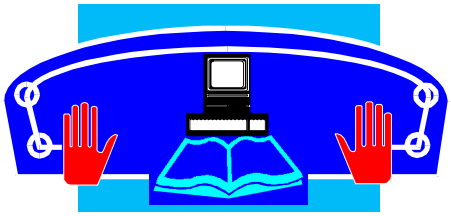

Nanisivik Project - Stakeholder Report
Type of Study: Analysis/review
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NANISIVIK PROJECT

STAKEHOLDER REPORT

NANISIVIK MINES LTD.

NANISIVIK PROJECT

STAKEHOLDER REPORT

APRIL 1, 1991

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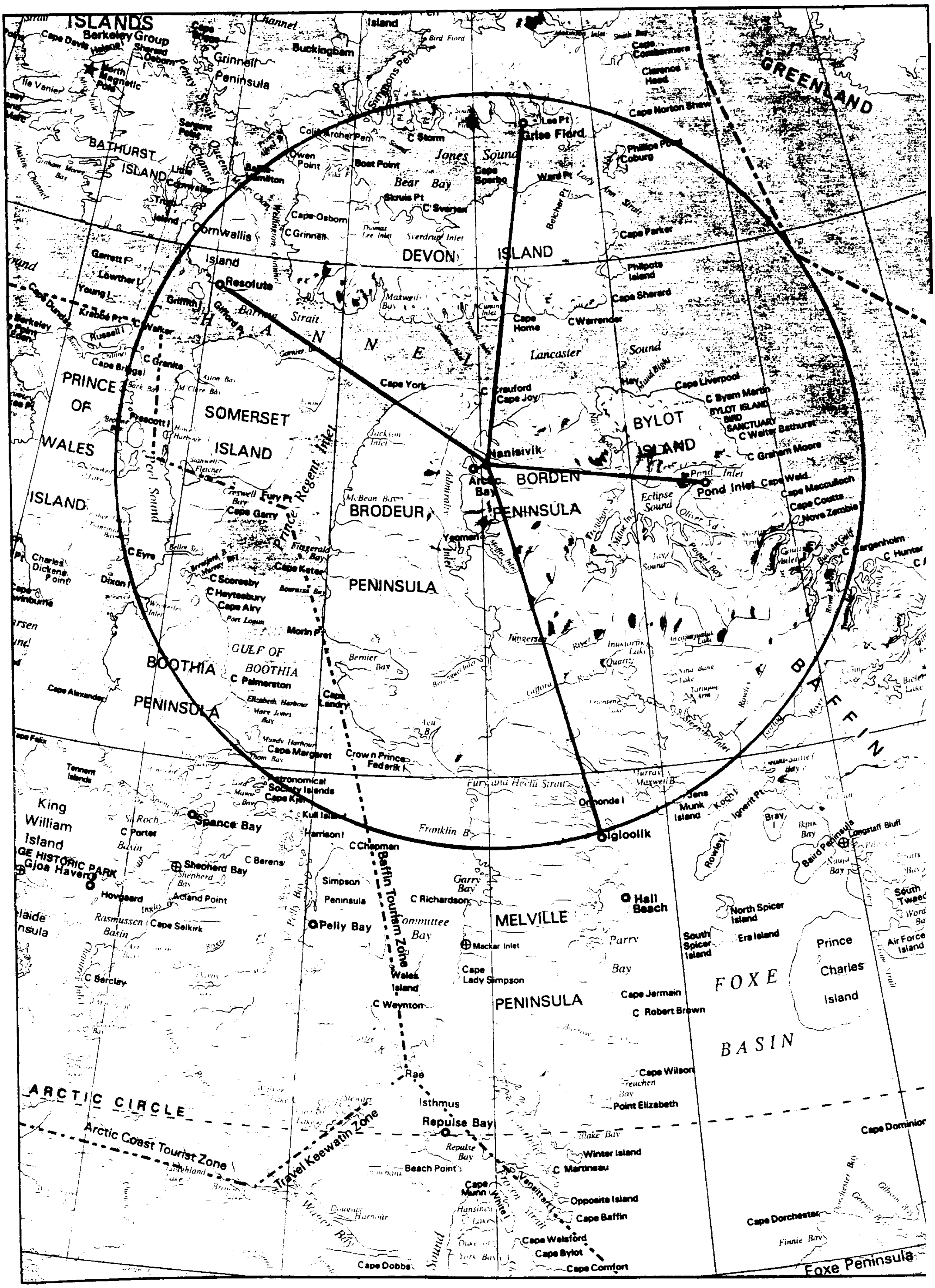
NANISIVIK PROJECT

STAKEHOLDER REPORT

This report is an update of the November 1989 Stakeholder Report. Its primary objective is to inform all persons with an interest in Nanisivik, or in economic development in Nunavut, of the project's performance, status and forecasts.

Nanisivik Mines Ltd. (NML) is the principal agent of economic development at Nanisivik. Since June 1990 NML has been a wholly owned subsidiary of Conwest Exploration Company Limited as the result of a merger of Mineral Resources International Limited and Conwest. Detailed operations and financial information for NML is found in the Conwest Annual Shareholder's Report, published in April.

The Nanisivik Project is a unique combination of a private enterprise industrial base integrated into a publicly owned infrastructure for the purpose of area economic development. Nanisivik is located at the heart of the 500000 square kilometre North " Baffin Area. As a transportation centre Nanisivik has a 2000-metre landing strip suitable for commercial jet aircraft and a deep-water port in the most favorable of the 13 sea navigation zones in the Canadian High Arctic. The unorganized community of Nanisivik is located within a 10 square kilometre block of Commissioner's Land which is administered by the Government of the Northwest Territories. The Hamlet of Arctic Bay (population 800) is connected by a 30 kilometre all-weather road and the two largest communities in the area, Igloolik and Pond Inlet, (population 1000 each), are within 400 kilometres.



ISLANDS
Berkeley Group
Cape Davis
Helena I
North Magnetic Pole
Grinnell Peninsula
Buckingham
BATHURST ISLAND
Cornwallis Island
Cape Osborn
C Grinnell
Sverdrup Inlet
DEVON ISLAND
Jones Sound
C Storm
Boat Point
Bear Bay
Skruis Pt
C Sverdrup
Cape Sparbo
Grise Fiord
Lee Pt
Ward Pt
GREENLAND
Cape Combermere
Clarence Head
Cape Norton Shaw
Phillips Point
Coburg
Belcher Pt
Cape Parker
Philpots Island
Cape Sherard
Resolute
Barrow Strait
C H A N N E L
Maxwell Bay
Cape Home
C Warrender
Lancaster Sound
Griffith I
Young I
Lowther I
Garrett P
Cape Dundas
Krabbé Pt
C Walker
Russell I
Cape Bridges
C Granite
PRINCE OF WALES ISLAND
Prescott I
Peel Sound
Cape York
C Crauford
Cape Joy
Cape Liverpool
C Byam Martin
BYLOT ISLAND
BYLOT ISLAND BIRD SANCTUARY
C Walter Bathurst
C Graham Moore
SOMERSET ISLAND
Jackson Inlet
Nanisivik
Arctic Bay
BORDEN PENINSULA
Pond Inlet
Cape Weld
Cape Macculloch
Cape Coutts
Nova Zembla
Eclipse Sound
Creswell Bay
Fury Pt
Cape Garry
Prince Regent Inlet
BRODEUR PENINSULA
Admiralty Inlet
Yeoman I
C Eyre
Fitzgerald Bay
Cape Kater
C Scoresby
C Hayesbury
Cape Airy
Port Logan
Morin Pt
Charles Dickens Point
Dixon I
Jungersen
Bernier Bay
GULF OF BOOTHIA
C Palmerston
BOOTHIA PENINSULA
Cape Alexander
Elizabeth Harbour
Cape Landry
Cape Margaret
Crown Prince Federik I
B A F F I N
C Hunter
C Bargenholm
Tennent Islands
Astronomical Society Islands
Cape Kjer
Kull Island
Fury and Hecla Strait
Ormonde I
Jens Munk Island
Igloolik
Franklin B
King William Island
C Porter
Spence Bay
Harrison I
C Chapman
Gjoa Haven
Shepherd Bay
C Berens
Hovgaard
Acland Point
Cape Selkirk
Rasmussen Basin
Simpson Peninsula
Pelly Bay
Baffin Tourism Zone
C Richardson
Committee Bay
Garry Bay
MELVILLE PENINSULA
Mackar Inlet
Hall Beach
Parry Bay
North Spicer Island
South Spicer Island
Era Island
Rowley I
Igloolik Pt
Bray I
Baird Peninsula
Longstaff Bluff
Prince Charles Island
Air Force Island
South Tweed
FOXE BASIN
C Barclay
Wales Island
C Weynton
Cape Lady Simpson
Cape Jermain
C Robert Brown
Cape Wilson
Point Elizabeth
Rae Isthmus
ARCTIC CIRCLE
Repulse Bay
Arctic Coast Tourist Zone
Travel Keewatin Zone
Beach Point
Winter Island
C Martineau
Cape Munn
Opposite Island
Cape Baffin
Cape Welsford
Cape Bylot
Cape Comfort
Cape Dobbs
Wager Bay
Cape Dorchester
Cape Dominion
Foxe Peninsula

The framework for the Nanisivik Project is the development agreement signed by the Governments of Canada and the Northwest Territories in 1974. The devolution of governmental authority and the signing of a land claim agreement in principle with the Tungavik Federation of Nunavut have changed the political environment in which Nanisivik exists. The demonstration of a profitable private enterprise investment in the area continues to be the most critical element for the future of the Canadians who work and live in North Baffin.

Economic Development

a) **Mine Operations .-**

1990 was the third consecutive year that the European price of zinc metal exceeded the 1985/87 average of US$ 850/tonne by 50% or more. Metal markets are cyclical and 1990 was probably the last year of this magnitude of prosperity for zinc concentrate producers like Nanisivik for a few years. The average price received for 1990 concentrate shipments was 15% less than that realized for the 1988 and 1989 shipments. The decrease in revenues for 1990 shipments was not directly proportional to the decrease in net income of the operation for a number of reasons.

Concentrate production from 1988 to 1990 declined 11 .5% despite a 6% increase in the tonnes of ore processed annually. This was a result of a 16.5% decrease in the zinc grade of the ore mined.

The ore grade, 8% zinc for 1990, is the same grade as that of the five million tonnes of mineral inventory which has remained constant over the past three years. Mining at the average grade of the mineral reserve was necessary in

1990 and is planned for 1991 and 1992 by the location of mineral occurrences discovered inthe mine. Atthistime 64%ofthe mineral reseweis outside the main orebody, generally below it, and requires considerable development to render it mineable.

The declining metal prices and the requirement to mine ore at a grade that results in concentrate production at a minimum level for an economically viable operation will make the next two years critical to determining the length of the mine life.

Net income for 1990 was 33% of that realized in 1988 and 1989. The large reduction was a results of the above revenue factors and increased costs for routine and non-routine operations in anticipation of more stringent cost controls over the next two years.

Over the past three years the total expense for corporate income tax and NWT mineral royalty was $30.3 million.

b) Ore Reserves

Enclosed is a table illustrating the mineral inventory history at Nanisivik which determines the life of the mining operation. For non-mining people it is " important to note that the term "ore reserve" is defined by security commissions as to a degree of certainty in quantifying the tonnage and grade of mineralization that can be mined at a profit. For this reason the ore reserve published for investor information has remained at the equivalent to five year's operation for some time.

NANISIVI

MINERAL INVE

	MI TO
1973 ORE RESERVE	
1976-1989 MINING	
1990 ORE RESERVE* *	
NET CHANGE	

INVENTORY CHANGES

SATELLITE DEPOSITS	
LOWER LENS	
MAIN OREBODY	

* adjusted on basis of 2.8 million to
**Published: 2.7 million tonnes @ 8

The mineral inventory includes all amounts and grades of mineralization known to the mine management and is used primarily for internal mine planning and waste rock disposal purposes.

The table indicates that the total reserve has doubled from the original 6.5 million tonnes to 13 million tonnes. The additional ore has a grade of only 7% zinc compared to the original 13% zinc.

The first 60% of the mineral inventory was mined over 13 years as a higher grade and the net income was used to repay the capital cost of the mine, invest in North Baffin mineral exploration, purchase participation in other mineral projects in Canada and, for the latter two years, to pay a shareholders' dividend.

The remaining 40% of the mineral inventory averages 8% zinc which is forecasted to be the minimum grade acceptable for an economically viable operation. This ore grade is more comparable with the grades of large southern Canadian mines (Brunswick Mining: 9% zinc, 4% lead, and Cominco's Sullivan mine: 7% zinc, 4% lead) than Cominco's Arctic mines, (Polaris: 14% zinc, 4% lead, and Red Dog: 17% zinc, 5% lead). At a milling rate of 710000 tonnes per year the current inventory forecasts a possible mine life of seven years to 1997. The remaining tonnage is not only of a lower grade of zinc but is located in satellite deposits and at depths which will require development and wiii result in higher mining costs.

The iife of every mine is ultimately dependent on the saie price of its minerai products. The recent closure of a number of goid mines has been the result of a reaiized goid price much lower than anticipated combined with a depietion of ore reserve tonnage and grade. in the early stages of a mine's iife this

results in interest expense being capitalized to the point that the ore reserve is unable to repay the original investment.

The Nanisivik mine is not a new mine and increasing capital costs for equipment replacement can be expected. Minerals are priced on an international market and events anywhere in the world can affect metal prices. It is critical that a mine like Nanisivik, which exports 100% of its production, continue to be a low cost producer on a world-wide basis if it is to maximize the mine life.

c) Exploration

Nanisivik Mines Ltd. continues to invest in the search for Canadian mineral deposits. Mine and property exploration in 1990 cost $1 million. Expenditures of $0.5 million were made on other programs, principally for industrial minerals in eastern Ontario and base metals in the Beaulieu River area of the Northwest Territories.

A major program of underground development and diamond drilling was performed on the Midway property of Regional Resources financed entirely by $4.5 million of share purchases by Nanisivik.

Early in 1991 Nanisivik entered into an agreement with Noranda Exploration for the expenditure of $5 million to earn a 50% interest in a copper prospect on Victoria Island.

d) Project

In addition to the mining operation Nanisivik seeks to contribute to economic development of the north Baffin area in other fields.

Tourism was supported through the hosting of the Midnight Sun Road Races when 100 visitors from Canada and the USA toured and ran over the four-day Canada Day weekend. Mine and site tours were provided for the 179 passengers of the Society Expeditions cruise ship when it docked at Arctic Bay and Nanisivik in August.

More extensive utilization of the Nanisivik facilities has been deterred by a shortage of overnight accommodation for visitors. Following the occupation of the new single status residence in February 1990, capacity became available in the original bunkhouse. A women's wash and shower room was constructed in one wing of the bunkhouse which permitted groups of 20 to 40 people to hold conferences and workshops at Nanisivik; March - Baffin Regional Teachers, April - Baffin School Principals, May- Baffin Recreation Coordinators.

The bunkhouse was closed in October for renovations to both the staff and visitor's wings. A complete refurbishing of carpets, tiles, paint, wallpaper, washrooms and lounges has made this facility attractive for visitors and special projects. The first group scheduled to occupy the visitors accommodations in 1991 is a team of 20 Polar Continental Shelf Project personnel who, assisted by four helicopters, will perform hydrographic surveys in the north Baffin area" for six weeks starting March 8th.

Preliminary discussions are currently being heid to assess the utilization of the Nanisivik port and fuel storage facilities as a refuelling depot for Canadian Coast Guard ice breakers during the Arctic shipping season.

The long-term utilization of the industrial and infrastructure facilities at Nanisivik as a north Baffin centre for special projects development will require exposure

of the operation to as many territorial and national entities as possible over the remaining mine life.

Consistent with the 1974development agreement whereby Nanisivik Mines Ltd. constructed non-mining related infrastructure at cost, the operation's management at Nanisivik wiil modify facilities and provide services and materials at cost in order to maximize the exposure of the site to potential future agents of economic development.

Within the government administered townsite at Nanisivik is the GNWT town centre complex. In addition to housing federal and territorial government services this facility was designed with excess capacity for future requirements of a developing area. To date these facilities have been utilized for temporary project offices and conference rooms.

The recent appointment by the GNWT Department of Transportation of an area director for management of the jet airports at Hall Beach and Nanisivik as well as the maintenance of the road to Arctic Bay is an indication of the strategic importance of Nanisivik in the north Baffin area.

e) **Nunavut**

The signing of the Nunavut Land Claim Agreement in Principle in 1990 initiated a joint effort by the Mining Association of Canada, the Prospectors and Developers Association of Canada and the Northwest Territories Chamber of Mines to present an analysis of the agreement provisions as they related to land tenure and access for the purpose of non-renewable resource development. Although the final brief was presented to the federal negotiators, two

drafts of the response were discussed with officers of the Tungavik Federation of Nunavut at Yellowknife during the autumn of 1990.

The mineral industry representatives recognizing that the probability of a final agreement in the near future would result in Inuit input to management boards covering 20% of Canada and surface ownership of 10% of the Northwest Territories. The TFN representatives recognized that with surface and sub-surface land ownership they had the opportunity to participate in the most probable source of Nunavut economic development, mineral development. These understandings resulted in the formation of a joint Mineral industry/TFN Working Group.

Nanisivik Mines Ltd.'as a member of all three mineral industry associations is contributing to a program for TFN orientation to the mineral industry and particularly to working with the Baffin Designated Inuit Organization to utilize the Nanisivik experience for future mineral development.

Social Development

a) Employment

The average permanent workforce at Nanisivik in 1990 was 189, an increase of 8% since 1987. The increase was primarily in the underground production division but additions were also made for environmental monitoring and daycare.

Staff turnover in 1990 declined to 44% from 58% in 1987. Over this three-year period southern resident staff turnover declined by 35% while northern resident

turnover increased by 10%. The classifications reflect a recession driven pattern for southern residents similar to a two-year decline 1982-1984 and a greater emphasis on temporary employment for northern residents, even though many were employed on a permanent basis.

The average northern resident component of the total staff declined to 21% which is equivalent to 25% of the operating staff. At year-end the 44 northern residents at Nanisivik originated from Arctic Bay (50%), other north Baffin hamlets (37%), and south Baffin (1 5%). This trend towards more concentrated participation from Arctic Bay is at the expense of other north Baffin communities, particularly Igloolik, because of the regional airline schedule and routing. During 1990 there Were two recruiting trips to Baffin communities but our conclusion has been that there are fewer applicants available, particularly those with sufficient education to qualify for the apprenticeship program.

The most significant change in the origin of southern resident staff was a decline from 25% to 20% for Newfoundland which was matched by an increase to 30% for Ontario.

b) Education

The prosperity resulting from increased zinc prices permitted Nanisivik Mines Ltd. to contribute $35000 in 1989 and 1990 to the Nanisivik Community Education Council. The supplementary funding was primarily used to staff the Allurut school with a full time Inuktitut instructor and to purchase materials necessary for teaching the first three years of the school curriculum in Inuktitut. Some of the funding was utilized to enhance french language instruction as both a first and second language.

c) International

Nanisivik Mines Ltd. was an official sponsor of the Polar Quest project whereby 20 students from Canada and the USSR performed environmental and community projects in Siberia and north Baffin from May to August 1990. A direct contribution of materials and sea freight was combined with site preparation and erection management for a skating rink at Arctic Bay

A Danish geologist working under contract to the Government of Denmark visited Nanisivik and conferred with the project management with regards to a revision of the Greenland mineral development legislation. The current mining act has proven too restrictive to attract significant foreign investment and involvement.

Representatives of CRA, the largest mining company in Australia, met with Nanisivik Mines Ltd. to discuss procedures for coordinating surface access and tenure with local communities and regional land councils. Their experience with Aborigines in Australia has resulted in a stagnation in mineral exploration and development to the disadvantage of the industry and the aboriginal people.

Environmental Protection

a) Tailings Disposal

The mining experience and results of underground exploration drilling have sustained the mineral inventory of Nanisivik at five million tonnes. At a grade of 8% zinc it requires seven tonnes of ore to be milled for each tonne of concentrate produced. The remaining six tonnes are rejected as tailings. A requirement exists for the deposition of 4.3 million tonnes of tailings which is

Canada Day Road Race - Arctic **Bay to Nanisivik**

On-shore Tailings Disposal Experimental Site

equivalent to 2.2 million cubic metres. As previously reported this volume is well beyond the capacity of West Twin Lake for subaqueous deposition.

Over the winter of 1989/90 studies were undertaken to expand the storage capacity of the West Twin Tailings Disposal Area. Following drilling of tailings previously deposited underwater, Terratech Ltée of Montreal designed a rock-fill dam which would raise the water level over 90% of the lake by four metres. An analysis of the complete tailings pumping system was completed by Kilborn Engineering. This design would store all the tailings solids under a water cover of two metres after operations ceased but would not allow for the discovery of additional ore and would present an operating problem to uniformly deposit tailings of a three metre depth.

An alternate proposal to deposit tailings above the level of the lake over 25% of the lake area to a height of 13 metres was considered. This system would be more efficient operationally and allow for additional capacity but posed questions as to dust pollution, pumping capacity for a longer pipeline and a method to isolate the potentially acid-producing tailings after the mine closure. A major operating uncertainty was the ability to discharge tailings above the water level during the nine months that the ambient temperature was below freezing.

In the summer of 1990 an in-situ test of an above water deposition system was initiated. A road was built along the north side of the lake at an elevation 15 metres above the lake level. The tailings pipeline was extended 585 metres (15%) along the road. An onshore area between the lake and the road was marked out with a grid to measure tailings solids settlement and with thermo-couples to detect changes in the permafrost regime. The proposed stabiliza-tion of the tailings area would be accomplished by covering all the exposed

sulphide tailings with a calcareous shale to a depth which exceeded the summer thaw, thereby keeping the tailings permanently frozen.

Under the direction of Series Consultants a series of dust sampling stations were installed in the Twin Lakes area.

Deposition onshore commenced in August. By mid-September, when ice formed on the lake, the toe of the tailings pile had reached the water. The test was run continuously until February 20th at which time the tailings solids had progressed 150 metres across the lake where they were confined by a previously constructed causeway. At this time the ice thickness on the lake exceeded one metre but the decant water from the tailings slurry had continued to flow into the lake and back to the concentrator as reclaim water.

The test was very successful. The coarseness of the tailings solids and the 15° C temperature of the tailings water permitted continuous drainage and melting of the ice at the toe of the tailings solids.

During the summer of 1991 a dyke will be built to increase the water depth in the west end of the lake and above water deposition restarted. The objective is to continue surface deposition throughout the winter utilizing the full 400-metre width of the lake.

b) Waste Rock Piles and Surface Disruption

The stockpiling of sulphide-bearing mine rock on the surface and the excavation of open pits are the two major sources of acid mine drainage. The waste rock stockpiles at Nanisivik were diamond drilled in 1990 and the core samples analysed to determine if the composition of the rock would result in

the capacity of the rock to absorb more acid than was generated by the sulphide in the rock through exposure to air and water. This was shown to be the case but tests will continue to cover waste piles with the calcareous shale to further minimize surface water drainage through the stockpiles and to promote the ascension of permafrost.

Completion of the open pits will be expedited to create depositories for any future waste rock that has to be removed from the underground workings. Eventually these backfilled pits will also be revered by shale. Other minor surface disturbances resulting from exploration or construction will be covered with shale to monitor its effectiveness on reducing acid generation.

c) Land Fill Sites

The community waste disposal land fill site is ideally located at the high point of a watershed to minimize the drainage of surface runoff through the site. Solid waste deposited at the site has a minimal effect on water quality but a press is currently under construction to reduce the volume required for disposal of drums. Liquid waste is being collected and alternatives considered for on-site disposal.

d) Water Licence

Nanisivik Mines Ltd. takes, uses and disposes of water under terms of an industrial water licence granted by the Northwest Territories Water Board. The current licence expires in October 1991.

Preparations for a water licence renewal commenced in September 1990. An application for the licence renewal was submitted in February 1991. A revised Restoration Plan and a revised Contingency Plan were submitted prior to the

licence application. A water licence renewal is subject to a public hearing. Representatives of the Hamlet of Arctic Bay have toured the mine operation and tailings disposal site to acquaint themselves with the status of the operation.

In response to a requirement by the water board for improved quality control of assays of metal levels in water decanted to Twin Lakes Creek, a graphite furnace has been purchased. When operated in conjunction with a recently purchased Atomic Absorption Spectrometer, assays are repeatable and the sensitivity improved to less than one part per billion.

e) Environmental Engineering

Research performed'at typical northern mining sites can provide data for the operation and restoration of mineral resource developments in the future. A previous study sponsored and published by the Department of Indian and Northern Affairs utilized the sub-Arctic gold mine of Echo Bay Mines at Contwoyto Lake and the base metal Arctic site of Nanisivik. Currently the Earth Sciences department at the University of Waterloo is proposing a long term study at the same locations to quantify evaporation rates and their effect on water balances at tailings disposal sties. Considering the very low precipitation at Nanisivik this information could be extrapolated to high Arctic desert sites. .

PROJECT STATUS

The Nanisivik mine has and is demonstrating that an efficient and profitable mineral development can be sustained in a frontier region of Canada. In addition, the mine can be operated in a manner which is cognizant of a dynamic public domain.

The mineral development at Nanisivik has justified the public investment in infrastructure but the infrastructure has not been fully utilized to maximize the economic development of the project and the north Baffin area.

The mine management continues to pursue the intent of the initial public/private agreement by offering- services to the public at a cost which could not be economically justified were it not for the mining operation.

Those Canadians who have participated in the Nanisivik Project have benefitted. Our concern is for the future of Nunavut if the maximum potential of the project is not realized for long term economic development.