APPENDIX A

Additional Pre-Hearing Conference Commitments

CUMBERLAND COMMITMENTS

Additional Pre-Hearing Conference Commitments

Commitment No. 1

All new information given in Technical Meeting presentations will be included in the FEIS.

Response:

The final EIS and supporting documents include all new information presented during the Technical Meetings at the time of Pre-Hearing.

Commitment No. 2

Provide finalized mine plan and schedule to include revisions to pit designs and any changes to dike alignments.

Response:

Chapters on mine Plan excerpted from the Feasibility Study is as below:

1. Introduction

This section of the report describes the mine plan developed by AMEC for the Meadowbank Gold project.

Three geological models were built outlining the gold bearing zones. After resource modeling was completed, these models were examined individually to determine the potential for open pit mining of each area. Pit designs were created for each model and Measured and Indicated mineralization above the economic cutoff was examined. Dilution was added to the mineralization based on the zones projected thickness, and when combined with the mining recovery, form the basis of the mine plan.

Conventional open pit shovel-truck methods will be used for mining. The milling rate will be 7,500 t/d ore for approximately 8.3 years. The mining function will be done by the mine operator with a combination of leased and purchased equipment. Waste stripping will vary by year, from a maximum of 79,000 t/d in Year 2 down to 11,000 t/d in Year -1. The average waste stripping rate is 52,000 t/d.

Mining occurs in four phases for the Portage pit: a two stage starter pit (Portage 1 and 2) mined for five years, Portage 3, and Portage 4. The Goose Island and Vault pits are mined as a single stage. Overlaps of the pits and phases occur to balance waste stripping, ore feed, and truck requirements.

2. Open Pit Optimization

To run the pit optimization, the block model was exported from Gemcom© to Whittle 4X®. Only model blocks carrying ore grades within the Measured and Indicated category were classified as potential ore blocks. Blocks carrying grades in the Inferred category were treated as waste, and referenced as waste in this report. A series of pit shells were created at various gold prices utilizing a varying revenue factor between 0.3 and 2.0, these pit shells were then reviewed with

Cumberland and a selection was made that best fit the profile selected for the project. For the Portage model the shell selected was based on the maximum gold available at the base case revenue factor of 1.00. The Goose Island shell selected was based on the shell that fell up against the geotechnical limits for the proposed deep water dike encircling the pit. The shell selected was at revenue factor 0.992. The Vault pit area shell selected was a revenue factor of 0.837. This shell fell up against the Indicated and Inferred boundary for all directions around the pit shape. The shells were loaded back into the mine planning package and evaluated for accessibility and overall pit footprint..

The parameters used to create the optimization models are summarized in the following table.

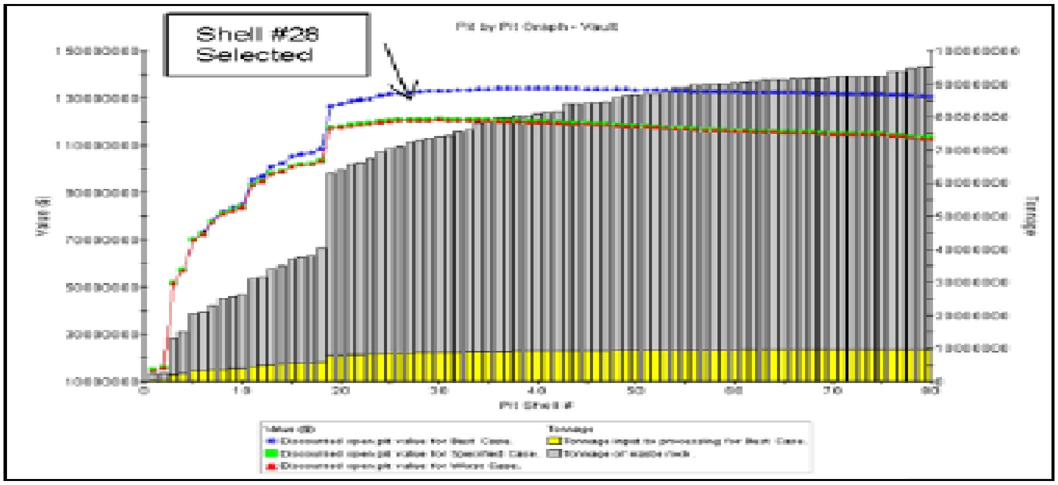
Pit Optimization Parameters

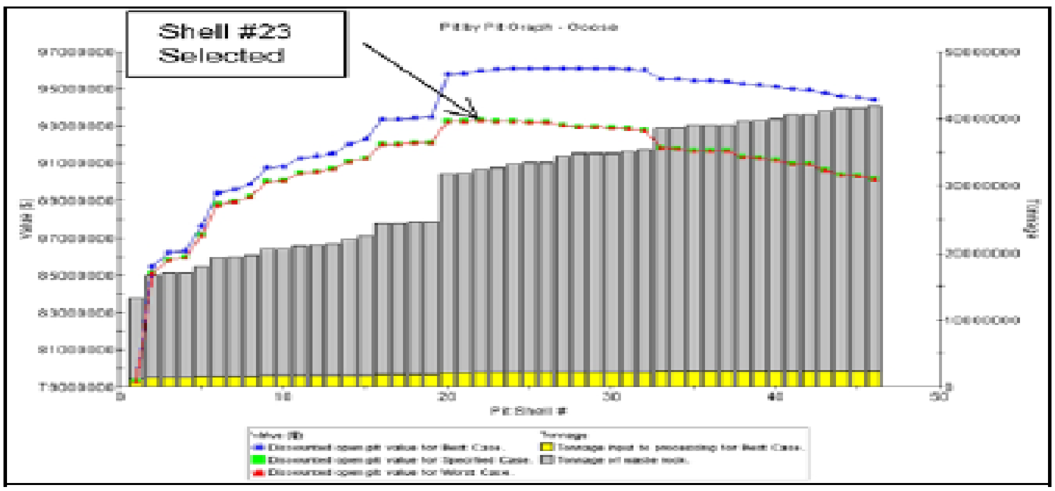
Parameter	Unit	Portage	Goose Island	Vault
Block Size				
X	(m)	6	6	6
Y	(m)	10	10	10
Z	(m)	6	6	6
Bulk Density				
Ore & Waste	(t/m^3)	Variable from model	Variable from model	2.65
Gold Price	($/oz)	400	400	400
Exchange Rate				
Cdn$/US$		1.3333	1.3333	1.3333
Primary Process Recovery (Au)	(%)	94.1	96.1	91.3
Costs				
Process and G&A	($/t milled)	21.22	21.22	21.22
Ore mining @ 7,500 t/d	($/t mined)	1.70	1.70	3.25**
Incremental Haulage	($/t mined)	0.00	0.00	0.00
Waste mining	($/t mined)	1.30	1.30	1.30
*Pit Slope Angles**	(degrees)	30° to 55°	40° to 51°	28° to 52°
Resulting Marginal Cutoff	g/t	1.32	1.29	1.36

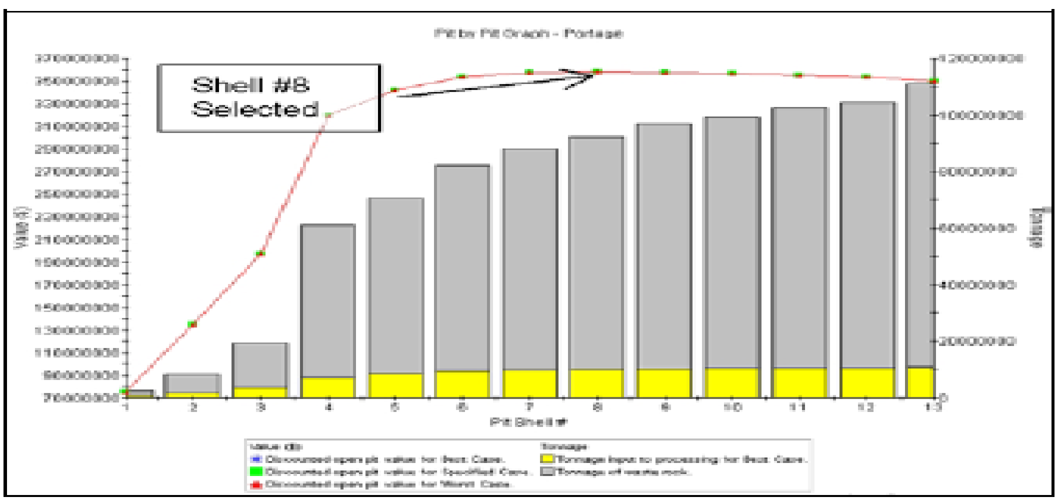
*See Appendix B for more detailed pit slope angles.
**(Vault Ore Mining Cost = 1.30 (waste) + 0.40 (in-pit ore inc) + 1.55 (ex-pit ore haul inc.)

The following three figures illustrate the optimized shell output and the position where the design pits fit on the graphs.

Whittle Nested Shell Output







3. Open Pit Design

3.1 Geotechnical Evaluation

Pit slope design criteria were developed by Golder and are listed in the following technical memoranda:

- Technical Memorandum on North Portage Pit Slope Design Criteria, 14 May 2004
- Technical Memorandum on Vault Pit Slope Design Criteria, 9 January 2004
- Technical Memorandum on Third Portage Pit Slope Design Criteria, 15 December 2003
- Technical Memorandum on Goose Island Pit Slope Design Criteria, 21 August 2003.

The following summarizes the key points for each pit area that were used in the determination of the pit slopes and the costing for the study.

Portage

The Portage pit was broken down into five major zones and 21 secondary zones. A geotechnical block model was assembled in order to use these zones for design purposes.

The following table outlines the slope parameters that were used in the design of the pit.

Portage Pit Slope Parameters

Zone	Contains Sub-sectors	*BFA (°)	Berm width (m)	*IFA (°)
1	0,10	35	4	33
2	1,2,6,9	65 to 70	8	51 to 55
3	7,8,14,15,101,102,106	65 to 70	10-12	46 to 52
4	11,12,13,16,109	70	10	52
5	3,20,107	50 to 60	10	39 to 45

* BFA – Bench Face Angle

* IRA – Inter-Ramp Angle

Goose Island

The Goose Island pit slopes were modeled using a geotechnical zone block model to represent the five major zones. Within these slope zones, recommended slope parameters are variable by rock type. The following table summarizes the slope parameters that were used in the design of the pit.

Goose Island Pit Slope Parameters

Zone	Model Azimuth	BFA	Berm width	IRA
1	340 to 40	60 to 65	8 to 10	45 to 51
2	40 to 120	55 to 65	8	44 to 51
3	120 to 240	60 to 65	8 to 10	45 to 51
4	240 to 340	60 to 65	10	45 to 49

The Golder recommended sub-zoning of sector 2, based on the dip of the bedding, was replaced with slope parameters averaged over the height of the zone. AMEC considers this simplification reasonable for feasibility level planning as it provides sufficiently accurate global volumetrics and a reasonable projection of the pit crest position. Pre-production detailed engineering will require a more detailed geotechnical slope model in this sector in order to achieve the recommended slope criteria.

Vault

The Vault pit slopes were modeled using a radially defined sectors, as shown in below.

Vault Pit Slope Parameters

Zone	Model Azimuth	BFA	Berm width	IRA
1	168 to 185	70	10	52
2	140 to 168	65	10	49
3	015 to 140	55	10	42
4	356 to 015	65	10	49
5	290 to 356	70	10	52
6	185 to 290	See below	-	-

Zone 6 represents the ore footwall, which dips into the pit at inclinations of 20° to 30°. The general strategy was to mine to the footwall of the mineralization, rather than using a benched geometry. In areas where mining below the footwall was required to establish ramp access, the following benching configurations were used:

- where the footwall slopes were flatter than 28°, multi-benching with a BFA = 65° and IRA=49°.
- where the footwall slopes were equal to or steeper than 28°, single benching with a BFA = 65° and IRA=28°.

The slope sector definitions shown above are different than those recommended by Golder due to differences in software used. Golder’s sector boundaries are lines orthogonal to an ellipse imposed over the pit in plan view, rather than lines radiating out from a point near the centre of the pit. As the pit design software used by AMEC defines sectors only by lines radiating from a single point, radial sector definitions were created to approximate Golder’s sector definitions. The completed pit model designs were reviewed by Golder for consistency with their recommended slope design criteria. The review confirmed that their recommended slope design criteria were generally followed. Where inconsistencies between their recommended criteria and the completed pit designs were noted, these were identified, and recommendations to address these inconsistencies were presented for incorporation in the next stage of design.

3.2 Design Parameters & Summary

The general project parameters used in the detailed pit design, including the geotechnical data described above, are as follows:

Bench height, single bench mining .... 6 m
Final bench heights .... 24 m
Berm width .... variable
Haul roads and pit ramps
Total width allowance. .... 25 m
Running surface .... 18 m
Berms and ditches........ 4 m
Maximum grade........ 10%

Total haul road width allowance is 25 m, except for Goose, which was designed to 23 m. This is narrower than desired and since Goose Island wall slopes will need to be changed, the ramp width should also be changed at this time. It is estimated that this will increase waste by approximately 500,000 t.

The Portage pit has been broken down into four phases based on gold grade, strip ratio, and the ability to access the pit based on the dike construction sequence. Stripping will start on the Portage island area with waste being used to construct the dikes and the tailings dam across Second Portage Lake, and any infrastructure requirements. After these are complete, waste will be hauled to the Goose Island dikes that will eventually be used for holding out the water from Third Portage Lake. Once these areas have been completed the waste will be hauled across the Second Portage causeway and placed in a waste storage area on the mainland to the north of the Second Portage Lake. Waste material is to be segregated to encapsulate any acidic and potentially acid generating (PAG) material within this dump. Non-acid generating material that is encountered within the pit will be used to construct the outer edges of the dump and to place over PAG as it is hauled from the pit.

Goose Island waste material will initially be placed below reclaimed water level within the dike structure. Once this area has been filled, waste will be hauled to the main Portage dump area.

Vault waste is predominantly comprised of intermediate volcanics and is to be hauled to the west of the footwall where it will be placed in a waste repository in lifts.

4. Pit Design Tonnages

The resources have been modeled utilizing a 1 g grade shell. To convert the in situ Measured and Indicated to anticipated mined tonnages, an in situ grade cutoff of 1.5 g/t was applied to Goose Island and Portage and 1.75 g/t applied to the Vault area. These cutoff grades are higher than the marginal grades resulting from the parameters in Table 4.1.

This was done in anticipation of the effects of dilution and, in the case of Vault, to account for the incremental haulage associated with the Vault Pit. These grade cutoffs in conjunction with a grade thickness cutoff formed the basis for the reserves. The thickness for each lens has been modeled and this thickness multiplied by the grade to give a gram per tonne metre value (g/tm). Material not meeting the grade and grade thickness criteria has been treated as waste. For mining purposes a 95% mining recovery was applied, followed by a dilution factor. The dilution factor was calculated as a function of the mineralized zone thickness. Fifty centimetres' of dilution was added to the hanging wall and 50 cm added to the footwall. The diluting material grade was determined by creating 0.5 m drillhole composites immediately outside the resource grade shell and calculating the average grade of the composites. The diluting material grade for each pit area was: 0.29 g/t in Portage, 0.28 g/t in Goose, and 0.38 g/t in Vault. Following this procedure resulted in dilution ranging from a low of 12% in Vault to a high of 27% in the Portage phase 4 area. Overall, dilution for the project averages 15%. The table below shows the in situ and diluted reserves by phase and pit area.

Over the course of the feasibility study the parameters for the calculation of the cutoff grade have changed. Process and G&A costs have risen from $21.22/t processed to $23.39/t processed, gold prices have risen, and the Canadian dollar has appreciated. At the time of reporting, gold was trading at US$434/oz and the Canadian dollar at 0.806.

This has had the effect of changing the calculated marginal cutoffs to the following:

Portage.. 1.45 g/t
Goose.. 1.42 g/t
Vault .... 1.50 g/t

In all cases the marginal cutoff grade calculated by economics has fallen below that utilized for the study. AMEC believe utilizing the cutoff grades of 1.5 for Portage and Goose Island and 1.75 for Vault has provided a margin of safety for the grade cutoff selected.

In-Pit Reserves by Pit & Phase Area

	Cutoff		Proven		Probable		Proven + Probable	
Pit	(g/t)	(g/t-m)	(kt)	Grade (g/t)	(kt)	Grade (g/t)	(kt)	Grade (g/t)
Undiluted								
Portage 1	1.5	3.0	1,161	5.85	4,891	4.63	6,052	4.866
Portage 2	1.5	3.0	-	0.00	1,655	5.25	1,655	5.253
Portage 3	1.5	3.0	-	0.00	1,299	5.19	1,299	5.193
Portage 4	1.5	3.0	-	0.00	1,148	4.24	1,148	4.242
Total Portage	1.5	3.0	1,161	5.85	8,993	4.78	10,154	4.900
Goose	1.5	3.0	-	-	2,018	5.91	2,018	5.914
Vault	1.75	3.5	51	3.60	7,892	3.52	7,943	3.524
Total Project			1,212	5.75	18,903	4.38	20,115	4.459
Diluted								
Portage 1	1.5	3.0	1,253	5.19	5,258	4.13	6,511	4.33
Portage 2	1.5	3.0	-	-	1,832	4.55	1,832	4.55
Portage 3	1.5	3.0	-	-	1,568	4.15	1,568	4.15
Portage 4	1.5	3.0	-	-	1,269	3.69	1,269	3.69
Total Portage	1.5	3.0	1,253	5.19	9,927	4.15	11,180	4.27
Goose	1.5	3.0	-	-	2,247	5.09	2,247	5.09
Vault	1.75	3.0	53	3.31	8,416	3.18	8,469	3.18
Total Project			1,306	5.11	20,590	3.86	21,896	3.93

Note: 95% mining recovery applied to all areas. 0.5 m contact dilution applied to all hanging walls and footwalls dilution grades are 0.29 g/t for Portage, 0.28 g/t for Goose and 0.38 g/t for the Vault pit

For the current mining rate and projected geological conditions, AMEC believe that the dilution and mining recovery are reasonable. AMEC believe that with further geological information and with any revision in the mining rates the dilution should be re-estimated.

5. Waste Material Handling

Waste material was categorized into seven different zones based on the rock types defined within the geological model. Inferred material within the pit has been treated as waste. The following table outlines the material types defined within the pit model, after dilution has been considered.

Waste Quantities & Type (tx000)

	Portage						
Waste Type	One	Two	Three	Four	Goose	Vault	Total
Mafic	13,781	4,453	4,317	1,590	17,768	-	41,908
Intermediate Volcanics	2214	115	454	270	9,494	-	12,546
Interbedded Volcanics	0.3	-	997	55	-	-	1,053
Banded Iron Formation	16974	1,774	9,415	2,028	3,956	-	34,146
Quartzite	22	-	872	34	2,523	-	3,451
Background IV	8,794	491	1,665	866	-	-	11,816
Unclassified Volcanics	-	-	-	-	-	68,734	68,734
Total Rock Waste	41,785	6,832	17,721	4,843	33,740	68,734	173,127
Overburden	3,601	-	3,131	57	3,045	-	9,834
Total	45,386	6,832	20,852	4,899	37,014	68,734	184,740

6. Mine Plan

6.1 Summary

Mining at Meadowbank will be by conventional open pit truck and shovel methods. The primary mining fleet will consist of two, 11 m3 hydraulic front shovels and 14, 150 t trucks (decreasing to 11, 150 t trucks in Year 5, and to eight trucks in Year 8), and four blasthole drills. Support equipment will include bulldozers, graders, loaders, and excavators to maintain the surfaces of the roads, dumps and operating benches and the water collection system at the pit rim and in-pit.

Mill feed will be hauled to a gyratory crusher at the south side of the Portage pit. The annual mine production and mill feed forecast for the project is included in Appendix B and is summarized in the following table.

Mine Production Forecast

	Total			
Year	Mill Feed (tx000)	Au (g/t)	Waste (tx000)	S.R.
-2*	111	6.35	2,396	21.7
-1*	387	6.13	4,069	10.5
1	2,241	4.84 (5.08)**	26,630	9.7
2	2,738	3.99	28,820	10.5
3	2,738	4.54	20,621	7.5
4	2,738	4.45	25,390	9.3
5	2,738	3.75	23,756	8.7
6	2,738	2.93	22,066	8.1
7	2,738	3.07	17,598	6.4
8	2,071	3.63	10,576	5.1
9	659	3.63	1,040	1.6
Total	**21,897**	**3.93**	**182,962**	**8.36**

*stockpiled ore for plant feed in Year 1
**mill feed including stockpile feed

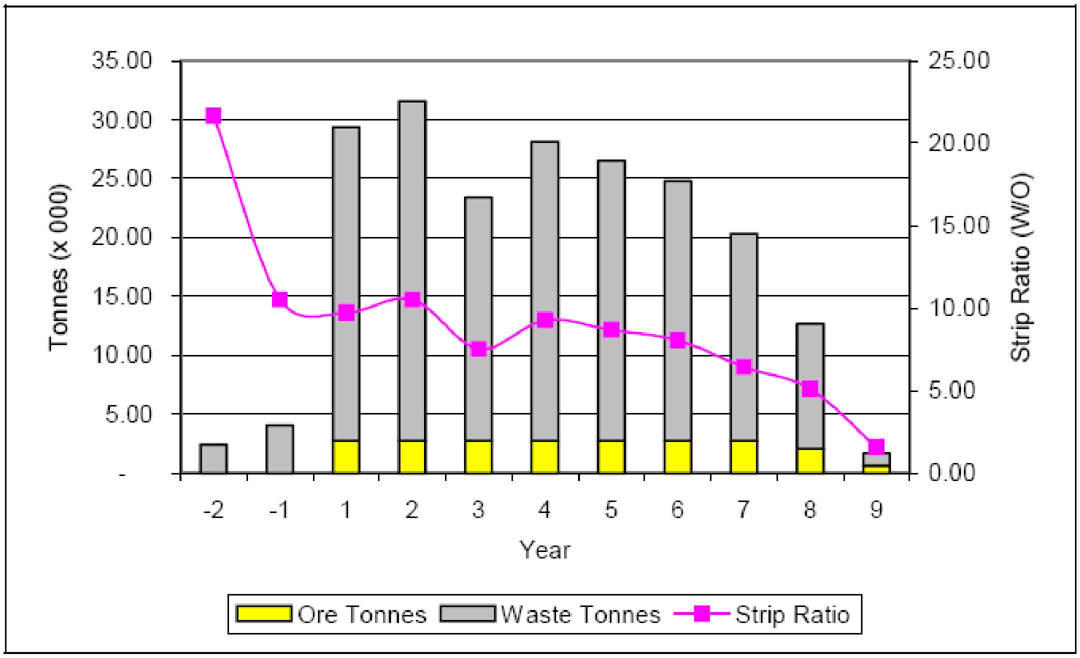
6.2 Pit Sequencing

The Meadowbank deposits are to be mined from three individual pits, with the Portage pit divided into four phases. The Portage starter phase is centred on a higher-grade section in the middle of the deposit, and the second phase continues this pit to depth. The third phase is centred on the west of the deposit and the final phase develops the connector zone, which ties Portage 1 and Portage 3 together. The phasing of the Portage pit allows the higher grade and lower strip ratio material to be exploited first. It also allows the creation of a backfill ramp over a mined out section within the pit and by emptying out specific portions of the pit, allows for the placing of backfill within the mined out areas.

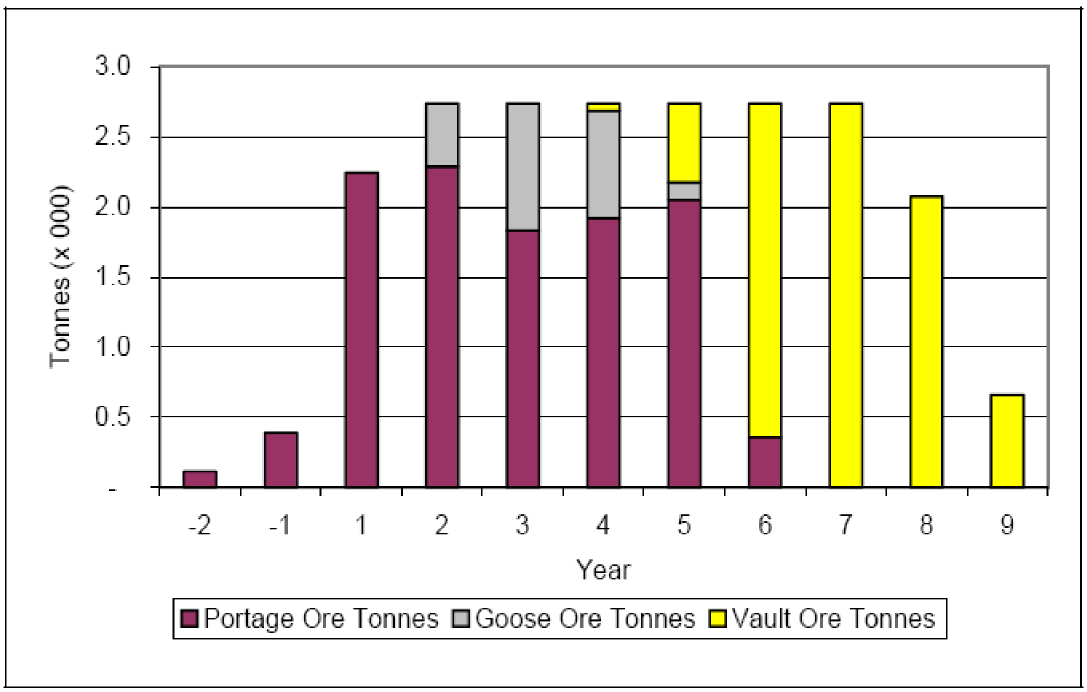
This lowers the overall mining costs and the site disturbance. The Goose Island pit due to its small size is mined as a single pit. The Vault pit has been mined as a single pit to allow for the equipment to operate as efficiently as possible.

Overall the grade profile and strip ratio are presented in the following figures.

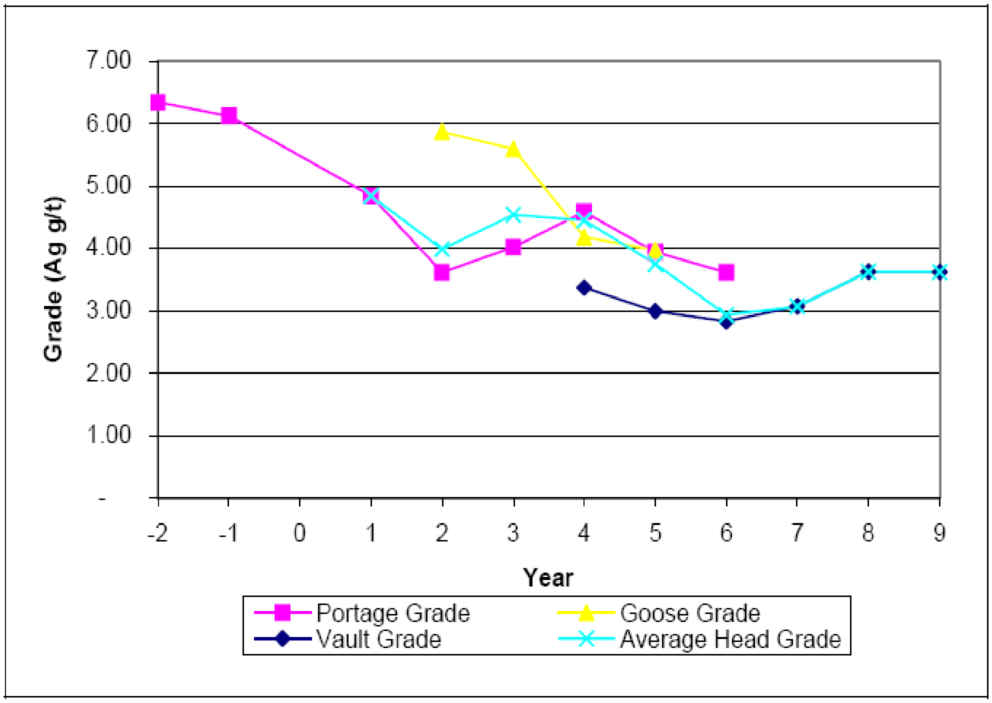
Mine Production Forecast



Mill Feed Tonnage by Pit



Head Grades by Pit



6.3 Pre-Production Mine Development

Pre-production mine development will be completed over a two year period, prior to mill start-up. During this period, 6,466 kt of waste material will be removed and 498 kt of mill feed stockpiled by the crusher for plant feed during Year 1. Of the total amount of waste, nearly 78% will be used for pre-production construction.

Initial pre-stripping will commence on the top of the Portage pit at the 150 m elevation. Waste material will initially be hauled to the east to construct the causeway across Second Portage Lake. Once this causeway has been completed, the water cutoff wall will be constructed and pumping of Second Portage Lake will proceed. While the cutoff wall is being installed, waste material will be used for the construction of the tailing facility.

Additional waste will be used for the construction work on-site.

6.4 Production Forecast

The mine production forecast was prepared on an annual basis for all years. The annual production target is based on maintaining the plant throughput at design capacity. Basic mine production parameters are as follows:

- 365 operating days per year (with 10 unscheduled down days per year)
- 7,500 t/d of feed to the crusher (average 7,711 t/d mining rate with down days)
- maintain production until the pit is exhausted
- smoothing of equipment requirements

- Year 8 includes a phasing down of production due to foreseen difficulties in maintaining 7,500 t/d from a rapidly shrinking working space at the pit bottom. Nine benches are mined in this year, at an average 5,700 t/d.

7. Mining Equipment

7.1 Summary

The mine production forecast and general logistical considerations were the driving forces behind fleet selection. Emphasis was placed on equipment with the ability to selectively mine the ore, flexibility to react quickly to changing conditions during mining operations, and the ability to work around narrow mining headings.

Pre-production mining will have one main priority, development of sufficient waste to complete the site construction. The pioneering work will be done by an owner-operated fleet. The required equipment fleet for the mine production period, from Years 1 to 9, is listed in the following table.

Production Equipment Fleet Requirements

Years	-2	-1	1	2	3	4	5	6	7	8	9*
152 mm (6") Blasthole drill	1	2	4	4	4	4	4	4	4	3	2
Tank drill	-	-	1	1	1	1	1	1	1	1	1
11.0 m^3 hydraulic front-shovel	-	-	2	2	2	2	2	2	1	1	1
11.0 m^3 front loader	1	1	2	2	2	2	2	2	2	2	2
6.0 m^3 backhoe	-	-	2	2	2	2	2	2	1	1	1
150 t haulage truck	4	4	14	14	14	14	11	11	11	8	2
Water truck	-	-	1	1	1	1	1	1	1	1	1
230 kW track dozer	4	4	4	4	4	4	4	4	4	4	4
160 kW motor grader	2	2	2	2	2	2	2	2	2	2	2
2 m^3 backhoe	-	1	1	1	1	1	1	1	1	1	1

*Year 9 is a partial year.

7.2 General Operating Parameters

To determine the number of equipment units required for each major fleet, productivities were calculated based on estimated annual operating hours and mechanical availability. The estimate of annual hours available is shown in the table below.

Annual Hours Available

Schedule	
Calendar days	365 d/a
Scheduled down days	- d/a
Unscheduled down days	10 d/a
Available days	355 d/a
Scheduled	24 h/d
Scheduled	8,520 h/a
Fixed Delays	
Shift change (2)	0.5 h/shift
Coffee	0.33 h/shift
Lunch	0.5 h/shift
Total	1.33 h/shift
Shifts per day	2.0 shifts/d
Available	21.33 h/d
Available	7,572 h/a

To allow for inefficiencies, as Indicated in the table, a 50-minute operating hour was applied to all equipment. In addition, 70% truck availability to the loader was applied to the loading units. The estimated mechanical availability of the equipment decreases with hours worked, as shown in the following table.

Equipment Life & Mechanical Availability per 6,000 Hour Increment

	Life	Incremental Hours (000)							
		0-6	6-12	12-18	18-24	24-30	30-36	36-42	>42
	Hours	Mechanical Availability (%)							
Blasthole drill	60,000	90	88	86	84	82	80	78	77
Hydraulic front shovel	55,000	90	88	86	84	82	80	78	77
Haul truck	70,000	90	88	86	84	82	80	78	77
Track dozer	35,000	90	88	86	84	82	80	78	77
Motor grader	35,000	90	88	86	84	82	80	78	77
Excavator	30,000	90	88	86	84	82	80	78	77

7.3 Blasthole Drills

A maximum of four, 152 mm drills will be used for blasthole drilling. This drill size fits with the selected bench height of 6 m. It is not expected that drilling and blasting will be required in the overburden.

Wall control will include pre-shear drilling for all final walls but the footwalls. Footwall exposures will use a buffer row only and final wall cleanup will be done with a small excavator and dozers. A small drill will also be on site for any horizontal dewatering hole drilling, completion of the pre-shear drilling, and RC sampling for grade control.

Production drilling has been based on the production forecast, estimated drill factors, and calculated productivities. Buffer blast pattern drilling has been estimated from an assumed blast pattern over the perimeter length of each bench. The assumptions were based on a buffer row with 3.38 m spacing and 2.25 m burden. Drainage will be provided by both in-pit pumping and horizontal drain holes.

Drill productivities were calculated for ore and waste using the factors given in the following table. The theoretical penetration rate was determined by comparing calculations from previous studies, calculations provided by suppliers and actual operating experience.

Blasthole Drill Productivity

Production Drilling 152 mm		
Theoretical penetration rate	42.0	m/h
Effective penetration rate	34.0	m/h
Drill factor	77.7	bcm/m
Effective productivity	1313	bcm/h

7.4 Loading Equipment

Two, 11.0 m^3 hydraulic front shovels are required for years 1 through 6, and one for the remaining three years. Two, 11.0 m^3 loaders are required for the mine life, with the exception of pre-stripping Years –2 and –1. Two 6.0 m^3 backhoes are also required for the mine life, with the exception of pre-stripping Years –2 and –1. These backhoes will be used for defining the ore zones along the hanging wall side and clean up of ore from the footwall. Loading productivities were based on the parameters listed in the table below. These parameters were applied to the average specific gravities resulting from the mine production forecast to calculate overall productivities. Annual loading productivities are summarized below.

Loading Parameters

	6 m^3 Backhoe	11 m^3 Shovel	11 m^3 Loader	Units
Bucket size	6.1	11.0	11.0	(m^3)
Bucket fill factor	95	95	95	(%)
Average cycle time	0.57	0.57	0.57	(min)
Truck spot time	0.75	0.75	0.75	(min)
Truck availability to shovel	70	70	70	(%)
Operating efficiency	83.3	83.3	83.3	(%)
Swell factor	40	40	40	(%)
Moisture	4	4	4	(%)

Loading Equipment Productivities

Year	-2	-1	1	2	3	4	5	6	7	8	9
Average specific gravity	2,426	2,715	2,991	2,823	2,949	2,913	2,937	2,867	2,854	2,858	2,889
6 m^3 Backhoe											
Theoretical productivity (t/h)	-	-	1,033	996	1,047	1,000	1,043	988	994	1,007	1,025
Effective productivity (t/h)	-	-	535	515	543	517	540	512	515	522	532
11 m^3 Front Shovel											
Theoretical productivity (t/h)	-	-	1,909	1,807	1,911	1,808	1,911	1,807	1,808	1,808	1,817
Effective productivity (t/h)	-	-	1113	1054	1114	1054	1114	1054	1054	1054	1061
11 m^3 Loader											
Theoretical productivity (t/h)	1,493	1,701	1,928	1,826	1,921	1,822	1,919	1,815	1,817	1,819	1,839
Effective productivity (t/h)	774	882	999	945	996	944	995	941	942	943	953

7.5 Haul Trucks

Haul truck sizes will be 150 t for all production. This size was selected to match the loading units and achieve production targets at minimum unit operating costs under design conditions. The fleet size will start at four trucks for Year –2 and -1, and increase to a maximum of 14 trucks in Year 1.

The number of trucks required has been based on the forecast production quantities and haulage productivities. These productivities were calculated by determining the haulage profiles for each material type (ore and waste) from each bench. Using these profiles as input for Caterpillar Inc.'s

FPC program a return cycle time based on the haulage truck rim pull chart was calculated. Cycle time factors are shown in the table below.

Table 4.14: Haul Truck Cycle Factors

Fixed Cycle Times	Load Time Spot	Load Time Cycle	Dump Time
Mill Feed	0.75 min	0.57 min	1.0 min
Waste	0.75 min	0.57 min	1.0 min
Rolling Resistance			
In pit – at shovel	3%	-	-
In pit – on bench	2%	-	-
In pit – ramp	2%	-	-
Haul roads	2%	-	-
Waste dump – ramp	2%	-	-
Waste dump – on dump	2%	-	-
Waste dump – at dozer	2%	-	-
Speed Limits			
On level	50 km/h	-	-
Uphill – loaded & empty	Truck limits(*)	-	-
10% Downhill – loaded	20 km/h	-	-
6% Downhill – loaded		-	-
10% Downhill – empty	20 km/h	-	-
6% Downhill – empty		-	-
Switchbacks	50 km/h	-	-
Sharp angle turns	50 km/h	-	-
Inefficiency Allowance			
Dump	50 m	-	-
Crusher	50 m	-	-

(*)Limited by rim pull

The cycle times were then used to calculate theoretical productivities. These were modified by applying various efficiency factors to achieve effective productivities. It was assumed that the trucks would run on arctic grade diesel fuel, and no de-rating factor was applied to account for reduced engine performance due to fuel quality. Effective productivities in turn were applied against the production forecast to determine the number of trucks required for each production period. The average productivities for each material type for each year are shown below.

Haul Truck Equipment Productivities

Year	-2	-1	1	2	3	4	5	6	7	8	9
Average specific gravity	2,426	2,715	2,991	2,823	2,949	2,913	2,937	2,867	2,854	2,858	2,889
Theoretical productivity (t/h)	566	473	410	439	343	405	525	460	381	327	246
Effective productivity (t/h)	411	343	298	319	249	294	381	334	277	238	179

7.6 Mine Support Equipment

The following complement of road construction and maintenance equipment will support the mine operations:

- two 160 kW class road graders to maintain mine site roads
- four 230 kW track dozers for dump maintenance, drill site preparation, road building, ditching, bench repair and shovel cleanup
- two 2 m^3 excavator to assist in ore control, wall cleanup, ditching and maintenance of the water control system.

7.7 Ancillary Equipment

The initial ancillary equipment fleet required for mining is shown below.

Ancillary Equipment Fleet

Number	Description	Capacity
1	Fuel/lube truck	n/a
1	Mechanics' truck	n/a
1	Welding truck	n/a
1	Blasting loader	n/a
1	Blasters' truck	n/a
1	Utility loader and tire manipulator	n/a
1	Rough terrain mobile crane	55 t
3	Lighting plant	n/a
1	Flat-deck truck	n/a
1	Crew bus	40+ person
6	Pickup truck	3/4 t

The fuel/lube truck will service all tracked equipment in the field. The haulage trucks will be fuelled and lubed as required when running between the pit and the crusher.

The supplier will deliver bulk explosives to the blastholes. Mine crews will load the detonators and boosters into the holes and tie in the shots, necessitating the equipment listed above.

The crew bus will be used to transport mine workers between the mine dry and their equipment. The six pickup trucks will be used by personnel in mine management, engineering, geology, survey, and grade control.

7.8 Equipment Purchase

The purchase schedule for the production equipment is shown in the following table.

Production Equipment Purchase / Lease & Replacement Schedule

Year	-2	-1	1	2	3	4	5	6	7	8	9
Blasthole drill	1	1	2	-	-	-	-	-	-	-	-
6 m^3 Backhoe		-	2	-	-	-	-	-	-	-	-
11 m^3 Shovel		-	2	--	-	-	-	-	-	-	-
13 m^3 Loader	1	-	1	-	-	-	-	-	-	-	-
Haulage truck	4	-	10	-	-	-	-	-	-	-	-
Track dozer	4	-	-	-	-	-	-	-	-	-	-
Motor grader	2	-	-	-	-	-	1*	-	-	-	-
Water Truck	-	-	1	-	-	-	-	-	-	-	-
2 m^3 Backhoe	-	1	-	-	-	-	-	-	-	-	-
Tank drill	-	-	1	-	-	-	-	-	-	-	-

* Replacement unit

7.9 Fuel Storage

Estimated diesel fuel consumption for the mine equipment is shown in the table below. The fuel storage area is described in Section 6. An additional approximate 5,000,000 L is required for blasting fuel oil over the mine life.

Estimated Annual Equipment Diesel Fuel Consumption (Lx000)

Year	-2	-1	1	2	3	4	5	6	7	8	9	Total
Fuel	1,570	2,645	14,465	15,129	13,508	14,290	11,475	11,834	11,208	8,376	1,572	106,073

8. Drilling, Blasting & Explosives

The primary blasthole drills will be diesel-powered rigs capable of drilling 152.4 mm diameter holes. As described in Section 4.7.3, drilling requirements were calculated for ore and waste. A pre-shear and buffer blasting followed by mechanical wall cleanup is to be utilized against the final wall..

Blasting operations will be affected by several factors, including wall control, and weather. A number of modified operating procedures will be implemented during the winter season. These may include minimizing the sleep time for loaded holes; ensuring that cuttings are mounded around the hole collars after loading to prevent snow drifting into the holes, and utilizing blast hole covers. These procedural changes would have limited or no impact on operating costs or number of personnel and thus have not been considered in this study.

Because of the remote location of the project, it has been anticipated that a 70% ANFO/30% Emulsion blend would be utilized for blasting. This would provide material for all conditions and ensure that blasting could be carried out at all times.

Blasting design and explosives consumption per hole are summarized in the table below.. Responsibility for blasting will be split between the mine work force and the explosives supplier. The supplier will be responsible for delivering blasting agents to the blastholes, and place powder in the holes. Mine personnel will charge the holes, place the detonators and boosters and tie in the patterns.

The supplier will provide the AN and emulsion components FOB Montreal, where it will be loaded on barges and transported to site and stored until required. The contractor will also supply mixing and delivery trucks. Cumberland will provide fuel oil and accommodations.

Blasting Calculations

Parameter	Unit	Waste & Ore
Blasthole Diameter	(mm)	152.4
Blasting Design		
Bench height	(m)	6
Subdrill	(m)	1.5
Depth	(m)	7.5
Burden	(m)	4.0
Spacing	(m)	4.5
Drill factor	(bcm/hole)	108
Explosives		
Stemming	(m)	3.0
Explosive column length	(m)	4.5
Explosive column mix		
ANFO	(%)	70
Emulsion	(%)	30
Total Blasting Agent per Hole	(kg)	77
Total Unit Consumption	(kg/bcm)	0.715

9. Mine Waste Management

The section summarizes the work done by Golder on defining the management of mine waste:

- “Mine Waste and Water Management, Meadowbank Gold project, Nunavut,” dated 05 March 2004
- “Alternative Waste and Water Management Plan, Meadowbank Gold project, Nunavut,” final report dated 07 March 2005.

9.1 Introduction

The proposed mine will generate approximately 185 Mt of mine waste rock from the following deposits:

- Vault (intermediate volcanic rocks)
- Portage (iron formation, intermediate volcanic and ultramafic rocks)
- Goose Island (iron formation, intermediate volcanic and ultramafic rocks).

The ultramafic rocks are not expected to be acid generating. Some of the intermediate volcanic rocks from the Vault Deposit are potentially acid generating. All other waste rock types and the tailings are potentially acid generating.

Several options for the storage of mine waste rock and tailings were evaluated using decision matrices, and preferred sites were selected. Waste rock from the North Portage, Third Portage, and Goose Island open pits will be stored in an area to the north of Second Portage Arm and to the west of the Vault haul road. The rock storage facility will be capped with a layer of non-acid generating rock at closure to constrain the active layer within relatively inert materials. The potentially acid generating waste rock below the capping layer will freeze, resulting in low rates of acid rock drainage (ARD) generation in the long term.

Waste rock from the Vault open pit will be stored in an area to the north and west of the Vault pen pit. The rock storage facility will be re-graded at closure to encourage run-off and to provide a final shape consistent with the surrounding topography. The water seepage from the Vault waste rock storage area is expected to be of suitable quality to allow discharge to the environment without treatment and capping of this facility is therefore not proposed.

9.2 Waste Rock Storage Portage & Goose

Waste from the pits will be used as construction material for the dikes, tailings dam, roads, and general site construction. Excess waste will be deposited in a waste dump located to the north and east of Portage pit, as well as in empty sections of Goose Island and Portage pits. Four potential rock storage areas on the north side of Second Portage Lake were considered, as summarized in the table below. The following site selection criteria were used to evaluate these options:

- minimize potential long-term environmental impacts (including ARD generation, metal leaching, seepage to the underlying groundwater regime)
- maximize ease of water management during operation
- maximize ease of decommissioning/closure
- minimize impact on catchment area
- minimize visual impact
- minimize areas of lakes impacted
- minimize footprint area (to reduce the volume of affected runoff)
- minimize the potential for geotechnical hazards (including slope instability, response to seismic activity)
- minimize haul costs.

Summary of Portage Rock Storage Facility Options

Option	Description
A	North from Second Portage Lake – small footprint
B	North-west from Second Portage Lake – large footprint
C	East from Vault Haul Road – small footprint
D	East from Vault Haul Road – large footprint

The options were evaluated using a decision matrix. The key categories that were used to evaluate the options were based on environmental, operational, and cost considerations. Within each category, the individual sub-indicators were assigned ‘weight’ values based on subjective estimates of relative importance, so that the sum of the weights would contribute to the overall option weightings according to the following table.

Weighting Factors used in Decision Matrix

Factor	Contribution to Overall Weighting
Environmental	50%
Operational	30%
Cost	20%

The options were then allocated a score for each of the criteria using a scale of 1 to 9 to show the relative difference between options, with 9 indicating the 'best' option and 1 indicating the 'worst' (Robertson and Shaw, 1999). An example of the scoring method is shown below.

Example of Scoring System used in Decision Matrix

	Footprint Area	Points	Notes
Option A	30 ha	9	9 points awarded for least footprint area (BEST)
		8	
		7	
		6	
Option C	60 ha	5	9 points x 30 ha (least area)/60 ha = 5 points
		4	
Option B	90 ha	3	9 points x 30 ha (least area)/ 90 ha = 3 points
		2	
		1	

The individual sub-indicator weighting values were then multiplied by the score to arrive at a weighted score. The weighted scores for each category were then summed to arrive at a total weighted score for each option.

The weighted scores for the various options are summarized below.

Summary of Weighted Scores for Rock Storage Facility Options

Option	Description	Weighted Score
A	North from Second Portage Lake – small footprint	560
B	North-west from Portage Lake – large footprint	459
C	East from Vault Haul Road – small footprint	436
D	East from Vault Haul Road – large footprint	355

Note: The highest score indicates the most desirable option.

Based on the estimated volumes for on-land rock storage, a waste dump layout was developed and key parameters for the dump are shown in the following table. It is expected that dumping of waste rock would commence closest to the Portage pit, and would proceed westward during development of the mine.

Portage & Goose Island Waste Rock Storage Parameters

Parameter	
Maximum Elevation of Adjacent Topography	192 m
Crest Elevation	205 m
Volume	27 Mm^3
Approximate Height (140 m Base Elevation)	60 m
Footprint Area	58 ha
Surface Area	66 ha

9.3 Vault Waste Rock Storage Facility

The presence of numerous lakes adjacent to Vault Lake limits the number of potential waste rock storage areas. In addition, the lack of topographical relief in the immediate area limits the height to which a rock storage facility could be constructed without becoming visible from large distances. Further, it was recognized that placing waste rock in the areas to the south of Vault Lake would impact a sub-watershed that did not drain towards the Vault open pit. The area to the north and west of the Vault open pits was therefore selected for the waste rock storage area.

Based on the estimated volumes for on-land rock storage, a waste dump layout was developed and key parameters for the dump are shown below.

Vault Waste Rock Storage Parameters

Parameter	
Maximum Elevation of Adjacent Topography	190 m
Crest Elevation	176 m
Volume	35 Mm^3
Approximate Height (140 m Base Elevation)	30 m
Footprint Area	191 ha
Surface Area	195 ha

10. Mine Water Management

10.1 Pit Dewatering Dikes

This Section summarizes Golder's basic engineering design of the proposed pit dewatering dikes at the Meadowbank Gold project. The proposed dikes are required to allow mining of the proposed open pits at the Portage and the Goose Island deposits..

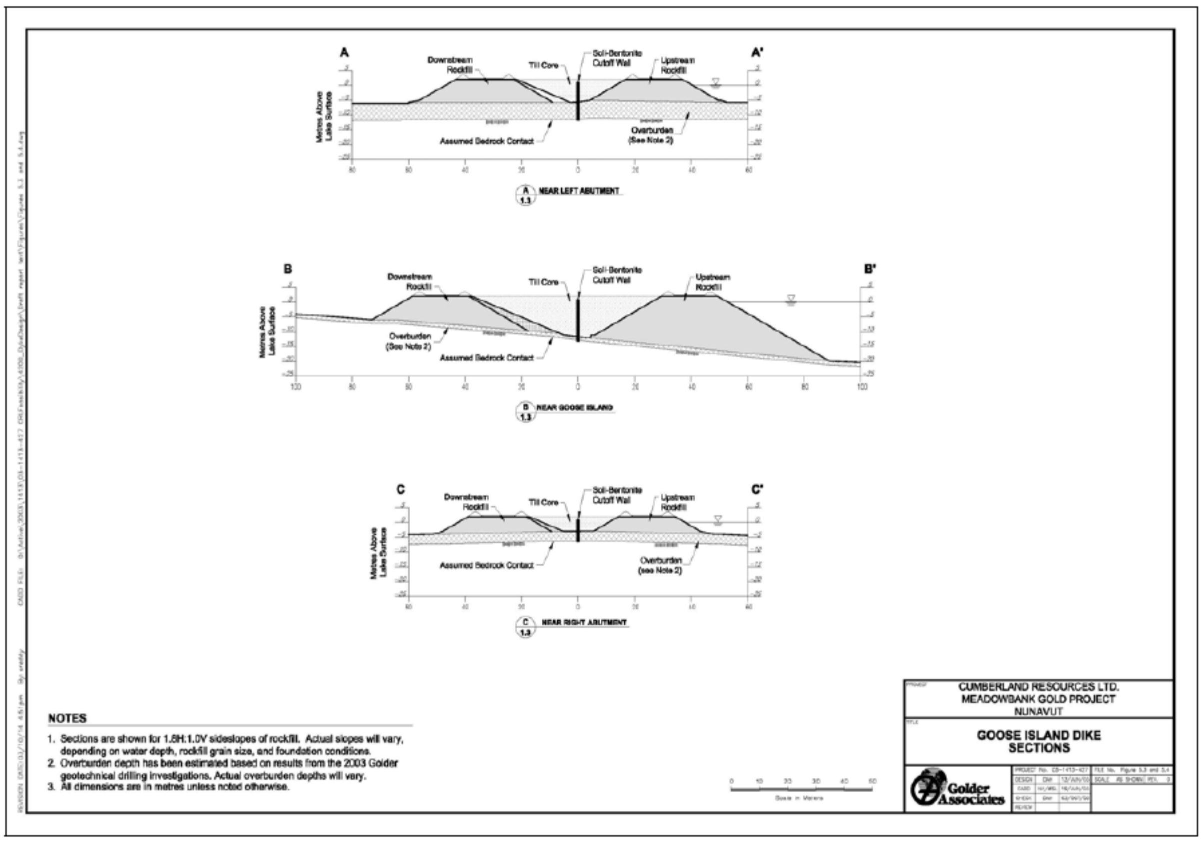
Three major dike structures are required:

- East Dike (including a causeway) – to be constructed prior to startup
- Bay Zone Dike – to be constructed prior to startup
- Goose Island Dike – to be constructed in Year 1 of the mine life.

The proposed cross-section, shown in the figure below, consists of two rock fill berms, with a till interberm material. A filter material would be placed on the inside face of the downstream, or pit side, rockfill zone. A soil-bentonite slurry wall would be constructed to bedrock as a trench excavation using a backhoe through the central till material, and through the overburden foundation materials. The purpose of the soil-bentonite wall is to provide a seepage cut-off. The dike crest will be surfaced with material suitable as haul road running course.

The rockfill to be used for construction will initially come from pre-stripping operations and through the development of a starter pit at the Portage Deposit. Quantity estimates indicate that approximately 380,000 m^3 of rockfill and 90,000 m^3 of till will be required for the dikes prior to startup.

Dewatering Dike Cross-section



The proposed construction methodology of the dikes would be as follows:

- construct the rock fill berms across or through open water; the dike crest would be maintained at least 2 m above the lake water level
- place filter material on the side face of the downstream (pit side) rock fill berm by dumping and dozing
- place till material as a central core between the two rockfill berms by dumping and dozing

- excavate the slurry wall through the central zone of the till material. A bentonite slurry would be placed or pumped into the excavation to stabilize the excavation walls as a result of the density of the slurry, and the filter cake formed between the bentonite and the surrounding till material. The excavated till material would be re- cycle to mix with bentonite and dozed back into the excavation to displace the bentonite slurry and form the soil-bentonite cutoff.

The central working platform for the construction of the soil-bentonite wall would be approximately 2 m above lake level, and would consist either of till material, or of a suitable pad material. An excavator, dozers, and dump trucks would work on this platform. Till would be dumped in windrows and dozed ahead of the working platform into open water between the two rock fill berms. Alternatively, till could be dumped along the rock fill crests and dozed into the central channel.

For the Bay Zone and East dikes, the soil-bentonite cutoff wall trench will be excavated to depths less than 12 m. This can be achieved with standard long-reach excavation equipment. For the Goose Island dike, the soil-bentonite cutoff wall trench will be excavated to depths greater than 12 m. This will require either custom-made long-reach excavators or cranes with clam shells.

Based on current materials balance calculations, sufficient quantities of suitable rockfill and till borrow materials will be available from pre-mining activities. The material for the till core will be derived from pre-stripping activities at the Portage deposit. Similarly, sufficient quantities of rockfill and till will be available from ongoing mining activities in Year 1 to build the Goose Island dike.

The construction quantities are sensitive to the sideslopes that will be achieved on the rockfill embankments. These slopes are likely to be in the range of 1.5H:1V to 2.0H:1V but in some areas could be as flat as 2.5H:1V. Slope stability analyses show that the dikes will be stable under static and earthquake load conditions.

Seepage modeling indicates that the total seepage through all of the dikes will be in the range of approximately 2.4 to 48.3 L/s. This value varies depending on potential cracking in the soil-bentonite cutoff wall and/or a potential gap in the cutoff wall at the bedrock contact. Cracks through the cutoff wall in the section through the overburden would result in the largest increase in seepage through the cutoff wall. The increase is in the range of one to two orders of magnitude more than a wall with no cracks or defects in the overburden section. Cracks within the till core section have a negligible effect on seepage.

A gap in the soil-bentonite cutoff wall at the bedrock contact would result in an increase in seepage of approximately one order of magnitude more than a wall with no gap at the bedrock contact.

10.2 Second Portage Arm Dewatering

Placement of rockfill for the east dike is planned to commence early in May of Year -1 and be completed by mid July; approximately 160,000 m^3 of rockfill is required. After the rockfill is completed, it is anticipated that temperatures would permit construction of the soil bentonite slurry wall; this is estimated to take three to four weeks. During the construction of the east dike, pump stations and pipelines will be installed for dewatering.

Golder recommends that Second Portage Arm be dewatered to 105 masl for construction of the tailings dike. The estimated volume of water is 12.8 Mm^3. Approximately 80% or 10 Mm^3 of this amount will have to be pumped from the tailings dam area across the east dike to draw the elevation of Second Portage lake down to 105 m.

It has been assumed that the weather will allow dewatering operations to run through to late October. This will leave a window of about 10 weeks for pumping after the east dike is complete and yields a required pumping rate of 1 M m^3/wk or 1,650 L/s. Heavy duty submersible pumps would be used for dewatering. A Flygt model LL-3400 is capable of delivering 900 L/s at a head of 30 m. Two or more of these pumps would be required for the bulk of the dewatering. The pumps, which are designed for marine applications and can handle high level of suspended solids, would be set in a pre-cast concrete or HDPE shaft and would lift the water over a weir into a channel. The channel would flow by gravity across the east dike.

It is envisaged that additional smaller submersibles, dropped from one of the permanent barges, would be used to drain low lying sections of the Portage pit lying between the east dike and the tailings dike.

10.3 Open Pit Dewatering

Water inflows to the open pit will generally be in the form of precipitation, leakage from under the dikes and leakage through faults. Currently water inflows are expected to be low, and small sumps are to be created to catch pit waters. These will then be emptied with small diesel pumps. In the Portage area, the water will initially be pumped to the process plant for treatment as required, prior to use in the process or discharge to the Attenuation Pond. At the completion of mining the Goose Island pit, mine water will be collected in the old Goose Island pit until treatment at final closure. Vault pit water will be pumped to the Vault Attenuation Pond for solids settling, prior to discharge to the environment.

11. Risks & Opportunities

The geological model has been based on the outline of a 1 g Au grade shell. These shells have varying dips and strike lengths. Grade control for this project is going to be critical. Overall a 1 m dilution has been applied (50 cm on the HW and 50 cm on the footwall – the base case) and a 95% mining recovery. The table below outlines the sensitivities of grade and tonnes to differing dilution widths.

Dilution Sensitivity

Dilution Width applied to HW/FW	Undiluted Recovered Tonnes (x '000)	Undiluted Grade	Diluted Recovered Tonnes (x '000)	Diluted Grade	Average Dilution (%)
50 cm (base case)	20,116	4.459	21,896	3.9322	14.6
25 cm	20,116	4.459	20,503	4.1776	7.3
75 cm	20,116	4.459	23,288	3.7162	21.9
100 cm	20,116	4.459	24,681	3.5245	29.1

As seen in the table above, the baseline dilution assumption of 50 cm on both the hanging and footwall contains both risk and opportunity. Field mining techniques will be modified as required to find the economically acceptable amount of dilution for the planned productivities. Possible dilution-minimizing techniques may include: Tighter blasthole drill spacing, detailed logging and sampling of blastholes, infill small diameter drillholes for sample collection purposes, specialized blasting techniques to minimize material movement, mining on half-benches, additional use of dozers and excavators to better segregate ore and waste. If these techniques are not successful, a medium-term geological model can be developed using tightly spaced RC or core holes oriented to best define the boundaries. This model would be used for ore control decisions instead of blasthole assays.

Once mining has commenced there may be opportunities to utilize an elevated cutoff grade. This would allow for the bringing forward of higher grade material in time and enhance project economics. The lower grade material would be stockpiled and fed at a later date.

The final schedule includes 136,000 t of undiluted Inferred material in Portage and 345,000 t in Goose Island that is above the currently used cutoff grade. This material represents potential mill feed if the classification can be successfully upgraded.

Further geotechnical investigation should be done to refine the slope design. Any steepening of the slope will have benefits to the overall operation.

Mine Production Schedule, as excerpted from the Feasibility Study, is as below:

17-May-05 11:58

Cumberland Production Forecast Schedule

OPEN PIT

		Year - 2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Total
Portage Phase 1&2	Ore (kt)	110.7	387.0	2,241.1	2,284.6	1,829.0	1,487.8	-	-	-	-		8,340.2
	Grade (g/t)	6.35	6.13	4.84	3.62	4.02	4.70	-	-	-	-		4.3806
	Waste 1 - IV Chloritic (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Waste 2 - Ultramafic (kt)	3.4	76.3	6670.9	4269.8	4562.4	2658.8	0.0	0.0	0.0	0.0	-	18,241.5
	Waste 3 - Iron Formation (kt)	214.2	1186.3	11317.6	2383.5	2184.9	1449.0	0.0	0.0	0.0	0.0	-	18,735.6
	Waste 4 - Intermediate Volcanic (kt)	10.7	35.1	1213.2	576.4	426.1	67.7	0.0	0.0	0.0	0.0	-	2,329.3
	Waste 5 - Quartzite (kt)	0.0	0.0	21.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	21.6
	Waste 6 - Background IV (kt)	260.9	395.8	5335.6	1700.4	1256.2	341.1	0.0	0.0	0.0	0.0	-	9,290.1
	Waste 7 - Unclassified Volcanics (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Overburden (kt)	623.9	906.6	2070.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	3,601.0
	Total Waste (kt)	1,113.2	2,600.2	26,629.3	8,930.1	8,429.7	4,516.6	-	-	-	-		52,219.1
	Waste Destination	1,2	2,3	4,7,11	11,	11,	11,						
Portage Phase 3	Ore (kt)	-	-	-	-	-	431.3	1,136.8	-	-	-		1,568.1
	Grade (g/t)	-	-	-	-	-	4.20	4.13	-	-	-		4.15
	Waste 1 - IV Chloritic (kt)	19.5	94.8	0.0	0.0	0.0	683.2	202.0	0.0	0.0	0.0	-	999.4
	Waste 2 - Ultramafic (kt)	230.9	412.4	0.0	0.0	0.0	2052.4	1614.1	0.0	0.0	0.0	-	4,309.7
	Waste 3 - Iron Formation (kt)	198.5	390.9	0.0	0.0	0.0	5792.4	3025.8	0.0	0.0	0.0	-	9,407.5
	Waste 4 - Intermediate Volcanic (kt)	0.0	0.6	0.0	0.0	0.0	168.8	280.8	0.0	0.0	0.0	-	450.1
	Waste 5 - Quartzite (kt)	0.0	42.6	0.0	0.0	0.0	811.6	24.5	0.0	0.0	0.0	-	878.7
	Waste 6 - Background IV (kt)	164.5	218.9	0.0	0.0	0.0	1066.0	225.8	0.0	0.0	0.0	-	1,675.1
	Waste 7 - Unclassified Volcanics (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Overburden (kt)	0.0	308.8	0.0	0.0	0.0	2152.4	0.0	0.0	0.0	0.0	-	2,461.2
	Total Waste (kt)	613.3	1,468.9	-	-	-	12,726.6	5,372.9	-	-	-		20,181.8
	Waste Destination	1,2	2,3				11,8	8,					
Portage Phase 4	Ore (kt)	-	-	-	-	-	-	914.6	354.9	-	-		1,269.5
	Grade (g/t)	-	-	-	-	-	-	3.7	3.6	-	-		3.69
	Waste 1 - IV Chloritic (kt)	0.0	0.0	0.0	0.0	0.0	0.0	55.8	0.0	0.0	0.0	-	55.8
	Waste 2 - Ultramafic (kt)	0.0	0.0	0.0	0.0	0.0	0.0	1055.1	535.0	0.0	0.0	-	1,590.1
	Waste 3 - Iron Formation (kt)	0.0	0.0	0.0	0.0	0.0	0.0	1439.1	586.2	0.0	0.0	-	2,025.3
	Waste 4 - Intermediate Volcanic (kt)	0.0	0.0	0.0	0.0	0.0	0.0	168.5	101.1	0.0	0.0	-	269.6
	Waste 5 - Quartzite (kt)	0.0	0.0	0.0	0.0	0.0	0.0	34.0	0.0	0.0	0.0	-	34.0
	Waste 6 - Background IV (kt)	0.0	0.0	0.0	0.0	0.0	0.0	581.7	285.2	0.0	0.0	-	866.9
	Waste 7 - Unclassified Volcanics (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Overburden (kt)	0.0	0.0	0.0	0.0	0.0	0.0	56.7	0.0	0.0	0.0	-	56.7
	Total Waste (kt)	-	-	-	-	-	-	3,390.9	1,507.5	-	-		4,898.4
	Waste Destination							8,	8,				
Goose	Ore (kt)	-	-	-	453.2	908.5	763.8	121.8	-	-	-		2,247.3
	Grade (g/t)	-	-	-	5.9	5.6	4.2	4.0	-	-	-		5.09
	Waste 1 - IV Chloritic (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Waste 2 - Ultramafic (kt)	0.0	0.0	0.0	8138.0	7453.6	2172.6	5.4	0.0	0.0	0.0	-	17,769.6
	Waste 3 - Iron Formation (kt)	0.0	0.0	0.0	1465.7	1130.8	1133.6	226.8	0.0	0.0	0.0	-	3,956.9
	Waste 4 - Intermediate Volcanic (kt)	0.0	0.0	0.0	5241.2	3084.0	1094.5	70.8	0.0	0.0	0.0	-	9,490.5
	Waste 5 - Quartzite (kt)	0.0	0.0	0.0	2000.6	522.7	0.0	0.0	0.0	0.0	0.0	-	2,523.2
	Waste 6 - Background IV (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Waste 7 - Unclassified Volcanics (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Overburden (kt)	0.0	0.0	0.0	3045.1	0.0	0.0	0.0	0.0	0.0	0.0	-	3,045.1
	Total Waste (kt)	-	-	-	19,890.5	12,191.1	4,400.7	303.0	-	-	-		36,785.3
	Waste Destination				5,6,11	11,	11,	11,					
Vault	Ore (kt)	-	-	-	-	-	54.7	564.4	2,382.9	2,737.0	2,070.7	658.6	8,468.3
	Grade (g/t)	-	-	-	-	-	3.4	3.0	2.8	3.1	3.6	3.6	3.18
	Waste 1 - IV Chloritic (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Waste 2 - Ultramafic (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Waste 3 - Iron Formation (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Waste 4 - Intermediate Volcanic (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Waste 5 - Quartzite (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Waste 6 - Background IV (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Waste 7 - Unclassified Volcanics (kt)	0.0	0.0	0.0	0.0	0.0	3746.0	14688.9	20558.3	17598.3	10575.6	1,039.86	68,206.8
	Overburden (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0
	Total Waste (kt)	-	-	-	-	-	3,746.0	14,688.9	20,558.3	17,598.3	10,575.6	1,039.9	68,206.8
	Waste Destination						10,	10,	10,	10,	10,	10,	
Total Open Pit													
	Ore to Mill (kt)	-	-	2,738.8	2,737.8	2,737.5	2,737.6	2,737.6	2,737.7	2,737.0	2,070.7	658.6	21,893.4
	Grade (g/t)	-	-	5.08	3.99	4.54	4.45	3.75	2.93	3.07	3.63	3.63	3.93
	Ore to Stkple (kt)	110.7	387.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		497.7
	Grade (g/t)	6.35	6.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		6.18
	Overburden (kt)	1,293.8	1,215.4	2,070.5	3,045.1	0.0	2,152.4	56.7	0.0	0.0	0.0	0.0	9,833.9
	Non-PAG (kt)	1,102.6	2,853.7	24,558.8	25,775.5	20,620.8	23,237.6	23,699.0	22,065.7	17,598.3	10,575.6	1,039.9	173,127.4
	PAG (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total Waste (kt)	2,396.4	4,069.1	26,629.3	28,820.6	20,620.8	25,390.0	23,755.7	22,065.7	17,598.3	10,575.6	1,039.9	182,961.3
	S.R.	21.65	10.51	9.72	10.53	7.53	9.27	8.68	8.06	6.43	5.11	1.58	8.36
	Total Tonnes (kt)	2,507.1	4,456.1	29,368.1	31,558.4	23,358.3	28,127.6	26,493.3	24,803.5	20,335.3	12,646.3	1,698.5	205,352.4
	Tonnes/Day	16,494	12,209	80,461	86,461	63,995	77,062	72,584	67,955	55,713	34,647	19,342	

Waste Destination Codes:

1 East dike - 0.35Mtonnes
2 Causeway, roads, misc - 0.4Mtonnes
3 Bay Zone dike, Tails dike - 2.5Mtonnes
4 Goose Island Dike - 2.2Mtonnes
5 Goose Island Dike Expansion (Dump 3) - 2Mtonnes
6 Near Goose Dump (Dump 2) - 6Mtonnes
7 Near Portage Dump (Dump 1) - 1Mtonnes
8 Portage 1/2 backfill - 17Mtonnes
9 Goose backfill - 21Mtonnes possible, not used as waste dump
10 Vault Dump - 68.2 Mtonnes
11 Portage & Goose Dump (Dump 4) - Maximum design of 112Mtonnes
12
13
14

OPEN PIT

		152	365	365	365	365	365	365	365	365	365	87.8141	
Portage	Ore (kt)	110.7	387.0	2,241.1	2,284.6	1,829.0	1,919.1	2,051.4	354.9	-	-	-	11,177.8
	Grade (g/t)	6.35	6.13	4.84	3.62	4.02	4.59	3.95	3.62	-	-	-	4.27
	Waste (kt)	1,726.5	4,069.1	26,629.3	8,930.1	8,429.7	17,243.3	8,763.8	1,507.5	-	-	-	77,299.3
Goose	Ore (kt)	-	-	-	453.2	908.5	763.8	121.8	-	-	-	-	2,247.3
	Grade (g/t)	-	-	-	5.87	5.60	4.19	3.98	-	-	-	-	5.09
	Waste (kt)	-	-	-	19,890.5	12,191.1	4,400.7	303.0	-	-	-	-	36,785.3
Vault	Ore (kt)	-	-	-	-	-	54.7	564.4	2,382.9	2,737.0	2,070.7	658.6	8,468.3
	Grade (g/t)	-	-	-	-	-	3.4	3.0	2.8	3.1	3.6	3.6	3.18
	Waste (kt)	-	-	-	-	-	3,746.0	14,688.9	20,558.3	17,598.3	10,575.6	1,039.9	68,206.8
Total Open Pit													
	Ore to Mill (kt)	-	-	2,738.8	2,737.8	2,737.5	2,737.6	2,737.6	2,737.7	2,737.0	2,070.7	658.6	21,893.4
	Grade (g/t)	-	-	5.08	3.99	4.54	4.45	3.75	2.93	3.07	3.63	3.63	3.93
	Ore to Stkple (kt)	110.7	387.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		497.7
	Grade (g/t)	6.35	6.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		6.18
	Overburden (kt)	1,293.8	1,215.4	2,070.5	3,045.1	0.0	2,152.4	56.7	0.0	0.0	0.0	0.0	9,833.9
	Non-PAG (kt)	1,102.6	2,853.7	24,558.8	25,775.5	20,620.8	23,237.6	23,699.0	22,065.7	17,598.3	10,575.6	1,039.9	173,127.4
	PAG (kt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total Waste (kt)	2,396.4	4,069.1	26,629.3	28,820.6	20,620.8	25,390.0	23,755.7	22,065.7	17,598.3	10,575.6	1,039.9	182,961.3
	S.R.	21.65	10.51	9.72	10.53	7.53	9.27	8.68	8.06	6.43	5.11	1.58	8.36
	Total Tonnes (kt)	2,507.1	4,456.1	29,368.1	31,558.4	23,358.3	28,127.6	26,493.3	24,803.5	20,335.3	12,646.3	1,698.5	205,352.4
	Tonnes/Day	6,869	12,209	80,461	86,461	63,995	77,062	72,584	67,955	55,713	34,647	4,653	

Commitment No. 10:

Provide mineral reserve numbers.

Response:

Meadowbank Open Pit Gold Reserves – Q1/2005[1]

Pit	Category	Tonnes	Grade (g/t)	Ounces
Portage				
	Proven	1,253,000	5.19	209,100
	Probable	9,927,000	4.15	1,324,500
Goose				
	Probable	2,247,000	5.09	367,700
Vault				
	Proven	53,000	3.31	5,600
	Probable	8,416,000	3.18	860,400
Total		**21,896,000**	**3.93**	**2,768,000**

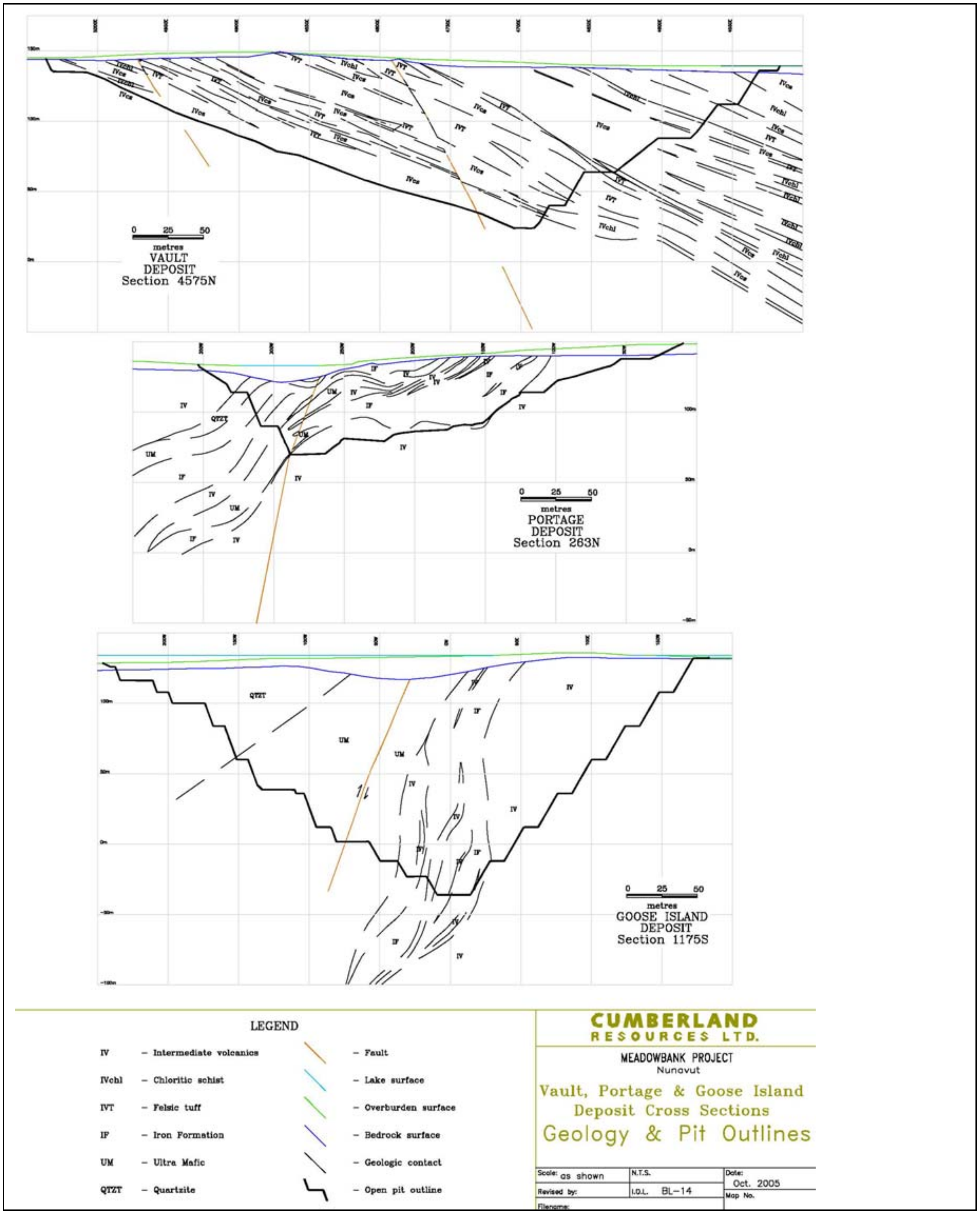
Note: 95% mining recovery and contact dilution applied. Proven and probable open pit gold reserves are a subset of resources.

Commitment No. 11

Provide a figure with a cross-section through each pit and combine the figures on one sheet.

Response:

See figure below.



Commitment No. 35

Provide information regarding the volume of camp sewage that will report to the Tailings Impoundment Area (TIA) in order to address why sewage inputs were not included in water quality modelling for the TIA.

Response:

According the Mass Balance, tailings water flow from the plant to the tailings pond will be 330 m^3/h. Estimated sewage flow will vary between 2 and 3 m3/hr, or sewage will make up approximately 1% MAX of the flow to the Tailings Impoundment. The 1% variation in water flow has little impact on the water quality modelling. The sewage volume is based on 300 L/person/d, similar to most other camps.

Commitment No. 36

Include information on the timing and multistage pumping of dewatering as possible mitigation measures to help address Total Suspended Solid (TSS) levels.

Response:

De-watering of the Second Portage Lake is will take place over a two month period. Second Portage arm will be pump down to expose the entire inside bathymetric ridge forming the base for the east tails retention dyke (this is all clean water). The tails storage area is pumped down, but not empty, thus minimizing the amount of “dirty water” to pump. Then, the “Connector Zone” (Portage Pit) will be pumped dry with the final volume of water and any suspended solids pumped into the tails storage area. No “dirty water” should need to be discharged from the tails storage area as a significant volume remains as the start of the “reclaim pond” for mill operating water. Pumps will be located in clean water (not too close to shore or shallows) to avoid “dirty water.” To help further minimize Total Suspended Solids in the receiving waters either the pumping will be slowed and / or turbidity curtains will be installed.

Commitment No. 40

AVS (Acid Volatile Sulfides) and SEM (Simultaneously Extractable Metals) studies have been completed and results will be provided.

Response:

Results have been provided in the tables below.

Table 1: Conventional Sediment Chemistry Data, Extractable (umol/g dw) & Total (mg/kg) dw Metals Concentrations, Meadowbank Study Lakes, July 2002

	Sediment Quality Guidelines		Third Portage Dike			Third Portage Lake Basins		
			East	South	West	South	North	East
			TPD-E	TPD-S	TPD-W	TP-S	TP-N	TP-E
	ISQG	PEL (CCME 2001)	22/07/2002	22/07/2002	22/07/2002	22/07/2002	22/07/2002	22/07/2002
CONVENTIONAL PARAMETERS								
Physical Tests								
Moisture (%)			83.7	82.7	80.9	60.4	79	84.7
pH			5.82	6.07	6.06	5.73	5.65	6.18
Organic Parameters								
Total Organic Carbon (% dw)			2.95	2.59	2.7	0.96	2.69	3.4
Particle Size								
Gravel (>2.00 mm) (%)			<0.1	<0.1	<0.1	0.8	<0.1	<0.1
Sand (2.00 - 0.063 mm) (%)			1.6	1.6	7.4	42.6	16.3	3.7
Silt (0.063 mm – 4 um) (%)			30.9	26.8	31.6	24.9	33	33.3
Clay (<4 um) (%)			67.5	71.6	61	31.7	50.7	63
EXTRACTABLE METALS (SEM) (μmol/g dw)								
Cadmium			<0.02	<0.02	<0.02	-	-	-
Copper			0.63	59.2	0.52	-	-	-
Lead			0.09	0.1	0.07	-	-	-
Mercury			<0.0001	<0.0001	<0.0001	-	-	-
Nickel			0.7	11.5	0.2	-	-	-
Zinc			0.48	0.34	0.27	-	-	-
Total SEM (μmol/g dw)			1.92	71.16	1.08	-	-	-
Acid Volatile Sulphide (AVS) (μmol/g dw)			0.5	<0.2	<0.2	-	-	-
SEM - AVS			-1.42	-71.0	-0.90	-	-	-

	Sediment Quality Guidelines		Third Portage Dike			Third Portage Lake Basins		
			East	**South**	**West**	**South**	**North**	**East**
			TPD-E	TPD-S	TPD-W	TP-S	TP-N	TP-E
	ISQG	**PEL (CCME 2001)**	22/07/2002	22/07/2002	22/07/2002	22/07/2002	22/07/2002	22/07/2002
TOTAL METALS (mg/kg dw)								
Antimony	NG[A]	NG	<10	<10	<10	<10	<10	<10
Arsenic	5.9	17	28	20	36	20	24	25
Barium	NG	NG	248	163	149	122	130	173
Beryllium	NG	NG	2.4	2	1.7	1.3	1.6	1.9
Cadmium	0.6	3.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	37.3	90	115	98	149	97	140	99
Cobalt	NG	NG	20	18	24	11	14	20
Copper	35.7	197	**82**	**56**	**75**	**56**	**69**	**68**
Lead	35	91.3	31	<30	<30	<30	<30	<30
Mercury	0.17	0.49	0.025	0.019	0.015	0.009	0.017	0.022
Molybdenum	NG	NG	7	4	5	<4	5	6
Nickel	18	36	115	76	85	49	76	98
Selenium	NG	NG	<2	<2	<2	<2	<2	<2
Silver	NG	NG	<2	<2	<2	<2	<2	<2
Thallium	NG	NG	<1	<1	<1	<1	<1	<1
Tin	NG	NG	<5	<5	<5	<5	<5	<5
Vanadium	NG	NG	63	49	54	43	49	50
Zinc	123	315	**140**	112	110	74	102	113

[A]NG = no guideline

Bold Concentrations exceed ISQG

Boxed concentrations exceed PEL	

	Sediment Quality Guidelines		Second Portage Lake			Tehek Lake			Tern Lake	
			South	Middle	North	North	South	Middle	T-1	T-2
			SP-S	SP-M	SP-N	TE-N	TE-S	TE-M	TERN-1	TERN-2
	ISQG	PEL (CCME 2001)	23/07/2002	23/07/2002	23/07/2002	24/07/2002	24/07/2002	24/07/2002	24/07/2002	24/07/2002
CONVENTIONAL PARAMETERS										
Physical Tests										
Moisture (%)			83.6	82.9	89.8	80.2	84	84.2	90.3	84.7
pH			6.49	5.84	5.5	6.14	5.74	5.37	5.94	5.89
Organic Parameters										
Total Organic Carbon (% dw)			3.98	3.55	8.03	2.62	2.79	2.81	7.13	4.37
Particle Size										
Gravel (>2.00mm) (%)			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sand (2.00mm - 0.063mm) (%)			6.8	4.8	5	5.2	3.6	2.2	2.4	13
Silt (0.063mm - 4um) (%)			38.3	33.3	35.8	35.6	28.8	30.8	35.2	41.9
Clay (<4um) (%)			54.9	61.9	59.2	59.2	67.6	67	62.4	45.1
EXTRACTABLE METALS (SEM) (µmol/g dw)										
Cadmium			<0.02	<0.02	<0.02	<0.02	-	-	-	-
Copper			3.35	0.77	7.29	0.31	-	-	-	-
Lead			0.09	0.09	<0.08	0.09	-	-	-	-
Mercury			<0.0002	<0.0001	<0.0002	<0.0001	-	-	-	-
Nickel			3.3	0.4	17.8	0.3	-	-	-	-
Zinc			0.79	0.42	0.75	0.36	-	-	-	-
Total SEM (µmol/g dw)			7.55	1.70	25.86	1.08	-	-	-	-
Acid Volatile Sulphide (AVS) (µmol/g dw)			0.3	2.2	0.5	1	-	-	-	-
SEM - AVS			-7.25	0.50	-25.36	-0.08	-	-	-	-

	Sediment Quality Guidelines		Second Portage Lake			Tehek Lake			Tern Lake	
			South	**Middle**	**North**	**North**	**South**	**Middle**	**T-1**	**T-2**
			SP-S	SP-M	SP-N	TE-N	TE-S	TE-M	TERN-1	TERN-2
	ISQG	**PEL (CCME 2001)**	23/07/2002	23/07/2002	23/07/2002	24/07/2002	24/07/2002	24/07/2002	24/07/2002	24/07/2002
TOTAL METALS (mg/kg dw)										
Antimony	NG[A]	NG	<10	<10	<20	<10	<20	<10	<20	<10
Arsenic	5.9	17	$\boxed{128}$	$\boxed{51}$	$\boxed{25}$	$\boxed{44}$	$\boxed{18}$	$\boxed{25}$	$\boxed{22}$	$\boxed{26}$
Barium	NG	NG	382	178	170	225	214	191	155	102
Beryllium	NG	NG	2.3	2	2	3.2	2	2.3	1	1.1
Cadmium	0.6	3.5	$\boxed{0.8}$	<0.5	<1	<0.5	<1	<0.5	<1	<0.5
Chromium	37.3	90	**77**	$\boxed{107}$	$\boxed{111}$	**82**	**75**	**68**	$\boxed{106}$	$\boxed{103}$
Cobalt	NG	NG	19	24	11	22	19	18	11	11
Copper	35.7	197	**113**	**90**	**81**	**88**	**86**	**67**	**103**	**83**
Lead	35	91.3	<30	<30	<60	**35**	<60	<30	<60	<30
Mercury	0.17	0.49	0.039	0.039	0.063	0.029	0.02	0.024	0.053	0.043
Molybdenum	NG	NG	19	9	<8	11	9	8	<8	<4
Nickel	18	36	$\boxed{128}$	$\boxed{78}$	$\boxed{73}$	$\boxed{69}$	$\boxed{59}$	$\boxed{50}$	$\boxed{83}$	$\boxed{67}$
Selenium	NG	NG	<2	<3	<4	<3	<4	<3	<4	<2
Silver	NG	NG	<2	<2	<4	<2	<4	<2	<4	<2
Thallium	NG	NG	<1	<1	<1	<1	<1	<1	<1	<1
Tin	NG	NG	<5	<5	<10	<5	<10	<5	<10	<5
Vanadium	NG	NG	44	56	49	62	58	52	40	36
Zinc	123	315	**144**	**123**	**132**	**145**	**138**	114	**123**	94

[A]NG = no guideline

Bold Concentrations exceed ISQG

Boxed concentrations exceed PEL

	Sediment Quality Guidelines		Vault Lake System				Farside		Inuggugayualik	
			V1	**V2-1 (Wally)**	**V2-2 (Wally)**	**V3**	**FL-1**	**FL-2**	**IL-N**	**IL-S**
	ISQG	**PEL (CCME 2001)**	V1 25/07/2002	V2-1 25/07/2002	V2-2 25/07/2002	V3 25/07/2002	FL-1 26/07/2002	FL-2 26/07/2002	IL-N 27/07/2002	IL-S 27/07/2002
CONVENTIONAL PARAMETERS										
Physical Tests			92.6	71.7	89.9	84.1	79	74.1	77.2	83.7
Moisture (%)			5.69	6.17	5.87	5.68	5.79	5.82	5.81	5.41
pH										
Organic Parameters										
Total Organic Carbon (% dw)			13.2	2	10.1	4.29	3.08	2.25	2.2	5.38
Particle Size										
Gravel (>2.00mm) (%)			<0.1	2.9	<0.1	<0.1	<0.1	1.9	<0.1	<0.1
Sand (2.00mm - 0.063mm) (%)			4.9	6.2	8.1	2.3	10.7	13.5	4.6	7.7
Silt (0.063mm - 4um) (%)			27.7	43.9	31.2	36.8	47.5	49.9	39	33.6
Clay (<4um) (%)			67.4	47	60.7	60.9	41.8	34.7	56.4	58.7
EXTRACTABLE METALS (SEM) (µmol/g dw)										
Cadmium			<0.03	<0.01	-	-	-	-	-	-
Copper			0.92	0.64	-	-	-	-	-	-
Lead			<0.2	0.13	-	-	-	-	-	-
Mercury			<0.0003	<0.00005	-	-	-	-	-	-
Nickel			<0.3	<0.1		-	-	-	-	-
Zinc			0.5	0.28	-	-	-	-	-	-
Total SEM (µmol/g dw)			1.45	1.06	-	-	-	-	-	-
Acid Volatile Sulphide (AVS) (µmol/g dw)			1.4	<0.2	-	-	-	-	-	-
SEM - AVS			-0.05	-0.90	-	-	-	-	-	-

	Sediment Quality Guidelines		Vault Lake System				Farside		Inuggugayualik	
			V1	**V2-1 (Wally)**	**V2-2 (Wally)**	**V3**	**FL-1**	**FL-2**	**IL-N**	**IL-S**
			V1	V2-1	V2-2	V3	FL-1	FL-2	IL-N	IL-S
	ISQG	**PEL (CCME 2001)**	25/07/2002	25/07/2002	25/07/2002	25/07/2002	26/07/2002	26/07/2002	27/07/2002	27/07/2002
TOTAL METALS (mg/kg dw)										
Antimony	NG[A]	NG	<30	<10	<20	<10	<10	<10	<10	<10
Arsenic	5.9	17	$\boxed{61}$	$\boxed{21}$	$\boxed{26}$	$\boxed{252}$	$\boxed{18}$	**10**	$\boxed{37}$	**11**
Barium	NG	NG	135	149	122	158	100	116	204	145
Beryllium	NG	NG	<2	1.6	1	2.4	1.1	1	1.8	1.4
Cadmium	0.6	3.5	<2	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	37.3	90	**76**	**73**	**77**	**73**	$\boxed{134}$	$\boxed{128}$	$\boxed{135}$	$\boxed{115}$
Cobalt	NG	NG	11	15	11	22	10	11	20	11
Copper	35.7	197	**116**	**82**	**124**	**157**	**63**	**47**	**64**	**47**
Lead	35	91.3	<90	**37**	<60	**42**	<30	<30	<30	<30
Mercury	0.17	0.49	0.088	0.016	0.06	0.044	0.017	0.014	0.019	0.026
Molybdenum	NG	NG	<20	6	<8	22	<4	<4	6	<4
Nickel	18	36	$\boxed{55}$	$\boxed{54}$	$\boxed{61}$	$\boxed{72}$	$\boxed{57}$	$\boxed{67}$	$\boxed{92}$	$\boxed{82}$
Selenium	NG	NG	<6	<2	<4	<2	<2	<2	<2	<2
Silver	NG	NG	<6	<2	<4	<2	<2	<2	<2	<2
Thallium	NG	NG	<1	<1	<1	<1	<1	<1	<1	<1
Tin	NG	NG	<20	<5	<10	<5	<5	<5	<5	<5
Vanadium	NG	NG	45	50	38	51	49	49	56	42
Zinc	123	315	**129**	118	**131**	**145**	85	87	100	97

[A]NG = no guideline

Bold Concentrations exceed ISQG

$\boxed{\text{Boxed concentrations exceed PEL}}$

Commitment No. 41

The FEIS will include a discussion as to why processed ore toxicity data is not presented.

Response:

The toxicity of tailings solids is generally not evaluated, and was not addressed at the Meadowbank site, since exposure pathways for ingestion of tailings solids do not exist under standard operating and post-closure scenarios. The tailings and supernatant water are contained in an engineered impoundment isolated from the receiving environment. At closure, the tailings solids will be covered with coarse run-of-mine waste rock, making tailings inaccessible. Toxicity testing, when conducted, typically focuses on supernatant water associated with tailings, which, when released, may report to groundwater and/or surface water resources.

Commitment No. 49

Clarify the circumstances under which quartzite will be used as aggregate, including options for mitigating any impacts from the inclusion of this PAG material.

Response:

Quartzite is volumetrically insignificant until mining at Goose Island is underway. Any quartzite quantities of significance will not be exposed until mining of Goose Island pit at which time it will be too late to use this material for aggregate. It will be treated the same as any PAG rock and disposed of in the dumps.

Commitment No. 77

Provide thresholds and explanation for the level of change in sediment chemistry that would justify the collection of benthos to monitor contaminant levels.

Response:

Sediment chemistry of Third Portage Lake is relatively well understood. At depths greater than 6 m, sediment consisted of clay-silt with very consistent grain size and metals concentrations both within and between project lakes. Despite the remote location and pristine conditions of the project lakes, several metals (i.e., arsenic, copper, cadmium, nickel, zinc, chromium) exceeded CCME guidelines for aquatic life protection. This is typical of mineralized areas and does not mean that adverse impacts to benthic communities should be anticipated. Nearly all metals, with the exception of mercury, do not become concentrated in the tissue of benthic invertebrates and the Metal Mining Effluent Regulations do not require that metal concentration in tissue of benthos or fish be measured. Furthermore, there is no good correlation between sediment metals and tissue metals concentrations in benthos or fish. Nevertheless, if the average concentration of all metals that currently exceed CCME guideline concentrations increases by 25% in the North Basin of Third Portage Lake (i.e., the location of effluent discharge), this will prompt a targeted study (see AEMP, 2005) to examine whether tissue metals concentration in chironomid larvae is higher in the North Basin than in the South Basin, the internal reference area.

Commitment No. 79

Provide further detail on water treatment technologies).

Response:

At end -of-mine life, the reclaim pond water quality will require treatment to meet MMER criteria for arsenic, copper, nickel, zinc and possibly nitrate and ammonia. Treatment alternatives would include:

- in-pit treatment for metals in conjunction with enhanced attenuation for ammonia and nitrate
- in-pit treatment thru enhanced attenuation for ammonia and nitrate and a separate dedicated treatment for metals in a water treatment system assembled, in part, from equipment in the mill.

Commitment No. 87

The ultimate fate of salvaged fish from project-affected waterbodies will be presented and incorporate the DFO Fish-Out Protocol adjusted for the project and the wishes of Baker Lake residents.

Response:

See 'KEY ISSUES IDENTIFIED BY THE BOARD – Fisheries and Aquatics' below.

Commitment No. 92

Southern point of hire will be identified.

Response:

Crew rotation will be out of Thompson, Manitoba. Possible additional points of hire are Baker Lake, Rankin Inlet and Chesterfield Inlet and perhaps other Nunavut communities. This matter is currently being negotiated with KIA as part of the IIBA.

Commitment No. 93

Workforce requirements relative to regional human resource inventory will be incorporated into assessment of employment effects.

Response:

Current IIBA negotiations are dealing with this issue and will include numbers of Inuit in Entry Level jobs, trades apprenticeships and as a percentage of the overall workforce at the mine.

Commitment No. 97

Criteria for decommissioning the road and the approach to consultations on the road closure decision will be included in the FEIS.

Response:

See 'KEY ISSUES IDENTIFIED BY THE BOARD – All-Weather Road' below.

ADDITIONAL REQUESTS – NO. 1

Provide topographic data on Northwest Arm of the Third Portage Lake.

Response:

Background & Objective

The draft Environmental Impact Statement (EIS) for Cumberland Resource's Meadowbank Gold project was reviewed by Geovector Management Inc.. Geovector's review report, dated 22 April 2005, identified two sites along the north-western watershed boundary of Third Portage Lake (3PL) that appeared to have potential for overflow of the boundary into the Back River System. The two sites are located as shown on Figure 1, taken from the Geovector report.

A field reconnaissance was performed by AMEC on 29 June 2005 to investigate the topography of these two sites and assess the potential for overflow from 3PL. The more southerly site is designated Site 1 and is located about 4 km west of the Meadowbank Camp at Latitude 65° 02' 2.72" N, Longitude 96° 09' 21.39" W (UTM NAD83 Zone 14 633909E, 7215267N). The second site is designated Site 2 and is located about 5 km northwest of Meadowbank Camp at Latitude 65° 03' 18.83" N, Longitude 96° 08' 14.08" W (UTM NAD83 Zone 14 634683E, 7217661N).

Site 1

At Site 1, an unnamed lake, which drains to the Back River, is located west of 3PL. The unnamed lake approaches to within about 200 m of 3PL. A rock-filled channel-like feature extends between the two lakes (see Photos 1 to 5).

A level survey was conducted which showed that on 29 June 2005 the water level in the unnamed lake was 4.32 m higher than the water level of 3PL. This means that overflow from 3PL into the unnamed lake does not occur naturally, and that overflow would not occur for even the most extreme estimate of 3PL water level rise due to mine dewatering and operations.

Site 2

At Site 2, the closest Back River drainage feature is a small unnamed lake located about 400 m north-west of 3PL. No channel-like features were observed between the lakes (Photos 6 to 8).

The area between 3PL and the small lake was inspected and the elevation of the watershed divide was assessed to be significantly greater than 5 m above the level of 3PL. This assessment is confirmed by the topographic map base shown in Figure 1, which shows that the 140 m contour line is located across the potential overflow path, whereas the 3PL water level is shown at El. 133 m. It is thus concluded that there is no potential for flow into the Back River System at Site 2 from 3PL for any possible water levels.

Figure 1: Copy of Geovector Report Figure 1 Showing the two Potential Overflow Sites from Third Portage Lake to the Back River System

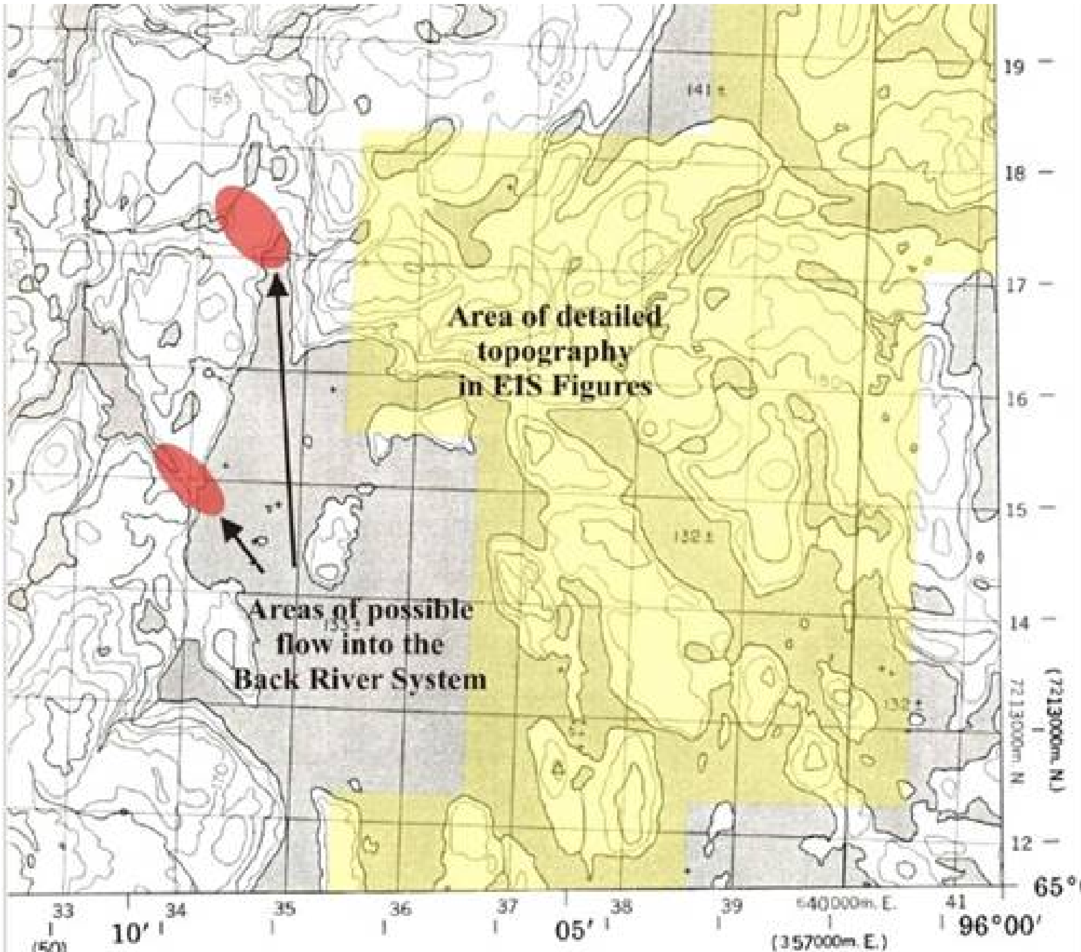


Figure 1

Areas of potential flow to the Back River System

Photo 1: Site 1 – Looking Northwest Along Rock Channel from Third Portage Lake

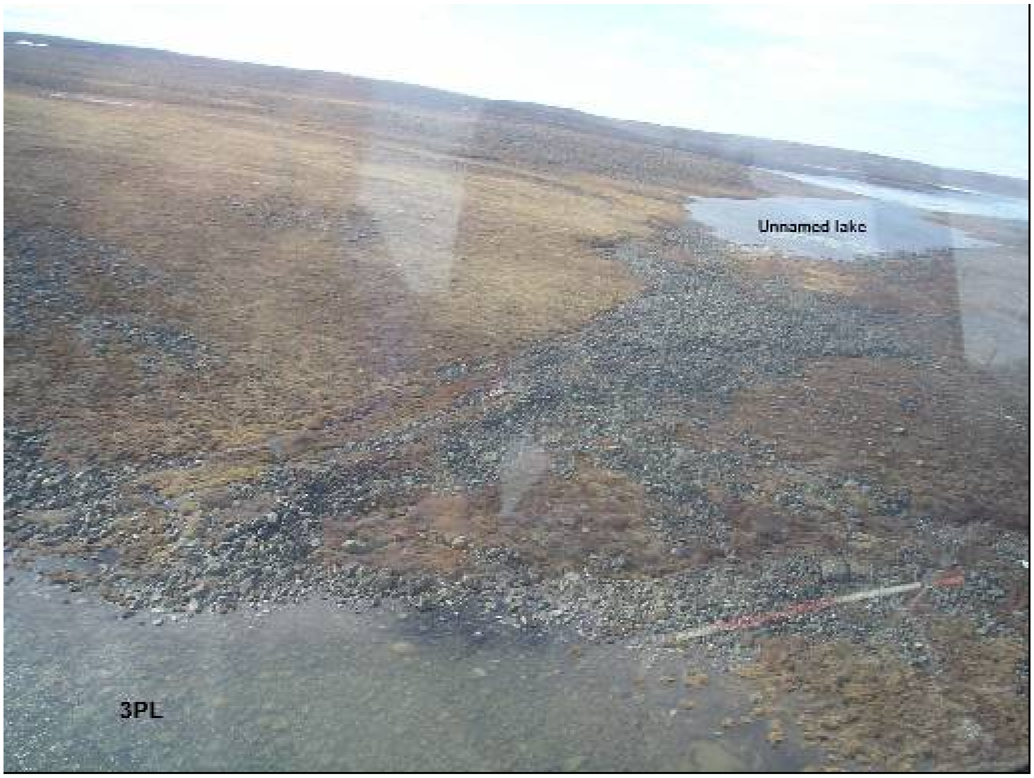


Photo 2: Site 1– Looking West Toward Rock Channel from Third Portage Lake

Photo 3: Site 1 – Looking Southeast Along Rock Channel from Unnamed Lake to 3PL

Photo 4: Site 1 – Looking Northwest at Unnamed Lake

Photo 5: Site 1 – Looking Northwest at the North end of Unnamed Lake at the Primary Outlet Channel flowing to the North

Photo 6: Site 2 – Looking Northeast Towards Site 2 with 3PL on the right

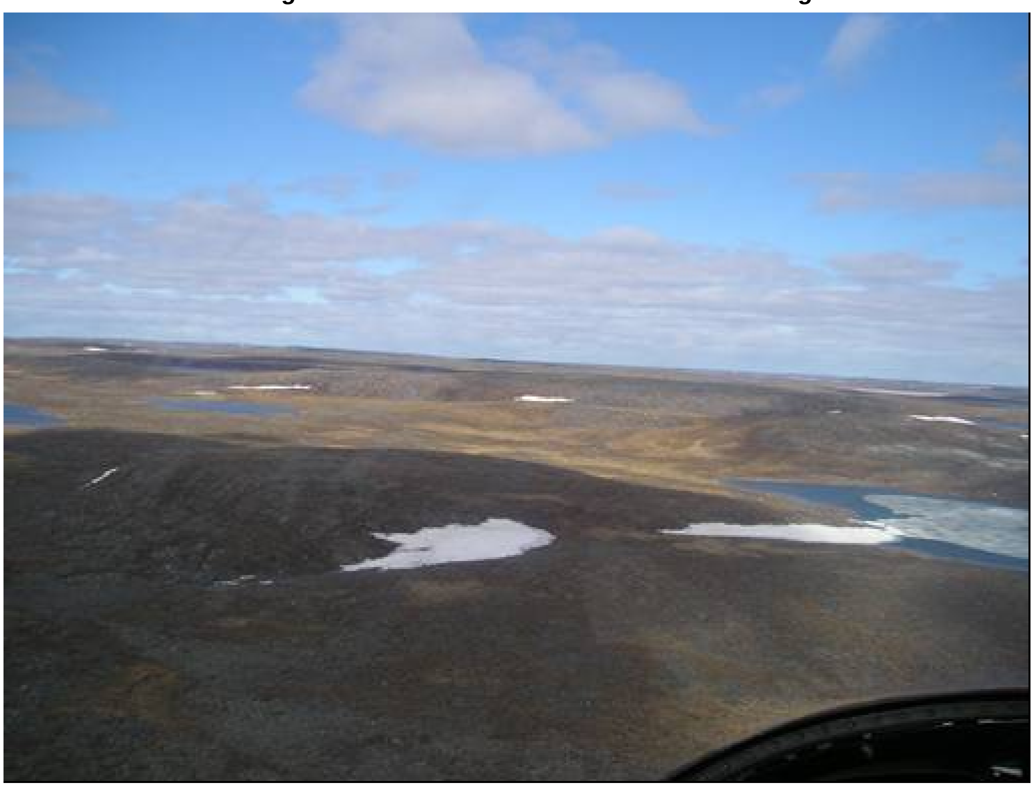


Photo 7: Site 2 – Looking North from 3PL

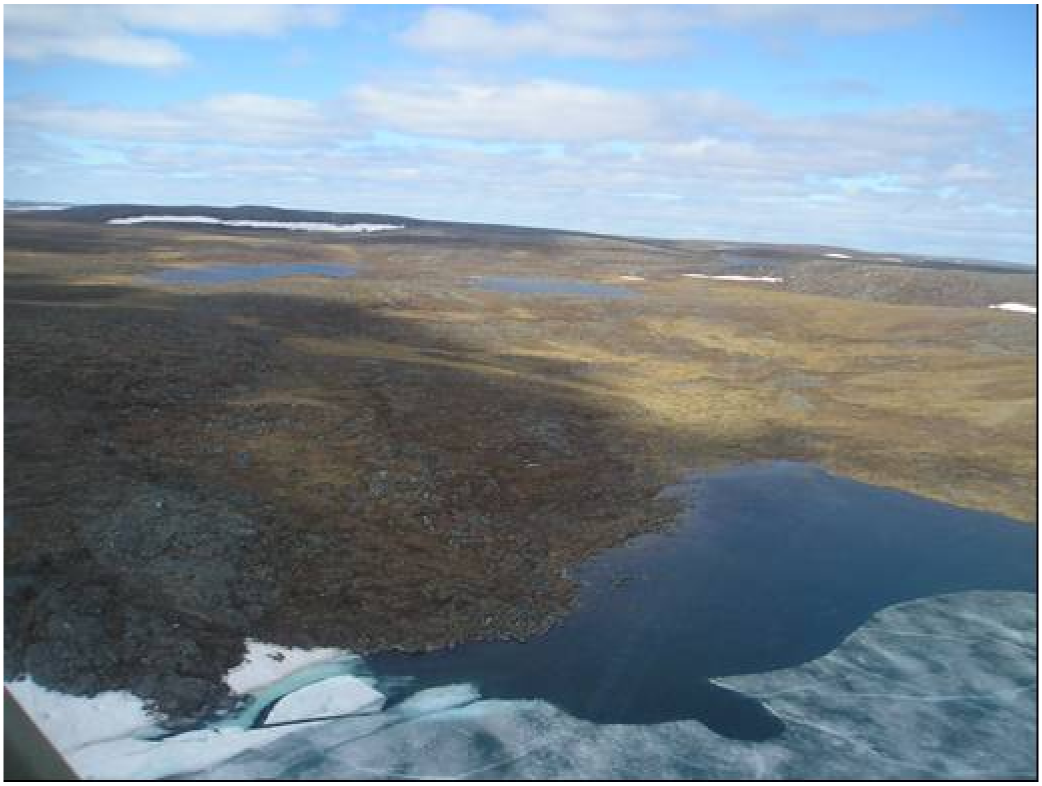


Photo 8: Site 2 – Looking North from 3PL

KEY ISSUES IDENTIFIED BY THE BOARD

FISHERIES & AQUATICS (A)

More information on the dewatering program, including the effect on the water levels, connecting channels and fish passage for remaining lakes; and the fish-out program, including the process for removing the fish, the deposition of the dead or alive salvaged fish and the means for communicating the fish-out program to local residents.

Response:

Cumberland Resources and their aquatic's consultant have been consulting with the people of Baker Lake and the HTO on the fish out program for several years. The issue have been discussed at numerous public meetings, an impact workshop and most recently at two consultation public meetings in 2005 (see Public Involvement Report for minutes from these meetings). To help the community and the HTO decide what methods should be used, a handout in English and Inuktitut on the fish out was circulated to the DFO and public. The approach presented takes into account DFO's draft fish out protocol adjusted to the project and Baker Lake residents. The English version of Cumberland's hand out and DFO's draft protocol are shown below.

Based on consultations to date, the consensus from the community and the HTO will be to live trap and move as many healthy fish as possible to adjacent lakes. Fish that do not survive the fish out will be given to the Baker Lake HTO to distribute as they see fit. The fish out program will not occur until at least 2008. From now to then, consultation shall continue with the HTO, KIA and the public of Baker Lake.

CUMBERLAND HANDOUT – IMPACTS TO FISH IN SECOND AND THIRD PORTAGE LAKES FROM LAKE DEWATERING

Background

Some of the gold that will be mined at Meadowbank lies underneath parts of Second Portage, Third Portage and Vault lakes. This will require that these areas be impounded or dammed, and drained of water to remove the fish before it is mined.

When mining is completed in about 10 to 15 years, most of the lake areas that were drained will be re-flooded, to allow fish back into these areas. The one exception is the northwest corner of Second Portage Lake. Because this area will be filled with mine tailings, it will not support fish after mining is completed. However, when the pits are re-flooded, because some former islands (e.g., Goose Island) and part of the land will have been mined, there will be more lake area available than before mining. This eventually should result in more fish in the project lakes than prior to mining.

The Issue

Fish must be removed from the impounded lake areas before they are drained. We would like to get the community of Baker Lake's perspective and opinion on what should be done with the fish that are removed. There are two options:

1. Remove as many fish as possible from the impoundments using gill nets and trap nets, sacrifice the fish and fillet or prepare them for consumption by the people of Baker Lake. Depending on the size and species of fish, they can be used to feed people or used as dog food. For example, lake trout and

Arctic char are preferred as food by people. Round whitefish may be used as dog food. It is very important that the fish do not go to waste.

2. Try to keep fish alive after capture by nets and transplant them to another lake. Attempts to do this have met with limited success in the past, as survival of fish averages about 50%. Fish that do not survive would be provided to the community as described above.

We would like to gauge the community of Baker Lake's wishes for what should be done with the fish – keep them or transplant them. To assist in making your decision, more information on both options is described below.

Option 1 – Sacrifice Fish

Gillnetting is a very effective means of capturing fish, although it is hard on them and many do not survive. Trap nets capture fish alive and in good health. However, trap nets do not capture fish easily and it requires much work to install the nets and move them around the lake. Fish must be removed from the impoundments within a few weeks, so a great deal of fishing effort must be applied to capture as many fish as possible fish before the lake is drawn down.

In most cases, sacrificing of fish is recommended. The ability of the lakes in the Meadowbank region to produce fish is limited by the amount of food in the lakes. The amount of food available can only support the number of fish that currently survive in these lakes. Adding more fish from another lake by transplanting, without adding more food, will not result in a long-term increase in fish. Eventually, the number of fish in the lake will return to the number before fish were transplanted.

Many fish that are transplanted may die or will be eaten by other fish after they are moved because of the stress of capture and transfer. Sacrificing fish that are captured will ensure that fish do not go to waste.

Option 2 – Transplant Fish

Moving fish from the dewatered part of the lake to another lake (e.g., moving fish from Second Portage Lake to Third Portage Lake) is an option that has been attempted at other mine sites. This would involve using gillnets and possibly trap nets to capture fish, hold them, and move them into an adjacent lake. This will temporarily increase the number of fish in the lake to which fish were transplanted.

Recent experience in fish salvage operations at a northern diamond mine (e.g., Diavik) by a consulting company and Canada Fisheries and Oceans showed that gillnets were more effective at recovering fish than trap nets, and that overall survival of fish from all capture methods was only 50%. However, survival of fish from gill nets was about 30%. Furthermore, in an attempt to improve survival of fish being transferred, specially designed "oxygenated recovery units" for fish were used. Use of oxygenated boxes did not improve survival of round whitefish and survival was actually diminished for lake trout.

Salvaged fish that do not survive the recovery effort will be autopsied to recover important data including fork length (mm), total weight (g), gender, maturity, stomach contents, and general internal and external health. A subsample of fish of different sizes will be analysed for metals concentration in muscle tissue, to establish a baseline prior to mining.

An additional benefit of both of the above options will be to undertake a research initiative to correlate total fish biomass (kg) of fish per unit area (ha) from the Meadowbank lakes. The information gained from this exercise will assist in determining and quantifying actual impacts to fish and fish habitat from impoundment and dewatering on this project and future projects. Collaboration with Fisheries and Oceans will be sought prior to undertaking this initiative.

Who Will Conduct the Work?

All fishing activities on the project lakes during the fish-out program will be conducted by the Baker Lake HTO, with the assistance and under the direction of Azimuth Consulting Group. Department of Fisheries and Oceans may also be involved. A critical component of this work is gathering appropriate biological data on the fish that are harvested. Training of technicians will occur during harvesting activities to ensure that harvesting of fish during subsequent fish-out programs (e.g., at Vault Lake) can occur under the direction of local people.

How Many Fish May Be Captured?

This is a difficult question to answer. The number of fish within each of the impounded lake areas is dependent on the area and water volume of the lake, and the value and quantity of the habitat and food resources within each of the lakes. Previous fisheries investigations have found that more fish are captured in gillnets from Second Portage Lake than from Third Portage Lake, suggesting that this lake is more productive than the others. Also, a greater proportion of Arctic char are present in Second Portage than Third Portage Lake.

Based on our previous investigations and our understanding of the ecology of these northern lakes, they contain many large, but very slow growing, old fish. Fish populations are dominated by lake trout (60% of all fish), round whitefish (25%) and Arctic char (10 to 15%). Very few burbot (<1%) are present in the lakes.

Our estimate of the number of fish (excluding minnow size fish) that might be harvested from each of the lakes below is very approximate and is based on fisheries studies, our understanding of abundance of habitat in each lake and professional judgment.

Impoundment Area	Area of Moderate and High Value Habitat (ha)	# fish/ha*	Number of Fish
Second Portage Lake	39.4	150	5,910
Goose Island Third Portage	62.0	80	4,960
Vault Lake	74.0	30	2,220
Phaser Lake	26.3	30	789
TOTAL			**13,879**

Note: * Estimated.

Total estimated water volume (million m^3), annual discharge (m^3) and discharge as a percent of lake volume, Meadowbank project lakes.

Pit	Receiving Environment	Dewatering Volume (Mm^3)	% of Lake Volume Drained	Area of Lake Drained (ha)	% of Lake Area Drained
Goose Island	Third Portage	2.6	1.14	138	3.7
Second Portage	Second Portage	12.2	43.6	134	32.3
Vault*	Wally	~1.5	5.3	98	20.1

Note: * Dewatering volume here is for Vault and Wally lakes combined.

DFO DRAFT PROTOCOL – GENERAL FISH-OUT PROTOCOL FOR LAKES TO BE LOST DUE TO MINING DEVELOPMENTS

BACKGROUND

The dewatering of lakes is often an unavoidable consequence of mine development particularly in the case of a diamond mine if the purpose is to gain access to underlying kimberlite pipes. All mining proponents will be required, as a condition of a ss. 35(2) *Fisheries Act authorization* to conduct a Fish-out Program (Program) on each lake to be lost prior to commencing with dewatering of the lake.

The fish-out of tundra lakes minimizes the wasting of fish, and provides a unique opportunity to test some basic assumptions about lake productivity in the North. The Programs are intended to collect scientifically defensible data from lakes scheduled for dewatering. This document is intended to provide the protocol for the conduct of such studies. It is expected that the detailed requirements contained within the protocol will be refined as results dictate.

The Program objectives are presented in Section 1. Section 2 presents the management structure of the program. Section 3 provides an overview of the program components and more detailed descriptions of data collection. Section 4 describes the reporting requirements.

PROGRAM OBJECTIVES

The objectives of the Program are:

- To avoid the wasting of fish
- to determine the actual size, distribution, and density of fish in Arctic lakes
- to test lake production models which predict fish population density and production from lake parameters
- to determine the linkages between habitat characteristics and fish populations.

The intent of the Fish-out Program is to remove fish and provide them to aboriginal communities to avoid wasting fish and provide scientifically defensible data. These data will be used to:

1. quantify fish production, fish habitat, and productivity of the intermediate trophic levels (primary and secondary producers)
2. establish linkages between fish habitat and fish productivity in Northern lakes
3. establish a reference database through which comparisons among lakes can be conducted
4. verify preliminary sampling program data on fish abundance and community structure with a complete fish census.

These data will be useful in providing a point of reference for the fisheries component of the AEMP. These data will also be useful for developing models for predicting the productivity of compensation initiatives.

PROJECT MANAGEMENT

The proponent will provide a qualified fish biologist to act as the project Biologist and is encouraged to utilise aboriginal expertise.

The project Biologist will be at site during crew training, to participate in the collection of data and to ensure the quality of data. The project Biologist will also be responsible for collating and checking data, and producing the project report and electronic database.

In order to make communications efficient, DFO will have one contact point for the management of the Fish-out Program. This person will be the project Authority. The project Authority will be responsible for providing advice to the project Manager and project Biologist as the need arises.

COMPONENTS

The capture and processing of fishes, including biological data collection, sample analysis, and recording of field data are the responsibility of the proponent based on DFO approved methods described herein. In the following sections are descriptions of the required components of the Program. Updated protocols should be developed for all data collection. Rigorous scientific procedures are required to provide usable data from the Fish-out Program. Strict protocols for all procedures will be in place prior to the commencement of work. Consistency of methods and environmental conditions are essential.

The Fish-out Program is broken into three general components based on level of ecosystem organization. These components are therefore:

1. Fish Community
2. Aquatic Biology/Physical Limnology
3. Habitat Inventory.

The Fish-out Program can also be broken into three phases as outlined in Table 1. The initial or Marking Phase will consist of a marking program. The second or CPUE Phase will consist of standardized fishing. These results will be used to derive population estimates from catch-per-unit-effort. This phase will also serve as a recapture phase for the marking and recapture program. The final or Total Removal Phase will consist of every effort to capture all remaining fish in each lake. This will be initiated once each lake has been sufficiently dewatered.

Aquatic Biology/Physical Limnology component data will be collected during the Marking and CPUE phases. Habitat Inventory data will be collected during CPUE and Total Removal phases. Aquatic vegetation mapping along with data on fishing depth, substrate, and surface water temperature will be obtained during the CPUE Phase. Physical habitat data will also be collected during the Total Removal Phase, once the Lakes have been sufficiently dewatered to expose the physical habitat.

Table 1: Schematic Timeline of the Fish-out Program Components

Fish-out Program Sub-Components	Study Phases		
	Marking	CPUE	Total Removal
Marking	■		
Recapture		■	■
CPUE		■	
Census	■	■	■
Aquatic Biology	■	■	
Physical Limnology	■	■	
Habitat Mapping			■

The Marking phase of the Fish-out Program should commence immediately following ice out, prior to an increase in water temperatures that may pose an unacceptable mortality risk. Primary and secondary producer sampling will be conducted during the open water season of the Program year. Due to the low survivability rates of white fish during netting and marking exercises, the Marking Phase on a particular lake will be foregone or terminated if previous sampling on a lake indicates a dominance of white fish or more than an incidental occurrences of white fish are encountered during the Marking Phase, respectively. The CPUE Phase will commence 3 to 7 days following the completion of the Marking Phase and continue until the CPUE Phase objective is met. During this same period, aquatic vegetation data will be collected as well as depth at the beginning, middle, and end of each net, substrate data, and surface water temperature. After lake volume has been sufficiently reduced (possible during the winter), the fish-out will resume until the final or Total Removal objective is met. During the CPUE Phase, there will be no physical or chemical alterations to the lakes. For the habitat mapping to be conducted, the lakes must be reduced to such a level that the habitat is exposed and can be photographed. There will be no physical alterations to the lake basins until the photography is completed. Once the photography is completed and the lake levels are sufficiently lowered, the Total Removal Phase will be conducted.

Fish Community

The goal of the fish community component of the Fish-out Program is to provide an accurate description of the size and structure of the fish community in the lakes being studied. This will be accomplished through several complementary methods that are described below. Specific field gear and deployment methods are also described.

Population Estimates

The population estimates take two forms: mark and recapture and catch-per-unit- effort (CPUE). The efficiency of these programs will be determined using the data resulting from the complete fish-out of a lake. In addition, the proportion of marked fish recaptured will also aid in determining the efficiency of the Fish-out Program. Procedures will follow Ricker (1975), *Computation and Interpretation of Biological Statistics of Fish Populations*.

Mark & Recapture

The mark and recapture component of the fish-out requires that a period of catch and release fishing occur prior to the CPUE and Total Removal phases (Table 1). Only after the Marking Phase will the CPUE Phase be initiated. As such, mark and recapture procedures are confined to a single iteration or single season census. The most commonly used method is the Adjusted Petersen Method. This method provides an unbiased estimate in most situations.

Catch-per-Unit-Effort (CPUE)

The CPUE population estimate methods will be conducted during the second or CPUE Phase of the Fish-out Program. CPUE estimators are based on the assumption that fishing effort is significant enough to reduce the population. The reduction in fishing success is considered to be proportional to the stock present. During the Fish-out Program the effort in terms of gear type must be kept constant. Therefore, gill net mesh-sizes and trap net types must remain constant. The number of panels of each mesh-size may be varied, but each mesh-size must be represented in the lakes at all times. It is anticipated that additional panels of each mesh-size will be required as stocks and hence catch rate, decrease. The following methods will be used to determine population estimates for fishes in lakes:

- **Leslie Method** - The Leslie method plots CPUE against cumulative catch over a period of time. The resulting straight line provides the initial population and catchability estimates.
- **DeLury Method** – The DeLury Method plots the logarithm of the CPUE against cumulative effort. The fitted straight line provides the initial population and catchability estimates. The DeLury Method can also be modified to allow multiple gear types (*e.g*. gill nets and trap nets) or to use mark and recapture data.

In order to confirm the reliability of the population estimates, a complete census of the lake fish communities must be completed. Every effort should be made to capture every fish in the lakes. This effort can be applied during two phases. During the CPUE data collection phase, every effort is made to capture as many fish as possible while keeping the gear types constant. Following this phase, every effort will be made to capture all remaining fishes in the lakes with what ever means can be conceived. Proposed methods will be presented to, and reviewed by, the project Authority.

Field Methods

Fishing Gear & Deployment

Trap net and gill net set locations will be recorded on a map. Date, time of setting, and time of retrieval will be recorded for each trap net and each gill net gang. Water depths at the start and finish of the trap net leads and gill nets are to be recorded either from field observation or from a bathymetry map. Lengths and heights of the trap net leads and gill nets are also to be recorded.

Trap Nets

DFO has two small mesh trap nets that can be used for the Fish-out Program. The traps are constructed of 7 mm mesh with a house of 1.23 x 1.23 x 1.23 m. The leads measure 61 m in length and 1.83 m in depth. The trap leads will be anchored to shore and set out perpendicular to the shoreline. Trap nets will be moved periodically to ensure full coverage of the available habitat in the lakes.

Gill Nets

Gill nets of a variety of mesh-sizes will be the primary gear used to capture fish for removal from lakes. The range of mesh-sizes is consistent with that used in the previous fish-out programs. For the Marking Phase, the goal is to live release fish back to the lakes; hence 38 mm (1.5”) stretched mesh nets should be used to limit gilling of fish and reduce mortalities. Nets will be periodically moved such that all available habitat is consistently fished. Shore-tethered nets will be set at various angles to the shoreline: perpendicular, diagonal, and parallel. Nets will also be set in the deeper basin areas.

Gill nets to be used for the purpose of fish removal (CPUE and Total Removal Phases) will have stretched mesh-sizes of 102 mm (4”), 76 mm (3”), 51 mm (2”), 38 mm (1½”), 25 mm (1”), and 22 mm

(7/8”). Date and time of each set and retrieval will be recorded for each net. The full range of mesh-sizes is to be fished at all times: this is essential. This means that there must be at least one panel of each mesh-size being fished at all times. The number of panels of each mesh-size will be increased as CPUE decreases. The proponent will ensure that that there is a sufficient stock of gill nets of each mesh-size so that fishing effort can be increased when CPUE begins to decrease. For small lakes, it may be more applicable to increase the small mesh sizes only to avoid cluttering the lake and having interference affecting catch rates. The setting of gill nets within the lake will be completed on a rotational basis that will result in the fishing of the entire lake and minimize potential avoidance behaviour. Gill nets will be set on the basis of 1/3 at fixed locations and 2/3 randomly moved throughout the lake for the duration of the fishing efforts.

Biological Data Collection

Marking Phase and CPUE Phase biological data sets are to be kept separate. That is, different number series should be used to distinguish fishes that are captured during the Marking Phase from those captured during the CPUE Phase. Marked fishes recaptured in the CPUE Phase will be subject to complete biological data collection, regardless of the data collected during the Marking Phase.

The gill net set and mesh-size are to be recorded for each fish captured during the Marking and CPUE Phases. In addition, each fish is to be assigned a unique fish number, identified to species, weighed (0.1 g), and measured for fork length (mm). Species such as burbot and slimy sculpin are to be measured for total length only. Sex, maturity, and reproductive status are also to be recorded. Aging structures are to be taken from all species live released during the Marking Phase, except burbot. For any mortalities, full biological data collection is required. Aging structures for burbot are only required from mortalities during the Marking Phase. During the CPUE Phase, appropriate aging structures (otoliths, scales, and/or finrays) are to be removed from a subsample of the smaller, younger fishes and all of the larger, older fishes.

Stomach Samples

During the CPUE phase, a subsample of 50 stomachs is to be taken from each species. Only stomachs containing food items will be collected. Samples collected will be distributed evenly across the size ranges of each species. Stomach samples are to be preserved in 10% formalin and shipped for analysis immediately.

Aging Structures

Appropriate aging structures (otoliths, scales, and/or finrays) are to be removed from a subsample of the smaller, younger fishes and all of the larger, older fishes.

Marking Phase

The Marking Phase will be conducted while the water temperature remains below 10°C in the lakes. It is important to minimize stress on fishes and to return the marked fish to the water as soon as possible.

Basic biological data will be recorded on each fish captured. Full biological data will be collected from fish mortalities. Detailed set data will be recorded for the gear used to capture fishes.

Trap nets and index gill nets will be used to capture fishes for marking. Three small mesh (¼”) trap nets will be installed in each lake. Index gill nets (1½” stretched mesh) will be set for short terms (30 to 60 min). All habitat available in the lakes will be surveyed so that CPUE comparisons can be made among habitat types.

All captured fishes greater than 250 mm will be primarily marked with a uniquely numbered marker. In addition, fin clips will also be applied as a secondary mark to these fishes. For species such as Lake Trout, the fin clip collected as an aging structure may be used as a secondary mark. Fishes less than 250 mm will only have secondary marks applied.

CPUE Phase

During the CPUE phase, net checks will be conducted twice per day. Checks may be reduced to once per day should the catch-per-unit-effort decline sufficiently. The CPUE Phase will be conducted until the CPUE objective is met. At this point, the fish-out will be suspended until the lakes are dewatered to a point where fish are sufficiently concentrated to allow fish-out efforts to continue. During the Marking and CPUE Phases there will be no alterations to the lakes, physically or chemically.

The CPUE Phase will also serve as the recapture component of the Mark and Recapture Phase.

Total Removal Phase

Once these lakes have been sufficiently dewatered, the gill nets and trap nets will be used to capture the remaining fishes. As the goal of this phase is to capture all remaining fishes, innovative capture methods, with prior approval by DFO, should also be attempted. The Total Removal will be conducted until the Total Removal objective is met.

The Total Removal will also serve as the recapture component of the Mark and Recapture Phase.

Fish-out Objectives

The minimum CPUE objective is defined as occurring when a declining CPUE has been demonstrated with sufficient fishing effort being employed, and no fishes are captured for 48 h of continuous netting, nets are removed for 48 h, nets are then re-deployed for 48 h of continuous netting and fishes are still not captured.

The minimum Total Removal objective is defined by consultation with DFO or as occurring when a declining CPUE has been demonstrated with sufficient fishing effort being employed, and no fishes are captured for 48 h of continuous trapping, traps are removed for 48 h, traps are then re-deployed for 48 h of continuous trapping and fishes are still not captured.

Aquatic Biology/Physical Limnology

With one of the principle goals of the Fish-out Program being that of determining the link between habitat and fish production (i.e., community-environment relationships), information about the various links within a lakes ecosystem must be collected. These data will provide the linkages between available habitat and observed fish stocks. The following ecosystem components will be characterized:

- Physical Limnology
- Water Quality/Nutrients
- Chlorophyll *a*
- Zooplankton
- Benthos

Methods

Permanent survey sites will be established in the deepest portions of each basin. These data will be considered representative of each entire lake. Except for benthos, sampling surveys will be carried out at each site in three, equally spaced sampling visits. The benthos survey will be conducted once, during mid-August. The information to be collected is presented in the following sections.

Physical Limnology

The following components will be carried out at each site during each site visit:

- Dissolved oxygen and temperature profiles.
- Secchi depth.

Daily wind, cloud cover, air temperature, and water temperature are to be recorded.

Water Quality/Nutrients

Samples will be taken at a depth of one metre (1 m) and mid-water column. Samples will be analyzed for:

- Total phosphorus
- Total nitrogen
- Total dissolved solids
- Dissolved nutrients – ammonia, nitrate, nitrite, ortho-phosphate, silica
- Total dissolved nitrogen
- Total organic carbon.

Chlorophyll a

Chlorophyll *a* samples will be taken from each of the water quality/nutrient sampling locations.

Zooplankton

Zooplankton sampling will be conducted during the water quality/nutrient sampling periods. Sampling will consist of four hauls, bottom to top per station using a 25 to 30 cm diameter net at least 7x longer than width with 70 to 100 micron mesh.

Benthos

Benthos biomass and taxonomy samples will be taken once during mid-August. A total of 20 Ekman dredge hauls will be taken below 5 m in each basin and represent the following depth intervals: six between 5 to 10 m; four between 10 to 15 m; three between 15 to 20 m; one between 20 to 25 m; and one deeper than 25 m. Fifteen of the hauls will be used for biomass determinations and the five remaining dredge hauls will be conducted at each depth interval for taxonomic purposes.

Habitat Mapping

The objective of this component is to develop a detailed Geographic Information System (GIS) and physical habitat database for a range of Northern lakes. This component targets physical habitat assessment and augments the data collected in the other components of the Fish-out Program. Combined, these data will provide an understanding of the structure and distribution of habitat in lakes, the relationships of fishes to habitat, and will be invaluable in developing models for predicting the productivity of compensation initiatives. All available habitat will be mapped in detail.

Methods

Habitat data will be collected using a combination of ground level shoreline surveys and aerial, whole lake photographic surveys. A suitable habitat classification system will be applied and augmented with georeferenced coordinates to allow for detailed habitat mapping of Fox Lake. Ground level habitat surveys will be augmented with low level photogrammetric aerial photography. From these surveys GIS maps of substrates, depth, slope, and wave energy will be produced through a joint DFO/Proponent project to characterize the lake habitats. Fieldwork for this project will be conducted prior to lake dewatering (ground level shoreline surveys) and after the lake has been dewatered (exposed pelagic zones). Aquatic vegetation, substrate and bathymetry will be mapped during the CPUE Phase and well as during the ground level survey.

DATA REPORTING

Data/Sample Analysis

The analysis of all samples, from water quality to aging structures, is the responsibility of the Proponent. All sample analyses will be conducted by qualified laboratories/personnel.

Reporting

The Proponent will provide the data resulting from the Fish-out Program in a Data Report Summary. Attempts will also be made to present and discuss the data in relation to the objectives of the Fish-out Program. In addition to the biological and survey data, sample analysis results will be provided. Analyses demonstrating the viability of the data will be included in the Data Report Summary. The report will also include population estimates.

In addition to the report, the proponent will supply DFO with:

- Photocopies of all field data/notes
- Copies of photographs
- An electronic database in Microsoft Access of all data collected, including the results of all sample analyses.

The report will also include references and comparisons to any baseline data available for these lakes.

KEY ISSUES IDENTIFIED BY THE BOARD

CHEMICALS MANAGEMENT (A)

Better description of cyanide used in the project mining process.

Response:

The cyanidation process for the extraction of gold from ore has been employed for over a century, since 1898 when it was first used in New Zealand and Africa. The process is used because it is very efficient and relatively inexpensive. The most common form of cyanide used is Sodium Cyanide, in chemical notation NaCN. The NaCN is mixed with water to form a solution, the gold ore is then mixed with the cyanide solution and the gold dissolves. The normal process is as follows.

The ore is crushed and added to the milling circuit along with water and cyanide solution. The ore, water and cyanide solution is ground and thickened until the resulting slurry is about 45% solids and the ore is the consistency of fine sand. The slurry is then introduced into a series of agitated tanks where the gold dissolves in the cyanide solution, typically in about 24 to 48 hours, often assisted by blowing in air or oxygen.

The process to recover the gold from solution starts by moving the slurry from the leach tanks to another set of tanks containing carbon. During the time in these tanks the gold in solution adsorbs onto the surface of the carbon. After the process is completed, the spent ore or “tails” passes out of the tanks over screens which are fine enough to let the tails leave but retain the carbon, which stays behind because it is bigger. Periodically the slurry is pumped over another set of screens, this time to remove the larger carbon (with the gold attached) while leaving the finer tailings in solution. The carbon with the gold attached is collected and sent to what is called a stripping vessel.

In the stripping vessel, the carbon, with the gold attached, is mixed under pressure with a caustic solution at a temperature around 140 °C. Under these conditions, the gold comes off the carbon and goes into solution. After a predetermined amount of time, the solution is drained from the vessel and sent to electrowinning cells where the gold is electroplated out of the solution onto steel wool cathodes. The solution is recycled back to the stripping vessel. The steel wool cathodes, containing the gold, are washed with sulphuric acid to dissolve the steel. The remaining sludge is dried, then combined with other compounds and melted in the furnace to produce dore bullion, the gold bars which are shipped off site.

The tailings, which contain cyanide in solution, are treated prior to being pumped to the tailings pond, to lower the cyanide to permitted levels. The conventional process for cyanide treatment and was developed by Inco in 1982. This process combines sulphur dioxide, air and the tailings slurry in the presence of a copper catalyst to oxidize and convert free cyanide and weak metal cyanide complexes to cyanate and to precipitate the strong cyanide complexes as stable insoluble compounds that are retained within the tailings solids. Cyanates are approximately 1000 times less toxic than cyanide and will decompose further in the natural environment to ammonia and carbon dioxide, which in turn are consumed and converted by plants and other aquatic organisms to harmless non-toxic compounds.

References

“Technical Guide For the Environmental Management of Cyanide in Mining”, Published 1992, by British Columbia Technical and Research Committee on Reclamation

“Chemistry and Treatment of Cyanidation Wastes”, Published 1991, by Mining Journal Books Ltd.

ALL-WEATHER ROAD (A, B & C)

a: More information to address public safety, including the Proponent's plans regarding all aspects of traffic control and every aspect of cooperation with the community to plan for and resolve concerns

b: Exploration of regulatory aspects of the road, such as traffic control, including consultation with the Hamlet of Baker Lake, the Federal Government (including INAC if appropriate), and the GN to determine the potential roles all levels of government will play in regulation of the road.

c. Long term options for the road, including the exploration of options to keep the road open after mine closure and maintenance plans for the road in the event the decision is made to keep the road open.

Response:

A response to these three information requests are provided below.

1.0 INTRODUCTION:

The Nunavut Impact Review Board (NIRB) pre-hearing decision dated 14 July 2005 instructed Cumberland Resources Ltd. (Cumberland) to address several questions related to Cumberland's use of the all-weather access road (the road) to the Meadowbank project site and future options for the use of that road. This submission addresses the first, second and third points set out in Section 6.6 of the NIRB decision (see above).

Cumberland has conducted additional consultation with the Hamlet of Baker Lake and its residents in respect of the road and its use and has discussed the road project with the Government of Nunavut (GN). The details of these consultations are reported elsewhere in Cumberland's submissions to NIRB. This submission is intended to address the "regulatory aspects of the road" as instructed by NIRB.

Cumberland has made some assumptions about the scope of the second NIRB instruction set out above in order to prepare the submission set out below. Since full consideration of the environmental impacts of the road, from construction to abandonment, are addressed elsewhere in the Final Environmental Impact Statement (FEIS), that information is not repeated here. Instead, based on our reading of this NIRB instruction, we have focussed on an explanation of the regulation and control of the road and road traffic over the life of the facility.

We note as well that although the NIRB instruction refers to "regulation of the road", that a significant portion of the proposed route is located on Inuit Owned Land (IOL) belonging to the Kivalliq Inuit Association (KIA). KIA is a private land owner and strictly speaking does not exercise regulatory authority. KIA does, however, manage its lands on the basis of a set of *Rules and Procedures for the Management of Inuit Owned Lands* (the "Rules" below) and where appropriate, this submission makes reference to these Rules.

2.0 LAND TENURE & THE CONTROL AND REGULATION OF THE ROAD

The regulatory framework and Rules which will apply to the road will be partially dependent on land ownership and any land tenure arrangements made by Cumberland. Appendix 1 is a map which outlines the road alignment and land tenure information.

Moving from the south end at Baker Lake to the Meadowbank site in the north, the most southerly portion of the proposed road traverses lands under the control of the Hamlet of Baker Lake and then lands under the administration and control of the GN (approximately 6.92 km), as part of the Baker Lake block land transfer. The next portion (approximately 7.48 km) is federal Crown land. The road then crosses IOL parcel BL-18 for a distance of 19.24 km and then moves on to federal Crown land again for a stretch encompassing approximately 53.86 km. The final, most northerly portion of the road is on IOL parcel BL-14 and runs for the last 23.84 km around Third Portage Lake to the mine site.

The parties which may play a role in the control and regulation of traffic and other activity related to the road therefore include INAC, the GN, the Hamlet of Baker Lake and the KIA. Each of these parties has its own authorities which can be brought to bear on the establishment of the road and its use.

2.1 Land Tenure & Control of the Road

Land Tenure:

Cumberland will have to negotiate with each of the parties that own or control lands along the proposed road to secure a right of way for construction of the road. Cumberland has not yet begun the negotiations necessary to assemble land for the road. It is anticipated that this work will take place after completion of the NIRB Review process. As the land tenure arrangements are negotiated, there will be a need to ensure some level of consistency among these land tenure instruments in order to ensure that the road can be efficiently and safely managed.

In the case of the Hamlet of Baker Lake, land tenure arrangements may involve approvals under a zoning bylaw or a bylaw amendment to secure land and authorization for the construction of the road.

On Commissioner's lands within the Baker Lake block land transfer, a land tenure arrangement will also have to be negotiated with the GN.[1]

On federal Crown lands a lease, easement or more likely a licence of occupation will be required.

On IOL the choice of instruments will be for KIA to make but it is expected that a lease or an easement will be required. IOL is of course private land and the KIA may authorize Cumberland's use of the road without necessarily approving the presence of others on their lands. Under the Nunavut Land Claims Agreement (NLCA) and Rules, Inuit have a right of access to IOL but the public may only enter on to or cross IOL in accordance with part 3 of Article 21 of the NLCA and the Rules. Whether public use of those portions of the road on IOL will be permitted is a matter for the KIA to determine.

Control of the Road:

Control of that portion of the road that is within the Hamlet of Baker Lake will depend on both hamlet bylaws and on the application of GN legislation. The Hamlet's traffic control bylaw may apply to the bottom end of the road depending on choices made by the GN about the classification of the road under the *Public Highways Act.*[2]

INAC will not likely play any role in the regulation of traffic on the road once it is constructed. It appears that Canada as represented by the Department of Indian Affairs and Northern Development (INAC) will

[1] It is not possible to say in advance what this may entail but some possibilities include a lease or an easement agreement.
[2] R.S.N.W.T. 1988, c.P-13. This may depend on whether the GN chooses to classify the road as a "primary highway" or not. If this is done, the applicability of the Hamlet's traffic bylaws may depend on the negotiation of an agreement under s.10 of the *Act.*

play a role in land tenure negotiations but that once the road is built INAC will not be involved in traffic management or the regulation of the use of the road.

KIA is not a regulator. Its only opportunity to influence the use of the road is through land tenure arrangements for the affected IOL parcels.

The GN's role will be based on whether the road is public or private, its legislation and on the effect of the *Nunavut Act*[3] on the control of the Crown lands over which the road will be built.

2.2 The Effect of the *Nunavut Act* on Tenure of the Right of Way

Section 49 of the *Nunavut Act* addresses the ownership of Crown lands in Nunavut.

Section 49 states:

> 49. (1) The following lands are and remain vested in Her Majesty in right of Canada:
>
> (*e*) all roads, streets, lanes and trails on public land;

The definition of "public land" in the statute "means any land, and any interest in land, in Nunavut that belongs to Her Majesty in Right of Canada or of which the Government of Canada has power to dispose." This clearly includes the Crown lands that the Cumberland road will be built on.

There is no definition of "road" in the *Nunavut Act* to help interpret its meaning under s. 49(1)(e). However, the term "highway" is defined in the *Motor Vehicles Act*[4] for the purpose of both that statute and the *Public Highways Act*. The definition of "highway" is as follows: "means a road, place, bridge or structure, whether publicly or privately owned, that the public is ordinarily entitled or permitted to use for the passage of vehicles".

Until land tenure arrangements are completed, Cumberland is not able to advise NIRB as to whether the road will be accessible to the public and therefore be a highway. These matters will have to be discussed with GN, INAC, and KIA. The eventual goal for the road (i.e. public or private) may also drive the choice of land tenure instruments. For example, leases are usually exclusive tenures. Easements and licences of occupation are not necessarily so.

There could be another interesting effect of the *Nunavut Act* on the use of the federal Crown land for the Cumberland road. This is also addressed in s. 49 of the *Act*. In s. 49(2) it states:

> "The right to the beneficial use or to the proceeds of the lands referred to in subsection (1) is appropriated to the Commissioner, and the lands may be held by and in the name of the Commissioner for the beneficial use of the Government of Nunavut."

It therefore appears that the GN will secure the right to the "use" of the Crown lands set aside for the road as set out in s. 49(1) once the road is built. Further, s. 49(3) of the *Nunavut Act* states:

> "[s]ubject to any law made by the Legislature, the Commissioner may manage, and sell, lease or otherwise dispose of, the lands referred to in subsection (1)."

[3] S.C. 1993, c. 28.
[4] R.S.N.W.T. 1988, c. M-16.

It appears therefore based on this review of the authorities in the *Nunavut Act* that once the road is built the GN will have a proprietary (right to the beneficial use) interest in that portion of the right of way on Crown lands and legislative control over the whole road if the public is allowed to use it.

3.0 ALL-WEATHER ACCESS ROAD MANAGEMENT[5]

Safety

All required transportation of fuel and supplies and road maintenance during the mine operation will be based on a fleet of equipment which may be mine owned or contracted. Employees will be required to be drivers licensed in a Canadian province or territory for the appropriate class of vehicle operating on the access road.

At this time the following operational parameters are proposed:

- no gates, except at the mine site and at Baker Lake Storage and fuel site, to be installed on road-way
- wildlife has right of way
- all vehicles to be insured and plated
- refuge stations to be provided with first response spill kits
- hunting restrictions and fishing restrictions as per Baker Lake HTO's stipulations
- trips per day will be 5 or 6 loads, so 10 or 12 "passes" total in both directions (loaded plus empty) based on 40 tonnes/load and 66,000 t/a
- vehicle type restrictions may be applied as required
- all spills of any materials will be reported and cleaned up, as set out in the spill contingency plans.
- the haulage fleet will be required to have appropriate spill containment and clean-up equipment on hand or available on demand.
- if the road is private a large sign will be posted at the entrance to the access road advising the general public that it is a private facility. While it will not be practical to exclude skidoo traffic, it will be important that they are discouraged and advised of the risks of interaction with large equipment.

Mitigation Measures

Proposed mitigative measures for Cumberland staff/contractors to address potential effects from traffic during mine construction and road operations may include:

- providing informational and training sessions regarding the potential for wildlife/vehicle collisions
- implementing dust control measures during construction and operations
- restricting vehicles to the road and approved construction areas
- banning any off-road vehicles to avoid damage to vegetation
- monitoring and reporting of wildlife observed in the vicinity of the road and reporting to appropriate environmental mine staff who will issue notices to vehicle operators accordingly
- posting appropriate speed limits

[5] Based on Cumberland's "*Access and Air Traffic Management Plan*".

- giving wildlife the "right-of-way", and reducing traffic speeds when animals are detected near roads or other approved work areas
- reporting of accidental wildlife mortalities.

4.0 CONCLUSION

It appears from this review that once the road is built the GN could have legislative control over all portions of the road outside the Hamlet of Baker Lake. Whether the road is public or private seems likely to determine the applicability of public highways legislation and rules. This choice will be in the hands of the land owners with whom Cumberland must negotiate land tenure for the right of way. If the road is public regulation of traffic and management of the road will largely be a matter for the GN to determine.

Cumberland is committed to working with Baker Lake residents and the land owners to develop a road traffic and safety management regime which is appropriate for the road once it is constructed.

5.0 LONG-TERM OPTIONS FOR THE ALL-WEATHER ACCESS ROAD

In its pre-hearing conference decision of 14 July 2005, NIRB instructed Cumberland to address the following issue with respect to the proposed all-weather access road from Baker Lake to the Meadowbank mine site:

> “Long term options for the road, including the exploration of options to keep the road open after mine closure and maintenance plans for the road in the event the decision is made to keep the road open and exploration of the regulatory aspects of the road such as traffic control ….”

At this time, Cumberland has no plan to keep the all-weather road open after the completion of abandonment and restoration activities at the Meadowbank site. We are aware from public consultation meetings in Baker Lake and from the pre-hearing conference of some expressions of public interest in having road access into the area north of Baker Lake after the mine closes. However, to date no future road proponent has come forward with concrete proposals for use of the road after Cumberland completes its mining operations. Given that portions of the road cross Inuit Owned Land administered by the Kivalliq Inuit Association (KIA) the question of whether public access and use of the road will be permitted may be in the hands of the KIA.

It is worth noting that the Nunavut Planning Commission’s (NPC) ruling on the conformity of the all-weather road to the Keewatin Regional Land Use Plan is based on the road’s use for access to a mine site. The conformity of the road to the Plan could be affected by future use as a transportation corridor. Cumberland’s plans involve nothing more than use for access to the Meadowbank site, consistent with the NPC ruling.

The lands across which the road will be constructed include parcels belonging to or under control of the Hamlet of Baker Lake, the Government of Nunavut (Commissioner’s Lands), the Kivalliq Inuit Association and federal Crown lands under the administration and control of Indian and Northern Affairs Canada (INAC). Each of these organizations manages its land as set out in its own bylaws, rules, statutes or regulations. All of these organizations would have to agree to extend the life of the road if the road were to be kept open after mine closure.

Before construction of the road can begin, land tenure will have to be negotiated with each of these organizations. Land tenure instruments may vary from landlord to landlord but will likely involve leases and/or licenses of occupation, preferably for the life of the mine. Cumberland anticipates that these instruments will include requirements for abandonment and restoration of the road upon mine closure. Cumberland will be legally liable for the completion of these road closure activities.

When Cumberland completes its closure of Meadowbank it will demobilize from the site and will complete any required abandonment and restoration of the road as it leaves. If any other proponent wants to take control of the road after Cumberland departs, arrangements for assignment of both tenure and liability for eventual abandonment and restoration of the road will have to be completed before abandonment and reclamation are completed at the Meadowbank site. Cumberland will not leave unfulfilled abandonment and restoration obligations behind, nor is it likely that Hamlet, Crown or private land administrators would permit such an occurrence.

Cumberland is not in a position to speculate about unknown future uses of the road. Likewise, we cannot assist NIRB with information about the environmental effects of either road use or maintenance plans by other parties. All of Cumberland's plans and activities associated with construction, operation, maintenance and eventual abandonment and restoration of the all-weather road have been included in the FEIS. Related impacts have been predicted, mitigation measures identified and monitoring plans are set out.

NIRB has the benefit of a full outline and impact assessment of Cumberland's plans for the all-weather road. Unless a firm proposal for taking over the road is made to Cumberland at some future point and some entity accepts an assignment of both land tenure and liability associated with the road, Cumberland will abandon and restore it as set out in the FEIS. In closing, it is worth noting that any other large scale use of the road would likely attract either screening or review under Article 12 of the Nunavut Land Claims Agreement. There will be opportunities in the future to consider the environmental effects of such road-based activities.

KEY ISSUES IDENTIFIED BY THE BOARD

SHIPPING & MARINE (A)

Full explanation of potential impacts from increased shipping traffic and potential for spills, including consultation with Chesterfield Inlet and how and whether or not Sections 6.2.2 and 6.2.3 of the NCLA, including the Government of Canada designation of a person who is liable for marine transportation, applies.

Response:

An overview of the marine shipping and liability regime applicable to the Meadowbank project is provided below.

OVERVIEW OF THE MARINE SHIPPING AND LIABILITY REGIME APPLICABLE TO THE MEADOWBANK PROJECT

Response to Key Issue 6.7 from NIRB Pre Hearing Decision Report of July 14, 2005

Submitted by
Cumberland Resources Ltd.
REVISED **October 17, 2005**

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8.0 SUMMARY AND CONCLUSIONS

1.0 INTRODUCTION

In its Pre Hearing Decision of 14 July 2005 the Nunavut Impact Review Board (NIRB) instructed Cumberland Resources Ltd. (Cumberland) to address the following key issue:

> *Full explanation of potential impacts from increased shipping traffic and potential for spills, including consultations with Chesterfield Inlet and how and whether or not sections 6.2.2 and 6.2.3 of the NLCA, including the Government of Canada designation of a person who is liable for marine transportation, applies*.

Cumberland completed a review of the likelihood of impacts on wildlife from shipping activities as well as consultation with residents of Chesterfield Inlet during the summer of 2005. The results of these efforts are reported elsewhere in Cumberland's filings.

This report will document the regulatory regime applicable to marine spill control and clean up including the environmental liability regime and it will address the application of the wildlife compensation regime under Article 6 of the Nunavut Land Claims Agreement (NLCA) to Cumberland's proposed shipping activities.

2.0 BACKGROUND

In order to proceed with the construction and operation of the Meadowbank project northeast of Baker Lake in Nunavut, Cumberland Resources Ltd. (Cumberland) will contract with a marine shipping company which does business in Nunavut to transport fuel, steel, construction materials, equipment and other consumables in to Baker Lake. This shipping activity will be required in support of the project for the life of the mine, from construction to decommissioning.

It is not possible to predict the actual shipping route at this time. The route may vary from year to year and depending on environmental conditions and ice. It may also vary based on the source and nature of the materials to be moved to the Meadowbank site. It could, for example, be from Montreal north along the east coast of Canada in to Hudson's Bay and down the west coast of Hudson's Bay to Chesterfield Inlet and then in to Baker Lake. Annual shipping activity may also originate in Churchill and travel up the coast of Hudson's Bay to the mouth of Chesterfield Inlet and then in to Baker Lake.

Large vessels (if they are used) cannot get through the narrows at the west end of Chesterfield Inlet so a transfer process (called "lightering") may take place at the mouth of the inlet to move the goods to smaller barges. It is also possible that barges which can travel all the way to Baker Lake may be used if the port of origin is Churchill.

In any event, Cumberland currently predicts that approximately 3-5 barges a year will go through Chesterfield Inlet and into Baker Lake all the way to the hamlet of Baker Lake where cargo will be unloaded and may be stored temporarily or else will be put on trucks to go to the Meadowbank site. It is not clear at this time what size barges will be used and consequently how many barge loads will be required each year, but the shipping activity, including the barging, will be a contracted service. Cumberland will not be directly involved in marine shipping and will not generally be responsible for the cargo[6] until it is delivered to Baker Lake. Standard marine shipping and transportation arrangements will apply.

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[6] It is difficult to make a definitive statement about Cumberland's responsibility for cargo shipped to Baker Lake which covers all possible scenarios as will be shown by the review of the legal regime set out in this memo. However, it is in

This report sets out an overview of the legal regime, including liability arrangements which currently apply to the shipping activities which must be contracted for by Cumberland. Its purpose is to address the concerns which have been raised by interveners in the NIRB Meadowbank mine Review to date.

2.1 An Overview of the Legal Regime Applicable to Cumberland's Shipping Activity

Marine shipping is a heavily regulated enterprise. The legal regime applicable includes both Canadian and international law. Canada is party to a number of international conventions which both directly and indirectly affect domestic law. Any shipping activities in support of the Meadowbank project will be subject to a legal regime which addresses the design and operation of the ships or barges, the shipping activity itself, a comprehensive regime of emergency response in the case of accidents, a comprehensive regime addressing liability for spills or accidents, environmental protection and compensation for loss or damages arising from shipping activities.

Most of the relevant law is based in statute[7] and regulation but there are cases which will be of assistance and some provisions of the Nunavut Land Claims Agreement (NLCA) also apply. The applicable law will depend on the location and nature of the shipping or other activity, on the type of ship (including a barge) involved in the transportation and on the nature of the cargo being carried. Further, the applicable law can depend on whether any accidents occur and if they do, the nature of any material which is spilled.

This report provides a brief overview of this legal regime prepared to assist the Nunavut Impact Review Board (NIRB) to address the Cumberland Meadowbank project. It is not a definitive review of the law of shipping or of the environmental law of the sea in Canada.[8]

Part 3 of this report begins with a review of the law related to shipping. Parts 4 and 5 address the environmental liability and pollution prevention regimes respectively. Part 6 briefly comments on some other statutory authorities relevant to issues raised in the pre-hearing meetings while Part 7 addresses Article 6 of the NLCA.

3.0 THE *CANADA SHIPPING ACT* [9]

3.1 Application

The objectives of the *Canada Shipping Act* (*CSA*) as set out in s. 5 include the specific objective in s. 5(c) to "protect the marine environment from damage due to navigation and shipping activities." Transport Canada is responsible for much of the administration of the Act. Section 7(1) of the *CSA* reads: "Except as otherwise provided in this Act, the Minister of Transport is responsible for the administration of this Act."

The *CSA* applies to "Canadian waters" which are defined to mean "the territorial sea of Canada and all internal waters of Canada." Section 2 of the *CSA* defines a number of terms that will be important to our understanding of context for the regulation of shipping, including the transportation of oil by ship to Baker Lake and the regulation of the risk of potential oil spills during the shipping or lightering process.

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our view fair to say that generally, Cumberland will not be responsible for any cargo it ships until it reaches Baker Lake.

[7] Although some cases will be referred to in this memo, a thorough review of case law related to the various international, national statutory and land claims regimes reviewed is beyond the scope of this work.

[8] Readers could refer to the Maritime Law Casebook prepared by the Dalhousie University Marine and Environmental Law Program, for additional information. See***:*** Edgar Gold, Aldo Chircop & Hugh Kindred, *Maritime Law* (Toronto: Irwin Law, 2003).

[9] R.S. 1985, c. S-9. The *Canada Shipping* Act, *2001,* S.C. 2001, c.26 was enacted to amend the *Shipping Conferences Amendment* Act and other statutes including the *Canada Shipping Act*. However, the 2001 Act will not come into force until all of the new regulations are in place.

The term "internal waters of Canada" is not defined in the *CSA* and neither is "territorial sea." The term "territorial waters" has been the subject of judicial consideration by the Supreme Court of Canada in *Canada (Attorney General)* v. *British Columbia (Attorney General)*[10]. In that case Justice Dickson stated:

> *"…territorial sea is defined by international law, i.e. the waters and submerged lands to a width of three miles seaward of the coast of the mainland but where the mainland coast is deeply indented or has a fringe of islands in its immediate vicinity, seaward from baselines enclosing these features."*

The term "internal waters," however, has not been judicially considered by the courts[11] although it is a term mentioned in the case law. For example, the 1994 N.W.T. case of *R.* v. *Northwest Territories (Commissioner)*[12] looked at the meaning of "internal waters" in relation to a water licence issued to the Town of Iqaluit when an accident resulted in the dumping of sewage into Frobisher Bay. The question was whether the definition of "inland waters" in the *Northern Inland Waters Act*[13] included the internal waters or the territorial sea waters as defined by the *Territorial Sea and Fishing Zones Act*[14]. Justice de Weerdt of the Supreme Court of the Northwest Territories found that "inland waters" did not include waters of the sea, whether internal waters or territorial sea waters.[15]

The term "inland waters" was also considered in B.C. in *Reference re Ownership of the Bed of the Strait of Georgia and Related Areas.*[16] The Court stated:

> *Waters have been described as territorial, inland, high seas, internal, interior and national, without those words gaining a precise meaning. On occasions such words have borne two or more meanings, depending on their context, and on whether they were used in a domestic or international law term which was formerly used to describe waters over which a country asserted sovereignty. Territorial sea would now describe the band of water lying outward from abase line from headland to headland, much as it is set out in our Territorial Sea and Fishing Zones Act. The water inside that line is called internal or inland in international law. At common law waters are inland which are inter fauces terrae. They are described in the common law as being within the realm and within the country. Often a body of water will be inland in both systems of law. But the elements differ.*

Thus it appears that inland waters include fresh water but that the term internal waters can include both fresh water and marine or sea water inside the limits of the territorial sea.[17] Consequently, since the *CSA* applies to internal waters, it applies to the Great Lakes and provides a basis for the regulation of shipping in the marine and fresh internal waters of Canada.

At the same time other statutes apply to Canadian waters, variously defined. For example, the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*[18] applies to inland waters in Nunavut.[19] Thus legally, internal waters can overlap with inland waters. It is clear that those portions of the shipping route within Nunavut for goods to be transported to Baker Lake for Cumberland are Canadian waters, internal waters and some portions are inland waters. In other words several statutory regimes will apply to manage

[10] [1984] 4 W.W.R. 289 at 299, [1984] 1 S.C.R. 388.
[11] Review of Carswell's *Words and Phrases*, current to June 2004.
[12] [1994] N.W.T.J. No. 39, 8 W.W.R. 405, N.W.T.R. 250, 95 C.E.L.R. (N.S.) 85 (NWTSC)
[13] R.S.C. 1985, c. N-25, (repealed).
[14] R.S.C. 1985, c. T-8, (repealed).
[15] *Supra,* note 7 at para. 43 QL.
[16] [1976] 1 B.C.L.R. 97.
[17] This was confirmed by Mr. Victor Santos Pedro of Arctic Shipping Safety of Transport Canada who confirmed that the *CSA* applies to all fresh and marine waters within the baseline. He said that the *CSA* applies to all navigable waters in Canada. He confirmed that the *CSA* would apply to Hudson's Bay, Chesterfield Inlet and Baker Lake. Personal communication, 14 July 2005.
[18] S.C. 2002, c.10.
[19] *Ibid,* s.4, definition of "waters."

shipping in support of the Cumberland project and to protect the environment in the areas affected by these activities.

The *CSA* also applies to vessels within “Canadian waters” (defined above) and a vessel is defined to include: “any ship or boat or any other description of vessel used or designed to be used in navigation.” This definition of vessel would include a ship carrying oil when that ship is in “Canadian waters.” The “vessel” definition also includes a barge carrying oil, as long as the barge is in “Canadian waters.”

Barges that carry oil are also subject to standards, established by Transport Canada under its authority from the *CSA.* These standards are discussed later in this memorandum.

3.2 Part XV of the *CSA* – Pollution Prevention and Response

Part XV of the *CSA* is entitled “Pollution Prevention and Response.” Part XV of the Act used to be administered by the Department of Fisheries and Oceans. However, “[a]ll policy and regulatory responsibilities associated with pleasure craft safety, marine navigation services, pollution prevention and response, and navigable waters protection were transferred from the Department of Fisheries and Oceans to Transport Canada in December 2003.”[20] Although pollution prevention and response is now administered by the Department of Transportation under the *CSA,* in Nunavut and north of 60 the Coast Guard is still responsible for such matters.

The Canadian Coast Guard (CCG) is “an integral part” of DFO that “ensures the safe and environmentally responsible use of Canada's waters.”[21] One of the areas of CCG responsibility is environmental response services. “The Environmental Response Services (ER) [of the CCG] protects the marine environment and related interests through preparedness and monitoring and by responding to marine pollution incidents in waters under Canadian jurisdiction.[22] Therefore, it is the Coast Guard that would respond to a marine pollution occurrence in Chesterfield Inlet and which would ensure that it was properly cleaned up. Mr. Steve Harbicht of Environment Canada in Yellowknife advises that in marine waters the Coast Guard is the lead agency for spill events and co-ordinates the response to a spill, the clean up and any follow up. He stated that other government departments could be involved later to deal with any payment by the polluter for clean up costs.[23]

Under the *CSA* Part XV, s. 654 defines a “ship” which: “includes any description of vessel or craft designed, used or capable of being used solely or partly for navigation, without regard to method or lack of propulsion”. This “ship” definition would include a barge. The definition applies when determining if a “ship” has caused pollution.

The application of Part XV is restricted in the north, however:

> 655. (1) Except where otherwise provided in this Part or in any regulation made thereunder, this Part and any regulations made thereunder apply
>
> (*a*) to all
>
> (i) Canadian waters, and
>
> (ii) waters in the exclusive economic zone of Canada

[20] Transport Canada website, updated June 2, 2005.
[21] Transport Canada website, updated June 2, 2005.
[22] Transport Canada website, updated May 20, 2005
[23] Personal communication with Steve Harbicht, June 30, 2005.

that are not within a shipping safety control zone prescribed pursuant to the *Arctic Waters Pollution Prevention Act*; and

(*b*) to all ships in waters described in paragraph (*a*).

This means that within *Arctic Waters Pollution Prevention Act*[24] (*AWPPA*) shipping safety control zones the *AWPPA* is the governing legislation. Thus, depending on the route used for the shipping of Cumberland's fuel, steel and other consumables some of the waters crossed may be "arctic waters" and the shipper's activities will be subject to the *AWPPA* regime which is discussed later in this memorandum.

3.3 The OPRC Convention

Part XV of the *CSA*, makes reference to the OPRC Convention.[25] Subsection 660.2 requires Canadian ships and other ships that are not Canadian ships that are in "waters" to do certain things including complying with the regulations established under s. 660.2(a) "respecting the procedures, equipment and resources that a ship must have on board for use in respect of an oil pollution incident respecting the ship". They include:

> 660.2(2) (*b*) have an arrangement with a response organization to which a certificate of designation has been issued pursuant to subsection 660.4(1) in respect of a specified quantity of oil that is at least equal to the total amount of oil that the ship carries, both as cargo and as fuel, to a maximum of ten thousand tonnes, and in respect of waters where the ship navigates or engages in a marine activity;
>
> 660.2(2)(c) have on board a declaration, conforming to the regulations, that
>
> > (ii) confirms that the arrangement referred to in paragraph (*b*) has been made, and
> >
> > (iii) identifies every person who is authorized, in accordance with the regulations, to implement the arrangement referred to in paragraph (b) and the shipboard oil pollution emergency plan.

It should be noted that the OPRC Convention clauses only apply to a "ship" in "waters" as they are defined for those clauses. Subsection 660.2(1) defines "waters" for the purposes of s. 660.2 as:

> means
> (*a*) Canadian waters, and
> (*b*) waters in the exclusive economic zone of Canada
> and includes, notwithstanding subsection 655(1), waters that are within a shipping safety control zone prescribed pursuant to the *Arctic Waters Pollution Prevention Act*.

So the OPRC Convention applies to waters within shipping safety control zones under the *AWPPA* if the ship is of a certain type and is within "waters" as defined in s. 660.2.

Subsection 660.2 also includes a different definition of "ship" for the purposes of that subsection:

> "ship"

[24] R.S.C. 1985, c. A-12.
[25] The OPRC Convention definition is : "OPRC Convention" means the International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990, signed at London on November 30, 1990, as amended from time to time, to the extent that those amendments are in force in respect of Canada".

(a) means

(i) an oil tanker of one hundred and fifty or more tons gross tonnage, and

(ii) a ship, other than an oil tanker, of four hundred or more tons gross tonnage that carries oil as cargo or as fuel,

(*b*) includes two or more ships, each of whose gross tonnage is less than that mentioned in subparagraph (*a*)(i) or (ii), that carry oil as cargo, that are towed or pushed together and whose aggregate tonnage is one hundred and fifty or more tons gross tonnage, and

(*c*) does not include

(i) a ship that is not a Canadian ship if it is only transiting in the territorial sea of Canada or the exclusive economic zone of Canada and if it is not engaged in the loading or unloading of oil during transit,

(ii) any warship, naval auxiliary ship or ship owned or operated by a state and used only on government non-commercial service, or

(iii) a ship that is on location and engaged in the exploration or drilling for, or the production, conservation or processing of, oil or gas in an area described in paragraph 3(*a*) or (*b*) of the *Canada Oil and Gas Operations Act*;

It is not yet known whether the ships or barges used to transport the oil to Baker Lake will fall under the definition of "ship" for the purposes of s. 660.2 and therefore, whether or not s.660.2 will apply to the transportation. In any event complying with these requirements would be the responsibility of the shipping company hired by Cumberland.

3.4 Regulations under the *Canada Shipping Act*

There are regulations under the *CSA* that are relevant to the shipping of oil to Baker Lake.

Oil Pollution Prevention Regulations[26]

The *Oil Pollution Prevention Regulations* (OPPR) under the *CSA* deal with preventing oil pollution from any ship in Canadian waters. Given the definition of "ship," the regulations would apply to barges too.

Part III of this regulation addresses oily discharges. In that Part, section 28 prohibits the discharge of "oil or oily mixture" into waters under Canadian jurisdiction. This would also include a spill of oil which might occur from a ship or barge or when offloading the fuel. There are exceptions to the prohibition in Part III which are set out in detail in the regulations. The master of the ship or barge would have a duty to report any discharge.

(B) Oil Barge Standards

Barges may be required to take the goods and fuel through Chesterfield Inlet to Baker Lake. Under the *CSA,* Transport Canada has developed standards for oil barges called *Standards and Guidelines for the Construction, Inspection and Operation of Barges that Carry Oil in Bulk*.[27]

[26] SOR/93-3.
[27] 1995, TP11960E, Transport Canada website.

In relation to barges carrying oil, there are certain standards that will be relevant. These *Standards* relate to the regulation of barges themselves, their design, construction, and operation. They do not regulate the use of the barges. These matters are covered by other authorities.

The *Standards* define “oil” and “oil barge” as:

> "oil" means oil of any kind or in any form and, without limiting the generality of the foregoing, includes petroleum, fuel oil, sludge, and oil refuse;
>
> "oil barge" means any description of non-self propelled vessel, other than an oil or gas offshore drilling unit or production unit, that is constructed or converted to carry bulk oil as cargo

Section 6 of the *Standards* states that every oil barge shall comply with the Oil Pollution Prevention Regulations.

Parts II and III of the *Standards* address the inspection of barges. Part IV is called Stability and Loading Information and section 25 states that all oil barges must comply with the requirements for damage stability set out under the OPPRs. Part X deals with Towing and Operational Requirements. Under section 86, the issue of shallow water operation is addressed.

Again, the point should be made that the *Standards* address issues that must be dealt with by the shipping company. Cumberland does not have a duty to comply with these standards, simply because it has hired a company to deliver the oil which will need to be transported part or all of the way to Baker Lake on a barge.

The *CSA* thus regulates both ship and barge standards, operations and environmental protection including clean up requirements if a spill event occurs. This regime is applicable all the way to Baker Lake. It would apply to the shipping company and not to Cumberland.

4.0 THE MARINE LIABILITY ACT [28]

The *Marine Liability Act* (*MLA*) came into force in 2001. The *MLA* addresses responsibility for damages or injuries that occur during maritime operations, including maritime shipping. Part 6 of the *MLA* repealed and replaced portions of Part XVI of the *Canada Shipping Act*, dealing with Civil Liability and Compensation for Pollution. The applicable regime for civil liability related to pollution is now found in the *MLA.*

4.1 Part 6 of the *MLA* – Liability and Compensation for Pollution

Part 6 of the *MLA* addresses Liability and Compensation for Pollution. This Part would apply to an oil spill from a ship. This interpretation is confirmed by Mr. Doug O”Keefe of the International Marine Policy and Liability Directorate of Transport Canada.[29] Section 50 states that the *MLA* has priority over the *Arctic Waters Pollution Prevention Act* but this is only if there is *inconsistency* between the two statutes.

The term “owner” for the purposes of Part 6 is defined in s. 47 to mean:

> (a) in relation to a Convention ship, the person who is registered as the owner of the ship or, if no person is so registered,
> (i) the person who owns the ship, or

[28] S.C. 2001, c. 6.
[29] Personal email communication with Doug O’Keefe, June 30, 2005.

(ii) if the ship is owned by a state and operated by a company that is registered as the ship's operator in that state, that company; or

(b) in relation to any other ship, the person who has for the time being, either by law or by contract, the rights of the owner of the ship with respect to its possession and use.

Therefore, the definition of "owner" does not include the owner of the cargo on the ship. This was confirmed by Mr. O'Keefe of Transport Canada. He advised that it is the ship owner who is liable for pollution under the *MLA*, not the owner of the cargo.[30]

Section 48 of the *MLA* states that Part 6 applies to Convention ships and other ships where the actual discharge of the pollutant takes place on the territory of Canada or in Canadian waters. In Part 6 a "Convention ship" is defined as:

means a seagoing ship, wherever registered,

(a) carrying, in bulk as cargo, crude oil, fuel oil, heavy diesel oil, lubricating oil or any other persistent hydrocarbon mineral oil; or

(b) on a voyage following any such carriage of such oil, unless it is proved that there is no residue of the oil on board.

A "ship" is defined in s. 47 as:

"means any vessel or craft designed, used or capable of being used solely or partly for navigation, without regard to method or lack of propulsion, and includes

(a) a ship in the process of construction from the time that it is capable of floating; and

(b) a ship that has been stranded, wrecked or sunk and any part of a ship that has broken up.

Therefore, the ship and/or barge carrying the oil to Baker Lake would fall under the definition of "Convention ship" as long as that ship could be considered a "seagoing" ship which is likely.

Section 51 makes the owner of the ship liable for the pollution from a ship and for the related costs including liability for environmental damage caused by pollution. This also includes costs and expenses incurred by any other party to prevent, minimize or remedy the pollution damage from the ship.[31] Section 51 sets up a very comprehensive regime of civil liability for oil pollution. Relevant portions are set out below:

51. (1) Subject to the other provisions of this Part, the owner of a ship is liable

(a) For oil pollution damage from the ship;

(b) For costs and expenses incurred by

(i) the Minister of Fisheries and Oceans,

(ii) a response organization within the meaning of section 654 of the *Canada Shipping Act*,

(iii) any other person in Canada, or

[30] Personal telephone communication with Doug O'Keefe, June 30, 2005.
[31] Personal email communication with Doug O'Keefe, June 30, 2005.

(iv) any person in a state, other than Canada, that is a party to the Civil Liability Convention,

in respect of measures taken to prevent, repair, remedy or minimize oil pollution damage from the ship, including measures taken in anticipation of a discharge of oil from the ship, to the extent that the measures taken and the costs and expenses are reasonable, and for any loss or damage caused by those measures; and

(c) for costs and expenses incurred

(i) by the Minister of Fisheries and Oceans in respect of measures taken under paragraph 678(1)(a) of the Canada Shipping Act, in respect of any monitoring under paragraph 678(1)(b) of that Act or in relation to any direction given under paragraph 678(1)(c) of that Act, or

(ii) by any other person in respect of measures the person was directed to take or prohibited from taking under paragraph 678(1)(c) of the Canada Shipping Act,

to the extent that the measures taken and the costs and expenses are reasonable, and for any loss or damage caused by those measures.

Liability for environmental damage

(2) If oil pollution damage from a ship results in impairment to the environment, the owner of the ship is liable for the costs of reasonable measures of reinstatement actually undertaken or to be undertaken.

Strict liability subject to certain defences

(3) The owner's liability under subsection (1) does not depend on proof of fault or negligence, but the owner is not liable under that subsection if the owner establishes that the occurrence

(a) resulted from an act of war, hostilities, civil war or insurrection or from a natural phenomenon of an exceptional, inevitable and irresistible character;

(b) was wholly caused by an act or omission of a third party with intent to cause damage; or

(c) was wholly caused by the negligence or other wrongful act of any government or other authority responsible for the maintenance of lights or other navigational aids, in the exercise of that function.

If the ship is a Convention ship then the ship owner's liability for pollution damage is limited under section 54 of the *MLA*. If the ship that causes the oil pollution is something other than a Convention ship then the ship owner's liability is limited in accordance with Part 3 of the *MLA*.[32]

The limits to liability are set out in Part 3 of the *MLA* as follows:

28. (1) The maximum liability for maritime claims that arise on any distinct occasion involving a ship with a gross tonnage of less than 300 tons, other than claims mentioned in section 29, is

(*a*) $1,000,000 in respect of claims for loss of life or personal injury; and

[32] Personal email communication with Doug O'Keefe, June 30, 2005.

(*b*) $500,000 in respect of any other claims.

It thus appears that the *MLA* civil liability provisions would protect persons including companies in Nunavut from damages resulting from oil pollution, environmental and other forms of damage arising from shipping associated with the Cumberland project.

4.2 Funds for Oil Pollution Damage

If the *MLA* applies to a spill of Cumberland's cargo,[33] the owner of the ship carrying oil would be liable for the pollution damages under the *MLA,* not Cumberland. There is a fund established to deal with the payment for oil pollution damage from Convention ships called the International Fund for Compensation for Oil Pollution Damage (the IOPC Fund) which is defined in s. 47 of the *MLA* as the "Fund Convention". It was originally established in 1971. As is set out in s. 75, the Fund is liable for payment of compensation when a claimant cannot get the full amount of damages from the ship owner or the owner's guarantor. Canada contributes to this fund as set out in s. 76 of the Act.

Canada has also established its own fund as set out in s. 77 of the *MLA.* It is called the Ship-source Oil Pollution Fund (the SOP Fund). This fund may provide compensation in the case of damages caused by ships other than Convention ships or for Convention ships where the claims exceed the compensation payable by the IOPC Fund.[34] Contributions have been made to the SOP Fund and it has topped out at $300 million and no further contributions are being made at this point. This fund is to be used for claims that are made but are not paid by the ship owner since the ship owner's liability is limited.[35] Claims to the SOP Fund are limited to $140 million per incident for oil spills by any vessel operating in Canadian waters. The IOPC Fund 's maximum limit is $405 million per incident. In May 2003 a Supplementary Fund Protocol for the IOPC Fund established a Supplementary Fund to cover damages beyond these amounts. However, joining the Supplementary Fund is voluntary and Canada has not yet ratified the Protocol.[36]

Mr. O'Keefe was of the view that the "Canadian waters" definition would include the waters of Baker Lake and Chesterfield Inlet. Thus the *MLA* would apply in those waters if there were an oil spill from a ship. However, as discussed below, the waters of Chesterfield Inlet could also fall under the definition of "arctic waters" and may therefore also be subject to the *AWPPA* liability regime. The *AWPPA* can of course apply to discharges of waste other than oil and in the case of an oil spill both the *AWPPA* and the *MLA* could apply as long as there is no inconsistency between the statutes.

5.0 THE ARCTIC WATERS POLLUTION PREVENTION ACT

The *Arctic Waters Pollution Prevention Act* applies to marine waters adjacent to Nunavut. The Act prohibits any person or ship, except as authorized by regulation, from depositing or permitting the deposit of waste in arctic waters or on any place on land under conditions where waste may enter arctic waters.[37] A "person" is prohibited from depositing or permitting the deposit of waste. This would therefore not just make the ship owner liable for a deposit of waste but it could also make the owner of the "waste" liable for the deposit. However, according to Mr. Peter Timonin, Regional Director for the Prairie and Northern Regions of the Marine Safety Branch of Transport Canada, the ship owner would definitely be charged if there was a spill and charges were laid. He expressed the view that since a ship owner has control of the

[33] See the discussion of the overlap and inconsistency issue in section 5 below on the *Arctic Waters Pollution Prevention Act.*
[34] Personal email communication with Doug O'Keefe, June 30, 2005.
[35] Personal telephone communication with Doug O'Keefe, June 30, 2005.
[36] *Maritime Law Review Discussion Paper*, International Marine Policy, Transport Canada: May, 2005.
[37] *Arctic Waters Pollution Prevention Act,* R.S.C. 1985, c. A-12, s. 4(1).

cargo it would be the ship owner who would be liable. Mr. Timonin stated that to his knowledge, no charges for a spill have ever been laid against a cargo owner.[38]

Under s. 2 of the *AWPPA*, "arctic waters" are defined as:

> "arctic waters" means the waters adjacent to the mainland and islands of the Canadian arctic within the area enclosed by the sixtieth parallel of north latitude, the one hundred and forty-first meridian of west longitude and a line measured seaward from the nearest Canadian land a distance of one hundred nautical miles, except that in the area between the islands of the Canadian arctic and Greenland, where the line of equidistance between the islands of the Canadian arctic and Greenland is less than one hundred nautical miles from the nearest Canadian land, that line shall be substituted for the line measured seaward one hundred nautical miles from the nearest Canadian land;

Therefore, the *AWPPA* applies to the sea waters around Chesterfield Inlet and, according to Mr. Ross McDonald it also likely applies to the waters of Chesterfield Inlet, as discussed previously. It would not apply to Baker Lake itself.

Under s. 2, "waste" is defined as follows:

> "waste" means
>
> (*a*) any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water to an extent that is detrimental to their use by man or by any animal, fish or plant that is useful to man, and
>
> (*b*) any water that contains a substance in such a quantity or concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water to the extent described in paragraph (*a*),
>
> and without limiting the generality of the foregoing, includes anything that, for the purposes of the *Canada Water Act*, is deemed to be waste.

Therefore, the definition of "waste" includes oil as well as other substances.

Subsection 4(1) sets out the following prohibition:

> 4. (1) Except as authorized by regulations made under this section, no person or ship shall deposit or permit the deposit of waste of any type in the arctic waters or in any place on the mainland or islands of the Canadian arctic under any conditions where the waste or any other waste that results from the deposit of the waste may enter the arctic waters.

Violators of the prohibition against depositing or permitting the deposit of waste into arctic waters are liable upon summary conviction to a fine, in the case of a person, of up to $5,000 and, in the case of a ship, of up to $100,000 and each day of continued violation is a separate offence.[39]

The Act also imposes absolute civil liability without fault or negligence[40] on resource explorers, operators of land-based undertakings and ship and cargo owners for costs, expenses, loss or damage and for

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[38] Personal communication with Peter Timonin, July 14, 2005. This is not to say that such charges are not possible.
[39] R.S.C. 1985, c. A-12, s. 18(1).
[40] There are no defences, unlike s. 677 of the *Canada Shipping Act,* R.S.C. 1985, c. S-9, as am. which includes such defences as the acts of third parties and negligence of government navigation authorities.

clean-up costs resulting from a deposit of waste in arctic waters.[41] This liability regime is set out in section 6 of the *AWPPA* a portion of which is below:

> 6. (1) The following persons, namely,
>
> (*a*) any person who is engaged in exploring for, developing or exploiting any natural resource on any land adjacent to the arctic waters or in any submarine area subjacent to the arctic waters,
>
> (*b*) any person who carries on any undertaking on the mainland or islands of the Canadian arctic or in the arctic waters, and
>
> (*c*) the owner of any ship that navigates within the arctic waters and the owners of the cargo of any such ship,
>
> are respectively liable and, in the case of the owner of a ship and the owners of the cargo thereof, are jointly and severally liable, up to the amount determined in the manner prescribed by regulations made under section 9 in respect of the activity or undertaking so engaged in or carried on or in respect of that ship, as the case may be, for costs, expenses and loss or damage described in subsection (2).
>
> (2) Liability under subsection (1) is
>
> (*a*) for all costs and expenses of and incidental to the taking of action described in subsection (3) on the direction of the Governor in Council, and
>
> (*b*) for all actual loss or damage incurred by other persons
>
> resulting from any deposit of waste described in subsection 4(1) that is caused by or is otherwise attributable to the activity, undertaking or ship, as the case may be, referred to in subsection (1).

Therefore, if the *AWPPA* applies to a spill, Cumberland, as the cargo owner, would be jointly and severally liable for the cleanup costs.

There is a two-year limitation period under s. 6(5). A cargo owner may escape liability by establishing that the cargo, if deposited in arctic waters along with other cargo of the same nature carried by the ship, would not result in a violation of the waste deposit prohibition under s. 7(4). However, this would not be possible with a fuel spill.

Monetary limits of liability are provided for in the Act and a formula for calculating limits is set out in the regulations.[42] For oil and gas exploration or development operations, the limit is $40 million, as set out in s. 8(f), and maximum liability for ship owners and cargo owners is 210 million gold francs as set out in s. 15(1).

[41] **See *AWPPA* ss. 6, 7.**
[42] *Arctic Waters Pollution Prevention Regulations,* C.R.C. 1978, c. 354.

According to Mr. McDonald of Arctic Shipping Safety of Transport Canada, the *MLA* does have precedence over the *AWPPA* in the event of inconsistency and these requirements may be harmonized with those in the *MLA* in the future.[43]

Shipping safety control zones may be established for arctic waters by order of the Governor in Council as set out in s. 11. Ships entering such zones may then be regulated in respect of construction, equipment, cargo and operation as set out in s. 12 and 13. Pollution prevention officers designated under the Act are given wide powers of entry and inspection, and powers to order ships to leave safety control zones and to take part in clean-up operations.[44]

There have been 16 zones set up under the Shipping Safety Control Zones Order.[45] These zones have not been changed since 1978. The ships and barges carrying cargo for Cumberland would pass through at least one of the zones. Zone 16 is in the area of Chesterfield Inlet and the ship might also pass through Zone 14 on the way there. It would be the responsibility of the shipping company to ensure that it has complied with the regulations related to ship requirements for such zones.

The *AWPPA* regime provides another layer of protection for persons who might be harmed by a release of waste into arctic waters. This regime provides protection for substances other than oil and involves an absolute liability regime for civil damages. This regime applies to Chesterfield Inlet insofar as it is not inconsistent with the *MLA* regime.

According to counsel in Justice Canada the question of whether the *MLA* or *AWPPA* applies to a spill event or an incident where waste is deposited will depend on the facts including, nature of the cargo, location of the accident and other factors. It could also depend on the issue of whether there is any “inconsistency” between s. 6 of the *AWPPA* (cargo owner liable) and the *MLA* (ship owner liable). In the absence of a fact scenario it is not possible to state a general rule about which statute would apply. So, the issue of whether Cumberland as the cargo owner would be liable to clean up a spill of cargo, would depend on both the facts and the law. We can, however, say that the ship owner would in all cases be liable.[46]

6.0 OTHER RELEVANT STATUTES

There are other laws which have important roles to play in the regulation of shipping and in responding to pollution or other damages which may arise from shipping activity. We review some of the relevant of these statutes below.

6.1 *Fisheries Act*[47]

The *Fisheries Act* protects fish and fish habitat in Canada and applies to any body of water that may contain fish. The Act is administered by DFO with the exception of the pollution control provisions in sections 36 to 42 which are administered by Environment Canada.

The definition of “fish” includes marine mammals. As well the term “Canadian fisheries waters” is used in specific sections of the statute and is defined as:

[43] Personal telephone communication with Ross McDonald, June 30, 2005.
[44] See *AWPPA*, s. 14 & 15.
[45] C.R.C.1978, c. 356.
[46] Phone and email communication with Ms. Lisanne Durand, Counsel Department of Justice Canada.
[47] R.S. 1985, c. F-14.

"Canadian fisheries waters" means all waters in the fishing zones of Canada, all waters in the territorial sea of Canada and all internal waters of Canada;

The Act prohibits the deposit of a deleterious substance into waters frequented by fish (which is defined to mean Canadian fisheries waters) or in an area where such a substance may enter into any such water (s. 36.3)). Therefore, this prohibition would include the waters in Hudson's Bay as well as Chesterfield Inlet and Baker Lake which would fall under the "Canadian fisheries waters" definition. Fish do not have to be harmed by the deposit of the deleterious substance. The offence is established if it is proven that the substance is deleterious to fish and that it was deposited. The substance does not have to render the receiving waters deleterious. Only the substance itself must be deleterious. Nor does it matter whether the spill was accidental or intentional since these are strict liability provisions.

Section 36(3) sets out the following prohibition:

> no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

This prohibition could apply if there was a spill of oil or another deleterious substance that was deposited in water frequented by fish.

Both sections 35 and 36 allow DFO to regulate, within its jurisdiction, almost any activity that takes place in or near fish bearing waters or fish habitats by authorizing, with conditions, the alteration, disruption or destruction of fish habitat. A Fisheries Authorization or Letter of Advice can be obtained from DFO depending on the circumstances.

If a substance does enter water, the person who owns or has "care, management or control" of the substance or who causes or contributes to the release must report the release to DFO as is set out in s. 38(4).

This statute will be important if an oil spill occurs or if a deleterious substance of another kind enters the water as a result of shipping activities in support of the Meadowbank project. Whether any liability could be attached to Cumberland in these circumstances would, however, depend on whether Cumberland had "care, management or control" of the substance or the oil when it entered the water or whether the ship owner did.

6.1.1 Marine Mammals

The issue of the effect that shipping might have on marine mammals was raised in the NIRB pre-hearing meetings. The *Marine Mammals Regulations*[48] promulgated pursuant to the *Fisheries Act* address fishing for marine mammals but there are no regulations which deal directly with shipping effects on marine mammals. Normally, barge and ship traffic does not destroy or directly damage fish or marine mammals. There may be some risk of disturbance of these organisms but at the level of traffic proposed by Cumberland that seems an unlikely eventuality.

The more important risk in the case of Cumberland's activities which involve only a few barges a year appears to be the risk of a spill to fish or marine mammals. Regulation of activities which may lead to such events is covered by the *Fisheries Act* as well as the other legislation reviewed above.

[48] SOR/93-56.

6.2 *Nunavut Waters and Nunavut Surface Rights Tribunal Act*[49]

Part 1 of the *NWNSRTA* regulates both the use of waters and the deposit of waste into waters in Nunavut.

The term “use” is defined as:

> "use", in relation to waters, means a direct or indirect use of any kind, including, but not limited to,
>
> (*a*) any use of water power and geothermal resources;
>
> (*b*) any diversion or obstruction of waters;
>
> (*c*) any alteration of the flow of waters; and
>
> (*d*) any alteration of the bed or banks of a river, stream, lake or other body of water, whether or not the body of water is seasonal.
>
> However, it does not include navigation or any other use connected with shipping activities that are governed by the *Canada Shipping Act*.

Based on this definition, Cumberland’s shipping activities would not constitute a “use” of waters.

The circumstance in which the *NWNSRTA* might be engaged would be where shipping activities resulted in an unauthorized deposit of waste or a spill of waste, such as oil, into inland waters. Such an event could of course also be addressed under the *CSA* or if the deposit involved a deleterious substance, it could be addressed under the *Fisheries Act.* In the shipping context, the *CSA* regime reviewed above may be the more relevant regulatory framework for a response.

Section 4 of the *NWNSRTA* sets out a broad definition of “waste” as follows:

> "waste" means any substance that, by itself or in combination with other substances found in water, would have the effect of altering the quality of any water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any water that would have that effect because of the quantity or concentration of the substances contained in it or because it has been treated or changed, by heat or other means, and includes
>
> (*a*) any substance or water that, for the purposes of the *Canada Water Act*, is deemed to be waste;
>
> (*b*) any substance or class of substances specified by the regulations;
>
> (*c*) water containing any substance or class of substances in a quantity or concentration that is equal to or greater than that prescribed by the regulations; and
>
> (*d*) water that has been subjected to a treatment or change described by the regulations.

Section 12 of the Act prohibits the deposit of waste without a licence. Oil or other substances spilled during the shipping process would likely fall under the definition of “waste” in the *NWNSRTA.* Section 90

1.1.1.1 ***[49]S.C. 2002, c. 10.***

of the Act makes any person who contravenes section 12 liable to prosecution. If this statute were used to address an unauthorized deposit of waste the most likely defendant would include the shipper.

Division 5 of Part 2 of the *NWNSRTA* addresses wildlife compensation and the Nunavut Surface Rights Tribunal's role in granting such compensation. An application can be made to the Tribunal by a claimant (an Inuk or Inuit) for loss or damage that a claimant suffers as a result of a development activity by a developer.

Section 152 of the *NWNSRTA* defines a developer as:

> "developer" means any person engaged in a development activity and includes, in the case of marine transportation as described in paragraph (*c*) of the definition "development activity", the owner of a ship.

Cumberland will be engaged in development activity at Meadowbank. It is noteworthy, however, that a ship owner is also included in this definition. This could make a ship owner liable for any wildlife loss or damage as well.

The term "development activity" is defined in s. 152 as follows:

> "development activity" means any of the following carried out on land or water in the Nunavut Settlement Area or in Zone I or Zone II, within the meaning assigned by section 1.1.1 of the Agreement:
>
> (*a*) a commercial or industrial undertaking or any extension of the undertaking, provided it is not a marine transportation undertaking;
>
> (*b*) a municipal, territorial, provincial or federal government undertaking or any extension of the undertaking, provided it is not a marine transportation undertaking; and
>
> (*c*) marine transportation directly associated with an undertaking described in paragraph (*a*) or (*b*). [Emphasis added]

Marine transportation associated with the Cumberland project will, at least in part, be carried out in Zone I or Zone II. These Zones are defined as follows in s. 1.1.1 of the *NLCA*:

> "Zone I" means those waters north of 61 latitude subject to Canada's jurisdiction seaward of the Territorial Sea boundary as measured from lines drawn pursuant to the Territorial Sea Geographical Co-ordinates (Area 7) Order SOR/85-872 that are not part of the Nunavut Settlement Area or another land claim settlement area;
>
> "Zone II" means those waters of James Bay, Hudson Bay and Hudson Strait that are not par of the Nunavut Settlement Area or another land claim settlement area.

If there was a spill in the waters of either Zone I or Zone II then any wildlife compensation issues associated with the shipping activity could come under the jurisdiction of the Surface Rights Tribunal.

The combination of the definitions of developer and development activity in respect of marine shipping activity means that a ship owner is the developer and could be liable for compensation associated with marine transportation.

Section 153(1) makes a developer absolutely liable for certain types of losses or damage suffered by a claimant:

153(1) Subject to this section, a developer is absolutely liable, without proof of fault or negligence, for any of the following losses or damage suffered by a claimant as a result of a development activity of the developer:

(*a*) loss of or damage to property or equipment used in harvesting wildlife or to wildlife that has been harvested;

(*b*) present and future loss of income from the harvesting of wildlife; and

(*c*) present and future loss of wildlife harvested for personal use by

There are exceptions to this absolute liability in s. 153(2). In particular:

(2) A developer is not liable under subsection (1)

(*a*) where the developer establishes that the loss or damage was wholly the result of an act of war, hostilities, a civil war, an insurrection or a natural phenomenon of an exceptional, inevitable and irresistible character;

(*b*) where the loss or damage was caused by a ship, to the extent that the developer would not, but for subsection (1), have been liable as a result of a defence or limitation of liability available at law; or

c) to the extent that the aggregate loss or damage for each incident exceeds the applicable limit of liability prescribed by, or determined pursuant to, regulations under paragraph 170(*e*). [Emphasis added]

A claim for loss or damage under Division 5 must be made to the Tribunal "within three years after the later of the date on which the loss or damage occurs and the date on which it comes to the knowledge of the claimant."

Section 154 and Division 5 of the *NWNSRTA* satisfy the requirements of sections 6.2.2 and 6.2.3 of the NLCA. Subsection 154(2) specifies the Ship Source Oil Pollution Fund for purposes of section 6.2.3 of the NLCA. Thus marine transportation directly associated with development activity in the Nunavut Settlement Area or Zone I or II which causes any damage of the type set out in section 153 is subject to the requirement to pay wildlife compensation. If the developer and claimant cannot negotiate appropriate compensation, the Nunavut Surface Rights Tribunal has jurisdiction to adjudicate the claim and make a compensation order.

6.3 The *Migratory Birds Convention Act, 1994*[50]

Another statute that should be considered is the *Migratory Birds Convention Act, 1994*. If an oil spill occurs, it is possible that migratory birds or their nests might be affected. A migratory bird is defined in s. 2(1) as "means a migratory bird referred to in the Convention, and includes the sperm, eggs, embryos, tissue cultures and parts of the bird". Under the Act, the relevant regulations are those made under s. 12(1)(h) and (i):

(*h*) for prohibiting the killing, capturing, injuring, taking or disturbing of migratory birds or the damaging, destroying, removing or disturbing of nests;

[50] S.C. 1994, c. 22.

(*i*) prescribing protection areas for migratory birds and nests, and for the control and management of those areas;

If a regulation is contravened, s. 13(1) of the *MBCA* sets out the penalties as follows:

13. (1) Every person who contravenes section 5, subsection 6(6) or any regulation

(*a*) is guilty of an offence punishable on summary conviction and is liable

(i) in the case of a corporation, to a fine not exceeding $100,000, and

(ii) in the case of an individual, to a fine not exceeding $50,000 or to imprisonment for a term not exceeding six months, or to both; or

(*b*) is guilty of an indictable offence and is liable

(i) in the case of a corporation, to a fine not exceeding $250,000, and

(ii) in the case of an individual, to a fine not exceeding $100,000 or to imprisonment for a term not exceeding five years, or to both.

For subsequent offences the penalties are increased in s. 13. The question is therefore who would be the “person” who would be contravening the regulation if there was an oil spill.

7.0 THE NUNAVUT LAND CLAIMS AGREEMENT

Article 6 of the NLCA addresses wildlife compensation. Part 2 of that Article addresses marine transportation. Sections 6.2.2 and 6.2.3 read:

6.2.2 Subject to Section 6.2.3, this Article shall apply to marine transportation directly associated with any commercial or industrial or any municipal, territorial, provincial or federal government undertaking, or any extension thereof, on land or water in the Nunavut Settlement Area and Zones I and II but does not apply to marine transportation not directly associated with such undertakings.

6.2.3 The Government of Canada shall specify a person, a fund, or both, capable of assuming the liability for marine transportation imposed under this Article by Section 6.2.2, and that specified person, or fund, or both, shall be considered to be a developer and that marine transportation shall be considered to be a development activity for the purpose of this Article.

These provisions are accommodated by Divison 5 of Part 2 of the *NWSRTA* as discussed above.

Article 6 applies with full force to a developer (not to the person or fund mentioned in s.6.2.3 of the NLCA) in other areas and in cases where the commercial undertaking is shipping, on inland waters for example.

It should be noted, however, that the definitions of “developer” and “development” in section 6.1.1 of the NLCA are very wide and could include Cumberland as well if inland shipping activity resulted in damages to property, equipment, wildlife reduced into possession or to present or future income from wildlife harvesting.

Liability for wildlife compensation under Article 6 is "absolute without proof of fault or negligence, for loss or damage suffered by a claimant as a result of development activity"[51] (which could include the marine transportation) "within the Nunavut Settlement Area in respect of:

(a) loss or damage to property or equipment used in wildlife harvesting or to wildlife reduced into possession;
(b) present and future loss of income from wildlife harvesting; and
(c) present and future loss of wildlife harvested for personal use by claimants.[52]

Some possible triggers for wildlife compensation might include compensation if a ship or barge damaged fish nets and compensation had to be paid. Compensation might, for example, include compensation for the value of the net, the lost fish and present and future loss of income and loss of wildlife harvested or to be harvested for personal use.

Given the time of the year when shipping related to Cumberland's project will occur, the likelihood of direct damage to terrestrial wildlife appears to be minimal. The potential for damage to fishing or hunting gear or disruption of harvesting activities appears to be a matter for the shipper. The largest risk may be that of a spill or deposit of waste of some sort that could affect income from harvesting over a long period.

8.0 SUMMARY AND CONCLUSIONS

The focus of this memorandum has been on the marine shipping context, of the activities associated with the development of the Meadowbank mine project. Cumberland Resources Ltd. intends to contract with an existing and experienced northern shipping firm to move fuel and other goods to Baker Lake.

Review of the statutory framework indicates that the contract shipper will bear almost all of the risk and legal responsibility associated with this activity and that shipping is subject to a very comprehensive regulatory framework. In cases where the *AWPPA* applies Cumberland could also be liable as the cargo owner. The question of liability for an oil spill or a release of a harmful substance or waste is a question of fact and law and depending on the circumstances the applicable rules will vary. However, it is clear from this review that extensive overlapping liability and compensation regimes are in place to cover almost every eventuality which might arise during Cumberland's operation of the Meadowbank project and that this regime provides significant protection for wildlife harvesters and residents of Kivalliq Communities.

[51] Section 6.3.1 NLCA.
[52] This is reflected in section 153 of the *NWSRTA* cited above.