

APPENDIX K

GSGILASON ECONOMIC IMPACT REPORT

Appendix K.1 Thor Lake Project – Economic Impacts. January 2011

Appendix K.1

Thor Lake Project – Economic Impacts. January 2011

The Thor Lake Project

Economic Impacts

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I.0 Introduction

Avalon Rare Metals Inc. (“Avalon” or the “proponent”) is in the advanced planning stage of the development of a rare metals mine from the Nechalacho deposit in the Northwest Territories (“the Thor Lake project”).

The mine and mill will be located approximately 5 km from the northern shore of Great Slave Lake, approximately 100 km southeast of Yellowknife – see map. Hydrometallurgical processing will occur near the historic Pine Point mine approximately 8.5 km from the southern shore of Great Slave Lake, approximately 90 km east of Hay River.

The mineral deposit will be developed to serve the growing world demand for rare metals which have a myriad of uses in advanced technologies. China currently has a near monopoly on production of rare metals - markets are seeking alternative supply sources.

The deposit is proven and the project is technically feasible. Moreover, the project is relatively environmentally benign, and will meet regulatory requirements. The project is also financially attractive to investors at current metal prices, and with current tax and royalty provisions.

I.1 Broad-Based Economic Benefits

The Thor Lake project will provide broad benefits to the economy in terms of employment, wages, and government tax revenues. The construction and operation of the mine and mill and associated processing plant will provide a major economic stimulus to a variety of communities near the mine and mill and plant sites, and to the Canadian economy.

The project also offers the opportunity for First Nations peoples to have meaningful participation in the wage economy, while at the same time having the work schedule flexibility to accommodate traditional pursuits and activities.

I.2 Report Outline

This overview report details the anticipated economic impacts resulting from mine, mill and hydrometallurgical plant construction and operation.

Impacts are presented from two perspectives – the Northwest Territories and the country as a whole. In particular, the report details explicitly the anticipated tax revenue flows to the territorial and federal governments.

Exhibits that support the analysis are presented at the end of each section. The Appendix contains more detailed supplemental material.

I.3 The Approach

The starting point for the impact analysis is the financial expenditure flows for the project as provided by Avalon. This information is disaggregated and further analyzed through:

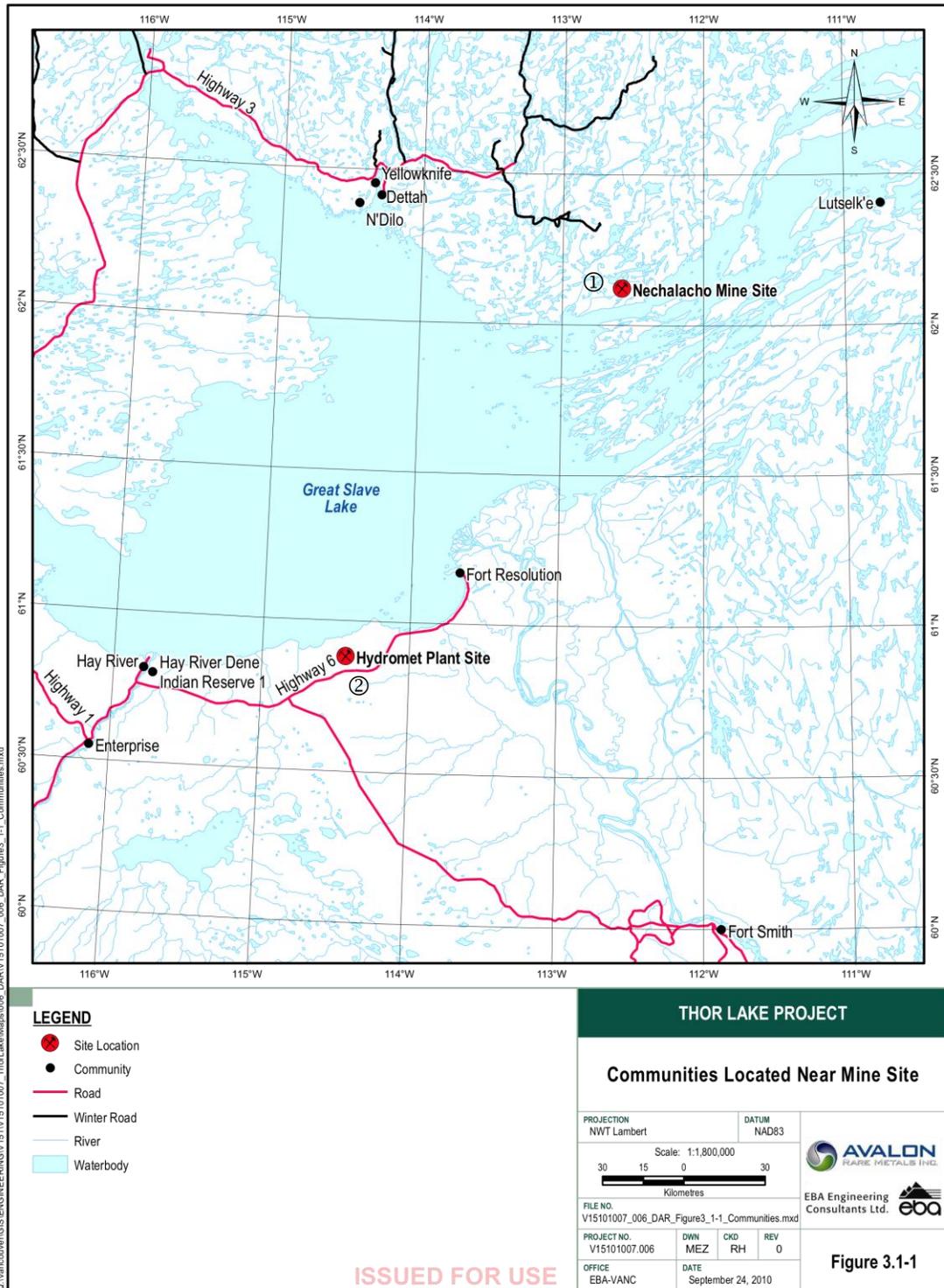
- the analysis of regional sourcing for supply expenditures;
- a matching between project job descriptions and the skills of the present NWT labour force;
- the results of Avalon's corporate model that give anticipated corporate income tax and royalty payments;
- a profile of the labour force in communities close to the mine and plant sites (as provided by NWT Bureau of Statistics information);
- the analysis of secondary effects on downstream suppliers and the consumer sector through input-output analysis results (the NWT Bureau of Statistics and Statistics Canada).

The direct economic impacts are derived directly from the project financial pro formas (e.g., wages, expenditures on supplies & services, tax & royalty payments), and therefore are more accurate than projecting economic impacts from the value of project output alone.

The next section provides a brief description of the project before the impact results are presented.

All dollar amounts refer to constant \$ 2010 in Canadian currency.

Exhibit 1: Map of Thor Lake Project



2.0 Project Synopsis

The project involves underground mining, milling and preparation of bulk concentrate at Thor Lake, and hydrometallurgical processing at a plant to be constructed at the historic Pine Point mine.

The products from the plant will be a mixed rare earth oxide (REO) product, and separated zirconium oxide (ZrO_2), niobium oxide (Nb_2O_5) and tantalum oxide (Ta_2O_5) products.

2.1 Project Activities

The ore will be mined at Thor Lake and processed at Pine Point in NWT.

The Thor Lake concentrate will be loaded onto 40 tonne intermodal containers, trucked by road to a temporary dock on Great Slave Lake 8 km away, transported by barge across the lake during summer, and trucked by road to the hydrometallurgical processing plant 8 ½ km away.

The finished products will be trucked from the hydrometallurgical plant to a railhead located immediately south of Hay River along Highway 2 and then loaded onto rail cars for delivery to international markets and further separation of rare earth oxides.

Tailings from the Thor Lake flotation plant for concentrate will be stored at a Tailings Management Facility or TMF. Tailings from the hydrometallurgical processing plant will be stored in a TMF approximately 2.5 km south in a historic open pit (I-37) that is a remnant from a past Cominco mine.

The mine site will have permanent camp facilities to serve the mine work force – many mine workers are expected to come from Yellowknife, Dettah, N'Dilo, Lutselk'e or Fort Resolution (the work rotation currently envisioned is 1 week on – 1 week off). Avalon will provide air transportation from Edmonton, Yellowknife, Lutselk'e and Hay River to the camp. Electricity will be produced on-site by diesel generators.

The hydrometallurgical plant site is accessible by all season road and, accordingly, there is no need for a worker camp site. Workers can commute from Hay River, Fort Smith, Fort Resolution or Enterprise (Avalon will provide bus transportation from Hay River and Fort Resolution). Power will be accessed from the existing hydrometallurgical.

2.2 Project Timing

The Thor Lake project from construction through reclamation will occur over 20 years:

- construction - years 1&2
- operations - years 3 through 20

Reclamation activities occur at the end of operations.

2.3 Project Output

The mine will produce 730,000 tonnes of ore annually or 13 million tonnes over its project life.

Total rare metal production will be 30,000 tonnes finished product annually or about 550,000 tonnes over the 18 year production period. The value of this lifetime production exceeds \$7 billion.

2.4 Construction and Operation Expenditures

Expenditures over the life of the Thor Lake project will total an estimated \$4.2 billion – \$1.0 billion during construction and reclamation, and \$3.2 billion during the 18 years of operation.

Expenditures (\$million)	Construction*	Operations**	Total
Wages \$ Benefits	118	654	772
Goods and Services	<u>875</u>	<u>2,571</u>	<u>3,446</u>
Total	993	3,225	4,218
Direct Employment (PYs)	880	6,120	7,000

* Includes reclamation.

** Includes property tax and payroll tax but excludes federal and NWT corporation/royalties taxes.

The \$3.4 billion in purchases of goods and services include expenditures on equipment, materials, fuel, contract services, and so on. The \$0.8 billion in wages include payroll burden and benefits.

Approximately 880 person-years of employment will occur during the construction phase, and a much greater 6,120 person-years of employment will be generated during the 18 year mine operating life.

3.0 Economic Impacts

The Thor Lake project will provide significant benefits to the economies of the NWT and Canada as a whole.

3.1 The Nature of Economic Impacts

The economic impacts of the Thor Lake project arise from the cash expenditures made during the project's construction and operations phases.

Economic impacts arise directly from income and employment to mine and plant workers. In addition, spinoff economic effects on downstream industries occur through linkages to the suppliers of goods and services (e.g., equipment suppliers), and through the respending of wage income on consumer goods and services. The total economic impact of the project is the sum of direct industry, indirect supplier, and induced consumer spending impacts.

Dollar impacts include the gross return to labour (wages plus benefits), and the gross return to business or business surplus (interest payments, depreciation, before-tax profits). The sum of the return to labour and capital is called income, Gross Domestic Product (GDP), or value-added.

Employment is measured in person-year equivalents to facilitate comparisons to other economic sectors and the total economy.

Beneficiary Group	Impact Indicator
(1) Labour	Wages plus Benefits
+ (2) <u>Business</u>	<u>Business Surplus</u>
= (3) The Economy	GDP or Value-Added

Payments to government in terms of income taxes, fuel taxes and the like represent a redistribution of the above incomes.

The total magnitude of impacts depends both on the absolute amount of expenditures, as well as the multiplied effects of these expenditures on the rest of the region. The multiplied effects depend on the economic structure of the region, particularly the import content of purchased goods and services. Imports, as well as taxes and savings, represent a "leakage" from the regional economy (i.e., money spent on imports is not available for respending within the region).

The Thor Lake project will have a greater impact on the economy of Canada than on that of the NWT, since some project expenditures, by necessity, will be made in Southern Canada.

3.2 Regional Sourcing of Labour & Supply Purchases

The starting point of the analysis is the profile of regional expenditures.

Employment and Wages. Avalon will have a preferential northern hiring policy. NWT residents with the requisite skills will have the first chance to be hired.

Nevertheless, many jobs will need to be filled by southern Canadians as much of the NWT labour force does not have the specific skills, especially in the professional and technical areas, that the project workforce needs.

Some of these southerners gaining long term operations jobs at the mine site will choose to relocate to the NWT (so called “in-migrants”). Others will maintain a permanent residence in Southern Canada.

Based on an assessment of job descriptions and available skill levels of the NWT labour force, Avalon has estimated the regional sourcing of labour to the project. Consistent with past experience, we have included some in-migration to take jobs during the operations phase e.g., a recent study found that 26% of the total NWT mine workforce were workers who moved to NWT (NWT Bureau of Statistics, “2009 Survey of Mining Employees”, August 2009).

The project will employ 880 people (PYs) during construction, and an average of 340 per year during operations. One in five construction workers, and over half of operations workers will come from the north (Exhibit I).

The NWT wage bill will amount to \$20 million during construction and average another \$20 million per year during operations.

A more detailed assessment of the employment and wages associated with the project is given in Exhibit A.1, Appendix A.

Supplier Purchases. The project will make substantial purchases from suppliers in the NWT and Southern Canada. Again, local NWT interests will have first chance at procurement but as with labour, the project will have to look to Southern Canada for specialized expertise and products.

Expenditures in the NWT will amount to an estimated \$220 million during construction and total \$1,009 million during operations.

During operations, a much higher 39% of each purchase dollar is spent in the north, compared to 25% during construction.

Exhibit A.2, Appendix A displays the level of operating purchases by region for a typical year.

3.3 Direct Economic Impacts

Exhibit 3 presents the direct economic impacts from the construction and 18-year operating life of the project:

- \$382 million in wages & benefits,
- 3,590 person-years of employment,
- \$774 million in territorial government revenues, and
- \$1,229 million in supply purchases.

Canada as a whole will receive:

- \$771 million in wages & benefits,
- 7,000 person-years of employment,
- \$1,471 million in government tax revenues, and
- \$3,214 million in supply purchases.

The benefits to Canada include those accruing to the NWT. The NWT government revenues are those before application of the federal formula financing arrangement.

Southern Canada is a major beneficiary from the project. For every \$1 in wages, supply purchases or taxes that the NWT receives, the rest of Canada receives close to another \$1.

The bulk of benefits will accrue from project operations and not project construction. Project benefits are not transitory as in many “prime the pump” resource development projects, projects that leave little lasting benefits to the local economy. The Thor Lake project provides an on-going legacy of economic opportunity to the north and Canada.

3.4 Total Economic Impacts

The additional impacts associated with indirect supplier purchases and the induced spending in consumer industries swell the benefits significantly.

As shown in Exhibit 4, the total beneficial impacts of the Thor Lake project are more than twice as great as the direct impacts alone.

For example, direct NWT employment during construction and operations is estimated at 3,590 PYs, whereas total (direct, indirect supplier and induced consumer) NWT employment is 9,355 PYs.

	Total Impacts*		Impacts per Year**	
	NWT	Canada	NWT	Canada
GDP \$ millions	5,561	6,449	278	322
Wages & Benefits \$ millions	693	1,578	35	79
Employment PYs	9,355	23,975	470	1,200

* Project lifetime construction & operations impacts (direct project, indirect supplier plus induced consumer responding).

** Average impacts per 20 year project life (2 construction & 18 operations).

Clearly, all of Canada has a stake to the benefits from the project.

Exhibit 1: Thor Lake Project - Regional Sourcing of Direct Labour

	Construction	Operations per Year
Employment person-years (PYs)		
NWT Residents - Existing	170	130
- In-Migrants	NA	60
Other Canadians	<u>710</u>	<u>150</u>
TOTAL	880*	340
Wages & Benefits \$ millions		
NWT Residents - Existing	20	13.6
- In-Migrants	NA	6.5
Other Canadians	<u>98</u>	<u>16.2</u>
TOTAL	118*	36.3

* Includes contingency.

Exhibit 2: Thor Lake Project - Regional Sourcing of Supply Purchases

	Construction	Total Operations*
Supply Purchases \$ millions		
NWT	220 25%	1,009 39%
Southern Canada	525 60%	1,460 57%
Rest of World	<u>130</u> 15%	<u>102</u> 4%
TOTAL	875	2,571

* Total over the 18 years of production.

Exhibit 3: Thor Lake Project - Direct Economic Impacts

	NWT Impacts			Canada inc. NWT Impacts		
	Const ⁿ	Operations ^a	Project Total	Const ⁿ	Operations ^a	Project Total
Direct Industry Impacts						
Employment PYs	170	3,420	3,590	880	6,120	7,000
Wages & Benefits \$ millions	20	362	382	118	653	771
Purchases \$ millions	220	1,009	1,229	745	2,469	3,214
Gov't Tax Revenues						
Income Tax - Corporate	0	343	343	0	789	789
- Personal	1	26	27	30	163	193
Mining Royalty	0	296	296	0	296	296
Payroll Burden - Payroll Tax	2	12	14	2	12	14
- EI Premiums	0	0	0	1	7	8
- CPP Premiums	0	0	0	4	26	30
- WCB Premiums	2	14	16	2	14	16
Fuel Tax	1	12	13	1	59	60
Property Tax	<u>0</u>	<u>65</u>	<u>65</u>	<u>0</u>	<u>65</u>	<u>65</u>
TOTAL	6	768	774	40	1,431	1,471

^a Total operations impacts over 18 year production period.

Exhibit 4: Thor Lake Project - Total Economic Impacts

	NWT Impacts			Canada inc. NWT Impacts		
	Const ⁿ	Operations	Total	Const ⁿ	Operations	Total
GDP \$ millions						
Direct	325	4,700	5,025	325	4,700	5,025
Indirect	60	300	360	175	740	915
Induced	<u>18</u>	<u>158</u>	<u>176</u>	<u>85</u>	<u>424</u>	<u>509</u>
Total	403	5,158	5,561	585	5,864	6,449
Wages & Benefits \$ millions						
Direct	20	362	382	118	653	771
Indirect	40	165	205	95	407	502
Induced	<u>11</u>	<u>95</u>	<u>106</u>	<u>51</u>	<u>254</u>	<u>305</u>
Total	71	622	693	264	1,314	1,578
Employment PYs						
Direct	170	3,420	3,590	880	6,120	7,000
Indirect	665	2,750	3,415	1,585	7,750	9,335
Induced	<u>240</u>	<u>2,110</u>	<u>2,350</u>	<u>1,280</u>	<u>6,360</u>	<u>7,640</u>
Total	1,075	8,280	9,355	3,745	20,230	23,975

- Note:
1. Construction figures are two year totals (plus reclamation).
 2. Operations figures are the totals over the 18 years of production.
 3. Direct impacts derived from pro formas and information provided by Avalon Rare Metals Inc.
 4. Indirect and induced impacts derived from Input-Output economic multipliers provided by NWT Bureau of Statistics and Statistics Canada.
 5. All financial figures in 2010 Canadian dollars.
 6. Employment expressed in person-years (PYs).

4.0 Regional Setting & Local Impacts

The NWT employment and economic impacts from the Thor Lake project will accrue primarily to the local areas surrounding the mine site and hydrometallurgical plant.

4.1 The Local Study Area

The Local Study Area or LSA for the Thor Lake project has two components (see map in Section I and Exhibit 5):

- Mine and Mill Site LSA #1 - the communities of Yellowknife including N'Dilo, Dettah and Lutselk'e
- Hydrometallurgical Plant Site LSA #2 - the communities of Enterprise, Fort Resolution, Fort Smith, Hay River, and Hay River Reserve

Yellowknife is by far the largest community in the NWT comprising approximately 45% of the territorial population and 55% of its employment base. Yellowknife has a high labour force participation rate of 80% and a low unemployment rate of 5%.

Aboriginal communities in the LSA such as N'Dilo, Dettah, Lutselk'e, Fort Resolution, and Hay River Reserve are much smaller and have limited employment opportunities as evidenced by participation rates generally under 50% and unemployment rates generally greater than 25%.

4.2 LSA Takeup of Project Employment

It is anticipated that about 470 positions will be created annually in NWT from project construction and operations - 180 directly, 170 indirectly in supplier industries and 120 in retail through the respending of wages earned at the direct and indirect stages (see Exhibit 4 and Section 3.4).

We expect that all the direct jobs in NWT will be drawn from the Local Study Area and that perhaps 90% of indirect and induced job also will come from the LSA.

It is not expected that there will be significant competition from other major projects for workers. The Snap Lake Mine is now operational. And the timeline for the MacKenzie Gas Project is uncertain.

It is anticipated that about 60 of the direct operations jobs will be filled by in-migrants to the NWT and these workers will draw some spouses or other adults who can work in indirect and induced jobs.

There is significant slack in the LSA economy apart from Yellowknife which has a tight labour market. Training and other recruitment strategies can help draw and equip potential workers from other parts of the LSA.

4.3 Other Impacts

Population. It is expected that each family that moves to the LSA to take a direct job consists of 3.5 people - one for the direct job and 2.5 others i.e., a total of 210 people (60 x 3.5).

The in-migrants likely will move to the larger non-aboriginal communities of Hay River, Fort Smith and Yellowknife due to the availability of housing and other services.

Inflation. Experience with the diamond industry in NWT over the past 15 years suggests that the Thor Lake project will not cause inflationary pressures.

Economic Diversification. The diamond industry has helped the northern business community to diversify and build capacity.

The local sourcing of goods and services by the Thor Lake project will add to this business diversification trend.

It is expected that the training and work experience from construction or operations jobs on the Thor Lake project will be portable to future work opportunities in the NWT.

Exhibit 5: Community Labour Force Activity in NWT 2009

	Pop ⁿ 15+	Labour Force			Participation Rate	Unemployment Rate
		Employed	Unemployed	Total		
Mine and Mill Site LSA 1						
Yellowknife exc. N'Dilo*	15,513	12,461	698	13,159	80%	5%
N'Dilo*	262	115	53	168	44%	32%
Dettah	182	89	35	124	49%	28%
Lutselk'e	<u>243</u>	<u>83</u>	<u>32</u>	<u>115</u>	34%	28%
Total	16,200	12,748	818	13,566	79%	6%
Hydromet Plant Site LSA 2						
Enterprise	87	64	5	69	74%	7%
Fort Resolution	390	152	50	202	39%	25%
Fort Smith	1,966	1,228	139	1,367	62%	10%
Hay River	2,973	2,113	176	2,289	71%	8%
Hay River Reserve	<u>215</u>	<u>110</u>	<u>35</u>	<u>145</u>	51%	24%
Total	5,631	3,667	405	4,072	65%	10%
LSA 1 plus LSA 2	21,831	16,415	1,223	17,638	75%	7%
Rest of NWT	11,899	6,284	1,393	7,677	53%	18%
Total NWT	33,730	22,699	2,616	25,315	67%	10%

* N'Dilo comprises part of the City of Yellowknife.

Source: NWT Bureau of Statistics

5.0 The Strategic Role of the Project

The Thor Lake project is strategic to the economic development of the NWT. It is a major business undertaking and once operational, will generate significant employment and wages to northerners.

The project will provide 190 direct high-paying, meaningful jobs with career potential to NWT residents. Many of these jobs will accrue to both natives and non-natives living outside the major population centre of Yellowknife. The project is an opportunity for outlying regions of the Territory to share in economic prosperity.

The rest of Canada is also a major beneficiary from the project. Significant employment and business opportunities will flow to the provinces particularly Alberta.

The rare earth/metal mining business is export-based and, as such, the project will earn significant amounts of foreign exchange. The project output will not displace sales from other Canadian mines as it produces a product unique in Canada.

The mine will generate significant tax revenues to the territorial and federal governments at a time when governments are striving to balance their budgets. The Thor Lake project will assist government in their deficit reduction exercise.

The mine will have long “coattail” effects on the business community. It is anticipated that several businesses will set up in the NWT to service the mine. In other cases, existing NWT companies will expand and hire more workers to service the mine. These potential business opportunities represent economic impacts over and above those analyzed in the report.

Finally, the Thor Lake project approach, which gives priority to northern hiring and procurement, and which involves the aboriginal community at the inception stage of project design is laudable.

Appendix A

Additional Material

Exhibit A.1: Thor Lake Project - Employment & Wages

	Total Project*		NWT Labour**	
	Wages \$000	Employment (PYs)	Wages \$000	Employment (PYs)
A. Construction Total				
Thor Lake Mine				
Labour & Support	38,100	315	7,100	61
Professional e.g., Engineering	6,000	20	-	-
Management & Oversight	6,200	30	600	4
Reclamation	<u>3,100</u>	<u>26</u>	<u>1,700</u>	<u>15</u>
Subtotal	53,400	391	9,400	80
Pine Point Plant				
Labour & Support	52,400	439	10,000	86
Professional e.g., Engineering	6,000	20	-	-
Management & Oversight	<u>6,200</u>	<u>30</u>	<u>600</u>	<u>4</u>
Subtotal	64,600	489	10,600	90
Total Construction	118,000	880	20,000	170
B. Operations per Year				
Thor Lake Mine				
Mine	12,480	101	4,890	41
Mill	5,870	60	1,800	19
Surface	3,380	30	810	7
Admin	2,280	21	1,380	12
Summer Help	<u>820</u>	<u>11</u>	<u>370</u>	<u>5</u>
Subtotal	24,830	223	9,250	84
Pine Point Plant				
Admin	1,020	9	350	4
Surface	790	7	540	5
Hydromet Plant	<u>9,230</u>	<u>97</u>	<u>3,300</u>	<u>35</u>
Subtotal	11,040	113	4,190	44
Marketing/Sales	460	4	140	2
Annual Operations	36,330	340	13,580	130

* Wages include benefits, employment measured in person-years (PYs), construction figures include 25% contingency.

** Indigenous to NWT i.e., excludes In-migrants who move to NWT.

Exhibit A.2: Thor Lake Project - Annual Operating Costs by Region of Spending*

	\$ millions			
	NWT	Canada	Other	Total
Fuel exc. Tax	-	14.6	-	14.6
Fuel Tax	0.7	2.7	-	3.4
Equipment & Supplies	39.2	54.6	3.2	97.0
Freight - Fuel	-	1.1	-	1.1
- Other Truck	0.6	-	-	0.6
- Summer Freight	6.0	1.7	-	7.7
- Rail	0.5	4.0	-	4.5
- Marine	-	-	0.7	0.7
Electric Power	4.0	-	-	4.0
Services	3.5	6.2	2.0	11.7
Property Tax	3.6	-	-	3.6
Payroll Tax	<u>0.6</u>	<u>-</u>	<u>-</u>	<u>0.6</u>
TOTAL	58.7	84.9	5.9	149.5

* Typical year midway through the 18 year production period.