

**LASTING BENEFITS  
FROM BENEATH THE EARTH:**

**MINING NICKEL FROM VOISEY'S BAY IN A MANNER COMPATIBLE  
WITH THE REQUIREMENTS OF SUSTAINABLE DEVELOPMENT**

REPORT FOR THE ENVIRONMENTAL ASSESSMENT HEARINGS  
INTO THE PROPOSED  
VOISEY'S BAY NICKEL MINE

PREPARED FOR INNU NATION

BY

THOMAS L. GREEN, M.A.  
ECOLOGICAL ECONOMIST  
577 Ward Street, Nelson, BC, V1L 1T1

OCTOBER 5, 1998

## **PEER REVIEW COMMENTARIES AND CURRICULUM VITAE**

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Note: This report underwent a peer review process. The commentaries of the reviewers, and their qualifications, precede the report.

### **Peer Reviewers:**

**Dr. H. Jack Ruitenbeek**

**Dr. Salah El Serafy**

## **H.J. RUITENBEEK RESOURCE CONSULTING LIMITED**

RR#2, Site 52, C21  
Gabriola, B.C.  
Canada V0R 1X0  
Tel. +1 250 247 8436  
Fax. +1 250 247 8492  
Email HJRUITEN@WEB.NET

---

08 October 1998

Mr. Thomas Green  
577 Ward Street  
Nelson, British Columbia V1L 4R3  
Phone/fax +1 250 354-4615

RE: Peer Review of "Lasting Benefits From Beneath the Earth: Mining Nickel from Voisey's Bay in a Manner Compatible with the Requirements of Sustainable Development", by T. Green, dated 5 October 1998

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I have completed my detailed review of the above Report, and offer the following comments.

This Report is of very high quality. It displays a high degree of analytical objectivity, and draws accurately and well from the received literature in this area. There are no flaws of methodology, and I am sure that the study will provide a lot of relevant food for thought for the assessment panel.

All of the Report's recommendations flow well from the analysis, and the analysis would be regarded as state-of-the-art in this discipline.

From my perspective, one of the more powerful arguments relates to the Report's assessment of current need for this project. The Report observes that the Proponent has likely over-stated demand growth. I concur fully with this assessment. While the Proponent projects positive growth, current realities are far from this. Some of my work is currently in Asia, preparing policies and programs that are part of the IMF/World Bank/Asian Development Bank 'rescue' package. Official growth forecasts for countries in the region commonly cite contractions of up to 10% this year, with Indonesia (the most populated country in the region) experiencing a 15% contraction. Unemployment is rising sharply. From a mining perspective, these conditions will have two effects: low demand growth and lower mining production costs. Both of these factors suggest that, in the next decade, there will be comparative advantages for the industry to develop Asian properties as opposed to properties in Canada or other industrial countries. In summary, an honest economic appraisal – based on realistic assumptions such as those outlined in this Report – would confirm that the immediate need for the Voisey's Bay reserves is questionable.

Yours sincerely,

[original signed]

H. Jack Ruitenbeek, Ph.D.

cc: Christine Cleghorn, Innu Nation, Fax +1 709 497-8396

HERMAN JACK RUITENBEEK, Ph.D.

Sep/98

ADDRESS RR#2 Site 52 C21 Tel: +1 250 247 8436  
Gabriola Island, B.C. Fax: +1 250 247 8436  
CANADA V0R 1X0 E-mail: hjruiten@web.net

EDUCATION Ph.D. (Development & Environmental Economics) 1990, London School of Economics,  
London, U.K.  
M.A. (Natural Resource Economics) 1984, University of Calgary, Canada  
B.A. (Distinction-Economics) 1980, University of Calgary, Canada  
B.Sc. (Distinction-Astrophysics) 1979, University of Calgary, Canada

Fluent in English. Working/reading proficiency in French and Dutch. Proficiency in Indonesian, Spanish, Portuguese. Canadian Citizen.

BACKGROUND 1981-Present President  
H.J. Ruitenbeek Resource Consulting Limited

Performed contract studies as a private consultant to the resource industry, to governments and regulatory agencies, to NGOs, to international financial institutions (IFI), and to the international official development assistance (ODA) community. Areas of study included renewable resource development (tourism, agriculture, forestry, wildlife), development economics (macroeconomic and fiscal policy), energy policy and development (oilsands mining, electricity, natural gas), mining development and impact mitigation, logistical systems (transportation systems, communications, trade) and environmental policy.

ODA/IFI clients include Asian Development Bank, Canadian International Development Agency, United Nations & World Bank regarding international environmental economics policies. Canadian government clients include FEARO/CEARC, Ministry of Finance, and Environment Canada regarding environmental economics and environmental assessment in Canada.

NGO clients include International Union for the Conservation of Nature (IUCN-Canada), The Nature Conservancy, and WWF-International (Geneva). Private sector clients include approximately 50 companies in the resource sector.

Expert witness to the following Canadian agencies: National Energy Board, Ontario Energy Board, BC Utilities Commission, Alberta Energy Resource Conservation Board, and the House of Commons Standing Committee on the Environment.

Countries of Experience ("\*" indicates mining analysis): Barbados, Bolivia, Cambodia, Cameroon, Canada\*, Chile, China\*, Ghana\*, Guyana\*, India, Indonesia\*, Jamaica, Kenya, Malaysia, Mexico, Namibia, Nigeria, Peru, Philippines\*, São Tomé & Príncipe, Singapore, Sri Lanka, Thailand, Trinidad & Tobago, U.K., Uganda, United States\*, Venezuela\*, Vietnam\*, Zimbabwe.

OTHER Current Founder, Canadian Society for Ecological Economics  
Current Journal Reviewer: Ambio (Sweden)  
Current Journal Reviewer: Ecological Economics (U.S.)  
Current Journal Reviewer: Environment and Development Economics (U.K.)

1993-Present Adjunct Professor, Department of Geography, University of Victoria  
1982-1987 Sessional Instructor, Economics, University of Calgary  
1985-1988 Research Associate, Canadian Energy Research Institute  
1979-1981 Mining Hydrology Analyst, Environment Canada

3118 North 17<sup>th</sup> Street  
Arlington, Virginia 22201-5202 U.S.A.  
Telephone 703-243 0629, Facsimile 703-243 7306  
E-mail: <selserafy@erols.com>

From: Salah El Serafy, D.Phil.(anon)

October 8, 1998

Mr. Thomas Green,  
Ecological Economist,  
577 Ward Street,  
Nelson, B.C, V1L 1T1, Canada

Fax: 250 354 4615

Dear Mr Green:

**Peer Review of "Lasting Benefits from Beneath the Earth:  
Mining Nickel from Voisy's Bay in a Manner Compatible with the Requirements of Sustainable  
Development" by Thomas Green**

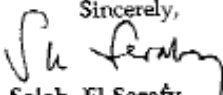
Many thanks for having invited me to be a peer reviewer of this very interesting report. Although to start with I lacked familiarity with the background documents, your patient and comprehensive explanations enabled me to appreciate the context necessary for me to place the report in its relevant setting.

The report is particularly impressive as it touches on several topics where the state of the art has by no means settled, and successfully addresses them with great dexterity. I have been struck especially by the wide range of readings that support the text, and the ability of the author to put these, backed by sensible judgment, to excellent effect. The handling of the user cost approach in my view is impeccable, and I am happy with the conclusions being based on it.

The responsibility of mining corporations toward the localities they operate in and the welfare of site inhabitants is now recognized the world over by all responsible operators who do not await official restraints, but take the initiative themselves. I have been consulted about protecting local economies of mining sites in various countries from the ill effects of reduced activity when the deposits inevitably decline. The damage done to sites in the process of exploration and extraction is often obvious, and this aspect has been satisfactorily addressed in the report. Less obvious, however, is the drop in the value of the site *pari passu* with the decline of the deposits. To the great credit of the report this important aspect has been deftly and fully addressed. The winding down of mining frequently threatens the livelihood of established communities that had assembled around the mining activity, so that diversifying the local economy becomes an all important element of forward planning. I am pleased the report has treated this aspect with the importance it deserves.

The report's analysis is thorough, and the judgments it makes are convincing. If the venture is to go forward, both the scale and the rate of exploitation should be reduced, as recommended, in order to allow for the time and effort necessary for inducing the needed economic diversification. All in all, I find this to be an outstanding piece of work, raising all the relevant issues, and concluding with wise and fair recommendations.

cc. Christine Cleghorn, Innu Nation, Fax: 709-478 8833

Sincerely,  
  
Salah El Serafy

## Salah El Serafy

Salah El Serafy, formerly Senior Adviser, Environment Department, the World Bank, is currently a free lance international economic consultant. He served for twenty years at the World Bank's Headquarters in Washington D.C. in various economist positions, mostly as a senior macro-economist in central departments including the Operations Evaluation Department, the Country Policy Department, and the Economic Advisory Staff of the Senior Vice-President, Operations. After leaving the Bank he led the World Bank's team for the Independent Evaluation of the Global Environment Facility (Pilot Phase), whose report was published in 1994 jointly by the United Nations Development Programme, the United Nations Environment Programme (UNEP), and the World Bank. Since then he has undertaken several consultant assignments with international organizations, private corporations, governments, and NGOs.

Salah El Serafy has developed the 'User Cost' method for estimating 'sustainable income' from depletable natural resources, contributed to and chaired joint UNEP-World Bank international workshops on environmental accounting during the 1980s; was a contributor to and joint editor of the UNEP-World Bank publication, *Environmental Accounting for Sustainable Development*, 1989 (containing his "The Proper Calculation of Income from Depletable Natural Resources"); and served twice on UNEP's international panels for the economics of ozone layer protection under the Montreal Protocol.

Prior to his service with the World Bank he had been Project Director, The Economist Intelligence Unit, London; Research Fellow, Department of Economics, Harvard University; and Professor of Economics, Alexandria University, Egypt. He was a post-doctoral Fulbright Fellow in the United States in 1962/63 and 1963/64, and has lectured extensively on natural resource economics in various parts of the world. He is a member of an international panel of experts appointed by (UNEP) for the production of a manual on 'Green Accounting', to be published by the United Nations in 1999. He has also been involved in an initiative by the Food and Agriculture Organization of the United Nations (FAO) to produce a similar manual for forestry.

His publications on natural resource economics include: "Absorptive Capacity, the Demand for Revenue, and the Supply of Petroleum", *Journal of Energy and Development*, Volume 7, No.1, Autumn 1981; "The Environment as Capital" in Robert Costanza, editor, *Ecological Economics: the Science and Management of Sustainability*, Columbia University Press, New York, 1991; "Depletable Resources: Fixed Capital or Inventories?" in Alfred Franz and Carsten Stahmer, editors, *Approaches to Environmental Accounting* (Papers presented at a conference on environmental accounting organized by the International Association for Research in Income and Wealth held in Baden, Austria, May 1991), Physica-Verlag, Heidelberg, 1993; *Country Macroeconomic Work and Natural Resources*, Environment Working Paper No.58, Environment Department, the World Bank, 1993; "Environmental Accounting for Sustainable Development: A Neoclassical Economic Approach" in *Modèles de développement soutenable, Des approches exclusives ou complémentaires de la soutenabilité?* International Symposium, Université Panthéon-Sorbonne, and AFCET Paris, March, 1994; and "Measuring Development: the Role of Environmental Accounting," *International Social Science Journal*, Vol. XLVII, No. 1, UNESCO, Paris, March 1995; "Depletion of Natural Resources": chapter 12, in Wouter van Dieren, editor, *Taking Nature into Account, a Report to the Club of Rome*, Copernicus, Springer-Verlag, New York, 1995; "In Defence of Weak Sustainability", *Environmental Values*, Vol. 5, 1996; "Weak and Strong Sustainability: Natural Resources and National Accounting", *Environmental Taxation and Accounting*, Vol. 1, No.1 Spring 1996; and "Natural Resources and National Accounting: Impact on Macroeconomic Policy", *Environmental Taxation and Accounting*, Vol. 1, No.2, 1997; "Green Accounting and Economic Policy", *Ecological Economics*, Vol. 21, No.3, June 1997.

Salah El Serafy is an honors graduate in Business and Economics from Alexandria University, Egypt; an honors graduate in Economics from London University; and a Doctor of Philosophy (D.Phil.) in economics from the University of Oxford. He is a life member of the Royal Economic Society, and a member of the Editorial Boards of *Ecological Economics* and *Environmental Taxation and Accounting*.

ADDRESS: 3118 NORTH 17TH STREET, ARLINGTON, VIRGINIA 22201 U.S.A. TEL. 703-243 0829; FAX 703-243 7906  
E-MAIL <SELSERAFY@EROLS.COM>

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The author consulted many individuals and organizations during the preparation of this report. In particular, I would like to thank:

- Thomas Michael Power, Chair, Economics Department, Montana State University
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- Mrs. Terry Rolfe, Ph.D. candidate, Resource Management and Environmental Studies, UBC
- Dr. Mary Louise McAllister, Professor of Environment and Resource Studies
- Dr. Patricia Perkins, Professor of Environmental Studies, York University
- Bill Hatton, Mammoth Mining Corporation

In addition, this report underwent a peer review process. I benefited from the critical comments of two economists who have considerable experience in integrating sustainability and economic analysis:

- Dr. Jack Ruitenbeek, Economist, H.J. Ruitenbeek Resource Consulting Ltd., and Adjunct Professor, University of Victoria.
- Dr. Salah El Serafy, Economist, World Bank.

Despite my debt to the above individuals and organizations, I take sole responsibility for the content of this report and any errors and omissions.

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## EXECUTIVE SUMMARY

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This report was prepared at the request of Innu Nation to examine the economic implications of the proposed Voisey's Bay Mine and Mill in preparation for the environmental assessment hearings into the undertaking.

The environmental assessment panel has made it clear that it sees environmental assessment as a means of bringing society closer to sustainability. This report closely examines the literature on economics and sustainability in the context of mining. It is focused on when and how the proposed mine should proceed, in conjunction with other related initiatives, in order to make the mine more compatible with sustainable development. This report shows that the Voisey's Bay mine could be developed later and in a way very different from that proposed by the proponent, in order to be more consistent with the objectives of sustainable development and to provide more modest but longer-lasting economic benefits.

### Key Conclusions

This study comes to the following conclusions:

#### Sustainable Development

- the Undertaking as presently proposed cannot be found to promote sustainable development.
- substantial modifications to the project are essential to reconcile the mine with the requirements of sustainability.
- the Undertaking should not proceed until there is demonstrated need, and the pace and scale of the operation should be much reduced.
- sustainable development requires effective participation by local populations, and in particular indigenous people, in decision-making and in equitable sharing of benefits. The consent of the Innu Nation and of the LIA should be obtained before the project proceeds.

#### Need

- there is no need for the Undertaking within the next 7 to 10 years.
- alternatives to the project exist but have not been thoroughly considered.

- proceeding with the project at the present time could well impose social costs on other nickel mining regions in Canada.

#### Pace, Scale, and Timing

- the project is viable at a much reduced pace of operation of approximately 5,000 tonnes per day, vs. the 20,000 tonnes per day proposed by the Proponent.
- the project would still be viable if it were deferred by 7 to 10 years.

#### Economic Benefits

- the economic benefits of the project have been overstated by the Proponent. Once subsidies and costs imposed on government by the Proponent are deducted, and government revenue is adjusted to take into account the “user cost”, the level of economic benefits appears more modest.
- by reducing the scale of the project and delaying start-up to provide an opportunity to build local capacity to participate in the project and to manage the changes induced by the project, prospects for local economic development are likely to be enhanced.
- the project may have the potential to leave a long-lasting economic burden through social disruption and potential for environmental contamination, in which case overall economic benefit would be much reduced.
- the Undertaking as currently designed is unlikely to significantly contribute to local economic diversification.
- by setting aside the user cost in a Sustainable Economy and Diversification Fund, the benefits from mining can be shared between generations to the lasting benefit of Labrador’s aboriginal and non-aboriginal populations.

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## I. INTRODUCTION

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This report was prepared on behalf of the Innu Nation, to assess independently if and how the Voisey's Bay nickel, copper, and cobalt deposit can be developed in a way that is consistent with the requirements of sustainable development, and in a way that minimizes social and environmental costs, while enhancing social benefits. The purpose of this study is to assist Innu Nation and the Environmental Assessment panel to understand more fully the broader economic implications of Voisey's Bay Nickel Company's proposals, in order to meet the objectives of the Memorandum of Understanding between Canada, Newfoundland, Innu Nation, and the Labrador Inuit Association.

In its guidelines for the preparation of an environmental impact statement, the panel properly emphasized that "promotion of sustainable development is a fundamental purpose of environmental impact assessment" (Guidelines 3.3). At the same time, Canadian and Newfoundland society and Innu have objectives other than sustainability. The Voisey's Bay Nickel Mine is proposed at a time when many people, non-aboriginal and aboriginal, are desperate for jobs and for higher wages. Federal, provincial, and aboriginal governments are having difficulty covering the costs of their programs, given the current emphasis on reducing government spending. Innu also wish to maintain their special relationship with the land and the many benefits they obtain when living off the renewable resources on which their ancestors were entirely dependent.

This study suggests that caution is required if society intends to permit the development of the proposed mine. The benefits of such development are always readily apparent: the jobs, the tax revenue, the business opportunities. Costs, on the other hand, have a tendency not to become apparent until well after the fact, or to be hidden by poor accounting practice or inadequate analysis. Often, projects which seemed promising turn out to be marginally profitable, or to impose economic burdens that exceed economic benefits. Economists have often suffered from the tendency to emphasize the positive. For instance, a 1988 review of World Bank project appraisals showed both a marked inclination to overstate benefits, and haphazard documentation of the costs imposed by project-induced environmental degradation (Barnes and Olivares 1988, cited in van Pelt, 1993).

In instances where projects appear to offer tremendous economic benefits, critical perspectives are often unwelcome. However, it is my intent to present to the panel, governments, participants, Innu Nation, and also for VBNC and its parent company, constructive criticism. This criticism will be focused on when and how the project should proceed, in conjunction with other related initiatives, in order to make the mine more compatible with sustainable development. In the pages that follow, it should become apparent that the Voisey's Bay mine could be developed later and in a way very different from that proposed by the proponent, in order to be more consistent with the objectives of sustainable development and to provide more modest but longer-lasting economic benefits. Not only should the timing of the undertaking be changed and its

design modified. To truly promote sustainability local capacity must be build up, and new institutions and practises created and implemented by other stakeholders.

### **How this Study is Organized**

This study proceeds in the following manner. First, the sustainability literature is reviewed in the context of non-renewable resource extraction. This review shows deficiencies with many interpretations of sustainable development in a mining context. To overcome this deficiency, I set out a test against which proposed mines can be evaluated, and then evaluate the undertaking against this test. In chapter III, I examine the need for the undertaking and possible alternatives. In chapter IV, drawing on the work by mineral economist Tom Bartek (1998), the viability of the operation under a reduced scale of operations is assessed. Chapter V examines various constraints that can be put on the proposed mine in order to make it more consistent with sustainable development. In chapter VI, the proponent's projections of revenue flows to government are critically evaluated, and some of the adjustments that should be made to such projections identified. Chapter VII then turns to the sustainability of local economies, focusing on how the project might be modified to better contribute to Innu economic development emphasizing long term benefits.

### **Background: Overview of the Undertaking**

The following background information is provided for readers who are unfamiliar with the proposed development. The Voisey's Bay nickel deposit was discovered by two prospectors in September 1993. Their firm, Archean, retains the rights to a 3% smelting royalty. The claim was filed by Vancouver-based Diamond Field Resources, Ltd., on whose behalf the Archean prospectors were working. In mid-1996, Inco Ltd. acquired the rights to the deposit and set up the Voisey's Bay Nickel Company, a wholly owned subsidiary, to exploit the deposit.

The Voisey's Bay deposit is considered exceptionally rich, containing high levels of nickel, copper and cobalt. It is made up of the Ovoid, with approximately 32 million tonnes of high grade ore which would be mined through open-pit methods, and several deposits that would have to be mined using underground methods. The total reserves are predicted to eventually reach 150 million tonnes. At maximum capacity as currently proposed, Voisey's Bay Nickel would add roughly 13% to global nickel mining capacity.

The Voisey's Bay deposit is located approximately 35 km southwest of Nain, an Inuit community, and about 80 km northwest of Utshimassit, an Innu community. It is thus in the traditional territories of both the Innu, who number approximately 1600, and who are represented by the Innu Nation, and the Inuit, represented by the Labrador Inuit Association (LIA). The region is at the border between tundra and forest tundra; growing conditions are difficult, nutrient availability is low, and climactic conditions extreme. Both Innu and Inuit continue to harvest the wildlife and plant resources of the region. Wildlife resources commonly hunted in the area include caribou, black bear, waterfowl, seabirds, seals and fish.

Neither Innu Nation nor the LIA have signed a treaty or land claims agreement, nor have they extinguished their aboriginal rights. Neither parties have been compensated or agreed to compensation should the mine go ahead, nor have they, to date, given their consent to the proposed mine. Negotiations with the federal and provincial governments to settle a land claims agreement (which the Innu term land rights negotiations), have been ongoing; these negotiations began before the deposit was discovered. As well, because of the overlap in traditional territories, the LIA and the Innu Nation have been involved in overlap negotiations to clarify exclusive and shared territories and to develop agreed upon procedures for addressing development in the shared areas.

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## **II. MINING, SUSTAINABLE DEVELOPMENT, AND THE PRECAUTIONARY PRINCIPLE**

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Confronted with growing evidence of “environmental trends that threaten to radically alter the planet, that threaten the lives of many species on it, including the human species,” the World Commission on Environment and Development issued an urgent call for sustainable development. According to the Commission, sustainable development is “...development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs” (WCED, 1987:43). Both the Canadian and Newfoundland governments have committed themselves to sustainable development.

Discussions about sustainability are complicated by the need to take into account the level or scale of analysis. For sustainable development to be achieved at a global level, there are ecological limits that cannot be exceeded, and rules to ensure that these limits aren't surpassed can be set out. Yet such rules may not be appropriate to apply to individuals, firms, regions or even countries. For instance, it might be deduced or agreed that sustainable development requires that some fossil fuel resources be passed on to future generations, and hence, fossil fuel resources should not be exhausted. However, a given corporation could exhaust its oil deposits and move on to a new line of business, so long as other companies or governments conserve oil stocks or develop substitutes to fossil fuels. Beginning at the other end of the scale, there is the need to take into account the cumulative effects of many small decisions. Thus, many seemingly trivial actions that assessed individually have barely noticeable environmental affects may result in severe environmental degradation if enough people or firms carry out the same action. For instance, the impact on climate change of one person using a car would be non-detectable, but as car use becomes generalized human behaviour then in the aggregate it would be expected that climate change would significantly accelerate.

### **II.1 The Precautionary Principle and Irreversibility**

The interpretation of sustainable development has since been strengthened by the adoption of the precautionary principle at the 1992 UN Conference on Environment and Development. This principle imposes a duty to take cost-effective actions to prevent serious or irreversible damage to the environment, despite scientific uncertainty as to the causes or consequences of environmental deterioration (Common, 1995). It requires the safeguarding of ecological space, a recognition of the need to allow natural processes to function and of the need to redress the accumulated ecological debt (O'Riordan and Cameron, 1994). The precautionary principle implies that the environment must not be harmed unless the opportunity costs of environmental protection<sup>4</sup>are very high (Pearce,



1994). The precautionary principle implies changes to the polluter pays principle. The resulting precautionary pollution pays principle (4P) requires that “the full costs of outputs from the economy to the environment are charged to the polluter in a way that adequately deals with the uncertainty about the impacts of pollution and encourages technological innovation” (Costanza and Cornwell, cited in Costanza et al., 1997).

Common (1995) notes that whole-hearted adoption of the precautionary principle reorients approaches to project evaluation:

Currently, the situation is generally that there is a presumption in favour of going ahead with commercially viable projects. The presumption may be overturned in any particular case if it can be established that serious or irreversible environmental damage is entailed. According to a strong interpretation of the precautionary principle, the presumption is reversed. **Since all projects have some environmental impact, it is necessary that any particular project be shown not to have serious or irreversible consequences before it can be approved.** A loose analogy is a shift from the judicial assumption of the accused person’s innocence unless guilt can be proved, to an assumption of guilt unless innocence can be proved (Common, 1995:214).

Guideline 3.4 put forth by the panel specifies that undertakings will be assessed under such a regime. In particular, the guidelines place the onus of proof on the proponent, and require that the proponent demonstrate that “priority has been given to strategies that avoid the creation of adverse impacts” (Guidelines, 3.4). The precautionary principle is directly relevant to the consideration of need. A precautionary approach would avoid a new development that results in environmental damage if it were unnecessary, and would give full consideration to alternatives to the undertaking.

Despite the breakthrough achieved by the Brundtland Commission in getting governments to adopt new approaches to economic development, there are two serious problems with the concept of sustainable development. First, general usage of the concept of sustainable development is dangerously vague, and contains significant conceptual weaknesses (Lélé, 1991), allowing various parties to define and use the concept so as to serve the particular interests in question (Daly, 1996). Secondly, it is now acknowledged within the sustainability literature that the solutions proposed by the WCED would not be sufficient to achieve long-term sustainability (Goodland et al., 1992). For instance, Duchin and Lange (1994) model the WCED’s policy prescriptions and conclude “...the prescriptions in the Brundtland Report are not adequate to arrest the growth in global emissions of the pollutants that were examined. On the basis of this analysis, we believe that far more strenuous actions need to be taken...” (page 27).

## II.2 Current Economy Dangerously Unsustainable

Since the WCED's report, and the commitments of Canadian and Newfoundland governments to sustainable development, the environmental trends identified by the commission have generally worsened. It is essential to understand that the problem of *un*sustainability is not something that humans will only face in the future. Already, the economy has exceeded many ecological limits (Meadows et al., 1992). The issue is not whether grave ecological deterioration will occur; rather, it is the degree of deterioration that will occur, what deterioration we will be able to avoid, and what deterioration we will be able to reverse. An OECD study recently concluded that the organization faced a "challenge as urgent, difficult, far-reaching in its implications as any in history. All major global ecosystems are in decline amid rapid population growth and continuously rising real incomes and increasing global economic activity" (OECD, 1997). Signs that ecological limits have been exceeded include:

- humans are estimated to appropriate 40% of the net primary productivity of terrestrial photosynthesis (Vitousek et al., 1986);
- climate change will make Canadians especially vulnerable to health problems, changes in agricultural potential, risks to wildlife, increased frequency of forest fires, and increased frequency of severe weather (Environment Canada, 1998);
- the ozone layer has thinned, increasing the penetration of UV radiation through the atmosphere and the consequent risk of skin cancer;
- land is degrading at unprecedented rates due to agriculture, urbanization, mining, and other influences;
- biodiversity is now being lost at a very high rate, with the current rate of extinction estimated to have reached 10 000 times pre-human extinction rates;
- humans now move more earth by mining than is carried to the sea by all the world's rivers (Young and Sachs, 1994); and
- exponential growth has occurred in the use of nearly all metals for several decades (Ayres, 1996), and the extraction and processing of such metals carries with it a significant "ecological rucksack" that is already exceeding ecological limits.

## II.3 Priority Actions to Achieve Sustainable Development

The basic idea of sustainability is straightforward: “a sustainable system is one that survives or persists” (Costanza and Patten, 1995:193). If a definition of sustainable development allows for actions and policies which, if pursued, allow continued environmental deterioration, then that definition should be rejected. Achieving sustainability will require aggressive action and tough decisions. In general, the following conditions relevant to the mining sector have been proposed by various researchers as prerequisites to achieving global sustainability:

- the rate of worldwide material consumption will need to be reduced by 50%;
- to ensure equitable sharing of burdens, and an adequate quality of life in the developing world, the material consumption of OECD countries will need to be reduced by a factor of between 2 and 10<sup>i</sup> (Schmidt-Bleek, 1994; Rees and Wackernagel, 1994; Young and Sachs, 1994; Weizsäcker et al., 1997);
- greenhouse gas emissions in OECD countries will need to decline by 80% (World Energy Council, 1993, cited in Weizsäcker et al., 1997);
- substances extracted from the lithosphere must not systematically accumulate in the ecosphere (Azar et al, 1996); and
- the productivity of land and the biodiversity of ecosystems must not worsen significantly from current conditions.

With respect to non-renewable resources, the concept of sustainable development entails particular challenges. Continued extraction of a non-renewable resource will eventually lead to the depletion of the resource, suggesting that future generations may not be able to meet their needs. This could be taken to imply that any level of extraction of a non-renewable resource is likely to be inconsistent with sustainable development. However, there is no value in non-renewable resources if they can never be extracted. Furthermore, in most instances it is not the possibility of shortages in non-renewables that is likely to endanger prospects for future economic activity. Rather, it is the likelihood that the extraction, processing, manufacturing, usage, and ultimate disposal of non-renewables over the next half-century will result in cumulative ecological impacts of grave severity. This is not to say that the possibility of exhaustion can be completely set aside. The Canadian Network for Sustainable Mining states that the mining industry “has been unable to maintain a reasonable inventory of proven deposits for future mining in Canada. National reserves of most ores have been significantly depleted” (Canadian Network for Sustainable Mining, 1998).

In plain English, the ability of future generations to meet their needs is mainly at risk because the current generation is causing ever-worsening environmental damage. It is likely that future generations would forgive us for using up, say, all exploitable nickel deposits, if doing so improved humanity’s chances of making it through the next 50 years without ecological collapse. Furthermore, technological progress is likely to improve humanity’s ability to make efficient usage of minerals, to substitute scarce minerals with alternatives, and to extract minerals from deposits that are currently unexploitable.

The highest priority is therefore to stop further ecological deterioration, and to pass on adequate stocks of renewable natural resources and ecosystems that will be viable over the long term. This is likely to require dramatic reductions in the level of extraction and usage of most minerals. A lower priority is to ensure that we pass on adequate stocks of non-renewables, and to ensure that current extraction of non-renewables contributes to achieving sustainability. A recent high level study commissioned by the director general of the OECD reached similar conclusions (citing the von Weizsäcker et al. 1997 study with approval), stating,

...the OECD should begin placing as much emphasis on improving resource efficiency as it has traditionally put on improving labour productivity. This would promote eco-efficiency in the broadest meaning of the term (OECD, 1997).

## **II.4 Definitions of Sustainable Development in a Mining Context**

Government and industry commonly interpret sustainable development in a way that would allow for a continued degradation of the world's ecosystems (e.g. Natural Resources Canada, 1995, 1997; Whitehorse Mining Initiative, 1994). Duerden (1992) concludes that in Canada's north there is a significant difference between those activities touted as sustainable and the true requirements of sustainability. The Minerals and Metals Policy of the government of Canada (Government of Canada, 1996) accepts the Brundtland definition of sustainable development, but interprets it with respect to minerals in the following way:

- finding, extracting, producing, adding value to, using, reusing, recycling, and, when necessary, disposing of mineral and metal products in the most efficient, competitive, and environmentally responsible manner possible, using best practices;
- respecting the needs and values of all resource users, and considering those needs and values in government decision making;
- maintaining or enhancing the quality of life and the environment for present and future generations; and
- securing the involvement and participation of stakeholders, individuals, and communities in decision making.

In defining sustainable development in the context of minerals and metals, it is recognized that the economic and social benefits of mineral development are not all consumed by the present generation. Current investments in human and physical capital benefit future as well as present generations (Government of Canada, 1997, page 4).

Several flaws are apparent with this interpretation:

- it does not directly address the need to reduce current levels of extraction and consumption of minerals on a global scale;
- it does not address the need to confine economic activity within ecological limits;
- it is open to interpretation and it provides no basis for determining required actions;
- it fails to acknowledge that given the currently alarming state of ecological deterioration, “maintaining or enhancing” quality of life and the environment will require aggressive and immediate action that will conflict with other goals such as finding and extracting additional minerals;
- it assumes that current investments in human (e.g. education and training) and physical capital (e.g. plants, infrastructure) will benefit future generations, so there is no need to invoke specific measures to distribute benefits across generations. However, if the investments themselves add to the need for non-renewable resources (e.g. we build more highways or enable higher levels of consumption), or if training is irrelevant to or impedes sustainability (we train more advertisers who encourage consumption), then future generations are not likely to benefit; indeed, they may be worse off as a result.

Because of the above flaws, I do not consider the federal government’s Minerals and Metals Policy as an appropriate benchmark against which to test the undertaking to see if it is consistent with sustainable development. Other attempts to address the implications of a commitment to sustainable development to mining are equally deficient. While Miller (1998) sets out to address how mining fits with sustainability, he focuses instead on a broad overview of the mining industry’s environmental initiatives without providing criteria to assess progress towards sustainability. He is also inconsistent in critiquing government initiatives to reduce the environmental impact of the mining sector as interfering with the competitive position of Canada’s mining industry, without recognizing that progress towards sustainability will require new institutions, regulatory regimes and constraints on economic activity.

The Whitehorse Mining Initiative (1994) does not address the need to stay within ecological limits; the need to reduce global consumption levels of minerals and to increase the material and energy efficiency with which minerals are used; and the requirement to distinguish between needs and artificially stimulated wants.

VBNC has, in its EIS, suggested that proceeding with the proposed Voisey’s Bay Mine contributes to sustainable development. However, as was pointed out in a previous submission, VBNC’s argument does not stand up to scrutiny.<sup>ii</sup>

Placer Dome recently issued a Sustainability Policy. While this policy is generally better than many, it still fails to address fundamental issues. It does acknowledge, however, that “essential to all definitions of sustainability is a respect for earth’s carrying capacity...” (Placer Dome, 1998).

Increasingly, some participants in the Canadian mining industry recognize that the industry has a long way to go towards reconciling mining with sustainable development. The joint industry-academia Canadian Network for Sustainable Mining argues that Canada needs a new paradigm of *holistic mining* to better harmonize mines with their ecological and social host environment. The network has an ambitious research program with many goals, including:

- reducing the quantity of waste rock generated by discriminating more precisely between ore and waste;
- maximizing the return of waste material back to the mine excavation as backfill;
- facilitating more responsible stewardship through maximizing the mineral reserve and mine life;
- increasing workforce and community safety;
- improving the capability to predict long-term metal release from waste rock piles, and to develop innovative strategies to control metal release;
- advancing the capability of mining companies to practice sustainable social, environmental, and economic development;
- improving the quality of public dialogue between proponents and local communities.

A fundamental flaw with 10 approaches to sustainable development reviewed above is that they do not recognize that economies must be constrained within ecological limits (Daly, 1977, 1991, 1996; Georgescu-Roegen, 1977; Rees, 1988, and many others). Instead, such approaches suggest that economic and environmental considerations should be given equal weight. This starting point leads to compromise without ensuring that the requirements of sustainability are met. As Bartlett has observed:

It is urgent that we be aware that these compromises reduce the rate of destruction of the environment (which is good), but in most instances, the ultimate result of a succession of many compromises is the destruction of the environment... One needs to know that a series of ten such compromises, each of which saves 70% of the remaining environment, will result in the loss of all but 3% of the environment (Bartlett, 1994:13).

Unfortunately, the literature on sustainability and non-renewable resources is still in its infancy. Many of the guidelines for enhancing the sustainability of non-renewable sectors are not convincing or are difficult to operationalize, particularly at the project level. Daly (1996:82) argues that society should only “deplete non-renewables at a rate equal to the development of renewable substitutes,” but while this rule might be sensible for oil, it is not clear what a renewable substitute to nickel would be. Daly recognizes difficulties with such a rule, concluding that full-cost pricing<sup>iii</sup> should be used so as to encourage investments in measures that increase material efficiency, thus reducing impacts of use and increasing the life expectancy of non-renewable resources.

Bartlett (1986) calls for “sustained availability,” where the extraction of non-renewables declines a fixed fraction per year, such that the resource is never exhausted. According to Bartlett, this would ensure that the needs of future generations are taken into account. While Bartlett’s proposal does not directly address the ecological impact of resource extraction, processing, use, and disposal, it would indirectly contribute to such solutions by slowing the rate of consumption. But for the short term at least, the emphasis needs to be on maintenance of ecological integrity, rather than on passing on adequate stocks of non-renewables.

Goodland and Daly (1995) propose eight physical measures to be used as an index of environmental sustainability, of which several are relevant to non-renewable resources:

- Energy intensity: the lower the energy intensity, the greater the sustainability.
- Material intensity: the lower the material intensity, the greater the sustainability.
- Recycled proportions: how much of a given fraction of material (e.g. nickel) is recycled, and how much is dissipated (e.g. used in forms where it is not practical to recycle).
- Transport intensity: how much transport is involved to produce and distribute the good.
- Water use: how much water is required, how it is obtained, and in what state it is returned to the ecosystem. (Adapted from Goodland and Daly, 1995).

Ideally, then, humanity’s needs should be met in ways that do not involve intensive use of materials, energy, or transport. The need to extract minerals should be reduced through efficient use and secondly, by ensuring high recycling rates and by avoiding dissipative uses. The need for virgin minerals should be met with mining operations that do not substantively reduce water quality.

Duerden (1992) discusses the relationship between mining and sustainable development in Canada's North. Mining, while by definition unsustainable, can be used to set up a trust fund to enhance community-based renewable resource activities. However, Duerden cautions that such a mechanism could make local aboriginal communities dependent on the rate of resource extraction. Providing northern and aboriginal communities with the right to prohibit unsustainable activity (or recognizing an *a priori* right to make such decisions based in aboriginal title) "...would promote global sustainability by forcing urban regions that demand energy and minerals from the North to conserve" (page 224).<sup>iv</sup>

Professor of Business Ethics A.W. Cragg has examined the ethical implications of sustainable development as they relate to the mining industry. Cragg concludes that sustainable development requires:

- "That the costs and benefits be accounted for and shared fairly"
- "That costs not be imposed from which those on whom they are imposed are unlikely to recover or alternatively from which they can recover only with great difficulty"
- "...efficient and effective resource extraction...[based on identification of] the value of natural resources in accurate and insightful ways and then to extract those resources in ways that do not needlessly destroy the value of what is 'down stream' or what is left behind for present and future generations."
- Accountability which allows stakeholders to evaluate performance against public commitments to sustainable development (Cragg, 1998).

With respect to the impacts of industrial development on aboriginal peoples, Cragg argues that the moral content of sustainability must be unpacked: much of what is argued to be sustainable represents "pervasive cultural bias." Those who benefit from resource extraction should bear the costs it generates, but what counts as a cost and as a benefit are a function of the values and ways of life of those affected. The active cooperation and participation of those affected is essential, to ensure that costs and benefits are accurately reflected (Cragg and Schwartz, 1996).



### **Mining and Sustainability: A View from Australia**

The Australian Conservation Foundation has concluded that achieving ecologically sustainable development in the mining sector requires adherence to the following fundamental principles:

- Improvements in material and non-material well-being, both within and between generations. This in turn requires:
  - the achievement of equity between generations;
  - the maintenance of constant natural capital and sustainable income;
  - recognition that there are biophysical limits on natural resource use;
  - appropriate pricing of environmental values and natural resources;
  - social equity and community participation, including recognition of the rights of indigenous people to control mining on their own land;
  - pursuit of qualitative development rather than quantitative growth as the objective of government policy; and
  - external balance, based on a diverse and resilient economy.
- The conservation of biodiversity and the maintenance of ecological processes, systems, and integrity.
- Adopting an anticipatory and precautionary policy approach to possible irreversible environmental damage or losses.
- Giving consideration to the global perspective and the rights and aspirations of other countries and their peoples for ecologically sustainable development (Burton et al., 1994, page ix).

Most of the sustainability and non-renewable resources literature does not address the implications of resource extraction on a landscape level. From the conservation biology and landscape ecology literature, it is evident that systems of parks and nature reserves will not be sufficient to protect landscape-level ecosystem functioning (Grumbine, 1992, 1994; Newmark, 1995; Pimental et al., 1992). To conserve biodiversity over the long-term, development outside of parks and reserves should retain essential habitat features, structures and processes of the undeveloped ecosystem; habitat fragmentation should be minimized, as should the contrast between developed and undeveloped landscapes (Grumbine, 1994; Burton et al., 1994; Mangel et al., 1996; Christensen et al., 1996).

## II.5 A Sustainability Test for Proposed Mines

Given the broad range of interpretations of the implications of sustainable development for the mining sector that are found in the literature, and the proliferation of flawed or inadequate interpretations of sustainable development, I prepared a sustainability test for proposed mines. This test is intended to rigorously put in place the requirements for global long term sustainability, drawing on the stronger elements of the literature discussed above. At present, no currently proposed mine could meet this test--an indication of how far society is from the conditions required for sustainable development. Also, if all new mines in one country had to meet such a test, while all other countries did not impose such requirements, the rigorous country's mining sector would be put at a short-term economic disadvantage. However, in the long run all new mines should pass such a test, for otherwise the preconditions for sustainability are unlikely to be met. Moreover, if a decision-making authority is claiming to "integrate the concept of sustainable development in...decision-making affecting the minerals and metals industry" (e.g. Natural Resources Commission, 1996:5), then the issues raised by such a test must be addressed. Mines should be redesigned or reconfigured to improve their score against such a test.

### Precedents for a Sustainability Test

Proposing a sustainability test for mines might appear to some as an impractical theoretical exercise. However, if one turns to the timber industry, one can see that efforts to define sustainability have been ongoing for almost two decades, advanced by such organizations as the Forest Stewardship Council and its local affiliates. At present, few logging operations in, for instance, BC, can pass the standards for certification of forest management practises set out by the Pacific Certification Council. However, since draft standards were published, a number of operators have modified their practises and have achieved certification. Industry heavy weight MacMillan Bloedel is also moving in such a direction – recently it announced a phase-out of clearcutting in its coastal BC operations.

Already, we can see a similar trend occurring in mining. In Canada, a number of environmental organizations, citizen groups and academics are in the early stages of developing criteria to assess the social and environmental performance of mines<sup>v</sup>, and similar efforts are taking place in other countries such as Australia. The recent poor environmental performance of the mining sector appears to be giving impetus to such initiatives. Sustainability tests or standards help set new benchmarks towards which an industry should aim, and against which stockholders, consumers and affected stakeholders can evaluate industry and individual company performance.

### Sustainability Test

To be consistent with sustainable development a proposed mine<sup>vi</sup> should be able to meet the following criteria.

**Present Need:** By the time the mine will be operational, need for the mineral will exist that cannot be met by reducing use, improving efficiency of use, improving recycling rates, or by extracting virgin ore from existing operations, without causing a mineral shortage that would lead to considerable social hardship and deprivation.

*Rationale:* Sustainability requires greatly increased resource efficiency. The rate with which virgin minerals are extracted, processed and used must be significantly lowered to reduce ecological impact across the globe.<sup>vii</sup> Need in this context is not the need of a proponent to generate profits, nor is it market demand when few efforts have been made towards sustainability. Rather, need is the requirement for virgin minerals in order to provide for a sufficient<sup>viii</sup> and ecologically sustainable existence for the present generation once all reasonable efforts towards the efficient use of the previously extracted stock of mineral have been made.

**Future Need:** Exploiting the deposit now does not deprive future generations of access to deposits of sufficient quantity and quality that they will be able to extract minerals to meet their needs, taking into account the likelihood of future scarcities of fossil fuels, the likelihood of severe restrictions on future fossil fuel use, and the likelihood of technological change in the extraction and processing of ores.

*Rationale:* Sustainability requires that the needs of future generations be taken into account.<sup>ix</sup> Given that part of the present generation's legacy will be an atmosphere with elevated greenhouse gas levels,<sup>x</sup> the accumulation of heavy metals in the biosphere,<sup>xi</sup> and significantly depleted oil reserves,<sup>xii</sup> and given that the exploitation of low grade deposits tends to result in higher pollution levels,<sup>xiii</sup> it is not sufficient to pass on to future generations low grade deposits that will be too energy-intensive or pollution-intensive to exploit.

**Acceptable Legacy:** The mine can and will be developed in such a way that there is high certainty that future generations will not be burdened by the need to undertake ecological restoration, by the need to provide ongoing treatment and decontamination of site discharges, or by the significant loss of ecological productivity or ecosystem services.

*Rationale:* Mines are notorious for leaving environmental problems, such as Acid Mine Drainage, that may last decades or centuries following mine closure.<sup>xiv</sup> Mining also tends to transform ecologically productive landscapes into lands of low ecological value less capable of providing ecosystem services such as growing crops or supporting wildlife. Leaving such a legacy is inequitable and inconsistent with sustainable development – present generations derive the benefits of mineral use, while future generations are left with the burden of cleanup and treatment and a planet less able to support human life.<sup>xv</sup>

**Encouraging Efficiency Incentives:** Proceeding with the mine at the present time will not significantly weaken incentives to use minerals more efficiently, to recycle, or to efficiently deplete deposits where extraction has already occurred.

*Rationale:* Sustainable development requires that global consumption of minerals be reduced by curtailing consumption by the affluent,<sup>xvi</sup> through more efficient mineral use, and by recycling<sup>xvii</sup>. New mines should not be approved if doing so contributes to reducing the incentives for efficient mineral use and recycling. Deposits should be exploited in a way that efficiently depletes the stocks of minerals, rather than high-grading deposits in such a way that future extraction will be difficult or prohibitively expensive.<sup>xviii</sup>

**Full-Cost:** The mineral will be extracted, refined, and processed in such a way that the producer is responsible for mitigating, compensating, or offsetting the mine's social costs and the known and likely environmental costs.

*Rationale:* One of the key requirements for achieving sustainability is that producers pay the full costs of their economic activity using a precautionary stance.<sup>xix</sup> Otherwise, producers have a financial incentive to cut costs by imposing burdens on society and the environment. At the same time, mineral prices that are low because environmental and social costs have not been factored in lead to excessive consumption and high social and environmental burdens.<sup>xx</sup>

**Equity:** Benefits from proceeding with the mine are shared between those who develop the deposit, those who work at the mine, and those whose landscape and community are affected. Furthermore, through controlling the rate of depletion, implementing a heritage fund, and/or by remediating past mining damage, benefits are shared by several generations.

*Rationale:* Sustainable development requires equity between and within generations. Those who are to be most affected by a development should have the right to a significant portion of the benefit. Because deposits that are mined will no longer be available to future generations, compensating mechanisms are required to spread benefits across generations.<sup>xxi</sup>

**Consent:** The informed and voluntary consent of those who are most affected by the burdens imposed by the proposed mine must be secured before the mine proceeds.

*Rationale:* Sustainable development requires effective participation in decision-making by local communities,<sup>xxii</sup> and the precautionary principle puts a duty of care or onus of proof on those who propose change<sup>xxiii</sup>. If consent is obtained, it

suggests that those who will be affected by the project are satisfied with mitigation and compensation measures.

**Landscape:** The mine does not significantly interfere with the maintenance of landscape-level ecological function or structure, nor does it significantly reduce habitat, species, or genetic diversity. In particular, the mine and associated infrastructure should not impede the protection of representative habitats (of sufficient size to contain viable natural populations), along with the connections between such habitats, nor should habitat be significantly fragmented.

*Rationale:* For long-term sustainability and maintenance of biodiversity it is essential to ensure that landscape-level structure and function is maintained.<sup>xxiv</sup>

**Offsetting Restoration:** The mine operators will go beyond ensuring that the new mine site will be reclaimed and restored to the highest standards. The mine operators will ensure that there is no net loss in the ecological value and services provided by regional ecosystems due to the new mine, by using part of the wealth generated by the mine to undertake offsetting restoration at previously abandoned mine sites.

*Rationale:* Sustainability implies that there is no net increase over time in the extent of environmental disturbance and contamination. Despite best restoration efforts, by the time they close new mines will ultimately have lower ecological value than existed prior to mine development.<sup>xxv</sup> Because humanity has surpassed many ecological limits, further ecological degradation is inconsistent with sustainability.<sup>xxvi</sup> By requiring operators of new mines to undertake offsetting restoration work at a previously abandoned site, the net level of environmental disturbance would be reduced to close to zero.<sup>xxvii</sup> Since the precautionary principle implies that those who have created a large ecological burden in the past have greater responsibility to remediate past damage<sup>xxviii</sup>, it is appropriate to impose a condition on the mining industry intended to ensure no net loss of ecological value which helps clean-up old sites.<sup>xxix</sup>

### **II.5.1 Applying the Sustainability Test to the Undertaking**

Based on the research contained in this document, the EIS, and studies by other researchers participating in the environmental assessment of the undertaking, the above test was applied to the project as currently defined. Possible modifications to the undertaking that would result in a better grade are also included. Results are shown in Table 1.



**Table 1: Performance of the proposed Voisey's Bay Mine against the sustainability test.**

Criteria	Voisey's Bay Mine Score (as configured in the EIS)	Possible modifications to project design to <b>improve score</b>
Present Need	Existing mines can meet global demand for nickel for next 7 to 10 years without the Voisey's Bay mine (Bartek, 1998). Initiatives to remove subsidies to resource sectors and to improve resource efficiency, or continued global economic slowdown (IMF, 1998) could delay need further.	Delay approval of undertaking until need exists.
Future Need	Exploiting Voisey's Bay at this time may result in inefficient exploitation of existing deposits. High rate of depletion leaves little for future generations.	Delay undertaking and slow rate of exploitation.
Acceptable Legacy	Many questions of social (Henriksen, 1998) and ecological impacts still unresolved (Goudie, 1998; Heathcote, 1998 a,b; Chambers, 1998; Chambers et al. 1998; Lavoie, 1998; Mackowecki, 1998a,b; Morrison, 1998; Pruitt, 1998; Schaefer, 1998, Silva Ecosystem Consultants; van Everdingen, 1998), while tailings have severe Acid Mine Drainage potential (Chambers, 1998). There is therefore a potential to leave future generations with a substantial ecological liability.	Additional research required to better understand local ecological conditions and to predict impacts. Approach to project design needs to seek better environmental solutions.
Encouraging Efficiency Incentives	Proceeding with mine now will add large nickel capacity (Bartek, 1998), reducing pressure to use resources more efficiently.	Delay mine, and reduce proposed rate of extraction.
Full-Cost Accounting	Many costs not borne by proponent; undertaking benefits from subsidies (see chapter VI).	Apply conditions to ensure that full-costs borne by proponent, and eliminate subsidies.
Equity	Benefits largely accrue to INCO shareholders and some workers during a short time frame, while burdens are mostly imposed on Innu and LIA.	Implement mechanisms such as IBA agreements, adjustment and diversification funds, to provide equitable sharing of benefits. Delay undertaking

		until local communities have tools to manage and adapt to project impacts and to participate in a way that provides for local benefits. Ensure that future generations do not face large environmental liabilities.
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Consent	LIA and INNU have not consented to the project and impact benefit agreements have not yet been concluded.	Modify project to make better fit with indigenous priorities and delay start-up until Impact Benefit Agreements are signed to show consent has been obtained. Set in place an Impact Management and Oversight Board with Innu Nation and LIA representation.
Landscape	Natural scientists and Innu have expressed concern about landscape level impacts (Silva Ecosystem Consultants, 1998; various Innu Nation submissions).	Modify project to better fit within landscape.
Offsetting Restoration	None provided for. Despite proposed reclamation and restoration, mine will result in lower ecosystem value and level of available ecosystem services.	Commit to compensating restoration. Innu Nation, LIA and natural scientists should identify abandoned sites that require restoration, and define the amount of such restoration required to arrive at no net loss in ecosystem value and services.

The Voisey's Bay nickel mine, as currently proposed, is far from meeting the requirements for sustainable development—rather, it worsens prospects for sustainable development. The proponent and others may advance many arguments for the mine, but the argument that the mine enhances prospects for sustainable development simply does not apply with the current project configuration. Conditions should be imposed on the proposed mine which will make it perform better on such a test.

The remainder of this study is largely intended to discuss some of the conditions that can be imposed on the proposed mine in order to improve prospects for sustainability. These conditions should apply if the panel decides there is a need for the undertaking, and if the panel recommends approval. Otherwise, the Voisey's Bay mine will impede sustainable development.

## **II.6 Summary Conclusions: Sustainability and Mining**

- There is growing consensus based on extensive scientific evidence that present economic activity is dangerously unsustainable, and that drastic action is required to avoid disaster and to achieve sustainability;
- It is widely acknowledged (by organizations including the OECD and UN) that to achieve sustainability, resource efficiency must be greatly improved, and that the extraction and use of metals must decline;
- The consent of those who are most affected by a project should be obtained, and benefits and burdens must be shared equitably.
- New mines should not be opened until there is societal need for the mineral, taking into account the need of future generations for accessible deposits;
- The mine should have an acceptable legacy;
- Proceeding with the mine must not undermine resource efficiency incentives; and
- The mine owner should bear the full costs of development.

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### III. NEED AND ALTERNATIVES

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#### III.1 Impact Assessment Based on Societal, Not Private Need

Fundamental to environmental impact assessment, and specifically required by guideline 7.0 a), is the requirement to consider both the need for the proposed undertaking and alternatives to the undertaking (Wood, 1995). It is important in the context of environmental impact assessment to understand how “need for an undertaking” should be interpreted.

Market forces and shareholder requirements for an adequate return on investment force corporations to seek profitability through revenue-generating activities—such as extracting and selling ore. This results in the corporation’s “private” need for a project. Similarly, local governments and communities may need tax revenues and jobs. However, these are not the needs that are to be considered in EIA. Need in the EIA context refers to a societal need for the good or service produced by the undertaking.

If an EIA is reviewing a proposed highway from A to B, then the assessment process should consider whether there is a need for transportation services from A to B. Note how this differs from arguing that the highway is needed because of the jobs it will create. By carefully specifying the need, the full range of alternatives becomes apparent. In this instance, the need for transportation services could be met by a highway, a railway, better use of existing roads by investing in public transit, and by making drivers pay the full cost of road use. By first considering whether there is a need for a project, society avoids paying for unnecessary highways, dams, and the like. By not confusing the need for transportation services with a desire for more local jobs, the assessment process avoids making decisions based on flawed reasoning. For instance, while building a highway creates jobs, so does running a public transit service. Both measures may increase government expenditures and hence the tax burden, which reduces the number of jobs elsewhere in the economy, so often the net effect of such projects on jobs is neutral or negative.

A prime example of a failure to properly consider need is provided by Montreal’s Mirabel International Airport. Although building the airport created jobs, it was a major drain on government revenues and the supposed need for a major new airport never materialized. To use another example, if an EIA is considering a proposed private hazardous waste dump, the need to be evaluated is not the private concern’s need for profit, nor local need for jobs, but the need for a disposal site for hazardous wastes.

In the context of the proposed Voisey’s Bay Nickel Mine, the assessment process should evaluate whether there is a need for the services provided by additional supplies of virgin nickel, copper, and cobalt, which is, after all, what the mine will produce. This assessment should take into account:

- the size and life span of other nickel mines;
- new mines likely to come on-line in the near future;
- world demand for nickel, the composition of this demand, and the time frame used to analyze demand
- the extent to which demand is consistent with sustainability;
- prospects to increase the efficiency with which nickel is used
- possibilities to substitute other materials for nickel
- current nickel recycling rates and prospects for increasing this rate; and
- the length of time it takes for a new mine to reach production.

### **III.2 Is There a Need for New Nickel Capacity?**

Thomas Bartek (1998) undertook an independent analysis for the Innu Nation of global markets for nickel. Bartek's study does not address how policies implemented to further sustainable development by various governments around the globe could affect nickel markets. It is therefore a conservative assessment of the supply and demand for nickel and the need for Voisey's Bay. Nonetheless, Bartek's study shows that VBNC's projections for future demand for nickel are likely to be significantly overstated.

Bartek finds that VBNC's growth projections are unreliable because of two shortcomings. First, the Proponent analyzed growth over the period 1960-1997, rather than referring to the more recent past. This time frame includes the high growth period of 1960-1973, when the annual compound growth rate was 6.6%. This has the effect of boosting the compound growth rate average from 1.7% to 3.4%, and misleadingly suggests that future growth in demand will be strong. Second, the Proponent assumed that growth was compound, but regression analysis suggests rather that nickel demand behaves as a linear function, with demand increasing by a constant amount each year.

#### **III.2.1 Nickel Supply, New Capacity, and Voisey's Bay**

Bartek then analyzes the supply of virgin nickel and comes to the conclusion that exclusive of Voisey's Bay, new mines that have recently started up or will do so in the next few years will add between 110 000 and 190 000 tonnes/year of new nickel capacity. This will likely take 8 years or more before historic rates of growth in nickel demand would absorb this additional capacity.

Bartek's study suggests there is no need for the additional nickel capacity from the Voisey's Bay mine until 2006 at the earliest.
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Bartek's study is relevant to an assessment of need that is uninterested in sustainable development. Because the panel and the MOU require explicit attention to sustainable development, the question of need requires further examination.

### **III.3 How Sustainable Development Affects the Consideration of Need**

#### **III.3.1 Low Cost Mineral Prices Impede Sustainable Development**

There is growing recognition of how subsidies in the resource sector in nations across the globe, and the failure to impose full-cost accounting and the polluter pays principle, results in artificially low prices for energy and minerals. Low prices result in high rates of material consumption and wasteful use of materials (OECD, 1997a), and delay the development of material-efficient technologies (Roodman, 1996). Such subsidies and distorted prices benefit a few powerful interests such as mining, while imposing costs on the remainder of society, and delaying the much needed transition to a sustainable materials economy (Young and Sachs, 1994; United Nations, 1997; Weizsäcker et al., 1997).

As governments around the world face fiscal restraint, and as they promote policies intended for sustainable development, such subsidies will come under increasing pressure. Prices for many primary materials would then rise, reducing the demand for virgin materials, and increasing the incentive to recycle. Such a price rise would reflect the fact that mineral producing companies were having to pay the full price of mining and processing minerals, and as such, would not create incentives to extract larger amounts of materials.

#### **III.3.2 Sustainable Development, Resource Efficiency, and Need**

There is now conclusive evidence that humanity must and can increase the material efficiency with which minerals are used. The material efficiency revolution could reduce global need for raw materials by half, if not more, while doubling living standards (Young and Sachs, 1994; Weizsäcker et al., 1997; OECD, 1997b). Only part of the promise of the efficiency revolution comes from technological progress, such as new energy efficient technologies. The main gains, however, come from a new approach to design which takes reducing human use of resources to be a primary concern. When products are redesigned with efficiency as a primary concern, with optimization approaches to design, and with a life-cycle emphasis that seeks to ensure that the product can be repaired, and eventually almost entirely recycled, startling gains in material and energy efficiency are possible. For instance, a new generation of "hypercars" could achieve several hundred miles per gallon, all the while being easier to manufacture and costing the same or less than today's cars. A hypercar would require minimal inputs of metal (including nickel) and weigh in at a mere 400 kg versus 1400 kg for existing cars. Such cars could be on the market as early as 2003, and a number of companies are competing to bring hypercars to market (Lovins et al., 1996, cited in Weizsäcker et al., 1997).

Advocates of a factor four reduction argue that halving current resource use while doubling wealth is easily achievable with existing technologies. A more conservative study undertaken by the United Nations (1997) acknowledges that material efficiency improvements could reduce resource requirements in industrial countries by up to 40%, while still maintaining the same service level. At the same time, it is essential to remain prudently skeptical about technological prospects. Technology takes time to diffuse. Long-lasting infrastructure, social values, and individual preferences all act to constrain the rate at which new technology can displace old technology and the rate with which efficiency improvements begin to provide payoffs. Empirical research also indicates that efficiency increasing technologies often displace resource use from one sector to another, such that net resource savings can be lower than initially predicted (Cleveland and Ruth, 1997).

To summarize, the elimination of subsidies that currently impede sustainable development, and growing efforts to launch a material efficiency revolution, further reduce the need for new nickel capacity, especially over the longer term.

### **III.4 Other Factors: The Asian Crisis and Need**

VBNC tries to demonstrate need for the mine in part by referring to Asia. VBNC states that there is "...growing demand for stainless steel in Asia, the result of growing prosperity and the consequent need to develop infrastructure..." While acknowledging current economic problems in the region, VBNC suggests that continued wealth gains are expected to result in continued growth in demand for nickel (AI:2-5).

The problems in Asia involve more than a cyclical downturn. Emerging markets have suffered from poor banking practices and security exchange regulation, nepotism, excessive speculation, failure to account for resource limits, and other structural problems. While some reforms are beginning to show promising results, many of the economies are contracting sharply and will take years to rebound (International Monetary Fund, 1998). It is unlikely that growth in nickel demand from this market will be as strong as projected by Inco/VBNC.

Taking into account:

- the likelihood of lower than projected market demand in Asia for the next 5 to 10 years;
- more accurate representation of past growth in demand for nickel showing the modest growth rate in demand for nickel over the past two and a half decades;
- existing nickel mining capacity;
- the fact that industrial economies show maturation of demand;
- the likelihood of innovations in eco-efficiency;
- the reduced demand that is likely to result if resource prices rise as subsidies to the resource sector are reduced around the globe and as governments and

- international agreements increasingly require that environmental costs be internalized; and
- the likelihood of oil price increases in the next 7 to 10 years resulting in lowered demand for energy-intensive goods (Cambell and Laherrère, 1998);

It appears safe to conclude that there is no need for the Undertaking for 7 to 10 years, if not considerably longer.

### **III.5 Alternatives to the Undertaking**

As argued in the above section, the need for the above undertaking has not been established, despite sustainable development, the precautionary principle, and the environmental impact assessment process imposing a duty on the Proponent to do so. Setting aside the question of need, the next step in a rigorous environmental impact assessment process is to consider the matter of alternatives. The panel has required that the Proponent provide information on both “alternatives available to the Proponent if the Undertaking does not proceed” (Guidelines, 7.0 a), and “alternative means of carrying out the Undertaking” (Guidelines, 7.0 c).

Alternatives to the proposed nickel mine at Voisey’s Bay should include:

- extracting nickel from existing mines, including the proponent’s parent company’s mines elsewhere in Canada (e.g. Inco’s Sudbury and Thompson operations) or other nations, as well as the mines of competitors;
- devising means of assisting customers to use nickel more efficiently, so as to make existing supplies last longer; and
- increasing the rate of nickel recycling, the durability of nickel products, and the extent to which nickel embedded in capital and consumer goods can be reclaimed.

The Proponent may object to the first alternative on the list, since it includes considering extraction from competitors’ mines, which would be of no interest to the Proponent. However, the Proponent could produce evidence to show whether producing nickel at the Voisey’s Bay mine is preferable to producing at other mines from a sustainability perspective. The second and third alternatives on this list may appear novel or impractical to the proponent, but, as I will argue, if the intention is to act consistently with sustainable development, they are not.

#### **III.5.1 Understanding Need**

By understanding that businesses and households buy products not for the products themselves, but rather to obtain the services that the products can supply, new possibilities

for environmental improvement become apparent. A powerful precedent in understanding that purchasers need services has been set by the energy industry, amongst others. Traditionally, energy utilities had been regulated in a way that made their profitability depend on selling ever more energy. But increased competition, new regulatory rules that recast incentive structures, and new ways of thinking, changed all this. It became apparent that customers wanted not cubic feet of natural gas or kilowatt-hours, but comfort, illumination, torque, heat, or cold—"end use services." Customers wanted such services cheaply, and so

...kilowatt-hours of electricity had to compete with all other ways to provide the same service: through increased electrical productivity (using fewer kilowatt-hours and more brains to do the same task with greater technology) or by substituting other fuels, or by substituting renewable energy... Utilities quickly learned that it was sound business strategy to sell customers what they wanted: energy efficiency (Weizsäcker et al., 1997).

This realization allowed Energy Service Corporations (ESCOs) to take advantage of market opportunities. ESCOs provide financing, management, and technical expertise to customers, in return for a percentage of energy savings (United Nations, 1997). Such innovations have not been limited to utilities and ESCOs, nor to electricity. The potential dividends available from shifting the profit basis of corporations from sales volume to services provided are only now becoming apparent. For instance, Dow Germany entered into a joint venture to provide customers with chemical services, rather than the chemicals themselves. The chemical manufacturer keeps control of the chemical throughout its life-cycle, allowing solvents to be safely transported and recovered and reused more than a hundred times. The corporation has understood that its clients aren't looking for solvents per se, but for the cleaning and other services that solvents can provide. The OECD has recently recognized that when consumers' needs are "defined as much as possible in terms of *services*," opportunities to reduce environmental costs are greatest (OECD, 1997b).

Following the concept of consumers having needs for services, INCO could seek out ways of helping existing users of nickel to obtain greater amounts of service out of a given amount of nickel, and to ensure that whatever nickel is used is more likely to be recovered at the end of a good's useful life. Inco's revenue would not come merely from output of nickel, but from its expertise in nickel use. Inco occupies an important position in the world market for nickel, which should help make this strategy a viable one for the company to pursue.

The greatest impediment to such an approach is likely to lie neither in technical limitations, nor in finding appropriate ways of increasing revenue while decreasing the customers' use of materials and recapturing scrap. Rather, corporate culture and ingrained ways of thinking will likely have to change (Weizsäcker, 1997; United Nations, 1997). Approving a new mine at Voisey's Bay at the present time may in fact hinder INCO from making such a transition. Many researchers in the sustainability and material efficiency field suggest that market forces and the increased profitability of an industrial-ecology approach will force this transition--those companies that do not adapt will lose out.



### **III.6 The Existing Mines Alternative**

INCO has suggested that it expects production to decline at its existing Canadian operations in Sudbury, Ontario, and Thompson, Manitoba. There are several reasons why production would decline:

- exhaustion of the ore body;
- poor market conditions;
- inability of existing sources to compete in global markets;
- the possibility of increasing profit margins by shifting to lower cost sources;
- strategic corporate behaviour intended to gain concessions from government and the workforce at existing mines, in order to improve profit margins.

From a sustainability perspective, there can be several advantages to continuing with extraction at existing mines. It avoids, for a given time, habitat destruction and fragmentation at a new site. It can encourage more efficient exploitation of a given ore body, rather than high-grading. It can also avoid laying off the existing work-force, and the resulting social costs (Locke, 1986). However, no corporate entity can produce at a loss over the long term, nor can it extract ore where the ore body is exhausted. Furthermore, as the average ore grade declines, the ecological impact of continuing with mining at the existing sites may eventually exceed that of opening a new mine with a richer ore-body.

In its July 27, 1998, news release, Inco expressed confidence in its ability to reduce costs and to achieve some production increases at its four longer-life, low-cost core mines in Ontario (Inco, 1998). Inco/VBNC have not demonstrated that need for virgin nickel cannot be met by its existing mines. Statements such as those contained in the news release suggest that existing mines are a viable alternative to the undertaking for the time being.

### **III.7 Summary Conclusions: Need and Alternatives**

- The Proponent's projections for future nickel demand are significantly inflated by calculating growth rates for the period 1960-1996, rather than the rates of a more recent period. Using the period 1973-1997, the annual compound growth rate of nickel demand is a mere 1.7%. Furthermore, nickel demand has been exhibiting a constant rather than a compound rate of growth. Proceeding with the Undertaking at this time would result in significant excess mine capacity for virgin nickel.
- Existing nickel mines can meet world demand for nickel for the foreseeable future, and large additions in nickel capacity will be added over the next few

years. There is therefore no need to develop the Voisey's Bay deposit at this time.

- The problems being experienced in East Asia are not a cyclical downturn, but rather are structural problems that will take many years until recovery occurs. Nickel demand in this region will likely be weak for several years.
- Sustainable development requires significant reductions in material use, and new design approaches and technological progress provide significant opportunities to reduce the need for primary materials.
- Efforts to remove subsidies, to transfer the tax burden off labour and onto resources, and to require the mining industry to pay the full costs of mineral development could significantly reduce the need for virgin metals. Such measures are advocated by the OECD, amongst others.
- From a sustainable development perspective, there is no need for new supplies of nickel at the present time; rather, there is a pressing need to reduce global consumption of minerals.
- Given the lack of need, the project can be delayed until need is established.

### ➔ **Recommendation 1: Need**

The environmental assessment panel should conclude that, given current supply, market conditions, and other factors, need for the mine has not been demonstrated and is unlikely to exist for at least 7 years. Furthermore, taking into account those factors which will contribute to the achievement of sustainable development, the panel would be safe to conclude that need in a sustainability context is likely to be even more remote than 7 years. A mining permit should not be issued at this time. A permit should only be issued when need for new sources of nickel can be demonstrated and the mine can be developed in a way that contributes to the achievement of sustainability.

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## **IV. FINANCIAL VIABILITY OF THE VOISEY'S BAY DEPOSIT**

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Various sections of this report have set out the benefits from a sustainability perspective of delaying the Undertaking and reducing the pace of the Undertaking. Such changes would obviously affect project economics. The Proponent has consistently stuck by its choice of a 20,000 t.p.d. operation, but without presenting any rigorous analysis to defend its position. Thomas Bartek, on behalf of Innu Nation, examined how the pace and scale of the mine would affect the mine's viability in section III of his report.

Key findings from Bartek's analysis:

- The Proponent has not demonstrated that operating rates below 15,000 t.p.d. are uneconomic.
- Industry standard plant capital cost data shows that the greatest effect in economics of scale occur below 5,000 t.p.d., with almost constant returns to scale above 10,000 t.p.d..
- A qualitative comparison with Falconbridge's Raglan nickel mine shows that Voisey's Bay has a comparative advantage in costs over Raglan. If Raglan is viable at 2,200 t.p.d, then it is difficult to conceive how Voisey's Bay would not be viable at similar production rates.
- A discounted after tax cash flow model of the Voisey's Bay mine demonstrates viability of an ovoid-only project at a production rate of as little as 2,500 t.p.d.
- Although a lower production rate results in higher per unit capital costs, most of the increase in NPV with higher production rates results from bringing future cash flow closer to the present, where the effects of discounting are lessened.

The Proponent appears to be pushing for a high extraction rate in order to maximize net present value, without giving due consideration to the broader societal and environmental benefits of a more modest rate of production and of deferring the project, which are discussed later in this report. Part of the reason why Inco may be seeking a high production rate is related to the high acquisition price it paid for Voisey's Bay. the fact that Inco paid too much to acquire the Voisey's Bay Nickel Company should not influence the panel's decision with respect to the proposed mine. This acquisition cost is a sunk cost. Inco proceeded with the purchase using very optimistic assumptions and failing to take into consideration the amount of time that would be required to develop a greenfield mine in an environmentally sensitive area subject to land claims negotiations.

Given the results from Bartek's analysis, deferring the mine is an economically feasible option. Because deferring the mine would delay the receipt of future cash flows, Net Present Value of the project for the Proponent would be reduced. However, from a societal

perspective, a slower rate of extraction would appear to enhance benefits, reduce costs, reduce risks, and be more consistent with sustainable development. The Net Present Value of the project to society could therefore actually increase by deferring the project and by slowing the rate of extraction.

A report by Goldman Sachs (LIA, 1998) lends support to Bartek's analysis and his conclusion that a lower production rate would be viable, suggesting:

Although it would be difficult for Inco to announce that it would proceed with a smaller project - and there may not be sufficient incremental capital savings associated with a smaller project - in retrospect, we believe that there could be a number of reasons to start up production at Voisey's Bay at a lower production rate.

- Allows for a longer period to explore and delineate the non-Ovoid resources;
- May provide for more realistic future exploitation of underground deposits;
- Allows for a more graduated capital spending program, particularly if the smelter and/or refinery investments can be deferred;
- Enables the nickel market to better absorb Voisey's Bay production as well as new Australian nickel laterite production without such extreme price disruption;
- Reduces the environmental impacts of the Project. (page 25)<sup>xxx</sup>

### **Summary Conclusions: Financial Viability**

- the Voisey's Bay deposit is unusually rich. This gives the Proponent considerable flexibility in developing the site and makes a range of extraction time frames and rates financially viable.
- the mine appears to be financially viable at any scale of operation between 2 500 and 20 000 t.p.d. Inco's desire to maximize net present value by selecting a high rate of extraction is not a basis for a societal decision on the mine's pace and scale.
- the mine's start-up date can be delayed for 5 to 10 years, while still remaining financially viable.

### **➔ Recommendation 2: Scale**

The Panel should reject the Proponent's assertions that 20,000 t.p.d. is the only feasible scale of operation for the Voisey's Bay mine as unsubstantial and as contradicted by other evidence, such as the viability of the 2,200 t.p.d. Raglan mine which faces higher costs, or the results from financial modeling.

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## V. IMPOSING CONSTRAINTS TO ACHIEVE SUSTAINABLE DEVELOPMENT

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VBNC suggests that labour and environmental standards used by INCO have been very high, and that VBNC will operate to the same high standards. In Chapter 1 of the EIS, VBNC makes several claims about Inco's practises and standards:

- "Since its formation in 1902, INCO has been committed to improving safety, protecting human health, and safeguarding the workplace and natural environment."
- that INCO has "a tradition of respecting the culture and tradition of adjacent peoples wherever it operates"
- INCO participates in the "Accelerated Reduction of Emissions of Toxics program of voluntary reduction of toxic emissions by 50 percent by the year 2000."
- "While INCO believes that its safety performance is amongst the best in the mining industry, it continues to improve this performance..."
- "Wherever INCO operates, it strives to forge close partnerships with all stakeholders adjacent to its operations and to be a responsible corporate citizen and good neighbour."

These statements suggest that Inco has voluntarily undertaken most of its efforts to improve environmental, social and labour standards at its operations, and that government regulation and other incentives to ensure satisfactory performance are almost redundant. This conclusion would not be supported by Marr (1993), who suggests that PT Inco's Soroako operations have benefited from low environmental and safety standards, and failure to compensate populations affected by the mine and associated hydroelectric facilities. The National Pollution Release Inventory recently reported that Inco's sulphuric acid releases increased by 43% between 1995 to 1996. Clement (1981) and Brasch (1997) also document how Canadian miners have had to pressure the company through strikes and other means to address their safety concerns. INCO showed strong resistance to implement measures to reduce SO<sub>2</sub> emissions from its Ontario operations as the damage caused by acid rain became apparent in the 1970's and 80's. Conversations with individuals familiar with Inco's Ontario operations suggest that there is considerable conflict between the corporation's profit motive and corporate responsibility.

It should be clear to Innu Nation and the panel that VBNC/Inco Ltd. cannot be counted on to voluntarily uphold high standards. Furthermore, VBNC could be sold to a corporation with no such commitments. This is not to condemn Inco or VBNC. Market pressures frequently encourage corporations to reduce costs by shifting environmental and social costs onto other parties. Therefore, reliance on voluntary efforts is unlikely to be effective. Indeed, EMCBC (1998) cites two KPMG Management Consultant studies as showing that the primary motivations that business leaders cited for their decision to establish environmental management programs were compliance with regulations (90%) and avoiding the potential

for director's liability (70%). A minority of business leaders claimed their environmental management programs were voluntary initiatives (25%).

To achieve sustainable development, society must impose constraints on market activity, or influence market incentives, to ensure producers and consumers alike take into account the social and ecological impacts of their activities. Economists generally advocate the use of market mechanisms as the most efficient<sup>xxxix</sup> means to achieve such goals.

## V.1 Full Cost Pricing/Polluter Pays Principle

In 1985, the member countries of the Organization for Economic Cooperation and Development adopted a declaration re-affirming the Polluter Pays Principle, whereby polluters are to be held responsible for the costs of pollution control and prevention measures required to maintain the environment in an acceptable condition (OECD, 1989). The MOU and the panel's guidelines indicate that the polluter pays approach should be taken. For instance, Section 3.3 of the guidelines requires that "the full costs of development are identified, mitigated, compensated, or offset." Forcing the proponent to address such costs may raise their production costs, and this may even make an undertaking no longer financially viable, in which case the Undertaking should not proceed. However, this is as it should be. An example directly relevant to the Newfoundland mining sector is provided by economist Wade Locke's recommendations to the Newfoundland Royal Commission on Employment and Unemployment. Professor Locke had provided an extensive list of recommendations, many of which would have affected the costs faced by mining companies and limited their decisions. Locke explained that this was appropriate:

...if the following recommendations are implemented, they will constrain the behaviours of mining companies, and as such, will increase their operating costs. This is exactly the intent of the recommendations. If mining companies will not voluntarily take into account the social costs...then these legislative changes will force the companies to internalize the costs...

**Therefore, a significant portion of current Newfoundland mining enterprises are implicitly subsidized through the fact that the social costs of their actions are borne by the residents of mining communities and not by [the companies] themselves (Locke, 1985:73).**

However, a clarification is required. The intent of forcing companies to internalize costs is not, as a casual reading of the above quote might suggest, to increase operating costs. Rather, it is to change the incentives faced by a company so that it finds new ways of operating that do not impose social costs. This spurs the company to innovate. As a result, the actual cost increases faced by the company are usually less than the social costs that were internalized. A truly innovative company may find a new approach that actually reduces both social and private costs, or offsets cost increases by generating new revenue (e.g. 3M's

pollution prevention pays program). Thus, costs borne by society are reduced, while those borne by companies typically increase initially and then are reduced through innovation.

Full-Cost Pricing (or True-Cost Pricing) is intended to help society identify the social and environmental costs of a given economic activity, so that various mechanisms can be used to force producers to bear most of such costs. The Conference Board of Canada (1993) accepts full-cost pricing as a cornerstone of sustainable development, a state “in which prices are made to reflect the costs of environmental as well as other resources.” It is best seen as a metaphor, as it is basically impossible to define a “true” cost, or to ensure that all costs have been accounted for.<sup>xxxii</sup> The principle remains, however, that society should try, to the extent possible, to force producers to address all the costs they impose on society. This can be done by taxing resource depletion, selling off quotas or permits to pollute, imposing pollution charges, setting standards, and the like.<sup>xxxiii</sup>

## **V.2 Market Mechanisms Often Fail to Produce Ideal Results**

In arguing for the use of market mechanisms, economists make several assumptions that fail to hold true in the real world of day to day business decisions. Producers’ reactions to pollution charges, and their failure to apply efficiency measures that can have a rate of return as high as 60%, shows that market mechanisms are less useful than theory would suggest. Often, companies are simply unaware of how changes affect their bottom line, or of what technologies are available to reduce costs (Weizsäcker et al., 1997; Jackson and Jacobs, 1991).

The best approach, then, is to use a mixture of market mechanisms, regulations, restrictions on operating conditions, etc., to minimize the social and ecological costs of the undertaking. This study addresses several costs that the Undertaking imposes on society, and recommends appropriate actions to minimize or internalize them.

## **V.3 The Boom/Bust Effect**

The large cash influx that a new mine brings, in terms of wages and expenditures, can create boom conditions, especially when a company town is involved or where the local economy is relatively small. During cyclical downturns in the industry, or when the ore is exhausted, the local economy goes “bust”--wages fall off, local business can no longer survive, housing loses value. In Chapter 21 of the EIS, the proponent assesses such impacts, but concludes that business disruption, wage inflation, and labour force displacement occurring during construction and operations would have only a minor impact. The proponent expects decommissioning to result in moderate impacts in terms of unemployment and decreased demand for goods and services.

This assessment may well prove to be overly optimistic. For instance, the proponent expects that in the Labrador North Coast area, with a current working-age population of 2034, local project-related employment will be 156 jobs during construction, 242 during open pit operations, 325 during underground operations, and 7 during decommissioning (EIS Table 21.14). This is a large increase in labour demand for the size of the workforce, and the wages are likely to be significantly higher than those offered at other places of employment. Such projections may, depending on the success of training programs, VBNC's employment practices, and the interest of North Coast residents in participating in mining, turn out to be based on inflated participation rates. Table 8-4 of the EIS, which compares educational requirements for the various positions with VBNC against the existing educational level and skill set of the aboriginal population, shows that most positions could not currently be filled by the aboriginal population. Although the proponent, with other parties, has set in motion a training program, it is likely that a number of years will be required before a high level of aboriginal participation is secured.

If the proponent's projections turn out to be accurate and a high proportion of jobs are secured by Shesbatshiu and Labrador North Coast inhabitants, the disruptive effect on the local economies is likely to be significant. Those who currently have higher levels of formal education, and who tend to be employed in key positions in the community, may quit current jobs to take up higher-paying mining-related employment. This would weaken existing institutions. The significant influx of wages into communities where un- and underemployment rates are currently high could create local boom conditions, especially as there is a local propensity to spend most income and save very little. Income inequality would increase. The economy in aboriginal communities would take on a dual character, with one economy for those with high wages, and another for those dependent on social support. Entrepreneurs could focus on servicing the high income earners, inflating prices disproportionately. Temporary shut-downs can also impose significant costs on communities and facilities. Furthermore, they can provide the mine operator with significant power over local councils or organizations.

➔ **Recommendation 3: Pace and Timing**

The proponent's operations should be constrained to a lower pace and scale, and the project should be delayed for a time frame sufficient for developing local capacity to both participate in the project and to manage the impacts of the project.

➔ **Recommendation 4: Sustainable Economy and Diversification Fund**

The user cost from the depletion of the mineral resource (see section VI.1 below) should be deposited in a Sustainable Economy and Diversification Fund. The user cost would be based on each year's actual rate of extraction and the mine's lifespan. This fund would be



used for regional investment in sustainable enterprises and in economic diversification to provide for a sustainable flow of income once the mine is closed.

➔ **Recommendation 5: Community Diversification and Adjustment Fund**

If government decides to forgo collecting the user cost, other mechanisms will be needed to buffer the communities from the effects of cessation of operations or from temporary slowdowns, VBNC should be required to set up a Community Diversification and Adjustment Fund. An amount equal to a fixed percentage (on the order of 7 to 10%) of the wages from aboriginal communities would be set aside in the fund until the fund had grown to the equivalent of a year's wages for all North Coast employees. During temporary shutdowns (of more than two months duration), up to 25% of the fund could be drawn on to pay for the cost of providing special services and counseling to those affected by the shutdown. Once the company provided notice that the mine would be closing, the fund would be available to the affected communities to help cover the costs a mine closure adjustment program.

➔ **Recommendation 6: Encourage Savings**

Innu Nation, LIA, and VBNC should explore how mechanisms to encourage aboriginal mine workers to save a significant proportion of their earnings to provide for a cushion against shutdowns and mine closure. These savings would ideally be invested in a way that contributes to community economic development.

#### V.4 **Compensation of Renewable Resource Users**

The proposed mine will cause a number of environmental effects which will affect local subsistence harvesting. Two main effects can be expected. The first is the direct impact on wildlife by the project. Other experts in this process have examined this effect. A secondary impact is the likelihood that a labour force influx and higher income levels will result in more recreational hunting and fishing.

➔ **Recommendation 7: Fish and Wildlife Compensation Fund**

Consistent with the polluter pays principle, the proponent should be required to contribute to a fish and wildlife compensation fund. This

fund would be used to compensate Innu Nation and LIA for negative impacts on their members' harvesting activities, their access to territory, or the resource base upon which they depend.

## V.5 Ensuring Effective Local Participation in Decision-Making

Sustainable development requires that those who are most impacted by development have influence over how it is carried out. Disparities in political and economic power allow corporations and governments to externalize social and ecological costs, resulting in unsustainability. Cost internalization, largely by using institutions to level disparities in political and economic power, is indispensable to sustainable development (Massarrat, 1997). Lack of local control results in social problems. Ostrom (1990) provides extensive documentation of how decision-making by local users has been more effective than central-government decision-making in managing local resources sustainably, despite common perceptions to the contrary.

Robinson et al. (1990) argue that sustainable development requires that:

- all persons should have a right to participate in decision-making that affects their lives;
- such participation requires the ability to effectively influence the powers that regulate activities having an impact the local natural environment;
- local participation in decision-making should promote the identification and choice of paths of development that are consistent with people's needs, values, and cultural identity.

Even without reference to sustainable development, it is clear that when local communities, and in particular indigenous communities or nations, feel that they cannot influence or control the factors that affect their lives, social costs are high and unsustainability results (Cragg, 1996). Lack of influence over the decisions that affect one's life and prospects for the community has an impact on individual self-esteem, cultural identity, motivation, etc... Innu and Inuit, for instance, went from being masters of their own destiny, to being wards of the state, and the result was cultural collapse (see Armitage, 1990; Henriksen, 1994).

Not only does lack of individual and collective influence impose costs on those directly affected, it also imposes broader social costs. Hospital bills are higher, tax revenues lower, and there is a need for counseling programs, drug treatment programs, etc. These costs tend to be ongoing, because the root cause of the problem is not removed.

### ➔ Recommendation 8: Impact Benefit Agreements

That project approval be conditional on the signing of Impact Benefit Agreements between the proponent and both the LIA and Innu Nation.

➔ **Recommendation 9: Project Modifications**

That any major modifications to the undertaking, or to the pace of extraction, require the consent of the LIA and the Innu Nation.

➔ **Recommendation 10: Impact Management and Oversight Board**

That either as part of the IBAs, or as an independent condition, a Voisey's Bay Impact Management and Oversight Board be established with equal aboriginal and VBNC representation. This board would have the power to:

- investigate the mine's performance against operating standards and conditions of approval, to approve monitoring programs, and to review monitoring data;
- impose temporary shutdowns where significant environmental or health and safety dangers exist, and to impose required remedial actions;
- review hiring practices and labour relations;
- approve detailed reclamation plans; and
- certify when rehabilitation and restoration requirements have been met.

While the board should strive for consensus, both the aboriginal parties would have veto power over the boards' decisions.

The Proponent may object that such a board would give undue power to other parties, particularly aboriginal people, and that, as a private and profit-driven enterprise, it should not have to satisfy such a condition. It might argue that it cannot operate with such uncertainty, since the board could impose conditions what would make the mine unprofitable. Yet such arguments should carry little weight. Both the LIA and the Innu Nation could benefit from the proposed mine, assuming it is developed appropriately and impact benefit agreements are signed. Under such conditions, the mines' aboriginal neighbours will naturally seek to ensure that the mine is profitable (so that it keeps operating and so that it can afford to cover restoration costs), so long as it operates in such a way that the social and environmental costs have been minimized. Furthermore, given that the proponent states that it has a "philosophy of respecting the culture and traditions of adjacent peoples wherever it operates," that it "strives to foster close partnerships with all stakeholders adjacent to its operations and to be a responsible corporate citizen and good neighbour," it should be confident that it will be able to operate the mine in a way that has the approval of Innu Nation and LIA.

The proposed Impact Management and Oversight Board would be an effective means of formalizing Inco/VBNC's commitments. If the proponent is serious about such commitments, then it should not object to such a proposal. Implementing sustainable development and internalizing social and environmental costs usually requires new institutions, modifications to incentive structures, and new means of sharing the benefits and burdens of development. The proposed Impact Management and Oversight Board is one such mechanism.

## **V.6 Mechanisms to Reduce Ecological Costs**

The Undertaking as currently proposed involves significant global, regional, and local ecological impacts. The undertaking will add more nickel to the global environment, consume significant quantities of fossil fuels, thereby adding to the greenhouse effect, fragment and destroy habitat, expose mineralized rock, thereby potentially creating an Acid Mine Drainage problem, etc. It is obviously impossible to open, operate, and close a mine without causing ecological impacts at each stage, and without leaving an ecological legacy. What is needed is a design which minimizes such impacts, an incentive structure which rewards the mine owner for reducing environmental impacts to the extent possible, and offsetting environmental restoration.

### **V.6.1 Using an Industrial Ecology Approach**

The Undertaking should be designed using an industrial ecology approach, in which the industrial designer draws upon knowledge of ecosystems and the need to balance industry input and output with natural ecosystem capacity, in order to optimize industrial activity with respect to both economic and environmental performance. Industrial ecology is an attempt to design industrial systems that maximize material efficiency, that minimize ecological impacts (largely by being more compatible with natural processes), and that minimize the potential for unanticipated damage (Ayres and Ayres, 1996; see also Journal of Industrial Ecology).

With respect to the Voisey's Bay mine, an industrial ecology approach would appear to suggest, for instance:

- that the project should emphasize backfilling the mined out pit to minimize the possibility of Acid Mine Drainage (Dr. Dave Chambers, personal communication, August 23, 1998; Canadian Network for Sustainable Mining, 1998).
- Properly investigating the feasibility of avoiding the use of Headwaters Pond as a tailings disposal site, to avoid contamination of the Reid Brook watershed (Dr. Dave Chambers, personal communication, August 23, 1998).
- Designing a wastewater treatment plant that produces water of drinking quality (Dr. Isobel Heathcote, personal communication, August 23, 1998).

Because an industrial ecology approach emphasizes design for avoidance of waste and environmental impact, it frequently results in considerable cost savings over the conventional alternative.

### **V.6.2 Offsetting Ecological Restoration**

To achieve long-term sustainability, mining should induce no net loss to regional or global ecosystem integrity and productivity. Despite the proponent's best efforts, despite the best reclamation and restoration, there will be a net loss in wildlife habitat and ecosystem integrity. It is impossible to recreate the ecosystem damaged by mining. However, there are opportunities to offset such losses. Much as the Department of Fisheries and Oceans has a no net loss policy with respect to fish habitat, a tool to make mining more compatible with sustainable development would be to require compensating ecological restoration. Here Inco/VBNC would be required to use part of the proceeds from Voisey's Bay to undertake ecological restoration at previously abandoned mining (or other industrial) sites in Labrador. The intended outcome would be that the loss in ecosystem integrity and function at the Voisey's Bay site after all reasonable efforts for reclamation and ecological restoration would be more than offset by the improvements in ecosystem integrity and function at unrelated abandoned sites. These sites should be chosen by LIA and Innu Nation from abandoned sites in Labrador where no party can be held liable for restoration. The amount of restoration required would be defined by an impartial committee of ecologists, drawing on Innu and Inuit ecological knowledge.

#### **➔ Recommendation 11: Industrial Ecology**

Any delay or deferral in proceeding with the Undertaking should be used to investigate how an industrial ecology approach could result in design improvements to better balance the mine with ecosystem capacity, and to optimize environmental performance.

#### **➔ Recommendation 12: Offsetting Restoration**

When the project proceeds, VBNC should be required to undertake offsetting ecological restoration at previously abandoned mine sites selected by Innu Nation and LIA.

## **V.7 Ensuring that Liabilities Are Fully Covered**

The Proponent proposes to rely on "self-insurance, utilizing its own financial resources and the resources of Inco to undertake reclamation, closure and post-closure monitoring and follow-up activities..." (AI 9-7). VBNC reviews the insurance policies under which it is

covered, but these insurance policies do not provide Innu Nation or the LIA with appropriate guarantees that they will be protected should unanticipated negative environmental impacts occur or should post-closure costs be higher than anticipated. Although Inco has corporate-wide Umbrella/Excess liability coverage of US \$200 000 000, excluded from this coverage is any site or location principally used as a waste disposal site or clean-up, removal, containment treatment, detoxification, or neutralization of pollutants on premises occupied by VBNC.

The undertaking has a life-span of between one and three decades (at proposed rates of extraction), or longer if additional discoveries are made or if the extraction rate is reduced. During such a time period, many things could happen that would result in self-insurance failing to cover the costs of environmental cleanup. For instance, if INCO made another investment error of similar proportions to its Voisey's Bay acquisition, it could end up with liabilities in excess of assets. This would give government or Innu Nation and the LIA no one to hold accountable in case of a major accident, or if extensive restoration were required. Alternatively, severe recessions, such as that experienced in East Asia, or technological change and competition, could cause nickel prices to drop and INCO to lose value. Finally, it is likely to be difficult to hold INCO liable for damages incurred by VBNC.

Therefore, additional measures and incentives are needed to ensure that all environmental liabilities will be covered. This is particularly so because many mines have later been found to be causing serious environmental contamination that requires prohibitively expensive clean-up and restoration efforts.

In addition, because of the need for long-term monitoring and maintenance (LTMM) even after the mine is closed and fully reclaimed, a monitoring and maintenance trust fund is required so that the governments or Innu Nation and the LIA do not bear such costs.

### ➔ **Recommendation 13: Bonding**

The proponent should be required to post a bond known as a flexible environmental assurance bond, intended to incorporate both known and uncertain environmental costs. As mining proceeds, VBNC would add to the amount bonded, such that at any time the bond could cover both known reclamation and restoration costs, plus the best estimate of the largest potential future remediation costs for environmental damages caused by the undertaking. The bond would earn interest, and would be incrementally redeemed to the mine owner as the owner demonstrated that ongoing efforts had decreased the outstanding liability for reclamation and remediation, and as uncertain environmental costs were defined more precisely or mitigated against (see Costanza and Perrings, 1990).

**→ Recommendation 14: Monitoring Trust Fund**

The proponent should be required to create a trust fund, with a payment schedule such that by the time the ovoid is exhausted, there is sufficient capital for annual interest payments to fund long-term monitoring and maintenance requirements. By the time of decommissioning, the trust fund should be large enough that payments from the fund can be made to rectify any reasonably likely problems with the tailings disposal, and still have funds left over for continuing monitoring and maintenance. Starting with a period 20 years after decommissioning, if no unexpected problems are being detected, the proponent should be able to make staged withdrawals from the fund to bring it down to a level sufficient to cover long-term monitoring and maintenance.

**V.8 Investor Pressure as a Means to Ensure Environmental Performance**

Stock markets can also indirectly apply pressure for improved environmental performance (Lanoie et al., 1998), although their effectiveness in achieving this goal is far below what it needs to be.<sup>xxxiv</sup> If investors are aware of the environmental damage being caused by a company, and if they have reason to believe that the company will be responsible for remediation, then they will reassess the company's value accordingly. Therefore, companies which pursue high environmental standards should, all other things being equal, be worth more than those companies that are environmentally noxious. However, there are many reasons why this mechanism has limited influence.

First, by cutting corners when it comes to the environment, short-term profits may be increased. Secondly, environmental liabilities are typically not discovered until many years in the future. Investors will discount such costs accordingly, as \$100 in ten years is worth about \$25 today to an investor who expects a 15% rate of return on investment. Thirdly, investors may question whether the firm will in fact be induced to cover the costs it imposed, as protracted court proceedings are often necessary before a given party is held liable. And finally, investors may not have all the information required to make such an assessment, although corporations face increasing pressure from stock market regulators to more fully disclose environmental liabilities (Housman, 1995). The panel can help remedy this last deficiency through provisions for independent audits.

**→ Recommendation 15: Environmental Auditing**

The panel should recommend that the Proponent be required every five years to commission an independent environmental audit of its Voisey's Bay site. This audit should be prepared by a third party,

should be prepared in an open and transparent manner, and should report the long-term financial implications of identified environmental liabilities in accordance with Generally Accepted Accounting Practices.<sup>xxxv</sup>



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## **VI. THE VOISEY'S BAY MINE AND GOVERNMENT COFFERS**

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The Proponent claims that the positive impacts of the project on the federal treasury will be “immense”, totaling \$3.7 billion in increased revenues over the life of the Project, and employment insurance program savings of \$370 million. The provincial treasury is predicted to receive \$1.5 billion in revenue, and a further \$170 million in worker compensation premiums.

There is a tendency with proposed development to note such revenue numbers with enthusiasm, without a more critical assessment that factors in costs and other effects, to determine net revenue impacts. As a result, projects often fail to bring the prosperity that their proponents' predictions suggest.

Several adjustments are necessary to gain a more accurate understanding of net revenue impacts:

- 1) revenue must be adjusted to take into account the fact that the project depletes the stock of capital. Canada, Newfoundland, Innu Nation and LIA go from being endowed with a rich ore body to being left with an environmental liability.
- 2) subsidies from government to the Proponent for proceeding with the Undertaking, and a share of general subsidies to the mining industry, need to be deducted from revenues.
- 3) increased government expenditures necessitated by the undertaking must be deducted from revenue. These expenditures include infrastructure required for the project and dependent on government funds, costs to regulate the project, and long-term costs absorbed by government.
- 4) because workers' compensation premiums are intended to cover the costs of death, accidents, and industrial diseases, such payments should not be considered a benefit.<sup>xxxvi</sup>
- 5) increased provincial revenue will decrease transfer payments from the federal government. While decreased dependency upon transfer payments is desirable, the net effect of the project on provincial revenues will be greatly lessened.
- 6) the Undertaking may preclude other projects which would generate greater revenue or decrease the need for government expenditures, and these opportunity costs should be factored in.

7) the influx of federal revenues from the Undertaking may be offset by a corresponding decline in federal revenues from the Sudbury or Thompson operations if world markets cannot absorb additional nickel capacity.

Addressing all of the above matters would require further study and better access to financial data concerning the project. The present study focuses on adjusting for capital depletion and accounting for subsidies.

## VI.1 Differentiating between Income and Capital Depletion

There are two main reasons not to count all the proceeds flowing to government from the depletion of non-renewable resources as revenue, or as income for government. First, the definition of income used by economists, advanced by economist Sir John Hicks, is based on the idea that income is that which can be consumed while maintaining capital intact. Hicks writes,

The purpose of income in calculations in practical affairs is to give people an indication of the amount which they can consume without impoverishing themselves. Following out this idea, it would seem that we ought to define a **man's income as the maximum value which he can consume during a week, and still expect to be as well off at the end of the week as he was at the beginning** (Hicks, 1946:172).

Income, or, in the instance at hand, government revenue, should be generated without stocks of capital being drawn down. The idea makes intuitive sense. If any business treated business receipts as income, without taking into account expenses, it would soon face bankruptcy. As Brown et al. (1991) explain, such accounting practices are a disguised form of deficit financing that inflate current output:

...it is as though a vast industrial corporation quietly sold off a few of its factories each year, using an accounting system that did not reflect these sales. As a result, its cash flow would be strong, and profits would rise. Stockholders would be pleased with the annual reports, not realizing that the profits were coming at the expense of the corporation's assets. But once all the factories were sold off, corporate offices would have to inform stockholders that their shares were worthless (page 29).

A second reason not to count all the proceeds as revenue is that doing so impedes sustainability. If society is serious about moving towards a sustainable economy, then it needs to move from an economy built largely on the liquidation of natural resources, to an economy that relies on sustainable use of a renewable resource base. Government expenditures will have to be brought in line with the level of revenue that is sustainable. As El Serafy and Lutz (1989) put it, "Prudent economic management requires that government know the maximum amount that can be consumed by a nation without causing its eventual impoverishment..." (page 2).

The need to account for the depletion of non-renewable resources has been recognized by economists (e.g. El Serafy, 1989, Daly and Cobb, 1994) and the UN now recommends that member countries prepare satellite accounts which make such corrections (UN, 1993). The Yukon government, which is heavily dependent on the mining sector, has considered the best means of making such corrections to its provincial accounts (Victor, 1990). The recommended approach for the Yukon involves the “El Serafy” method, or the user cost approach. It is based on the observation that depleting a non-renewable resource involves two types of costs. The first type of costs are the current extraction costs—the costs that will be faced by VBNC in mining and processing the nickel ore. The second cost—the loss of future net receipts—reflects the fact that as the mine is depleted, society loses a potential source of income in the future. Accordingly, to determine sustainable income, net revenue is divided into an income stream and a user cost stream. The principle is that the user cost stream would be based on the amount that would need to be reinvested in order to provide a permanent income stream once the ore body is depleted. Assuming that investments may be made in renewable resources that obtain a rate of return of  $r^{xxxvii}$  per year, true income is given by the formula,<sup>xxxviii</sup>

$$\text{True income} = \text{Net Proceeds} \times [1 - 1/(1+r)^n]$$

where  $n$  is the number of years until the resource is depleted.

As the mine is worked and its mineral contents decline, the land will progressively lose its economic worth. The Labrador Inuit Association and the Innu Nation have not been compensated for their loss of this value. One way to safeguard their rights to the mineral resource would be to capture the loss of land value due to mineral depletion by setting aside the user cost. As noted above, the user cost implicit in extraction can be estimated according to a formula that takes into account: (a) the life expectancy of the mine at the current extraction rate and (b) the expected rate of return of alternative investments. By investing the equivalent of the user cost at the assumed rate or return, income, as estimated, may be perpetuated. Otherwise, when the mineral contents are exhausted, there will be no income. By investing the user cost regionally, the economies of affected communities will become diversified and losses in employment when mining ceases will be offset by jobs in the new, diversified businesses.

There are a number of technical issues to resolve in applying the user cost method, which will not be covered here. A government intent on ensuring user costs are accounted for would also have a number of approaches it could take depending on its policy objectives. Government could charge the user cost to the corporation directly, such that the corporation’s revenue would be net of the user cost, and the government would collect the user cost as the royalty generated by the resource. This would be the most appropriate approach given the theory behind user cost. Alternatively, it could decide to allow the corporation to maximize its income by not assessing a user cost. The corporation would end up with higher levels of revenue than in the above approach, which would provide a higher level of corporate revenue to be taxed, but the taxes and royalties collected (assuming royalty regimes do not change

significantly) would be lower than the amount collected if user costs were charged directly

### **User Cost: A Simple Example**

The following example will show how the user cost method works. Suppose there is a deposit of 100 000 tonnes of ore which generates government revenue of \$10 per tonne of ore mined. The rate of extraction is either 2 years at 50 000 tonnes per year, or 10 years at 10 000 tonnes per year. There are investments in renewable resources available which yield a return of 4% per year.

In the first scenario, the user cost factor informs government that it can only count \$37,700 of total receipts of \$500,000 as true income. The government invests the balance, or \$462,000, in a renewable resource. Once the mine is depleted, there is a total fund of:

$$\begin{aligned} &= (462\,000 \times 1.04) + 462\,000 \\ &= \$943\,000 \end{aligned}$$

Assuming this fund yields the predicted 4% return, the fund will provide for a sustainable income flow of :

$$\begin{aligned} &= \$943\,000 \times 0.04 \\ &= \$37\,700 \end{aligned}$$

This is the same income as the government earned net of user costs during mining. Government revenue adjusted in this way is sustainable.

In the second scenario, because a slower rate of extraction is used, the user cost is lower – only 67% versus 92% in the first scenario. Out of an annual revenue of \$100,000, \$32,400 is income, and the balance is for investment. By the time the mine closes, there is a fund of \$811,000, which at 4% generates \$32,400 in annual income.

When depletion occurs rapidly, a high proportion of government revenue must be invested to provide a large enough fund to create an ongoing income stream once the mine is exhausted. This is because the fund does not have time to grow through compounding before the resource is depleted. But the reason is also intuitive: if we mine so fast that only one generation benefits from the ore body, then sustainability requires that a significant proportion of the proceeds be set aside for their benefit.

against corporate revenue. Then, government could adjust its own revenues to ensure sustainability of income by calculating its user cost. The user cost would be set aside to provide for sustainability of regional income. Finally, government could require that each mining company deduct the user cost from gross mine revenues to be deposited in a user cost fund held by the company. While the company could not draw on the capital from the user cost fund to boost present revenues, it would be free to invest this capital in sustainable

enterprises within the region. Income generated by such investments would benefit the mining companies once the mines in question were exhausted. In this way, it is the mining companies themselves that would benefit from the sustainability of income.

The approach that appears the best aligned with the economic theory behind user cost and the realities of the present case, given the information available to the author, is the first, where user cost is assessed against gross project revenues and deposited in a trust fund to promote sustainability and diversification of the regional economy. This is based on the observation that the LIA and Innu Nation have unresolved rights in the mineral resources of Voisey’s Bay, and that these rights encumber those of the proponent, and the federal and provincial governments. Accordingly, the deposit is part of the LIA’s and Innu Nation’s capital assets, though their joint ownership may not amount to 100% of the asset. If the asset is depleted, they have incurred a user cost. The user cost in question should thus be deducted from the entirety of proceeds from the mining operations (gross revenue net of costs), and a significant portion of this user cost should be invested in a fund to provide for the sustainability of the regional economy. A smaller proportion could be invested to promote sustainability of the provincial economy.

Table 2 shows a hypothetical result for reserves of approximately 150M tonnes and revenue of \$12 billion<sup>xxxix</sup> over its lifetime and assuming that investments in renewables could lead to a 4% rate of return. The actual user cost would depend on market conditions, and would be calculated on each year’s revenue taking into account the rate of extraction and the projected life of the mine at that year’s extraction rate.

**Table 2: User Cost Adjustment of Gross Revenue from the Mine**

Gross Revenue from mine	Mine Life of 17 Years		Mine Life of 34 Years	
	User Cost	Sustainable Revenue	User Cost	Sustainable Revenue
\$12,000	\$6,160	\$5,840	\$3,163	\$8,837

User cost calculation with a rate of return from renewable investments of 4%, demonstrating the cost of depletion. Gross revenue from the undertaking is adjusted to subtract the user cost to derive the sustainable revenue, using the El Serafy method. The user cost should be invested to provide for regional economic sustainability. The mine owner’s net revenue is substantially reduced. By slowing the rate of extraction, the user cost is reduced. All figures are in millions of constant \$1997 dollars.

If such a user cost regime were applied, then it would be inappropriate to collect royalties from the mine, because in theory, a properly assessed royalty is equal to the user cost. The user cost would amount to a substantial fund, which would then be used to provide for regional economic sustainability, either by investing in local renewable resource projects, or to invest elsewhere with the proviso that the income from investments would return to the local region. In this way, a depletable asset has been converted into a perpetual source of income.

It may be that for a variety of reasons government is unwilling to apply such a significant change to royalty regimes for mines. If the mine were to proceed as per current legislation, and assuming for the moment that there was not the complicating factor of LIA and Innu Nation rights to the resource, then the proponent’s revenue would not be affected. Instead, direct government revenues and royalties would be adjusted according to the user cost method. The result would be shown as in Table 4 below.

**Table 3: User Cost Adjustment of Government Revenue**

Direct Taxes and Royalties	Total	Mine Life of 17 Years		Mine Life of 34 Years	
		User Cost	Sustainable Revenue	User Cost	Sustainable Revenue
Federal Taxes	\$1,550	\$796	\$754	\$409	\$1,141
Provincial Taxes and Royalties	\$1,450	\$744	\$706	\$382	\$1,068

User cost calculation with a rate of return from renewable investments of 4%, demonstrating the cost of depletion. Government revenues from the undertaking are adjusted to subtract the user cost to derive the sustainable revenue, using the El Serafy method. The user cost should be invested to provide for regional economic sustainability. The amount of government revenue that can be used for current expenditures is substantially reduced. By slowing the rate of extraction, the user cost is reduced. All figures are in millions of constant \$1997 dollars.

The key concept for Innu Nation, the proponent, the panel, the public, and government to appreciate is that the revenue generated by the project is not equivalent to income—only part of the profits, taxes and royalties collected should be available for current expenditures. The remainder should be used to invest in making the regional economy more sustainable. Furthermore, the apparently high levels of corporate and government revenue generated by the project need to be evaluated against the cost of depleting this non-renewable asset. The faster the rate of depletion, the higher the user cost.

To summarize the key points:

- revenues generated by the project and taxes and royalties collected should not be considered to be income, because a user cost must be deducted;
- by adjusting revenues and/or taxes and royalties using the user cost method, society sees the cost involved in using up its mineral wealth and avoids the unpleasant surprises of lowered income in the future;
- the slower the ore body is depleted, the more that gross revenue generated by the mine or tax and royalties collected from the mine represent income;

- only the proportion of gross revenue that fits the definition of income should be available for disbursement to shareholders (after taxes);
- only the proportion of taxes and royalties that fit the definition of income should be used to fund current expenditures;
- the user cost proportion of taxes and royalties should be invested in making the economy sustainable;
- if government is not willing to undertake adjustments to account for the user costs, then LIA and Innu Nation should benefit from a substantial proportion of the returns from the project through impact benefit agreements, and should use such proceeds to provide for sustainable income flows for their communities; and
- in calculating provincial Net Domestic Product, the user cost should not be included.

## V1.2 Adjusting for Industry Subsidies

Around the globe, the mining sector is heavily subsidized by government, offsetting much of the taxes and royalties paid by mining companies (Ryan, 1995; Roodman, 1996; Young, 1992; OECD, 1997a). Subsidies do not necessarily involve outright payments by government. Subsidies are more generally defined as any government policy that alters market risks, rewards, and costs in ways that favour certain activities or groups (Roodman, 1996). Subsidies are not necessarily bad. Economies often perform poorly at meeting certain human needs or social objectives, and subsidies may be necessary to offset or temper certain market forces. However, most subsidies have unintended side effects. They often accelerate resource depletion, encourage environmental degradation, worsen government finances, and hinder economic development (WCED, 1987; Roodman, 1996; OECD 1996, 1997a; Myers, 1998). Unfortunately, there are no rigorous studies exploring the extent to which mining is subsidized in Canada.

Potential sources of subsidies for the Voisey's Bay mine include the following:

- legislating forced transfer of property rights from Innu and Inuit to mining companies;
- preferential tax policies: tax credits, deferrals, exemptions, accelerated depreciation;
- direct payment, preferential loans, loan guarantees, provision of below market price utilities, support with research and development, marketing, public relations;
- provision of infrastructure to support project development;
- allowing social and environmental costs to be externalized, assuming responsibility for environmental costs and liabilities created by the mine during exploration;

- government support for training programs focused on providing the proponent with a workforce;
- government payments for workers suffering from occupational disease, government assistance during mine closure; and
- market failure subsidies.

It should be noted that many of the above subsidies are difficult to determine, as they may involve confidential agreements negotiated between VBNC/Inco and government.

### **VI.2.1 Subsidies through Forced Transfer of Property**

As Roodman (1996) notes, even though the US mining industry has been subsidized to the extent of \$900 US<sup>xi</sup> per US citizen in foregone royalties, “the true subsidy...consists of usurping millions of hectares of land from indigenous people...to allow mining” (page 18). Neither Innu nor Inuit have ever signed a treaty or given up land rights, nor have they been compensated for loss of resources. Had Innu and Inuit been allowed to auction off their mineral rights at full market value, the mine would still have been financially viable, as companies would only pay an amount that they were willing to pay and still mine. By giving away mineral rights for a modest payment to the provincial treasury, the mine is subsidized. In effect, Innu and Inuit cross-subsidized shareholders of Diamond Field Resources and INCO. It is difficult to assess the value that this subsidy represents, but the mine likely has a rent of between \$1 and 2 billion dollars. Here it is assessed conservatively at a billion dollars. Impact Benefit Agreements or provisions for a Sustainable Economy and Diversification Fund into which the user cost was deposited would help offset this subsidy.

### **VI.2.2 Subsidies through Preferential Tax Treatment**

Taxes are frequently set so as to encourage a given industry by providing preferential treatment. If an industry is not carrying its fair share of the tax burden, it is indirectly subsidized. Canada’s *Income Tax Act* allows 100% write-off on all exploration expenses and pre-production development costs. In calculating taxable federal income, mining companies also receive a resource allowance in lieu of a deduction for provincial mining taxes and royalties. This reduces the federal tax rate by 25%. A federal study reported in 1996 that mining operations had an effective tax rate of 21.84% at the federal level (Natural Resources Canada, Department of Finance and Industry Canada 1996). The federal resource allowance on total resource profits of \$10 billion would provide for a \$2.5 billion dollar tax credit, whereas actual provincial mining and royalty taxes would be approximately \$0.5 billion, providing the proponent with a generous subsidy. In addition, assuming that production began in the year 2002, VBNC would only begin paying federal income tax in 2006.<sup>xii</sup>

The above only illustrates how the mining industry benefits through the tax system. By introducing Bill 43, which could apparently increase provincial revenues collected from VBNC by over 50%, the Government of Newfoundland has implicitly shown that it believe



provincial taxes and royalties are too low. At the same time, the government of Newfoundland has subsidized exploration by providing 130% write-off for exploration expenses. From the above analysis, it appears that preferential taxation and excessive provisions for write-offs represent a subsidy on the order of \$1 billion or more.

### **VI.2.3 Subsidies through Direct Government Assistance**

It is difficult to assess whether the project would receive any direct government support. Neither the federal nor the provincial government appears to be providing any direct payments or loan guarantees for the mine complex. With respect to the proposed smelter/refinery at Argentia, the confidential nature of negotiations between the province and Inco/VBNC make it impossible to determine if any inducements are being offered to locate the smelter/refinery on the Island.

It is clear that the Proponent, like any other mining company working in Newfoundland and Labrador, benefits from the services and support provided by the Mines and Metals division of Natural Resources Canada and its Newfoundland counterpart in the Department of Energy and Mines. For instance, research into Labrador's geology over the last couple of decades funded under joint Federal/Provincial resource development agreements represents a significant subsidy to the mining industry. Because such subsidies benefit the entire mining industry, it is difficult to assess how much of such future expenditures should be attributed against the government revenues that will be collected from VBNC.<sup>xliii</sup>

The project will also put increased demands on many federal and provincial departments and agencies. For instance, the department of Fisheries and Oceans will have to monitor the project's effects on fish habitat and stocks. The provincial government will need inspectors to ensure environmental, health, labour, and safety standards are met, and this too will place additional costs on government, either by requiring new staff, or by forcing existing staff to pay less attention to other companies or projects where they have a regulatory role.

### **V1.2.4 Infrastructure and Services Subsidies**

Subsidies frequently occur where government provides new infrastructure or services to support projects, especially if the infrastructure is without residual value once the project is decommissioned. The mine will require a port, roads, airstrip, and housing for workers, etc., but these costs will be covered by VBNC. However, if approval of the mine prematurely encourages INCO to reduce or abandon Sudbury or Thompson operations, the value of government infrastructure in these regions would likely drop substantially. The resulting disruption would also increase social costs, and the demand for related government programs, though they would not necessarily qualify as subsidies.

The proponent concludes that the Undertaking will improve social conditions in Labrador North Coast communities (EIS, Chapter 20). However, this assessment may prove to be overly optimistic. The conflicts induced by the introduction of mining culture into indigenous culture, the influx of high incomes, and the arrival of new workers could result in higher levels of social turmoil, especially if the indigenous communities feel that the Undertaking has lessened the level of control they have over their lives. This could result in higher demands on social services.

In the past, nickel mining has resulted in a number of industrial diseases. Nickel can induce nasal, accessory sinuses, lung, and larynx cancers, as well as other occupational diseases (Seguin, 1998; Clement, 1981). Diesel fumes from underground mining equipment can also have health effects. Because the VBNC mine complex will be a modern operation, the level of industrial diseases induced by the mine will likely be lower than those experienced at Inco's Ontario operations. (Although Seguin (1998) suggests that the fact that the Undertaking would have a new inexperienced workforce, could result in initially higher accident rates than at the Sudbury operations.)

If industrial diseases do result, the costs of providing medical services to remote communities on the Labrador North Coast would be substantial. Given the increased demand on health services, VBNC's commitment to assist in funding the new hospital in Happy Valley Goose Bay is appropriate.

#### **V1.2.5 Subsidies Through Allowing Costs to be Externalized**

Where the Proponent is allowed to impose a social or environmental cost without full compensation, it receives in effect a subsidy. For instance, legislation and regulations related to the exploration phase provide few environmental safeguards. Innu have witnessed the environmental effects of the exploration frenzy that followed the discovery of the Voisey's Bay deposit (Innu Nation Task Force on Mining Activities, 1996). The Undertaking can also be subsidized if government does not ensure that the Proponent will be fully liable for any long-term costs created by the project's environmental legacy. The potential for sulphide bearing tailings to create hazards that last for generations is well known.

Markets impose constant discipline on corporations to cut costs, and one means of doing so is to reduce labour costs. This is done by using more capital equipment, making workers work harder, by keeping wages low, or by allowing the emphasis on labour productivity to overshadow the workers' health and safety. Both Clement (1981) and Brasch (1997) document the role unions have played in forcing Inco to adopt worker health and safety measures to reduce accident rates. Workers and society would bear the costs of poor safety practices.

The project, despite the best efforts of environmental reclamation and remediation, will result in net environmental degradation. As noted elsewhere in this report, such costs should be

minimized and where residual impacts occur, they should be offset. Unless the panel and regulatory authorities impose conditions of approval on the Undertaking which minimize and offset social and environmental costs, the Undertaking benefits from such subsidies. If so, the value of such subsidies should be subtracted from project benefits to better assess the economic implications of the project.

### **VI.2.6 Market Failure Subsidies**

The cost of many goods does not accurately reflect their full costs inclusive of social and environmental costs. This is particularly so in the case of energy. Petroleum producers and consumers do not pay the full costs imposed by the extraction, refining, transportation, and use of their product. The undertaking will require substantial inputs of diesel for generating electricity and mining equipment, jet fuel for worker transport, fuel for ocean shipping, etc. Accounting for the environmental costs of fossil fuel use is extremely difficult. Some authors have suggested that the true cost of fossil fuel is on the order of 5 to 10 times current prices (von Weizsäcker and Jesinghans, 1992). Were the Undertaking to proceed with significantly higher oil prices (assuming it was still viable), it is likely that the proponent's choice of technologies, the capital/labour mix, the attention devoted to energy efficiency, etc. would change in order to reduce costs and to maximize returns.

A comprehensive economic evaluation of the project would use "shadow prices" to correct for the failure of the price system to include such environmental externalities. Unfortunately, such subsidies are pervasive throughout the economy. No attempt is made to evaluate the extent to which the Undertaking benefits from such market failure subsidies, although the following example gives some indication.

The EIS notes that the project's maximum annual emission of CO<sub>2</sub> would be 0.205 Mt/y (EIS 8-16). Various sources provide estimates of the damage caused per tonne of carbon emitted and the values range widely. At the low end, a study by Mendelsohn (1998) would suggest a nil or even slightly negative value per tonne of C, as his model predicts that the global economy may actually benefit from global warming. The Intergovernmental Panel on Climate Change uses a value of between US \$1 to \$30 per tonne of C. WWF-Germany advocates a precautionary value of US \$125 per tonne C. With time, it is probable that as the impacts of climate change become better understood, there will be a higher level of consensus of the damage caused per tonne of C.<sup>xliii</sup>

Here it is assumed, for illustrative purposes, that the damage caused per tonne of carbon emitted might reasonably be found to be \$30US or \$12CAN per tonne of CO<sub>2</sub> (the high end of the IPCC estimate). If markets functioned ideally, this cost would be reflected in the price of fossil fuels. The proponent at maximum production would be paying an additional \$2.5 million per annum in fuel costs or carbon taxes. The proponent's statement that the project involves "no immediate or discernible environmental effect on climate change" (EIS 8-16) could then be written as "the project may impose on the global community an annual cost on the order of up to \$2.5 million by contributing to the Greenhouse Effect." However, fossil fuel extraction, refining and transportation involves environmental impacts other than climate

change, and so the market failure subsidy involved could amount to considerably more. Because such market failures are pervasive throughout the global economy, other inputs to the project are likely to be similarly under priced.

Thus, while it is difficult to exactly assess the values involved, the point remains that the project benefits from the pervasive failure of markets to incorporate in the price of goods the environmental damage they induced. A thorough critical assessment of the project's economic impacts should take the more significant such distortions into account through shadow-pricing project inputs.

### **VI.3 Summary Conclusion: Government Coffers**

While government revenues generated by the project initially appear impressive, they need to be offset by costs imposed on government and subsidies received by the Proponent. Further study, better defined final project configuration, and access to confidential information would be necessary to determine fully the extent of such costs and subsidies. It appears that such costs and subsidies total at least 2 billion dollars over the life of the project, though not all of these subsidies directly affect the federal or provincial finances.

#### **➔ Recommendation 16: Independent Assessment of Revenue Impacts**

The panel should recommend that an independent assessment be prepared of the project's effect on federal and provincial finances. This assessment should take into account the user cost, all subsidies benefiting the Undertaking, externalized costs, increases in government expenditures necessitated by the project or its legacy, and government revenue foregone from other projects precluded by the undertaking. Such a study should also identify the best means of phasing out any subsidies and to make the proponent bear the full cost of the development.

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## VII. THE VOISEY'S BAY MINE AND THE SUSTAINABILITY OF LOCAL ECONOMIES

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*It is an illusion to believe that the pipeline will solve the economic problems of the North. Its whole purpose is to deliver northern gas to homes and industries in the South. Indeed, rather than solving the North's economic problems, it may accentuate them.*

*The native people, both young and old, see clearly the short-term character of pipeline construction. They see the need to build an economic future for themselves on a surer foundation. The real economic problems in the North will be solved only when we accept the view the native people themselves expressed so often to the Inquiry: that is, the strengthening of the native economy. We must look at forms of economic development that really do accord with native values and preferences. If the kinds of things that native people now want are taken seriously, we must cease to regard large-scale industrial development as a panacea for the economic ills of the North.*

--Justice Thomas R. Berger, 1977

The Proponent emphasizes that the project will create significant economic benefits, including:

- increasing provincial GNP;
- boosting employment; and
- creating opportunities for long-term economic diversification by fueling economic spin-offs and by leaving a legacy of skilled individuals and companies.

This section examines how the Undertaking as currently configured would affect local sustainable economic development, and modifications that might be made to endure better such development.

### VII.1 Context for the Undertaking: Innu Economic History

It is useful to recall that not so long ago, both Innu and Inuit had their own economies that had been sustainable over the longer term. These economies were self-reliant, focused on meeting human needs while providing a rich social and cultural life. Benefits were shared relatively equally, all members of the society participated, and from childhood to one's death, each person had a contribution to make.

Decisions were made by Innu or Inuit without external influence. While there were difficult times, including starvation, long-lasting periods of deprivation and hardship were most likely relatively infrequent until the post-contact period, as settlers and others began to compete with the indigenous populations for the region's resources.<sup>xiv</sup>

The trading era gradually changed the Innu economy. Although the relationship between indigenous peoples and traders was in some ways mutually advantageous, economic power was unequal. The indigenous people were exploited, often receiving minimal payment for furs that could be resold at great profit in Europe. Despite such change, Innu continued to be largely independent, to make their own decisions, to travel freely, and to lead their own way of life. As the trading era went on, and as settlers extended their traplines, displacing Innu and putting pressure on wildlife reserves, hardship became more severe. With settlement, dramatic changes occurred. While there was now less chance of starvation, independence was lost, and Innu effectively became wards of the State and subject to considerable influence from European institutions such as the Catholic church, the schools, and the judiciary. Government sought to impose its resource harvesting regulations on Innu, despite aboriginal rights. The change from being an independent people with a rich endowment of natural resources, to being dispossessed wards of the state, brought with it cultural collapse, loss of individual and collective self-esteem, substance abuse, and a host of social ills that have been extensively documented (see Armitage, 1990 for instance).

What the above shows is that the Innu experienced in some ways economic "undevelopment." Innu had an economy in which needs were more than met at most times, where "the workforce" was highly skilled and capable of a diversity of tasks, where unemployment was unknown, and where participation in the economy created a sense of individual and collective self-worth and provided meaning. Innu are now a small, marginalized minority, overwhelmed by an economy geared toward serving distant needs. Local needs are largely, but poorly met through government transfer payments which provide the ability to purchase goods imported to the region. The population is largely unhealthy, nutrition in the community is poor, unemployment is high, social distress prevalent. Innu currently have few skills that are relevant to an industrial economy. Government has transferred Innu resources to itself, or to third parties. Given this context, economic development for Labrador's indigenous communities is only likely to be successful if it reestablishes many of the underlying fundamentals on which Innu and Inuit culture and economies were previously based. This suggests that the following conditions should be created.

### **Required Prerequisites for Aboriginal Economic Development**

- Innu and Inuit should once again have the power to make the key decisions that affect their future, and should have control over their own resource base.

- the emphasis of economic development should be on recreating self-reliance,<sup>xlv</sup> focused on ensuring that local needs are met in a way that shares costs and benefits, and in which participation in the economy provides meaning and not just a wage;
- economic disparities should be kept small; in particular, the creation of an economic elite would diminish future prospects for sustained economic development;
- local capacity needs to be built up before large scale economic development occurs. This will allow Innu and Inuit to manage change introduced by the Undertaking, to be effective partners in decision-making, to hold more prestigious jobs, and to develop new businesses unrelated to the Undertaking;
- large fluctuations in the level of economic activity should be avoided;
- the centrality of the traditional land-based economy must be recognized; economic development should strengthen opportunities for Innu and Inuit to sustainably harvest the renewable resources of their traditional territories.

Against the above pre-conditions for lasting economic development in Labrador, VBNC would superimpose a mining economy. Mining is often promoted as a promising route to economic development. However, past experience shows that mining can often hinder, rather than further, economic development (see section VII.3). Few mining-dependent economies have managed to sufficiently diversify before mining activity ceased.

## **VII.2 Towards a Clearer Conception of Economic Development**

Economic growth is frequently used interchangeably with the term “economic development.” Daly (1992) notes that “growth” implies “quantitative increase in the scale of the physical dimensions of the economy,” while development implies “qualitative improvement in the structure, design, and composition...” (page 224). Continued economic growth is both impossible (the Earth is finite) and undesirable (ever more growth involves using up resources, creating pollution, and crowding the Earth with ever more infrastructure, factories, goods, and wastes). Economic development can continue indefinitely—we can increase knowledge and wisdom, improve technologies, better learn to meet human needs.

With this clarification we can see that Innu and Inuit have experienced economic growth, but not necessarily development. The Innu “GDP” in the year 1400 would be very small, as no long-term surplus was accumulated and production was geared towards household

consumption. In 1998, Innu GDP would reach millions of dollars. However, many indicators such as nutrition, health, suicide rates, education relative to skills required for participation in the economy, etc., would suggest that the Innu economy is now less developed. This is not to say that Innu have not benefited from modern goods and services, but rather that in sum, economic growth has had little to do with improving Innu well-being.

The Proponent appears to be unaware of the difference between growth and development. VBNC sees no conflict between supporting sustainable development and being focused on a strategy of expansion and growth, equating sustainable development with exploiting new resources, or of referring to “a healthy global economy, with current projected growth rates in the range of 3 to 5%...” (Vol.1, p. 3), or suggesting that development of oil and gas reserves off the Newfoundland coast will “continue to build a sustainable industry” (EIS 22-10).

The Proponent argues that provincial GDP will increase by \$11.6 billion as a result of the Undertaking. This statement shows two instances of growth-vs.-development confusion. First, growth in GDP is not desirable in and of itself. For instance, resource depletion and degradation of the natural environment appear misleadingly in GDP as desirable components of economic progress (El Serafy, 1997). Many adjustments are needed to subtract defensive expenditures, to account for resource depletion, environmental damage, to factor in unpaid labour, etc., before a more useful measure of economic welfare can be constructed (Daly and Cobb, 1994; Daly, 1996). Indeed, the economy can grow as resources are depleted, as people have less leisure time, as poverty rates increase, and as people are harmed by environmental degradation (Daly and Cobb, 1994; Stockhammer et al., 1997).<sup>xlvi</sup>

The second confusion results because the Proponent refers to the project’s contribution to Gross Domestic Product. The more relevant indicator is Net Domestic Product, which is obtained by deducting the capital consumption or depreciation that occurred over the accounting period from GDP. Given that the proponent’s project involves depleting stocks of nickel in the province, the project’s contribution to the province’s economy should be net of the user cost. To do otherwise inflates the project’s contribution to the provincial economy. The main point of the above is that while mining usually contributes to economic growth, as commonly measured, as it involves increasing the rate of resource throughput. However, it does not necessarily result in economic development.

### **VII.3 Mining as a Pathway to Economic Development**

Common sense would suggest that countries or regions which are rich in mineral resources would have an easier time developing their economies. Experience often suggests the reverse, something known as the resource curse thesis: “It is widely believed that natural mineral resources are desirable. However...it seems that this ‘natural asset’ can distort the economy to such a degree that the benefit actually becomes a curse” (Auty, 1993: preface).

Several factors have been found to contribute to mineral wealth’s failure to support the economic development of Third World nations:



- mineral resources engender an optimistic bias from government, leading to dependence on the mineral sector;
- economic diversification and investment in the non-mining sector is neglected;
- the volatility of the mineral sector perturbs the economy;
- the isolation of the mining sector from the rest of the economy, due to its capital-intensive nature and the lack of upstream or downstream processing opportunities;
- the creation of a “labour aristocracy” of highly-paid mine workers, while other workers’ wages stagnate; and
- uncertainty created by impending exhaustion of a non-renewable resource (Auty, 1993).

Tilton (1992) finds that the disappointing development results engendered by mineral wealth are partly explained by the failure to appropriately invest resource rents in a way that will provide for the long-term flow of goods and services. Rents are often used to finance current spending, or are taken offshore.

Many of the factors that apply to developing countries would also apply, though with perhaps less influence, in the Labrador context. Other authors have identified other reasons for mining’s lackluster performance in encouraging economic development. These include:

- businesses and individuals limit exposure to cyclical downturns and to eventual exhaustion of the ore body, by avoiding investments in mining-dependent regions;
- mobility of mining workforce discourages long-term investment by businesses and individuals living in the region;
- mining company dominance in the local economy and politics encourages dependency; corporations benefit from dependency because it weakens labour and local government’s bargaining position; poor bargaining positions allow more of the resource rent to be captured by the corporation;
- poor linkages between mining and the rest of the economy;
- the major decisions affecting the region are made in distant corporate headquarters and reflect international markets, removing local sense of control and responsibility;
- few prospects for downstream development (processing the ore) or upstream development (supplying the mine with goods and services);
- mining skills are not easily transferable to other workplaces;
- mining companies take advantage of cyclical downturns to reduce the expectations of the workforce, local communities, and government, so as to gain concessions;
- local costs usually exceed local benefits, so there is little reason to wish to remain in a mining-dependent region; and
- mining culture, being that of hard work and rough play, with frequent instances of violence amongst men and towards women, results in high levels of social distress and lessened ability of income to contribute to economic development.

Locke (1986) examined the difficulties that Newfoundland communities face when mines shut down. He argued for:

- an investment fund based on a Swedish model in which mining companies invest during good times for tax breaks and withdraw during hard times for investment purposes;
- a reserve or depletion fund to provide a tax base to communities experiencing revenue shortages once mines are closed, and to help diversify the local economy;
- requiring companies to disclose to communities their operating plans and an economic impact statement assessing the impacts of its decisions to close operations, along with supporting financial data to support the reasons for closure; and
- requiring companies to make restitution payments when departing communities.

The intent of Locke's recommendations is clear, e.g. stabilizing community economies, preparing them to adapt to mine closure, and reducing the social costs of closure. However, Locke was addressing existing mines. In the case of a proposed mine, there is more potential to set up required conditions from the outset.

Instead of providing Innu, Inuit, and other Labrador residents with a legacy of skills, the project, unless carefully controlled, could be "a shocking lurch into a potential dead end" (Power, 1998). It is therefore essential to determine conditions that can be imposed to improve prospects for local economic development.

#### **VII.4 Conditions for Local Development**

The influx of wages into the region during the project's lifespan will provide a window of opportunity for new businesses to become established, and for owners and employees to learn business skills. For some businesses such as local restaurants, the mine could create a temporarily forgiving business environment where prices may be kept relatively high, thereby offsetting mistakes or inefficiencies as owners and employees learn efficient business practices. Early efforts will be required to wean such businesses from being dependent on the mining economy if they are to outlast the mine. To build up a diversified business base, coordinated efforts will also be required immediately. New businesses require a trained workforce, access to resources, access to capital, and appropriate markets. New businesses in small remote communities typically take between 5 to 10 years from initial concept to proven economic viability. However, given the remote location, transportation difficulties, weather, available resources and other factors, it is likely that the best economic diversification efforts will yield modest results.

In a thorough survey of local development in Canada, Brodhead et al. (1993) conclude that, ... "top-down", large-scale strategies emphasizing the attraction of outside industries...have not often been effective in promoting long-term development... In contrast, the [Economic Council of Canada] case studies have shown that the "bottom-up" strategies based on mobilizing previously

underutilized community resources can lead to both social and economic benefits, albeit on a small scale at the outset (p. 316).

Their study suggests several preconditions for successful long-term local economic development:

- a long-term commitment (10 year minimum) to proactive planning;
- recognition that lasting results will take a decade to materialize;
- emphasis on building local capacity, through training, education, and work experience;
- access to capital funds and capacity to invest surplus funds locally through loans to local small businesses;
- access to information on markets and market conditions;
- mechanisms to improve access to information, ideas, and new technologies;
- focusing on partnerships between private business, non-profit organizations, and government; and
- focusing on economic development efforts and helping communities to direct their own future, to meet local needs, and to increase self-reliance.

Lewis and Hatton (1992) examine the preconditions for successful aboriginal joint ventures — ventures intended to capture wealth, experience, and skill from large projects that would otherwise drain to outside economies. Economic development premised on attracting outside enterprise will fail because it does not strengthen “the capacity of the community’s members to plan and build an economic future which suits their values, priorities, and needs” (page 6). Due to poor self-esteem, low levels of formal education, substance abuse problems, lack of resource base, a small or non-existent business sector, high costs of infrastructure provision, over-extended leaders, political instability, and heavy dependence on outside expertise, aboriginal communities face many disadvantages in pursuing economic development. Lewis and Hatton emphasize four essential ingredients for local economic development:

1. planning and research to understand the regional economy;
2. financial equity available for investment;
3. access to loans; and
4. comprehensive training programs.

Using the Voisey’s Bay Nickel Mine as a vehicle to diversify the local economy will be very difficult, particularly if the mine life-span is short. Diversification will require a proactive approach, including:

- capacity-building before the mine proceeds, so as to ensure effective participation in the project;
- identification of Innu and Inuit economic development needs, priorities, and values;
- proactive planning between indigenous stakeholders, VBNC, and government, which identifies barriers to economic development and training needs, and ensures that required programs take place;

- setting up a substantial investment fund for seed funding of new enterprises;
- provision of business planning and management expertise;
- access to equity and financing; and
- equity participation in joint ventures (Bill Hatton, Personal Communication, July 1998).

### **VII.3.1 Culture and Industrialization**

Prospects for the project to provide net benefits to affected Innu and Inuit are presently limited for cultural reasons. It should be recalled that the industrial revolution was slow to take off at first, largely because there was no workforce available at the time that was used to routine tasks, taking orders, and set hours of work. Instead, the workforce had been accustomed to a craft industry setting where workers were their own masters, and where work was rewarding in its own right. In a similar way, Innu culture is significantly at odds with that of the ideal industrial workforce. In Nutshimit, or the country, where many Innu feel most culturally secure, several cultural attitudes can be observed that are highly different from those of a shift worker:

- there is no camp boss, nor is there a tradition of giving or following orders; rather, leadership is fluid and contingent on the consent of other hunters;
- accumulation is frowned upon, sharing is valued and expected;
- activities occur not according to the dictates of a clock, but rather in response to environmental conditions and harvesting opportunities;
- work is valued in its own right, and is integrated with other parts of life.

Culture is dynamic; Innu culture is currently undergoing rapid change. However, it should be clear that Innu culture strongly retains many of the above values, so that partaking in wage labour can result in inner conflict, conflict within the extended family, and a crisis of identity. The above suggests that if significant numbers of Innu are to become wage labourers and entrepreneurs, either culture will change significantly, or the Undertaking needs to be carefully designed to enable aboriginal participation with minimal loss of cultural identity.

Wage employment can boost self-esteem, allow one to better provide for one's family and buy goods helpful for engaging in harvesting activities, and replace dependency on government. The opportunity to start new businesses unrelated to the Undertaking could also provide such benefits, and more, if the business allows for independence, a good fit between work requirements and Innu culture and personal values, and flexibility to engage in harvesting activities. The challenge for Innu will be to find ways of participating in the economy that enrich rather than weaken culture. Innu can only do so much in this direction if projects are thrust upon them that are incompatible with Innu priorities, if the projects are simply too large, or if change occurs too rapidly. As the Innu Task Force on mining activities noted, many Innu felt that "...the speed at which the mine was being developed pre-

empted the possibility of Innu people getting trained in time to qualify for these jobs” (INTFOMA, 1996:43). The task force also reported how the prospect of easy jobs with VBNC could in fact deter young Innu from pursuing further education, while cultural loss and social problems loomed large.

If approval is received, and the Proponent decides to proceed immediately with an ovoid only project, few Innu from Utshimassit will benefit from mining employment. During most of the 6-8 years of mining out the ovoid, the Innu workforce will be employed relocating their community.

It is likely that only a small portion of Innu and Inuit will benefit directly from wage employment or spin-offs created by the Undertaking. In exchange for allowing such a rich ore body to be depleted, Innu and Inuit should benefit from a social dividend, not just work for a minority within their communities. For VBNC, after all, wages are a regrettable cost of business, and whether indigenous people or others wear the hard hats is of little import. Therefore, if the LIA and Innu Nation membership merely obtain work from the project, then they have not shared in the project’s payoffs.

A social dividend implies that Innu Nation or LIA members should not have to work at the project in order to participate in the project’s benefits. If an individual feels that mining is simply not a way of life that they want to pursue, then he or she should derive benefits from the project without actually working at the mine. The James Bay and Northern Quebec Agreement has shown how this can be done through the income support program for hunting and trapping. If proceeds from the project are used to improve the long-term viability of renewable resource harvesting and the ability of Innu and Inuit to pursue this livelihood, then the project will have provided social and cultural benefits and added to long-term economic viability.

## **VII.5 Summary Conclusions**

If the Undertaking is to provide lasting economic benefits to local populations, in accordance with the requirements of sustainable development, then several conditions will need to be imposed on the project. These conditions are consistent with those identified in other chapters of this report. The main requirements are to:

- delay the project sufficiently to allow Innu and Inuit to capacity build, so that they may gain greater benefits from the project and have the capacity to manage change and address project-induced impacts.
- slow the pace of operations to reduce the economic impacts of the project, to spread project benefits over time, to provide a longer time-frame for economic diversification, and to minimize the potential for and effects of production shutdowns caused by temporary nickel gluts.
- limit the amount of power gained by VBNC to influence workers, communities, LIA and Innu Nation, and the provincial government.

- reduce the likelihood of VBNC responding to excess supply on global nickel markets by shutting down production, and if temporary shutdown occurs, provide adjustment mechanisms.
- ensure that the renewable resource economy is not negatively impacted by the project, by applying strict environmental controls, by compensating any impacts that cannot be mitigated, and by adopting measures to encourage traditional harvesting activities.
- invest the mineral resource rent in a way that procures long-term economic benefits for Innu and Inuit.
- initiate economic diversification efforts immediately, and set in place required tools, institutions, and training programs.
- ensure that the Undertaking proceeds in a way that secures benefits for Innu and Inuit who do not work for wages, through sharing of a social dividend.

Many of the recommendations put forth in earlier chapters of this report are supported by the findings of this chapter, but are not repeated here.

➔ **Recommendation 17: Social Dividend to Support Harvesting**

The Undertaking should not proceed until a mechanism has been found to use part of the proceeds from the Undertaking to provide a social dividend in the form of an income support program for renewable resource harvesting activities. Ideally, through carefully designed incentives, at least as many Innu and Inuit would benefit from this program as would benefit from wage employment at the mine.

➔ **Recommendation 18: Diversification Initiative**

A coordinated, proactive economic diversification initiative should immediately be established, involving LIA, Innu Nation, and federal and provincial governments.

➔ **Recommendation 19: Seed Capital**

A substantial seed capital investment fund should build up reserves during the project, and lend out funds to initiatives that show financial viability. Until the ore body is 50% depleted or seven years from exhaustion, a portion of those funds could be lent out to small business ventures that are mine-related, but after that point, any loans should only be made to businesses that are not mining-dependent.

➔ **Recommendation 20: Stabilizing Revenue**

Government revenues from VBNC should be deposited in a fund from which only the interest can be used for current spending. By stabilizing revenue, government dependence on short-term output from the mine will be reduced.

➔ **Recommendation 21: Local Priorities**

Economic development of the Labrador North Coast should be based on the vision, needs and priorities of LIA and Innu Nation members.

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## VIII. CONCLUSION

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This panel, and the parties to the Memorandum of Understanding, have a unique opportunity to set new standards in environmental assessment. This would be done by rigorously interpreting sustainable development as it relates to the proposed Undertaking. To do so requires a hard look at how the project fits with sustainability, with a world where resource use must decline, where the emphasis is on meeting human needs rather than on an outdated commitment to economic growth, where we do more with less, and where local populations control and influence the economic development of their region. This in turn requires a thorough examination of need and alternatives. As this study has shown, the Proponent has not demonstrated need for the project, nor has the Proponent fully considered alternatives. In fact, based on the analysis in this study and the related study by mineral economist Tom Bartek, there is no current need for the project.

Given that the Undertaking, as currently configured, is incompatible with sustainable development, given that there is no need for the Undertaking at the current time, and given the impacts the Undertaking will entail, the panel has considerable flexibility. The panel can recommend that the Undertaking not be approved. The project could be approved, but the start-up date could be deferred until 7 to 10 years' time, if at that point need is established. If the project is to go ahead, the constraints required by sustainable development would necessitate significant changes to the project, in particular with regards to the pace and scale of the operation and its fit with the economic development priorities of LIA and Innu Nation.

There are precedents for the situation faced by the Panel and the Parties to the MOU. In 1977, the Berger Inquiry on the Mackenzie Valley pipeline concluded,

And a Mackenzie Valley pipeline should be postponed for ten years. If it were built now, it would bring limited economic benefits... Postponement will allow sufficient time for native claims to be settled, and for new programs and institutions to be established (Inquiry, Vol. 1, page xxvii).

Those social and economic gains will follow from the achievement of a sense of collective pride and initiative by the Dene, Inuit, and Metis, and not simply from a clearing away of legal complications to enable industrial development to proceed... We have never had to determine what is the most intelligent use to make of our resources. We have never had to consider restraint. Will we continue, driven by technology and egregious patterns of consumption, to deplete our energy resources wherever we find them? (Inquiry, Vol.1, page 200).



There are significant parallels between the two cases. Despite dire predictions by proponents, Canada north of 60° survived the collapse of the Mackenzie Valley pipeline.<sup>xlvii</sup> The need was not pressing, alternatives existed, delay was required to ensure aboriginal rights were respected and that the economic benefits of northern development would be lasting, and significant environmental concerns required further research. Advocates of both undertakings rely on the questionable premise that only by attracting large-scale projects from outside can local economic development be jump-started.

But over twenty years have passed since the Berger Inquiry. The world and Canada's environmental predicament has become more dire, while our ecological knowledge has improved. An environmental assessment in 1998 should go beyond the Berger Inquiry adopt a higher level of precaution and be more averse to accepting social and environmental impact.

If the panel concludes that the mine can proceed, it has an opportunity to set a new global benchmark for reconciling mining with sustainability. The Canadian mining industry's international reputation has suffered in recent years from the Bre-X fiasco and from environmental accidents such as the \$150 million worth of damage caused by the tailings spill from the Boliden mine in Spain, or the tailings pond spill at the Cambior Inc. mine in Guyana, for instance. While corporate statements of commitment to sustainable development can contribute to change in corporate culture and behaviour, such statements are insufficient to ensure appropriate design, scale, operations, and decommissioning. Corporations are subject to market pressures, takeovers, and the like, which frequently impede actions and behaviour required by sustainability.

Achieving sustainable development requires that society impose constraints on markets. Just as respect for the rights of individuals required outlawing slavery, so the pursuit of sustainability requires new rules, under which market behaviour is free to take place. Inco and VBNC may prefer the old days of mining, because business was simpler, and it was easier to make a profit. But achieving sustainable development requires new rules and institutions; no business will be unaffected. The panel can help set up a framework which ensures that there are long-term benefits, and that the social and environmental legacy is acceptable.

The pressure to do otherwise, to make sure the mine is speedily approved, will be intense. Newfoundland and Labrador's economy is leaving far too many people without enough work. The need for jobs is real, the need for government revenues persistent. Many entrepreneurs see the Undertaking as a chance to get rich quickly. Small business owners see a chance to improve their bottom line. Proponents of economic growth see the mine as the key to Labrador's prosperity. Governments compete for foreign investment, and want to ensure that the international business community feels investments will be secure.

Newfoundland has had a history of concentrating on the short-term when it comes to mega-projects, and the results have been disappointing. The Churchill Falls Hydroelectric

development is a painful reminder of this pattern, with Hydro Quebec benefiting from windfall profits until 2041, increasingly subsidized by the government of Newfoundland.

Yet by concentrating on the short term, society risks being left with an unfortunate legacy and missing a unique opportunity to implement measures that would further sustainability. Canada will have helped further increase the rate of resource use, just when the importance of resource efficiency is being recognized in traditionally conservative institutions such as the OECD, the UN, and the World Bank. A short-term burst of economic activity and jobs will provide few lasting local benefits, despite leaving nearby populations with a depleted ore body, a potential environmental hazard, and a largely irrelevant set of skills. The sooner the deposit is exploited, and the faster ore is extracted, the less is the potential for indigenous population to share in the benefits, and the greater the social costs are likely to be. This in turn will render future economic development more difficult. Government and others will see an influx of funds, but largely derived from one-time depletion of an asset. According to rigorous application of conservative economic theory, such funds should not be seen as income, as there is a “user cost” when a non-renewable asset is depleted.

It would be unfortunate if just as the industrial world is becoming painfully aware of the unsustainability of its ways, the proposed Undertaking forced Innu and Inuit to participate in mining with terms not of their own choosing. Mining is an inherently unsustainable activity, and it should not take precedence over a long tradition of sustainable harvesting.

If one steps back and looks at the long course of history of resource use in Labrador, a different picture emerges. The Voisey’s Bay ore body sat untouched while scores of generations of Innu and Inuit lived off the bounty of the nearby land and the ocean coast. A small number of Innu and Inuit, over the span of perhaps less than one generation, may benefit from rapid extraction of the ore, while many others may find their way of life disrupted. As well, Newfoundland and Labrador’s non-indigenous population will derive some modest employment benefits, while much of the wealth from the mine will quickly be dissipated. Labrador’s indigenous peoples are likely to be drawn ever more tightly into the West’s unsustainable consumer culture, just as Westerners are learning of the urgent need to tame their own excesses. Within a decade, a large pit will be left behind and a staggering amount of acid-generating tailings. As the new millennium dawns, surely we approach economic development and the extraction of minerals in a more inspiring way.

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## ENDNOTES

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<sup>i</sup> The need for a 90% reduction in material intensity in OECD countries was acknowledged in the October 1994 Carnoules Declaration, endorsed by prominent individuals including the former executive directors of the Business Council for Sustainable Development and the Brundtland Commission.

<sup>ii</sup> See Green, T., 1998. "Critique of the Socio-Economic Analysis and Assessment of Impacts in Voisey's Bay Nickel Company's Environmental Impact Statement," prepared for Innu Nation, Major Deficiency #1.

<sup>iii</sup> Full-cost or true cost pricing involves setting prices or adjusting prices so that they better reflect the social and environmental costs of production.

<sup>iv</sup> For such rights to make a significant contribution to global sustainability, indigenous peoples and local communities around the globe would need to have the right to refuse inappropriate development. The way resources are extracted would likely change so that fewer social and environmental impacts resulted,

contributing to sustainability, and the price of raw materials would likely increase, leading to improved resource efficiency.

<sup>v</sup> At the time of writing, the criteria were still in draft form and not available for public release. The Environmental Mining Council of BC in Victoria is playing a lead role in coordinating this effort.

<sup>vi</sup> In this test, the term mine is understood to include all associated infrastructure such as roads, processing plants, stockpiles, transmission lines, worker's quarters, tailings ponds, etc.

<sup>vii</sup> See for instance Ayres and Ayres, 1996; Azar, Holmberg and Lindgren, 1996, Daly, 1992, 1996; Duchin and Lange, 1994; Goodland and Daly, 1995; Meadows, Meadows and Randers, 1992; OECD 1997b; United Nations, 1997, Weizsäcker, Lovins, and Lovins, 1997.

<sup>viii</sup> See Daly, 1996, pages 220-222, Durning, 1992, Max-Neef, 1992

<sup>ix</sup> WCED 1987.

<sup>x</sup> See various assessments by the Intergovernmental Panel on Climate Change.

<sup>xi</sup> Azar, Holmberg, and Lindgren, 1996; Ayres, 1996.

<sup>xii</sup> Campbell and Laherrère, 1998.

<sup>xiii</sup> Cutler, 1991; Ayres, 1978.

<sup>xiv</sup> EMCBC, n.d., 1998.

<sup>xv</sup> WCED, 1987; Common, 1995; Cragg and Schartz, 1996; Goodland and Daly, 1995; Daly, 1996; Young, 1992; Young and Sachs, 1994.

<sup>xvi</sup> Goodland et al., 1992; Daly, 1996; Wackernagel and Rees, 1997.

<sup>xvii</sup> See note 7, rationale for present need, above.

<sup>xviii</sup> Georgescu-Roegen, N., 1971; Cutler, 1991, Ayres, 1978.

<sup>xix</sup> OECD, 1989; Costanza and Cornwell, 1992.

<sup>xx</sup> Pigou, 1920; Pearce and Turner, 1990; Daly, 1992,

<sup>xxi</sup> WCED 1987; El Serafy, 1989; Daly, 1992, 1996; Common, 1995.

<sup>xxii</sup> WCED, 1987, Cragg and Schwartz, 1996.

<sup>xxiii</sup> O'Riordan and Cameron, 1994

<sup>xxiv</sup> Grumbine, 1993; Burton et al., 1994, Mangel et al., 1996.

<sup>xxv</sup> Jordan et al., 1987

<sup>xxvi</sup> Jacobs, 1991.

<sup>xxvii</sup> This parallels the Canadian government's "no net loss" principle for fish habitat management.

<sup>xxviii</sup> O'Riordan and Cameron, 1994

<sup>xxix</sup> Many abandoned sites significantly contribute to ecological deterioration and stress, yet funds for reclamation and restoration are limited, and previous owners difficult to hold liable. This approach would allow two problems to be simultaneously solved.

<sup>xxx</sup> The report by Goldman Sachs is quoted in Labrador Inuit Association 1998. As of writing, the author had not received a copy of the report.

<sup>xxxi</sup> Economists have a special meaning for the term "efficiency." A market outcome is said to be economically efficient (taking the initial distribution of wealth as given) if there is no way of making one person better off without someone else being made worse off. In practice, a modified test is used, where a course of action is efficient if winners could compensate losers--whether or not they do. Economic efficiency is therefore blind to ethical considerations and ecological limits, and it is based on a number of assumptions about markets and human welfare. The concept of economic efficiency is often criticized.

<sup>xxxii</sup> For instance, it is impossible to assign a cost to causing the extinction of a species. Also, the existing market is full of distortions, because no industry currently faces the full costs of its actions, so the prices used to calculate full costs are themselves off the mark.

<sup>xxxiii</sup> Despite the economist's usual preference for using the market to force polluters to change their production so as to reduce social costs, there are significant limitations to this approach. There are absolutes that are best prohibited, rather than taxed. For instance, if society rejects slavery, then it makes no sense to apply special charges to companies that use slaves, so that they will find it cheaper to hire their workers. The use of slaves is simply made illegal, with high penalties for breaking the laws.

<sup>xxxiv</sup> Indeed, the stock markets are largely considered to be an impediment to sustainability, due to the short-term focus of investors, a problem noted with concern by the prominent economist John Maynard Keynes in 1936.

<sup>xxxv</sup> For instance, see American Institute of Certified Public Accountants, 1996. Statement of Position 96-1, Environmental Remediation Liabilities. New York, NY.

<sup>xxxvi</sup> Otherwise, one could come to perverse conclusions. For instance, if the mine became accident-prone, and higher premiums were required to offset the costs for injured workers, society would appear to be better off--a conclusion workers could not support.

<sup>xxxvii</sup> El Serafy suggests that the rate  $r$  should be based on the prospective real rate of return that can be achieved in new investments. The author believes that such a rate of return should be based on factoring in all social and environmental costs. Given how unsustainable most industrial activity currently is, and the already high rates of renewable resource use, rates of return of new investments in renewable resources in a sustainable economy are likely to be modest. Accordingly, this study would advocate a precautionary  $r$  of between 2 and 4%. Higher values of  $r$  diminish the responsibility to future generations.

<sup>xxxviii</sup> Two formats can be used. Typically it is written in the form  $n+1$  and applied when payments are made at the beginning of each year. In this case the form  $n$  is preferred and receipts occur at the end of each year.

<sup>xxxix</sup> There is considerable uncertainty over the revenue that will be generated by the undertaking should it proceed. Furthermore, estimates of government revenue provided by the proponent do not include breakdowns, nor are underlying assumptions spelled out (the proponent did not respond to the author's request for the assumptions and the detailed breakdowns that were behind this analysis). Thus the numbers used in this section of the study should be considered indicative only. They are based on earlier projections that were probably unrealistically optimistic about prospects for nickel prices.

<sup>xl</sup> In 1995 dollars.

<sup>xli</sup> Exclusive of the Federal Large Corporations Tax which is based on taxable capital, offset by a credit for the Federal Income surtax. In effect, large corporation tax is paid until three years before Income taxes will be paid.

<sup>xlii</sup> In 1995, a team of researchers from various organizations and universities proposed to research Canadian subsidies to the mining industry, but were unable to secure the required funding (personal communication, Patricia Perkins, Professor of Environmental Studies, York University, August 10, 1998).

<sup>xliii</sup> Valuation of costs and benefits where environmental change is involved is difficult and fraught with moral judgements, methodological complications, and uncertainty. For instance, if global warming causes, as is predicted, the extinction of a significant number of species, how is such loss to be valued? How does one evaluate the loss of human life, and is it acceptable -- as some studies have done -- to assign a different value to the life of a rich northerner versus that of a poor inhabitant of a tropical small island state? A precautionary stance and a commitment to sustainable development would suggest that humanity should avoid further climate change because of the risks of destabilizing ocean currents and because many species may not be able to adapt or migrate quickly enough. For an interesting examination of the limitations of the valuation/cost-benefit analysis approach when dealing with climate, see Brown, P.G. 1998. "Towards an economics of stewardship: the case of climate," *Ecological Economics* 26(1)11-21.

<sup>xliv</sup> Early in this century, for reasons that are not well understood, population levels of the George River Caribou Herd were very low, and Innu had to repeatedly turn to government and other relief.

<sup>xlv</sup> Self-reliance does not imply self-sufficiency.

<sup>xlvi</sup> Even so, while an adjusted GDP is a useful tool for designing and assessing environmental policy, it should be used cautiously as it is not a measure of human welfare itself, nor does it take into account all environmental considerations. For instance, an adjusted GDP still equates most increases in consumption as desirable, while the consumption of many goods adds little or nothing to welfare (Lintott, 1998).

<sup>xlvii</sup> The project collapsed of its own weight, because it didn't make financial sense to proceed (Ed Weich, electronic mail communication to the author, August 7, 1998).