMINISTRATION OF LICENSES ISSUED UNDER THE NORTHWEST TERRITORIES WATERS ACT IN THE NORTHWEST TERRITORIES

1. At the time of issuance, a copy of the License is placed on the Public Registry in the office of the Mackenzie Valley Land and Water Board in Yellowknife, and is then available to the public.

2. To enforce the terms and conditions of the License, the Minister of Indian Affairs and Northern Development has appointed Inspectors in accordance with section 35(1) of the *Northwest Territories Waters Act*. The Inspectors coordinate their activities with staff of the Mackenzie Valley Land and Water Board. The Inspector responsible for License MV2004L8-0001 is located in the Yellowknife, NT.

3. To keep the Mackenzie Valley Land and Water Board and members of the public informed of the Licensee's conformity to License conditions, the Inspectors prepare reports which detail observations on how each item in the License has been met. These reports are forwarded to the Licensee with a covering letter indicating what action, if any, should be taken. The inspection reports and covering letters are placed on the Public Registry, as are any responses received from the Licensee pertaining to the inspection reports. It is therefore of prime importance that you react in all areas of concern regarding all inspection reports so that these concerns may be clarified.

4. It is the responsibility of the Licensee to apply to the Mackenzie Valley Land and Water Board for a new License. The past performance of the Licensee, new documentation and information, and points raised during a public hearing, if required, will be used to determine the terms and conditions of any new License. Please note that if the License expires and another has not been issued, then water and waste disposal must cease, or you, the Licensee, would be in contravention of the *Northwest Territories Waters Act.* It is suggested that an application for a new License be made at least eight (8) months in advance of the License expiry date.

5. If, for some reason, License MV2004L8-0001 requires amendment, then a public hearing may be required. You are reminded that applications for amendments should be submitted as soon as possible to provide the Mackenzie Valley Land and Water Board with ample time to go through the amendment process. The process may take up to six (6) months or more depending on the scope of the amendment requested.

6. Specific clauses of your License make reference to the Board, Analyst or

Inspector. The contact person, address, phone and fax number of each is:

**Mackenzie Valley Land and Water Board:**

Public Registry Clerk
Mackenzie Valley Land and Water Board
P.O. Box 2130
4910 50th Avenue, 7th Floor
YELLOWKNIFE, NT XIA 2P6
Phone: (867) 669-0506
Fax: (867) 873-6610

**Analyst:**

Analyst
Water Laboratory
Department of Indian Affairs and Northern Development
P.O. Box 1500
4601- 52nd Avenue
YELLOWKNIFE, NT XIA 2R3
Phone: (867) 669-2780
Fax: (867) 669-2718

**Inspector:**

Water Resources Officer
South Mackenzie District
Department of Indian Affairs and Northern Development
140 Bristol Avenue
YELLOWKNIFE, NT X1A 3T2
Phone: (867) 669-2768
Fax: (867) 669-2720

# MACKENZIE VALLEY LAND AND WATER BOARD
# WATER LICENSE

Pursuant to the *Mackenzie Valley Resource Management Act* and Regulations, the Mackenzie Valley Land and Water Board, hereinafter referred to as the Board, hereby grants to:

Contaminants and Remediation Directorate, DIAND – NT Region
(Licensee)

of P.O. Box 1500, Yellowknife, NT, X1A 2R3
(Mailing Address)

Hereinafter called the Licensee, the right to alter, divert or otherwise use water subject to the restrictions and conditions contained in the *Northwest Territories Waters Act* and Regulations made thereunder and subject to and in accordance with the conditions specified in this License.

| | |
|---|---|
| License Number: | MV2004L8-0001 |
| License Type: | A |
| Water Management Area: | Northwest Territories 01 |
| Location: | Colomac Mine Site at Baton Lake near Indin Lake, Northwest Territories Latitude 64° 25' N and Longitude 115° 05'W |
| Purpose: | Water Use and Waste Disposal |
| Description: | Remediation and Reclamation of the abandoned gold mining and milling operations at Discovery Mine Site |
| Quantity of water **not to be exceeded**: | 15 000 /$m^3$ annually |
| Effective Date of License: | February 25, 2005 |
| Expiry Date of License: | February 24, 2010 |

This License issued and recorded at Yellowknife includes and is subject to the annexed conditions.

**MACKENZIE VALLEY LAND AND WATER BOARD**

**Witness** **Chair**

**APPROVED BY**

**Minister of Indian Affairs and Northern Development**

## PART A: SCOPE AND DEFINITIONS

### 1. Scope

This License entitles the Contaminants and Remediation Directorate, Department of Indian Affairs and Northern Development – NT Region, to use water and dispose of waste for the long-term water management activities associated with the Remediation and Reclamation of the abandoned mining and milling operations at the Colomac Mine, located at Baton Lake near Indin Lake, Northwest Territories (Latitude 64° 25' N and Longitude 115° 05' W); the abandoned exploration activities at the Kim-Cass properties located at Hewitt Lake near Lex Lake, Northwest Territories (Latitude 64° 18' N and Longitude 115° 18' W) and the access road connecting said properties.

This License is issued subject to the conditions contained herein with respect to the taking of water and the depositing of waste of any type in any waters or in any place under any conditions where such waste or any other waste that results from the deposits of such waste may enter any waters. Whenever new Regulations are made or existing Regulations are amended by the Governor in Council under the *Northwest Territories Waters Act*, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited, this License shall be deemed, upon promulgation of such Regulations, to be automatically amended to conform with such Regulations.

Compliance with the terms and conditions of this License does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

### 2. Definitions

In this License: **MV2004L8-0001**

**"Act"** means the *Northwest Territories Waters Act;*

**"Analyst"** means an Analyst designated by the Minister under section 35(1) of the *Northwest Territories Waters Act*;

**"Average Concentration"** means the moving average of any four (4) consecutive analytical results, or less than four (4) analytical results if collected during a batch decant, submitted to the Board in accordance with the sampling and analysis requirements specified in the "Surveillance Network Program". The following is an example to illustrate the procedures for calculating the average:

| | |
|---|---|
| Sample 1 | 0.15 |
| Sample 2 | 0.12 |
| Sample 3 | 0.10 |
| Sample 4 | 0.18 |

Moving Average = (0.15+0.12+0.10+0.18)/4=0.137

Sample 5 0.20
Moving Average = (0.12+0.10+0.18+0.20)/4=0.150
Sample 6 0.16
Moving Average = (0.10+0.18+0.20+0.16)/4=0.160;

"**Board**" means the Mackenzie Valley Land and Water Board established under Part 4 of the *Mackenzie Valley Resource Management Act*;

"**Colomac Remediation Plan**" means the document entitled "*Colomac Site Remediation Plan - Final Report*" dated March 2004 and prepared by the Contaminated Sites Office (CSO), including all supporting documents submitted with the Plan and filed with the Board at that time, as well as the supplemental information submitted by the CSO in the August 9, 2004, letter consisting of: notes from community consultation (Lafferty report, May 2004); baseline environmental conditions in North Pond and L-Shaped Lake (Rescan report); risk assessment of candidate effluent quality criteria for Tailings Lake discharge (SENES report); and evaluation of candidate effluent quality criteria (MESL report);

"**Discharge**" means the controlled release of any water or waste to the Receiving Environment;

"**Dam 1b**" means the proposed Dam as outlined on page 163 of the *Colomac Site Remediation Plan Final Report* and supporting document K1;

"**Decanting**" means the partial removal of water from the epilimnion of Tailings Lake and the Zone 2.0 Pit;

"**Diversion Ditches**" means the engineered structures designed to divert water away from the Tailings Containment Area as defined in the Colomac Site Remediation Plan Final Report figure 3.3;

"**Effluent Quality Criteria**" means a waste meeting a quality that will be discharged into a Receiving Environment, for this License Effluent Quality Criteria is defined under Part D, Items 3, 4 and 7;

"**Enhanced Natural Removal**" means the in-situ treatment of the contaminated water in Tailings Lake and Zone 2.0 Pit for the purpose of enhancing contaminant removal from the water through natural processes which, during the course of this License, may include: the addition of mono-ammonium phosphate (MAP), lime and biodegradable flocculating agents to the water in Tailings Lake and Zone 2.0 Pit; aeration and mixing of the water in Tailings Lake and Zone 2.0 Pit; and the transfer of contaminated water between the Zone 2.0 Pit and Tailings Lake;

"**Freeboard**" has two (2) definitions depending on the containment structure:

"**Freeboard**" **for the Tailings Containment Area** means the vertical distance between water line and the lowest water containment elevation on a dam or dyke's upstream slope;

"**Freeboard" for the Zone 2.0 Pit** means the vertical distance between the Zone 2.0 Pit water line and the ordinary high water mark of Baton Lake, or as recommended by a qualified Geotechnical Engineer and approved by the Board;

"**Geotechnical Engineer**" means a professional engineer registered with the Association of Professional Engineers, Geologists, and Geophysicists of the Northwest Territories and whose principal field of specialization is the design and construction of earthworks in a permafrost environment;

"**Greywater**" means all liquid wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet wastes;

"**Inspector**" means an Inspector designated by the Minister under section 35(1) of the *Northwest Territories Waters Act*;

"**Licensee**" means the holder of this License;

"**Minewater**" means ground water or any water used in mining that is pumped or flows out of any underground workings or open pit;

"**Minister**" means the Minister of Indian Affairs and Northern Development;

"**Modification**" means an alteration to a physical work that introduces a new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion;

"**Reclamation**" means the process of reconverting disturbed land to its former or other productive uses, including:

1. the removal of equipment or buildings or other structures and appurtenances;
2. the decontamination of buildings or other structures or other appurtenances or land or water; and
3. the stabilization, contouring, maintenance, conditioning or reconstruction of the surface of land;

"**Receiving Environment**" means surface waters, groundwater or lands to which water or waste is discharged or deposited;

"**Rehabilitation**" implies that the land will be returned to a form and productivity that includes a stable ecological state that does not contribute substantially to environmental deterioration and is consistent with surrounding aesthetic values;

"**Regulations**" means Regulations proclaimed pursuant to section 33 of the *Northwest Territories Waters Act*;

"**Remediation**" means the removal, reduction or neutralization of substances, wastes or hazardous materials from a site so as to prevent or minimize any adverse effects

on the environment now or in the future;

"**Restoration**" means the process of restoring site conditions as they were before the land disturbance;

"**Sewage Disposal Facilities**" comprises the area and engineered structures designed to contain sewage located approximately 1.2 km northeast of the camp/mill complex, i.e. the sewage lagoon located at 64° 23' 57.2" N and 115° 03' 97.4" W;

"**Sewage**" means all toilet wastes and greywater;

"**Solid Waste Disposal Facilities**" comprises the areas and associated structures designed to contain solid wastes;

"**Spillway**" means the proposed Spillways at Dam 2 and Dyke 7 as outlined on pages 149 and 156 and shown on figures 5.2, 5.3 and 5.6 of the *Colomac Site Remediation Plan Final Report* and supporting document K2;

"**Sump**" means an excavation intended to collect surface water, groundwater and seepage from the Tailings Containment Area;

"**Tailings Containment Area**" comprises the tailings containment basin(s) consisting of Tailings Lake, Spruce Lake and Fuscum Lake and their associated dams and/or dykes;

"**Tailings**" means material rejected from the mill after the recoverable valuable minerals have been extracted;

"**Tailings Water**" means the supernatant waste contained in Tailings Lake and the Zone 2.0 Pit;

"**Total Phosphorous**" consists of all forms of phosphorus measured in a sample, and includes organic and inorganic forms of both dissolved and particulate phases. These forms are chemically converted to orthophosphate for analysis and reported by the analytical laboratory as "phosphorus." Total Phosphorus should be analyzed using ultra-low detection limits for oligotrophic waters;

"**Waste Rock**" means all unprocessed rock materials, except ore and tailings, which are produced as a result of mining and milling operations;

"**Waste**" means waste as defined by section 2 of the *Northwest Territories Waters Act;*

"**Waters**" mean any waters as defined by section 2 of the *Northwest Territories Waters Act;*

"**Water Supply Facilities**" comprises the area and associated intake infrastructure at Steeves Lake up shore from the oil boom catchment north of the camp;

**"Water Use"** means a use of Water as defined by section 2 of the *Northwest Territories Waters Act* and shall include freshwater from all sources and minewater;

**"Waste Disposal Facilities"** includes all facilities designated for the disposal of waste including, but not limited to: Zone 2.0 Pit; Zone 2.5 Pit; Zone 3.0 Pit; Land Treatment Unit and Tailings Containment Area;

**"Zone 2.0 Pit"** means the largest of the three pits excavated between 1989 and 1997 as shown on figure 3.1 of the *Colomac Site Remediation Final Report;*

## PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report (both hard copy and electronically) with the Board no later than March 31st of the year following the calendar year reported which shall contain the following information:

   a) the monthly and annual quantities in cubic metres of fresh water obtained from all sources;

   b) the monthly and annual quantities in cubic metres of each and all waste discharged;

   c) a summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures;

   d) tabular summaries of all data generated under the "Surveillance Network Program" including a comparison with the discharge criteria and trend analysis if a discharge from Fuscum Lake has occurred; as well as all other data collected for Tailings Lake and the Zone 2.0 Pit;

   e) annual total volumes of seepages from the Tailings Containment Area and seepage to and from the Zone 2.0 Pit;

   f) the results and assessment of the Zone 2.0 Pit groundwater monitoring program as per Part D, Item 9;

   g) a list of all unauthorized discharges;

   h) a summary of any remediation work completed during the year and an outline of any work anticipated for the next year;

   i) a summary of any studies requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned;

   j) any revisions to the Contingency Plan;

   k) any revisions to the approved Remediation Plan;

   l) any other details on water use or waste disposal requested by the Board or an Inspector by November 1st of the year being reported; and

   m) a map depicting all the SNP stations.

2. The Licensee shall comply with the "Surveillance Network Program" annexed to this License, and any amendment to the said "Surveillance Network Program" as may be made from time to time, pursuant to the conditions of this License.

3. The "Surveillance Network Program" and compliance dates specified in the License may be modified at the discretion of the Board.

4. Meters, devices or other such methods used for measuring the volumes of water used and waste discharged shall be installed, operated and maintained by the Licensee to the satisfaction of an Inspector.

5. The Licensee shall, within sixty (60) days of the issuance of this License, post the necessary signs, where possible, to identify the active stations of the "Surveillance Network Program". All postings shall be located and maintained to the satisfaction of an Inspector. Within this timeframe, the submission of a map and GPS coordinates is also required for all active and inactive "Surveillance Network Program" stations.

6. The Licensee shall ensure a copy of this License is maintained at the site of operation at all times.

## PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all fresh water for the camp and associated uses from Steeves Lake and Duck Lake using the Water Supply Facilities or as otherwise approved by the Board.

2. The Licensee may obtain water from Duck Lake to use in testing the tailings line used to pump water between Tailings Lake and the Zone 2.0 Pit.

3. The annual quantity of fresh water used for all purposes shall not exceed 15,000 cubic metres.

4. The water intake hose used on the water pumps shall be equipped with a screen designed to ensure no entrainment or impingement of fish.

## PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Tailings Containment Area and Zone 2.0 Pit shall be operated and maintained to engineering standards such that:

   a) a Freeboard limit of 1.0 m shall be maintained at all times for the Tailings Containment Area, or as otherwise recommended by a Geotechnical Engineer;

   b) a Freeboard limit of 0.5 m shall be maintained for the Zone 2.0 Pit, or as otherwise recommended by a Geotechnical Engineer;

   c) seepage from the Tailings Containment Area is minimized;

d) any seepage that occurs immediately below Dam 1 or Dam 1b is collected and immediately returned to the Tailings Containment Area;

e) erosion of containment structures facilities is addressed immediately;

f) measures are taken to contain the solids fraction of the Mill Tailings (including wind-blown tailings) within the Tailings Containment Area;

g) weekly visual examinations of the dam(s), dam seepage collection sumps, and tailings water transfer line(s) during its use, shall be carried out and records of these examinations shall be kept for review upon the request of an Inspector. More frequent inspections shall be performed at the request of an Inspector; and

h) an inspection of the Tailings Containment Area shall be carried out annually during the summer months by a qualified Geotechnical Engineer registered in the Northwest Territories. The Engineer's inspection report shall be submitted to the Board within sixty (60) days of the inspection, including a covering letter from the Licensee outlining an implementation plan to respond to the Engineer's recommendations.

2. The Licensee shall discharge all Sewage to the Sewage Disposal Facilities and shall maintain the Sewage Disposal Facilities to the satisfaction of an Inspector.

3. All wastes discharged from Surveillance Network Program Station 1563-11 shall not exceed the following effluent quality standards:

| PARAMETER | MAXIMUM AVERAGE CONCENTRATION |
|---|---|
| $BOD_5$ | 30 mg/L |
| Suspended Solids | 35 mg/L |
| Oil & Grease | 5 mg/L |
| Fecal Coliform | 1000 CFU/100 mL |

The Waste discharged shall have a pH between 6.5 and 8.5.

4. All wastes discharged by the Licensee from Fuscum Lake to the receiving environment, namely Surveillance Network Program Station 1563-10, shall meet the following effluent quality requirements:

| PARAMETER | MAXIMUM AVERAGE CONCENTRATION | MAXIMUM CONCENTRATION OF ANY GRAB SAMPLE |
|---|---|---|
| Total Arsenic | | 0.1 mg/L |
| Total Copper | | 0.1 mg/L |
| Total Cyanide | | 0.48 mg/L |
| Weak Acid Dissociable (WAD) Cyanide | | 0.16 mg/L |
| Total Lead | | 0.014 mg/L |
| Total Nickel | | 0.3 mg/L |

| PARAMETER | MAXIMUM AVERAGE CONCENTRATION | MAXIMUM CONCENTRATION OF ANY GRAB SAMPLE |
|---|---|---|
| Total Zinc | | 0.06 mg/L |
| Total Ammonia | 5.0 mg/L | 10 mg/L |
| Total Suspended Solids | 20 mg/L | 40 mg/L |

The Waste discharged shall have a pH between 6.5 and 8.5 and no visible sheen of oil and grease.

5. If the water quality of Fuscum Lake meets the discharge criteria identified in Part D Item 4, water discharged from Fuscum Lake shall be directed to the Cone-Heart-Steeves Lake wetland system, via a diffuser over a large area of the wetland at a rate not exceeding 5,000 $m^3$/day, or as otherwise approved by the Board.

6. The Licensee shall provide five (5) days notice to an Inspector and the Board prior to the commencement of discharge from Fuscum Lake each calendar year. This notification shall also include the water quality results confirming the achievement of discharge criteria, as well as a site map to scale of the discharge pathway.

7. All wastes discharged by the Licensee from Tailings Lake to the Receiving Environment, namely Surveillance Network Program Station 1563-41, shall meet the following effluent quality requirements:

| PARAMETER | MAXIMUM AVERAGE CONCENTRATION | MAXIMUM CONCENTRATION OF ANY GRAB SAMPLE |
|---|---|---|
| **Conventional Variables** | | |
| Total Suspended Solids | 15 mg/L | 30 mg/L |
| **Nutrients** | | |
| Total Ammonia (as N) | 5.0 mg/L | 10.0 mg/L |
| Nitrite (as N) | 0.4 mg/L | 0.8 mg/L |
| Nitrate (as N) | 5 mg/L | 10 mg/L |
| Total Phosphorous (as P) | 0.22 mg/L | 0.44 mg/L |
| **Metals** | | |
| Total Aluminum | 0.4 mg/L | 0.8 mg/L |
| Total Arsenic | 0.04 mg/L | 0.08 mg/L |
| Total Copper | 0.010 mg/L | 0.020 mg/L |
| Total Lead | 0.010 mg/L | 0.020 mg/L |
| Total Nickel | 0.05 mg/L | 0.10mg/L |
| Total Selenium | 0.005 mg/L | 0.010 mg/L |
| Total Silver | 0.002 mg/L | 0.004 mg/L |
| Total Zinc | 0.020 mg/L | 0.040 mg/L |
| **Cyanide Species** | | |
| Total Cyanide | 0.10 mg/L | 0.20 mg/L |
| Weak Acid Dissociable (WAD) Cyanide | 0.025 mg/L | 0.050 mg/L |

| PARAMETER | MAXIMUM AVERAGE CONCENTRATION | MAXIMUM CONCENTRATION OF ANY GRAB SAMPLE |
|---|---|---|
| Thiocyanate | 3 mg/L | 6 mg/L |

The Waste discharged shall have a pH between 6.5 and 8.5 and no visible sheen

8. Ninety (90) days prior to any discharges from Tailings Lake or from Zone 2.0 Pit to Tailings Lake as a contingency measure, the Licensee shall submit a Discharge Plan that includes: a bathymetric study of L-shaped Lake, describing the lakebed, shoreline profiles; proposed sampling location and mixing zone.

9. The Licensee shall provide five (5) days notice to the Board and an Inspector prior to the commencement of supernatant transfer from the Tailings Containment Area to the Zone 2.0 Pit, or from the Zone 2.0 Pit to Tailings Lake, each calendar year.

10. The Licensee shall annually review the groundwater monitoring program for Zone 2.0 Pit, unless otherwise directed by the Board. Included in the assessment shall be an interpretation of how groundwater monitoring station water elevations correlate to Zone 2.0 Pit water and lake-water elevations (Baton, Steeves, Duck, Spot and Truck Lakes.) The Licensee shall compare annual groundwater quality monitoring program results to the assessment for chemical parameters of concern as stated in the "*Impact Assessment of Colomac Zone 2.0 Pit Seepage on Steeves Lake*", SENES Consultants Limited, April 2001.

11. The Licensee shall implement any revisions to the Groundwater Monitoring Program referred to in Part D, Item 9, as and when approved by the Board.

12. All run-off captured by the Diversion Ditches and directed to the Receiving Environment shall meet the total suspended solids effluent quality limit of Part D, Item 4, including Surveillance Network Program Station 1563-34 and other outflows i.e. Duck Pond. If this is not met, additional sediment control and erosion control measures must be implemented in order to achieve this limit.

13. The Licensee shall collect all seepages from Dam 1 and Dam 1b that do not meet water quality effluent requirements as described in Part D, Item 7 and pump the seepage back into Tailings Lake prior to release into the Receiving Environment.

14. In the event that Enhanced Natural Removal fails to treat the contaminated water contained within either Tailings Lake or Zone 2.0 Pit, the use of any alternative treatment processes, such as those previously assessed in pilot studies, for contaminated water within the Tailings Containment Area and Zone 2.0 Pit will require an amendment to this water license.

15. The Licensee shall collect, intercept, treat and discharge hydrocarbon contaminated water as described in section 5.10.1 of the *Colomac Site Remediation Plan Final Report March 2004* and letter submitted to the Board dated August 30, 2004. Any changes to the approved method as outlined in the *Colomac*

*Site Remediation Plan* will be submitted to the Board for approval.

16. Absorbent material used to collect hydrocarbon seepage shall be disposed of in a manner approved by the Inspector.

17. The Licensee shall treat all hydrocarbon contaminated soil as described in section 5.10.1 of *Colomac Site Remediation Plan Final Report March 2004* and the letter submitted to the Board dated August 30, 2004. Any changes to the approved method of treatment as outlined in the *Colomac Site Remediation Plan* will be submitted to the Board for approval.

18. The Licensee shall submit to the Board, for approval, a minimum of ninety (90) days prior to disposal a Hazardous Waste Management Plan that shall include, but not be limited to the following materials:

    a) Tailings in and around the mill (excluding tailings in the Tailings Containment Area);

    b) waste ore; and

    c) residual cyanide-bearing materials in and around the mill complex.

## PART E: CONDITIONS APPLYING TO MODIFICATIONS

1. The Licensee may, without written approval from the Board, carry out modifications to the Water Supply Facilities, Waste Disposal Facilities, Sewage Disposal Facilities and existing Diversion Ditches provided that such modifications are consistent with the terms of this License and the following requirements are met:

    a) the Licensee has notified the Board in writing of such proposed modifications at least sixty (60) days prior to beginning the modifications;

    b) such modifications do not place the Licensee in contravention of either the License or the *Act*;

    c) the Board has not, during the sixty (60) days following notification of the proposed modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and

    d) the Board has not rejected the proposed modifications.

2. Modifications for which all of the conditions referred to in Part E, Item 1 have not been met may be carried out only with written approval from the Board.

3. The Licensee shall provide to the Board as-built plans and drawings of the modifications referred to in this License within ninety (90) days of completion of the modifications.

## PART F: CONDITIONS APPLYING TO CONTINGENCY PLANNING

1. The Licensee shall submit to the Board for approval any revisions to the approved

Contingency Plan. Any revisions of the approved plan shall be in accordance with the NWT Water Board's "Guidelines for Contingency Planning, January 1987." In addition to conforming to these Guidelines, the plan shall also include contingencies associated with the following items:

a) diversion ditches;

b) water transfer between Tailings Lake and the Zone 2.0 Pit,

c) Fuscum Lake discharge;

d) Enhanced Natural Removal in Tailings Lake and Zone 2.0 Pit and;

e) chemical storage on site.

2. If not approved by the Board, the Contingency Plan referred to in Part F, Item 1 shall be revised and resubmitted within sixty (60) days of receiving notification of the Board's decision.

3. The Licensee shall review the Contingency Plan annually and modify the plan as necessary to reflect changes in operation and technology. Any proposed modifications shall be submitted to the Board for approval.

4. If, during the period of this License, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:

a) employ the appropriate contingency plan;

b) report the incident immediately via the 24 Hour NWT Spill Report Line. Currently the number is (867) 920-8130; and

c) submit to an Inspector, a detailed report on each occurrence not later than thirty (30) days after initially reporting the event.

5. Prior to commencing the Decanting of Zone 2.0 Pit to the Receiving Environment, the Licensee shall submit to the Board for approval, a Decanting Plan for Zone 2.0 Pit that shall include, but not be limited to the following:

a) risk-based Effluent Quality Criteria for the Zone 2.0 Pit water;

b) pumping methods including location(s) of intake and outflow structures;

c) the design of any erosion protection structures in the discharge area; and

d) the frequency, locations and procedures for monitoring flow rates in the discharge stream.

6. Decanting of the Zone 2.0 Pit may commence if the following requirements have been met:

a) the Decanting is consistent with all other terms and conditions of this License;

b) the water quality in Zone 2.0 Pit meets the risk-based discharge criteria established by the Board and the sample results have been provided to the Inspector at least five (5) days prior to the start of Decanting; and

c) the Board has approved the Decanting Plan.

7. Any transfer of water from Zone 2.0 Pit to Tailings Lake shall commence upon written authorization of the Inspector.

## PART G: CONDITIONS APPLYING TO RECLAMATION

1. The Licensee shall complete the Reclamation work within the specified time schedule in the *Colomac Site Remediation Plan*, or as subsequently revised and approved by the Board.

2. The Licensee shall review the *Colomac Site Remediation Plan* annually and shall modify the Plan as necessary to reflect changes in technology, and results of Reclamation and/or other studies. The proposed modifications shall be submitted to the Board as per Part B, Item 1.

3. Upon implementation of the *Colomac Site Remediation Plan*, the Licensee shall provide to the Board updates of all Reclamation activities by March 31st of each year as per Part B, Item 1.

4. The Licensee shall submit to the Board for approval, a minimum of ninety (90) days prior to the demolition of any buildings or equipment, a detailed plan outlining the following:
   a) removal of all potentially hazardous materials associated with any buildings or equipment;
   b) management of contaminated water from mill demolition and cleaning and the proposed effluent quality criteria for this water; and
   c) the management of any other hazardous waste.

## PART H: CONDITIONS APPLYING TO CONSTRUCTION

1. The Licensee shall submit to the Board, a minimum of ninety (90) days prior to the construction of the Spillways, a Final Detailed Design Report stamped by a Geotechnical Engineer. The report shall include but not be limited to the following:
   a) construction drawings and specifications
   b) the results of all geotechnical investigations and design analyses, key monitoring parameters and threshold exceedance values, and detailed plans for inspection;
   c) the frequency, locations and procedures for monitoring flow rates;
   d) relevant studies for the design; and
   e) permafrost analyses.

2. Final as-built drawings of the spillways referred to in Part H, Item 1, including rationale for any changes from the original design, shall be stamped by a Geotechnical Engineer and submitted to the Board within ninety (90) days of

completion of the structure.

3. The Licensee shall submit to the Board, a minimum of ninety (90) days prior to the construction of Dam 1b, a Final Detailed Design Report stamped by a Geotechnical Engineer. The report shall include but not be limited to the following:
   a) construction drawings and specifications;
   b) the results of all geotechnical investigations;
   c) a geothermal analysis of the valley and its impacts on design details;
   d) seepage analyses;
   e) key design and performance parameters for Dam 1b; and
   f) monitoring requirements for Dam 1b stability.

4. Final as-built drawings of Dam 1b referred to in Part H, Item 3, including rationale for any changes from the original design, shall be stamped by a Geotechnical Engineer and submitted to the Board within ninety (90) days of completion of the structure.

5. The Licensee shall submit to the Board, a minimum of ninety (90) days prior to the construction of the Tailings Cap Cover, a Final Detailed Design Report stamped by a Geotechnical Engineer.

6. Final as-built drawings of the Tailings Cap Cover referred to in Part H, Item 5, including rationale for any changes from the original design, shall be stamped by a Geotechnical Engineer and submitted to the Board within ninety (90) days of completion of the cover.

7. The Licensee shall submit to the Board for approval, a minimum of ninety (90) days prior to construction, a Final Detailed Design Report for the Restoration of natural drainages for the outflows of Duck Pond, Truck Lake, and the stream crossings along the Kim-Cass access road. The design shall include details on the Restoration of Truck Lake, including the removal of debris and the Restoration of riparian areas.

8. Final as-built drawings of the drainage Restoration works referred to in Part H, Item 7, including rationale for any changes from the original design, shall be stamped by a Geotechnical Engineer and submitted to the Board within ninety (90) days of completion.

9. The Licensee shall ensure that any other dams, dykes or structures, including extensions to current containment structures adhere to the current edition of the Canadian Dam Safety Association (CDSA) Guidelines.

10. Final as-built drawings of the dams, dykes or structures referred to in Part H, Item 9, including rationale for any changes from the original design, shall be stamped by a Geotechnical Engineer and submitted to the Board within ninety (90) days of completion of the structure.

11. A minimum of ninety (90) days prior to the construction of new Diversion Ditches the Licensee shall submit to the Board for approval, construction drawings and specification for the ditches.

12. Final as-built drawings of the Diversion Ditches referred to in Part H, Item 11, including rationale for any changes from the original design, shall be stamped by a Geotechnical Engineer and submitted to the Board within ninety (90) days of completion of the ditches.

**MACKENZIE VALLEY LAND AND WATER BOARD**

**Witness**

**Chair**

MACKENZIE VALLEY LAND AND WATER BOARD
SURVEILLANCE NETWORK PROGRAM

| | |
|---|---|
| LICENSEE: | Contaminants and Remediation Directorate, Department of Indian and Northern Affairs – NT Region |
| LICENSE NUMBER: | MV2004L8-0001 |
| EFFECTIVE DATE OF LICENSE: | February 12, 2005 |
| EFFECTIVE DATE OF SURVEILLANCE NETWORK PROGRAM (SNP): | February 12, 2005 |

## 1. Surveillance Network Program Description & Sampling Requirements

For the purposes of this water license, the sampling parameters have been grouped into the following categories:

**Cyanide1** = Total Cyanide (TCN);

**Cyanide Suite** = Total Cyanide (TCN), Weak Acid Dissociable Cyanide (WAD CN) Thiocyanate (SCN);

**Dissolved Metals** = Total elemental analysis by ICP-Metal Scan of: Silver (Ag), Arsenic (As), Aluminum (Al), Barium (Ba), Cadmium (Cd), Cobalt (Co), Copper (Cu), Chromium (Cr), Iron (Fe), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Lead (Pb), Selenium (Se), Strontium (Sr) and Zinc (Zn).

**Hydrocarbons** = Extractable Hydrocarbons (ExtHC), and Benzene, Toluene, Ethyl-benzene, and Xylene (BTEX);

**in situ Ecological** = field multiprobe tests at one metre depth intervals for Temperature (T), Conductivity, pH, Redox Potential (Eh), and Dissolved Oxygen;

**Major Ions** = Alkalinity (Alk), Calcium (Ca), Chloride (Cl), Hardness, Magnesium (Mg), Potassium (K), Sodium (Na), and Sulphate ($SO_4$);

**Microbiological =** $BOD_5$, Feacal Coliforms

**Nutrients =** Total Ammonia ($NH_3 + NH_4^+ - N$), Total Nitrate + Nitrite ($NO_3^- + NO_2^-$), Total Phosphorous (TP), Orthophosphate (OP), and Total Organic Carbon (TOC);

**Solids** = Total Suspended Solids (TSS) and Total Dissolved Solids (TDS);

**Standard =** pH, Temperature (T), and Conductivity (Cond). These parameters should

be measured both in the field as well as in the laboratory.

**Total Metals** = Total elemental analysis by ICP-Metal Scan of: Silver (Ag), Arsenic (As), Aluminum (Al), Barium (Ba), Cadmium (Cd), Cobalt (Co), Copper (Cu), Chromium (Cr), Iron (Fe), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Lead (Pb), Selenium (Se), Strontium (Sr) and Zinc (Zn).

Note: If any sampling requirement falls within two (2) required sampling categories, it need only be sampled once.

Note: Where metals are analyzed, hardness must be analyzed as well.

Note: Standard suite must be analyzed for all field samples.

**Surveillance Network Program (SNP) Station 1563-1 (active)**

| | |
|---|---|
| Description: | Freshwater intake from Steeves Lake |
| Location: | 64° 24.610' N 115° 05.834' W |
| Sampling Frequency: | Monthly |
| Sampling Parameters: | Standard, Turbidity, Total Coliform, and E-Coli |
| Rationale: | To determine the potability of Steeves Lake water, the regulation of which falls within the jurisdiction of the Stanton Regional Health Board |

**Surveillance Network Program (SNP) Station 1563-2 (active)**

| | |
|---|---|
| Description: | Outlet from Steeves Lake at the south end |
| Location: | 64° 22.816'N 115° 08.008'W |
| Sampling Frequency: | Quarterly |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, and Total Metals |
| Rationale: | To provide information on water quality of Steeves Lake outflow |

**Surveillance Network Program (SNP) Station 1563-3 (inactive)**

| | |
|---|---|
| Description: | Outlet of Dyke Lake |
| Location: | N/A |
| Sampling Frequency: | N/A |
| Sampling | N/A |

| | |
|---|---|
| Parameters: | |
| Rationale: | Dyke Lake no longer contains water |

**Surveillance Network Program (SNP) Station 1563-4 (active)**

| | |
|---|---|
| Description: | Inlet to Steeves Lake from Truck Lake |
| Location: | 64° 24.221'N 115° 06.215'W |
| Sampling Frequency: | Monthly during periods of open water |
| Sampling Parameters: | Standard, Solids, Major Ions, Total Ammonia (NH3 + NH4+ - N), Nitrate, Total Metals and Hydrocarbons |
| Rationale: | To monitor water quality of Baton-Spot-Truck lake outflow & Steeves Lake |

**Surveillance Network Program (SNP) Station 1563-5 (active)**

| | |
|---|---|
| Description: | Seepage from Tailings Containment Area Dam 1 |
| Location: | 64° 26.437'N 115° 02.893'W |
| Sampling Frequency: | Monthly |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Cyanide Suite, and Total Metals |
| Rationale: | To monitor water quality of Dam 1 seepage |

Note: Flow rates and volume of seepage returned to the Tailings Containment Area shall be monitored daily.

**Surveillance Network Program (SNP) Station 1563-6 (inactive)**

| | |
|---|---|
| Description: | Seepage from Dam 2 |
| Location: | N/A |
| Sampling Frequency: | N/A |
| Sampling Parameters: | N/A |
| Rationale: | Dam 2 is no longer function as a water-containing structure |

**Surveillance Network Program (SNP) Station 1563-7 (inactive)**

| | |
|---|---|
| Description: | Seepage from Dam 3 |
| Location: | N/A |
| Sampling Frequency: | N/A |
| Sampling Parameters: | N/A |
| Rationale: | Dam 3 was never built |

**Surveillance Network Program (SNP) Station 1563-8 (inactive)**

| | |
|---|---|
| Description: | Seepage from Dam 4 |
| Location: | N/A |
| Sampling Frequency: | N/A |
| Sampling Parameters: | N/A |
| Rationale: | Dam 4 was never built |

**Surveillance Network Program (SNP) Station 1563-9 (inactive)**

| | |
|---|---|
| Description: | Seepage from Dam 5 |
| Location: | N/A |
| Sampling Frequency: | N/A |
| Sampling Parameters: | N/A |
| Rationale: | Dam 5 was never built |

**Surveillance Network Program (SNP) Station 1563-10 (active)**

| | |
|---|---|
| Description: | Fuscum Lake at intake, prior to discharge; at end of discharge pipe during periods of discharge. |
| Location: | 64° 25.923'N 115° 03.938'W<br>end of pipe coordinates TBD |
| Sampling Frequency: | Once prior to commencement of discharge; weekly during discharge, or daily if conductivity increases; and once on the last day of discharge |
| Parameters: | Standard, Solids, Major Ions, Nutrients, Cyanide |

| | |
|---|---|
| | Suite, Total Metals, |
| Rationale: | To monitor the degradation of ammonia and determine if water quality is adequate for discharge. Weekly to coincide with scheduled flights off site. |

Water from Fuscum Lake shall be sampled once a year prior to discharge to the environment and the samples will be provided to the Environmental Protection Branch of Environment Canada for the purpose of performing a static "pass/fail" bioassay for both rainbow trout *Oncorhyncus mykiss* and cladoceran crustacean *Daphnia magna* as per (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/14);

**Surveillance Network Program (SNP) Station 1563-11 (active)**

| | |
|---|---|
| Description: | Effluent from the Sewage Disposal Facilities |
| Location: | Upstream at culvert inlet or downstream at toe of road embankment |
| Sampling Frequency: | Weekly during decant |
| Sampling Parameters: | Standard, Solids, Total Ammonia (NH3 + NH4+ - N), Microbiological, and if there is a visible sheen, Oil & Grease and Hydrocarbons |
| Rationale: | Decant will not be necessary due to the low volume of sewage |

**Surveillance Network Program (SNP) Station 1563-12 (active)**

| | |
|---|---|
| Description: | Cone Pond at the creek inlet at south shore |
| Location: | 64° 25.876'N 115° 04.502'W |
| Sampling Frequency: | Once every two weeks during Fuscum Lake discharge, and monthly otherwise during periods of open water |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Cyanide Suite, Total Metals. |
| Rationale: | To monitor downstream effects of Fuscum Lake discharge on water quality |

**Surveillance Network Program (SNP) Station 1563-13 (active)**

| | |
|---|---|
| Description: | Creek downstream of Tailings Containment Area Dam 1 |
| Location: | 64° 26.467'N 115° 02.221'W |
| Sampling | Monthly during periods of open water |

| | |
|---|---|
| Frequency: | |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Cyanide Suite, and Total Metals |
| Rationale: | To detect any downstream movement of contaminants from Dam 1 seepage |

Note: Flow rates at SNP Station 1563-13 shall be estimated at the time of sampling and recorded in a logbook.

**Surveillance Network Program (SNP) Station 1563-14 (active)**

| | |
|---|---|
| Description: | Inflow to North Pond downstream of Tailings Containment Area Dam 2 |
| Location: | 64° 27.005'N 115° 02.824'W |
| Sampling Frequency: | Monthly during periods of open water |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Total Organic Carbon, Cyanide Suite and Total Metals. |
| Rationale: | To monitor a potential discharge path in the Remediation Plan |

**Surveillance Network Program (SNP) Station 1563-15 (inactive)**

| | |
|---|---|
| Description: | Runoff from toe of waste rock storage areas |
| Location: | 64° 24.021'N 115° 06.055'W |
| Sampling Frequency: | Once in the spring and once in the fall following a spring freshet/rain event |
| Sampling Parameters: | Standard, Solids, Major Ions, Total Ammonia (NH3 + NH4+ - N), Nitrate, and Dissolved Metals |
| Rationale: | To determine the presence of acid/alkaline rock drainage |

**Surveillance Network Program (SNP) Station 1563-16 (inactive)**

| | |
|---|---|
| Description: | Runoff from ore storage areas |
| Location: | N/A |
| Sampling Frequency: | N/A |
| Sampling Parameters: | N/A |
| Rationale: | There is minimal ore on site. |

**Surveillance Network Program (SNP) Station 1563-17 (inactive)**

| | |
|---|---|
| Description: | Reclaim water |
| Location: | N/A |
| Sampling Frequency: | N/A |
| Sampling Parameters: | N/A |
| Rationale: | The mill will not be in operation |

**Surveillance Network Program (SNP) Station 1563-18 (inactive)**

| | |
|---|---|
| Description: | Mill tailings taken at mill |
| Location: | N/A |
| Sampling Frequency: | N/A |
| Sampling Parameters: | N/A |
| Rationale: | The mill will not be in operation |

**Surveillance Network Program (SNP) Station 1563-19 (inactive)**

| | |
|---|---|
| Description: | Creek between Duck Pond and Cone Lake downstream of culverts under tailings line road |
| Location: | N/A |
| Sampling Frequency: | N/A |
| Sampling Parameters: | N/A |
| Rationale: | Not specifically relevant to the operation as it currently stands |

**Surveillance Network Program (SNP) Station 1563-20 (active)**

| | |
|---|---|
| Description: | Steeves Lake shoreline below mill site where surface runoff enters Steeves Lake |
| Location: | 64° 24.301'N 115° 07.153'W |
| Frequency: | Monthly during periods of open water |
| Sampling Parameters: | Hydrocarbons |
| Rationale: | To monitor hydrocarbons entering Steeves Lake from tank farm seepage |

**Surveillance Network Program (SNP) Station 1563-21 (inactive)**

| | |
|---|---|
| Description: | Interception trench between fuel tank farm and Steeves Lake |
| Location: | 64° 24.471'N 115° 05.970'W |
| Sampling Frequency: | Once in the spring and once in the fall, or at periods of water collection |
| Sampling Parameters: | Hydrocarbons |
| Rationale: | To monitor hydrocarbons moving through the overburden between the tank farm and Steeves Lake |

**Surveillance Network Program (SNP) Station 1563-22 (inactive)**

| | |
|---|---|
| Description: | Minewater pumped from open pit |
| Location: | N/A |
| Sampling Frequency: | N/A |
| Sampling Parameters: | N/A |
| Rationale: | No minewater is being pumped from the open pit |

**Surveillance Network Program (SNP) Station 1563-23 (active)**

| | |
|---|---|
| Description: | East shore of Truck Lake near toe of embankment |
| Location: | 64° 24.172'N 115° 06.004'W |
| Sampling Frequency: | Annually |
| Sampling Parameters: | Standard, Solids, Major Ions, Total Ammonia (NH3 + NH4+ - N), Nitrate, and Dissolved Metals |
| Rationale: | To capture surface run-off and seepage from waste rock dump and Zone 2.0 Pit. |

**Surveillance Network Program (SNP) Station 1563-24 (active)**

| | |
|---|---|
| Description: | Tailings Lake: one in mixed zone (above thermocline) and one in unmixed zone (below thermocline) |
| Location: | 64° 26.599' N 115° 03.395' W |
| Sampling Frequency: | Four times a year including the approximate spring turnover, summer stratification, fall |

| | |
|---|---|
| | turnover, and winter stratification, if safe to do so |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Cyanide Suite, In Situ Ecological, and Total Metals |
| Rationale: | To determine the extent of cyanide natural degradation throughout the water column, the effects of chemical precipitation, the presence of thermoclines/chemoclines, and the fate of contaminants |

**Surveillance Network Program (SNP) Station 1563-25 (inactive)**

| | |
|---|---|
| Description: | Supernatant Discharge to Pit |
| Location: | 64° 22.816'N 115° 07.153'W |
| Sampling Frequency: | Weekly during transfer of supernatant. |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Cyanide Suite, Dissolved Metals |
| Rationale: | To determine the quality of water transferred to the Zone 2.0 Pit and permit the estimation of total loading of contaminants |

**Surveillance Network Program (SNP) Station 1563-26 (active)**

| | |
|---|---|
| Description: | Zone 2.0 Pit: one sample in mixed zone (above thermocline) and one sample in unmixed zone (below thermocline) |
| Location: | 64° 23.956' N 115° 05.227' W |
| Sampling Frequency: | Quarterly to include the approximate spring turnover, summer stratification, fall turnover, and winter stratification, if safe to do so |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Cyanide Suite, In Situ Ecological, and Total Metals |
| Rationale: | To determine the extent of cyanide natural degradation throughout the water column, the effects of chemical precipitation, the presence of thermoclines/chemoclines, and the fate of contaminants |

**Surveillance Network Program (SNP) Station 1563-27 (active)**

| | |
|---|---|
| Description: | Surface of Dyke Lake |
| Location: | 64° 23.228'N 115° 06.198'W |
| Sampling Frequency: | Monthly during periods of open water |
| Sampling Parameters: | Standard, Solids, Major Ions, Total Ammonia (NH3 + NH4+ - N), Nitrate, Dissolved Metals |
| Rationale: | Although Dyke Lake rarely contains water, it can provide information regarding waste rock runoff |

**Surveillance Network Program (SNP) Station 1563-28 (inactive)**

| | |
|---|---|
| Description: | North end of Baton Lake near foot of the waste rock pile |
| Location: | N/A |
| Sampling Frequency: | N/A. |
| Sampling Parameters: | N/A |
| Rationale: | Historically, license limits have been met and results are similar to SNP 1563-30 |

**Surveillance Network Program (SNP) Station 1563-29 (active)**

| | |
|---|---|
| Description: | Baton Lake at mid lake: one sample in mixed zone (above thermocline) and one sample in unmixed zone (below thermocline) |
| Location: | 64° 23.665'N 115° 04.883'W |
| Sampling Frequency: | Quarterly to include the approximate spring turnover, summer stratification, fall turnover, and winter stratification, if safe to do so |
| Sampling Parameters: | Standard, Solids, Major Ions, Total Ammonia (NH3 + NH4+ - N), Nitrate, Total Organic Carbon, In Situ Ecological, Total Metals |
| Rationale: | To ensure contaminated water from the Zone 2.0 Pit is not reaching Baton Lake, by comparing background with detectable change; and to detect/monitor waste rock runoff |

**Surveillance Network Program (SNP) Station 1563-30 (active)**

| | |
|---|---|
| Description: | Spot Lake |
| Location: | 64° 24.279'N 115° 05.513'W |
| Sampling Frequency: | Quarterly |
| Sampling Parameters: | Standard, Solids, Major Ions, Total Ammonia (NH3 + NH4+ - N), Nitrate, Dissolved Metals |
| Rationale: | To detect Zone 2.0 Pit tailings water migration; and/or detect/monitor waste rock runoff |

**Surveillance Network Program (SNP) Station 1563-31 (active)**

| | |
|---|---|
| Description: | Inflow to Paddle Lake |
| Location: | 64° 26.365' N 115° 01.698' W |
| Sampling Frequency: | Quarterly during periods of open water & twice during the winter |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Total Organic Carbon, Cyanide Suite, Total Metals |
| Rationale: | To monitor Dam 1 seepage effects on the Indin River system |

**Surveillance Network Program (SNP) Station 1563-32 (active)**

| | |
|---|---|
| Description: | Surface of Lake 315 |
| Location: | 64° 25.242'N 115° 00.770'W |
| Sampling Frequency: | Quarterly |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Cyanide 1 and Total Metals |
| Rationale: | To determine final water quality before reaching the Indin River system & to assess impacts |

**Surveillance Network Program (SNP) Station 1563-33 (active)**

| | |
|---|---|
| Description: | Spanner Lake, upstream of the Tailings Containment Area |
| Location: | 64° 27.796'N 115° 03.374'W |
| Sampling Frequency: | Quarterly |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Cyanide1, Total Metals |

| | |
|---|---|
| Rationale: | To monitor as a control to provide background quality of water entering the Indin River system for water quality comparison |

**Surveillance Network Program (SNP) Station 1563-34 (active)**

| | |
|---|---|
| Description: | A natural depression immediately u/s of the North Pond, or at approximate inflow into North Pond |
| Location: | Coordinates TBD |
| Sampling Frequency: | Weekly during spring freshet only |
| Sampling Parameters: | Standard, Solids, Total Ammonia (NH3 + NH4+ - N) |
| Rationale: | To monitor the water quality discharged from the Tailings Lake North diversion ditch |

**Surveillance Network Program (SNP) Station 1563-35 (active)**

| | |
|---|---|
| Description: | Heart Lake discharge at the inlet to Whaletail Bay. |
| Location: | 64° 25.467'N 115° 05.761'W |
| Sampling Frequency: | Quarterly. |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients and Total Metals. |
| Rationale: | To determine the final water quality entering Steeves Lake from Fuscum Lake. |

**Surveillance Network Program (SNP) Station 1563-36 (active)**

| | |
|---|---|
| Description: | Indin River East of Colomac above the confluence of the outflow from Lake 315. |
| Location: | 64° 27.339'N 115° 58.155'W |
| Sampling Frequency: | Quarterly |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Cyanide1, and Total Metals |
| Rationale: | To provide additional background knowledge of water quality in the Indin River and determine downstream effects |

**Surveillance Network Program (SNP) Station 1563-37 (active)**

| | |
|---|---|
| Description: | Indin Lake approximately 3 km south of Leta Arm |
| Location: | 64° 13.910'N 115° 13.459'W |
| Sampling Frequency: | Quarterly |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients and Total Metals |
| Rationale: | To provide additional background knowledge of water quality in the Indin River and determine downstream effects |

**Surveillance Network Program (SNP) Station 1563-38 (active)**

| | |
|---|---|
| Description: | North end of 'Dragon Lake', which is located between Baton Lake and Lake 315 |
| Location: | 64° 25.557'N 115° 02.572'W |
| Sampling Frequency: | Once a year (spring) |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Total Organic Carbon, Cyanide1, and Total Metals |
| Rationale: | To detect major seepage from Tailings Lake and/or Spruce Lake porewater into another watershed |

**SNP STATIONS ESTABLISHED FOR MV2004L8-0001**

**Surveillance Network Program (SNP) Station 1563-39 (active)**

| | |
|---|---|
| Description: | Tailings Lake surface, immediately prior to discharge through the Spillway. Until spillway is constructed, at toe of Dam 2 in approximate location of proposed spillway inlet |
| Location: | Coordinates TBD |
| Sampling Frequency: | Monthly during periods of discharge |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Total Organic Carbon, Cyanide Suite, Total Metals |
| Rationale: | To determine water quality effluent from Tailings Lake prior to discharge through the Spillway |

**Surveillance Network Program (SNP) Station 1563-40 (active)**

| | |
|---|---|
| Description: | L-shaped Lake, immediately after wetlands discharge |
| Location: | 64°27.474 N 115° 02.146 ' |
| Sampling Frequency: | Weekly, during periods of discharge |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Total Organic Carbon, Cyanide Suite, Total Metals |
| Rationale: | To monitor reactions within the mixing zone. |

**Surveillance Network Program (SNP) Station 1563-41 (active)**

| | |
|---|---|
| Description: | Outlet of L-shaped Lake |
| Location: | Coordinates TBD |
| Sampling Frequency: | Weekly, during periods of discharge |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Total Organic Carbon, Cyanide Suite, Total Metals |
| Rationale: | **Point of compliance under Part D, Item 7 of the Water License** To compare water quality at the outlet of L-Shaped Lake to CCME Criteria for Protection of Freshwater Aquatic Life. To verify the predictions of the SENES Risk Assessment of Candidate Effluent Quality Criteria for Tailings Lake Discharge Colomac Mine Site July of 2004 |

**Surveillance Network Program (SNP) Station 1563-42 (active)**

| | |
|---|---|
| Description: | Steeves Lake surface, outside of boom; a minimum of three locations (1563-42south ,1563-42 central, 1563-42 north) |
| Location: | Steeves Lake |
| Sampling Frequency: | Monthly during periods of open water |
| Sampling Parameters: | Standard, Hydrocarbons |
| Rationale: | To monitor for the presence of potential hydrocarbons within Steeves Lake adjacent to the Fuel Tank Farm |

**Surveillance Network Program (SNP) Station 1563-43 (active)**

| | |
|---|---|
| Description: | Tailings Lake North; one sample in mixed zone (above thermocline); one sample in unmixed zone (below thermocline) |
| Location: | Coordinates TBD |
| Sampling Frequency: | Four times a year including the approximate spring turnover, summer stratification, fall turnover, and winter stratification, if safe to do so |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Cyanide Suite, In Situ Ecological, and Total Metals |
| Rationale: | To determine the extent of cyanide natural degradation throughout the water column, the effects of chemical precipitation, the presence of thermoclines/chemoclines, and the fate of contaminants |

**Surveillance Network Program (SNP) Station 1563-44 (active)**

| | |
|---|---|
| Description: | Outfall of Dyke 7 spillway into Tailings Lake |
| Location: | Coordinates TBD |
| Sampling Frequency: | Monthly during periods of open water |
| Sampling Parameters: | Standard, Solids, Major Ions, Nutrients, Cyanide Suite, and Dissolved Metals |
| Rationale: | To monitor for the water quality from Spruce Lake entering Tailings Lake via the Dyke |

**Surveillance Network Program (SNP) 1563- 45 at diversion ditch outflow to Duck Pond (active)**

| | |
|---|---|
| Description: | A natural depression immediately upstream of the Duck Pond, or at approximate inflow into North Pond |
| Location: | Coordinates TBD |
| Sampling Frequency: | Weekly during spring freshet only |
| Sampling Parameters: | Standard, Solids, Total Ammonia (NH3 + NH4+ - N) |
| Rationale: | To monitor the water quality discharged from the Tailings Lake North diversion ditch |

**Surveillance Network Program (SNP) 1563- 46, 47, 48 & 49 (active)**

| | |
|---|---|
| Description: | Lake samples from the Groundwater Monitoring Plan as per Part D, Item 10 includes "L1, L2, L3 and L4" lake samples |
| Location: | Coordinates TBD |
| Sampling Frequency: | Quarterly |
| Sampling Parameters: | Standard, Solids, Major Ions, Total Ammonia (NH3 + NH4+ - N), Nitrate, Total Organic Carbon, Total Metals |
| Rationale: | To monitor potential impacts of Zone 2.0 Pit water within Steeves Lake |

**Surveillance Network Program (SNP) 1563- 50, 51, 52 & 53 (active)**

| | |
|---|---|
| Description: | Groundwater samples from the Groundwater Monitoring Plan as per Part D, Item 10 includes "W1, W2, W3, W4" monitoring wells |
| Location: | Coordinates TBD |
| Sampling Frequency: | Quarterly. |
| Sampling Parameters: | Standard, Solids, Major Ions, Total Ammonia (NH3 + NH4+ - N), Nitrate, Total Organic Carbon, Dissolved Metals |
| Rationale: | To monitor the potential ingress of Zone 2.0 pit water prior to Steeves Lake |

## 2. Water Level, Flow and Volume Measurement Requirements

a) The daily, monthly and annual quantities of water pumped between the Zone 2.0 Pit and Tailings Lake shall be measured and recorded in cubic metres.

b) If discharge from Fuscum Lake is authorized, the daily quantity of water discharged from Surveillance Network Program Station Number 1563-10 shall be measured and recorded in cubic metres.

c) The Licensee shall monitor the flow and quality of seepage at Dam 1 in a manner approved of by an Inspector.

d) The Licensee shall measure the water levels of Tailings Lake and Zone 2.0 Pit weekly during water transfer and twice per year otherwise, once in the fall and once in the spring (after freshet).

e) The Licensee shall measure the water levels of Baton and Steeves Lakes twice per year, once in the fall and once in the spring (after freshet).

## 3. Reports

a) The Licensee shall submit, in March, June and December coinciding with the sampling season and data availability, to the Board and the Inspector all data and information required by the "Surveillance Network Program" the results of the approved quality assurance plan, as well as the identification of any anomalies and trends.

b) The Licensee shall, unless otherwise requested by an Inspector, include all of the data and information required by the "Surveillance Network Program" including the results of the approved Quality Assurance/Quality Control program in the Licensee's Annual Report, which Report shall be submitted to the Board on or before March 31st of the year following the calendar year being reported.

## 4. Quality Assurance/Quality Control

a) All analyses shall be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of Water and Wastewater" or by such other methods as may be approved by an Analyst.

b) All analyses shall be performed in a laboratory approved by an Analyst.

c) The Licensee shall have a Quality Assurance/Quality Control plan which includes both field and laboratory requirements and which must meet with the approval of an Analyst.

d) The plan referred to in Part 4, Item 2, (above) shall be implemented as approved by an Analyst.

**MACKENZIE VALLEY LAND AND WATER BOARD**

**Witness** **Chair**

## REASONS FOR DECISION

**Reference/File Number:** Water License MV2004L1-0001 (Type "A")
Colomac Site Remediation Plan

**Licensee:** Contaminants and Remediation Directorate
Indian and Northern Affairs Canada – NT Region

## Mackenzie Valley Land and Water Board

## REASONS FOR DECISION

Issued pursuant to section 26
of the *Northwest Territories Waters Act*, R.S.C. 1992, c.39

## BACKGROUND AND REGULATORY HISTORY

On March 31, 2004, the Contaminants and Remediation Directorate of the Department of Indian and Northern Affairs Canada – NT Region (CARD or the Licensee) applied to the Mackenzie Valley Land and Water Board (MVLWB or the Board) for a Type "A" Water License MV2004L1-0001 (the License). Supplemental information was submitted August 9, 2004, including a *Risk Assessment of Candidate Effluent Quality Criteria for Tailings Lake Colomac Mine Site*. The application was for the long-term water management activities associated with the Remediation and Reclamation of the abandoned gold mining and milling operations at the Colomac Mine, located at Baton Lake near Indin Lake, Northwest Territories (Latitude 64° 18' N and Longitude 115° 18' W) and the access road connecting said properties.

The application was distributed to First Nations, Communities, Government Agencies and other organizations in order for the MVLWB to conduct a Preliminary Screening as required under Part 5 of the *Mackenzie Valley Resource Management Act (MVRMA).*

On September 2, 2004, the Board held a meeting to consider the CARD application. During this meeting the Board determined that the proposed operation was not likely to be a cause for public concern and should not have a significant adverse impact on the environment. Reasons for Decision on the preliminary screening were issued under separate cover. Therefore, the Board determined that the application could proceed through to the regulatory process and licensing.

During this meeting, the Board noted that the proposed operation was supported by the Dogrib Treaty 11 Council and surrounding Tlicho communities and that the Remediation and Reclamation of the Colomac Mine would help to improve the environment.

Notice of a Public Hearing was published in accordance with the requirements of the *Northwest Territories Waters Act (NWTWA)* in NewsNorth on September 20, 2004. The Public Hearing was to be held November 4 & 5, 2004 in the Hamlet of Rae-Edzo, at the Cultural Centre. No notices of persons wanting to make presentations concerning this application were received by the Board by the deadline of October 1, 2004. CARD consented, in writing, to the disposition of this matter without a Public Hearing on October 12, 2004. The MVLWB therefore cancelled the hearing in accordance with subsection 21 (3) of the *NWTWA*.

A draft version of the License was prepared by Board staff, distributed to the Reviewers and made available for public comment on November 16, 2004, with comments due on December 6, 2004. Changes based on the submissions received from Reviewers were incorporated into the Water License and distributed for a second time to the Reviewers and public for comment on December 22, 2004, with comments due on January 21, 2005.

All evidence submitted to the MVLWB was taken into consideration during the drafting of the License that was presented to the Board on February 24, 2005.

During the License proceeding, the Board was aware of the sensitivity of the issues regarding the abandonment of the Colomac Mine and its potential impacts to Indin River System. The Indin River watershed is in the traditional area of the Tlicho and is subject to the Dogrib Treaty 11 Claim Interim Measures Agreement and Final Agreement.

## GENERAL

The Board has decided to issue Water License MV2004L8-0001 subject to the conditions set out therein. The License has been issued under separate cover.

The Board's Reasons for Decision are elaborated below under the headings contained in the License. The License contains terms and conditions the Board feels are necessary to protect the environment, conserve the water resources of Steeves Lake and the Indin River watershed and provide appropriate safeguards in respect of the Licensee's use of waters and deposit of wastes.

## REQUIREMENTS OF SECTION 14 of the *NWTWA*

### Existing Licensees

With respect to paragraph 14(4)(a) of the *NWTWA*, the Board is satisfied that granting the License to the Licensee would not adversely affect, in a significant way, any existing Licensee, providing the conditions of the License are met. There are no Licensees with precedence.

## Existing Water Users

Paragraph 14(4)(b) of the *NWTWA* prohibits the issuance of a License unless the Board is satisfied that appropriate compensation has been, or will be paid by the Licensee to members of the classes of water users and persons listed in that paragraph who have claimed compensation within the period specified in the Notice of Application.

The Board received no claims for compensation either during the prescribed period or afterwards. Provided that compliance with the License conditions is achieved, the Board does not believe that any users or persons listed in paragraph 14(4)(b) of the *NWTWA* will be adversely affected by the use of waters or the deposit of waste proposed by the Licensee.

## Effluent Quality Standards

Under section 14(4)(c)(ii) of the *NWTWA*, the Board is satisfied that the effluent water quality parameters it has developed and set down in the License as conditions are appropriate and will protect the receiving waters. Reasons for Decision for each parameter are discussed in detail below in "Part D: Conditions Applying to Waste Disposal."

## Financial Responsibility of the Applicant

The Board must satisfy itself of the financial responsibility of the Applicant under paragraph 14(4)(d) of the *NWTWA* before it can issue the License. The Colomac Mine Long-term Water Management Project will be undertaken by the Government of Canada through the Contaminant and Remediation Directorate, Department of Indian and Northern Affairs. There is, therefore, no issue in the Board's view as to the capacity of the Applicant to meet any, or all, financial obligations set out in the *NWTWA* and License.

## REQUIREMENTS OF SUBSECTION 15(2) OF THE *NWTWA*

With respect to subsection 15(2) of the *NWTWA*, the Board must minimize any adverse effects the operation may have on other Licensees, users, depositors, owners, occupiers, or other right holders that have interests in the water management area in which the licensed operation is located. These parties are to have the opportunity to notify the Board regarding their concerns about the effects the development may have on them.

The Board is satisfied that the Licensee's adherence to the terms and conditions of the License will protect parties who have an interest in the water management area in which the Licensee is operating.

## REQUIREMENTS OF SUBSECTION 17 OF THE *NWTWA*

Pursuant to subsection 17(1) of the *NWTWA*, the Board may require the Licensee to provide security to the Minister in accordance with the Northwest Territories Water Regulations (the Regulations). Subsection 17(2) of the *NWTWA* specifies how much security may be applied, including the compensation of persons affected by the licensed activities and the reimbursement of the Government of Canada for expenditures made during the course of the remedial activities under sections 27(3) and 39(1) of the *NWTWA*.

Given that the Licensee is the Government of Canada, no security is required. The liability with respect to the clean up of this abandoned mine site already rests with the Crown.

## WATER LICENSE MV2004L8-0001 TERMS AND CONDITIONS

### License Conditions

The conditions set forth in the License have been imposed in order to address the Board's statutory responsibilities and concerns raised during this regulatory process. These reasons address the more significant of those concerns.

### Scope of the License

The Board has reviewed the application and evidence in the Public Registy and the advice provided by interested parties. The Board has defined the scope of the appurtenant undertaking as follows:

> "This License entitles the Contaminants and Remediation Directorate Department of Indian Affairs and Northern Development – NT Region, to use water and dispose of waste for the long-term water management activities associated with the Remediation and Reclamation of the abandoned mining and milling operations at the Colomac Mine, located at Baton Lake near Indin Lake, Northwest Territories (Latitude 64 25' N and Longitude 115 05' W); the abandoned exploration activities at the Kim-Cass properties located at Hewitt Lake near Lex Lake, Northwest Territories (Latitude 64 18' N and Longitude 115 18' W) and the access road connecting said properties. "

The scope of the License is consistent with the CARD application and provides the latitude necessary for the Remediation and Reclamation of the abandoned mining and milling operations.

### Term of the License

The License has been issued for a term of five (5) years, as requested by CARD in their application.

A five (5) year term will accommodate the necessary time to treat and discharge contaminated water from Tailings Lake. The current water balance models for the Tailings Containment Area (TCA) assume a low probability for the need to discharge prior to 2008, allowing adequate time for the Enhanced Natural Remediation (ENR) to treat the contaminated water currently in Tailings Lake. A final Water License will be required to discharge the water currently contained within the Zone 2.0 Pit.

## PART B: GENERAL CONDITIONS

The general conditions assist in the appropriate administration of the License, including keeping the Board informed of activities on site through the requirement for annual reporting.

**Part B, Item 1:** The annual report will be submitted to the Board as a summary of the past year's work. The Board believes this will ensure that any trends that deviate from predicted performance of the Enhanced Natural Removal and Reclamation will be identified in a timely manner and ensure effective corrective actions are taken and unauthorized discharges are avoided.

**Part B, Item 2:** All Licenses include a requirement to submit summaries of the data generated under the Surveillance Network Program (SNP) annexed to that License. This provides information on how the waste water handling, storage and treatment systems are performing. Based on this data, the Board can make the sound regulatory decisions necessary to protect the receiving environment. In order to facilitate such decisions, when necessary, the Board has required the Licensee to submit SNP data summaries as part of the annual report.

## PART C: CONDITIONS APPLYING TO WATER USE

**Part C, Item 3:** In the original Water License, MV2000L2-0018, the Licensee required 5000 $m^3$/annually of water to carry out their operations. The volume of water was amended to 15 000 $m^3$/annually in response to comments submitted by CARD on the Draft Water License on December 6, 2004.

The revised volume includes mill cleaning, dust suppression and a 25% contingency factor. It also includes camp usage and tailings pipeline transfer that was included in Water License MV2000L2-0018. The Board noted that there were no interventions on the overall amount of water requested or how it would be used.

## PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

The Board has included conditions applying to Waste Disposal in Part D of the License. All the evidence from the Licensee and Reviewers' comments were considered by the Board when determining the effluent quality criteria. The Board considered how protective, achievable and enforceable the effluent criteria were using Enhanced Natural Removal technology. Furthermore, the Board recognizes that the Dogrib Treaty

11 Council has developed a series of guiding principles which should be respected when establishing an Effluent Quality Criteria for the Colomac site. The Board has decided that the criteria set out under Part D are sufficiently stringent to ensure that any adverse impacts of the waste created by the Licensee will be minimized and sufficiently protective of aquatic life and water uses in the receiving environment.

**Part D, Item 3:** The Board has set the effluent quality objectives for the sewage decant from the sewage lagoon in Part D, Item 3. The four (4) regulated parameters reflect limits that were included in the previous licenses for Colomac Mine held by Royal Oak Mines Ltd. and the Contaminated Sites Office of DIAND. The limits are derived from the Northwest Territories Water Board's *Guideline for Discharge of Treated Municipal Wastewater in the Northwest Territories*, 1992.

**Part D, Item 4:** The ten (10) regulated parameters for Part D, Item 4 were incorporated from the Contaminated Sites Office, Water License MV2000L2-0018. The Board had set these objectives for water quality in Cone Lake, which flows into Steeves Lake, for the regulated parameters in 2000. These objectives are based upon existing water quality data and, where applicable, the Canadian Water Quality Guidelines as established by the Canadian Council of Ministers of the Environment (CCME) in 1999. In some cases, these guidelines have been adjusted to make them site-specific. The Board is satisfied that through the imposition of the effluent quality requirements set out in the License, the Board's mandate for protecting water quality will be met. It should also be noted, however, that these values pertain only to the discharge of waste water from Fuscum Lake to the receiving environment, namely Surveillance Network Station 1563-10. They do not apply to any discharge from Tailings Lake.

The reasons for establishing the effluent quality criteria and/or water quality criteria for these substances at the levels set out in Part D Item 4 are specified below. Please note that for all parameters, other than Ammonia and Total Suspended Solids, there are no maximum average concentration values. This is due to the fact that the Fuscum Lake discharge is an event of a short duration and can therefore be considered a batch discharge. This led to very specific sampling requirements that do not require four (4) consecutive samples of these parameters as required in the definition of average concentration. The maximum concentration of any grab sample requirements are to allow for the natural variability in the lake water quality, and have always been expressed as double that of the average concentration value. Therefore, for those parameters whose sampling will not reach the frequency required to calculate the average concentration values, there is only the one requirement, which is double that of the maximum average value.

**Ammonia** – The Board has established a maximum average concentration (MAC) of 5.0 mg/L and a maximum concentration (MC) in any grab sample of 10.0 mg/L for ammonia. These effluent quality criteria are intended to protect the waters and minimize contamination of Steeves Lake. The Board recognized that unionized ammonia can be toxic to fish and other aquatic organisms at low levels. In setting these effluent quality criteria, the Board recognized that Steeves Lake is an ultraoligotrophic lake that is likely to be sensitive to nutrient inputs and associated eutrophication. The

waste discharged, however, will flow through a natural wetland, which to some degree takes up nutrients and thereby reduces this concentration even further. The maximum average and maximum concentrations are relatively consistent with the levels that have been established in previous water licenses and with the levels that were proposed as achievable limits by the applicant. In addition, these criteria, and the use of natural wetland treatment of the discharged water, prior to entering fish-bearing water, are sufficient to ensure that the water quality limits are met in Steeves Lake. The Board is satisfied that the Applicant can achieve these effluent quality criteria for Fuscum Lake wastewater through the application of the treatment and discharge procedures proposed.

**Arsenic** – The board has established a MC of 0.1 mg/L for arsenic. This value is based on Saskatchewan Surface Water Quality Objectives (1998) for the protection of aquatic life. This value is double that of the objective value (0.05 mg/L) to allow for natural variation in arsenic concentrations in the lake water.

**Copper** – The Board has established a MC of 0.1 mg/L for copper. This effluent quality criterion is intended to protect water users and minimize contamination of Steeves Lake. This value is higher than the value put forth by the Canadian Water Quality Guidelines as established by CCME since documentation supplied by the Licensee demonstrated that background copper levels are above the CCME value of 0.002 to 0.004 mg/L. Since background levels reach upwards of 0.04 mg/L, Board staff and Reviewers have suggested that a small degree of variability should be added to account for natural fluctuations.

**Total Cyanide** – The Board has established a MC of 0.48 mg/L for cyanide based upon best professional judgment of Board staff and Reviewers. The ratio of Total Cyanide to Weak Acid Dissociable (WAD) Cyanide is 3 to 1, as demonstrated by the Licensee. Since it is the toxicity of the WAD Cyanide that is of greatest concern, the value of Total Cyanide is acceptable to the Board at three (3) times the value of WAD Cyanide.

**Weak Acid Dissociable (WAD) Cyanide** – The Board has established a MC of 0.16 mg/L for Weak Acid Dissociable Cyanide. The limit was based on information and rationale provided by the Licensee regarding standards in use in other parts of the world. This rationale was reviewed formally by the Board and accepted.

**Lead** - The Board has established a MC of 0.014 mg/L for lead. The values for grab samples are double the desired value for maximum average concentration. This value is therefore consistent with the value put forth by the Canadian Water Quality Guidelines as established by the CCME in 1999.

**Nickel** - The Board has established a MC of 0.3 mg/L for nickel. The values for grab samples are double the desired value for maximum average concentration. This value is, therefore, consistent with the value put forth by the Canadian Water Quality Guidelines as established by the CCME in 1999.

**Total Suspended Solids** – The Board has established effluent quality criteria for Total Suspended Solids (TSS) for discharges of waste. The Board has established a MAC of 20 mg/L and a MC of 40 mg/L for TSS. These effluent quality criteria are intended to protect water users and minimize contamination of Steeves Lake. In setting these effluent quality criteria, the Board recognized that elevated levels of TSS could adversely affect fish and other aquatic organisms, with the severity of effect dependant on both the concentration of TSS and the duration of exposure to the TSS levels. The effluent quality criteria were established to ensure that the water quality objectives could be met in Steeves Lake and are consistent with other water licenses. The Board is satisfied that these effluent quality criteria can be achieved through the application of best management practices. These values are derived, in part, from the Canadian Water Quality Guidelines (CCME 1999) for TSS.

**Zinc** – The Board has established a MC of 0.06 mg/L for zinc. The values for grab samples are double the desired value for maximum average concentration. This value is, therefore, consistent with the value put forth by the Canadian Water Quality Guidelines as established by the CCME in 1999.

**Part D, Item 7:** The principles established by the MacDonald Environmental Services Ltd. report *An Evaluation of Candidate Effluent Criteria for the Colomac Mine Site* focused on a use-protection and non-degradation approach in setting effluent quality criteria. The Board accepts the use of an initial mixing in L-Shaped Lake, outside of which there should be no chronic toxicity to aquatic life. Accordingly, the limits have been set to protect life and should not result in significant changes to the water quality in the outflow of L-Shaped Lake.

**Total Suspended Solids -** The Board has established a MAC of 15 mg/L and a MC in any grab sample of 30 mg/L for TSS. DIAND initially proposed a limit of 20 mg/L MAC and 40 mg/L for a MC. The limits have been revised for consistency with the National Metal Mining Effluent Regulations (MMER) based on Environment Canada recommendations of September 8, 2004. The Board recognizes that the limits are lower then the established limits for Part D, Item 4 and may require DIAND to utilize a wetlands discharge. There is a concern that the discharge of water may mobilize sediments and possibly erode the seepage channels between North Pond, Unnamed Lake, and L-Shaped Lake. This potential erosion warrants stricter effluent quality criteria to prevent elevated levels in the downstream receiving environment.

**Total Ammonia (as N) –** The Board accepts the water quality limits suggested by DIAND in their August 10, 2004, letter. DIAND proposed 5.0 mg/L MAC and 10.0 mg/L MC for total ammonia (as N). These limits are consistent with limits previously established under Part D, Item 4. This MAC will provide a high level of protection for aquatic organisms, is likely achievable, and will minimize loadings in the receiving environment.

**Nitrite (as N) –** The Board has established a MAC of 0.4 mg/L and MC of 0.8 mg/L for nitrite (as N) as recommended by DIAND in their letter of August 10, 2004, and

supported by Environment Canada in their letter of September 8, 2004. The Board recognizes that elevated levels of nitrite have the potential to adversely affect aquatic organisms and the SENES Report a *Risk Assessment of Candidate Effluent Quality Criteria for Tailings Lake Discharge Colomac Mine Site* identifies a potential for nitrite concentration in Tailings Lake to be of concern. The MacDonald Environmental Services Ltd. report suggested a MAC of 0.15 mg/L and a MC of 0.3 mg/L; these limits are likely unachievable and overly stringent as denitrification process is expected to reduce the nitrite levels in North Pond, Unnamed Lake and L-Shaped Lake.

**Nitrate (as N) -** The Board has established a MAC of 5.0 mg/L and a MC of 10.0 mg/L for nitrate (as N). These limits are lower then the aquatic toxicity for the most sensitive aquatic species relevant to the Colomac area, the caddisfly larvae and *daphnid*. The chronic toxicity concentrations are 65.0 mg/L and 43.0 mg/L for nitrate $N0_3$ – N, respectively (CCME 2003). Additionally, these limits should ensure that loading is not a concern to the downstream environment.

**Total Phosphate (as P) -** The Board has established a MAC of 0.22 mg/L and a MC of 0.44 mg/L for total phosphate (as P). Based on the water quality predictions completed by SRK Consulting, the phosphate limits are likely to average 0.05 mg/L with an upper bound estimate of 0.22 mg/L in 2008. Due to concerns with eutrophication, the MacDonald Environmental Services Ltd. report recommended a MAC of 0.15 mg/L and a MC of 0.30 mg/L. These limits are likely unachievable and overly stringent. However, the MAC of 0.25 mg/L and MC of 0.50 mg/L originally proposed by DIAND on August 10, 2004, will not provide adequate protection to the receiving environment. The Board recognizes that further wetland treatment may be required to reach the established criteria, however, the concerns with loading and potential for eutrophication warrant the stricter conditions as supported by Environment Canada in their letter of January 21, 2005.

**Total Aluminum -** The Board accepts the water quality limits suggested by DIAND in their August 10, 2004, letter and supported by Environment Canada in their letter of September 8, 2004, of 0.4 mg/L MAC and 0.8 mg/L MC as being both protective and achievable for aluminum.

**Total Arsenic:** The Board accepts the water quality limits suggested by DIAND in their August 10, 2004, letter and supported by Environment Canada in their letter of September 8, 2004, of 0.04 mg/L MAC and 0.08 mg/L MC for arsenic. Based on the available water predictions a MAC of 0.04 mg/L would be consistently achievable and provide a high level of protection for aquatic organisms.

**Total Copper:** The Board accepts the water quality limits suggested by DIAND in their August 10, 2004, letter and supported by Environment Canada in their letter of September 8, 2004, of 0.010 mg/L MAC and 0.020 mg/L MC for copper. Based on the available water predictions a MAC of 0.010 mg/L would be consistently achievable and provide a high level of protection for aquatic organisms.

**Total Lead:** The Board has established a MAC of 0.10 mg/L and a MC 0.20 mg/L for lead. The effluent quality criteria proposed by DIAND are on the same order of magnitude as the CCME guidelines. The Board has chosen to adopt the levels proposed by Environment Canada in their letter of September 8, 2004. These levels are both protective and achievable, while allowing for the natural fluctuations in water quality.

**Total Nickel:** The Board has established a MAC 0.05 mg/L and a MC of 0.10 mg/L for nickel as suggested by Environment Canada in their letter of September 8, 2004. The effluent quality criteria proposed by DIAND of 0.005 mg/L MAC and 0.010 mg/L MC on August 10, 2004, are an order of magnitude above detection limits and any potential analytical problems could result in exceedances. Additionally, the proposed limits are below the CCME guideline for Freshwater Aquatic Life, 0.025 mg/L. As loadings are not a concern an artificially low number is not reasonable for this License.

**Total Selenium:** The Board accepts the water quality limits suggested by DIAND in their August 10, 2004, letter and supported by Environment Canada in their letter of September 8, 2004, of 0.0050 mg/L MAC and 0.010 mg/L MC, as being protective and achievable for selenium.

**Total Silver:** The Board has established a MAC of 0.002 mg/L and a MC of 0.004 mg/L for Silver as suggested by Environment Canada in their letter of September 8, 2004. The effluent quality criteria of 0.0015 mg/L MAC and 0.003 mg/L MC proposed by DIAND on August 10, 2004, are tenfold above detection limits. Any potential analytical problems could result in exceedances. The effluent quality criteria established in the License should be achievable and protective for aquatic life.

**Total Zinc:** The Board accepts the effluent quality criteria as suggested by DIAND in their August 10, 2004, letter and supported by Environment Canada in their letter of September 8, 2004, of 0.020 mg/L MAC and 0.040 mg/L MC for zinc. The Board recognizes that the limits are lower then the established limits for Part D, Item 4 and may require DIAND to utilize a wetlands discharge to minimize loadings in Watershed A.

**Total Cyanide:** The Board accepts the effluent quality criteria as suggested by DIAND in their August 10, 2004, letter and supported by Environment Canada in their letter of September 8, 2004, a of MAC 0.020 mg/L and a MC 0.040 mg/L for cyanide. The Board recognizes that the limits are lower then the established limits for Part D, Item 4. However, to ensure that free cyanide concentrations remain below the Water Quality Objectives in the receiving environment and in order to minimize loadings, the Board has required a stricter standard to be met.

**Weak Acid Dissociable (WAD) Cyanide:** The Board accepts the effluent quality criteria as suggested by DIAND in their August 10, 2004, letter and supported by Environment Canada in their letter of September 8, 2004, recommending a MAC of 0.020 mg/L and a MC of 0.040 mg/L for WAD cyanide. The Board recognizes that the

limits are lower then the established limits for Part D, Item 4. However, the limits under Part D, Item 4 are designed for a batch decant vs. a continuous discharge. To ensure the protection of aquatic life, limits which would be consistently achievable, and minimize loadings to the environment, the Board has chosen a stricter limit.

**Thiocyanate:** The Board accepts the effluent quality criteria as suggested by DIAND in their August 10, 2004, letter and supported by Environment Canada in their letter of September 8, 2004, a MAC of 3.0 mg/L and a MC of 6.0 mg/L for thiocyanate. The effluent quality criteria established in the License should be achievable and protective for aquatic life.

**Part D, Item 10:** As a result of concerns over groundwater flow from the Zone 2.0 Pit to either Steeves and/or Baton Lake during the originally licensing in 2000, the Licensee was required to develop a Groundwater Monitoring Plan, as per Part D, Item 4 of Water License MV2000L2-0018. This requirement has remained in the current License. The requirement for this plan should ensure that the Licensee continues, throughout the life of the project, to conduct the appropriate studies and undertake the tests necessary to identify any groundwater seepages of tailings water to the receiving environment.

## PART E: CONDITIONS APPLYING TO MODIFICATIONS

The conditions applying to modifications are to allow for small-scale changes in the structures of the proposed undertaking. As per the definition of 'Modifications' under Part A of the License, a modification does not include an expansion nor does it allow for an alteration of the purpose or function of the work conducted. It should, therefore, be noted that the Board is not in any way authorizing any amendments to the requirements of the License by virtue of the inclusion of this section. Any such requests for amendments must be undertaken pursuant to the terms of the *NWTWA*.

## PART F: CONDITIONS APPLYING TO CONTINGENCY PLANNING

The Board has imposed conditions requiring the Licensee to undertake ongoing contingency planning in order to make the Licensee and the Board more aware of the uncertainties that may arise during the operations. The Licensee is to provide plans that detail how effects resulting from unexpected situations will be mitigated. It should be noted that the Board requires the Licensee to review the Spill Contingency Plan on an annual basis and modify as necessary to reflect changes in operation, technology and staffing.

## PART G: CONDITIONS APPLYING TO REMEDIATION

Generally, these conditions require the License to adhere to a timeline as presented in the *Colomac Mine Remediation Plan*. The Board has imposed conditions requiring the Licensee to adhere to these timelines, thus insuring that adequate funding and planning

are included in the Reclamation of the Colomac Mine. A condition has been included to provide the Board with updates on mine Reclamation.

**Part G, Item 4:** This item requires the Licensee to prepare a detailed plan for the management of hazardous waste that may be a by-product of the demolition of any building or equipment. This requirement should ensure that adequate planning has taken place for the treatment and disposal of any waste resulting from the decommissioning of the buildings.

## PART H: CONDITIONS APPLYING TO CONSTRUCTION

Generally, these conditions require the Licensee to submit a number of Final Detailed Design Reports to ensure that sufficient attention and resources have been devoted to the proper construction of the various works which make up the Colomac Site Remediation Plan (Remediation Plan). As the Remediation Plan is a conceptual document that outlines a number of preferred remediation methods, as well as options that remain under consideration for the nine components of the Remediation Plan, the Board requires CARD to submit the Final Detailed Design Reports to inform the Board of final design considerations. Conditions have also been included to ensure all as-built drawings and documentation of field decisions during construction are submitted to the Board and Public Registry.

## SURVEILLANCE NETWORK PROGRAM

The requirement for monitoring the characteristics of water and waste associated with the Licensee's undertakings related to an abandoned mine are described in the Surveillance Network Program (SNP), which is attached to the License. The SNP calls for extensive and ongoing sampling and analysis to be conducted at those stations identified in the Schedule. The number of stations, the sampling frequency, and the list of variables reflect the information that was considered necessary to monitor the potential downstream effects on Steeves Lake, Baton Lake and the Indin River system. The Board believes that the conditions specified in the SNP will ensure that adequate monitoring data are collected to characterize waters and wastewaters to assess compliance with effluent criteria, and evaluate the accuracy of predictions of the effects Enhanced Natural Removal will have on treating contaminated water within Tailings Lake and the Zone 2.0 Pit.

The SNP contains a total of fifty-three (53) stations. However, it should be noted that the majority of these were transferred over from the previous Water Licenses for gold mining and the short-term water management activities. Thirty (30) of the SNP stations were transferred over from the previous Water License for Colomac Mine N1L2-1563 held by Royal Oak Mines Inc. Stations 1563-31 to 1563-38 were transferred over from MV2000L2-0018 held by the Contaminated Sites Office of DIAND. For consistency, the numbers of the SNP stations from the former Water Licenses were maintained, even though the License number has changed. A number of these stations require no monitoring since they are no longer relevant to the current state of the mine and marked

inactive within the License. A short rationale is provided for each of the sampling stations individually within the License and therefore also forms part of the Board's Reasons for Decision.

## CONCLUSION

Subject to the terms and conditions set out in the License, and for the reasons expressed herein, the MVLWB is of the opinion that the CARD Colomac Mine Remediation Plan can be managed in a way which will protect the water resources of Steeves Lake and the Indin Watershed from unacceptable impacts.

Signed on behalf of the MVWLB:

2. 3. 2005
Date

Stephen Nielsen Interim Chair

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FILE NUMBER: MV2004L8-0001

Date: Friday, May 20, 2005

To: Mr. David Livingstone

Organization: DIAND

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Copied To: Charlene Coe for Ed Hornby, South Mackenzie District, DIAND
Kathleen Racher, Water Resources Division, DIAND

From: Marilyn for Todd Burlingame, Chair/CEO MVLWB

Number of pages including cover

**Remarks:**

Issuance of a Type of a Water License
- Letter
- Scope and Definitions
- Cover Letter
- Procedures
- Reasons for Decision

☐ Enclosures

☐ As requested

☒ For your information

☐ For your comment

☐ For your approval

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