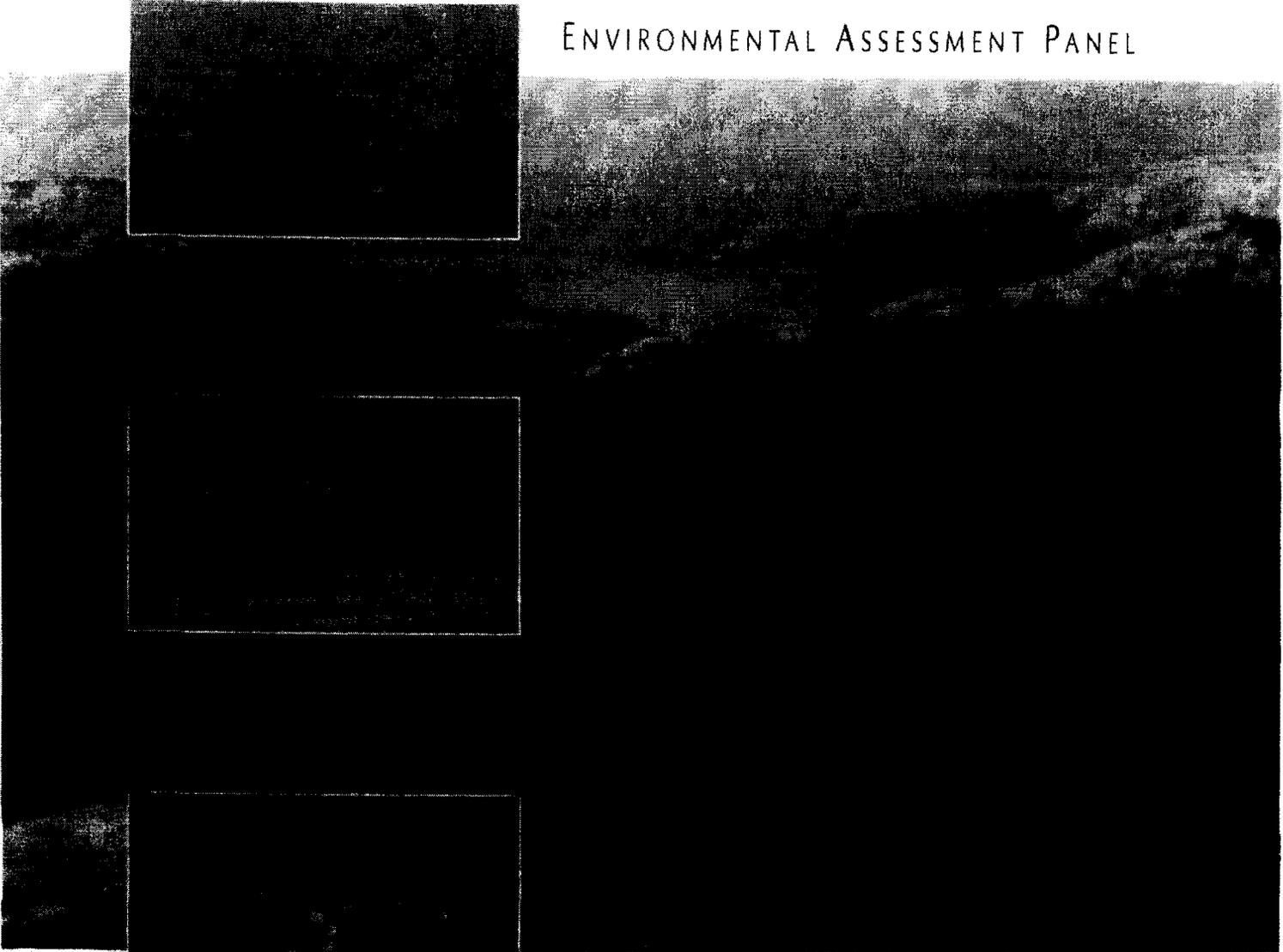




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ENVIRONMENTAL ASSESSMENT PANEL

REPORT ON THE PROPOSED
VOISEY'S BAY
MINE AND MILL PROJECT

MARCH 1999

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**VOISEY'S BAY
ENVIRONMENTAL ASSESSMENT PANEL**

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Dear Sirs and Madam:

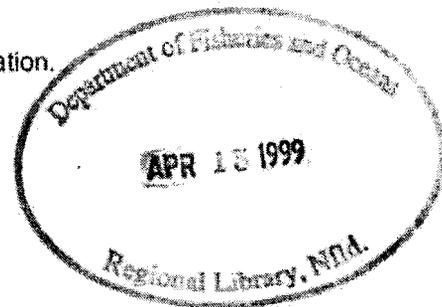
In accordance with the mandate issued January 31, 1997, the Joint Environmental Assessment Panel has completed its review of the Voisey's Bay Mine and Mill Development as proposed by the Voisey's Bay Nickel Company.

We are pleased to submit the Panel report for your consideration.

Respectfully,

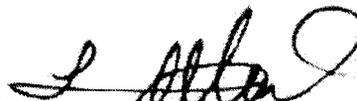


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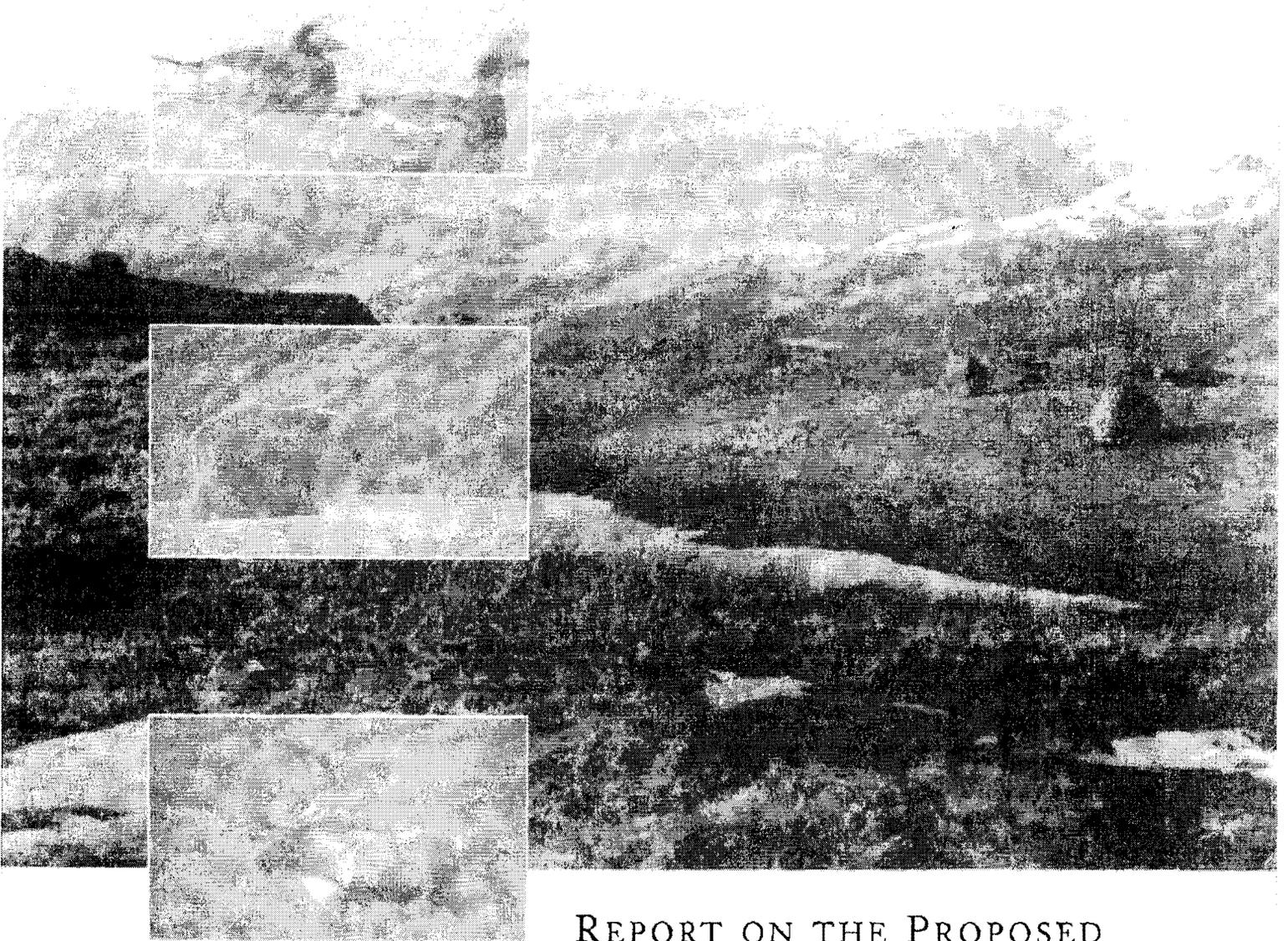


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ENVIRONMENTAL ASSESSMENT PANEL



REPORT ON THE PROPOSED
VOISEY'S BAY
MINE AND MILL PROJECT

MARCH 1999

Government of Canada
Innu Nation

Government of Newfoundland and Labrador
Labrador Inuit Association

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Printed and bound in Canada

Catalogue No. En106-45/1999E
ISBN 0-662-27511-X

Publié aussi en français sous le titre : *Projet d'exploitation minière
et d'usine de concentration de la baie Voisey.*

This report is also available in alternative format and also on the
Canadian Environmental Assessment Agency's web site at
<http://www.ceaa.gc.ca>

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SUMMARY

THE PROJECT

The Voisey's Bay Nickel Company (VBNC) proposes to mine nickel, together with some copper and cobalt, at a location in northern Labrador, 35 km south of Nain and 79 km north of Utshimassits (Davis Inlet). VBNC would start by mining 32 million tonnes of ore from an open pit, while carrying out more exploration to find out exactly how much ore is underground. VBNC would then develop an underground mine, where it hopes to be able to mine another 118 million tonnes.

VBNC would process the ore in a mill on site to produce concentrates. The main waste product coming out of the mill would be finely ground rock called tailings. The tailings, together with some of the waste rock excavated from the open pit and the underground mine, would be stored under water in two tailings basins made from existing lakes. This would prevent the tailings and rock from being in contact with both air and water simultaneously, which would cause them to release acid.

VBNC would transport the concentrates from Edward's Cove by ship to another location, as yet undecided, for further processing. At first, the ships would not have to travel through landfast ice, but eventually VBNC would want to ship year round, except when the ice is forming or in the early spring.

During the hearings, VBNC said that the Project would create 570 jobs during construction, 420 jobs in the open pit phase and 950 jobs in the underground phase. Only about half of the workers would be on site at any one time, because they would work and live at the site for two weeks, and then return home for two weeks. VBNC would not build a new town at the mine site.

THE REVIEW PROCESS

In January 1997, the federal and provincial governments, the Labrador Inuit Association

(LIA) and the Innu Nation signed a memorandum of understanding (MOU) setting out how the environmental effects of the proposed Voisey's Bay Mine and Mill Project would be reviewed. A five-person panel was appointed to carry out this review and prepare this report. The panel members are Ms. Lesley Griffiths (Chairperson), Dr. Peter Usher, Dr. Charles Pelley, Ms. Lorraine Michael, and Mr. Samuel Metcalfe.

The Panel held two rounds of public meetings. Scoping sessions took place in spring 1997. The second round, 32 days of public hearings, took place in 10 Labrador communities and in St John's during September, October and November 1998.

THE PANEL'S OVERALL CONCLUSION

To reach an overall conclusion about the Project's effects, the Panel asked three main questions, based on the terms of reference in the MOU.

- Would the Project cause serious or irreversible harm to plants and animals and their habitats?
- Would the Project affect country foods or prevent Aboriginal people from harvesting them, either now or in years to come?
- Would the Project bring social and economic benefits to many people in northern Labrador or to only a few, and would these benefits last?

The Panel has very carefully reviewed all aspects of the Project and listened to the opinions of government, Aboriginal organizations and many other people. Based on this review, the Panel has made a number of recommendations about how the Project should be carried out. The Panel has concluded that, provided these recommendations are carried out, the Project would not seriously harm the natural environment, or country foods and people's ability to

harvest them. The Panel has also concluded that the Project with a lifespan as described in the EIS has the potential to offer the people of northern Labrador lasting social and economic benefits through employment and business opportunities. Therefore, the Panel has recommended that the Project be allowed to go ahead, as long as the other recommendations in this report are made part of the conditions of approval.

MINE LIFE, LAND CLAIMS, AND IMPACT AND BENEFIT AGREEMENTS (IBAs)

The Panel's first three recommendations address some important issues that many presenters spoke about:

- how long the Project would last;
- how it might affect land claims negotiations; and
- the role of impact and benefit agreements (IBAs).

The Panel agrees that the Project must last at least 20–25 years. In this way, more than one generation of people would benefit from the mine. Communities would also have a chance to create new economic development opportunities, based on the increased incomes coming from the Project. Therefore, the Panel has recommended that the Province include conditions in the mining lease to ensure that, if VBNC finds less nickel underground than expected, it would reduce the amount of nickel it takes out each year in order to extend the life of the mine.

LIA, the Innu Nation and many individuals told the Panel that the Project should not go ahead until land claims had been settled. After the Panel started its work, the Supreme Court of Canada issued an important court decision about Aboriginal title and rights across the whole country (the *Delgamuukw* judgement). The Panel understands this decision to mean that where Aboriginal people have title to their traditional lands, governments have certain obligations if

they are going to allow resource development such as the Project to take place on those lands. Governments must ensure that Aboriginal people

- participate in the resource development;
- are properly consulted; and
- receive fair compensation.

The Panel believes governments can best meet those three obligations by settling land claims. The Panel has therefore recommended that, before the Project goes ahead, the federal and provincial governments finalize land claims agreements in principle with LIA and the Innu Nation, and put enforceable interim measures in place until the final agreements are signed.

However, the Panel understands that issues that have nothing to do with the Project could possibly delay the settlement of one or both of the land claims. If this occurs, the Panel has recommended that the two governments, LIA and the Innu Nation negotiate an environmental co-management agreement ensuring that Aboriginal people are still fully consulted about the Voisey's Bay development. Participation and compensation would then have to be delivered through IBAs negotiated between VBNC and the two Aboriginal organizations. The Panel emphasizes that these alternative arrangements should leave Inuit and Innu no worse off than they would be if land claims agreements were in place.

VBNC told the Panel that it intended to avoid or reduce some of the predicted negative effects of the Project and to increase predicted Project benefits through the IBAs. LIA, the Innu Nation and many individuals told the Panel that IBAs must be concluded before the Project starts. The Panel believes that it would be easier for both VBNC and the Aboriginal organizations to negotiate IBAs if land claims agreements were already settled. But, in any event, since the IBAs are an important part of the whole Project, the Panel has recommended

that they be in place before the Project is allowed to proceed.

SHIPPING

Many people told the Panel that taking ships through the landfast ice could make winter travel and hunting hazardous for North Coast residents, and could disturb seals, especially when they are whelping. There were concerns about the effects of possible oil or concentrate spills, if a ship should have an accident along the shipping route. There were also concerns about the effect over time of frequent small oil or concentrate spills getting into the water at the port site in Edward's Cove.

There was considerable discussion about the need to ship in the winter months, based on production rates and VBNC's ability to store concentrates at the site for long periods. VBNC told the Panel that it would not take any ships through landfast ice for at least the first two to three years of the Project, and possibly longer. It also said that it would not ship through landfast ice if it could not do so safely. The Panel agrees with many presenters that there is still considerable uncertainty about the effects of icebreaking along the shipping route. The Panel has recommended that VBNC, before being allowed to ship through landfast ice, should

- together with LIA and regulators, further investigate both the need to ship in the winter, and how breaking landfast ice would affect wildlife and the safety of ice users; and
- negotiate a shipping agreement with LIA to address concerns about winter shipping and other issues.

The Panel has also made recommendations about ensuring that ships navigate to and from Edward's Cove safely, and about preventing marine pollution. The Panel has concluded that the risk of a concentrate or oil spill would be low, provided that VBNC emphasized safety measures.

Nevertheless, the Panel has recommended that both VBNC and governments prepare oil spill response plans that could deal with a major oil spill, if necessary.

AIR QUALITY

The main effect of the Project on air would be dust raised by the open pit operation and by haulage trucks along the roads. This dust would get into streams and lakes, and affect water quality. Other air emissions would come from burning fuel, either to generate power or to operate vehicles. The Panel has recommended that VBNC develop a plan to control dust and to reduce the amount of fuel burned by conserving energy.

TAILINGS, WASTE ROCK AND SITE WATER MANAGEMENT

During the review, everyone recognized that controlling acid generation in the tailings and waste rock was a critical issue. To do this successfully, VBNC must be able to store a huge volume of tailings and waste rock permanently under water in two tailings basins. Issues discussed during the review included

- alternative methods of storing the tailings and waste rock safely;
- the choice of location for the two tailings basins;
- the design of the dams;
- seepage of contaminated water through and under the dams; and
- the fate of the tailings basins after the mine closed down.

The Panel heard that alternative methods might include using the tailings and waste rock to backfill the open pit or the underground mine, or putting them in the sea (submarine disposal). VBNC told the Panel that it is willing to consider backfilling but would need to complete the

underground exploration and get more experience at the site before it could make that decision. The regulators told the Panel that they would not authorize submarine disposal at this time.

The Panel has concluded that VBNC's proposed method of dealing with tailings and waste rock would prevent acid generation from being a problem. The Panel also believes that VBNC has chosen the best locations to reduce environmental impacts (starting with Headwater Pond and then constructing the North Tailings Basin when the underground phase begins). However, the Panel has recommended that VBNC investigate the backfilling option before constructing the North Tailings Basin. By doing this, the company might be able to avoid or delay the need for the second tailings basin.

The Panel has also made recommendations about dam design, water treatment, seepage collection and treatment, and a dam safety inspection and maintenance program for all project phases.

The Project would also produce a large amount of waste rock that should not generate acid because of its different chemistry. VBNC intends to store the non-reactive rock on land. The big concern was that acid-generating rock could end up in these waste dumps if waste is not sorted accurately. The Panel has recommended that VBNC develop reliable ways to sort the two types of waste rock and also contingency plans in case acid does form in the storage piles on land.

The milling operation would require large amounts of water to treat the ore. VBNC proposes to recycle much of the water that passes through the mill. Issues raised during the hearings included

- the need to maximize water recycling in order to reduce the amount of fresh water taken from lakes in the area;
- the water quality in the tailings basins; and
- the effects of putting treatment sludges into the tailings basins.

The Panel has concluded that VBNC should operate the mill in such a way as to produce the best achievable levels of treated wastewater quality. This would require constant monitoring and process management. The Panel has made recommendations about water recycling, pollution prevention and sludge management.

When VBNC finishes mining the open pit, the alternatives would include filling it with tailings or waste rock, or allowing it to flood. The Panel has recommended that VBNC rehabilitate the pit in such a way that it is visually acceptable and ensures that Reid Brook cannot be contaminated, either through surface runoff or groundwater.

CONTAMINANTS IN THE ENVIRONMENT

The Panel has recognized that many people living in the North, because of their experience, are very concerned about the effects of resource developments such as the Project on contaminant levels in country foods. VBNC carried out modelling exercises to predict how metals in the rock, released by mining, might move through air and water and up through the food chain. The Panel has concluded that this Project would be unlikely to release metals into the environment at levels that would cause a hazard to fish, wildlife or humans. But, because of the importance of protecting both the quality of country foods and people's confidence that they are safe to eat, the Panel has recommended that

- VBNC monitor contaminant levels close to the Project site; and
- governments, LIA and the Innu Nation develop a program to monitor contaminant levels throughout northern Labrador.

FRESHWATER FISH AND FISH HABITAT

The Project would affect many streams and lakes close to the site through the construction of the two tailings basins, extraction of water for the mill, and the need to divert or alter

streamflows. Other influences would include stream crossings, erosion and sedimentation, and dust. VBNC proposes to protect fish and fish habitat, including Reid Brook, by discharging only treated wastewater into the sea and by permanently diverting water from the Headwater Pond tailings basin away from the Reid Brook watershed.

Issues raised during the hearings included

- the Project's effects on arctic char in Reid Brook and nearby streams;
- how much fish habitat would be affected and how VBNC would replace it under DFO's no net loss policy;
- the effects of blasting;
- the combined effects of all Project facilities and activities on Reid Brook; and
- what VBNC should monitor and how.

The Panel has concluded that VBNC's proposed mitigation measures should adequately protect fish habitat in Reid Brook. If monitoring results showed unpredicted effects, the Panel believes that VBNC could and should take additional measures. The Panel was concerned, however, about the possibility that more fish habitat could be affected than predicted if VBNC was not able to maintain at least minimum flows of water in all streams affected by the Project. The Panel also did not receive any information about how VBNC would replace the fish habitat that would be destroyed by the construction of the tailings basins.

The Panel has recommended that VBNC prepare a fish habitat protection report with details on all mitigation measures, and that DFO provide opportunities for the public to comment on VBNC's habitat replacement proposals. Other recommendations address preparation of a special environmental protection plan for Reid Brook, the way in which DFO should apply the no net loss policy to this Project, and

monitoring and related studies in Reid Brook and the wider Kogluktokoluk-Ikadlivik-Reid Brook system.

MARINE FISH AND FISH HABITAT

The Project would affect marine water and sediment quality through the discharge of treated wastewater, first into Edward's Cove and later also into Kangeklualuk Bay (the only two discharge points). The Panel agreed with DFO's suggestion that VBNC investigate whether all of the wastewater could be safely discharged into Edward's Cove in order to avoid affecting a second bay. The Panel does not expect that the Project would cause a harmful effect on marine fish habitat, except in a very small area, or on the fish themselves. But the Panel was told that this would be the first time in Canada that a nickel-copper-cobalt milling operation had discharged its effluent into salt water, and so there is limited information about the effects of the combination of these metals in a marine environment. The Panel has therefore recommended new research, together with careful monitoring. The Panel has also recommended that VBNC, throughout the life of the Project, keep working to reduce the total amount of pollutants discharged in the wastewater, even if it is already meeting regulated standards.

SEALS, WHALES AND POLAR BEARS

The main effects of the Project on seals and whales would likely be noise and ice disturbance caused by shipping. An oil spill could also affect marine mammals. Presenters from both government and the public were concerned that not enough was known about seals and whales in this area of northern Labrador, including population numbers and the habitat they use. Shipping through landfast ice has not happened in this area before, and so there is also some uncertainty about how winter shipping would affect seals. The Panel has recommended that DFO carry out more regional studies on

marine mammals to add to the work already done by VBNC, and that VBNC and LIA determine whelping times for ringed seals in order to avoid affecting them at that sensitive time.

The Panel concludes that the Project should not adversely affect polar bears, provided that VBNC works with LIA to develop good plans to manage potential interactions between Project employees and bears. The Panel has also recommended that the provincial and federal governments sort out who has jurisdiction over polar bears off the Labrador coast in order to improve conservation and enforcement.

PLANTS, CARIBOU AND BLACK BEARS

On land, VBNC focused particularly on predicting the Project's impacts on plant communities, caribou and black bear. The Project would inevitably destroy some plant habitat. VBNC plans to keep this destruction to a minimum and to restore most of the disturbed areas to natural vegetation as soon as possible (not necessarily waiting until the Project closes down). The Panel heard concerns about the possibility of forest fires and about the effects of exploration activity, and has made recommendations to address these.

The Project is located within the range of the George River caribou herd. In some years, caribou have wintered in the Voisey's Bay area. Issues raised at the hearings included the alteration or loss of habitat, and the effects of noise, human presence or icebreaking on the caribou's movements. The Panel concluded that the area that the Project would affect is not a critical part of the range of the George River caribou. Nevertheless, VBNC must carry out its proposed mitigation measures to avoid adverse effects on caribou travelling through the area. If necessary, VBNC might even have to suspend parts of its operations for a short period while caribou are migrating through. Other recommendations include addressing winter shipping concerns through the shipping agreement between LIA and VBNC.

Although VBNC has collected information on numbers of black bears in the area of the Project, there is not enough information to judge the importance of the area in comparison to the rest of the region. The Panel has therefore recommended that the Province carry out further studies. Presenters acknowledged that VBNC had greatly improved its procedures at Voisey's Bay to avoid having to kill "problem" bears, and the Panel has recommended that VBNC develop a special environmental protection plan for black bears.

BIRDS

The area of northern Labrador that would be affected by the Project, including the shipping route, contains many breeding colonies of seabirds and important habitat for coastal waterfowl. A major oil spill would pose the biggest risk to these birds, although noise could also affect breeding populations. The Panel has recommended emergency response planning to deal with the effects of an accident, an oily waste management plan for VBNC's ships and a monitoring plan to study the effects of noise.

Harlequin ducks breed on several streams in the Project area, including one that flows out of the lakes that would be used for the North Tailings Basin. The eastern population of harlequin duck is listed as an endangered species. VBNC expects the Project to displace between three and six breeding pairs, but predicts that they would quickly move to alternative habitat. The Panel has concluded that the Project would add to cumulative effects on harlequin ducks. The Panel has therefore recommended that VBNC take all possible steps to reduce these effects, and develop a monitoring and research program to better understand the habitat needs of harlequins, including what type of mitigation measures work best. The Panel believes that VBNC, by doing this, could contribute significantly to the success of the National Recovery Plan for harlequin ducks,

which would offset the negative effects of the Project.

The Panel heard many concerns about VBNC's decision to locate the airstrip for the Project a few kilometres away from the Gooselands, an important salt marsh habitat and staging area for waterfowl and a valued Aboriginal hunting area. Both government bird experts and Inuit hunters told the Panel that aircraft flying over the Gooselands on approach or takeoff could scare birds, causing them to abandon the area temporarily or, possibly, permanently. The Panel has concluded that the effects of the airstrip on the Gooselands are still uncertain. The Panel has therefore recommended that VBNC either

- realign the runway and delay its plans to operate a Category 1 airport until new aircraft approach technology has been developed; or
- operate with air traffic restrictions that could include restricting flights during critical periods for migratory waterfowl.

ABORIGINAL LAND USE AND HISTORICAL RESOURCES

Aboriginal presenters told the Panel that they were concerned that the Project could affect both the wildlife and plants that they depend on, and their ability to harvest them. Their concerns included

- loss of habitat;
- disturbance of wildlife;
- possible contamination of country foods;
- additional harvesting pressures from Project employees; and
- reduced access to resources, both at the Project site and through disruption of ice travel.

The Panel has concluded that the Project need not cause widespread harvest disruption if

VBNC carried out its mitigation measures carefully. However, the Panel has recommended that VBNC put in place a harvesting compensation program as part of the IBAs. It would also be particularly important that VBNC enforce policies and procedures to prevent employees from fishing or hunting during the two weeks they are working and living at the site.

There are a number of known archaeological and historical resources in the Project area, and more might be discovered during construction. The Panel has recommended that VBNC prepare a revised protection and management plan to ensure that these sites would be properly identified and protected.

EMPLOYMENT AND BUSINESS

The Project would provide both employment and business opportunities to people living in Labrador and other parts of the province. Following a policy it calls the adjacency principle, VBNC proposes to give first preference to members of LIA and the Innu Nation, then other residents of Labrador, followed by residents of the mainland portion of the province.

Issues brought to the Panel included

- training, and particularly how it can be made relevant and accessible to Aboriginal people and to women;
- ways Aboriginal people can get on-the-job experience;
- the possible impacts of unionization on employment for local people;
- transportation difficulties for people who live in communities south of Rigolet;
- language and cultural issues at the work site, and how these could affect the retention of Aboriginal employees;
- ways to make a mine site a comfortable and supportive place for women employees; and

- problems around access to child care and elder care that could make it difficult for some people, particularly women, to get employment at the Project.

The Panel has concluded that, even with the adjacency principle and VBNC's employment commitments in the IBAs, Aboriginal people in northern Labrador would likely face a number of barriers to employment. Once they were hired, they would also face some major adjustments in getting used to an industrial work site and a fly-in/fly-out rotational work system.

The Panel has made a number of recommendations that address these issues. They include

- improving the existing Multi-Party Training Program to increase access to training for Aboriginal people and for women;
- designating Cartwright as a pick-up point for employees;
- setting up anti-racism and cross-cultural programs;
- implementing a second chance policy for employees who run into difficulties adjusting to their jobs;
- establishing a process to ensure that women's concerns and perspectives are built into all decision making in the workplace; and
- implementing measures to improve child care services in home communities.

VBNC predicts that the Project would deliver approximately one quarter of its total economic benefits to Labrador through business opportunities. The Panel heard concerns about the length of the Project and how that would affect people's decisions to invest in local business development; the availability of information to help business people plan; and VBNC's contract tendering procedures. The Panel has recommended that VBNC develop a compre-

hensive supplier development strategy to provide timely information and make it easier for local suppliers to put in competitive bids.

FAMILIES AND COMMUNITIES

Because the Project would be a fly-in/fly-out operation, with transportation provided to all North Coast communities, Happy Valley-Goose Bay and Labrador West, and because VBNC would give preference to employees living in Labrador, the Project is not expected to create big population changes in any community, with the exception of Nain. Therefore, employment provided by the mine is expected to be the main cause of social changes to families and communities.

Many people told the Panel that they feared the Project would undermine their culture and values, and change their relationship to the land. VBNC predicted that there would be adjustment problems, but that increased employment and income would eventually lead to greater community well-being. Many people challenged this idea, saying that Aboriginal people in particular get their sense of self-esteem from other sources, such as culture, tradition and skills on the land. Some presenters were afraid that the Project would result in more drinking and violence in the home, rather than less. They also pointed out that there could be a greater gap between people who earn good wages at the mine and those who do not.

The Panel also heard from many presenters who wanted to see more economic opportunities for North Coast people and who were looking forward to employment at the Project.

The Panel has concluded that nobody can be totally certain how the Project would affect families and communities because the proposed mine and mill would create such a new situation for northern Labrador. Many other factors would also have an effect, quite apart from the Project. The Panel has also concluded that there is a need for new economic development because,

ENVIRONMENTAL ASSESSMENT PANEL

although very important, the harvesting of renewable resources through hunting and fishing cannot adequately support the growing population in the area.

The Panel agrees that, if the Project goes ahead, Aboriginal people must be treated with fairness, justice and respect to avoid negative social effects. To achieve this, all parties should ensure that Aboriginal people received a broad range of benefits through employment, IBAs and reinvestment of the increased revenues that governments would get from the Project. The Panel has recommended that the federal government do this by improving airports in the coastal communities, and that the provincial government put some of the revenues back into improving community-based preventive health care programs.

Because Nain is the closest community to the Project, it would see more direct changes than other communities, relative to its size. Presenters told the Panel that they were concerned about

- the Town's ability to respond to new demands and pressures;
- the effect of the Project on housing and the cost of living;
- the ability of Nain businesses to prepare to bid on contracts; and
- the effect of the Project on existing businesses because of competition for employees or services.

The Panel has recommended that VBNC pay a grant in lieu of taxes to the Town and that the Town and the company set up better communications to deal with problems and opportunities. The Panel has also recommended that the Town, LIA, and the federal and provincial governments prepare a five year housing strategy.

ENVIRONMENTAL MANAGEMENT

Throughout the review, many presenters said that if the Project goes ahead, a good environmental management system must be in place.

The system would ensure that the effects of the Project were carefully monitored and that VBNC took quick corrective action, if necessary. It would also enable Aboriginal people, throughout the life of the Project, to review and make recommendations on key Project elements, from the start of construction through final decommissioning.

The Panel has recommended a number of steps that should be taken, either in conjunction with the settlement of land claims agreements or as separate but equivalent measures. As one of the first steps, the federal and provincial governments, LIA and the Innu Nation should establish an Environmental Advisory Board with a mandate to review VBNC's monitoring program, permit applications and environmental protection plans. The Board could also address ongoing environmental management issues and concerns. Other recommendations address the need for

- a shipping agreement between VBNC and LIA;
- a broader marine management planning process under the terms of the *Oceans Act*;
- reclamation objectives that would be incorporated into every aspect of Project planning and operations;
- financial assurances;
- an effective biophysical monitoring program to be carried out by VBNC; and
- a socio-economic monitoring program that would be the responsibility of the Province.

The full Panel report contains more details about all of the Panel's conclusions and recommendations.

The Panel wishes to thank everybody who took part in this environmental assessment review for sharing their knowledge, experience and ideas.

MAP OF LABRADOR



1 INTRODUCTION

1.1 MEMORANDUM OF UNDERSTANDING

On January 31, 1997, the governments of Canada and Newfoundland and Labrador, and the presidents of the Labrador Inuit Association (LIA) and the Innu Nation, announced the signing of a memorandum of understanding (MOU). Under this MOU, they agreed to establish a joint environmental assessment review of a proposal by the Voisey's Bay Nickel Company (VBNC) to develop a mine and mill near Voisey's Bay, Labrador.

The MOU was established to harmonize the environmental assessment processes of the federal and provincial governments and to recognize the interests of the two Aboriginal groups who have overlapping land claims in the area.

With a membership of about 5,200, the Labrador Inuit Association represents both Inuit and "Kablunangajuit" — an Inuktitut term for the people of northern Labrador who are also referred to as "Settlers." LIA members reside primarily in Nain, Hopedale, Makkovik, Postville, Rigolet, North West River and the Upper Lake Melville area. For the purposes of this report "Inuit" is used to describe LIA members. The Innu Nation represents approximately 1,500 Innu mainly living in the communities of Sheshatshiu and Utshimassits (Davis Inlet). A map of Labrador communities appears on the opposite page.

The Department of Fisheries and Oceans has federal responsibility for the review process because of its responsibility to issue an authorization for destruction of fish habitat under subsection 35(2) of the *Fisheries Act* and a permit under section 5 of the *Navigable Waters Protection Act*. In order to participate in the harmonized review process, the provincial government exempted the project from the *Newfoundland Environmental Assessment Act*.

A complete copy of the MOU can be found in Appendix C. It includes direction on administering the process and important definitions

relating to the environmental assessment process. Schedule 1 to the MOU contains the terms of reference for the review, outlines the review's scope and timelines, and lists factors to be considered during the review. Figure 1 summarizes the review process.

1.2 PANEL HISTORY AND MEMBERSHIP

The independent Joint Panel on the Voisey's Bay Mine and Mill Development Proposal was appointed on January 31, 1997 to conduct the public review of the undertaking. It includes Ms. Lesley Griffiths (Chair), Mr. Samuel Metcalfe, Ms. Lorraine Michael, Dr. Peter Usher and Dr. Charles Pelley, whose biographies appear in Appendix A.

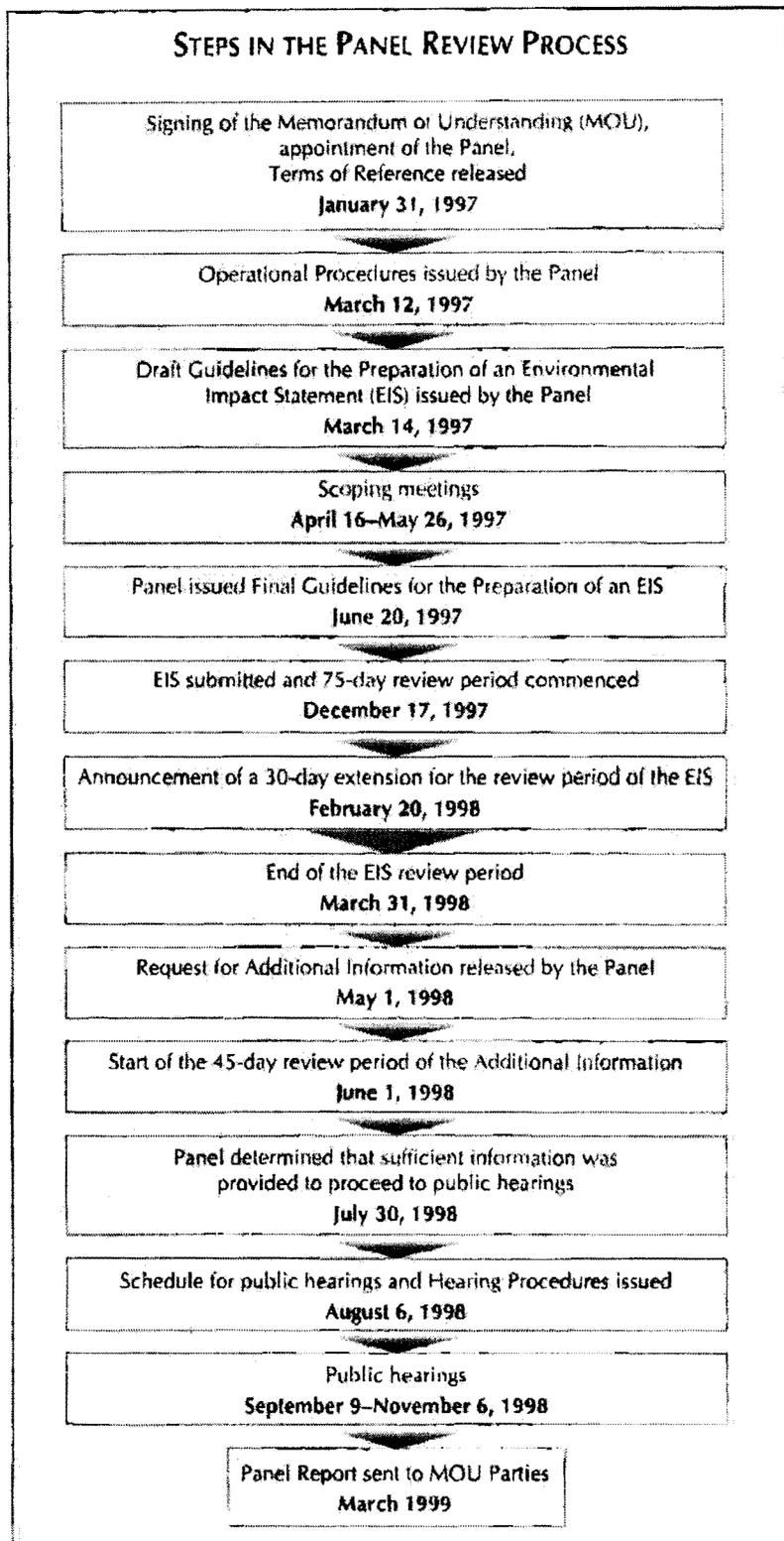
1.3 PARTICIPANT FUNDING

The Canadian Environmental Assessment Agency (CEAA) made funding available to help interested groups participate in the review process. A funding committee, independent of the Panel and administered by CEAA, assessed the applications and awarded a total of \$150,000 to 12 groups for the first phase of the review process, which included scoping of the environmental assessment. For the second phase of the review process, which included public hearings, the committee awarded \$259,000 to 13 groups. The public was encouraged to participate throughout the process, which included preparing the final guidelines for the Environmental Impact Statement (EIS), and reviewing the adequacy of the EIS and Additional Information.

1.4 REVIEW PROCESS

Following the panel's appointment on January 31, 1997, draft EIS guidelines were issued on March 14, 1997 for public review and comment. The guidelines outlined the issues that VBNC was asked to respond to in its EIS. Public meetings were held in April and

FIGURE 1



May 1997 to allow interested organizations, groups and individuals to inform the Panel of the range of issues they thought the Panel should address during the review. These "scoping sessions" were held in Nain, Rigolet, Hopedale, Postville, Makkovik, Sheshatshiu and Utshimassits, as required by the MOU. Given the interest shown by other communities, the Panel also held scoping sessions in Goose Bay, Cartwright and St. John's. After carefully considering the comments received, the Panel released the final EIS guidelines on June 20, 1997.

On December 17, 1997, VBNC's response to the guidelines, the EIS, was released for the 75-day public comment period required under the MOU. The Panel added 30 days to the review period after VBNC released some background documents to the EIS. The Panel reviewed the EIS, and considered comments on the document's adequacy submitted by members of the public, environmental groups, community organizations, Aboriginal groups, and federal and provincial government departments and agencies. On May 1, 1997, following this process, the Panel requested more details from VBNC in a number of areas where the EIS did not provide sufficient information to support meaningful discussion at public hearings. These details (known as Additional Information) were provided to the Panel on June 1, 1998 and then made available for a 45-day public review period, as required by the MOU.

On July 30, 1998, the Panel announced its determination that the EIS, background documents and the Additional Information contained sufficient detail to support meaningful discussion of the proposal at public hearings.

The public hearings allowed individuals, organizations and government representatives to provide their views on the implications of the proposed project. VBNC was also allowed to explain the project and respond to concerns and questions raised by other participants. Between September 9 and November 6, 1998,

the Panel held 32 days of hearings in Nain, Utshimassits, Sheshatshiu, Hopedale, Rigolet, Postville and Makkovik. Hearings were also held in Goose Bay, Cartwright, Labrador City, and St. John's. The public hearings included community, general and technical sessions. A list of sessions can be found in Appendix D.

This report is the final stage of the process to be completed by the Panel. It summarizes the concerns the Panel heard, the Panel's findings, and the conclusions and recommendations the Panel is making to provincial ministers, federal ministers, and the presidents of LIA and the Innu Nation.

A public registry of all documents, including submissions made to the Panel during the scoping meetings and public hearings, was maintained at the Panel's office in Nain and at the Canadian Environmental Assessment Agency in Hull, Quebec. A list of these documents is available on the CEAA Web site (www.ceaa.gc.ca).

1.5 PROJECT DESCRIPTION

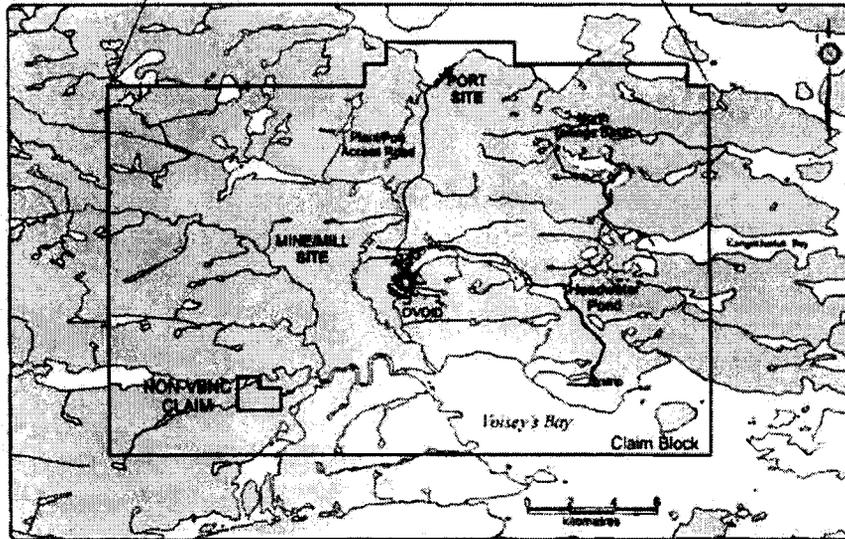
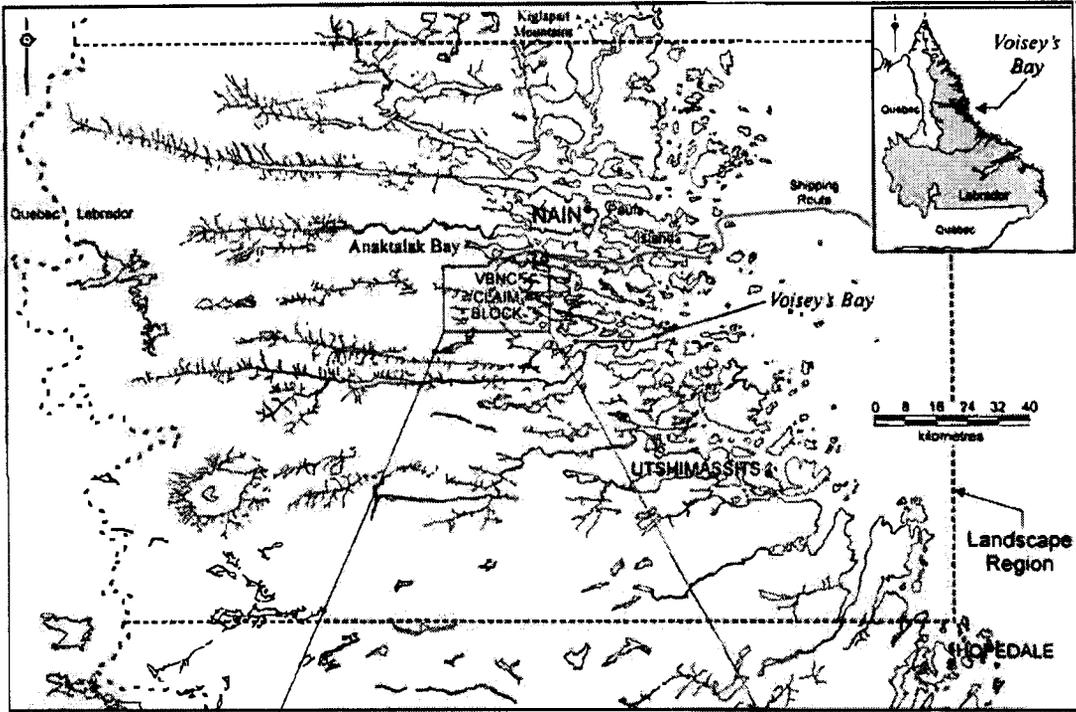
Over the course of the environmental assessment review process, elements of the proposal have evolved. While the Panel sees no significant change in the original project description in the MOU, it recognizes that the Project will continue to evolve. The Panel considered this fact when reaching its conclusions and determining its recommendations for this report. The description that follows is consistent with the Project description provided by VBNC in its EIS and the Project description that accompanied the MOU.

VBNC proposes to develop a nickel-copper-cobalt mine and mill near a place known to the Inuit of Labrador as Tasiujatsoak and to the Innu of Labrador as Kapukuanipant-kauashar, which is also known as Voisey's Bay. The proposed mine and mill would be located in northern Labrador, 35 km southwest of Nain and 79 km northwest of Utshimassits.

The indicated mineral resource is estimated to be 150 million tonnes and consists of three

REPORT ON THE PROPOSED VOISEY'S BAY MINE AND MILL PROJECT

LANDSCAPE REGION AND SITE MAP



ore bodies, described by VBNC as the Ovoid, the Eastern Deeps and the Western Extension. VBNC proposes to mine 32 million tonnes of ore from the Ovoid using conventional open pit techniques, and to mine the anticipated 118 million tonnes of mineral resource from the Western Extension and Eastern Deeps using underground techniques. The Eastern Deeps and Western Extension zones will require further exploration before the details of a mine plan can be determined. At full capacity, the mill would process ore into nickel-cobalt and copper concentrates at a rate of 20,000 tonnes of ore per day. Concentrates would be trucked to storage facilities at the port site at Edward's Cove and shipped off site for further processing.

Site infrastructure would include a plant, a port facility and storage area at Edward's Cove, access roads, accommodations and an airport. See page 4 for a map of the site.

The site map also shows the Landscape Region of 20,000 km² identified by VBNC as the geographic basis for VBNC's assessment of terrestrial, aquatic, and marine ecosystems potentially affected by the Project.

VBNC's preferred shipping route extends from Edward's Cove to the east end of Paul's Island and then passes north of the Hens and Chickens. VBNC prefers to ship using an extended shipping season. This would entail no shipping during the period of initial ice formation and during early spring.

During mining and concentrating operations, the Project would produce mine rock and tail-

ings that could generate acid. There is a proposal to place these materials under a permanent water cover to inhibit acid generation. Mine rock and tailings would be co-disposed in Headwater Pond during open pit mining, which is expected to last for the first eight years that the mine operates. During underground mining, tailings would be placed in the North Tailings Basin, located about 10 km northeast of the plant site, and acid generating mine rock would continue to be placed in Headwater Pond. Waste rock that did not generate acid would be stored in surface facilities.

Another important part of the project description is the water management plan, which encompasses all stages of the mine operation. The key objectives of this plan are to reduce environmental effects on freshwater and marine habitats, to use as much reclaimed water from within the water management system as possible and to recycle water within the mill as much as possible.

Upon closure, the project site would be decommissioned and reclaimed to return it to a safe and environmentally stable condition.

Direct on-site employment would peak at approximately 950 during the underground phase. During operations, VBNC proposes transporting workers to the project by aircraft from pick-up points in local communities. Living accommodations would be provided on site for workers as no town site is planned.

2 THE PROJECT AND SUSTAINABLE DEVELOPMENT

2.1 CONTEXT

To ensure the effects of the Project were properly assessed, the Memorandum of Understanding (MOU) specifically instructed the Panel

- to consider the need for the Project;
- to address the Project's effects on biological diversity, and on the capacity of renewable resources to meet the needs of present and future generations; and
- to examine the extent to which VBNC applied the precautionary principle to the Project.

The *Canadian Environmental Assessment Act* (the *CEA Act*) defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." In the guidelines, the Panel interpreted the three objectives of sustainable development as follows, and indicated that these interpretations would guide its review of the Environmental Impact Statement (EIS) and other submissions:

- the preservation of ecosystem integrity and maintenance of biological diversity;
- respect for the right of future generations to the sustainable use of renewable resources; and
- the attainment of durable and equitable social and economic benefits.

The Whitehorse Mining Accord looked at the implications of sustainable development for mineral resource extraction and used a multi-stakeholder approach to develop a strategic approach to sustainability in mining. Natural Resources Canada (NRCan) further developed these issues and included the objective that "the economic and social benefits of mineral devel-

opment are not all consumed by the present generation and that current investment in human and physical capital benefit future as well as present generations."

In the EIS, VBNC committed to extract minerals and metal products efficiently at all stages of mining and processing, in order to reduce environmental effects and improve economic benefits, and to respect the needs and values of other resource users throughout the life of the Project.

Many submissions to the Panel addressed various aspects of sustainability that are discussed throughout this report. This chapter describes how the Panel reached an overall conclusion about the Project in the context of sustainable development.

2.2 ECOSYSTEM INTEGRITY, BIODIVERSITY AND RENEWABLE RESOURCES

The Panel asked VBNC to describe how the Project would extract the mineral resource at Voisey's Bay without impairing ecosystem integrity or biodiversity, and how it planned to protect the plant and wildlife resources that Aboriginal people have used for generations and that continue to form a vital part of their local economy, and social and spiritual well-being.

VBNC acknowledged the ecological values and sensitivities of the Landscape Region in which the Project would be located, especially those associated with Reid Brook, the Goose-lands and the marine resources of the five-bay complex. It also acknowledged the significance of the landfast sea ice as habitat and as an extension of the land for the purposes of local travel and harvesting. VBNC indicated that the design and operation of the Project would

- minimize the land-based footprint of the Project and, hence, the amount of disturbance to terrestrial habitat;

- prevent direct Project discharges into the Reid Brook system or the Voisey's Bay estuary;
- prevent acidification of streams and lakes and subsequent mobilization of metals into the food chain by storing sulphide-rich tailings and waste rock permanently under water;
- minimize effects on wildlife through employee policies and training and various forms of mitigation; and
- reduce the effects of shipping on landfast ice by limiting winter shipping and through other forms of mitigation.

Many presenters told the Panel that, to protect the environment and the resources that support Aboriginal harvesters and their families, VBNC must pay meticulous attention to dust control; water, tailings and waste rock management; and protection of habitat for plants, fish and wildlife. In every North Coast community, people expressed great concern about the effects of winter shipping on landfast ice, and Inuit in particular also questioned the effects of the airstrip on the Gooselands. The Panel addresses all of these issues in chapters 5 through 13.

The Panel concludes that, in many respects, the Project is a relatively conventional mining operation using proven mitigation measures, and that its effects can be predicted with reasonable certainty. However, the Panel recognizes that the Project must deal with a number of significant challenges, including

- the protection of the Reid Brook system, given the location of the open pit and other Project features;
- the protection of the Gooselands and the waterfowl that use this salt marsh;
- safe navigation through ice and the complex pattern of islands, headlands and shoals;

- the protection of sea ice users during VBNC shipping through landfast ice; and
- effective reclamation in a subarctic environment.

The Panel concludes that VBNC could construct, operate and decommission the Project without either significantly damaging local and regional ecosystem functions, or reducing the capacity of renewable resources to support present and future generations. To do so, VBNC must operate within an effective environmental management system, as the EIS proposes; implement further mitigation, as this report recommends; and use the results of a scientifically sound effects monitoring program to improve environmental performance throughout the life of the Project.

However, the Panel believes that sufficient uncertainty remains about the effects of shipping through landfast ice that this component of the Project should not proceed until these questions have been resolved to the satisfaction of the Labrador Inuit Association (LIA) and government.

The Panel also concludes that effective environmental management of the Project would require, not only diligent efforts by VBNC, but also the continued cooperation of the four parties to the MOU and the development of an environmental co-management organizational structure in northern Labrador, such as that described in Chapter 17.

2.3 DURABLE AND EQUITABLE SOCIAL AND ECONOMIC BENEFITS

The Panel asked VBNC to indicate how the Project would deliver durable and equitable social and economic benefits to Aboriginal people in northern Labrador, other Labrador residents and the province. VBNC stated that the Project would, over a period of 20 to 25 years, deliver these benefits in three ways:

- direct employment at the Project and related business opportunities, targeted to LIA and

Innu Nation members and the rest of Labrador through the application of a company policy called the adjacency principle;

- financial participation in the Project by LIA and the Innu Nation through impact and benefit agreements (IBAs); and
- increased government taxation revenues.

Many individuals and organizations told the Panel that the Project could indeed deliver benefits, provided some crucial conditions were met. First and foremost of these was that the Project should, as proposed, last 20 to 25 years and preferably more. This would enable workers to earn pensions and accumulate savings beyond one generation, and to develop industrial and business skills that could support new economic activities. At the same time, communities could use the increased flow of income over a long period to diversify their local economies. A long duration would also reduce the risk of negative effects associated with the community boom-and-bust effect.

The Panel, and many presenters, while recognizing VBNC's intentions to develop both the open pit and underground phases of the Project, observed that two major uncertainties might affect Project life — volatile nickel prices and incomplete knowledge about the extent of the underground reserves. The Panel addresses these issues in Chapter 3, Project Need and Resource Stewardship. It concludes that, despite these uncertainties, the Project could deliver durable benefits, if VBNC is required to carry out the planned underground exploration program and to adapt production rates as necessary to ensure that the mineral resource is extracted over a period of at least 25 years.

Many presenters also told the Panel that a second crucial condition would be that VBNC deliver employment and business benefits to Innu and Inuit communities as promised, and that the fly-in/fly-out operation not become, in

fact, a "fly-over" operation. VBNC and others should also ensure that both men and women benefit. The Panel addresses these issues mainly in Chapter 15, Employment and Business, and concludes that Inuit and Innu and other Labradorians would benefit from Project-related employment and business, provided that IBAs were finalized and implemented. VBNC must also ensure appropriate training (in cooperation with other parties), consistent application of the adjacency principle, and close attention to language, cultural and gender-based aspects of working conditions.

VBNC acknowledged that individuals and communities in northern Labrador would experience some negative social and economic effects and that the Project might increase economic disparity. VBNC sees these effects as mostly short term, as communities go through a period of adjustment, and indicated that long-term improvements in individual and community health and well-being would more than offset them. The Panel heard many views and concerns about these issues, which it addresses mainly in Chapter 16, Family and Community Life, and Public Services.

The Panel concludes that this is a complex issue, that the Project would cause both negative and positive social effects, and that these effects would not be distributed equally. The Panel also concludes, however, that an economy based only on harvesting renewable resources is unlikely to be capable of sustaining the growing Innu and Inuit populations, and that social and economic change is both inevitable and ongoing. The Panel believes that the Project could deliver significant positive social effects and that negative effects would be manageable if IBAs were successfully negotiated and implemented, and increased government revenues were reinvested in regional services and infrastructure. As discussed in Chapter 4, the Panel also believes that land claims agreements — or equivalent binding measures dealing with Project consultation, compensation and participation —

must be in place before the Project starts to ensure Inuit and Innu can more effectively control their lives and futures.

2.4 PRECAUTIONARY PRINCIPLE

The MOU instructed the Panel to consider the extent of the precautionary principle's application to the Project. The Rio Declaration of 1992, to which Canada is a signatory, states that the precautionary approach requires that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." The *CEA Act* provides no guidance on the application of the precautionary principle to environmental assessment.

In determining whether Project-environment interactions could lead to serious or irreversible damage, the Panel considered

- the degree of novelty of the interaction in similar environments;
- the degree of uncertainty about potential effects;
- the magnitude and duration of potential effects and the extent to which they might be irreversible; and
- the extent and scale at which potential effects could impair biological productivity and ecosystem health.

The Panel considers that the precautionary principle or approach requires a proponent to demonstrate that its actions will not result in serious or irreversible damage. Specifically, the Panel asked VBNC to show that it had

- designed the Project to avoid adverse effects wherever possible;
- developed mitigation measures, or contingency or emergency response plans, of proven effectiveness;

- designed monitoring programs to ensure rapid response and correction when adverse effects are detected (or would design these in cooperation with others, where appropriate); and
- developed adequate systems to remediate any residual accidental or unplanned adverse effects of the Project and demonstrated sufficient financial resources to compensate for such effects.

The Panel asked VBNC to take a conservative approach to its predictions by, for example, using worst case scenarios, where appropriate. The Panel sought assurance that, if there was great uncertainty about the seriousness and irreversibility of the effects of any Project component, that VBNC could reduce this uncertainty, correct the problem or suggest a viable alternative to that component.

VBNC stated that, in its view, the precautionary principle as applied to the Project means anticipation and prevention, so designers and planners should incorporate environmental information into all stages of their activities. VBNC advised the Panel of the ways in which it had incorporated the precautionary principle into the Project's design to prevent adverse effects, prevent pollution, deal with unplanned events, develop monitoring and follow-up programs, and ensure that the company's liability and insurance regime holds it accountable for damages. The Panel examines these claims in detail in the appropriate chapters.

The Innu Nation and LIA recommended more restrictive interpretations of the precautionary principle. For example, one expert appearing on behalf of the Innu Nation suggested that the principle requires the Panel to begin with the hypothesis that the Project would damage the environment, and to reject that hypothesis only under the weight of contrary evidence. The Innu Nation also stated that any action with long-term or irreversible consequences

precludes some future options, which is contrary to the principle of sustainability. It asserted that adaptive management relies on a monitoring and mitigation approach, which would violate both the precautionary and sustainability principles. The Innu Nation expressed the precautionary principle simply as "if we wait and see, it will be too late."

The Panel concludes that it was not presented with plausible hypotheses, well grounded in experience and theory, that the Project, or key elements of it, would cause serious or irreversible adverse environmental effects. The Panel also concludes that any uncertainties about these matters could be satisfactorily addressed by the measures recommended in this report.

2.5 ABORIGINAL KNOWLEDGE

The MOU instructed the Panel to "give full consideration to traditional ecological knowledge whether presented orally or in writing." The Panel provided guidance on this requirement in its guidelines by characterizing traditional ecological knowledge as a subset of Aboriginal knowledge. It defined the latter as "the knowledge, understanding, and values held by Aboriginal people that bear on the impacts of the Undertaking and their mitigation," based on "personal observation, collective experience, and oral transmission over generations." The Panel further noted that Aboriginal knowledge is evolving with new experience and understanding, so it did not wish to limit Aboriginal people's contribution to the assessment to what is commonly known as traditional ecological knowledge.

Those elements of Aboriginal knowledge relating to values, norms and priorities were particularly important in the scoping phase of the review and strongly informed the Panel's guidelines. The guidelines indicated that Aboriginal knowledge relating to such matters as ecosystem function, resource abundance, resource distribution and quality, land and resource use, and social and economic well-being would be essential

when developing baselines, predicting impacts and assessing the significance of effects in the EIS and during the public review.

The Panel indicated that VBNC should either obtain this information with the cooperation of other parties and present it in the EIS, or help Aboriginal persons and parties present such information directly to the Panel during the review.

In 1995, VBNC entered into discussions with LIA and the Innu Nation to obtain Aboriginal knowledge for its EIS. During the next three years, it funded workshops, reports and studies. The results of these activities were, for the most part, presented directly to the Panel by LIA and the Innu Nation, rather than in the company's EIS. The aboriginal organizations presented issues scoping reports; reports on land use, environmental knowledge and potential environmental effects; and, in the case of the Innu Nation, a report on socio-economic conditions and a video showing current Innu family and community conditions and describing personal perspectives on the Innu future. The Panel understands that VBNC did not influence, or seek to influence, the content or quality of the projects it funded.

The Panel considers that VBNC adequately conformed to the guidelines and commends its efforts in a situation where guidance and experience are lacking. When Aboriginal knowledge was presented in technical hearings, the Panel considered it on the same basis as other expert information, keeping in mind that the hearings were conducted in a non-judicial, non-adversarial fashion. The Panel considers that Aboriginal knowledge was used effectively during the review, both in the technical and the community hearings.

CONCLUSION

Based on the foregoing conclusions, the Panel believes that the Project could contribute significantly to sustainable social and economic development on the North Coast and in the

rest of Labrador, without harming vital ecosystem functions and habitats or the ability of Inuit and Innu to keep using land in traditional ways. To make this contribution, VBNC must uphold the commitments it made during the review process and work diligently throughout the life of the Project to prevent or minimize adverse effects and maximize benefits. The Panel also believes that each of the four parties to the MOU would have a continuing and essential role to play to ensure progress towards environmental and community sustainability.

Recommendation 1

The Panel recommends that the Voisey's Bay Mine and Mill Project be authorized to proceed, subject to the terms and conditions identified in the rest of the Panel's recommendations.

3 PROJECT NEED AND RESOURCE STEWARDSHIP

3.1 PROJECT NEED AND TIMING

In its guidelines, the Panel directed the proponent to justify the need for the Project. VBNC responded in the EIS and hearings by describing what it saw as a growing market for nickel, the weak state of the provincial and regional economies, and the economic viability and potential of the Project. VBNC stated that it wished to develop the project "to meet Inco's strategy of developing low-cost nickel deposits and remaining as the world's leading producer of nickel."

For many presenters, the question of need was most closely tied to timing. In other words, does the project need to start immediately, or can it be delayed by a number of years? Some people suggested that delaying the project could make the project more economically viable, which would in turn enhance local benefits and ensure high enough returns to adequately cover the costs of environmental protection and reclamation. A second argument made in favour of delay was that it would reduce potential adverse social impacts by giving Aboriginal people and communities time to prepare. Aspects of viability are addressed in this chapter. Aspects of readiness are addressed in chapters 15, 16 and 17.

The Panel believes that the exact definition of "need" for a new mining venture is somewhat problematic. It considers the following factors possible components of project justification:

- the global economy's need for new nickel and for the benefits that nickel products provide (copper and cobalt are seen as by-products and secondary to this discussion);
- the need to build and maintain low-cost reserves for the Canadian nickel industry in order to support both the industrial needs of VBNC's parent company, Inco, and continued Canadian economic activity; and

- the requirement for regional economic development based on producing primary metal.

Some presenters urged the Panel to look not only at the demand side (world nickel markets) but also at the supply side when reviewing the requirement for new nickel. They wanted to ensure that nickel reserves were conserved for the use of future generations and to reduce the overall environmental impacts related to the extraction, use and disposal of materials.

3.1.1 Materials Consumption and Environmental Consequences

Nickel is a non-renewable resource. However, the main argument that the Panel heard in favour of slowing the extraction of this finite commodity related not to a fear that the world would run out of nickel but to a concern that global ecosystems cannot afford the environmental consequences of the current throughput of industrial materials, let alone an expansion.

An ecological economist speaking on behalf of the Innu Nation argued that the Western world probably needs to reduce the total throughput of materials by 75 percent. This would, he said, reduce the accumulating levels of environmental stress and degradation that result from all phases of materials use, while accommodating the basic needs of less developed countries. While not arguing to cancel the Voisey's Bay Project, he did suggest that delaying its start and reducing its scale would contribute significantly to environmentally responsible supply management. He argued that the Project can only be justified by a societal need for goods and services based on the "virgin" metals produced by the Project. Then he provided a list of factors to be considered, based on existing and potential mines, existing and projected consumption, potential substitution of other metals for nickel and recycling rates.

The Innu Nation also argued that high grade deposits, not just low grade deposits, should be left for future generations and that excess supply is a disincentive to developing more efficient product uses.

Natural Resources Canada (NRCan) told the Panel that approximately one third of the nickel used in stainless steel is recycled metal. It was NRCan's position that metals are not destroyed but are "placed in inventory on surface." The Panel observes that this would tend to support the argument that high grade deposits should be mined first. An expert, appearing on behalf of the Innu Nation, agreed with this premise to a certain extent by arguing that, since low grade deposits are energy and pollutant intensive, and since extractive technology will change, it may make sense to exploit high grade deposits first, thus causing less environmental damage and building up the recycling inventory.

The Panel agrees that conservation of materials, including nickel, is an important objective. During the hearings, the Panel heard about the high levels of recycling achieved in the nickel industry. It is also aware that Inco is developing

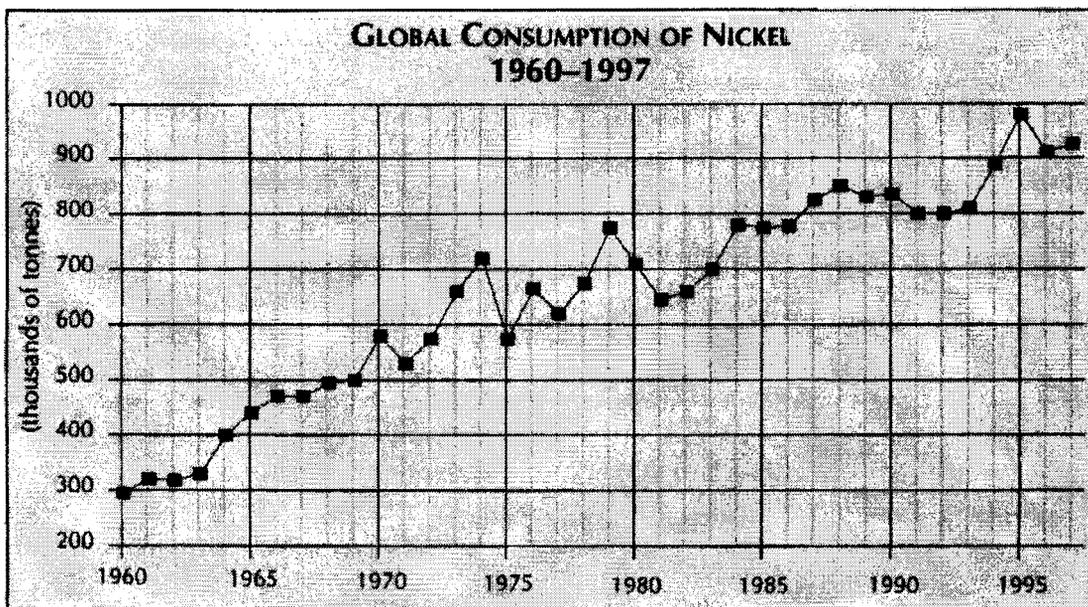
new uses for nickel that should increase the value of the product without necessarily increasing the amount used. The Panel does not believe, however, that an environmental assessment of one project can satisfactorily address issues of global nickel use and conservation. The Panel suspects that nickel not supplied by VBNC would quickly be supplied by another producer. This might cause more environmental damage and provide fewer benefits than the VBNC Project, particularly if mining occurred without the constraints imposed on a Canadian project.

The Innu Nation also discussed the rate at which a finite resource such as nickel should be extracted from the ground to ensure durable and equitable benefits. The following sections address production rates and resource stewardship.

3.1.2 World Nickel Markets

The main fact VBNC used to justify the need for the Project is that the nickel market has grown by a compounded 4 percent since 1963. Other participants pointed out that the annual compound growth rate is overestimated because the

FIGURE 2



growth rate was 6.5 percent from 1960-73 but only 1 percent from 1973-96. They also observed that the growth rate is bound to drop as the market increases in size.

The nickel consumption graph shown in Figure 2 shows that there was almost no growth between 1984-92 and renewed high growth in the past few years. This corresponds to the primary nickel demand described in the Additional Information, which states that demand has recently increased by approximately 50,000 tonnes per year, from 769,000 tonnes in 1993 to 1,004,000 tonnes in 1997. The annual consumption increase is therefore quite variable, depending on the period chosen.

Looking at projected consumption growth without relying on historical growth projections seems to be difficult. An NRCan expert said that production figures are considered more accurate than consumption figures because actual consumption is difficult to measure accurately. For instance, the consumption of nickel in stainless steel is tracked to the point of steel production, as opposed to final consumption. However, VBNC noted that demand for nickel in superalloys grew at the rate of 8 percent per annum between 1993 and 1997. This suggests the emergence of a market not reflected in past consumption data. This market may partially support the strong growth seen in recent years.

Annual per capita consumption figures from NRCan show a world demand of 1.9 kg, with very high consumption in steel producing countries such as Taiwan, South Korea and Japan. Consumption in less developed populous regions is low. For example, China consumes 0.6 kg, India 0.7 kg, Africa 0.4 kg and Eastern Europe 0.6 kg. However, consumption in those regions is increasing rapidly.

The other important market force is supply. With the exception of Raglan, most of the new capacity outlined by both the Innu Nation and NRCan will come from nickel laterites. These

deposits require extracting metals from oxide ores using leaching processes similar to those that have proven successful in low grade copper and gold ores. The largest of these new projects is Murrin Murrin in Australia, which, if its second stage expansion occurs, would be the same size as Voisey's Bay. However, NRCan indicated that both recovery rates and financing for this project were uncertain. Both Inco and Falconbridge have also announced pilot projects to extract lateritic ores in New Caledonia, and Cuba also has large lateritic reserves.

Another important source of supply is Russia. That country has the world's largest sulphide reserves at Norilsk and exports large quantities of stainless steel scrap from dismantled military infrastructure.

Innu Nation experts based their analysis on the assumption that the project would add to existing productive capacity. The Panel notes, however, that Inco has already announced that it will reduce high cost production in its Ontario and Manitoba divisions, as discussed in more detail later in this document. Other sulphide based producers around the world are experiencing difficulties at present prices. Botswana production, for example, is very heavily subsidized at present prices and nickel concentrates have been imported to keep the smelting operation viable.

The Panel concludes that there is a high degree of uncertainty in projections of market growth. For example, the period required for growth to absorb the projected capacity of Voisey's Bay during Ovoid production ranges from about 3 to 17 years, depending on the assumptions used. Per capita consumption figures suggest both that growth potential is high and that it is tied significantly to emerging economies. The present slump in nickel prices with the slowing of the Asian economies also supports that conclusion.

On the supply side, the Panel recognizes the uncertainty of the supply of recycled stainless

steel coming from the former Soviet republics. In addition, the supply of lateritic nickel may be significant but the cost efficiency of the related extraction process is uncertain.

3.1.3 Importance to the Canadian Economy

The Panel does not consider the review to be a proper forum for discussing the importance of the Project to the economic viability of Inco. However, the Panel acknowledges the contribution of the nickel industry to the Canadian economy. Inco is the largest producer in the Canadian nickel sector, which had net export earnings of \$1.6 billion in 1997. Inco accounts for over 70 percent of the capacity of the three Canadian smelters and over 80 percent of the capacity of the three Canadian refineries. Most of the concentrates for the three Canadian smelters are produced locally in Thompson and Sudbury, while Falconbridge augments its smelter feed from the Raglan mine in northern Quebec. The two Sudbury smelters have undergone major capital upgrades and have potential for significant future operating life.

The supply of cost-effective Canadian concentrates is being threatened. In Sudbury, Inco's near-surface reserves are low grade; the higher grade material is located at depths below 2000 m. Falconbridge is short of reserves in Sudbury and is relying on Raglan and other exploration properties to augment its supply. There is exploration potential in Labrador (the Kiglapaits and Donner Resources sites), a significant exploration program in northeastern Quebec near Sept-Îles and a recently announced discovery in northern Quebec. At present, there are no known offshore sulphide deposits that can supply significant quantities of concentrates to Canadian smelters, and there are no known major commitments to look for such deposits. Therefore, Canada must manage and develop its supply.

The Panel believes there is some justification for concerns that structural change in the nickel market may reduce long-term prices. It

is also difficult to assess the sustainability of Russia's present level of exports of primary metal and stainless steel scrap, or the potential success of methods for extracting oxide nickel from laterites. Even with these uncertainties, VBNC is willing to make a major investment based on the Ovoid reserves and believes that, with extraction facilities in place, it can profitably extract a significant portion of the underground resources.

The Panel observes that there is potential for growth in the world nickel market and that new domestic sources will have to be developed just to maintain Canada's existing position. Given that Inco supplies about 20 percent of that market, the Panel assumes that Inco, as part of its internal justification of the project, will assure itself that production from Voisey's Bay is required. In addition, Inco will have to convince financiers that its projections are valid before development proceeds.

3.1.4 Need for Local Economic Development

While it was made quite clear to the Panel that economic development at any cost was not an option, people in Aboriginal communities felt that new economic activity was important to the future, provided the environmental effects, the timing and the level of control were satisfactory. In all of the Inuit communities people expressed interest in the direct and indirect jobs that might accrue from the Project. In the Innu communities, elders and younger people indicated that jobs could provide some benefits, including resources to support important traditional activities.

The Panel acknowledges, however, that some Aboriginal people feel they cannot support the Project under any circumstances, because of its social and environmental consequences, and because they feel that a mining project is not compatible with Aboriginal culture, ways of life and aspirations for the future.

In Nain, the Panel heard from a group of presenters who described a busy local economy, with good prospects in fisheries, small-scale quarrying, tourism and crafts. The presenters felt that the Inuit communities had a range of economic development opportunities and need not depend on large resource extraction developments such as the project.

The business community of Happy Valley-Goose Bay strongly supported the Project as a way to diversify the economy away from dependence on the military presence. In Labrador West, already an experienced mining community, people also strongly supported the Project. Chapter 15 discusses regional economic benefits in more detail.

3.2 PRODUCTION RATE AND MINE LIFE

Throughout the hearings, the Panel heard concerns about the length of the Project from Aboriginal organizations, the Province and many individuals. VBNC is proposing a 25 year project at Voisey's Bay but presenters were concerned that changing circumstances, such as nickel prices, the economic fortunes of VBNC's parent company or poor results from the underground exploration program, could alter this intention. One of the key factors determining the length of the Project (the mine life) is the rates at which VBNC will extract and process the nickel (the production rates).

3.2.1 Proposed Production Rates

VBNC based its EIS proposal on a mill processing 20,000 tonnes per day (tpd). In the

Additional Information, VBNC refined this proposal to show different production rates during start-up, open pit operation and underground operation, as shown below.

This table clearly shows the effect of the anticipated lower grade of the underground ore, which would require a much higher throughput of ore and a longer operating period to produce the same amount of nickel.

During the open pit stage VBNC would, in effect, be mining and milling nickel at an annual rate equivalent to 15,000 tpd but using a 20,000 tpd mill to accomplish it in nine months. The larger mill capacity therefore permits

- more flexibility in dealing with the severest winter weather;
- a delay of several years before winter shipping may be needed; and
- a gradual increase in throughput as underground material becomes available.

Based on the existing mineral inventory, and assuming a two year start-up period, the open pit reserves of 31.7 million tonnes would be exhausted in 6.5 years. Assuming the projected 118.3 million tonnes of underground resource is found, is converted to ore reserves and can be mined at the 20,000 tpd capacity, the operating life would be extended to a total of approximately 23 years. The latest reported underground resource is some 92.7 million tonnes but VBNC is committed to continuing the exploration program.

Project Phase	Tonnes of Ore Processed/Year	Tonnes of Nickel Produced/Year	Annual Operating Period
Start-up (1-3 years)	3.7 million	82,000	6-9 months
Full Open Pit Operation	5.5 million	122,500*	9 months
Underground Operation	7.3 million	75,000	12 months

*This represents the 270 million pounds often quoted as project capacity.

VBNC justifies this level of operation in Section 2 of the Additional Information, stating that anything below 15,000 tpd is not economical. Since the capital cost of a 20,000 tpd mill is only about 5 percent greater than the cost of a 15,000 tpd mill, VBNC decided to go with the larger mill now rather than plan for expansion for the lower grade underground resource. Unit operating costs drop steadily as production rates increase, although at 15,000 tpd costs are less than 10 percent higher than are costs at 20,000 tpd.

3.2.2 Optimum Design Production Rate

At the hearings, a number of presenters argued that a lower production rate is feasible and would extend the mine life, which led to a discussion of the optimum design production rate for a new mining operation. The Panel is aware that this area has not been extensively researched, especially for mines whose economic circumstances may differ from the norm, but some literature does exist. It is known, for example, that the capital cost per unit of throughput decreases as the production rate increases. The operating cost per unit also decreases until economies of scale no longer apply. There is, for example, a limit to the amount of additional equipment that can work efficiently in a constrained space, particularly underground.

An expert for the Innu Nation argued that a production level well below 15,000 tpd is still economic. His analysis suggested that a production level of 3,000 tpd would still be marginally profitable. However, the Panel notes that he used high plant recovery rates and capital costs that could be considered low (he used a capital cost below that published for Raglan, although the port and airstrip already existed at that location). The Panel also observes that the Innu Nation analysis showed that profitability drops rapidly at a production rate below 10,000 tpd.

The Panel understands that the most accurate way to calculate the optimum design production rate is by using a series of cash flow

analyses in which both operating and capital costs are varied appropriately. Such a calculation goes beyond the scope of environmental assessment (a point that NRCan emphasized during the scoping sessions). Presumably, this type of analysis gave rise to the matrix of possible alternatives provided in the Additional Information.

However, the Panel is aware that some methodologies do exist to provide initial estimates. An NRCan expert discussed one of them — Taylor's equations — at the hearings. Taylor's equations, produced from an analysis of production rates at many mines, suggest that the optimum design production rate for a resource of 150 million tonnes might be approximately 19,000 tpd. The Panel notes that applying these equations to the 32 million tonnes of resource in the Ovoid suggests a production rate of approximately 6,000 tpd for a 15 year operating life. However, the high level of fixed capital costs for the project (the cost of the port and airport, for example) would tend to increase the optimum design production rate.

Another factor limiting the design production rate is the rate at which the ore can be removed. In the Additional Information, VBNC suggested 30,000 tpd as a likely limit of the project's technical capacity. This is based on the Ovoid reserves and would likely be considerably lower for the underground operation. Any decrease in the underground resource that can be economically recovered would likely further reduce the rate at which it could be mined.

Therefore, the volume of the actual final reserve is critical to this analysis. The Panel considers that the best information available is found in VBNC's October 2, 1998 reply to the Panel's question about factors that affect the design and scheduling of the operation. The Panel notes that the resource cited in that analysis is some 25 million tonnes larger than the last-quoted resource but considers that figure within the realm of possibility, given the likely extension of the Eastern Deeps. The other working assumption suggested by the Panel was that the grade

of the total underground resource will be similar to the grade of the existing resource. VBNC calculated the amount of resource based on a cut-off grade of 0.7 percent nickel equivalent.

After examining the graphs provided in the reply, and assuming average costs as calculated from an industry report and from internal cost data, the Panel observes that there is an underground resource of approximately 65 million tonnes with a grade of 1.6 percent nickel, which can be mined economically at US \$3.00 per pound. How the actual costs of the Voisey's Bay Project would compare to the average used in VBNC's October 2 analysis is unknown. The higher production rate would tend to reduce the unit cost but the additional overhead costs of the remote location could well offset this saving. As discussed above, the Panel believes it would be more difficult to mine this 65 million tonne underground reserve at the design production rate of 20,000 tpd, although the higher grade would somewhat compensate for decreased metal output.

Combining this reduced underground resource with the Ovoid reserves gives a total likely minable resource of some 95 million tonnes. Applying Taylor's equations to this figure would suggest a production rate of approximately 10,000 tpd. The Panel concludes, therefore, that this rate is a reasonable first approximation of a design production rate based on the existing knowledge of the mineral resources at the site. The Panel also notes, however, that the higher capital costs of a mine in an isolated location might require a production level higher than that given by Taylor's equations to justify the additional investment.

Should new ore zones be discovered at the site, they would extend the life of the operation. However, such zones should not be considered when calculating a preliminary production rate. They would, of course, change the footprint of the project within the claim block. Decisions on the resulting environmental impact would need to be made in conjunction with regulators and

stakeholders as part of the ongoing environmental management plan (see Chapter 17).

3.2.3 Ovoid-only Scenario

Many presenters expressed great concern to the Panel about the possibility that the Project could close after depleting the open pit, which was referred to as the Ovoid-only scenario. While VBNC confirmed during the hearings that this was not its intent, participants were concerned that fluctuating nickel prices made the underground expansion somewhat uncertain.

In its October 2 reply to Panel questions on this matter, VBNC stated that, if a structural change in the nickel market resulted in a long-term price of US \$1.85 per pound, probably none of the underground resource could be profitably extracted. While VBNC makes it clear that it does not anticipate such low prices over the long term, it is not clear to the Panel if, in fact, any part of the Project would proceed at the lower prices.

In its October 2 reply, VBNC evaluated the biophysical consequences of a greatly reduced underground resource of only 10 million tonnes. It showed that a much smaller underground operation would reduce the Project's footprint by eliminating the need for the North Tailings Basin, and would therefore reduce environmental effects. It described an underground mine of only 2,000 tpd and pointed out that this smaller operation would still employ as many people as the open pit.

In this chapter, the Panel addresses two aspects of this issue: replacement of reserves and the nature of the deposit itself.

Replacement of Reserves

A number of presenters expressed concerns that VBNC would mine the higher grade open pit reserves contained in the Ovoid at a non-sustainable rate to maximize company profits and then cease operations. VBNC has stated its commitment to the underground resources as

presently outlined and to ongoing exploration to replace the reserves extracted. It points to its operations in Sudbury and Thompson, which have operated well beyond their initial reserve life and where the company has made considerable investments in new technology to ensure the ongoing viability of both the mineral reserves and the extraction plants.

The Panel believes it is worth noting that the history of many mining companies in Canada, including Inco, shows that the industry prefers to look for reserve replacements close to existing operations. Mining engineers are taught that reserves must be replaced at a rate equal to their depletion if a mining company is to survive and that the most likely place to find a new ore body is adjacent to an existing operation. There are many examples of this philosophy in Canada in places such as Noranda, Sudbury, Flin Flon, Red Lake, Sullivan and Timmins.

Nature of Deposit

As one criterion for applying the precautionary principle, the Panel considered the extent to which an aspect of the project could be considered novel or untried. As a result, it considered whether there were unique circumstances that could increase the risk of the Ovoid-only scenario. The Panel offers the following analysis.

The Panel observes that projects commonly begin with an open pit operation to produce important initial revenues and to delay capital expenditures for the underground operation. Since operating costs for an open pit mine are considerably lower than those for an underground mine, the recovery of lower grade material in the pit is often justifiable and the planned milling capacity is often higher than the capacity a company can attain during the underground phase.

Lower grade material is not present in the Ovoid deposit. In fact, the Ovoid resource has a higher average grade than the more disseminated mineralization underground. The Discovery Hill zone contains a potential low grade and near

surface resource. However, in the hearings, VBNC stated that the grade of that material would probably not support an underground operation and that open pit methods might be too expensive because of the disposal costs for the significant volumes of mineralized waste that would be produced.

In a more typical situation, as the mine progresses underground, the grade of the material being mined has to increase to support the increased mining costs. That means the mining plan excludes low grade material as far as possible, although some may have to be extracted as part of the normal underground mining sequence. In fact, an underground operation often has difficulty supplying an adequate volume of ore to meet milling capacity. However, it may produce a volume of metal output similar to that produced by an open pit operation, as underground ore is generally of higher grade. Starting underground mining early has another significant benefit: a company can increase the grade of the mill supply as open pit reserves near depletion and it becomes more difficult to meet production requirements.

The Panel concludes that obvious differences between this deposit and more typical mines do increase the possibility of a "scoop and run" operation, although the Panel does not suggest that this is VBNC's intent. On the other hand, the Panel notes that the higher profitability of the Ovoid operation would allow the project to incur the high fixed development costs of a greenfields site and to recover the investment early in its operating life, even when the short-term product price outlook is not good. The potential underground reserves also have a high grade portion that VBNC will likely be able to recover, as discussed earlier.

3.2.4 Effect of Secondary Processing

The Panel's mandate quite clearly did not include an environmental assessment of any proposed secondary processing facilities in the province. Neither did it require the Panel to consider any

environmental effects produced by secondary processing of the concentrates at any destination.

During the hearings, however, the Panel clearly indicated that the final destination of the concentrates could affect the timing, economic viability and socio-economic benefits of the Project, and therefore it was within the Panel's mandate to comment on these issues. The Province confirmed this interpretation by asserting that the Panel should assess how socio-economic benefits might vary based on concentrate destination. The Province provided results of its economic analysis of a Project that included secondary processing facilities but refused to discuss any details of the model that gave rise to these results.

Provincial legislation requires that ore mined in Newfoundland and Labrador be processed in the province, if economically feasible. VBNC is proposing, however, to carry out secondary processing of the nickel concentrate at its smelting facilities in Ontario and Manitoba. This issue was not resolved at the time of the hearings. Therefore, the Panel observes that the final destination of the concentrates for secondary processing is uncertain.

Both Aboriginal groups expressed concern that the need to justify construction of a smelter on the island portion of the province was driving the proposed production rate to 122,500 tonnes of nickel, which they felt was too high and would unnecessarily shorten the life of the Project. They also expressed concern that provincial requirements to establish secondary processing facilities might reduce overall profitability and lead to cost-saving measures at the mine and mill site, which might in turn compromise VBNC's commitments to environmental protection.

Looking first at the argument that factors external to the Project are determining the production rate, the Panel believes there is no question that a significantly reduced production rate could reduce the profitability of new secondary processing facilities. It is less obvious,

however, how the justification of those facilities led to proposed capacity of 122,500 tonnes. Based on the proven Ovoid reserves, and assuming the two year start-up phase discussed earlier, VBNC could achieve that capacity for only approximately four years of the mine's projected 23 year operating life. The Panel observes that any new secondary processing facility based on that capacity would require another supply of concentrates, beyond that produced at Voisey's Bay, for most of its operating life. A source of supply would need to be identified early in the planning of such a facility. Given that there is a potential shortage of Canadian concentrates based on existing smelting capacity, and that no obvious offshore source of sulphide concentrates exists, the viability of such a secondary facility is not obvious to the Panel.

On the other hand, it is not clear to the Panel how Inco's existing secondary treatment facilities could process the proposed maximum production of 122,500 tonnes of nickel in concentrates. It appears that the total excess capacity of existing Inco plants, based on NRCan data, is well below that level. When questioned in hearings, VBNC described Inco's excess capacity as "upwards of 200 million pounds," which translates to something below 90,000 tonnes.

The Province believes that a project including a provincially based smelter would still be profitable, although profitability would be reduced. The results of one analysis provided by the Province showed a return on investment of between 11 and 17 percent for a project including a smelter in the province. The Panel notes, however, that this analysis was based on production of 133 million pounds of nickel (rather than 270 million pounds) and reserves of 68.5 million tonnes.

Although neither VBNC nor the Province provided details of its economic models, the Panel observes that any significant increase in capital expenditures with only marginal increases in production revenues will both

delay and reduce the revenues flowing to both levels of government through the corporate taxation system. The capital expenditures can be deducted from both federal and provincial corporate income taxes and from the provincial mining tax. In addition, increased capital expenditures would increase the processing allowance available under the provincial mining tax. Regardless of statements made by the Province that governments should not provide subsidies to Inco, the Panel notes that the taxation system effectively subsidizes operations with low profitability and benefits most from those with high profitability. It should be noted, however, that VBNC's models forecast that 78 percent of all taxes flowing to the Province through corporate, mining, income or sales taxes flows through to the federal government under equalization adjustments.

It is unclear to the Panel how increased capital expenditures or reduced profitability — both likely effects of a requirement to build a new smelter — would affect revenues flowing to the Aboriginal groups. VBNC stated that the impact and benefit agreements (IBAs) currently being negotiated contain payments that allow the Aboriginal groups to participate in the profits of the project. In addition, details of the Labrador Inuit Association (LIA) land claims show that 3 percent of the revenues payable to the Province under the mineral tax regime would be payable to LIA. Any reduction in profitability could affect those revenue flows.

Finally, there is the question of how the concentrate destination would affect the socio-economic benefits flowing to the local, regional and provincial economies. VBNC contends that the bulk of the local benefit will come from jobs and business opportunities under the adjacency principle. It is important to note that about 65 percent of the jobs and income impacts are predicted to occur during the underground stage of the Project, so any effects on profitability that jeopardize this phase would have severe negative impacts.

In looking at the supply of goods and services, VBNC stated that the positive benefits predicted for the Labrador and provincial economies were based on the estimated ability of companies to provide these requirements. The fact remains, however, that since VBNC plans to back-haul supplies on concentrate carriers, the destination port of the concentrates will affect the source of the supplies. Undoubtedly, many supplies will not originate in the province, regardless of concentrate destination. As a result, some special arrangements will be needed so that local suppliers can compete and predicted benefits can be achieved.

The Panel concludes that VBNC's decision to produce 122,500 tonnes of nickel annually was not driven by secondary processing considerations. Decisions about secondary processing could, however, significantly affect the profitability of the Project, which in turn affects the flow of socio-economic benefits to governments and to the people of Labrador.

3.3 RESOURCE STEWARDSHIP

Assessing the optimum timing and production rate of the Project and the potential socio-economic effects of varied concentrate destinations is a complex task. The Panel concludes, in light of the dynamic nature of both the reserve base and future nickel markets, that it cannot prescribe production rates for the various stages of the Project. The Panel does, however, offer guidance and makes recommendations as to how these decisions can best be made to maximize benefits to all stakeholders.

As already discussed, the Panel considers a minimum annual design rate of 10,000 tpd to be a reasonable first approximation, based on existing reserves and resources. This is, in fact, VBNC's planned annualized rate during the two to three year start-up period, based on the proposal to operate for approximately six months at a rate of 20,000 tpd. The Panel also accepts the 20,000 tpd planned rate during the

underground operation phase, if underground exploration confirms the projected volume and grade of reserves. By allowing VBNC to avoid winter shipping until the uncertainties have been investigated (see Chapter 10), excess milling capacity would also give the company an obvious advantage during the Ovoid phase, especially since the incremental capital cost is not significant. That capacity would also be useful if a lower than expected tonnage of high grade material is mined during the underground phase, or if technical or environmental problems preclude winter shipping.

The Panel's concerns apply mainly to the increased nickel output during the full-scale open pit operating period. The Panel believes that the plan to increase production to 122,500 tonnes for such a short period will create high capital costs for product handling, especially if additional vessels are required to ship concentrate to VBNC's preferred destination. It is also not clear, as discussed earlier, how new smelter capacity could be justified at that rate or how existing smelter capacity could absorb that level of production.

The Panel notes that, in one scenario, VBNC could use existing excess smelting capacity during the start-up phase. The company would then be able to confirm reserves through underground exploration and link the construction of new capacity more closely to the long-term production potential of the Project. Supplying both existing and new secondary processing capacity for a short period of time would allow VBNC to reach the maximum production capacity of the Ovoid. This strategy would both enhance the profitability of the project and ensure more logical stewardship of the mineral resource as reserves and markets become more clearly defined. Under such an approach, VBNC would have to make enforceable commitments to early exploration and to subsequent development of the underground resource if reserve predictions are substantiated.

How would these design and operating decisions best be made? In answer to a panel

question, a representative of the Newfoundland and Labrador Department of Mines and Energy stated that the Province does not usually dictate the level of production to a company during the lease application process or at any other time. The Panel concludes, however, that in this case the mining lease should include some assurances or conditions attached to such fundamental issues as the production rate and mine life.

Durable and equitable benefits are only achievable if the project lasts for 25 years. However, the project will last that long only if a significant portion of the underground reserves can be extracted economically. Unrealistic demands on the project, imposed by either VBNC or the Province, could jeopardize a resource that could provide significant benefits to the people of Labrador and the entire province.

Recommendation 2

The Panel recommends that the Province and VBNC negotiate a mining lease that promotes the attainment of durable and equitable social and economic benefits to the people of Labrador and of the Province through resource stewardship. The following conditions should be attached to that lease:

- **VBNC must proceed as soon as possible with an underground exploration program and, if reserves are proven, commit to early development to blend underground output with the late stages of open pit production; and**
- **if initial underground exploration does not confirm current reserve projections, VBNC must extend the life of the open pit by reducing the annual production rate to ensure that the Project can continue to operate for at least 20 to 25 years.**

4 LAND CLAIMS AND IMPACT AND BENEFIT AGREEMENTS

4.1 BACKGROUND

The Memorandum of Understanding (MOU) authorized the Panel to consider "submissions regarding the relationship between the Undertaking and land claims negotiations." The Panel therefore indicated in its guidelines that it would consider "whether proceeding with the Undertaking prior to the negotiation of a land claims agreement with an affected Aboriginal party would jeopardize, impair, or limit those negotiations."

The Labrador Inuit Association (LIA) and the Innu Nation told the Panel that doing so would indeed have that effect. They further asserted that

- key social, economic and environmental mitigation measures can only be delivered through land claims agreements and through impact and benefit agreements (IBAs), and that such measures are therefore inextricably linked to those agreements;
- their interests in IBA negotiations are adversely affected because the negotiations are occurring outside the context of land claims agreements; and
- their consent would be required before project authorization, and that such consent could be achieved through land claims agreements and IBAs.

LIA and the Innu Nation stated that the Project should not be authorized before each group has reached a land claims agreement — at minimum, a ratified agreement in principle with secure interim measures — with the governments of Canada and the Province. In addition, they stated that IBA negotiations should be finished and an agreement ratified before the Project is authorized, and that the agreement should be in place before construction begins.

Many Inuit, Innu and organizations also strongly supported these conclusions and conditions.

VBNC stated that, although it supports the principle of a negotiated land claims agreement, it is not a party to these negotiations. The company feels that its right to pursue its interests should not depend on completion of an agreement. VBNC is negotiating IBAs with LIA and the Innu Nation, but regards these as discretionary arrangements that should not hold up the Project.

Canada and Newfoundland provided some information on the status of land claims negotiations but took no position on the matter.

4.2 LAND CLAIMS

In keeping with the MOU, the Panel stated in its guidelines that it would not (and it does not) "make findings or recommendations regarding ... the existence or substance of Aboriginal rights." However, after those guidelines were issued, the Supreme Court of Canada rendered a judgement (*Delgamuukw v. British Columbia*) that provides specific guidance on the consequences of Aboriginal title and rights. Both LIA and the Innu Nation referred to this judgement in arguing that their consent is required. The Panel feels obliged to consider the current implications of Aboriginal title in relation to consent, to consider what form such consent might take and to make recommendations on the delivery of key mitigation measures.

The Panel therefore considered the following three questions.

- If Aboriginal title exists in the area, what are its consequences for project authorization?
- What would a land claims agreement likely include?
- How would land claims negotiations be adversely affected if the Project were authorized to proceed prior to a settlement?

These appear to be matters of some uncertainty, and the Panel's observations on them are not intended to be either determinations of legal fact or legal interpretations.

4.2.1 Consequences of Aboriginal Title

According to the Supreme Court in *Delgamuukw*, Aboriginal title encompasses "the right to exclusive use and occupation of land," and "the right to choose to what uses land can be put." Aboriginal title also encompasses mineral rights, and such lands may be used in certain non-traditional ways. The concept therefore has an economic component. Aboriginal rights, which among other things can include the right to engage in specific traditional practices in specific places, can exist without title. However, these rights are not necessarily exclusive.

Aboriginal rights and title are not absolute. They may be infringed for legislative objectives that are "compelling and substantial." These can include mineral developments such as the VBNC Project. Governments have fiduciary obligations to Aboriginal people, however, and the *Delgamuukw* judgement sets out certain tests that governments must meet to justify infringing on Aboriginal rights and title. These tests include ensuring

- Aboriginal participation in resource development;
- consultation and, in some cases, full Aboriginal consent; and
- fair compensation.

Performance requirements for these tests are not described in detail. Both the first and third requirements arise from the economic component of title. They involve both legal and economic principles, which the Supreme Court acknowledged to be complex and which it did not describe in detail in its judgement. However, the principle of participation is said to involve both the process and the result of resource allocation.

The requirement for full consent is specified "particularly when provinces enact hunting and fishing regulations in relation to Aboriginal lands." The Innu Nation submitted that this means anything, including the Project, that affects fish and wildlife in the area, but the Panel is not persuaded that this is a plain reading of *Delgamuukw*. The Panel understands *Delgamuukw* to mean that formal consent on the part of Aboriginal title holders is not legally required for the Project to proceed, although there are sound political and moral reasons for governments to obtain their consent.

The Crown is obliged to consult because it has the capacity to grant land and resource tenures. The Panel understands that, in light of recent court judgements, governments must take consultation seriously, and that the environmental assessment process is held to the same high standards. If the lands in question are subject to Aboriginal title, the Panel must therefore give due consideration to matters presented to it by title holders.

If the foregoing is now the law of the land, there are significant consequences for Project approval. The rights described would be constitutionally protected, and the obligations described would be constitutionally required. The Crown's obligations would be legal, not merely political. The Panel would need to consider the effect of these legal facts on the authorization and environmental aspects of the project, in the same way it considers the effect of any other applicable federal or provincial legislation.

Under policy established many years before the *Delgamuukw* judgement, Canada acknowledged an obligation to negotiate comprehensive claims agreements in areas where Aboriginal title is unceded or unextinguished. In accepting a claim for negotiation, Canada does not admit legal liability and does not acknowledge title. Canada and the provinces have taken the position that claims agreements need not precede resource development on those lands. Both LIA and the

Innu Nation observed that Canada and the Province do not formally recognize and act in accordance with Aboriginal title before ratifying a final claims agreement.

The *Delgamuukw* decision specifies, with much greater clarity, the Crown's obligations with respect to granting or permitting third party rights on Aboriginal title lands. The effects of *Delgamuukw* appear to include the following.

- The Crown cannot dispose of land or resource rights, or permit development activity, on Aboriginal title lands unless it has met its obligations with respect to participation, consultation and compensation.
- The Crown must meet these obligations before development begins, rather than merely undertaking to negotiate a claims agreement at some unspecified future date. Injunctions have been granted to First Nations in British Columbia when these conditions have not been met.
- The Crown's traditional position that development can proceed on Aboriginal title land in advance of arrangements for participation, consultation and compensation, if not also consent, is no longer tenable.

In the context of land claims negotiations, interim measures to protect the interests of Aboriginal title holders are no longer discretionary; they are mandatory.

While the Supreme Court did not decide that land claims agreements are required before resource development can begin, the judgement stated that, where Aboriginal title exists, "the Crown is under a moral, if not a legal, duty to enter into and conduct those negotiations in good faith."

The Panel considers that a land claims agreement is the most effective and efficient way of implementing the Crown's obligations, because it provides both the substance of these obligations and an institutional framework for implementing them.

Delgamuukw provides explicit guidance for determining whether Aboriginal title actually exists for the lands that VBNC seeks to occupy or for any lands that the Project might affect. That determination is not part of the Panel's mandate. The Panel merely notes that Canada has accepted for negotiation two claims that include part or all of these lands. These are the claims of LIA and the Innu Nation, both currently under negotiation. Canada is also negotiating a claim by the Makivik (Inuit of Quebec) with respect to an area of land and sea north of Hebron (approximately 58° N). The Labrador Métis Nation (LMN) has submitted a claim to an area of "south and central Labrador" whose actual geographic limits were not communicated to the Panel. The LMN advised the Panel that the Department of Justice Canada rejected this claim in a draft response that the Minister of Indian and Northern Affairs has neither accepted nor rejected.

4.2.2 Likely Contents of a Land Claims Agreement

Canada's policy on negotiating land claims agreements provides for transfer of title to selected lands, hunting and fishing rights, resource revenue sharing and Aboriginal involvement in environmental management, both onshore and offshore. However, final agreements are not identical, and these core elements can be modified to meet local circumstances and objectives, which may include balancing Aboriginal rights and title with those of the Crown and of existing third party interests.

Based on LIA's submissions of November 2 and 3, the LIA land claims agreement will resemble the Nunavut Final Agreement in key respects. The Panel assumes, for the purposes of this discussion, that those submissions reflect the likely outcome of an agreement.

The following key elements of the LIA land claim pertain to this environmental assessment:

- selection of lands in surface title, exceeding 20 percent of the Labrador Inuit Settlement Area, which will cover the entire north coast of Labrador;
- priority subsistence harvesting rights, and co-management with respect to wildlife, fisheries and environmental assessment, throughout both the Settlement Area and a substantial marine area extending to the 12 mile limit;
- resource royalty sharing on both Labrador Inuit lands and Crown lands (this would include revenues from the VBNC Project);
- a cash transfer;
- compulsory IBAs on major developments throughout the Settlement Area; and
- wildlife compensation provisions.

The Innu Nation appears to be negotiating similar general provisions, although details may vary.

IBAs include measures to minimize adverse effects of major development activities on land claims agreement beneficiaries, and to enhance positive effects. Prospective resource developers must negotiate an IBA (in all cases with the surface title holder and in some cases anywhere in the settlement region) before beginning a project. Land claims agreements typically include particular provisions to compensate beneficiaries for adverse effects on wildlife harvesting, in the context of IBAs. Section 4.2.3 provides further details on how IBAs work in other claims.

Resource revenue provisions ensure that land claims agreement beneficiaries obtain a set share of the royalties flowing to governments from development activity, regardless of where the activity occurs in the Settlement Area.

From this brief account, it is evident that key elements of a land claims agreement ensure

that governments meet their legal obligations to provide for participation, consultation and compensation. The Panel makes no comment on the appropriateness or desirability of any particular approach to or component of a land claims settlement. The only purpose of this discussion is to identify the most likely outcomes of negotiations and the ways prior authorization might adversely affect those outcomes, based on recent experience.

4.2.3 Potential Adverse Effects on Land Claims Negotiations

If a project were authorized to proceed before a land claim was settled, how might that adversely affect land claims negotiations? Both LIA and the Innu Nation argued that the land claims agreements they are currently negotiating would be compromised if the Project were authorized to proceed before they settled those claims. Specific concerns included co-management, resource royalty sharing and IBAs.

Concerns Related to Co-Management

If co-management provisions of a land claims agreement were in effect, LIA and the Innu Nation would have a direct and non-discretionary relationship with the regulatory agencies involved in this project. This cannot be achieved through IBA negotiations. Through the MOU, LIA and the Innu Nation established significant cooperation with governments regarding the present environmental assessment of the project. The Province has also made a discretionary commitment to enable LIA and the Innu Nation to review permits associated with the Project. As both LIA and the Innu Nation have pointed out, without a land claims agreement, there is no provision to continue these arrangements during the environmental management phase of this Project, or to co-manage any other development that might occur on Aboriginal title lands.

Resource Royalty Sharing and Other Financial Considerations

The proposed Inuit land claims agreement calls for LIA to receive three percent of provincial resource royalties from the Project. This does not appear to depend on the selection of the claim block as Inuit land. Under a final agreement, the Province would collect resource revenues and remit a portion of them to the beneficiaries.

The Innu Nation indicated that it could not negotiate a resource royalty share on the Project through its land claim if the project is approved before the claim is settled, as it is the Innu Nation's understanding that "existing" projects would not be subject to the provisions of its agreement. The Innu Nation also asserted that, without a land claims agreement, IBA payments would be subject to taxation.

If compensation, in the form of rent revenues, is not provided through a land claims agreement or an IBA before the Project starts, the Innu Nation and LIA will not obtain financial resources with which they can address their own concerns according to their own priorities.

Resource revenue sharing and cash transfers constitute compensation for past, present or future use of resources, and for any damages caused by resource development. The Crown provides this compensation directly, normally through a land claims agreement, as a consequence of its fiduciary obligations. The only direct "compensation" that developers provide relates to damages resulting from accidental or unintended consequences of activities that the Crown has authorized.

Concerns Related to IBAs

Although VBNC is negotiating IBAs with LIA and the Innu Nation, it regards these as discretionary arrangements that do not have to be completed before the Project starts. If land claims agreements were already in place, IBAs would be non-discretionary and the Project could not proceed without them. Wildlife compensation would also be non-discretionary.

The Innu Nation argues that lack of a land claims agreement puts it at a disadvantage in its negotiations with VBNC, because that lack makes IBAs discretionary. LIA argues that an IBA negotiated within the framework of a land claims agreement differs from one negotiated outside of that framework, without clearly specifying the nature of that difference.

The Panel notes, however, the following provisions of the Nunavut Final Agreement (and similar agreements), which make IBAs less open-ended in the context of a settled land claim.

- Benefits shall not place an excessive burden on the proponent and undermine the viability of the Project.
- Matters considered appropriate for negotiation are defined. Although not necessarily inclusive, the list does not include equity participation, or revenue capture as rent or compensation. It should be noted that the parties to the current IBA negotiations could negotiate any of the items in Schedule 26-1 to the Nunavut Final Agreement.
- It is assumed that IBAs are concluded after environmental reviews and project approval, because they must be consistent with the terms and conditions of both.

Negotiations normally begin at least 180 days before a project starts, and there are provisions for both voluntary and compulsory arbitration, as early as 60 days after the negotiations begin.

As a general principle, IBAs cannot be used to stop or delay an approved project. The Panel is not aware of any case where the beneficiaries of a land claim have attempted to do so.

The Panel believes that a land claims agreement would provide greater certainty with respect to IBAs, as both the Innu Nation and LIA have observed. However, such an agreement would also give a developer greater certainty. VBNC stated that the prospects of successfully negotiating an

IBA would be better if matters normally related to land claims agreements were kept separate. The Panel agrees.

The Panel is not persuaded that negotiating an IBA within the framework of a land claims agreement necessarily results in a more advantageous IBA for the beneficiaries. A land claims agreement would simply make it mandatory to negotiate an IBA before a project starts. The next section discusses this issue further.

Neither LIA nor the Innu Nation specifically argued that its land selection might be jeopardized. Although the Province offered the claim block to LIA before minerals were discovered on it, the land claim appears to provide for both resource revenue sharing and an IBA, whether these lands eventually fall under Inuit surface title or not. As long as this is so, and as long as the claim provides for environmental co-management, LIA would not be adversely affected if the Project began before land was selected and confirmed. Similarly, if the final agreements include adequate provision for wildlife compensation, and if current restrictions on employee harvesting are maintained (see Chapter 14, Aboriginal Land Use), Innu and Inuit harvesting rights would not be adversely affected.

There are also some more general considerations. The Innu Nation argued that the practical effect of Aboriginal title and rights would be diminished if governments could continue to authorize major developments on Aboriginal title land without concluding a land claims agreement and without penalty. LIA asserted that the integrity of the negotiation process itself would be undermined.

Both the Innu Nation and LIA have asserted that redress and remedies are available to them through the courts, and the foregoing analysis suggests that they may be correct. However, litigation would entail substantial cost and take a long time. The plaintiffs would have to prove their Aboriginal title, according to the tests

outlined in *Delgamuukw*, and other parties might intervene with different claims. The Panel does not speculate on the outcome, but a court might come to conclusions regarding titles and rights to specific lands that differ from those currently accepted by Indian and Northern Affairs Canada for negotiating purposes.

LIA and the Innu Nation noted, and the Panel concurs, that legal action would create a prolonged period of uncertainty for all concerned. It would also constitute a major setback to the goodwill and cooperation established among the parties to date, and to whatever progress has been achieved in negotiations and discretionary arrangements. Legal action would subject the VBNC Project, even if authorized, to uncertainties in implementation, and severely diminish prospects for successfully delivering key social, economic and environmental mitigation in a cooperative manner. The Panel cannot recommend a course that could effectively negate the benefits of the project to Inuit, Innu and, ultimately, VBNC.

4.2.4 Alternative Measures

Are there alternative methods to ensure that the Crown's fiduciary obligations to Aboriginal title holders are met, short of negotiating a land claims agreement? The Panel considers that negotiated, project-specific agreements, relating to such matters as IBAs and environmental management regimes, could serve this purpose (see Chapter 17, Environmental Management). However, the Panel cautions that, if such agreements are reached only on a project-by-project basis, there is a risk of developing a hodge-podge of overlapping and perhaps inconsistent arrangements that would create extra costs. Negotiating a final agreement from which the appropriate arrangements would naturally flow is very likely a simpler and more efficient approach, which would also create a clearer and more secure environment for potential developers. It also puts the onus for clarifying issues of land

and resource tenures precisely where it belongs: with the governments that grant them rather than the developers who seek them.

If alternative arrangements to land claims agreements are to be effective, they must be implemented as though they were binding interim measures related to such agreements. At the very least, these arrangements would continue the ad hoc measures already agreed to by the Province and Canada in good faith, specifically the MOU that established the present review, and the involvement of LIA and the Innu Nation in reviewing permit applications.

Although existing claims policy "provides that appropriate interim measures may be established to protect the interests of a claimant group while its claim is being negotiated," both the Innu Nation and LIA indicated that the two governments have resisted formal interim measures to provide for control over developments such as the VBNC Project. Both groups also noted that agreements in principle are not legally binding, and that what has been negotiated to that point is not protected until formal ratification by all parties takes place and implementing legislation is passed. They asserted that the Province will only consider substantive and binding measures after an agreement in principle is ratified, and characterized the positions of the two governments as "unalterable."

Both LIA and the Innu Nation expressed a willingness to accept an agreement in principle, rather than a final agreement, as a condition of consent, as long as the agreement in principle included effective and binding interim measures. They stated, and the Panel acknowledges, that they were taking some risk in doing so.

The co-management arrangements recommended by the Innu Nation and LIA as a "second-best" solution could be put in place without an agreement in principle, using agreements that address the continuing review, approval and environmental management of the VBNC project (as outlined in Chapter 17). If such

agreements reflect the key elements of land claims agreements described above, they might fulfill governments' fiduciary obligations.

4.2.5 Recommended Approach

The Panel considers that proceeding by way of either land claims agreements or alternative binding measures is essential if "durable and equitable benefits" are to be achieved. This is an important element of sustainability assurance and is, therefore, sound public policy. The Panel heard a long and consistent history of disregard of Inuit and Innu rights and interests, of continuing encroachment on Inuit and Innu land, and of progressive restriction of Inuit and Innu activities. But the Panel also heard of more recent government attempts to establish trust and a new way of doing things. The Project gives Canada and the Province an historic opportunity, which should not be lost. The Panel believes there is time to act and to do things right.

Early resolution of the land claims situation in the project area will benefit VBNC and any other developer that may seek resource rights in the area, because it would clarify procedures and outcomes and provide a clear means and a greater likelihood of obtaining the cooperation of the Innu and the Inuit. Since the co-management provisions of land claims agreements define the relationship of the beneficiaries to various regulatory agencies of government, they clarify environmental management of any particular project.

The Panel concludes that, even if LIA and the Innu Nation have Aboriginal title and rights in the Voisey's Bay area that would be infringed by the Project, governments do not require their formal consent in order to authorize the Project. However, such infringement cannot occur without the participation, consultation and compensation of the Aboriginal people represented by those organizations. Consequently, Canada and the Province cannot authorize the Project until they have met their obligations to encourage

the participation of these groups, to consult with them and to compensate them.

The Panel concludes that proceeding with the Project before the Inuit and Innu land claims are settled or before equivalent measures are put in place would adversely affect land claims negotiations concerning environmental co-management and resource revenue sharing, and possibly those concerning IBAs.

The Panel believes that land claims agreements are the most effective and efficient way for governments to meet their obligations related to participation, consultation and compensation, although there does not appear to be a legal duty to conclude such arrangements. The Panel notes that alternative arrangements outside of, or leading to, land claims settlements could also allow governments to meet their obligations. However, the Panel believes that, to ensure that the Project has durable and equitable benefits, these other arrangements should leave the Inuit and the Innu no worse off than they would be had they concluded land claims agreements.

The Panel believes that settling land claims is the preferable route to take. However, the Panel recognizes that factors entirely extraneous to the Project could delay the settlement of one or both land claims indefinitely. If that happens, then alternative equivalent measures, as described in Chapter 17, must be put in place.

Recommendation 3

The Panel recommends that Canada and the Province conclude and ratify land claims agreements in principle with the Inuit of Labrador, represented by LIA, and with the Innu of Labrador, represented by the Innu Nation, before issuing any project authorizations. The agreements in principle should include binding and enforceable interim measures for co-management to provide a bridge between the end of this environmental

assessment and the full operation of the co-management elements of the agreements. This will require Canada and the Province to amend their approaches to claims negotiations to ensure that the required interim measures are put in place as an integral part of an agreement in principle.

Failing that, the Panel recommends that, before issuing any project authorizations, Canada and the Province negotiate equivalent alternative measures with LIA and the Innu Nation, as outlined in Chapter 17. Such measures must provide for Inuit and Innu participation, consultation and compensation in respect of the Project, in keeping with the fiduciary obligations of Canada and the Province.

The Panel considers the arrangements proposed in Chapter 17, including the proposed Environmental Advisory Board (EAB), to be equivalent to and consistent with land claims provisions for environmental management. The Panel therefore believes that the proposed EAB, referred to in subsequent chapters, could exist within or outside of the framework of a final land claims agreement.

The Panel recognizes that VBNC also has rights and interests that could be adversely affected if governments did not fulfill their obligations to Aboriginal title holders quickly. The Panel recognizes that VBNC lawfully applied for exploration rights, which the Province granted. It is the responsibility of the Crown to ensure that the rights and titles it grants to third parties are clear and unencumbered. To minimize the adverse effects of this recommendation on VBNC, the panel believes that Recommendation 3 can be implemented while VBNC is planning the Project and applying for permits. This would facilitate the start of construction once final authorization is given.

Recommendation 4

The Panel recommends that, whichever option in Recommendation 3 is adopted, as long as the arrangements are legally binding and enforceable, conditional authorization be given that would provide VBNC with satisfactory assurance to plan the Project and apply for permits while negotiations continue. This would allow both processes to occur concurrently rather than consecutively. However, actual construction should not be authorized to proceed until the conditions of Recommendation 3 have been fulfilled.

4.3 IMPACT BENEFIT AGREEMENTS (IBAs)

This section describes how IBAs mitigate project effects to help governments meet their obligations related to participation, consultation and compensation. It also discusses the relationship of IBAs to land claims agreements in that respect. The specific manner in which IBAs may mitigate or enhance project effects is discussed elsewhere.

While IBAs are typically an integral part of a land claims agreement, they can also occur outside that context. Mining companies and Aboriginal people across northern Canada and Alaska have negotiated a number of such agreements. IBAs have become more comprehensive, addressing not only employment and business opportunities but also social and cultural issues, and providing financial benefits. For example, the Whitehorse Mining Initiative Accord — negotiated by the mining industry, government, labour unions, Aboriginal people and the environmental community — does not refer explicitly to IBAs. However, many of the accord's recommendations for improving relations between Aboriginal people and the mining industry are negotiated through IBAs.

Outside of the land claims context described in the previous section, there is no prescribed form or substance for IBAs, and they are evolving in

both contexts. IBAs are bilateral agreements between private parties, so details of their negotiation and their contents may not be public knowledge. However, both LIA and the Innu Nation stated that they would subject their IBAs to formal ratification votes. To do this, they will have to make the substance of the agreements public, with the possible exception of certain proprietary information.

In 1995, VBNC entered into IBA negotiations on a discretionary basis, with both the Innu and the Inuit. These negotiations began before a land claim was settled, before environmental review and before project approval, in direct contrast to the provisions of land claims agreements. While VBNC's initiative is to its credit, there have been difficulties.

By November 1998, IBA negotiations had progressed substantially in most areas but were still incomplete. LIA advised the Panel that, at that time, there were no ongoing negotiations and no process for continuing them. The Innu Nation and VBNC jointly advised the Panel that they had reached tentative agreement on many issues and that negotiations were ongoing. Participants said that several factors were making it difficult to successfully conclude these IBAs.

For example, both the Inuit and the Innu have been seeking to negotiate direct compensation from VBNC itself, quite apart from what might be provided for in a land claims agreement. VBNC has stated that it does not intend, through the IBAs, to assume what are normally government responsibilities. It also expressed concern that confusion about what properly belongs to land claims, as opposed to IBAs, has impeded successful negotiations. The Panel agrees with VBNC's views, and considers this a strong reason for concluding a land claims agreement and then completing IBA negotiations within that context. The Panel believes that if governments clarified *their* responsibilities before IBA negotiations took place, this would benefit both VBNC and the Aboriginal parties.

VBNC also considered the legal provisions sought by the LIA an obstacle. The Panel was not informed of the details of these provisions and offers no opinion on this matter.

Both LIA and the Innu Nation asserted that uncertainties in the Project description have hindered negotiations, because their objectives might vary under different project conditions. The Panel notes that, under existing land claims agreements, IBA negotiations would follow environmental review and project approval. Again, this shows why it would be better to conclude a land claims agreement as soon as possible, and then to conclude IBA negotiations in that context.

Finally, all of the parties concerned have said that they do not want a time limit imposed on negotiations. The Panel observes that such time limits are mandatory under land claims, and that the Minister of Indian and Northern Affairs imposed a time limit in the case of the Northwest Territories Diamonds Project. The Panel believes that a time limit with provision for dispute resolution is desirable in this case, if authorization would otherwise be forthcoming.

LIA has stated that there is no substitute for an IBA and no alternative to an IBA. The Innu Nation asserts that governments cannot impose the detailed provisions of an IBA as terms and conditions for approving the Project. VBNC itself designated IBAs as the means by which certain potentially adverse effects will be mitigated and beneficial effects enhanced. For all of these reasons, the Panel cannot recommend that the Project proceed before formal conclusion of IBA negotiations.

The Panel recognizes that there have been certain barriers to concluding IBA negotiations, as described above. The Panel believes that the best way to remove those barriers is to resolve the land claims question, and then to conclude IBA negotiations within the more precise and restricted framework of land claims agreements. Concluding IBAs within a land claims agreement framework would ensure that the IBAs do not include the program or financial elements of a land claims agreement, which are normally provided by governments. Such an approach would remove current uncertainties about overlapping provisions of IBAs negotiated with LIA and the Innu Nation, which VBNC indicated were a further difficulty. It would also address the concerns expressed by VBNC, LIA and the Innu Nation, and would avoid any possibility of adverse effects on the land claims themselves, as described in Section 4.2.3.

Recommendation 5

The Panel recommends that Canada and the Province issue no Project authorizations until LIA and the Innu Nation have each concluded Impact Benefit Agreements (IBAs) with VBNC. Whether these occur inside or outside the context of a settled land claims agreement, IBA negotiations should be concluded within an agreed time frame, or, if necessary, the Minister authorizing the Project should impose a time frame. The negotiating framework should also include provision for dispute resolution, including the use of compulsory arbitration if required.

5 AIR QUALITY

The main sources of the Project's effects on air quality would include dust generated in the open pit and along haul roads, and emissions from vehicles and power generators. VBNC's baseline studies consisted of meteorological measurements taken at two locations at Edward's Cove and Camp Pond, and a series of air quality studies measuring total suspended particulates, dustfall, nitrogen oxides and sulphur dioxide. VBNC characterized the existing air quality in the Voisey's Bay area as "relatively pristine." This was consistent with VBNC's observation that the site is far from any significant sources of air pollution.

To mitigate the Project's effects on air quality, VBNC plans to

- generate power efficiently, using exhaust gas heat recovery systems, a preventive maintenance program and other tools;
- use low sulphur fuels;
- apply water and dust-reducing agents to haul roads, and take other proactive measures to manage dust;
- promptly reclaim disturbed areas to reduce wind erosion;
- use dust collectors and scrubbers in the milling process; and
- use closed conveyors and transfer points.

In addition, the Environmental Protection Plan will include noise control measures, but these are not specified in the Environmental Impact Statement (EIS).

In predicting residual air quality impacts, VBNC looked at four of the six so-called "common air pollutants": total suspended particulates, sulphur dioxide, nitrogen dioxide and carbon monoxide. The only aspect of toxic air pollutants it addressed was the contribution of heavy metals in dustfall to possible contaminant uptake by plants, animals and humans. VBNC

quantified the Project's maximum annual emission of carbon dioxide, one of the most significant greenhouse gases. It also briefly addressed potential microclimate changes in areas of direct physical disturbance.

VBNC modelled noise contours for various sources, both separately and in combination, and then addressed the implications of these predicted noise levels for individual valued ecosystem components (VECs), such as birds.

According to the modelling results, the Project would meet both the provincially regulated standards and the federal maximum desirable objectives for air quality at the Claim Block boundary in all time periods. Within the boundary, air quality would also easily meet these standards, with the exception of short-term particulate matter, which could exceed provincial standards within 2 to 3 km of the open pit during open pit mining.

The Project's annual contribution of carbon dioxide is estimated to represent an increase of 1.2 percent in the total annual emissions of Newfoundland and Labrador, which are currently 4 percent of the Canadian total.

VBNC therefore predicts that residual air quality effects would be minor (not significant) during construction and operation because elevated levels of air pollutants would either fall within regulated standards or be confined to a limited area within the Claim Block, and would be of short duration. The company considers the Project's carbon dioxide emissions to be insignificant in comparison to national or global totals.

VBNC proposes to monitor emissions and ambient air quality. This would presumably be compliance monitoring, to be reviewed by the Newfoundland Department of Environment and Labour (NDOEL). If required, further mitigation measures could include upgraded dust collection systems or scrubbers and changes in dust suppression processes.

5.1 BASELINE INFORMATION, MODELLING AND REGULATORY REQUIREMENTS

VBNC used two different models developed for the US Environmental Protection Agency to predict air quality impacts from point sources (for example, the open pit and the power generators) and from linear sources (the haul roads). The models used information about emission sources, site activities, equipment specifications, fuel specifications and emission controls; hourly meteorological data from the Camp Pond weather station; and local terrain data.

The Province regulates ambient air quality through the Air Pollution Control Regulations under the *Environment Act*. Schedule B to these regulations sets standards for air quality that must be met at the boundary of an industrial site. In an urban setting, this would generally be the property line. Within that boundary, air quality falls within the purview of the provincial Occupational Health and Safety Regulations.

NDOEL asserted that VBNC's baseline air quality studies and air modelling were not carried out in accordance with departmental policies and protocols, so they did not accurately represent either existing or future conditions. NDOEL was concerned that worst case scenarios (for example, maximum equipment usage or upset conditions) were not modelled. VBNC replied that it did not model upset conditions, such as baghouse ruptures, because process control systems would detect the breakdown and immediately shut down the system. It also said that modelling scenarios were "worst case" in the sense that they assumed least favourable weather conditions.

NDOEL also stated that the Claim Block boundary was not an appropriate "property line" with respect to meeting point-of-impingement air quality standards for two reasons. First, project employees would be living on site; therefore, air quality near the accommodations complex must meet the higher standards set by the Air Pollution Control Regulations to ensure health

protection, rather than the somewhat lower standards set by the Occupational Health and Safety Regulations. Second, the Claim Block also includes a large area, beyond the actual work site, in which air quality should remain unaffected.

At the hearings, VBNC confirmed that it would meet all regulatory requirements, including data collection and dispersion modelling requirements, and the air quality criteria established by the Air Pollution Control Regulations at the accommodations complex. The Province has indicated that it would negotiate a more appropriate boundary for compliance than the edges of the Claim Block. This boundary would adhere more closely to the locations of Project facilities and activities. The permit process would also establish and enforce ambient air quality compliance monitoring.

The Panel is confident that the baseline information and modelling results were sufficient for environmental assessment purposes and concludes that the current regulatory system will provide for an appropriate level of compliance monitoring.

5.2 DUST MANAGEMENT

The sources of suspended particulates from the Project would include land clearing and site preparation, blasting and other activities in the open pit, wind erosion from rock and overburden storage areas, operation of the crusher plant and conveyors, truck haulage along unpaved roads, concentrate loading at the port, combustion of fuel to operate vehicles or to generate power or heat, and underground mining activities. Depending on the concentrations, suspended particulates can cause or aggravate respiratory problems or reduce visibility. The particulates may also carry persistent contaminants, such as heavy metals or toxic chemicals, that will eventually settle out onto soil, water or plants.

Of all these sources, VBNC estimates that the open pit, truck haulage, the hot water boilers and the power generators would contribute the

largest amount. Blasting was not considered to be a key factor in causing ambient air quality impacts, except for very short periods. It was not included in the air quality modelling, although its contributions through dustfall to the movement and accumulation of contaminants were taken into consideration in the contaminants modelling.

Many people addressed dust deposition issues in connection with watercourses, such as Reid Brook. Some Inuit presenters also expressed concern that airborne particles would be deposited on the surface of the snow and could then be transported long distances by wind-driven snowdrift.

The Panel concludes that dust management should be an essential component of VBNC's environmental management throughout the life of the Project, and that it is an area to which VBNC must vigorously apply its policy of continuous improvement.

5.3 EMISSION REDUCTION

Under the *Canadian Environmental Protection Act (CEPA)*, the federal government has established ambient air quality objectives at three levels. The most stringent is termed the maximum desirable level. This objective is intended to prevent degradation of air quality in pristine or unpolluted areas. The Panel believes this clearly applies to the Voisey's Bay area, and notes that the *CEPA* objective is stricter than the provincial ambient air quality standards for sulphur dioxide and total suspended particulates.

The Panel understands that ambient air quality standards would be met, often easily, except within a fairly small area of the Claim Block. This is, however, no reason for complacency. The Panel believes that VBNC should make every effort, through the use of best environmental management practices, a vigorous energy conservation program, and appropriate pollution control equipment, to continuously reduce emissions at source throughout the life of the Project and to minimize the contributions

of greenhouse gases. There are four main reasons behind this conclusion.

- The Voisey's Bay area has nearly pristine air quality. In keeping with the national policy reflected in the maximum desirable objectives for air quality, the goal should be to keep degradation to an absolute minimum.
- Air emissions would be a potential source of adverse impacts to watercourses in the area and particularly to Reid Brook.
- Like other northerners, Labrador residents are already seeing the effects of airborne contaminants travelling long distances, and they would need to be reassured that the Project would not add to their concern.
- While the contribution of the Project to regional or global atmospheric problems, such as acid precipitation and climate change, may seem insignificant, these problems are in fact caused by the combined effects of many seemingly insignificant contributions.

There are no regulated emission standards for carbon dioxide. However, if the Kyoto Protocol to the United Nations Framework Convention on Climate Change is ratified, Canada will have made an international commitment to reduce its greenhouse gas emissions to 6 percent below 1990 levels over the period 2008–2012. This reduction will be no easy task, given that Canada's emissions are projected to be 19 percent above 1990 levels by the year 2010. The Panel therefore believes that VBNC has a responsibility to minimize carbon dioxide emissions through careful attention to energy conservation, which will also help maintain ambient air quality.

Recommendation 6

The Panel recommends that VBNC, as part of its environmental protection plan, do the following.

- **VBNC should develop a dust management plan that incorporates best management practices derived from other mining and related operations, to minimize the creation and mobilization of dust. This plan should include preventive measures, such as appropriate speed limits for truck traffic on haul roads and dust suppression techniques.**
- **VBNC should develop a comprehensive energy conservation program, to prevent air pollution effects by reducing the combustion of fossil fuels. The program should include an energy review of the planned Project design before construction starts.**

6 TAILINGS, MINE ROCK AND SITE WATER MANAGEMENT

The mineral resource at Voisey's Bay contains highly reactive sulphide minerals. Therefore controlling acid generation in the tailings and waste rock generated during mining and milling and requiring storage for perpetuity will be a critical issue. In addition, large volumes of process water would be needed to concentrate the ore through the milling process and to transport the tailings to the storage areas. While a significant portion of this water could be recycled, the exact amount is difficult to predict from pilot testing. The proposed production of two concentrates, the accumulation of process contaminants, and the requirement for fresh water to mix reagents and to cool pump seals would all affect the amount of water that could be recycled. Excess water would be treated and discharged to the marine environment; some participants were concerned about the effects of disposing of the resulting sludge. The source of the fresh water will reduce flow to Reid Brook.

6.1 TAILINGS AND MINERALIZED WASTE ROCK DISPOSAL

VBNC proposes to use a phased approach to dispose of mine wastes that could generate acid. It suggests disposing of these wastes underwater in two natural lake basins. Based on a proven ore resource of 150 million tonnes, VBNC would produce approximately 13.2 million m³ of tailings from the Ovoid operations and 5.5 million m³ of potentially reactive waste rock from both open pit and underground mining over the life of the mine. The company plans to dispose of these wastes in Headwater Pond. VBNC plans to begin placing up to 59.6 million m³ of tailings from underground mining in the North Tailings Basin once the Ovoid is exhausted; this disposal would continue until the end of the Project. Water treatment sludge would be co-disposed with tailings in both basins.

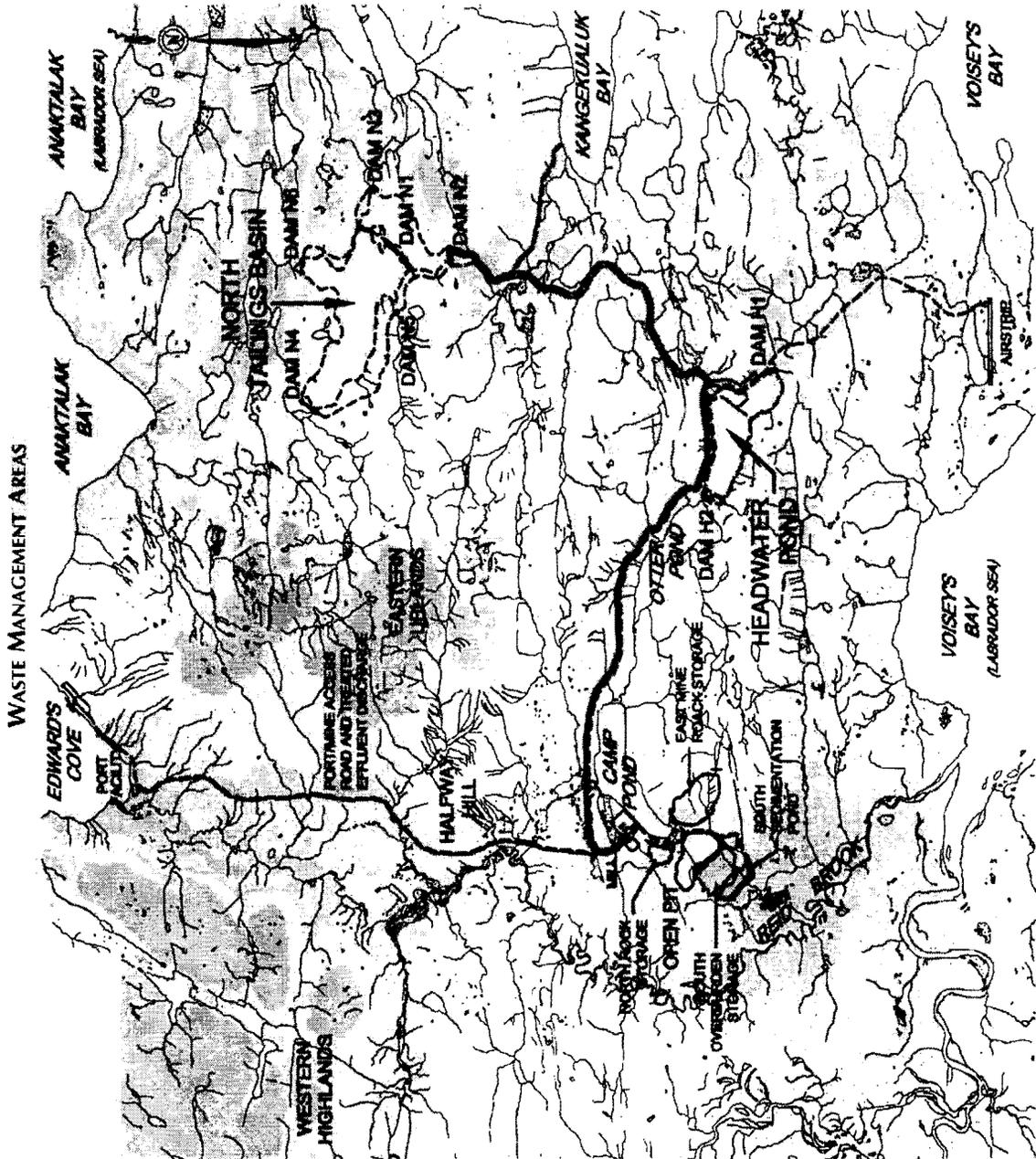
A pipeline system, approximately 8 km long, would transport slurry tailings from the mill for disposal in Headwater Pond. A 7-km extension would be required for the North Tailings Basin. Another pipe would carry reclaimed water from the basins back to the mill for use as recycled process water. The access roads to the basins would parallel the pipelines, and VBNC would use the road to Headwater Pond to haul mineralized waste from the Ovoid and the underground operations to the southeast section of the basin for disposal.

All participants consider the subaqueous disposal of acid-generating material to be the best option for managing wastes. The Province states that eliminating air by submerging the material underwater is the most accepted method of minimizing the oxidation of sulphides. Natural Resources Canada (NRCan) states that acid generation is very difficult to stop once it starts, but reactive tailings can have a very stable geochemistry underwater. Therefore, lake disposal would create a stable and secure environment that would minimize engineered structures and yield a low-cost closure and maintenance system with a very low risk of failure over the long term. An expert from the Labrador Inuit Association (LIA) said that the issues of concern were not insurmountable. LIA felt that the overall tailings and waste rock conceptual design, and the plans for underwater disposal, were reasonable.

6.1.1 Tailings Basin Designs

VBNC considered eight sites for disposal of mine tailings and mineralized waste rock before arriving at its preferred sites of Headwater Pond and the North Tailings Basin (see map on page 38 Waste Management Areas). It considered only candidate sites that were located outside of the Reid Brook watershed or could be permanently diverted out of it; that could provide permanent water cover; and that could accommodate the

REPORT ON THE PROPOSED VOISEY'S BAY MINE AND MILL PROJECT



required volumes of mine wastes, based on a mineral resource of 150 million tonnes. The volume of waste that could be contained versus the volume of rock required for dam construction was an added consideration. Smaller dams require less rock (thus reducing the Project footprint), are safer and minimize seepage.

By applying further environmental and engineering criteria — such as minimal environmental effects, expansion capability, safety and ease of closure, topographic and hydrological containment, cost effectiveness, aesthetic acceptability, interference with the ore body and regulatory time frame — VBNC eliminated all but three candidate sites. Although the third candidate site, Option 5, met the criteria, VBNC did not select it as a preferred site because of its distance from the mill and its need for higher dams than the North Tailings Basin.

Depositing tailings and waste rock in Headwater Pond would require construction of two perimeter dams with heights of 13 m and 15 m. At the west end of the basin, Dam H2 would permanently cut off drainage to Otter Pond and the Reid Brook watershed. Seepage from the dam is estimated to be 0.2 L/s. A second dam, H1, would block drainage eastward into the Throat Bay watershed. Outward seepage from this dam is estimated to be 0.1 L/s. As the volume of the Ovoid tailings is less than the basin's natural capacity, all tailings would be deposited below the existing lake outlets.

For the North Tailings Basin, six dams would be required to increase the capacity of this three-lake system to accommodate an estimated 59.6 million m³ of tailings. Two of the dams, N4 and N5, would be diversion structures to prevent fresh water from entering the basin. Dam N1 would be a temporary control structure between the upper and lower lakes. Three perimeter dams — N2, N3 and N6 — would increase the capacity of the basin. Ranging in height from 13 m to 35 m, they would be developed in stages as the tailings were deposited.

Outward seepage from the dams ranges up to 0.3 L/s into the Kangeklukluk Bay watershed and up to 0.2 L/s into the Kangeklualuk Bay watershed.

VBNC stated that water cover in the basins is predicted to range between 2 m and 4 m and that this cover would be maintained during extreme drought conditions. Environment Canada expressed concern about the effectiveness of a shallow water cover to prevent oxidation and re-suspension of tailings, and LIA questioned whether ice and wind action would disturb the water cover. Whether provisions were adequate to minimize metal flux from the tailings into the water column was also an issue.

NRCan indicated that findings from the field verification of the Mine Environment Neutral Drainage program determined that the critical minimum depth of water cover needed to prevent oxidation and avoid wave disturbance is 1.3 m to 1.4 m.

The Panel heard concerns about potential seepage and the need to detect, collect and treat seepage before it is released to the environment. VBNC proposes to grout bedrock foundations of the dams with a blanket and grout curtain to control seepage. For dams founded on overburden, seepage would be controlled using a slurry trench cut-off. Seepage from the tailing basins would be monitored using a combination of surface water sampling, both upstream and downstream of the dams, and groundwater wells installed near the dam toes. If adverse effects on water quality were detected, through either monitoring or visual dam inspections, VBNC would collect the water and pump it back into the basin. Then the company would assess the potential causes and consider measures to reduce seepage, such as additional grouting or other dam design modifications.

Some participants expressed concern that an apparent fault associated with the north end of both Headwater Pond dams could provide a conduit for groundwater seepage or lead to dam

failure. VBNC stated that all structural features were incorporated into hydrogeologic modeling and that they are geologically stable. The company would grout bedrock foundations to reduce hydraulic conductivity and investigate them for seepage potential. There was similar concern that a landslide mapped north of Dam H2 could cause failure of the dam, but again VBNC described this area as being stable.

In the hearings, participants also discussed the need to monitor and maintain dam integrity and concerns about the effectiveness of bentonite dam cores under similar climatic conditions. VBNC stated that the dams proposed for both basins are conventional water-retaining dams.

Participants expressed concerns about potential ruptures of tailings pipelines. VBNC described the pipelines as one pipe inside another with insulation between the two. Pipes would be adjacent to travel routes and would be monitored. In addition, the rate of discharge flow would be monitored and any flow discrepancy in comparison to the input would trigger an alarm. There were also questions about the capacity of emergency dump pockets to contain the pipeline contents should emergency stoppage of flow occur when tailings were present in the line. VBNC stated that emergency pumps would normally empty slurry material from the line before it was shut down. As an example of how seldom the dumping option would be used, VBNC described the experience of the Louvicourt Mine in northern Quebec. At that mine, which uses similar technology for an extended tailings pipeline operated under similar climatic conditions, it has not been necessary to dump the line since the mine began operating approximately six years ago. Should it be necessary, however, VBNC stated that it would immediately contain or clean up material removed from the line.

6.1.2 Alternative Disposal Plans

Many participants told the Panel that VBNC should explore alternatives to the North Tailings

Basin for disposing of underground mine tailings. Alternatives they suggested included submarine disposal, and backfilling of the open pit and underground workings. These alternatives could reduce the size of the dams needed for the North Tailings Basin. Depending on the size of the mined ore reserves, backfilling the mine workings, in conjunction with backfilling the open pit, might possibly even eliminate the need for a second disposal basin.

Submarine disposal of tailings has been practised internationally and at two locations in Canada, the Island Copper and Kitsault projects in British Columbia.

At Island Copper, both waste and tailings were discharged into the ocean during the entire life of a large tonnage copper mine. The Panel understands that there are varying opinions about the residual environmental effects at this site. The Panel also notes that the biological productivity of that marine disposal site is quite different from that of the Project area, so results may not be transferable.

An expert for LIA stated that submarine disposal, either confined or unconfined, reduces engineering requirements, provides greater chemical stability and reduces the footprint on land. However, LIA indicated that it was not necessarily recommending consideration of this option. NRCan submitted that, with changes in technology and knowledge of the behaviour of tailings in a marine environment, submarine disposal merits future consideration, possibly as an alternative to the North Tailings Basin for tailings disposal during the underground phase. Environment Canada stated that, under current regulations, VBNC would be required to demonstrate that submarine disposal was the only practical option or was the best option for the environment; such disposal would also require site-specific approval under subsection 36(5) of the *Fisheries Act*. The Province considers submarine disposal risky because of the inability to predict, control or rectify the spread of contaminants

throughout the environment. It indicated that it would not likely grant approval at this time.

The Panel observes that Saskatchewan uranium mining operations routinely store tailings in mined-out pits. Those tailings contain metal concentrations in addition to residual radioactivity. These operations minimize the level of tailings contaminants entering groundwater by surrounding the tailings with a pervious envelope of waste rock or an impervious liner. The volume of those pits in relation to the tailings placed, however, is much higher than for the Ovoid.

VBNC indicated that several issues affect the potential use of backfilling. First, underground operations must be adequately isolated from the pit to ensure no danger of inflow exists. Second, since the pit is close to the Reid Brook watershed, ensuring acceptable water conditions or isolating the material from potential migration to Reid Brook is critical.

An expert speaking on behalf of the Innu Nation suggested that, instead of creating a deep pit lake once the Ovoid operations have finished, VBNC should backfill the pit with sulphide-bearing waste to the original sulphide horizon, place a cap of clean material on top, and then flood it. He suggested that, while the water in a pit lake would turn over seasonally, incorporating oxygen in the process, the water contained in the flooded waste would oxygenate much more slowly. This would reduce the migration of oxygenated water to the sulphide rock on the sides of the pit. This option would also ensure long-term submerging of the waste with no risk of containment failure.

In all underground mining methods suited to this deposit, backfilling would be a necessity. VBNC has committed to further investigating backfilling alternatives. It stated that the staged approach of using Headwater Pond for Ovoid tailings and mineralized mine rock before commissioning the North Tailings Basin gives the company an opportunity to assess other disposal

options, particularly if underground ore reserves are less than predicted. VBNC said it needs operational experience to evaluate the viability of using the open pit as a containment facility for mine wastes. The company also stated that the first preference for backfill is waste rock and that it is impossible to determine whether tailings from the underground would be suitable as backfill without a bulk sample. The greatest potential problem would be high sulphur content in the backfill, which could cause combustion and produce dangerous gases.

The Panel is aware that the technology of backfill placement is advancing. Paste technology, for example, may eliminate restrictions on the use of tailings with high sulphur content. It is also understood that all the tailings cannot be placed in the mined-out areas. Typically, the density of tailings is roughly half that of in-situ ore and they occupy more than twice the original volume.

The Province stated that alternative disposal underground or in the open pit could be dealt with during the approval process, when the details of mining would be better understood.

As another alternative, the Innu Nation emphasized the need to minimize the number of mine waste disposal sites and suggested restricting them to a single watershed to reduce environmental effects. Due to the high ecological value of the Reid Brook watershed, it suggested reconsidering the use of Headwater Pond, placing all tailings in an expanded North Tailings Basin and using Option 3 for disposal of mineralized waste rock.

6.1.3 Tailings Basin Decommissioning

When closing the mine, VBNC proposes to construct permanent dam spillways to allow the basins to discharge while maintaining a 5.5-m freeboard to prevent overtopping of the dam. The slopes of the tailings dams would be flattened and additional erosion controls installed for long-term stability. For the North Tailings

Basin, diversion dams would be removed and drainage would be redirected through the basin as before. The company would remove unneeded structures or facilities and replant vegetation on exposed areas. Decommissioning activities would be designed to ensure that the tailings and waste rock placed in the tailings basins remained permanently flooded to prevent acidification, in water deep enough to prevent re-suspension of tailings.

VBNC proposes to continue treating water from both tailings basins until it is clean enough to release directly into the environment. As a contingency measure, VBNC proposes to investigate the method of placing passive barriers on tailings to reduce contaminant flux. Once acceptable for release, effluent from Headwater Pond would be discharged eastward into the Throat Bay watershed, and effluent from the North Tailings Basin would be returned to its natural drainage into the brook below Dam N2, where it would discharge into Kangekluak Bay. There was some discussion of the possibility of returning all or a portion of the Headwater Pond discharge to the Reid Brook watershed. VBNC said that was feasible if water quality was acceptable at that time. The Panel notes that VBNC did not define acceptable standards. At minimum, these would have to be compatible with the Metal Mining Liquid Effluent Regulations (MMLER) but could be more stringent, depending on site-specific requirements.

CONCLUSIONS AND RECOMMENDATIONS

The Panel concludes that VBNC's site selection process was adequate and did incorporate environmental factors. The Panel believes that VBNC chose the best available natural options. The storage-to-dam ratios are high, and the fact that the tailings in Headwater Pond would be placed below the natural outflow level is a significant safeguard to prevent an accidental tailings spill into the sensitive Reid Brook watershed.

Since the long-term security of the tailings facilities will depend on the integrity of the

perimeter dams, the Panel believes that dam design and maintenance will be crucial. The Panel was not presented with any evidence suggesting that the proposed dam designs were inadequate or inappropriate, but nevertheless it believes it would be prudent for VBNC to learn from experiences elsewhere, particularly in similar climatic zones.

The Panel was assured that all dams would be designed for the worst case seismic event and that, on decommissioning, dam slopes would be stabilized and reduced. The Panel also believes that VBNC should incorporate provisions for seepage collection, should it prove necessary.

The Panel believes that the proposed design would allow VBNC to maintain water cover in both tailings facilities during dry years. During operations, Headwater Pond would have 0.26 million m³ of excess water in a normal year, while North Tailings Basin would have 2.68 million m³. During exceptionally dry years, VBNC would be able to take corrective action, which could include increasing the use of recycled water or, if necessary, reducing or stopping production.

Recommendation 7

The Panel recommends that VBNC

- ensure the final design of all dams includes provision for the worst possible seismic event;
- evaluate best environmental management practices in Canada and elsewhere for dam design and construction in order to identify provisions for seepage collection and treatment; and
- prepare and implement a dam safety inspection and maintenance program for all Project phases.

The Panel agrees with the staged use of Headwater Pond, with subsequent development

of the North Tailings Basin depending on the final resource volume and the results of the ongoing evaluation of alternatives, as discussed above. The Panel believes that VBNC should vigorously investigate the possibility of disposing of tailings or waste rock both in the open pit and underground as a way to avoid developing the North Tailings Basin. This would diminish the Project's footprint, preventing the disturbance of another watershed and reducing the loss of harlequin duck habitat.

Recommendation 8

The Panel recommends that, before deciding to commission the North Tailings Basin, VBNC should evaluate the potential for using the mined-out Ovoid as a disposal site for either tailings or waste rock. It should also investigate, when adequate samples are available, the adequacy of both acid-generating waste rock and tailings as underground backfill material. During this environmental evaluation, the company should consider the best currently available technology for disposing of tailings and the results of the harlequin duck monitoring program (see Recommendation 65). This evaluation should be subject to review and recommendations by the proposed Environmental Advisory Board.

6.2 NON-MINERALIZED WASTE ROCK MANAGEMENT

VBNC proposes to dispose of approximately 22 million tonnes of waste rock, which will not generate acid, in two land storage sites adjacent to the open pit (see map on page 38, Waste Management Areas). Over 90 percent of all waste rock is non-reactive. The East Mine Rock Storage is designed to contain 18 million tonnes, while the North Rock Storage is designed for 4 million tonnes. In addition, approximately 9 million

tonnes of overburden material would be placed in the South Overburden Storage.

VBNC conducted static and kinetic tests on mine rock types to identify potentially acid-generating materials and to determine associated rates of reactivity. Testing also showed sulphide content to be a good indicator of metal content; nickel is the main metal of concern in reactive mine rock leachate. VBNC proposes to use sulphur content to distinguish between reactive and non-reactive waste rock. Rock with less than 0.2 percent sulphur would be disposed of on land, and the remaining waste rock would be treated as reactive and disposed of underwater in Headwater Pond. This compares to the British Columbia guidelines, which recommend a 0.3-percent cut-off, and suggestions by an expert for the Innu Nation that waste rock above a 0.1-percent sulphur cut-off be managed as reactive. VBNC stated that there is very little material present in this critical range.

The troctolite was determined to be acid generating and VBNC proposes to dispose of it entirely underwater. For the open pit, the vast majority of gneiss was characterized as non-reactive, although small amounts of higher sulphur gneiss are associated with the troctolite contact zone. Troctolite and gneiss can be easily distinguished visually. Tests on overburden materials indicate they are not acid generating.

During operations, blasting could result in the mixing of rock types, although VBNC stated that if any ore became mixed with waste rock, the resultant material would be sent to the concentrator. To evaluate waste rock content, VBNC proposes to develop a protocol consisting of a regular sampling procedure that would analyze samples on site before rock pile characterization is determined. Testing would continue until rock could be sorted reliably using other techniques, such as visual differentiation. During Project construction, a temporary analytical facility would be set up to test rock from roads and borrow pits.

Environment Canada, LIA and Innu Nation expressed concerns that the waste rock disposal sites on land could release contaminants into the environment. Specifically, they were concerned that acid-generating material would end up in non-acid-generating waste dumps. The Panel was told that a conservative characterization of mine rock to distinguish between reactive and non-reactive waste rock, and an effective rock sorting process during mining, are both critically important to prevent disposal of reactive rock on land. These procedures must be verifiable and errorless under all operating conditions, including some anticipated severe weather conditions.

Participants also wanted VBNC to ensure that on-land storage piles performed to predicted standards and to establish measures to address any problems encountered.

VBNC proposes to continue testing to verify expected behaviour of mine rock over the long term. A system of drainage ditches would collect runoff from the mine rock storage areas and direct it to the South Sedimentation and Surge Pond. Capturing drainage would allow VBNC to treat any contaminated water before discharging it. In response to an Environment Canada recommendation, VBNC agreed to implement a verification and field monitoring program for waste rock and to develop a contingency plan to deal with reactive material found in the non-mineralized waste rock storage piles.

Participants also argued that VBNC should make maximum use of non-reactive mine rock as a construction aggregate, to minimize the need to develop additional quarry and borrow sites. VBNC has indicated that it would treat non-mineralized waste rock as a priority construction material but that such rock would not be available in the early years of mining development.

The Panel concludes that the operational sorting of acid-generating waste would require close attention. As described by VBNC, the Ovoid contains a large volume of waste rock

that contains no sulphide minerals. Rock that does contain sulphides either looks different or is limited to zones close to the main sulphide-bearing areas. The Panel believes that good mine planning, combined with appropriate blasting procedures, could minimize the chances that reactive ore would be mixed with non-reactive waste rock. The volume of mixed material would therefore be sufficiently small that VBNC would be able to send it all to the mill as proposed.

There was little discussion of the way VBNC would sort acid-generating material in the underground operation. While it would probably be easier to identify acid-generating waste material underground, continued segregation of the material in the waste handling system could be more difficult. This could require VBNC to include additional waste handling flexibility at the mine design stage.

Recommendation 9

The Panel recommends that VBNC

- **prepare and implement a program, which can be carried out throughout the life of the Project, to verify and monitor open pit and underground waste rock that is disposed of on the surface;**
- **develop procedures to segregate all waste that originates from potentially acid-generating zones but is sorted as non acid-generating, and to assign this waste to a specific dump site so that the company can take mitigative measures if monitoring reveals a problem;**
- **outline contingency plans for dealing with reactive material encountered in the non-mineralized piles, particularly for managing runoff; and**

- ensure that the waste handling system designed for the underground operation allows separate handling and disposal of acid-generating material.

6.3 WATER QUALITY ISSUES

The proposed milling operation is a complex water handling facility that, at its peak, would use some 11 million m³ of water annually to treat ore from the open pit. While much of that water would be recycled, 5.4 million m³ would be discharged into Edward's Cove annually during the operation of the open pit. This would be the only discharge of water into the environment. The main sources of this water would be

- 1.1 million m³ of fresh water from Camp Pond;
- a net of 2.32 million m³ from the Headwater Pond drainage area; and
- the remainder from site runoff and dewatering of the open pit.

During the underground operation, the discharge to Edward's Cove would increase to 7.5 million m³, with the extra supply coming from the North Tailings Basin. In addition, 2.68 million m³ would be released as excess from the North Tailings Basin to Kangekqualuk Bay.

VBNC predicts that the quality of the water that would be released to Edward's Cove would be well below discharge limits imposed by the MMLER or by the Newfoundland Department of Environment and Labour (NDOEL). For example, the most recent pilot plant test results predict that concentrations of nickel would be lower than 0.01 mg/L, as opposed to a monthly average of 0.5 mg/L, which is the MMLER requirement.

6.3.1 Water Balance

Maintaining the balance of water requires a

complex water handling system. To reduce treatment requirements, an initial pumpdown of Headwater Pond would remove approximately 8 million m³ of water and lower the water level to 84 m above sea level. The water balance in Headwater Pond would be maintained by pumping an estimated 5.18 million m³ of recycled process water to the mill annually with an excess of 0.26 million m³ going to the treatment plant. The proposed initial pumpdown of the North Tailings Basin would remove 4 million m³ of water and decrease the water level to 124 m above sea level. Reclaimed water would also be collected from the North Tailings Basin for use in the milling process. Excess water would be treated at a dedicated water treatment plant located at the basin, if water quality required it, and piped to Kangekqualuk Bay for discharge through a diffuser.

Participants questioned the need for two water treatment plants and effluent discharge points. The treatment plant at the North Tailings Basin has been planned to treat the excess discharge during operation and all discharge on decommissioning. Since a return water line back to the main treatment plant would exist, the discharge could possibly be directed there. VBNC stated that this would require an expansion of the pumping and water treatment capacity of the main plant, and that the company would consider this option in future plans. This issue is discussed further in Chapter 9, Marine Environment: Land-Based Effects.

The Panel heard from both Innu Nation experts and Environment Canada that measures must be taken to maximize water recycling, since reduced water recycling would increase both freshwater withdrawals and the volume of water requiring treatment prior to release as effluent. The water treatment facilities must also be designed to handle the volumes of water needing treatment if the company recycles less water than expected. Environment Canada suggested that evidence does not support VBNC's claims

that the company could manage increased volumes without significantly increasing loadings into Edward's Cove.

6.3.2 Water Quality

VBNC predicted that the tailings basin water and tailings pore water would contain small amounts of heavy metals, most prominently nickel, in concentrations lower than MMLER limits. It also predicted elevated levels of ammonia, introduced through the use of ammonium and nitrate fuel oil blasting agents. VBNC would mitigate any acidification of the basins by adding lime. The Panel notes that findings from ongoing pilot testing by VBNC have so far confirmed many of the predictions in the Environmental Impact Statement (EIS), with the exception of higher thiosalt and lower iron levels than predicted.

Environment Canada expressed concerns about the need to prevent or minimize impacts associated with acidification of the tailings ponds, particularly thiosalt generation. Thiosalts are formed in alkaline environments and are unstable intermediate oxidation products of sulphide minerals. Oxidation of thiosalts can acidify tailings ponds and release metals into the water column. In addition, thiosalts in recycled water can lower metallurgical recovery, reducing the amount of recycled water available to the mill and increasing freshwater withdrawals.

Environment Canada and NRCan stated that it is difficult to predict and to control thiosalt production, as thiosalts are resistant to conventional effluent treatments. They have low toxicity but they may be oxidized by bacteria to lower the pH. Their acidity can be seasonal. Currently, thiosalts are treated by natural degradation in ponds. However, the Canada Centre for Mineral and Energy Technology is coordinating a consortium to study approaches to managing thiosalts that will minimize environmental effects and maximize metal recovery.

VBNC claims thiosalts posed no problems

to metallurgical recovery during pilot plant testing, even when the plant was running with 100-percent recycled water. Also, since thiosalts are a product of the milling process, they are introduced into tailings ponds during the operations stage only. They oxidize to sulphates in ponds over time. If the ponds do become acidified, VBNC calculates that it could neutralize the amount of acid released by adding only 300 tonnes of lime to the pond through the tailings line.

Environment Canada also expressed concerns to the Panel about impacts associated with releasing ammonia into the environment. Ammonia is toxic in its ionic form, which occurs in high pH environments. Environment Canada is concerned that high ammonia levels in a high pH effluent could be lethal to fish. VBNC predicts that the concentration of ammonia would fall below 0.180mg/L and claims that, although the pH of the tailings pond would be high during operations, the company would adjust the pH of all effluent to an acceptable level before discharge.

Environment Canada was also concerned about the settling characteristics and chemical stability of sludge co-disposed with tailings. Since metal fluxes from the sludge could affect metal concentrations in pond water and increase the need for make-up water, accurate predictions of sludge volume are important. Environment Canada was particularly interested in how VBNC would monitor sludge and how it would manage sludge during shutdowns and after decommissioning.

VBNC predicts that sludge production would range between 4000 and 6000 dry tonnes/year. Sludge would be composed primarily of iron hydroxide, but it would also contain small amounts of other heavy metals. VBNC states that, since hydroxides would probably be present in the tailings, it does not expect an incremental increase in hydroxide levels to affect pond water quality. It maintains

that the tailings provide a geochemically stable environment for sludge storage over the long term, but it is committed to completing sludge stability tests. Settling tests completed in the pilot plant show that sludge settles rapidly and that, when co-disposed with tailings, it can improve solids settling. VBNC considers that the co-disposal scenario would also eliminate the need for an additional waste management facility.

CONCLUSIONS AND RECOMMENDATIONS

The Panel concludes that the proposed milling operation could produce effluent concentrations that fall well within discharge standards. The Panel also realizes that pilot test results are indicators only and that VBNC would need to monitor and manage the process constantly to achieve similar results during the variable conditions under which this plant would operate. In addition, MMLER standards are currently under review and the Panel feels that this operation should perform, not to discharge standards, but to the best achievable levels.

The amount of water recycled and the build-up of contaminants in process water would significantly affect water quality. The Panel therefore makes the following recommendations.

Recommendation 10

The Panel recommends that VBNC further develop its water recycling plans, in consultation with Environment Canada, incorporating

- **procedures to maximize the volume of recycled water of acceptable quality, taking into account factors that could limit the use of recycled water in the mill process; and**
- **contingency plans to deal with potential requirements for additional raw water withdrawals and wastewater treatment.**

Recommendation 11

The Panel recommends that VBNC integrate into its environmental protection plan, in consultation with Environment Canada,

- **pollution prevention procedures that apply the best management practices for minimizing thiosalt production;**
- **pollution prevention procedures that reconcile pH levels and ammonia concentrations in ponds and effluents, taking into account the potential accumulation of ammonia under ice; and**
- **a sludge management plan that takes into account alternative sludge disposal options, the long-term potential for metal dissolution from sludge co-disposed with tailings, and the implications of mill shutdowns and decommissioning.**

6.4 OPEN PIT WATER ISSUES

Once the Ovoid has been mined out, VBNC proposes to stabilize the sides of the pit and then allow it to flood. As discussed above, many participants suggested that the mined-out pit first be filled with acid-generating waste rock or tailings before final decommissioning. Many also mentioned issues that might delay the flooding of the pit. Regardless of the final decision, all participants stressed that, not only would the open pit lie in the Reid Brook watershed, but the potential exists for long-term groundwater migration towards Reid Brook. In addition, during scoping sessions, community members expressed concern about the interaction of wildlife, especially caribou, with the flooded pit.

6.4.1 Flooding of the Open Pit

VBNC has proposed that, after completing mining in the Ovoid, it would flood the pit to reduce acid generation. The company assumes it would take 6 years to flood the pit if diversions were directed into the pit and 16 years if they were not. Early flooding is considered essential for reasons of water quality control. LIA expressed concerns that more information is needed on the effects of flooding, on time needed to flood the pit and on acid generation by sulphide-bearing rock exposed at the pit wall before flooding. The provincial government stated that extreme care would be needed if flooding posed a risk to safety in the underground operation. The Province added that it would not permit VBNC to flood the pit if such a risk existed.

Although VBNC assumed that water quality in the flooded open pit would be similar to that in the tailings ponds, participants were concerned that this is an overly optimistic assumption. Both the Innu Nation and Environment Canada stated that the long exposure of pit walls to oxidation and the unknown chemical quality of groundwater could degrade water quality over time. In addition, sulphide material would be exposed on the pit wall toward Discovery Hill that would not be flooded; the company might need to use an alternative method to prevent oxidation there.

As necessary, VBNC plans to continue to pump water from the pit for treatment and discharge at Edward's Cove until pit water quality reaches discharge standards.

6.4.2 Open Pit Hydrology

Participants were concerned about the predicted time it would take for groundwater from the open pit to reach Reid Brook. The EIS stated 200 to 1000 years, but an Innu Nation expert's calculations suggested a few decades. VBNC provided calculations for clarification, which suggested that it would take 475 years for pit water to reach the wetlands at the base of Discovery Hill, assuming a 1-km pathway. The company

said it would be unrealistic to expect a direct seepage pathway to Reid Brook to develop.

VBNC stated that groundwater contamination would not be an issue because the hydraulic gradient would run towards the pit during operations and while the pit is flooding. VBNC will then continue to pump in order to maintain this hydraulic gradient until the water in the pit is of acceptable quality to be released to both surface water and groundwater.

The Panel concludes that VBNC should consider backfilling the open pit. However, before beginning excavation, VBNC should put a reclamation plan in place to help it fill the pit rapidly, backfill the pit or maintain a dewatered pit, if underground safety requires that option. The ultimate goal is to achieve the best water quality as quickly as possible in order to return flows to Camp Brook and to create an aesthetically pleasing and ecologically functional landscape.

Recommendation 12

The Panel recommends that VBNC develop a long-term management and rehabilitation plan for the open pit. The plan should be subject to review and recommendations by the Environmental Advisory Board, and should include

- ongoing modelling and laboratory testing of evolving water quality in the flooded pit, of discharge rates and of the type and length of treatment required;
- a strategy to reduce the time that the open pit walls will be exposed before the pit is flooded, developed by evaluating best environmental management practices; and

- **measures to reclaim the surrounding area to promote wildlife safety and the development of appropriate shoreline habitat.**

The Panel also concludes that potential seepage pathways between the open pit and Reid Brook could and should be monitored, using strategically placed groundwater monitoring wells, which would give ample warning if contaminants were migrating through the bedrock. VBNC would then need to take corrective action, which would presumably

include continuing to pump and treat the water in the pit.

Recommendation 13

The Panel recommends that VBNC establish monitoring wells between the open pit and Reid Brook, and develop suitable threshold levels for contaminants and a contingency plan to take corrective action if contaminants are found in groundwater flowing towards Reid Brook.

7 CONTAMINANTS IN THE ENVIRONMENT

To establish baseline conditions, VBNC investigated existing levels of metals in water, sediments, soils and the tissue of selected organisms from representative sites adjacent to the Project. In a few cases, measured baseline values for some metals in freshwater, seawater and their sediments in the Project area, as well as for some benthos and fish, exceeded current guidelines (although the nature and extent of these exceedances were not always clearly stated in material presented to the Panel). These exceedances are considered to be a natural condition because of the presence of the measured metals in country rock. There is also an excess of mercury in caribou, attributed to the fact that lichen has absorbed mercury transported through the atmosphere from southern sources.

Using its proprietary IMPACT™ model, Beak International predicted that metals that VBNC would release into the environment would pose hazards to living organisms. IMPACT™ is a probabilistic model that accounts for the pathways and fates of released metals; the behaviour and properties of these metals in environmental media, including bioaccumulation in organisms; and the resulting risk to biological receptors such as fish, wildlife and humans.

Beak considered dust and other atmospheric emissions as a potential contaminant source; it also considered aquatic releases of treated effluent, including releases from the open pit, the mine and mill and the concentrate handling facility, as well as seepage and post-closure surface releases from the two tailings basins. Beak modelled effects for various phases of the Project, including post-decommissioning, for up to 140 years.

The ultimate source of virtually all metals that may be released is the mine rock itself. The model therefore relied on analysis of mine rock from the Ovoid, the Western Extension and the Eastern Deeps, and of predicted tailings

composition and tailings water chemistry. As Beak noted, model results and interpretation depended strongly on the accuracy of VBNC's source terms and environmental transport forecasts. Beak characterized its modelling as a "screening level assessment" and suggested the results be used to identify requirements for more detailed assessments, and to identify the need for additional mitigating and monitoring measures where incremental exposure increases warrant.

Beak initially analyzed eight metals (copper, nickel, cobalt, lead, zinc, cadmium, aluminum and arsenic), based on their known environmental toxicity and on biological sensitivity to these metals. Although mercury is a known potential contaminant of country foods (particularly fish and marine mammals) and elicits widespread concern in northern Canada, it was not included in the original modelling. So the Panel requested and received additional information on mercury contaminant potential from VBNC.

The modelling exercise predicted incremental changes in water and sediment chemistry over time, and levels of metals uptake for a variety of aquatic and terrestrial receptors, including freshwater and marine invertebrates, fish, waterfowl, marine mammals, and large and small terrestrial mammals, selected for their ecological and cultural importance. Metal dosages were calculated for each receptor by pathway, and compared to the benchmark dosage at which chronic adverse effects might occur, in order to establish a hazard quotient.

Modelling accounted for the time that any particular species would be present in a potentially contaminated area. VBNC used high-end or worst case values for inputs and uptakes, based on site-specific information where available, or established literature values. Where metals were below detection limits, they were assumed to be at the detection limit for the purposes of

modelling. Such conservative approaches overestimate potential environmental effects.

The Canadian Council of Ministers of the Environment has established water quality objectives. The model predicts that, as a result of the Project, contamination will exceed these objectives in freshwater and freshwater sediments, but not in marine water or marine water sediments. Exceedances are expected to result from tailings pond seepage and from periodic releases of water from the flooded pit into Camp Pond. As a result, contaminant levels would exceed United States Environmental Protection Agency chronic effects guidelines for freshwater snails and land-locked char at these locations. There would also be excess levels of nickel and aluminum for arctic char in the Throat Bay watershed and at the head of Kangeklualuk Bay during the post-operational period. No exceedances are predicted for terrestrial or marine mammals or for birds, since the incremental effects of the Project would fall below guidelines for all species of these animals modelled.

All samples of mine rock and tailings had levels of mercury lower than detection limits. VBNC predicts that, based on a balance of factors, the potential for mercury mobilization in water will not increase. Mercury will not become more bioavailable and there will be no significant increment available for bioaccumulation or biomagnification in the food chain.

Therefore, VBNC predicted that the environmental effects of the metals that the Project would release would be largely indistinguishable from localized minor effects already occurring due to existing natural levels of metals. It also predicted that contaminants would have no consequences for the country foods that local residents eat.

VBNC stated that it would monitor water, sediment and some biota in receiving watersheds for both modelled and other metals as appropriate, for the life of the Project.

GOVERNMENT AND PUBLIC CONCERNS

The Department of Fisheries and Oceans (DFO) believed that VBNC did not substantiate its position that mercury mobilization would not be an issue. DFO did not assert that mercury mobilization would definitely be a problem, but considered that it could be. DFO's chief concerns included the uncertainty surrounding predictions about mercury mobilization and about the behaviour of metals in sediments and salt water. With respect to predictions based on modelling, DFO questioned whether they adequately addressed metal speciation and whether the IMPACT™ model properly addressed the complexity of mercury's effect on aquatic systems; DFO also questioned VBNC's choice of certain macrobenthos as indicators, as well as the model's failure to quantify probability ratings. However, DFO noted that the baseline chemical analyses for metals that VBNC reported were compatible with and comparable to its own data.

The Canadian Wildlife Service (CWS) of Environment Canada also considered VBNC's predictions about mercury to be optimistic, in view of the potential problem of acidification, which could mobilize even small quantities of available mercury. CWS considered that there were insufficient baseline data with respect to birds and mammals. It also identified several technical problems with VBNC's contaminant modelling, although some of these turned out to be errors of presentation. Overall, CWS considered that VBNC had underestimated contaminant hazards.

DFO and CWS made broadly similar recommendations. For example, both recommended that VBNC

- do more baseline sampling;
- further evaluate, strengthen and test the model, in cooperation with DFO and CWS; and
- monitor a broad range of species for contaminants throughout the life of the

project, and establish a protocol for interpreting results and taking remedial action.

The provincial Forestry and Wildlife Branch recommended monitoring small mammals for contaminants.

An expert, appearing on behalf of the Innu Nation, also suggested several methodological flaws in the selection and application of the IMPACT™ model. These focused chiefly on the use of average values rather than a range, particularly with respect to stream flows and to bioconcentration in organisms; the failure to include extreme events; and the lack of sensitivity analysis. Thus, a worst case scenario was not modelled. She suggested that probabilistic modelling was required, and also noted that more baseline data were needed to provide an adequate range of input values.

LIA experts recommended a review of all existing data, further sampling to fill gaps, cooperative identification of monitoring targets and a monitoring program that, among other things, would include areas used for harvesting. LIA emphasized the need for a cumulative effects approach to contaminants, and provided a spatial framework for modelling sources, pathways and receptors in the Project area.

VBNC responded that it had presented a deterministic, not a probabilistic, analysis, using conservative values throughout to predict the outcome of a worse case scenario. It provided a comparison of predicted and measured values of metals in certain plants and aquatic organisms to confirm that the model tended to overestimate metals accumulation. VBNC noted that the model was not intended to predict the occurrence or severity of acute toxicity due to accidental events, but rather the effects of chronic low-level exposure on organisms over long periods of time. VBNC did not consider that more baseline research was required before construction. However, it was willing to discuss modelling issues with all parties, to consider monitoring the effects of contaminants on

wildlife and to review the protocol for interpreting results, in consultation with DFO and CWS. VBNC reaffirmed its view that mercury is not an issue in the assessment of the Project, because Project activities would not increase existing levels of mercury in organisms.

CONCLUSIONS AND RECOMMENDATIONS

The Panel considers that VBNC provided adequate baseline data on contaminants in water, sediments and biota adjacent to the proposed Project, for the purposes of the Environmental Assessment. The Panel also agrees in principle with VBNC's approach to modelling, in particular that

- it was appropriate to begin with deterministic modelling using conservative values; and
- the screening approach was appropriate for the purposes of the Environmental Assessment.

The Panel considers that the source terms were appropriate, and that the values and assumptions used within the modelling exercise tended to overestimate, rather than underestimate, metals hazards.

It would appear, on the basis of assessment done to date, that Project activities are unlikely to release metals into the environment at levels that would constitute a significant hazard to fish, wildlife or humans. The Panel was not presented with any clear hypotheses (as opposed to concerns) that released metals would significantly threaten ecosystem or human health, based on knowledge of the way these metals would be released and mobilized, the way they would become bioavailable, and the potential for bioaccumulation and biomagnification in organisms and food chains in the Landscape Region.

The Panel notes that while levels of some metals, particularly nickel, copper and aluminum, are predicted to exceed guidelines near the Project site, these metals do not significantly bioaccumulate or biomagnify in the food chain.

Even if they accumulate at levels hazardous to aquatic organisms at a few specific sites, which is considered unlikely, they would not become hazardous to predator species because those species are not resident at those sites, and hence would not become hazardous to humans.

Nonetheless, the Panel believes that contaminants, as they may affect country foods or its consumption, are a significant issue in relation to the Project. The Panel therefore believes that two distinct monitoring programs are required. One, which should be VBNC's responsibility, is an effects monitoring program that is hypothesis driven and tightly focused on metals. The other is a more general contaminants monitoring program focused primarily on country foods and the health of the food chain. This should be a cooperative program under EAB direction.

Recommendation 14

The Panel recommends that VBNC develop an appropriate effects monitoring program for metals and other contaminants, in cooperation with DFO, Environment Canada, LIA and the Innu Nation. The program should include a protocol for interpreting results and for taking remedial action. The program should be in place before construction starts and should be subject to ongoing modification, as appropriate.

In view of the concerns expressed by various participants, and in keeping with Beak's warning, further consideration should be given to both the technical aspects of and appropriate targets for modelling for the purposes of monitoring.

Recommendation 15

The Panel recommends that a program be established to monitor contaminant levels in country foods on a continuing

basis in northern Labrador. This general program should be a cooperative one involving primarily governments, LIA, and Innu Nation, although VBNC should contribute some technical and material support. The lead agency for this program should be designated by DFO, in its capacity as the Responsible Authority. This lead agency should be the primary funder of the program, and provide scientific resources to it, but the program should be under the direction of the Environmental Advisory Board (EAB). The objective of the program should be to address public concerns, and to minimize misunderstandings about the actual effects of the Project on the regional environment. The program should address the cumulative and synergistic effects of contaminants from all sources, and should include provisions for interpreting and communicating the results to the regional public on a continuing basis. It should fully incorporate the knowledge and experience of the federal Northern Contaminants Program and also develop cooperative links with it. The program should, at the outset, ensure that adequate baseline data are obtained on contaminant levels (not restricted to metals) in a broad spectrum of biota and locations in the region. It should assemble all existing contaminants data for the region from all relevant public and private agencies, and then add to them as required. These baseline data should be available prior to construction, subject to review and recommendations of the EAB.

Two issues appear uncertain, and require further examination. One is the potential for

mercury mobilization and in particular under what circumstances acidification might occur at a level and scale which could increase it, and if it does, whether other factors might counteract this tendency. The other is the behaviour of metals in the marine environment and sediments, in particular whether they might become more bioavailable to marine organisms than VBNC has predicted. These matters should be considered on a continuing basis as part of the effects monitoring program, but they also require dedicated research.

Recommendation 16

The Panel recommends that DFO and Environment Canada jointly develop a problem statement and research design

to identify the means by which mercury could become mobilized in the environment, within the parameters of this Project. If this exercise results in a clear hypothesis linking the Project to mercury mobilization at levels potentially hazardous to fish, wildlife, or humans, then DFO, Environment Canada, and VBNC should develop and fund a cooperative research program leading to prevention or mitigation.

The issue of the behaviour of metals in the marine environment is addressed in Recommendation 27.

8 FRESHWATER FISH AND FISH HABITAT

Through a variety of alterations and activities, the Project could affect fish and the habitat they use in eight watersheds. VBNC collected base-line data for these watersheds. In addition, a freshwater connection exists for much of the year between the outlets of Reid, Kogluktokoluk and Ikadlivik brooks. In fact, the Department of Fisheries and Oceans (DFO) calls Reid Brook a tributary of the larger Kogluktokoluk-Ikadlivik system. Therefore, VBNC also collected base-line data for this ninth watershed. See map of Area Watersheds on page 56.

Because of the high relief and peninsular location of the Project, the eight watersheds are small, ranging in size from about 10 to 170 km². Although aquatic productivity is low throughout the Landscape Region in comparison to productivity in more southern areas, the aquatic ecosystems in the area's two distinct ecological landscapes differ significantly. In the high upland areas, low nutrient availability, intermittent flows and steep gradients limit fish habitat and productivity. In contrast, relatively higher productivity is found in the larger streams and rivers that wind through deep sands and gravels in the low-lying, sheltered, well-vegetated valleys. The Kogluktokoluk-Ikadlivik-Reid brook system, along with its estuarine delta, provides extensive fish habitat, especially for Arctic char, and is recognized as one of the most ecologically rich areas in the Landscape Region and northern Labrador.

VBNC's field studies determined that fish species in the assessment area include Arctic char, brook trout, lake trout, round whitefish, three-spine stickleback and nine-spine stickleback.

The mine, the mill, the accommodation complex, the overburden and waste rock storage facilities, and the initial tailings management facility (Headwater Pond) would all be located within the Reid Brook watershed, together with

haulage roads and approximately half of the Project's main access road. However, VBNC proposes to divert much of the drainage directly affected by Project activities into other watersheds to reduce impacts on Reid Brook.

The facility for managing the underground phase tailings, the North Tailings Basin, would destroy habitat in three ponds and affect three additional watersheds by diverting streams, producing seepage through containment dams or discharging excess water during the post-decommissioning phase. Construction of related access roads and a tailings pipeline would also affect these ponds and watersheds.

VBNC assessed the potential impacts of Project construction, planned and routine activities, and accidental events, including hazardous material spills, fire, rupture of either the tailings or effluent pipelines, dam failure, and road flooding or washout. It used the following headings when assessing potential environmental effects on fish and fish habitat:

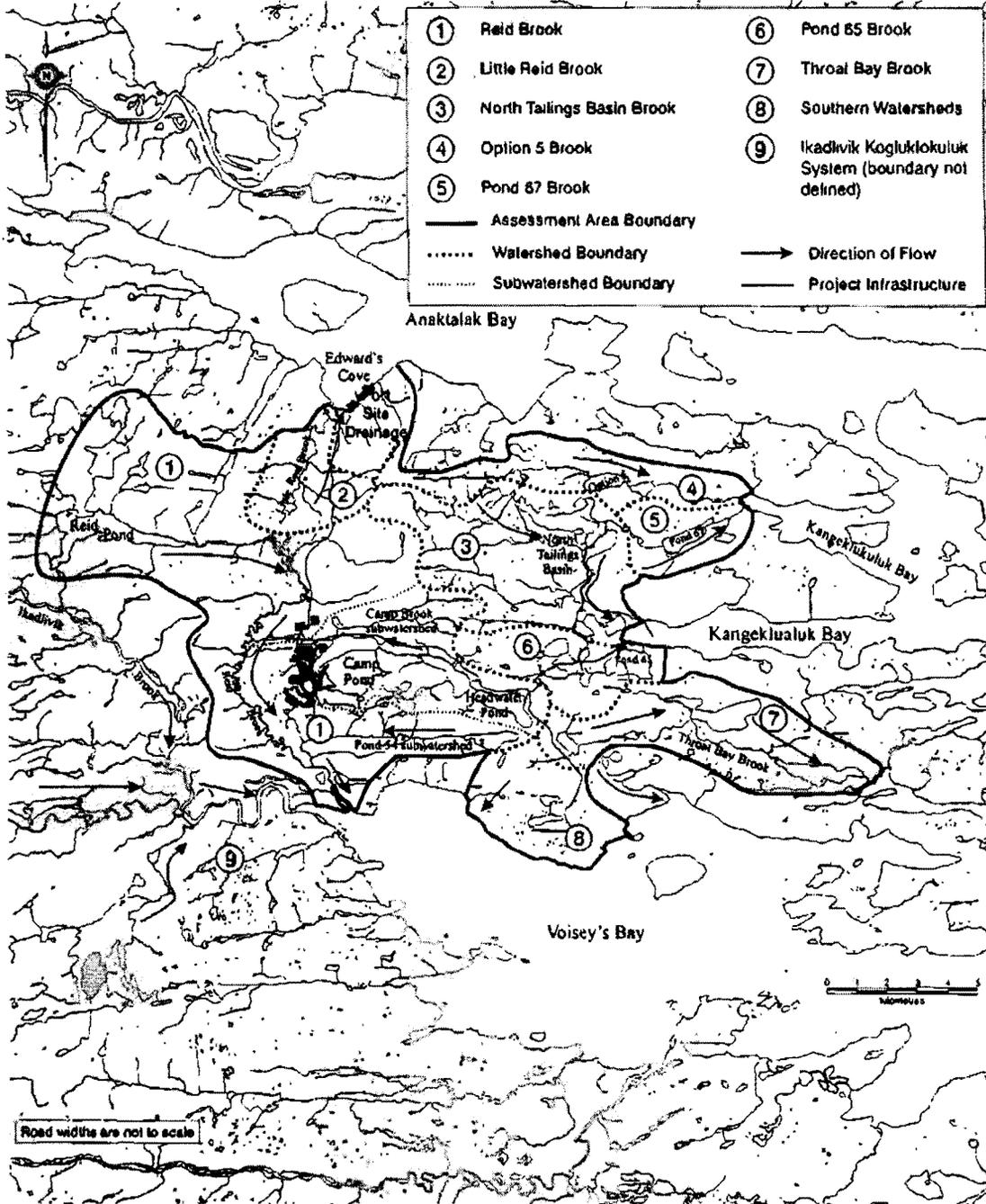
- *habitat loss*, caused by stream diversion or dewatering, and by the conversion of ponds into tailings management facilities;
- *fish loss*, which would occur when operations began in the tailings management facilities; and
- *habitat modification*, caused by a variety of activities that may alter water flows, change shoreline characteristics, or result in inputs of suspended solids, or of metals and other chemicals.

Contaminant modelling was done to predict the uptake of contaminants in three representative aquatic organisms: Arctic char, brook trout and an unspecified freshwater snail (see Chapter 7, Contaminants in the Environment).

VBNC proposes to protect Reid Brook and other freshwater systems by

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AREA WATERSHEDS



- consolidating facilities and reducing areas of disturbance;
- discharging treated effluent from the two tailings facilities and the mill into saltwater at Edward's Cove and Kangeklualluk Bay;
- maximizing the use of recycled water, thereby minimizing water extraction;
- collecting and treating site drainage, ultimately discharging the effluent out of the Reid Brook watershed; and
- permanently diverting outflows from the Headwater Pond tailings management facility through the Throat Bay watershed in the post-decommissioning phase.

The company will incorporate other mitigative measures into the Environmental Protection Plan, such as the following:

- erosion and sediment control facilities and practices;
- procedures to protect fish and fish habitat during activities such as road grading, blasting, excavation, dredging and airstrip de-icing, which would include timing such activities so that they don't coincide with sensitive periods for fish;
- education and training for personnel; and
- a no-fishing policy for employees.

Besides the federal and provincial environmental assessment processes, three key pieces of legislation form the regulatory context for fish and fish habitat protection. Under the *Fisheries Act*, DFO regulates all in-stream and near-stream activities that could affect fish habitat. Subsection 35(1) states that no person can carry out any work or undertaking that results in harmful alteration, disruption or destruction (HADD) of fish habitat. However, under subsection 35(2), DFO may authorize HADD of fish habitat associated with project development activities.

In 1986, DFO issued the Policy for the Management of Fish Habitat, which included the "no net loss" guiding principle. This principle is designed to maintain productive fish habitat capacity by replacing, on a case by case basis, habitat that is unavoidably lost. As a result, when DFO authorizes HADD, the proponent is required to negotiate a habitat compensation plan with DFO and to sign a legally binding contractual agreement. In reviewing compensation options, DFO employs a hierarchy of preferences, which are defined in the Policy for the Management of Fish Habitat and summarized as follows.

1. Avoid habitat loss through project redesign, relocation or mitigation.
2. Replace habitat capacity at or near the project site.
3. Replace habitat capacity off site or increase productivity of existing habitat for affected stock.
4. When none of the above methods of habitat replacement is technically feasible, supplement the fishery resource through artificial production. (DFO notes that this should happen only in rare cases.)

Also under the *Fisheries Act*, liquid discharges from the Project must meet the requirements of the Meral Mining Liquid Effluent Regulations, which are administered by Environment Canada. In addition, permits are required under the *Navigable Waters Protection Act* for any works that interfere with public navigation, which would include the tailings management facilities.

Under the provincial Environmental Control Water and Sewer Regulations, the Newfoundland and Labrador Department of Environment and Labour regulates water extractions, various forms of construction in and beside watercourses, and wastewater discharges.

In 1995, VBNC initiated baseline studies of stream hydrology, pond bathymetry, water

and sediment quality, primary productivity, benthic macroinvertebrates, and fish and fish habitat, among other topics. Some of this work continued into 1998 and VBNC provided a progress report on it during the hearings.

DFO and VBNC have not fully determined the total amount of fish habitat that the Project would alter, disrupt or destroy. In the Environmental Impact Statement (EIS), VBNC predicts that the Project would affect the ponds used by the two tailings management facilities, and some stream habitat close to the open pit and the South Sedimentation Pond, among other sites. However, VBNC does not consider this to be a residual impact because it would replace the habitat through the fish habitat compensation agreement. In other areas where the Project may reduce water flows, VBNC commits to maintaining minimum instream flows or replacing the habitat through the compensation agreement.

Negligible or minor residual environmental effects are predicted for each of the eight watersheds, with the following exceptions:

- accidents could have negligible to major effects; and
- nickel contained in water released from the two tailings facilities during the post-decommissioning phase could result in sub-lethal (moderate) effects on snails in the North Tailings Basin Brook, downstream from Dam 2 as far as and including Pond 57, while aluminum contained in that water could result in sub-lethal effects on char in the same area of the North Tailings Basin Brook and in Throat Bay Brook in Pond 64.

8.1 EFFECTS ON CHAR

Discussions centered mainly on the anadromous char that spends most of the year in the Reid Brook system. It is larger and much more abundant than the land-locked char found in some lakes. As VBNC pointed out, sea-run char has been an important local food source for many

generations and has sustained an important commercial fishery since the 1970s.

In its baseline work, VBNC expended considerable effort on Arctic char studies. For example, it studied biological characteristics that determine fish growth rate and production, conducted radio-telemetry studies of fish caught in both Reid Brook and Ikadlivik Brook to learn more about migration patterns, did a survey to document areas of spawning activity in Reid Brook and operated a counting fence in Reid Brook. VBNC also made use of DFO's extensive work on Arctic char in Labrador.

Nevertheless, the state of knowledge about the Voisey's Bay char stock is not all that advanced, according to DFO. For population information, apart from VBNC's recent tagging and counting studies, DFO depends on commercial landings, which in turn depend on the level of fishing effort expended. VBNC suggested that the stock was depressed below the natural capacity of the area because of overfishing. DFO questioned this, and suggested that char could be much more abundant than the catch statistics suggest. Landings are depressed, but DFO is not sure if that means stocks are low. The Department does know, however, that abundance in any given river system can vary significantly from year to year.

Because VBNC found char in the lower reaches of Camp Pond Brook, DFO recommended re-evaluating the Project's effects on char. It may be that char use Camp Pond Brook only during years of high water. However, since Project effects would likely be more pronounced in Camp Pond Brook than in Reid Brook, the Panel agrees that VBNC should provide more information on the significance of Camp Pond Brook to char and should make every effort to ensure that the Project does not affect char using this brook (see Recommendation 17). A HADD determination should occur only as a last resort.

In Reid Brook, it appears that the key areas of spawning and overwintering habitat are located upstream from the outlet of Camp Pond Brook,

while the Project would mainly affect downstream water quality and quantity. Char are found in the lower reaches of Reid Brook year round; however, individual fish spend only a short time there because they are passing through. Therefore, it would be crucial to maintain adequate water flow to ensure that char could move freely between habitat in the upper reaches of Reid Brook, Ikadlivik Brook and the Voisey's Bay estuary.

DFO, the Innu Nation and others have questioned the reliability of flow predictions based on a relatively short period of on-site hydrometric observations. VBNC has committed to continuing these observations and to updating its water management plan in accordance with the results. Intervenors also argued against the use of mean values for surface flows, on the basis that flow reductions could be more harmful at times of natural low flow. The Panel concludes that VBNC should establish and justify minimum flow requirements and should demonstrate how its water management plan will guarantee those flows consistently, including during dry years. The Panel addresses this issue in Recommendation 17.

8.2 HABITAT LOSS

At the hearings, the Panel heard considerable discussion about applying the federal "no net loss" principle to the Project. Participants also discussed, at length, the connections between the process used to determine HADD, the likely or desirable results of this process, and the identification and ranking of fish habitat impacts in the EIS. DFO's working definition of HADD is "any change in fish habitat that reduces its capacity to support one or more life processes of fish."

While DFO defines fish habitat as including physical, chemical and biological attributes, it addresses physical alterations only when determining HADD. Physical alterations include changes in water flow, as well as sedimentation

that smothers or otherwise physically alters bottom habitat. Chemical alterations are regulated under section 36 of the *Fisheries Act*, which deals with deleterious substances; Environment Canada administers this section.

VBNC predicts that the Project would destroy or disrupt standing water habitat in Headwater Pond and the North Tailings Basin; stream habitat in North Tailings Basin Brook below the tailings facility and in Tributary 1 in the Reid Brook watershed; and marine inter-tidal habitat at the port site.

In some areas where the Project would cause streamflow changes, the EIS concludes that the effects would fall within the range of natural variability of flow or pond level characteristics, and would therefore constitute neither HADD nor a residual impact. This conclusion assumes that, in some cases, mitigation may be required to provide minimum instream flow. The EIS does not describe how these minimum flows would be determined or provided. In a response to DFO, VBNC acknowledged that many concerns about flow alteration and its effects on fish habitat "can only be fully addressed when detailed design work is under way, at which time VBNC will address each flow alteration on a case by case basis." In some cases, the volume, timing and duration of flow alterations would depend on final design, water balance and process water requirements. Potential mitigation measures would include reducing water requirements or using alternate sources, avoiding sensitive periods or augmenting flow during dry periods.

VBNC emphasized its view that environmental assessment should not become embroiled in HADD determination: "HADD determination is a separate process and any attempt to resolve issues of HADD and compensation in the EA process is misplaced and in conflict with guidance from DFO." Nevertheless, VBNC complained on several occasions during hearings that it was having difficulty proceeding with

the HADD identification process because DFO had not provided adequate quantification criteria.

VBNC provided its habitat quantification report to the Panel, although that report was not part of the EIS. The report indicated that the next step in the process would be a report on compensation options for anticipated fish habitat losses, followed by a stakeholder consultation process.

In DFO's opinion, HADD identification should be integrated into the environmental assessment process, and not left to a later permit stage. The Department criticized the EIS because, in its view, VBNC inadequately identified potential habitat effects. DFO maintained that it had provided ample information on quantification criteria and had referred VBNC to other literature on the topic. However, DFO did indicate that it has not yet developed criteria for identifying standing water and marine habitat.

In its recommendations to the Panel, DFO sought more detail on effects on fish habitat associated with

- the construction and operation of the tailings basins;
- the initial drawdown of water from those basins;
- flow alterations in the Reid Brook, North Tailings Basin, Throat Bay and Option 5 watersheds;
- plans for diverting, and then restoring, streams in these watersheds;
- sedimentation in Camp Pond; and
- the determination and maintenance of minimum streamflows.

The type of detail DFO sought included information on substrate use, the restriction or obstruction of migration, scouring, velocity barriers, projected habitat use, annual flow variations and sensitive biological time periods.

An expert for the Innu Nation criticized the amount of baseline data VBNC had collected

and asserted that the EIS underestimated the amount of habitat that the Project would affect. He also suggested that Project alterations could affect upstream habitat, in some cases. VBNC indicated that it had examined the potential of upstream habitat, which in many cases was limited by obstructions, steep gradients or intermittent flows. The Innu Nation's main conclusion was that VBNC should re-examine alternative ways of carrying out the Project to see whether the scope of effects on fish habitat could be reduced. (The Panel discusses alternative methods of managing tailings in Chapter 6, Tailings, Mine Rock and Site Water Management.)

The Panel recognizes that determining HADD and negotiating a habitat compensation agreement is indeed a separate process from environmental assessment, in the same way that negotiating IBAs between the company and Aboriginal organizations is a separate process. But the Panel also believes that the HADD process has to be considered during environmental assessment because, like the IBAs, it would deliver significant elements of the mitigation program. Specifically, the HADD process would

- initiate a more detailed review of all potential physical habitat effects than is possible during environmental assessment, using DFO's expertise as well as that of the Project team to precisely identify the types of mitigative action that would prevent impacts in the first place (and therefore avoid HADD); and
- provide compensation for lost habitat in accordance with DFO's hierarchy of preferences.

The Panel agrees with VBNC that certain generic mitigation methods are well established, such as methods for controlling sedimentation at construction sites and for minimizing impacts through the design and construction of stream crossings. Other methods, particularly those for maintaining minimum water flows throughout

the affected freshwater systems, would be more site specific.

The Panel believes that DFO has both the requisite regulatory powers and the resources to ensure a rigorous review and determination of HADD. Therefore, the Panel's main challenge is to assess the total probable effects of the Project on habitat, rather than to replicate DFO's job.

Perhaps the main conundrum for the Panel — and, at the hearings, DFO agreed that this was indeed a conundrum — is that no one knows at this stage how VBNC could deliver compensation. Could the company create similar habitat or increase productive capacity close by, for the same stock? Or would it be required to create new habitat off site, and what would this mean to local resource users? Or, if these alternatives would not work, would VBNC be required to pay cash compensation to be used by DFO elsewhere? (Although the proponent of the NWT BHP Diamonds Project was required to pay such compensation, the Panel recognizes that DFO considers this to be an unusual situation and not a desirable precedent.)

The Panel therefore concludes that the primary purpose of the HADD process should be to identify all possible ways to avoid HADD. For the purposes of the assessment, VBNC has provided sufficient baseline information to indicate the likely general scope of effects on habitat. However, as part of the HADD process, VBNC needs to provide more information on how it proposes to avoid harmful impacts to fish habitat, particularly by maintaining minimum flows. For example, VBNC must determine what flows different species require in different parts of the system at different times of the year, and how it can ensure these flows.

Recommendation 17

The Panel recommends that, before DFO provides authorizations under subsection 35(2) of the *Fisheries Act*,

VBNC prepare a fish habitat protection report on the proposed prevention and mitigation elements of both the Project design and the environmental protection plan. This report should address

- **mitigation of effects arising from flow alterations during construction, pump down periods, operation and decommissioning;**
- **minimum (and, where appropriate, maximum) flows to be maintained, including information on how these flows were determined;**
- **the sources of water to maintain flows and control mechanisms required to deliver this mitigation;**
- **the extent to which char use habitat in Camp Pond Brook;**
- **ways that the Project could affect this use and, if necessary, details of any additional mitigation measures proposed to ensure that no significant effects will occur; and**
- **an appropriate environmental effects monitoring program.**

The Panel was not presented with evidence indicating that the habitat likely to be lost was particularly productive compared to other habitat in the region, or that it was an important harvesting location. However, because the public was unable to comment to the Panel on the results of the HADD process (that is, on what the compensation plan would deliver), the process should remain as open as possible.

Recommendation 18

The Panel recommends that DFO provide LIA, the Innu Nation and the general public with adequate opportunity to review and comment on

the draft fish habitat compensation agreement.

Because HADD is determined and compensation is negotiated on the basis of predictions, the Panel asked whether compensation agreements were ever re-visited if environmental effects monitoring revealed unforeseen habitat loss. DFO agreed that this was theoretically possible, although it was unable to cite a precedent.

The Panel believes that the environmental effects monitoring program should assess how effectively mitigation measures have protected fish habitat. One of the purposes of this review should be to ensure that VBNC maintains minimum streamflows or takes corrective action.

The Panel certainly endorses the objectives embodied in the hierarchy of preferences laid out in DFO's habitat protection policy, but it has no way of evaluating how feasible it would be to mitigate residual effects by replacing habitat on site or near the site. The Panel does not consider financial compensation paid to DFO, such as that paid during the NWT BHP Diamonds Project, to be an acceptable alternative.

While it is clear that VBNC will require HADD authorizations if the Project is to proceed, the Panel, together with other presenters, is concerned about the possibility of continuing habitat loss or harmful alteration should VBNC be unable to maintain required flows. The Panel is not convinced that VBNC would be able to adequately mitigate new residual effects by replacing habitat. Therefore, the Panel believes that HADD authorizations should occur only once, at the start of the Project, and should be limited to HADD that is absolutely unavoidable. Thereafter, VBNC should be obligated to do whatever is required to protect all remaining habitat.

Recommendation 19

The Panel recommends that DFO indicate to VBNC that the Department will

not accept subsequent requests for HADD authorizations for the proposed Project. In the overall environmental effects monitoring program outlined in its fish habitat protection report (see Recommendation 17), VBNC should include a monitoring component designed to validate the predicted effects of the Project on fish habitat and to assess the effectiveness of mitigation measures. If, at some later date, monitoring results indicate that flow alterations have destroyed or harmfully altered additional habitat, the onus should be placed on VBNC to restore that habitat as quickly as possible.

The Panel concludes that the environmental assessment would have proceeded more smoothly if the HADD determination process had been further advanced and if VBNC had been able to present a review of potential habitat compensation options. It appears that the dispute between DFO and VBNC concerning clear guidelines for habitat identification and classification was a major cause of delay.

Recommendation 20

The Panel recommends that DFO develop a proponent's guide to HADD identification and the development of fish habitat compensation options that clearly lays out the steps a proponent should take, the methods to be used and the criteria by which the proponent's work will be judged. DFO should complete the criteria for standing water and marine habitat as soon as possible and include them in the guide.

DFO is concerned about possible habitat loss in Camp Pond due to sedimentation

resulting from airborne transportation of dust from the open pit and nearby roads. The Panel believes that every effort should be made to avoid a HADD authorization in Camp Pond, especially if such an authorization, followed by compensation, prompted VBNC to relax environmental protection efforts in Camp Pond, which is an important part of the overall Reid Brook system.

Recommendation 21

The Panel recommends that VBNC and DFO jointly review all potential sources and pathways of sedimentation, and currently proposed mitigation with respect to Camp Pond, to avoid or minimize sediment transport into the pond wherever possible, so that fish habitat loss does not occur.

8.3 BLASTING

An extensive blasting program will be carried out over many years. DFO expressed concern about the possible effects of blasting, including

- the effects of shock waves and vibrations on fish, fish eggs and larvae;
- the effects of ammonium nitrate and fuel oil blasting residues on receiving waters; and
- the effects of blasting on the groundwater regime and on the possible subsurface movement of contaminants.

VBNC has committed to monitoring blasting residues and to installing groundwater monitoring wells around the open pit.

The Panel was not presented with firm evidence that blasting would cause the rock to fracture more extensively than predicted, or that fish would be affected, given the distance between the pit and the nearest fish habitat. The Panel therefore believes that DFO's concerns should be further investigated during the

process of developing the effects monitoring program to see whether additional monitoring is justified.

Recommendation 22

The Panel recommends that, as part of the environmental protection plan, VBNC develop blasting procedures that incorporate DFO's guidelines with respect to protecting fish and fish habitat.

8.4 COMBINED PROJECT EFFECTS ON REID BROOK

Throughout the review process, participants expressed concern about the Project's combined effects on freshwater fish and habitat in the Reid Brook system, because that system will be the receiving environment for a number of emissions and alterations. In the Additional Information, VBNC summarized the combined effects of each stage of the Project on Reid Brook: flow reduction, blasting residues and sedimentation during construction; flow reduction and sedimentation during operations; and a much smaller flow reduction and release of sediment during decommissioning and post-decommissioning. Because each of these alterations is predicted to be quite small, VBNC concludes that the overall environmental effect will be negligible to minor.

DFO acknowledged VBNC's efforts to avoid impacts in Reid Brook, but concluded in its presentation to the Panel that, "When the totality of the project infrastructure is taken into account, it is difficult to accept that there will be no impact on the system or potential environmental effects." DFO did not provide an alternative hypothesis with respect to residual impacts, but it did indicate, without specific recommendations, that VBNC should apply all possible mitigation methods.

LIA recommended that VBNC assume that the combined effects on Reid Brook will be greater than those indicated by the prediction

of individual effects, and opt for more stringent prevention or mitigation. LLA stated that "if we wait for environmental effects monitoring to show an effect it will be too late."

The Panel recognizes the sensitivity of the Reid Brook watershed, which arises from the area's productivity and its social and cultural significance. VBNC has, however, no choice but to mine the nickel deposit where it is located. The Panel has been impressed by VBNC's systematic efforts during the design of the Project to minimize effects on the Reid Brook system. The Panel has examined the arguments against using Headwater Pond to store tailings and has concluded that the disadvantages of this location are outweighed by its good containment potential, combined with the fact that drainage can be permanently diverted out of the Reid Brook watershed. Chapter 6 includes further discussion of the alternatives the Panel considered.

However, the Panel agrees with DFO that there is still a degree of uncertainty about the interactive effect of a number of different stressors. There is also a degree of uncertainty about predicted effects, given the nature of the Project's interaction with the Reid Brook system. The Project could reduce and alter subsurface and surface flow in many ways, produce airborne and waterborne particulate matter from many sources, and cause small or large spills in many different parts of the drainage area.

The Panel believes that this uncertainty is not so large, nor are the potential impacts so devastating, that the Project cannot be approved. But the Panel concludes that the precautionary approach so far demonstrated by VBNC should be extended. During the hearings, VBNC indicated its willingness to do so. Recommendations in chapters 5 and 6, dealing with various aspects of air quality and water management, address this issue.

In addition, the Panel believes that further

avoidance and mitigation measures should be considered and summarized in a single document focusing on the Reid Brook watershed.

Recommendation 23

The Panel recommends that VBNC develop, as part of the Environmental Management System, an environmental protection plan for Reid Brook that incorporates the following, as required:

- **adjustments to the main access road route and design to minimize potential impacts on Reid Brook;**
- **design and construction of appropriate stream crossings on tributaries;**
- **specific traffic management procedures at key locations along the road;**
- **seepage collection at the toe of Dam H2; and**
- **additional mitigation measures to improve the quality of water leaving Camp Pond, if necessary (for example, additional water retention or development of an engineered wetland).**

8.5 MONITORING AND BASELINE INFORMATION

VBNC has committed to developing an environmental effects monitoring program to monitor cause and effect relationships between the Project and valued ecosystem components (VECs), based on the same criteria they used to rank the significance of effects on VECs. Three main issues were raised by DFO with respect to monitoring freshwater fish and fish habitat. In all three cases, DFO criticized the amount of baseline data collected. However, this criticism mainly related to the need for adequate information to sup-

port future monitoring rather than to concerns about the validity of predictions in the EIS.

VBNC sampled primary productivity and plankton and zooplankton biomass over two years to determine the primary productivity of seven representative ponds in the study area. DFO wanted VBNC to do more extensive sampling that would cover seasonal variations of abundance and to relate results to environmental variables, so that this extended baseline work could be used as the foundation of a monitoring program. The Department also recommended that VBNC model the Project's effects on some species of phytoplankton and zooplankton.

VBNC responded that phytoplankton species are poor indicators of environmental change precisely because of high natural temporal variability. It also stated that, by comparing predicted future water quality to established water quality guidelines which are based on chronic and acute effects, VBNC had addressed some aspects of the impact of the Project on primary productivity.

Similarly, DFO wanted to see more extensive baseline sampling of benthic macroinvertebrates to confirm estimates of diversity. It also wanted additional modelling for one or more representative species. VBNC indicated that it was aiming to describe biodiversity, species composition and relative abundance, rather than to carry out a definitive study of benthic macroinvertebrates in the area.

A number of intervenors stated that monitoring should focus as much or more on potential effects on the basic "building blocks" of the ecosystem as on effects on higher level species. The intuitive appeal of this approach is that the monitoring program could thereby deliver the earliest possible warning if things are going wrong. However, the Panel also appreciates the mining industry's concern that environmental effects monitoring must be practical and cost effective, and must link observed results with project-induced impacts.

The Canada Centre for Mineral and Energy Technology presented information to the Panel on the Aquatic Effects Technology Evaluation (AETE) program, a joint government-mining industry initiative to test potential instream methods for determining effluent impacts on resident biota. As this presentation indicated, "A major difficulty to standardization of biological monitoring techniques has been the large number of potential techniques available. Potential classes of organisms include fish, benthos, zooplankton, phytoplankton, macrophytes and bacteria. Potential levels of each class of organism include intracellular, tissue, organism, population and community levels."

The AETE program is structured on a four-step monitoring framework to determine the following.

- Are contaminants getting into the system, and at what exposure levels?
- Are contaminants bioavailable—in other words, are they accumulating in organisms?
- Is there a measurable response to these contaminants?
- Can the exposure, bioavailability and response be linked to identify the cause?

The results and recommendations of the program will probably form the basis of the new requirements for monitoring environmental effects to be incorporated into the revised Metal Mining Liquid Effluent Regulations.

The Panel understands that much of the current research on effects monitoring of various industry effluents, in both freshwater and marine water, has used benthic macroinvertebrates rather than plankton or algae. The Panel concludes that it is at present unclear whether monitoring at lower trophic levels is practical and whether such monitoring could discern effects that could be clearly attributed to the Project. However, monitoring should provide early warning of any food chain effects. The results and recom-

mendations of the AETE program are likely to provide important guidance in this regard, although they may need to be adapted to reflect the northern Labrador situation.

Recommendation 24

The Panel recommends that VBNC develop monitoring studies for contaminant effects in freshwater with input from DFO, Environment Canada and other stakeholders, and consider the findings of the Aquatic Effects Technology Evaluation (AETE) program. To provide early warning of effects, serious consideration should be given to monitoring at least at the benthic macroinvertebrate level, if not at a lower trophic level, provided there is reasonable assurance that the program will be able to deliver clear cause and effect information that is scientifically valid. Additional baseline information need only be collected if required to support the selected monitoring component. VBNC should also offer to collaborate with any research carried out as a follow-up to the AETE program by providing monitoring information from the Project to be used as a case study.

When it came to monitoring possible effects on Arctic char, VBNC and DFO advocated different approaches. Both parties agreed that Kogluktokoluk and Ikadlivik brooks and Reid Brook operate to a certain extent as one system. VBNC's baseline monitoring has indicated that many char may spawn in Reid Brook but overwinter in Ikadlivik, possibly because of a shortage of overwintering habitat in Reid Brook and the difficulty of navigating the falls at the outlet of Reid Pond. A smaller percentage of char enter Reid Brook, but subsequently turn around and both spawn and overwinter in Ikadlivik.

From DFO's perspective, the Project is an intervention in a poorly understood aquatic ecosystem, and if VBNC is to validate its prediction that the Project will not significantly affect char in the Reid Brook system, it must at least monitor the population in Kogluktokoluk and Ikadlivik brooks as well. Effects on juvenile production in Reid Brook could affect habitat use in other parts of the system. Conversely, an adverse effect on numbers in Reid Brook could be masked if the population as a whole was increasing.

VBNC, on the other hand, proposes to focus on Reid Brook, on the pathways through which the Project could affect Reid Brook, on monitoring of early warning indicators to detect significant changes to char habitat and on mitigation of any such changes. VBNC says that comparing any population changes in Reid Brook to overall population numbers in the combined system will dilute the results.

The Panel sees merit in both approaches. On the one hand, the Panel agrees with VBNC that monitoring should be "simple, practical and achievable," and that it should serve as an early warning indicator to trigger action to prevent adverse impacts. This suggests that the effects monitoring should focus primarily on Reid Brook itself and its tributaries. On the other hand, the Panel appreciates DFO's concern about the implications of locating a mining project close to a productive but imperfectly understood river system. This suggests that DFO and VBNC should try to expand knowledge about the Arctic char that use the entire Kogluktokoluk-Ikadlivik-Reid system, incorporating Aboriginal knowledge in the process.

The Panel is not in a position to determine what types of studies should be carried out. This should be determined as part of a collaborative process that involves LIA and the Innu Nation as well.

The Panel believes that VBNC is responsible for monitoring effects in the Reid Brook system and that DFO is responsible for managing

the wider Kogluktokoluk-Ikadlivik-Reid system. However, because the Project will considerably alter the Reid Brook watershed, the Panel believes that VBNC should contribute resources, which could include in-kind resources, to the wider monitoring effort.

If VBNC's effects monitoring in Reid Brook indicates a significant variation from predicted conditions, VBNC should be required, if necessary, to expand the scope of its monitoring to include other parts of the system.

Recommendation 25

The Panel recommends that VBNC carry out hydrometrical, water quality and fish population monitoring in the Reid Brook system; that DFO initiate appropriate studies to increase understanding of fish and fish habitat in the wider Kogluktokoluk-Ikadlivik-Reid system, involving LIA and the Innu Nation in this process; and that VBNC contribute significantly to these studies by providing information and other resources.

9 MARINE ENVIRONMENT: LAND-BASED EFFECTS

Because of the intricate shoreline around the site, the Project could cause environmental effects in five different bays, although the greatest concentration of interactions would occur in Anaktalak Bay. In addition, ships would be travelling along a corridor that runs out from Anaktalak Bay, around the end of Paul's Island and into the Labrador Sea.

This chapter focuses on the effects of Project discharges and land-based influences on the marine environment. The next chapter focuses on shipping.

In the Environmental Impact Statement (EIS), VBNC indicated that four of the bays are made up of one or more basins, separated by shallower ledges or sills. Fine-grained sediments have accumulated in the deeper areas, which are covered by permanently cold water. Currents are generally weak; sediments in the deeper areas are moved mainly by storm and tide events. Water chemistry is similar in all five, except that Voisey's Bay exhibits slightly different characteristics due to larger freshwater input. Concentrations of metals and nutrients are typically very low. Sea ice, as a habitat for algae and zooplankton and as a scouring mechanism, plays an important role in the ecology of the shallower, inshore waters. VBNC indicated that the five-bay area does not include any unique habitat when viewed in the context of northern Labrador.

Nutrient input from the many streams and rivers and from the inshore Labrador Current help to make the coastal waters relatively productive. Phytoplankton and algae form the basis of the marine food chain. The food chain supports a variety of zooplankton, benthic invertebrates such as shrimp and scallops, and fish, including Arctic char that reside year round in the area's bays, streams and ponds; rock cod; and Atlantic salmon that migrate through. Marine mammals include polar bears and different species of seals and whales.

In Anaktalak Bay, VBNC would construct a port site covering approximately 70 hectares. This would include both a temporary and a permanent shipping dock, concentrate and fuel storage facilities, and a marshalling and equipment storage area. Both of the docks would require infilling, and the port site runoff would also be a source of sediment loading and of chemical and metal inputs through fugitive concentrate and hydrocarbon losses during loading and unloading operations. The Bay would also receive sediment loading from other Project activities via Little Reid Brook.

VBNC would discharge treated water from the milling operation, the Headwater Pond tailings basin and other site water management facilities into Edward's Cove at a 50-m depth through a 160-m-long diffuser.

The combined effects in Anaktalak Bay would therefore include sedimentation, the accumulation of metals in sediments and marine biota, concentrate and hydrocarbon loadings through chronic losses, changes in ice cover, and loss or alteration of intertidal and subtidal fish habitat.

In Throat Bay, the Project's effects during operations would include the release of water containing dissolved metals through dam seepage from the Headwater Pond tailings facility. In the post-decommissioning stage, once the water in Headwater Pond no longer needed treatment, the excess water would drain into Throat Bay.

Voisey's Bay receives the drainage from Reid Brook, which could be affected by a wide range of Project facilities and activities, and from the southern watersheds where the airstrip is located.

Once the underground began operating, Kangekukuluk Bay would receive dam seepage from the North Tailings Basin and Kangekualuk Bay would receive both dam seepage and excess water from the North Tailings Basin, which would be treated if required.

Potential accidents that were considered included concentrate or fuel spills at the loading dock, which would affect Anakralak Bay (see Chapter 10, Marine Environment: Shipping), or the failure of a tailings dam, which could affect Kangekualuk, Kangeklukuluk or Throat bays.

Perhaps VBNC's most prominent mitigative measure for the marine environment was the decision to locate the port site and effluent diffuser in Anakralak Bay rather than the closer Voisey's Bay to prevent impacts on that biologically productive estuarine environment. VBNC would also collect port site drainage in a sedimentation pond, and implement a program to control discharges from all vessels while those vessels are at the port site. Other relevant mitigative measures have been described in previous chapters.

In predicting effects, VBNC addressed sedimentation, the accumulation of metals, eutrophication, and habitat alteration and loss in Anakralak Bay; short-term sedimentation and salinity changes resulting from the pump-down of the North Tailings Basin, and longer term accumulation of metals in Kangekualuk Bay; and the accumulation of metals in Kangeklukuluk, Throat and Voisey's bays. The company predicted effects of accidental events for all locations.

Where habitat is destroyed through infilling at the port site, VBNC would negotiate habitat compensation with the Department of Fisheries and Oceans (DFO), so this is deemed to have no residual effect. Elsewhere, habitat alteration is rated as negligible because of the relatively slow rate of sedimentation, wide dispersal and the prediction that fine sediments would end up in the deepest parts of the basin.

During operations, the effects of metals accumulation in water, sediments and marine biota in Anakralak Bay would reach their maximum in the first five years. However, they would remain below the relevant threshold concentrations for chronic effects in aquatic animals and are rated minor, as are the effects of treated

effluent discharge in Kangekualuk Bay, where maximum levels would be reached more slowly. The effects of metals accumulation from seepage and runoff during decommissioning and post-decommissioning in Kangekualuk, Kangeklukuluk, Throat and Voisey's bays are predicted to reach their maximum levels mostly between 50 and 75 years after decommissioning, depending on the metal and the pathway. These effects are rated as negligible.

9.1 MARINE FISH HABITAT

Subsections 35(1) and (2) of the *Fisheries Act* applies to marine as well as freshwater habitat. This means that harmful alteration, disruption or destruction (HADD) of fish habitat cannot occur without authorization by DFO, which involves the negotiation of a compensation plan to ensure no net loss of productive fish habitat capacity.

The debate over the quantification of potential fish habitat loss extended to the marine as well as the freshwater environment (see Section 8.2). In its habitat quantification report, which was not part of the EIS, VBNC indicated that it expected the construction of the port facilities to destroy 20,000 m² of intertidal habitat, for which the company would need to negotiate habitat compensation arrangements. VBNC also expressed concern about what it saw as a lack of clear criteria for quantifying marine habitat and identifying potential HADD.

DFO acknowledged that it is still developing formal guidelines for determining HADD for the marine environment, and that methodologies for doing so are not as well defined as those used for the freshwater environment. Criteria are likely to be site specific, focusing on species and habitat issues that are important in the local area. DFO argued, however, that the information required for the HADD process in the marine environment was also required for environmental assessment.

The Labrador Inuit Association (LIA) questioned whether impacts on sea ice were considered when determining HADD. DFO indicated that it has no policy on this.

In general, the Panel considers that the marine HADD issues are more straightforward than the freshwater issues. The main cause of HADD would likely be the direct removal of habitat through the placement of port and diffuser facilities on the sea bottom, with presumably some sedimentation effects in the immediate vicinity. VBNC's pilot plant test results suggest that it would be able to achieve low rates of discharge for suspended solids — that is, rates around one fifth of the Metal Mining Liquid Effluent Regulations (MMLER) limit. DFO has indicated that it does not expect the effluent discharge to result in physical smothering of the benthos. Chemical alterations do not fall within the HADD process.

The Panel recognizes sea ice is an important part of the whole marine habitat complex, with respect to both primary productivity and marine mammals. The Panel acknowledges that it may be difficult to include sea ice within the HADD process, but agrees with LIA's position that the lack of regulatory protection for sea ice is a serious gap. This is one of the issues that LIA wishes to pursue with DFO through a marine management plan (see Chapter 17, Environmental Management).

The Panel did not receive information on the type of options that may be considered to compensate for the loss of marine fish habitat, and is therefore unable to comment on this aspect.

As with the freshwater environment, the Panel concludes that the primary purpose of the HADD process for the marine environment is to identify all possible ways to avoid HADD, and that a review of potential habitat compensation options would have enhanced the environmental assessment process. Recommendations 17 and 20 therefore apply both to the freshwater and the marine environments.

9.2 DILUTION MODELLING

For the diffuser discharges in Anaktalak Bay and Kangekdualuk Bay, VBNC used a numerical model (Princeton Ocean Model) with temperature, salinity, wind velocity, surface elevation and bathymetry inputs to calculate the spatial extent and dilution rate for the effluent plume. It ran each model for non-stratified winter water column conditions and stratified summer conditions at three different stages in the life of the Project. The results of this model then determined the predicted zone of influence, the changes to water column quality within that zone and the rate of sedimentation. Once the plume reached 1000:1 dilution it was deemed to be equivalent to ambient water quality conditions.

As input parameters, the model used effluent characteristics predicted by a consultant based on the performance of similar treatment plants elsewhere, rather than the maximum discharges as defined by MMLER limits.

DFO criticized the lack of supporting information provided, particularly with respect to the settling velocity of material in suspension. It also recommended that modelling take into account forcing mechanisms due to seasonal stratification variations, seasonal changes in estuarine circulation, fjord flushing rates and high frequency storm events. While, in the long term, some of these variations would result in wider dilution and dispersion of contaminants, DFO was concerned that there could be different short-term effects.

The Panel observes that VBNC, in applying the Princeton Ocean Model, arguably did not use a worst case scenario. A background report filed with the EIS predicted that the Project's effluent would contain significantly fewer contaminants than the levels permitted by the MMLER. Subsequent pilot-scale testing, as described in a subsequent report, suggested that the treatment plant proposed for the Project would be able to achieve even better results, although the Panel notes that full-scale operations

under variable conditions cannot always produce the same results as pilot plants.

The Panel observes that metal concentrations in the water column within Edward's Cove are predicted to be at least two orders of magnitude lower than US Environmental Protection Agency criteria for protection from chronic effects. The Panel recognizes that many influences could affect the size and behaviour of the effluent plume, but it was not presented with a scenario suggesting that the Project would exceed these guidelines. It would also be possible to verify the water quality predictions, at different times of the year and during different weather events, within the Project's first year of operation, so that additional mitigation could be put into place very quickly, if required. VBNC would be required to monitor effluent characteristics and has committed to monitoring water quality within the zone of influence around the diffuser. The Panel therefore concludes that additional modelling is not required at this stage.

DFO suggested that, to reduce the footprint of the Project, VBNC reconsider its decision to locate a diffuser in Kangeklualuk Bay when the North Tailings Basin is constructed, and consider treating excess water in the main mill site plant and discharging it into Edward's Cove instead. As discussed in Chapter 6, the Panel notes that the North Tailings Basin might not be required. If it is, the Panel concurs with DFO's suggestion to reassess the need for a second diffuser. Such a reassessment should be carried out in consultation with Anakralak Bay resource users through LLA, in the context of observed environmental effects in Edward's Cove during the first years of operation.

Recommendation 26

The Panel recommends that, if the North Tailings Basin is required during the underground phase, before approvals are given for its construction, VBNC

prepare a report to review the environmental advantages and disadvantages of consolidating effluent discharge into Edward's Cove instead of constructing a second diffuser in Kangeklualuk Bay. The report should examine the results of the compliance and effects monitoring carried out for the existing Edward's Cove diffuser, and should be subject to review and recommendations by the Environmental Advisory Board.

9.3 ECOTOXICOLOGICAL EFFECTS AND THE METAL MINING LIQUID EFFLUENT REGULATIONS (MMLER)

The discharge of treated effluent from the diffusers in Anakralak and Kangeklualuk bays falls under the MMLER, which are part of the *Fisheries Act* and administered on behalf of DFO by Environment Canada. These regulations, which specify maximum discharge concentrations for eight parameters including copper, nickel, total suspended matter and pH, are currently being revised. The new MMLER would likely be in place before the Project began. They will include mandatory requirements for environmental effects monitoring, and updated provisions for site-specific requirements, if these are needed to protect aquatic receiving environments.

At the hearings, participants discussed the ecotoxicological effects of Project discharges, particularly the current state of knowledge about such effects in a marine environment, in relation to the EIS predictions, the discharge limits specified by the MMLER and monitoring requirements. More research has been done relating to metal pathways in the freshwater environment, and there is generally more experience with mining effluents in freshwater. It appears that this would be the first mine to discharge effluent from a nickel-copper-cobalt processing operation into coastal waters.

Metals behave differently in the marine

environment because of the presence of salt, different pH levels and other variations. These can affect the way metals are speciated, the extent to which they become or stay dissolved in the water column, and their tendency to attach to particles. One example, which DFO raised as a concern, is that the rate of flocculation may be higher in the marine environment. This would remove metals from the water column, but when the floc particles sank to the bottom, they could become attractive food items to animals in the benthic layer.

Environment Canada told the Panel that the current MMLER standards were based on best available technology, tested against evidence and data from freshwater situations. DFO observed that there is also a lack of research on a number of relevant issues in this area, including chronic toxicity effects of combined nickel-copper-cobalt effluents on marine biota and the effects of metal particles in the marine environment. It also questioned the possible effects of chemicals used in the milling process, especially in combination with the metals in the effluent. DFO also suggested that the Project would have ecotoxicological effects beyond the 1000:1 dilution zone.

To reduce what it saw as serious uncertainty, DFO suggested that VBNC do some short-term toxicity tests for typical organisms in the marine environment, including Arctic char in their marine phase. It also recommended the use of organ pathology monitoring, rather than body burden measurements, for two reasons: this method can show the combined effects of different contaminants, and it also captures the effect of the "hit and run" phenomenon, when contaminants cause a problem but don't remain in the animal. DFO argued that organ pathology would be an effective early warning mechanism. Harmful effects could be identified at the individual level long before they would have a chance to affect the population level.

In its response, VBNC pointed out that its modelling predictions show that the Project

should easily meet the water and sediment quality guidelines developed by governments (of the US and Canada, respectively) to protect marine biota. The pilot effluent treatment program reinforces the EIS predictions by showing that VBNC should be able to achieve a high level of treatment throughout the life of the Project, producing an effluent that contains significantly fewer contaminants than the levels permitted by current MMLER standards. If monitoring indicated a problem, VBNC would be able to consider a number of options, such as substitution of chemicals, operation changes or treatment changes. VBNC disagreed with DFO's position on the use of organ pathology to monitor ecotoxicological effects, on the basis that it is not a reliable way to link cause and effect. It also contended that programs such as Aquatic Effects Technology Evaluation (AETE) and AQUAMIN were better suited to evaluating environmental quality criteria and guidelines than site-specific environmental assessments.

The Panel sees, in this discussion of ecotoxicological effects, three main questions.

- How significant are the gaps in the current state of knowledge about the impacts of nickel-copper-cobalt effluents in the marine environment?
- Would compliance with the MMLER provide sufficient environmental protection?
- What type of monitoring would be needed to confirm the degree and extent of toxicological effects?

The Panel does not believe that the knowledge gaps are so crucial that this aspect of the Project could not proceed. DFO did not argue this; in fact, it recommended that VBNC consider increasing the effluent loading in Edward's Cove by discharging treated water from the North Tailings Basin there instead of into Kangekluak Bay (see Recommendation 26 above). Nevertheless, the Panel concludes

that further research on the ecotoxicological effects of mining effluents, and particularly nickel-copper-cobalt effluents, on marine biota would benefit all parties, including resource users, DFO, Environment Canada, VBNC and the mining industry in general. The Panel also believes that VBNC has a responsibility to participate in this research effort, because it would be using Anakralak Bay and possibly Kangeklualuk Bay as part of its wastewater management system for over 20 years.

Recommendation 27

The Panel recommends that DFO, Environment Canada, the Canada Centre for Mineral and Energy Technology and VBNC, in consultation with LIA and the Innu Nation through monitoring partnerships, should develop a research program using the Voisey's Bay Mine and Mill Project as the central case study, to increase the level of knowledge about the effects of nickel-copper-cobalt effluents in the marine environment, particularly with respect to effluent discharge standards, mitigation measures, and monitoring methods and procedures.

The Panel recognizes that VBNC hopes and expects to produce an effluent containing significantly fewer contaminants than the levels permitted by current MMLER standards, which suggests that the benchmark for best available technology may have shifted. It would not be unreasonable to assume that, during the Project's life, this benchmark would shift again. The Panel encourages VBNC to apply its environmental management policy of continuous improvement to all operations affecting effluent quality.

The Panel does not know what standards would be in effect when the Project began operation, or the extent to which they would be tailored to the marine environment. Nor is the

Panel in a position to recommend site-specific requirements. Furthermore, end-of-pipe criteria, such as the MMLER or the Newfoundland Department of Environment and Labour (NDOEL) regulations, do not directly address the issue of total loading, which is particularly relevant for contaminants that do not biodegrade.

The Panel observes that the Project would discharge effluent into pristine waters, and that every effort should be made to minimize the amount of persistent contamination introduced into the system, just as the Canadian Ambient Air Quality Objectives promote a higher standard of care in pristine airsheds. Therefore, the Panel believes that consistent efforts throughout the life of the Project to reduce pollutants at source — by using cleaner production strategies, achieving high operating standards at all treatment facilities and adopting technological upgrades as they become available — would be the best way to protect the marine environment. These efforts should be combined with an appropriate effects monitoring program linked to conservative thresholds that would trigger corrective action if required.

Recommendation 28

The Panel recommends that VBNC commit, through its environmental protection plan, to reducing total marine pollutant loadings on a continuous improvement basis, and work with Environment Canada to develop policies and procedures that would

- **improve mill processes to reduce pollutants at source;**
- **ensure, through a preventive maintenance program and other approaches, that treatment facilities operate at the highest standards of effectiveness; and**

- upgrade treatment technology as needed.

VBNC should report regularly to the Environmental Advisory Board on the results of this pollution prevention program.

Recommendation 29

The Panel recommends that VBNC be required to include the following in its follow-up program:

- a marine water and sediment quality monitoring program that includes threshold criteria related to existing water and sediment quality guidelines (threshold levels should be set at a point that gives suitable early warning);
- mandatory mitigative action if these thresholds were exceeded; and
- research studies designed to identify any adverse health effects in marine biota, followed by revision of the threshold criteria if necessary.

9.4 BASELINE KNOWLEDGE NEEDED FOR MONITORING

VBNC carried out baseline studies in 1995-96, focusing on the five-bay complex, to collect data on physical oceanography, ice conditions in Anaktalak Bay, seawater chemistry, phytoplankton and zooplankton, coastal geomorphology, sediment quality, intertidal and subtidal conditions, fish communities, and fish and shellfish chemical profiles. VBNC also used a number of DFO studies, particularly on char.

Both DFO and LIA expressed concerns about the level of baseline knowledge of the marine environment presented in the EIS and background documents. In both cases, the parties mainly presented this concern as an issue to be

resolved through the design and implementation of the monitoring program. More information is needed in order to know where to look to verify that the Project has had no harmful effects or to detect early warnings of possible problems.

DFO observed that VBNC collected sufficient data on the physical oceanography of the area but did not analyze them to provide an overview of the physical processes controlling the dynamics of the marine environment in inshore bays. Specific issues included

- the need to understand how bottom circulation patterns will affect contaminant dispersion (Anaktalak Bay is actually a fjord with limited flushing of the deeper waters);
- the need to consult recent literature on the inshore Labrador Current to better understand water mass exchange between the inshore and offshore, and how ice moves; and
- a lack of current information on pack ice in the area.

Regarding the biological oceanography component of the EIS, DFO was concerned that sampling was restricted both seasonally and geographically, and that ecological analysis was needed to link the biological, chemical and physical information to identify possible changes, particularly to the lower food web. One specific concern was how changes to the ice cover in Anaktalak Bay could affect various species such as scallops, mussels, clams and sea urchins in their larval stages. Another was the lack of sampling of the spring phytoplankton bloom that represents the most significant period of primary productivity during the year.

In its submissions to the Panel, DFO characterized marine habitat in the assessment area as productive and dynamic, and recommended that VBNC develop a broad overview of sub-Arctic marine ecosystem dynamics in the Project area, including inshore bays and the coastal archipelago.

DFO argued that such an overview is "fundamentally important to the assessment process" and "of particular interest to Fisheries and Oceans in the context of its 'oceans' mandate."

LIA, through its Inuit experts, shared with the Panel its knowledge of the various processes and resources within Anaktalak Bay, based on long-term personal observation and many generations of travel and resource use in the area. These experts also described Anaktalak Bay as highly dynamic and talked about interactions among winds, tides, water masses, ice, fish and marine mammals; aspects of the food chain; the potential for shellfish harvesting; and marine mammal and waterfowl habitat. Like DFO, LIA stated the need for a more comprehensive understanding of the ecological processes within the marine environment, which should be developed collaboratively and integrate Aboriginal knowledge. LIA placed this issue within the context of its recommendation to the Panel that a marine management plan be developed under the mandate of the *Oceans Act*.

DFO challenged VBNC's estimate of the abundance of shellfish in Anaktalak Bay and its assessment of the commercial potential of the shellfish beds. VBNC had carried out some surveys in Edward's Cove and had extrapolated these results to the whole bay, based on projected densities for three types of habitat: estuarine, boulder barricade and bedrock. VBNC concluded that "the stocks of shellfish in Anaktalak Bay have no capacity to support commercial fisheries," based on the estimated limited densities and slow growth rates. DFO, in response, cited a number of viable fisheries elsewhere that exploit long-lived, slow-growing species.

LIA emphasized the importance of Anaktalak Bay for domestic shellfish harvesting, and indicated its interest in diversifying its commercial fisheries by exploring Anaktalak Bay's potential. It is concerned that the conversion of Edward's Cove into an industrial site will remove that potential. This concern is based partly on

the LIA's observations of shellfish tainting in Nain harbour.

DFO characterized the marine finfish information in the EIS as "extremely cursory," and identified the following as areas where information gaps existed: seasonal variability, capelin spawning beaches, pelagic species and Project impacts on Arctic char in the marine phase of their life cycle. DFO also critiqued VBNC's stock assessments for Arctic char, concluding that, from all sources, "information on true abundance of char is uncertain."

In response, VBNC argued that

- its baseline program contributed significantly to the body of scientific knowledge about the northern coast of Labrador;
- it had focused on the five-bay area to avoid "diluting" the identification of effects;
- the information collected was sufficient to support impact predictions and would be supplemented through the life of the Project through monitoring; and
- it had integrated physical, chemical and biological information while identifying and assessing effects and that it had already taken many of DFO's concerns into consideration.

VBNC also made the following commitments:

- to sample water chemistry parameters during the construction and operation phases to verify effluent dilution predictions;
- to update knowledge of the area's physical oceanographic processes as information becomes available;
- to update the database on ice conditions through a proposed program of joint research incorporating local participation and knowledge;
- to use relevant stock estimate data if and when DFO collects such data in the future;
- to include marine fish and habitat in the

environmental effects monitoring program, which could include sampling of water, sediment chemistry and deposition, and benthic infauna; and

- to review the available knowledge base while designing the environmental effects monitoring program in order to identify links and select monitoring targets and parameters.

In general, the Panel believes that the baseline information VBNC has collected is sufficient for the purposes of environmental impact assessment. VBNC's predictions focus mainly on those areas, receptors and pathways likely to show the greatest changes as a result of the Project. The Panel believes that it is reasonable to assume that any problems, including bioaccumulation of metals, will show up first and most prominently in Edward's Cove, for example, rather than "leapfrogging" Edward's Cove to appear elsewhere in Anaktalak Bay. Therefore, protecting Edward's Cove should also protect Anaktalak Bay. However, the Panel recognizes that some additional baseline information may be needed to support the monitoring program, depending on the indicators that are selected.

The Panel also appreciates DFO's concern that the Project would likely cause changes and effects in the existing marine ecosystem in many subtle and complex ways. The proposed Project would be the first large-scale industrial intrusion on the Labrador coast, about which there is certainly a wealth of Aboriginal knowledge but a paucity of scientific knowledge. The Panel agrees with LIA and DFO that ongoing work, though not necessarily more data collection, is needed to develop a more integrated description of marine ecological processes, particularly in a regional context. Such a description and understanding could help refine understanding of potential Project effects, and improve both Project and resource management decisions. VBNC has committed to working with LIA to develop a more integrated understanding of processes in Anaktalak Bay through the monitoring partnership. Recommendations in Chapter 17, Environmental

Management, also address the need for a marine management planning process involving DFO.

The Panel believes that VBNC is wrong in writing off the commercial shellfish potential of Anaktalak Bay based on currently available information. However, the Panel agrees that the responsibility for carrying out detailed stock assessments for a broader area than just Edward's Cove (that is, Anaktalak Bay) most properly lies with DFO. VBNC is responsible for identifying types and densities of shellfish within the area where the Project would interact with this receptor. Possible effects on the harvesting of shellfish fall into three categories:

- actual contamination or tainting of animals;
- spatial conflicts in the port area; and
- perceived effects (it may be difficult to market product from an area perceived to be an industrial site, or harvesters may avoid the Project area).

Effects on harvesting are covered in Chapter 14, Aboriginal Land Use and Historical Resources.

The Panel believes that VBNC, in surveying Edward's Cove — where there is the greatest risk of contamination, tainting or spatial conflict — has provided the needed amount of information for environmental assessment. However, the Panel also believes that VBNC should also be responsible for monitoring effects to verify the extent of these effects on shellfish around Project facilities, and that the company should compensate resource users, if necessary (see Chapter 14, Aboriginal Land Use and Historical Resources).

Recommendation 30

The Panel recommends that VBNC monitor shellfish for metals, bacterial contamination and hydrocarbon tainting to identify the extent of the area affected by the Project.

10 MARINE ENVIRONMENT: SHIPPING

VBNC is proposing to ship approximately 1,250,000 tonnes of nickel-copper-cobalt concentrate and some 150,000 tonnes of copper concentrate annually. Most of the nickel-copper-cobalt concentrate and all of the copper concentrate would be shipped in the "open water" season — that period when no landfast ice is present. VBNC has proposed to ship up to nine cargoes through landfast ice in the January to March period, allowing the initial ice to become 20 cm thick before beginning icebreaking, and ceasing shipping operations during April and May.

The ships to be used for the nickel-copper-cobalt concentrate would be in the 25,000-tonne range. They would be Canadian registered vessels with Canadian crews because the final destination would be a Canadian port. These vessels would be designed to CAC3 ice class standards or equivalent. VBNC proposes to ship the copper concentrates to undetermined locations in vessels acquired on the spot market, which might be somewhat larger.

VBNC also plans to back-haul most required bulk supplies on the concentrate vessels. Fuel would be transported in special tanks in the transport vessels, with a maximum return cargo of 5,000 tonnes. VBNC has committed not to transport fuel during shipping in landfast ice. At least 20 voyages would be required to deliver annual fuel requirements during peak operations. It is possible that, with the exception of winter shipping, every return voyage would include fuel delivery. Other bulk supplies would be back-hauled in specially designed containers to allow for rapid and safe unloading at Edward's Cove.

Public concern about the shipping regime ran high, both in the nearest communities and in communities further along the coast. Many presenters considered the shipping routes, and particularly shipping in landfast ice, to be an extension of the Project footprint to a point

beyond the Hens and Chickens. The following issues caused the most concern:

- disruption of travel routes caused by shipping through landfast ice, including dangers to ice users created by both the track itself and new cracks created in unpredictable places radiating from or even distant from the track, resulting from the action of winds and currents on the adjacent ice;
- disturbance of marine mammals, particularly whelping seals, caused by both the noise and the icebreaking action of the transport vessels;
- potential oil and concentrate spills along the shipping route;
- disturbance of breeding birds and marine mammals within the Landscape Region by ship traffic during the open water period;
- ecological impacts on marine life caused by chronic spills and port activity in Edward's Cove and the nearby portions of Anaktalak Bay;
- disruption of harvesting; and
- interference with offshore fisheries or with prolific bird breeding areas, such as the Gannet Islands off Cartwright, caused by shipping effects extending to the pack ice and southward along the coast, depending on the shipping route chosen to the final concentrate destination.

In addition, through the *Oceans Act* and land claims negotiations, the Labrador Inuit Association (LIA) wishes to pursue a marine management plan for the areas to be affected by shipping. It would protect the marine environment and Inuit harvesting rights and management interests. LIA stated that, if shipping proceeded before these negotiations were finalized, the

marine management plan, land claims negotiations and harvesting rights to marine resources would be prejudiced.

This chapter discusses most of these concerns, although other potential shipping effects are dealt with in more detail in Chapter 11, Marine Mammals, and Chapter 13, Birds.

10.1 REGULATORY REGIME

The international nature of shipping, and the many treaties and conventions to which Canada is a signatory, complicate the regulation of shipping. Essentially, Transport Canada regulates, inspects and enforces vessel, equipment and crew procedures under the *Canada Shipping Act* and related acts and codes. Under the *Oceans Act*, the Canadian Coast Guard (CCG), a branch of the Department of Fisheries and Oceans (DFO), provides and maintains navigational aids that support commercial shipping and recreational boating, enforces many of the regulations on water and provides icebreaking services. Also under the *Oceans Act*, the Canadian Hydrographic Service is responsible for "measuring and describing the physical features of Canada's navigable waters and their marginal land areas and making this information available in the most suitable form for use by navigators." Finally, under the *Pilotage Act*, the Atlantic Pilotage Authority provides qualified navigators to support vessels entering harbours, where this support is deemed necessary.

Years ago, Canada recognized both the unique nature of its large expanse of Arctic waters and the importance of exercising jurisdiction over it. The *Arctic Waters Pollution Prevention Act* includes special rules for shipping in waters north of 60° latitude. While this Act does not restrict access, it controls the ice capability of vessels that enter the area and when they may do so. Initially, the Act controlled access based solely on the season. However, ships can now survey ice conditions well in advance of passage. So a new regulatory approach under the Arctic

Ice Regime Shipping System (AIRSS) bases the right of access on the percentage of ice cover a ship will encounter. In addition, the Act sets a zero discharge limit for oily wastes instead of the 15 parts per million allowed elsewhere. The application of the *Arctic Waters Pollution Protection Act* provisions to northern Labrador is an outstanding issue between the Government of Canada and LIA.

LIA, CCG and Transport Canada all expressed concern that shipping conditions on the Labrador coast are as severe as those "north of 60" but are not as closely regulated. In fact, the Panel notes that it could be argued that the large expanses of landfast ice around the many offshore islands, the dynamic and rapidly moving pack ice driven by the Labrador Current, and the more variable weather conditions might make this area more dangerous to shipping. Transport Canada recommended that AIRSS should be applied to this area. VBNC replied that the blanket implementation of this system would not be beneficial, because it would affect other users of the area, such as coastal supply vessels, fuel delivery vessels and the vessels shipping dimension stone from Ten Mile Bay. The company agreed to implement the applicable aspects of the system in its shipping management plan.

The Panel agrees with VBNC's approach. In fact, AIRSS is apparently largely voluntary and a legislated application would likely take considerable time to implement. The nickel-copper-cobalt concentrates would be shipped in Canadian registered ships with Canadian crews as required under the *Coastal Trading Act*. To meet the requirements of the extended shipping season, they would be constructed to meet the highest standards required under AIRSS, and VBNC has committed to providing them with the most up-to-date navigational aids. The Panel believes that additional controls are required to ensure "ships of opportunity" contracted on the spot market that enter hazardous Canadian waters to transport copper concentrates do so

in a condition that ensures safe passage. A well-designed marine management plan would ensure that such vessels meet required construction and navigational standards.

Recommendation 31

The Panel recommends that vessels built or contracted by VBNC to ship nickel-copper-cobalt concentrates be designed or tested for equivalency to CAC3 standards to ensure such vessels can travel safely through the worst potential ice conditions.

Recommendation 32

The Panel recommends that VBNC incorporate Arctic Ice Regime Shipping System procedures into the Marine Transportation Management Plan to ensure the safe passage of both dedicated and contracted concentrate vessels. VBNC should implement these procedures in consultation with the regulators and with the LIA as part of a bilateral shipping agreement (see Recommendation 97).

10.2 WINTER SHIPPING

10.2.1 VBNC's Proposal

VBNC has stated that, while it would prefer year-round shipping, it would adopt an "extended shipping season" because of the concerns of local residents. The basis of that plan is to stop shipping from the time the winter freeze-up begins until the ice reaches a thickness of 20 cm, allowing the landfast ice to stabilize before icebreaking begins. An ice corridor of approximately three beam widths of the concentrate carrier would then be established in which the nine return-trip passages would take place. The Environmental Impact Statement (EIS) stated that it would take a matter of hours for the corridor to refreeze

sufficiently that a snow machine could cross safely. In addition, by using backwash, the ice-breaking vessel could create ice bridges across the track, a procedure that the MV Arctic uses at Nanisivik and Raglan when entering through landfast ice.

The nine passages would take place between January and March. During April and May, shipping would again cease because of the potential whelping of ringed seals and because usage peaks during this time as days become longer, weather moderates, and travel for hunting and other purposes increases.

VBNC anticipates that the concentrate carrier would need icebreaker support when travelling in pack ice, but not in landfast ice. The icebreaker would likely wait until the concentrate carrier loaded and returned through the ice track. Transit time from the edge of the landfast ice to Edward's Cove is estimated at 12 hours and loading time at approximately 36 hours.

CCG expressed concern that resources might not be available to meet this requirement. A CCG icebreaker would need 1.5 to 2 days to respond to a request for assistance at Hens and Chickens and it could ill afford the waiting time. Some participants suggested that this service could be provided on a cost-recovery basis and that private icebreaking services might be available.

10.2.2 Safety of Ice Users

Very few issues raised more concern than VBNC's proposal to ship during the winter through landfast ice. For Nain residents, this ice provides transportation routes for hunting, fishing, gathering wood, getting access to cabins and visiting Inuit communities to the south. While concern was greatest in Nain, residents of Utshimassits and coastal communities as far south as Cartwright indicated that they have historically used the landfast ice to access inland caribou hunting areas as far north as Nain.

Concerns focused chiefly on the dangers to ice users caused by winter shipping. In Nain,

presenters described their experiences during a period when icebreakers extended the shipping season to bring supplies to the town. In Rigolet, participants discussed an icebreaker's trial voyage into Lake Melville and the way that disrupted traditional travel routes and made travelling on sea ice unpredictable. The Panel notes that, in those cases, the icebreakers were opening passage for other vessels, so the experience with the concentrate ships might be somewhat different.

The following potential dangers were discussed.

- Because of local conditions that could lead to milder temperatures during winter thaws and fast tides among the islands, the ice might not refreeze as fast as predicted and it might take up to two days to be safe. VBNC conceded that variable weather could make January the most adverse time for ice refreezing during the proposed shipping season.
- The icebreaker would cross large pressure cracks, which could loosen large pans of sea ice. Cracks from the ice track could extend long distances to reach land.
- Icebreaking could make ice by the shore more dangerous and the closing of the track could create open water at the shoreline, particularly around the narrows at Paul's Island, or around natural cracks and rattles.

VBNC suggested mitigation measures to overcome the safety problems. It committed to informing all residents of the communities, by radio or personal visit, when a ship was about to enter the ice corridor. In response to concerns that hunters might be out on the land for two or three days and not be aware that the icebreaker had gone through, VBNC stated that people on snow machines would patrol the track and mark the track and the route to the snow bridges. These markers would only be removed when the route was safe again.

In response to concerns that hunters might not see these markers or the track, especially in stormy conditions, VBNC stated that adequate flexibility would be built into the schedule to allow vessels to wait outside the ice until it is considered safe to enter. During the hearings in Nain, VBNC also promised that it would not proceed with winter shipping if such shipping could not be done safely.

10.2.3 Requirement for Winter Shipping

LIA informed the Panel that it is not convinced that winter shipping is required. It questioned whether the main issue was truly technical problems associated with concentrate storage, as VBNC stated, or whether economic issues were involved. VBNC outlined the economic implications of increased storage time, including financial implications of delays in processing the concentrates, capital costs of increased storage facilities, and additional costs for containers and storage facilities for operational supplies.

During the hearings, the Panel requested additional information on the problems of concentrate storage. VBNC's response included the following points.

- Concentrates would oxidize during storage. During laboratory tests, concentrate piles underwent complete oxidation in two weeks. It is difficult to scale the results of this test up to a large storage pile in a storage shed, as oxygen might not be as readily available in the core of the pile. The resulting oxidation would form a cemented mass, which would cause concentrate loading problems.
- Concentrates could also become compacted during storage. Residual calcium carbonate, used to control pH during concentration, could react with the concentrate; the resulting gypsum (calcium sulphate) would cause compaction.

VBNC stated that, although it does not fully understand what would happen to the

concentrates in storage, it will commit to solving any problems caused during storage of up to two months. When asked why it decided to maintain a 5-percent moisture content instead of drying the concentrate, as is done at Raglan, VBNC stated that the concentrate characteristics favoured that approach. The Panel notes that the process at Raglan has also had problems. The first incident occurred when rapid oxidation caused handling problems, and the second involved a concentrate spill when a pipe was broken during loading and dry material spilled from the pipe. Maintaining higher concentrate moisture would prevent both types of events.

VBNC made the following additional commitments regarding winter shipping.

- The winter shipping schedule would not be affected by concentrate destination, as additional nickel-copper-cobalt concentrate carriers would be provided to maintain the schedule.
- There are no plans for winter shipping during construction, even if project approval comes in winter. Only in emergency situations, such as a major equipment failure, would VBNC need to ship during winter, and then only if the company had worked out a protocol with LIA and responsible authorities.

10.2.4 Approval of Winter Shipping

The Panel notes that VBNC does not require regulatory approval to ship in winter. Concentrates are now shipped from Raglan during the winter. The first such trip occurred in February and March 1998, and additional voyages are planned. Falconbridge plans to suspend shipping during seal whelping or hunting periods, which it will determine in consultation with local Aboriginal groups.

LIA insisted that no winter shipping should take place without its approval. As an element of impact and benefit agreements (IBAs), LIA has pursued negotiations with VBNC to set up a framework process for reaching an agreement-

protocol on shipping (see Chapter 17). The agreement would determine whether winter shipping would occur and under what conditions. LIA stated that a shipping agreement is the only acceptable option for addressing Inuit opposition to winter shipping. During hearings, VBNC and LIA both indicated that such an agreement could be reached outside of an IBA. Inuit need trust, time and confidence in the safety of winter shipping. Some participants suggested that, as a first step, VBNC should take LIA representatives to observe the MV Arctic travelling in ice to Raglan to load concentrates. This would give the LIA representatives more knowledge of the behaviour of ice tracks and ice bridges.

CONCLUSIONS AND RECOMMENDATIONS

The Panel recognizes the importance of land-fast ice to the Inuit, who use it for traditional activities, and their concerns about the potential interference and dangers associated with winter shipping. VBNC has stated that it needs the flexibility associated with an extended shipping season to properly plan a viable and economical mining operation, especially during the underground phase.

First, the Panel realizes that, until the operation actually begins, VBNC cannot accurately predict the behaviour of concentrate in storage. Because of its commitment not to ship in April and May, however, it has assumed that it can solve any problems associated with storage of up to two months. Therefore, if winter shipping did not take place, the storage facility would be empty at the end of the operating period, roughly by the end of December, and a shutdown would take place until the beginning of April. The storage area would fill gradually in April and May, until the first concentrate vessels arrived.

VBNC has stated that, during the start-up period of approximately two to three years, the mill would produce at a rate "equivalent" to six months of operation. While production may extend beyond six months at a rate somewhat

below mill capacity, there is little likelihood that more than nine months would be required and a shutdown would be possible. Although the Panel has previously expressed concerns about this level of production for such a short period, VBNC plans to produce 20,000 tonnes per day (tpd) for an equivalent nine-month period for the remaining life of the Ovoid. If all goes well and this can be done in nine months, a shutdown would still be possible. However, operating problems or the introduction of lower grade material from the underground may require VBNC to extend that period. The shipping requirement may be somewhat less than nine voyages, however. Based on present plans for the underground, the mill would need to operate year round and winter shipping would be required if VBNC hasn't solved storage problems.

In considering the economic justification for winter shipping, the Panel notes that the delay in cash flow stemming from delaying the supply of concentrates would be most significant early in the life of the operation. The additional cost of storing concentrate and operating supplies would be constrained mainly by the increase in production during the four years the Ovoid runs at maximum production.

Using a precautionary approach, however, the Panel is not prepared to recommend that winter shipping never occur, because there is still time to study concentrate behaviour and the feasibility of winter shipping. VBNC does not plan to begin winter shipping until at least four years after the Project begins, and winter shipping might not be essential to the operation until sometime after that. The Panel concludes that this period would give VBNC time to define the problems and develop solutions that would benefit all stakeholders.

Recommendation 33

The Panel recommends that VBNC implement a program, in conjunction

with LIA and regulators, to explore the requirement for and viability of winter shipping through landfast ice, which should include the following:

- **additional research into concentrate behaviour and measures to lengthen storage time as operating volumes of concentrate become available;**
- **additional study of the behaviour of ship tracks in ice, based on experience from the Raglan operation; and**
- **trial voyages by concentrate carriers during initial operating years, under differing winter conditions, to examine the actual behaviour of landfast ice and to assess the safety of such an operation.**

Recommendation 34

The Panel recommends that VBNC undertake further modelling studies of the performance limitations of candidate vessels for navigating in ice, and further evaluate their ice navigation performance limitations, including shaft horsepower, hull strengthening, ice-ingestion hazards and ability to operate in ballast condition close to load displacement draft.

Recommendation 35

The Panel recommends that VBNC incorporate the following elements into the Marine Transportation Management Plan to ensure the safety of vessels while shipping in landfast or pack ice:

- **establish a dedicated coordination centre for all shipping to and from**

the Project area and for all phases of the project;

- **review and adjust shipping plans before the ice season starts to reflect the availability of icebreaker resources and ice conditions;**
- **before allowing ships to enter pack ice, ensure that they have sufficient strength and power to operate in ice, that crews are competent in ice and that icebreaker support is readily available, so that such ships are not beset in ice and forced into an uncharted area;**
- **provide an ice information system that extends to the limits of pack ice along the route planned for the vessel; and**
- **establish protocols to ensure that the icebreaker commander and bulk carrier master reach consensus about procedures to be adhered to during escort, before the ship enters the ice.**

10.3 SHIP ROUTING CONSIDERATIONS

VBNC indicated that the key factors affecting the choice of a shipping route include the availability of hydrographic information, the need for a route that does not require demanding route changes or passage near dangerous shoals, and the location of important ecological sites, such as seal whelping locations or bird breeding colonies. The Panel notes that all three of these factors have certainly imposed severe constraints on the route to Edward's Cove.

10.3.1 Hydrographic Information

The proposed shipping route is shown on page 84. The route from the Hens and Chickens to the vicinity of Whale Island is based largely on traditional routing to Nain

and the availability of hydrographic information for the area. The Panel notes that the level of hydrographic information available for the Labrador coast can at best be described as grossly inadequate. As outlined by DFO, of the 49 charts serving inshore Labrador, 18 are based on British Admiralty and French sources from before the early 1900s, 24 on US sources from the 1940s and 1950s, and 5 on German sources.

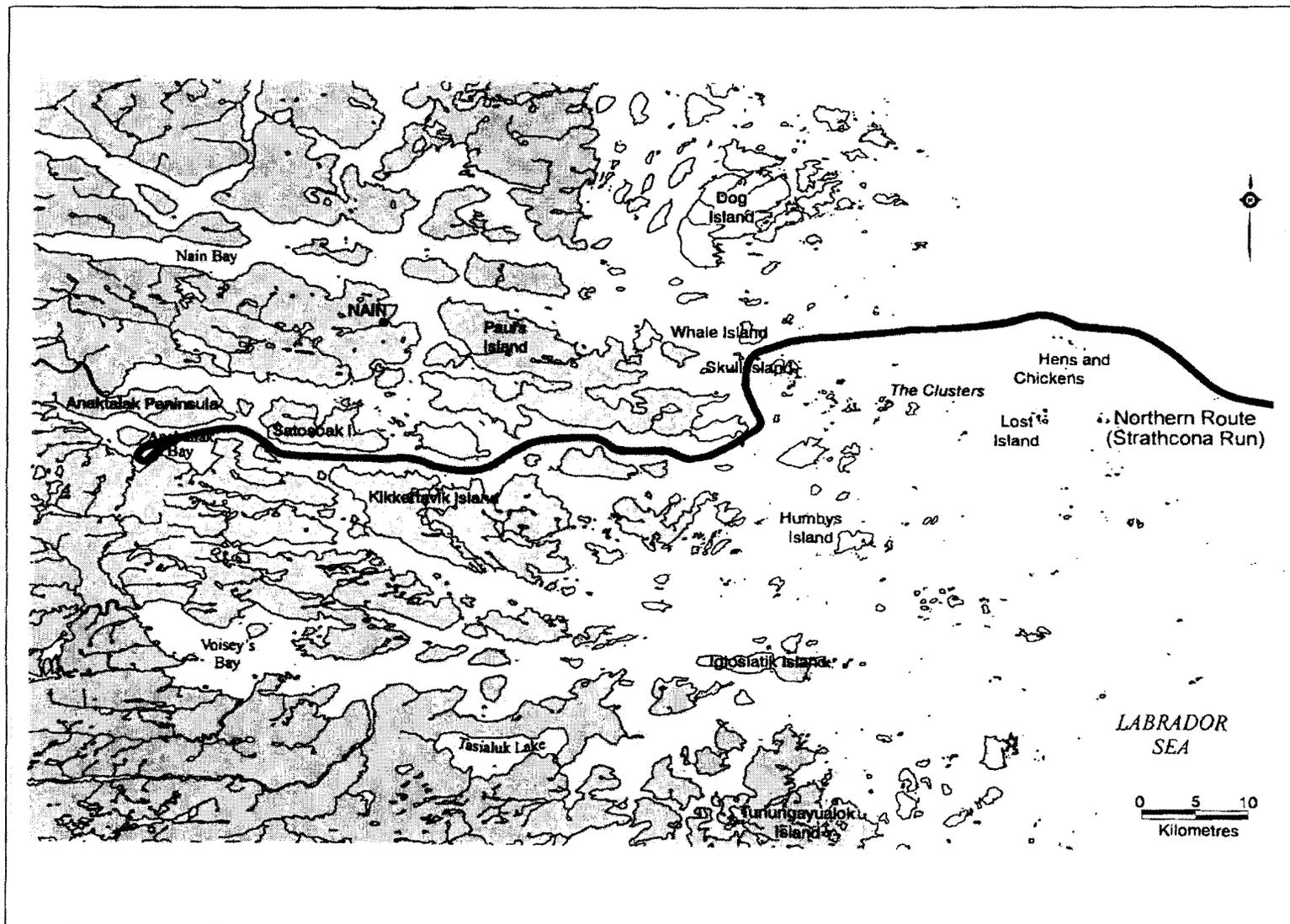
To overcome that problem along the shipping route, VBNC contracted for independent hydrographic surveys and, in conjunction with the Canadian Hydrographic Service (CHS), charts are available for the proposed route to Edward's Cove. CHS recommends enhancing the source data used to compile these charts (5051 and 5052) to ensure that they meet modern hydrographic survey standards and the draught requirements for vessels envisioned for the Project. While there are no known significant problems with these charts at present, they cannot be deemed problem free until the recommended enhancements are completed. VBNC agrees that this would be done.

There are, however, considerable "white spaces" along the route where no hydrographic surveys are available. CHS has recommended that additional hydrographic surveys of these neighbouring areas be undertaken in the interests of ship safety, environmental response, search and rescue operations, and icebreaker operations. VBNC agrees but considers charting to be a CHS responsibility.

10.3.2 Alternate Routes

Environment Canada and others stated that VBNC should consider alternatives to the eastern portion of the proposed route. The route from Whale Island to the south of Paul's Island necessitates several course alterations and interacts with important hunting routes from Nain to the Sina. No route completely avoids important ecological sites or hunting routes, but alternate routes allow for choices based on

PROPOSED SHIPPING ROUTE



REPORT ON THE PROPOSED VOISEY'S BAY MINE AND MILL PROJECT

weather and on changing marine mammal or bird concentrations, and ensure that disturbances are not concentrated at any particular site.

Again, alternate routes raise charting considerations. VBNC stated that it was considering an alternate, more direct route but that only preliminary hydrographic work has been carried out to assess such a route.

10.3.3 Pilotage and Navigation

The proposed shipping route into Edward's Cove in some locations is narrow and several turns have to be negotiated. Transport Canada evaluated the route and concluded that it would be acceptable only if modern navigational aids were in place. It was also concerned that a ship beset in pack ice could be carried into rocks, shoals and small islands. Transport Canada said that personnel with local knowledge of the area should be available to assist with transit to Edward's Cove. VBNC has stated that it would include local advisors on the marine management team.

The Atlantic Pilotage Authority would determine whether the shipping corridor is a compulsory or non-compulsory pilotage area once VBNC provides definitive information on the actual vessels selected. Such determinations are based entirely on ship safety criteria. The Panel understands that the master of a Canadian registered vessel using a route regularly can be authorized as a pilot. For vessels chartered on the spot market, the Pilotage Authority would provide a pilot on request.

10.3.4 Communications/Electronic Navigational Aids

The route assessment carried out by Transport Canada placed considerable emphasis on navigational aids to ensure vessel safety. CCG has provided a plan of navigational aids that must be in place before concentrate shipping starts and has recommended that VBNC and CCG negotiate the provision of

those aids. VBNC stated that a single user should not have to provide the navigational aids, and that CCG is responsible for ensuring safe navigation.

CCG indicated that local, land-based navigational aids should be available to supplement modern electronic navigational devices. CCG recommended that all vessels possess an electronic charting display information system (ECDIS) and VBNC agreed. CCG also recommended the use of a differential global positioning system and said the system being established in Rigolet should provide adequate coverage for the Project area. Changes to domestic shipping regulations include the mandatory introduction of the Global Maritime Distress and Safety System on February 1, 1999.

CONCLUSIONS AND RECOMMENDATIONS

The Panel concludes that, while VBNC, Transport Canada and CCG have all stated the opinion that vessels of the proposed size can safely travel the route to Edward's Cove, strict safety devices and precautions must be followed to prevent accidental events. Adequate modern hydrographic charts would be one important factor. It would also be critical to provide modern electronic and fixed navigational aids and to ensure that all candidate vessels can use these aids. Local knowledge should be incorporated into approach planning and, in the case of chartered spot market vessels, pilots should be available for the trip.

There is debate as to who should pay for improved charts and navigational aids and for required maintenance. The Panel feels strongly that, given the inadequate level of marine services provided to date to the Labrador coast, Canada should bear a significant share of these costs. This is an area that could see other economic development, particularly increased shipping in conjunction with ecotourism and development of a national park. VBNC should be required to provide resources for infrastructure dealing

directly with final approaches into Anaktalak Bay and Edward's Cove. The Panel suggests that the federal government consider developing cost-sharing policies based on the principle that, the closer the approach comes to serving a single client, the higher the proportion of the costs assumed by the client should be.

Recommendation 36

The Panel recommends that Canadian Hydrographic Service survey additional areas adjoining the proposed route in the interests of ship safety, environmental response, search and rescue operations, and icebreaker operations.

Recommendation 37

The Panel recommends that VBNC, in consultation with DFO and LIA, review one or more alternate shipping route(s) into Anaktalak Bay, and that hydrographic surveys and subsequent charting of these route(s) to modern Canadian Hydrographic Service hydrographic standards be carried out within the next three years.

Recommendation 38

The Panel recommends that the Atlantic Pilotage Authority declare Edward's Cove a compulsory pilotage area to ensure that non-Canadian vessels chartered on the spot market are required to carry a pilot with local knowledge.

Recommendation 39

The Panel recommends that, before shipping begins, VBNC install the best available electronic and fixed navigational aids, including a fixed tide gauge, to ensure precise vessel

locating along the shipping route.

10.4 CHRONIC SPILLS AND ACCIDENTAL EVENTS

10.4.1 Ballast Water

Presenters expressed concerns about the management of ballast water and the release of such water during loading operations in Edward's Cove.

In the EIS, VBNC identified the need for a ballast water management program to reduce the risk of introducing non-indigenous species into Anaktalak Bay and committed to developing such a program as part of its environmental management system. DFO concurred with the need for such a program. It listed several mitigative options, such as treatment before taking on or discharging ballast water, and mid-ocean exchanges. DFO indicated that the program should address the varying risks associated with different intake locations and with marine safety issues. DFO does not currently regulate ballast water, although ballast water has been identified as a priority concern under the new *Oceans Act*. Some ports in Canada have found other ways to enforce ballast water controls.

10.4.2 Cargo Loading Controls

Participants were also concerned about the safety of the concentrate cargoes. It is important that the moisture content of fine cargoes such as the concentrate be closely controlled, as such cargoes can liquefy and cause structural damage or stability problems for the ship. Moisture content must be tested to ensure it is within the Transportable Moisture Limit and cargoes above this limit must be carried in specially built ships. The onus is on the shipper to carry out testing but it is the responsibility of the port warden to ensure the safety of the cargo. While a port warden is not mandatory for domestic cargoes, the Panel understands that Canadian masters are authorized to act as port wardens in those situations. Problems with concentrate oxidation

should become better understood over time but, again, the Panel understands that concentrate carriers have nitrogen flood systems to prevent on-board problems.

10.4.3 Concentrate Spills

Participants were concerned about the environmental effects of concentrate spills. Such spills could occur as chronic releases during loading at Edward's Cove and or as an accidental event. The Panel notes that a major release of concentrate could only happen as a result of a catastrophic breakup of the concentrate vessel.

VBNC carried out two modelling exercises that included releases of 25,000 tonnes of concentrate, one at the dock in Edward's Cove and the other at the east end of Paul's Island. In Edward's Cove it is predicted that, because of the low currents, most of the material would sink in place and only 1 percent would be dispersed beyond the immediate area after eight weeks. For such a localized spill, a large portion of the material would presumably be recovered but smothering and long-term contamination of local organisms would occur.

For the spill at the end of Paul's Island, the model included a bottom current of 0.25 m/s. It is predicted that the coarse fraction (45 percent of the material) would remain within 30 km of the spill but that the finer fraction would be dispersed beyond that. DFO argued that, given the dynamic nature of the marine environment along the shipping route, the model used overly simplistic assumptions, particularly for the Paul's Island scenario.

DFO was also concerned that metal concentrations could persist at high levels for extended periods, causing toxicity effects that would be worse than the physical smothering. Elevated toxic concentrations in the spill area would have large-scale impact if distributed widely in a high-energy environment, and contaminated sediments may also influence colonization and recolonization of the habitat. DFO suggested

that this could lead to effects greater than those indicated in the EIS. Experience with the cleanup of contaminated dredge spoils indicates that recovery processes frequently liberate even greater levels of contaminants into the surrounding environment.

DFO recommended that concentrate spill modelling be extended to evaluate the effects of spills in other areas along the shipping route where physical oceanographic parameters would cause more widespread distribution of the concentrate spilled. The effects of such scenarios on marine organisms in the area should be considered.

VBNC placed considerable emphasis on concentrate spill prevention, environmental protection, engineering design and inspection, and operational training and practice.

The Panel concludes that chronic spilling of concentrate in Edward's Cove is the more likely problem. This could be controlled only through the design of the loading system and through strict dust control. The concentrates would be stored at 5-percent moisture but drying during concentrate oxidation would occur. The Panel notes that the type of "runaway" spill experienced recently at Raglan is not likely to occur, but training and care during loading would be essential.

10.4.4 Oil Spills

All ships and docks require an approved Oil Pollution Emergency Plan (OPEP) in accordance with the regulations of the *Canada Shipping Act*, as a contingency measure in case an incident occurs. CCG has approved the current temporary oil handling facility at Edward's Cove, but it would have to recertify the facility if the facility becomes permanent. The plan for vessels, known as the Shipboard Oil Pollution Emergency Plan (SOPEP), is a ship-specific document and must also be certified by CCG. Owners of ships and docks must also have a contract with an approved response organization that would respond to a major incident. For eastern Canada, including

Labrador, this organization is the Eastern Canada Response Corporation (ECRC), based in St. John's. Vessels operating in Canadian waters are not required to carry pollution containment and clean-up equipment on board.

CCG maintains a 10,000-tonne spill response depot independently of ECRC in St. John's, for both inshore and offshore response. It also has a small depot at Goose Bay with a 150-tonne capacity. The CCG response centre becomes involved only when a spill source is unknown or when the contracted response organization does not respond effectively. If a polluter is unwilling or unable to respond, CCG will manage the clean-up and seek to recover costs.

VBNC contends that, with the emphasis it has placed on safety measures and emergency preparedness, the risk of marine accidents would be low. VBNC characterized the probability of a major fuel oil release resulting from a ship being damaged in ice or open water as very low, although it did not assign a numerical probability to that event. The estimated probability of a small loading/discharge spill of less than four tonnes is one in 29 years.

VBNC presented modelling results for what it characterized as credible worst case spill events for a location at Edward's Cove and another east of Paul's Island. In both cases, VBNC modelled a 400-tonne oil spill in open water in July and a 200-tonne oil spill in fast ice in March. It also considered the behaviour of a 200-tonne oil spill in pack ice around Whale Island.

An open water spill in Edward's Cove would be trapped within the confines of Anaktalak Bay. Its rate of spread east and west would depend on tidal conditions at the time of the spill. VBNC estimates that there is only a 1-percent probability that it would escape to the outer part of Anaktalak Bay within five days. Modelling of the same size of spill off the southeast coast of Paul's Island indicated that there was only a 5-percent probability of it extending more than 8 km east-

west along the southeast shore after five days, and a 1-percent probability that it would extend west into Anaktalak Bay, or east or southeast to a distance of perhaps 25 km, over the same time period.

In open water, 10 to 15 percent of the spilled diesel would soon evaporate. In stormy conditions outside the islands, turbulence would break the slick into particles, which would be entrained in the water column. In more protected waters, much of the spill would be contained within channels and between islands, where the possibility of entrainment in the water column would be less likely to happen.

Spills at the same locations in March in landfast ice would be more confined, as the fuel released would behave differently under ice and would not be transported by wind. A scenario for a 200-tonne oil spill in pack ice near Whale Island indicated that the fuel would solidify and be ground into particles that would become dispersed and gradually incorporated into the ice and carried southwards with it. After three weeks, when it might be near Belle Isle in decaying pack ice, the remaining weathered oil would be entirely dispersed in the water column.

VBNC proposes the following mitigation measures.

As part of VBNC's Marine Management Plan, ships would have a quality management system consisting of a comprehensive set of operating manuals, based on the International Safety Management Code, that would describe routine and emergency practices and procedures. Procedures manuals guide both ship and shore personnel in safe operating practices and planned response capability. Required procedures include the SOPEP referred to above.

The ECRC is certified for a 10,000-tonne response capability, with the nearest depot in St. John's rated at 2500 tonnes. Additional equipment can be brought in from other east coast locations, as required. The *Canada Shipping Act* allows response organizations a maximum

of 72 hours to respond to outlying clients, and it was suggested at hearings that response times could be less than 12 hours under favourable conditions. VBNC stated that it intends that all shipping contracts include a condition that would allow the company to activate emergency response if a ship operator failed to do so.

VBNC expects to have 800 m of boom on shore at Edward's Cove for early response, with more available from ECRC. Booms could be deployed in open water situations to protect certain sensitive areas. VBNC indicated that the information collected from 780 km of shoreline mapping adjacent to the Project site could be used to support contingency planning. Chemical dispersants are not considered effective, so they would probably not be used. VBNC characterizes residual effects of an accidental oil spill in some cases as moderate (significant).

DFO asserted that the potential for oil spills is more serious than the EIS indicates, and that the oil spill modelling was limited in scope and not based on worst case scenarios. The model for Paul's Island relied on minimal current measurements, despite the dynamics and complexity of water movement and bathymetry in the area. The Edward's Cove models assumed no net currents outside the cove itself. The scenarios did not include the effects of ice movement and breakup on dispersal, and did not consider the impacts of a full 5000-tonne loss in Anaktalak Bay in open water or the impacts of a major loss in winter.

CCG advised the Panel that response planning would involve each of the parties with legal liabilities: VBNC, the shipowner, the port operator, and the response organization. For the purposes of tactical response and priority setting, response planning could include stakeholders through advisory committees. CCG maintains a database of shoreline sensitivity mapping, including wildlife and harvesting areas, for inshore protection and cleanup.

DFO recommended that

- VBNC carry out improved modelling of oil spill scenarios, taking into account sea ice as marine mammal habitat, seasonality and a more detailed consideration of the effects on marine mammals (see also Chapter 11, Marine Mammals);
- OPEPs be submitted to CCG for review once a new oil handling facility is complete;
- vessels carry a minimum amount of oil spill response equipment including boom, skimmers, sorbents and storage; and
- VBNC provide a support vessel at Edward's Cove to respond to minor incidents at the wharf or along the route, and to maintain navigational aids (CCG envisages a small work boat capable of handling inshore oil spill booms and skimmers, transporting technicians to navigational aid sites along the route, and supporting other functions normally associated with a major marine operation; the vessel would also be able to assist CCG in search and rescue operations by becoming a member of the Coast Guard Auxiliary).

LIA questioned the appropriateness of the worst case scenarios identified, in terms of both the likely quantities of spilled oil and the times and locations of such spills, and noted the lack of quantitative probability estimates for oil spills. It considered the modelling of oil spill dispersion and fate inadequate, in part because there was insufficient consideration of currents and ice. LIA also noted that VBNC did not consider the cumulative effects of hydrocarbon releases from Project-related shipping in Anaktalak Bay. LIA recommended that these deficiencies be addressed, and also that an appropriate vessel be positioned to respond to a spill within 12 hours.

VBNC characterized the 5000-tonne case as an "incredible" worst case scenario as it would involve the near-instantaneous release of the

entire cargo, whereas catastrophic spills rarely release more than 20 percent. VBNC considers that formal probability modelling of rare events is not very accurate, and would not be helpful in responding to them. It did, however, undertake to continue developing spill scenarios as part of its response planning and OPEP implementation. VBNC agreed that response equipment must be close by, but asserted that it would be better located at Edward's Cove than on a ship. It agreed to provide a work boat in Edward's Cove. CCG review of OPEPs is a regulatory requirement and VBNC agreed to it.

CONCLUSIONS AND RECOMMENDATIONS

The Panel considers that VBNC's emphasis on safety measures and emergency preparedness is the best way to minimize the risk of marine accidents. If the appropriate navigational aids, ice and weather forecasting systems, and operating and emergency procedures are in place and properly maintained, the probability of a vessel incident resulting in a concentrate or oil spill is low.

The Panel concludes that concentrate losses at the loading dock could be a problem with localized effects, if proper handling and dust control measures are not implemented. VBNC would need to monitor loading operations and to improve loading procedures if it detected problems.

Recommendation 40

The Panel recommends that VBNC integrate concentrate loading procedures and controls into the Marine Transportation Management Plan in consultation with Transport Canada. VBNC must provide the services of a port warden when required, especially when loading copper concentrate on non-Canadian vessels. VBNC should also monitor dockside concentrate handling operations, and take corrective action if it observes chronic concentrate losses.

The Panel agrees that a ballast water management program would be needed, and that compliance with it should be made an integral part of all shipping contracts. A precautionary approach would be essential because it might well be impossible to mitigate any adverse effects after a non-indigenous species had been introduced. Therefore, the objective of the program should be to ensure that no ship discharges untreated ballast water into Anaktalak Bay that originates from beyond a defined regional ecological boundary.

Recommendation 41

The Panel recommends that, before any Project-related shipping begins, VBNC be required to develop a ballast water management program in consultation with DFO. This program should give a high degree of ecological protection to marine waters near the Project. Requirements of the program should be made part of all shipping contracts, which should include a financial penalty for non-compliance.

The Panel notes that the proposed oil cargoes are certainly larger than the current level of cargoes transported on the Labrador coast. At the same time, they are also much smaller than the large tanker loads that have been involved in the most catastrophic ocean spills, and the product carried would be more easily dispersed. There is limited utility in developing formal probability estimates, but a precautionary approach suggests that response planning should assume that a significant spill would occur at some time during the life of the Project. Further modelling, incorporating various factors identified by participants, should continue as a basis for emergency response planning. The Panel considers that VBNC should develop and model worst case scenarios not only to enhance emergency planning, but also to enhance public understanding of the probability, extent and consequences of a catastrophic event.

Emergency response planning should focus on a "credible" worst case scenario. Advance planning for boom deployment, oil slick recovery and shore cleanup would require a response plan establishing priorities for protecting specific coastal locations and shoreline types (based in part on existing sensitivity mapping), and incorporating agreement on appropriate clean-up methods. This plan should be at least partially based on existing sensitivity mapping and agreements on appropriate clean-up methods. This planning should involve, not only the legally liable parties, but also potentially affected communities and economic interests. The Environmental Advisory Board (EAB) would be an appropriate framework for ongoing planning and response involving those parties.

Recommendation 42

The Panel recommends that VBNC implement its proposed safety and emergency preparedness measures with respect to oil spills.

Recommendation 43

The Panel recommends that VBNC and DFO reach agreement on a credible worst case scenario for oil spills, and that all responsible parties then base their oil spill response planning on this scenario. Response equipment should be positioned, response plans reviewed and updated, and emergency preparedness maintained and tested accordingly, throughout the shipping component of the Project. VBNC and LIA should also include response planning in their proposed bilateral shipping agreement. VBNC should continue to develop oil spill scenarios and fate modelling and should incorporate DFO and public concerns, as appropriate, in its ongoing emergency response planning.

Emergency response plans should include specific provisions for effects monitoring, and evaluation of the effectiveness of response measures, that would begin immediately if a major spill occurred. VBNC should ensure that its shippers are fully aware of and prepared to implement this requirement.

The Panel was advised that if a spill occurred under stormy conditions (i.e. waves over 3 m), containment and recovery would likely be ineffective. Emergency preparedness and rapid shore-based response capability would be the most important strategies for minimizing the effects of a spill. However, the nearest major response centre is a minimum of 12 hours away in favourable conditions, and relatively little equipment would be located on shore at Edward's Cove. If an incident occurred, it might well happen under conditions of darkness, fog or storm. Enhanced shipboard capability is therefore desirable as a first line of response, even though the potential for early containment and recovery would still be low under adverse circumstances.

Recommendation 44

The Panel recommends that VBNC require ships carrying fuel to the site to carry oil spill response equipment on board, including booms, skimmers, sorbents and storage.

Recommendation 45

The Panel recommends that VBNC provide a support vessel at Edward's Cove to respond to minor incidents, provide docking support, maintain navigational aids and serve as a first line of response to a major oil spill along the shipping route.

A comprehensive shore-based clean-up strategy and plan should be developed before shipping begins. The Panel considers that the vulnerability of Voisey's Bay to an oil spill occurring along the proposed shipping route is low. However, because of its estuaries and mudflats, where oil could remain in harmful form for a long time, it is a particularly sensitive area, and emergency planning should take this into account.

Recommendation 46

The Panel recommends that the Canadian Coast Guard, with the cooperation and assistance of VBNC, and in consultation with LIA, update and complete existing sensitivity mapping of shoreline types, critical coastal habitat, key harvesting areas and other areas of local importance, as a basis for cooperative planning of response strategies and priorities.

11 MARINE MAMMALS

VBNC focused its assessment on the marine mammals it identified as valued ecosystem components (VECs). Seals, as top predators, were considered indicators of the ecological integrity of the Landscape Region. Harp, ringed, harbour and bearded seals were selected as VECs. Harp and ringed seals are culturally valued and important as country food; they are also sold commercially. Minke whales were selected as the most common whale in the region. Beluga whales and polar bears were considered as species of special conservation status, due to the status the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has given them. The proposed shipping route lies in the range of all of these marine mammals.

The Department of Fisheries and Oceans (DFO) manages marine mammals under the *Fisheries Act*. There are no compliance monitoring requirements for the proposed Project activities as they affect marine mammals.

The provincial Forestry and Wildlife Branch manages polar bears under the *Wildlife Act*. There are no compliance monitoring requirements for the proposed Project activities as they affect polar bears.

11.1 SEALS AND WHALES

11.1.1 VBNC Assessment

VBNC conducted numerous marine mammal surveys, including spring surveys of seal whelping areas, near the shipping route and in the inner bays and islands near the Project site. Underwater noise was modelled to assess potential impacts of shipping on ringed seals.

Harp seals are abundant along the shipping route in summer but are not abundant in the Landscape Region during the period of ice cover. Only a small portion of the northwest Atlantic population is present in the region at any one time. Ringed seals, also abundant along the

shipping route, are present year round in the Landscape Region. Spring surveys indicated that ringed seals are particularly abundant in the area east of Voisey's Bay and south of the shipping route, an area thought to be an important nursery area. VBNC observed significant densities along the shipping route near the ice edge, with lower densities in the bays. Ringed seals maintain breathing holes under the fast ice and also congregate along the edge of the fast ice. Polynyas, floe edges and leads in the ice provide important habitat. During the open water season, ringed seals come into the bays to feed.

Bearded seals and harbour seals are present year round in the Landscape Region. Bearded seals are benthic feeders and occur at low densities near areas of open water and partial ice cover. Harbour seals are non-migratory fish eaters; they are thought to overwinter where currents maintain open water. Whelping occurs in coastal areas, reportedly in June.

Minke whales are migratory and are rarely present in the Landscape Region in winter. They feed inshore on fish and crustaceans. Beluga whales appear sporadically along the north coast of Labrador in spring, as far south as Makkovik, mainly near the edge of the fast ice. They are part of at least two populations, the Ungava Bay and southeast Baffin Island–Cumberland Sound populations, whose ranges VBNC selected as the beluga whale assessment area. COSEWIC has classified both beluga populations as endangered.

VBNC identified the potential effects of the Project on marine mammals as follows.

Noise

Sources of noise would include vessel traffic, aircraft and construction at the port site. VBNC modelling indicated that ringed seals can detect noise in water up to several tens of kilometres away. Seals may suffer temporary hearing loss within 100 m of a vessel travelling through ice,

and they display avoidance behaviour at 500 to 700 m. The Environmental Impact Statement (EIS) stated that the effect on whales is similar, but it did not explain why or which species are affected. However, the EIS also stated that avoidance behaviour in belugas can occur tens of kilometres away from large vessel traffic. VBNC identified two potential effects of vessel traffic on seals and whales: temporary displacement behaviour and diminished reception of signals due to masking effects. The effects of aircraft noise in water are highly localized and transitory, but startle effect and avoidance are reported at elevations below 500 m for seals on the surface of the ice or water, or on beaches. Seals and whales would likely reduce the time they spend in Edward's Cove or avoid it altogether, especially during construction. VBNC predicts that only a small proportion of any population would temporarily experience noise disturbance and that it would do so in non-critical areas.

Ice Disturbance

Experience elsewhere suggests that seals may be attracted to a ship track in ice, or avoid it. The Project could deter seals from remaining in Edward's Cove during the winter. Mortality from collisions would result only if seals had nowhere to escape. This is not likely, because seals are agile and maintain multiple holes. They could be more vulnerable during whelping, but VBNC stated that shipping would not occur then. The potential for hinge ice collapse caused by shipping is considered small, and such a collapse would affect only a small proportion of any marine mammal population.

Whales are not present in the Landscape Region in winter and winter shipping would not affect them.

Accidental Events

An oil spill is the key accidental event that could affect seals and whales. They could be exposed to a spill directly or by feeding on oiled prey.

In most cases, they could avoid a spill. Harbour seals are the most vulnerable marine mammals because they are the most likely to haul out on shorelines, which could be oiled. Ringed seals would be vulnerable during whelping, but VBNC states that shipping would not occur then. Seals and whales can tolerate ingestion of small quantities of oil because they are able to metabolize hydrocarbons, and whales' baleen functions are not impaired. Thus, although some seals and whales could come in contact with an oil spill if it occurred, the effects are not considered lethal, and only a small proportion of any population would be affected.

A concentrate spill would expose marine mammals to elevated levels of nickel and copper in prey species, but VBNC predicts that marine mammals' ability to regulate their levels of those metals would prevent deleterious effects.

Based on contaminant modelling (see Chapter 7), VBNC predicts that bioaccumulation of metals in marine mammals would not cause an adverse effect.

VBNC has proposed the following mitigation measures:

- icebreaking mitigation measures and a restricted shipping schedule;
- traffic control and navigational aids in the shipping lane to ensure safe passage, which would reduce the risk of accidental events affecting marine mammals;
- surveys to detect the presence of marine mammals, conducted before construction blasting at the port site;
- training of site personnel to manage encounters so as to reduce disturbances; and
- oil spill contingency plans.

VBNC predicted that construction, operation and accidental effects would have minor residual effects on seals and whales, and that decommissioning would have negligible effects.

Residual effects on beluga whales were predicted to be negligible during all phases of the Project.

11.1.2 Government and Public Concerns

DFO expressed concerns about VBNC's choice of scale and method, along with specific concerns about the validity of its assessment and predictions. The Department suggested that the assessment area was not large enough as it did not include the pack ice area beyond the outer islands, which is important habitat for some species, including bearded seals. It questioned whether population-level effects were the appropriate criterion for impact significance, noting that, while it agreed with the EIS significance ratings at that level, significant problems such as localized depletion or avoidance could also occur on a regional scale.

DFO asserted that not enough information exists about marine mammals and their requirements to establish a benchmark or baseline, and therefore uncertainty is a significant problem, which VBNC did not sufficiently acknowledge in making its predictions. Baseline deficiencies include lack of information on population definition, abundance, structure, dynamics and critical life history requirements, especially for the resident ringed seal population, which is potentially the most vulnerable to disturbance by the Project. Despite Project-specific predictions of insignificant impact, DFO is concerned that increased industrial development in the region in the long run could cause adverse effects, and that the environmental assessment process does not appear to provide adequate means of addressing this problem.

DFO acknowledged that VBNC had done considerable survey research, but asserted that it did not interpret its results in context. It stated that there was inadequate consideration of potential productivity "hot spots," such as the landfast ice edge and the pack ice/open water edge, and of the implications of shipping for the marine food chain and marine mammal habitat.

With respect to noise, DFO noted that VBNC had only modelled sound for an ore carrier in fast ice, not for the cavitation effects of an icebreaker and not for shipping in pack ice. DFO did not question the appropriateness or results of the modelling, but it noted that there are many uncertainties about how marine mammals respond to underwater noise from vessel traffic. This uncertainty applies particularly to the relation between short-term behavioural response and long-term well-being, the extent of adjustment and habituation, and the functions of vocalization and, hence, the effects of masking. DFO suggested that disturbance studies are needed to examine the long-term effects of noise, and to establish whether startle effects and temporary displacement disrupt feeding and breeding behaviour. DFO also suggested that there is a particular need to assess the effects of noise in Edward's Cove.

DFO suggested that an oil spill could have more serious effects at the regional level on marine mammals and their habitat than VBNC suggests, although it did not provide any detailed suggestions as to why this might be so. It also noted that VBNC's modelling of concentrate spills did not represent the places where the greatest dispersion of concentrates might occur, and hence did not constitute a worst case scenario. DFO also stated that VBNC had not adequately considered the toxicological effects of recurrent but non-catastrophic events.

DFO emphasized the need for VBNC to commit to mitigative shipping strategies, including flexibility of shipping schedules to accommodate year-to-year variability in ice conditions related to marine mammal requirements. DFO noted the need for a monitoring program for marine mammals that is well planned, cost effective and driven by hypotheses. Specifically, the department recommended that further studies be done to

- provide a broad overview of subarctic marine ecosystem dynamics, and critical

life history requirements of marine mammals, on the northern Labrador coast;

- verify noise predictions;
- determine shipping impacts on the physical integrity of landfast ice habitat;
- evaluate the significance of the landfast ice edge and the pack ice as marine mammal feeding areas;
- improve oil spill modelling, with specific emphasis on the effects of VBNC's pack ice spill scenario on marine mammals; and
- determine the cumulative effects of shipping on marine mammals.

Inuit experts, on behalf of the Labrador Inuit Association (LIA), questioned VBNC's understanding of the dynamics and complexity of the marine environment. They noted that all of Anaktalak Bay is a habitat for ringed, harp, bearded, harbour and grey seals. In general, they said that bearded seals are more common in the area than the EIS suggested. During the open water period, minke, beluga and humpback whales, along with narwhals, use Anaktalak Bay, and LIA stated that the EIS did not sufficiently recognize this fact. Ringed seals make increased use of Anaktalak Bay in winter on occasions when the sea is close to shore, and LIA experts raised concerns that discharging warmer effluent water there would reduce ice cover. While stating that shipping would adversely affect the fast ice environment, they suggested that the drift and saltation of dust particles would also cause the ice to disintegrate earlier in the spring, by increasing absorption of solar radiation. They stated that the seal whelping period occurs from late February to early April, so the proposed shipping schedule could cause mothers to abandon their young, and otherwise increase the risk of collision and mortality. This is a particular concern off the south and east coasts of Paul's Island, which are core seal hunting areas in spring because they are easy to reach from Nain.

LIA stated that a cooperative understanding of these matters was needed to develop appropriate and effective mitigation measures.

In response, VBNC noted that it assessed marine mammal populations at the Landscape Region level, not over their entire range. Most ranges are much larger than the Landscape Region, and no populations are largely confined to the Landscape Region, or to the Project's likely zones of influence, at any one time. Consequently, VBNC believes its predictions err on the side of caution. These predictions also take uncertainty into account, according to Canadian Environmental Assessment Agency (CEAA) criteria.

VBNC considers that no additional research is required on pack ice impacts, as it regards this environment as outside the assessment area and believes the effects of shipping on it would be trivial.

VBNC noted that the additional noise generated by an icebreaker accompanying an ore carrier would not be significant, except during certain operations that would generate cavitation noise. VBNC stated that its noise modelling did not require further refinement and that it would be better to study the actual effects of noise on marine mammals, especially seals. It therefore supported the idea of a tightly focused study on ringed seals' response to winter shipping, and suggested this be incorporated into the monitoring framework. VBNC suggested that seals are adaptive to noise and therefore resilient, noting that they can distinguish between threatening and non-threatening noise, and that they live successfully with noises such as moving ice. VBNC suggested that no further studies at Edward's Cove were warranted, especially with regard to aircraft noise, which it regards as having trivial effects. The company also stated that it had considered the cumulative effects of shipping on marine mammals as prescribed by CEAA, and that considering further effects would not produce meaningful results.

CONCLUSIONS AND RECOMMENDATIONS

The Panel considers that the population status, life history and habitat requirements of most marine mammal species in the Landscape Region are not well understood, particularly with respect to understanding the overall significance of the assessment area to marine mammal populations. The Panel also recognizes that VBNC did considerable baseline research on marine mammals within the assessment area, which has contributed to the knowledge base.

The Panel considers that the basic regional research required to provide the necessary context for VBNC's assessment studies should not be the responsibility of an individual proponent. That is a public obligation, and DFO should receive adequate resources to do this research regularly. The Panel agrees that DFO's recommended studies would help provide context and baseline information, but considers that most of these studies are appropriately DFO's responsibility as manager of Canada's oceans and their fishery and marine mammal resources. The Panel recognizes that budgets for government environmental management agencies, including DFO, have been severely constrained in recent years. Nonetheless, if there is a public benefit to frontier resource development, then there is a public obligation to ensure that research required to ensure environmental sustainability is done in an orderly fashion. It is neither reasonable nor productive to put this burden on the first proponent in an area.

Recommendation 47

The Panel recommends that DFO fund, conduct or sponsor additional marine mammal studies that contribute to the understanding of cumulative and Project effects, and that Canada provide DFO with the resources necessary to do so. These studies should include regional research, and general studies of noise and ice effects.

LIA should be involved in the design and conduct of these studies, which should be subject to the review and recommendations of the Environmental Advisory Board.

VBNC should be responsible for monitoring effects related to Project impacts.

Winter shipping in the region is novel, and the Project would substantially increase the level of open water shipping. Winter shipping is by no means novel in other parts of the Arctic, however. No evidence was provided to the Panel that either winter or open water shipping, at the level proposed for this Project and adhering to current regulations and safety standards, has had clear or consistent adverse effects on marine mammal populations elsewhere. The Panel does not consider that this Project would significantly affect marine mammal populations, but the effects of increased shipping for several purposes over the long term could be significant. For that reason, predictions of minor or negligible impact with respect to this Project should not rule out long-term monitoring. Continuing studies and monitoring would be required, not only for adaptive management of this Project, but to better understand the possible long-term effects of increased activity.

The EIS provided sufficient material for review at the hearings, but future monitoring would require further baseline research. Fortunately, there is time to do useful studies and trials before winter shipping is proposed to begin. These should be done, and they should be provided for as part of the shipping agreement (see Recommendation 97). A cooperative approach involving the Environmental Advisory Board (EAB) would be essential.

The Panel agrees that the effects of noise on marine mammals need to be better understood. The Panel notes that not even the likely responses of marine mammals to noise have been clearly established, let alone the meaning

of those responses at the individual or population level. It has not been clearly established whether marine mammals are sufficiently resilient, through compensating behaviour or habituation, to noise at the levels that the Project would likely generate. There should be more studies, especially on long-term and population-level effects, and on whether immediate behavioural effects result in stress or disturbance affecting critical life stages. In addition, no evidence was presented to show that there could be adverse effects at the population level, or that cumulative noise effects could impair the health or function of individual animals. Noise would be temporary and occasional, and any adverse effects would occur sufficiently close to the noise source that only small numbers of the population could be affected at any time. The Panel considers that VBNC should conduct appropriate studies in the context of shipping, although it might not be necessary for the company to complete such studies before beginning shipping.

The Panel considers that winter shipping could impair the physical integrity of fast ice. It was not clearly established, however, that this would have any significant adverse effects on marine mammals. As Inuit participants noted, in the immediate area of the shipping lane, hinge ice might crush seals and seal dens might collapse, although direct collisions involving adult seals seem unlikely. However, the whelping period for ringed seals was not clearly established and further investigation is needed to prevent adverse effects. Although, in winter, only a very small proportion of the ringed seal population inhabits the proposed ship track, that track could be critical habitat for those animals at that time. The Panel notes that the shipping route traverses some parts of the ringed seal habitat to which Nain residents have the easiest access, and considers that measures to avoid these areas at certain times and to minimize the effects of vessel traffic at others would be essential (see Recommendation 39).

Recommendation 48

The Panel recommends that VBNC determine, in cooperation with LIA, ringed seal whelping times near the shipping route, before beginning winter shipping.

The Panel considers that seals and whales are likely to avoid oil spills, and notes that they can tolerate spilled oil to some extent. If lethal effects should occur, only an insignificant proportion of any population would be affected. The Panel does not see much utility in doing modelling studies or scenarios on the impact of spills on marine mammals; however, if a spill occurred, there should be provisions in place to study its effects, and the effectiveness of response measures, without delay (see Recommendation 43).

The Panel agrees that metals released to the environment as a result of Project activities would be unlikely to affect marine mammals adversely, especially as few individual animals would be present in the area long enough to be exposed at harmful levels. However, metal levels in marine mammals should be monitored as part of the larger contaminant monitoring program recommended in Chapter 7.

11.2 POLAR BEARS

11.2.1 VBNC Assessment

VBNC did not conduct any specific studies on polar bears, although it recorded incidental observations made during other exploration and scientific activities.

Polar bears on the Labrador coast are part of the Davis Strait population, whose range was used as the assessment area. VBNC stated that this population is currently estimated at 1,200, but only a small part of it is present on the Labrador coast at any one time, and generally only from March to August. Individuals drift south with the pack ice and then come ashore and travel north along the coast. Denning

has been known to occur east of Paul's Island, close to the proposed shipping route. Polar bears feed in the Landscape Region, chiefly on seals. COSEWIC has classified the species as vulnerable but considers the Davis Strait population to be stable. There have been no direct encounters between bears and humans during VBNC exploration activities.

VBNC identified the following potential effects of the Project on polar bears:

- physical alteration or loss of habitat caused by disruption of seals or seal habitat by winter shipping;
- disturbance caused by noise, Project activities and human presence (VBNC noted experience elsewhere showed both avoidance of and habituation to these effects, and the company suggested that the Project would attract animals, although they might temporarily avoid icebreaking vessels);
- an increase in encounters between humans and bears, as polar bears can be attracted to human settlement; and
- mortality of individuals due to direct contact with oil or through ingestion of oil-killed birds, fish or seals, if an oil spill were to happen at sea.

Based on contaminant modelling (Chapter 7), bioaccumulation of metals in marine mammals is not considered a potential adverse effect.

VBNC has proposed the following mitigation measures:

- implementation of an oil spill contingency plan; and
- development of a polar bear relocation plan to deal with human safety concerns or fuel spills (VBNC indicated that it was prepared to pay for this program).

VBNC predicted residual effects of oil spills would be minor (not significant) and all other effects would be negligible.

11.2.2 Public Concerns

LIA did not consider that winter shipping would have detrimental effects at the population level, but expressed concerns about the localized effects of shipping on bears and bear habitat along the shipping route. These localized effects, it suggested, could result from disruption or displacement of seals in the vicinity, from catastrophic or chronic marine oil spills, and from increased human presence (due to exploration in the Kiglapait area as well as shipping activities), which could result in problem kills. In particular, LIA observed bears would emerge from dens during the icebreaking period. Concerns about loss of harvest opportunities are addressed in Chapter 14. However, LIA also noted that, although polar bears are nominally under the jurisdiction of the provincial *Wildlife Act*, offshore jurisdiction is unclear. Perhaps more importantly, effective enforcement capacity is lacking. LIA recommended establishing a polar bear management zone in northern Labrador that would include the shipping route, and establishing measures relating to habitat protection, monitoring and compensation.

CONCLUSIONS AND RECOMMENDATIONS

The Panel observes that COSEWIC's current draft status report on polar bears indicates that the Davis Strait population estimate of 1,400 animals is outdated, is of only fair quality and suffers from a moderate degree of bias. Whether the population is actually stable is uncertain, although some indications show that it is increasing and is not detrimentally affected by current harvest levels. The Panel agrees with VBNC's prediction that Project activities, other than oil spills, would have negligible population-level effects on polar bears, if VBNC carries out its mitigation measures and adheres to the appropriate environmental protection plans.

Recommendation 49

The Panel recommends that VBNC develop contingency plans for dealing with the effects of oil spills or chronic pollution on polar bears, and for encounters between humans and bears. These should be developed in cooperation with LIA in the context of the proposed shipping agreement, and LIA should advise VBNC in a timely manner of any polar bear denning activity near the shipping route.

The Panel considers that, because human activities are increasing in the area, clear jurisdiction and effective enforcement are required to ensure conservation, especially because polar bears are a vulnerable species. In view of existing

quota limits on polar bear harvesting, the Panel recognizes that any polar bear mortality caused by Project activities would have adverse economic effects on Aboriginal harvesters.

Recommendation 50

The Panel recommends that Canada and the Province act to clarify jurisdiction over polar bears off the Labrador coast. The responsible party should enhance its enforcement capability. It should also establish an effective reporting system for problem kills, such as the system that exists in the Northwest Territories, to ensure conservation and to use as a basis for the compensation recommended in Chapter 14.

12 TERRESTRIAL ENVIRONMENT AND WILDLIFE

VBNC identified three valued ecosystem components (VECs) for the terrestrial environment, which are considered in this chapter:

- plant communities, as the basis of wildlife habitat;
- caribou, considered the most important terrestrial wildlife resource of the area, and a major part of Inuit and Innu diet; and
- black bears, because they are commonly observed and hunted, and because of their cultural and spiritual importance (VBNC characterized black bears as an umbrella species, whose abundance is an indicator of the health of other species supporting the food chain).

The potential effects of the Project on Aboriginal and recreational hunting are considered in Chapter 14.

The Forestry and Wildlife Branch of the provincial Department of Forest Resources and Agrifoods manages forest resources under the authority of the *Forestry Act*, and manages caribou and black bears under the authority of the *Wildlife Act*. The Branch is responsible for forest fire protection and suppression, and the office at Northwest River is the closest office to the Project site. Proposed Project activities are not subject to permit or compliance monitoring requirements related to their effects on plant communities or wildlife, except for revegetation conditions that may be included in the mining lease. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designates plants and animals as endangered, threatened or vulnerable; no such plants or terrestrial mammals have been reported in the assessment area.

12.1 PLANT COMMUNITIES

12.1.1 VBNC Assessment

VBNC identified an assessment area of 35,000 ha for plant communities, roughly coincident with

the Claim Block. To provide a detailed description of the plant communities and terrestrial habitat types in the Landscape Region, VBNC mapped a hierarchy of ecological land classifications, based on landforms, climate and vegetation. The primary ecological land classification identified five land regions — areas of terrain that share distinctive regional climates and dominant vegetation types — in the Landscape Region. VBNC derived information about plant communities in the assessment area by using the lowest level of land classification hierarchy, the land type, to provide the greatest level of detail. It conducted field surveys during the summers of 1995–97, and mapped plant communities using air photography.

VBNC identified 17 land types in the assessment area. About 65 percent of the area is forested (mostly spruce, fir and birch, with lichen and sphagnum), although this includes some thickets and tuckamore. About 26 percent of the area consists of rock, gravel, heath or coastal barrens. Most of the rest consists of various types of wetlands. These communities are thought to be relatively stable over long periods of time. Growing seasons are short, and growth and nutrient cycling rates are low. Fire rotation cycles are thought to be about 500 years.

VBNC identified the following potential effects of the Project on plant communities. Physical disturbance and loss would occur due to site preparation, the location of surface facilities and open pit mining during construction, operation and decommissioning. The Project as described would require clearing 753 ha, which would include inundating 25 ha at Headwater Pond and 155 ha at the North Tailings Basin. All of this clearing would occur during the initial construction phase, except for the North Tailings Basin. About 75 percent of the area to be cleared is forested habitat. There are 17 plant communities in the assessment area; clearing

would affect, at most, 5.4 percent of any one community. Off-road vehicle traffic could damage additional areas.

Contaminant uptake, in the form of increased metal concentrations, could occur in plants due to external accumulation of settled particulate matter or internalized uptake of metals from soil. Metals could be released during the operation and commissioning phases through liquid effluent, air emissions and dustfall. The potential for releases would be highest during the open pit mining phase. VBNC predicts that projected metal concentrations would have no detectable effect on lichens.

Fire, fuel spills, and the failure of a tailings dam or pipeline are accidental events that could adversely affect plant communities. Fire could affect substantial areas of spruce and lichen forest, although no worst case scenarios were provided. Most Project facilities would be located in valley bottoms, and the area around the proposed mine and mill, port, haul road and airport consists mainly of mixed spruce, fir, birch and lichen forest. Salt marshes are particularly sensitive to oil or other spills, although the most important such marsh, the Gooselands, would not be vulnerable because no fuel storage sites could drain there.

VBNC predicted that ongoing and future activities within the Landscape Region, including mineral exploration by VBNC and others, would have no detectable cumulative environmental effect on the abundance of plant communities.

VBNC has proposed the following mitigation measures:

- identifying and avoiding sensitive land types;
- reclaiming land to encourage natural succession of indigenous species, and regularly updating a reclamation plan; and
- making emergency preparations for fire-fighting and maintaining emergency preparedness.

Measures relating to atmospheric transport of particulate matter are noted in Chapter 5, Air Quality.

VBNC has predicted the following residual effects:

- minor (not significant) loss of plant communities;
- minor (not significant) contamination;
- major (significant) effects from fire, but a low (not quantified) likelihood of fire.

12.1.2 Government and Public Concerns

The provincial Forestry and Wildlife Branch stated that there would be a need to maintain communication with the Northwest River office in order to ensure effective fire response capability, and to do monitoring and follow-up to ensure the success of revegetation. The Branch indicated that, because of the distance of this office from the site, there would be a minimum one-hour response time.

An expert speaking on behalf of the Innu Nation expressed concern that an increase in the fire cycle could reduce forest area and increase tundra area, and recommended that the Province review the adequacy of VBNC's fire response measures. Along with an expert for the Labrador Inuit Association (LIA), he also recommended that lichens be an integral part of an effects monitoring program, since they are important in the food chain, and as a vector for biomagnification of airborne pollutants.

CONCLUSIONS AND RECOMMENDATIONS

The loss of some plant communities, and therefore of some habitat, is an inevitable consequence of construction. The proportion of any single plant community lost to Project activities in the assessment area would be low. Reclamation would eventually restore plant cover in much of the Project footprint, although this would not necessarily be the same community that existed before the Project began, nor

would it necessarily have the same ecosystem function.

Disturbance could and should be minimized through appropriate restrictions on off-road traffic when the ground was not frozen.

Recommendation 51

The Panel recommends that VBNC develop an environmental protection plan with respect to plant community and terrain disturbance that would

- **identify sensitive land types and avoid them to the greatest extent possible; and**
- **restrict off-road vehicle traffic to designated routes as much as possible when the ground is not frozen, limit such traffic to essential monitoring functions, favour the use of helicopters for exploration and isolated construction activities, and restrict off-road use of heavy vehicles to winter.**

The Panel considers that if adequate mitigation measures were taken with regard to atmospheric emissions (Chapter 5), Project-induced contamination of plant communities would not have measurable effects beyond the immediate area of Project activities. The Panel therefore does not consider that monitoring lichen for contaminants should be a priority for VBNC. Lichen monitoring for contaminants should occur in the context of the larger contaminant monitoring program recommended in Chapter 7.

The Panel agrees that if appropriate precautions and contingency plans were in place, the probability of Project-caused forest fire would be low, and that the extent of fire damage could be minimized, especially in view of the terrain and vegetation configuration in the Project area.

Recommendation 52

The Panel recommends that VBNC maintain adequate on-site equipment and emergency preparedness to respond to forest fires as early as possible, to minimize damage. These plans should be subject to review and approval by the Forestry and Wildlife Branch of the provincial Department of Forest Resources and Agrifoods.

Particularly during scoping sessions, many Inuit and Innu expressed their concerns about the damage caused by exploration activities generally, including abandonment of fuel caches and exploration equipment, indiscriminate clearing and careless use of off-road vehicles. They regarded these as significant Project-related effects that occurred before this environmental assessment. The Panel notes that the Province amended the *Mineral Act* in 1995 to provide for greater regulatory control over mineral exploration and has been monitoring mineral exploration in the field since then.

Recommendation 53

The Panel recommends that the Province review the effectiveness of the revised *Mineral Act* regulations, and of its monitoring activities, with respect to the cumulative effects of mineral exploration on terrestrial and aquatic habitat in northern Labrador, in consultation with the Innu Nation and LIA.

12.2 CARIBOU

12.2.1 VBNC Assessment

VBNC conducted 22 dedicated aerial surveys of caribou in and around the Claim Block during the winters of 1996 and 1997, and conducted further surveys in 1998. The company also

conducted ground surveys in the Claim Block to determine the extent of habitat use, and the timing and location of caribou movements.

The proposed project lies in the range of the George River herd, which covers much of northern Labrador and Quebec. The George River herd is currently the largest in the world, and recent estimates indicate that it numbers at least 675,000 animals. Some biologists believe the herd is entering a prolonged period of decline. The Claim Block, which constitutes less than 0.1 percent of the herd's range, is near the edge of the range and is not used for calving or rutting. It is considered to be good winter range and in some years, especially recently, caribou have wintered in the Voisey's Bay area. In times when the herd's population was low, caribou were rarely observed in the Claim Block and adjacent area. In 1996, 8,000 to 10,000 animals (or over 1 percent of the herd) that had wintered there congregated in the eastern portion of the Claim Block in April, and then passed westward through the Project area during the spring migration to calving grounds. This does not happen every year, and biologists do not consider that caribou exhibit fidelity to the winter range. The Claim Block itself is not considered an important foraging area, but under present conditions it can be an important spring migration route. VBNC believes that when caribou are on the sea ice and the islands in winter, their movements are not directed and they would avoid or detour around a ship track without detriment.

VBNC identified the potential effects of the Project on caribou as follows.

Alteration or Loss of Habitat

Construction would destroy some apparently non-critical foraging and resting habitat, and operations could disrupt localized movements of individual caribou overwintering in the Claim Block. Roads and other Project facilities are not expected to block movement during spring

migration, because caribou are adaptable and alternate routes are available. Winter shipping could disrupt movements on landfast ice, but it is not scheduled to occur during late winter and spring staging and migration.

Disturbance Due to Noise and Human Presence

Noise and human presence would disturb the caribou less than alteration of habitat, and would last for a shorter time. Caribou would habituate to routine events.

Accidental Events

Forest fires would destroy habitat, but most forage would not burn or would recover quickly. Fire, along with vehicle accidents, could result in individual mortality.

Based on contaminant modelling (Chapter 7), bioaccumulation of metals in caribou is not considered a potential adverse effect.

VBNC has proposed to minimize disruption of caribou traversing the Claim Block or the shipping route by

- identifying east-west routes crossing access roads, haul roads and pipelines;
- constructing graded slopes and ramps at critical road intersections, and minimizing snowbanks from plowing at these points;
- elevating or burying pipelines at critical crossings, as appropriate;
- reducing road traffic volume, or even eliminating it during spring migration, and imposing speed limits; and
- stopping icebreaking in early spring.

VBNC also stated that it would monitor caribou movements through the Claim Block to reduce interactions.

VBNC predicted the following residual effects:

- minor (not significant) effects from construction and operation; and

- negligible (not significant) effects from decommissioning and accidental events.

VBNC predicts no adverse population-level effects on caribou as a result of the Project.

12.2.2 Government and Public Concerns

The provincial Forestry and Wildlife Branch expressed concerns about the interaction of caribou with Project infrastructure, especially the airstrip, and suggested fencing or effective visual monitoring as a mitigative measure.

An expert on behalf of the Innu Nation, while not disagreeing with VBNC's characterization of herd biology, questioned some of its interpretations and conclusions. He produced some data suggesting that the Claim Block and surrounding area may be an important part of the herd's range. He did not advance a specific hypothesis about why this might be so, but suggested the matter required further study. He also suggested that lack of site fidelity does not diminish the area's importance, but only makes it more difficult to determine the effect of Project activities on population levels. He also pointed to uncertainties and lack of consensus in the literature on the effects of disturbance and on the adaptability of caribou to disturbance. Finally, he considered that there is not enough information and experience to predict the effects of an icebreaker track on caribou movements on fast ice. At the heart of his disagreement with VBNC was his application of the precautionary principle. He suggested that, as a general principle, the initial hypothesis must be that the project would damage the environment, and that this prediction should only be altered under the weight of opposing evidence.

Innu and Inuit participants stated concerns about potential contamination of caribou through seepage from the tailings ponds and dust generated by the Project. Caribou have died after becoming tangled in wires left on the ground during mineral exploration. Some people considered that caribou would avoid the Project

area and become scarcer or less healthy. Winter shipping is a particular concern. Open tracks, which in some conditions would not refreeze quickly, could disrupt migration, or even result in mortality if caribou tried to swim across them, because caribou cannot get back out of deep water. Inuit experts considered that caribou migrate north-south, as well as east-west, on the sea ice.

CONCLUSIONS AND RECOMMENDATIONS

The Panel notes that there was no fundamental disagreement about the factual evidence supplied by VBNC, although there were some differing interpretations of it. The Panel considers that the Claim Block constitutes a small and non-critical part of the range of the George River herd. The Project does not require a major linear transport facility that might significantly obstruct migration or provide greater public access to the herd, as the proposed site is both isolated and compact. The worst case scenario, which the Panel regards as unlikely, is that mitigation measures would be ineffective and the peninsula between Anaktalak and Voisey's bays would be effectively lost as caribou habitat. Even if this occurred, it might not have a measurable population-level effect, especially if the herd was entering a long period of decline, although it might well adversely affect local harvesters. This loss of habitat would be long term but not permanent, especially if reclamation measures were successful.

The Panel observes that the proposed Project activities in the terrestrial environment are not novel or untested with respect to caribou habitat. There are many examples, some decades old, of industrial activities on caribou ranges around the circumpolar world. Such activities can result in stress and displacement, but there are also examples of habituation. The Panel is not aware of any instances of long-term adverse population-level effects that are clearly attributable to industrial activities such as the Project, so long as

excessive hunting does not also occur. However, the cumulative effects of several such developments are a concern, chiefly because of the potential for significant habitat fragmentation at the herd level.

Recommendation 54

The Panel recommends that the Province, LIA and the Innu Nation ensure that future environmental assessments of major developments in the range of the George River caribou herd (whether in Labrador or Quebec) pay particular attention to the cumulative effects of range fragmentation.

VBNC has proposed measures to mitigate the effects of linear land development on caribou. These measures include road and pipeline design, and traffic management. The Panel considers these measures appropriate in principle, but they must be rigorously applied and enforced.

Recommendation 55

The Panel recommends that VBNC establish appropriate mitigative measures, as it has proposed to do, with respect to roads, pipelines and other linear facilities. These should facilitate unimpeded travel by caribou and ensure that caribou are kept away from the airstrip, by using fencing if necessary. These measures should also conform to best practices existing at the time they are implemented.

Recommendation 56

The Panel recommends that VBNC develop an environmental protection plan for caribou that would

- **provide for regular monitoring of caribou in the Claim Block, and in adjacent areas when caribou may be congregating or migrating, as appropriate;**
- **establish a graduated set of responses to caribou presence and movements near the Project, beginning with limits on traffic speed and volume, up to and including complete cessation of traffic during migration events; and**
- **provide for monitoring of and reporting on the effectiveness of VBNC's caribou mitigation measures, and their modification, as appropriate.**

It is offensive to Innu and Inuit to see animals harmed or killed by human activity unrelated to hunting, as can happen when there is incomplete cleanup after mineral exploration or related activities.

Recommendation 57

The Panel recommends that VBNC, and its contractors and subcontractors, clean up and remove all equipment immediately after any exploration or other activities occurring anywhere outside fenced-in Project operations, whether within the Claim Block or elsewhere in northern Labrador.

The Panel considers that, due to insufficient information, it is impossible to be certain about the effectiveness of proposed measures to mitigate the effects of winter shipping on caribou. The Panel recognizes that while VBNC's predictions of minor and negligible effects at the population level may be correct, harvesters might experience adverse effects and winter shipping could directly cause some caribou mortality.

Movements of caribou on sea ice, and the behaviour of caribou in response to shipping, require further study.

Recommendation 58

The Panel recommends that VBNC and LIA, as part of the shipping agreement, develop a program to monitor and minimize the effects of winter shipping on caribou.

The Panel notes the absence of a formal herd co-management mechanism that could be used to evaluate Project effects in the context of the many other factors affecting caribou abundance and health, and to coordinate appropriate responses to such effects. These are matters of legitimate concern to other users of the George River caribou herd.

Recommendation 59

The Panel recommends that the Province, LIA and the Innu Nation enter into co-management arrangements for the George River caribou herd with the Government of Quebec and Quebec Aboriginal users.

12.3 BLACK BEARS

12.3.1 VBNC Assessment

VBNC selected the Landscape Region as the assessment area for black bears. It used radio-telemetry to establish den locations and home ranges as a basis for understanding habitat use and estimating abundance and distribution. Actual field studies were limited to an area of 1686 km² around the Claim Block.

The Project is situated in black bear habitat, and there are active dens nearby. Based on its bear count within the Reid Brook area, VBNC estimated a density of 0.45 to 0.52 bears per km² in the Reid Brook Valley, the lower Ikadlivik

Brook Valley and the Kogluktokoluk Brook Valley, forested areas that provide the prime feeding and denning habitat in the Landscape Region. These relatively high densities (similar to those reported in parts of Alberta and Montana) may have occurred because bears were attracted to human activity at VBNC and other exploration camps. Densities outside of these areas are thought to be much lower. VBNC estimated the population of the entire Landscape Region at 2,200 black bears. Captured bears were in good physical condition. VBNC characterized the population as abundant and stable.

Mineral exploration in recent years has led to more encounters between people and black bears, and it is estimated that mineral exploration companies killed at least 50 bears in 1995 and 1996. This constituted a large proportion of the sustainable annual kill. During the same period, VBNC itself reported more than 50 incidents of bear capture, most resulting in relocation. Problem kills have decreased substantially since 1996, and in 1998 there were none, as of early November. This is a result of both decreased exploration levels and improved camp maintenance and procedures, including personnel awareness and training. VBNC has conducted workshops with Innu representatives on appropriate procedures for dealing with black bears.

VBNC identified the potential effects of the Project on black bears as follows.

- Encounters between humans and bears would likely increase due to greater human presence and the possible attraction of bears to food and waste.
- Black bears might avoid the main areas of noise disturbance, especially the open pit and quarries. As blasting would begin before denning, bears might create or occupy new dens further away. At noise levels above 100 dB (which would occur within a radius of approximately 9 km of the open pit), dens could collapse due to ground

vibrations and there could be mortality of young cubs in dens. Up to five known dens could be affected. Noise from local aircraft traffic would cause displacement or short-term avoidance of habitat but is not expected to result in measurable effects on physiology or reproductive success.

- The Project would disturb less than 3 percent of preferred denning habitat and 0.5 percent of barrens forage habitat. Bears are adaptable and would avoid these areas. This could result in the adjustment of individual home ranges, but would not affect population density.
- Accidental events such as fire, pipeline failure, dam failure and contaminant spills could destroy habitat, although fire can in some cases renew or enhance bear habitat.

Based on contaminant modelling (Chapter 7), bioaccumulation of metals in black bears is not considered a potential adverse effect. The cumulative effects of increased mineral exploration in the Landscape Region could result in increased encounters between bears and humans, and increased problem kills.

VBNC has proposed the following mitigation measures:

- identifying and protecting sensitive bear habitat, especially active dens;
- improving food storage and waste management, improving personnel awareness and training, and equipping personnel working away from camps with warning devices;
- using electric fencing to enclose Project areas that are particularly attractive to bears, subject to consultation with Innu and wildlife officials;
- restricting on- and off-road traffic; and
- recording bear encounters and response actions in accordance with the environmental protection plan.

VBNC predicted the following residual effects:

- minor (not significant) effects from construction and operation;
- negligible (not significant) effects from decommissioning; and
- minor (not significant) effects from accidental events.

12.3.2 Government and Public Concerns

The provincial Forestry and Wildlife Branch acknowledged that existing mitigative measures had already improved handling of problem bears. However, it recommended continued and adaptive bear awareness training, and reporting of all bears handled on site. It also noted that relocated bears will often return, even if taken a long distance away, and stressed the importance of ensuring that individual animals do not become problems in the first place.

An expert for the Innu Nation suggested that population density may have been over-estimated. He suggested that the regional significance of the area had not been well established and noted, with the support of an expert for LIA, that population and environmental monitoring of black bears is inherently difficult. He considered that permanent (or long-term) loss of "at least" five den sites, combined with defence kills, is a moderate, not minor, effect because it would change the abundance or distribution of one or more generations of that portion of the population.

Participants advanced differing views about the productivity of the Voisey's Bay area, the area's usefulness as a source or sink, and the population-level effects that might result from increased disturbance and problem kills at or near the site. However, both Innu and Inuit consider that black bears have always been abundant in the Voisey's Bay area, due the good food supply there. They are concerned about problem kills on both conservation and ethical grounds.

CONCLUSIONS AND RECOMMENDATIONS

The Panel concludes that the regional black bear population cannot be well defined based on existing knowledge. The population of the Landscape Region (in contrast to the study area itself) is not well established, as no relevant studies have been done. VBNC suggested that regional population estimates should be the responsibility of the management agency, and the Panel agrees. However, because of insufficient knowledge about the Landscape Region, and because the Project area may have been a “sink” by virtue of its attraction during the study period, it is uncertain how representative the observed densities in the study area are. Consequently, the Panel considers that there is not a sufficient basis for predicting the impact of even a relatively low level of problem kills that might occur even if all mitigation measures were implemented.

Recommendation 60

The Panel recommends that the Province undertake or sponsor further research to establish black bear population definition, abundance, structure, dynamics and critical life history requirements, to ensure the appropriateness and effectiveness of adaptive management strategies for black bears. The Innu Nation and LIA should be involved in the design and conduct of this research, and the research should be subject to the review and recommendations of the Environmental Advisory Board.

It cannot be said with confidence whether bears’ avoidance of or attraction to human activity would be a greater influence on the local bear population. It is not clear that moving bears to alternate den locations would compensate for displacing them from dens in the Project area, especially if those dens were in an area of prime

habitat effectively lost for the life of the Project. Simply mapping and avoiding sites near the Project would not help if bears also avoided them because of noise. Therefore, increased human activity might gradually deplete the bear population in the Project area. The Panel recognizes that such depletion would adversely affect the rights and interests of Innu and Inuit harvesters.

The Panel also notes, however, that industrial activities such as those VBNC has proposed are not novel in black bear country. There was no suggestion that there is a clear or consistent record of depletion in such cases. The Panel notes with approval that VBNC has substantially improved its operating procedures for avoiding encounters with black bears. The Panel therefore considers that the measures that VBNC has proposed for camp management and bear awareness training are in principle appropriate, but must be rigorously applied and enforced. The Panel believes that a cooperatively developed monitoring program is needed.

Recommendation 61

The Panel recommends that VBNC develop an environmental protection plan with respect to black bears that would

- **continue to implement and refine measures to improve food storage and waste management, restrict on- and off-road traffic, and train personnel;**
- **provide for the use of electric fencing in Project areas, as appropriate;**
- **regularly monitor black bear presence and denning activities; and**
- **establish a protocol for avoiding bears and dens during Project activities, by relocating, reducing or temporarily stopping activities, as appropriate.**

13 BIRDS

In the Environmental Impact Statement (EIS), VBNC acknowledges that the Project would affect the land-based birds that breed in the Project area, raptors that prey on these birds, and other birds that use Camp Pond, Headwater Pond or the North Tailings Basin. For example, noise, lights and human activity could disturb birds; construction of Project facilities or streamflow alterations to manage tailings could destroy or alter habitat; metals might accumulate in the food chain; and oil released through chronic small oil spills or discharges, or through a major oil spill, could cause oiling effects.

Many questions arose regarding Project effects on the abundant bird species that breed in and migrate through the impact area. Participants expressed major concerns about the definition of the impact area. While VBNC discussed effects along the shipping route as far as the Hens and Chickens, Environment Canada and other participants said that effects on birds that migrate along the shipping route further offshore, such as thick-billed murres and dovekeys, should be included in the assessment. Environment Canada and residents of more southern coastal communities also said that the assessment should include the entire shipping route.

This section looks at three important effects on birds:

- effects on nesting and migrating seabirds and coastal waterfowl;
- effects on special conservation status birds nesting in the area; and
- potential effects on the Gooselands.

13.1 SEABIRDS AND COASTAL WATERFOWL

VBNC chose an assessment area for seabirds and coastal waterfowl that encompassed coastal areas from northern Labrador to the south and west of Lake Melville. VBNC estimated that the breeding populations in this area contribute

63 percent of the geese, 25 percent of the dabbling ducks and 55 percent of the diving ducks migrating annually along the Atlantic Flyway. The area around Nain is described as the second most important seabird breeding area, representing about 13 percent of the Labrador population; an estimated 20,500 pairs of birds breed between Voisey's Bay and Anaktalak Bay and east to the offshore islands. The species involved include common murres, Atlantic puffins, guillemots, scoters, eiders and gulls. Whichever shipping route to Edward's Cove was chosen, the route would pass numerous important breeding colonies of seabirds. In addition, millions of thick-billed murres and dovekeys migrate along the offshore areas in the fall.

VBNC stated that the largest potential effect on these birds would be the risk of a major oil spill. Such a spill, depending on the time of the year and the spill location, could foul breeding areas, cause oiling that could kill many breeding birds and affect many birds that stage in the area each fall. The surrounding environment could take years to recover from such an event. The Labrador Inuit Association (LIA) and Environment Canada agreed with this assessment but also emphasized the risk presented by chronic oil spills. They recommended that VBNC enlarge the assessment area to consider the entire shipping route, once the destination port has been chosen. VBNC disagreed, stating that the assessment area is large enough to encompass all Project waterfowl interactions but small enough to avoid diluting study results.

Noise from shore-based Project activities and from shipping activities near nesting sites could threaten breeding birds. There is evidence that breeding populations of some species — especially common eider, black duck, scoters, guillemots and terns — have declined during the past 20 years. One possible cause has been

the decrease in food supply, especially capelin. Other factors include the use of snowmobiles and speedboats, which gives harvesters greater access to birds and increases noise disturbance; increased recreational harvesting; and environmental hazards along the Atlantic Flyway. VBNC quotes various studies that associate noise and disturbance with lower breeding productivity, but it concludes that predictable noise levels below 90 dBA have little effect and lead to habituation.

The Panel concludes that great care must be taken to protect this large and important breeding and staging area for waterfowl. It agrees that assessing the impact of Project-related shipping well beyond the Landscape Region would not be useful, due to the cumulative effects of other shipping activities. However, Project-related shipping would be a critical aspect of potential Project effects on waterfowl in the Nain area and an important part of the cumulative effects on birds along the shipping route off Labrador. Measures must be put in place to monitor these effects and to ensure that chronic or accidental effects do not significantly contribute to stress on seabird populations.

Recommendation 62

The Panel recommends that VBNC, in consultation with Environment Canada, LIA, the Innu Nation and other interested parties, develop and implement an environmental protection and emergency response plan for seabirds and waterfowl that clearly identifies all sensitive areas and time periods for seabirds and sea ducks, identifies all potential Project interactions and ensures adequate protection of these areas. These plans should include consideration of all sea ducks and seabirds that migrate through the area and that come into contact with the shipping route.

Recommendation 63

The Panel recommends that VBNC, in consultation with Environment Canada and LIA, develop a vessel oily waste management plan that includes

- **procedures for identifying all potential sources of chronic, relatively small discharges of oil, both accidental and deliberate, as well as large oil spills;**
- **an explicit zero-discharge goal for chronic oil pollution originating from Project vessels;**
- **best management practices designed to achieve zero discharge, to be reviewed regularly; and**
- **provisions for adequate, land-based reception facilities for oily wastes from Project vessels, at both Edward's Cove and at the reception port, including a disposal plan for such wastes.**

Recommendation 64

The Panel recommends that VBNC, in consultation with Environment Canada and LIA, develop a monitoring program to evaluate the effects of noise and disturbance from passing vessels on breeding colonies. Based on the results of this program, VBNC should, if necessary, develop and implement additional mitigation measures that may involve alternate shipping routes (these are addressed in Recommendation 37).

13.2 SPECIES OF SPECIAL CONSERVATION STATUS

The EIS identified two avian species as having special conservation status. In addition, a presenter raised concerns about a third species at the hearings.

13.2.1 Harlequin Ducks

In 1990, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) listed the eastern population of the harlequin duck as an endangered population. In 1998, the population was estimated at 1,500 birds. There is also a Greenland population, estimated at 1,000 to 2,000 birds; some of these breed in northern Labrador and others breed in Ungava in northern Quebec. The birds in the Voisey's Bay area are thought to be part of the eastern population, which winters off Atlantic Canada and the northeastern US.

The EIS and Additional Information stated that the baseline information on harlequin duck distribution in the Project area came from various sources. These included a 1984 study by the Canadian Wildlife Service (CWS), a 1997 study by the Department of National Defence (DND), Aboriginal knowledge, and a series of surveys carried out by VBNC. The VBNC surveys included nine aerial surveys of breeding pairs in 1995-97, three aerial and ground brood surveys in July and August 1996, and three aerial surveys of coastal areas in 1995 and 1996. At the hearings, VBNC provided additional information from an aerial and a ground survey carried out in 1998. The assessment area included the upstream portions of rivers that run through the Claim Block. Peak numbers in the area were 32 breeding pairs in 1997. This represents approximately 20 percent of the known individuals from Labrador surveys and 8 percent of the estimated 1988 eastern population. VBNC expects the Project to displace 2 to 3 breeding pairs from the area of the North Tailings Basin and 1 to 3 pairs from Little Reid Brook, due to noise and human presence during construction.

Loss of Habitat

Environment Canada said harlequin ducks have a high adult survival rate and low breeding productivity. The population estimates are based

largely on the number of individuals that winter at a very limited number of favoured locations along the eastern seaboard. If the high survival rate is accurate, then the low growth rate of the population must be the result of low productivity, thus making nesting habitat critical. Environment Canada therefore stated that a better understanding of the extent to which habitat limits the harlequin duck population is needed to assess the immediate and long-term consequences of the Project, and its contribution to cumulative effects. It also indicated that the effectiveness of a habitat replacement or relocation program would depend on the loyalty of breeding birds to nesting sites.

The most evident and irrevocable loss of harlequin duck habitat would take place in the brook that drains the North Tailings Basin. This brook is one of the most productive harlequin duck breeding areas in the area (20 percent of broods). Environment Canada stated that disturbance and the loss of invertebrate populations caused by damming lake outflow would likely render the brook unsuitable for harlequin ducks even after it is rehabilitated. It strongly recommended that VBNC eliminate the North Tailings Basin by backfilling the open pit or using an alternative lake (Option 5).

Environment Canada also commented that VBNC made little attempt to identify the extent to which harlequin ducks use coastal areas, and that it should carry out extensive surveys to ensure that environmental protection and emergency response plans take sensitive coastal habitats into consideration.

VBNC states that the Project would probably result in a net loss of habitat; however, this loss does not appear to be a critical limiting factor for this population. The company predicts that breeding pairs would move to adjacent habitat, with the possible but not inevitable loss of one breeding season. Temporary loss of productivity in the North Tailings Basin area would not have a significant effect. VBNC indicates that the

proposed phased approach to tailings disposal in the North Tailings Basin would give the company an opportunity to examine mitigation measures to ensure that brooding pairs are placed in alternate habitat without loss of production.

VBNC stated that the program to examine harlequin duck distribution has lasted four years and will continue. In addition, coastal habitat has been surveyed and harlequin ducks were encountered only once. While the availability of suitable habitat does not appear to be a limiting factor, VBNC would work with other stakeholders to identify and implement mitigation measures to relocate harlequin ducks within the Claim Block. If necessary, it would consider creating or restoring habitat.

Additional Breeding Disruption

VBNC indicated that other factors could potentially disrupt the breeding productivity of harlequin ducks.

The company would need to install culverts across several streams to provide road access to port and tailings facilities, but harlequin ducks do not swim through culverts. VBNC states that harlequin ducks have not been observed along any of the streams to be crossed. It would consider installing bridges if it found harlequin ducks near a stream crossing.

In accordance with the precautionary approach, Environment Canada recommends that, when VBNC is designing and siting roads and other facilities parallel to a watercourse, the company be required to maintain a minimum buffer distance of 100 m in areas that could provide breeding or brooding habitat for harlequin ducks. VBNC would work with CWS to identify places requiring a buffer and would leave room for buffers where practicable.

Genetic Studies

Participants also discussed the importance of defining to which population the birds breeding near Voisey's Bay belong: the one that winters

in Greenland or the one that winters on the eastern seaboard. This would help parties identify the potential cumulative threats to the eastern population. Environment Canada recommended that VBNC be required to undertake a study, using telemetry or genetics, to determine the population affinity of the birds in the Voisey's Bay area.

VBNC believes that CWS can best answer the population question and that the question is not an appropriate component of the monitoring framework. The Panel agrees that it would be best if CWS scientists did such a study, in conjunction with VBNC's monitoring program. The Panel notes that, according to reports from the Cheviot Project, such research should be done cautiously. Researchers tried radio telemetry at that site, but monitors fixed to feathers were lost when the birds molted. Surgical implantation of the transmitters apparently led to bird mortality.

CONCLUSIONS AND RECOMMENDATIONS

The Panel concludes that the Project would place an additional cumulative burden on harlequin ducks and could permanently remove breeding habitat. No existing legislation prevents this removal of habitat or requires habitat replacement.

The Panel notes, however, that the first three aspects of the recovery strategy, described in the National Recovery Plan for the Harlequin Duck in Eastern North America (RENEW Report No. 12, March 1995), are as follows:

- scientific research into reproductive, feeding and behavioral ecology;
- population monitoring, including sex and age ratios; and
- habitat protection, including an assessment of factors that affect habitat quality.

The Panel believes that VBNC could provide important data to the recovery program from its ongoing monitoring programs and research into mitigation measures. In addition, VBNC

could make research in the Landscape Region invaluable to the success of the recovery program by providing financial or logistical support to CWS scientists. Such aid could well result in the development of practical measures to replace habitat, both in the assessment area and elsewhere, well beyond the two to three breeding sites that the Project would place at risk.

In addition, DND and others continue to evaluate the effects of low-level flying on the harlequin duck population. The number of breeding pairs recorded as part of that monitoring program suggests the breeding population may have been underestimated. Additional work will be carried out in relation to the proposed hydro developments on the lower Churchill River. Combining the results of that research with research from the Project could well provide an understanding of the population dynamics of the harlequin duck that will be vital to success of population recovery efforts.

Recommendation 65

The Panel recommends that VBNC develop an ongoing research and monitoring program for harlequin ducks in the Project area, in consultation with the Canadian Wildlife Service and other interested parties, to better understand the physical, biological and chemical attributes of harlequin duck habitat and to refine an effective mitigation and monitoring strategy.

Recommendation 66

The Panel recommends that VBNC incorporate the following measures into its environmental protection plan in order to protect harlequin ducks and their habitat:

- **construction standards and procedures that require bridges instead of culverts for crossings of waters**

frequented by harlequin ducks (harlequin duck nest surveys should be carried out 100 m upstream and 100 m downstream of each potential stream crossing site to ensure a minimum separation zone);

- **design standards that ensure appropriate buffer zones between roads and streams that provide harlequin duck habitat, where physically achievable; and**
- **procedures to control dust and noise in critical habitat areas.**

Recommendation 67

The Panel recommends that VBNC collaborate with Environment Canada, the Department of National Defence, the Province of Newfoundland and Labrador, and other relevant parties to integrate the methodologies and results of VBNC's on-site harlequin duck monitoring program with those of other monitoring programs or studies related to present, proposed or future developments in Labrador, to ensure valid assessment of the cumulative effects of the Project, including shipping activities.

13.2.2 Peregrine Falcon

VBNC indicated that the peregrine falcon continues to have special conservation status, although population numbers have improved markedly. Approximately 45 nesting territories have been identified in Labrador and about 15 of these are in the Landscape Region. Although no nests occur in the Claim Block, VBNC identified potential habitat overlooking Edward's Cove, and sites have been identified along the shipping route.

The EIS identifies four potential effects of the Project on the peregrine falcon. The research

that VBNC quoted on the effects of noise and human presence includes details about effects on birds in urban areas. However, there seems to be a relationship between the bird's height above potential interference and its apparent sense of safety.

VBNC ruled out the potential for metals bio-accumulation in peregrine falcons because its modelling showed no such accumulation in food sources such as the willow ptarmigan. The black guillemot is a prime food source for peregrine falcons in the Voisey's Bay area, so the main threat lies in an oil spill, which would affect this food source. VBNC did not predict significant effects for the peregrine falcon and participants did not bring forward major concerns at the hearings.

13.2.3 Barrow's Golden Eye

One presenter expressed concern that more attention should be paid to the Barrow's golden eye, the eastern species of which also appears to be under great stress. The species is known to occur near Nain. Little information seems to be available and Environment Canada stated that the status of the species is being evaluated. There is no reported occurrence of the Barrow's golden eye at Voisey's Bay, which does not appear to be an important habitat for the bird.

13.3 IMPACT ON THE GOOSELANDS

VBNC is proposing to locate a Category 1 airstrip, to be used by aircraft such as the Dash 8, approximately 6 km from the Gooselands. Presenters were most concerned about the effects of noise from this airstrip, although other effects on the area could include hydrological changes resulting from flow alteration in Reid Brook and noise and light effects from mining the Ovoid.

The Gooselands salt marsh, at the estuary of the Ikadlivik and Reid Brook systems, is a critically important waterfowl habitat in the Nain district. It is a valuable spring hunting area because it is the first major stopping place for waterfowl

once they arrive in the Nain district. Eggs are gathered in the area and adjacent islands. It is also a vital harvest area in the late summer and fall as, in addition to birds, there is always a reliable subsistence harvest of marine mammals, fish and berries. Harlequin ducks are also present. Inuit presenters were concerned that if nesting and migratory waterfowl abandoned the Gooselands, they would leave the Nain district altogether.

Aboriginal groups and CWS staff suggested that the Gooselands is one of the most productive and extensive habitats of its type along the coast and that it is critical to both breeding and migrating waterfowl. The Panel understands, however, that there has been no systematic assessment of estuarine habitats and related waterfowl areas along the Labrador coast, so information is insufficient to compare and rank the Gooselands with other areas, such as Groswater Bay. Some presenters were concerned, by interfering with migratory waterfowl, the airstrip could effectively remove valuable habitat — placing additional stresses on migrating birds — and affect the success of Aboriginal harvesting efforts.

Airstrip Siting

Using recommendations from an aviation consultant, VBNC decided to move the airstrip site, originally located close to Camp Pond, to the lowlands east of Headwater Pond. VBNC indicated that, of 26 potential sites considered, this was the only one that would allow the 2.5-percent approach necessary for a Category 1 landing system without interference from high ground. Aircraft would pass directly over the Gooselands, about 6 km from the airstrip, when landing from or taking off towards the west. Over the Gooselands, the aircraft altitude would be 172 m on a 2.5-percent instrument approach, 473 m on an 8.2-percent non-instrument approach and 488 m on takeoff.

VBNC offered two justifications for requiring Category 1 landing capability. First, this

capability would increase the percentage of flight completions during employee rotations, thus reducing delays on crew changes. VBNC acknowledged that, while this would benefit employees from Goose Bay or Labrador West, employees travelling to and from the coastal communities, none of which have Category 1 airstrips, could still have trouble completing flights.

Second, VBNC wanted to be able to complete flights for medical or personal emergency evacuations. The Panel considers this a reasonable argument, given that up to 500 employees would be present in an industrial workplace, while noting that coastal communities with similar or larger populations do not currently enjoy a similar level of service and protection.

Inuit experts on behalf of LIA criticized the site selection process for not taking environmental effects on the Gooselands into account. Aboriginal groups and Environment Canada expressed concern that the birds, when breeding or resting on the Gooselands, will not habituate to the aircraft noise. Local experience does not support the prediction that waterfowl would return immediately after being flushed. LIA believes there is a risk of long-term, if not permanent, displacement of birds from the Gooselands and the Voisey's Bay estuary. It suggested that Project activities, particularly helicopter noise, may have already displaced birds. This would significantly affect Inuit and Innu harvesting. LIA pointed out that the EIS does not discuss compensation for loss of access to a harvesting resource. It also suggested that bird-aircraft collisions would be a considerable safety hazard.

To support its concerns, LIA presented summary data from a report written by CWS for the Inuvialuit Wildlife Management Advisory Council (NWT) on the effect of aircraft operation on various waterfowl and gulls. This report showed that flyover heights of 450 m and 650 m created significantly different startle effects. The Panel notes that many of the studies involved helicopters, which were seen as causing much

more disturbance than fixed-wing aircraft. In addition, the fixed-wing aircraft studies mainly involved the Cessna 185; they did not mention the Dash 8 aircraft proposed for the Project, although they did recommend small aircraft over larger aircraft. The report also indicated that flight timing and aircraft circling influence effects.

VBNC argues that birds would not abandon the Gooselands due to the startle effect, as flight frequency would be low and habituation to noise is expected. It also disagreed that the risk of aircraft-bird collisions would be significant. While VBNC did not ask its aviation consultant to consider environmental effects when selecting sites, the company removed sites located along the shores of Voisey's Bay from consideration and collected additional baseline information after sites were chosen. The company pointed out that, due to prevailing winds, 75 percent of all flights would approach from the east, which means the same number of flights would take off to the west. VBNC is willing to meet with stakeholders to discuss the site selection process and to consider ways to respond to concerns.

Presenters were concerned that, by the time anyone realized an airstrip was adversely affecting birds in the Gooselands, it might be too late to do anything other than compensate Aboriginal resource users. VBNC described a number of possible mitigation measures, which the Panel considered. One suggestion made during the hearings was to amend the take-off protocol to require pilots to turn left after reaching a safe altitude, thus avoiding the Gooselands. The Panel notes that, to minimize the loss of hunting opportunities, VBNC could severely limit flight activity during prime harvesting periods, even alternating the type of aircraft used during these times. The company could also alter daytime schedules to ensure planes fly during periods when the birds are less active or have flown elsewhere for feeding.

The Panel concludes that the effects of the proposed airstrip site and approach orientation

on the Gooselands are uncertain, and that VBNC should therefore use a precautionary approach. Even though time may be limited, VBNC should review the site selection process in consultation with LIA and Environment Canada and gather additional baseline information on how birds use the Gooselands, especially during the spring 1999 arrival of the migratory birds. VBNC should also attempt to document bird behaviour in response to low flying aircraft of the type proposed for the Project. Finally, VBNC should identify all possible mitigation measures that it would use if negative effects became apparent.

The Panel agrees that the proposed site of the airport is reasonable, based on its elevation and distance from critical habitat. The main problem stems from the runway orientation, which allows the airport to operate as a Category 1 airport and requires aircraft to pass over the Gooselands on approach and takeoff. The Panel therefore concludes that the airport can remain in its proposed location, but that it must be subject to certain restrictions until Environment Canada and Aboriginal organizations are satisfied that it is safe to remove those restrictions, based on the results of effects monitoring studies. The Panel believes that, consequently, two options should be open to VBNC.

Recommendation 68

The Panel recommends that, in view of risks to waterfowl habitat and populations, and to the success of Aboriginal harvesting efforts, VBNC should pursue one of the following strategies to develop the airport in its proposed location.

- It should realign the runway so that aircraft would not fly directly

over the Gooselands, and operate the airport as a non-precision approach facility until new landing technology permits it to operate it as a Category 1 facility.

OR

- Before constructing and operating the proposed Category 1 airport, it should develop an air traffic management plan, which would include measures — up to and including temporary restriction of flights during critical migratory waterfowl staging periods — to ensure that flights would not unduly disturb waterfowl using the Gooselands or disrupt Aboriginal harvesting. The Plan should include effects monitoring provisions, and VBNC should remove air traffic restrictions only if the results of this monitoring justify doing so. The air traffic management plan should be subject to the review and recommendations of the Environmental Advisory Board.

Should the operation of the airport adversely affect Aboriginal harvesting, VBNC would be required to compensate resource users under the terms of a wildlife harvesting compensation program (see Chapter 14, Aboriginal Land Use and Historical Resources). However, the Panel emphasizes that relying on compensation is not an appropriate strategy, and that the purpose of alternatives identified in Recommendation 68 is to prevent adverse effects on the Gooselands.

14 ABORIGINAL LAND USE AND HISTORICAL RESOURCES

14.1 ABORIGINAL LAND USE

In its guidelines, the Panel indicated that it would consider the potential adverse effects of the Project on Aboriginal people's current use of lands and resources for traditional purposes, and also on such activities as tourism, outfiring, commercial harvesting and recreation, including opportunities foregone or precluded as a result of the Project.

Although project-caused changes to Aboriginal people's current use of lands and resources for traditional purposes is part of the definition of "environmental effect" under the *Canadian Environmental Assessment Act*, the Canadian Environmental Assessment Agency provides no guidance on how to define or document such use. The Panel is aware that "current use" can have a range of meanings. At a minimum, it means use during the last few years, because land use patterns vary and no single year can be considered fully representative. In its broadest sense, it means land use within "living memory" as recorded by the map biography method typically used to establish Aboriginal title or site-specific Aboriginal rights. This method produces a comprehensive record of the last 30 to 40 years and, for more limited purposes, a record as long as 60 to 70 years. The Panel indicated in its guidelines that it would consider land claims documentation for the purposes of establishing current use of lands and resources in the context of this review. To determine possible adverse effects of the Project and ways to remediate them, the Panel decided to focus on land and resource use patterns over approximately the last 20 years, and also on possible future uses.

The Labrador Inuit Association (LIA) referred the Panel to its original documentation of land use and occupancy (*Our Footprints are Everywhere*). It also submitted a report called *From Sina to Sikujaluk: Our Footprint*, which updated this information for the period 1977 to 1997. According

to these documents, the Voisey's Bay area and virtually all of the Landscape Region has been and continues to be in the core of Labrador Inuit territory, and there is much current and traditional use in the area. Inuit experts and participants at community sessions provided specific evidence of this use to the Panel.

The areas including and adjacent to the Project itself, along with the shipping route, are an important part of Nain's harvesting area for both subsistence harvesting and commercial fishing, and possibly for commercial shellfish harvesting in future as the local fishery diversifies. The Voisey's Bay stock complex accounts for the greatest part of the Nain char fishery. The area around Nain is the most heavily harvested of the entire north coast of Labrador. Peak harvesting periods are in spring (April and May) and fall (September through freeze-up in December), although people go out on the land and sea in every month of the year. In spring, people travel on the sea ice to many important fish and wildlife harvesting areas, including sites in Voisey's Bay for char and rock cod, and an area south of Paul's Island for seals. The latter is among the closest sealing sites to Nain. In fall, people travel to the bays for seals and wood, and to the coastal islands to hunt birds and hares.

While the Project site is on the margin of Innu territory, as indicated by maps provided by the Innu Nation, Innu have frequented the Voisey's Bay area for generations. Several Utshimassits elders told the Panel that they were born and raised in that area, and that they have a profound spiritual attachment to it. Innu use of the Voisey's Bay area appears to have diminished since Utshimassits (Davis Inlet) was established at its present location in 1967. Nonetheless, the area (particularly the Gooselands and the Reid Brook system) is important to several families for subsistence harvesting of a variety of fish, birds, small mammals, berries, black

bear and seals. Innu also travel on the sea ice, across the proposed ship track, to hunt caribou inland from Nain via the Fraser River.

The Project, especially the winter shipping route, would potentially affect other communities further south. Inuit and Settlers from other north coast communities, and even from Happy Valley–Goose Bay, travel to Nain along the coast, especially in winter, chiefly to gain access to the interior plateau to hunt caribou. Métis and others from the south coast of Labrador also travel to the Nain area to hunt caribou in some years. People in Cartwright expressed concern about the possible effects of accidental oil spills on birds and marine fisheries.

Other Aboriginal groups, such as Nunavik Inuit, the Naskapis Band of Quebec and Innu of Matimekush–Lac John at Schefferville, do not currently use the area itself. However, they assert interests that could be affected if the Project adversely affected caribou population levels or, for the Nunavik, polar bears or beluga.

Neither Inuit nor Innu provided the Panel with current documentation on harvest quantities, although they stated that country food continues to provide a substantial part of the local diet, and is important for both economic and health reasons.

14.2 HARVEST DISRUPTION

14.2.1 VBNC Assessment

VBNC predicts the following residual effects (described in detail in previous chapters) from normal operations:

- loss or alteration of harvesting areas;
- reduced access to harvesting areas; and
- loss of mobility or increased travelling times.

These, along with the sense of loss of control over the site, are rated as minor (not significant) during construction, operation and decommissioning, and negligible during post-

decommissioning. The effects of accidents, chiefly through contamination, are rated as moderate (significant), although of low probability.

VBNC indicated that it would designate a buffer area around the Project site as a no-hunting zone for safety reasons, resulting in some loss of access. The actual extent of this zone would be established in consultation with LIA and the Innu Nation.

VBNC proposes a number of mitigation measures, some of which have been discussed in detail in the chapters on fisheries, marine mammals, terrestrial wildlife and contaminants. The Project would be a fly-in/fly-out operation, with no resident population to create additional harvesting pressures. VBNC's policy is that no person working for VBNC or its contractors is permitted to hunt, trap or fish at any time during his or her work term at any VBNC camp or facility. At the end of each two-week shift, employees would be returned to their point of pick-up.

VBNC stated that it would negotiate a wildlife compensation agreement in the context of impact and benefit agreements (IBAs) to deal with residual effects. The company suggested that this fund might provide an agreed-upon amount for anticipated losses, with distribution to be decided by a board of elders or community representatives. It would compensate individuals for specific losses or damages, such as loss of property and equipment, or of harvesting opportunities. It would also compensate the community for general losses. Strict rules of evidence would not be required. A joint board with an independent chair would determine compensation for losses resulting from significant unplanned or accidental events.

14.2.2 Government and Public Concerns

Government and public participants stated concerns about the following potential adverse effects of the Project on lands, on access to resources, and on the abundance and quality of those resources:

- physical loss and disruption of habitat involving the loss of over 750 ha of habitat, including the lakes used as tailings facilities, as well as possible forest fires and possible adverse effects to the Reid Brook system, which could result in significant losses in the Voisey's Bay char stock;
- disturbance of wildlife — including the effects of shipping on seals, the effects of air traffic on the Gooselands, disruption of caribou movements on land and on sea ice, and the effects of oil spills on seabirds and marine mammals — which could change wildlife distribution, abundance and accessibility;
- contamination or tainting of fish, shellfish and wildlife by metals, oil spills or treatment effluent;
- additional harvesting pressures from workers on site, and kills of problem black bears and polar bears; and
- reduced access to important harvesting areas, such as the Claim Block itself and the port site at Edward's Cove, and the disruption of travel on the sea ice by winter shipping.

LIA indicated a more general concern that the combined effects of port activities, treatment effluent, oil spills and shipping could lead harvesters to avoid Anaktalak Bay altogether. LIA asserted that Inuit would have limited ability to harvest elsewhere, because the entire harvesting area around Nain is fully used.

LIA proposed that compensation should address effects as perceived by hunters, and should include compensation for dislocation and costs of moving to new areas, on a case by case basis. There should also be provision for compensation for major unplanned outcomes, such as a significant loss of char habitat in Reid Brook or waterfowl habitat in the Gooselands, with no burden of proof. LIA wants an absolute liability scheme that would deal with problems quickly as they arose. The Innu Nation approached

compensation as more of a communal matter, involving cultural as well as economic losses. It also suggested VBNC establish a fund to be administered by elders. Both organizations expressed concern about the adequacy of company liability insurance in the case of a major or catastrophic event.

Among other things, the Department of Fisheries and Oceans (DFO) recommended

- that the no-fishing policy on site be strictly enforced and that adequate resources be devoted to this purpose (DFO emphasized that this is VBNC's responsibility, not DFO's); and
- that VBNC evaluate the need for a program to monitor shellfish in the Edward's Cove area for metals, bacterial contamination and hydrocarbon tainting.

DFO also expressed concerns about the possible development of a black market involving unauthorized trafficking of country food between Aboriginal harvesters and site employees.

The provincial Forestry and Wildlife Branch recommended that the comprehensive no-hunting policy at the site include eggging.

CONCLUSIONS AND RECOMMENDATIONS

The Panel concludes that there would be a low probability of significant or widespread harvest disruption due to adverse effects on the abundance or quality of fish and wildlife resources in the Landscape Region, if VBNC's proposed mitigation methods succeeded, and if the relevant Panel recommendations in other chapters were adopted. Strict adherence to and enforcement of no-hunting and no-fishing policies would also be required.

Recommendation 69

The Panel recommends that VBNC continue its current no-hunting and no-fishing policy on site, and ensure

that it is strictly enforced. The policy should be expanded to include a ban on egging. The policy should also provide for termination of employment in the case of unlawful trafficking in fish and wildlife, and ensure that employees are made aware of these consequences.

Recommendation 70

The Panel recommends that VBNC implement its proposed policy of returning employees to their point of pick-up, to ensure that they cannot use the site as a base for hunting and fishing during their time off.

Nonetheless, the Panel considers that certain localized residual effects on animal abundance and quality might occur. Contamination or tainting of shellfish in the vicinity of the proposed port at Edward's Cove might be unavoidable. The affected area might not be extensive, as DFO advised the Panel that similar ports in the province have not experienced major adverse effects and that shellfish closures were in some cases restricted to about 100 m around the site. Nonetheless, if closures were required they could adversely affect future commercial opportunities as well as subsistence harvesting. The Panel has recommended that shellfish in Edward's Cove be monitored for metals, bacterial contamination and hydrocarbon tainting, as this is the site where such effects would most likely occur during operations (Recommendation 26). It is also possible that marine mammals might avoid at least the Edward's Cove area, if not a larger part of the head of Anaktalak Bay, for an unknown duration as a result of Project activities.

The Project might impair harvester access for long periods of time. Areas affected could include

- the Edward's Cove area due to port activities, and because harvesters might choose to avoid the area because of noise, industrial activities and the perceived risk of contamination;
- the areas adjacent to and south of the proposed shipping route during winter shipping, if safe and reliable crossings of the ship track could not be guaranteed; and
- the Gooselands, if mitigation measures were unsuccessful.

In combination, these effects could significantly displace harvesting efforts, to the disadvantage of individual harvesters and their families. If displacement was more than temporary, it could affect the overall success of harvesting of some species. Because of the potentially long-term and irreversible nature of these effects, the Panel concludes that they should be rated as moderate (significant) because they could affect a portion of the local harvester population for more than a generation. The Panel agrees that accidental events, should they occur, could also have significant adverse effects on harvesting.

The Panel recognizes that many Innu and Inuit might feel a loss of a particularly valued part of their homeland if they were displaced by these effects, and that such a loss would be irreversible from an aesthetic, recreational or spiritual perspective. There would be no mitigation for this. Nonetheless, VBNC would have to provide compensation to the extent possible for any harvest disruption that actually occurred.

Recommendation 71

The Panel recommends that VBNC reach agreement with LIA and the Innu Nation about harvesting compensation regimes before the Project is authorized. These compensation regimes should be negotiated in the

context of Impact Benefit Agreements and be in place before construction begins. They should include protocols for compensating Aboriginal people for

- increased harvesting costs incurred by displacement or impaired access;
- benefits they might have realized from commercial opportunities that they will not be able to exploit because of the Project;
- damage to equipment or property; and
- subsistence and commercial harvests that do not happen because the Project has reduced the abundance or impaired the quality of wildlife.

Liability should be sufficient to cover catastrophic events, and the harvesting compensation regime should apply to VBNC's contractors and subcontractors, including their shippers.

These compensation agreements should apply to both occasional individual losses and large-scale accidental or unforeseen events. VBNC should be assumed liable, unless there is proof to the contrary. Onus of proof of the extent and value of a loss should lie with the claimants, according to protocols established as part of the agreement. More baseline data on harvesting activities and outcomes might be needed to ensure that mitigation was working and to develop and implement an effective compensation program. If so, a program for data collection should be negotiated as part of the compensation agreement.

The Panel observes that Project activities might adversely affect traditional harvesters not covered by IBAs.

Recommendation 72

The Panel recommends that VBNC commit to providing compensation on a case by case basis for traditional harvesters, other than LIA or Innu Nation members, who may be adversely affected by, for example, disruption of travel on the sea ice in winter.

14.3 EFFECTS OF PROJECT EMPLOYMENT AND INCOME ON HARVESTING

Many participants at the public hearings were concerned about the possible effects of Project employment on their ability to harvest. They identified several possible outcomes, both positive and negative, of the trade-off between more income and less time. There were concerns about whether families would continue to get what they need from the land when they need it, and whether families would still be able to spend time in the country together, and to transmit the knowledge, skills and values of harvesting to future generations. Both Innu and Inuit insisted that the Project must not harm their ability to maintain harvesting as a source of income and as a way of life. They also stated that going to the country is much more than an economic activity; it has cultural, spiritual and recreational values that are part of their basic identity. Chapter 16 addresses those concerns more fully.

VBNC asserted that income from Project employment would enable harvesters to better equip themselves. At the same time, the rotational employment period — two weeks on followed by two weeks off — would give people reasonable opportunity to engage in harvesting activities. VBNC also stated that, in other Aboriginal communities, rotational employment has had a positive effect on harvesting, on balance.

With respect to monitoring and follow-up, VBNC indicated a willingness to contribute to research on levels of country food consumption

and on harvesting activities. It noted that funds for this could also come from the proposed Social and Cultural Protection Fund, whose mandate would include monitoring the broader social and economic effects of the Project and, where necessary, developing appropriate interventions. This fund could also finance programs to support harvesting.

The Panel considers that the effects of wage employment and income would probably, on balance, be beneficial for harvesting, although how individual harvesters and households respond to or experience these effects would vary. Experience elsewhere in the North suggests that subsistence harvesting economies are resilient in this respect, although the result would not necessarily be the same in northern Labrador. Effects should be monitored as part of a more general program of socio-economic monitoring (see Chapter 16), with a view to adjusting employment conditions, if required.

It is possible that one long-range effect of long-term, full-time employment on North Coast communities would be a shift in economic orientation from a predominantly seasonal mixture of employment and harvesting to year-round wage work, with most people doing only occasional harvesting. It is unlikely that the Project would be the sole cause of such a trend, which not all residents would regard as adverse.

14.4 HISTORICAL RESOURCES

14.4.1 VBNC Assessment

VBNC conducted historical resource assessments in 1995, 1996 and 1997 that covered part of the VBNC Claim Block. With the cooperation of LIA and the Innu Nation, VBNC also did an archeological assessment in 1996 that involved Innu and Inuit archeological researchers. While a uniform methodology was not applied to the historical resources assessment area, all areas were subject to a general visual inspection. If assessors felt an area could

hold historical resources, they used more intensive methods, such as close surface inspection and subsurface testing. VBNC also considered information gathered from personal interviews, a literature review, air photos, map analyses and a predictive model of archeological potential.

A total of 134 archeological and contemporary sites were identified in the assessment area. Most of these sites were found near the shores of Anaktalak Bay, Edward's Cove, Voisey's Bay and Kangelkualuk Bay, and in the Reid Brook Valley. Precise site locations were not published for resource protection reasons but the information was provided to the provincial government, LIA and the Innu Nation.

VBNC recognized that mining activity could destroy or alter some of the historical resources the company identified during its assessment. To mitigate these effects, VBNC developed the historical resources contingency plan, which will address protection during all phases of the Project. This plan includes a policy statement on protecting historical resources, standard operating procedures to be followed if an historical resource is discovered and specific mitigation measures to protect known historical resources.

Archeological sites and artifacts are protected under the provincial *Historical Resources Act*. This legislation ensures that developments such as the Voisey's Bay Mine and Mill Project, which are likely to alter, damage or destroy heritage resources, are regulated and monitored through archeological impact assessment before development begins. The Culture and Heritage Division of the provincial Department of Tourism, Culture and Recreation told the Panel in its submission that it would manage these matters if the Project is approved.

14.4.2 Government and Public Concerns

The Culture and Heritage Division found VBNC's approach to historical resources satisfactory. It did suggest that VBNC's 1995 historical resource contingency plan be updated

to reflect the current status of known archeological and historical resources, and to reflect potential within the historical resources assessment area.

LIA is seeking to secure Labrador Inuit rights to Inuit historical resources and to participate in the governance of their distribution. LIA has also included this issue in negotiations on the social and cultural provisions of its IBA.

LIA questioned the accuracy of VBNC's predictive model for historical resources because it feels it is not possible to predict the location of historical sites across a broad region based on what has already been found on a local scale. LIA also believes the provincial government's Cultural and Heritage Division lacks the resources to adequately monitor sites and compliance with the *Historical Resources Act*.

CONCLUSIONS AND RECOMMENDATIONS

The Panel agrees that a comprehensive plan to preserve historical resources is needed so that all sites would be identified and preserved appropriately. The cooperation shown by VBNC to date is encouraging but all parties must continue to be diligent in this area.

Recommendation 73

The Panel recommends that VBNC, as part of its environmental protection plan, reach agreement with LIA and the Innu Nation on the provisions of an historical resources protection and management plan, based on a revision of the existing historical resources contingency plan, before the Project is authorized. This plan should be negotiated in the context of Impact Benefit Agreements and be in place before construction begins.

15 EMPLOYMENT AND BUSINESS

VBNC predicted that, over the life of the Project, it would generate approximately 80,000 person-years of employment in the province, with slightly less than half being located in Labrador. This total includes direct employment (workers employed by VBNC or VBNC's contractors), indirect employment (workers employed at businesses supplying goods or services to VBNC), and induced employment (workers employed by businesses benefiting from the re-spending of direct and indirect income). In Labrador, VBNC estimates that 63 percent of total Project-related employment would be direct, 25 percent indirect and 12 percent induced. VBNC's total expenditures would be \$10.6 billion (\$8.2 billion for operations and \$2.4 billion for capital expenditures), of which \$3.3 billion would be spent in Labrador.

For North Coast communities, VBNC predicts that the main source of economic benefits would be direct employment, with the potential for some induced employment. Nain is a possible exception because its proximity to Voisey's Bay could give an advantage to certain types of business development. In Happy Valley-Goose Bay and Labrador West, VBNC sees more potential for indirect employment.

Many presenters had questions, concerns and suggestions about access to employment and business opportunities.

15.1 DIRECT EMPLOYMENT OPPORTUNITIES

In its guidelines, the Panel asked for specific information on educational, training and employment opportunities for local people, recognizing that employment opportunities at the Project would be directly linked to levels of education and training.

In the Environmental Impact Statement (EIS) and Additional Information, VBNC outlined the number and kinds of jobs expected to become available during each phase of the Project, the skills required for those jobs and the expected

duration of each job category. During the hearings, VBNC gave general information on the years of experience an employee would need to qualify for various jobs. VBNC also outlined the current situation for employment, education, training and skills on the local, regional and provincial levels. Based on these factors, VBNC projected the number, duration and type of jobs that would be available to workers throughout the province.

The Panel heard many concerns and suggestions from communities, organizations and individuals, particularly with respect to barriers to employment for people on the North Coast. Concerns focused on access (the ability to find out what work would be available, suitable training and other types of preparation, qualification requirements, the effects of potential unionization and hiring practices) and retention (VBNC's policies with respect to language and culture, harassment, and employee and family support).

Project construction will require an experienced and highly skilled workforce. VBNC pointed out that these jobs would be short term and would most likely be filled mainly by people from outside the local area because potential workers in North Coast communities lack the necessary experience and skills. VBNC expects workers to come from the island of Newfoundland to meet the demand. It estimates that North Coast communities would benefit from 29 percent of total employment (156 person-years) and income expected for Labrador during this phase.

During the open pit phase, VBNC expects more jobs to become available to the North Coast population as the overall number of workers increases. However, North Coast inhabitants would make up a smaller proportion of workers overall during this production stage. The Project would need a skilled, experienced workforce, and the demand for high school education as a minimum requirement would increase. Labrador

North Coast communities are projected to receive 21 percent of employment (242 person-years) and income benefits going to Labrador during the open pit phase.

During the underground phase, Labrador North Coast communities are projected to receive 20 percent of employment (325 person-years) and income benefits going to Labrador. VBNC anticipates that any workers who wished to qualify for underground jobs would be given the opportunity to train for this work during the open pit phase.

Though VBNC expressed confidence that the labour supply in Labrador would be adequate to fill its needs during the operations phases, it did not make predictions about the community breakdown of that supply. VBNC expressed caution about interpreting the employment numbers generated by economic modelling. It warned that these numbers are indicators or projections and not quotas. VBNC was confident that the fly-in/fly-out nature of the operations would give North Coast residents an advantage in access to employment, as people living in communities other than designated pick-up points would be responsible for paying the additional transportation costs.

As its main mitigative measure related to hiring, VBNC commits to applying the "adjacency principle." This principle gives first priority to residents "located in communities which are adjacent to the Company's mine/mill and smelter/refinery operations." During the hearings, VBNC said it would give preference first to qualified members of the Labrador Inuit Association (LIA) and the Innu Nation, then qualified residents of Labrador followed by qualified workers from the island portion of the province. VBNC says it is negotiating the details of the adjacency principle in the impact and benefit agreements (IBAs) and is committed to contracting only companies who would abide by the principle.

VBNC also committed itself during the hearings to considering people's life experience

as a basis for employment eligibility. It acknowledged that workers could bring many transferable skills from experience without meeting formal educational requirements. The development of a personal inventory of skills is part of the search and recognition program being delivered under the Multi-Party Training Plan discussed in Section 15.1.1.

VBNC stated on a number of occasions that it would require contractors and subcontractors to adhere to its policies regarding employment but did not say how it would monitor contractors' compliance.

VBNC also indicated that it would monitor "the numbers and types of workers employed." In the public technical session on training and labour, it also pointed out that the Province would require quarterly reports on VBNC's employment and business procurement figures.

15.1.1 Training Opportunities

VBNC acknowledged the barriers that Aboriginal people and women would face in getting employment at the mine site. The company has worked with the federal and provincial governments, the College of the North Atlantic, LIA, and the Sheshatshiu and Mushuau Innu band councils to create a Multi-Party Training Plan (MPTP) to provide pre-employment education and training for interested individuals. The MPTP, based on what the Panel believes to be a successful program developed in Saskatchewan, is designed specifically to attract Aboriginal people interested in qualifying for work at the proposed mine. VBNC also presented details of a women's pilot workshop that has been conducted as part of the MPTP.

A number of presenters expressed concerns that training must meet the needs of Aboriginal workers and that, therefore, Aboriginal groups should be involved in delivering it. LIA in particular stated that training programs should not be the sole responsibility of government agencies and VBNC. From its experience in

administering training programs using money from Post Pathways and the regional bilateral agreements between the federal government and Aboriginal groups, LIA believes that the greater the control it has over programming, the more successful such programming is.

LIA expressed frustration that MPTP money is not dedicated solely to training Aboriginal people. The initial \$1.3 million dedicated to the program has come from the Labour Market Development Agreement, which co-manages federal employment benefits. LIA expressed concern that this training money is available to all residents of Labrador and that only unemployed workers eligible for Employment Insurance (EI) may apply. It believes that these two requirements combined, especially the EI requirement, could make many Inuit ineligible for this training. Similar concerns could presumably apply to residents of Innu communities also, although the current Sango Bay construction project may result in a different situation in Utshimassits.

The Panel recognizes that training opportunities should be open to all residents of Labrador, but concludes that current restrictions of the MPTP, combined with the high levels of chronic unemployment in North Coast communities, may mean that Aboriginal residents would be unable to benefit from the provisions of the adjacency principle.

Recommendation 74

The Panel recommends that, to improve access to appropriate training opportunities for as many North Coast residents as possible, the parties involved in the Multi-Party Training Program (the federal and provincial governments, the Innu Nation, LIA, the College of the North Atlantic and VBNC) collaborate to identify new or reallocate existing resources to ensure that Aboriginal participants who do not meet the Employment Insurance

eligibility requirements could still qualify for training assistance.

The Province expressed concern that there is insufficient information about the specialized training that would be needed over and above the basic entry-level requirements. Though on-the-job training would be VBNC's responsibility, the Province believes that such information is needed to build a more unified approach to training. The Building, Construction and Trades Council recommended development of a comprehensive skills inventory to track the skills available in the workforce. The Council feared that, without such an inventory, an oversupply of tradespeople could be created, and individuals would waste time and money getting trained with little chance of eventual employment.

Recommendation 75

The Panel recommends that the Province, in cooperation with VBNC, LIA, the Innu Nation and the College of the North Atlantic, coordinate the development of a skills inventory to help parties develop both appropriate training programs and individual career planning.

Another training issue raised was how to help workers get the training and experience they need to work at the mine during the operations phases. In the public hearings, VBNC outlined plans to train LIA and Innu Nation members at other mine sites; these trainees could then become mentors at the Project. The Building, Construction and Trades Council recommended using the construction phase to help workers in training gain their journeyman status. This practice, known as "featherbedding," requires a fully accredited employee to work with the trainee. Because of its financial implications, it needs to be built into Project planning right from the beginning. The Council also alerted the

Panel to safety concerns that arise when employers use inexperienced workers on construction sites without adequate supervision. "Featherbedding" also helps to address this issue.

Some North Coast residents probably already have suitable skills and experience and VBNC should make every effort to recruit them during the construction phase. The Panel acknowledges, however, that the Project may not employ large numbers of Aboriginal workers during construction, because of the specialized skills required and the short duration of the work. The Panel concludes that it makes little sense to mount an extensive effort to train new construction workers, given the transient nature of the work. Instead, the Panel endorses VBNC's mentoring proposal and agrees with the Building, Construction and Trades Council that the construction phase should be used to give on-the-job experience to workers who will then be able to "graduate" to longer-term work in subsequent phases of the Project.

Recommendation 76

The Panel recommends that VBNC, in consultation with LIA and the Innu Nation and prior to Project approval, establish a quota for apprenticeships during the construction phase, with emphasis on skills that would be transferable to the operations phases. Through the tendering process, VBNC should require contractors to establish these apprenticeship positions.

As another barrier to training opportunities, both Inuit and Innu presenters described the alienation and loneliness North Coast residents often feel when they travel to larger centres to take a training or education program, especially if there are few or no other Aboriginal participants. Aboriginal women entering non-traditional occupations can face a double barrier. LIA's experience shows that locating training programs

in participants' home communities results in higher retention and success rates.

From evidence presented, the Panel believes that retention of participants in training could become an issue. Therefore, every attempt must be made to group sufficient numbers of workers from similar backgrounds together in training programs. Locating training centres in North Coast communities, where possible, could help VBNC overcome this potential difficulty. However, the company would need to use other types of affirmative action, particularly in the case of women, so that participants would not feel isolated and therefore be more likely to drop out. The Panel recognizes the value of VBNC's search and recognition process, including the effort to train Aboriginal trainers. The Panel believes that involving LIA and the Innu Nation in developing and implementing this process would make the process more credible and culturally relevant, and thus more effective.

VBNC would need to put extra effort into the search and recognition process to attract women who may want to work at the Project, but who feel inexperienced or daunted by a variety of barriers.

Recommendation 77

The Panel recommends that, upon Project approval, the parties to the Multi-Party Training Plan develop a strategy for doing the following:

- **locating some training programs, beyond adult basic education, in appropriate North Coast communities;**
- **developing formal and informal support programs, such as support groups, counselling or mentoring, for Aboriginal students who have to leave their home communities for training;**

- **providing extra supports, such as child care, to give women, especially single-parent women, equal access to training;**
- **developing a monitoring program to track training outcomes — including trainees' participation in, completion of or failure to complete the program, and their ability to obtain employment — to help the parties improve the program, as necessary.**

Recommendation 78

The Panel recommends that VBNC, to build on the search and recognition process, work in partnership with LIA and the Innu Nation to further develop and implement the process. LIA and the Innu Nation should play the major role in workshop delivery. This partnership should involve the Tongamiut Inuit Annait and Innu women designated by the Innu Nation, to ensure that the search and recognition workshops for women respond effectively to the concerns and requirements of Aboriginal women.

15.1.2 Unionization

Some presenters expressed concerns that unionization of the Project workforce might limit local residents' access to employment. Because of the provincial labour regime, all recent major construction projects in the province have employed unionized workers and the Panel was told that this would likely be the case for the construction of the Voisey's Bay Project.

The operations phases would not automatically fall under a legislated union regime. However, presenters feared that a union coming in during the operations phases could require VBNC to hire workers from outside the area

and that such a situation could nullify the adjacency principle. During the hearings, the Province clarified this issue. If the workplace were to become unionized during operations, VBNC would have to negotiate a collective agreement with the bargaining agent that included all commitments made to LIA and the Innu Nation through the IBAs, which are also binding agreements. Evidence was presented, both in hearings and in written documentation, of similar situations where collective agreements have honoured commitments made by employers in IBAs.

The Panel therefore concludes that if the IBAs include the adjacency principle as an enforceable provision, unionization will not act as a barrier to local employment.

15.1.3 Employment Access for Communities South of Rigolet

The EIS gave brief attention to the communities on the South Coast and the Labrador Straits. It indicated that these areas jointly account for 17 percent of the population of Labrador, but predicted that they would obtain less than 3 percent of total Project employment and income. VBNC has not designated any community on the South Coast as a pick-up point but stated that it would monitor the numbers of employees coming from the area and consider designating a pick-up point there if numbers warranted.

The Panel heard from presenters in Cartwright, including the Labrador Métis Nation, that the absence of a designated pick-up point represented a significant barrier to employment. South Coast residents wanting work at the Project would have to pay the extra transportation costs to get to Goose Bay or move there. If VBNC provided transportation to even one South Coast community, it would increase residents' employment options. It is also possible that South Coast communities may soon be linked by road.

The Panel agrees that, to ensure that South Coast residents benefit from the provisions of the adjacency principle (after members of LIA and the Innu Nation, preference will be given to other Labrador residents), VBNC should locate a pick-up point in this area.

Recommendation 79

The Panel recommends that VBNC designate Cartwright as a pick-up point for Project employment, and consider the possibility of a pick-up point in an additional community south of Cartwright, if circumstances warrant.

15.1.4 Language and Cultural Concerns

To help Aboriginal people adjust to the workplace, and to help the workplace accommodate Aboriginal workers, VBNC proposed the following mitigative measures:

- hiring Aboriginal employment coordinators who would be involved with employee relations, which would begin with the hiring process and extend to interaction with the community;
- serving country food on site, when feasible;
- providing an employee assistance plan to cover the needs of workers and their families as they adjust to rotational work at the mine;
- having interpreters on site to assist workers who are not fluent in English;
- allowing for a two-week cultural leave without pay, which, together with vacation time, could permit two six-week breaks that workers could use for harvesting purposes; and
- providing cross-cultural training for both non-Aboriginal and Aboriginal workers.

LIA and the Innu Nation, as well as individual members, expressed many concerns about the ability of VBNC to accommodate Aboriginal

culture at the mine and mill site. They were concerned about Aboriginal workers' ability to use their own languages at the work site, to get country food in the cafeteria and to have flexible schedules to accommodate their lifestyle.

VBNC stated that English would be the working language at the mine site, and presented statistics suggesting 97.5 percent of people in Inuit communities and 88 percent of people in Innu communities speak English. Based on their own research, both LIA and the Innu Nation questioned the validity of these numbers, as well as the definition of the ability to speak a language. Both Aboriginal groups expressed concerns about safety in the workplace if Aboriginal languages could not be used in some situations.

LIA recommended that, where possible, special situations be set up to accommodate language needs. As an example, LIA suggested that communication systems between dispatchers and haulage truck drivers could be set up to accommodate the use of Inuktitut or Innu-Eimun, if all the workers on a given shift spoke the same language.

The Panel believes that cultural issues would present a major challenge to VBNC and to workers, with language being only one issue. Individuals in coastal communities suggested that Aboriginal workers would encounter many difficulties in trying to fit into the mining workplace. The Panel heard stories of Aboriginal workers who had experienced sexual and racial harassment, or who felt their personal situations were not understood and had therefore left the workplace. The Panel also heard examples of expectations that VBNC would not be able to meet. For example, one man wondered why a worker could not just decide to stay for a longer shift if he or she had no reason to go home.

In several communities, presenters raised the issue of company policies relating to dismissal of employees for infractions of workplace rules, such as possession of drugs or alcohol. VBNC's

right to enforce these rules was not challenged, but some participants encouraged VBNC to develop fair policies that would make such employees eligible for "second chance" re-hiring after an appropriate period of time.

The Panel believes that retaining Aboriginal workers would be an important challenge for VBNC, and for LIA and the Innu Nation, if the Project were to continue to deliver durable and equitable social benefits. Becoming qualified and obtaining work would be a significant hurdle for many Aboriginal employees, but adapting to the demands and constraints of a rotational schedule, long shifts and an industrial workplace could be a much larger hurdle over time, especially for individuals who would already be dealing with social problems such as substance abuse or who would face significant family or community pressures during their two weeks at home.

At the same time, the Panel is aware of other northern mining projects with large and stable Aboriginal workforces. VBNC presented literature to the Panel during the hearings that gave some examples of ways in which Aboriginal communities have worked with companies to create situations where workers can carry on their community and traditional lives while holding down paying jobs in the mining industry.

The Panel commends VBNC for its proposed mitigative measures to promote retention of Aboriginal employees, and suggests that VBNC should rigorously apply its policy of continuous improvement in this area by monitoring employee retention success and reasons that individuals leave. The Panel is concerned that, despite good intentions, it might seem easier to VBNC to replace an Aboriginal employee who leaves, voluntarily or otherwise, with a non-Aboriginal employee with ample mining experience, rather than to make further changes to working conditions or to give Aboriginal employees a second chance.

Recommendation 80

The Panel recommends that, before hiring Aboriginal employment coordinators, VBNC set up a joint committee with LIA and the Innu Nation to finalize job descriptions and requirements for these coordinators. This committee should also work with the coordinators to establish guidelines for the anti-racism and cross-cultural programs to be delivered on site.

Recommendation 81

The Panel recommends that VBNC develop a policy to establish the process and criteria to be used to determine if and when an employee who leaves voluntarily or is dismissed for just cause can re-apply for employment on the Project. Through its Aboriginal employment coordinators, VBNC should be prepared to work with prospective employees to discuss ways VBNC can personally support them in a second employment attempt, and ways in which VBNC can address specific workplace problems.

The policy should provide a reasonable second chance, with appropriate conditions, to employees who may have experienced difficulty in adapting to an industrial workplace and rotational schedule, but who wish to make a second attempt.

Recommendation 82

The Panel recommends that VBNC, through the Aboriginal employment coordinators, monitor Aboriginal employee satisfaction with language and cultural aspects of the workplace, including reasons why Aboriginal

employees leave, and use this information to maintain and improve the Aboriginal employee retention rate.

15.1.5 Women's Employment

Women from Labrador talked about the barriers that women would face in getting access to potential jobs at the proposed mine site. A representative from the Labrador West Status of Women Council, speaking about the inequality of opportunity that exists for women, said that women want "equality of opportunity; equality of choice; equality of safety; equality of rights; equality of financial security and independence; equality of access to education and training; equality of being able to use that training and education in the job market; equality of access to the benefits of the resources of our land."

Many people pointed out that the mining industry continues to be a male-dominated workplace, with women's participation across the country remaining fairly steady at 10 to 11 percent of total employment. According to the figures presented by the Women's Resource Development Committee (WRDC), the percentage of women in Atlantic Canada employed in the joint category of mining and construction trades is 1.8 percent.

VBNC has said it is willing to try to change this ratio for the Voisey's Bay Project and has indicated a commitment to employment equity. VBNC informed the Panel that, as a subsidiary of Inco, it is covered by federal employment equity legislation. Some of VBNC's efforts have included a pilot workshop for women as part of the search and recognition process, and the development of a women's employment plan and a harassment policy, which covers both racial and sexual harassment. While these efforts were acknowledged, women's groups who appeared before the Panel believed that VBNC needed to go farther. In particular, WRDC expressed concern that the women's employment plan submitted by VBNC during the hearings process falls far

short of a full employment equity process.

VBNC has developed a policy on sexual harassment addressing such issues as sexist jokes, display of material of a sexual nature and sexually degrading words. Several presenters, however, including the provincial Women's Policy Office, indicated that women will also experience more subtle behaviours that can contribute to a "poisoned" workplace for women. This is seen as being particularly true for workplaces where the most occupations are those in which women have been traditionally under-represented. There is also concern that Aboriginal women could be particularly vulnerable. Presenters therefore recommended that VBNC address the broader issue of gender harassment.

Both government and community groups suggested that VBNC would not show real commitment to employment equity unless it developed an affirmative action plan that set measurable goals. Similarly, VBNC should set measurable goals for its cross-cultural and gender sensitivity training. Some presenters stated that VBNC had not consulted women's groups sufficiently in developing existing programs, and had not incorporated advice from groups such as WRDC that have extensive experience in developing effective employment equity programs.

Presenters also said VBNC should carry out comprehensive gender-based analysis, defined in one submission on behalf of Inuit and Innu women and the Newfoundland and Labrador office of Women in Trades and Technology as "analysis that takes account of women, their reality, experiences, and the issues of importance to them." These presenters also advocated involving women in all aspects of program planning, from defining research topics to integrating women fully as sources of information.

The Panel believes that with women's issues, as with the concerns of Aboriginal people in general, VBNC needs to develop a fully consultative process in which concerned groups help develop programs that affect their lives.

Recommendation 83

The Panel recommends that VBNC, prior to Project authorization, revise existing VBNC employment assistance programs — including, but not limited to, the women’s employment plan and the harassment policy — to address women’s concerns. In developing the revised programs VBNC should

- **hold consultations with Innu Women chosen by the Innu Nation and with representatives from Tongamiut Inuit Annait, Women’s Resource Development Committee, the Provincial Advisory Council on the Status of Women and the Women’s Policy Office of the provincial government;**
- **use gender-based analysis; and**
- **include measurable goals and procedures to monitor compliance with federal employment equity legislation and the provincial government’s harassment policy.**

A number of women told the Panel that another barrier to women’s employment is their responsibility for providing child and elder care. In scoping sessions and the hearings, participants discussed ways child care might be provided during the Project. Tongamiut Inuit Annait (TIA) members strongly advocated on-site child care for mothers with preschoolers, because two weeks away from home is a long time for parents with younger children.

The Panel recognizes the legitimacy of women’s concerns around child and elder care, as well as VBNC’s position that child care at the work site is not practical, given the nature of the industrial workplace and accommodations and the reality that employees will be working 12-hour shifts, with little time left to give to family respon-

sibilities on site. The Panel also believes that VBNC, LIA and the Innu Nation have a responsibility to remove barriers to women’s participation in the Project workforce, to the extent possible.

The Panel believes that the best approach would be to develop or augment a reasonable program of child care in the individual communities. While 24-hour care is probably neither affordable nor even desirable, a service offering care during regular or extended working hours would assist extended family members who might be looking after the children of Project employees, and would also allow women and men to take advantage of Project-related employment in the community. Developing such a service should be the responsibility of LIA and the Innu Nation, with assistance from the Province. VBNC should contribute resources through IBA payments.

Recognizing that family emergencies could occur and be extremely stressful to employees, VBNC should also support employees with family responsibilities by providing emergency leave.

Recommendation 84

The Panel recommends that, during bilateral negotiations related to impact and benefit agreements, VBNC, LIA and the Innu Nation address resource requirements that would permit LIA and the Innu Nation to develop a comprehensive program of community child care for families with a parent or parents at the work site.

Recommendation 85

The Panel recommends that VBNC develop a policy to provide for family leave for employees with child care or elder care responsibilities who face an emergency situation.

The Panel notes that it heard from a significant number of Inuit women who were

not convinced that the IBA negotiations were addressing women's concerns and issues, of which child care is one. The Panel is not privy to these negotiations and therefore cannot comment on the accuracy of these observations. However, LIA did indicate its intention to ensure that women are consulted and involved and that women's interests are fully addressed. The Panel would encourage LIA to review the comments and concerns of women who spoke at the hearings and to work with TIA and other Inuit organizations to address outstanding issues.

15.1.6 Employee Assistance Program and IBAs

VBNC acknowledged many of the employment barriers facing North Coast residents, and indicated that its main mitigative measures would be the employee assistance program (EAP) and specific provisions to be negotiated in IBAs.

VBNC would provide the EAP to employees and their immediate families. It will include initial counselling by the Aboriginal employment coordinator; referrals; additional services provided by other agencies or medical staff; counselling and awareness programs on subjects including financial management, stress, family violence and substance abuse; and workplace orientation sessions for new employees.

According to a joint presentation made by the Innu Nation and VBNC, the Innu Nation IBA will include the following provisions to help Aboriginal men and women obtain employment:

- an education and training program;
- an agreement in principle to set quantified employment objectives as part of VBNC's commitment to the adjacency principle;
- specific measures to ensure that formal educational requirements are not a barrier to Innu employment;
- the hiring of an Innu employment coordinator who would participate in the interview and selection process for all job candidates;

- measures to create a workplace that respects Innu culture and values and helps the Project function effectively and efficiently; and
- a workplace conditions program that would include measures such as an anti-discrimination policy, mandatory cross-cultural programs for all employees, a mentoring program run by and for Innu employees, access to country food, and provisions for cultural leave and job sharing.

While LIA and VBNC did not present this level of detail about their IBA negotiations, the Panel understands that LIA has similar concerns. LIA pointed out that it had not yet reached agreement with VBNC on employment preferences for Inuit, including ways to deal with the principle of adjacency. It also indicated that the parties had not reached agreement on gender equity issues, such as the training of Inuit women, the participation of Inuit women in the workforce, the development of gender sensitive workplace conditions, and the representation of women on the proposed IBA implementation committee.

15.2 BUSINESS OPPORTUNITIES

VBNC provided a preliminary list of likely business contracts that the Project would require, and information on the distribution of business benefits during the exploration stage. It also indicated that it was carrying out a business supply capability study in Labrador and the rest of the Province, the results of which would have to remain confidential. This study will include a determination of national benchmarks. VBNC's estimates of indirect employment and income in the EIS were not based on this more detailed study.

VBNC indicated that Labrador businesses have a wide diversity of experience in delivering goods and services. Labrador West has considerable experience in serving the mining industry, and Happy Valley-Goose Bay has been a transportation

hub and a centre of international military flying operations for many years. North Coast and other communities in Labrador have had little opportunity to develop large-scale business experience and are hindered by limited transportation infrastructure.

VBNC therefore predicts that Happy Valley–Goose Bay and Labrador West will draw the main business benefits from the Project, though Nain may be able to take advantage of its proximity to the site. VBNC noted, however, that both the Innu Nation and the Labrador Inuit Development Commission (LIDC) have been discussing possible joint ventures with other companies to enhance their capacity to bid on Project contracts.

15.2.1 Projected Economic Benefits and Effects

VBNC predicts that the Project would substantially diversify local economies in Labrador, although it does not provide much detail about how this would happen. As quantified by VBNC, the key economic benefits to local, regional and provincial businesses over the life of the Project would be as follows:

- Labrador and Newfoundland businesses and workers would capture 16 percent of the expenditures on goods and services;
- Labrador firms would supply nearly 43 percent of the purchases made within the province, amounting to \$2 billion; and
- indirect employment would generate incomes totalling \$1.48 billion across the whole province, with \$436 million going to Labrador and \$74 million to the Labrador North Coast.

VBNC suggests that, for the North Coast in particular, higher income levels associated with increased participation in the waged economy would induce employment growth, through increased retail trade and business growth associated with improved infrastructure and services.

These projections are greater for Nain than for the rest of the coast because of predicted in-migration to Nain. In general, predictions of increased induced business are greater for larger centres.

During the hearings, VBNC updated the information from the Industrial Benefits Monitoring Program, which was described in the EIS. VBNC reported that to date \$55 million out of an approximate total of \$127 million allocated to the province has been spent in Labrador on goods and services for the Project. Both LIA and the Innu Nation expressed dissatisfaction with the benefits that have accrued to Aboriginal businesses to date. In a document submitted during the hearings, VBNC indicated that it expects to improve its record through the business opportunities chapter of the IBAs.

During the hearings, VBNC said that it wanted the IBAs to include measures to give Aboriginal people opportunities to participate in the Project. Two of the measures mentioned were business participation objectives and preferences for business opportunities. At the same time, VBNC pointed out opportunity was only one part of the equation, the other being supply capacity.

To increase Aboriginal business capacity, VBNC committed to supporting a revolving business loan fund and a business centre. It reported that it had met with working groups on several occasions to identify contracting opportunities that the Project would create. These working groups discussed measures that LIA and the Innu Nation could take to pursue contracts. VBNC pointed out, as well, that both LIA and the Innu Nation had established separate joint venture companies that had successfully bid on contracts for camp operation and maintenance (LIA), and camp catering and housekeeping (Innu Nation).

The EIS assesses the negative environmental effects on businesses and related employment during construction and operations as minor, indicating that they will be short term and highly

reversible over time. The effects identified in the EIS include the following.

- some business disruption as businesses give priority to the mine rather than to regular customers;
- business closures due to increased competition;
- wage inflation because of the pressure on businesses to compete with wages at the mine; and
- labour force displacement, either to the mine or to businesses that offer better paying jobs because they serve the mine.

15.2.2 Mitigation Measures

As with direct employment, VBNC stated that it would try to enhance local business participation and reduce negative effects by applying the adjacency principle when buying goods and services, and through specific provisions in IBAs. VBNC did not provide details about the way the adjacency principle would work for businesses.

VBNC does say in the EIS that IBAs would ensure significant employment and business opportunities for members of LIA and the Innu Nation. As one example, VBNC indicated at the hearings that they are negotiating with the Innu Nation to form a Business Development Advisory Committee that will promote the involvement of Innu businesses and create more employment opportunities in Innu communities. Similar provisions are being negotiated in the LIA IBA. VBNC also believes that IBAs would enhance business organizations through increased funding and therefore increase the capacity of Innu and Inuit to shape their own economic future.

15.2.3 Public and Government Concerns

At the hearings, a number of presenters indicated that the Project would need to last at least 20 years to benefit Labrador businesses and spur economic diversification. Chapter 3, Project Need and Resource Stewardship, addresses this issue.

A second major concern related to the procurement of goods and services. Presenters speaking on behalf of businesses in the Happy Valley–Goose Bay area, Labrador West and the North Coast all stated that they did not have sufficient information about VBNC's requirements to plan for the future. For example, they did not know what types of goods VBNC would back-haul on the concentrate carriers and which goods the company could buy from Labrador businesses. Presenters also asked about contracting procedures and whether they would be given fair opportunity to bid on contracts. The Atlantic Canada Opportunities Agency (ACOA) indicated that VBNC should address these concerns by developing an explicit supplier development strategy to provide timely information and establish contracting procedures to help local businesses compete on an equal footing.

Business groups in Labrador City and Wabush were concerned that VBNC would accept bids for materials delivered to the concentrate discharge location or another port outside Labrador, and would incur the freight charges to Edward's Cove. This would disadvantage any local quotes for materials on which suppliers had already incurred transportation costs to Labrador.

Both LIA and the Innu Nation talked about the difficulties local businesses experienced when trying to get access to business opportunities during the Project's exploration stage. LIDC stated that Aboriginal enterprises would need special assistance to qualify for contracts, because they are not used to dealing with large-scale developments.

Both groups reiterated that the Project should not go ahead before IBAs are in place, since IBAs would include specific provisions to assist Aboriginal businesses and resources to help them branch out into other economic development ventures, thereby creating longer term durable benefits for their communities. As indicated in Recommendation 5, the Panel concurs with this conclusion.

CONCLUSIONS AND RECOMMENDATIONS

The Panel believes it is important to ensure that existing and new Labrador businesses maximize their participation in the Project because

- according to VBNC's predictions, at least 25 percent of the Project's economic benefit to Labrador would come in the form of indirect employment and income; and
- local business growth would provide a wider range of opportunities for people to participate, especially since not everyone would either want or be able to work at a fly-in/fly-out mining operation.

The Panel agrees with many presenters that Labrador businesses need more information about VBNC's requirements for services and supplies to be able to plan. The company has not yet chosen the ultimate destination of the concentrate carriers. The Panel believes that destination would affect the company's decisions about where to obtain certain supplies, with implications both for suppliers and for transportation and handling businesses in Labrador.

The Panel observes that VBNC has not explained how it would apply the adjacency principle to the procurement of goods and services. Although, in the EIS, the company outlines the record of various commute mines in procuring goods and services from nearby businesses, it does not commit itself to a particular plan. The EIS presents a much more positive picture for the Upper Lake Melville region than it does for the North Coast. The most it offers the North Coast is "best efforts...to award contracts on the basis of price, quality and other relevant value factors." (EIS 21.2.5.1)

The Panel recognizes that factors relating to location, business experience in general and mining experience in particular will tend to favour the larger centres in Labrador. However, the Panel believes that the Project should also contribute significantly to Aboriginal business development in North Coast communities. This would require VBNC to make specific commitments, pursue specific actions and apply its policy of continuous improvement.

The Panel agrees with ACOA that VBNC would need to develop a strategy, with measurable goals and a monitoring process, to ensure that potential suppliers in Labrador had every opportunity to prepare and to compete, and that VBNC's communication, tendering and contracting procedures should help the company realize or better the economic benefits predicted in the EIS.

Recommendation 86

The Panel recommends that, as soon as possible and before construction, VBNC, in consultation with representatives of Aboriginal and other Labrador businesses and relevant federal and provincial agencies, establish an explicit supplier development strategy that includes contract procurement procedures and supplier development initiatives. The strategy should include objectives for Aboriginal and Labrador procurement that the company could monitor and evaluate. All provisions of this strategy should conform to commitments made in Impact Benefit Agreements.

16 FAMILY AND COMMUNITY LIFE, AND PUBLIC SERVICES

16.1 EFFECTS ON COMMUNITIES AND FAMILIES

The Project would be the first large-scale industrial development in northern Labrador. For many Aboriginal people working at the site, and for their families, this would be their first experience with an industrial work site (and, more specifically, a mining operation), a fly-in/fly-out system, 12-hour shifts and industrial wages. With the exception of Nain, VBNC does not predict that the Project would significantly change the size or demographics of various Labrador communities. Therefore, VBNC expects that the Project would affect individuals, families and communities mainly through direct employment.

During the hearings, many presenters talked about the significance of locating a large mine/mill operation on traditional Aboriginal lands and of regularly breaking through the landfast ice. They indicated that this would also profoundly affect families and communities, whether or not they chose to work at the Project.

This chapter focuses mainly on family and community effects on the North Coast, and addresses specific implications for Nain because it is the community nearest to the Project.

16.1.1 VBNC Assessment

VBNC characterized the Inuit and Innu communities of northern Labrador as having below average income, above average population growth, and above average social and health problems. According to the 1991 Census of Canada, average family income in Labrador was \$50,854. Family incomes in northern Labrador ranged from a low of 40 percent of the Labrador average in Utshimassits to a high of 67 percent in Makkovik. The Panel observes that the Labrador average is significantly higher than the provincial average; however, as VBNC noted, most Innu and Inuit households are 20 to 40 percent larger than the Labrador average. Fifty-three percent of the

North Coast population is under 25, compared to the Labrador average of about 40 percent.

VBNC stated that substance abuse remains one of the most significant social problems for Inuit and Innu families and communities. Substance abuse is also directly related to incidents of crime and family violence. VBNC linked other social problems, such as the higher incidence of disease, mortality and suicide in northern Labrador, to the poor socio-economic conditions in the region. The Environmental Impact Statement (EIS) notes that the suicide rate in northern Labrador between 1979 and 1983 was twice the national rate for Aboriginal people and five times the overall national rate. Cuts in transfer payments to municipalities from the Province have reduced social services and infrastructure.

VBNC observed that, despite these problems, strong family bonds continue, as do many other positive aspects of life in northern Labrador. VBNC also acknowledged that the people of northern Labrador value their culture, language and spirituality highly.

VBNC predicts that, without the Project, population and the demand for housing and municipal services will continue to grow, and that this will compound many existing family, social and health problems in the communities. Land claims settlements will have a positive effect, permitting greater autonomy and providing the means to improve living conditions. However, VBNC predicts that economic conditions will not substantially improve for some time, and therefore the incidence of substance abuse, family violence and suicide may remain high. The relocation of Utshimassits will provide employment benefits to Mushuau Innu for several years and benefit family and community life in the long term.

Project Effects

VBNC predicts that demographic change, as shown in Table 2 below, would occur mainly in

Nain, because it is the closest community to the Project, and in Happy Valley–Goose Bay and Labrador West, because these two regions could be principal service centres for the mine. In-migration related to direct jobs would likely be highest during the underground phase, when the Project would need highly skilled and specialized workers.

TABLE 2: DEMOGRAPHIC PREDICTIONS

	Existing Population	Predicted In-Migrant Workers ¹	Predicted In-Migration ²
Nain	1,209	0-45	0-140
Happy Valley–Goose Bay	8,655	0-76	0-204
Labrador West	10,473	0-70	0-187

¹ Range predicted over the life of the Project.

² Workers and families.

VBNC identified a number of potential adverse effects related to the Project, including work-related stress, income differentials, cost of living increases and social problems. For example, for many people working on the Project, it would be their first time in full-time industrial work. This would be stressful for those not used to working on a rigid schedule in an industrial or office environment. VBNC also noted that people who did not receive jobs, or who were further marginalized by environmental and cultural change, would also experience stress.

Most Project employees would work on a two-weeks-on, two-weeks-off rotating schedule. VBNC acknowledged that commuting workers and their families could experience emotional problems associated with the rotational schedule. Relatively high salaries might lead to money management problems and, combined with the intensive work schedule, might promote binge drinking or spending when workers returned home at the end of their rotation.

Mitigation

VBNC stated that the key mitigation measures would be the fly-in/fly-out basis of the operation,

and impact and benefit agreements (IBAs), along with land claims settlements.

VBNC selected a fly-in/fly-out mode of operation over a permanent town because it considers that option more attractive to workers, more cost effective and consistent with current practice in northern mining operations. VBNC indicated that the higher transport costs associated with a fly-in/fly-out mode would be more than offset by reduced costs for construction, maintenance, closure and employee relocation.

VBNC predicts that the fly-in/fly-out mode of operation, and the designation of each North Coast community as a pick-up and drop-off point, would discourage migration to, from and among those communities. The adjacency principle, which would give hiring priority to members of the Labrador Inuit Association (LIA) and the Innu Nation, would be a further disincentive, as moving to a North Coast community would not give in-migrants an employment advantage. VBNC therefore predicts that most communities would continue to grow at the same rates as in the recent past, with the probable exception of Nain, where in-migration is expected to be high during the open pit and underground phases.

Since there would be no Project town site, VBNC stated that no one would be forced to relocate to obtain employment. The fly-in/fly-out operation would allow Aboriginal employees to enter the industrial workforce while remaining in their home communities, where they are supported by friends and family in a familiar environment. This should help mitigate the stress some workers could experience from being in an industrial workplace for the first time. As well, the seasonal operation during the start-up phase of the Project would serve as an adjustment period for these workers. VBNC noted that employees and their families might choose to move to other designated pick-up communities for several reasons: to be near

family, to take advantage of more employment opportunities for other family members, or to get access to a greater range of health, social, recreational, educational or retail services.

While the specific content of the IBAs under negotiation are confidential, the Panel heard presentations from VBNC, the Innu Nation and LIA outlining the matters covered by the IBAs. Most of the items relate to employment, working conditions and business opportunities, and are discussed in Chapter 15, Employment and Business. However, other items relate to environmental management, social and cultural protection, access to and use of the Project area, and financial compensation. They are intended to provide benefits to Innu and Inuit who do not work at the site or supply the Project. VBNC indicated that certain elements of the employee assistance plan (EAP) would also be available to families of employees. These elements would include

- counselling and awareness programs on matters such as financial management, stress, family violence and substance abuse;
- the services of Aboriginal employment coordinators, who would work with employees and their communities; and
- off-site counselling for drug and alcohol problems.

VBNC stated that the social and cultural protection fund, contemplated in IBAs, would promote the individual and collective well-being of Innu and Inuit through social, cultural and civic activities.

VBNC also indicated that many family problems that the Project might create or aggravate could best be addressed through existing community-based services. These include the services provided by the provincial Department of Health and Community Services, which is responsible for health care facilities, community-based health services and social

services. These are delivered in Labrador through a regional board, the Health Labrador Corporation. Public health nursing services in Inuit and Innu communities have been devolved to the Labrador Inuit Health Commission and Innu band councils.

Residual Effects

VBNC predicts that the construction phase would be the only period that would create significant residual effects for North Coast families and communities. Otherwise, the company predicted that residual effects, including demographic change, would be minor or negligible everywhere except Nain.

VBNC recognizes Inuit and Innu concerns that the Project might increase social problems due to demographic and economic change, but it feels that the Project would positively affect families and communities currently experiencing poverty and unemployment. VBNC suggested that the Project would raise the self-esteem of its employees by reducing or eliminating their dependency on transfer payments. Workers and their families would have good, steady incomes and extended periods of time together. This would benefit the whole community. The support measures put in place by VBNC through human resources policies and IBAs would help reduce any stress and other difficulties experienced by workers and their families. These factors and other project benefits would improve the outlook for many families, increase community pride, improve health conditions and decrease social problems.

For areas of Labrador other than the North Coast, VBNC predicts that residual effects would be minor or negligible.

Monitoring and Follow-up

VBNC regards monitoring and follow-up as the responsibility of governments and of Aboriginal and community organizations, possibly funded in part through the social

and cultural protection funds in IBAs. VBNC also stated that it was prepared to cooperate with these bodies by exchanging information and expertise.

16.1.2 Public and Government Concerns

Participants at the community hearings focused their concerns on the possible adverse effects of the Project on family and community relations and on their culture and way of life. Many feared that the Project would further undermine their culture, identity, values, traditions and language. Many felt the Project would also threaten life on the land, and the values associated with it, such as sharing and mutual support. This is not merely an economic issue to the participants but also a social and cultural one, and no amount of jobs and money could compensate them for such losses. A man from Sheshatshiu, referring to the Atlantic Groundfish Strategy (TAGS), said he felt sorry for Newfoundland fishers because, as he saw it, they were being paid to lose their culture, and he did not want that to happen in Labrador.

To some Innu and Inuit, particularly elders, the Project would be, by its very nature, disrespectful and even a violation of their homeland, quite apart from any specific adverse effects it might have on places or resources they use. Harvesters, elders and many others drew the connection between the land and a sense of well-being. Many questioned whether Project employees could effectively integrate a rotational commuting schedule with the need to provide food and wood for their families regularly or with the current pattern of family weekends in the country. A woman from Nain said, "What others might believe to be simple is what we are more content with and that's providing for our families and enjoying their happiness. And when I say that, I don't mean that we would not like to move ahead in this world. I believe that we could do that and still maintain our culture and traditions and uniqueness."

Several participants cast doubt on VBNC's prediction that more employment and income would improve social conditions. Some, particularly women, were concerned that increased income would lead to more, not less, drinking. The provincial Department of Health and Community Services observed that there had already been cases of employees drinking more heavily than usual at home after a two-week work shift. This, coupled with the difficulties all family members would face in coping with a rotational schedule, could increase family violence and demands on social services.

The Department of Health and Community Services also noted that alcohol consumption in Utshimassits declined for three years after employment at the Sango Bay site began, but it has since returned to previous levels. The Department predicted that, with the current level of addiction-related social problems in Utshimassits, "employment with VBNC will not substantially affect residents' ability to maintain sobriety and increase health," although it acknowledged that employees would likely benefit from the EAP.

Some participants inquired how widely communities would share benefits from the Project, if these benefits came only in the form of employee wages. They observed that people who lacked the requisite skills or were unable to function in English would not get jobs on the site, and that they should benefit too. Some participants, including the Department of Health and Community Services, were concerned that Project employment and income would create greater inequalities in communities, and that this would adversely affect community and family relations.

Other people considered that they and their communities would benefit greatly from good jobs that provided useful experience and increased incomes, and expressed confidence that the Project would provide these benefits. Younger men, especially, looked forward to getting work at the site.

Some participants considered that IBAs might address concerns related to family and community effects, but few were aware of the details of these confidential negotiations. It was also generally noted that IBAs were, in any event, not yet in place. Some participants hoped that IBA funds would be used to support local initiatives, such as the Outpost Program of the Innu Nation, and the Life Skills and Language programs of the Inuit, which involve elders at various hunting and fishing camps. These were noted as examples of Aboriginal people's commitment to maintaining their culture and traditions, and to ensuring that experience and knowledge of the land are passed on.

Many participants acknowledged serious social and economic difficulties in the communities. It was widely agreed that lack of economic opportunity, low incomes, alcohol and substance abuse, and family violence are problems in urgent need of solution. However, some participants at both the community and technical sessions did not accept VBNC's position that increasing the income of the limited number of people who would find Project-related employment would solve the general problem of poverty and low self-esteem. Tongamiut Inuit Annait (TIA), for example, stated that self-esteem comes primarily from culture and tradition, self-reliance and generosity in community life, rather than from employment status and income.

Many Innu and Inuit attributed the continuing loss of their cultural traditions, and their social and economic difficulties, to a history of domination and restriction by government, the churches and the education system. They cited several examples of events and projects over which they had no control and which gave them no benefits, but which did create significant adverse effects. These included Churchill Falls hydro development, low-level military flying, mineral exploration, community relocation and road construction. Meanwhile,

laws have increasingly restricted Inuit and Innu use of the land. Based on these experiences, many Innu and Inuit do not believe that the Project would or could differ.

An expert appearing on behalf of the Innu Nation identified what he called a "master narrative" that had arisen among Innu over the last 30 years, by which they explain their situation. They believe they have been treated unfairly, and that in order to rebuild their social order, they must be treated fairly and with respect. Justice and fair treatment are necessary to gain their consent to the Project, and this requires that land claims be settled and that VBNC be accountable to Innu. Self-esteem and dignity, he suggested, would not result from individual benefits such as jobs and money, because they result from social interaction in a collective or public setting. In the context of the "master narrative," he suggested, self-esteem arises from hunting and living competently on the land, and from work in the community rather than at a distant location.

Both LIA and the Innu Nation acknowledged that their members need more income and could therefore benefit from Project employment. But both also stated that they do not want to compromise their culture and way of life, or other economic development opportunities based on renewable resources. The Project should support, and certainly not preclude or impede, these other endeavours. The Innu Nation and LIA see the revenue from IBAs as an essential means to help them reach their goals of economic, cultural and political development, as long as those benefits are not outweighed by negative social and economic costs.

Innu Nation stated that "the social problems which you heard about...are very real to us. We are a people dispossessed of our land, and until we can gain real control over our land and our lives, things are not going to start improving." A participant in Nain said that "a lot of the problems can be attributed to Inuit losing

control over their communities and their own lives." Both organizations, and many individual Inuit and Innu, said that land claims and IBAs are the best means for them to regain control over their lives and to ensure that they could, on balance, benefit from the Project. Further, they said, without these essential tools for regaining control and governance, the potential benefits of the Project would not be achieved.

Several participants indicated a need to monitor the social impacts of the Project. The Department of Health and Community Services stated that it would do so, although it did not describe how. The Labrador Inuit Health Commission (LIHS) stated that health and socio-economic impacts should be monitored, but that there is neither an adequate baseline of information nor a program in place to do this. LIHS suggested this be remedied by a partnership of agencies including itself and VBNC, in the context of IBAs. A social and health monitoring or surveillance program would require an agreed set of issues and indicators, a continuing and effective means of collecting data, staff who could maintain the system and analyze the data, and an agreed set of benchmarks that would trigger intervention even if the specific cause could not always be identified.

With one exception, the Panel did not hear concerns about the Project's effects on family and community life in other parts of Labrador. Presumably, this is so because residents in larger centres are already used to participating in large projects — and, in the case of Labrador West, in the mining industry — and because demographic changes will be small in comparison to existing populations and infrastructure capacity.

However, the Labrador Métis Nation (LMN) stated that VBNC had ignored the situation of communities south of Rigolet, which the LMN says will continue to be affected by out-migration. If no community on the South Coast were designated a pick-up point for Project workers, LMN believes that people might move

to Happy Valley–Goose Bay to have better access to Project employment, since VBNC would not cover travel costs from communities to pick-up points.

CONCLUSIONS AND RECOMMENDATIONS

The Panel observes that there is substantial uncertainty about Project effects on family and community life, and on the regional culture and way of life. Reasons include the following:

- because of the large number of factors that could influence employment outcomes, VBNC itself cannot predict employment, business and income impacts at the community level;
- it is often difficult to predict how individuals will respond to a complex initiative such as the Project, and how these responses might change over time;
- it is difficult to predict exactly how well mitigative measures would work; and
- the effects of a specific development such as the Project are inherently difficult to distinguish from larger, ongoing social, economic and demographic changes occurring independently.

The Panel also notes that while some presenters drew parallels with past developments in Labrador, the proposed Project would differ significantly, since it would be a fly-in/fly-out operation with an up-to-date environmental management system, accompanied by IBAs. Therefore, past experiences are not necessarily accurate predictors of future effects.

The Panel considers that VBNC has made considerable effort to inform people in northern Labrador about the Project, and especially about the training and employment opportunities it would provide. The environmental assessment review has also enhanced awareness of the Project. However, the Panel recognizes that, understandably, because of people's past experience,

many people are skeptical about what they are hearing. There appears to be considerable fear and uncertainty among people because they do not know what is involved in the operation of the mine. The Panel believes that, in some cases, only direct experience can give people the information they need. Another significant difficulty is that the general public does not know about or understand many of the mitigative measures and benefits that IBAs would deliver, because the negotiations are confidential.

The Panel acknowledges that VBNC can only do so much ahead of time to allay such fears by informing people. In some cases, only direct experience can answer questions people may have. The Panel believes that efforts to familiarize the families of workers with the mine site and operations once the Project started would be a helpful follow-up to what has been done to date.

The Panel believes that, without the Project, it is unlikely that there would be major alternative forms of investment in the region to provide economic activity for a rapidly growing population with increasing demands. If renewable resources are carefully managed, and potentially adverse Project effects are avoided, then the resource base itself should at least remain stable. However, harvesting costs are increasing and the exploitation of new resources might require significant investments, while commodity prices are unstable. Renewable resources provide an essential but incomplete economic base for the regional population. Renewable resource harvesting, like other small-scale enterprises in the area, also tend to provide seasonal employment only.

The region already relies on high per capita levels of government expenditure, and these are unlikely to increase greatly. In the meantime, the regional population continues to grow. IBAs, if concluded, would provide important additional funding for a variety of purposes, but these funds depend entirely on Project authorization

and success. Land claims agreements would also provide an economic stimulus but, again, some of the funds they generate depend on developments such as the Project. Even under the most optimistic scenario, there would still be a great need for direct employment and for the tax revenues that local economic activity would generate. All parties recognize these economic needs. The Project, if it continued for the proposed 20 to 25 years, would significantly meet these needs. The combined effect of all these factors on demographic and economic trends is impossible to predict, but it would probably be neither sudden nor dramatic.

The Panel acknowledges that some people would experience more negative than positive effects from the Project. Many of those most concerned about adverse effects to the land, to community and family life, and to their culture and traditions might be unable or disinclined to work on the Project. If the Project is to create durable and equitable social and economic benefits on the North Coast, it must do more than provide jobs for some people or prevent significant adverse effects on harvesting.

IBAs would be an important means of spreading and broadening the benefits of the Project. The Panel agrees that successfully negotiated IBAs, and settled land claims, would be important ways to mitigate the projected negative impacts of the Project. Control over financial resources and the administration of social programs would help LIA and the Innu Nation deal with the regular needs of their communities, as well as those arising from the effects of the proposed mine.

The Panel observes, however, that IBA provisions would apply only to Innu and Inuit, and could not mitigate effects on non-beneficiaries or on other entities that are not exclusively Innu or Inuit. This includes the North Coast municipalities, not all of whose residents are land claim or IBA beneficiaries. For example, LIA would not be obliged to

direct IBA funds to municipalities to provide public services, and municipalities would not be justified in depending on IBAs to fund public services. As well, land claims agreements are not intended, and cannot be used by governments, as a substitute for the normal array of government services and citizenship benefits.

The Project could also provide broadly based and durable benefits through the related revenues that would accrue to governments. However, for benefits to occur, the governments that received these revenues would need to reinvest an adequate proportion of them in community infrastructure and services. The next sections discuss how this might be done.

The Panel considers that if the Project provided for all of these streams of benefits — employment, IBAs and regional reinvestment of increased government revenues — then it would achieve the fairness, justice and respect that Aboriginal people are seeking from the Project.

The Panel concludes that monitoring of socio-economic impacts would be an essential part of an effects monitoring program. While government and community agencies should take the primary responsibility for such monitoring, VBNC also has a role to play. The Panel makes recommendations on this matter in Chapter 17, Environmental Management.

The Panel is unable to draw conclusions about future trends in inter-community migration in Labrador. The Panel is aware of a tendency in other areas, such as northern Saskatchewan, for fly-in/fly-out workers from smaller communities to gravitate to larger urban centres. The Panel considers that if this tendency occurred in Labrador, it would most likely occur as migration from communities south of Rigolet, because that region would not benefit from IBAs and would face transportation barriers to employment at the Project. Designating at least one community in that area as a pick-up point would offset these disadvantages to some degree. Recommendation 79 addresses this issue.

The Panel concludes that VBNC's main responsibility with respect to minimizing the potential negative effects of demographic change would be to ensure that working conditions and employee transportation policies, to the greatest extent possible, assisted workers to remain in their home communities, if they wished. The Panel also recognizes that upgrading air transportation facilities in North Coast communities, which would not be VBNC's responsibility, might help North Coast residents move back and forth between their homes and the work site more easily (see Recommendation 91).

16.2 SERVICES AND INFRASTRUCTURE

Though VBNC does not anticipate a significant increase in population in most communities due to the Project, it nevertheless predicts that there might be greater demands, especially for services, because employment may raise people's purchasing power and lifestyle expectations. The demand for improved services and infrastructure would be highest where an influx in population occurred. However, the Panel observes that Labrador coastal communities have a limited capacity to deal with demands for more and improved housing, water and sewer systems, transportation and road systems, and social services.

VBNC predicts that the Project's residual effects on services and infrastructure would be moderate (significant) during the construction phase in Nain and the Happy Valley-Goose Bay area. Elsewhere, and during other Project phases, the effects would be minor (negligible) and short term. Overall, VBNC predicts that the effects on North Coast services and infrastructure would be "overwhelmingly positive" because the Project would increase direct, indirect and induced income in those communities.

In the next section, the Panel focuses on Nain because the nature and extent of Project effects in this community would likely differ from those in any other community.

16.2.1 Town of Nain

Nain is the closest community to the site of the proposed Project and lies within fairly easy travel distance by helicopter, boat or snow machine. While no Project facilities would be located in Nain, VBNC has indicated that a significant amount of direct Project-related activity would take place in Nain during the construction phase, while the airstrip and wharf facilities were being completed.

Again, VBNC indicated that the main mitigation measures would be the fly-in/fly-out system; application of the adjacency principle; and financial participation payments to the LIA negotiated through the IBA, which could be used to provide local services and facilities. VBNC asserts that other mitigative responses would be the responsibility of various levels of government and could be financed through increased revenues generated by the Project. VBNC also suggests that the Town of Nain could influence population growth by controlling the supply of serviced land for housing.

In Nain, VBNC predicts an average of 84 person-years of Project-related employment (including direct, indirect and induced effects) during construction, 133 during the open pit phase and 184 during the underground phase. The unemployment rate would steadily decline, theoretically reaching zero during the underground phase. Some business development is expected to occur, as a result of the adjacency principle, the community's proximity to the Project site, and the increased employment income and consumer demand. Nain's economy is therefore predicted to diversify.

VBNC acknowledges that the Project might cause some wage inflation and labour force disruption in Nain, particularly at the beginning of each major phase (construction, open pit and underground) but suggests that the economy would adjust quickly. VBNC also acknowledges that housing costs would probably rise in Nain. These costs would depend

partly on the Town's ability to develop new housing to meet demand.

The EIS ranks the economic impacts of Project decommissioning and post-decommissioning as moderate or major (and therefore significant) but suggests that these could be reduced if increased economic activity in Nain during the Project had encouraged economic diversification.

VBNC's position is that socio-economic monitoring would be the responsibility of other parties, but it has indicated that it would be prepared to assist by providing relevant Project information in certain instances. For example, VBNC would monitor Project expenditures and provide this information to appropriate government departments and agencies to help them with their economic planning. VBNC also proposes to continue ongoing discussions with the Innu Nation and LIA.

Public and Government Concerns

Submissions and comments from residents of Nain at the scoping sessions and public hearings addressed a wide range of socio-economic issues, many of which were also raised in other North Coast communities (and are addressed under other headings in this report). The following concerns, however, which were raised by the Town of Nain and others, relate to Nain's particular situation.

- The Project would present definite business development opportunities for Nain; however, these opportunities could be lost either through the "fly-over" phenomenon or because of back-haul connections between the Project site and other communities.
- Opportunities will also be lost if businesspeople in Nain could not get ready in time. VBNC may be discussing its specific commodity or service requirements with LIA in the IBA negotiations, but these are confidential.

- Business development and growth in Nain would be hampered by the lack of suitable serviceable land for commercial use, and also by the current state of the potable water system and other municipal services.
- Transportation infrastructure would not accommodate increased traffic. The airstrip would need to be relocated or upgraded (Section 16.3 of this report addresses this issue in more detail). Marine facilities would also need improvement, which would include constructing a breakwater and developing a marine service centre.
- The Project could seriously affect existing businesses and institutions by inflating wages, attracting skilled employees and disrupting limited local services, especially transportation in the early stages.
- The municipal infrastructure, including roads, water, waste management facilities and recreation facilities, is already inadequate for the existing population and could be seriously stressed by the predicted population growth related to the Project. The Town does not levy property taxes and does not agree with VBNC's contention that municipal revenues would increase sufficiently to provide needed services. Over three quarters of municipal funding comes from federal transfers through the Labrador Inuit Agreement.
- Education, health and social services are already inadequate for the existing population. The Town is not convinced that the Province would reinvest Project revenues in these services to meet increased demand.
- Nain's housing stock is also already deficient in terms of quantity and state of repair. The Town is not confident it could respond to increased demand resulting from the Project.
- The Project would increase the cost of living for all Nain residents, whether they benefited economically from the Project or not. Increased income disparities would exacerbate existing social tensions.
- The Town of Nain is not party to the IBA negotiations, and has no assurance that any financial payments made by VBNC would be used to provide services or facilities that are currently a municipal responsibility. The IBA is intended to benefit the members of LIA; the Town is responsible to all residents, whether they are LIA members or not.

CONCLUSIONS AND RECOMMENDATIONS

The Panel recognizes that community government in northern Labrador may go through a transition period once land claims have been settled. The Panel did not receive information on how land claims would change current municipal structures and processes, so the following conclusions and recommendations are based solely on the existing situation.

From the information presented during the review process, the Panel concludes that the Town of Nain faces a difficult situation. The magnitude of the Project-related impacts on municipal services and responsibilities would depend largely on the amount of related demographic change. This would depend on a number of factors, identified in the EIS, that would be based largely on personal choices. The Panel acknowledges that the maximum level of in-migration predicted in the EIS might not occur. On the other hand, the EIS does not address the possibility of speculative in-migration, assuming that use of the adjacency principle would make this unlikely. However, if economic activity increased in Nain, more people, most likely ex-residents, might choose to return, whether they were directly employed by the Project or not.

However, if the Town was unable to provide the necessary services and amenities, in-migration could quickly be counterbalanced by out-migration, if Project employees and their families decided to move to Happy Valley-Goose Bay to obtain suitable housing or enjoy more recreational, consumer or educational opportunities. This would wipe out at least part of the Project's economic benefits to the community of Nain.

The Panel acknowledges that VBNC is not responsible for current infrastructure and service inadequacies. However, the Panel was not presented with any evidence to back up VBNC's assertion that "tax revenues and user fees for new residential and commercial development will offset the costs of building and maintaining new infrastructure and providing additional services." Given the Town's existing tax structure and revenues, this seems improbable. It also appears that LIA is not obliged to spend any payments received from VBNC through IBA negotiations on municipal services, and the Panel has no way of knowing whether LIA intends to channel funds in that direction.

Usually, when a major industrial project is developed, it falls within the municipal boundaries of the adjacent community, thereby adding to the local tax base and revenues. Fly-in/fly-out operations in northern areas are less dependent on adjacent communities, draw their employees from a number of different communities and must often build much of their own infrastructure. Should VBNC therefore be required to pay something equivalent to municipal property taxes to any Labrador communities, and if so, which ones? The Panel believes that a strong case can be made for such payments to the Town of Nain for the following reasons.

- During the exploration and construction phases, VBNC would have made extensive use of Nain's facilities and services.
- During the production phase, VBNC would probably continue to benefit in various ways from the proximity of Nain. One example given by VBNC was the occasional need for overflow accommodation.
- Nain is expected to experience significant in-migration as a direct result of the Project. Because of its size and infrastructure limitations, Nain cannot be expected to absorb this increase in the same way that a larger urban area such as Happy Valley-Goose Bay could.

Recommendation 87

The Panel recommends that VBNC pay a grant-in-lieu of taxes to the Town of Nain to offset some of the increased costs incurred by the Town as a result of the construction and operation of the Project. The formula used to calculate the grant-in-lieu should be negotiated by the Newfoundland and Labrador Department of Municipal and Provincial Affairs, the Town of Nain and VBNC. It should reflect expected Project-related uses of community infrastructure and services, projected municipal costs attributable to Project-related in-migration and any Project-related revenues accruing to the community.

The Panel concludes that addressing housing problems in Nain, with respect to both adequacy and cost, would likely to be a key element in maximizing Project benefits and minimizing adverse effects in Nain. Currently, 45 percent of the housing stock needs major repairs and about 50 families need new houses. The EIS predicts that by 2001, due to natural population growth and early Project-induced in-migration, the population could increase by more than 170 people.

The Panel agrees with VBNC that people who found employment with the Project or in related businesses might well have sufficient resources to repair their houses or build new ones. However, the increased economic disparities likely to accompany the Project, coupled with a rise in the cost of living and increased competition for limited housing resources, could adversely affect a significant number of Nain residents and cause more social problems.

The provincial Department of Municipal and Provincial Affairs indicated during scoping sessions that it was gathering baseline and population information to prepare a housing needs analysis for the next 10 years, but it did not participate further in discussions during the public hearings.

Recommendation 88

The Panel recommends that the Town of Nain, LIA, the Newfoundland and Labrador Department of Municipal and Provincial Affairs, and Indian and Northern Affairs Canada jointly develop a five-year housing strategy for Nain, including funding sources, to meet the housing needs of existing and potential residents.

It was apparent to the Panel that there is considerable frustration in the Town over the issue of planning for economic development. Town business people and managers are uncertain what they should be planning for and are afraid that they could "miss the boat," especially with respect to the lead time required to make additional land available for commercial development.

The Panel acknowledges that the relationship between the Town of Nain and LIA may be a complicating factor. LIA has been negotiating with both VBNC and governments on matters of regional significance but has no apparent structural links to the Town, although most of Nain's residents are LIA members. Through LIDC, LIA

has been developing business opportunities for its members and has been communicating closely with VBNC. However, LIA is not responsible for economic development planning in the Town of Nain.

The Panel also recognizes concerns about the effects of wage inflation and labour force disruption on existing businesses and organizations. While these effects might be short term, as the EIS predicts, they could nevertheless jeopardize some local businesses and work against the economic diversification that is identified as one of the Project's lasting benefits. The Panel does not see easy answers to these potential problems, but it believes that they may lie in some combination of improved and timely communications, and accessibility to appropriate training (not solely focused on Project-related occupations).

To address concerns about inadequate preparation for business opportunities and effects on existing businesses, the Panel concludes that stakeholders must develop a proactive strategy and that VBNC must enhance its communications with the Town.

Recommendation 89

The Panel recommends that VBNC and the Town of Nain develop a communications protocol to keep each party regularly informed about issues and activities of mutual interest. The protocol should include arrangements for representatives to meet when necessary to discuss concerns. The purpose of the communications protocol would be to provide opportunities to address problems at the earliest stages and to promote initiatives that might be of mutual benefit.

Recommendation 90

The Panel recommends that LIA, the Town of Nain, and the Newfoundland

and Labrador Department of Development and Rural Renewal collaborate in a community economic development planning process for Nain. The overall goal should be to achieve a diverse and sustainable local economy that can maximize participation in Project-related enterprises, while strengthening existing businesses and seeking out new community-based possibilities. The process should encourage the involvement of the various interest groups, including VBNC, as appropriate.

16.2.2 Other Communities

Municipal officials in Happy Valley-Goose Bay, Labrador City and Wabush expressed confidence in their ability to cope with increased demands for services and infrastructure. However, councils and community groups in the smaller municipalities told the Panel that they do not have the funds to meet their current needs, let alone any new demands. The Town of Rigolet pointed out that the Project would place extra strain on an already stretched social services budget by creating greater social and health problems, such as increases in alcoholism and in the spread of sexually transmitted diseases. The Town also anticipates housing shortages that it would not be able to handle. It was skeptical about VBNC's claim that money would be available through IBAs.

The Panel has not seen evidence that the Project would cause significant demographic change in North Coast communities, except Nain. The Panel therefore believes that the Project would not change the level of demand for social services in coastal communities, other than Nain, to such an extent that mitigative actions beyond those contained in IBAs would be required.

16.3 REGIONAL REINVESTMENT OF GOVERNMENT REVENUES

As stated in section 16.1.2, the Panel believes that federal and provincial governments would need to reinvest some of the increased revenues generated by the Project into regional infrastructure and services, if durable and equitable benefits are to occur. While LIA and the Innu Nation would receive financial participation payments through IBAs, these are equivalent to land rents and do not replace government obligations to provide services and infrastructure.

Early in the hearings, some presenters referred to heritage or diversification funds, which are used in other areas to reinvest revenues from resource development projects and to extend benefits to future generations. The four parties to the Memorandum of Understanding (MOU) might wish to explore such an option. The Panel believes, however, that it would be better if governments committed to investing in specific infrastructure and services in northern Labrador. These should increase the ability of people and communities to address fundamental social and health problems and to tackle the challenges of regional and community economic development by building on the benefits of the Project.

A number of presenters said that the level of air transportation service available to coastal communities is seriously inadequate. LIA and other groups and individuals suggested that it was fundamentally unfair for the Project to have a first-class airstrip capable of landing Dash 8 aircraft with a high percentage of completions, while community airstrips depend on visual landings, resulting in a less than reliable system. They asserted that if VBNC needed such an airstrip to protect the health and safety of some 500 workers on site, communities with equal or larger populations needed better airstrips for the same reason.

While the Panel does not conclude that the development of a Category 1 airstrip (see Recommendation 68) at Voisey's Bay automatically requires upgrading of other community airstrips, it does believe that investing in a better air transportation system for the North Coast would be a very appropriate way to use increased public revenues. The federal government would receive significant taxation revenues from the Project and would be able to reduce equalization payments to the Province as a result of increased provincial revenues. Therefore, Canada should reinvest some of these increased revenues into regional infrastructure that would improve the ability of northern Labrador residents to retain and build on the economic benefits of the Project.

Recommendation 91

The Panel recommends that the Province, in consultation with the Labrador Inuit Association, initiate discussions with Transport Canada to develop a five-year strategy to upgrade air transportation facilities on the North Coast to meet Category 1 requirements. Because of the limitations of the existing strip at Nain, and increased levels of air traffic, the Panel recommends that Nain receive top priority.

The Panel also heard from many presenters about the need for improved health care. The Panel acknowledges VBNC's generous donation to the new hospital in Happy Valley--Goose Bay. This hospital, however, only benefits people in coastal communities if they have reasonable access to it. Upgraded air transportation

services should improve the success and safety of both emergency and regular travel to the hospital, and should also allow health professionals, such as doctors and dentists, to travel more easily to and from smaller communities.

The Panel also heard from health care providers and residents that more resources are needed to improve preventive and community-based health care programs. The Project might increase demands for such services beyond current capacity in Nain. But even if the Project did not affect demand, the Panel believes that investing increased provincial government revenues from the Project into preventive and community-based health care programs would

- help both individuals and communities in northern Labrador to function more effectively;
- improve quality of life; and
- decrease provincial expenditures for acute health care, social services and corrections.

In the Panel's view, such investment would contribute effectively to durable and equitable social and economic benefits.

Recommendation 92

The Panel recommends that the Province, through Health Labrador Corporation and in consultation with the Labrador Inuit Health Commission and the Innu Health Commission, assess future preventive and community-based health care needs, set priorities for new or enhanced programs and services, and establish those programs and services, as required.

17 ENVIRONMENTAL MANAGEMENT

Environmental management, as addressed in this report, encompasses both VBNC's own policies, procedures and actions, and the wider context, including the regulatory regime and the involvement of other stakeholders. Key themes at the public hearings included the following:

- the relationship of environmental management to differing levels of certainty about predicted project effects;
- the distinction between matters needing to be resolved at the environmental assessment stage, and those that can and should be dealt with at the later permit stages;
- the relationship of environmental management to possible future changes in the Project;
- the implications of the current land claims situation for environmental management;
- the need for effective Aboriginal participation in both monitoring activities and ongoing regulatory processes, and different organizational structures and agreements through which this might be accomplished;
- the approach to monitoring, components of follow-up programs and the adequacy of existing baseline studies to support these programs; and
- reclamation issues, including the provision of financial assurance to cover liabilities.

VBNC presented information on its proposed Environmental Health and Safety Management System (EMS), which it described as a framework for organizing its environmental protection efforts, preventing pollution and continuously improving its environmental performance. It also described the company's proposed monitoring approach.

The EMS would have four tiers of documentation: an overall EMS manual, 11 environmental

protection plans to be updated as required over the life of the Project, detailed procedures for various activities, and the forms and records used to support the system. VBNC is a wholly owned subsidiary of Inco Limited, and its EMS adheres to Inco's procedures and policies, including Inco's corporate environmental health and safety guidelines. Inco also carries out environmental health and safety audits of all its divisions, including subsidiaries, and audit results are presented to Inco's Board of Directors.

VBNC's proposed monitoring program would have two main components. Compliance monitoring would be done to ensure that the Project met both specific regulatory requirements, and internally established standards and targets. Environmental effects monitoring, also referred to as the follow-up program, would test and validate the predictions of the environmental assessment, verify the accuracy of various models used during the process, and determine whether mitigative measures were effective and the environment was being protected.

VBNC proposes to develop the effects monitoring program in collaboration with the Labrador Inuit Association (LIA) and the Innu Nation through formal bilateral arrangements that it calls monitoring partnerships. Therefore, VBNC did not present details of proposed effects monitoring studies in the Environmental Impact Statement (EIS), but it did outline the criteria it would use to select which interactions between the Project and the valued ecosystem components (VECs) would be monitored.

VBNC stressed the importance of basing monitoring studies on clear and achievable objectives, testable hypotheses, practical methods, key indicators that can provide early warning of environmental change, parameters that can be measured accurately and precisely, and pathways that link contaminant sources and receptors. Otherwise, there is a risk of carrying out studies

that are, in VBNC's words, "data rich and information poor."

The monitoring partnerships, as conceived by VBNC and endorsed by LIA and the Innu Nation at the hearings, would be "business relationships," designed to achieve Aboriginal participation in all phases of the monitoring program, to integrate Aboriginal knowledge, and to provide timely and effective reporting to local communities.

VBNC proposes to fund monitoring activities required for regulatory compliance, which would include any follow-up required under section 38 of the *Canadian Environmental Assessment Act* (the *CEA Act*). But the company also indicated its willingness to participate as a funding partner in other programs addressing broader regional objectives, where mutual benefit could be established.

17.1 REGULATORY CONTEXT

The regulatory context for environmental management of the Voisey's Bay Project has three fundamental aspects. The first is the various pieces of applicable legislation, their associated approvals and permits (the EIS identified 50 of these), and the procedures for issuing these approvals, which may or may not include formal or informal opportunities for further public review and input.

The second aspect, emphasized particularly by Environment Canada, includes the various agreements, strategies and guidelines produced by government, usually in collaboration with other stakeholders, that are intended to promote sustainable development through responsible environmental stewardship. While not legally binding, these should play a central role in helping VBNC avoid impacts and prevent pollution.

The third aspect is the power of the Responsible Authority, under section 38 of the *CEA Act*, to require that a proponent implement a formal follow-up program to verify the accuracy

of environmental assessment predictions and to determine the efficacy of mitigative measures. The Department of Fisheries and Oceans (DFO) has already indicated that it would require such a program and VBNC has outlined, in general terms, what it thinks the program should include.

The Panel notes that when land claims agreements have been reached, the regulatory context will change to a certain degree, as discussed in Chapter 4. While the federal and provincial governments would retain their regulatory authority, they would be required to obtain and consider the recommendations of the Aboriginal parties. The rest of this chapter, therefore, relates to the existing situation, in the absence of land claims agreements.

Participants expressed a number of concerns about the regulation of the Project, including the following.

- How are the various approvals granted and in what order? Could any part or parts of the Project proceed in a piecemeal fashion before certain key agreements had been reached?
- The regulatory framework contains some gaps, which will need to be filled through the environmental assessment process by way of conditions.
- The approvals and permit processes do not necessarily allow for public or stakeholder review and consultation. Important decisions about the Project could be made without input from Inuit and Innu.
- Informal arrangements to seek comments from LIA and the Innu Nation during past permit processes relating to exploration activities, although a move in the right direction, have not always been satisfactory. The Aboriginal organizations have had limited time and insufficient resources to review applications, and have often received no feedback on their input.

- Due to piecemeal permitting by a number of different agencies, no one might take the combined effects of all the permitted activities into account.
- Although a number of departments are willing to consult with Aboriginal stakeholders regarding different permits and approvals, this could place a considerable burden on LIA and the Innu Nation.
- Government agencies may have good intentions but limited resources to do the type of on-the-ground inspections in northern Labrador that would be needed to ensure compliance.

Both LIA and the Innu Nation have recommended that some of these concerns be addressed through the negotiation of an environmental agreement, which would cover issues such as Aboriginal participation in regulatory processes, and terms and conditions that are not included in regulations.

Although many federal and provincial departments would play a role in the ongoing regulation of the Project, DFO, as the Responsible Authority, would have continuing responsibilities under the *CEA Act* after the environmental assessment phase is over. These responsibilities would be over and above DFO's duties with respect to fish, fish habitat, and marine navigation and safety. They would include supervising the follow-up program and coordinating the federal government's response to the Panel report.

From the Province's perspective, the Department of Environment and Labour and the Department of Mines and Energy would play key roles, although the Province has not formally indicated whether or how coordination would be carried out. The Department of Mines and Energy would administer the mining lease under the *Minerals Act*. While the lease does not require constant monitoring or frequent reporting, it is likely to be a key document with respect to ensuring accountability for environmental liabilities.

17.2 ENVIRONMENTAL MANAGEMENT AND UNCERTAINTY

Both LIA and the Innu Nation expressed strong concerns about relying on the environmental management regime to deal with what they saw as fundamental uncertainties about the Project. LIA emphasized that VBNC should not think that release from the environmental assessment process gives the company a "blank cheque" to proceed with a project that includes ill-defined elements. LIA was particularly concerned that aspects of the Project relating to the pace and scale of the operation, shipping plans and the underground mine could "escape environmental assessment," and it was not confident that the current regulatory and permit system could plug that gap.

For the Innu Nation, uncertainties related to what it saw as inadequate impact identification; a failure to fully assess alternative methods of carrying out key components of the Project; and several "unresolved issues" — for example, the reclamation plan, the monitoring program and the decision about backfilling the open pit. The Innu Nation argued that monitoring should not be considered a cure for "serious uncertainties about environmental impacts of the Undertaking, and inadequate assessment of reasonable alternative means of carrying out the Undertaking."

Both LIA and the Innu Nation suggested that the Panel stop the environmental assessment process until VBNC had resolved these uncertainties by providing more information. However, they both provided alternative recommendations, should the Project proceed.

From VBNC's perspective, environmental assessment is best carried out early in the planning process, when it can best influence design decisions. The Project is bound to evolve to a certain extent, and therefore expecting a complete Project description at the assessment stage is unrealistic.

The Panel agrees with LIA and the Innu Nation that a number of uncertainties remain

about the Project. The Panel believes, however, that in most cases these uncertainties are not unreasonable at this stage of project planning and design, especially as some of them relate to future information that could only be obtained if VBNC were able to proceed with advanced underground exploration.

Uncertainty relating to production rate and mine life is addressed in Chapter 3, Project Need and Resource Stewardship, and specifically in Recommendation 2. Issues relating to the assessment of alternative means of carrying out the Project are dealt with in the appropriate sections of this report. Other issues identified during this environmental assessment that will require review later in the life of the Project include

- tailings management during the underground phase (whether this involves developing the North Tailings Basin or replacing or delaying it through some alternative means, such as backfilling the open pit);
- reassessment of the decision to construct a second diffuser in Kangekluajuk Bay;
- any new surface facilities associated with the underground phase, particularly west of Reid Brook;
- any modifications to Headwater Pond or the North Tailings Basin, such as dam height changes to increase volume;
- the development of a separate sludge disposal facility, if it should be required;
- the decision as to whether Headwater Pond outflow could be returned to the Reid Brook system in the post-decommissioning phase;
- any major modifications to the shipping regime; and
- the review and approval of the monitoring program and the reclamation plan.

The Panel agrees with LIA and the Innu Nation that a means must be developed to ensure

that ongoing regulatory decision making and effects monitoring include Aboriginal participation and full consideration of environmental implications.

17.3 ENVIRONMENTAL CO-MANAGEMENT MEASURES

Both LIA and the Innu Nation have stipulated that the Project should not be allowed to proceed until land claims agreements have been reached, for a number of reasons. With respect to environmental management, both parties are negotiating environmental and resources co-management components that could be applied to the Voisey's Bay Project and to other potential industrial developments. Both parties also indicated that a co-management regime based on land claims would be a better way to proceed than ad hoc, project-by-project structures, because it would allow them to deal more comprehensively with cumulative effects of different projects and would be a more efficient use of their time and resources. However, both LIA and the Innu Nation provided detailed recommendations for environmental structures, presumably to be considered as interim arrangements if the Project proceeded in advance of land claims agreements.

The Panel's conclusions and recommendations in this chapter should be read in conjunction with Chapter 4, Land Claims and Impact Benefit Agreements, and particularly Recommendation 3. While the Panel considers that it would be preferable for governments to ratify an agreement in principle with LIA and the Innu Nation before the Project proceeds, the Panel recognizes that equivalent alternative measures could also allow Canada and the Province to meet their fiduciary responsibilities. This chapter addresses those alternative measures.

Both LIA and the Innu Nation proposed that the parties to the Memorandum of Understanding (MOU) and VBNC develop and sign a multi-party environmental agreement. The agreement would be legally binding and would provide a

framework for environmental monitoring. From LIA's perspective, it would formalize corporate commitments, provide a mechanism for incorporating Aboriginal knowledge and address issues not fully dealt with during environmental assessment. The Innu Nation has also recommended that the agreement cover reclamation, financial security, reporting requirements and the approval of the various EMS plans to be prepared by VBNC.

The proposed environmental agreement was presumably based on a similar agreement signed after the NWT BHP Diamonds Project environmental assessment was completed. Although Aboriginal parties were involved in developing and implementing that agreement, they were not actual signatories. The stated purpose of the NWT agreement was to provide for "Project-related environmental matters additional to such matters governed by legislation, regulations and Regulatory Instruments" and it covered many of the same topics proposed by LIA and the Innu Nation.

LIA and the Innu Nation's proposals diverged on the issue of implementing the environmental agreement. LIA recommended establishing an independent environmental agreement agency with representatives from the five parties. The Innu Nation, however, envisaged a trilateral environmental monitoring body with representatives from the two Aboriginal organizations and VBNC. It indicated that this body could be the same as the monitoring partnership previously described.

LIA also proposed two additional bilateral agreements: a shipping agreement to be signed by VBNC and LIA that would describe how the shipping component, and particularly winter shipping, would be carried out; and an integrated marine management plan that DFO and LIA would develop under the terms of the *Oceans Act*. VBNC has agreed to negotiate the shipping agreement. DFO, however, has indicated that considerable consultation has to be carried out

around the new *Oceans Act* before beginning any integrated marine management planning process, which could not be a bilateral process anyway. DFO suggested other avenues might be found but did not specify any possibilities at the hearings.

VBNC criticized the proposed environmental agreement and the independent agency as unnecessary. It also said these proposals blurred the lines of accountability, which VBNC believes would be much more clearly drawn in the bilateral monitoring partnerships to be established through impact and benefit agreements (IBAs). VBNC also emphasized that it should retain ultimate responsibility for compliance monitoring and for Project management decisions about mitigation.

Both the federal and provincial governments indicated that they believed their regulatory roles and processes were clearly established and adequate for the job at hand, and that additional terms and conditions could be attached to the various Project approvals and therefore made legally binding. While open to discussing ways to improve Aboriginal participation in regulatory processes, they were non-committal about the need for either an agreement or a separate monitoring review body.

17.3.1 Environmental Management: Functions and Relationships

The Panel believes it is important to clarify the various functions expected of any new environmental management structure. Based on information presented during the review, the Panel believes these functions should include the following.

- Until land claim agreements are finalized, the environmental management structure must ensure that governments fully consult and involve Aboriginal parties in substantive decisions regarding traditional lands.
- It should promote coordination among various government agencies and between

the federal and provincial governments to ensure that regulatory processes do not become so compartmentalized that the significance of the broader picture is lost.

- It should ensure that both Aboriginal knowledge and local concerns and priorities are incorporated into VBNC's EMS and into the design and implementation of the monitoring program.
- It must provide a satisfactory way to address future Project changes and developments.
- It should provide an effective and credible way to oversee the follow-up program, as required by the *CEA Act*.
- It should provide opportunities for Inuit and Innu to be directly involved in Project monitoring.
- It should not burden VBNC with additional and unnecessary layers of bureaucracy.
- It should reflect the fact that sound environmental management and steady progress towards sustainability are matters of broad public interest and responsibility.

The Panel recognizes that effective environmental management would involve three sets of relationships. The first is between VBNC and the regulatory agencies. The Panel believes that this relationship is well established, and that, in general terms, the mining industry is well regulated. This does not mean there is no room for improvement. However, the Panel was not presented with evidence of significant gaps in the regulatory system related to the Project, except with respect to the regulation of activities affecting sea ice south of 60° (and this is not mining legislation).

The second relationship is between VBNC and the Aboriginal parties. While clearly this is not altogether smooth, all three parties agreed that they wanted to negotiate monitoring partnerships. Through these partnerships, Inuit and Innu would have direct advisory input into the

design and implementation of monitoring studies, including the definition of thresholds to trigger action; would participate in the actual monitoring; would receive regular reports on monitoring results; and would be provided with resources to support their participation. It is worth noting that there is no indication that these types of provisions were included in the IBAs signed in the Northwest Territories (although no one can be certain, since IBAs are confidential). Therefore, the environmental agreement in that case was designed to include at least some of these elements.

The Panel concludes that it is very much in the interests of sound environmental management that LIA and the Innu Nation work closely with VBNC through monitoring partnerships to maximize Aboriginal input into the design and implementation of the EMS plans, including the monitoring program. This function need not be duplicated through the advisory side of an independent monitoring agency. However, it does not replace the more formal and arms' length review and oversight role included in the follow-up program.

Recommendation 93

The Panel recommends that VBNC negotiate the proposed monitoring partnerships with both LIA and the Innu Nation through their respective Impact Benefit Agreements. The monitoring partnerships should ensure Inuit and Innu participation in the design, implementation and evaluation of the monitoring program. They should also provide opportunities for Inuit and Innu to obtain necessary training and to collect and analyze data, using both scientific methods and Aboriginal knowledge and observation.

The third relationship is between the Aboriginal parties and government. In the Panel's

opinion, this relationship is the least well defined and established, although the MOU itself represents a positive step in this direction. LIA and the Innu Nation expressed considerable concern that they would be effectively shut out of subsequent regulatory processes. As an example, while DFO requires VBNC to consult with the public before bringing forward proposals to compensate residents for the loss of fish habitat, DFO itself has no formal process to continue this consultation while preparing the fish habitat compensation plan, a confidential contractual arrangement between DFO and VBNC. The Panel recognizes that this third relationship would be significantly altered and presumably improved through new self-government and co-management arrangements, once land claims agreements have been reached.

The environmental agreement proposed by LIA and the Innu Nation would ensure Aboriginal involvement in reviewing environmental monitoring and would consolidate a number of conditions that VBNC must meet. The Panel agrees that both of these functions are required but believes that the first is most properly done through a four-party agreement that would continue the relationship set up through the MOU.

In relation to the second function, the Panel is also concerned about the possibility of excessive reliance on contractual agreements to carry out environmental management functions that are usually governed by regulation. The Panel believes that the terms and conditions that emerge from this assessment, over and above existing regulatory requirements, could and should be attached to the various permits and approvals to give them proper legislated weight as well as transparency, which would provide for public accountability. Commitments made by VBNC regarding business and employment benefits most properly belong in IBAs, which would also be legally binding.

The environmental agreement could be project specific, and therefore apply only to the

Voisey's Bay Project. However, the Panel believes that it would be more efficient and effective to expand the scope of the agreement to include other mineral resource activity in northern Labrador, including further exploration.

Recommendation 94

The Panel recommends that, before construction begins, Canada, Newfoundland and Labrador, LIA and the Innu Nation negotiate an environmental co-management agreement to address both biophysical and socio-economic aspects of mineral resources development in northern Labrador. The agreement should establish an appropriate mechanism for ongoing four-party involvement in associated regulatory processes, the review of future related Project developments and the administration of the follow-up program.

This agreement should also satisfy the requirements for consultation and participation laid out in the *Delgamuukw* decision to justify infringement of Aboriginal rights and title.

The Panel observes that the four parties to this agreement may wish to broaden the scope of the agreement to include issues relating to other aspects of resource development in northern Labrador.

17.3.2 Organizational Structures for Environmental Management

During the discussions about organizational structures for overseeing environmental monitoring, presenters described two independent monitoring bodies at other projects: the Institute for Environmental Monitoring and Research (IEMR), established following the assessment of the low level flying program in Labrador; and the Independent Environmental Monitoring Agency (IEMA) for the Ekati Diamond Mine in the Northwest Territories. The emphasis of

IEMR appears to be mainly on promoting and funding research in support of effects monitoring. The Innu Nation expressed concern about the effectiveness of this body, opting in its environmental management recommendations to the Panel for a more direct relationship with VBNC through their monitoring partnership. The IEMA appears to be a closer match to the model proposed by LIA.

Both agencies appear to provide a means whereby independent scientific expertise can be brought to bear when reviewing monitoring programs. However, in the case of the Voisey's Bay Project, the Panel does not endorse this approach for the following reasons. The Panel is impressed by the calibre of the government scientists who participated in the review process, and by their local knowledge and experience, and believes that they should continue to contribute their expertise as part of the follow-up program. The Panel also believes that the Aboriginal organizations need access to scientific knowledge and advice, but that this access should be direct, rather than through a scientific review committee working for an independent agency. Direct access would ensure that the scientific advice responded directly to the needs of the Aboriginal organizations and could be integrated easily with Aboriginal knowledge and expertise, as required. The Aboriginal organization could then bring this scientific advice either directly to VBNC, through their monitoring partnership, or to the other signatories to the four-party agreement outlined in Recommendation 94.

As an example of effective integration of Aboriginal and scientific knowledge, the Panel also commends the contribution of LIA's panels of Inuit experts during the hearings. The Panel would see Aboriginal organizations' direct use of scientific advisors as an excellent opportunity to continue this type of integration.

The Panel recognizes the need for full Aboriginal participation in reviewing the implementation and results of the monitoring program.

The Panel further believes that an independent monitoring agency would be an inappropriate mechanism because the proposed monitoring partnerships would ensure direct Aboriginal input into the design and implementation of the monitoring program. The Panel does not believe that VBNC should be required to fund both the monitoring partnerships and a separate agency.

In place of an independent agency, the Panel concludes that the federal and provincial governments, LIA and the Innu Nation should jointly form an Environmental Advisory Board specifically to evaluate VBNC's ongoing environmental performance and to address concerns and issues as they may arise. The role of the advisory board would include reviewing and making recommendations about

- initial and subsequent permit applications;
- VBNC's completed EMS framework and environmental protection plans;
- compliance monitoring results;
- activities undertaken as part of the follow-up program, including environmental effects monitoring; and
- other issues relating to the Project that any of the four parties or VBNC wishes to bring to the advisory board.

The responsible federal or provincial department or agency would still make final decisions on regulatory issues, unless it had specifically delegated those decisions to the board. However, protocols would be established to give the board sufficient time to make its recommendations and to ensure that those recommendations were carefully considered and that the board received feedback. At the same time, the Panel believes that the board and the participating parties should make the review processes as efficient as possible, to avoid delaying or inconveniencing VBNC unnecessarily.

As with the mineral resources development agreement, this board could be specific to the Voisey's Bay Project, or could, more effectively, include in its mandate all issues relating to mineral resources exploration and development in northern Labrador.

Recommendation 95

The Panel recommends that, under the terms of the environmental co-management agreement, the four parties to the Memorandum of Understanding should establish an Environmental Advisory Board (EAB) for northern Labrador. Its mandate would be to review the results of compliance monitoring and of the follow-up program established under the *Canadian Environmental Assessment Act*; to review permit applications and future Project development proposals; and to address ongoing environmental management issues and concerns. Canada and the Province should fund the Board's operations, which should include a secretariat to coordinate administrative and scientific functions. The EAB should publish an annual report.

To help the Environmental Advisory Board in its work, the Panel concludes that VBNC should consolidate all the various environmental and socio-economic requirements and commitments into one document to provide a benchmark against which the Project's performance can be evaluated.

Recommendation 96

The Panel recommends that, before construction starts, VBNC prepare an environmental performance document that clearly lays out all key terms and

conditions under which the Project would operate and all commitments made by VBNC, including all performance standards, financial assurances, targets, quotas and reporting procedures. The document should indicate in each case the appropriate legal basis (for example, attached as a condition to a *Navigable Waters Protection Act* approval, included in an impact and benefit agreement or voluntary agreement). This document would be designed to help VBNC report its environmental performance and to help governments, Aboriginal organizations and the public evaluate it.

17.3.3 Shipping Agreement and Marine Management Plan

LIA and VBNC have already agreed to negotiate a bilateral shipping agreement intended to establish the terms by which shipping would occur, particularly through landfast ice in the Project area. These terms would include monitoring measures. Although winter shipping would not occur for a number of years, LIA wishes, before construction starts, to negotiate some provisions relating to shipping during the open water season. Issues could include speed, noise, effects on birds and the shipping schedule.

LIA also hopes to develop an integrated marine management plan under the auspices of the *Oceans Act* that could ultimately incorporate part or all of the provisions of the shipping agreement. During the hearings, DFO initially suggested to the Panel that this would be an entirely appropriate and feasible activity under the *Oceans Act*. However, DFO subsequently indicated that it is not yet able to enter into a planning process through this mechanism and did not indicate when it would be ready.

Evidence presented during the review has convinced the Panel that existing legislation and resource management systems do not ade-

quately protect the interests of Labrador Inuit and any other sea ice users. DFO held out little hope that legislation could be changed quickly, and stated that, while the *Oceans Act* shows promise, it is not immediately usable. As indicated in Chapter 10, the Panel believes significant uncertainties still surround the effects of winter shipping, and that these must be satisfactorily resolved before winter shipping is allowed to proceed. The Panel also understands that the completion of a land claims agreement may give LIA an important role in marine management.

Given all of these circumstances, the Panel endorses the appropriateness of a negotiated shipping agreement. The Panel recognizes LIA's interests in the management of landfast ice areas, and therefore agrees with its position that this agreement should be negotiated bilaterally. However, the Panel believes that the agreement could be strengthened if DFO participated in the process. DFO raised one specific concern — the possibility that a bilateral agreement might jeopardize ship safety by constraining the ability of the master to make decisions. While this seems improbable, since neither VBNC nor LIA wishes to compromise navigational safety, it does indicate that the Canadian Coast Guard may have a useful role to play in this process, given its knowledge, experience and regulatory responsibilities.

The Panel believes that a bilateral agreement is, in this case, a reasonable compromise, given the interests of the two parties and the likely time lag before the federal government would be able to revise legislation. However, the agreement would include matters of broad public interest, so the Panel would encourage the two parties to make the contents of the agreement public to maintain the transparency of the environmental management process. The contents would include the results of the concentrate storage studies.

Recommendation 97

The Panel recommends that VBNC negotiate a shipping agreement with LIA before Project construction starts. Initially, this agreement should address protocols for shipping during the open water period, as well as the processes to be followed to address outstanding issues of concern around winter shipping. The Panel also recommends that DFO play a role in this process as an advisor on matters of marine safety and environmental protection.

The Panel agrees with LIA that coordinated marine planning and management is needed for the northern Labrador coastal area, especially to manage the cumulative effects of other projects or additional shipping through ice. The Panel also agrees that the Labrador marine environment deserves protection equivalent to that provided for more northerly but similar ecosystems. As participants explained at the hearings, Labrador Inuit are as dependent on sea ice as Inuit living north of 60°.

The Panel expects that LIA would be in a substantially stronger position to pursue this goal once land claims are finalized but would still require DFO's collaboration. While appreciating that implementation of the new *Oceans Act* is placing considerable demands on DFO's time and resources, the Panel nevertheless believes that the federal government should provide sufficient resources to at least start development of a marine management plan for northern Labrador. A comprehensive planning exercise may not be possible at this time, but the Panel encourages DFO and LIA to identify preliminary steps and perhaps alternative vehicles for broader marine management, as DFO suggested in the final technical session of the hearings.

Recommendation 98

The Panel recommends that DFO and LIA start talks to identify areas of interest, priorities, resources and opportunities related to marine management planning, to determine which elements of an integrated resource management planning process can proceed. These talks should be designed to produce a memorandum of understanding on these issues in a timely fashion. This planning process should preferably take place under the terms of section 31 of the *Oceans Act*; if they do not, DFO should identify an alternative approach.

Figure 3 shows the relationship of the various agreements and organizational entities to each other and to the Project.

17.4 VBNC'S ENVIRONMENTAL MANAGEMENT SYSTEM

The Panel recognizes that the Canadian mining industry has made significant strides in environmental management in recent years. Liability for poor environmental performance is less easily escaped and has therefore become an important factor in maintaining overall business viability. The Panel also acknowledges the roles played by government, labour and public interest groups in achieving these improvements. The Panel was generally impressed by VBNC's proposed EMS framework, and believes the company has the knowledge and experience, backed up by that of its parent company, Inco, to do a creditable job.

Both the federal and provincial governments have indicated that they want to help develop and refine certain aspects of the environmental protection plans. For example, Environment Canada wishes to work with VBNC to develop various pollution prevention and waste management plans, and the Department of Environment

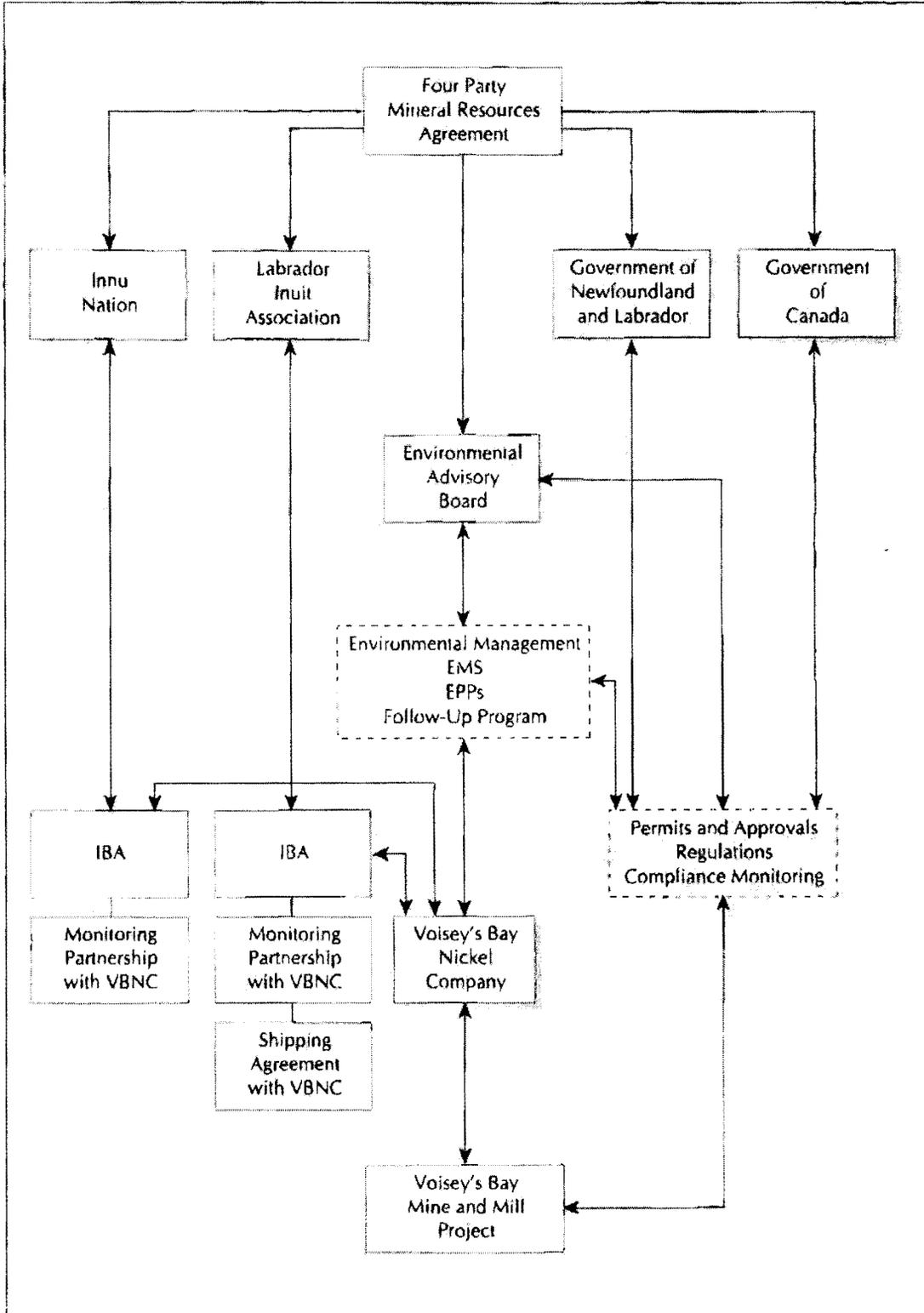
and Labour wants to work with VBNC to develop protocols for environmental self-audits. Both the Innu Nation and DFO want regulatory agencies and other stakeholders to approve all environmental protection plans and updates.

VBNC provided information on its proposed occupational health and safety plan, which would provide for regular employee input through a committee that would meet monthly. An expert speaking on behalf of the Innu Nation provided a long list of suggested occupational health and safety recommendations. He also suggested that nickel mining was inherently very hazardous to the health of workers. The Panel observes that the literature cited in support of this argument dealt mainly with the health impacts of older types of nickel processing, rather than the type of operations proposed for Voisey's Bay. It was not convinced, on the basis of this evidence, that workers at the Voisey's Bay Mine and Mill would be subject to unacceptable health risks.

The Panel observes that, as with environmental management generally, the mining industry has also made big improvements in occupational health and safety, with some notorious exceptions. Workers in the industry, through the efforts of their unions, can take considerable credit for these advances. Concern was expressed that, if the Project was not unionized during the operations phase, employees new to the mining industry — a group that would probably include most of the Aboriginal employees — would have neither the experience nor the organizational support to ensure that their interests were protected. The Panel acknowledges this concern, but notes that there would certainly be some experienced workers on site and that the interests of Aboriginal employees would also be represented by LIA and the Innu Nation through IBAs and monitoring partnerships.

The Panel notes that many of the recommendations made by the Innu Nation expert fall within the responsibility of the provincial

FIGURE 3 ENVIRONMENTAL MANAGEMENT: PROPOSED ORGANIZATIONAL STRUCTURE



regulators. The Panel believes that a detailed investigation of occupational health and safety issues is beyond the scope of this environmental assessment review, but concludes that the Environmental Advisory Board would provide an appropriate forum for dealing with any outstanding issues.

Recommendation 99

The Panel recommends that VBNC prepare its environmental protection plans, emergency response and contingency plans, and occupational health and safety plans in consultation with appropriate regulatory agencies, before construction begins, and that these plans be subject to review and recommendations by the Environmental Advisory Board. The environmental protection plans and emergency response and contingency plans should be developed as field-usable documents, and be reviewed and updated regularly.

17.5 RECLAMATION

The central objectives of the mine closure and reclamation plans, as defined by VBNC, would be to protect public health and safety, reduce post-closure maintenance and monitoring, and minimize environmental liabilities. VBNC would develop a detailed mine closure plan several years before closure actually takes place. VBNC submitted a reclamation plan framework to the Panel just before the hearings, though it was not part of the EIS. Reclamation would be progressive; as soon as a disturbed area or Project facility was no longer needed, it would be reclaimed to a stable state.

Overburden and non-mineralized rock storage areas would be constructed with appropriately stable slopes, and portions that would be susceptible to erosion would be revegetated. Buildings and structures would be removed, and all disturbed areas graded and contoured.

VBNC would ask area residents whether they would like the company to leave any of the transportation facilities (the roads, wharf and airstrip) in place for emergency use. If not, VBNC would remove structures, culverts and bridges, and loosen the surfaces of roads and the airstrip, which it would either seed or leave to revegetate naturally. Aboveground pipelines would be removed and underground pipelines either removed or cleaned and capped.

The reclamation of the open pit, including alternative approaches, is covered in Chapter 6, Tailings, Mine Rock and Site Water Management.

Decommissioning and final reclamation activities should take up to two years to complete. An inspection and monitoring program would check on water quality, the stability of pit walls and rock piles, and the success of revegetation efforts. The EIS also identifies some of the steps that would be taken in the event of a temporary shutdown for operational or economic reasons.

Reclamation requirements would be an integral part of the mining lease, and VBNC would need to fulfill them before surrendering the lease. The standard lease requires the lessee to slope all actively mined areas to a grade not exceeding 30 degrees, and to replace the stock-piled soil and vegetation mat. In surrounding areas, the lessee must "restore the landscaping of the area to a state existing immediately before the activities of the Lessee or to such a state that, in the opinion of the Minister, does not result in the area being adversely affected ..."

Concerns raised during the review included

- the need for specific performance standards and guidelines to ensure that reclamation is successful;
- concern about the use of indigenous plant materials;
- the need for public input into the development, implementation and monitoring of the reclamation plan; and

- the need to have financial assurances in place to ensure that money is always available to complete reclamation.

The Panel believes that, for many people, reclamation is one of the central Project issues, for two main reasons. First, Labradorians are all too familiar with the consequences of mining without mandatory reclamation, Schefferville being one example. Second, for both Innu and Inuit, respect and care for the land is a fundamental part of their world view. The Panel recognizes that the proposed mine, however carefully constructed and operated, represents an assault on the integrity of the land to many Aboriginal people, particularly the elders. This in turn leads to a sense of loss, particularly because Voisey's Bay has a special place in the hearts of Innu and Inuit. While a reclamation program would not necessarily remove this sense of loss, the Panel believes that it would provide an opportunity to demonstrate care for and good stewardship of the land, and to involve Inuit and Innu in a "healing" process for the land.

The Panel concludes that VBNC should therefore ensure that Aboriginal people play central roles in all aspects of the reclamation strategy, thereby bringing their own traditional ecological knowledge to the process and also expanding their knowledge and skills base. Indeed, the proposed monitoring partnerships might very appropriately be renamed monitoring and reclamation partnerships.

Recommendation 100

The Panel recommends that VBNC, LIA and the Innu Nation, through the monitoring partnerships, negotiate an agreement to include significant levels of Aboriginal participation in the research, planning, implementation and monitoring of the reclamation plan through the post-decommissioning

phase. This agreement should include appropriate transfers of Aboriginal knowledge and technical reclamation knowledge and skills. Through this agreement, VBNC and its Innu and Inuit partners should collaboratively develop reasonable and achievable objectives for the reclamation process.

In the Panel's opinion, the reclamation plan framework provides a good overview of the approach VBNC would take. It identifies a number of specific challenges the company would face, because of the subarctic climate, and the need for an ongoing research program to find the most effective and practical ways of revegetating disturbed areas.

In its reclamation plan framework, VBNC acknowledges the need to minimize disturbed areas and to ensure that activities do not lead to unnecessary damage. The Panel commends VBNC for this approach but recognizes that it is not always easy to ensure that everyone on a work site takes the longer view, especially when under immediate pressure. Therefore, it will be important to find ways to put the concept into practice so that, from the first day of the Project, VBNC employees, contractors and subcontractors are working to develop the final landscape.

Recommendation 101

The Panel recommends that VBNC, as soon as possible and before construction starts, develop policies and reporting and accountability systems to ensure that reclamation objectives are built into all aspects of the Project's design, construction and operations, particularly with respect to minimizing the extent of disturbance. VBNC should

- **continue to develop the reclamation plan in partnership with LIA and the Innu Nation;**

- **review all construction and operating plans from the perspective of reclamation;**
- **conduct appropriate employee and contractor training and awareness sessions;**
- **monitor compliance with the reclamation plan; and**
- **report progress, both internally and externally.**

17.6 FINANCIAL ASSURANCES

During the review, participants expressed considerable concern about the provision of adequate financial assurances to ensure that

- damage from spills or accidents would be remediated or compensation would be provided;
- the site would be properly closed and reclaimed at the end of the Project or during a temporary shutdown, and that all environmental liabilities would be removed; and
- sufficient resources would be in place to maintain permanent water covers over tailings and mineralized waste rock and to address long-term monitoring requirements.

These concerns also extended to contractors and subcontractors.

VBNC is proposing to carry environmental liability insurance, where available, to cover the costs of cleaning up accidental events. Other liabilities, not covered by liability insurance, would be covered through self-insurance, backed by the assets of VBNC's parent company, Inco.

The Department of Mines and Energy is developing a new Mines Act, which will give the Minister formal authority to ask for financial assurances when a mining lease is approved. However, even without this legislative change, the Department has already required mining

companies in the province to make financial commitments to cover future reclamation costs, so the principle and practice are well established. At this stage, the Province cannot specify exactly what it would consider acceptable assurance. However, it is acutely conscious of the risks that it would run if satisfactory arrangements were not made, because liability would then accrue to the people of Newfoundland and Labrador.

The Innu Nation criticized reliance on self-insurance; if the company ran into financial trouble, it would be too late to negotiate other financial assurance instruments or dedicated assets. It was also concerned that parent companies might not always honour the liabilities of their subsidiaries. It recommended that one or more sources of security be required from VBNC, including reclamation bonds, a security deposit, a guarantee from Inco secured by tangible assets, a line of credit and a monitoring trust fund. The Innu Nation also asked for arrangements that would allow LIA and the Innu Nation to get access to those funds, if necessary.

In the case of the Ekati Diamond Mine in the Northwest Territories, the government required both a staged security deposit (so much to be paid each year, with options to vary the amounts depending on the progress made in continuous reclamation) and an "irrevocable guarantee" of \$20 million. VBNC has estimated in its reclamation plan that the total cost of decommissioning and reclamation would be around \$60 million.

The Panel agrees that financial assurance is a vital part of the environmental management process and that total self-insurance is not an adequate response. However, the Panel appreciates that there are difficulties associated with other tools such as bonds, which generally cease to be guaranteed once the credit rating of the company purchasing the bond dips below a certain level. A variety of other tools are available, however. In the mining lease, the Province should specify which tools provide adequate security

while not imposing unnecessary financial burdens on VBNC.

The Panel believes that the Department of Mines and Energy should research a range of options, referring to experience elsewhere, including the Ekati Diamond Mine project. Before attaching requirements to the mining lease, the Department should also seek advice on those options from other stakeholders through the new Environmental Advisory Board.

Recommendation 102

The Panel recommends that the Department of Mines and Energy consult with the Environmental Advisory Board before deciding on appropriate requirements for financial assurances to be attached to the mining lease. Such assurances should be phased in to cover estimated reclamation and post-decommissioning monitoring costs at any given point in the life of the Project, and should include an appropriate cash component. These assurances may also include bonds, dedicated assets or irrevocable guarantees.

17.7 MONITORING AND FOLLOW-UP PROGRAMS

At times during the review there was some confusion about the terms “monitoring” and “follow-up.” Monitoring can include both compliance and environmental effects monitoring. Compliance monitoring is a regulated activity and the responsibility of VBNC. Effects monitoring is not currently a regulated function, although Environment Canada expects the revised Metal Mining Liquid Effluent Regulations (MMLER) to include some effects monitoring requirements. Effects monitoring, depending on the issue, could be carried out by VBNC or by other interested parties.

However, under the terms of the CEAA, the Responsible Authority — in this case,

DFO — can require the proponent to carry out a follow-up program to verify the accuracy of the environmental assessment or to determine the effectiveness of mitigation measures. Such a program could include effects monitoring.

In the Additional Information, VBNC provided a preliminary monitoring framework, indicating that it intends to revise the framework in collaboration with the appropriate government agencies, and with LIA and the Innu Nation through the monitoring partnerships. The monitoring framework addressed biophysical monitoring only; VBNC maintained that socio-economic monitoring is the responsibility of other parties.

17.7.1 Monitoring Biophysical Effects

VBNC provided a preliminary list of valued ecosystem components (VECs) to be monitored. At the hearings, there was considerable discussion about the criteria used to create this list. From VBNC’s point of view, monitoring should focus on those VECs that the EIS predicted would be affected by the Project, because it has already been established that the Project and the VEC are linked by a pathway. As a number of people pointed out, however, there could also be good reasons to monitor certain VECs for which no effects had been forecast, to verify that the predictions in the EIS were correct. At the hearings, VBNC acknowledged the validity of this argument and indicated its willingness to consider monitoring certain additional areas.

There was also discussion about the appropriate trophic level at which to monitor. Predators at or near the top of the food chain, such as raptors or larger mammals, are often of most immediate concern to the public but may not provide the most useful monitoring information. Food chain alterations may take a long time to show up at the upper trophic levels and it may be difficult to separate Project influence on predators at these levels from many other influences.

Instead, some presenters argued that monitoring should focus on subjects such as periphyton, benthic macroinvertebrates, lichens or small mammals, which might give earlier and clearer warning of Project effects.

On the other hand, not all effects to higher level species are indirect, through the food chain. The Panel also heard concerns that VBNC was not proposing to monitor marine mammals, caribou, polar bears and waterfowl. The Panel addresses these issues in other chapters of this report. The Innu Nation, based on its experience with the Institute for Environmental Monitoring and Research, recommended that the Panel specify which VECs should be included in the monitoring program to avoid lengthy disputes. But at the hearings, the Innu Nation agreed that it was more important to first establish an effective environmental management structure that would provide an efficient and collaborative way to develop the monitoring program to meet the interests of the various parties. The recommendations contained in Section 17.3 are intended to do this.

The Innu Nation also mentioned the importance of timely public access to raw monitoring data and analytical results, and the benefits of establishing a reference area to distinguish changes caused by the Project from those caused by wider environmental influences, such as climate or long distance atmospheric transport of contaminants.

DFO indicated that it would play two distinct roles, as advisors and as regulators. As the Responsible Authority, DFO would require VBNC to submit its proposed program for review and approval before construction begins, and to show evidence of adequate stakeholder consultation. DFO stated that the monitoring program must be scientifically defensible, with specific monitoring objectives based on testable hypotheses, a position that VBNC and others share.

DFO also recommended that VBNC add numerous parameters to the freshwater and

marine components of the monitoring program; carry out additional baseline studies; and develop better knowledge, presumably through experiments, about the potential toxicity of nickel-copper-cobalt effluents in saltwater to different local species. (See Chapter 7, Contaminants in the Environment and Chapter 9, Marine Environment: Land-Based Effects).

VBNC, on the other hand, presented an approach at the hearing that focused more on verifying predictions about the concentration and movement of contaminants by means of aquatic pathways than on the possible concentration and effect of such contaminants in various species, with an emphasis on taking practical mitigative action if necessary.

It appears that some of the friction between DFO and VBNC, in evidence during the review, was based on the differences between a scientific approach that looks for greater understanding of the way ecosystems work, and an engineering approach that seeks primarily to avoid problems or detect and fix them. The two approaches can and in this instance should be complementary, if both parties can focus on some key areas in which greater ecosystem-based knowledge has the best potential to improve engineering practice and consequently improve environmental performance.

The Panel concludes that there appear to be significant common grounds among all stakeholders on which to build a reasonable consensus about monitoring. Everyone wants to see monitoring that delivers meaningful information and that is based on good science and Aboriginal knowledge. The Panel believes that it will be important to put adequate time and effort into reaching agreement on the monitoring framework itself, which should be much more than a list of things to monitor. Emphasis should be placed on determining objectives and parameter selection criteria first.

The Panel also concludes that the monitoring program, as well as verifying predictions,

testing models and providing feedback to be used to improve environmental management, would also play an important role in assuring local residents that the environment was being protected to a high standard and that the resources they use were unaffected. Criteria to select monitoring parameters should be developed accordingly.

The Panel agrees with VBNC's emphasis on cause-and-effect relationships and concentration on immediate pathways. However, recognizing that some receiving environments would be affected by multiple sources, the Panel believes that parameters should also be selected to indicate potential combined ecosystem effects of the Project. The Panel also endorses VBNC's intention to develop threshold levels — benchmarks to be used to determine when further mitigative action might be required.

The Panel does not think that it is appropriate in this report to select monitoring parameters; this should be done as part of a larger collaborative process. However, the Panel believes that many useful discussions about candidate parameters took place during the hearings, and that these should be carefully reviewed. The need for additional baseline monitoring should also be reviewed in the context of the areas selected for study.

The Panel recognizes the appeal of establishing a reference area against which the area influenced by the Project could be compared. The Panel is not able to make a definitive recommendation, based on the limited information provided during the review, but it believes that VBNC and the Environmental Advisory Board should address the benefits and feasibility of this approach. It is possible that the Mining Association of Canada, government and other research institutions could collaborate to maintain such a reference area.

Recommendation 103

The Panel recommends that VBNC develop the biophysical monitoring

framework collaboratively. The framework should be based on sound scientific principles, the need for practical environmental management feedback, and the concerns of northern Labrador residents and resource users. The monitoring framework should include a data access policy, reporting protocols and monitoring benchmarks to be used to trigger action. It should also emphasize the need for process transparency and public access to information.

17.7.2 Monitoring Socio-Economic Effects

The Project is predicted to have a range of socio-economic effects, both positive and negative, including changes in employment levels, local population numbers, existing and new businesses, local economies, cost of living, housing, health, family life, social interactions and community well-being. In a few cases, such as direct employment, the effects of the Project would be clear as long as good records were kept. In most other cases, it would be hard to separate the net effect of the Project from that of a number of other influences.

VBNC has indicated that it would cooperate with government agencies and other bodies by sharing relevant Project information, such as employment or business statistics, subject to certain confidentiality restrictions. The Province would also require the company to submit information on employment and business benefits on a quarterly basis. VBNC also stated that the financial provisions to be included in IBAs were in part intended to provide LIA and the Innu Nation with the resources to carry out any studies they deemed necessary.

The Panel heard very little from other participants on this subject. The Labrador Inuit Health Commission (LIHC) put forward its proposed program to monitor various indicators

of community health, which is intended to help LIHC design and improve appropriate intervention programs. This program is not targeted solely at Project effects, which LIHC agreed could be hard to single out. It requested that VBNC share appropriate information where possible, and VBNC agreed to do this.

The Panel concludes that responsibility for socio-economic monitoring should be shared. VBNC should be responsible for

- providing information to enable evaluation of their application of the adjacency principle; and
- monitoring, in collaboration with LIA and the Innu Nation through monitoring partnerships, the effectiveness of its proposed socio-economic mitigation measures, including the relevant environmental protection plans (human resources, education and orientation, Aboriginal involvement and public involvement).

VBNC should also be responsible for responding to socio-economic concerns or problems, attributable to the Project, that have been identified through monitoring carried out by LIA, the Innu Nation or the Province. This response could require VBNC to take direct corrective or mitigative action or to collaborate with other parties to identify the best route to take.

The Panel assumes that LIA and the Innu Nation would need to carry out some basic monitoring to ensure that employment and business targets and provisions in the IBAs are being met, and that the IBAs will contain provisions to ensure that this happens, including a process to deal with the results of such monitoring including dispute resolution if required.

While DFO, as the Responsible Authority, administers the requirement for a follow-up program, the Panel believes it would be inappropriate for a federal department to take responsibility for ensuring the delivery of local and regional benefits. While the Province cur-

rently has no legislated requirement to oversee a socio-economic follow-up program, the Panel expects that the Province would wish to carry out this function in collaboration with federal partners and Aboriginal organizations. The Panel expects that such a program would not only provide information to help refine mitigative measures and guide the allocation of provincial resources, but would also help the Province respond to and plan for other major projects, particularly in Labrador.

Unlike the *CEA Act*-driven follow-up program, which would probably focus on monitoring work carried out by VBNC, the Panel expects that the socio-economic follow-up program would include monitoring carried out by LIA, the Innu Nation, and provincial and regional agencies.

Recommendation 104

The Panel recommends that the Province designate a provincial department or agency to develop and oversee a counterpart to the follow-up program under the *Canadian Environmental Assessment Act*, which would focus on the socio-economic effects of the Project. The purpose of this program would be to verify the predictions of the Environmental Impact Statement, to ensure that VBNC is keeping its socio-economic commitments, to evaluate the effectiveness of mitigative measures, and to guide provincial resource allocations for services and infrastructure. This socio-economic follow-up program should be developed in collaboration with the Environmental Advisory Board.

Recommendation 105

The Panel recommends that VBNC be required to submit an annual report

to the provincial department designated as holding responsibility for the socio-economic follow-up program (see Recommendation 104), and to the Environmental Advisory Board. This report would describe the Project's performance in delivering socio-economic benefits to Labrador Inuit Association and Innu Nation members and to Labrador residents and businesses. If necessary, the Environmental Advisory Board should provide recommendations on mitigation or enhancement measures to appropriate provincial and regional economic agencies and to VBNC.

The Panel agrees that LIA and the Innu Nation should initiate socio-economic effects monitoring in communities, with the assistance of other partners, as appropriate. These partners would include the Province, especially with respect to health care, education, housing, services and infrastructure issues. University and other research institutions might be interested in supporting other aspects of social and community research.

As with biophysical monitoring, the Panel believes that socio-economic monitoring studies should be based on specific objectives, which would in turn be based on testable hypotheses. In addition, monitoring should be structured to differentiate the effects of the Project by gender and by age wherever possible, in order to track progress towards the equitable distribution of socio-economic benefits.

Recommendation 106

The Panel recommends VBNC provide a gender breakdown for all employment figures submitted in its quarterly reports to the Province.

17.8 ABORIGINAL KNOWLEDGE IN FUTURE ENVIRONMENTAL ASSESSMENTS

The Panel notes that the requirement to fully consider Aboriginal knowledge in environmental assessment is a very recent one, and that the *CEA Act* provides no guidance on the matter. The previous environmental assessment panel with similar instructions (in the NWT BHP Diamonds Project) noted several difficulties in implementing this requirement, which it attributed to a lack of direction from government. That panel recommended that "the Government of Canada develop a policy on the inclusion of traditional knowledge in environmental assessment," which would meet the need to "set out guidelines and standards that developers are expected to meet when preparing environmental assessments." The NWT BHP Diamonds Panel also noted a need to define "the role and responsibility of government in this area." So far as the Voisey's Bay Panel is aware, Canada has not acted on this recommendation.

VBNC told the Panel that it encountered several difficulties in incorporating Aboriginal knowledge in its EIS. It attributed these difficulties to

- undertaking the assessment in the context of complex negotiations on other issues with the same parties, which complicated both access to Aboriginal knowledge and the ability to plan and conduct effective research; and
- the absence of an agreed definition of what constitutes Aboriginal knowledge.

VBNC endorsed the recommendations of the NWT BHP Diamonds Panel, and further recommended that the responsibilities of Aboriginal governments be clarified in this regard.

The Panel recognizes that VBNC faced a difficult task. Although Aboriginal knowledge may be the only source of certain information that may be required for an EIS, it may not always or even normally be possible for a proponent

to obtain this information, either practically or ethically. A proponent cannot be required to incorporate Aboriginal knowledge in its EIS if those who have this knowledge do not wish to provide it to the proponent for that purpose. It may be desirable for a proponent and affected Aboriginal parties to develop a cooperative approach to impact assessment, but this is not always possible and cannot be a requirement for environmental assessment. It is reasonable that a proponent should make material contributions to ensure that Aboriginal knowledge is brought to bear on environmental assessment, as was the case in this review.

The Panel draws the following conclusions from its experience with this review.

- Environmental assessment should include all areas of Aboriginal knowledge, rather than traditional ecological knowledge only.
- It is almost certainly more effective for a proponent to provide material support to help Aboriginal parties contribute Aboriginal knowledge directly to the public review process, rather than be required to include it in its own EIS. Any guidance to proponents in this regard should take full account of the political circumstances in which development proposals may occur, and should not impose requirements that proponents cannot and should not fulfill.
- Full consideration of Aboriginal knowledge in technical hearings should not imply uncritical acceptance, but rather that such knowledge should be examined as carefully as other expert knowledge.
- Future panels should have considerable discretion in developing their own guidelines on how Aboriginal knowledge should be brought to bear on their own reviews, based on their particular circumstances, what they find out in scoping sessions and the experience of previous panels.

- Formal government policies or guidelines that purport to define Aboriginal knowledge, or the ways it should be used or interpreted, will not likely assist the environmental assessment process. Such an approach seems no more realistic than trying to define science or any other form of knowledge for public policy purposes.

Recommendation 107

The Panel recommends that both Canada and the Province should incorporate into their respective environmental assessment processes the principle of full consideration of traditional ecological knowledge. The Panel further recommends that this consideration be expanded to include all Aboriginal knowledge. Governments should provide guidance to proponents on their basic obligations and options with respect to using Aboriginal knowledge in an Environmental Impact Statement or ensuring its presentation in the public review process. More specific guidance on using Aboriginal knowledge in future reviews should be provided by the responsible panels on a case by case basis.

17.9 CUMULATIVE EFFECTS

As required by the Panel, VBNC addressed cumulative environmental effects by assessing the Project's predicted effects in combination with the potential effects of projects and activities "which are ongoing or likely to proceed, and have therefore been issued permits, licences, leases, or some other form of approval, as specified by the Canadian Environmental Assessment Agency." VBNC's predictions about cumulative effects were integrated into the chapters of the EIS dealing with VECs. The Panel has responded in a similar fashion with conclusions and recommendations in other chapters, where applicable.

ENVIRONMENTAL ASSESSMENT PANEL

The Panel believes that future environmental assessments might be able to play some role in managing cumulative effects, but observes that many of the pressures on the northern Labrador ecosystem and on communities would occur without being subject to any formal assessment.

The Innu Nation recommended to the Panel that regional ecosystem-based planning should occur at the landscape level, identifying and protecting fundamental ecological processes, functions, landscapes and migration corridors. LIA also wishes to carry out marine management planning, based on a similar ecological analysis. The Panel also notes that the Province has put in place a network of Regional Ecosystem Ecologists.

The Panel concludes that VBNC's responsibilities with respect to cumulative effects are to

- minimize Project effects on the environment through good planning and through the

design and effective implementation of its environmental management system;

- implement a valid effects monitoring program; and
- share information and contribute to collaborative research, where appropriate.

The Panel believes that the Environmental Advisory Board proposed in this report would provide a valuable forum in which the four parties to the MOU could address cumulative effects issues as they arose. The Panel also hopes that the four parties, continuing in the collaborative spirit that was evident throughout this review process, would jointly identify regional research, planning and resource management initiatives that might be necessary to ensure environmental protection and the development of sustainable communities in northern Labrador.

18 RECOMMENDATIONS

Recommendation 1

The Panel recommends that the Voisey's Bay Mine and Mill Project be authorized to proceed, subject to the terms and conditions identified in the rest of the Panel's recommendations.

Recommendation 2

The Panel recommends that the Province and VBNC negotiate a mining lease that promotes the attainment of durable and equitable social and economic benefits to the people of Labrador and of the Province through resource stewardship. The following conditions should be attached to that lease:

- VBNC must proceed as soon as possible with an underground exploration program and, if reserves are proven, commit to early development to blend underground output with the late stages of open pit production; and
- if initial underground exploration does not confirm current reserve projections, VBNC must extend the life of the open pit by reducing the annual production rate to ensure that the Project can continue to operate for at least 20 to 25 years.

Recommendation 3

The Panel recommends that Canada and the Province conclude and ratify land claims agreements in principle with the Inuit of Labrador, represented by LIA, and with the Innu of Labrador, represented by the Innu

Nation, before issuing any project authorizations. The agreements in principle should include binding and enforceable interim measures for co-management to provide a bridge between the end of this environmental assessment and the full operation of the co-management elements of the agreements. This will require Canada and the Province to amend their approaches to claims negotiations to ensure that the required interim measures are put in place as an integral part of an agreement in principle.

Failing that, the Panel recommends that, before issuing any project authorizations, Canada and the Province negotiate equivalent alternative measures with LIA and the Innu Nation, as outlined in Chapter 17. Such measures must provide for Inuit and Innu participation, consultation and compensation in respect of the Project, in keeping with the fiduciary obligations of Canada and the Province.

Recommendation 4

The Panel recommends that, whichever option in Recommendation 3 is adopted, as long as the arrangements are legally binding and enforceable, conditional authorization be given that would provide VBNC with satisfactory assurance to plan the Project and apply for permits while negotiations continue. This would allow both processes to occur concurrently rather than consecutively. However, actual construction should not be authorized to proceed until the

conditions of Recommendation 3 have been fulfilled.

Recommendation 5

The Panel recommends that Canada and the Province issue no Project authorizations until LIA and the Innu Nation have each concluded Impact Benefit Agreements (IBAs) with VBNC. Whether these occur inside or outside the context of a settled land claims agreement, IBA negotiations should be concluded within an agreed time frame, or, if necessary, the Minister authorizing the Project should impose a time frame. The negotiating framework should also include provision for dispute resolution, including the use of compulsory arbitration if required.

Recommendation 6

The Panel recommends that VBNC, as part of its environmental protection plan, do the following.

- VBNC should develop a dust management plan that incorporates best management practices derived from other mining and related operations, to minimize the creation and mobilization of dust. This plan should include preventive measures, such as appropriate speed limits for truck traffic on haul roads and dust suppression techniques.
- VBNC should develop a comprehensive energy conservation program, to prevent air pollution effects by reducing the combustion of fossil fuels. The program should include an energy review of the planned Project design before construction starts.

Recommendation 7

The Panel recommends that VBNC

- ensure the final design of all dams includes provision for the worst possible seismic event;
- evaluate best environmental management practices in Canada and elsewhere for dam design and construction in order to identify provisions for seepage collection and treatment; and
- prepare and implement a dam safety inspection and maintenance program for all Project phases.

Recommendation 8

The Panel recommends that, before deciding to commission the North Tailings Basin, VBNC should evaluate the potential for using the mined-out Ovoid as a disposal site for either tailings or waste rock. It should also investigate, when adequate samples are available, the adequacy of both acid-generating waste rock and tailings as underground backfill material. During this environmental evaluation, the company should consider the best currently available technology for disposing of tailings and the results of the harlequin duck monitoring program (see Recommendation 65). This evaluation should be subject to review and recommendations by the proposed Environmental Advisory Board.

Recommendation 9

The Panel recommends that VBNC

- prepare and implement a program, which can be carried out through-

out the life of the Project, to verify and monitor open pit and underground waste rock that is disposed of on the surface;

- develop procedures to segregate all waste that originates from potentially acid-generating zones but is sorted as non acid-generating, and to assign this waste to a specific dump site so that the company can take mitigative measures if monitoring reveals a problem;
- outline contingency plans for dealing with reactive material encountered in the non-mineralized piles, particularly for managing runoff; and
- ensure that the waste handling system designed for the underground operation allows separate handling and disposal of acid-generating material.

Recommendation 10

The Panel recommends that VBNC further develop its water recycling plans, in consultation with Environment Canada, incorporating

- procedures to maximize the volume of recycled water of acceptable quality, taking into account factors that could limit the use of recycled water in the mill process; and
- contingency plans to deal with potential requirements for additional raw water withdrawals and wastewater treatment.

Recommendation 11

The Panel recommends that VBNC integrate into its environmental

protection plan, in consultation with Environment Canada,

- pollution prevention procedures that apply the best management practices for minimizing thiosalt production;
- pollution prevention procedures that reconcile pH levels and ammonia concentrations in ponds and effluents, taking into account the potential accumulation of ammonia under ice; and
- a sludge management plan that takes into account alternative sludge disposal options, the long-term potential for metal dissolution from sludge co-disposed with tailings, and the implications of mill shutdowns and decommissioning.

Recommendation 12

The Panel recommends that VBNC develop a long-term management and rehabilitation plan for the open pit. The plan should be subject to review and recommendations by the Environmental Advisory Board, and should include

- ongoing modelling and laboratory testing of evolving water quality in the flooded pit, of discharge rates and of the type and length of treatment required;
- a strategy to reduce the time that the open pit walls will be exposed before the pit is flooded, developed by evaluating best environmental management practices; and
- measures to reclaim the surrounding area to promote wildlife safety

and the development of appropriate shoreline habitat.

Recommendation 13

The Panel recommends that VBNC establish monitoring wells between the open pit and Reid Brook, and develop suitable threshold levels for contaminants and a contingency plan to take corrective action if contaminants are found in groundwater flowing towards Reid Brook.

Recommendation 14

The Panel recommends that VBNC develop an appropriate effects monitoring program for metals and other contaminants, in cooperation with DFO, Environment Canada, LIA and the Innu Nation. The program should include a protocol for interpreting results and for taking remedial action. The program should be in place before construction starts and should be subject to ongoing modification, as appropriate.

Recommendation 15

The Panel recommends that a program be established to monitor contaminant levels in country foods on a continuing basis in northern Labrador. This general program should be a cooperative one involving primarily governments, LIA, and Innu Nation, although VBNC should contribute some technical and material support. The lead agency for this program should be designated by DFO, in its capacity as the Responsible Authority. This lead agency should be the primary funder of the program, and provide scientific resources to it, but the program should be under

the direction of the Environmental Advisory Board (EAB). The objective of the program should be to address public concerns, and to minimize misunderstandings about the actual effects of the Project on the regional environment. The program should address the cumulative and synergistic effects of contaminants from all sources, and should include provisions for interpreting and communicating the results to the regional public on a continuing basis. It should fully incorporate the knowledge and experience of the federal Northern Contaminants Program and also develop cooperative links with it. The program should, at the outset, ensure that adequate baseline data are obtained on contaminant levels (not restricted to metals) in a broad spectrum of biota and locations in the region. It should assemble all existing contaminants data for the region from all relevant public and private agencies, and then add to them as required. These baseline data should be available prior to construction, subject to review and recommendations of the EAB.

Recommendation 16

The Panel recommends that DFO and Environment Canada jointly develop a problem statement and research design to identify the means by which mercury could become mobilized in the environment, within the parameters of this Project. If this exercise results in a clear hypothesis linking the Project to mercury mobilization at levels potentially hazardous to fish, wildlife, or humans, then DFO, Environment Canada, and VBNC should develop and

fund a cooperative research program leading to prevention or mitigation.

Recommendation 17

The Panel recommends that, before DFO provides authorizations under subsection 35(2) of the *Fisheries Act*, VBNC prepare a fish habitat protection report on the proposed prevention and mitigation elements of both the Project design and the environmental protection plan. This report should address

- mitigation of effects arising from flow alterations during construction, pump down periods, operation and decommissioning;
- minimum (and, where appropriate, maximum) flows to be maintained, including information on how these flows were determined;
- the sources of water to maintain flows and control mechanisms required to deliver this mitigation;
- the extent to which char use habitat in Camp Pond Brook;
- ways that the Project could affect this use and, if necessary, details of any additional mitigation measures proposed to ensure that no significant effects will occur; and
- an appropriate environmental effects monitoring program.

Recommendation 18

The Panel recommends that DFO provide LIA, the Innu Nation and the general public with adequate opportunity to review and comment on the draft fish habitat compensation agreement.

Recommendation 19

The Panel recommends that DFO indicate to VBNC that the Department will not accept subsequent requests for HADD authorizations for the proposed Project. In the overall environmental effects monitoring program outlined in its fish habitat protection report (see Recommendation 18), VBNC should include a monitoring component designed to validate the predicted effects of the Project on fish habitat and to assess the effectiveness of mitigation measures. If, at some later date, monitoring results indicate that flow alterations have destroyed or harmfully altered additional habitat, the onus should be placed on VBNC to restore that habitat as quickly as possible.

Recommendation 20

The Panel recommends that DFO develop a proponent's guide to HADD identification and the development of fish habitat compensation options that clearly lays out the steps a proponent should take, the methods to be used and the criteria by which the proponent's work will be judged. DFO should complete the criteria for standing water and marine habitat as soon as possible and include them in the guide.

Recommendation 21

The Panel recommends that VBNC and DFO jointly review all potential sources and pathways of sedimentation, and currently proposed mitigation with respect to Camp Pond, to avoid or minimize sediment transport into the pond wherever possible, so that fish habitat loss does not occur.

Recommendation 22

The Panel recommends that, as part of the environmental protection plan, VBNC develop blasting procedures that incorporate DFO's guidelines with respect to protecting fish and fish habitat.

Recommendation 23

The Panel recommends that VBNC develop, as part of the Environmental Management System, an environmental protection plan for Reid Brook that incorporates the following, as required:

- adjustments to the main access road route and design to minimize potential impacts on Reid Brook;
- design and construction of appropriate stream crossings on tributaries;
- specific traffic management procedures at key locations along the road;
- seepage collection at the toe of Dam H2; and
- additional mitigation measures to improve the quality of water leaving Camp Pond, if necessary (for example, additional water retention or development of an engineered wetland).

Recommendation 24

The Panel recommends that VBNC develop monitoring studies for contaminant effects in freshwater with input from DFO, Environment Canada and other stakeholders, and consider the findings of the Aquatic Effects Technology Evaluation (AETE) program.

To provide early warning of effects, serious consideration should be given to monitoring at least at the benthic macroinvertebrate level, if not at a lower trophic level, provided there is reasonable assurance that the program will be able to deliver clear cause and effect information that is scientifically valid. Additional baseline information need only be collected if required to support the selected monitoring component. VBNC should also offer to collaborate with any research carried out as a follow-up to the AETE program by providing monitoring information from the Project to be used as a case study.

Recommendation 25

The Panel recommends that VBNC carry out hydrometrical, water quality and fish population monitoring in the Reid Brook system; that DFO initiate appropriate studies to increase understanding of fish and fish habitat in the wider Kogluktokoluk-Ikadlivik-Reid system, involving LIA and the Innu Nation in this process; and that VBNC contribute significantly to these studies by providing information and other resources.

Recommendation 26

The Panel recommends that, if the North Tailings Basin is required during the underground phase, before approvals are given for its construction, VBNC prepare a report to review the environmental advantages and disadvantages of consolidating effluent discharge into Edward's Cove instead of constructing a second diffuser in Kangeklualuk Bay. The report should examine the results of the compliance

and effects monitoring carried out for the existing Edward's Cove diffuser, and should be subject to review and recommendations by the Environmental Advisory Board.

Recommendation 27

The Panel recommends that DFO, Environment Canada, the Canada Centre for Mineral and Energy Technology and VBNC, in consultation with LIA and the Innu Nation through monitoring partnerships, should develop a research program using the Voisey's Bay Mine and Mill Project as the central case study, to increase the level of knowledge about the effects of nickel-copper-cobalt effluents in the marine environment, particularly with respect to effluent discharge standards, mitigation measures, and monitoring methods and procedures.

Recommendation 28

The Panel recommends that VBNC commit, through its environmental protection plan, to reducing total marine pollutant loadings on a continuous improvement basis, and work with Environment Canada to develop policies and procedures that would

- improve mill processes to reduce pollutants at source;
- ensure, through a preventive maintenance program and other approaches, that treatment facilities operate at the highest standards of effectiveness; and
- upgrade treatment technology as needed.

VBNC should report regularly to the

Environmental Advisory Board on the results of this pollution prevention program.

Recommendation 29

The Panel recommends that VBNC be required to include the following in its follow-up program:

- a marine water and sediment quality monitoring program that includes threshold criteria related to existing water and sediment quality guidelines (threshold levels should be set at a point that gives suitable early warning);
- mandatory mitigative action if these thresholds were exceeded; and
- research studies designed to identify any adverse health effects in marine biota, followed by revision of the threshold criteria if necessary.

Recommendation 30

The Panel recommends that VBNC monitor shellfish for metals, bacterial contamination and hydrocarbon tainting to identify the extent of the area affected by the Project.

Recommendation 31

The Panel recommends that vessels built or contracted by VBNC to ship nickel-copper-cobalt concentrates be designed or tested for equivalency to CAC3 standards to ensure such vessels can travel safely through the worst potential ice conditions.

Recommendation 32

The Panel recommends that VBNC in-

corporate Arctic Ice Regime Shipping System procedures into the Marine Transportation Management Plan to ensure the safe passage of both dedicated and contracted concentrate vessels. VBNC should implement these procedures in consultation with the regulators and with the LIA as part of a bilateral shipping agreement (see Recommendation 97).

Recommendation 33

The Panel recommends that VBNC implement a program, in conjunction with LIA and regulators, to explore the requirement for and viability of winter shipping through landfast ice, which should include the following:

- additional research into concentrate behaviour and measures to lengthen storage time as operating volumes of concentrate become available;
- additional study of the behaviour of ship tracks in ice, based on experience from the Raglan operation; and
- trial voyages by concentrate carriers during initial operating years, under differing winter conditions, to examine the actual behaviour of landfast ice and to assess the safety of such an operation.

Recommendation 34

The Panel recommends that VBNC undertake further modelling studies of the performance limitations of candidate vessels for navigating in ice, and further evaluate their ice navigation performance limitations, including shaft horsepower, hull strengthening,

ice-ingestion hazards and ability to operate in ballast condition close to load displacement draft.

Recommendation 35

The Panel recommends that VBNC incorporate the following elements into the Marine Transportation Management Plan to ensure the safety of vessels while shipping in landfast or pack ice:

- establish a dedicated coordination centre for all shipping to and from the Project area and for all phases of the project;
- review and adjust shipping plans before the ice season starts to reflect the availability of icebreaker resources and ice conditions;
- before allowing ships to enter pack ice, ensure that they have sufficient strength and power to operate in ice, that crews are competent in ice and that icebreaker support is readily available, so that such ships are not beset in ice and forced into an uncharted area;
- provide an ice information system that extends to the limits of pack ice along the route planned for the vessel; and
- establish protocols to ensure that the icebreaker commander and bulk carrier master reach consensus about procedures to be adhered to during escort, before the ship enters the ice.

Recommendation 36

The Panel recommends that Canadian Hydrographic Service survey addi-

tional areas adjoining the proposed route in the interests of ship safety, environmental response, search and rescue operations, and icebreaker operations.

Recommendation 37

The Panel recommends that VBNC, in consultation with DFO and LIA, review one or more alternate shipping route(s) into Anaktalak Bay, and that hydrographic surveys and subsequent charting of these route(s) to modern Canadian Hydrographic Service hydrographic standards be carried out within the next three years.

Recommendation 38

The Panel recommends that the Atlantic Pilotage Authority declare Edward's Cove a compulsory pilotage area to ensure that non-Canadian vessels chartered on the spot market are required to carry a pilot with local knowledge.

Recommendation 39

The Panel recommends that, before shipping begins, VBNC install the best available electronic and fixed navigational aids, including a fixed tide gauge, to ensure precise vessel locating along the shipping route.

Recommendation 40

The Panel recommends that VBNC integrate concentrate loading procedures and controls into the Marine Transportation Management Plan in consultation with Transport Canada. VBNC must provide the services of a port warden when required, especially

when loading copper concentrate on non-Canadian vessels. VBNC should also monitor dockside concentrate handling operations, and take corrective action if it observes chronic concentrate losses.

Recommendation 41

The Panel recommends that, before any Project-related shipping begins, VBNC be required to develop a ballast water management program in consultation with DFO. This program should give a high degree of ecological protection to marine waters near the Project. Requirements of the program should be made part of all shipping contracts, which should include a financial penalty for non-compliance.

Recommendation 42

The Panel recommends that VBNC implement its proposed safety and emergency preparedness measures with respect to oil spills.

Recommendation 43

The Panel recommends that VBNC and DFO reach agreement on a credible worst case scenario for oil spills, and that all responsible parties then base their oil spill response planning on this scenario. Response equipment should be positioned, response plans reviewed and updated, and emergency preparedness maintained and tested accordingly, throughout the shipping component of the Project. VBNC and LIA should also include response planning in their proposed bilateral shipping agreement. VBNC should continue to develop oil spill scenarios and fate modelling and

should incorporate DFO and public concerns, as appropriate, in its ongoing emergency response planning. Emergency response plans should include specific provisions for effects monitoring, and evaluation of the effectiveness of response measures, that would begin immediately if a major spill occurred. VBNC should ensure that its shippers are fully aware of and prepared to implement this requirement.

Recommendation 44

The Panel recommends that VBNC require ships carrying fuel to the site to carry oil spill response equipment on board, including booms, skimmers, sorbents and storage.

Recommendation 45

The Panel recommends that VBNC provide a support vessel at Edward's Cove to respond to minor incidents, provide docking support, maintain navigational aids and serve as a first line of response to a major oil spill along the shipping route.

Recommendation 46

The Panel recommends that the Canadian Coast Guard, with the cooperation and assistance of VBNC, and in consultation with LIA, update and complete existing sensitivity mapping of shoreline types, critical coastal habitat, key harvesting areas and other areas of local importance, as a basis for cooperative planning of response strategies and priorities.

Recommendation 47

The Panel recommends that DFO

fund, conduct or sponsor additional marine mammal studies that contribute to the understanding of cumulative and Project effects, and that Canada provide DFO with the resources necessary to do so. These studies should include regional research, and general studies of noise and ice effects.

LIA should be involved in the design and conduct of these studies, which should be subject to the review and recommendations of the Environmental Advisory Board.

Recommendation 48

The Panel recommends that VBNC determine, in cooperation with LIA, ringed seal whelping times near the shipping route, before beginning winter shipping.

Recommendation 49

The Panel recommends that VBNC develop contingency plans for dealing with the effects of oil spills or chronic pollution on polar bears, and for encounters between humans and bears. These should be developed in cooperation with LIA in the context of the proposed shipping agreement, and LIA should advise VBNC in a timely manner of any polar bear denning activity near the shipping route.

Recommendation 50

The Panel recommends that Canada and the Province act to clarify jurisdiction over polar bears off the Labrador coast. The responsible party should enhance its enforcement capability. It should also establish an effective reporting system for problem

kills, such as the system that exists in the Northwest Territories, to ensure conservation and to use as a basis for the compensation recommended in Chapter 14.

Recommendation 51

The Panel recommends that VBNC develop an environmental protection plan with respect to plant community and terrain disturbance that would

- identify sensitive land types and avoid them to the greatest extent possible; and
- restrict off-road vehicle traffic to designated routes as much as possible when the ground is not frozen, limit such traffic to essential monitoring functions, favour the use of helicopters for exploration and isolated construction activities, and restrict off-road use of heavy vehicles to winter.

Recommendation 52

The Panel recommends that VBNC maintain adequate on-site equipment and emergency preparedness to respond to forest fires as early as possible, to minimize damage. These plans should be subject to review and approval by the Forestry and Wildlife Branch of the provincial Department of Forest Resources and Agrifoods.

Recommendation 53

The Panel recommends that the Province review the effectiveness of the revised *Mineral Act* regulations, and of its monitoring activities, with respect to the cumulative effects of mineral exploration on terrestrial and

aquatic habitat in northern Labrador, in consultation with the Innu Nation and LIA.

Recommendation 54

The Panel recommends that the Province, LIA and the Innu Nation ensure that future environmental assessments of major developments in the range of the George River caribou herd (whether in Labrador or Quebec) pay particular attention to the cumulative effects of range fragmentation.

Recommendation 55

The Panel recommends that VBNC establish appropriate mitigative measures, as it has proposed to do, with respect to roads, pipelines and other linear facilities. These should facilitate unimpeded travel by caribou and ensure that caribou are kept away from the airstrip, by using fencing if necessary. These measures should also conform to best practices existing at the time they are implemented.

Recommendation 56

The Panel recommends that VBNC develop an environmental protection plan for caribou that would

- provide for regular monitoring of caribou in the Claim Block, and in adjacent areas when caribou may be congregating or migrating, as appropriate;
- establish a graduated set of responses to caribou presence and movements near the Project, beginning with limits on traffic speed and volume, up to and including complete cessation of

traffic during migration events; and

- provide for monitoring of and reporting on the effectiveness of VBNC's caribou mitigation measures, and their modification, as appropriate.

Recommendation 57

The Panel recommends that VBNC, and its contractors and subcontractors, clean up and remove all equipment immediately after any exploration or other activities occurring anywhere outside fenced-in Project operations, whether within the Claim Block or elsewhere in northern Labrador.

Recommendation 58

The Panel recommends that VBNC and LIA, as part of the shipping agreement, develop a program to monitor and minimize the effects of winter shipping on caribou.

Recommendation 59

The Panel recommends that the Province, LIA and the Innu Nation enter into co-management arrangements for the George River caribou herd with the Government of Quebec and Quebec Aboriginal users.

Recommendation 60

The Panel recommends that the Province undertake or sponsor further research to establish black bear population definition, abundance, structure, dynamics and critical life history requirements, to ensure the appropriateness and effectiveness of adaptive management strategies for black bears. The Innu Nation and LIA

should be involved in the design and conduct of this research, and the research should be subject to the review and recommendations of the Environmental Advisory Board.

Recommendation 61

The Panel recommends that VBNC develop an environmental protection plan with respect to black bears that would

- continue to implement and refine measures to improve food storage and waste management, restrict on- and off-road traffic, and train personnel;
- provide for the use of electric fencing in Project areas, as appropriate;
- regularly monitor black bear presence and denning activities; and
- establish a protocol for avoiding bears and dens during Project activities, by relocating, reducing or temporarily stopping activities, as appropriate.

Recommendation 62

The Panel recommends that VBNC, in consultation with Environment Canada, LIA, the Innu Nation and other interested parties, develop and implement an environmental protection and emergency response plan for seabirds and waterfowl that clearly identifies all sensitive areas and time periods for seabirds and sea ducks, identifies all potential Project interactions and ensures adequate protection of these areas. These plans should include consideration of all sea ducks and seabirds that migrate through the area

and that come into contact with the shipping route.

Recommendation 63

The Panel recommends that VBNC, in consultation with Environment Canada and LIA, develop a vessel oily waste management plan that includes

- procedures for identifying all potential sources of chronic, relatively small discharges of oil, both accidental and deliberate, as well as large oil spills;
- an explicit zero-discharge goal for chronic oil pollution originating from Project vessels;
- best management practices designed to achieve zero discharge, to be reviewed regularly; and
- provisions for adequate, land-based reception facilities for oily wastes from Project vessels, at both Edward's Cove and at the reception port, including a disposal plan for such wastes.

Recommendation 64

The Panel recommends that VBNC, in consultation with Environment Canada and LIA, develop a monitoring program to evaluate the effects of noise and disturbance from passing vessels on breeding colonies. Based on the results of this program, VBNC should, if necessary, develop and implement additional mitigation measures that may involve alternate shipping routes (these are addressed in Recommendation 37).

Recommendation 65

The Panel recommends that VBNC

develop an ongoing research and monitoring program for harlequin ducks in the Project area, in consultation with the Canadian Wildlife Service and other interested parties, to better understand the physical, biological and chemical attributes of harlequin duck habitat and to refine an effective mitigation and monitoring strategy.

Recommendation 66

The Panel recommends that VBNC incorporate the following measures into its environmental protection plan in order to protect harlequin ducks and their habitat:

- construction standards and procedures that require bridges instead of culverts for crossings of waters frequented by harlequin ducks (harlequin duck nest surveys should be carried out 100 m upstream and 100 m downstream of each potential stream crossing site to ensure a minimum separation zone);
- design standards that ensure appropriate buffer zones between roads and streams that provide harlequin duck habitat, where physically achievable; and
- procedures to control dust and noise in critical habitat areas.

Recommendation 67

The Panel recommends that VBNC collaborate with Environment Canada, the Department of National Defence, the Province of Newfoundland and Labrador, and other relevant parties to integrate the methodologies and results of VBNC's on-site harlequin

duck monitoring program with those of other monitoring programs or studies related to present, proposed or future developments in Labrador, to ensure valid assessment of the cumulative effects of the Project, including shipping activities.

Recommendation 68

The Panel recommends that, in view of risks to waterfowl habitat and populations, and to the success of Aboriginal harvesting efforts, VBNC should pursue one of the following strategies to develop the airport in its proposed location.

- It should realign the runway so that aircraft would not fly directly over the Gooselands, and operate the airport as a non-precision approach facility until new landing technology permits it to operate it as a Category 1 facility.

OR

- Before constructing and operating the proposed Category 1 airport, it should develop an air traffic management plan, which would include measures — up to and including temporary restriction of flights during critical migratory waterfowl staging periods — to ensure that flights would not unduly disturb waterfowl using the Gooselands or disrupt Aboriginal harvesting. The Plan should include effects monitoring provisions, and VBNC should remove air traffic restrictions only if the results of this monitoring justify doing so. The air traffic management plan should be subject to the review

and recommendations of the Environmental Advisory Board.

Recommendation 69

The Panel recommends that VBNC continue its current no-hunting and no-fishing policy on site, and ensure that it is strictly enforced. The policy should be expanded to include a ban on egging. The policy should also provide for termination of employment in the case of unlawful trafficking in fish and wildlife, and ensure that employees are made aware of these consequences.

Recommendation 70

The Panel recommends that VBNC implement its proposed policy of returning employees to their point of pick-up, to ensure that they cannot use the site as a base for hunting and fishing during their time off.

Recommendation 71

The Panel recommends that VBNC reach agreement with LIA and the Innu Nation about harvesting compensation regimes before the Project is authorized. These compensation regimes should be negotiated in the context of Impact Benefit Agreements and be in place before construction begins. They should include protocols for compensating Aboriginal people for

- increased harvesting costs incurred by displacement or impaired access;
- benefits they might have realized from commercial opportunities that they will not be able to exploit because of the Project;

- damage to equipment or property; and
- subsistence and commercial harvests that do not happen because the Project has reduced the abundance or impaired the quality of wildlife.

Liability should be sufficient to cover catastrophic events, and the harvesting compensation regime should apply to VBNC's contractors and subcontractors, including their shippers.

Recommendation 72

The Panel recommends that VBNC commit to providing compensation on a case by case basis for traditional harvesters, other than LIA or Innu Nation members, who may be adversely affected by, for example, disruption of travel on the sea ice in winter.

Recommendation 73

The Panel recommends that VBNC, as part of its environmental protection plan, reach agreement with LIA and the Innu Nation on the provisions of an historical resources protection and management plan, based on a revision of the existing historical resources contingency plan, before the Project is authorized. This plan should be negotiated in the context of Impact Benefit Agreements and be in place before construction begins.

Recommendation 74

The Panel recommends that, to improve access to appropriate training opportunities for as many North Coast residents as possible, the parties involved in the Multi-Party Training Program (the federal and provincial governments,

the Innu Nation, LIA, the College of the North Atlantic and VBNC) collaborate to identify new or reallocate existing resources to ensure that Aboriginal participants who do not meet the Employment Insurance eligibility requirements could still qualify for training assistance.

Recommendation 75

The Panel recommends that the Province, in cooperation with VBNC, LIA, the Innu Nation and the College of the North Atlantic, coordinate the development of a skills inventory to help parties develop both appropriate training programs and individual career planning.

Recommendation 76

The Panel recommends that VBNC, in consultation with LIA and the Innu Nation and prior to Project approval, establish a quota for apprenticeships during the construction phase, with emphasis on skills that would be transferable to the operations phases. Through the tendering process, VBNC should require contractors to establish these apprenticeship positions.

Recommendation 77

The Panel recommends that, upon Project approval, the parties to the Multi-Party Training Plan develop a strategy for doing the following:

- locating some training programs, beyond adult basic education, in appropriate North Coast communities;
- developing formal and informal support programs, such as support

groups, counselling or mentoring, for Aboriginal students who have to leave their home communities for training;

- providing extra supports, such as child care, to give women, especially single-parent women, equal access to training;
- developing a monitoring program to track training outcomes — including trainees' participation in, completion of or failure to complete the program, and their ability to obtain employment — to help the parties improve the program, as necessary.

Recommendation 78

The Panel recommends that VBNC, to build on the search and recognition process, work in partnership with LIA and the Innu Nation to further develop and implement the process. LIA and the Innu Nation should play the major role in workshop delivery. This partnership should involve the Tongamiut Inuit Anait and Innu women designated by the Innu Nation, to ensure that the search and recognition workshops for women respond effectively to the concerns and requirements of Aboriginal women.

Recommendation 79

The Panel recommends that VBNC designate Cartwright as a pick-up point for Project employment, and consider the possibility of a pick-up point in an additional community south of Cartwright, if circumstances warrant.

Recommendation 80

The Panel recommends that, before

hiring Aboriginal employment coordinators, VBNC set up a joint committee with LIA and the Innu Nation to finalize job descriptions and requirements for these coordinators. This committee should also work with the coordinators to establish guidelines for the anti-racism and cross-cultural programs to be delivered on site.

Recommendation 81

The Panel recommends that VBNC develop a policy to establish the process and criteria to be used to determine if and when an employee who leaves voluntarily or is dismissed for just cause can re-apply for employment on the Project. Through its Aboriginal employment coordinators, VBNC should be prepared to work with prospective employees to discuss ways VBNC can personally support them in a second employment attempt, and ways in which VBNC can address specific workplace problems.

Recommendation 82

The Panel recommends that VBNC, through the Aboriginal employment coordinators, monitor Aboriginal employee satisfaction with language and cultural aspects of the workplace, including reasons why Aboriginal employees leave, and use this information to maintain and improve the Aboriginal employee retention rate.

Recommendation 83

The Panel recommends that VBNC, prior to Project authorization, revise existing VBNC employment assistance programs — including, but not limited

to, the women's employment plan and the harassment policy — to address women's concerns. In developing the revised programs VBNC should

- hold consultations with Innu Women chosen by the Innu Nation and with representatives from Tongamiut Inuit Annait, Women's Resource Development Committee, the Provincial Advisory Council on the Status of Women and the Women's Policy Office of the provincial government;
- use gender-based analysis; and
- include measurable goals and procedures to monitor compliance with federal employment equity legislation and the provincial government's harassment policy.

Recommendation 84

The Panel recommends that, during bilateral negotiations related to impact and benefit agreements, VBNC, LIA and the Innu Nation address resource requirements that would permit LIA and the Innu Nation to develop a comprehensive program of community child care for families with a parent or parents at the work site.

Recommendation 85

The Panel recommends that VBNC develop a policy to provide for family leave for employees with child care or elder care responsibilities who face an emergency situation.

Recommendation 86

The Panel recommends that, as soon as possible and before construction,

VBNC, in consultation with representatives of Aboriginal and other Labrador businesses and relevant federal and provincial agencies, establish an explicit supplier development strategy that includes contract procurement procedures and supplier development initiatives. The strategy should include objectives for Aboriginal and Labrador procurement that the company could monitor and evaluate. All provisions of this strategy should conform to commitments made in Impact Benefit Agreements.

Recommendation 87

The Panel recommends that VBNC pay a grant-in-lieu of taxes to the Town of Nain to offset some of the increased costs incurred by the Town as a result of the construction and operation of the Project. The formula used to calculate the grant-in-lieu should be negotiated by the Newfoundland and Labrador Department of Municipal and Provincial Affairs, the Town of Nain and VBNC. It should reflect expected Project-related uses of community infrastructure and services, projected municipal costs attributable to Project-related immigration and any Project-related revenues accruing to the community.

Recommendation 88

The Panel recommends that the Town of Nain, LIA, the Newfoundland and Labrador Department of Municipal and Provincial Affairs, and Indian and Northern Affairs Canada jointly develop a five-year housing strategy for Nain, including funding sources, to meet the housing needs of existing

and potential residents.

Recommendation 89

The Panel recommends that VBNC and the Town of Nain develop a communications protocol to keep each party regularly informed about issues and activities of mutual interest. The protocol should include arrangements for representatives to meet when necessary to discuss concerns. The purpose of the communications protocol would be to provide opportunities to address problems at the earliest stages and to promote initiatives that might be of mutual benefit.

Recommendation 90

The Panel recommends that LIA, the Town of Nain, and the Newfoundland and Labrador Department of Development and Rural Renewal collaborate in a community economic development planning process for Nain. The overall goal should be to achieve a diverse and sustainable local economy that can maximize participation in Project-related enterprises, while strengthening existing businesses and seeking out new community-based possibilities. The process should encourage the involvement of the various interest groups, including VBNC, as appropriate.

Recommendation 91

The Panel recommends that the Province, in consultation with the Labrador Inuit Association, initiate discussions with Transport Canada to develop a five-year strategy to upgrade air transportation facilities on the North Coast to meet Category 1 requirements. Because of the limita-

tions of the existing strip at Nain, and increased levels of air traffic, the Panel recommends that Nain receive top priority.

Recommendation 92

The Panel recommends that the Province, through Health Labrador Corporation and in consultation with the Labrador Inuit Health Commission and the Innu Health Commission, assess future preventive and community-based health care needs, set priorities for new or enhanced programs and services, and establish those programs and services, as required.

Recommendation 93

The Panel recommends that VBNC negotiate the proposed monitoring partnerships with both LIA and the Innu Nation through their respective Impact Benefit Agreements. The monitoring partnerships should ensure Inuit and Innu participation in the design, implementation and evaluation of the monitoring program. They should also provide opportunities for Inuit and Innu to obtain necessary training and to collect and analyze data, using both scientific methods and Aboriginal knowledge and observation.

Recommendation 94

The Panel recommends that, before construction begins, Canada, Newfoundland and Labrador, LIA and the Innu Nation negotiate an environmental co-management agreement to address both biophysical and socio-economic aspects of mineral resources development in northern Labrador. The agreement should establish an appropriate

mechanism for ongoing four-party involvement in associated regulatory processes, the review of future related Project developments and the administration of the follow-up program.

Recommendation 95

The Panel recommends that, under the terms of the environmental co-management agreement, the four parties to the Memorandum of Understanding should establish an Environmental Advisory Board (EAB) for northern Labrador. Its mandate would be to review the results of compliance monitoring and of the follow-up program established under the *Canadian Environmental Assessment Act*; to review permit applications and future Project development proposals; and to address ongoing environmental management issues and concerns. Canada and the Province should fund the Board's operations, which should include a secretariat to coordinate administrative and scientific functions. The EAB should publish an annual report.

Recommendation 96

The Panel recommends that, before construction starts, VBNC prepare an environmental performance document that clearly lays out all key terms and conditions under which the Project would operate and all commitments made by VBNC, including all performance standards, financial assurances, targets, quotas and reporting procedures. The document should indicate in each case the appropriate legal basis (for example, attached as a condition to a *Navigable Waters Protection*

Act approval, included in an impact and benefit agreement or voluntary agreement). This document would be designed to help VBNC report its environmental performance and to help governments, Aboriginal organizations and the public evaluate it.

Recommendation 97

The Panel recommends that VBNC negotiate a shipping agreement with LIA before Project construction starts. Initially, this agreement should address protocols for shipping during the open water period, as well as the processes to be followed to address outstanding issues of concern around winter shipping. The Panel also recommends that DFO play a role in this process as an advisor on matters of marine safety and environmental protection.

Recommendation 98

The Panel recommends that DFO and LIA start talks to identify areas of interest, priorities, resources and opportunities related to marine management planning, to determine which elements of an integrated resource management planning process can proceed. These talks should be designed to produce a memorandum of understanding on these issues in a timely fashion. This planning process should preferably take place under the terms of section 31 of the *Oceans Act*; if they do not, DFO should identify an alternative approach.

Recommendation 99

The Panel recommends that VBNC prepare its environmental protection plans, emergency response and con-

tingency plans, and occupational health and safety plans in consultation with appropriate regulatory agencies, before construction begins, and that these plans be subject to review and recommendations by the Environmental Advisory Board. The environmental protection plans and emergency response and contingency plans should be developed as field-usable documents, and be reviewed and updated regularly.

Recommendation 100

The Panel recommends that VBNC, LIA and the Innu Nation, through the monitoring partnerships, negotiate an agreement to include significant levels of Aboriginal participation in the research, planning, implementation and monitoring of the reclamation plan through the post-decommissioning phase. This agreement should include appropriate transfers of Aboriginal knowledge and technical reclamation knowledge and skills. Through this agreement, VBNC and its Innu and Inuit partners should collaboratively develop reasonable and achievable objectives for the reclamation process.

Recommendation 101

The Panel recommends that VBNC, as soon as possible and before construction starts, develop policies and reporting and accountability systems to ensure that reclamation objectives are built into all aspects of the Project's design, construction and operations, particularly with respect to minimizing the extent of disturbance. VBNC should

- continue to develop the reclamation plan in partnership with LIA

and the Innu Nation;

- review all construction and operating plans from the perspective of reclamation;
- conduct appropriate employee and contractor training and awareness sessions;
- monitor compliance with the reclamation plan; and
- report progress, both internally and externally.

Recommendation 102

The Panel recommends that the Department of Mines and Energy consult with the Environmental Advisory Board before deciding on appropriate requirements for financial assurances to be attached to the mining lease. Such assurances should be phased in to cover estimated reclamation and post-decommissioning monitoring costs at any given point in the life of the Project, and should include an appropriate cash component. These assurances may also include bonds, dedicated assets or irrevocable guarantees.

Recommendation 103

The Panel recommends that VBNC develop the biophysical monitoring framework collaboratively. The framework should be based on sound scientific principles, the need for practical environmental management feedback, and the concerns of northern Labrador residents and resource users. The monitoring framework should include a data access policy, reporting protocols and monitoring benchmarks

to be used to trigger action. It should also emphasize the need for process transparency and public access to information.

Recommendation 104

The Panel recommends that the Province designate a provincial department or agency to develop and oversee a counterpart to the follow-up program under the *Canadian Environmental Assessment Act*, which would focus on the socio-economic effects of the Project. The purpose of this program would be to verify the predictions of the Environmental Impact Statement, to ensure that VBNC is keeping its socio-economic commitments, to evaluate the effectiveness of mitigative measures, and to guide provincial resource allocations for services and infrastructure. This socio-economic follow-up program should be developed in collaboration with the Environmental Advisory Board.

Recommendation 105

The Panel recommends that VBNC be required to submit an annual report to the provincial department designated as holding responsibility for the socio-economic follow-up program (see Recommendation 104), and to the Environmental Advisory Board. This report would describe the Project's

performance in delivering socio-economic benefits to Labrador Inuit Association and Innu Nation members and to Labrador residents and businesses. If necessary, the Environmental Advisory Board should provide recommendations on mitigation or enhancement measures to appropriate provincial and regional economic agencies and to VBNC.

Recommendation 106

The Panel recommends VBNC provide a gender breakdown for all employment figures submitted in its quarterly reports to the Province.

Recommendation 107

The Panel recommends that both Canada and the Province should incorporate into their respective environmental assessment processes the principle of full consideration of traditional ecological knowledge. The Panel further recommends that this consideration be expanded to include all Aboriginal knowledge. Governments should provide guidance to proponents on their basic obligations and options with respect to using Aboriginal knowledge in an Environmental Impact Statement or ensuring its presentation in the public review process. More specific guidance on using Aboriginal knowledge in future reviews should be provided by the responsible panels on a case by case basis.

APPENDIX A PANEL MEMBERS

MS. LESLEY GRIFFITHS (CHAIR)

Ms. Griffiths is an environmental and community planning consultant, based in Halifax, with 20 years of experience in public consultation and consensus building, environmental impact assessment, waste and water resource management, oil and gas development, and tourism and recreation planning. She was a member of the joint Canada-Nova Scotia environmental assessment panel that reviewed the proposed Halifax Harbour Wastewater Management System.

MR. SAMUEL METCALFE

Mr. Metcalfe is Inuk-born and a former resident of the Inuit community of Nain near the proposed Voisey's Bay Mine and Mill Project. He has had a wide range of experience in both the public and private sectors. He is a former federal public servant who served as head of the culture and linguistics division of Indian and Northern Affairs Canada in Ottawa.

Mr. Metcalfe is retired and living in Cornwallis, Nova Scotia.

MS. LORRAINE A. MICHAEL

Ms. Michael is active in the Canadian social justice movement with extensive regional, national and international experience. She is the former program coordinator, women and economic justice for the Ecumenical Coalition for Economic Justice. Ms. Michael has experience in assessing the social impact of economic

development activities in Newfoundland and Labrador, her home province. She holds degrees from Memorial University of Newfoundland and the University of Toronto.

Ms. Michael resides in St. John's, Newfoundland.

DR. CHARLES PELLEY

Dr. Pelley is a Newfoundland-born geologist and mining engineer. He served as a member of the federal environmental assessment panel reviewing the Rabbit Lake, Saskatchewan uranium mine. In positions held with the Iron Ore Company of Canada, Canada Wide Mines and Asbestos Corporation Limited, he gained considerable experience in mine planning and operations.

Dr. Pelley holds a Ph.D. in Engineering from McGill University and is currently the Stollery professor of mining engineering at Queen's University in Kingston, Ontario.

DR. PETER J. USHER

Dr. Usher is an Ottawa-based consultant in the fields of social and environmental impact assessment, land use and resource management, and Aboriginal claims. His client base is chiefly in northern Canada, where he worked for many years. Dr. Usher holds a Ph.D. in geography from the University of British Columbia. He is currently the chair of the Wildlife Management Advisory Council (NWT).

APPENDIX B LIST OF ABBREVIATIONS AND ACRONYMS

ACOA	Atlantic Canada Opportunities Agency	GDP	Gross Domestic Product
AETE	Aquatic Effects Technology Evaluation	HADD	Harmful alteration, disruption or destruction of fish habitat permit
AIRSS	Arctic Ice Regime Shipping System	HLC	Health Labrador Commission
AQUAMIN	Assessment of Aquatic Effects of Mining in Canada (An Environment Canada Program)	IBA	Impact and Benefit Agreement
asl	above sea level	IEMA	Independent Environmental Monitoring Agency
BHP	Broken Hill Properties	IEMR	Institute for Environmental Monitoring and Research
CAC3	Canadian Arctic Class - Level 3 Classification	IMPACT™	model used to predict contaminant loadings
CEAA	Canadian Environmental Assessment Agency	INHC	Innu Nation Health Commission
<i>CEA Act</i>	<i>Canadian Environmental Assessment Act</i>	LHDC	Labrador Health Development Commission
<i>CEPA</i>	<i>Canadian Environmental Protection Act</i>	LIA	Labrador Inuit Association
CCG	Canadian Coast Guard	LIDC	Labrador Inuit Development Corporation
CHS	Canadian Hydrographic Service	LIHC	Labrador Inuit Health Commission
COSEWIC	Committee on the Status of Endangered Wildlife In Canada	LMN	Labrador Métis Nation
CSA	<i>Canadian Shipping Act</i>	L/s	litres per second
Cu	Copper	mg/l	milligram per litre
CWS	Canadian Wildlife Services	MMLER	Metal Mining Liquid Effluent Regulations
db	decibel (noise measurement)	MOU	Memorandum of Understanding
dBA	"A-weighted" decibel (noise measurement)	MPTP	Multi-Party Training Plan
DFO	Department of Fisheries and Oceans	NCP	Northern Contaminants Program
DGPS	Differential Global Positioning System	NDOEL	Newfoundland Department of Environment and Labour
DND	Department of National Defence	NRCan	Natural Resources Canada
DOE	Department of Environment	<i>NWPA</i>	<i>Navigable Waters Protection Act</i>
EAB	Environmental Advisory Board	NWT	Northwest Territories
EAP	Employee Assistance Programme	OPEP	Oil Pollution Emergency Plan
ECRC	Eastern Canada Response Corporation	pH	measure of acidity or baseness of a liquid
EEM	Environmental Effects Monitoring	SOPEP	Shipboard Oil Pollution Emergency Plan
EI	Employment Insurance	TIA	Tongamiut Inuit Annait
EIS	Environmental Impact Statement	tpd	tonnes per day
EISC	Environmental Impact Screening Committee	VBNC	Voisey's Bay Nickel Company
		VEC	Valued Ecosystem Component
		WRDC	Women's Resource Development Committee

APPENDIX C MEMORANDUM OF UNDERSTANDING ON ENVIRONMENTAL ASSESSMENT OF THE PROPOSED VOISEY'S BAY MINING DEVELOPMENT

This MEMORANDUM OF UNDERSTANDING

BETWEEN:

THE GOVERNMENT OF NEWFOUNDLAND AND LABRADOR, as represented by the Minister of Environment and Labour and the Premier as Minister Responsible for Intergovernmental Affairs;

THE GOVERNMENT OF CANADA, as represented by the Minister of the Environment and the Minister of Fisheries and Oceans;

THE LABRADOR INUIT ASSOCIATION, as represented by the President;

AND:

THE INNU NATION, as represented by the President.

(The "Parties")

WHEREAS:

- Voisey's Bay Nickel Company Limited is proposing an undertaking in connection with nickel-copper-cobalt deposits at a place known to the Inuit of Labrador as Tasiujatsoak, to the Innu of Labrador as Kapukuanipant-kauashat, which is also known as Voisey's Bay;
- The Undertaking would be carried out in land and water areas that are subject to comprehensive claims negotiations currently underway pursuant to Framework Agreements signed respectively by LIA, Canada and Newfoundland & Labrador, and the Innu

Nation, Canada and Newfoundland & Labrador;

- The Parties wish to ensure that the Environmental Effects of the Undertaking are assessed through the establishment of a single, effective and efficient process;
- Both the *Newfoundland Environmental Assessment Act*, RSN 1990, cE-14 ("NEAA") and the *Canadian Environmental Assessment Act*, S.C. 1992, c.37 ("CEAA") are applicable to the Undertaking and to this Memorandum of Understanding;
- The Premier as Minister Responsible for Intergovernmental Affairs of Newfoundland & Labrador has responsibilities pursuant to the *Intergovernmental Affairs Act*, RSN 1990, cI-13
- The Minister of Environment and Labour of Newfoundland & Labrador has responsibilities pursuant to NEAA;
- The Minister of the Environment of Canada has responsibilities pursuant to CEAA;
- The Minister of Fisheries and Oceans of Canada has responsibilities pursuant to the *Fisheries Act*, R.S.C. 1985, c.F-14, the *Navigable Waters Protection Act*, R.S.C. 1985, c.N-22, and CEAA and is the lead Responsible Authority for the purposes of CEAA;
- Section 37 of NEAA enables the Minister of Environment and Labour of Newfoundland & Labrador, when he is of the opinion that it is in the public interest, with the approval of the Lieutenant-Governor in Council, to exempt, by order, an undertaking

from the application of NEAA subject to terms and conditions;

- Under the authority of Section 37 of NEAA, the Exemption Order with respect to the Undertaking will, on approval of the Lieutenant-Governor in Council, establish an alternative process to that set out in NEAA, which process will be comprised of the terms and conditions of the Exemption Order, one of which includes the performance of an environmental assessment in accordance with this Memorandum of Understanding;
- Sections 40 to 42 of CEEA enable the Minister of the Environment of Canada to enter into an agreement with other jurisdictions respecting the joint establishment of a review panel and the process by which the panel conducts an assessment of the environmental effects of a proposed undertaking;
- The President of the Innu Nation has responsibilities on behalf of the Innu of Labrador to ensure that the Undertaking is fully assessed, and has been given authority by the Innu Nation Board to enter into this Memorandum of Understanding;
- The Board of Directors of LIA has responsibilities on behalf of the Inuit of Labrador to ensure that the Undertaking is fully assessed and the Board of Directors has authorized the President of LIA to enter into this Memorandum of Understanding; and
- The Parties wish to describe the process that will be followed in the conduct of an Environmental Assessment of the Undertaking.

THEREFORE, the Parties agree that:

1. **DEFINITIONS**

In this Memorandum of Understanding including the Recitals, Schedule 1 and the Annex thereto, but excluding Schedule 2:

"Agency" means the Canadian Environmental Assessment Agency;

"Canada" means the Government of Canada;

"Contingency Plan" means a program intended to address malfunctions, accidents or unplanned events that may occur in connection with the Undertaking;

"CEEA" means the *Canadian Environmental Assessment Act*;

"Cumulative Environmental Effect" means the additive and interactive effects of an undertaking in combination with other projects or activities that have been or will be carried out;

"Day" means a calendar day;

"EIS Guidelines" mean the direction provided to the Proponent by the Panel on matters which must be addressed in the Proponent's Environmental Impact Statement;

"Environment" means the components of the earth and includes

- (a) land, water and air, including all layers of the atmosphere,
- (b) all organic and inorganic matter and living organisms,
- (c) the social, economic, recreational, cultural, spiritual and aesthetic conditions and factors that influence the life of humans and communities, and

- (d) a part or combination of those things referred to in paragraphs (a) to (c) and the interrelationships between two or more of them;

“Environmental Assessment” (hereinafter “EA”) means an assessment of the Environmental Effects of the Undertaking that is conducted in accordance with this Memorandum of Understanding;

“Environmental Effect” means, in respect of an undertaking

- (a) any change that the undertaking may cause in the Environment, including any change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by aboriginal persons, or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, and
- (b) any change to the undertaking that may be caused by the Environment,

whether any such change occurs within or outside Canada;

“Environmental Impact Statement (hereinafter “EIS”) means the report that presents the results of the EA conducted by the Proponent;

“Federal Ministers” mean the Minister of the Environment of Canada and the Minister of Fisheries and Oceans of Canada;

“Follow-up Program” means a program for

- (a) verifying the accuracy of the EA of the Undertaking,
- (b) determining the effectiveness of any measures taken to Mitigate the adverse Environmental Effects of the Undertaking, and
- (c) implementing measures to Mitigate adverse Environmental Effects identified in (a) and/or (b);

“Innu Nation” means the Innu Nation of Labrador;

“LIA” means the Labrador Inuit Association;

“Memorandum of Understanding” (hereinafter “MOU”) means this Memorandum of Understanding including Schedules 1 and 2 and the Annex to Schedule 1 attached hereto;

“Mitigation” means in respect of the Undertaking, the elimination, reduction or control of the adverse Environmental Effects of the Undertaking, and includes restitution for any damage to the Environment caused by such effects through replacement, restoration, compensation or any other means, and “Mitigate” has a corresponding meaning;

“NEAA” means the *Newfoundland Environmental Assessment Act*;

“Newfoundland & Labrador” means the Government of Newfoundland and Labrador;

“Panel” means the review panel which is appointed pursuant to Section 3 of this MOU;

“Participant Funding Program” means the program which is referred to in Section 2.5 of this MOU;

“Parties” mean signatories to this MOU;

“Proponent” means Voisey’s Bay Nickel Company Limited;

“Provincial Ministers” mean the Minister of Environment and Labour of Newfoundland & Labrador and the Premier as Minister Responsible for Intergovernmental Affairs of Newfoundland & Labrador;

“Residual Effect” means an Environmental Effect remaining after all mitigative measures have been applied;

"Responsible Authority" means a federal body that is required under CEAA to ensure that an environmental assessment of the Undertaking is conducted;

"Review" means the joint public review to be conducted by the Panel in accordance with this MOU;

"Secretariat" means the Secretariat which is established pursuant to Section 2.6 of this MOU;

"Terms of Reference" mean the Terms of Reference for the Panel, as set out in Schedule 1;

"Undertaking" means the proposed construction, operation, demolition, decommissioning, rehabilitation and effective surrender of any leases by the Proponent of a mining development and associated activities as described in Schedule 2.

2. GENERAL

2.1 **Purpose:** The purpose of this MOU is to establish a single, effective and efficient process for assessing the Environmental Effects of the Undertaking, including provision for comprehensive public involvement.

2.2 **Land Claim Agreements and Self-Government Agreements:** The Parties will enter into negotiations to consider appropriate amendments to the MOU to reflect agreements-in-principle, interim measures agreements or final agreements reached in the two sets of comprehensive land claims negotiations now proceeding among Canada, Newfoundland & Labrador and LIA, and among Canada, Newfoundland & Labrador and Innu Nation.

2.3 **Panel Review:** A Panel will be appointed to conduct the Review of the Undertaking.

2.4 **Panel Budget:** The Parties will consult with each other to ensure the Panel has adequate financial resources to conduct the Review of the Undertaking.

2.5 **Participant Funding:** Persons who wish to participate in the Review of the Undertaking may apply for funding from the Agency in accordance with its Participant Funding Program.

2.6 **Panel Secretariat:** A Secretariat, including the public information function, will be established by Canada on behalf of the Parties after taking into account their recommendations, to assist the Panel in its duties. The Panel office will be established at Nain.

2.7 **Public Information Centres:** Public information centres will be established by the Panel at Utshimassits and Nain and other locations in the Province as deemed appropriate by the Panel. These public information centres will be administered by the Panel Secretariat.

2.8 **Public Registry:** A registry that provides ongoing public access to information relating to the Review of the Undertaking will be established at the Panel office for purposes of compliance with Section 55 of CEAA.

2.9 **Publication of MOU:** This MOU will be published upon Panel appointment.

2.10 **Participation by Officials of the Parties:** Nothing in this MOU will be construed as restricting participation in the Review of the Undertaking by representatives of departments and agencies of Newfoundland & Labrador and Canada and representatives of LIA and Innu Nation.

2.11 **Announcements:** The Parties or their designates will coordinate any

announcements regarding the matters addressed in this MOU.

3. APPOINTMENT OF A PUBLIC REVIEW PANEL

- 3.1 **Membership of Panel:** The Panel will consist of up to five persons. Panel members will not be employed by the Public Service of Canada, the Public Service of Newfoundland & Labrador, LIA or the Innu Nation.
- 3.2 **Criteria for Panel Members:** Each Panel member will be unbiased and free of any conflict of interest relative to the Undertaking and have knowledge or experience relevant to the anticipated Environmental Effects of the Undertaking.
- 3.3 **Selection and Appointment of Panel Members:** The Panel members including the Chair will be appointed by Canada from a list of nominees selected by the Parties. Each of the Parties will select three nominees and at least one nominee selected by each of the Parties will be appointed members of the Panel.
- 3.4 **Timing of Panel Appointment:** Following the selection of nominees, the members of the Panel will be appointed concurrently with the execution of the MOU.
- 3.5 **Public Notice:** Upon the appointment of the Panel, the Parties will give public notice of the appointment.
- 3.6 **Panel Review:** Upon appointment, the Panel will conduct its Review of the Undertaking in accordance with the Terms of Reference.
- 3.7 **Powers:** The Panel will have the powers set out in Section 35 of CEAA.

4. PANEL REPORT

- 4.1 **Reporting:** Upon completion of the Review of the Undertaking, the Panel will concurrently convey its Panel report to the Provincial Ministers, Federal Ministers, the President of the LIA and the President of the Innu Nation.
- 4.2 **Reporting to the Public:** The Panel report will be published and, prior to the announcement of its release to the public, the Secretariat will place embargoed copies of the report in the communities of Nain, Utshimassits (Davis Inlet), Shesharshiu, Hopedale, Makkovik, Rigolet, Postville and in other locations as appropriate to ensure timely availability on public release. The Panel report will be made available to the residents of the named communities immediately following the announcement of the public release of the Panel report. Copies will be available to the general public on request. Panel announcements will originate in Nain and other locations as appropriate.

5. AMENDMENTS

- 5.1 **Amendments:** This MOU may be amended only with the written consent of all the Parties. Unless another day is agreed, an amendment will become effective upon its execution by the Parties.

6. FINAL PROVISIONS

- 6.1 **Without Prejudice:** This MOU is made without prejudice to the positions taken by the Parties in any other forum. This MOU is not to be construed as conferring on, recognizing, denying or derogating from any aboriginal, treaty, constitutional or other rights, benefits, claims or privileges that may be claimed by any of the Parties, person, or group of persons. This

MOU will not be interpreted to be an agreement or treaty within the meaning of Section 35 of the *Constitution Act*, 1982. Nothing in this MOU is to be construed as providing any consent, approval or authorization whatsoever by LIA and the Innu Nation, in connection with the Undertaking or any part thereof.

6.2 **Change to the Undertaking:** If the Proponent proposes to change the Under-

taking, the Parties will reconsider and may amend this MOU and may redirect the Panel as to changes to the review process.

6.3 **Consultation:** The Parties will consult on the implementation of this MOU as required.

6.4 **Translation:** The MOU will be translated into Inuktitut and Innu-Eimun before its execution by the Parties.

IN WITNESS WHEREOF our signatures are hereunto inscribed.

Original signed by:
William Barbour 31/01/97
President
Labrador Inuit Association

Original signed by:
Sergio Marchi 30/01/97
Minister of the Environment
Government of Canada

Original signed by:
Peter Penashue 30/01/97
President
Innu Nation

Original signed by:
Brian Tobin 30/01/97
Approved pursuant to the *Intergovernmental Affairs Act* by the Premier, as Minister Responsible for Intergovernmental Affairs, or the Secretary to Cabinet for Intergovernmental Affairs Government of Newfoundland and Labrador

Original signed by:
Kevin Aylward 30/01/97
Minister of Environment and Labour
Government of Newfoundland and Labrador

Original signed by:
Fred Mifflin 30/01/97
Minister of Fisheries and Oceans
Government of Canada

SCHEDULE 1

TERMS OF REFERENCE

PANEL REVIEW OF THE PROPOSED VOISEY'S BAY MINING DEVELOPMENT

INTRODUCTION

Pursuant to the Memorandum of Understanding on Environmental Assessment of the Proposed Voisey's Bay Mining Development, a public review Panel is appointed to conduct a Review of the Environmental Effects associated with the Undertaking proposed by Voisey's Bay Nickel Company Limited.

These Terms of Reference are developed by the Parties and are approved by the Minister of the Environment.

The Undertaking may change as further studies and work are conducted. If, during the Review process, the Panel becomes aware of a proposal by the Proponent to change the Undertaking, the Panel will, if it considers the change significant, advise the Parties forthwith.

For purposes of this Review, the Department of Environment and Labour of Newfoundland and Labrador is the lead Provincial department, the Department of Fisheries and Oceans of Canada is the lead Responsible Authority pursuant to CEAA, and Voisey's Bay Nickel Company Limited is the Proponent of the Undertaking.

DEFINITIONS

The definitions within Section 1 of the Memorandum of Understanding on Environmental Assessment of the Proposed Voisey's Bay Mining Development will apply to this Schedule.

SCOPE OF THE REVIEW

In carrying out the Review, the Panel will address the factors outlined in the Annex to Schedule 1 and will give full consideration to traditional ecological knowledge whether presented orally or in writing. Although a review of the substance or definition of aboriginal rights or a determination

of the scope or substance of land claims negotiations are not within the Panel's Terms of Reference, the Panel may consider submissions regarding the relationship between the Undertaking and land claims negotiations.

STEPS IN THE REVIEW PROCESS

The main steps in the Review by the Panel will be as follows:

1. **Provision of Documents:** Upon appointment, the Panel will be provided the Description of the Undertaking and a copy of the document prepared by the Proponent entitled "The Voisey's Bay Mine/Mill Project — Project Description Report" dated September 26, 1996 and any revisions thereto which the Parties may receive from the Proponent.
2. **Conduct of the Review:** The Panel will prepare and issue operational procedures for the conduct of the Review.
3. **Development of Draft EIS Guidelines:** The Panel will develop Draft EIS Guidelines and will distribute them for public comment. Widely disseminated notices will be given to ensure the public is fully aware of the Draft EIS Guidelines, and copies of the Draft EIS Guidelines will be made available to the public. In developing the Draft EIS Guidelines, the Panel will review the report of the Innu Nation dated March 15, 1996, and an LIA report dated July 4, 1996.
4. **Scoping Exercise:** The Panel will carry out a comprehensive scoping exercise to explain the Review process, to help identify priority issues to be addressed during the Review, and to receive comments on the Panel's Draft EIS Guidelines. The scoping exercise must include seeking Innu and Inuit views about traditional ecological knowledge to

be used for EA purposes, how traditional ecological knowledge should be obtained and how it should be evaluated.

The scoping exercise will be carried out through public meetings in the communities of Nain, Utshimassits, Sheshatshiu, Hopedale, Makkovik, Rigolet, Postville and in other locations in the Province as may be determined by the Panel. Oral comments received at public meetings will be considered by the Panel as fully as written comments.

The Panel will determine what documentation is necessary to support the scoping exercise.

The Panel may require the Proponent to attend the Panel's public scoping meetings. In addition, the Panel may require the Proponent to hold separate meetings to permit interested persons to gain an understanding of the Undertaking and identify issues of concern. The Panel or the Secretariat may audit the Proponent's meetings.

The Panel will visit the proposed site and fly over the proposed alternative shipping routes during the scoping exercise to gain a first-hand understanding of the Undertaking and its surroundings. Representatives of the LIA, the Innu Nation, the general public, and the Proponent may join the Panel during the site visit.

5. Issuance of EIS Guidelines to Proponent:

The Panel will complete the EIS Guidelines within 120 days of its appointment, taking into account the consultation with the public and public comment received. The EIS Guidelines will address all factors identified in Annex I to these Terms of Reference. The Panel will forward the EIS Guidelines to the Proponent, and at the same time copies of the EIS Guidelines will be distributed to the public registry and public information centres. Widely disseminated notices will be given to ensure the public is fully aware of the EIS Guidelines, and copies of the

EIS Guidelines will be made available to the public.

6. **EIS Preparation:** The Panel will require the Proponent to prepare the EIS in accordance with the EIS Guidelines and submit the EIS to the Panel.
7. **Public Review of the EIS:** The EIS will be placed in the public registry and the public information centres, and will be available for public review and comment. The comments are to be provided to the Panel either in writing or verbally by submitting quality recordings. Comments are to be provided to the Panel within 75 days from public release of the EIS. Comments given verbally are to be considered by the Panel as fully as written comments.
8. **EIS Sufficiency:**
 - (a) On completion of public review of the EIS, the Panel, taking into consideration the comments received and its own review of the EIS, will determine if the EIS is sufficient to proceed to public hearings.
 - (b) If the Panel determines that the EIS is sufficient to proceed to public hearings, it will schedule and announce public hearings as provided by step 9.
 - (c) If the Panel determines that there are significant deficiencies, such that the EIS is not sufficient to proceed to public hearings, the Panel will issue a deficiency statement requesting additional information from the Proponent, which the Proponent will provide. At the same time the Panel issues the deficiency statement to the Proponent, the deficiency statement will be placed in the public registry and the public information centres, and made available to the public.
 - (d) The Panel's determinations in Steps 8 (a), (b) and (c), including the issuance of a deficiency statement, will be made

within 30 days of completion of Step 7.

- (e) Upon receipt of the additional information, the Panel will place it in the public registry and the public information centres, and will make it available for public review and comment for 45 days from the Panel's receipt of the additional information.
- (f) On completion of public review of the additional information, the Panel, taking into consideration the comments received and its own review of the additional information, will determine within 15 days if the EIS, supplemented by the additional information, is sufficient to proceed to public hearings and paragraphs (b) to (f) will apply.

9. Announcement of Public Hearings: Once the Panel determines that the EIS is sufficient to proceed to public hearings, it will schedule and announce the public hearings within 7 days. The Panel will attempt to schedule the public hearings to maximize the attendance and participation of the public, taking into account the seasonal activities and traditional practices of the Innu and Inuit. The public hearings will begin no earlier than 30 days and no later than 45 days after the schedule is announced. The Panel will issue detailed procedures for the conduct of the public hearings. The public hearings will be conducted in a manner that ensures a thorough examination of matters relevant to the Panel's mandate and in particular the examination of technical evidence.

10. Public Hearings: The Panel will hold its public hearings in the communities of Nain, Utshimassits, Sheshatshiu, Hopedale, Makkovik, Rigolet, Postville and in other locations in the Province as may be determined by the Panel. Technical hearings will

be held in Nain, Utshimassits and in other locations in the Province as may be determined by the Panel based on its assessment of the interest demonstrated in the communities.

The Panel will use best efforts to complete the public hearings within 45 days.

- 11. Reporting:** The Panel will prepare and submit to the Parties a report including, but not limited to, the following:
- description of the public review process,
 - summary of any comments and recommendations received from the public, and
 - rationale, conclusions and recommendations of the Panel.

The Panel will submit its report at the earliest possible date, but in no event later than 90 days following completion of the public hearings.

PUBLIC PARTICIPATION

The Panel will conduct its Review in a manner which will promote and facilitate public participation.

SPECIALIST ADVISORS TO PANEL

The Panel may secure the services of independent experts to provide information on and help interpret technical and scientific issues and issues relative to traditional ecological knowledge.

The names of any specialists retained and their advice to the Panel will be made public. Independent specialists hired by the Panel may be requested to appear before the Panel at the public hearing sessions.

TRANSLATION AND INTERPRETATION REQUIREMENTS

Translation:

Dissemination: All translated materials will be placed in the public registry and in the appropriate public information centres.

Panel's Documents: The Panel's operational procedures, public notices pertaining to the Panel's meetings and hearings, detailed procedures for the conduct of the public hearings, Draft EIS Guidelines, EIS Guidelines and any deficiency statement issued by the Panel will be translated into Innu-Eimun and Inuktitut. The translations will be made available as a video tape or in written form at the same time as the English version is publicly released by the Panel and will be provided on request to individuals and organizations. Issuance of these documents will not be delayed more than one week for translation purposes.

The Panel report will be translated into Innu-Eimun and Inuktitut. The translation of the conclusions and recommendations of the Panel report and summaries of key sections will be available at the same time as the English version of the report is conveyed to the Provincial Ministers, the Federal Ministers, the President of LIA and the President of the Innu Nation. Conveyance of the Panel report will not be delayed more than one week for translation of the conclusions, recommendations and summaries mentioned above.

Proponent's Documents: The key sections of the EIS will be translated. Following consultation with the Innu Nation and LIA, the Panel will determine which parts of the EIS will be translated by the Proponent into Innu-Eimun and Inuktitut. The Panel may require that the translation of these parts of the EIS be made available either as a video tape or in written form. The Proponent will take all reasonable measures to ensure that the translation of these

documents will be available at the same time as the English version is publicly released by the Panel and will be provided to individuals and organizations upon request. The same procedure will apply to the translation of any additional information provided by the Proponent in response to any deficiency statement issued by the Panel.

Following consultation with the Innu Nation and LIA, the Panel will determine which other documents will be translated into Innu-Eimun and Inuktitut, whether the translation will be provided as a video tape or in written form and when the translation will be provided.

Interpretation:

Following consultation with the Innu Nation and LIA, the Panel will determine interpretation requirements from English to Innu-Eimun and Inuktitut and from Innu-Eimun and Inuktitut into English for the public meetings hosted by the Panel, the site visit and the public hearings, including the technical and general hearings, and any other interpretation requirements, and appropriate interpretation services will be provided by the Panel.

Assistance of LIA and Innu Nation:

LIA and the Innu Nation will collaborate and take necessary measures to assist the Panel and the Proponent in identifying translation and interpretation requirements for the Review and in producing translation of the documents in a timely fashion. Nothing in this paragraph imposes financial obligations on the LIA or the Innu Nation.

ANNEX TO SCHEDULE 1

FACTORS TO BE CONSIDERED DURING PUBLIC REVIEW

The definitions within Section 1 of the Memorandum of Understanding on Environmental Assessment of the Proposed Voisey's Bay Mining Development will apply to this Annex. The Review will include consideration of the following factors as they relate to all phases of the Undertaking:

1. Description of the Undertaking, including its temporal and spatial boundaries;
2. Need for the Undertaking;
3. Purpose of and rationale for the Undertaking;
4. Analysis of alternatives including:
 - (a) alternatives to the Undertaking, and
 - (b) alternative means of carrying out the Undertaking which are technically and economically feasible and the Environmental Effects of any such alternatives;
5. Temporal and spatial boundaries of the study areas;
6. Extent to which biological diversity is affected by the Undertaking;
7. Description of the present Environment which may reasonably be expected to be affected, directly or indirectly, by the Undertaking, including adequate baseline characterization;
8. Description of the likely future condition of the Environment within the expected life span of the Undertaking if the Undertaking were not approved;
9. Environmental Effects of the Undertaking including the Environmental Effects arising from malfunctions, accidents or unplanned events that may occur in connection with the Undertaking;
10. Potential Cumulative Environmental Effects of the Undertaking;
11. The significance of the effects as described in items 9 and 10;
12. Proposed Mitigation measures that are technically and economically feasible and that would Mitigate any significant adverse Environmental Effects of the Undertaking, including the interaction of these measures with existing management plans;
13. Proposals for environmental compliance monitoring;
14. Measures to enhance any beneficial Environmental Effects;
15. Proposals for Contingency Plans;
16. Residual Effects associated with the Undertaking and their significance;
17. Need for and requirements of any Follow-up Program in respect of the Undertaking;
18. Capacity of renewable resources that are likely to be significantly affected by the Undertaking to meet the needs of present and future generations;
19. Extent of application of the precautionary principle to the Undertaking; and
20. Comments received by the Panel during the Review.

SCHEDULE 2 DESCRIPTION OF THE UNDERTAKING

Voisey's Bay Nickel Company Ltd. (the "Proponent") is proposing to develop a nickel-copper-cobalt mine and mill in the vicinity of a place known to the Inuit of Labrador as Tasiujatsoak, to the Innu of Labrador as Kapukuanipant-kauashat, which is also known as Voisey's Bay. The indicated mineral resource is estimated to be 150 million tonnes. The deposit consists of three ore bodies known as the Ovoid, the Eastern Deeps, and the Western Extension. The Ovoid would be mined using open pit techniques. The Western Extension and Eastern Deeps would be mined by underground techniques. The ore would be processed to nickel-cobalt and copper concentrates using conventional milling processes. The concentrates would be shipped to a smelter off-site. This proposed development is hereinafter referred to as the "undertaking".

The proposed mine/mill would be located in northern Labrador, 35 km southwest of Nain and 79 km northwest of Utshimassits (Davis Inlet). The climate is subarctic with short summers and long winters. The surrounding terrain is rugged, with elevations ranging to 400 m above sea level. Most of the undertaking would be located in a sheltered valley connecting Anaktalak Bay, to the north, with Voisey's Bay to the south. Disposal of tailings and waste rock would take place in valleys to the east of the mine. Valleys are largely forested, while upland areas consist predominantly of barren rock. The area drains to several watersheds which include watercourses supporting Arctic char and other fish populations. The undertaking would be carried out in an area subject to ongoing aboriginal land rights negotiations involving Newfoundland & Labrador, LIA and Canada, and Newfoundland & Labrador, Innu Nation and Canada.

The undertaking, through its life cycle, includes open pit and underground mining facilities and operations, the construction and operation of storage and deposition areas for

waste rock and overburden, mine site roads, borrow pits and quarries and their road access, an airstrip, a concentrator, a tailings impoundment area, an accommodations and services complex, a port site with shipping dock and concentrate storage building, maintenance and storage areas including equipment laydown and fuel storage areas, explosives storage and manufacturing facilities, a sewage treatment system, a power supply and distribution system, a water supply and distribution system, water diversion and drainage systems and a communications system. The undertaking includes the activities associated with the above operations and infrastructure such as the transportation of personnel and supplies and the shipping of concentrates.

The open pit would be mined using conventional methods. The waste rock would be stored near the open pit, or under a water cover, depending on its potential to generate acid. An estimated 13.7 million tonnes of overburden would be removed and stored near the open pit. Approximately 20.5 million tonnes of non-acid generating waste rock would be stored in surface facilities. One million tonnes of waste rock is categorized as potentially acid generating and would be placed under a water cover. Discharge water from the mineralized waste rock disposal pond may need treatment.

Underground deposits would be mined by sinking shafts followed by blasting and load-haul-dump operations. Approximately 15.5 million tonnes of waste rock from the underground mine would be produced. Fifteen million tonnes is considered potentially acid generating and would be placed under water cover; the remaining 0.5 million tonnes would be stored above ground. Water from the open pit and underground mining sites, as well as drainage from waste rock and overburden piles, would be collected and, if necessary, treated before discharge.

Ore would be transported to the concentrator, and processed into nickel-cobalt and copper concentrates using crushing, grinding and flotation processes. The concentrator would be designed based on an initial production rate of 15,000 tonnes per day of ore. Concentrates would be trucked to storage facilities at the port site at Anakralak Bay and shipped for smelting.

The tailings produced during the concentrating process are potentially acid-generating and would be placed under a permanent water cover to inhibit acid generation and leaching of metals. The Proponent's preferred tailings basin site is a pond approximately 12 km northeast of the plant site. The Proponent maintains it has sufficient capacity to accommodate the tailings associated with the projected mineral resource. Site development would include perimeter dams, control gates, access roads, surface water diversion and, if necessary, a polishing pond. Decant water would be reclaimed and recycled, with any excess water treated if necessary before discharge.

Potable and fire-fighting water would be obtained from groundwater wells in the Reid Brook basin. Power would be supplied by diesel power generation units. The airstrip would be located north of Camp Pond.

To date, three shipping routes (northern, eastern and southern) are being considered by the Proponent for the passage of bulk carriers containing the concentrate between the outer islands of the Labrador coast and the proposed port site at Kakiak (Edward Cove). The potential northern route following a portion of "Strathcona

Run", the existing shipping route to Nain, is currently the Proponent's preferred option. Three shipping season options are being considered. Seasonal shipping would consist of shipping during the ice-free season. Extended shipping would enable shipping to continue during early ice formation and during ice break-up. Year-round shipping would involve uninterrupted service throughout the year. The Proponent would prefer to ship concentrate during the greatest number of months possible, however, because of the importance of ice for winter travel, habitat and harvesting, the Proponent states that it will continue to consult with local residents and government regulators regarding an appropriate shipping season.

Approximately 700 persons would be employed during construction of the undertaking, and during operations, an estimated 500 persons would be employed plus additional contract personnel. The expected life of the undertaking is longer than 20 years and depends on the mineral resource and production rate. Workers would be transported to the site by air. Living accommodations would be provided on-site. No town site is planned.

Upon mine closure, the site would be decommissioned and rehabilitated to approach pre-development conditions. Progressive decommissioning and rehabilitation would commence at an early stage during mine development and would continue throughout the life of the mine until the effective surrender of any leases by the Proponent.

APPENDIX D SCOPING MEETINGS AND PUBLIC HEARINGS

SCOPING MEETINGS

April 16-17, 1997 — Nain, Labrador
 April 19-20, 1997 — Utshimassits (Davis Inlet), Labrador
 April 23-25, 1997 — Happy Valley-Goose Bay, Labrador
 April 28-29, 1997 — St. John's, Newfoundland
 May 6, 1997 — Cartwright, Labrador
 May 7, 1997 — Rigolet, Labrador
 May 8, 1997 — Makkovik, Labrador
 May 12, 1997 — Postville, Labrador
 May 13, 1997 — Happy Valley-Goose Bay, Labrador
 May 14-15, 1997 — Sheshatshiu, Labrador
 May 26, 1997 — Hopedale, Labrador

PUBLIC HEARINGS

Happy Valley-Goose Bay, Labrador:
 September 9, 1998 — General — Project Description
 September 10, 1998 — General — Approaches to Impact Assessment / General — Regulatory Issues
 September 11, 1998 — General — Regulatory Issues / General — Project Description / Community
 September 12, 1998 — General
 September 28-29, 1998 — Technical — Tailings, Waste Rock and Containment Issues
 September 30, 1998 — Technical — Freshwater and Marine Environment
 October 1-2 1998 — Technical — Freshwater and Marine Environment
 October 3, 1998 — Technical — Terrestrial Environment and Birds
 October 31, 1998 — General / General — Local and Regional Economic Impacts
 November 2, 1998 — Technical — Socio-Economic (Women's Issues) / Technical — Socio-Economic (Impacts on Harvesting and Renewable Resources)
 November 3, 1998 — General — Impacts and Benefit Agreements and Land Claims / General

November 4-5, 1998 — Technical — Environmental Management
 November 6, 1998 — Closing Remarks

Nain, Labrador:
 September 14, 1998 — General — Impacts on Nain / Community
 September 15, 1998 — Technical — Marine Transportation
 September 16, 1998 — Technical — Marine Transportation
 September 17, 1998 — Community

Labrador City, Labrador
 September 19, 1998 — General

Rigolet, Labrador:
 October 5, 1998 — Community

Makkovik, Labrador:
 October 6, 1998 — Community

Postville, Labrador:
 October 7, 1998 — Community

Utshimassits (Davis Inlet) Labrador:
 October 15, 1998 — Community
 October 16, 1998 — General — Training and Labour Issues / Technical — Socio-Economic (Social, Spiritual, Cultural)
 October 17, 1998 — Technical — Socio-Economic (Social, Spiritual, Cultural) / Community

St. John's, Newfoundland:
 October 22, 1998 — General

Hopedale, Labrador:
 October 28, 1998 — Community

Sheshatshiu, Labrador:
 October 29-30, 1998 — Community

Cartwright, Labrador:
 November 1, 1998 — Community

APPENDIX E ACKNOWLEDGEMENTS

The Panel wishes to express its thanks to all those who participated in the review of the Voisey's Bay Mine and Mill Project. In particular, the Panel thanks the people of Labrador who welcomed the Panel into their communities and shared their views with the Panel.

The Panel would also like to thank representatives of the federal government, provincial government, LIA and the Innu Nation for their participation. The Panel appreciates the cooperation of VBNC and its consultants throughout the process.

The Panel extends special thanks to its secretariat which assisted in the review and the completion of its report. They are as follows:

Brian Torrie — Panel Manager
Sharon Baillie-Malo — Analyst
Angie Barrados — Analyst
Mary Webb — Information Officer
Josée Lance — Information Officer