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The economic impact of diamond mining in Canada

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With the promise of more to come, it has taken less than a decade for Canada to thoroughly shake up the global diamond industry as the new kid on the block. Going forward, there are significant potential implications for the northern regional economies, intergovernmental relations, fiscal transfer funding formulas and the global diamond industry. In fact, with current negotiations already under way, \$260 million in annual diamond royalties that presently flow from mines in the Northwest Territories (NWT) to coffers in Ottawa may well be the final motivation towards granting the NWT the status of being Canada's 11th province. In the very least, current negotiations will likely lead to a greater devolution of power from Ottawa to Yellowknife.

We anticipate that during the next quarter century, existing and already planned diamond mines will add a further \$69 billion to the economy through a \$65 billion lift to exports and just over \$4 billion in capital expenditures needed to develop the mines. Federal, provincial and territorial governments stand to collect a cumulative \$8.5 billion in diamond royalties during this period. Growing present average salaries at the rate of inflation, about 70,000 directly employed person years of diamond mining employment could earn \$6 billion in cumulative wages. The remaining \$50 billion in revenues would go to other costs and profits, particularly to foreign shareholders.

Having already done so in the NWT, diamond mining holds out the promise of transforming northern economies in Nunavut, Ontario, and particularly Saskatchewan. In 2005, diamond mining accounted for about 51% and 9% of the NWT and Nunavut economies, respectively. Both shares will likely trail off gradually before a fourth mine comes on line in the NWT early next decade. As two major mines begin production, Saskatchewan could gain a sizeable 1% lift to its economy in each of 2009 and 2011 and over the next 25 years royalties could average \$130 million annually for the provincial government, peaking at about \$180 million annually for about a decade. However, the grade (weight of diamonds expressed as carats/tonne) extracted from Saskatchewan mines remains uncertain and a lower grade could result in significantly less royalties to the province. Furthermore, cutting and polishing factories have been created in numerous Canadian cities including Yellowknife, Vancouver, Winnipeg, Toronto, Montreal, and Matane.

Although the impact of a single mine presently under construction in Ontario is likely to be minor, there is significant ongoing exploration and appraisal activity in other regions of the province such as around Wawa, Kirkland and the James Bay lowlands.

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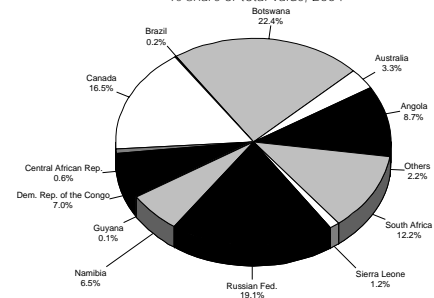
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Chart 1

World rough diamond production

% share of total value, 2004



Source: Natural Resources Canada

1. The Canadian industry's rise

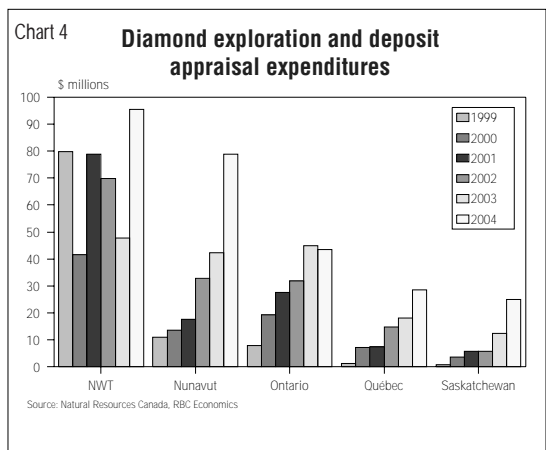
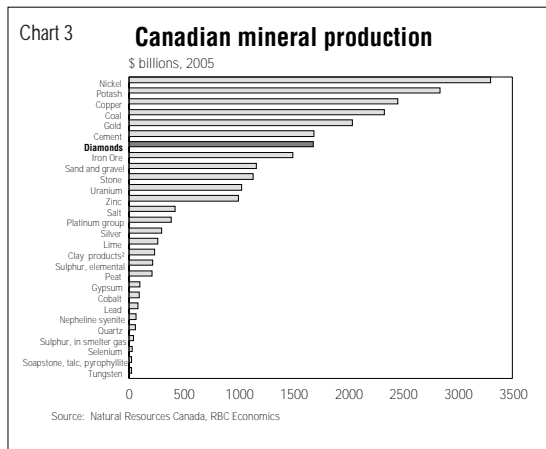
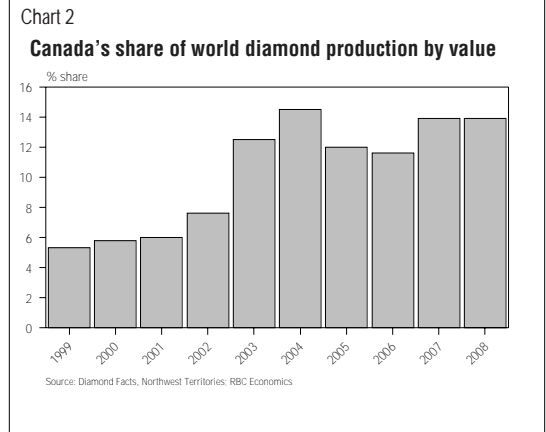
To give a sense of how quickly the industry has evolved, Canada had no diamond mines in operation as recently as 1997, but now claims three that are presently in production, two more slated to open by 2008 and potentially three more that are in early appraisal stages. By quantity, Canada is sixth in the world in total annual production, but, by value, it is the third biggest diamond-producing country in the world behind Russia and Botswana and slightly ahead of South Africa. Canada now accounts for about one-eighth of global diamond production as measured by value, which is higher than its share of production measured in carats (about 8%) because Canadian diamonds are generally among the highest quality in the world and fetch higher-than-average prices (chart 1). Chart 2 shows how rapidly the Canadian industry has risen, and chart 3 demonstrates that, within eight short years, diamonds came out of nowhere to presently account for about 6% of the value of total mineral production in Canada. Only nickel, potash, copper, coal, gold, and cement rank higher than diamonds on annual production values.

Over 2007-2008, when the new mines open, diamonds may well overtake gold as the fifth largest source of mining activity. These two new mines — Snap Lake (NWT) and Victor (Ontario) — will place Canada solidly in third place, well ahead of South Africa, but still behind Russia and Botswana by value. With widespread appraisal activity scouring the frozen north for more diamondiferous kimberlites (volcanic cones that push upward from the earth and contain diamonds created under high pressure and temperature), there even exists the possibility of many more mines to come (chart 4). Diamond exploration expenditures (\$251 million in 2005) have been scattered across about 60 prospecting areas in Canada. In 2004, the NWT once again led diamond exploration expenditures in Canada at \$96 million. However, diamond exploration and deposit appraisal expenditures in Nunavut (\$79 million), Ontario (\$44 million), Quebec (\$29 million) and Saskatchewan (\$25 million) have also been ramping up during the past five years. Projects at advanced stages of exploration include Gahcho Kue (NWT), Star Diamond (SK), and Fort à la Corne (SK). If the appraisal and permitting phases of these projects progresses uninterrupted, additional projects could be in construction as early as 2009. Table 1 in the appendix provides a summary of mines that are presently in operation (Ekati, Diavik, and Jericho), those that will be in operation by 2008 (Snap Lake and Victor), and other possible future mines (Fort à la Corne, Gahcho Kue, and Star Diamond).

2.a. National economic impact

Diamond mining is a significant economic contributor through its contribution to GDP, labour income, employment, and government revenue and royalties. The assumptions made in this paper to calculate the economic impact of diamond production err on the conservative side by using an average value per carat based on total production and total value in Canada during 2005. So far, the expansion of the Canadian industry has had no noticeable impact on world diamond prices compared to other more dominant forces such as shifts in company reserves.

For many commodity prices, it is often an accepted practice to use average current prices to develop long-term forecasts. The appendix outlines this and other economic assumptions and applies them in order to estimate the key economic impacts of past, current and expected diamond production in Canada. Canada's diamond mines (three in production, two expected by 2008, and at least three likely prospects within a five- to seven-year horizon) are roughly expected to generate a cumulative \$80 billion in GDP in their lifetimes, with \$69 billion yet



to come, through effects of a production-led lift to exports and the capital expenditures necessary to develop the mines. Project timelines indicate that all current and potential mines are expected to reach peak production by 2013, accounting for about 0.2% of the Canadian economy in that year. Chart 5 illustrates the peak impact year of diamond mining by region and when that peak occurs depending on the opening of new mines. Diamond-related capital expenditures during the construction phases of Canada's first three diamond mines from 1997 to 2005 boosted Canada's non-residential investment by about 5.2%. Diamond exports amounted to roughly 0.3% of Canada's total exports in 2005. We expect this 0.3% contribution to be at least maintained during the next five to seven years as six more diamond mines come on stream.

2.b. Regional economic impact through existing mines

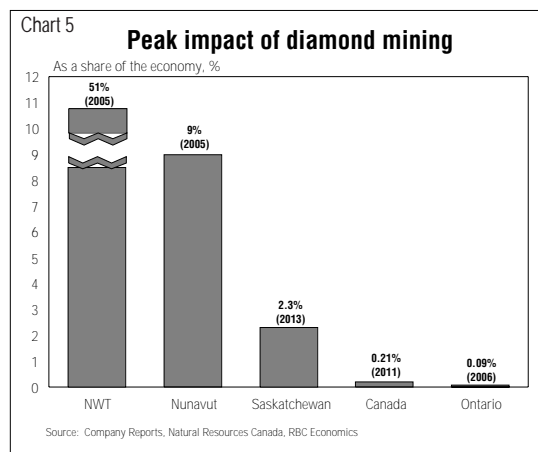
Since the inception of Canada's first diamond mine in 1998, real GDP in the NWT has surged dramatically, reporting average real growth of 10% from 1999 to 2005. During this period, the NWT solidified its third-place standing in world diamond production by value. The Ekati and Diavik diamond mines ramped up to full production in 2004, producing approximately 12 million carats (8% of world carat production). The production impact of Ekati and Diavik on the NWT economy contributes about \$1.8 billion annually. The value of diamond mining projects as a share of the economy in the NWT hit 43% in 1998 and subsequently went through two consecutive years in which the incremental contribution to the economy's GDP declined. However, the commencement of Diavik's construction phase in 2001 supported levels above those in 1998. As well, an additional boost came in 2005 from the start-up of Snap Lake's construction phase, which injects more value into the economy than the production phase of the project. These additions caused diamond mining as a share of the economy to reach a peak in 2005 at 51% of the economy (see chart 5). Our outlook projects that, while diamond production will continue to be a substantial contributor to the NWT's economy, the impact on GDP will gradually decline as construction winds down and production rates level off.

Nunavut's first diamond mine, Jericho, began production in February 2006. Jericho's production capacity is relatively small, but the impact on the Nunavut economy is substantial. The peak impact on the economy was felt in 2005 when \$100 million in capital expenses were incurred to construct the mine, accounting for roughly 9% of

its economy (see chart 5). Thereafter, approximately \$70 million annually will be reaped from production, translating into a gradually declining share of the overall economy from 6% down to 4% over its 8 year project life spanning from 2006 to 2014. In Ontario, where a \$7 billion mining industry already exists, the relative lift is much smaller with Ontario's Victor mine expected to contribute at its peak (reached in 2006) a tiny 0.09% to the economy's GDP (see chart 5). Like Snap Lake and Jericho, the construction phase of the project from 2006 to 2007 will be the most stimulative in employment and dollar terms. Once the project begins production, the GDP contribution will dwindle down to 0.01% in 2008 and is expected to gradually decline during the 17-year life of the project as overall economic growth erodes the relative impact.

2.c. Regional economic impact for future diamond mine prospects

While exploration across the country is extensive, the focus remains concentrated on the NWT, Nunavut, Saskatchewan, Ontario and Quebec. In particular, there are three likely prospects — with several others brewing — that have entered the appraisal and permitting stage. If current plans proceed on schedule, Star Diamond (SK), Gahcho Kue (NWT) and Fort à la Corne (SK) could begin production in 2011, 2012 and 2013, respectively. The impact on northern Saskatchewan would be economically significant in terms of employment and GDP growth. Star Diamond and Fort à la Corne are each \$1 billion capital projects. The commencement of Star Diamond's construction phase is expected to provide about a 1% lift to the province's economy in 2009. In 2011, the start-up of Fort à la Corne's construction phase will add an additional 1% to Saskatchewan's GDP. Once both projects shift into production, the incremental GDP impact will decline from a peak of 2.3% in 2013 down to about 0.5% by 2032. Gahcho Kue would also be a significant addition to diamond production and would help ensure continued strength in the NWT diamond industry. The project would account for roughly 8% of the NWT economy during the construction phase and this contribution would steadily decline during the life of the production phase.



For governments, the opportunity associated with diamond mining is perhaps best reflected in chart 7. Applying a 13% royalty rate on production, which is similar to that presently collected in the NWT, yields a peak of more than \$300 million in annual royalties through mines in the NWT, a peak of about \$180 million a year in royalties from Saskatchewan mines for a full decade, and minor amounts in Ontario and Nunavut. However, royalty rates have not yet been established for Saskatchewan and Ontario, and they may depend upon the size and grade of the mines.

2.d. Regional employment impact

The diamond industry has created high-quality employment opportunities across the country. The average salary in 2003 for all workers employed in the diamond mining industry was \$63,700. Ekati and Diavik are the largest private employers in the NWT, employing approximately 1500 people. Recent employment figures estimate an additional 1850 jobs related to diamond mining activities in 2005 (including direct and contract employees involved in operations, expansions and construction of mines). The addition of Snap Lake and Gahcho Kue will add 510 construction jobs and 580 full-time production-related jobs. Diamond-related employment currently accounts for roughly 15% of employment in the NWT.

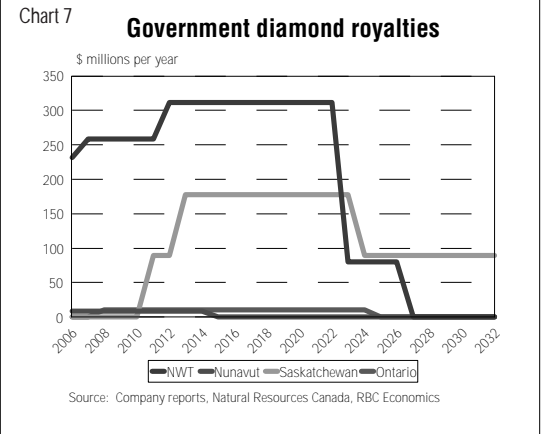
These employment estimates do not include spin-off jobs created as a result of the development of diamond mines. Some examples of spin-off employment include jobs in wholesale trade, the transportation sector, other services, and the diamond manufacturing and polishing industry. The implications of a diamond mine are extensive and, therefore, spin-off jobs are typically estimated using a multiplier in the range of 1.7 to 2.0. In the NWT, the multiplier effect drives up the share of jobs created as a result of the mines closer to 30% of its total employment. The Victor mine in Ontario expects to employ about 600 people during construction and maintain 400 full-time employees during production. Saskatchewan's two projects in the Fort à la Corne region are each anticipating requirements of about 1000 employees during construction and 500 employees throughout production.

The potential training, employment and business opportunities associated with the diamond industry are enormous for the affected regions. To ensure that the benefits are reaped from within their economy, the government of the NWT continues to impose restrictions and regulations on diamond hiring practices. Government policy supports permitting a diamond mine only if part of the production is supplied to the local industry. Hiring preference is given to Aboriginal northerners and other NWT residents who have the necessary skills to work at the mine. Hiring targets are typically 60% northerners and, within that, about 30% northern Aboriginals. As projects continue to develop, Canada's mining industry will continue to confront major skilled labour shortages that are expected to worsen.

3. A potential devolution of power to Yellowknife

Perhaps the most significant potential impact stemming from the development of the diamond industry is that it may well be the final reason needed to grant the NWT provincial status after a very long quest for greater autonomy from the federal government. At the very least, the NWT is likely to achieve greater independence even if it remains a territory. With negotiations under way, however, the stakes are large. An estimated \$260 million in royalty payments collected from diamond mining activity last year — and poised to grow much larger — currently flows straight to Ottawa. Unlike in a province, the federal government retains the rights to Crown lands in territories and the riches extracted from within. A risk, however, lies in what happens to transfer funding arrangements with Ottawa. If the pattern of recent deals between the federal and provincial governments offers a guide, it is plausible that the NWT will retain those royalties and get to keep most of the existing transfer payments at least for the foreseeable future.

Beyond royalty revenues, there are other advantages that would accrue to the NWT if it became a province that it does not currently enjoy as a territory. It would still retain all of the same powers it currently has, plus it would also get a vote in the Constitutional amending formula, which only provinces can have. Finally, whereas in a territory the federal government can enter into provincial-type affairs such as school curriculum, it cannot do so directly insofar as a province is concerned.



Appendix

Table 1

Current and planned diamond mines in Canada

Mine	Location	Construction start	Production start	Annual production (million carats)	Annual production (\$/carat)	Employees (construction)	Employees (production)	Capital costs (\$ millions)	Projected life (yrs)
Ekati	NWT (300km NE of yellowknife)	Jan 1997	Oct 1998	5	140	600	800	900	25+
Diavik	NWT (300km NE of yellowknife)	Dec 2000	Jan 2003	8	104	800	700	1300	16-22
Jericho	Nunavut (400km NE of Yellowknife)	March 2005	Feb 2006	0.5	145	60	80	99.7	9
Snap Lake	NWT (220km N of yellowknife)	Feb 2005	Oct 2007	1.5	106	450	500	636	20
Victor	ON (100km W of James Bay coast)	Early 2006	Oct 2008	0.6	400	600	400	982	17
Fort à la Corne	SK (50km NE of Prince Albert)	2011	2013	5	n/a	1000	400-600	1000	20+
Gahcho Kue	NWT (300km NE of yellowknife)	2010	2012	3	n/a	600	400	825	15
Star Diamond	SK (60km E of Prince Albert)	2009	2011	5	n/a	1000	400-600	1000	10-15
				28.6		5110	3680-4080	6743	

Source: Company Reports, Natural Resources

Table 2

Estimated economic impact of diamond mining in Canada

	Production (millions)	Price* (\$/carat)	Projected life	Annual impact		Lifetime impact		
				Capital during construction (\$ millions)	Exports during production (\$ millions)	Total exports (\$ millions)	Total capital costs (\$ millions)	Total GDP contribution (\$ millions)
Diamond mines								
Production								
Ekati (NWT)	5.0	137	25	450	684	17,110	900	18,010
Diavik (NWT)	8.0	137	20	650	1,095	21,901	1,300	23,201
Jericho (Nunavut)	0.5	137	9	100	68	616	100	716
Planned								
Snap Lake (NWT)	1.5	137	20	318	205	4,106	636	4,742
Victor (ON)	0.6	137	17	491	82	1,396	982	2,378
Future prospects								
Star Diamond (SK)	5.0	137	12.5	500	685	8,563	1000	9,563
Gahcho Kue (NWT)	3.0	137	15	413	411	6,165	825	6,990
Fort à la Corne (SK)	5.0	137	20	500	685	13,700	1,000	14,700
TOTAL IMPACT ON CANADIAN ECONOMY				3,422	3,916	73,557	6,743	80,300

Assumptions to appendices

1. Estimates are based on data from the latest company reports, Northwest Territories Government, Statistics Canada, and Natural Resources Canada. Of the three categories of diamond mines, the 'future prospects' category (Star Diamond, Gahcho Kue, and Fort à la Corne) is the most susceptible to overall changes to its production and timing predictions. These projects are currently in the appraisal/permitting stages and estimates will be more accurate once this process is complete.
2. Average price per carat is calculated using total value (\$1,683 billion) and total production (12.3 billion carats) of diamonds in Canada during 2005 which yields 137\$/carat.
3. Capital costs are spread over an assumed two-year construction period with the exception of Jericho, which completed its construction over one year.
4. All production is assumed to be exported. Exports are calculated by multiplying production with the average price per carat. Total exports are calculated by multiplying exports by the projected life of the mine.
5. Total GDP contribution is the sum of total capital costs and total exports.
6. The lifetime economic impact analysis spans from 1997 (the start of construction of Canada's first diamond mine, Ekati) to 2032 (the final year of production of Fort à la Corne). The \$ impact is the sum of construction costs incurred and total production value yielded in each year. The \$ impact is then expressed as a share of the regional economy where the mine is located. GDP (\$ millions) is based on actuals from 1997 to 2005. From 2006 to 2007 the GDP estimates are based on RBC's forecasts and from 2008 to 2032 we assume annual GDP growth of 4.5%. However, GDP for the Northwest Territories and Nunavut are forecasted using 4.5% growth right from 2006 to 2032. GDP for the Northwest Territories in 1997 and 1998 includes Nunavut.

**Appendix 3
Lifetime economic impact analysis of diamond production in Canada**

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Northwest Territories																				
Ekati	450	1135	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	
Diavik																				
Snap Lake																				
Gahcho Kue																				
\$ Impact	450	1135	685	1335	1335	1781	1781	1781	2099	2099	1987	1987	1987	2400	2400	2398	2398	2398	2398	
GDP \$m	2691	2652	2292	2515	2972	3037	3680	4174	4083	4267	4459	4659	4869	5088	5317	5556	5806	6068	6068	
% of GDP	17%	43%	30%	27%	45%	44%	48%	43%	49%	49%	45%	43%	41%	47%	47%	43%	41%	40%	40%	
Nunavut																				
Jericho									99.7	68.5	68.5	68.5	68.5	68.5	68.5	68.5	68.5	68.5	68.5	
\$ Impact									99.7	68.5	68.5	68.5	68.5	68.5	68.5	68.5	68.5	68.5	68.5	
GDP \$m									1101	1151	1202	1256	1313	1372	1434	1498	1566	1636	1636	
% of GDP									9%	6%	6%	5%	5%	5%	5%	5%	4%	4%	4%	
Ontario																				
Victor									491	491	491	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	
\$ Impact									491	491	491	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	
GDP \$m	359353	377897	409020	440759	453701	478141	493345	517407	537604	570963	593801	620522	648446	677626	708119	739984	773283	808081	808081	
% of GDP									0.09%	0.09%	0.08%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	
Saskatchewan																				
Star Diamond																				
Fort à la Corne																				
\$ Impact	29157	29550	30778	33828	33127	34327	36394	39999	42490	44853	46603	48700	50892	53182	55575	58076	60689	63420	63420	
GDP \$m																				
% of GDP																				
Canada																				
\$ Impact	450	1135	685	1335	1335	1781	1781	1781	2199	2659	2546	2137	2637	3050	3735	3733	3918	3918	3918	
Canada GDP (\$m)	882733	914973	982441	1076577	1108048	1154204	1216191	1290185	1368726	1452996	1516820	1585077	1656405	1730943	1808836	1890233	1975294	2064182	2064182	
% of GDP	0.05%	0.12%	0.07%	0.06%	0.12%	0.12%	0.15%	0.14%	0.16%	0.18%	0.17%	0.13%	0.16%	0.18%	0.21%	0.20%	0.20%	0.19%	0.19%	
NWT																				
Ekati	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	
Diavik	1096	1096	1096	1096	1096	1096	1096	1096	1096	1096	1096	1096	1096	1096	1096	1096	1096	1096	1096	
Snap Lake	205.5	205.5	205.5	205.5	205.5	205.5	205.5	205.5	205.5	205.5	205.5	205.5	205.5	205.5	205.5	205.5	205.5	205.5	205.5	
Gahcho Kue	411	411	411	411	411	411	411	411	411	411	411	411	411	411	411	411	411	411	411	
\$ Impact	2398	2398	2398	2398	2398	2398	2398	2398	2398	2398	2398	2398	2398	2398	2398	2398	2398	2398	2398	
GDP \$m	6341	6626	6924	7236	7561	7902	8257	8629	9017	9423	9847	10290	10753	112393	117451	122736	128259	134031	140062	
% of GDP	38%	36%	35%	32%	32%	29%	28%	28%	7%	7%	6%	6%	1%	1%	1%	1%	1%	1%	0%	
Nunavut																				
Jericho																				
\$ Impact																				
GDP \$m																				
% of GDP																				
Ontario																				
Victor	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	
\$ Impact	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	
GDP \$m	844445	882445	922155	963652	1007016	1052332	1099687	1149173	1200885	1254925										
% of GDP	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%										
Saskatchewan																				
Star Diamond	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	
Fort à la Corne	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	685	
\$ Impact	1370	1370	1370	1370	1370	1370	1370	1370	1370	1370	1370	1370	1370	1370	1370	1370	1370	1370	1370	
GDP \$m	66274	69256	72373	75630	79033	82590	86306	90190	94249	98490	102922	107553	112393	117451	122736	128259	134031	140062	140062	
% of GDP	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	
Canada																				
\$ Impact	3850	3850	3850	3850	3850	3850	3850	3850	2069	1384	1302	1302	685	685	685	685	685	685	685	
Canada GDP (\$m)	2157070	2254138	2355575	2461575	2572346	2688102	2809067	2935475	3067571	3205612	3349864	3500608	3658135	3822751	3994775	4174540	4362394	4558702	4558702	
% of GDP	0.18%	0.17%	0.16%	0.16%	0.15%	0.14%	0.14%	0.13%	0.07%	0.04%	0.04%	0.04%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	

*GDP for the Northwest Territories in 1997 and 1998 includes Nunavut.