APPENDIX 16.I

Economic Report for the NICO Project

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APPENDICES

16.I.1 INTRODUCTION AND METHODOLOGY

16.I.1.1 Background

Golder contracted SJ Research Services to assess the economic impact of Fortune NICO Project on the Northwest Territories (NWT) economy. SJ Research Service's 2006 NWT Input-Output (IO) Model, the latest available at the time of the initiation of the study, was utilized. This was used to measure the territorial economic impacts associated with construction, investment, and mine operation.

SJ Research Service's IO model of the NWT economy is based on Statistics Canada's 2006 NWT input-output table and is rectangular with 25 industries and 57 commodities.

Fortune is the sole owner of the NICO Project located approximately 160 km northwest of Yellowknife, NWT. The site contains a near-surface deposit with the following estimated total reserves:

16.I.1.2 Study Focus

An IO, or economic impact model, which identifies all of the inter-industry production and trading linkages of an economy is a tool to assess the economic impact of an event, new spending or investment, a new industry, or other shock to a regional economy.

Direct impacts reflect the initial expenditures made by the NICO Project after adjusting for leakages. Indirect impacts measure the secondary business transactions that result from the initial expenditures. Induced impacts are third round impacts from the spending of incremental labour income in the economy after removing a portion for taxes and savings. Results are typically expressed in terms of Gross Output, Gross Domestic Product (GDP), Labour income (included in GDP), and employment (jobs).

Gross Output is equivalent to the total value of sales or shipments. Because it includes the value of final sales and intermediate goods and services, double-counting occurs, and thus is not as good a measure of economic activity as gross domestic product. Gross domestic product is the sum of all value-added in various sectors of the economy within a prescribed geographic area. It equals the gross value of production of firms less the purchases of intermediate goods and services from other firms. Gross domestic product is the measure of the "size" of an economy.

Both construction and operational impacts were calculated by creating a mixed endogenous–exogenous model. This approach allows modification of the input structure of the expanding industry to reflect the output and input structure of the new development. This approach is appropriate when the input structure of the new differs substantially from the input structure of the impacted industry. In the case of construction impacts, total cost and some inputs from the project proponent in terms of employment were available. As such, the construction industry inputs structure was exogenized and modified to reflect the addition of mine construction.

In both cases (construction and operations) inputs reflect only those that can be locally (within NWT) sourced. Where information on the source of inputs was lacking, the IO model's default import leakages were used. A detailed account of the mixed endogenous–exogenous model methodology is available in Attachment 16.I.II.

In the case of mixed IO models, direct gross output impacts equal the initial project outlay and the GDP component is the value added portion of the project. Inter-industry inputs, however, are adjusted for leakages. This corresponds to the geographic definition of GDP as activity taking place within a prescribed geography. In

other words, since construction takes place within NWT, gross output and GDP accrue within the same geography.

For operations, the mining industry was shocked by a vector of expenditures by commodity, based on information supplied by the project proponent. Total new annual output was provided by Fortune and, on average, will be $163 million per year. Wages were modified to reflect new operational employment and the GDP component of “other operating surplus” was modified to ensure model balance.

Data for mine closure expenditures did not include detailed inputs and employment. As a result, closure impacts were calculated using a more traditional final demand shock to the territorial input-output model. As is the case with operational and construction impacts, the initial expenditure was adjusted downward to reflect imports from outside the NWT.

There are obvious additional impacts not purely economic that are realized in the regions of design and construction, which are not taken into consideration for this study. Examples of these are the additional benefits realized in the area due to the additional training and experience gained from engineering design firms, suppliers, vendors, and most particularly construction workers with improved productivity and better quality and workmanship as a result. Further, better practices introduced into the communities and organizations by having large well managed projects and sharing of these practices not only between operations or between each of the projects but with support companies or organizations related to the projects.

Input-output models are recognized to have limitations. For example, the models do not do the following:

- capture changes over time, IO model results are best described as comparative statics;
- capture economies of scale;
- capture environmental and social effects that are not easily expressed in economic terms – these can be both positive and negative (quality of life may improve for some and not improve for others, depending on personal choices and values); and
- necessarily well address the ability of an economy to respond to increases in economic activity in the short term – a large project can represent a large shock to particularly smaller economies such as that of the region, which in turn can strain limited human resources, cause changes in prices, and make economic impacts difficult to predict.

However, expressing results on an annual basis for each year of the construction phase as well as the operational phases (2014 to 2016 [underground mining] and 2016 to 2032 [Open Pit mining]) offsets the weaknesses associated with showing changes over time. In addition, the use of a mixed model with project proponent supplied inputs and employment mitigates the shortcomings with respect to economies of scale.

To transform the information provided by the NICO Project proponent into direct, indirect, and induced economic impacts, a number of assumptions were made, including the following:

- The NICO Project proponent provided total construction costs. These were in the $400 million dollar range with a substantial proportion occurring at the Saskatchewan metallurgy facility.
- The Saskatchewan facility costs are excluded from this analysis as they occur outside the NWT.

- Construction costs are provided broken down into open pit and underground development and equipment and mill complex.
- Pit and underground development were assigned to the construction industry. Equipment was assigned to the manufacturing industry and was assumed to be all imported.
- Mineral Processing Plant complex costs were broken down into construction and equipment (manufacturing) components based on previous mining SJ Research Services projects.
- The NICO Project proponent provided a quarterly breakdown of construction costs per activity. These were used to allocate investments across a 3-year time period.
- The NICO Project proponent provided man hours by quarter. These were divided by 2000 to convert to person years and were similarly allocated across a 3-year time period.
- Annual construction labour costs are available in the NWT IO tables. These were inflated to 2010 levels and multiplied by person years to calculate annual construction labour costs.
- Total labour costs, development, and equipment costs were subtracted from total annual investment and a combination of construction own-industry purchases (i.e., purchases of construction services by the NICO Project) and the GDP component of “Other Operating Surplus” were modified for model balance.
- The NICO Project proponent provided total operating costs broken down into the following categories: power, labour, fuel, lube, parts, tires, reagents, material, and freight. These were divided by the number of annual periods (18.3 years for total life of mine and 2.1 years for the underground phase) to determine annual operating costs. Total annual revenue was likewise annualized. The NICO Project proponent also provided annual employment in positions.
- Power was assigned to the utilities industry. Fuel, lube, parts, tires, reagents, and material were assigned to the manufacturing industry. Freight was assigned to the transportation and warehousing industry. The IO model default leakages for imports was applied and, in this case, all manufacturing inputs are treated as imports.
- Total annual input costs were subtracted from total annual revenues and the GDP component of “Other Operating Surplus” was modified to provide model balance.
- The NICO Project proponent provided data on mine closure expenditures. These included an initial outlay of $34.9 million (assigned to the construction industry), $0.759 million over 10 years for post-closure physical monitoring and maintenance (assigned to the construction industry), $0.728 million for chemical monitoring over 20 years (assigned to the professional, scientific, and technical services industry), and $0.200 for post-closure water treatment over 20 years (physical maintenance of wetlands and equipment replacement assigned to the construction industry).
- The NICO Project proponent provided closure data in 2011 dollars. These were converted to 2010 dollars using the 5% discount factor used by Fortune to convert future closure expenditures to net present value.
- Closure impacts were estimated with final demand shock through the construction and professional service industries to the territorial IO model. Both the inputs and results are expressed cumulatively over the de-

commissioning and monitoring period and the initial expenditure was adjusted downward to reflect imports from outside the NWT using default model leakages.

16.I.2 MINE CONSTRUCTION, OPERATION, AND CLOSURE

16.I.2.1 Summary of Results

All impacts are expressed as impacts over the status quo (no investment) case and are in 2010 Canadian dollars, except where otherwise noted.

At the territorial level, mine construction, operation, and closure will have the following incremental impacts on employment levels (Table 16.I.2-1).

Table 16.I.2-1: Employment Impacts – Construction, Operation, and Closure

Employment Impacts (Person Years) Construction and Operation	Year 1	Year 2	Year 3	Annual Operational Impacts Underground	Annual Operational Impacts Open Pit	Cumulative Operational Impacts	Cumulative Closure Impacts
Direct Employment[a]	2.2	132.9	95.7	232.8	127.3	2550.9	85.1
Indirect Employment	0.0	0.0	0.0	83.4	78.3	1443.5	39.9
Induced Employment	0.5	33.2	23.9	163.6	91.4	1824.0	24.6
Total Employment	**2.7**	**166.1**	**119.5**	**479.7**	**297.0**	**5818.3**	**149.7**

[a] In all cases in this study, direct impacts are impacts after adjusting for leakages for imports and inventory withdrawals.

Total impacts are the sum of direct, indirect and induced impacts. Direct impacts reflect initial expenditures after adjusting for leakages. Indirect impacts measure the secondary business transactions that result from initial expenditures. Induced impacts are third round impacts from the spending of incremental labour income in the economy after removing a portion for taxes and savings. A complete accounting of definitions is available in Attachment 16.I.I.

Table 16.I.2-2 outlines the incremental impacts on GDP at the territorial level for mine construction, operation, and closure.

Table 16.I.2-2: Incremental Impacts on Gross Domestic Product – Construction, Operation, and Closure

GDP Impacts ($M) Construction and Operation	Year 1	Year 2	Year 3	Annual Operational Impacts Underground	Annual Operational Impacts Open Pit	Cumulative Operational Impacts	Cumulative Closure Impacts
Direct GDP	0.2	9.5	6.9	81.6	106.3	1893.7	9.2
Indirect GDP	0.0	0.0	0.0	15.0	13.4	249.4	5.1
Induced GDP	0.1	3.3	2.4	16.2	9.1	180.7	2.4
Total GDP	**0.2**	**12.8**	**9.2**	**112.8**	**128.8**	**2323.8**	**16.7**

Note: Gross Domestic Product (GDP) is the measure of the sum of all goods and services produced within a geographic area and is the measurement of the "size" of an economy. GDP is included within gross output, represents value added or payments to final factors of production, and includes both profits and labour income.

Incremental impacts at the territorial level on labour income for mine construction, operation, and closure is presented in Table 16.I.2-3.

Table 16.I.2-3: Incremental Impacts on Labour Income – Construction, Operation, and Closure

Labour Income Impacts ($M) Construction and Operation	Year 1	Year 2	Year 3	Annual Operational Impacts Underground	Annual Operational Impacts Open Pit	Cumulative Operational Impacts	Cumulative Closure Impacts
Direct Labour Income	0.2	9.5	6.9	30.4	13.0	275.1	5.7
Indirect Labour Income	0.0	0.0	0.0	6.0	5.5	102.1	2.5
Induced Labour Income	0.0	2.2	1.6	8.8	5.1	101.7	1.2
Total Labour Income	**0.2**	**11.7**	**8.4**	**45.2**	**23.7**	**479.0**	**9.3**

Note: Labour income is included in gross domestic product and includes wages, salaries, and supplementary labour income (employer contributions to pension plans and benefit packages).

16.I.2.2 Impacts by Industry – Construction Phase

Table 16.I.2-4 provides total cumulative impacts (sum of direct, indirect, and induced) by industry of project construction on the territorial economy. All direct activity occurs within the construction industry itself and all manufactured heavy equipment and pre-fabricated products are imported, leaving indirect impacts minimal. Induced impacts, which represent the additional impacts of consumer spending of wages earned, is concentrated heavily within the retail trade and service industries.

16.I.2.3 Operational Impacts

Tables 16.I.2-5 and 16.I.2-6 provide total impacts (direct, indirect, and induced) by industry of project operation on the territorial economy once the project is operational. The bulk of total and direct activity occurs within the mining industry. Indirect impacts (industries providing inputs to the mining sector) are concentrated in utilities and transportation. Induced impacts, which represent the additional impacts of consumer spending of wages earned, are concentrated heavily in trade and personal services.

Table 16.I.2-4: Total Cumulative Impacts by Industry – Construction

Total Impacts ($M Canadian) Construction and Investment – NWT (3-year Period)	Gross Output Impact	GDP at Factor Cost Impact	GDP at Market Prices Impact	Employment Impact (Person Years)	Labour Income Impact
Crop and Animal Production	0.0	0.0	0.0	0.2	0.0
Forestry and Logging	0.0	0.0	0.0	0.0	0.0
Fishing, Hunting, and Trapping	0.0	0.0	0.0	0.1	0.0
Support Activities for Agriculture and Forestry	0.0	0.0	0.0	0.2	0.0
Mining and Oil and Gas Extraction	0.0	0.0	0.0	0.0	0.0
Utilities	0.6	0.3	0.3	0.8	0.1
Construction	215.9	16.5	16.5	230.8	16.5
Manufacturing	0.0	0.0	0.0	0.1	0.0
Wholesale Trade	0.2	0.1	0.1	0.9	0.1
Retail Trade	1.2	0.7	0.7	15.2	0.6
Transportation and Warehousing	0.8	0.3	0.3	2.5	0.2
Information and Cultural Industries	0.3	0.2	0.2	0.9	0.1
Finance, Insurance, Real Estate, and Rental and Leasing	3.6	2.1	2.4	5.2	1.1
Professional, Scientific, and Technical Services	0.1	0.1	0.1	1.0	0.1
Administrative and Support, Waste Management, and Remediation Services	0.1	0.1	0.1	1.2	0.1
Educational Services	0.0	0.0	0.0	0.4	0.0
Health Care and Social Assistance	0.2	0.1	0.1	0.9	0.1
Arts, Entertainment and Recreation	0.0	0.0	0.0	0.7	0.0
Accommodation and Food Services	0.8	0.4	0.4	8.0	0.3
Other Services (Except Public Administration)	0.1	0.0	0.0	0.9	0.0
Operating, Office, Cafeteria, and Laboratory Supplies	0.5	0.0	0.0	0.0	0.0
Travel, Entertainment, Advertising, and Promotion	0.4	0.0	0.0	0.0	0.0
Transportation Margins	0.1	0.0	0.0	0.0	0.0
Non-Profit Institutions Serving Households	0.8	0.6	0.6	12.7	0.6
Government Sector	1.0	0.6	0.6	5.7	0.5
Total	**226.8**	**22.3**	**22.6**	**288.3**	**20.3**

NWT = Northwest Territories; GDP = Gross Domestic Product

Table 16.I.2-5: Total Cumulative Impacts by Industry – Operation

Total Impacts ($M Canadian) Operations – NWT- Including Underground Phase	Gross Output Impact	GDP at Factor Cost Impact	GDP at Market Prices Impact	Employment Impact (Person Years)	Labour Income Impact
Crop and Animal Production	0.0	0.0	0.0	0.4	0.0
Forestry and Logging	0.0	0.0	0.0	0.0	0.0
Fishing, Hunting, and Trapping	0.0	0.0	0.0	0.2	0.0
Support Activities for Agriculture and Forestry	0.0	0.0	0.0	0.6	0.0
Mining and Oil and Gas Extraction	163.8	81.6	81.6	232.8	30.4
Utilities	16.9	8.7	9.3	23.4	2.5
Construction	1.3	0.4	0.4	3.4	0.2
Manufacturing	0.2	0.0	0.0	0.3	0.0
Wholesale Trade	1.0	0.6	0.6	4.3	0.3
Retail Trade	3.1	1.8	1.9	40.8	1.5
Transportation and Warehousing	16.7	5.7	6.2	49.9	3.1
Information and Cultural Industries	1.2	0.8	0.8	3.7	0.2
Finance, Insurance, Real Estate, and Rental and Leasing	10.0	6.0	6.6	14.6	1.1
Professional, Scientific, and Technical Services	0.6	0.3	0.3	3.9	0.2
Administrative and Support, Waste Management, and Remediation Services	0.4	0.3	0.3	4.6	0.2
Educational Services	0.1	0.1	0.1	1.1	0.0
Health Care and Social Assistance	0.7	0.3	0.3	2.8	0.1
Arts, Entertainment, and Recreation	0.2	0.1	0.1	2.1	0.0
Accommodation and Food Services	2.1	1.0	1.2	22.1	0.8
Other Services (Except Public Administration)	0.3	0.1	0.1	3.2	0.1
Operating, Office, Cafeteria, and Laboratory Supplies	5.8	0.0	0.0	0.0	0.0
Travel, Entertainment, Advertising, and Promotion	1.5	0.0	0.0	0.0	0.0
Transportation Margins	0.2	0.0	0.0	0.0	0.0
Non-Profit Institutions Serving Households	2.1	1.6	1.6	31.9	1.6
Government Sector	5.8	3.3	3.3	33.5	2.7
Total	**233.9**	**112.8**	**114.8**	**479.7**	**45.2**

NWT = Northwest Territories; GDP = Gross Domestic Product

Table 16.I.2-6: Total Cumulative Impacts by Industry – Operation

Total Impacts ($M) Operations – NWT- Excluding Underground Phase	Gross Output Impact	GDP at Factor Cost Impact	GDP at Market Prices Impact	Employment Impact (Person Years)	Labour Income Impact
Crop and Animal Production	0.0	0.0	0.0	0.2	0.0
Forestry and Logging	0.0	0.0	0.0	0.0	0.0
Fishing, Hunting, and Trapping	0.0	0.0	0.0	0.1	0.0
Support Activities for Agriculture and Forestry	0.0	0.0	0.0	0.3	0.0
Mining and Oil and Gas Extraction	163.8	106.3	106.3	127.3	13.0
Utilities	13.4	6.9	7.4	18.6	1.9
Construction	0.9	0.3	0.3	2.5	0.2
Manufacturing	0.1	0.0	0.0	0.2	0.0
Wholesale Trade	0.7	0.4	0.4	2.9	0.2
Retail Trade	1.7	1.0	1.0	22.0	0.8
Transportation and Warehousing	15.6	5.3	5.9	46.7	3.0
Information and Cultural Industries	0.8	0.5	0.6	2.5	0.2
Finance, Insurance, Real Estate, and Rental and Leasing	5.6	3.4	3.7	8.1	0.6
Professional, Scientific, and Technical Services	0.4	0.2	0.2	2.6	0.1
Administrative and Support, Waste Management, and Remediation Services	0.3	0.2	0.2	3.0	0.2
Educational Services	0.0	0.0	0.0	0.6	0.0
Health Care and Social Assistance	0.4	0.2	0.2	1.7	0.1
Arts, Entertainment, and Recreation	0.1	0.0	0.0	1.3	0.0
Accommodation and Food Services	1.2	0.6	0.7	12.5	0.4
Other Services (Except Public Administration)	0.2	0.1	0.1	2.0	0.1
Operating, Office, Cafeteria, and Laboratory Supplies	4.4	0.0	0.0	0.0	0.0
Travel, Entertainment, Advertising, and Promotion	1.0	0.0	0.0	0.0	0.0
Transportation Margins	0.1	0.0	0.0	0.0	0.0
Non-Profit Institutions Serving Households	1.1	0.8	0.8	16.6	0.8
Government Sector	4.4	2.5	2.5	25.3	2.1
Total	**216.3**	**128.8**	**130.3**	**297.0**	**23.7**

NWT = Northwest Territories; GDP = Gross Domestic Product

16.I.2.4 Closure Impacts

Table 16.I.2-7 provides total impacts (direct, indirect, and induced) by industry of mine closure on the territorial economy. The bulk of total and direct activity occurs within the construction industry during the initial substantive outlay on decommissioning. Smaller direct impacts occur in the professional, scientific, and technical service industry which accounts for post-closure environmental monitoring activity. Indirect impacts (industries providing

inputs to the construction sector) are concentrated in transportation and administrative and support, waste management and remediation services. Induced impacts, which represent the additional impacts of consumer spending of wages earned, are concentrated heavily in trade and personal services.

Table 16.I.2-7: Total Cumulative Impacts by Industry – Closure

Total Impacts ($M) Cumulative – NWT-Closure Phase	Gross Output Impact	GDP at Factor Cost Impact	GDP at Market Prices Impact	Employment Impact (Person Years)	Labour Income Impact
Crop and Animal Production	0.0	0.0	0.0	0.1	0.0
Forestry and Logging	0.0	0.0	0.0	0.0	0.0
Fishing, Hunting, and Trapping	0.0	0.0	0.0	0.0	0.0
Support Activities for Agriculture and Forestry	0.0	0.0	0.0	0.1	0.0
Mining and Oil and Gas Extraction	1.8	1.2	1.2	1.6	0.2
Utilities	0.4	0.2	0.2	0.5	0.1
Construction	32.3	9.3	9.4	85.9	5.7
Manufacturing	0.0	0.0	0.0	0.0	0.0
Wholesale Trade	1.2	0.7	0.7	5.0	0.4
Retail Trade	0.8	0.5	0.5	10.3	0.4
Transportation and Warehousing	0.9	0.3	0.4	2.8	0.2
Information and Cultural Industries	0.3	0.2	0.2	1.0	0.1
Finance, Insurance, Real Estate, and Rental and Leasing	2.8	1.7	1.8	4.0	0.3
Professional, Scientific, and Technical Services	1.3	0.6	0.6	8.1	0.5
Administrative and Support, Waste Management, and Remediation Services	0.5	0.3	0.3	5.8	0.3
Educational Services	0.0	0.0	0.0	0.2	0.0
Health Care and Social Assistance	0.1	0.1	0.1	0.6	0.0
Arts, Entertainment, and Recreation	0.1	0.0	0.0	1.2	0.0
Accommodation and Food Services	0.4	0.2	0.2	4.1	0.1
Other Services (Except Public Administration)	0.1	0.1	0.1	1.8	0.0
Operating, Office, Cafeteria, and Laboratory Supplies	1.1	0.0	0.0	0.0	0.0
Travel, Entertainment, Advertising, and Promotion	0.8	0.0	0.0	0.0	0.0
Transportation Margins	0.2	0.0	0.0	0.0	0.0
Non-Profit Institutions Serving Households	0.4	0.3	0.3	6.4	0.3
Government Sector	1.7	1.0	1.0	10.0	0.8
Total	**47.3**	**16.7**	**17.1**	**149.7**	**9.3**

NWT = Northwest Territories; GDP = Gross Domestic Product

16.I.2.5 Employment Quality

Quality of jobs created is rated high during the construction phase. An estimated 230 person years are expected to be created in the construction industry, with an average wage of $70 000 to $75 000 (including overtime and employee contributions to pension and benefit plans) per year in 2010 Canadian dollars.

As expected, long-term employment quality is also highly rated with the concentration of employment within mining. Average annual wages (including overtime and employee contributions to pension and benefit plans) are in the $100 000 range and $130 000 during the underground phase in 2010 Canadian dollars.

16.I.2.6 Contractor Opportunities

Fortune will depend on several contract services to operate the mine. As shown by the input-output results, the demand for business services will create additional job opportunities. Fortune has identified the contract opportunities that local businesses are most likely to access. They include the following:

- camp services (estimated 10 to 14 positions): catering and accommodation management;
- transportation industry (estimated 50 positions): truck operators (including those who will haul concentrate to Hay River) mechanics, and fuel services. The positions will include the following:
  - road construction (20 to 30 positions); and
  - road maintenance (3 positions for operations).
- mine support services (estimated 10 to 13 positions). The positions will include the following:
  - expediting/mine resupply;
  - environmental monitors;
  - communications;
  - external trainers on-site to conduct specialty training such as conflict management, cultural sensitivity, etc.;
  - community relations; and
  - sub-office in Behchokǫ̀: administration, logistics, and mechanical.

In total, Fortune estimates that 50 to 60 positions will be filled annually by contractors during the operational phase of the NICO Project. The majority (60 to 80%) are expected to be filled by Northerners, with 30 to 50% of these being Aboriginal.

It is also anticipated that some local contractor opportunities will occur during the construction phase (another 20 to 30 positions). Fortune plans to focus pre-employment training around filling skilled and semi-skilled construction positions. Fortune also will require contractors to draw labour from qualified local sources and provide on-the-job training program during the construction phase. A number of people in the local communities have heavy equipment experience or training, and they will be provided with site-specific on-the-job-training during the construction phase.

Inputs into the economic model show that, net of equipment (manufactured outside of NWT), there is $97 million in goods and services to be purchased during the construction phase, and it is expected that some of this can be provided by local contractors and businesses. The equivalent figure during the operational phase is $25 million per year, the bulk in the transportation, warehousing, and other support industries (power generation, information and financial services, rental and leasing, technical services, waste management, and accommodation and food services).

16.I.3 FISCAL IMPACTS

An expansion in economic activity is expected to generate incremental government revenues. The economic impact model's fiscal module is based on the latest territorial and federal budgets and estimates government revenues as follows:

- Provincial personal income tax is calculated by using the territorial personal income tax rate that would apply to average industry annual income. This is applied to model-generated labour income.
- Federal personal income tax is calculated by using the federal personal income tax rate that would apply to average industry annual income applied to model-generated labour income.
- Corporation income tax is calculated by applying the respective territorial and federal corporate tax rate to incremental corporate profits before taxes calculated by the model.
- Unincorporated business income taxes are calculated by applying the small business tax rate to incremental unincorporated business profits calculated by the model.
- Sales tax calculation is based on the ratio of territorial sales tax collected to retail trade gross output applied to incremental retail trade output calculated by the model.
- Fuel and tobacco revenues are calculated as a fixed ratio (based on territorial budget figures of tobacco and fuel tax revenues to total sales tax revenue) multiplied by estimated sales tax revenues.
- Mining royalties are problematic to estimate within IO model results. While IO results are typically linear and proportional, mining royalties in NWT are levied at a graduated rate that increases by 1% for each additional $5 million in the mine output (increasing with the size and scale of the mine value) and royalty rates range from 0 to 14%. Under the land claim agreements, the federal government provides the First Nations and their communities with a portion of the royalties received from the non-renewable resource extraction within the Territory and within the settled land claim areas. Mining royalties are collected by the federal government (Indian and Northern Affairs Canada) and were $78 million in 2005. In this study, mining royalties are estimated by applying the ratio of mining royalties collected to mining industry gross output (approximately 3.3%) to the project gross revenue and should be treated with caution.

Table 16.I.3-1 presents the estimated government cumulative fiscal impacts during the construction phase.

Table 16.I.3-1: Government Cumulative Fiscal Impacts – Construction

Government Fiscal Impacts - Construction	Personal Income Tax	Corporate Income Tax	Taxes Unincorporated Business Profits	Property Taxes	Sales and Excise Taxes	Payroll Taxes	Mining Royalties	Total Revenue
Federal ($M)	4.351	0.140	0.135	0.000	0.563	0.000	0.000	5.189
Territorial ($M)	1.916	0.091	0.044	0.090	0.141	0.447	0.000	2.752
Total ($M)	**6.267**	**0.231**	**0.179**	**0.090**	**0.705**	**0.447**	**0.000**	**7.941**

Note: presented in Canadian dollars.

At the Territorial level the NICO Project, once fully operational, is expected to generate the following fiscal impacts annually for the life of the NICO Project (Table 16.I.3-2).

Table 16.I.3-2: Annual Fiscal Impacts – Operational

Government Fiscal Impacts – Operational Underground	Personal Income Tax	Corporate Income Tax	Taxes Unincorporated Business Profits	Property Taxes	Sales and Excise Taxes	Payroll Taxes	Mining Royalties	Total Revenue
Federal ($M)	10.853	4.717	0.417	0.000	1.299	0.000	5.416	22.702
Territorial ($M)	5.801	2.455	0.109	0.458	0.359	0.817	0.000	**10.000**
Total ($M)	**16.654**	**7.172**	**0.527**	**0.458**	**1.658**	**0.817**	**5.416**	**32.702**

Government Fiscal Impacts – Operational Open Pit	Personal Income Tax	Corporate Income Tax	Taxes Unincorporated Business Profits	Property Taxes	Sales and Excise Taxes	Payroll Taxes	Mining Royalties	Total Revenue
Federal ($M)	5.566	7.524	0.250	0.000	0.700	0.000	5.416	19.454
Territorial ($M)	2.976	3.915	0.065	0.523	0.211	0.427	0.000	**8.117**
Total ($M)	**8.541**	**11.439**	**0.315**	**0.523**	**0.911**	**0.427**	**5.416**	**27.572**

At the Territorial level, the NICO Project is expected to generate the following fiscal impacts cumulatively over the course of the closure phase (Table 16.I.3-3).

Table 16.I.3-3: Annual Fiscal Impacts – Closure

Government Fiscal Impacts – Closure Cumulative	Personal Income Tax	Corporate Income Tax	Taxes Unincorporated Business Profits	Property Taxes	Sales and Excise Taxes	Payroll Taxes	Mining Royalties	Total Revenue
Federal ($M)	1.949	0.437	0.198	0.000	0.328	0.000	0.000	2.912
Territorial ($M)	1.093	0.227	0.052	0.068	0.203	0.172	0.000	1.814
Total ($M)	**3.042**	**0.665**	**0.249**	**0.068**	**0.531**	**0.172**	**0.000**	**4.726**

Estimated government revenues are for direct, indirect, and induced impacts and do not represent solely Fortune's taxes and royalties paid. Estimates are not adjusted for any changes to equalization entitlements.

To derive territorial property taxes a number of assumptions were made. First, property taxes are a relatively stable function of GDP at factor cost. Time series analysis of territorial government property tax revenues and GDP at factor cost suggests this is the case. Second, the direct operational property tax is assumed to be the impact of the new facility on property taxes within the general taxation area (NWT excluding the City of Yellowknife, Town of Hay River, Town of Fort Smith, Village of Fort Simpson, Town of Norman Wells, and Town of Inuvik). Within the general taxation area, the territorial government collects property taxes. This revenue is assigned to the general revenue fund to provide territory-wide services. This figure is approximately $0.5 million per year once the facility is fully operational.

It should be noted that analogous to a "have not" province receiving equalization payments, under the Territorial Formula Financing Agreement, the NWT does not receive mining royalties and has a substantial portion of its new revenues from both direct and indirect taxes clawed back through a reduction in the annual transfer.

The NWT depends on transfers from the federal government for over two-thirds of its revenues because per capita spending needs in the NWT are far greater than the NWT's per capita revenue raising capacity. The main federal transfer, the Territorial Formula Financing (TFF) Grant, is designed to fill the gap between the NWT's spending needs and revenue raising capacity. The NWT generates only slightly more than 20% of its revenue needs from taxation. Under the NWT's funding arrangements with Canada, the NWT keeps 100% of the money raised through tax rate increases, but a large part of the increase in own-source revenues that result from a growing economy is offset by a lower Territorial Formula Financing Grant. The clawback, on average, is less than 100%. The NWT realizes an average net benefit from the growth of tax revenues of 3%, the specific benefit depends on whether the NWT tax rate is above or below the national average rate for a given tax base.

The TFF Grant theoretically measures the difference between what the NWT would need to spend to provide similar levels of public services as the provinces and its ability to raise its own revenues at similar levels of taxation: TFF Grant equals Expenditure Requirements minus Revenue-Raising Ability. The NWT's revenue-raising ability takes into account the various revenue sources that the government has at its disposal to raise revenues and measures how much the NWT could raise from these sources if it levied the same taxes as the provinces at national average tax rates. This revenue-raising ability is referred to as Eligible Revenues. All eligible revenues are applied to the formula as a 3-year moving average with a 2-year lag. An Economic Development Incentive is applied to Eligible Revenues, effectively excluding 30% of Eligible Revenues from the Grant calculation. This is meant to provide a fiscal incentive for the NWT to promote economic growth. Without it, a dollar of increased tax revenue would simply be offset by an equal reduction in the Grant. This does not equate to a 70% claw-back because the eligible revenues in the formula are determined using the NWT revenue capacity, not its actual revenues. Thus, the claw-back would be 70% only in a situation whereby actual revenues and revenue capacity were identical.

The combination of the revenues measured at National Average Tax Rates and the Economic Development Incentive produce different rates at which each revenue reduces the Territorial Formula Financing Grant.

Mining royalties are not a part of the TFF Agreement and, therefore, would not be subject to claw-back should the NWT negotiate a resource revenue sharing agreement with the federal government. At present, these revenues go to Federal government General Revenues.

In conclusion, the net fiscal impact of the project on Territorial revenues is difficult to measure but is likely in the range of 30% of total revenues, less mining royalties.

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ATTACHMENT 16.I.I

Definitions and Model Description

Final Demand: sum of personal expenditure, government purchases of goods and services, business and government investment, and net exports.

Gross Output: total expenditures on local goods and services as well as payments to labour and business profits. Gross output includes double counting because it includes the value of inputs used in production rather than net value added alone.

GDP at factor cost: measure of net economic activity within a prescribed geographic area. It represents the payments made to final factors of production: labour, unincorporated business profits, and other operating surplus (corporate profits, interest income, inventory valuation adjustments, and capital consumption allowances). GDP at factor cost excludes the value of intermediate goods and services used in production.

GDP at market prices: GDP at factor cost plus indirect taxes less subsidies.

Employment: measured in positions.

Direct impact: total project expenditure, usually construction or operating outlays.

Indirect impact: the secondary impact that includes inter-industry transactions, purchases of inputs from supporting industries

Induced impact: the additional impact from changes in household spending as industries modify labour input requirements in response to altered levels of demand for output.

Industry outputs are calculated as $(I-D(I-\mu-\alpha-\beta)B)^{-1}D((I-\mu-\alpha-\beta)e^{*}+(I-\mu-\beta)X_d+(I-\mu)X_r)=X$

Where:

I = an identity matrix of industry by industry dimension

D = a matrix of coefficients representing commodity output proportions

B= a matrix of coefficients representing commodity input proportions (technical coefficients) by industry

μ = a diagonal matrix whose elements represent the ratio of imports to use

α = a diagonal matrix whose elements represent the ratio of government production to use

β = a diagonal matrix whose elements represent the ratio of inventory withdrawals to use

e^{*} = final demand categories of consumption, government purchases of goods and services, business and government investment, and inventory additions.

X_d = final demand category of domestic exports

X_r = final demand category of re-exports.

Employment is calculated as a fixed number of positions per dollar of industry output.

ATTACHMENT 16.I.II

Mixed Endogenous–Exogenous Input-Output Impacts

In a 3 industry x 3 industry input-output model with industry 3 exogenized, endogenous industry output and final demand X^M

$$\begin{vmatrix} X_1 \\ X_2 \\ Y^L{}_3 \end{vmatrix}$$

is calculated as follows:

$X^M = M^{-1} Y^M$

Where M=

$$\begin{vmatrix} (1-a^L{}_{11}) & -a^L{}_{12} & 0 \\ -a^L{}_{21} & (1-a^L{}_{22}) & 0 \\ -a^L{}_{31} & -a^L{}_{32} & -1 \end{vmatrix}$$

$A^L = (D(I-\mu-\alpha-\beta)B)$

$Y^M =$

$$\begin{vmatrix} Y^L{}_1+a^L{}_{13}X_3 \\ Y^L{}_2+a^L{}_{23}X_3 \\ -(1-a^L{}_{33})X_3 \end{vmatrix}$$

$Y^L = D((I-\mu-\alpha-\beta)e^*+(I-\mu-\beta)X_d+(I-\mu)X_r)$

Where:

I = an identity matrix of industry by industry dimension

D = a matrix of coefficients representing commodity output proportions

B= a matrix of coefficients representing commodity input proportions (technical coefficients) by industry

μ = a diagonal matrix whose elements represent the ratio of imports to use

α = a diagonal matrix whose elements represent the ratio of government production to use

β = a diagonal matrix whose elements represent the ratio of inventory withdrawals to use

e* = final demand categories of consumption, government purchases of goods and services, business and government investment, and inventory additions.

Xd = final demand category of domestic exports

X_r = final demand category of re-exports.