NICO PROJECT
NORTHWEST TERRITORIES, CANADA

ANALYSIS OF PROJECT ECONOMICS

Prepared for

The Tłįchǫ Government

By

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Contents

List of Figures

List of Tables

Executive Summary

Fortune Minerals Ltd of London, Ontario is developing a cobalt-gold-bismuth mine in the Northwest Territories about 160 km northwest of Yellowknife. A feasibility study carried out in 2007 developed a combined underground and open pit operation which would produce 4,000 tonnes per day of ore to provide feed for a concentrator and a hydrometallurgical plant. The mine life was estimated to be 15 years.

In late 2009 and early 2010, the project plan was modified so that the mine will produce a bulk concentrate to be shipped to a hydrometallurgical plant to be constructed by Fortune Minerals near Saskatoon, Saskatchewan where it will be processed into pure metals. Also, as a result of a modified mine plan and an increase in metal prices, the reserve estimate was increased so that the mine life is now estimated to be 18 years.

The share price of Fortune Minerals increased to $0.95 following the announcement of the change in project plan and increased reserves, but has since dropped to $0.78 per share. The likely reason for this lukewarm market response is the complexity of the project which is directly related to the complexity of the mineralogy of the reserves.

The project value is most sensitive to changes in cobalt price because about 60% of project revenue depends on cobalt. There are indications the supply of cobalt could increase as other mines in Africa and Asia increase production of the metal, thus reducing its price. If the price of gold remains at or near current levels, the project value remains positive even if there are large decreases in the prices of cobalt (and bismuth). However, the project is not profitable with only the current reserves of gold. Fortune Minerals has announced a drilling program (7,000 metres in 43 holes) beginning in the spring of 2010 to explore for more reserves.

There are other significant risks associated with the development of this mine. They are:

- The proposed mine lies entirely on leased land within Tłı̨chǫ First Nation traditional territory and an impact-benefits agreement between Fortune and the Tłı̨chǫ would have to be negotiated. Both the mine and processing plant projects are undergoing environmental review and permitting. A new all-weather gravel road to the Yellowknife Highway (Highway 3) would need to be proposed and permitted.

- The plant in Saskatchewan will make use of water from a local aquifer and there is concern about how much water will be used and about possible contamination. Delays due to permitting of the plant could have a negative effect on project economics.

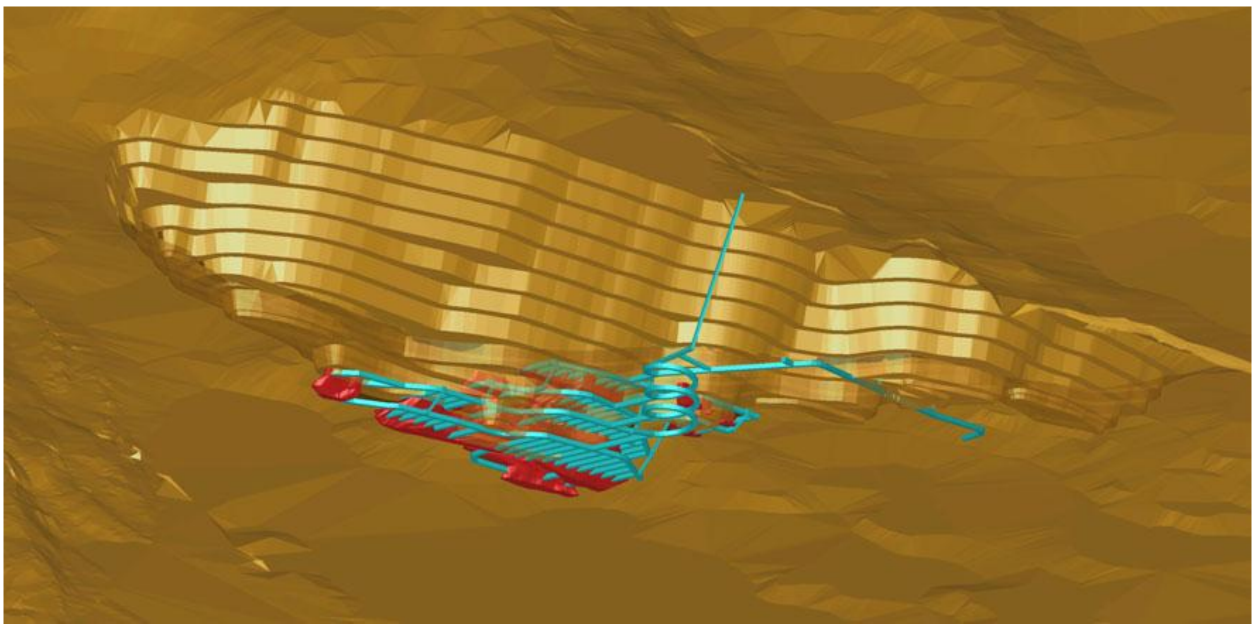
- The company plans to use diesel fuel for power supply which is expensive and adds to complexity as the fuel must be delivered to the site. There is an opportunity to connect to the existing Snare-Yellowknife hydroelectric system at a relatively low cost and set up some combination of hydroelectric and diesel power at the proposed mine site.

In May 2012 minor typographical corrections were made to this report and an update was made based on new information about the project. The update is given in Appendix B.

Introduction

Fortune Minerals Ltd of London, Ontario is developing a cobalt-gold-bismuth mine in the Northwest Territories about 160 km northwest of Yellowknife. A feasibility study carried out in 2007 (Fortune Minerals Ltd, 2007) developed a combined underground and open pit operation which would produce 4,000 tonnes per day of ore to provide feed for a concentrator and a hydrometallurgical plant. The mine life was estimated to be 15 years. Following construction of the mine over a three year period, underground and open pit mining would occur for two years, followed by 13 years of open pit mining. The products of the mine and plant would be gold doré bars, bismuth concentrate, and 99.8% pure cobalt metal.

Figure 1 shows a model of the pit and underground workings when the mine operation is complete.



Source: Fortune Minerals Ltd (2007, p 102)

Figure 1 Model of final excavation of open pit showing location of underground operations.

Since the 2007 study, the project plan has undergone a number of changes. The most significant change is the re-location of the hydrometallurgical plant to Langham, Saskatchewan, about 30 km west of Saskatoon. The mine would produce a bulk polymetallic concentrate and ship it to this plant where pure metals (bismuth, cobalt, copper, nickel) and gold doré would be produced. The other change is an increase in the amount of reserves based mostly on metal price increases since 2007 and on re-design of some aspects of the underground operation and the pit.

The mine and plant are expected to be in operation in late 2012. Considerable progress has been made in advancing the project. (See NICO project description at Fortune Minerals web site www.fortuneminerals.com.) Underground test mining programs were conducted in 2006 and 2007. Fortune Minerals purchased buildings, mineral processing equipment and spare parts from the now closed Golden Giant mine near Hemlo, Ontario; the equipment is scheduled for re-location to the mine site in April 2011. BNP Paribas, a European investment bank, has been engaged to arrange a $US200-250 loan to finance the construction and operation of the mine. (Fortune Minerals, October 21, 2009).

The proposed mine lies entirely on leased land within Tłı̨chǫ First Nation traditional territory and an impact-benefits agreement between Fortune and the Tłı̨chǫ would have to be negotiated. Both the mine and processing plant projects are undergoing environmental review and permitting. A new all-weather gravel road to the Yellowknife Highway (Highway 3) would need to be proposed and permitted, which would occur under a separate environmental assessment.

The following describes an economic analysis of the original and revised project with a view to highlighting the risks to and opportunities for project value.

Resources and Reserves

The economic feasibility of any mine depends critically on the amount of available metal in the ground. Estimates of available metal are made according to generally accepted procedures within the geological community. Statements made about the amount of available metal are made according to a classification scheme. This classification scheme is described below.

Background

Resources are defined as a quantity of mineralized rock (usually measured in tonnes) that has the potential to be mined and processed into metals. Resources become reserves once a technically feasible and economic method of extracting and processing the mineralized rock (called ore) that meets prevailing legal and environmental standards has been established. The key distinction between a reserve and a resource is the availability of an economic, legal, and environmentally acceptable method of extraction.

It follows that changes in the feasibility of the method, the prevailing economic conditions, or in the legal and environmental requirements can transform a resource to a reserve or vice versa. For example, an increase in metal price can turn a resource into a reserve; the discovery that a proposed method of extraction is not technically feasible can turn a reserve into a resource.

Drilling programs, which extract core samples from a potential deposit, together with geological analyses are used to estimate the amount of resources. Figure 2 shows an example of core samples from a drilling program conducted in either 2003 or 2006 at the NICO site. These samples would be assayed at a laboratory to determine the amount of metals available. Given an adequate spatial distribution of drill holes with assayed core, an estimate of the amount of the resource can be made.

Source: Fortune Minerals Ltd (2007, p 41)

Figure 2 Core samples showing sulphide mineralization containing cobalt and bismuth.

Intuitively, the greater the number of drill holes and assays, the greater would be the confidence in the estimated resource. Resources are divided into three types: *measured, indicated* or *inferred*, depending on the number of core drill holes per unit area (drill hole density). There is no specific number of drill holes within a unit area that determines whether a resource one or the other type; it depends on the geology of the deposit and on the judgement of an experienced geologist. The details of the method used to estimate resources between drill holes (the "interpolation method") are also determined by an experienced geologist. The required level of experience is specified in the definition of a "qualified person" in National Instrument 43-101, a standard for disclosure of information related to mineral projects. (NI 43-101, 2005)

Figure 3 shows the relationship between these three types of resource. Figure 3 also shows how a resource becomes a reserve. Consideration of economic, legal, social, governmental factors (for example, settlement of a land claim) and the availability of a technically feasible method for extraction can change an indicated resource to a probable reserve and a measured resource to a proven reserve. There are variations to this. Depending on the geological situation and the judgement of the qualified person(s) in charge of carrying out the estimation, it is possible that not all indicated resources will become probable reserves and not all measured resources will become proven reserves.

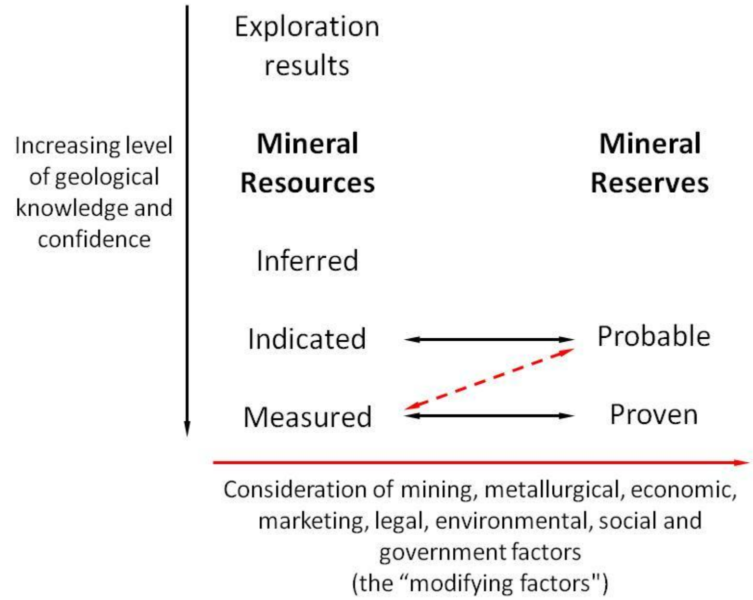


Figure 3 The relationship between resources and reserves.

The total reserves are the sum of the probable and proven reserves. Inferred resources remain inferred resources, despite the availability of a method for extraction, and are not included in the total reserve estimate. Inferred resources are typically extensions of indicated resources based on geological inferences (hence the name) and assumptions about the underlying mineralization, i.e., they are not based on drill hole data.

Reserve Estimates for NICO Project

Two estimates of reserves have been made for the NICO project. In a 2007 feasibility study (Fortune Minerals Ltd, 2007) total proven and probable reserves were 21,817 kilotonnes of ore.

Table 1 shows the tonnages and grades of this reserve estimate. The grades of the metals are the average concentrations of the reserve tonnages.

Table 1
Reserve Estimates for NICO Project

	Tonnes	Au (g/t)	Bi (%)	Co (%)
Underground				
Proven	231,000	5.318	0.126	0.133
Probable	973,000	5.006	0.200	0.147
Total Underground	1,204,000	5.066	0.186	0.144
Open pit				
Proven	7,058,000	1.142	0.160	0.114
Probable	13,555,000	0.698	0.158	0.131
Total Open Pit	20,613,000	0.850	0.159	0.125
Total Reserves	21,817,000	1.083	0.160	0.126

Data from Tables 1.2, 1.3, and 1.4 of Fortune Minerals Ltd (2007)

Recently Fortune Minerals (January 14, 2010) announced an increase in total reserves to 30,986 kilotonnes of ore. The tonnages and grades of this new reserve estimate are shown in Table 2. Copper is now included in the reserve estimate for reasons discussed in the section below on ore processing.

Table 2
Updated Reserve Estimates for NICO Project

	Tonnes	Au (g/t)	Bi (%)	Co (%)	Cu (%)
Underground					
Proven	1,403,000	2.33	0.22	0.16	0.04
Probable	767,000	2.42	0.19	0.17	0.03

Total Underground	2,170,000	2.47	0.21	0.16	0.03
Open pit					
Proven	15,019,000	0.85	0.16	0.12	0.04
Probable	13,797,000	0.71	0.15	0.12	0.03
Total Open Pit	28,816,000	0.79	0.15	0.12	0.03
Total Reserves	30,896,000	0.91	0.16	0.12	0.04

Data from Fortune Minerals Ltd (January 14, 2010)

Figure 4 shows the relationship between these two reserve estimates.

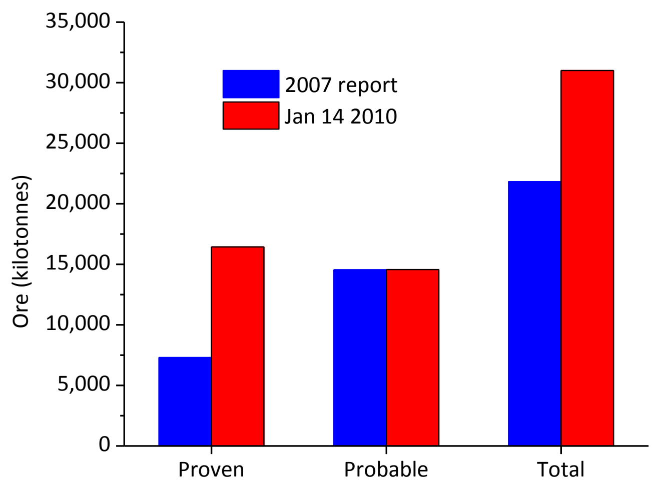


Figure 4 Estimates of proven and probable reserves for the underground and open pit operations.

Technical factors and an increase in metal prices have contributed to this increase in reserves. For example, note the difference in gold grades between

Table 1 and Table 2; the average gold grades decreased due mostly to the large increase in gold price since 2007 (from $600/oz to over $1,000/oz). Based on metallurgical testing since 2007, higher metal recoveries are possible which also contributes to the increase in reserves.

The tonnage available from the underground part of the mine has been increased to 2,170 kilotonnes partly as a result of a modification of the mining requiring less backfilling of mined out stopes.[1] Higher prices have led to an open pit mining scheme that requires less waste removal; almost all of what was considered waste (8-10 million tonnes) in the 2007 study is now part of the reserves.

The stock market responded to the increase in reserves and other information in the January 14, 2010 announcement. The share price reached a high of $0.95 on January 19. However, the share price dropped rather quickly since then and as of April 15, 2010, it was $0.78. This suggests the market is “not enthused” about the project. (See the share price graph and historical prices at http://www.fortuneminerals.com/Investors/Stock-Info/default.aspx)

In a recent news release Fortune Minerals (March 16, 2010) announced plans for a drilling program (7,000 metres in 43 holes) during 2010 to determine if additional resources extend below the current underground reserves. By comparison, about 11,000 metres of drilling in at least 66 holes over an area of approximately 2,000 by 500 metres was used to make the reserve estimate in

Table 1. (Fortune Minerals Ltd, 2007, pp 27-28)

Ore Processing

The 2007 feasibility study proposed that a hydrometallurgical facility be built at the mine site to process the ore into the pure metals cobalt, bismuth, and gold. The main reason for considering

[1] A stope is an area in an underground mine from which ore is extracted. Stopes can be a variety of shapes depending on the orebody geometry. As shown in Figure 1, the stopes of the underground portion of the proposed NICO mine will be horizontal openings.

this is that it is difficult to find a buyer for a polymetallic concentrate such as that which would be produced by NICO. The prices for each of the metals in the concentrate have to be negotiated in terms of some percentage (which is never 100%) of the current spot price; this is difficult to do over the long term. In addition, the smelter or refinery that accepts the concentrate would likely charge a high fee for treatment and penalties would be charged for any impurities in the concentrate that would hinder the smelting or refining process. The mine is also responsible for freight and insurance costs. The end result is that the mine might receive 60-70% of the value of the metals in the concentrate.

Thus a hydrometallurgical facility owned by the mine effectively guarantees a buyer. (The project becomes “vertically integrated”.) However, such a facility at the proposed mine site raises a number of issues. Power and water requirements for such facilities are significant and most of the reagents and chemicals used in the plant would have to be transported to the site. Probably the most significant issue is the difficulty of finding trained personnel to operate such a plant willing to re-locate to the north.

Fortune Minerals (January 14, 2010) announced that it plans to construct a hydrometallurgical facility in Langham, Saskatchewan (near Saskatoon). Bulk polymetallic concentrate from the NICO mine will be transported by truck 450 km south to Hay River, NWT and then by rail (CN Rail) to Langham. It is expected that the cost of the facility will be $150M and that it will be operational by 2012. This effectively moves the concentrate processing south where more power is available and where it will be possible to obtain trained personnel.

Based on the description in the 2007 feasibility study, a simplified flowsheet for processing the ore into metal is shown in Figure 5. Overall the process would be similar for the revised project plan. The thick horizontal line in Figure 5 denotes the division between the mine and the processing plant in Langham.

At the proposed mine the ore would be subjected to crushing, grinding and flotation to produce a bulk concentrate containing mainly gold, cobalt, bismuth, and smaller amounts of copper and nickel. At the refinery the concentrate is re-ground and separated by flotation into cobalt and bismuth concentrates. The bismuth concentrate is treated with cyanide to remove gold then dewatered. In the 2007 feasibility study, this concentrate would have been sold to MCP Group, a metals supplier. (See http://www.mcp-group.com/index.html) The bismuth concentrate will be refined into bismuth metal (99.5% pure) at the proposed Langham plant. (Fortune Minerals Ltd, January 14, 2010) The cobalt concentrate would be leached with sulphuric acid in an autoclave to oxidize the cobalt sulphides and produce a cobalt sulphate solution which is then formed into cobalt metal (99.8% pure) by electrowinning.

The residue from the autoclave goes into a carbon in pulp (CIP) cyanidization circuit to recover gold onto carbon particles. The gold is stripped from the carbon particles into solution and combined with the gold resulting from cyanidization of the bismuth concentrate after which it is recovered from solution by electrowinning. Gold is removed from the electrowinning cells and refined into doré bars containing up to 90% gold. The bars would be sent to a refinery to be made into pure gold.

In the 2007 feasibility study slurry residues containing cyanide used to recover gold would have been passed through a cyanide destruction circuit which employs the INCO sulphur dioxide/air process to destroy cyanide. (This process is used at a number of mines worldwide and results in low cyanide and metal concentrations in effluent.) The chemical reaction in this process requires sulphur dioxide as well as oxygen and is catalyzed using copper sulphate which is recovered from the cobalt concentrate. In the new scheme copper is recovered as a 99.99% pure metal product at the plant in Langham. Presumably the cyanide used at the plant in Saskatchewan will be recovered for reuse.

A partial list of the chemicals required for the plant can be made based on the description of the process in the 2007 feasibility study. (Fortune Minerals Ltd, 2007, pp 104-105) The list includes: sulphuric acid, cyanide, lime (to control acidity and to precipitate iron and arsenic), sodium hydrosulphide (to remove copper from the cobalt sulphate solution), hydrogen peroxide (to remove cyanide from concentrates), activated carbon, caustic solutions (to strip gold from carbon), oxygen, a source of sulphur dioxide, copper sulphate, etc. The majority of these chemicals would have to be transported to the site. Oxygen and copper sulphate could be manufactured at the site. This gives an idea of the complexity of the plant as well as its cost of operation and the potential supply risks in the north.

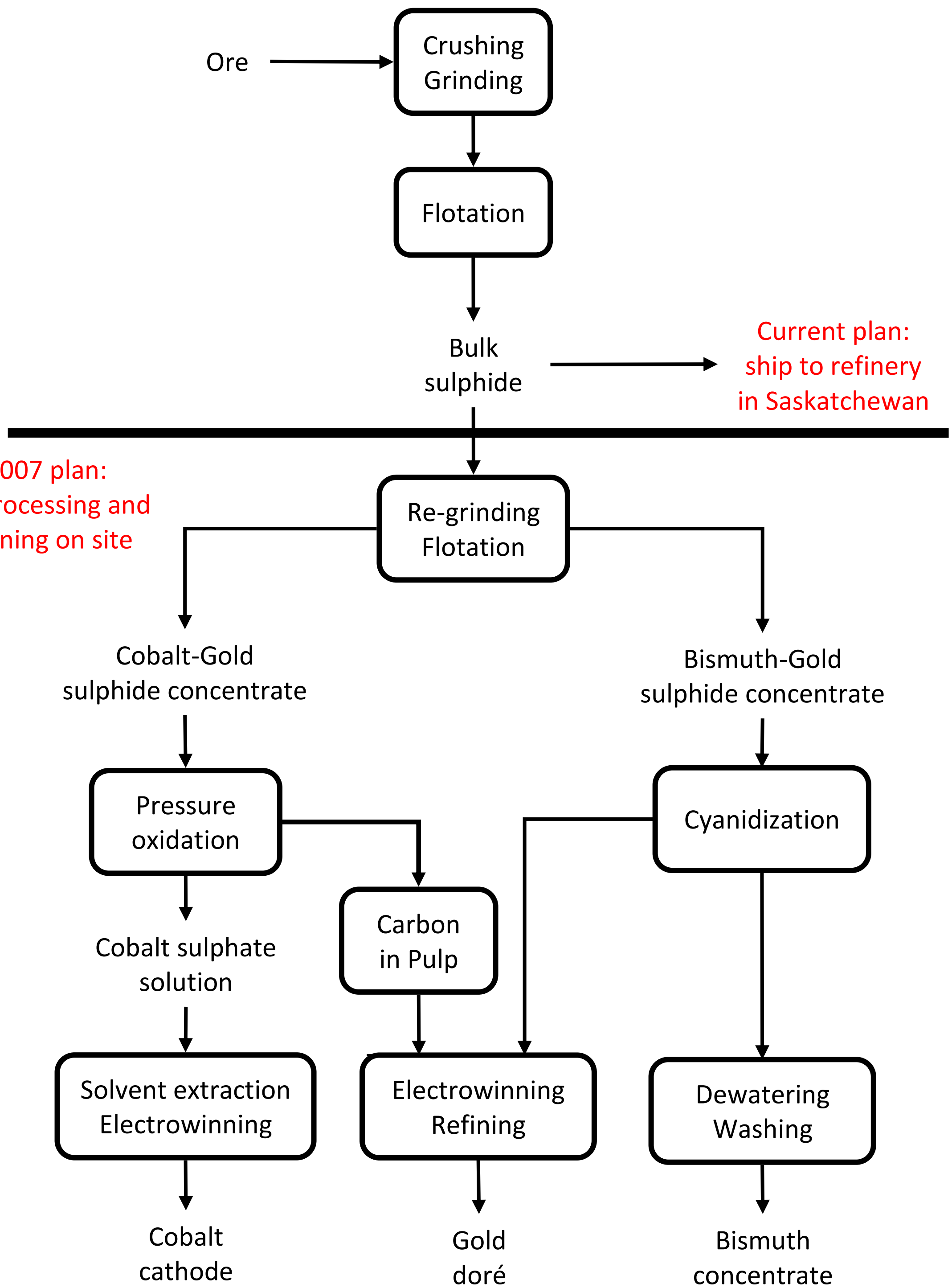


Figure 5 Simplified ore processing flowsheet

Cobalt and Bismuth Markets

Worldwide the majority of cobalt occurs in laterite deposits of southeast Asia, in nickel-copper sulfide deposits of Canada and Australia, and in the sedimentary copper deposits of the Democratic Republic of Congo (DRC) and Zambia. Cobalt is a by-product of nickel or copper production from these sources. The top six cobalt producing countries are: DRC, Australia, China, Russia, Canada, and Cuba. The DRC is by far the largest producer; in 2009 mines in the DRC produced 25,000 tonnes of cobalt, 8,000 tonnes of which was produced by the new Tenke Fungurume mine in the south of the DRC. China is the largest producer of refined cobalt (99.8% pure) and obtains the cobalt ore and unrefined cobalt from the DRC. Total world production of cobalt in 2009 was about 6.6 million tonnes. (USGS, 2010a)

Cobalt is traded via negotiated agreements between producers, metals traders and consumers. Its price is determined by metals price information providers (e.g., Platts, Metalprices.com, Minormetals.com) who monitor daily physical transactions and use the prices of those transactions to compute an average daily price. Supply of cobalt can originate from producers, consumers with excess supply, or government stockpile releases. The volume of sales varies over time and from country to country. Consequently prices can vary rapidly owing to perceptions of availability.

The London Metal Exchange (LME) launched a cobalt contract in February 2010. The contract trades in one tonne lots of minimum 99.3% pure cobalt. It is not clear what effect this LME contract will have on cobalt price, but since the LME will store cobalt in one or more warehouses, as it does with other metals traded on the exchange, supply and constraints on supply will be known by traders and therefore less price volatility may result.

Bismuth is typically been produced as a by-product of lead or tungsten refining but there are two mines, one in Bolivia and another in China, which produce only bismuth from bismuth ore. China has the largest reserves of bismuth and produced 4,500 tonnes in 2009. (USGS, 2010b) Bismuth has a variety of applications in metallurgy, as a pharmaceutical additive, as a possible substitute for lead in solder and paint, and in nuclear reactors.

Bismuth is traded in a manner similar to cobalt, i.e., via transactions between producers, metal traders and consumers. Figure 6 shows the annual price time history of bismuth from 1970 to 2009. Supply of bismuth is relatively stable and the potential for a shortfall in supply is not presently apparent. There are proposed mines, such as NICO and another in Vietnam, which would add to the supply and the Tasna mine and smelter in Bolivia may recommence operation. The price increases from 2006 to 2008 have been attributed to an increase in world demand combined with flat world production and speculative investing activity. (USGS, 2008)

Figure 6 shows the annual price time history of bismuth, cobalt and gold from 1975 to the present. From 2000 to 2009 there is not much correlation between the price of gold and the price of the other two metals, but there is some correlation between the prices of bismuth and cobalt during the same period.

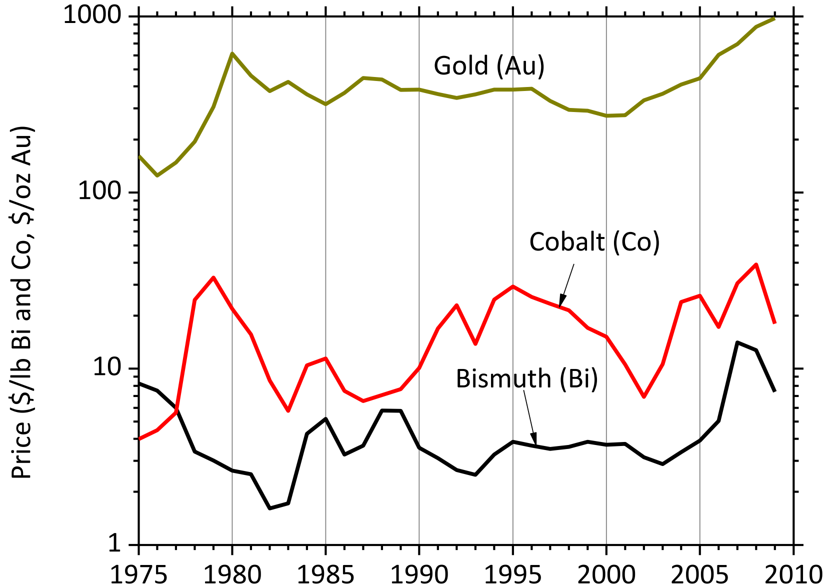


Figure 6 Bismuth, cobalt and gold annual prices 1975-2009.
Sources:

Bismuth and cobalt prices: 1970-1998: USGS (1999), 1999-2009: Mineral Commodity Summaries available at http://minerals.usgs.gov/minerals/pubs/commodity/

Gold prices: London Bullion Market www.lbma.org.uk

Financial Analysis

Using data from the 2007 feasibility study, it was possible to develop a financial model of the original NICO project. This model was used to determine the sensitivity of the project value to changes in parameters such as metal prices and costs.

The analysis began with the tonnages, grades, and recoveries of all the resources. These data, combined with the assumed metal prices, the $US/$CDN exchange rate, the annual ore production, and the mine life enabled the calculation of an expected revenue per tonne of ore which is $68.09/t in Canadian dollars. The calculations are shown in Table 3.

Table 3
Calculation of Revenue per Tonne of Ore

	Tonnes	**Au (g/t)**	**Bi (%)**	**Co (%)**		
Underground	1,204,000	5.066	0.186	0.144		
Open pit	20,613,000	0.85	0.159	0.125		
Total	21,817,000	1.083	0.160	0.126		
Contained metal[1]		759,502	77,192,107	60,626,522		
Recoveries		59.17%	62.73%	80.45%		
Available metal[1]		449,397	48,422,609	48,774,037		
Price[2]		525	4.50	16.50	Total	
Revenue		235.934	217.902	804.772	1,258.61	$M (US)
				Exchange rate	0.844	$US/$CDN
				Total Revenue	1,491.24	$M (CDN)
				Mine life	15	years
				Annual Revenue	99.42	$M (CDN)
				Annual production	1,460	ktonnes
				$/t ore	68.09	$CDN

[1]Contained and available gold is expressed in troy ounces, bismuth and cobalt in pounds.
[2]Prices are $US/oz for gold and $US/lb for bismuth and cobalt.
All data from Tables 1.2, 1.3, 1.4, and 1.5 of 2007 feasibility study (Fortune Minerals Ltd, 2007)

The operating costs for underground and open pit mining, including ore processing were computed from Table 18.2 of the 2007 feasibility study (Fortune Minerals Ltd, 2007, p 113) which is reproduced in Table 4.

Table 4
Operating Cost Estimates

Item	Cost ($CDN/t ore)
Underground mining (2 years only)	34.02
Open pit mining	11.49
Processing	15.36
Power and heat	6.91
Effluent treatment	0.31
General and administration	3.14
Metal and concentrates shipment	0.94
Total underground operating cost	60.68
Total open pit operating cost	38.15
Total average over life of mine	39.40

The estimated capital cost of the project was $213.106M (Fortune Minerals Ltd, 2007, p 113) and the pre-production construction period is expected to be 35 months (Fortune Minerals Ltd, 2007, p 112). The capital costs were assumed to be spent uniformly over the three year construction period, i.e., $71.035M per year.

These results enabled calculation of the net present value (NPV) of the proposed project. Using a discount rate of 8%, the resulting pre-tax NPV is $112.1M, greater than the value of $91.8M computed in the 2007 feasibility study. The internal rate of return (IRR) was 15.2% which compares with the value of 15.3% computed in the 2007 feasibility study. (See Fortune Minerals Ltd, 2007, p 116) The difference in NPV is not significant and may be due to the assumption of how the capital costs are spent in the pre-production period or to the fact that working capital requirements, sustaining capital costs, and closure costs were not included, each of which would decrease the estimate of NPV.

The spreadsheet showing the calculation of NPV is given in Appendix A. The payback period is between years 7 and 8 from the start of construction (or between 4 and 5 years from the start of operation).

Sensitivity analysis was performed to determine the change in NPV with changes in capital and operating costs as well as metal prices. Figure 7 shows the changes in NPV versus percentage changes in capital and operating costs. NPV is most sensitive to changes in open pit operating costs. A 15% increase in open pit operating costs, from about $38/t to $44/t, causes a decrease in NPV from $112.1M to about $60M, equivalent to a $9M decrease in NPV for every dollar increase in the open pit operating cost. This is due to the large tonnage (and large revenue) from the open pit part of the operation.

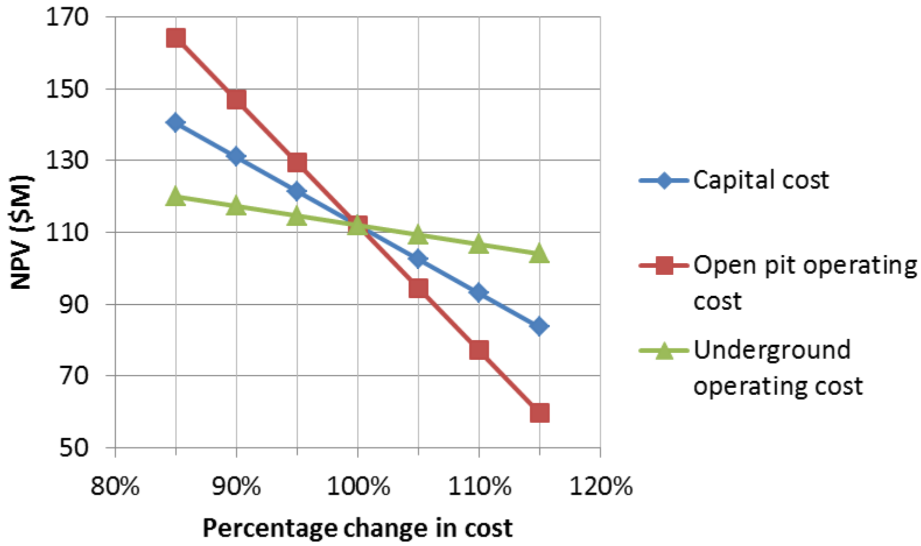


Figure 7 Sensitivity of project NPV to percentage changes in capital cost and underground and open pit operating costs.

Figure 8 shows the changes in NPV versus percentage changes in metal prices. The NPV is very sensitive to changes in the price of cobalt. The reason for this is simple – for the assumed prices almost 64% of the total revenue to the mine comes from cobalt. (See Table 3) The sensitivity of NPV to gold price changes is almost identical to that of bismuth price changes because the revenue for these metals is almost equal.

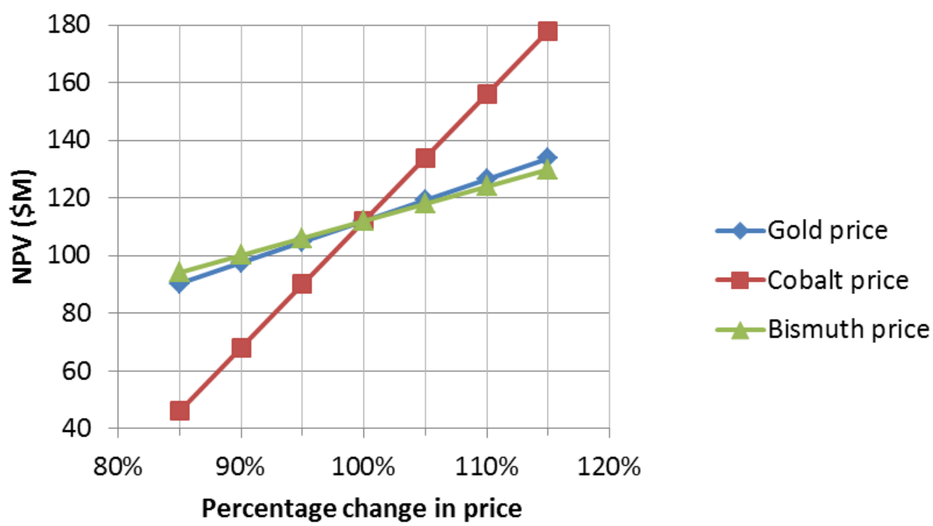


Figure 8 Sensitivity of project NPV to percentage changes in gold, bismuth and cobalt prices. The sensitivity of NPV to gold price changes is the same as that for bismuth price changes.

It should be noted that the results shown in Figure 8 assume that the prices change independently of each other. This is not true in general. However, because bismuth and cobalt are specialized industrial metals, it is conceivable that the prices of these metals would move together. Gold is mostly used as an investment, a hedge against inflation or world and market instability, and thus its price is likely independent of the prices of the other two metals. Figure 9 shows the sensitivity of NPV to simultaneous percent changes in the bismuth and cobalt prices shown in Table 3 and assuming the gold price remains at $525/oz. NPV is most sensitive to changes in the cobalt price. The range of NPV is quite large, from about $28M to about $195M.

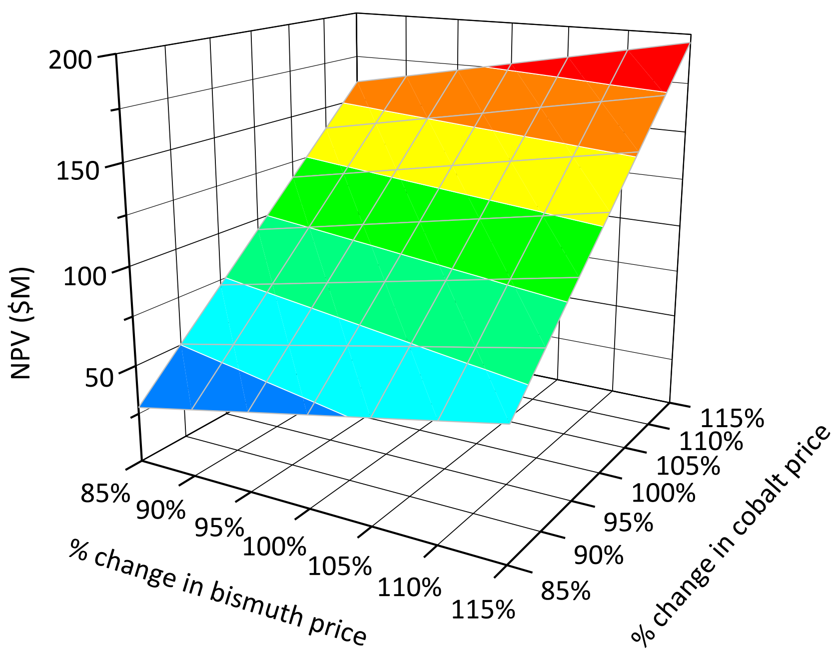


Figure 9 Sensitivity of NPV to simultaneous changes in bismuth and cobalt prices

Actually, determination of the sensitivity of NPV to external economic factors such as price is difficult because it requires development of a model for price behaviour. The reader is invited to think about trying to develop a model that would capture the behaviour of metal prices over the last three years.

The 2007 feasibility study showed a significant sensitivity of project NPV to the $US/$CDN exchange rate. However, exchange rates are a function of several macroeconomic factors and it is very likely that metal prices would change as exchange rates change, particularly the price of gold. For example, over the last three years the Canadian dollar has risen in value against the US dollar and the price of gold has increased significantly while the prices of bismuth and cobalt have increased and then decreased. (See Figure 6)

Using the tonnages, grades, recoveries and assumed prices from the updated reserve estimate (Fortune Minerals Ltd, January 14, 2010) an updated estimate of the NPV was made. The capital cost was assumed to be the sum of the estimated $150M capital cost of the Langham plant (Fortune Minerals Ltd, December 8, 2009) and an estimate of $195M for the flotation plant at the mine site based on scaling capital costs from operations with similar crushing, grinding and flotation equipment. The result was about $245M mainly because of the larger assumed prices, although the operating costs could be underestimated. As for the original reserve estimate and project plan, the NPV was sensitive to changes in the cobalt price because the revenue from cobalt was about 50% of the total revenue. The NPV also exhibited a similar sensitivity to operating costs of the open pit.

Project Risks and Opportunities

The economics of the revised NICO project, including the processing plant in Saskatchewan, appear promising. The NPV is sensitive to capital and operating costs in an expected manner. There are technical risks to the project and opportunities for improving the economics of the project. The following discusses these and possible mitigating circumstances or measures.

Price risk and reserves

Probably the most significant risk is the possibility of decreases in the price of cobalt. There are indications that the supply of cobalt will increase particularly if some cobalt and nickel/cobalt mines in Africa and Asia come into full production. (Reuters, February 22, 2010) However, as long as the gold price remains at or near current levels, the project value remains positive even if there are large decreases in the prices of cobalt and bismuth. But in the extreme, without the cobalt the mine is not economic at current gold prices ($1,200/oz).

Although it is too early to tell, the recent introduction of cobalt trading on the London Metals Exchange will result in more transparent trading and should lead to less price volatility which, in the past, has been related to perceptions, not knowledge, about constraints on cobalt supply. In addition, over the long term the use of cobalt in such applications as batteries for hybrid vehicles and cell phones will increase leading to an increase in demand for the metal. (Cobalt Development Institute, http://www.thecdi.com/index.php)

Despite this, the mine would benefit considerably if more gold reserves were available to reduce the sensitivity to cobalt and/or bismuth price changes. Changes in the price of gold are likely not correlated with those of cobalt or bismuth. Given current gold prices lower gold grades can be designated as reserves. Also the geological conditions of the area, as described in the 2007 feasibility study (Fortune Minerals Ltd, 2007, p 9), are favourable for the occurrence of more minerals at depth as well as laterally. Finding the location of these mineralized zones is the objective of the planned 2010 drilling program. (Fortune Minerals Ltd, March 16, 2010)

Processing plant

The re-location of the processing plant to Saskatchewan will greatly simplify construction and operation of the NICO mine. As discussed above, having such a facility at the proposed mine site would increase power and water requirements and require the transport of chemicals used for processing. Leakage of these chemicals into the environment is always a possibility and facilities would have to be constructed to avoid or mitigate this risk, a challenge in an Arctic environment. All of this would significantly increase operating costs. The cost of transporting a bulk concentrate from NICO to the plant in Saskatchewan is much less.

One concern associated with the plant is a delay or complications due to permitting. The plant will make use of water from a local aquifer and there is concern about how much water will be used and about possible contamination. An environmental assessment of the plant site and aquifer testing are currently in progress and are expected to be complete in May 2010. (Fortune Minerals Ltd, March 16, 2010)

Another question concerns the feed for the plant. In a press release Fortune Minerals (December 8, 2009) stated the plant "is expected to employ 85 people over a 15 to 20 year period based on the anticipated life of the NICO deposit alone." The production rate at NICO is 180 tpd or 65,700 tonnes tonnes per year. This seems to be a small amount and other sources of feed may be required. In spring of 2010 the Saskatchewan government is expected to introduce tax legislation to encourage processing of minerals imported into the province to metals. Thus, the plant should be able to attract feedstock from other projects and may be able to become involved in metal recycling.

Power supply

In the 2007 feasibility study it was proposed that power would be provided by the Snare River hydroelectric complex located 22 km west of the mine. However, the capacity of the Snare River complex is not sufficient and obtaining such capacity would require construction of another dam. Financing a large capital project such as a dam is difficult without a guaranteed buyer and NICO would not be a buyer until it is permitted. In addition, a franchise to sell power generated on Tłı̨chǫ land must be granted by the Tłı̨chǫ government and a water use license must be obtained from the government of the Northwest Territories to develop a dam for hydroelectric power generation. Obtaining these permits and franchises is time-consuming.

As of August last year, plans are to supply power for the NICO mine will be supplied by diesel generator. (See Northern News Services, August 24, 2009). A simple economic analysis of this option suggests it could add considerably to operating costs and that given the high cost of diesel fuel, a better alternative would be to develop a hydroelectric alternative or some combination of hydroelectric and diesel power.

Instead of building a dam, the Northwest Territories Power Corporation (NTPC) suggested connecting the mine to the existing Snare-Yellowknife system. This would cost $10-15M. To be conservative, suppose it costs $20M. For an 8% discount rate, the same as that used to determine project value, and an 18 year mine life, this is equivalent to an annual cost of about \$2.1M. This must be added to the annual cost of power. A rule of thumb[2] is that the energy requirements for a mine are 60 kilowatt-hours (kwh) per tonne of ore mined and processed. If the NICO mine mines and processes 4650 tonnes per day, the annual energy requirement for the mine would be 101.835Mkwh (million kwh). Based on rates quoted in August 2009, (Northern News Service, August 24, 2009) the total equivalent annual cost of power for the hydroelectric and diesel options are given in Table 5. Although the capital cost of diesel generators is not known, it is clear that the annual cost of hydroelectric power is much lower than that of diesel. Per tonne of ore, the cost of hydropower is about \$7.84/t while that of diesel is at least about \$18/t.

Table 5
Total power costs for diesel and hydroelectric power

Option	Equivalent annual capital cost @ 8% for 18 years	Rate	Annual energy costs for 101.835Mkwh	Total equivalent annual cost
Diesel	unknown	\$0.30/kwh	30.5M	>\$30.5M
Hydroelectric	\$2.1M	\$0.11/kwh	11.2M	\$13.3M

Given the large difference in cost, it would seem that efforts should be made to develop some form of hydroelectric option. Benefits for the mine in terms of lower costs and for the local community in terms of a reliable low cost power supply and revenues would result. A reliable supply of power would also be attractive for future industrial development, including mines.

Tailings disposal

Parts of the orebody contain significant amounts of arsenic and the 2007 feasibility study mentioned the possibility of arsenic migrating into acid solution generated from the tailings. (Fortune Minerals Ltd, 2007, p 108) The presence of arsenic and other metals will require treatment of all effluent from the waste rock dumps and tailings ponds, adding considerably to costs during and after the operation of the proposed mine.

The original plan as described in the 2007 feasibility study was to dispose the two waste streams in separate facilities. However, the current plan is to dispose tailings and waste rock together in a single facility. (Fortune Minerals Ltd, November 4, 2009) The costs of disposal of the two waste products at a single site, instead of two sites, should be lower and co-disposal could reduce or eliminate the need for effluent treatment.

Tailings are relatively impermeable and water flows slowly through consolidated tailings. On the other hand, waste rock is strong material but very permeable to both air and water. Thus mixing the two waste streams would produce a new material with high strength and low permeability – a good combination for construction and for essentially stopping the flow of

[2] The source of this rule of thumb is unknown, but it was checked against some existing operations and found to be valid.

contaminated water from the waste deposit and the flow of air which leads to acid production and metal leaching. Co-disposal also reduces the total mine waste footprint and because the combination stabilizes rapidly, earlier rehabilitation of the waste deposit is possible.

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Appendix A – Project Cash Flow

NICO cash flow																		
Capital cost	213.106	$M																
	Construction			Operation														
Year of operation				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Construction																		
Pre-production ($M)	71.035	71.035	71.035															
Ore Production																		
Underground				602	602													
Open pit				858	858	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,377
Total production (kt)				1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,460	1,377
Costs																		
Underground $/t ore				60.68	60.68													
Open pit $/t ore				38.15	38.15	38.15	38.15	38.15	38.15	38.15	38.15	38.15	38.15	38.15	38.15	38.15	38.15	38.15
Total operating costs ($M)				69.26	69.26	55.70	55.70	55.70	55.70	55.70	55.70	55.70	55.70	55.70	55.70	55.70	55.70	52.53
Revenue																		
Underground $/t ore				74.41	74.41													
Open pit $/t ore				55.88	55.88	95.08	95.08	95.08	95.08	95.08	95.08	95.08	95.08	95.08	95.08	95.08	95.08	89.68
Total Revenue ($M)				130.29	130.29	95.08	95.08	95.08	95.08	95.08	95.08	95.08	95.08	95.08	95.08	95.08	95.08	89.68
Cash flow ($M)	-71.035	-71.035	-71.035	61.03	61.03	39.38	39.38	39.38	39.38	39.38	39.38	39.38	39.38	39.38	39.38	39.38	39.38	37.15
Cumulative cash flow ($M)	-71.035	-142.071	-213.106	-152.08	-91.05	-51.67	-12.29	27.09	66.47	105.85	145.24	184.62	224.00	263.38	302.76	342.14	381.52	418.67
Present values																		
8%	-68.268	-63.019	-58.174	46.136	42.589	25.370	23.419	21.619	19.956	18.422	17.006	15.698	14.491	13.377	12.349	11.399	10.523	9.163
NPV @ 8% =	$112.06	$M																
IRR =	15.2%																	

Appendix B – May 2012 Update

This appendix discusses the effects of new data and information on the economics of the NICO project.

Reserves

A drilling program was carried out during the summer of 2010. The results of the program are described in a press release (Fortune Minerals, December 3, 2010). The drilling program explored the deposit at its extremities and at depth and found some intersections containing high concentrations of gold and cobalt which indicate that the deposit does extend to depth. However, there has been no update to the reserve estimates based on the results of the drilling program. Consequently in the following analyses the reserve estimates shown in Table 2 are used.

What has changed significantly since the since 2010 is metal prices, particularly the price of gold. The reserve estimate provided in a press release (Fortune Minerals Ltd, January 14, 2010) assumed the following prices (all in US dollars): Gold $900/oz, Cobalt $20/lb, Bismuth $10/lb, Copper $2.75/lb. However, current (May 2012) approximate prices are

Gold	$1,500/oz
Cobalt	$13.50/lb
Bismuth	$12/lb
Copper	$3.50/lb

These price changes could affect the reserve estimates, possibly in a positive sense due to the increase in the price of gold. However, there are other factors that play a role in defining reserves.

Reserve estimates and project value are sensitive to the $US/$CDN exchange rate. Since costs are being paid in Canadian dollars and revenues are in US dollars, reserve estimates and project value increase if the exchange rate is low. The $US/$CDN exchange rate has increased since 2010. A value of $US0.92 per $CDN was used in the 2010 estimate of project value whereas the current rate is $US0.97 per $CDN.

Ore Processing

The ore from the mine will be processed to form a bulk concentrate which will be shipped by train to a proposed processing plant in Saskatchewan. (the Saskatchewan Mineral Processing Plant or SMPP). The capital costs of the plant have increased from $150M to at least $200M (Fortune Minerals, February 17, 2011).

Pilot testing of the ore processing system has resulted in two significant findings. The sulphide minerals containing cobalt and bismuth, as well as smaller concentrations of copper and nickel sulphides, will be concentrated by flotation at the mine site. Originally gold was to be leached from the tailings of the sulphide flotation process using cyanide. However, it was found that some of the gold could be recovered using gravity techniques (e.g., a centrifuge or shaking table) before flotation. This would be so-called free gold, not associated with sulphides. In addition, re-design of the flotation circuit resulted in improved recovery of gold that is associated with the sulphide minerals. The significance of this is no cyanide will be needed to concentrate gold at the mine site. This reduces the costs and risks associated with handling cyanide. (Fortune Minerals Ltd, March 16, 2011)

Further testing of the proposed processing system at the SMPP found that the flowsheet shown in Figure 5 could be simplified. In particular the bismuth and cobalt concentrates could be combined before pressure leaching to break down the sulphides. This would reduce both capital and operating costs of the SMPP. Slight improvements in the recoveries of gold and cobalt were also found: gold from 72% to 76%, cobalt from 83% to 84%. (Fortune Minerals Ltd, January 12, 2012)

Project Value

The current metal prices given above, an exchange rate of $US0.97/$CDN, the $200M capital cost of the SMPP, and the increased gold and cobalt recoveries given above were used to provide an updated estimate of the net present value (NPV) of the project. The reserves and the capital cost of the flotation plant ($195M) are assumed to be the same as for the 2010 estimate. The resulting NPV is about $222M, $23M less than the 2010 estimate given on page 16. The numbers are not significant but the fact that the two estimates are similar is related to the increased capital cost of the SMPP, the increased exchange rate and the relationship between the prices of gold and cobalt.

Given the reserves of gold and cobalt, the revenue stream from the two metals is equal when the price of gold is $1,400/oz and the price of cobalt is $13.6/lb. These prices are close to current prices. The sensitivity of project value is almost equally dependent on gold and cobalt price if prices remain close to their current values. This is illustrated in Figure 10 where it is seen that project NPV is almost equally sensitive to changes in each of the metal prices. The total revenue from each of these three metals is about equal making the project economics less dependent on the price of cobalt.

Given global economic conditions, it is reasonable to assume that the price of gold will remain close to the current price for some time. The prices of cobalt and bismuth may also remain close to current values. Consequently the sensitivity depicted in Figure 10 could be representative.

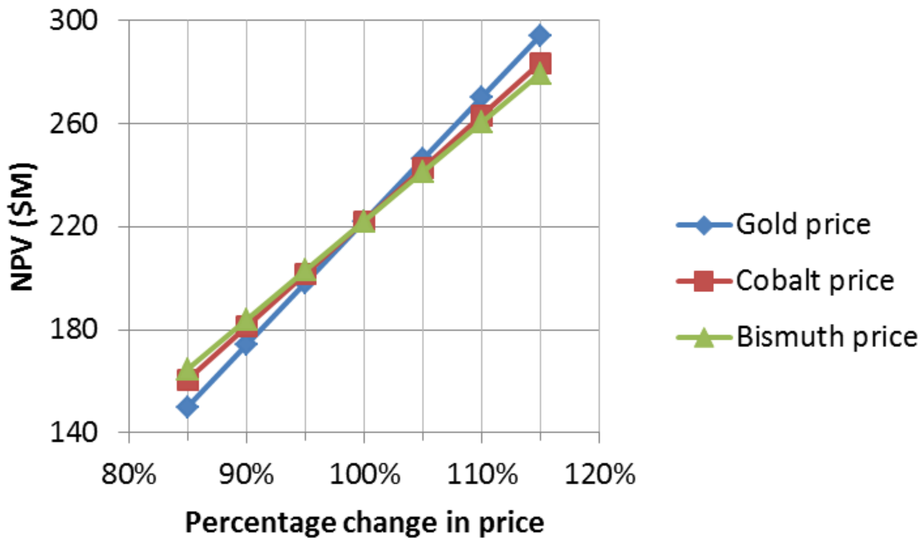

Figure 10 Sensitivity of project NPV to percentage changes in gold, cobalt and bismuth prices assuming the following base prices: gold $1,500/oz, cobalt $13.5/lb, bismuth $12/lb.

Non-market risks can also affect project value. For example, the SMPP is a hydrometallurgical plant and such plants do have a reputation for long start-up times (Campbell et al, 1999). The longer the start-up time, the more the delay in realizing full revenue and this leads to a reduction in project value. A more important issue is whether the recoveries determined by the pilot plant tests can be realized. More testing is the only way to understand these uncertainties.

Power supply and Tailings Disposal

Power supply

Diesel fuel is still being considered for power supply at the mine. However, it is possible to construct a transmission line from the mine to the Snare-Yellowknife hydropower system. The cost of this transmission line might be $20M. Although Snare-Yellowknife system currently does not have the capacity to supply the mine, it should be possible to negotiate the development of additional capacity with the Northwest Territories Power Corporation. Such additional capacity would benefit industrial development in the region. Anything which reduces the dependence on diesel fuel is worth pursuing as the cost of diesel is about three times that of hydroelectric power. Furthermore diesel prices could increase over the life of the mine and the logistics of transporting diesel fuel to the site result in additional operation costs.

It may be worth considering wind power as a means of reducing the need for diesel. Diavik Diamond Mines has begun construction of a wind farm at their mine site which will reduce their diesel consumption by 10%. (See Diavik Diamond Mines media release dated November 2, 2011 (http://www.diavik.ca/ENG/media/1131_media_releases_1736.asp, accessed May 2012). Whether there is sufficient wind at or near NICO to justify a wind farm remains to be seen but this does give an idea of what mining companies are considering in order to reduce power requirements. The experience gained at Diavik would be useful if a similar development occurred at NICO.

Tailings disposal

Co-disposal of tailings and waste is proposed at the mine site as a means of reducing the mine footprint and reducing the risk of acid drainage. However, the behavior of co-disposal in the sub-Arctic is not well understood. More testing of this method at the site is required to better understand its behavior and to determine the costs of its operation.