Socio-economic Contribution of Gold Mining in the Yellowknife Mining District

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Abstract and Biography

Gold mining in the Yellowknife area of the Northwest Territories started long before the concept of sustainability entered the academic literature and by the time the term enjoyed widespread public acceptance, the Yellowknife gold mining industry was in its sunset years. Nevertheless, the city of Yellowknife will long outlive the gold mines that it was founded on, demonstrating that not only can mining build sustainable communities, but that sustainable mining as a concept is an entirely valid precept.

To this effect, the authors examine the complex economic and social aspects of the gold mining industry in the Yellowknife area over the last 70 years.

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Note: All financial values are expressed in constant 2002 Canadian dollars, unless otherwise stated. This includes gold prices.

Introduction

Over the last twenty years the concept of sustainable development has evolved from its origins in the Brundtland Commission to its current pervasive presence in virtually all aspects of public life. The minerals industry has not escaped this trend.

Gold mining in the Yellowknife area started long before concept of sustainability entered the academic literature and by the time the term enjoyed widespread public acceptance, the Yellowknife gold mining industry was in its sunset years. Despite this, and largely because of the high profile environmental "legacy" associated with the Giant mine, there is a perception that gold mining activity in Yellowknife has not contributed to sustainable development. The argument goes that external costs, once factored in, would greatly exceed any benefits created by the 70 or so years of gold production.

This paper attempts to dispel the argument by showing the contribution of gold mining in the Yellowknife Mining District (YMD) to the sustainable development of the area.

Contribution of Gold Mining in the Yellowknife Mining District to Wealth Creation

The following series of charts and notes outline quantitatively how the mineral resources of the three largest gold mines in the YMD (Con, Giant and Discovery) have contributed to wealth creation[1] since mining commenced in the mid-1930's.

Some 13.5 million ounces of gold have been produced from the YMD since mining operations commenced at Con in 1938 (Fig. 1). The bulk of production has been from Giant mine, which has produced over 7 million ounces of gold since operations began in 1948. To date, Con mine has produced 5.5 million ounces of gold. Discovery mine, which operated from 1950 to 1968 and was the smallest of the three, produced just over 1 million ounces of gold during its life.

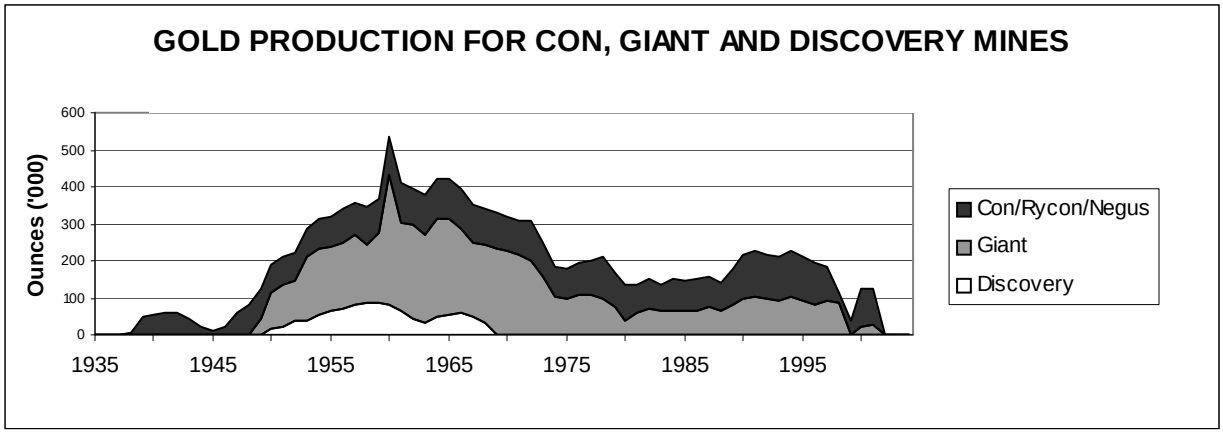

Figure 1. The distribution of gold production for Con, Giant and Discovery mines, from 1938 to the present time.

The bulk of gold production in the district occurred between 1952 and 1973. During this period, over 7.7 million ounces of gold were produced, accounting for 60% of the total. Gold production artificially peaked in 1960 at 535,000 ounces, principally due to an 18-month reporting period for Giant as the company switched financial year-ends.

Gold production decreased dramatically from mid-1990 owing to a combination of factors, including strike activity at both Con and Giant mines, production cutbacks in response to the rapidly decreasing gold price, and ore depletion. Con mine ceased production permanently in November 2003 while Giant is slated for closure in mid-2005. Gold production from Giant mine over the 2004-2005 period is expected to total 60,000 ounces.

Giant, Con and Discovery mines have generated cumulative revenues in excess of $5,510 million since mining first commenced in 1938 (Fig. 2). Giant and Con have contributed $2,743 and $2,528 million in revenues respectively, or some 96% of the total. The Discovery mine generated $240 million in revenues.

While the bulk of gold production occurred between 1952 and 1973, gold revenues were most abundant between 1974 and 1997 in response to significantly higher gold prices over this period. For example, revenues during the 1952 to 1973 period amounted to $1,839 million, whereas revenues over the 1974 to 1997 period were $3,157 million. Gold prices averaged $236 and $728 respectively over these two periods.

In recent years, revenues from gold production in the Yellowknife Mining District have decreased significantly owing to a combination of the declining gold price and production cutbacks. Since 1997, the gold price has averaged $447, while production has fallen from an average 180,000 ounces per year over the 1974 to 1997 period to an average of 100,000. Over the same period, annual revenues have decreased from an average of $132 million to just $45 million.

[1] Wealth creation is defined here as revenues generated through gold sales.

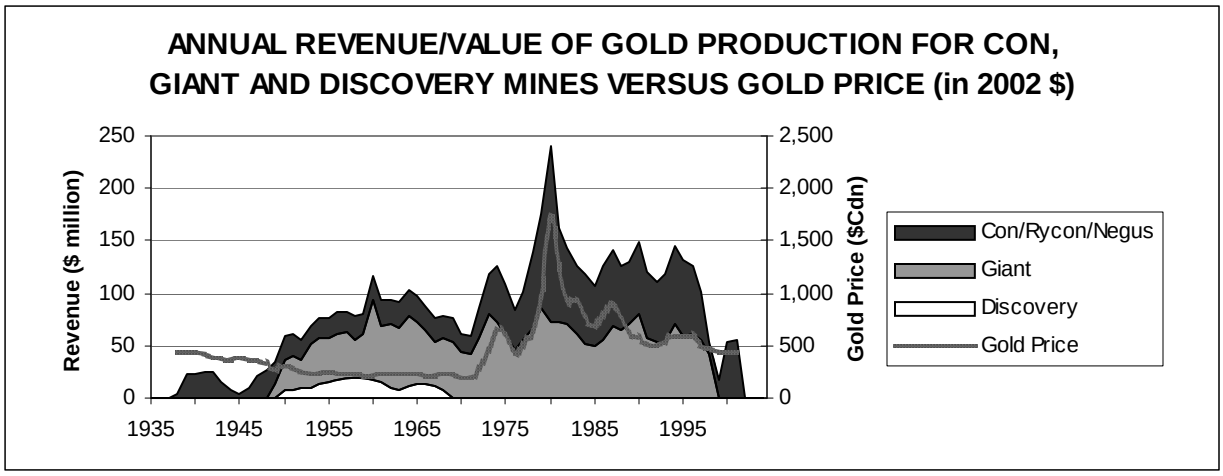

Figure 2. The distribution of annual revenues for Con, Giant and Discovery mines, from 1938 to the present time, juxtaposed against the gold price. Note: figures for Giant represent reported revenues, including hedge gains and interest, up to 1998. Figures for Discovery represent reported revenues. Figures for Con refer to the value of gold produced, which was calculated by multiplying annual ounces by the average annual spot gold price in Canadian dollars. Giant and Con are combined from 2000 onwards.

Giant has produced significantly more gold than Con, yet total revenues are similar (Fig. 3). This is because production from Giant was most prolific during the 1952 to 1973 period when gold prices were lowest. Production from Con, on the other hand, was most abundant between 1991 and 1997, during a time of high gold prices.

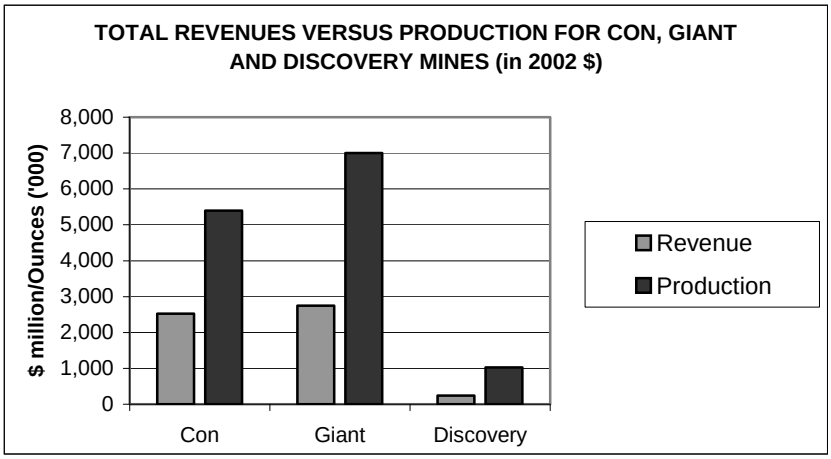

Figure 3. Revenue versus production for Con, Giant and Discovery mines.

A comparison of revenue versus production for Con, Giant and Discovery mines reveals that Con received $470 for each ounce of gold produced from the mine. Discovery mine on the other hand received only $230, a function of the low gold prices prevalent from 1950 to 1968, the time during which the mine operated. Giant mine received $390 for each ounce of gold produced.

The quantitative analysis above demonstrates that the gold mines of the YMD converted the gold contained in the rocks underlying Yellowknife into a stream of highly significant cash flows. In fact, the gold mines are responsible for much of the early "built capital" in the city including the hydro power developments at Snare (Giant) and Bluefish (Con) and a significant amount of the downtown Yellowknife housing stock, much of which is still in use. Significant contributions to early community facilities are also directly attributable to the mines – for instance, Giant's donation of the lumber for the Gerry Murphy Arena.

Role of Government in Wealth Creation

The Canadian government provided support for resource industries in Canada following the Second World War through the development of infrastructure and the Emergency Gold Mining Assistance program (EGMA). The EGMA program was established to help rural, mostly northern communities, deal with the impact of steadily increasing inflation coupled with a fixed gold price. The following charts and discussion illustrate the importance of this program to the Yellowknife Mines.

Giant mine received $47 million in EGMA payments from the federal government between 1948 and 1971 (Fig. 4). The mine generated over $1,000 million in revenues over the same period.

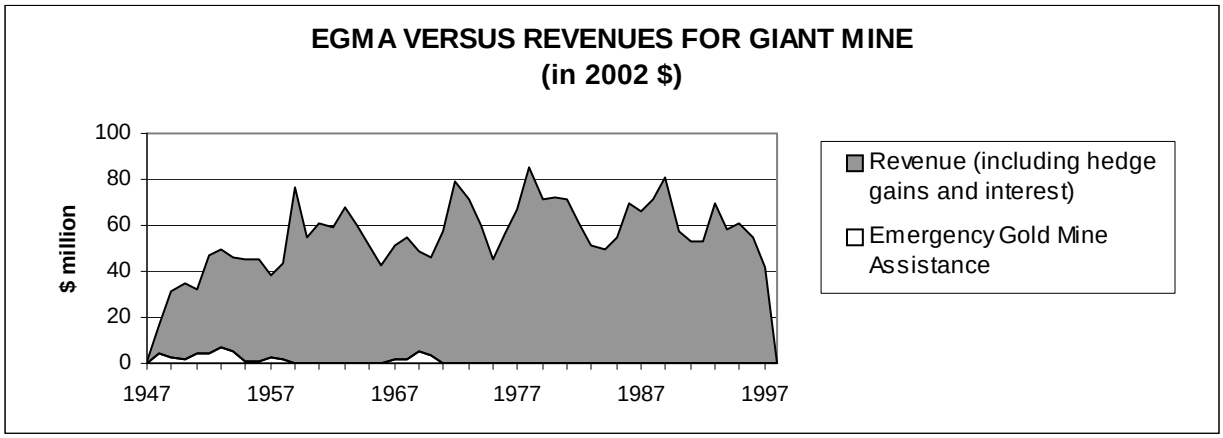

Figure 4. Amount and timing of Emergency Gold Mine Assistance versus revenue for Giant mine.

EGMA played a critical role during the first ten years of mining at Giant in helping to keep the mine profitable and establish itself (Fig. 5). For example, EGMA contributions between 1949 and 1955 totaled $30 million, while profits (excluding EGMA) generated over the same period totaled only $44 million. EGMA again played an important role during the late-1960's in keeping the mine profitable, after a long period of steadily decreasing gold prices.

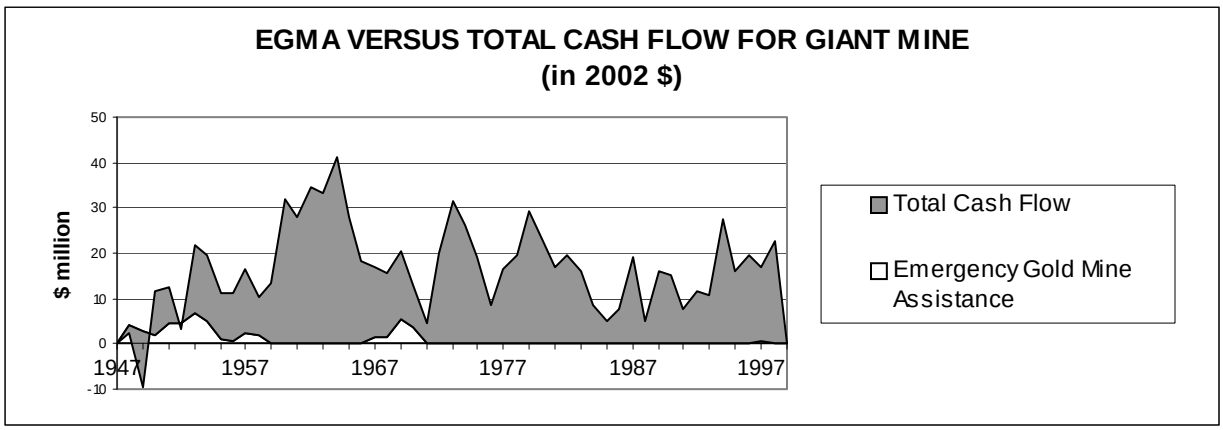

Figure 5. Amount and timing of Emergency Gold Mine Assistance versus total cash flow[2] for Giant mine.

Profits generated by Giant mine to 1998, including EGMA contributions, totaled $867 million. Therefore, EGMA contributions amounted to only 5% of the total.

[2] The total cash flow takes operating costs, capital expenditures and tax payments into account. It is a measure of the mine's profitability.

Con mine received $38 million in EGMA from the federal government between 1948 and 1971 (Fig. 6). Some $522 million worth of gold was produced from the mine over the same period. Discovery mine received $11 million in EGMA from the Federal government between 1950 and 1968 (Fig. 7). During this period, the mine generated some $240 million in revenues.

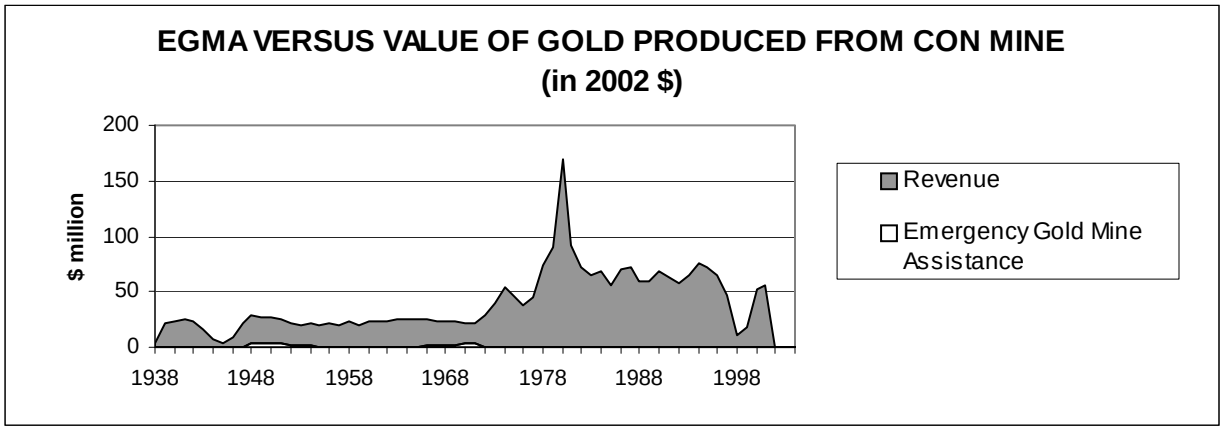

Figure 6. Amount and timing of Emergency Gold Mine Assistance versus value of gold produced from Con mine.

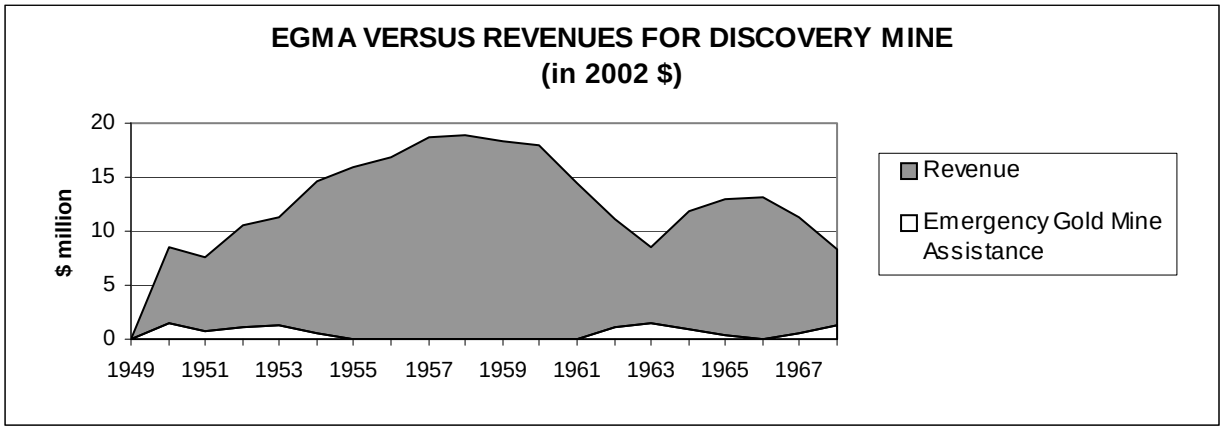

Figure 7. Amount and timing of Emergency Gold Mine Assistance versus revenue for Discovery mine.

As with Giant, EGMA played a critical role during the initial years of Discovery mine in helping to keep the operation profitable and establish itself (Fig. 8). EGMA contributions during the first five years of mine life totaled $5 million. EGMA again played an important role during the early-1960's in keeping the mine afloat, most notably in 1963 during an unexpected decrease in production and increase in operating costs. However, increased EGMA contributions towards the end of the mine life were insufficient to stave off mine closure in the face of diminishing reserves and a decreasing gold price.

Profits generated by Discovery mine over the mine life, including EGMA contributions, totaled $93 million. EGMA contributions therefore amounted to around 12% of the total.

Since the end of the EGMA program in 1970 the role of government in the creation of wealth from gold mining in Yellowknife has been less direct, with more emphasis on mineral policy and regulatory aspects. There has been a particular emphasis since the early 1970's on balancing the need to meet increasing environmental and social expectations with the decreasing ability of the mines to deliver on these demands as the resources became depleted. There has been none of the EGMA style "subsidies", although during the last five years of depressed gold prices, there has been the provision of directed financial assistance from all three levels of government, in part to ensure a relatively orderly wind down of the operations. Assistance has included support for exploration, geological and

other technical research, environmental management and also a negotiated deal to allow partial operation of the Giant mine following the bankruptcy of the last owner, namely Royal Oak Mines.

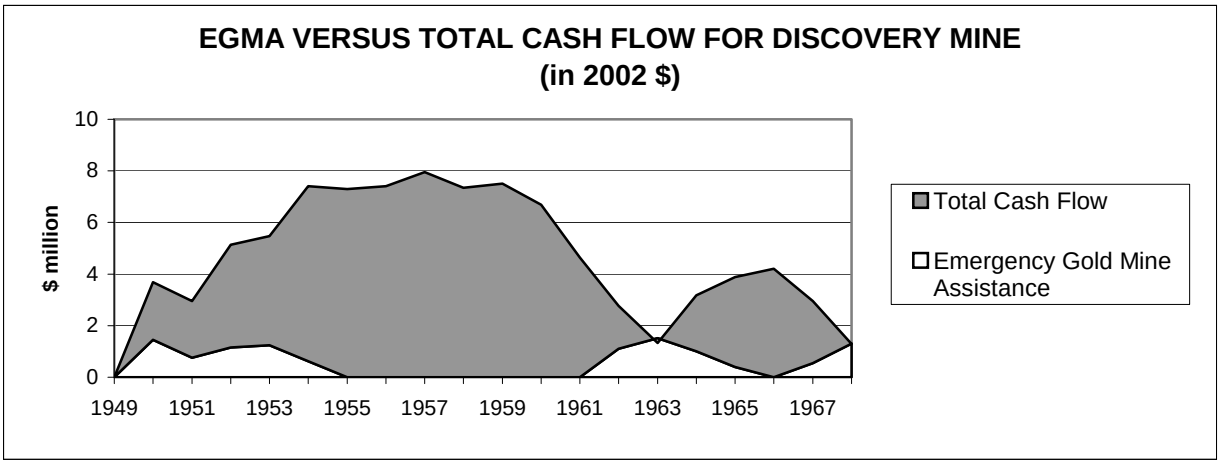

Figure 8. Amount and timing of Emergency Gold Mine Assistance versus total cash flow for Giant mine.

Role of Private Industry in Wealth Creation

Private industry has played a traditional role in the Yellowknife Mining District, providing risk capital for initial startup and for various development projects in response to ongoing ore reserve definition and gold price movements. Significant projects include the initiation of open pit mining at Giant and the sinking of the Robertson Shaft at Con in response to increasing gold prices in the 1970's, and various investments in plant infrastructure (the Con autoclave, the Giant tailings retreatment plant), and environmental management initiatives in the 1980's. Private industry also played its traditional role of ensuring the mines operated profitably and that ongoing exploration was conducted to replace depleted ore reserves. The three operating mines also invested considerable money in more regional exploration work to identify additional deposits – for example Giant Yellowknife Mines developed the Salmita Mine in the 1980's as a result of this work.

Because of the remoteness of the area all three Yellowknife mines invested a great amount of money in infrastructure, particularly housing. It was only in the late 1980's that the Giant mine finally sold off the majority of its wholly owned housing stock in the main part of the city.

The charts and narrative below illustrate how the profitably of the Giant and Discovery Mines varied over the last sixty years. Unfortunately, a similar level of information is not available for the Con mine as it was an operating division of Cominco for many years and reporting was not as detailed.

Operating costs for Giant mine followed a similar trend to the gold price over the first 35 years of mine life (Fig. 9). During this period, operating costs averaged $70 per ounce (in current dollars), while the gold price averaged $113 per ounce. This period also saw the highest gold production (Fig. 1), a factor that no doubt contributed to the evident control over operating costs. However, while operating costs continued to increase at Giant post-1982, the gold price trended downwards. This led to a marked drop in profitability, most notably in the mid-1980's (Fig. 5). The reality of the 1970's and 1980's was that Giant was a relatively unprofitable underground mine supported by a series of profitable open pit operations and the satellite Salmita mine. The resultant cash flow problems manifested in strike action in 1981 and ultimately the sale of Falconbridge's 19% interest in the mine in 1986, breaking a 40-year plus association of the Giant mine with the Falconbridge group and predecessor companies. The mine went through a turbulent four years of ownership changes until the sale of the mine to Royal Oak Resources in 1990.

Royal Oak succeeded in capping operating costs at or below the $400 per ounce level during the 1990's, albeit with the painful and notorious strike of 1992 –1993, keeping the mine profitable until its sale to Miramar in 1999.

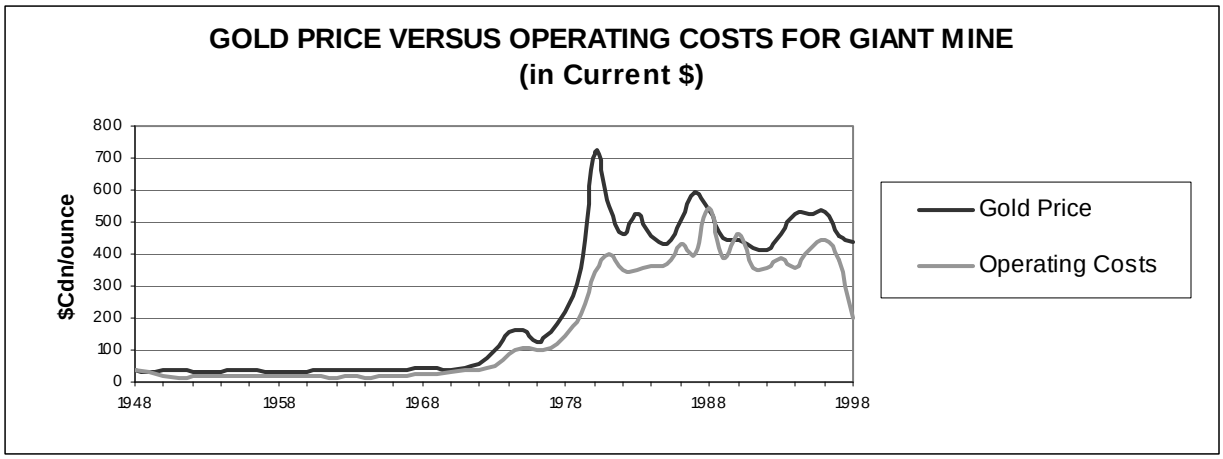

Figure 9. Gold price versus operating costs for Giant mine (in current dollars).

The detailed operating history of Con mine is less well known, although it followed a similar path to the Giant Mine, with three changes in ownership between 1985 and 1993, following the sale of the asset by long term owner Cominco.

Operating costs for Discovery mine were, for the most part, significantly lower than the gold price over the life of mine (Fig. 10). For example, operating costs averaged $24 per ounce (in current dollars), while the gold price averaged $36 per ounce over the mine life. Operating costs increased suddenly in 1963 and the mine posted a loss for the year of $190,000.

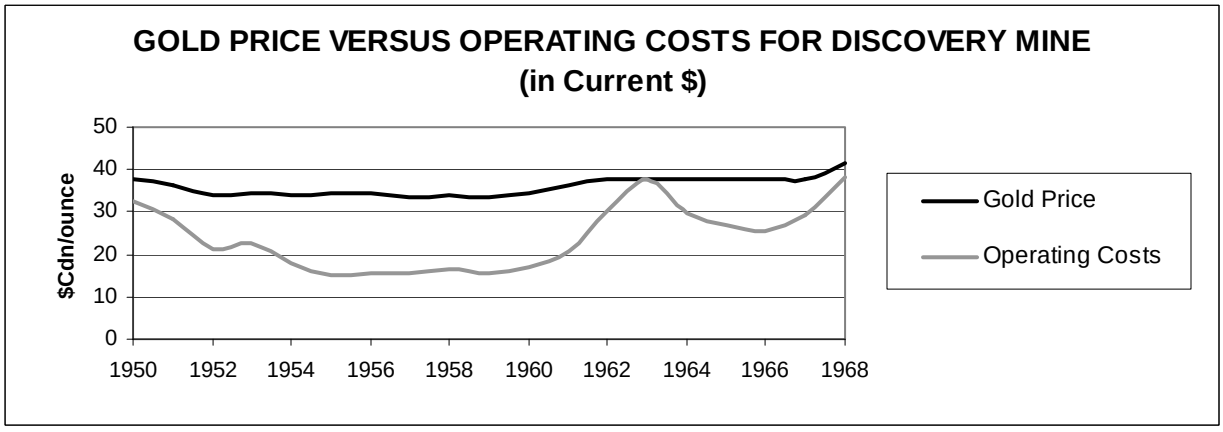

Figure 10. Gold price versus operating costs for Discovery mine (in current dollars).

Increased operating costs, and a fire in the mill rather than the complete depletion of the ore reserve, led to the closure of Discovery in 1968.

Role of Civil Society in Wealth Creation

Three main groups of Civil Society have exerted an influence on the Yellowknife gold mines, namely organized labour, local First Nations and environmental non-governmental organizations. Organized labour has probably had the most influence on the creation of wealth through the various negotiated contracts at the mines and ongoing pressure in the area of health and safety at the operations. Labour availability was an ongoing concern throughout the life of the mines and much of the "social" infrastructure developed by the three mines was a response to difficulties in obtaining and maintaining an adequate workforce at the operations.

Environmental Non Governmental organizations, while common today, only became a factor in the operations of the Yellowknife Mines in the early 1970's (in the form of Ecology North and later Canadian Arctic Resources Committee). These groups contributed and often led efforts to improve environmental management at the mines.

Local First Nations have long voiced opposition to the gold mines and to this day are ambivalent to openly negative to the whole issue. Intervention by the Indian Brotherhood at the first water license public hearing for the Giant mine in 1973 resulted in a six-month adjournment to undertake research, which in turn led to the public health research of 1976 – 1977.

Distribution of Wealth derived from Gold Mining in the Yellowknife Mining District

The basic measure of economic contribution is Gross Domestic Product (GDP)[3]. As the charts below illustrate, the three mines have contributed over four billion dollars to the economy of the Northwest Territories (NWT) as measured by GDP over the last sixty-five years. What is interesting is the relatively constant contribution, with the exception of the short-lived gold price spike of 1981. Following a slow buildup through to about 1954, the gold mines contributed between $50 and $80 million annually to the territorial economy till 1971 (17 years) and then in the order of $100 million annually through to 1998 (27 years). Apart from the short lived peak of 1981 through 1982 there is little evidence of the "boom bust" characteristics that critics of the industry often point to as a weakness of the industry.

To date, Con and Giant mines have contributed similar amounts of just over $2,000 million each to the NWT GDP (Fig. 11). Discovery is estimated to have contributed at least $182 million. However, on a per ounce basis, Con has added significantly more value to the NWT GDP than either Giant or Discovery - $348 versus $297 and $178 respectively. The reason for this, with regard to Con and Giant, relates to production efficiencies. Con mine generated more employment per value of output than Giant. Furthermore, Con spent more on operating and capital costs per ounce of gold produced than Giant, thus impacting to a greater extent on the territories GDP.

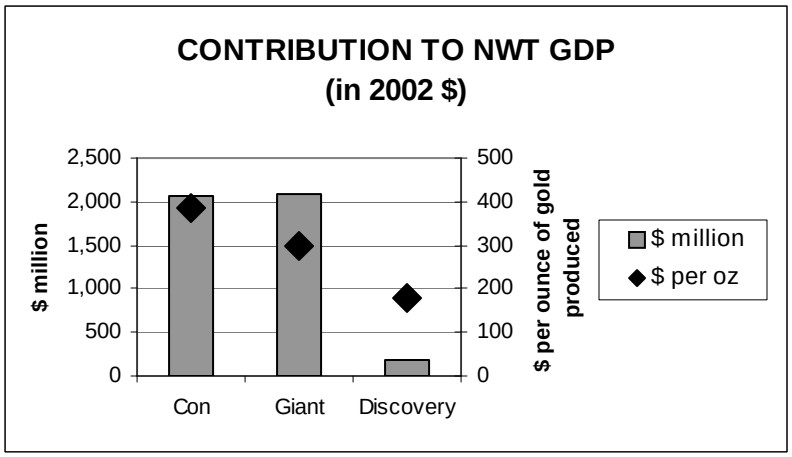

Figure 11. NWT GDP contributions for Con, Giant and Discovery mines. The figures were obtained using empirically determined multipliers supplied by the Investment and Economic Analysis Division of the Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories (GNWT). The multiplier for Giant was considered applicable to Discovery and thus used to determine its GDP contribution.

The contribution figures for Discovery are regarded as minimum values, as the impact of additional revenues from hedge gains and interest earnings is unknown. However, the real per ounce value will likely be close to that of Giant.

[3] Defined as the market value of goods and services produced over time.

Conclusion

Investment of benefits generated from the Yellowknife gold mines to ensure a sustainable future beyond mining provides an interesting example for "Mining and Sustainable Development". Yellowknife moved beyond "mining town" status following the decision to make it the territorial capital in the late 1960's. The growth of the city and nearby communities has been driven by a steady increase in the contribution of the transportation and Government sectors since 1970. It is important to note the basic infrastructure of the city to which the gold mines contributed (power, highway access, housing, local mining industry supplier) as Yellowknife evolves into a government, transportation and diamond mining industry support center.

As indicated previously, total revenues generated by Con, Giant and Discovery mines came to $2,528, $2,743 and $240 million respectively (Fig. 12). By comparison, Ekati diamond mine has, in just over four years, generated more in revenues than either Con or Giant did over 50-plus years of production – around $3,200 million. Furthermore, Ekati and Diavik together are expected to produce more than $22,000 million in revenues over the next 20 years, dwarfing the contributions made by the gold mines of the Yellowknife Mining District.

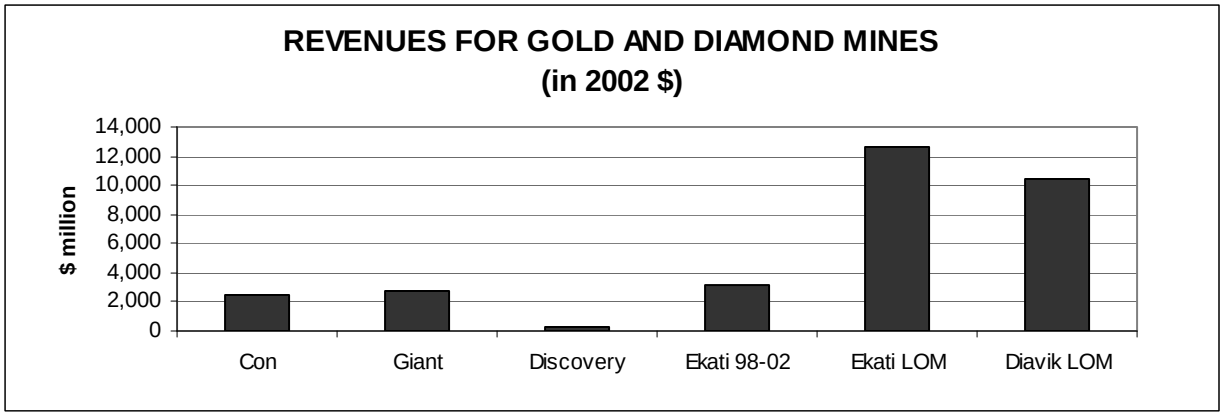

Figure 12. Revenues for Con, Giant and Discovery gold mines with Ekati and Diavik diamond mines. LOM stands for life-of-mine.

Yellowknife will long outlive the gold mines that it was built on, demonstrating not only that mining can build sustainable communities, but that sustainable mining as a concept is an entirely valid precept.