



## **2004 ANNUAL REPORT WATER LICENCE NWB2MRY0406 -TYPE "B"**

The above water license will expire on June 30, 2006 and identifies the conditions that Baffinland Iron Mines Corporation must comply with respect to "Water Use and Waste Disposal" at the Mary River Project located within Water Management Area - Nunavut 05, Baffin Island.

This annual report is a requirement under Part B: GENERAL CONDITIONS, item 2 and is due before March 31, 2005 as requested by the Nunavut Water Board.

### **SUMMARY REPORT OF WATER USE AND DISPOSAL ACTIVITIES**

Water is used to sustain two operations:

- Mary River Base Camp; and
- Drilling contracted by Boart Longyear.

#### **1.0 WATER USE**

##### **1.1 Mary River Base Camp**

The base camp supports about 30 people. Water is primarily used for cleaning, cooking, drinking and cutting drill core. Running hot and cold water is available at the Ablution and Kitchen Modules. Facilities include 2 showers, 4 sinks and a washer and dryer. Water used to cut core is collected in 3 garbage can sized containers and is re-circulated.

Water is pumped from Robert Lake, west of the camp, into two 305 gallon storage tanks which are located within the Ablution module (Appendix 3, section 1 for pictures).

##### **1.2 Drilling**

Water is used to provide a lubricant for drilling to cool drill bits and coat the drill string with salt (calcium chloride -  $\text{CaCl}_2$ ) in order to prevent freezing of drill fluids due to permafrost conditions and the massive iron oxides encountered during drilling. Water is obtained primarily from either mine creek, a seasonal drainage to the east of Deposit No 1, or Mary River, but also from either local run off.

Water is pumped from a river site into salt mixing tanks, then heated and pumped to the drill over distances that generally exceed 1 kilometre (Appendix 3, section 2).

### **1.3 Disposal Activities**

Waste products include greywater, toilet waste and garbage.

Greywater generated from the Kitchen and Ablution modules are drained into 2 large, 2 x 3 metre water sumps constructed at the back of the modules. Sumps were dug and lined with stones to facilitate drainage then in-filled with sand. No backflow of greywater has been observed. Refer to Appendix 3 section 4.

Toilet waste was disposed of into sumps dug to about 1 metre into the “Active Layer” till permafrost is encountered. Sumps are gradually filled with toilet waste, burned then finally in-filled with at least 0.5 meters of sump alluvium. As of September 13, 2004, 2 sumps have been dug and in-filled. Sumps are located within a 500 metre square area.

Garbage consists of domestic kitchen refuse, aluminium cans and paper. This material is incinerated daily and residual material is placed into fuel drums. These drums are used as airstrip markers and the balance are sent to Pond Inlet for disposal. Refer to Appendix 3, section 5.

### **1.4 List of Unauthorised Discharges and Summary of the Following Action Taken**

During the 2004 field season 2 minor unauthorized (< 25 litres) fuel spills occurred. Refer to Appendix 4 for documentation.

### **1.5 Revisions to the Spill Contingency Plan and Abandonment and Restoration Plan**

Requested revisions from the NWB have been completed and revised as of December 31 2004.

### **1.6 Progressive Reclamation Work Undertaken**

Most reclamation consisted of an on-going site clean up related to the 1963 - 1965 exploration programs. Debris consists of machinery, vehicles, fuel and salt drums, general garbage and miscellaneous metal.

One of the old buildings was repainted at the old base camp site. A new diesel stove was put in the cabin, the floor was shored up and the cabin was insulated.

Drums, small vehicles and scrap metal were collected and consolidated into piles. Some items were cannibalized and used at the current camp. Refer to Appendix 3, section 6 for pictures.

Runway improvement involved continual grooming, the installation of a culvert system, navigational aids including wind socks, marker stakes and a centre line. (See section 7).

### 3.0 INFORMATION AS REQUIRED BY PARTS I, ITEM 5

This section deals with the monitoring program.

#### 3.1 Water Consumption Rates

#### 3.2 Camp Operations

From July 1 to September 11, 2004, the average daily consumption of water from Robert Lake was approximately 500 gallons per day (2200 litres). Refer to Appendix 2. This works out to be **0.22 cubic metres or 2.2 % the daily maximum quantity allowance of 10 cubic metres per day as set out in the licence.**

#### 3.3 Drilling Operations

Water is used mainly to cool drilling bits and to deliver a solution of salt to the drill string.

The pump delivers water at a rate of 25 litres per minute and operates for about 12 to 14 hours per day. With the average 50% recirculation, the **average consumption was about 9,000 to 10,500 litres per drill per day or 9 to 11 cubic metres of water representing 15 to 20% of the allowance of 70 cubic metres per day of water. Recirculation varied to more than 70% during normal running of hot water to less than 10% when a fault seam or void was encountered during drilling**

During the later half of the year, an increase in the salt mixture, colder temperatures and longer pumping distance lead the drill contractors to rationalise that a stronger pump would be required to ensure that sufficient water is available for drilling in 2005. Additional pumping facility would require a modification of this Water Licence.

It is intended to use three - four (3-4) drills in 2005. An amendment to the water licence is required to allow a more effective use of the diamond drill. It is expected that increased pump capacity and the two additional drills to a four drill programme will require an increase in the maximum water draw per day. Assuming no recirculation and 24 hour pumping capacity, this would mean maximum water consumption per drill of:

**54 litres (12 gallons) per minute x 60 minutes x 24 hours = 78,000 litres per day per drill or  
78 cubic metres per day**

**Assuming four drill rigs, the drill programme would require a maximum capacity of 312 cubic metres per day.**

It is important to note that this theoretical maximum capacity is technically unachievable. The optimistic average consumption with 20% recirculation and an improved operating efficiency of 20 hours per day would see an actual average consumption of 210 cubic metres per day.

**Actual water consumption would be approximately 70% of this figure or approximately 150 cubic metres per day. It is assumed that salt recirculation will be difficult due to the mixing of drill core (iron oxide) fines with the salt that result in reduced productivity. Additional mixing basins have been brought to the site to maximise recirculation and minimise salt consumption. However, it may be necessary to abandon recirculation attempt to maximise drill productivity.**

Discussion with Boart Longyear to improve productivity indicates a lower percentage of recirculation would result in a higher drill per metre productivity. This is balanced against an increase cost per metre due to the increased consumption of drill salt (calcium chloride). As the landed cost per tonne of the drill salt in Pond Inlet is \$1,000 per tonne, there is considerable effort to maximise recirculation to maximise effectiveness and minimise consumption of the drill salt. There is also a financial imperative to maximise drill productivity and reduce costs. The drill contractor Boart Longyear is unclear that it can improve meterage productivity without reducing recirculation. This would require increased salt consumption and a corresponding water requirement.

The flow rate calculation of Mary River is approximately 1.0 million cubic metres per day. See Appendix 5 for the flow rate calculation. Therefore accessing the Mary River as a water source for the maximum rate of 312 cubic metres per day would still have a minor impact on the capacity of the Mary River.

### **3.4 GPS Co-Ordinates for Water Sources**

See Appendix 6.

### **3.5 GPS Co-Ordinates for Waste Disposal**

See Appendix 6

## **4.0 ANY OTHER DETAILS ON WATER USE OR WASTE DISPOSAL REQUESTED BY THE BOARD BY NOVEMBER 1, 2004**

None requested as of November 01, 2004.



## **APPENDIX 1 - ENVIRONMENTAL BASELINE STUDY**

Knight Piésold Consulting visited the Mary River Camp from August 14th – 16<sup>th</sup>, 2004. A preliminary environmental assessment was undertaken involving a general reconnaissance of local flora, fauna and water drainage.

A water monitoring program was introduced, consisting of water sampling of Mary River and its tributary, Mine Creek.

August 26 - Water sampling done at 563019E, 7912566N at Mary River.

August 27 - Water sample at 564973E, 7914883N at Mine Creek. Slower flow rate than that of Mary River.

### **Water Testing Procedures**

Sampling completed twice, once in mid-August and at the end of August

Two Stations:

One on Mary River (samples A, C & E); and

One on the Mine Creek Drainage (samples B & D, once sample was damaged in transit)

Mine Creek Drainage	564973 E
	7914883 N
Mary River	563019 E
	791256
	(UTM Zone 17 –NTS 37G/5)

One large (1 l) and one small (250 ml) taken at each station

Results exhibited negligible trace metals or nutrients (see Appendix 7).

## APPENDIX 2 – CAMP WATER CONSUMPTION

WATER COMSUPTION LOG - MARY RIVER CAMP					
DATE	GALLONS	LITERS	DATE	GALLONS	LITERS
JULY 2, 2004	600	2730	AUGUST 14, 2004	500	2270
JULY 3, 2004	300	1370	AUGUST 15, 2004	600	2730
JULY 4, 2004	600	2730	AUGUST 16, 2004	590	2680
JULY 5, 2004	700	3180	AUGUST 17, 2004	590	2680
JULY 6, 2004	500	2270	AUGUST 18, 2004	500	2270
JULY 7, 2004	590	2680	AUGUST 19, 2004	650	2950
JULY 8, 2004	590	2680	AUGUST 20, 2004	300	1360
JULY 9, 2004	590	2680	AUGUST 21, 2004	590	2680
JULY 10, 2004	590	2680	AUGUST 22, 2004	590	2680
JULY 11, 2004	590	2680	AUGUST 23, 2004	350	1590
JULY 12, 2004	540	2450	AUGUST 24, 2004	590	2680
JULY 13, 2004	590	2680	AUGUST 25, 2004	300	1360
JULY 14, 2004	100	460	AUGUST 26, 2004	500	2270
JULY 15, 2004	600	2730	AUGUST 27, 2004	600	2730
JULY 16, 2004	500	2270	AUGUST 28, 2004	500	2270
JULY 17, 2004	600	2730	AUGUST 29, 2004	600	2730
JULY 18, 2004	600	2730	AUGUST 30, 2004	375	1700
JULY 19, 2004	610	2770	AUGUST 31, 2004	298	1350
JULY 20, 2004	300	1360	SEPTEMBER 1, 2004	600	2730
JULY 21, 2004	600	2730	SEPTEMBER 2, 2004	550	2500
JULY 22, 2004	600	2730	SEPTEMBER 3, 2004	600	2730
JULY 23, 2004	500	2270	SEPTEMBER 4, 2004	200	910
JULY 24, 2004	600	2730	SEPTEMBER 5, 2004	300	1360
JULY 25, 2004	500	2270	SEPTEMBER 6, 2004	300	1360
JULY 26, 2004	90	410	SEPTEMBER 7, 2004	200	910
JULY 27, 2004	600	2730	SEPTEMBER 8, 2004	450	2050
JULY 28, 2004	600	2730	SEPTEMBER 9, 2004	590	2680
JULY 29, 2004	400	1820	SEPTEMBER 10, 2004	585	2660
JULY 30, 2004		0	SEPTEMBER 11, 2004	400	1820
JULY 31, 2004	250	1140	SEPTEMBER 12, 2004	600	2730
AUGUST 1, 2004	450	2050	SEPTEMBER 13, 2004	550	2500
AUGUST 2, 2004	200	910	SEPTEMBER 14, 2004	600	2730
AUGUST 3, 2004	450	2050	SEPTEMBER 15, 2004	300	1360
AUGUST 4, 2004	950	4320	SEPTEMBER 16, 2004	300	1360
AUGUST 5, 2004	350	1590	SEPTEMBER 17, 2004	600	2730
AUGUST 6, 2004	605	2750	SEPTEMBER 18, 2004	550	2500
AUGUST 7, 2004	700	3180	SEPTEMBER 19, 2004	200	910
AUGUST 8, 2004	610	2770	SEPTEMBER 20, 2004	300	1360
AUGUST 9, 2004	500	2270	SEPTEMBER 21, 2004	300	1360
AUGUST 10, 2004	550	2500	SEPTEMBER 22, 2004	200	910
AUGUST 11, 2004	700	3180			
AUGUST 12, 2004	300	1360			
AUGUST 13, 2004	400	1820			

**AVERAGE ABOUT 500 GAL PER DAY**

## APPENDIX 3 – CAMP PHOTOS

### FIGURES

#### Section 1 – Camp Water Use



Ablution Module-sinks Kitchen Module-sinks 2 x 305 gal water tanks Washer and Dryer and Water heater



Showers

Water to cool blades

Mary River Base Pump

Robert Lake is the  
Camp Water Source

#### Section 2 - Drilling Water Use



Pump Shack at Mary

Salt Mixing Site

Salt Water Bathes

Water Pumps



Typical Water Line  
several kilometres to drill station



Section 3 – Greywater Disposal.



Greywater Drainage  
From Ablution Module



Greywater Drainage  
From Kitchen Module



Construction of Kitchen  
Greywater Sump

Section 4 – Toilet Waste



Toilets



Toilet Waste Sump #1



Toilet Waste Sump #2

Section 5 -- Garbage



Camp Incinerator



Furnace



Residual Waste Drums



Section 6 – On Going Reclamation.

Clean up of the 1965 Base Camp consisted of the consolidation of scattered debris



Consolidation of Debris



1965 Muskeg



Various Machinery etc. Fuel and Salt Drums



Consolidation of Drums



Discarded Propane (1965)



Camp Shack Exterior



Repainted Interior

Section 7 Runway Improvement



Culverts



Culverts in place



Western Wind Sock



Runway Markers



Airstrip Eastern Centre line



Airstrip Western Centre line



Eastern Wind Sock



## **APPENDIX 4 – SPILL REPORTS**



## NWT SPILL REPORT

(Oil, Gas, Hazardous Chemicals or other Materials)

24 - Hour Report Line  
Phone: (867) 920-8130  
Fax: (867) 873-6924

<b>A</b> Report Date and Time 2004 JUNE 19	<b>B</b> Date and Time of spill (if known) 2004 JUNE 14/15	<b>C</b> <input checked="" type="checkbox"/> Original Report <input type="checkbox"/> Update no. _____	Spill Number					
<b>D</b> Location and map coordinates (if known) and direction (if moving) UTM 7914000N ; 558800E MAPSHEET 379/5: SOUTH SIDE OF SE END OF AIRSTRIP.								
<b>E</b> Party responsible for spill FIELD TECHNICIAN WORKING FOR SUITE 500 - 56 TEMPERANCE ST BAFFINLAND IRON MINES CORPORATION TORONTO, ONT, M5H 3V5 TEL (416) 364 8820 ; FAX (416) 364 0193								
<b>F</b> Product(s) spilled and estimated quantities (provide metric volumes/weights if possible) 10-15 litres of UNLEADED GASOLINE								
<b>G</b> Cause of spill HELICOPTER DOWN DRAFT KNOCKED OVER BUNG WITH 25-30 litres left in it. BUNG WAS REPORTEDLY TIGHT BUT LEAKED OVER A COUPLE OF HOURS. SPILL OCCURRED DURING CAMP CONSTRUCTION & MOBILISATION.								
<b>H</b> Is spill terminated? <input checked="" type="checkbox"/> yes <input type="checkbox"/> no	<b>I</b> If spill is continuing, give estimated rate	<b>J</b> Is further spillage possible? <input type="checkbox"/> yes <input checked="" type="checkbox"/> no	<b>K</b> Extent of contaminated area (in square meters if possible) 1 to 15 m <sup>2</sup>					
<b>L</b> Factors effecting spill or recovery (weather conditions, terrain, snow cover, etc.) THE BUNG WAS TIGHT BUT EITHER CROSSTHREADED OR RUBBER GASKET AROUND BUNG WAS TORN, ALLOWING SLOW LEAKAGE OF FUEL		<b>M</b> Containment (natural depression, dikes, etc.) NOT APPLICABLE, CONTAINMENT SITE WAS BEING CONSTRUCTED						
<b>N</b> Action, if any, taken or proposed to contain, recover, clean up or dispose of product(s) and contaminated materials ABSORBENT MATERIAL WAS LAIN AND ALL CONTAMINATED SOIL REMOVED FROM SITE. APPROXIMATELY 20 kg OF CONTAMINATED SOIL WAS REMOVED AND WILL BE REDISPOSED OF IN POND INLET DUMP								
<b>O</b> Do you require assistance? <input checked="" type="checkbox"/> no <input type="checkbox"/> yes, describe:		<b>P</b> Possible hazards to person, property, or environment; eg: fire, drink water, fish or wildlife NONE						
<b>Q</b> Comments or recommendations DISCUSSIONS WITH FIELD PERSONNEL IS INCONCLUSIVE TO EXACT CAUSE OF SPILL. THE RUBBER GASKET THAT FORMS A SEAL (IMPERMEABLE) WAS BROKEN, PROBABLY DUE TO CROSS-THREADING THE BUNG. THIS WOULD ALSO HAVE ALLOWED THE LEAK TO OCCUR AND TORE THE GASKET. ADDITIONAL GASKETS HAVE BEEN PURCHASED AND ALL FIELD TECHNICIANS HAVE WILL BE MADE AWARE OF ENSURING THAT THE RUBBER GASKET IS NOT DESTROYED AND MORE IMPORTANTLY THAT THE DOUBLE THREADING DOESN'T OCCUR.		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; padding: 5px;">FOR SPILL LINE USE ONLY</th> </tr> <tr> <td style="padding: 5px;">Lead agency</td> </tr> <tr> <td style="padding: 5px;">Spill significance</td> </tr> <tr> <td style="padding: 5px;">Lead Agency contact and time</td> </tr> <tr> <td style="padding: 5px;">Is this file now closed? <input type="checkbox"/> yes <input type="checkbox"/> no</td> </tr> </table>		FOR SPILL LINE USE ONLY	Lead agency	Spill significance	Lead Agency contact and time	Is this file now closed? <input type="checkbox"/> yes <input type="checkbox"/> no
FOR SPILL LINE USE ONLY								
Lead agency								
Spill significance								
Lead Agency contact and time								
Is this file now closed? <input type="checkbox"/> yes <input type="checkbox"/> no								
Reported by SIMON MONTGOMERY JACOBIE MATHIAS	Position, Employer, Location FIELD TECHNICIAN BAFFINLAND - MARYSVILLE	Telephone N/A : 558 RADIO CURRENTLY IN CAMP						
Reported to MICHAEL ZUREWSKI	Position, Employer, Location PRESIDENT BAFFINLAND - TORONTO	Telephone 416 364 8820						





## NWT SPILL REPORT

(Oil, Gas, Hazardous Chemicals or other Materials)

24 – Hour Report Line  
Phone: (867) 920-8130  
Fax: (867) 873-6924

<b>A</b> Report Date and Time <p style="font-size: 1.2em;">JY13/04</p>	<b>B</b> Date and Time of spill (if known) <p style="font-size: 1.2em;">JY12/04</p>	<b>C</b> <input type="checkbox"/> Original Report <input type="checkbox"/> Update no. _____	Spill Number
<b>D</b> Location and map coordinates (if known) and direction (if moving) <p style="font-size: 1.2em;">Air strip - Mary River Base Camp</p>			
<b>E</b> Party responsible for spill <p style="font-size: 1.2em;">Ken Borek Air ways</p>			
<b>F</b> Product(s) spilled and estimated quantities (provide metric volumes/weights if possible) <p style="font-size: 1.2em;">Twin Otter fuel</p>			
<b>G</b> Cause of spill <p style="font-size: 1.2em;">Leaking Fuel, Fitter</p>			
<b>H</b> Is spill terminated? <input checked="" type="checkbox"/> yes <input type="checkbox"/> no	<b>I</b> If spill is continuing, give estimated rate <p style="font-size: 1.2em;">No</p>	<b>J</b> Is further spillage possible? <input type="checkbox"/> yes <input checked="" type="checkbox"/> no	<b>K</b> Extent of contaminated area (in square meters if possible) <p style="font-size: 1.2em;">1.5 metre<sup>2</sup></p>
<b>L</b> Factors effecting spill or recovery (weather conditions, terrain, snow cover, etc.)		<b>M</b> Containment (natural depression, dikes, etc.)	
<b>N</b> Action, if any, taken or proposed to contain, recover, clean up or dispose of product(s) and contaminated materials <p style="font-size: 1.2em;">Remove fuel soaked material into bag</p>			
<b>O</b> Do you require assistance? <input checked="" type="checkbox"/> no <input type="checkbox"/> yes, describe:		<b>P</b> Possible hazards to person, property, or environment; eg: fire, drink water, fish or wildlife <p style="font-size: 1.2em;">None</p>	
<b>Q</b> Comments or recommendations <p style="font-size: 1.5em;">2-3 litre spilled</p>			<b>FOR SPILL LINE USE ONLY</b>
			Lead agency
			Spill significance
			Lead Agency contact and time
			Is this file now closed? <input type="checkbox"/> yes <input type="checkbox"/> no
Reported by <p style="font-size: 1.2em;">G. Masim-Apps</p>	Position, Employer, Location <p style="font-size: 1.2em;">Geologist Baffinland</p>		Telephone <p style="font-size: 1.2em;">8816-314 66078</p>
Reported to <p style="font-size: 1.2em;">G. Masim-Apps</p>	Position, Employer, Location <p style="font-size: 1.2em;">Geologist Baffinland</p>		Telephone <p style="font-size: 1.2em;">8816-314-66078</p>

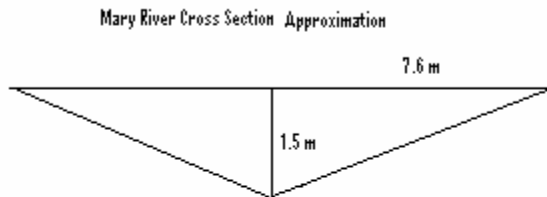
## APPENDIX 5 – WATER FLOW RATE CALCULATIONS

Flow Rate Calculation for Mary River as of August, 2004.

Site location: UTM 563142E, 7912451N

$$\begin{aligned}
 \text{Rate} &= \text{Velocity} \times \text{Area of Triangle} \\
 &= 1.8 \text{ m / s} \times \frac{1}{2} \text{ Base} \times \text{Height} \\
 &= 1.8 \text{ m / s} \times \frac{1}{2} \times 7.6 \text{ m} \times 1.5 \text{ m} \\
 &= 12 \text{ cubic metres per second} \\
 &\sim = \mathbf{1 \text{ million cubic metres per day} *}
 \end{aligned}$$

\* (average flow rate as monitored and measured over a four day period each in mid July and mid August (rate ranged from 1.5 to 2.5 metres per second, and averaged 1.8 metres per second)



$$\text{Velocity} = \text{Distance } 50 \text{ metres} / \text{Time } 27.5 \text{ seconds} = 1.8 \text{ m/s}$$

$$\text{Area of Triangle} = \frac{1}{2} \text{ Base} \times \text{Height}$$

Other flow observations:

Mine Creek Drainage flow rate a trickle as of September 18, 2004.

Mary River flow as of mid-September is one-half the rate from mid-August 2004. On 26 September, a flash freeze had the Mary River freezing 'solid' over a 36-hour period.

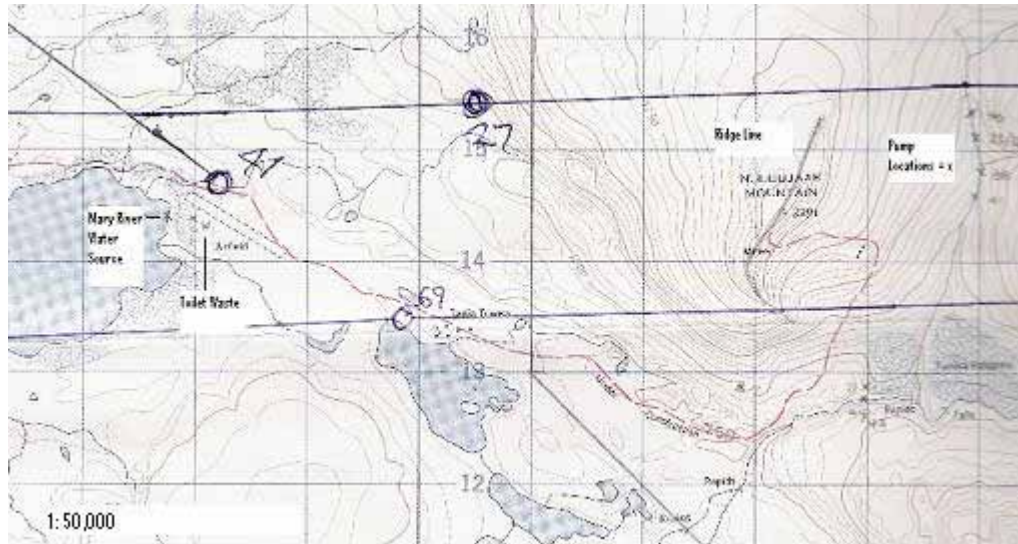
## APPENDIX 6 – DRILL WATER STATIONS

### Locations FOR WATER SITES AND WASTE DISPOSAL

PUMPING LOCATIONS						
FOR	LATITUDE			LONGITUDE		
DRILL SITE	degrees	minutes	seconds	degrees	minutes	seconds
MR1-04-31	71	18	32	79	12	22
MR1-04-32	71	18	32	79	12	22
MR1-04-33	71	19	45	79	10	46
MR1-04-34	71	19	45	79	10	46
MR1-04-36	71	19	45	79	10	46
MR1-04-37	71	19	34	79	10	46
MR1-04-38	71	19	34	79	10	46
MR1-04-39	71	19	34	79	10	46
MR1-04-40	71	19	54	79	10	51
MR1-04-41	71	19	28	79	10	51
MR2-04-42	71	18	20	79	8	2
MR1-04-44	71	18	28	79	12	22
MR1-04-45	71	18	28	79	12	22
BASE CAMP	71	19	26	79	22	20
WASTE DISPOSAL LOCATION						
BASE CAMP	71	19	26	79	22	0



**Water Source and Waste Disposal Map for Mary River Base Camp and Drilling Area**





## **APPENDIX 7 – WATER TEST RESULTS**

MARY RIVER BASE CAMP- AUGUST 2004

