Newfoundland and Labrador

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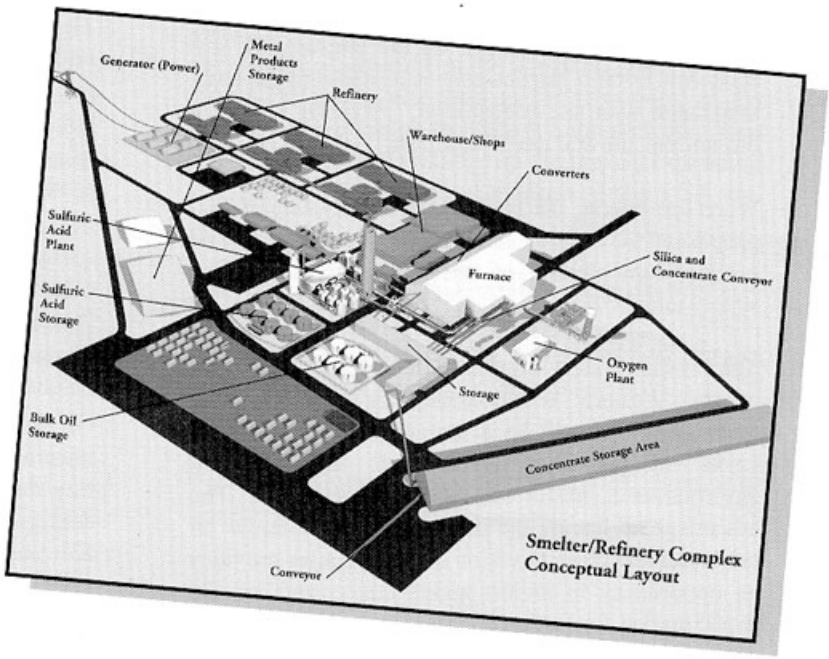
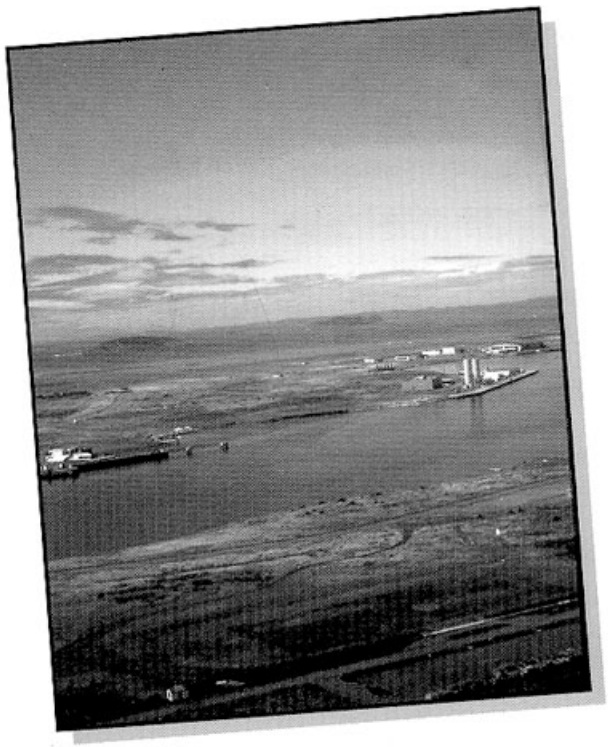
Department of Mines and Energy

Mines Branch





Voisey's Bay Nickel Smelter/Refinery Complex -Conceptual Layout and Future Site at Argentia

Argentia Site Chosen For Smelter/Refinery Complex

On November 29th, 1996, Dr. Stewart Gendron, President of Voisey's Bay Nickel Company Limited, announced that Argentia was chosen as the site for the proposed smelter/refinery complex to process the nickel and cobalt concentrate produced at Voisey's Bay.

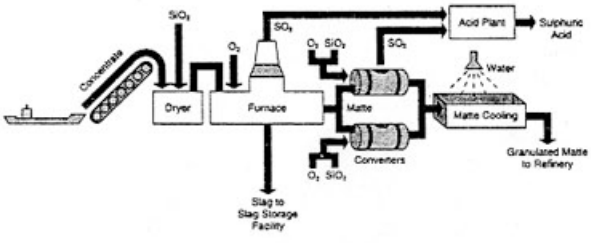
After a three-month evaluation process by Bechtel Canada, the company said it was clear that Argentia scored higher than any other site on the criteria used in the evaluation. According to Bechtel, Argentia offers very significant advantages on the engineering and economic criteria, particularly as it relates to the costs associated with site preparation. Argentia is both a brownfield site and deepwater port.

When operational, the smelter will directly employ 500 people and the refinery another 400. There will also be a significant amount of business opportunities for supply and services.

The smelter/refinery complex will be one of the largest in the Western World using the best available technology and will be a state-of-the-art facility, in terms of emission levels and other critical environmental, health and safety requirements. The advantage of having the smelter/refinery complex on tidewater and close to major shipping routes provides an opportunity to import nickel concentrate on the world market for further smelting and refining.

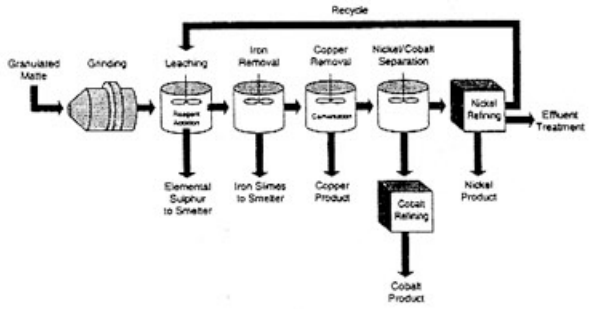
The smelting process involves the partial upgrading of metal in molten form from concentrate. Smelting is required to recover the metal content and convert it into a matte that is ready for refining.

Smelting Process



This matte is further refined using a leaching process to separate the metals in a liquid form before they are converted back to a solid form producing a high-purity product.

Refinery Process



The smelter/refinery complex will produce up to 270 million pounds of nickel and 7 million pounds of cobalt per year. In addition to the nickel and cobalt, about 20% of the total copper in the ore, or 36 million pounds of copper per year, will also be produced as a by-product at Argentia.

New Mineralized Zone Discovered at Voisey's Bay

On January 31, 1997, Inco announced that a new mineralized zone has been discovered at the Voisey's Bay deposit. This zone lies beneath, but is partly contiguous with, a shallow zone in the Western Extension. Assays of the core in this zone vary from 1.2 to 2.8% nickel and, on average, are significantly higher in terms of nickel content than those of the disseminated mineralization in the Eastern Deeps.

Drilling in the Eastern Deeps is still ongoing and Voisey's Bay Nickel has indicated resources of 50 million tonnes containing 1.36% nickel, 0.67% copper and 0.09% cobalt. This resource is in addition to the 32 million tonnes of 2.83% nickel, 1.68% copper and 0.12% cobalt in the Main Ovoid.

Exploration also continues on the western extension and Voisey's Bay west mineralization zones.

As of October 21, 1996, total reserves at Voisey's Bay are projected to be in the 150 million tonne range.

In early January, 1997, Voisey's Bay Nickel Co. Ltd. announced that SNC-Lavelin Inc. was awarded the project and construction management contract for the mine and mill complex. SNC will be responsible for managing, engineering, procurement, construction and site management activities.

Also in 1997, a procurement and operations office will be established in Happy Valley - Goose Bay to support on-going exploration activities in Labrador and to co-ordinate logistics during the construction and operations phase of the mine/mill.

The Memorandum of Understanding for environmental assessment of the mine development was signed by the governments of Canada and Newfoundland and the presidents of the Labrador Inuit Association and Innu Nation on January 31, 1997. It is hoped that the project will clear this process by May, 1998 allowing for production in the second half of 1999.

Before construction of the smelter/refinery complex at Argentia can begin, environmental assessment and permitting of the proposed complex, in accordance with applicable regulatory requirements, must be completed. Voisey's Bay Nickel Company registered the project for environmental assessment on January 22, 1997, and a harmonized federal/provincial process has been agreed upon. If approvals are received, construction could begin in 1997 and the company hopes to have the smelter/refinery complex operational to begin smelting Voisey's Bay nickel and cobalt concentrate in the year 2000.

The overall feasibility study for the Voisey's Bay project, including the mine, mill and smelter/refinery complex, is scheduled to be completed by early 1997.

Australian Company Purchases Interest in IOC

A major Australian resources company, North Limited, announced on January 31, 1997, that an agreement has been reached for the purchase of a 59.3% interest in the Iron Ore Company of Canada (IOC).

North Limited will pay US $230 million for a controlling interest in IOC. The purchase of IOC's shares comprises the combination of Bethlehem Steel's 37.57% and National Steel's 21.73% interests and is subject to regulatory and government approvals plus the consent of the remaining shareholders.

The purchase is expected to be finalized by March 31, 1997. Under the agreement, Bethlehem Steel and National Steel will receive approximately US $145 million and US $85 million, respectively.

The current IOC shareholders and their respective interests in IOC are as follows: Bethlehem Steel International Corporation, 37.57%; Mitsubishi Corporation, 21.77%; National Steel Corporation, 21.73%; Labrador Iron Ore Royalty Income Fund, 11.98%; and Dofasco Inc., 6.95%.

This is positive news for IOC, Labrador West, and the Canadian mining industry because of the transfer of management, technical and marketing expertise with North Group's existing iron ore operations in Australia. North is encouraged by a number of opportunities to enhance the value of IOC by expanding production through the reactivation of the idle pellet plant at Sept-Iles. This could also lead to the expansion of the mining and processing facilities at Labrador City. This will enable IOC to capitalize on the rapidly expanding Electric Arc Furnace steel markets in the USA and Asia.

North Limited is a major Australian resources company involved in mining, forestry and the design, manufacturer and marketing of mining and process equipment. Net assets total approximately US $1.25 billion.

For more information on North Limited, contact its internet site at www.north.com.au.

New Mining Producers in 1997

Richmont Mines Inc. acquired full title to the Nugget Pond deposit from Noveder Inc. in January, 1996. The Nugget Pond project is located in the southeast sector of the Baie Verte Peninsula.

An exploration program of $3.5 million was completed at the end of September, confirming mineable ore reserves of 390,000 tonnes grading 12.69 grams of gold per tonne or 4,950,000 grams (160,000 ounces) of gold. Based on these reserves, the mine life is expected to be four years.

The project development to date has seen the construction of the access road, the erection of a large shop/mine dry building, three warehouses, an office, an environmental and assay lab, a five-kilometre power line and various access roads. Mining of underground ore began in December.

The first quarter of 1997 will see completion of the mill construction, mill commissioning and gold production. When in full production, Richmont will employ between 80 and 90 people and produce about 1.4 million grams (46,000 ounces) of gold per year.

Roycefield Resources of New Brunswick plans to bring the Beaver Brook antimony deposit into production in mid-1997. The deposit is located 53 km southwest of Glenwood. Drill-indicated reserves stand at 1,379,908 tonnes averaging 4.49% antimony.

The mine will be an underground operation, and the mill will have a capacity of 400 tonnes per day. Roycefield plans to produce about 5% of the world's antimony for the next 13 years (100,000 tonnes of ore per year). The mine/mill will employ about 100 people. The company will initially produce concentrate for North American and European suppliers of flame retardants to the plastic and vinyl industries. However, Roycefield is developing a new hydrometallurgical process to convert antimony sulphide into value-added antimony trioxide.

Construction of the mill building, which started in November, 1996, was finished at the end of February. Installation of mill equipment will coincide with mill construction and continue through March and April.

In May, 1996, Roycefield Resources was granted EDGE status, with the condition that an antimony trioxide plant be built in the province.

Power Slate Enterprises will start commercial production of slate at Keels, Bonavista Bay, in the spring of 1997. A small processing building has been constructed on site. Through funding by Human Resources Development Canada, workers have been trained in slate quarrying and in processing techniques. A limited quantity of slate was produced during the training program which was completed at the end of November, 1996.

Production efforts will concentrate on roofing slate for markets in the United States and Europe. Slate for flooring, flagging and rock retaining will also be sold as by-products. The operation will employ about 20 people.

Power Slate Enterprises was designated an EDGE corporation in August, 1996.

Value of Mineral Shipments to Increase Again

The Department of Mines and Energy forecasts the total value of Newfoundland and Labrador's mineral shipments to be $985 million in 1997. This is an increase of 5% over the preliminary value of mineral shipments in 1996. The value of iron ore shipments will increase 7% in 1997 to $880 million. An increase is also forecast for mining industry employment of 4% to 3,460 in 1997.

Exploration expenditures in the province will decrease 25% to $69 million in 1997. Most of this activity will be concentrated in the Voisey's Bay region and other parts of northern Labrador with about $14 million being spent on the island portion of the province. The number of claims staked in the province in 1997 should remain at the 1996 level of approximately 15,000.

Major Capital Expenditure Program for IOC

The Iron Ore Company of Canada has approved a major capital expenditure program over the next two years. IOC will invest $75 million in 1997 and 1998 in new capital investment at Labrador City.

One of the major components of the capital investment is the construction of a new flotation plant at Labrador City, which will mean increased recoveries of iron ore in the mill, and lower levels of silica in iron concentrates and pellets.

In the future, IOC will have the ability to produce iron products which have the specific chemical composition to meet individual customer demands. In addition, the ability to produce low-silica pellets will allow the company to produce pellets for the direct reduction iron market, the fastest growing market for iron-ore products.

In addition to the flotation plant, money will go into a new wet-grinding mill system and the automatic train system between Labrador City and Sept-Iles. The new wet-grinding mill system will mean there will be significant reduction in dust production which causes health problems for workers as well as environmental damage.

Mines & Energy Ministers Conference

The province of Newfoundland and Labrador is host to the 54th Mines and Energy Ministers Conference which will take place in St. John's, July 6-9, 1997. These conferences are held annually on a rotating basis across Canada. Newfoundland and Labrador last hosted this conference in 1987, and is the host in 1997 to coincide with the Cabot 500 celebrations and the completion of the construction phase of the Hibernia Project.

These meetings offer a forum for invited delegates from industry and national associations to interact with the ministers and representatives from the different government jurisdictions, as well as for the discussion of federal-provincial and interprovincial issues pertinent to the natural resource development and regulation in Canada. Guest speakers will be invited from both government and industry. Various social events are planned in conjunction with Cabot 500 celebration in order to further promote Newfoundland and Labrador.

Geological Hazards in Newfoundland

Tilt Cove, Baie Verte Peninsula, March 11, 1912 - Tilt Cove was a thriving mining community at this time, built around a small rocky cove, and surrounded by steep cliffs. The mine manager's family were sitting around the tea-table of their house that lay under the steep rock cliffs at the head of the cove. It had been a hard winter, and the slopes lying above the house were blanketed with a thick carpet of wet snow following freezing rain the day before. The family heard a crack, a loud rushing sound, and the house was hit by a powerful avalanche of snow that swept them downslope and cut the house in two. Next door, 11 year-old Vera Alcock, the daughter of the community telegrapher, recalls their maid Emily being thrown across the room and trapped under the stove. Five people died in that avalanche, including Emily, the mine manager and his son. Vera survived and recently provided a vivid eye-witness account to the "Churchill Square Harbinger". This is just one example of many geological disasters that have affected the Province over the last 100 years.

The Geological Survey of the Department of Mines and Energy has been examining the historical record of avalanches and other geological hazards in the Province in the course of a long-term project aimed at better understanding of geological hazards in Newfoundland and Labrador. Much of our historical information comes from newspaper reports stored in the Provincial Archives. The hazards considered include avalanches, when a mass of snow slides down slope; landslides, when a saturated mass of soil slides down steep slopes; and rock fall, when a block of rock detaches itself from a cliff and falls.

Avalanches, suprisingly, are comparatively common in Newfoundland and Labrador, and up to 27 people have lost their lives over the last 120 years. As well as in Tilt Cove, fatal avalanches have occurred in Betts Cove, Corner Brook, Curling, Griquet, Okak, and at least twice in St. John's (most recently in 1959, when 5 people were killed in the Battery). In 1995, two people were killed by an avalanche in Blanc Sablon, just across the border in Quebec. About 7 people a year are killed by avalanches in Canada, but most of these are involved in recreational activities in mountainous terrain, particularly in the Rockies. With recent increases in winter back-country use, Gros Morne National Park has reported 3 avalanche incidents in recent years, fortunately none with fatal effect. Newfoundland is somewhat unusual in the number of incidents that involve avalanches striking residences. The high snowfall, and the steep slopes that surround many communities makes Newfoundland particularly vulnerable to this type of avalanche.

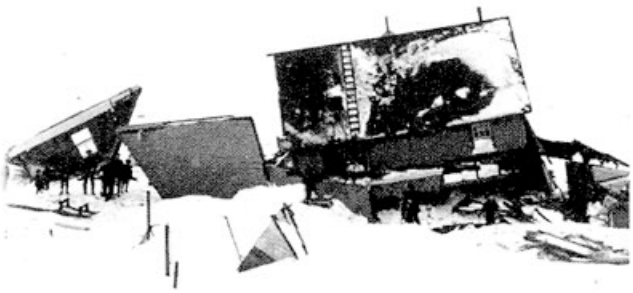
The worst geological disaster in Newfoundland's history (and the worst earthquake-related disaster in Canadian history) was the tsunami (tidal wave) that struck the Burin Peninsula in November, 1929. Twenty-eight people perished in this tragedy, mostly by drowning, in the communities of St. Lawrence, Taylor's Bay and Lawn. A large earthquake on the Grand Banks caused a tsunami, which was noticed as far away as Bermuda, and struck the southeast coast of the Burin Peninsula. Residents noticed the sea withdrawing from the harbours, and 10 minutes later the first of three huge waves struck the coast. The waves floated houses off their foundations, smashed properties along the shore, and flooded whole communities.

The steep slopes, which cause avalanche hazards, can also result in landslides and rock-falls. The worst landslide disaster in Newfoundland occurred when four children were killed in Harbour Breton in 1973. A

landslide of rain-soaked soil and trees swept away four houses containing 19 people. Other landslide tragedies have occurred in St. John's (two separate fatal accidents on South Side Road), and in Corner Brook. Rockfalls often occur but are rarely fatal, although several people have been killed by them including incidents in Portugal Cove and Springdale.

Understanding such disasters, and the conditions in which they are likely to occur permits planners to identify hazardous areas. Many problems can be avoided by diverting construction away from hazardous areas, and in the case where residences already exist, to develop protective measures, and evacuation plans.

The Geological Survey is interested in hearing about other avalanche, landslide or rock-fall incidents. Please contact David Liverman (709-739-4216; e-mail: dgl@zeppo.geosurv.gov.nf.ca) if you have any information.



The two houses struck by the Tilt Cove avalanche, 1912. Photograph reproduced courtesy of the Provincial Archives.

Recent Publications and Open Files of the Geological Survey

Digital Geochemical Atlas of Newfoundland (CD-ROM) by P.H. Davenport, L.W. Nolan, A.J. Butler, H.A. Wagenbauer, P. Honarvar, G.J. Kilfoil and C.K. Saunders, open file Nfld/2607.

Epigenetic Gold Occurrences, Eastern and Central Dunnage Zone, Newfoundland by D.T.W. Evans, Mineral Resources Report 9 (1996).

Geology of the Tommy's Arm River-Shoal Arm Brook area (NTS 2E/5), North-central Newfoundland, scale 1:50 000, by B.H. O'Brien and D.L. MacDonald, 1996. Open File 002E/05/0967 Map 96-033 (digital).

Geology of the Kenemich River map area (NTS 13G/SW), Labrador, scale 1:100 000, by G.A.G. Nunn and T. van Nostrand, 1996. Open File 013G/0048 Map 96-034 (blueline).

Soil, stream-water and stream-sediment geochemistry of the Florence Lake Greenstone Belt, Labrador (parts of 13K/10, 14 and 15), by John McConnell, 1996. Open File 013K/0225.

Epigenetic gold occurrences, central Newfoundland, compiled by D.T.W. Evans and G.J. Stapleton, Open File Nfld/2620, Map 97-1, Version 1.0.

Publications and Open File List, compiled by J. Gillespie, Open File Nfld/2619, Version 1.0.

Earth resources data directory, a collection of digital databases at the Newfoundland Department of Mines and Energy, compiled by J. Butler, 1996. Open File Nfld/2067, Version 7.0.

Preliminary surficial geology of the Kamarsuk map area (NTS 14C/05), Labrador, scale 1:50 000, by F.T. Kirby, 1995.

Geology of the northwestern part of Florence Lake greenstone belt and the Biaikio Showing, Hopedale Block (Nain Province), eastern Labrador (western part of NTS area 13K/15. Geological Survey, Newfoundland Department of Mines and Energy, Open File Map 97-02, scale 1:25 000, 1997, R.R. Miller and D.T. James.

Winter Seminar Series

The Department of Mines and Energy is once again offering its annual Winter Seminar Series. Part 1 runs from January to March, 1997 and part 2 of the series runs from April to May, 1997. The seminars are held in the lower-level meeting room of the Natural Resources Building, 50 Elizabeth Avenue in St. John's.

These seminars are open to the general public. The remaining seminars in part 1 and the seminars in part 2 of the series are:

Part 1

March 7 (4:00 PM) - New data from the Rigolet area, Labrador, *David Corrigan* (*Memorial University*).

March 14 (4:00 PM) - The Roberts Arm Group in Notre Dame Bay: upside-down and inside-out, *Andy Kerr.*

March 21 (3:30 PM) - Future directions for digital data bases: a presentation and open discussion, *Peter Davenport.*
A digital resource summary database for Labrador, *Dick Wardle.*

March 27 (Thursday, 4:00 PM) - Volcanic geochemistry, Notre Dame Bay area, *Kate MacLachlan* (*Memorial University*).

Part 2

April 4 (4:00 PM) - Quaternary stratigraphy in the Stephenville area, *Martin Batterson.*

April 11 (4:00 PM) - Some thoughts on the Hunt River greenstone belt, Labrador, *Donald James.*

April 18 (3:30 PM) - Archiving and accessing digital geophysical data, *Ferd Morrissey and Ned Vukomanovic.*
Mine Reclamation, *Gerry Kilfoil.*

April 25 (4:00 PM) - Nain Plutonic Suite geology, Alliger Lake area, *Bruce Ryan.*

May 2 (4:00) - Gold mineralization in the Avalon zone, *Sean O'Brien and Cyril O'Driscoll.*

May 9 (3:30 PM) - Title to be determined, *Dave Hawkins (Energy).*
Industrial Minerals, *Llewellyn Higdon and Ambrose Howse.*

May 16 (3:30 PM) - Geological maps and GIS, *Steve Colman-Sadd.*
Ordovician biostratigraphic zones, *Doug Boyce.*

For more information contact Don James at 729-2774 or e-mail at dtj@zeppo.geosurv.gov.nf.ca.

Upcoming Events

Investing in the Americas '97
April 7-10, 1997
Miami, Florida
The premier conference on mining investment in Latin America. For more information, contact:
Tel: (305) 669-1963
Fax: (305) 669-7350

Annual General Meeting of CIM and CIM Tradex.
April 27-May 1, 1997
Vancouver, British Columbia
For the 99th annual general meeting, the theme is "New Frontiers for the Next Century". For additional information, call:
Chantal Murphy
Tel: (514) 939-2710 ext. 304
Fax: (514) 939-2714
email: cmcim@login.net

GAC/MAC Annual Meeting
May 19-21, 1997
Ottawa, Ontario
This is the premier geoscientific meeting in Canada with a strong international representation. For further information, contact the Geological Association of Canada.
Tel: (709) 737-7660
Fax: (709) 737-2432

33rd Forum on the Geology of Industrial Minerals
May 25-28, 1997
Quebec City, Quebec
The Forum on the Geology of Industrial Minerals is an annual event hosted by state or provincial geological surveys or their equivalent. For more information, contact:
Tel: (418) 658-5400
Fax: (418) 658-5459

Happy Valley-Goose Bay Mining Conference and Trade Exhibit
June 16-19, 1997
Happy Valley-Goose Bay, Labrador
Your Opportunities ..... Your Future: Voisey's Bay and Beyond. For further information, contact:
Wyn Barnes
Tel: (709) 896-3321
Fax: (709) 896-9454

Baie Verte and Area Chamber of Commerce Mining Conference
June 20-22, 1997
Baie Verte, Newfoundland
This is an annual review of developments in the local exploration and mining scene. For more information, contact:
Kevin Thistle
Tel: (709) 532-4646
Fax: (709) 532-8310

NEWFOUNDLAND AND LABRADOR

GOVERNMENT OF
NEWFOUNDLAND AND LABRADOR
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Director Mineral Lands.....(709) 729-6425
Core Storage, St. John's.....(709) 729-5833
Core Storage, Pasadena.....(709) 686-2054
Engineering Analysis..... (709) 729-6449
Mining Project Analysis.....(709) 729-3197
Mineral Industry Assistance.....(709) 729-2358
Mineral Rights..... (709) 729-6418
Exploration Monitoring.....(709) 729-6437
Quarry Rights..... (709) 729-6410
Wabush Office.....(709) 282-3949

Geological Survey (Fax 709-729-3493)

Publications and Information.....(709) 729-3159
Mineral Deposits.....(709) 729-5946
Mineral Occurrence Data System.(709) 729-5986
Newfoundland Mapping.....(709) 729-3574
Labrador Mapping..... (709) 729-2107
Geochemistry, Geophysics & Terrain Sciences..... (709) 729-2171
Geoscience Data Centre.....(709) 729-6693
Industry Services.....(709) 729-6193
GEOSCAN..... (709) 729-6441
Goose Bay Office.....(709) 896-5162

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