SJR

38

FISCAL NOTE

No. 1

STATE OF ALASKA
2000 LEGISLATIVE SESSION

BILL NO. (S) Bill Version: SJR 38
Publish Date: 3/3/00

Revision Date/Time (Note if correction) _____ Dept. Affected _____
Title Approving transfer of railroad land BRU _____
Component _____
Sponsor Senator Gary Wilken
Requester _____ Component No. _____

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

OPERATING EXPENDITURES	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
Personal Services						
Travel						
Contractual						
Supplies						
Equipment						
Land & Structures						
Grants & Claims						
Miscellaneous						
TOTAL OPERATING	0.0	0.0	0.0	0.0	0.0	0.0
CAPITAL EXPENDITURES						
CHANGE IN REVENUES ( )						

FUND SOURCE (Thousands of Dollars)

1002 Federal Receipts						
1003 GF Match						
1004 GF						
1005 GF/Program Receipts						
1037 GF/Mental Health						
Other (Specify Type)						
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0

Estimate of any current year (FY2000) cost: _____

POSITIONS

Full-time						
Part-time						
Temporary						

ANALYSIS: *(Attach a separate page if necessary)*

Prepared by: _____ Phone 465-4940
Division Senate Transportation Date/Time 3/2/00
Approved by Commissioner Senator Jerry Ward, Chair Date _____
Agency _____

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GARY WILKEN
SENATOR
Districts 29 & 30
West Fairbanks

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Member: Health, Education, & Social Services (HESS)
Member: Legislative Budget & Audit
Member: State Affairs

Alaska State Legislature
Senate

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MEMORANDUM

TO: Representative Andrew Halcro
Chairman, House Transportation Committee

FROM: Senator Gary Wilken

DATE: March 30, 2000

RE: Request of hearing for SJR 38

I respectfully request that a hearing be scheduled in the House Transportation Committee to discuss SJR 38, "A resolution expressing support for a cooperative United States-Canada feasibility study on extending the North American rail system through British Columbia and the Yukon Territory to Alaska."

Senate Joint Resolution 38 is the Senate Companion to Representative Jeannette James' HJR 51. It will show support for Senator Frank Murkowski's effort to authorize and fund a feasibility study on the extension of the North American rail system to Alaska. This endeavor would be beneficial and could stimulate economic development for the state.

The resolution provides Senator Murkowski solid support from the Alaska Legislature for his work and this project. It passed the Senate on March 22, 2000 by a vote of 19-0, with one absent.

I have attached a sponsor statement for SJR 38. Please contact Ms. Kara Moriarty, at extension 3018, in my office if you have any questions or comments relating to this request.

Gary Wilken

GARY WILKEN
SENATOR
Districts 29 & 30
West Fairbanks

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Member: Finance
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SPONSOR STATEMENT

SJR 38

A Resolution expressing support for a cooperative United States-Canada feasibility study on extending the North American rail system through British Columbia and the Yukon Territory to Alaska.

Senate Joint Resolution 38 shows support from the Alaska Legislature for a feasibility study to be conducted on the extension of the North American rail system through Canada to Alaska.

Railroads provide safe, cost-effective, and reliable long distance transportation. Allowing Alaska to be connected to the rest of North America by rail will lead to increased economic development for the people of our state.

Senator Frank Murkowski is committed to this project and is proposing legislation that would establish and provide funding for a bilateral commission to conduct this feasibility study. The study would determine the best route, identify markers, and estimate construction costs for the project.

SJR 38 will send a strong message in support of completing this feasibility study, the first step towards connecting Alaska to the rest of North America by rail.

NEWS FROM THE OFFICE OF

FRANK MURKOWSKI

United States Senator • Alaska

Contact: Chuck Kleeschulte
For Immediate Release:
March 20, 2000

MURKOWSKI INTRODUCES ALASKA-CANADA RAILROAD EXTENSION BILL

View a copy of this legislation

WASHINGTON -- Alaska Sen. Frank Murkowski took another step in efforts to link the continental rail system with the Alaska Railroad when he introduced legislation in the Senate to create a bilateral U.S.-Canada Commission to study the feasibility of the rail link.

Murkowski last week announced legislation in the Senate that would create an 18-member commission, equally appointed by the President and the Canadian government, to conduct a technological and economic feasibility study of linking the rail system in Alaska to the "nearest appropriate point" in Canada. The commission would be charged with reporting on the results of its study within five years, and it would be authorized to spend $6 million in American funds on preliminary engineering and environmental work.

"Alaska and the Yukon both are woefully deficit in the transportation systems to move goods to market. A railroad extension might provide the essential transportation infrastructure to allow the Far North to blossom in the decades ahead, while protecting the environment. If a railroad connection proves to be economically, environmentally and socially sound, then let's move ahead. If not, let's drop the idea. But at the very least we need this commission to give the idea a honest hearing," said Murkowski.

Last year, after discussions with a group of Canadian parliamentarians, Canadian Ambassador Raymond Chretien, Canadian Minister of Transport David Collinette, and the Canadian-American Border Trade Alliance, Murkowski suggested it might make sense to build the roughly 1,200 miles of rail that would be needed to finish the linkup. The Alaska Railroad currently ends at Eielson Air Force Base, outside of Fairbanks, about 270 miles from the Canadian border, while the Canadian rail system ends at spurs to Fort Nelson or beyond Fort St. James, both about 900 miles from the Alaskan border.

Noting that America is continuing testing on a North American anti-missile defense system, Murkowski noted this is a particularly good time to launch a review of railroad extension since one of the prime sites under consideration for a missile interceptor base is at Delta Junction in Alaska, which could well

justify construction of the first 80 miles of the Alaska Railroad's extension toward the Canadian border.

Murkowski also encouraged a railroad conference held in Vancouver, B.C. in January. He said some estimates during the conference indicated the potential for such a line to carry up to 120 million tons of freight per year -- future mineral developments and timber making up the majority of the potential freight.

He noted the line would allow economic development of the mineral resources of the Yukon-Tanana uplands that stretch from Faro, Y.T., north to Fairbanks. The zone, home already to the Fort Knox gold mine in Alaska and the future home of mines working the huge Pogo gold deposit, contains large amounts of silver, tungsten, copper, lead, zinc and other ores. On the Alaska side of the border there are already more than 14 major hard-rock deposits identified, while in the Yukon there are more than 10 major mineral deposits known. This does not include the Alaska coal deposits a line could move to markets in the rest of North America or to port facilities connecting to East Asia.

Murkowski said the railroad's likely corridor is also filled with timber. He said within just 15 miles of a likely railroad corridor, there are 1.4 billion board feet of hardwood pole timber and almost 1.7 billion board feet of mixed pole timber.

"I am not an expert. I cannot verify the 120 million ton freight estimate. But it is fuel for thought and a reason why we need a comprehensive feasibility study," said Murkowski.

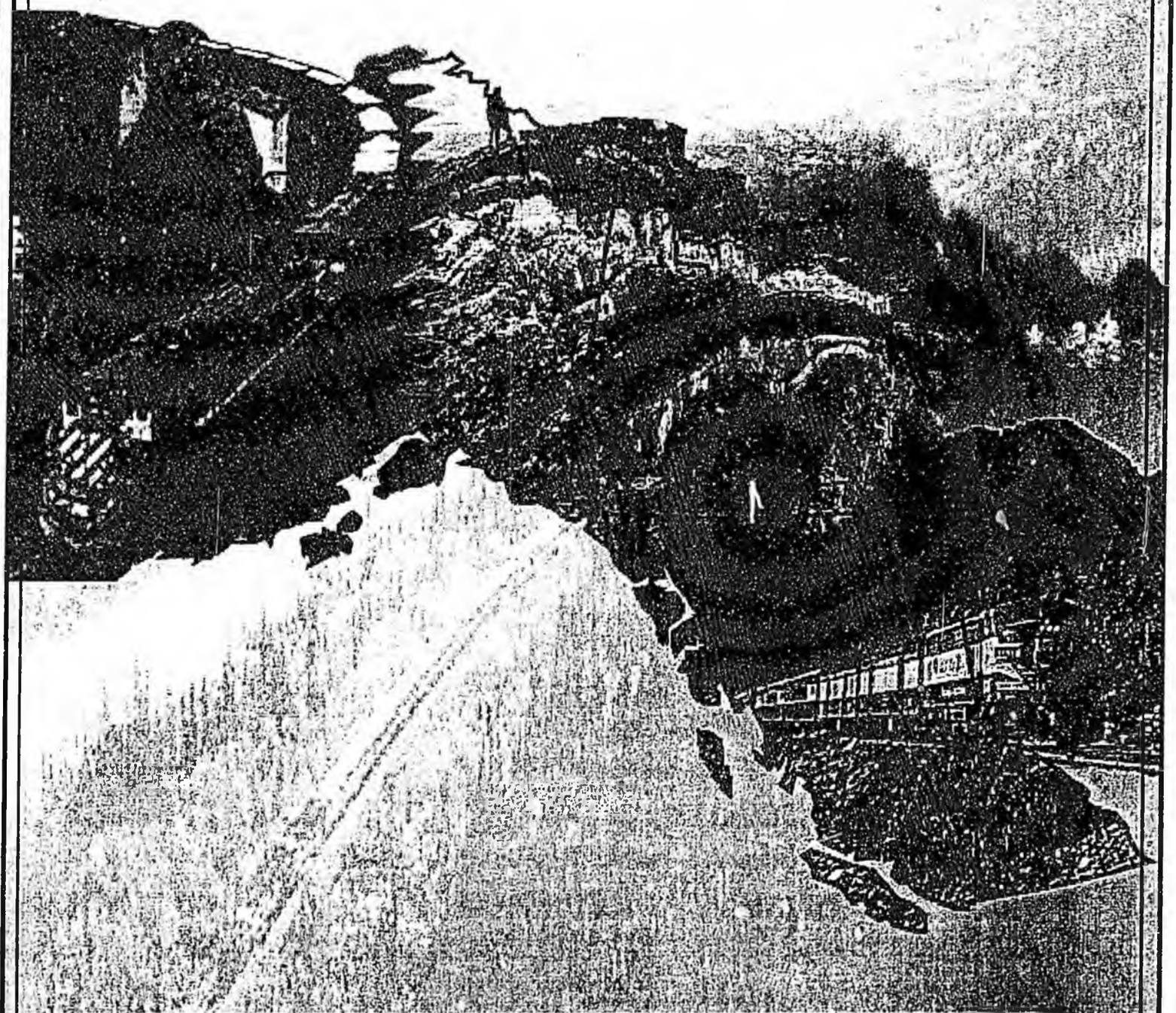
He said such a study commission might be opposed by environmentalists because of their bias against the use of natural resources or fear of the opening of undeveloped land in the north by a rail line. But Murkowski said a railroad should be most favored transportation system by environmentalists since railroads have small "footprints," and are controlled access systems that prevent uncontrolled development and uncontrolled land and wildlife impacts.

Under the bill, the commission would be comprised of representatives from local communities and local/Native residents, individuals with economics, engineering and resource management backgrounds, including representatives with minerals, timber and wildlife and fisheries management training. Specifically the American side of the commission will contain two members from local communities, one representing the State of Alaska nominated by the Governor, one representing Alaska Natives, four from commercial activities including one associated with the Alaska Railroad, and two scholars employed by Alaska education institutes, one with subarctic engineering expertise.

-30-

Rails to Resources

Bringing Alaska and the Yukon closer to the world



United States Senator Frank H. Murkowski

Press Information Packet

March 16, 2000

Here is an Op-Ed on the Senator's view on expanding railroads in Alaska. It is timely because of the introduction of legislation to set up a commission to consider railroad extension. Please consider for use. (Words 988) 3-15/16-00

Let's Get Alaska's Economy Back on Track by Extending Railroads

By Senator Frank Murkowski

Senator Frank H. Murkowski of Alaska

Back in April 1915, President Woodrow Wilson decided that construction of a railroad to Alaska's Interior was the single greatest step he could take to unlock the then territory's great promise and to get the region's economy on track.

Some eighty-five years later times have ***not*** changed.

Alaska and the neighboring Yukon Territory in Canada are still North America's last uptapped storehouse of mineral and natural resource wealth. We now know where much of that treasure lies — economic transportation to get the materials to market being the chief impediment to its development.

Over the years one thing has changed: We now know how to develop our mineral, energy and timber resources in an environmentally sensitive manner, so we can protect the beauty and the wildlife of the North, while producing jobs to sustain the region's human inhabitants.

We know there is a mineral zone that extends throughout the Yukon-Tanana uplands near Faro, Y.T., north to Fairbanks. The zone, home already to the Fort Knox gold mine in Alaska and the future home of mines working the huge Pogo gold deposit, contains large amounts of silver, tungsten, copper, lead, zinc and other ores. On the Alaska side of the border there are already more than 14 major hardrock deposits identified, while in the Yukon there are more than 10 major mineral deposits known. This does not include the Alaska coal deposits a line could move to Lower 48 or East Asian markets.

The same zone is also filled with timber. Within just 15 miles of a likely 1,200-mile railroad corridor through Canada into Alaska, there are 1.4 billion board feet of hardwood pole timber and almost 1.7 billion board feet of mixed pole timber.

Further to the North lies a second developmental target that another railroad could help get on track. That is the huge low-pollution, high-quality coal deposits at Point Lay and also the vast minerals of the Amber mining district farther to the southeast.

It would take just a 90-mile line to carry the coal from Point Lay to the Red Dog mine where a 60-mile line along the existing mine haul road would carry it to tidewater. Such a railroad could bring energy, in the form of coal, to the mine where it could be used to power a new electro-refining technology that would add tremendous value to the zinc-lead ore being shipped from Alaska, and most importantly provide additional jobs to the region. It also would finally allow some of the North Slope's 6 trillion tons of coal to be exported.

It would take just a 150-mile line to access the vast hard-rock resources of the Ambler Mining District and bring them to the coast, or about a 350-

mile line to tie into the Alaska Railroad heading south.

Some would say talk of railroad extension is nothing more than "pie-in-thesky" rhetoric. But railroads offer a host of benefits. They are the most energy efficient form of transportation. More importantly, they are one of the most environmentally sensitive forms of transportation. Railroads offer controlled access that removes the environmental threat of uncontrolled development. They emit the lowest levels of air pollution and usually cause the least disruption to the land.

And a rail corridor would encourage the co-location of all pipelines and power transmission lines — a process that makes especially good environmental sense.

I propose a public/private alliance to conduct a comprehensive feasibility study. Let's join forces to make a modest investment to examine this carefully.
- US Senator Frank H. Murkowski, speaking to the CAN/AM Border Trade Alliance in September of 1999

Last year, after talks with Canadian Parliamentarians during the Canada-U.S. Interparliamentary Conference, I held discussions with Canadian Ambassador Raymond Chretien and Canadian Minister of Transport David Collinette, and later with the Canadian-American Border Trade Alliance. In January I was further encouraged by estimates that their might be 120 million tons of freight a year from new mines and timber development along the Alaska-Canada rail corridor that would utilize such a new railroad link.

Thus I am introducing legislation in Congress to advance consideration of that railroad project. My bill will create an impartial bilateral commission to study the economic, environmental and engineering feasibility of completing the transcontinental railroad linking Canada with Alaska.

A joint commission should have the funding — I'm proposing $6 million — and the authority to oversee a comprehensive feasibility study of a line from where the Canadian rail system ends at either Fort Nelson or near Fort St. James, about 900 miles from the Alaska border, northward to link up with the Alaska Railroad, 270 miles from the border near Fairbanks.

My bill would create an 18-member commission, half being appointed by each country. The commission would be fully representative of the residents of the area and also include scientific expertise to make sure that the difficult issues surrounding a railroad will be thoughtfully considered.

Quick action to set up the commission is particularly timely since a decision is likely within the next year on whether the United States should proceed with construction of an anti-missile defense system. And perhaps the best site for an initial 100-missile intercepter base is at Delta. That decision might justify extending the railroad to Fort Greeley, 80 miles closer to the border than Eielson Air Force Base — reducing the amount of additional track needed in Alaska to about 190 miles.

We should not be afraid to think seriously about big projects. Just because they're daunting, doesn't make them impossible. In this day and age of great concern for the environment: if one assumes -- as I do — that the resources of the Yukon and Alaska inevitably will be developed, then rail looks like a very healthy way to make that possible.

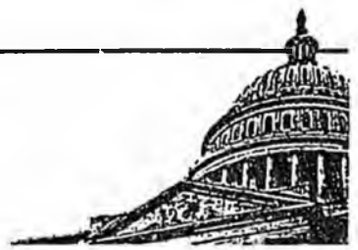
All the commission will do is bring about debate. It will consider and explore new ideas. If a railroad connection is economically, environmentally and socially sound, then we should move ahead with it. If it is not, then it should be dropped. But at the very least, let's give the idea an honest hearing, now before any more decades pass.

-30-

NEWS FROM THE OFFICE OF

FRANK MURKOWSKI

United States Senator • Alaska



For Immediate Release:
March 16, 2000

Chuck Kleeschulte or Cindi Bookout
O (202) 224-9306; H (301) 283-4149; O 224-8767
(Email: chuck_kleeschulte@murkowski.senate.gov)

Murkowski Introduces Alaska-Canada Railroad Extension Bill

FAIRBANKS — Alaska Sen. Frank Murkowski took another step in efforts to link the continental rail system with the Alaska Railroad when he announced today he will introduce legislation to create a bilateral U.S.-Canada Commission to study the feasibility of the rail link.

Murkowski announced legislation in the Senate that would create an 18member commission, equally appointed by the President and the Canadian government, to conduct a technological and economic feasibility study of linking the rail system in Alaska to the "nearest appropriate point" in Canada. The commission would be charged with reporting on the results of its study within five years, and it would be authorized to spend $6 million in American funds on preliminary engineering and environmental work.

"Alaska and the Yukon both are woefully deficit in the transportation systems to move goods to market. A railroad extension might provide the essential transportation infrastructure to allow the Far North to blossom in the decades ahead, while protecting the environment. If a railroad connection proves to be economically, environmentally and socially sound, then let's move ahead. If not, let's drop the idea. But at the very least we need this commission to give the idea a honest hearing," said Murkowski in announcing the legislation.

Last year, after discussions with a group of Canadian parliamentarians, Canadian Ambassador Raymond Chretien, Canadian Minister of Transport David Collinette, and the Canadian-American Border Trade Alliance, Murkowski suggested it might make sense to build the roughly 1,200 miles of rail that would be needed to finish the linkup. The Alaska Railroad currently ends at Eielson Air Force Base, outside of Fairbanks, about 270 miles from the Canadian border, while the Canadian rail system ends at spurs to Fort Nelson or beyond Fort St. James, both about 900 miles from the Alaskan border.

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base is at Delta Junction in Alaska, which could well justify construction of the first 80 miles of the Alaska Railroad's extension toward the Canadian border.

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Under the bill, the commission would be comprised of representatives from local communities and local/Native residents, individuals with economics, engineering and resource management backgrounds, including representatives with minerals, timber and wildlife and fisheries management training. Specifically the American side of the commission will contain two members from local communities, one representing the State of Alaska nominated by the Governor, one representing Alaska Natives, four from commercial activities including one associated with the Alaska Railroad, and two scholars employed by Alaska education institutes, one with subarctic engineering expertise.

The bill will formally be introduced in the Senate on Monday, March 20. -30-

Resolution of Support for a U.S.-Canada Cooperative Feasibility Study on Extending the North American Rail System through British Columbia, the Yukon Territory, and to Alaska

Alaska-Canada Rail Link Conference, January 20, 2000, Vancouver, BC

Whereas, rail transportation is the most cost-effective long distance method of overland transportation; and,

Whereas, rail transportation is an essential component of the North American inter-modal transportation system; and,

Whereas, rail transportation is energy efficient, capable of moving goods three to nine times as far as highway transportation with a given amount of fuel; and,

Whereas, rail transportation emits lower levels of carbon monoxide, carbon dioxide, nitrogen oxides and volatile organic compounds than other modes of freight transportation; and,

Whereas, rail transportation systems allow controlled access and reduced overall impacts to environmentally sensitive regions; and,

Whereas, rail transportation remains an important component of national and continental defense planning; and,

Whereas, the continental rail system cannot be said to be complete until it includes all states, provinces and territories; and,

Whereas, the Government of Alaska recently enacted legislation to reauthorize the delineation and acquisition of a rail transportation corridor from the present terminus of the Alaska Railroad to the Alaska-Yukon border; and,

Whereas, Alaska, the Yukon Territory, and British Columbia contain extensive oil and gas, mineral and timber resource reserves that currently are inaccessible, and require bilateral cooperation in the development of freight transportation infrastructure to facilitate their utilization for the benefit of the United States and Canada; and,

Whereas, northern rail transportation may provide significant potential for the visitor industry by facilitating the comfortable movement of passengers over long distances while minimizing the impact of such movement on the surrounding environment; and,

Whereas, ongoing research and advancement in rail technology continues to increase the efficiency of rail transportation, ensure rail safety, and decrease the impact of rail transportation on the environment,

Therefore be it resolved, that the undersigned call upon the United States and Canada to engage in a cooperative feasability study to examine the costs and benefits of constructing a rail connection to link Alaska and the Yukon Territory via northern British Columbia with the existing North American rail system; and,

Be it further resolved, that a bilateral commission representing local governments, business interests, and aboriginal stakeholders be created to define the goals and objectives for the cooperative feasability study, and to report the results of the study to the appropriate governmental entities of Canada and the United States; and,

Be it further resolved, that funding for operation of the bilateral commission and for the conduct of the cooperative feasability study should be considered a priority by the federal, state, provincial and territorial governments; and,

Be it further resolved that copies of this resolution shall be disseminated to local, provincial, territorial, state and federal governments in the affected regions of the United States and Canada.

Ed Asp, Dease Lake & Tahltan District Chamber of Commerce
Laurel Barger-Sheen, Delta Junction Chamber of Commerce
Dave Beatty, Ironworkers Local 97
Tom Blackbird
John Blair, McElhanney Land Surveys
Douglas Blamey, Whistle Poke Railway Co.
Kells Boland, Prolog Canada Inc.
Morris Booth, The Bering Connection
J. D. (David) Broadbent, Canadian Arctic Railway
Al Broadfoot, Thompson Foundry
Bill Brophy, Fairbanks Industrial Development Corporation
Jim Carlyle, Seaspan International Ltd.
Gil Carmichael, Board of Directors, Intermodal Transportation Institute
Domenico Celli, Canadian Arctic Railway
Terry Chandler
Alben Chmelauskas, MacMillan Bloedel Paper Co.
Jim Christie, McElhanney Land Surveyors
Marshall Cohoe, Confederation Pacific Roadways Ltd.
George Colquhoun
Hal Cooper, Cooper Consulting Company
Iain Cuthbert, Triton Environmental Consultants
Graham Dallas
Lyle Dallman, Ahtna Enterprise Corp.
Paul Daniels, The Bering Connection
Steven Dean, Teck Corp.
Jesse Duke, Yukon Dept. Of Economic Development
James Evavold, A Financial Source
Bruce Feltham
Michael Fournier
Peter Fraser, Pacific Corridor Enterprise Council
T. C. Fuglestad, Tryck Nyman Hayes, Inc.
Jim Gleeson
David Gobel, Technical Services and Design
Gloria Goodwin, Fort St. James Chamber of Commerce
Diane Gregory, Kennecott Canada Exploration
Paul Grigsby, BC Chamber of Commerce
Kees Groot, Canadian Arctic Railway
Pete Hallgren, City of Delta Junction (Ft. Greely Reuse Authority)
John Hansen, Northwest Cruise Ship Association
David Hayer
Gordon Hazlewood
Joe Henri, International Bering Strait Tunnel and Rail Group
Laurie Herman, Alaska Railroad
Scott Hinds
Steve Hites, Skagway Street Car Company
Jeannette James, Alaska House of Representatives
Scott Janke, City of Seward
Graham Kedgley, NW Corridor Development Corp./ Kitac Ent. Ltd.
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Joan Tait, Tait and Tait Consultants
Tony Tennessy
Bob Tivy
Jim Togyi, Ft. Saint James
Greg Vezina, Canadian Arctic Railway
Thomas Vissing, University of British Columbia
Patrick Weber, Canadian Arctic Railway
James Wilson
Milton Wiltse, Alaska Division of Geological and Geographic Surveys
John Winter, BC Chamber of Commerce
Mike Young, Fairbanks North Star Borough Assembly
R. Walt Young
Tom Zbaren, Hebert Research
Richard Zimmer

Rails to Resources Act of 2000 (Introduced in the Senate)

S 2253 IS

106th CONGRESS

2d Session

S. 2253

To authorize the establishment of a joint United States-Canada commission to study the feasibility of connecting the rail system in Alaska to the North American continental rail system; and for other purposes.

IN THE SENATE OF THE UNITED STATES

March 20, 2000

Mr. MURKOWSKI introduced the following bill; which was read twice and referred to the Committee on Foreign Relations

A BILL

To authorize the establishment of a joint United States-Canada commission to study the feasibility of connecting the rail system in Alaska to the North American continental rail system; and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the 'Rails to Resources Act of 2000'.

SEC. 2. FINDINGS.

Congress finds that--

(1) rail transportation is an essential component of the North American intermodal transportation system;

(2) the development of economically strong and socially stable communities in the western United States and Canada was encouraged significantly by government policies promoting the development of integrated transcontinental, interstate and interprovincial rail systems in the states, territories and provinces of the two countries;

(3) United States and Canadian federal support for the completion of new elements of the transcontinental, interstate and interprovincial rail systems was halted before rail connections were established to the state of Alaska and the Yukon Territory;

(4) both public and private lands in Alaska, the Yukon Territory and northern British Columbia, including lands held by aboriginal peoples, contain extensive deposits of oil, gas, coal and other minerals as well as valuable forest products which presently are inaccessible, but which could provide significant economic benefit to local communities and to both nations if an economically efficient transportation system was available;

(5) per ton of freight moved, rail transportation systems emit lower levels of carbon monoxide, nitrogen oxides and volatile organic compounds than other modes of freight transportation;

(6) rail transportation systems are capable of moving cargo with up to nine times the energy efficiency of highway transportation;

(7) rail transportation in otherwise isolated areas facilitates controlled access and reduced overall impact to environmentally sensitive areas;

(8) the extension of the continental rail system through northern British Columbia and the Yukon Territory to the current terminus of the Alaska Railroad would significantly benefit the U.S. and Canadian visitor industries by facilitating the comfortable movement of passengers over long distances while minimizing effects on the surrounding areas;

(9) extension of the Alaska Railroad system to the Canadian border is consistent with the intent of Congress as expressed in the Alaska Railroad Organic Act of 1914, which called for a system of up to 1,000 miles in length; and

(10) ongoing research and development efforts in the rail industry continue to increase the efficiency of rail transportation, ensure safety, and decrease the impact of rail service on the environment.

SEC. 3. AGREEMENT FOR A UNITED STATES-CANADA BILATERAL COMMISSION.

The President is authorized and urged to enter into an agreement with the government of Canada to establish a joint commission to study the technological and economic feasibility of linking the rail system in Alaska to the nearest appropriate point on the North American continental rail system.

SEC. 4. COMPOSITION OF COMMISSION.

(a) MEMBERSHIP-

(1) TOTAL MEMBERSHIP- The Agreement should provide for the Commission to be composed of 18 members, of which 9 members are appointed by the President and 9 members are appointed by the government of Canada.

(2) GENERAL QUALIFICATIONS- The Agreement should provide for the membership of the Commission, to the maximum extent practicable, to be

representative of--

(A) the interests of the local communities (including the governments of the communities), aboriginal peoples, and businesses that would be affected by the connection of the rail system in Alaska to the North American continental rail system; and

(B) a broad range of expertise in areas of knowledge that are relevant to the significant issues to be considered by the Commission, including economics, engineering, management of resources (such as minerals and timber), social sciences, fish and game management, environmental sciences, and transportation.

(b) UNITED STATES MEMBERSHIP- Under the Agreement, the President shall appoint the United States members of the Commission as follows:

(1) Two members from among persons who are qualified to represent the interests of communities and local governments of Alaska.

(2) One member representing the State of Alaska, to be nominated by the Governor of Alaska.

(3) One member from among persons who are qualified to represent the interests of Native Alaskans residing in the area of Alaska that would be affected by the extension of rail service.

(4) Four members from among persons involved in commercial activities in Alaska who are qualified to represent commercial interests in Alaska, of which one shall be a representative of the Alaska Railroad Corporation.

(5) Two members from among scholars employed in institutions of higher education in Alaska, at least one of whom must be an engineer with expertise in subarctic transportation.

(c) CANADIAN MEMBERSHIP- The Agreement should provide for the Canadian membership of the Commission to be representative of broad categories of interests of Canada as the government of Canada determines appropriate, consistent with subsection (a)(2).

SEC. 5. GOVERNANCE AND STAFFING OF COMMISSION

(a) CHAIRMAN- The Agreement should provide for the Chairman of the Commission to be elected from among the members of the Commission by a majority vote of the members.

(b) COMPENSATION AND EXPENSES OF UNITED STATES MEMBERS-

(1) COMPENSATION- Each member of the Commission appointed by the President who is not an officer or employee of the Federal Government shall be compensated at a rate equal to the daily equivalent of the annual rate of basic pay prescribed for level IV of the Executive Schedule under section 5315 of title 5, United States Code, for each day (including travel time) during

which such member is engaged in the performance of the duties of the Commission. Each such member who is an officer or employee of the United States shall serve without compensation in addition to that received for services as an officer or employee of the United States.

(2) TRAVEL EXPENSES- The members of the Commission appointed by the President shall be allowed travel expenses, including per diem in lieu of subsistence, at rates authorized for employees of agencies under subchapter I of chapter 57 of title 5, United States Code, while away from their homes or regular places of business in the performance of services for the Commission.

(c) Staff-

(1) IN GENERAL- The Agreement should provide for the appointment of a staff and an executive director to be the head of the staff.

(2) COMPENSATION- Funds made available for the Commission by the United States may be used to pay the compensation of the executive director and other personnel at rates fixed by the Commission that are not in excess of the rate payable for level V of the Executive Schedule under section 5316 of title 5, United States Code.

(d) OFFICE- The Agreement should provide for the office of the Commission to be located in a mutually agreed location within the impacted areas of Alaska, the Yukon Territory, and northern British Columbia.

(e) MEETINGS- The Agreement should provide for the Commission to meet at least biannually to review progress and to provide guidance to staff and others, and to hold, in locations within the affected areas of Alaska, the Yukon Territory and northern British Columbia, such additional informational or public meetings as the Commission deems necessary to the conduct of its business.

(f) PROCUREMENT OF SERVICES- The Agreement should authorize and encourage the Commission to procure by contract, to the maximum extent practicable, the services (including any temporary and intermittent services) that the Commission determines necessary for carrying out the duties of the Commission. In the case of any contract for the services of an individual, funds made available for the Commission by the United States may not be used to pay for the services of the individual at a rate that exceeds the daily equivalent of the annual rate of basic pay prescribed for level V of the Executive Schedule under section 5316 of title 5, United States Code.

SEC. 6. DUTIES.

(a) Study-

(1) IN GENERAL- The Agreement should provide for the Commission to study and assess, on the basis of all available relevant information, the technological and economic feasibility of linking the rail system in Alaska to the North American continental rail system through the continuation of the rail system in Alaska from its northeastern terminus to a connection with the continental rail system in Canada.

(2) SPECIFIC ISSUES- The Agreement should provide for the study and assessment to include the consideration of the following issues:

(A) Railroad engineering.

(B) Land ownership.

(C) Geology.

(D) Proximity to mineral, timber and other resources.

(E) Market outlook.

(F) Environmental considerations.

(G) Social effects, including changes in the use or availability of natural resources.

(H) Potential financing mechanisms.

(3) ROUTE- The Agreement should provide for the Commission, upon finding that it is technologically and economically feasible to link the rail system in Alaska as described in paragraph (1), to determine one or more recommended routes for the rail segment that establishes the linkage, taking into consideration cost, distance, access to potential freight markets, environmental matters, and such other factors as the Commission determines relevant.

(4) COMBINED CORRIDOR EVALUATION- The Agreement should also provide for the Commission to consider whether it would be useful and technologically and economically feasible to combine the power transmission infrastructure and petroleum product pipelines of other utilities into one corridor with a rail extension of the rail system of Alaska.

(b) REPORT- The Agreement should require the Commission to submit to Congress and the Secretary of Transportation and to the Minister of Transport of the government of Canada, not later than 5 years after the Commission commencement date, a report on the results of the study, including the following:

(1) FEASIBILITY- The Commission's findings regarding the technological and economical feasibility of linking the rail system in Alaska as described in subsection (a)(1).

(2) ROUTE- If such an action is determined technologically and economically feasible, the Commission's recommendations regarding the preferred route and any alternative routes for the rail segment establishing the linkage.

SEC. 7. COMMENCEMENT AND TERMINATION OF COMMISSION.

(a) COMMENCEMENT- The Agreement should provide for the Commission to begin to function on the date on which all members are appointed to the Commission as provided for in the Agreement.

(b) TERMINATION- The Commission shall terminate 90 days after the date on which the Commission submits its report under section 6.

SEC. 8. FUNDING.

(a) RAILS TO RESOURCES FUND- The Agreement should provide for the following:

(1) ESTABLISHMENT- The establishment of an interest-bearing account to be known as the

'Rails to Resources Fund'.

(2) CONTRIBUTIONS- The contribution by the United States and the government of Canada to the Fund of amounts that are sufficient for the Commission to carry out its duties.

(3) AVAILABILITY- The availability of amounts in the Fund to pay the costs of Commission activities.

(4) DISSOLUTION- Dissolution of the Fund upon the termination of the Commission and distribution of the amounts in the Fund between the United States and the government of Canada.

(b) AUTHORIZATION OF APPROPRIATIONS- Funds are hereby authorized to be appropriated to any Fund established as described in subsection (a)(1) in the total amount of $6,000,000, to remain available until expended.

SEC. 9. DEFINITIONS.

In this section:

(1) AGREEMENT- The term `Agreement' means an agreement described in section 2.

(2) COMMISSION- The term `Commission' means a commission established pursuant to any Agreement.

(3) COMMISSION COMMENCEMENT DATE- The date determined under section 6(a).

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ALASKA-CANADA RAIL LINK CONFERENCE PACKET

Revised: February 10, 2000

January 20, 2000
Vancouver, B.C. Canada

From: the office of Representative Jeannette James
Room 102, Alaska State Capitol
Juneau, Alaska 99801-1182

Email: rail@legislator.com
URL: www.repjames.org

Sponsors
Alaska Canada Rail Link Conference

January 20, 2000
Vancouver, B.C. Canada

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TONY KNOWLES
GOVERNOR
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January 19, 2000

The Honorable Jeannette James
Alaska State Legislature
State Capitol, Room 102
Juneau, AK 99801-1182

Dear Representative James:

Thank you for hosting a conference on improving the transportation link between Alaska, Canada, and the lower 48. I appreciate your efforts to keep the channels of communication open between interested governmental representatives.

I also appreciate your past efforts in getting through legislation, which I signed, to delineate a corridor to connect the Alaska Railroad to the Canadian Border. Transportation infrastructure is vital to the prosperity of Alaska.

I will be interested in hearing from you and our Department of Transportation and Alaska Railroad representatives on the outcomes of your meeting. I wish you and the other conference participants good luck in your discussions.

Sincerely,

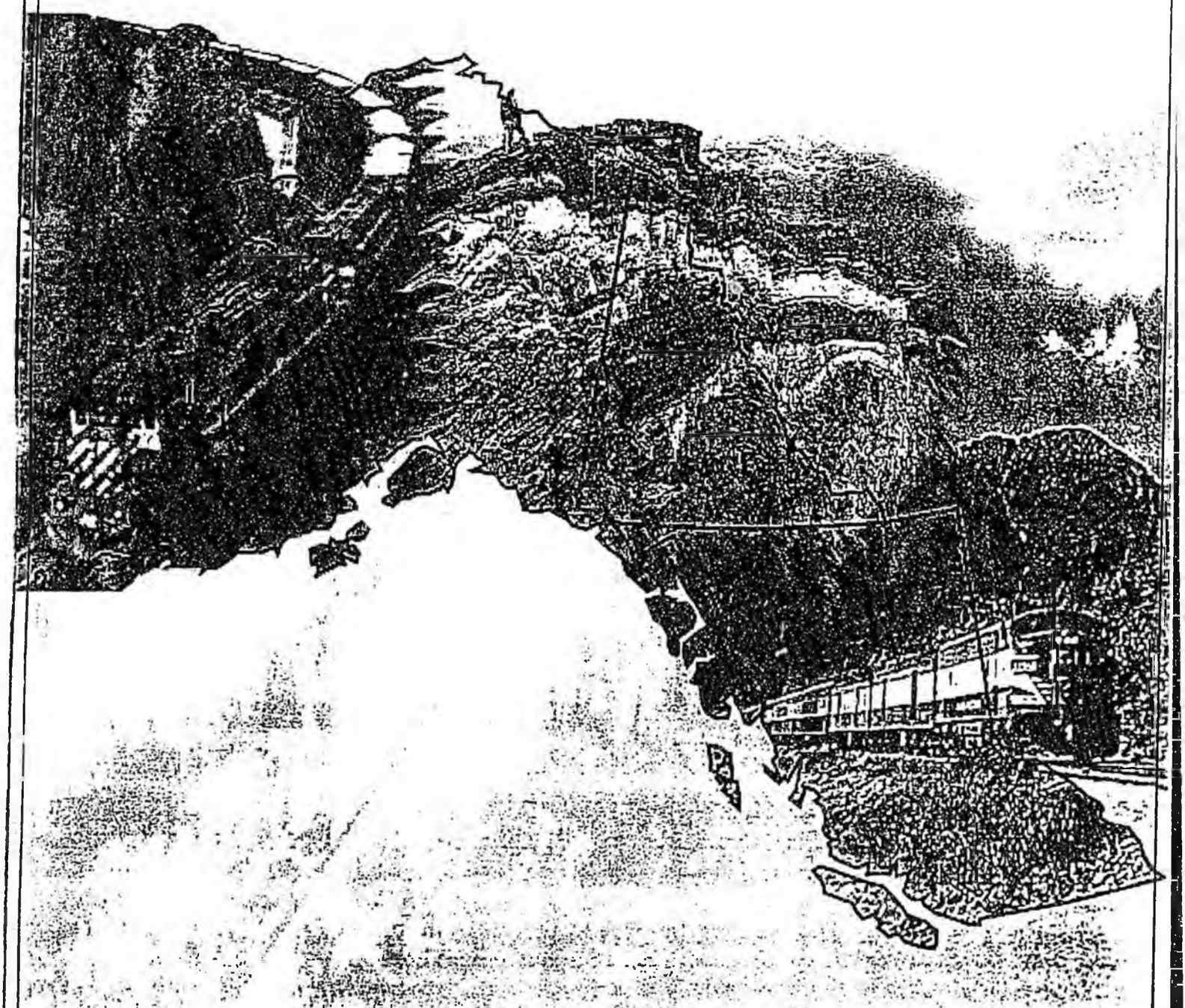
Tony Knowles
Governor

Section 1:

Report to the conference from the office of
Senator Frank Murkowski

Rails to Resources

Bringing Alaska and the Yukon closer to the world



United States Senator Frank H. Murkowski

Alaska Canada Rail-Link Conference

January 20, 2000

Vancouver, British Columbia

Rails to Resources

Frank H. Murkowski, United States Senator

The following are excerpts of a speech given by Senator Frank H. Murkowski to the CANAM Border Trade Alliance on September 14, 1999. The opening section, which discussed the Canada-U.S. Interparliamentary Group, was not included.

I'm very happy to see you all. No bilateral relationship is closer than the one between Canada and the U.S. It deserves the care and feeding this group can give it, and I hope you never lose that sense of mission.

[Canada-U.S. Interparliamentary Group discussion]

Let me take just another few minutes to talk about something else of vital importance to us all.

I want you to imagine for a moment that Canada and the United States have suddenly been given an opportunity to jointly acquire a huge new territory — as big as the Yukon Territory and Alaska combined.

This splendid land is full of natural resources: gold, silver, lead, zinc, copper, and lesser metals; hardwood and softwood timber; fish, wildlife — and truly splendid vistas for the tourist.

Best of all, it is still largely untouched. All we have to do is reach out for it....

Wouldn't that be a wonderful opportunity for the growth of both our countries?

The fact is, we ALREADY have such a region. What we don't have is a fast and efficient way to get goods and people there and back again.

The Alaska Railroad cuts through the center of Alaska from the coast to Fairbanks, less than three hundred miles from the Canadian border.

In Canada, there are two sets of track running as far north as Fort Nelson on one route, and beyond Fort St. James on the other. In both cases, it would take only about 900 additional miles of track to reach Alaska.

I want to enlist the Canadian/American Border Trade Alliance in the growing movement to bring Alaska and the Yukon into the transcontinental rail system.

Senator Frank H. Murkowski of Alaska

The logical route through Canada passes through one of the richest mining districts on the continent, but one which is so remote that few people have ever visited it, and which will probably never be developed without rail transportation. The same goes for the area's timber resources. And it applies to areas of Alaska that also require rail transportation to reach their full potential.

One possible route, from Prince George, British Columbia to Fairbanks, was even surveyed by the U.S. Army Engineers in 1942. So this is not a new idea — it's a project that could have been done, and should have been done, but has been delayed for decades.

Let's resurrect it.

Yes, it would be expensive. Yes, it is visionary in a way that is seldom seen today. But do those things make it intrinsically a bad idea? I

don't think so.

Let's look at it with an open mind. The Interparliamentary group has discussed and understands the need for a whole series of north-south transportation corridors to facilitate the movement of goods and people within North America. This should be seen as a part of that concept.

For those from Canada, think of it as a revival and elaboration of the "Roads to Resources" initiative you had underway years ago. Call it "Rails to Resources." It was a good idea then, and it still is today.

I propose a public/private alliance to conduct a comprehensive feasibility study. Let's join forces to make a modest investment to examine this carefully.
- US Senator Frank H. Murkowski

The Alaska State Legislature recently reauthorized the acquisition of a right-of-way to the border. They haven't spent the money yet — they're just making sure their options remain open. I'd like to see the same thing done in Canada, at the Federal, provincial and territorial levels, as appropriate.

This isn't pie in the sky. We need to start with a cold, calculated look at the project's feasibility, and that's where you come in.

I propose a public/private alliance to conduct a comprehensive feasibility study. Let's join forces to make a modest investment to examine this carefully.

We should look at possible routes with several things in mind: maximizing potential traffic by building adjacent to the most valuable resources, minimizing costs by looking at the best terrain, maximizing potential passenger usage for tourism, and minimizing environmental impacts.

And when it comes to protecting the environment, let's also look at establishing a corridor large enough to accommodate future growth.

Doesn't it make sense to combine things like rail lines, major highways, electrical transmission lines and pipelines as much as possible, so that the rest of the countryside is affected as little as possible? I think it does.

When we're done, we should have in hand virtually everything necessary to move directly into preparing a detailed environmental impact statement for a specific proposal: a preferred route, knowledge of the engineering challenges and costs involved, an understanding of the potential for both freight and passenger movement.

So, here's the bottom line: business is business, and when the nation's business improves, your business improves.

When you leave this meeting, I want you to think seriously about this proposal. I want you to call your executive director, Jim Phillips, and tell him what you think. Write to me, and give me your thoughts. And I want you to write to your own Congressmen, MP's and Senators, and tell THEM why you think this will help both of our countries' economies.

With your support, I will introduce legislation to create and fund a joint public/private commission that will include federal, state, provincial and territorial representatives, First Nations and Alaska Native representatives, and business interests.

That commission will be responsible for identifying specific goals and objectives for the feasibility study I've talked about today, for getting the study underway, and for reporting back to Congress, the Parliament and the public on what we need to do next.

This project has been on the back burner for more than a half-century. Let's turn up the heat

The North American Rail System

From Real Horses to Real Horsepower

The first primitive "railroad" in the United States used horse-drawn cars on wooden rails, but experiments with steam locomotion began in the early 1800s, and in 1831, regular steam powered service began in South Carolina. Rapid expansion followed. Four years later, over 1,000 miles of track had been laid, and there were 200 railroad charters in eleven states.

Western development in the United States spurred even greater growth. By 1860, there were 11,000 miles of track. The westward expansion also prompted the first Congressional land grants to railroads. Government leaders felt that railroads would spur settlement, and the grants allowed companies not only to retain the rights of way for rail lines but to have saleable land to offset construction costs.

In the United States, four of the first five transcontinental railroads were largely made possible by such grants, along with a considerable number of smaller lines in the western United States. A total of 131 million acres of public land was appropriated to dozens of rail-lines. A receiving company was given the right-of-way along with alternate sections of land, with the Federal Government generally [illegible] the price of the sections it kept. In return, all rates were reduced by 50% for Federal traffic. From 1850 until the practice was ended in 1946, it is estimated that the government saved $900 million: a considerable deal considering that the land was only worth a total of $500 million at the time it was granted. After the Civil War ended, trackage grew from 35,000 miles to an all-time high of 254,000 miles in 1916.

Canada's first railroad began operations in 1836, but by the middle of the century, although some 40 companies had been granted government permission to build rail lines, only six had actually laid any track, totaling only 80 miles. In 1849, the government stepped in to help, offering to lend enough money to cover half the construction costs of any line longer than 74 miles (120 kilometers).

Companies proved eager to take Canada's offer. By 1860, Canada's rail lines reached more than 2,000 miles. The first east-west link was achieved in 1885 when the last spike in the Canadian Pacific Railway was driven. That set the tone, and in just 50 years, from 1850 to 1900, the miles of track available to Canada's railroads grew from 80 miles to 19,000.

Today, Canadian National operates about 17,000 miles of track in Canada and another 950 miles in the United States. The CN network serves all five of Canada's major ports: Halifax, Montreal, Prince Rupert, Thunder Bay, and Vancouver.

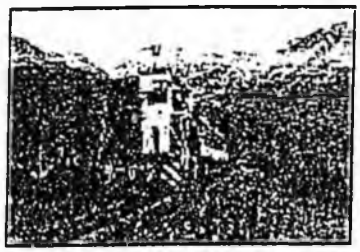
Meanwhile, Canadian Pacific operates a 15,000 mile network extending from Montreal to Vancouver and into the U.S. midwest and northeast. It serves ports on the east coasts of Canada and the U.S. and the Port of Vancouver.

Technological developments for rail lines rode the swelling tide of industrial change. Larger, more powerful locomotives, cars with larger capacities, improved couplers, the application of air-brakes, as well as adoption of standard gauge rail and standard time resulted in huge gains of efficiency and economic rail service. The development of national, rather than regional, economies in North America is owed in no small way to the influence of our railroads.

The Alaska Railroad

The history of the Alaska Railroad begins in 1903 with the Alaska Central Railway; a failed venture that managed to lay only 71 miles of track out of Seward, in an unsuccessful attempt to reach Anchorage.

But Congress still felt it was wrong that a territory twice the size of Texas had no rail system. The Alaska Railroad Organic Act of March 12, 1914 required incoming President Woodrow Wilson to construct a rail not to exceed 1,000 miles and, among other things, to "...best aid in the development of the agricultural and mineral or other resources of Alaska...and so as to provide transportation of coal for the Army and Navy, transportation of troops, arms, munitions of war, the mails, and for other governmental and public uses." The act gave the President broad powers to acquire land, operate terminals, or anything else that could help make the railroad a reality.



In 1915, the government purchased the remains of the Alaska Central for $1.2 million, and selected the current route northward. In 1917, it also bought the Tanana Valley Railroad, a narrow-gauge miners' line northwest of Fairbanks, for $300,000. These acquisitions formed the nucleus of the present system.

By the end of 1920, the Alaska Engineering Commission completed 382 miles of new track, and rebuilt the original 71 miles out of Seward and 32 miles in the Tanana Valley. The main obstacle for completion were bridges to span the Tanana River and Hurricane Gulch. The Tanana bridge had a 701 foot span, which at the time was the longest such in the United States. The Hurricane Gulch bridge spanned a total of 918 feet with a height of 296 feet.

Just before his untimely death, on July 15, 1923, President Warren G. Harding drove the golden spike officially completing the Alaska Railroad.

Military bases and construction projects starting in the 1930s spurred continued refinements to accommodate heavier loads and straighter hauls, and a large "picture postcard" terminal was built in Fairbanks. The assumption was that the latter would become the terminus for a railroad across British Columbia and the Yukon Territory to link Alaska with the railways of the lower 48 states.

World War II provided another influx of new equipment. Post-war rehabilitation encouraged passenger service and in 1946, a blue and gold streamliner, the AuRoRa, made its first run between Anchorage and Fairbanks. For military purposes, a spur to Whittier had been established by tunneling next to Portage Glacier in 1944.

Also during World War II, in 1942, U.S. Army Engineers surveyed a route that would have taken the railroad all the way from Fairbanks to Prince George, British Columbia, connection to the North American rail system there, and extended the Alaska portion of the line all the way to Teller, on the northwest coast.

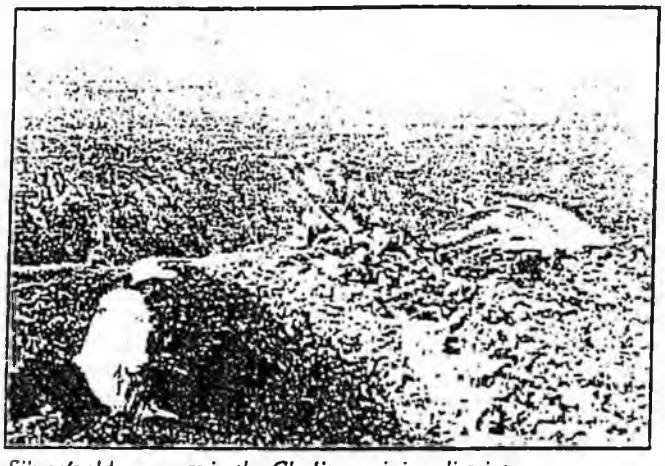
Although the latter parts of the once-planned system have not yet been built, the U.S. Department of Defense has consistently maintained that Alaska's strategic location remains critical, and that rail is an essential element of a comprehensive defense transportation system.

The Alaska Railroad was transferred from the Federal Government to the State of Alaska in 1983, and today it remains a great asset.

Proposed Railroad Corridor Resources

The Tanana uplands, which stretch over 250 miles from the Yukon Territory into Fairbanks, Alaska, appears to be rich in base metal potential (gold, silver, copper, lead, zinc, molybdenum, and tin). Because of the lack of infrastructure, there has been little detailed exploration for base metals other than gold in this region. With rail access, there is no question that significant new base metal deposits will be identified.

The Uplands have a history of incredible resource potential dating back to the gold rush days along the Yukon River. Today the area still remains mostly as it was then: inaccessible. In spite of this, one of the most productive gold mines in the United States, Fort Knox, operates just outside of Fairbanks and produces over 1,000 ounces of gold per day. Access is currently being worked out to reach the Pogo deposit, further to the east, which contains an estimated 5.2 million ounces of gold. Although gold is still a draw, the uplands contain tremendous amounts of silver, tungsten, copper, lead, zinc, and other minerals in identified deposits.



Silver/gold prospect in the Chulitna mining district. -photo by K. H. Clautice

Further to the northwest lies the largest coal field in the United States near Point Lay. Not only is this coal very near the surface, but it is of exceptional quality averaging 12,000 BTUs and an extremely low sulfur content of less than 0.02%. Not far south from Point Lay is the Red Dog zinc mine, which last summer announced new finds. Unfortunately, the mine can only ship product for a few months of the year when pack ice retreats enough to allow barge traffic. The Matanuska-Susitna Valley region to the south hides yet another large, high quality coal deposit that already sits on the Alaska Railroad line. With the development of a connection, this would be available for shipment to the rest of the continent.

Claim staking activity in Alaska also has a traditional fall-off curve, but recent years have not seen that tradition followed. 1998 was the third $1 billion year for mining in Alaska. Staking continued strong through the summer of 1999 with results still being processed. Figure 1 shows a select list of Alaska mines near the railroad corridor.

On the other side of the border in the Yukon, active mining, approvals, and exploration are all ongoing, but with similar access problems as occur in Alaska. 1998 mineral production exceeded $100 million (Canadian), and the industry continues to play the largest role in the private sector economy of the territory. Recent exploration and development activity has reached a peak not seen since the Klondike Gold Rush. With a government committed to seeing a healthy investment climate for the mining industry combined with citizen support, mining potential for the Yukon has far to go. Figure 2 shows a few mines in the Yukon Territory near the proposed corridor.

Forestry information along the proposed corridor is similarly bright, but yet again with similar access problems. Within 15 miles of the corridor from the Yukon to Fairbanks lies 117 million cubic feet of hardwood pole timber and 141 million cubic feet of mixed pole timber. The Ladue River valley alone has the potential to create a chipping industry in Alaska even with its low-value fiber.

The forest products industry is still a fledgling in the Yukon Territory, but activity has developed throughout the last couple of decades in the Watson Lake area. Other potential areas include Mayo, Dawson City, Teslin, and Haines Junction. Timber supply shortages in the northwest combined with increased demand in Asian markets keep the future of this industry positive, but much of the territory has yet to be surveyed.

figure 1, mining data in Alaska

Alaska Mines	Ownership	Resource Information
Koyukuk-Huges mining district	production mostly from Alaska Gold Co.	231,000 oz Au produced 1930-1995
Innoko-Tolstoi mining district		Placer Au district; significant Au-Sb-Hg potential 706,267 oz Au produced through 1995
Hot Springs mining district	(numerous)	Placer Au-Sn district; 568,632 oz Au and 720,000 lb cassiterite produced through 1995
Fairbanks mining district	(numerous)	8,022,434 oz placer Au 1902-1995; 304,548 oz Au and over 4 million lbs Sb from veins and shear zones produced through 1990
Fort Knox	Kinross Gold Corp.	3,745,000 oz Au proven and probable reserves open at depth; 702,295 oz Au produced between 1996 and 1998
Ryan Lode	reclaimation by La Teko Resources Inc.	822,200 oz Au and 2.4 million oz Au in two shear zones
Grant Mine		212,000 tons of 0.36 oz/ton Au
True North	La Teko Resources Inc.	Estimated 1,314,000 oz Au
Gil Claims	Kinross Gold Corp./ Teryl Resources Corp.	Resource of 433,000 oz Au
Delta massive sulfide belt		40 million ton reserve containing percentages of: Cu, Zn, Pb, Ag,Au
Taurus		Cu-Au prospect; 140 million ton reserve containing percentages of: Cu, Au, Mo
Big Creek/Ladue		Pb-An-Ag massive sulfide prospects
Slate Creek	Slate Creek	55 million tons of 6.3% high quality chrysotile asbestos
Fortymile mining district	Kennecott Exploration Co.	Placer Au district; 534,974 oz Au produced 1883-1995
Pogo	Teck Corp./Sumitomo Metal Mining America Inc.	5.2 million oz Au reserves; exploration and development on-going
Red Dog Mine*	Cominco Alaska Inc.	157.8 million tons proven and probable reserves containing percentages of Zn, Pb, Ag; production and exploration on-going; over 1 million tons of concentrate produced in 1998

*Red Dog Mine, in Northwest Alaska, could become the terminus for a spur from Fairbanks to the Ambler mining district.

figure 2, mining data in the Yukon Territory

Yukon Mines	Ownership	Resource information
Brewery Creek Mine	Viceroy Resouce Corp.	613,000 contained oz Au; 1997-1998 production of 125,025 oz Au
Kudz Ze Kayah Property	Cominco Ltd.	13 million ton reserve containing percentages of: Cu, Pb, Zn, Ag, Au; final approvals expected in 1999
Sa Dena Hes Property	Cominco Ltd.	3.2 million ton reserve containing percentages of: Pb, Zn, Ag; opened in 1991 but closed in 1992 due to low prices
Wolverine Property	Boliden Ltd./Atna Resources Ltd.	6.237 million ton reserve containing percentages of: Cu, Pb, Zn, Ag, Au; further delineation planned
Minto	Asarco Inc./Minto Explorations Ltd.	7.2 million ton reserve containing percentages of: Cu, Ag, Au; production planned for late 2000
Carmacks Copper	Western Copper Holdings Ltd.	14.1 million ton reserve containing percentages of: Cu, Au; undergoing final stages of environmental assesment
Division Mt. Coal	Cash Resources	52.9 million ton resource at 9,328 BTU/lb and 0.43% Sulfer; under study with environmental assesement to begin next year
Wolverine	Atna Resources/ Expatriate Resources	6.2 million ton reserve containing percentages of: Zn, Cu, Pb, Ag, Au; metallurgical work planned
Wolf	Atna Resources/YGC Resources	4.1 million ton inferred resource containing percentages of: Zn, Pb, Ag; further exploration planned
Fyre Lake	Pacific Ridge Exploration	15.4 million tons preliminary resource containing percentages of: Cu, Co, Au; still in exploration

NEWS FROM THE OFFICE OF

FRANK MURKOWSKI

United States Senator • Alaska

For Immediate Release: Contact: Chuck Kleeschulte or Cindi Bookout
January 20, 2000 O (202) 224-9306; H (301) 283-4149; O 224-8767
(Email: chuck_kleeschulte@murkowski.senate.gov)

Embargoed until noon PST, Thursday, January 20, 2000

Murkowski Willing to Introduce Legislation to Create Commission to Study Alaska-Canada Railroad Extension

VANCOUVER, BC -- U.S. Senator Frank H. Murkowski today said he is willing to introduce legislation in Congress this year to create an impartial bilateral commission to study the economic, environmental and engineering feasibility of completing the trans-continental railroad linking Canada with Alaska.

Murkowski, R-Alaska, chairman of the U.S. Senate Energy and Natural Resources Committee, said extending the Canadian rail system to link up with the Alaska Railroad might make both economic, strategic and environmental sense, helping greatly the economies and lifestyles of citizens of the Yukon Territory and Alaska.

"If there is a significant showing of support for an effort to look at rail options, I am willing to introduce legislation in Congress to establish the parameters for a bilateral U.S.-Canada commission to oversee a comprehensive feasibility study. Such a bill would establish a process for the appointment of commissioners and could also authorize funds for the commission's operations.

"This would get the ball rolling in the U.S., but reciprocal action also would have to be taken by the Government of Canada, because any commission clearly will have to be bilateral with equal representation from both nations," said Murkowski, in remarks prepared for delivery today during the Alaska-Canada Rail Link Conference being held in Vancouver, BC. The conference was sponsored by Alaska State Rep. Jeannette James, R-North Pole.

In remarks delivered by Murkowski's Transportation aide Bill Woolf, the senator said he envisions a commission made up of business leaders, academicians and representatives of the First Nations and Alaska Natives having sufficient expertise to "ensure that its consultants deliver the best in construction engineering, economics and environmental science."

Murkowski last year, after talks with Canadian Parliamentarians during the Canada-U.S. Interparliamentary Conference, later discussions with Canadian Ambassador Raymond Chretien and Canadian Minister of Transport David Collinette, and talks with the Canadian-American Border Trade Alliance, suggested it might make sense to reconsider the feasibility of building the roughly 1,200 miles of rail that would be needed to finish the railroad, last seriously considered in 1943.

The Alaska Railroad currently ends at Eielson Air Force Base, outside of Fairbanks, about

270 miles from the Canadian border, while the Canadian rail system ends at either Fort Nelson or beyond Fort St. James, about 900 miles from the Alaskan border.

Murkowski said the dawn of a new millennium may be the time to resurrect the railroad because both Alaska and the Yukon, while "land rich," are still "poor" in the amenities taken for granted in other areas of the two nations.

"One of the chief roadblocks to development of the north is the lack of adequate transportation. With all the talk about how the developed countries are moving from manufacturing to 'service' societies, the fact is that we are still dependent on getting material objects -- food, iron ore, lumber, other resources -- from one place to another. And because Alaska and the Yukon do not have the transportation infrastructure they need, both our nations are a little poorer than they have to be," said Murkowski.

He said the railroad's time may have come for several reasons.

He noted the line would allow economic development of the mineral resources of the Yukon-Tanana uplands that stretch from Faro, Y.T., north to Fairbanks. The zone, home already to the Fort Knox gold mine in Alaska and the future home of mines working the huge Pogo gold deposit, contains large amounts of silver, tungsten, copper, lead, zinc and other ores. On the Alaska side of the border there are already more than 14 major hard-rock deposits identified, while in the Yukon there are more than 10 major mineral deposits known. This does not include the Alaska coal deposits a line could move to market.

Murkowski added the railroad's likely corridor is also filed with timber. He said within just 15 miles of a likely railroad corridor, there are 1.4 billion board feet of hardwood pole timber and almost 1.7 billion board feet of mixed pole timber, not counting the possibility of agricultural development or of other Alaska freight that could to help fund the line's costs.

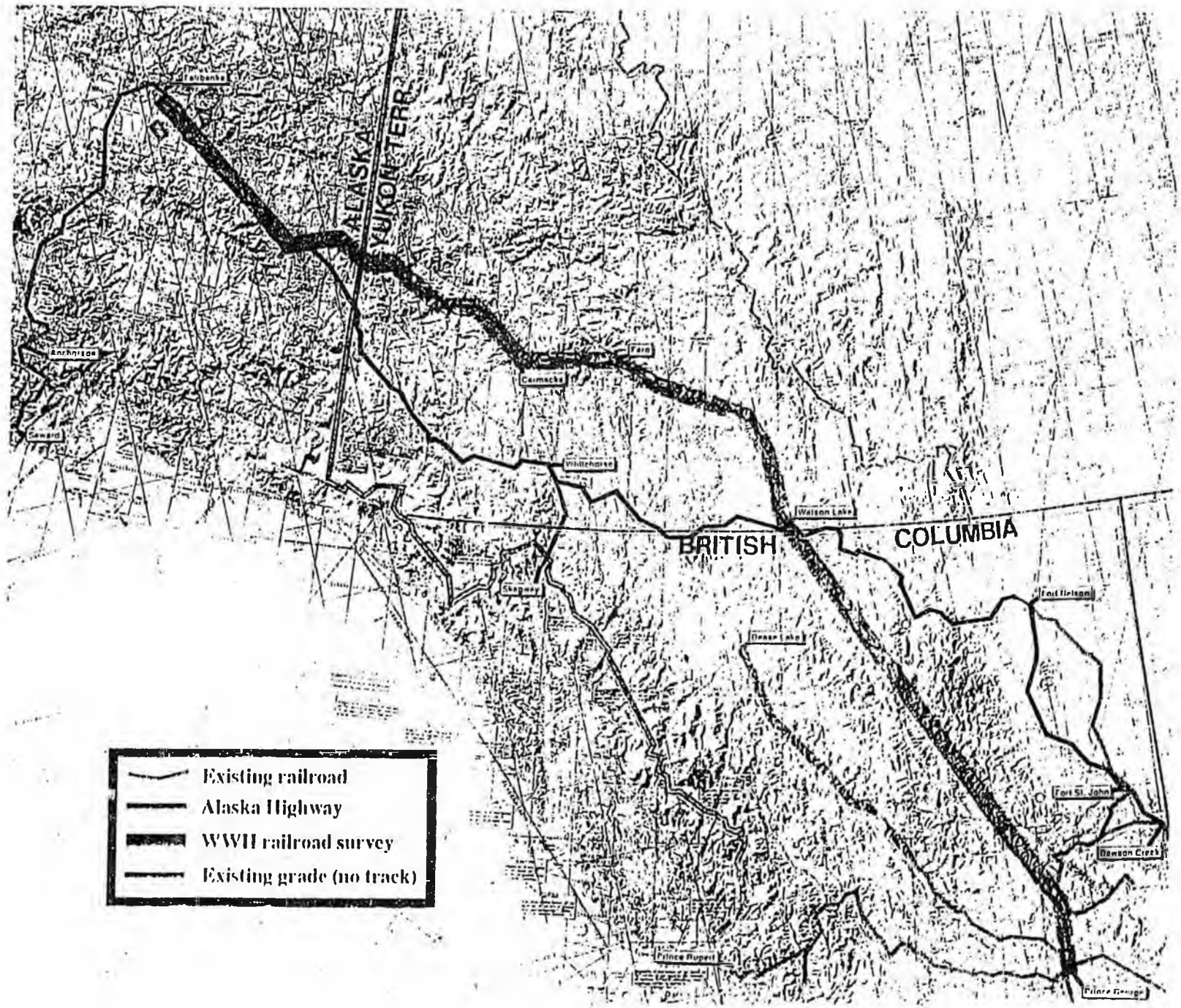
Murkowski, noting that testing is continuing on a North American anti-missile defense system, added that one of the prime sites under consideration for a missile intercepter base is at Delta in Alaska, which could well justify construction of the first 80 miles of the Alaska Railroad's extension toward the Canadian border.

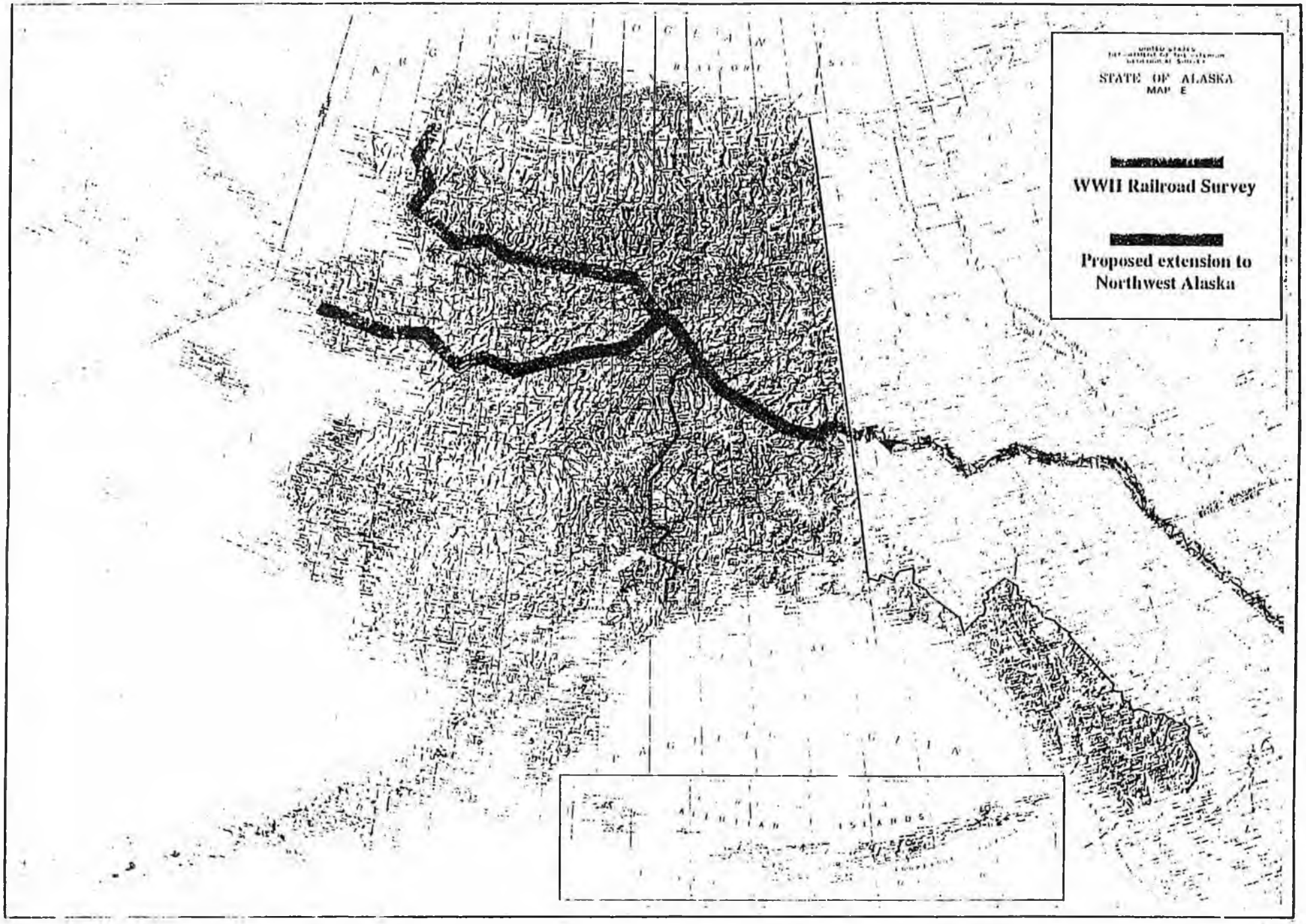
And the U.S. Senator said a railroad corridor would encourage co-location of all pipeline and power transmission lines -- a process that makes environmental sense.

"A rail corridor offers controlled access that removes the environmental threat of uncontrolled development. Rail systems are the most energy efficient and emit the lowest levels of air pollution of any mode of freight transportation. Rather than cause environmental concerns, a railroad offers the best options to protect the environment," said Murkowski.

"We should not be afraid to think seriously about big projects. Just because they're big, doesn't make them bad. In this day and age of great concern for the environment: if one assumes -- as I do -- that the resources of the Yukon and Alaska in[illegible] will be developed, then rail is a very healthy way to make that possible," said Murkowski.

-30-


ALASKA
YUKON TERR
BRITISH
COLUMBIA
Fairbanks
Anchorage
Seward
Fairbanks
Carmacks
Whitehorse
Watson Lake
Fort Nelson
Fort St. John
Dawson Creek
Prince Rupert
Existing railroad
Alaska Highway
WWII railroad survey
Existing grade (no track)


STATE OF ALASKA
MAP E
WWII Railroad Survey
Proposed extension to
Northwest Alaska

Prepared by the office of United States Senator Frank H. Murkowski. For further information, contact Chuck Kleeschulte, Press Secretary, at (202) 224-6665. Although every attempt has been made to assure the accuracy of the information in this packet, changing resource data prevents guaranteeing the authenticity of all the information.

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Section 2:

Remarks to the conference by **Gil Carmichael**,
director Intermodal Transport Institute,
University of Denver

Gil Carmichael

ITI
INTERMODAL
Transportation Institute

People

Meet the Members of the ITI Board of Directors

Gilbert E. Carmichael
Chairman of the ITI Board

Vice Chairman
MotivePower Industries
Meridian, Mississippi

Chairman
Amtrak Reform Council

Gilbert E. (Gil) Carmichael is a leading international authority on railroad and intermodal transportation policy and is committed to a seamless, safe and secure, efficient and economical, freight and passenger transportation system for the 21st century. Carmichael served as the US Department of Transportation Federal Railroad Administrator (FRA) in the administration of President George Bush from 1989 to 1993 and is currently on the Amtrak Reform Council. He is vice chairman of the Board of MotivePower Industries, the leading independent manufacturer of after-market locomotive component parts and the leading independent locomotive remanufacturer in North America.

In addition to managing the nation's rail safety and research programs as FRA Administrator, Carmichael supervised international railway technical assistance programs and sponsored the first World Railways Congress in 1991, which brought together senior government and railway officials from 60 nations. He also helped develop the national transportation policy to permit intermodal transportation initiatives and to formulate new federal policy toward the rail mode and Amtrak, the United States rail passenger system. He chaired the three-year, $29 million, National Maglev Initiative and was one of many contributors to the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), proposing a network of regional high-speed rail passenger corridors, now under development.

A graduate of Texas A&M University and a former Fellow in the Kennedy School of Government at Harvard University, he presents and publishes papers on the transportation industry, promoting the need for a North American and global intermodal freight and passenger system, utilizing the world's rail network. He is a contributing editor to *Progressive Railroading*. On 20 May 1999 Carmichael delivered a speech before the Road Gang, Washington DC's highway transportation fraternity. His address is entitled "The Case for Interstate II"

This paper especially prepared for

ALASKA / CANADA RAIL LINK CONFERENCE

January 20, 2000
Gilbert E. Carmichael
2209 Highway 45 N., Suite F
Meridian, MS 39301
601-483-9712/9711 fax

GIL CARMICHAEL
ADDRESS TO THE ALASKA/CANADA
RAIL LINK CONFERENCE
VANCOUVER, B.C., JANUARY 20, 2000

I welcome this opportunity. On several occasions I have accepted invitations to address audiences in Alaska concerning future options and opportunities as that state considers its 21st Century transportation needs. Strategies and intentions on the part of the people of British Columbia and the Yukon always have been important to any plans that Alaska might undertake, and I am pleased to know that opinion leaders in Canada have begun to consider what steps are appropriate for them.

As an outsider, it is not proper for me to come here and lecture you about what you should do. But I do have experience which I believe is worth sharing.

A North American Rail System Has Evolved

One of the developments that stimulated this meeting is the growing recognition that remarkable changes in recent years have transformed the main-line railroads of North America into a unified operating network. This North American rail system carries profound...and positive implications for the economies, societies, environmental concerns, and mobility needs of the people who live in Canada, Mexico and the United States.

There actually is a lengthy history of cross-border operations involving our railroad companies. For many decades tracks of the Canadian-owned Soo Line ranged throughout the United States midwest to destinations as far away as Cincinnati and Kansas City. The Grand Trunk, a long-time subsidiary of Canadian National, operated to Detroit and Chicago. United States railroads controlled routes in southern Ontario. Burlington Northern has served Vancouver and Winnipeg for many years. Amtrak operates to Montreal, Toronto and Vancouver. In the early decades of the 20th Century United States rail companies controlled affiliates within Mexico, and later Mexico's national railway system held interests in a key route in Texas.

One important legacy of cross-border ownership and operation is a continental rail system with common and standardized track, equipment, and operating practices. Locomotives, freight cars and passenger equipment can operate freely over routes in all three nations.

The basic pattern of a North American rail system has been in place for a century. Unfortunately, it suffered along with the fortunes of the rail industry in the post-World War II era,

when public policy in the United States favored transportation solutions involving highways and commercial aviation, and was content to allow rail transportation to languish. That finally changed in 1980 when Congress adopted the Staggers Act and conferred a greater degree of economic deregulation upon the industry.

The result of Staggers was "staggering." A sick industry was restored to health. During the past 20 years more than 60 billion dollars of private capital investment has flowed to new equipment, better track, and innovative technology. United States railroads are profitable again. Light-density lines have been spun off to hundreds of local and regional carriers who have preserved and improved freight service. Policy in Canada meanwhile allowed the nation's federally-chartered company, Canadian National, to divest itself of uneconomic lines and dramatically improve its balance sheet. Mexico restructured its rail system through a privatization plan that now stands as a world model. Private companies with joint Mexican-US ownership now operate routes throughout that nation and have developed improved high-performance corridors which link the interior of Mexico with freight customers as far away as Montreal and Vancouver.

Today, the North American Rail System serves 90 states and provinces--almost 400 million people--with 240,000 miles of routes. Main-line routes connecting major cities utilize heavy-duty welded rail and are in better operating condition than at any time in the industry's history.

A Global Intermodal Network Is in Place

Meanwhile, another innovation has taken place over the past 20 years, and it has profoundly altered transportation. Intermodal transportation has become the global standard for moving freight---using a system which is sharply focused on speed, safety, reliable scheduling, and economic efficiency. "Intermodal" is to transportation what the "internet" is to communications.

Today, the intermodal network emphasizes moving freight in North America and passengers in Europe and Asia. It is beginning to include passenger service in the United States.

The global high-speed intermodal freight system builds on the strengths of each mode--who have become partners in offering service. Key to its success is the versatility of the cargo container. Cargo ships and airplanes span the oceans. The freight railroad is the high-speed, long-distance, transportation artery for container movement on the land. The truck provides local feeder service at origins and destinations. Cargo airplanes deliver high-value and specialized freight. This

system works--but it urgently needs dramatic improvements to its land component in order to handle growing volumes of containers delivered by ship and airplane.

Modern, strategically located, high-efficiency, high-capacity intermodal terminals are key to the system, providing almost "seamless" interchange of containers. Secondary rail and highway routes support the intermodal system and connect cities, rural regions, and individual freight customers to the main-line corridors.

Today, a doublestack train leaving a coastal port like Vancouver can replace 280 trucks, run at speeds up to 90 miles an hour on the western railroads, and afford as much as nine times the fuel efficiency of an 18-wheel trailer rig on the highway. Overall, the operational and economic efficiency of freight's intermodal network conserves fuel, reduces other environmental impacts, and is significantly safer. It represents the most economically and environmentally "sustainable" approach to transportation services. These are especially critical elements for the pristine nature of Northwest Canada and Alaska.

A Rail Corridor Offers Many Advantages

The time has come, it seems to me, for the people of northwestern Canada and the state of Alaska to consider the benefits of being connected to the huge North American Rail System and the global intermodal network--whose long-distance land component is the railroad. Experience elsewhere demonstrates that efficient transportation service brings down the cost of transporting goods and passengers. The people of Alaska, British Columbia and the Yukon are consumers of goods and are far removed from the sources of manufacture.

Other important trends are in place which suggest to me the advantages of a British Columbia-to-Alaska rail linkage. I recognize that some people would argue that vast sections of this region be preserved in pristine condition. However, construction of the Alaskan Highway more than a half-century ago opened northwest Canada and Alaska to development. In retrospect, we would have been better off if a railroad line had been built instead. But that is a bit of history that we cannot erase.

During the post-World War II era, Alaska's population has grown by roughly 100,000 each decade. That trend is firmly in place. Northern British Columbia and the southern Yukon have been opened to mineral extraction. At the same time the entire area is attracting the interest of tourists. They are coming. They will continue to do so.

I am convinced that a policy of "selective expansion" of transportation connections, based upon the railroad, will be

preferable to annual invasions of sport utility vehicles rambling willy-nilly over environmentally-sensitive land--such as Alaska's Denali National Park.

The Unique Benefits of Railroads

For this part of the North American continent, rail service offers several advantages over highways.

The railroad operates over a narrower right-of-way, and leaves a smaller footprint upon the land. Construction activity is less disruptive of natural surroundings. Research undertaken in Russia suggests that a rail corridor has far less impact in regions of permanent frost because track ballast absorbs much less radiant heat from the sun than a highway surface. Research conducted by Alaska's Department of Transportation found that it actually raised the freeze line.

Railroad design allows heavier weights to be transported with little effect upon the land surface. This takes on special importance in regions of unstable soil conditions, and those climates subject to frequent freezing and thawing. By contrast, even the best-designed interstate highways built over stable terrain are being repaved at nearly twice the rate originally projected, because heavy trucks cause so much damage.

Railroad operations are more environmentally benign as well. Trains are more fuel efficient and emit lower levels of pollution. Pollution levels can be reduced even further through the use of locomotives powered by natural gas--or ultimately by electrification at some point in the future. The "occasional train" is less intrusive than a constant procession of highway vehicles. They also afford all-weather capabilities. I am told that one railroad track has capacity equal to eight lanes of highway.

Rail transportation offers a particular benefit in accommodating tourism business. Train travel by itself can be part of the tourism experience, and moving tourists by train permits controlled access to scenic areas, as the Alaska Railroad has proved for years. When people leave the train, they can move in groups via shuttle buses, which cause fewer problems than a herd of private vehicles operating independently. No matter how carefully we plan roadways to minimize environmental concerns, when people visit your scenic wonders by SUV, they will be inclined to roam wherever their personal fancies impel them.

I already have noted the lower-cost transportation that railroads can provide versus truck or air cargo. But a rail-based tourism system also will allow for the expansion of a jobs-producing tourist economy in an environmentally sustainable way.

It Is Time to be Visionary

I have presented my case for connecting northwest Canada and Alaska to the North American Rail System and the global intermodal transportation network. It is not my intent to recommend a particular route alignment, and I am aware that preliminary studies already have taken place. Obviously, a rail line through northwest Canada logically would connect with the Alaska Railroad. I also believe that consideration should be given to "multi-modal" rail corridors. It is an easy matter to establish a buried fiber optics cable in the process of building a railroad line. This would connect remote regions to the continent's main-line telecommunications system. Portions of the corridor may make sense for energy pipelines as well. Rail corridors can easily move freight, passengers, fuel and information.

The specific route--its components and capabilities--rightfully belongs as a decision to be made by the people of British Columbia, Alaska and the Yukon. Part of the decision process should include the feasibility of private investment to defray a portion of the costs. By working with its congressional delegation and the U.S. Department of Transportation, I believe that Alaska can make a strong case that segments of this rail project to be built in that state should qualify for funding under the recent surface transportation reauthorization law.

I recognize that Alaska, British Columbia and the Yukon represent special places whose priorities sometimes are different from those considered elsewhere. Distance. Remoteness. Climate. Environment. The status of native inhabitants. Natural resources. Scenery. Wilderness.

Growth is taking place, and will continue. Alaska's rate of population increase during the past 50 years is exceeded only by that of Arizona, Florida and Nevada. Tourists arrive in greater numbers each year to Alaska and northwest Canada. In the "lower 48" states, the 20th Century was a period in which we accomplished much in transportation, but the landscape is littered with the debris of our mistakes. We became over-reliant upon the highway and the airport. We allowed our railroads to founder for 80 years until the choices were stark ones--deregulation or nationalization. Many local and intercity rail passenger services were left to die. Our transportation policies led to the withering of small towns and the crowding of new suburbs. We brought smog and highway gridlock to our large cities.

You people have the opportunity to capture the benefits of the 21st Century's transportation system without repeating our mistakes of a century that has just passed into history. You have the freedom to design a system for your use that qualifies as "ethical." Ethics may seem to be a strange word to apply to

something as commonplace as transportation, but it is a concept that I have argued for more than a quarter-century. When I speak of an ethical transportation system, I mean one that is economically-efficient, safe, environmentally-benign, and energy-conserving, but also meets the mobility needs of the people who live here--or come to visit.

We now know that highways and airways cannot solve the transportation problems facing us. They cannot meet the freight and passenger growth that we confront. I encourage you be visionary. If you plan carefully, you can maintain the best possible quality of life for your citizens.

Thank you.

Sponsors

Alaska Canada Rail Link Conference

January 20, 2000
Vancouver, B.C. Canada

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Section 3:

Remarks to the conference by **Steve Hites,**
owner Skagway Streetcar Company

Steve Hites

SKAGWAY STREET CAR COMPANY, INC.

270 SECOND AVENUE, P. O. BOX 400
SKAGWAY, ALASKA 99840
TELEPHONE (907) 983-2908 FACSIMILE (907) 983-3908

Steve Hites has been in the entertainment business in the North since 1972, when he left his home in Colorado and came to Skagway, Alaska, seeking a job with the White Pass & Yukon Route narrow gauge railroad. While working his way through the company as a brakeman, conductor, train dispatcher, and passenger agent, he performed in local theaters and saloons, and wrote dozens of songs about the Klondike Gold Rush and the history of Alaska and the Yukon. These songs formed the basis of his first album, "Yukon Legacy", which was recorded live at the Red Dog Saloon in Juneau, Alaska, and released in 1978. It was the first record album ever produced in Southeast Alaska.

Hites has toured throughout the North over the last 27 years, and in addition to hundreds of stage, television, film, and radio performances, he has released two more albums: "Inside Passage" (1992, 1996), and "Life on the Railroad" (1993). His original songs have appeared on several albums by other northern artists. He has also produced three professional multi-media programs, a stage play, and written and published a book on the White Pass & Yukon Railroad, "Scenic Railway of the World."

During his railroad career in Alaska, Hites worked as Director of Rail Operations for Tour Alaska, Inc., pioneering the use of privately-owned vista dome passenger cars on the Alaska Railroad. He was Manager of Passenger Operations for the successful reopening of the White Pass & Yukon Route as a summer-only passenger excursion railroad. This line passes through the Klondike Gold Rush National Historical Park as well as the Tongass National Forest, and carried over 285,000 people in 1999. Hites continues to work in a consulting capacity for Tri-White Corporation, the Toronto owner of the White Pass & Yukon.

With the rapid growth of the Alaska cruise industry, Hites and his wife, Gayla, concentrated their efforts on recreating the **Skagway Street Car Company**, a sightseeing operation in Skagway which uses a fleet of eleven antique automobiles

from the 1920's and ' 30's to show visitors around the historic community and all its points of interest. Hites calls the tour "theater without walls", and dresses up in a 1890's- style black three- piece suit with gold watch and derby hat. "We get to tell old Skagway stories on every tour," he says. "It's great fun."

The company also operates a fleet of modern 27-passenger minibuses, providing short sightseeing tours up to the US/Canadian border, and longer day trips into the Yukon Territory. The majority of the company's tours are sold on cruise ships.

In 1996 the company opened a new entertainment complex in Skagway. The three-story building houses the 160-seat **Club House Theater**, the 2,000 square foot **Skagway Mercantile** specialty retail store, and the **Excelsior Cafe & Bakery**, as well as providing the company with offices, storage, and staff apartments. The building was inspired by the 1899 architect's drawings of the original Club House of the Arctic Brotherhood, a Klondike Gold Rush social organization. The new building, which was built in the Skagway Historic District in the Klondike Gold Rush National Historical Park, incorporates all of the period elements of a structure which would have been built in Skagway in 1899. It is Skagway's largest historic-styled building.

Steve Hites's stories, songs, and original music can be heard daily each summer when he performs at the Club House Theater, or at some 300 special concert performances which he contracts to do aboard the cruise ships which call in at Skagway throughout the season.

Hites has a degree in History and Education from Whitworth College. He served on the Skagway City Museum Board for ten years, and was elected to a seat on the Skagway City Council from 1991 through 1994. During his term the Council voted the Guidelines for the Skagway Historic District into law. These guidelines, which are part of the Skagway City Code, are used to direct development in the Skagway Historic District, where architecture and signage must reflect the period of the Alaska - Yukon Gold Rush of 1896 - 1910. Most of this district in downtown Skagway is also part of the Klondike Gold Rush National Historical Park's Skagway Unit.

Steve Hites and his wife Gayla have one grown son, Ryan.

Tourism & Recreational Railroads:
A Northern Glimpse into the 21st Century

The first railroad in the Far North, the White Pass & Yukon Route, was built one hundred years ago with British financing, American engineering, and Canadian contracting. I wrote a song to honor Micheal J. Heney, the energetic young Canadian contractor who helped to build the WP&YR.

"Big Mike Heney"

I was born one cold gray morning on the Overland Express;
the brakeman was the midwife, the conductor was impressed.
They knew I was a railroad man from the chew tucked in my cheek;
I shrieked like a locomotive, had a spike between my teeth.
(He shrieked like a locomotive, had a spike between his teeth.)

Before I was old enough to walk they had me layin' track
crawlin' along, ties under my arm, a rail across my back
I warmed my bottle on the firebox, I helped to shovel coal
While the engineer would take his nap, I made the engine roll
(While the engineer would take his nap, he made the engine roll)

Drillin' tunnels through the Rockies, drinkin' whiskey during the day
I grew up on the CPR, Van Horn a leadin' the way
We laid track so fast we never looked up ' til a fish swam by to say
"you've laid the railroad over a cliff into Vancouver Bay"
(Yes, you've laid the railroad over a cliff into Vancouver Bay)

As I was there treadin' water, another fish passed by to say
"They've found gold up in the Klondike two thousand miles away"
So I hitched a ride on a humpback whale right up to Skagway town
The gold rush needed a railroad, I started breakin' ground

(The gold rush needed a railroad, he started breakin' ground)

With picks and shovels and powder, and a wild-eyed gang of men
we blasted into the mountains and blasted them down again
I used spiderwebs for trestles, fought with grizzly bears as well
"Give me dynamite and snooze, I'll build a railway straight to Hell."
(Give him dynamite and snooze he'll build a railway straight to hell.)

I went on to other exploits, built a railroad to the Pole
a railroad to Hawaii, trains to Singa por and Seoul
but a man like me just can't sit back as I gaze up at the stars
I'll build a railroad up to Jupiter, a shortline on to Mars
("He'll build a railroad up to Jupiter, a shortline on to Mars.")

All that talk about the last century has got me going. Let's build a Time Machine, get in it together, set the old "Way Back Dial" (remember the Way Back Machine from the "Rocky and Bullwinkle Show", with Sherman and Mr. Peabody?), and hang on!

It is the late 1960's. Trains Magazine editor David P. Morgan writes a cover story which asks, "Who Killed the Passenger Train?" Privately operated North American passenger trains are dying off, victims of the interstate, the automobile and the airplane.

Let's go on forward a bit. It is the mid 1970's. The lives of quasi-government corporations Amtrak and Via Rail hang in the balance as government committees drag these skeletal rail services through the hot coals of debate on "public need" vs. "public dollars" spent on passenger trains.

Whoa. That's enough of that. Let's jump forward again.

It is the mid 1980's. Union Stations in major cities are turned into shopping malls, hotels, and restaurants. The last American private passenger train, the Rio Grande Zephyr, is allowed to suspend service. The passenger train has finally reached the end of the line.

Not good scenery here. Seems the farther ahead we go, the worse it gets. But being optimists (and everyone in this room is an optimist, or you wouldn't be here, talking about construction of the last link in the transcontinental railroad), we want to see where all this ends up.

Now, it is the year 2000. It is now thirty-five years after the "official death" in the press of the passenger train. And we look out across a very different landscape.

Rail travel is booming. It is not traditional rail travel by any means. It is a new type of experience: recreational rail travel, leisure rail travel, maybe, even, perhaps, rail cruising. The phenomena is still new enough that workable labels have yet to be attached. But whatever you want to call it, the recent popularity of recreational rail travel begs comparison with the rise in popularity experienced in the cruise industry. And with tourism predicted to become the largest industry in the world during this century, business and industry leaders should look closely at these parallels to better understand present and future opportunities.

Into our Time Machine again! Back again to the ' 60's.

The Jet Age arrives. The remaining transatlantic ocean liners are doomed. Some survive by trying to transform themselves into warm-water party vessels, offering leisurely cruises around the Caribbean. They don't really go much of anywhere, there isn't much to do on board (shuffle board and gambling), and even the entertainment is sophomoric. But it keeps several companies afloat. Entrepreneurs like Miami's Ted Arison charter laid-up ships on the cheap from the likes of Canadian Pacific, fill them with discount cruisers, bring them home happy, and do it again. Wanting to find a name that tells potential customers what he is selling, Arison chooses ""Carnival" for the atmosphere on board, and tags his vessels "The Fun Ships". (Carnival's "Fun Ships" now comprise the largest and most profitable cruise line in the world.) Stan McDonald charters the CPR's "Princess Patricia", and starts Princess Cruises. Chuck West starts Westours, a cruise and land package operator to Alaska. (For a detailed study of this fascinating transition period, read Carnival Cruise Line's President's Bob Dickenson's 1997 book, "Selling the Seas: The Creation of the Modern

Cruise Industry").

Wow! What's happened here? An outdated transportation mode whose fleets are ready for the scrapper is repackaged and becomes a leisure mode. The ship becomes the vacation. The means becomes the end, and the journey becomes the vacation.

Let's pop back to the present, because this is exactly what has happened with the passenger train.

Successful examples of this change are all around us.

Excursion railroads like the White Pass & Yukon Route, and the Durango & Silverton;

"Day trains" like The Rocky Mountaineer, and the Sierra Madre Express in Mexico's Copper Canyon, who overnight their passengers in hotels along the rail route;

"Cruise trains" like the American Orient Express

Private car "trains" like the Princess' Tour's Midnight Sun Express, and Holland America Line Westours' McKinley Explorer;

Dinner trains like the "Spirit of Washington" running in the Seattle metropolitan area, and BC Rails' dinner train to Squammish;

Combinations of the above like the Napa Valley Wine Train;

Excursion trains used as substitutes for automobiles like the Grand Canyon Railway:

Ski trains like the one out of Denver, Colorado to Winter Park on the old D&RGW;

Steam excursion trains operating over regular roads, like BC Rail's popular "Royal Hudson".

There are many others, but these show the diversity of products available to the 21st Century recreational railroad passenger in North America.

These new products all have several things in common:

--They do not primarily serve the public as a means of getting from A to B
(This is even true with the Denver Ski Train. The customer is buying the skiing experience packaged with the train, not the transportation service.)

--They provide what the customer wants (as to a variety of services)

--They do it at a price which is acceptable to the market

--They make money, or they aren't around anymore. Not one of these operations is subsidized by a government. My personal rule of thumb: railroad operations should pay their own way.

Recreational rail travel needs to be looked at as a for-profit enterprise. For most common carriers, passenger revenues have never been more than incremental, an "add on" to freight revenues. And, in the Far North, with it's light population density, local passengers have never been a major part of a railroad's revenue. So, these revenues need to be generated from elsewhere.

The first revenue train operated by the first railroad in Alaska was a July 21st, 1898 passenger excursion train from Skagway to the end-of-track on the White Pass and Yukon Route. Four flat cars were jammed with local politicians, businessmen, writers from Seattle, and from the towns three newspapers. Shortly after the road's completion in 1900, the White Pass rolled out it's timeless slogan, "Scenic Railway of the World," which it carries to this day.

WP&YR maintained a Passenger Office in Chicago, Illinois. White Pass salesmen like Herman Weig carried their bulky "magic lantern" show out on the road. The marvelous hand-tinted photo transparencies held audiences in awe, and Weig lectured throughout the country to church groups and service clubs on the glories of leisure travel in the mysterious Land of the Midnight Sun.

Canadian Pacific put together complete vacation packages to Alaska and the Yukon early on, using their fleet of coastwise steamships. Northern Pacific followed, partnering with the Alaska Steamship Company. With the opening of the Copper River & Northwestern, circle tours could be booked all the way through to Fairbanks, with rail from Cordova to Chitna, thence overland to the Chena River, and connecting

with river steamers back up the Yukon itself and back out at Skagway. The completion of the U.S. Government Railroad in 1923 created yet another circle tour loop, from Seward to Anchorage, and on to Fairbanks, now entirely by train.

Seventy- six years after U.S. President Warren G. Harding drove the ceremonial last spike at Nenana, two railroads in the Far North survive. Passenger revenues are essential to both, but they are generated by tourism to Alaska. Neither survives on ticket sales generated along the route of its line.

The Alaska Railroad is a full service common carrier running over the same route opened by President Harding. It operates year-round passenger service on its own trains. During the busy summer tourist season, the ARR express trains between Anchorage and Fairbanks offer private car haulage rates to Princess Tours and Holland America Line Westours, whose private fleets now total over two dozen full-dome railcars. These luxurious vista domes are carried on the tail end of the trains behind the regular Alaska Railroad coaches. In addition, the ARR has recently purchased a new full-domed trainset which can be used for service on the popular scenic run from Anchorage to Seward, Alaska.

The White Pass & Yukon Route, which suspended operations for five and a half years between 1982 and 1988 due to the closure of its principle shipper, the Cyprus Anvil lead-zinc mine, reopened in May 1988 as a passenger-only summer excursion railroad. Cashing in on the rapid growth of the cruise market, the WP&YR carried 36,000 riders its first season back in business, hit 100,000 by the fourth season, and carried an astounding 278,000 revenue passengers in 1999. With its 40-mile round-trip ride sold as a Shore Excursion on every cruise ship calling on Skagway, operating up to nine trains per day, many to sold-out crowds, it is one of the most profitable of all excursion railroads, commanding one of the highest rates per passenger mile operated anywhere in the world. Its Toronto owner, Tri-White Corporation, plans to grow an even larger leisure services company from within the WP&YR. They have no plans to change the profitable 100 year old narrow gauge railroad, but President Fred McCorriston has repeatedly said that White Pass will look at any reasonable business proposal that can make money for his company.

So much for the present. What will the future of rail cruising look like? How will it look in the Far North? We do have several clues.

One of the least heralded and most dramatic changes which has come about has been the complete redesign and re-engineering of the passenger car.

Tom Rader, founder of Colorado Railcar Manufacturing in Ft. Lupton, Colorado, began the re-invention of the vista dome in 1988 with the introduction of the "Ultradome" on the Midnight Sun Express between Anchorage and Fairbanks. Rader continued engineering the concept with the "Ultradome II" series, and now builds completely new "from the ground up" full-dome railcars, in both a double-decked (bi- level) and single level version (new sills, new trucks, brand new everything). Customers for the Rader domes include Princess Tours, Peter Armstrong's Rocky Mountain Rail Tours, and the British Columbia Railway. The Alaska Railroad purchased a full trainset of Rader-built equipment from First American Railways defunct "Florida Fun Train". (For answers as to why that failed, see me after the conference: we'll have a drink and talk about where not to locate one's terminals, and how you really need to have a solid market your product before you start running it.)

Rader threw the old Pullman Standard-type construction concepts out the window, and literally built a new window. Using modern materials and techniques, he created the largest viewing areas ever built into rail equipment. With their rooftops made entirely out of specially strengthened, tinted, bowed glass, these versatile and lightweight cars offer passengers unprecedented scenic viewing opportunities.

Many railroads run through spectacular scenery, but without a platform from which to view that scenery, the ability to experience that beauty is diminished, or even lost. If what the railroad has to sell is its scenery, it must find the best way to serve that product up for the viewing customer. The new dome design has provided one way.

And they are just a box, waiting to be made into something.

Just like aboard the cruise ships, the interior spaces of the new rail cars are being re-shaped by the customer as well. To rise like a Phoenix from the ashes, the concept of the ocean liner had to re-invent itself. On Royal Caribbean International's new Voyager of the Seas, old-time shuffleboard has been replaced by ice skating rinks, golf courses, in-line skating arenas, rock climbing walls, and multiple themed restaurants. Similarly, the tired railroad day coach has become the interactive video arcade car, a bi-level atriumed dance lounge, a two- tiered themed dining room, or a solarium car with retractable roof fully equipped with weight room, saunas, and multiple hot tubs.

Sleeping accommodations no longer need to be crammed into dark narrow spaces with the bathroom down the hall, or perhaps under the seat of your tiny roomette. Guests on the cruise train of the 21st Century will lie down in comfortable double beds under their section of the full dome, reaching from one side of the car to the other, falling asleep under a canopy of stars, and in the morning awake - not to an Amtrak Deluxe Bedroom commode/shower all-in-one combination plastic molds- but to their own full-sized washroom with separate in-room shower bath. When not enjoying the on-train activities (lectures in the library, a piano concert or dance band in the Showroom), they can watch television or videos in their suite, or let the countryside roll by outside while they listen to the music of their choice on their state-of-the-art in-room stereo sound system.

To be fair, some of this is already being done on the beautifully refurbished 1950's era equipment of the American Orient Express. But no matter how you clean it up, the platform being used by the AOE still dates from the 1950's: tiny rooms, bathrooms down the hall or retrofitted, and a high price tag for the pleasure (between $500 and $1,000 per person per day).

With no real competition in the luxury end of the market, the AOE has done well. But any train which utilizes the new car technology will provide more of the creature comforts the customer wants, and will capture the market in short order.

The cruise trains of the 21st Century will be what the market demands. Any railroad wanting passenger revenues will need to use the most modern platforms available to get a piece of that market. They will present new and different itineraries to lure more people to try the cruise train product: ski cruises, Civil War theme cruises, The American Southwest cruises, "the best Capital cities of America" cruises, and "National Parks of the West". The possibilities are endless. And the proposed transcontinental link between Canada and Alaska, with its scenery and sweep, is a natural for the new trains.

Cruise lines, tour companies, and travel wholesalers could offer packages with a cruise ship one way, and a rail return on the "cruise train" back again in the opposite direction. Stopping along the way for historical, cultural, or natural points of interest, the cruise train itinerary, like that of a cruise ship, would allow passengers the opportunity to get out and experience the areas along the route first hand. Off-train excursions into the countryside, like Shore Excursions on ships, would allow for more in depth exploration.

Pretty cool stuff. But as we enter this new era, for businesses that really want to be a part of it and participate, the sky literally has to be the limit. The market demographics tell us that the leisure traveler of 2000 is younger, more educated, more sophisticated, more well-traveled, more active, and more financially secure than ever before. They are far more demanding, but they will pay the fare for a perceived value. They like nice things.

I recall the middle-aged Texan who was riding with his family and a small group of escorted tour passengers on the original Midnight Sun Express back in 1984. He was wearing a leisure suit with an open-necked shirt, and several gold chains hung around his neck. As we glided into the Nenana River Canyon southbound, we decided to treat the small group to something special, and served brunch up topside in the dome. Sipping his fresh Bloody Mary, savoring the perfect unbroken hollandaise sauce on his Eggs Benedict, listening to the tastefully muted classical music floating over the sound system, he leaned back, looked at me and said, "Ya' know, son, I like nice things. This is a nice thing."

The passenger trains which will be placed into service on the proposed last great transcontinental link between Canada and Alaska will have to be cut of that kind of cloth.

The cruise trains of the next century must be "nice things". If they are, long distance rail travel will most certainly "make its own way", finding a comfortable niche in the leisure market of the future.

One last element to consider. Beyond the statistics and market information, beyond the geography and the engineering, there is the adventure of what is being proposed here today. The doing of something never before done, of participating in something important, something great. No one put that feeling into words in a better way than Gordon Lightfoot did in 1967 with his wonderful song about the very first Canadian Transcontinental railroad, the "Canadian Railroad Trilogy".

(CANADIAN RR TRILOGY).

Note: The above paper was presented by Steve Hites at the Alaska Canada Rail Link Conference, January 20, 2000, Vancouver, B.C.

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MARKET DEVELOPMENT POTENTIAL

for the

COMMODITY CARGO TRANSPORT

between

ALASKA, CANADA AND THE NORTHERN TIER

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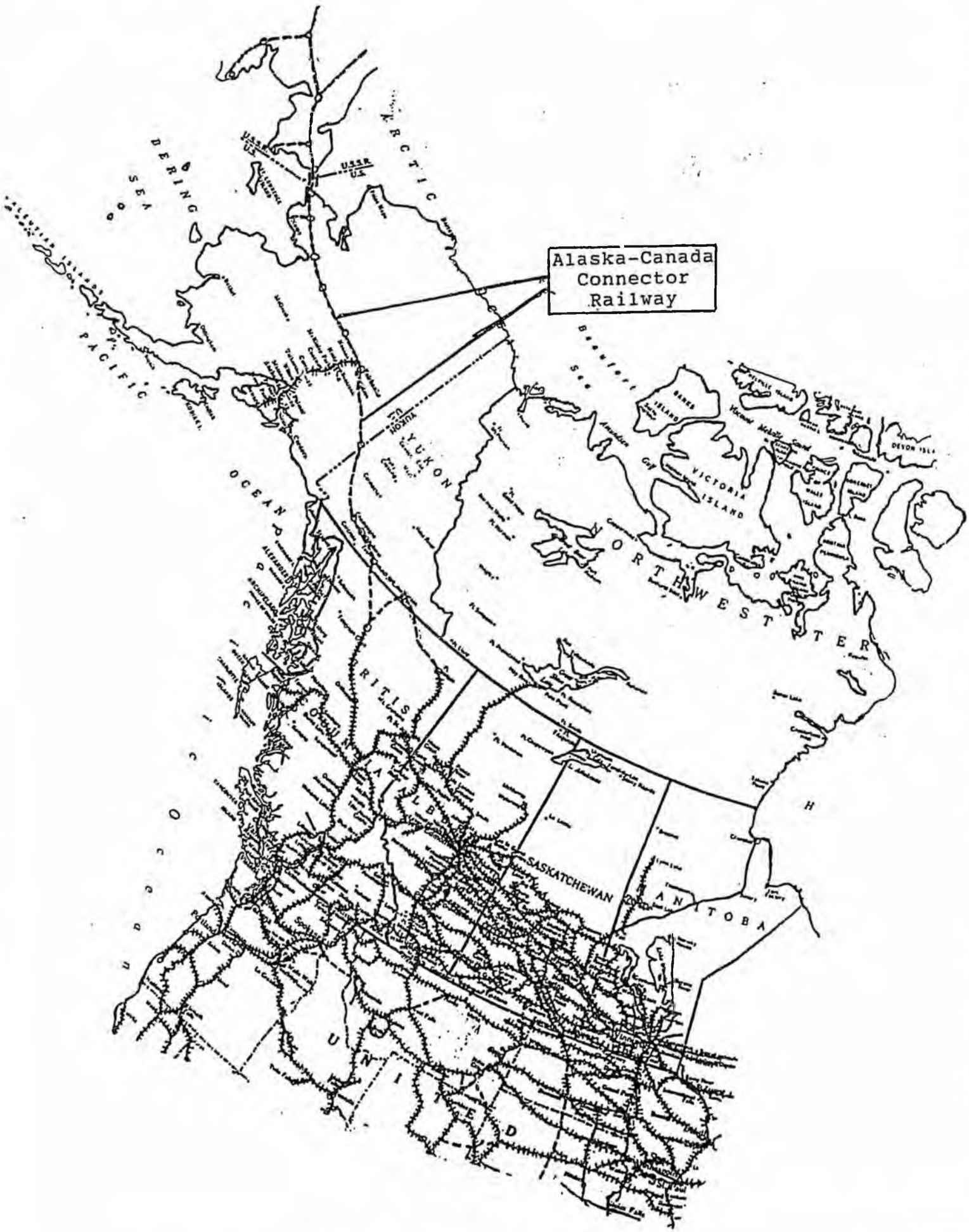
Sponsored by:

The Alaska State Chamber of Commerce
and the
Vancouver Board of Trade

January 20, 2000

EXISTING AND PROPOSED RAILROAD LINES IN ALASKA AND CANADA AND NORTHERN TIER



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INTRODUCTION

There is renewed interest in the connection of the Alaska Railroad with the rest of the North American rail network (Ref. 1). The economy of Alaska is becoming increasingly intertwined with the rest of the United States as a north-south orientation. In addition, the Canadian provinces are becoming more interconnected to their southern neighbors in the United States and Mexico as north-south interlinkages become greater. The completion of the railway link between Alaska and British Columbia is the one major element in the completion of the North American rail network, as shown in Figure 1.

There are several reasons why the completion of the railway from Canada to Alaska would be beneficial for all of the affected regions. The completion of the railway line from Canada to Alaska would reduce the transportation costs of goods hauled to Alaska. The result would be a reduction in the cost of living to Alaska residents. It would then become easier and cheaper to export raw materials from Alaska to Canada and the Lower 48 States of the United States. Fuel and mineral resources produced in Alaska would then become more competitive from a price standpoint in the lower 48 states as compared to alternative sources.

The completion of the construction of the railway from Canada to Alaska can also influence trade patterns in North America and throughout the World. The recent passage of the North American Free Trade Agreement (NAFTA) between Mexico and the United States in 1993 has led to a major expansion in north-south trade between the three countries. It has been estimated that the volume of north-south trade in North America has increased by 5.0 percent per year from 1993 to 1999. The total volume of the east-west trade in North America during the same period has only increased by 1.5 to 2.0 percent per year.

There is the potential for extending the North American railway network to the south from Mexico to South America by way of Central America (Ref. 2). There have been proposals advanced to develop a unified rail, road, air and marine transportation system among all of the nations of North and South America. The Western Hemisphere Transportation Ministers' conference held in New Orleans in December 1998 agreed to begin the planning for such a unified transportation system as a part of a future trade area of the Americas (Ref. 3). The route layout for a proposed Western Hemisphere rail network is illustrated in Figure 2.

There is also the possibility of increases in east-west trade by way of Alaska to Asia and Europe. A recent article by Gillespie (Ref. 4) in 1998 in the Alaska Business Journal described the possibility of completing an underground railroad tunnel beneath the Bering Strait. There have been a number of proposals made to build a railroad tunnel under the Bering Strait, but have so far been unrealized (Refs. 5,6,7,8). The construction of a railroad tunnel under the Bering Strait would allow a Worldwide railroad network to be developed as shown in Figure 3. Alaska and neighbor Chukotka would then become the American and Asian World trade centers for a future Worldwide rail network connecting all continents.

Figure 1

CONNECTING RAILROAD ROUTE NETWORK TO THE BERING STRAIT RAILROAD TUNNEL 5

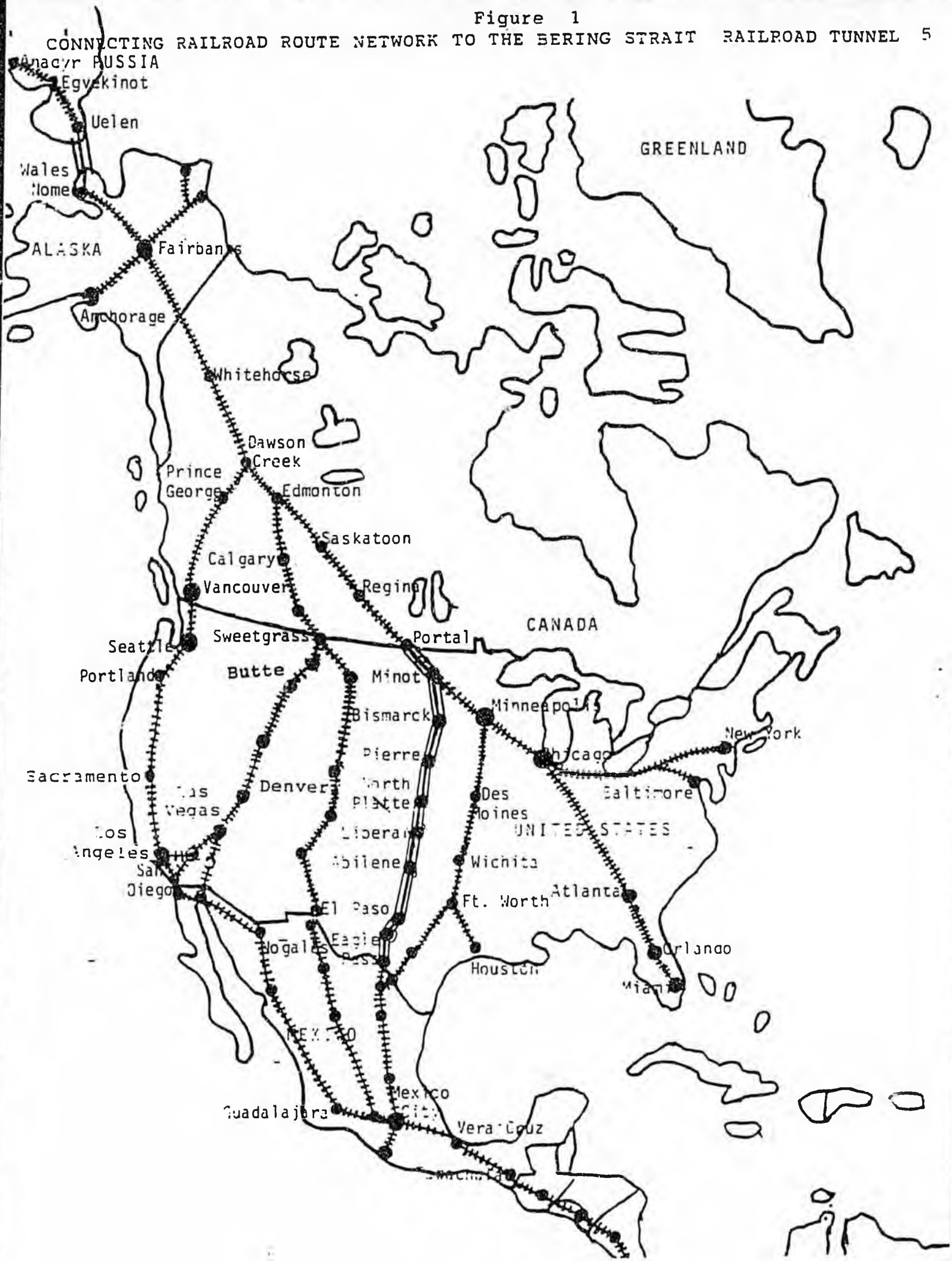


Figure 2

PROPOSED INTERAMERICAN RAILROAD LINE BETWEEN NORTH AND SOUTH AMERICA

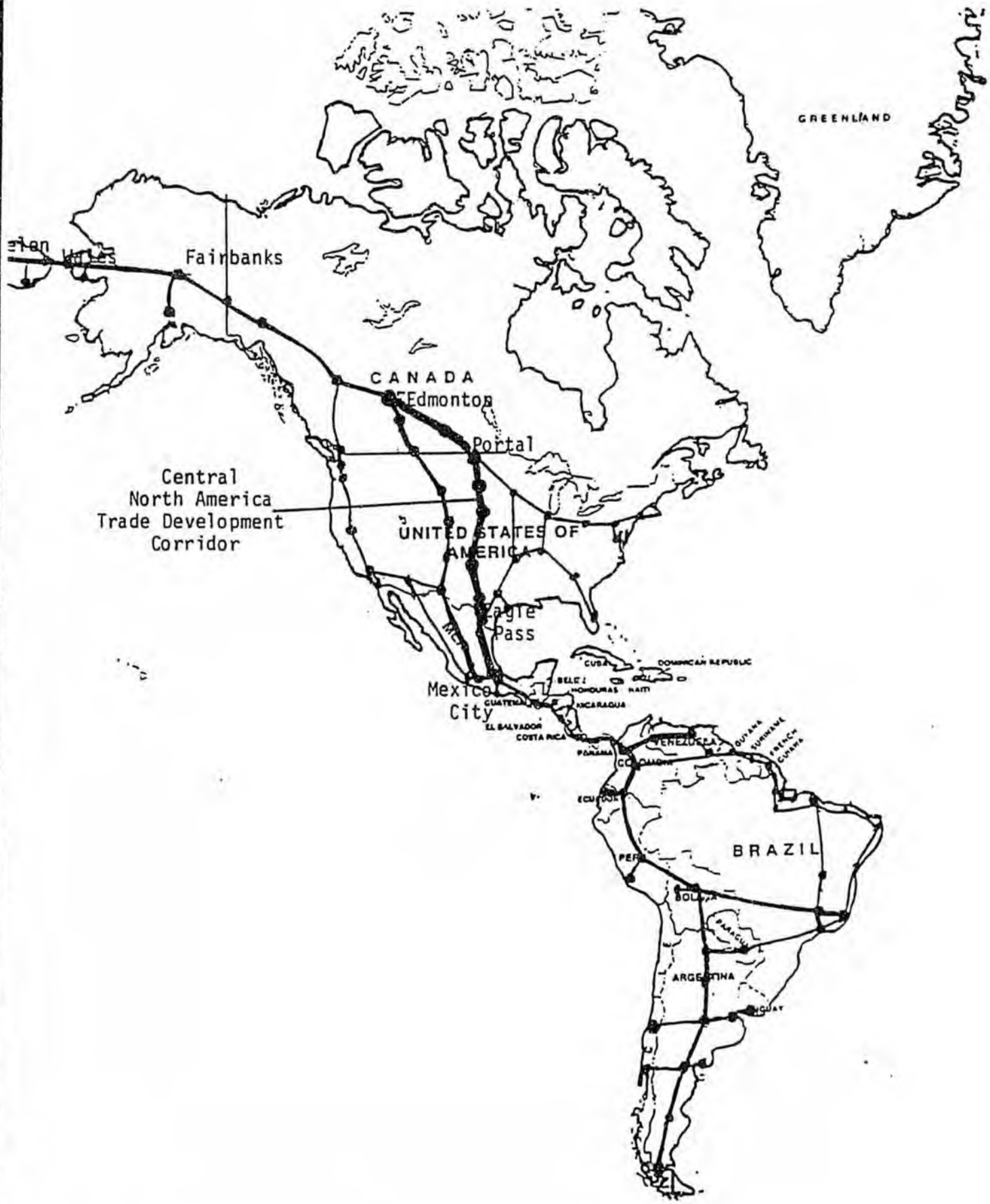
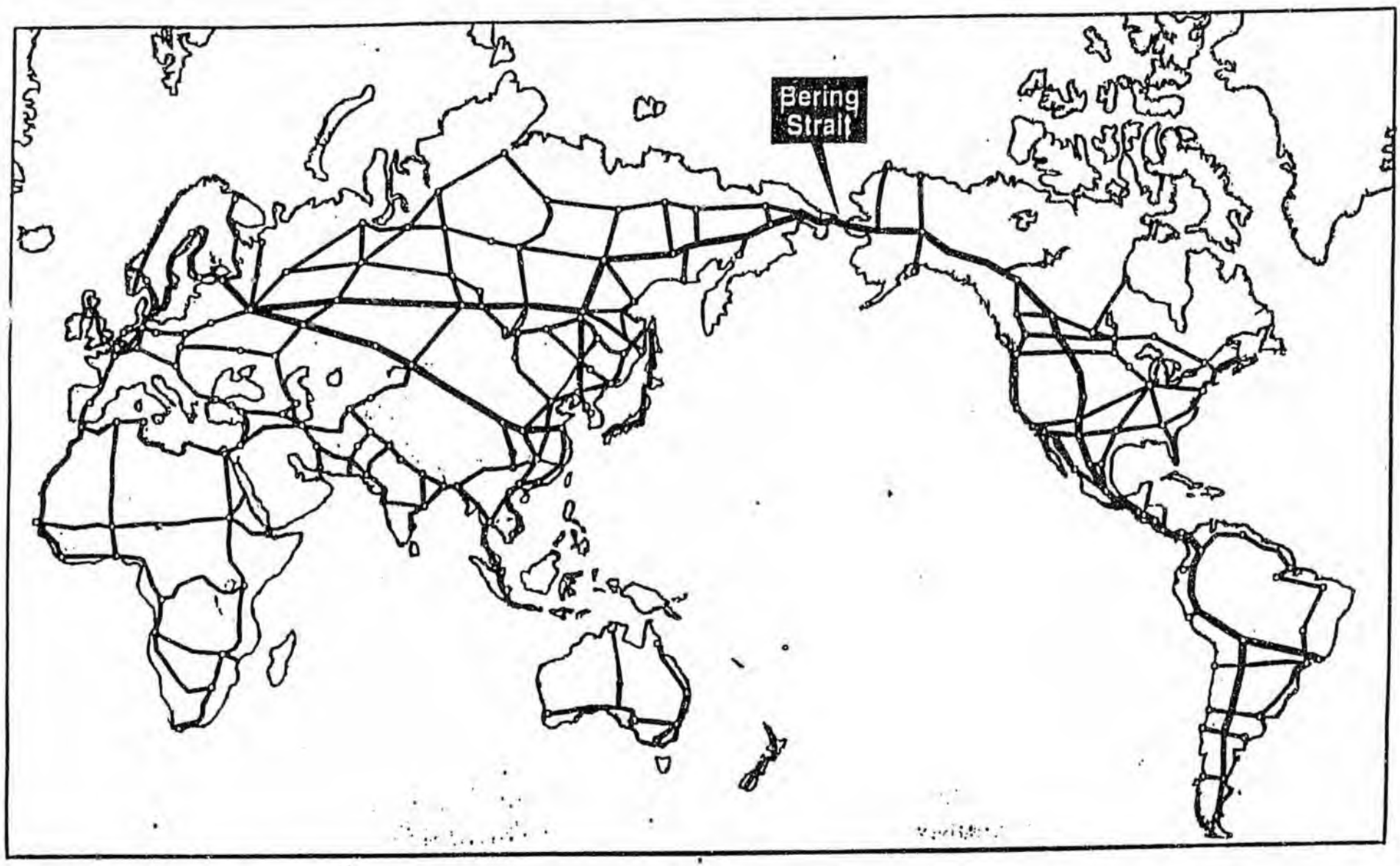


Figure 3

ROUTE LAYOUT OF THE PROPOSED WORLDWIDE RAILROAD NETWORK TO ALL CONTINENTS(Ref.9).



BACKGROUND

The earliest efforts to develop a railway line between Alaska and Canada with the Lower 48 States were actually a part of early proposals to develop a Worldwide railroad network. There were reported but unsubstantiated reports of a proposed as early as the late 1860's after the Civil War to build a railway line from Denver to Paris by way of Alaska and Russia (Ref. 9). This railway project was to be a part of the efforts to construct the Trans-Siberian Railway being constructed under the direction of Count Sergei Witte (Ref. 10). However, these efforts never came to fruition because other railroads needed to be built in more populated areas.

The completion of the Trans-Siberian Railway from Moscow to Port Arthur in 1903 and to Vladivostok in 1908 led to the formation of a company in the State of New Jersey in 1906 (Ref. 6). The purpose of this railway was to connect Paris and Moscow with New York plus Fort Nelson and Edmonton in Canada to Chicago and New York. This company was incorporated with $6 million U.S. in equity capital with French, Russian and American investors with the purpose of operating both freight and passenger service. This project was halted by the onset of World War I (Ref. 11) and was not restarted.

After World War II, there were extensive surveys of railway line development under the direction of Joseph Stalin in Russia. These efforts led to the surveying and grading of the entire Northern Arctic railway along the Arctic Ocean from Vorkuta to Egvekinot over 4,000 miles. In addition, route surveys and engineering designs were conducted of the 2,500 mile long rail corridor from Yakutsk in the Sakha Republic to the Bering Strait (Ref. 12). These efforts were suspended upon Stalin's death but reappeared in a book by Chersakov in Russia in 1993 to build a railway from Moscow to New York, as shown in Figure 4 (Ref. 13). In the United States there were also efforts made by the Czech engineer George Koumal, who proposed building a tunnel under the Bering Strait (Ref. 5).

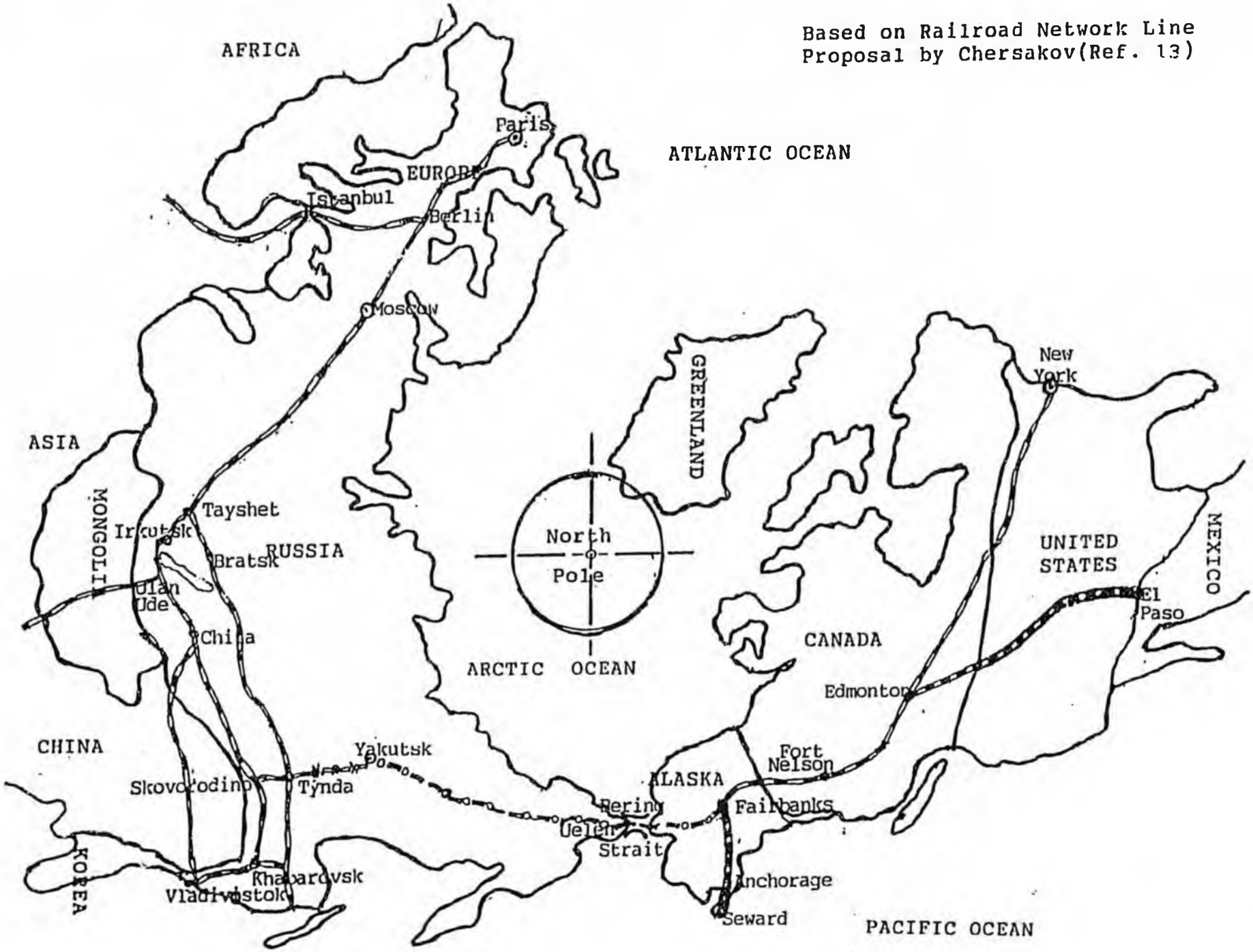
The concern about the possibility of constructing a railway line to Alaska began with the purchase of Alaska and the Aleutian Islands from Russia in 1867. Russia at that time sold Alaska to the United States in part because it lacked the transport infrastructure to maintain these remote regions. The initial development of Alaska began in the 1890's with the discovery of gold, but did not become significant until the onset of World War II in 1941.

A number of military facilities were built in Alaska during World War II to begin the development of its infrastructure. One of the major projects was to connect Alaska with Canada by either a highway or rail line. The roadway was built as an alternative to the railway because of its lower initial cost and shorter construction time. In addition, the initial street shortage during World War II resulted in a greater priority being given to tanks and artillery than a railway at that time (Ref. 34).

The Alaska Railroad was originally chartered as an initial part of this infrastructure by the United States Congress in 1912 through the establishment of the Alaska Railroad Commission. The authorization of $35 million U.S. for railroad construction by the U.S. Congress in 1912 was approved by President Wilson in 1914 to make it possible to begin layout, design and construction. The legislation approved called for the construction of 1,000 miles (1,600 km) of

Figure 4

PROPOSED RAILROAD NETWORK LINKAGE BETWEEN THE EURASIAN AND NORTH AMERICAN CONTINENTS



railroad lines in Alaska from the interior to an ice-free port along the Pacific Ocean at the Southern end of the Kenai Peninsula.

It was originally decided to build the Alaska Railroad from the ice-free Port of Seward at the South of the Kenai Peninsula to the Fairbanks area via Anchorage with a total length of 515 miles (825 km). This original section of the Alaska Railroad was finally completed in 1923 at a cost of $60 million and was dedicated by then President Warren Harding. The Alaska Railroad was extended for an additional 20 miles (38 km) in Eielson during the 1950's as a part of its rebuilding and expansion to serve Eielson Air Force Base as a new facility with a total length of 535 miles (860 km). As a result, there are 465 miles (745 km) of railroad line, which remain unbuilt by the Federal Government in Alaska under the terms of this originating legislation passed in 1912 (Ref. 14), which could be constructed in the future.

The Alaska Railroad as an operating railroad line was owned by the Federal Government, but had relatively little traffic upon its initial completion so that it required an annual Congressional appropriation until 1938. The line's traffic greatly increased during World War II and thereafter so as to never again require an operating subsidy. The line was rebuilt during the early 1950's at a cost of $100 million U.S. so as to be able to handle the increasing traffic demands associated with the Korean War and then the Cold War. The Alaska Railroad was finally sold by the Federal Government to the State of Alaska in 1984 for $23 million U.S. and continues to be under the present ownership by the State of Alaska under profitable operation today.

One of the main reasons for the development of the military infrastructure in Alaska was to allow for supplies to be transported to Russia to assist in its war effort with Germany during World War II. The development of the civilian infrastructure of Alaska began in earnest after the end of World War II. The economic growth of Alaska greatly accelerated following the development of the Prudhoe Bay oil field on the North Slope after 1975 with the construction of the pipeline to Valdez to facilitate crude oil shipments to the West Coast of the United States.

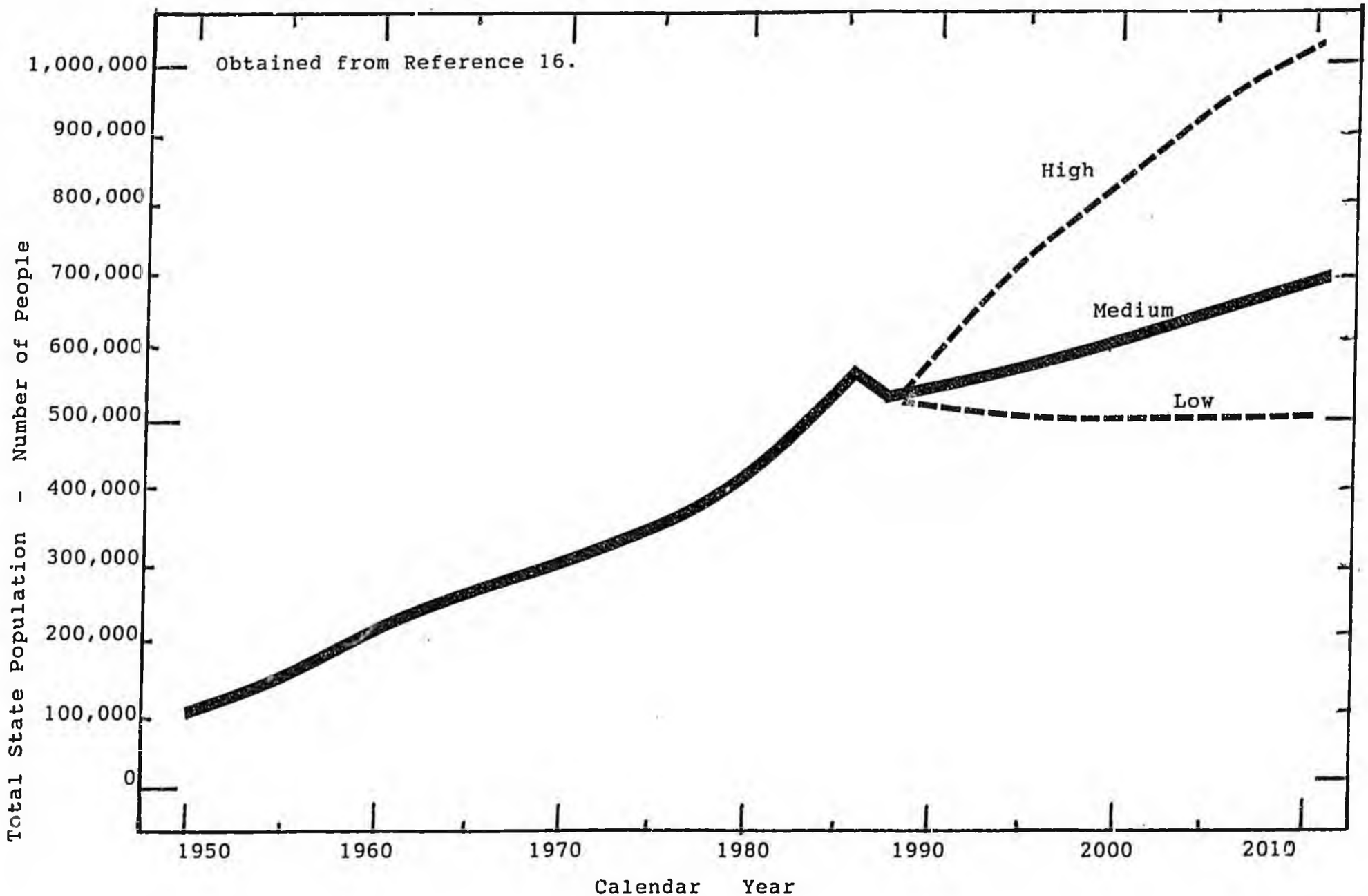
As a result, the population of Alaska has grown from 100,000 in 1950 to 500,000 in 1990 and to an estimated 600,000 in 2000. The population of Alaska could reach 700,000 to 1,000,000 by 2010, as shown in Figure 5 (Ref. 15). The population growth of Alaska appears to be closely following the medium scenario for development at an estimated rate of increase of 1.4 to 1.5 percent per year. In excess of 70 percent of the total population of Alaska lies within the so-called "Rail Belt" between Seward, Anchorage, Denali and Fairbanks.

INFRASTRUCTURE

There is a parallel need to develop the railroad infrastructure of the Northwestern part of North America in order to provide a suitable degree of economic integration with the railroad systems of Canada, the United States and Mexico and eventually to Asia. Railroads generally provide the most suitable means for land-based transportation of large quantities of freight and even passengers in the far Northern climates of Canada and Alaska. These superior characteristics of railroads over highways occur because of their relative ease of maintenance with respect to frost heaves in permafrost, their greater resistance of materials to extremely cold temperatures, and their inherently greater energy efficiencies and lower land use requirements.

Figure 5

PAST, PRESENT AND FUTURE TRENDS IN POPULATION FOR THE STATE OF ALASKA



The railroad network in Alaska is relatively minimal at the present time with only a single North-South corridor in the South-Central part of the state known as the "Rail Belt". There is a 535 mile long railroad line from Seward at the Southern end of the Kenai Peninsula through Anchorage on the Cook Inlet to the North as far as Fairbanks in the central interior of Alaska and then East to Eielson Air Force Base, as shown in Figure 6. There is also a branch line from Portage to Whittier, which allows access to boat traffic to Southeastern Alaska. A rail-barge service connects from Whittier to Prince Rupert in British Columbia and to Seattle, Washington in the Northwest corner of the Lower 48 States to and from the Port of Whittier. There are also several small branch lines to specific industries and mining operations on the route to the coal mine at Healy, the gravel mine at Palmer and others.

These railroad operations in Alaska are all owned and operated by the Alaska Railroad Corporation. The Alaska Railroad Corporation is owned by the State of Alaska with its headquarters in Anchorage. The Alaska Railroad hauls considerable amounts of petroleum products, coals, gravel, wood, chemicals and intermodal freight. The overall freight traffic level on the Alaska Railroad was 5.1 million short toms (4.6 million metric tons) hauled in 1991, as shown in Table 1. This level of railroad freight traffic is expected to grow significantly in the future, as illustrated in Figure 7 (Ref. 16).

The total revenue produced from the hauling of this 5.1 million short tons of freight in 1991 was $48.0 million U.S. The Alaska Railroad also hauled 471,217 passengers in 1991, which has divided between the regular coach and tour business, to produce a revenue of $16.4 million. The total revenue on the Alaska Railroad in 1991 from the combined freight and passenger services was $68.3 million U.S. as compared to expenses of $63.9 million U.S. to result in a net profit of $4.4 million U.S. as shown in Table 2 (Refs. 17,18,19).

The total freight traffic on the Alaska Railroad was estimated as approximately 9.5 million short tons (8.6 million metric tons) in 1998 and 11.5 million short tons in 1999(10.4 million metric tons) based on data reported in the Alaska Business Journal (Ref. 20). Railroad passenger traffic was estimated as 550,000 per year in 1998 and 600,000 per year in 1999 with the continuing growth of Alaska's tourist trade. The total revenues for the Alaska Railroad were expected to have exceeded $95 million U.S. in 1999 with $75 million U.S. from freight and $20 million from passengers with a net income of $8 million U.S.

The other railroad is the White Pass and Yukon Railroad in the extreme Southeastern corner of Alaska from Skagway to Whitehorse in the Yukon Territory of Canada. This railroad is a 111-mile long narrow gauge line as compared to the standard gauge Alaska Railroad. This railroad formerly hauled copper, lead and ore concentrates from mines in the interior to the coast for shipment by boat to smelters located elsewhere. This rail line now operates exclusively as a primarily Summer passenger tourist operation with little if any freight service (Ref. 21).

There are also railroad lines in the adjacent provinces of Alberta and British Columbia, which would be important as the connecting links to the proposed Alaska-Canada connector railroad project. In British Columbia, the British Columbia Railway presently operates a 460-mile (740-km) line from Vancouver in the Lower Mainland to Prince George in the interior. Branch lines

Figure 6

LOCATIONS OF THE EXISTING AND PROPOSED ALASKA RAILROAD LINES IN THE RAILBELT

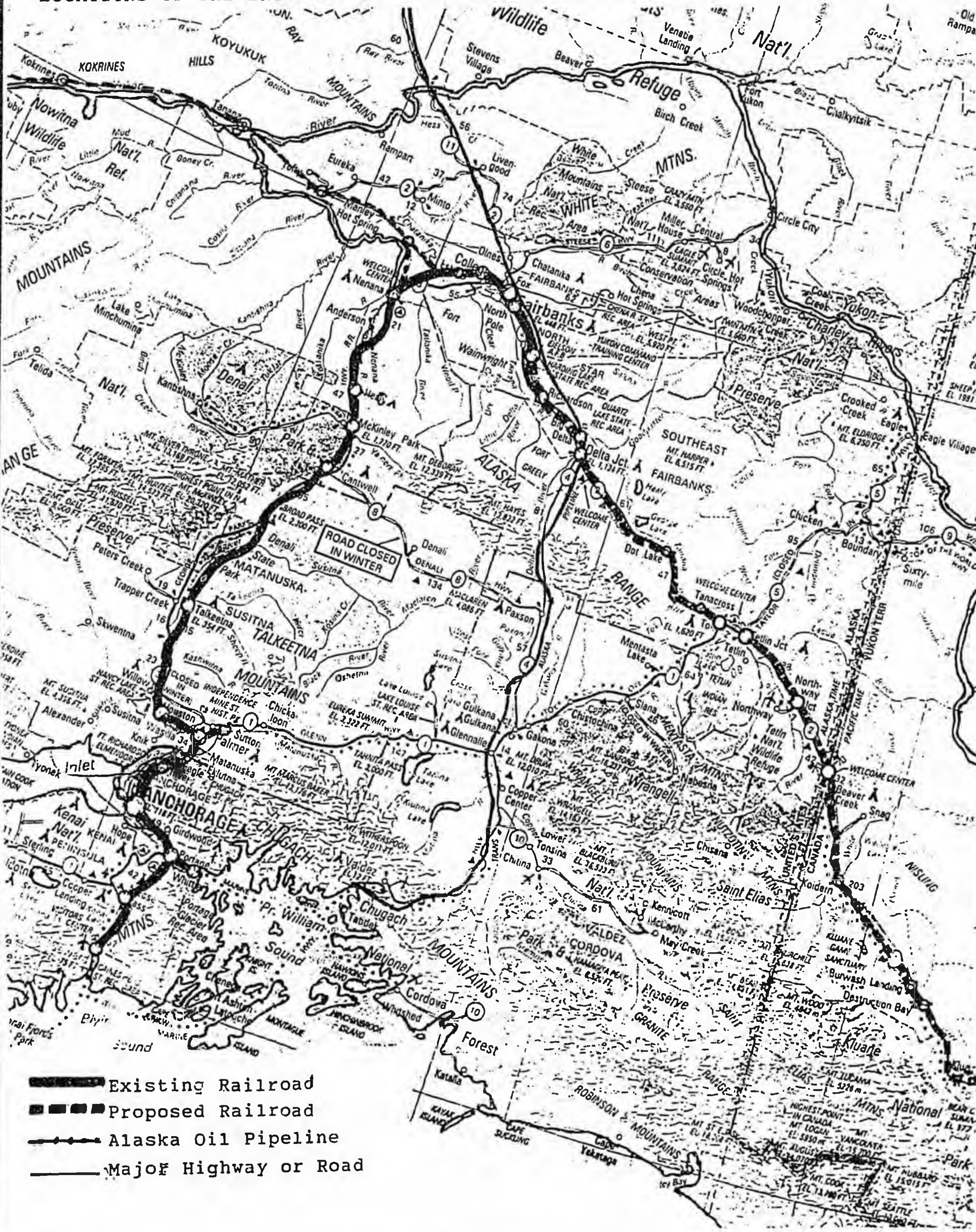


Table 1

OBSERVED FREIGHT TRAFFIC LEVEL TRENDS ON THE ALASKA RAILROAD (REFS. 17, 18)

Specific Commodity	Freight Traffic Level-Million Net Short Tons/Year		
	1980	1985	1991
Gravel	1.00	1.00	1.80
Coal	0.60	1.50	1.60
Petroleum	0.15	0.20	1.40
Intermodal	0.10	0.20	0.20
Other	0.25	0.40	0.10
Total	**2.10**	**3.30**	**5.10**

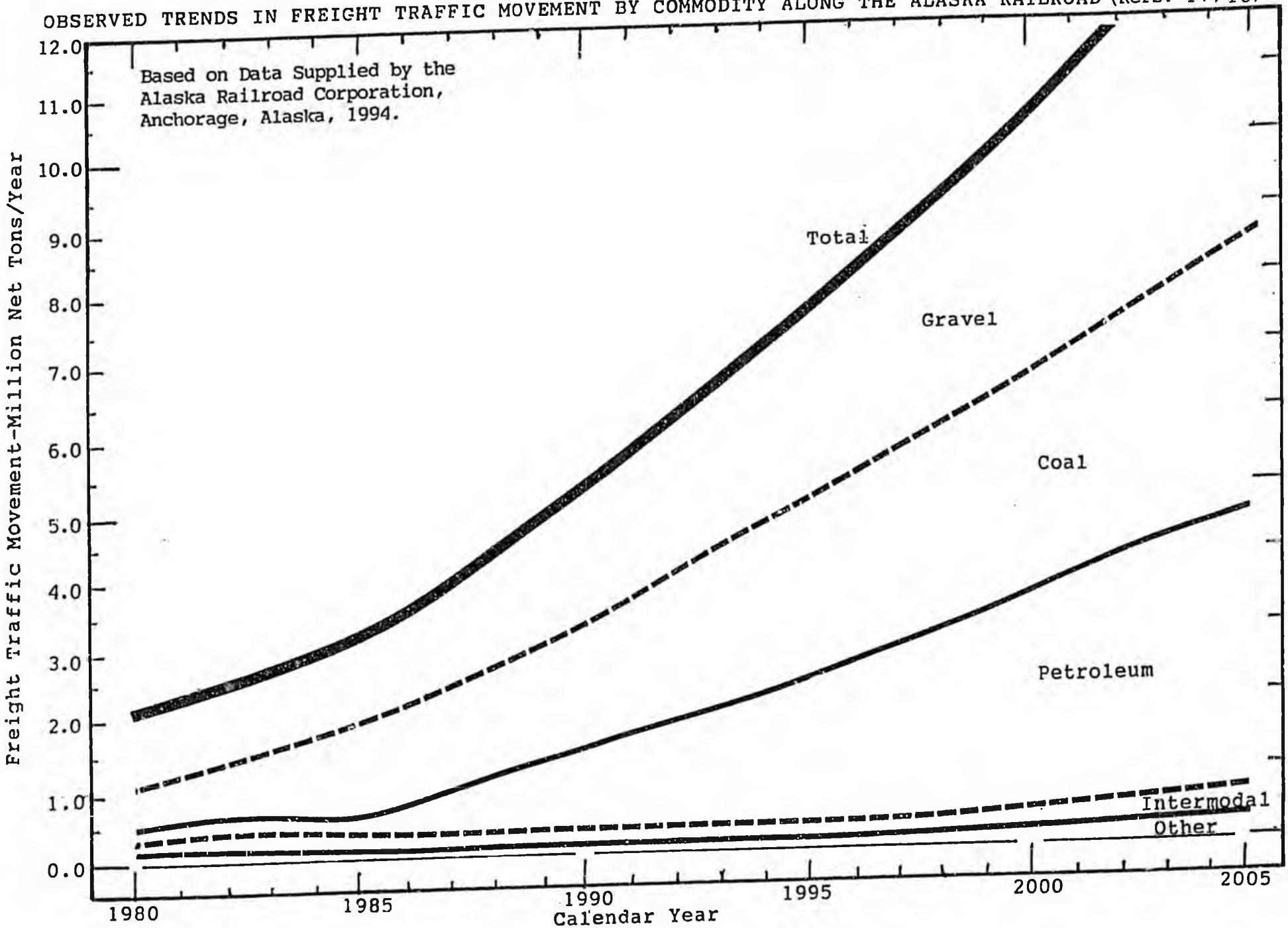
Table 2

TRAFFIC LEVELS AND REVENUE LEVELS FOR THE ALASKA RAILROAD IN 1991 (REFS. 18, 19

Specific Commodity	Freight Traffic Level-Million Net Short Tons/Year		
	Haul Distance Miles	Quantity Tons/Year	Revenue $/Year
Petroleum	356	1,400,000	$19,000,000
Coal	358	1,600,000	$12,000,000
Intermodal	356	200,000	$6,500,000
Gravel	35	1,800,000	$3,000,000
Other	356	100,000	$7,500,000
SubTotal	-	**5,100,000**	**$48,000,000**
Passenger	515	471,217	$16,400,000
Leases	-	-	$4,000,000
SubTotal	-	**471,217**	**$20,600,000**
Total	-	-	**$68,600,000**

Figure 7

OBSERVED TRENDS IN FREIGHT TRAFFIC MOVEMENT BY COMMODITY ALONG THE ALASKA RAILROAD (Refs. 17,18).



extend from Prince George to the North to Fort Nelson and to the Northwest at Jackson near Dease Lake, as shown in Figure 8. There is also a branch line to the coal mine at Tumbler Ridge, British Columbia which is electrified, and handles 5 million tons per year of coal.

There is a connection from the British Columbia Railway to the Canadian National Railway at Prince George with a line to Prince Rupert. There are also connections to both the Canadian Pacific and Canadian National Railways at Edmonton in Alberta from which connections to the Midwestern and North Central United States can be made by way of Montana, North Dakota and Minnesota. There is a recently privatized branch line from Peace River in northern Alberta to Fort Resolution in the Northwest Territories and from Edmonton to McMurray in the Athabasca tar sands region from north of Edmonton.

The British Columbia Railway carried 17.9 million net short tons (16.2 million metric tons of cargo in 1997, a 6.15 percent increase over 1996 with an average haul of 300 miles (480 km). The total revenues of the British Columbia Railway were approximately $275 million U.S. in 1997, a 1.91 percent increase over 1996. The net income of the British Columbia Railway was $50 million U.S. in 1997, a 10.7 percent increase over 1996 (Ref. 22).

The British Columbia Railway operates two lines, which may serve as useful interconnections to the Alaska Railroad. The 450-mile (720-km) long single-track line from Chetwynd to near Dawson Creek to Fort Nelson would serve as the access line to Edmonton and the Midwestern and Eastern United States. The 500-mile line (800-km) from Prince George to Summit Lake and Fort St. James along Takla Lake has a single track for 300 miles (480 km) to Chipmunk. The rail line has only bridges and grades with no tracks for the final 200 miles (320-km) to Dease Lake.

The Fort Nelson branch line through the Peace River Valley presently hauls grain, wood, oil, other minerals and foods and equipment with 2 to 4 trains per day. The Dease Lake line typically has one to two trains per day and handles almost exclusively logs for the pulp and paper mills at Prince George. The Fort Nelson line handles an estimated annual traffic flow of 3.5 to 7.5 million short tons (3.2 to 6.8 million metric tons) per year while the Dease Lake line handles 1.5 to 2.5 million short tons (1.35 to 2.25 million metric tons) per year of freight. The total freight traffic flow on the two lines is between 5.0 and 10.0 million short tons (4.5 to 9.0 million metric tons) per year, which approximates that of the Alaska Railroad.

The connection of the Alaska Railroad and the British Columbia Railway will require the construction of 880 miles (1,410 km) from Eielson to Dease Lake at a minimum. The connection of the two railroads between Eielson and Fort Nelson will require the construction of a total of 1,180 miles (1,895 km) of trackage. The connection of the Alaska Railroad at Eielson with the British Columbia Railway at both Dease Lake and Fort Nelson will require the construction of 1,360 miles (2,185 km) of track. The total estimated capital cost of constructing the entire railway connections is between $6.9 and $4.7 billion U.S. (Ref. 23).

The estimated route distances for the various railway line segments to connect the Alaskan and Canadian railway systems are listed in Table 3. The illustrations of the individual route distances for the interconnection of the Alaskan, Canadian and American railway networks is illustrated in Figure 9. It will then be possible to have trains running between Alaska and the United States

Figure 8

NETWORK CONFIGURATION OF EXISTING RAILROAD LINES IN ALBERTA AND BRITISH COLUMBIA (Ref. 16).

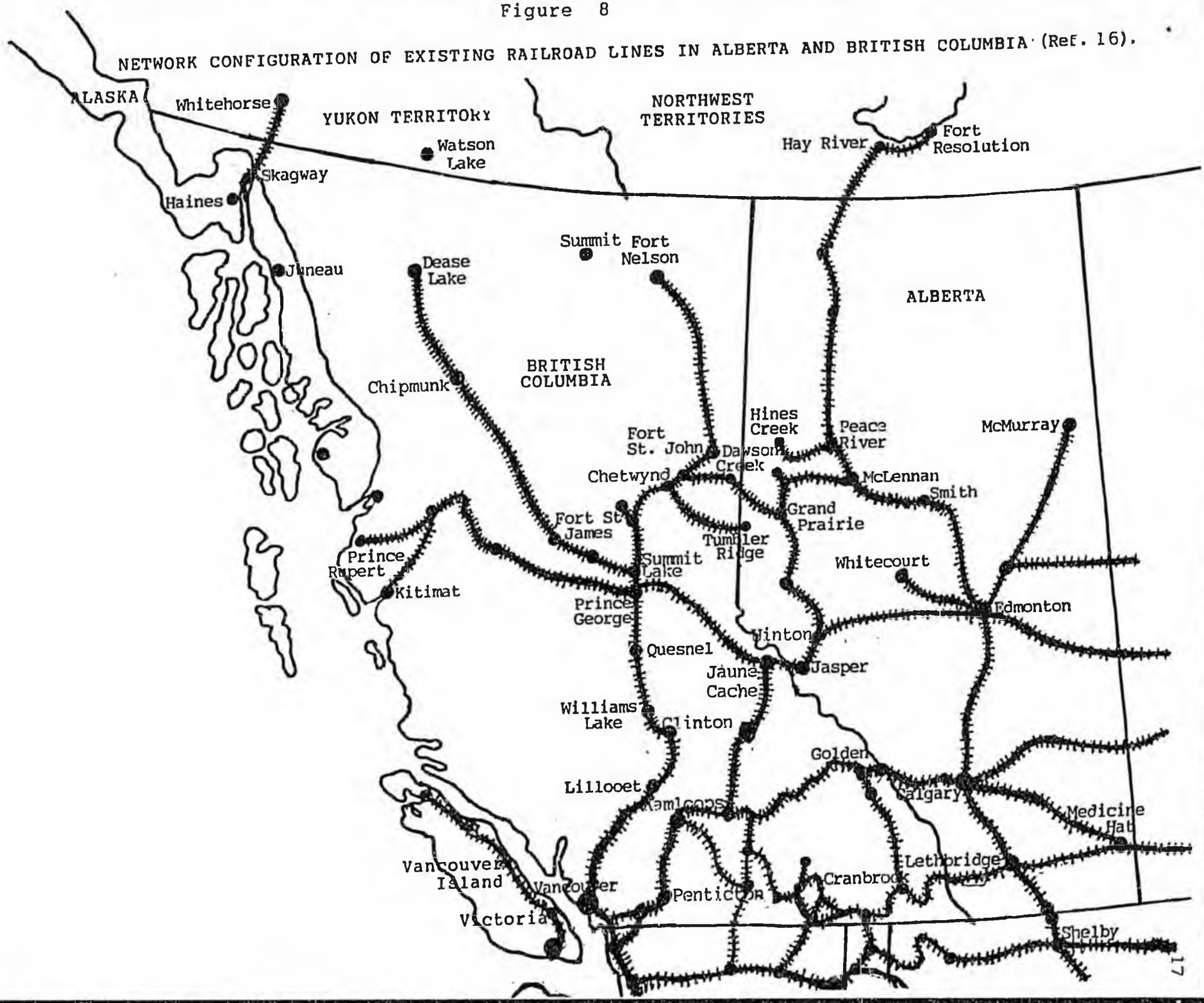


TABLE 3

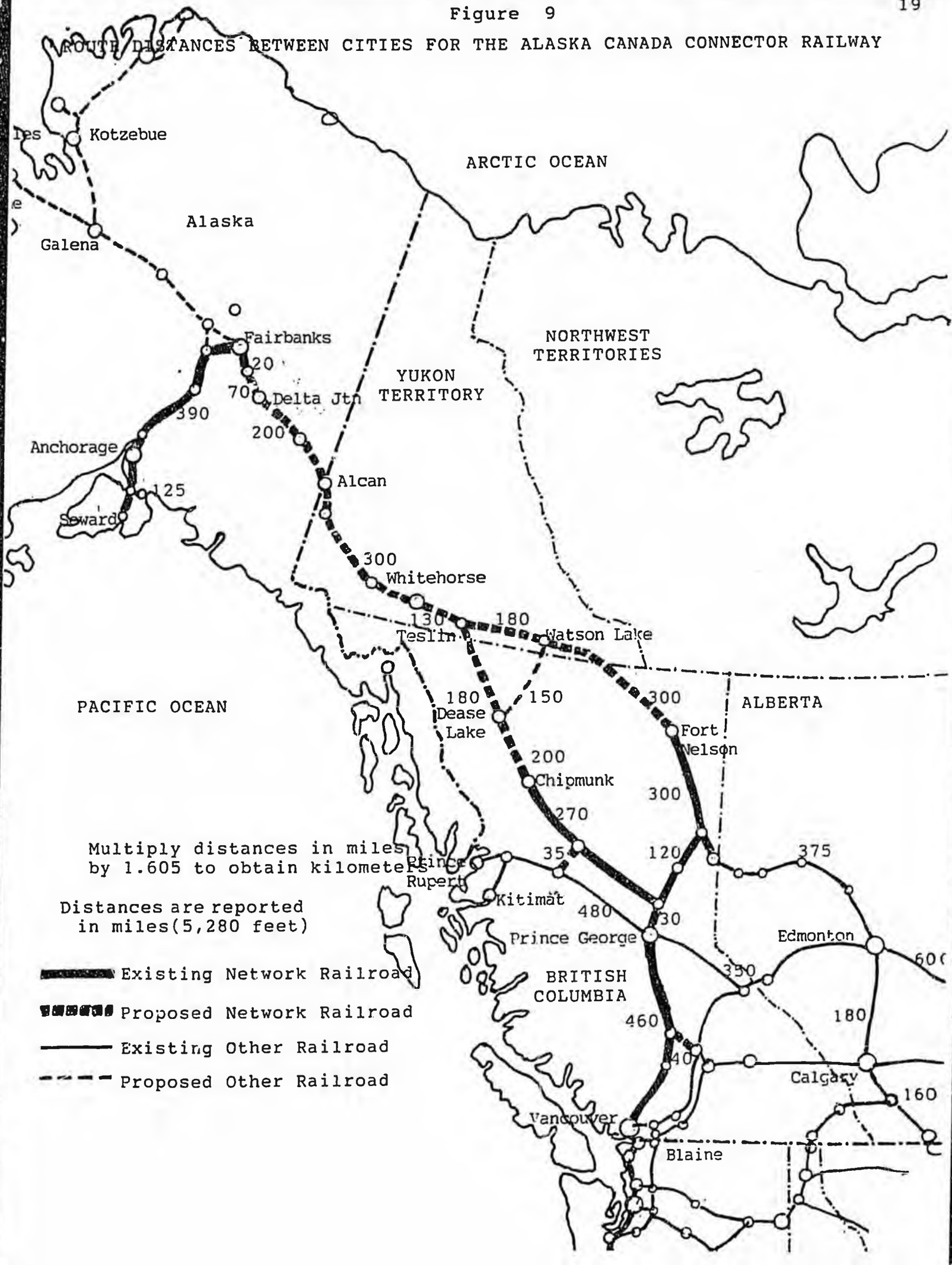
ESTIMATED ROUTE DISTANCES FOR RAILWAY CONSTRUCTION IN THE STATE OF ALASKA, THE YUKON TERRITORY AND THE PROVINCE OF BRITISH COLUMBIA (REF. 24)

Segment Category	Route Segment By City Pair	Route Distance		Affected Railroad	Present Status
		Miles	Kilometers		
Alaska-Canada	Fairbanks to Eielson	20	32	ARR	Existing
	Eielson to Delta Junction	70	113	ARR	Proposed
	Delta Junction to Alcon	200	320	ARR	Proposed
	Alcon to Whitehouse	300	480	TBD	Proposed
	Whitehouse to Teslin	130	210	TBD	Proposed
Dease Lake Connector	Teslin to Dease Lake	180	290	TBD	Proposed
	Dease Lake to Chipmunk	200	320	BCR	Graded
	Chipmunk to Summit Lake	270	435	BCR	Existing
	Summit Lake to Prince George	30	48	BCR	Existing
Fort Nelson Connector	Teslin to Watson Lake	180	290	TBD	Proposed
	Watson Lake to Dease Lake	150	240	TBD	Proposed
	Watson Lake to Fort Nelson	300	480	TBD	Proposed
	Fort Nelson to Chetwynd	300	480	BCR	Existing
	Chetwynd to Summit Lake	150	240	BCR	Existing
	Summit Lake to Prince George	30	48	BCR	Existing
Washington Connector	Prince George to Prince Rupert	480	770	CNR	Existing
	Prince George to Vancouver	460	740	BCR	Existing
	Vancouver to Blaine	30	48	BNSF	Existing
Montana Connector	Chetwynd to Edmonton	525	845	CNR	Existing
	Edmonton to Sweetgrass	340	545	CPR	Existing
	Prince George to Edmonton	350	560	CNR	Existing
North Dakota Connector	Edmonton to Saskatoon	250	400	CPR	Existing
	Saskatoon to Regina	130	210	CPR	Existing
	Regina to Portal	150	240	CPR	Existing
Alaska Railroad	Seward to Anchorage	120	195	ARR	Existing
	Anchorage to Fairbanks	415	665	ARR	Existing
	Fairbanks to Eielson	20	32	ARR	Existing

Abbreviations: ARR – Alaska Railroad; BCR – British Columbia Railway; CNR – Canadian National Railway; CPR – Canadian Pacific Railroad; BNSF – Burlington Northern Sante Fe Railroad; TBD – To be Determined.

Figure 9

ROUTE DISTANCES BETWEEN CITIES FOR THE ALASKA CANADA CONNECTOR RAILWAY



through Canada in an uninterrupted way. The commodities which could be hauled on this extension of the North American railway network, is the subject of the remainder of this paper.

ENERGY

Energy is a matter of critical concern with regard to the construction of the proposed railroad between Alaska, Canada and the Lower 48 States for several reasons. The United States is the World's largest consumer of energy, where Alaska has the Nation's largest untapped reserves of energy. The hauling of crude oil, petroleum products, natural gas or gas liquids and coal can be done either by the railroad itself or by parallel gas or oil pipelines. The future development of energy resources in either Alaska or northwestern Canada will require the transport of large amounts of equipment and materials for the energy production facilities and the required pipelines plus the provisions for workers at the production sites.

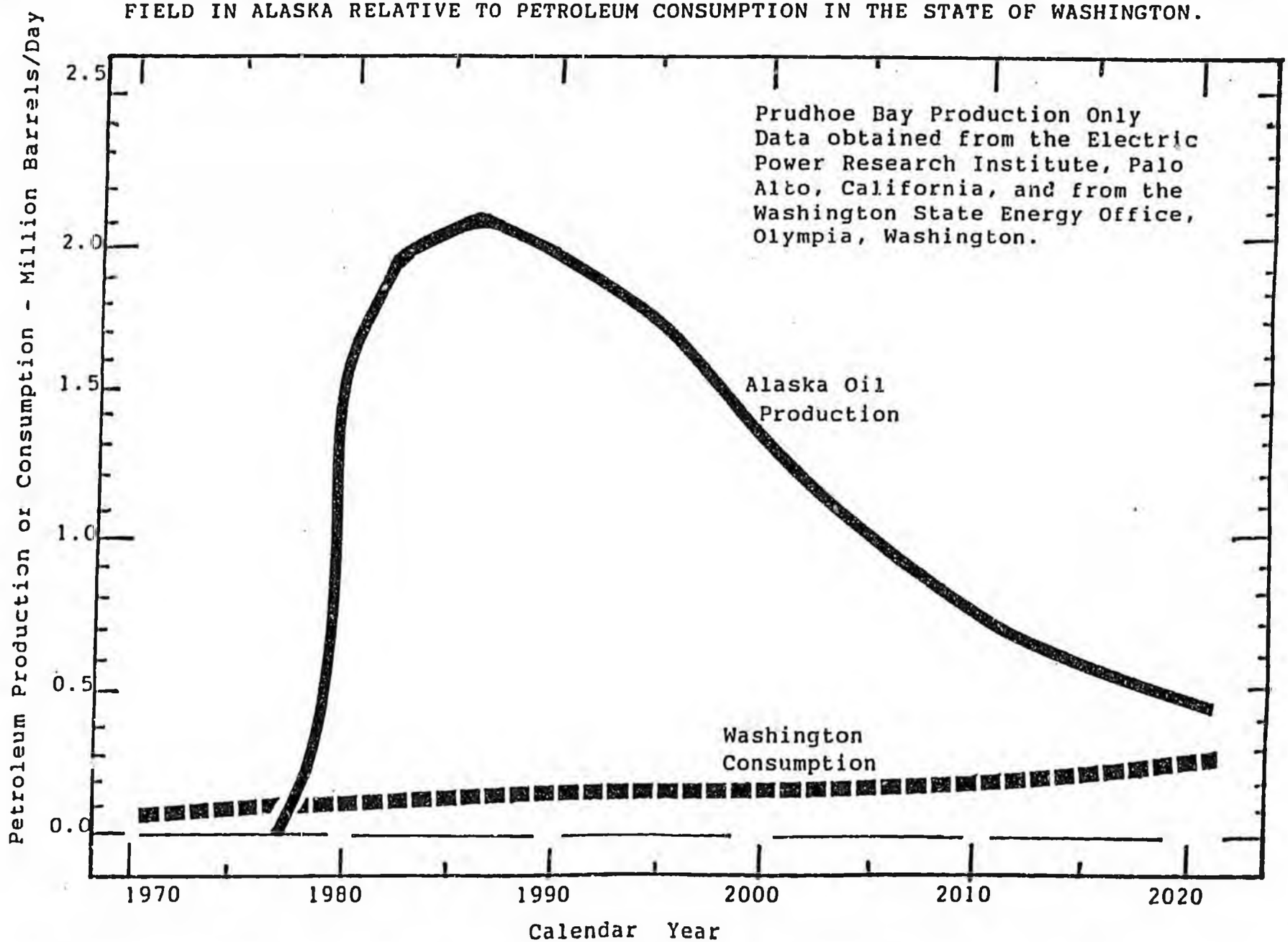
One of the main products being shipped by railroad in Alaska at the present time over the Alaska Railroad is either crude oil or petroleum products. The North Slop oil field at Prudhoe Bay has been the major oil producing field in Alaska since the late 1970's, which has taken up the slack in oil production in Texas by increasing oil production in Alaska, at least until recently. However, even the large Prudhoe Bay field in Alaska is now beginning to decline as well, as shown in Figure 10. The production out of the Prudhoe Bay field has declined from 2.1 million barrels per day (111 million metric tons per year) at its peak to 1.9 million barrels per day (101 million metric tons per year) in 1990 to 1.8 million barrels per day (95 million metric tons per year) in 1993.

There is also approximately 100,000 barrels per day produced from other oil fields in Alaska as well, which are located on the Kenai Peninsula of far southern Alaska for approximately 5.3 million metric tons per year. There is a large oil field adjacent to the Southwest of the existing Prudhoe Bay field of approximately equivalent size in the National Strategic Petroleum Reserve. There is also a large oil field within the Arctic National Wildlife Refuge (ANWR) to the East of the existing Prudhoe Bay field. The field to the Southwest of Prudhoe Bay could be developed under present conditions. However, it would probably be very difficult to develop the ANWR field to the East of Prudhoe because of environmental restrictions in a wildlife refuge area. The total untapped oil reserves in Alaska are in the range of 10 to 20 billion barrels or more or between 1.3 and 2.5 billion metric tons per year.

The limiting constraint to the future development of both petroleum and natural gas from the Prudhoe Bay area of the North Slope of Alaska may well be transportation in addition to environmental restrictions. The existing crude oil pipeline from Prudhoe Bay to Valdez is beginning to suffer from increasing maintenance problems because of electrolysis requiring greater cathodic protection. The Alyeska crude oil pipeline is also suffering increasing maintenance problems resulting from greater pump and pipe wear. The result is the necessity to periodically curtail oil throughout or to build bypasses in certain sections to correct these problems. There has also been a large oil spill on Prince William Sound in 1989 as well as smaller oil spills in recent years. These problems are expected to continue into the foreseeable future to at least some extent.

Figure 10

OBSERVED AND EXPECTED TRENDS IN TOTAL CRUDE OIL PRODUCTION FROM THE PRUDHOE BAY FIELD IN ALASKA RELATIVE TO PETROLEUM CONSUMPTION IN THE STATE OF WASHINGTON.



The result is that the existing Prudhoe Bay pipeline may not be able to handle the future crude oil flow requirements if the other field is developed from the area. As a result, there may be a need to develop additional transportation facilities for bringing crude oil out of the Prudhoe Bay field. The construction of a railroad line from Prudhoe Bay to Fairbanks to connect with the proposed Bering Straits connecting railroad would make it possible to transport crude oil to Washington, Montana and Minnesota over land without any pipeline maintenance problems. The needs for crude oil by refineries in the Midwestern and Eastern United States could then be readily met without any possibility of the reoccurrence of marine oil spills at Valdez on Prince William Sound, at Ferndale or Anacortes on Puget Sound or elsewhere.

There is also the need to build a natural gas pipeline out of the Prudhoe Bay area. The previous idea was to build the pipeline to Valdez and load liquefied natural gas onto ships for transport to major use points. However, the loading and unloading of liquefied natural gas may present some added safety risks and certainly adds some increased costs. A better alternative may be to build a natural gas pipeline from Prudhoe Bay to Fairbanks and then parallel to the proposed connecting railroad from Alaska through Canada to the Lower 48 States, as has been previously discussed.

The need for developing natural gas resources in Alaska and transporting them to the Lower 48 States is made especially great because of the expected growth in its use. Natural gas has been designated as the "environmental fuel of choice" by the Clinton Administration, and as a result its use is expected to grow by at least five percent per year over the next few years. Natural gas consumption has increased from 20 trillion cubic feet per year (565 billion cubic meters per year) in 1990 to 23 trillion cubic feet per year (650 billion cubic meters per year) in 1993 and is expected to reach 30 trillion cubic feet in 2000 as shown in Figure 11.

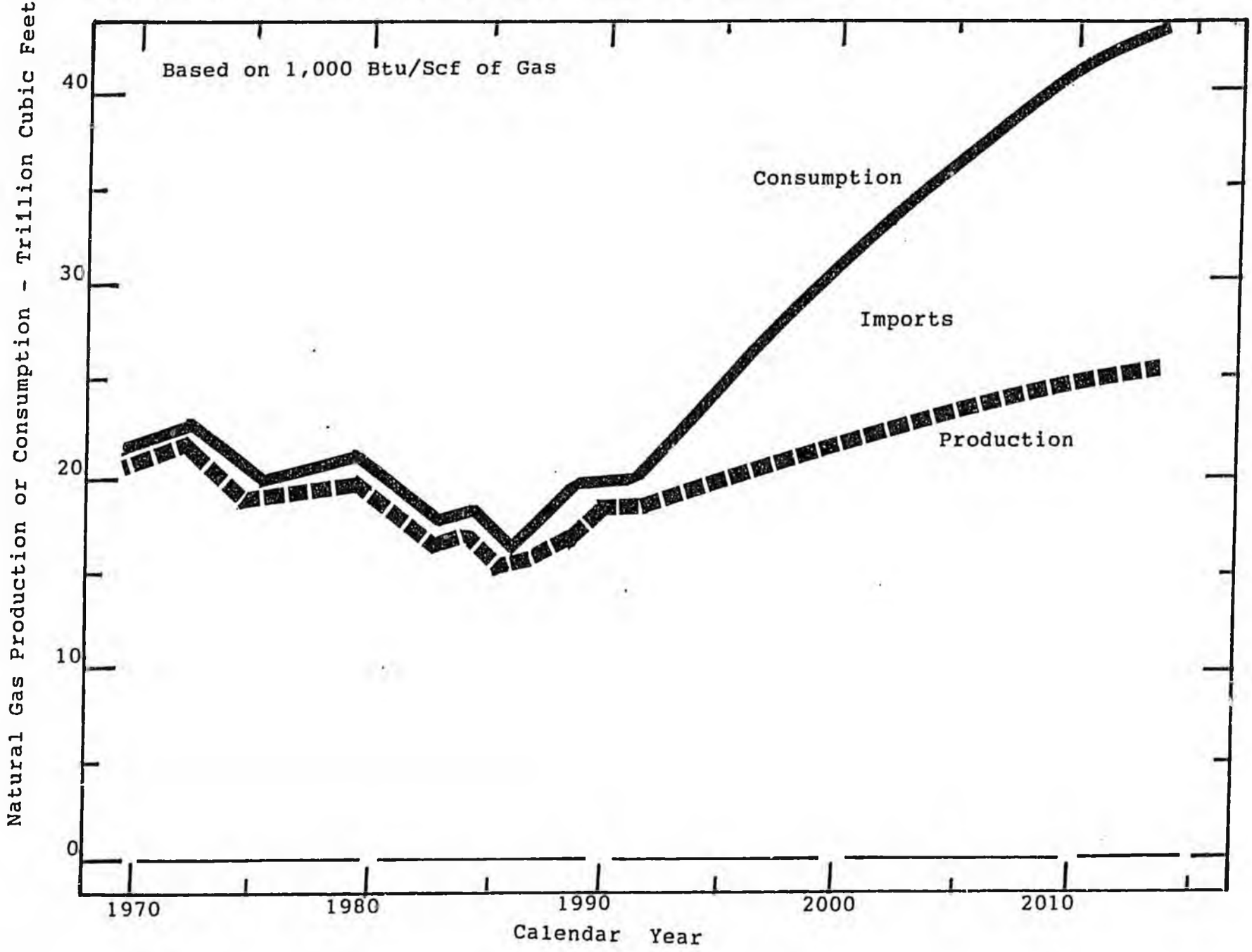
Natural gas consumption is expected to increase to 32 trillion cubic feet per year (905 billion cubic meters per year) by 2000 and 41 trillion cubic feet per year (1,160 billion cubic meters per year) in 2010 if present trends continue. Unfortunately, domestic natural gas production from the Lower 48 States is estimated to only increase from 18 trillion cubic feet per year (510 billion cubic meters per year) in 1990 to 25 trillion cubic feet per year in 2010. The result is that the amount of natural gas, which will need to be imported from outside of the Lower 48 States or from new fields is expected to increase from one trillion cubic feet per year (28 billion cubic meters per year) in 2000 to 20 trillion cubic feet per year (565 billion cubic meters per year) in 2010.

The potential sources for importing natural gas from other countries are more limited than for crude oil because of the need for cryogenic cooling, the safety concerns of storing and transporting liquefied natural gas, and the additional expense involved. As a result, the practical options for large-scale importation of natural gas are limited to pipeline transport from Mexico or Canada at the present time. The location of a natural gas pipeline parallel to the proposed Alaska connecting railroad would make it possible to transport natural gas from Alaska to the Lower 48 States or even from Canada on an enhanced economical basis.

The United States is the World's greatest energy consumer and is also the World's greatest energy importer. The United States consumes large amounts of petroleum, which is primarily used for transportation. The United States imported more than half of its total petroleum consumed this past year. The petroleum production in the United States is expected to continue

Figure 11

EXPECTED TRENDS IN NATURAL GAS PRODUCTION AND CONSUMPTION IN THE UNITED STATES



to decline while its consumption is expected to continue to increase, as shown in Figure 12 (Refs. 26, 27). Alaska has the greatest known reserves of untapped domestic petroleum in the United States, which reason and logic say need to be developed in order to reduce imports.

The United States has very limited amounts of oil and gas resources, but very large reserves of coal, as listed in Table 4 (Ref. 26) and illustrated in Figure 13 (Ref. 27) There are very large coal reserves located in Alaska, as shown in Table 5 (Ref. 28). There is a large coal field at Beluga on the Kenai Peninsula in Southern Alaska, which could be utilized, plus the Nenana field near Fairbanks in Central Alaska. There is another large coal field in the Colville Valley of Northwestern Alaska with a high heating value, which could also be developed in the future. The Arctic Slope low sulfur coal reserves of 20 billion metric tons or more are one of the World's largest deposits, but is limited in terms of development by transportation (Ref. 28). The coal reserves in Alaska constitute 20 to 25 percent of the total for the entire Nation and are between 500 billion and one trillion metric tons in magnitude (Ref. 29).

The Alaska coals tend to be of the bituminous and subbituminous grades with some lignites. The coal in Alaska tends to be very low in sulfur content with a minimal air pollution potential. The coal in the Colville Valley is high in heating value to make it desirable as either a utility or industrial fuel. Some of this coal has properties, which make it suitable for metallurgical coking as well as for utility steam coal. The coals from Alaska would have a particularly suitable market in Japan and Korea for steelmaking, as well as those from British Columbia, where these countries tend to have very little coal reserves of their own.

The expected coal use in Japan, Korea and Taiwan alone is expected to increase from 80 million metric tons per year in 1990 to 200 million tons per year by 2010. Some of this coal could be provided from Alaska and Siberia in the future. However, a considerable amount would still be expected to come from Australia, as it is generally the price leader for the Pacific region in terms of the present export market. There are presently about 700,000 short tons (600,000 metric tons) of coal shipped from the Usibelli mine near Healy to Seward over the Alaska Railroad and then by ship to Korea for use in electric power generation. There is also approximately 4.3 million short tons (3.9 million metric tons) of high grade bituminous coal shipped from the Tumbler Ridge mine in northeastern British Columbia by the British Columbia Railway to Vancouver for export to Japan and elsewhere in Asia.

One solid bulk energy fuel, which could be hauled on the connecting Alaska-Canada railroad is coal. As previously noted, Alaska has very large available resources of both utility steam coal and metallurgical coking coal. The State of Alaska is presently exporting approximately 0.75 million short tons per year of low sulfur coal to Korea to the Korean Electric Power Company. This coal is mined at the Usibelli mine near Healy to the South of Fairbanks and then transported on the Alaska Railroad to Seward. The coal is then loaded onto ships and taken to Korea for electric power generation. There is also another 0.75 million short tons per year hauled on the Alaska Railroad to local power plants in Alaska , which operated by local electric utilities, private industries, native corporations, and by the U.S. military bases.

The present coal hauling on the British Columbia Railway is 5.3 million short tons per year (4.8 million metric tons) from the Tumbler Ridge mine near Dawson Creek to Vancouver for export to

Table 4

COMPARISON OF TOTAL ENERGY RESERVES AND CONSUMPTION PATTERNS IN THE UNITED STATES IN 1991 (REF. 26)

Energy Resource	Total Energy Resources		Annual Energy Consumption	
	10^{15} Btu	% of total	10^{15} Btu/Year	% of total
Coal	75,000	61.7%	18.9	23.4%
Nuclear	46,000	37.8%	6.2	7.7%
Oil	350	0.3%	33.5	41.4%
Gas	300	0.2%	19.3	23.8%
Hydro	-	-	2.9	3.6%
Renewable	-	-	0.1	0.1%
Total	**121,650**	**100.0%**	**80.9**	**100.0%**

Table 5

ESTIMATES OF POTENTIAL COAL RESOURCES IN ALASKA (Ref. 28)

Coal Field	Measured Million Tons	Identified Million Tons	Potential Million Tons
Beluga	500	10,000	30,000
Nenana	175	6,200	9,500
Bering River	60	110	3,500
Wishbone Hill	40	120	350
Chickaloon	3	25	100
Anthracite Ridge	1	5	50

Figure 12

PAST, PRESENT AND FUTURE TRENDS IN PETROLEUM CONSUMPTION AND PRODUCTION IN THE UNITED STATES

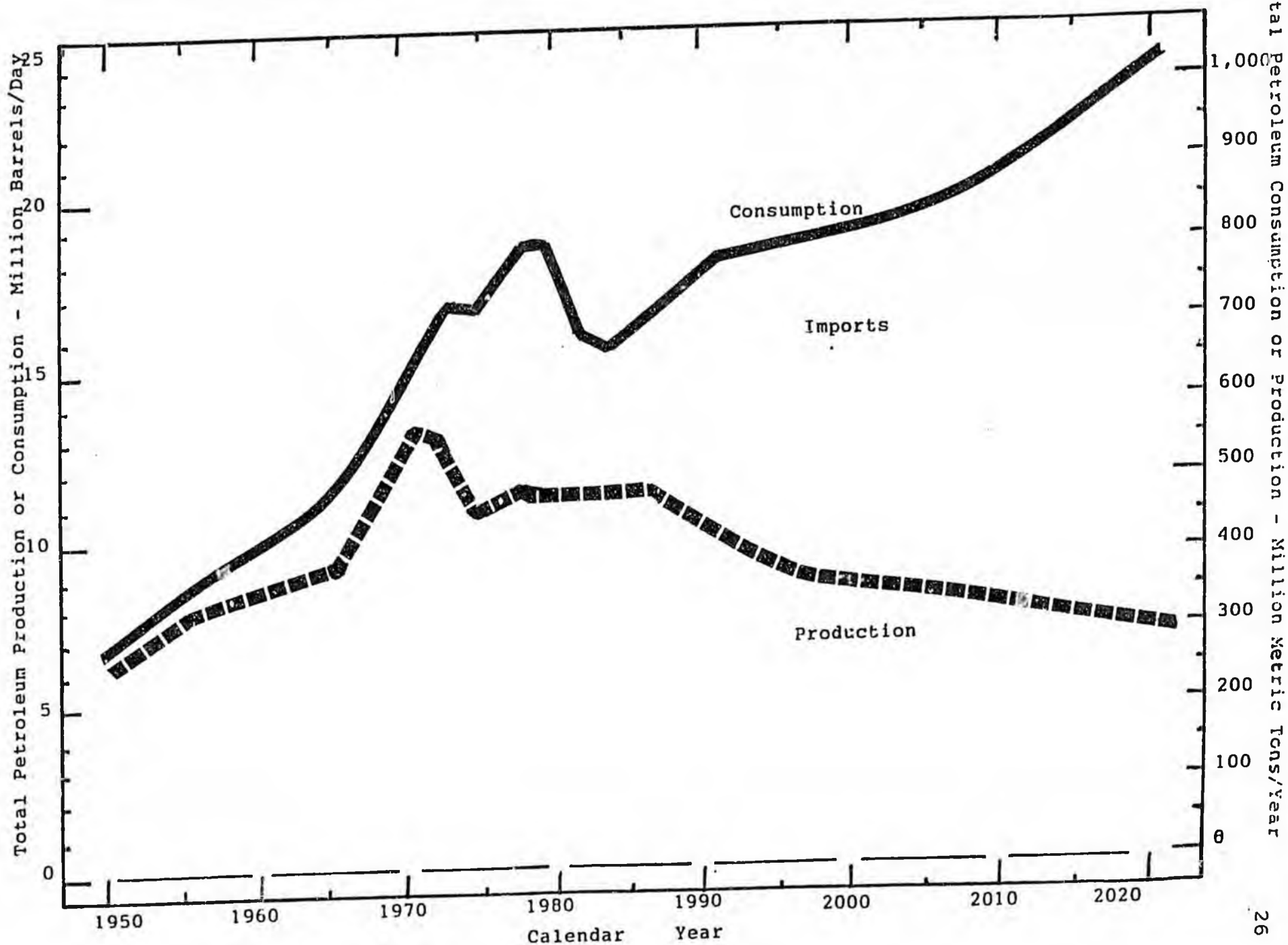
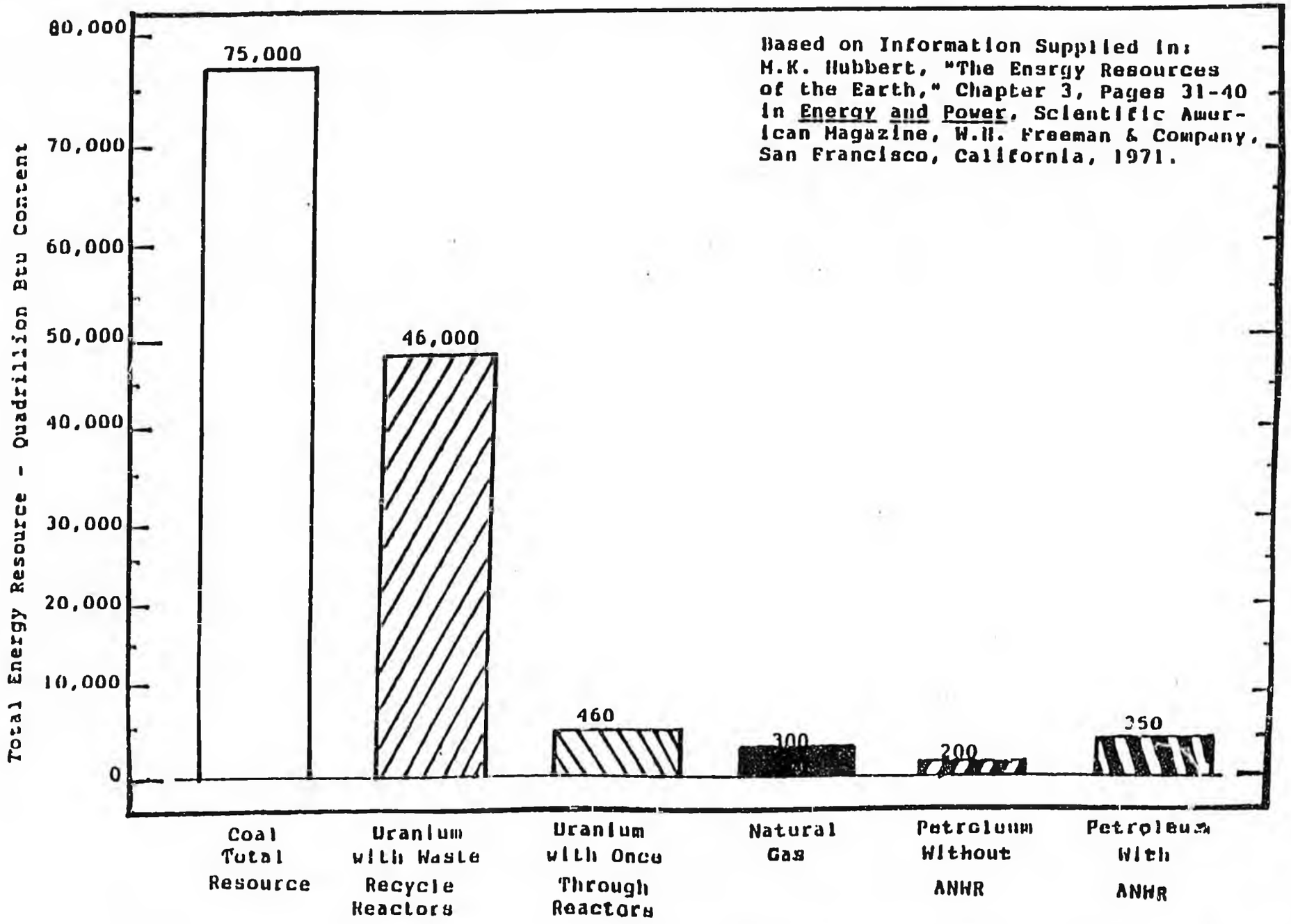


Figure 13

KNOWN TOTAL ENERGY RESERVES BY FUEL TYPE IN THE UNITED STATES IN QUADRILLION BTU.



Japan, Taiwan and Korea. This amount of coal hauled is expected to decrease to 3.3 million short tons per year in 2000 (3.0 million metric tons) with a reduction in purchases for metallurgical coking coal for steel production in Asia. Other uses need to be found for this coal.

There is a good possibility that coal exports from Alaska could significantly increase in the future, as shown in Table 6 (Ref. 29). Coal exports from Alaska were projected to increase from 0.8 million tons in 1990 to 2.0 million tons after 1995 and to 5.5 million tons after 2000. This coal could be transported by means of the Alaskan and Canadian rail lines to Asia for use in Japan, Korea, Taiwan and elsewhere in Asia. It is possible that coal could be shipped by rail from Alaska or Northwest Canada to the Lower 48 States, but it is unlikely in the near term because of the large coal reserves available in the Rocky Mountain States. The amount of coal which could be shipped over the connecting Alaska-Canada railroad lines is estimated as 5 to 15 million tons per year which represents approximately 5 to 15 percent of the present U.S. coal exports to other countries, as shown in Table 7.

Crude oil is another bulk commodity that could be shipped in large quantities from Alaska or Canada via the connecting Alaska-Canada railroad project to the Lower 48 States of the United States for processing. The development of the new oil fields adjacent to the existing Prudhoe Bay field could yield a production of at least 1.5 million barrels per day (80 million metric tons per year) of crude oil. At least some of this crude oil could be hauled by rail to the Lower 48 States of the United States from Alaska by way of the new railroad line from Prudhoe Bay to Fairbanks.

The shipments of crude oil could be made by means of tanker unit trains from the producing fields to the refining centers. The development of oil fields near Prudhoe Bay and in the Peace River Basin and elsewhere in Alberta could lend themselves to long distance shipments of crude oil by tank car to the Lower 48 States if the United States. It might also be possible to ship refined products in the reverse direction or even petroleum products from the refineries in Alaska to online communities along the railroad line. Oil shales and tar sands could even be shipped by rail from deposits to refineries in Alberta, but are generally processed at the local mine sites.

The present level of petroleum-related shipments along the British Columbia Railway and the Alaska Railroad is approximately 4 to 5 million short tons per year for both crude oil and petroleum products in combination. It is estimated that the potential market for petroleum shipments is 5 to 10 million short tons per year using conservative growth projections. It is possible that as much as 10 to 15 million short tons per year of crude oil and petroleum products could be shipped over the connecting Alaska Canada railroad upon its completion if a higher growth rate assumption is employed as the basis for making estimates.

Another commodity which could be shipped by rail along the Alaska-Canada connecting rail line is natural gas. The natural gas could be liquefied at elevated pressures and very low temperatures and placed in tank cars for long distance shipment while avoiding the need for additional pipeline construction. There is a potential safety hazard in passing through the tunnel because of the possibility, however remote, of a leak and explosion. An alternative form of natural gas transport would be as a methane-hydrate complex where water and methane have been found to produce solid snow-like matrices at supercooled temperatures and very high pressures such as occurs in permafrost zones (Ref. 30). Pipelines are the more likely means of natural gas transport.

Table 6

EXPECTED COAL EXPORT TRENDS IN ALASKA (REF. 29)

Calendar Year	Freight Traffic Level - Million Net Short Tons/Year		
	Minimum	Medium	Maximum
1980	-	0.00	-
1984	-	0.15	-
1990	-	0.75	-
1992	-	0.65	-
1995	0.80	1.00	2.00
2000	0.00	5.00	5.50
2005	0.00	7.00	10.00
2010	0.00	11.00	15.00
2020	0.00	20.00	30.00
2030	0.00	30.00	30.00

Table 7

EXPECTED MARKETS FOR FUTURE ALASKAN COAL EXPORTS (REF. 29)

Coal Importer	Total Coal Exports - Millions Tons/Year				
	1990	1995	2000	2005	2010
Japan	-	1.00	1.60	2.10	2.60
Korea	0.80	0.80	1.20	1.70	2.20
Europe	-	0.20	0.50	1.00	1.50
Mexico	-	-	-	0.50	1.50
Lower 48	-	-	-	0.50	1.00
Synthetic Oil	-	-	2.00	4.00	6.00
Other	-	-	0.20	0.20	0.20
Total	**0.80**	**2.00**	**5.50**	**10.00**	**15.00**

There have been no estimates made of natural gas shipments along the proposed Alaska-Canada connecting railroad line. However, it is possible that the magnitude of these natural gas shipments could become equivalent to those of petroleum if it were to become economical to ship methane-hydrate supercooled solid materials in the future. Once a more realistic basis, the need for equipment for natural gas gathering systems with processing plants at the wellheads plus pipeline transmission could be substantially benefited by having access to transport by the proposed Alaska-Canada connecting railroad with parallel pipelines. The recovery of seam gas from coal fields is a logical part of coal development.

COMMODITIES

There are a large number of commodities which are or can be moved over the Alaska Railroad and the British Columbia Railway. The previous Alaska Transportation Systems Planning Study (Ref. 31) by the University of Alaska divided rail cargo movements into the six categories of bulk liquids, bulk solids, machinery and metal products, forest products, food products and general cargo. The major commodities moved over the Alaska Railroad were reported to be rock, sand and gravel plus coal and petroleum products, intermodal trailers and containers, and others. The major commodities moved over the British Columbia Railway include forest products, grain, petroleum products, food and machinery to provide a frame of reference.

The ultimate economic viability of the proposed Alaska connecting railroad project will be determined by its ability to move goods between Alaska and Canada and the Lower 48 States in a cost competitive and time efficient manner. The traffic levels for cargo movements into and our of the various marine ports in Alaska have been presented in Table 8 (Ref. 32). The movement of these commodities through these ports gives an indication of the types of movements of materials, which could be expected to be hauled on the Alaska to Canada connecting railroad line. The major commodities noted include petroleum, metals, fish, chemicals and forest products. The commodities, which can be moved, are separately categorized as bulk commodities and specialty materials.

The major commodities moved by the Alaska Railroad include petroleum, coal, gravel and intermodal freight. A study was previously conducted in 1979 by the University of Alaska to determine commodity movements if a railroad link were constructed from Alaska through Canada to the Lower 48 States (Ref. 30). The major commodities identified which could be transported included petroleum, coal, machinery, forest products, food products and general cargo, as shown in Table 9. The amounts of material, which could be hauled by means of this railroad link, were listed as being only on the order of one million tons per year, which alone would mot be able to justify the cost of construction. However, the cargo traffic volumes reported in this study of approximately 1.2 million short tons per year (1.1 million metric tons) were well below the 5.1 million short tons per year in 1991 (4.6 Million metric tons per year).

This study also made a determination of the impact of building a railroad link from Alaska to the Lower 48 States upon road and rail traffic in Alaska upon its existing infrastructure. Without a rail link to the Lower 48 States, the rail traffic would increase from 435 million met ton-miles per year to 483 million net ton miles per year between 1992 and 2000, as shown in Table 10. The

Table 8

CARGO TRAFFIC LEVELS FOR THE ALASKAN PORTS (Ref. 32).

REGION	PORT	MILLION TONS/YEAR	MAJOR COMMODITIES
SOUTHWEST	Skagway	1.200	Copper, Lead, Zinc, Oil
	Ketchikan	2.200	Forest Products, Chemicals, Oil
WESTERN	Kodiak	0.600	Petroleum, Fish
	Unalaska	0.300	Petroleum, Fish
	Bethel	0.100	Petroleum, Fish
	Nome	0.075	Petroleum, Fish
SOUTH CENTRAL	Valdez	60.000	Petroleum
	Kenai	10.000	Petroleum, Chemicals
	Anchorage	2.000	Petroleum, General
	Whittier	0.300	Petroleum, Military
	Seward	0.150	Forest Products, Fish

Table 9

1979 ESTIMATES OF COMMODITY MOVEMENTS BY RAIL BETWEEN ALASKA AND THE LOWER 48 STATES (Ref. 31).

COMMODITY MOVED	TOTAL MOVEMENT - TONS/YEAR	
	1992	2000
BULK LIQUIDS (OIL)	110,000	152,000
BULK SOLIDS (COAL)	120,000	137,000
MACHINERY - METALS	159,000	213,000
FOREST PRODUCTS	52,000	59,000
FOOD PRODUCTS	221,000	315,000
GENERAL CARGO	293,000	401,000
TOTAL MOVED	955,000	1,277,000

Table 10

EXPECTED IMPACTS OF A RAIL LINK CONSTRUCTION

FROM ALASKA TO THE LOWER 48 STATES

ON ALASKA FREIGHT TRAFFIC AND POPULATION (Ref. 31).

CALENDAR YEAR	TRANSPORT MODE	NO RAIL LINK MILLION NTM/YEAR	WITH RAIL LINK MILLION NTM/YEAR
1992	Rail	435	877
	Highway	406	406
	Total	841	1,273
2000	Rail	483	974
	Highway	451	451
	Total	934	1,425
1992	Population	450,000	600,000
2000	Population	500,000	830,000

highway traffic would increase from 406 million net ton miles per year to 451 million net ton miles per year between 1992 and 2000 without this rail link. If the rail link were constructed the rail traffic would greatly increase from 877 to 974 million net ton miles per year between 1992 while the highway traffic would remain the same.

These results are based on information developed in 1979. In the meantime, the growth in traffic has raised the total shipments on the Alaska Railroad to above one billion met ton-miles per year in 1991. These values are well above the projected traffic figures even without a rail link o the Lower 48 States being completed. A major reason for this increase in traffic has been the growth in population of Alaska since the completion of the Alaska crude oil pipeline from Prudhoe Bay to Valdez. This population growth has resulted in an increase in economic activity with a resultant increase in freight traffic on the Alaska Railroad. There has also been a considerable growth in freight traffic on the British Columbia Railway over the past 10 years.

Forest products are one bulk commodity, which could be hauled by rail to the Lower 48 States from Alaska or Canada as either wood, pulp or paper. The amount of timber harvested in Alaska has been presented in Table 12, with values ranging from 5 to 22 million board feet per year (Ref. 33). The amount of timber harvested in Alaska could increase in the future to between 25 and 144 million board feet per year, as shown in Table 13. There has been a need for timber by lumber mills in Japan and Korea for many years because of their lack of available domestic resources. In addition, the decline of forest resources in the Pacific Northwest of the United States has given impetus to the need for importing outside timber from both Alaska and Canada by ship or rail to the Lower 48 States of the United States, especially to California and Texas.

The amount of forest products which could be shipped at least some segments of the connecting Alaskan and Canadian railroad system is estimated as much as 5 to 15 million tons per year. Alaskan or Canadian timber and partially finished lumber could be shipped to either the Lower 48 States by an all rail haul or to Japan and Korea in Asia from Seward or Prince Rupert. Timber or partially finished lumber from Alaska and Canada could be shipped to Japan, Korea, China and other countries in Asia and perhaps in limited quantities to the United States. There will also be large quantities of chips and wood wastes generated, which could be processed into pulp or used as fuel. The use of waste wood or even municipal refuse as fuel with rail shipments is also feasible, including burning in combination with coal in rural areas to provide electricity for local residences, businesses, and industries.

The problem with forest products in Alaska is that the proposed rail line would go through the northern interior while the main forests are located near the southeastern coast. The inland forests tend to be more slow growing and sparse in the colder drier climate, which could be readily harvested near the railroad. In British Columbia, the entire rail network is near forests, which tend to be faster growing in the more moist warmer climate. It is therefore suggested that the main emphasis on hauling forest products with the proposed new connecting railway line would be in Canada and not Alaska.

Mineral mining activities are a major concern for the construction of the proposed railway line between Alaska, Canada and the Lower 48 States. Gold mining is a matter of immediate interest, especially in the Pogo mining region near Delta Junction in Alaska. The amount of gold to be

TABLE 11

ESTIMATED FREIGHT AND PASSENGER TRAFFIC FLOWS ON THE ALASKA RAILROAD AND THE BRITISH COLUMBIA RAILWAY IN 1999

Transport Type	Commodity Hauled	British Columbia Railway		Alaska Railroad Company	
		Million Short Tons/Year	Percent of Total Use	Million Short Tons/Year	Percent of Total Use
Freight	Coal	5	25.0	2	18.0
	Petroleum	1	5.0	3	28.0
	Aggregate Rock	1	5.0	2	18.0
	Food Products	1	5.0	1	9.0
	Grain (Wheat)	2	10.0	0	0.0
	Metal & Machinery	1	5.0	0	0.0
	Forest Products	6	30.0	1	9.0
	Intermodal	2	10.0	1	9.0
	Other	1	5.0	1	9.0
	Total	20	100.0	11	100.0
Passenger	Passengers/Year	600,000	-----	160,000	-----
Distance	Haul Distance	305 Miles	----	205 Miles	----

Notes: 1. Data based on information from Reference 22.
2. Data based on information from Reference 19.

Table 12

ALASKA TIMBER HARVEST TRENDS IN THE NORTHERN AND SOUTHEASTERN REGIONS (Ref. 33).

CALENDAR YEAR	TOTAL HARVESTED - MILLION BOARD FEET/YEAR[1]		
	NORTHERN[2]	SOUTHEASTERN[3]	TOTAL
1980	3.6	1.9	5.5
1984	10.9	11.6	22.5
1985	9.8	1.7	11.5
1986	5.0	5.4	10.4
1987	8.7	2.2	10.9
1988	8.9	1.5	10.4
1989	12.5	1.9	14.4
1990	10.6	0.5	11.1
POTENTIAL	320	240	560

* Notes: 1. 4.0 Board Feet = 1.0 cubic foot
2. Includes the Fairbanks, Delta and Toll areas
3. Includes the Southern and Panhandle areas

Table 13

PROJECTED TRENDS IN ALASKA TIMBER HARVESTING FROM 1990 TO 2030

CALENDAR YEAR	TOTAL HARVEST - MILLION BOARD FEET/YEAR		
	MINIMUM	MEDIUM	MAXIMUM
1990	--	11.1	--
1995	6.0	25.2	51.0
2000	33.7	79.5	127.2
2010	45.3	85.0	144.0
2020	44.0	82.9	140.7
2030	45.9	78.0	123.2

* Note: 1. Assume ratio of 1/3rd row logs and 2/3rds wood chips
2. Assume a development ratio of 60% Northern and 40% Southern

transported is not large, but chemicals are required for processing, equipment and materials are required for mining, and provisions of food and other items are required for mining. It is also possible that gold mined from deposits adjacent to the proposed railway line could be used as a form of security collaterization for project financing of its construction. The estimated amounts of materials, which could be hauled along the railway line for gold mining, are between one and three million short tons per year.

Other mineral ores and products can be shipped along at least portions of the proposed Alaska Canada connecting rail route. Cements can be shipped as a construction material along with sand, rock and gravel and limestone, although generally only for short distances. There will be a need for hauling a number of metal and mineral ores from mines to processing plants as these resources become developed in the future. The magnitude of this market is estimated as being from 2 to 6 million short tons per year for bulk mineral ore transport.

One specific mineral, which might have considerable interest along the proposed Alaska Canada connecting railroad line, is that large iron ore deposits exist in the Yukon Territory and the Northwest Territories. The iron ore could be mined and taken to a future small steel mill to be located along the railway line. The coal required for coking and the limestone for fluxing could also be transported by the railroad from mine to mill, and the steel products transported, also by rail to customers. One possible application for such a steel mill could be to produce railroad rails and construction beams to support future economic development along the railroad line corridor in Alaska and Canada (Ref. 23). The expected total iron and steel traffic on the railway would be one to three million short tons per year.

The hauling of metals on the Bering Strait railroad line is another specialty material, which can be transported. Fabricated steel products and steel products can be shipped in both directions from Seward to Alaska or from the Lower 48 to States to Canada as the needs develop. Construction steel can be shipped over intermediate distances or over the entire route depending on the specific need. Metallic ores can also be shipped along the railroad line over shorter distances for processing in smelting plants and others such as the Red Dog zinc mine. It is expected that much of this traffic will originate in the mineral-rich zones of the Yukon and Northwest Territories.

It is estimated that the shipment of metal products and ores will comprise 2 to 5 million tons per year. Equipment and materials will need to be hauled along the railroad line in order to foster mineral mining and other economic development. The possibility that new oil and gas development could occur within a reasonable time frame would necessitate the movement of large amounts of piping, pumps, compressors and other machinery. The possible development of natural gas production with coal bed gas recovery could occur separately from oil development would require large amounts of piping and equipment. The equipment and machinery hauling could generate 2 to 5 million short tons per year of rail traffic for the Alaska-Canada connecting railroad.

Grain is a bulk commodity, which can be shipped, in large quantities from the United States and Canada to China, India, Russia and other countries in Asia. The grains, which could be shipped, include corn, barley and wheat, depending upon the use desired. The grain could be shipped from the Peace River area of northeastern British Columbia or from Alberta to the west through Prince

Rupert or Seward and then to the points of use. Existing markets and cars could be utilized in an extension of existing services to primarily interior market locations. The amount of grain which would be expected to be shipped via the Alaska-Canada connecting railroad is 3 to 8 million tons per year. This amount represents 3 to 8 percent of the present U.S. grain exports of almost 100 million short tons per year, and could be greatly increased if the Bering Strait tunnel were to be built.

Other agricultural crops could be shipped by rail such as potatoes or hydroponically grown vegetables or farm fish. Such facilities could be located at periodic intervals along the line with greenhouses and used for enhanced crop growing with carbon dioxide enrichment. The hauling of these specialty crops could add one to two million tons per year to the railroad traffic on the Alaska Canada connector line in both directions, and would be useful for small villages.

Food products can be shipped in both directions along the Alaska-Canada connecting railroad route. A particular market in at least the immediate term is from the Lower 48 States of the United States to Alaska, where much of it must be refrigerated due to perishability concerns. Fruits and vegetables and meats can be shipped by means of these refrigerated cars to Alaska or Canada from the United States. Dried food products can also be shipped by means of the Alaska-Canada connector railroad line from the United States to Alaska, Alberta, British Columbia and elsewhere in northwest Canada. This market is estimated as being from 2 to 6 million tons per year in magnitude for food products shipments in a northbound direction.

One specific type of agricultural operation, which may become increasingly common in Alaska and Northwestern Canada in the future are hog farms for pork production. The States of Colorado and South Dakota have recently passed ballot initiatives to restrict hog farm operations in their states because of nitrate water pollution and odorous air pollution. The location of these hog farms in remote areas of the Far North would act to minimize adverse environmental impacts as as to create employment opportunities in depressed regions.

Hog farms need to have extensive grain feed shipments plus chemical supplies. They also have the need to process and remove wastes as well as to ship the pork product to distant markets. It is estimated that 10 to 15 hog farms could be located in these remote communities along the Alaska-Canada connector railway line. These hog farms could create as much as 3 to 7 million short tons per year of freight traffic, and would generate large amounts of wastes for recovery.

A number of chemicals can be hauled along the Alaska-Canada connecting railroad line. These chemicals include basic industrial inorganics such as sulfuric acid, nitric acid and caustic soda in the liquid form as well as dry bulk chemicals such as sodium carbonate, limestone and titanium oxide pigments. There are a number of organic chemicals which could be hauled along the Alaska-Canada connecting railroad line in either direction which include ethylene from the plant in Red Deer, Alberta. There will be a need for these chemicals to be shipped to support the mining and mineral processing industries plus other industries to be located in Northwest Canada and to a lesser extent elsewhere in Alaska. The estimated magnitude of this market is 2 to 5 million tons per year for chemical shipments of organic and inorganic materials.

A related material to chemicals is fertilizers, which are needed to assist agriculture in East Asia and elsewhere. Potash is one fertilizer material, which can be shipped in bulk from Saskatchewan along with potassium sulfate and potassium nitrate. The economics of shipping these materials depends on the haul distance involved and their value at the point of use. It is expected that these fertilizers shipments would be primary from America to Asia, and that the magnitude of the materials shipped would be from 1 to 5 million tons per year for fertilizer shipments. A particular route would be potash shipments from Saskatoon, Saskatchewan to Edmonton, Alberta and Prince George to Prince Rupert British Columbia by rail for export to Asia by ship.

Intermodal freight traffic has been a major component of the growth in railroad freight traffic over the past few years in the United States. Intermodal freight traffic includes truck trailers as well as single stack or double stack containers. Intermodal freight traffic is bi-directional in nature as it can move from the Lower 48 States to Alaska or from Alaska and Canada to the Lower 48. There is no specific description of the contents of intermodal freight except that it is material, which is time-sensitive in terms of equipment or goods where speed of shipment is a necessity. The Alaska-Canada connector railway route may make it possible to ship cargoes between the various inland destinations entirely by land routing without having to offload or onload containers at the marine ports or Seward or Prince Rupert or Haines to reduce overall transport costs.

The rail intermodal shipments in the United States now exceed 10 million trailer and container units per year for a net weight exceeding 200 million tons and is increasing at more than 5.0 percent per year. The level of cargo shipments at the various ports on the West Coast of the United States now exceeds 200 million tons per year exclusive of crude oil, and is increasing at a rate of greater than 3.0 percent per year. The Pacific Rim trade is now the most rapidly growing in the World. Intermodal freight traffic could go between the United States, Canada, Mexico and Latin America in the Western Hemisphere to Japan, Korea, Taiwan, China, Southeast Asia, Russia, the Newly Independent States plus Western and Eastern Europe in the Eastern Hemisphere. The growth of intermodal freight traffic along the proposed Alaska-Canada connector railway would become especially great if the Bering Strait, railroad tunnel between Alaska and Asia ever becomes a reality particularly. The development of large scale electronic commerce and internet shopping may greatly accelerate the need for this project.

The present total intermodal freight traffic on the combined Alaska Railroad and British Columbia Railway is estimated as 3 to 5 million short tons per year at the present time. This intermodal freight traffic could increase to between 5 and 10 million short tons per year with the completion of the Alaska-Canada connector railway from the Lower 48 States to Fairbanks without any significant impact of electronic commerce. This intermodal freight movement between Alaska and Canada and the Lower 48 States could increase to as much as 10 to 15 million short tons per year with extensive electronic commerce and internet shopping being utilized.

The final freight transport category for consideration with the proposed Alaska-Canada connector rail line are military cargoes as there are a number of Army, Air Force and Navy facilities located in Alaska. The starter cargo go justifying the entire construction of the 1,300 mile long (2,085 km) Alaska-Canada connector railroad line may be to develop a major missile base at Fort Greely near Delta Junction, Alaska. The initial rail line construction would be for 70 miles from Eielson Air Force Base to Fort Greely at Delta Junction and then for 200 miles to the Yukon border. The

expected military cargoes to be hauled over the Alaska-Canada connector railway are expected to range between 3 and 10 million short tons per year depending on construction.

CONCLUSIONS

The completion of the construction of the Alaska-Canada connector railroad line over the 1,300 mile distance from Eielson, Alaska to Dease Lake and Fort Nelson, British Columbia will make it possible to link the Alaska Railroad with the rest of the North American railroad network. It will then be possible to haul a wide variety of materials along this railroad line between Alaska, Canada and the Lower 48 States in both directions. In addition, it is also planned to have railroad passenger service along this rail line in order to serve the remote villages and communities.

There are a wide variety of commodities, which can be hauled along the Alaska-Canada connector railroad line, as listed in Table 14. The commodities identified, which can be hauled, include the categories of fuels, resources, metals, agriculture, chemicals, intermodal, military and other cargoes. It is estimated that between 45 and 120 million net short tons per year could hauled over the Alaska-Canada connector railroad line. The starter commodities to initiate the railway operation would most likely be the military related cargoes to the new missile base. The largest quantity of cargoes to be moved over the railway line would probably be fossil fuels, including coal, crude oil and petroleum products.

The expected increase in total cargo movements along the 1,300-mile long Alaska-Canada connector railroad line is illustrated in Figure 14. Approximately 65 percent of the total railway freight traffic increase in Northwestern Canada and Alaska will be in Canada, primarily on the British Columbia Railway. Approximately 35 percent of this total railroad freight traffic will be on the Alaska Railroad. The total freight traffic movements to be expected along the planned 1,300 mile Alaska-Canada connector railroad line is expected to constitute about one-third of the total freight traffic movements to be expected in Northwestern Canada and Alaska.

The estimated freight traffic flow on the planned Alaska-Canada connector railroad is expected to increase from 5 million net short tons per year in 2006 as the startup to 20 million short tons per year in 2010. The freight traffic flows are expected to increase to 30 million net short tons per year in 2020 to 48 million tons per year in 2030, as shown in Table 15. The freight traffic flows are expected to increase from 1.4 billion net ton-miles in 2006 to 17.8 billion net ton-miles in 2030. The freight traffic revenues are expected to reach 222 million dollars per year by 2010 and increase to $665 million per year by 2030.

The startup of the Alaska Canada connector railway in 2006 will result in a rapid initial increase in freight traffic revenues based on military cargoes. The expected freight traffic revenues are expected to reach $222 million in 2010 and $357 million per year in 2020 as shown in Figure 15. These expected freight traffic revenues are expected to be sufficient to allow the railroad to be operated on a profitable basis after the year 2010 within 5 years of beginning its service.

The above referenced railway freight traffic revenues are based on the cost, revenue and traffic data provided for the Alaska Railroad operation, as listed in Table 16. The total amount of freight moved in 1991 was 5.1 million net short tons to generate 1.05 billion net ton-miles of freight

TABLE 14

ESTIMATED INCREASES IN FREIGHT TRANSPORT BY COMMODITY FOR THE ALASKA CANADA CONNECTOR RAILROAD

Overall Category	Specific Commodity	Amount Tranported Million Tons/Year	Percent of Total	Freight Haul Direction
Fuels	Coal	5.1-15.0	11.1-11.3	Bidirectional
	Crude Oil	3.0-6.0	6.7-5.6	Southbound
	Petroleum Products	2.0-6.0	4.4—5.6	Southbound
	Subtotal	10.0-27.0	22.2-22.5	----
Resources	Forest Products	5.0-15.0	11.1-12.5	Southbound
	Gold Mining	1.0-3.0	2.3-2.5	Northbound
	Mineral Mining	2.0-6.0	4.4-5.0	Bidirectional
	Subtotal	8.0-24.0	17.8-20.0	----
Metals	Metallic Ores	1.0-3.0	2.2-2.6	Bidirectional
	Metal Products	2.0-5.0	4.3-4.2	Bidirectional
	Equipment and Machinery	2.0-5.0	4.3-4.3	Northbound
	Subtotal	5.0-13.0	10.8-11.1	----
Agriculture	Grain	3.0-8.0	6.6-6.8	Southbound
	Food Products	2.0-6.0	4.4-5.1	Northbound
	Hog and Pork	3.0-7.0	6.5-5.9	Bidirectional
	Subtotal	8.0-21.0	17.5-17.8	----
Chemical	Chemicals	2.0-5.0	----	Northbound
	Fertilizers	1.0-5.0	----	Bidirectional
	Subtotal	3.0-10.0	6.7-8.3	----
Intermodal	Intermodal Freight	5.0-10.0	----	Bidirectional
	Internet Shopping	3.0-5.0	----	Northbound
	Subtotal	8.0-15.0	12.5-17.5	----
Military	Military Cargoes	3.0-10.0	6.7-8.3	Bidirectional
Other	To be Determined	Unknown	Unknown	----
Total	Total Amount	45.0-120.0	100.0	----

Figure 14

ESTIMATED INCREASES IN TOTAL FREIGHT TRAFFIC VOLUMES ALONG THE ALASKA RAILROAD AND THE BRITISH COLUMBIA RAILWAY BETWEEN 1990 AND 2030 FOR THE ALASKA-CANADA CONNECTOR CORRIDOR

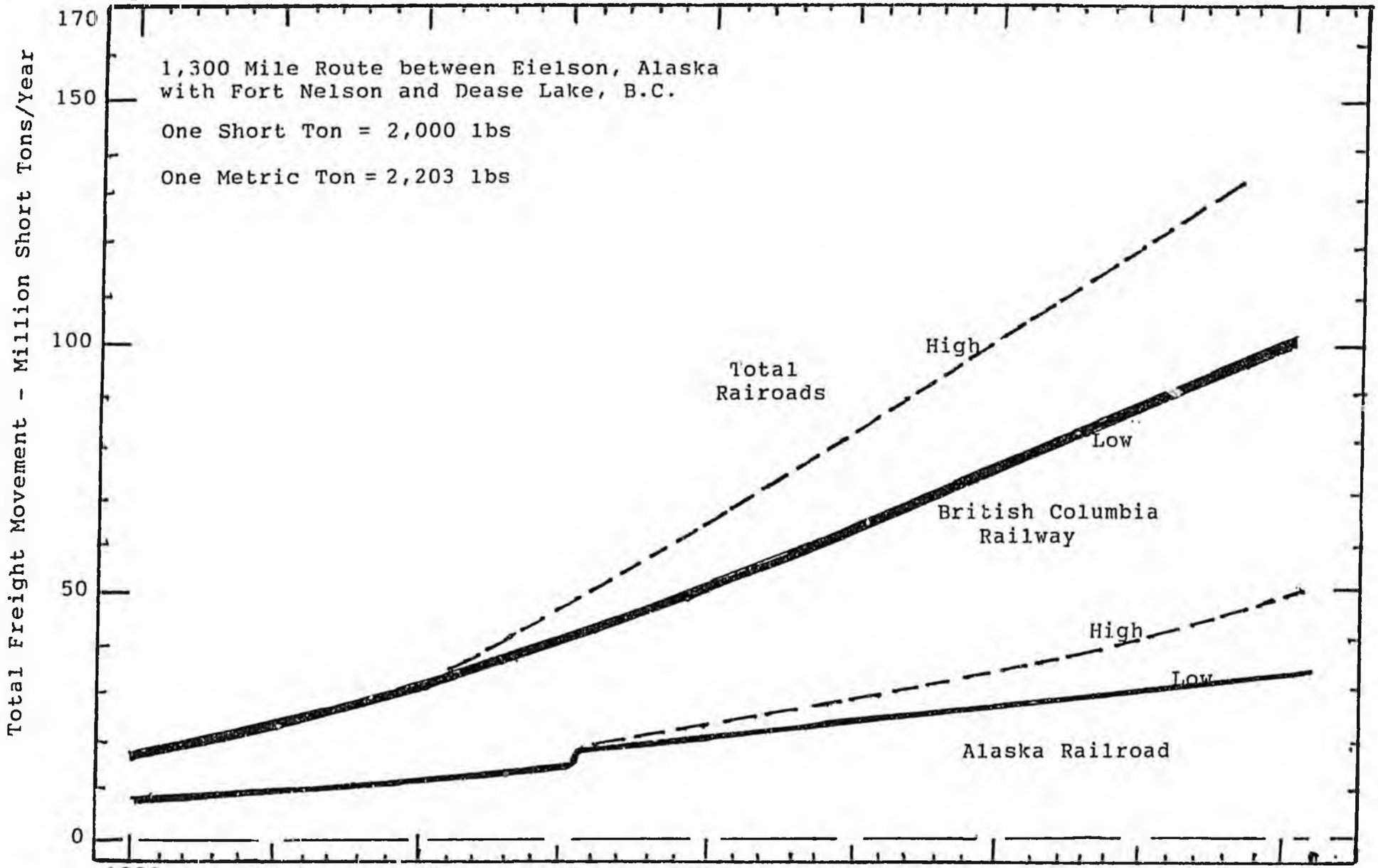


TABLE 15

ESTIMATED INCREASES IN FREIGHT TRAFFIC AND OPERATING REVENUES FOR THE ALASKA CANADA CONNECTOR RAILROAD LINE[3]

Calendar Year	Shipments Million Tons/Year	Haul Distance Miles	FreightTraffic Level[1] Million NTM/Year	Rate ¢/NTM	Annual Revenue Million$/Year
2000	0	----	0	4.05	0
2005	0	----	0	4.00	0
2006	5	275	1,375	3.95	55
2007	8	280	2,800	3.90	109
2008	13	285	4,275	3.85	165
2009	17	290	4,930	3.80	187
2010	20	300	6,000	3.70	222
2015	25	325	8,125	3.60	293
2020	30	335	10,050	3.55	357
2025	38	350	13,300	3.65	485
2030	48	370	17,760	3.75	665

Notes:
1. Reported in million net ton-miles per year.
2. Reported in cents per net ton-mile travelled.
3. Reported in 1999 constant dollars.
4. Tons are reported as short tons (2,000 lb/short ton)
5. Metric tons are calculated by multiplying short tons by 0.909.

Figure 15

ESTIMATED INCREASES IN FUTURE FREIGHT TRAFFIC REVENUES ALONG THE ALASKA-CANADA RAILROAD CONNECTOR ROUTE BETWEEN EIELSON, ALASKA AND FORT NELSON AND DEASE LAKE, BRITISH COLUMBIA

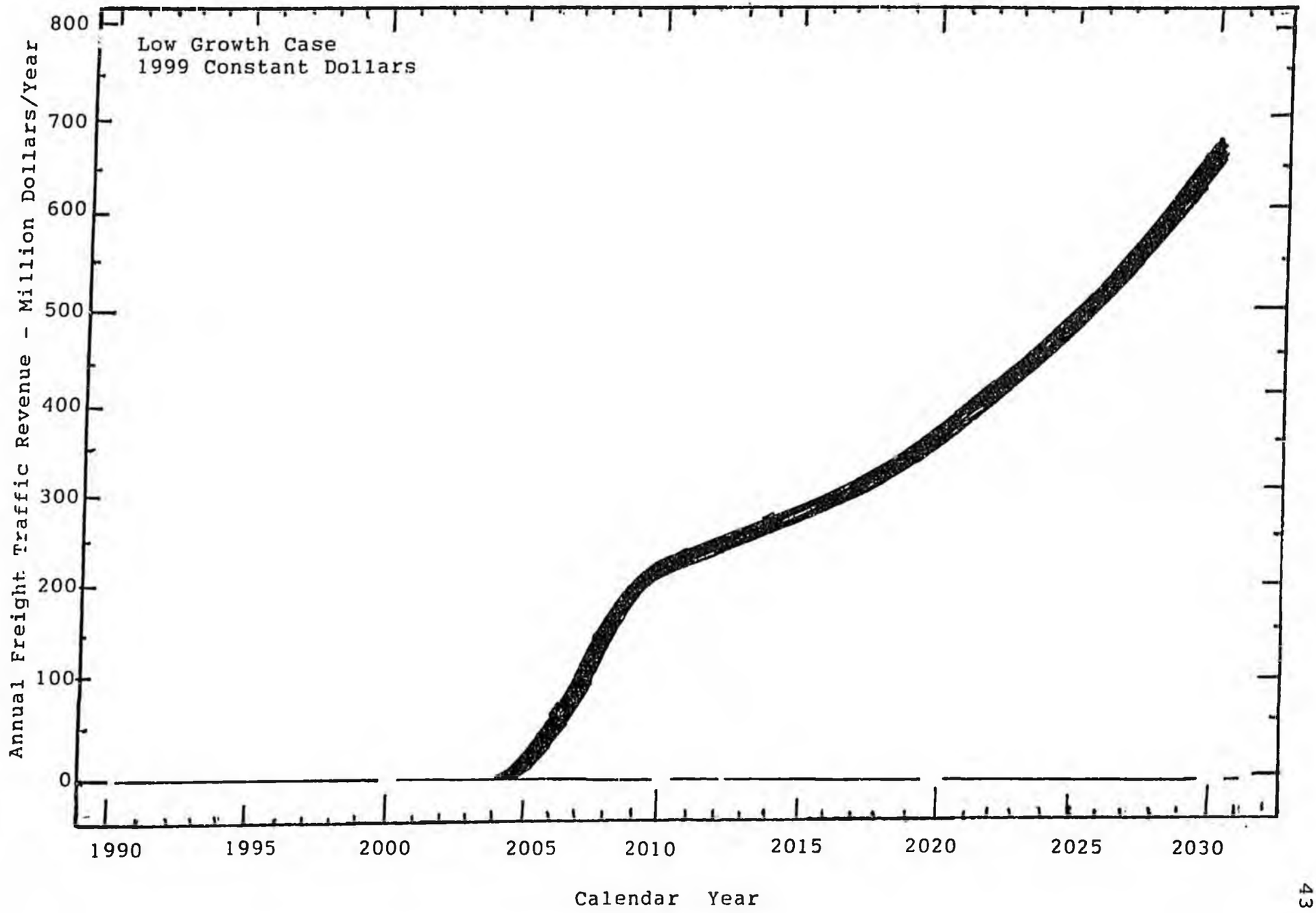


TABLE 16

REPORTED FREIGHT REVENUE HAUL RATES ON THE ALASKA RAILROADS IN 1991 (REFS. 18,19)

Commodity Transported	Distance Miles	Amt. Hauled Net Tons/Yr.	Traffic Level Net Ton Mi/Yr	Annual Rev. Million$/Year	Unit Rate ¢/Net Ton/Mi.
Petroleum Prod.	356	1,400,000	498,400,000	19,000,000	3.812
Coal-Local	120	800,000	96,000,000	3,000,000	3.125
Export	358	800,000	286,400	9,000,000	3.142
Coal Total	**478**	**1,600,000**	**382,400,000**	**12,000,000**	**3.138**
Gravel Total	35	1,800,000	63,000,000	3,000,000	4.762
Intermodal	356	200,000	71,200,000	6,500,000	9.129
Other Materials	356	100,000	35,600,000	7,500,000	21.067
Freight	535	5,100,000	1,050,600,00	48,000	4.569/NTM
Passenger	515	471,217	167,753,250	16,400,000	9.776/PM
Total	**535.00**	**----**	**----**	**64,400,000**	**----**

TABLE 17

ESTIMATED PASSENGER SERVICE REVENUE ON THE ALASKA CANADA CONNECTOR RAILROAD LINE (REF. 16)

Passenger Travel Type	Unit Rail Fare ¢/Pass-Mile	Trip Distance Miles	Traffic Level Pass/Day	P. Movement Mil PM/Year	Annual Rev. Million $/Year
Tourist Travel	6.5-7.5	3.00-500	250-500	27-91	1.8-6.8
Occup. Travel	4.0-6.0	100-550	750-1,000	27-200	1.1-12.0
Tourist & Car	8.0-10.0	300-900	250-500	27-164	2.2-16.4
Auto Transport	$300-500/Veh	300-500	50-150	5-27	5.5-27.4
Organized Tours	10.0-15.0	250-900	500-750	46-246	4.6-36.9
Total Amount	**4.0-15.0**	**100-900**	**1,800-2,900**	**132-728**	**15.2-99.5**

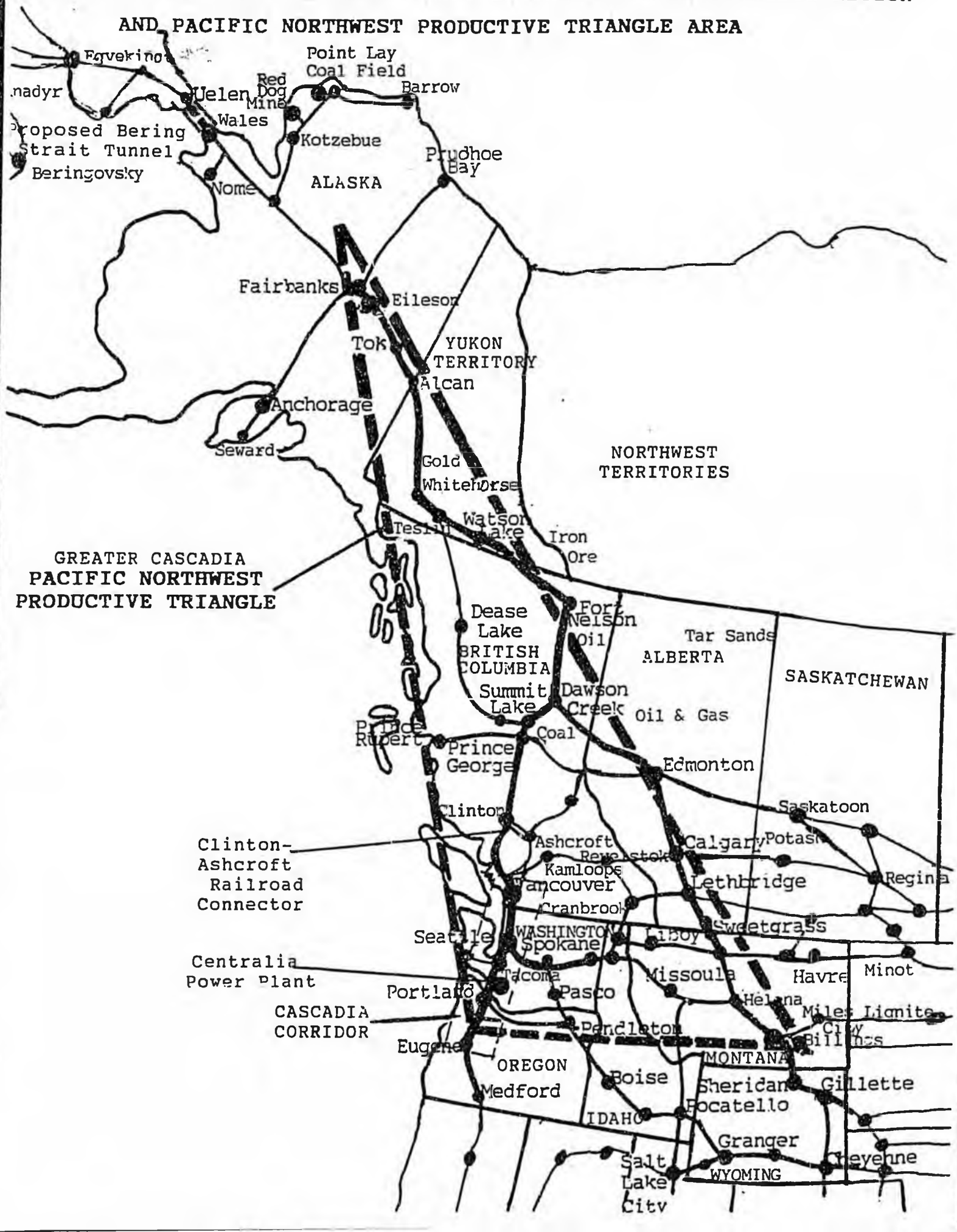
traffic with an average haul distance of 205 miles, as compared to 305 miles for the British Columbia Railway. The total revenue generated from freight traffic on the Alaska Railroad was $48 million in 1991, which was 75 percent of the total. The passenger traffic on the Alaska Railroad constituted 25 percent of the total system revenue with a total of $16.4 million with 471,217 passengers in 1991 with an average trip length of 355 miles.

The proposed passenger service on the Alaska Canada connector railroad would have 1,800 to 2,900 passengers per day or 651,000 to 1,085,000 passengers per year with an average trip length of 435 miles. The rail passenger service would have revenues ranging from $15 to $100 million per year, as shown in Table 17. These passenger revenues would constitute 10 to 15 percent of the total for the proposed Alaska Canada connector railroad line.

The proposed Alaska Canada connector railroad line of 1,300 (1,805 km) from Eielson, Alaska to Fort Nelson and Dease Lake, British Columbia would have sufficient freight traffic to be economically viable with coal and oil, mineral and forest resources, intermodal cargoes and agricultural products the main constituents if proper development policies are implemented. There would be considerable freight traffic flows in both directions to serve to connect Alaska with the Lower 48 States. In addition, the future construction of this railway would serve as the vehicle to promote economic growth and development throughout the entire Greater Pacific Northwest productive triangle, as illustrated in Figure 16. This railway line could first be extended to western Alaska and ultimately to Asia and Europe by way of the Bering Strait tunnel, especially with the advent of electronic commerce.

Figure 16

AILROAD NETWORK SYSTEM DEVELOPMENT IN THE CASCADIA CORRIDOR REGION AND PACIFIC NORTHWEST PRODUCTIVE TRIANGLE AREA



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Section 5:

Remarks to the conference by **Dr. Milton A Wiltse**, Director and State Geologist, Alaska Division of Geological and Geophysical Surveys

EAST-CENTRAL ALASKA GEOLOGIC RESOURCES

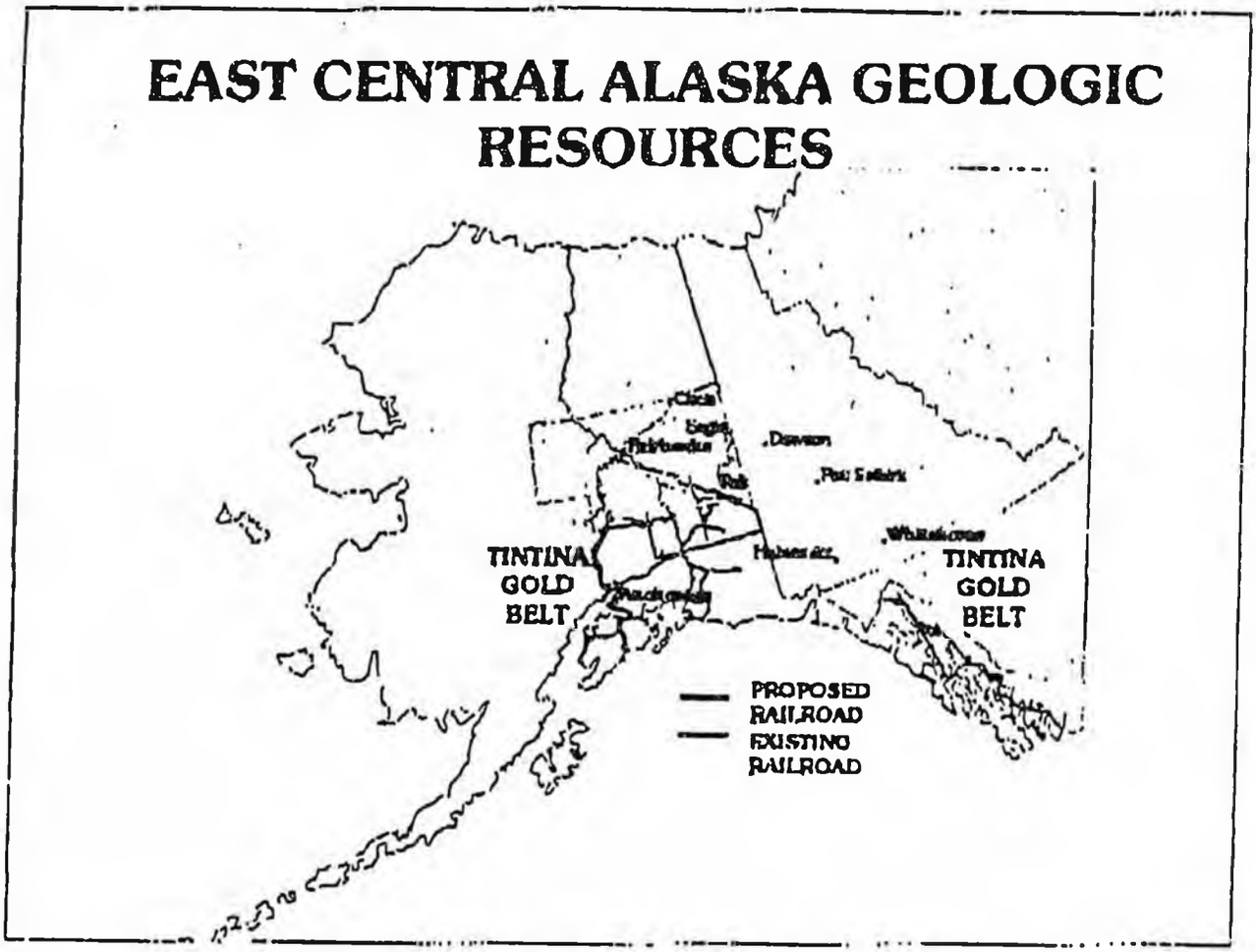
Comments by

Dr. Milton A. Wiltse, Director & State Geologist
Alaska Division of Geological and Geophysical Surveys

For

ALASKA CANADA RAIL LINK CONFERENCE
January 20, 2000
Vancouver, B.C. Canada

EAST CENTRAL ALASKA GEOLOGIC RESOURCES

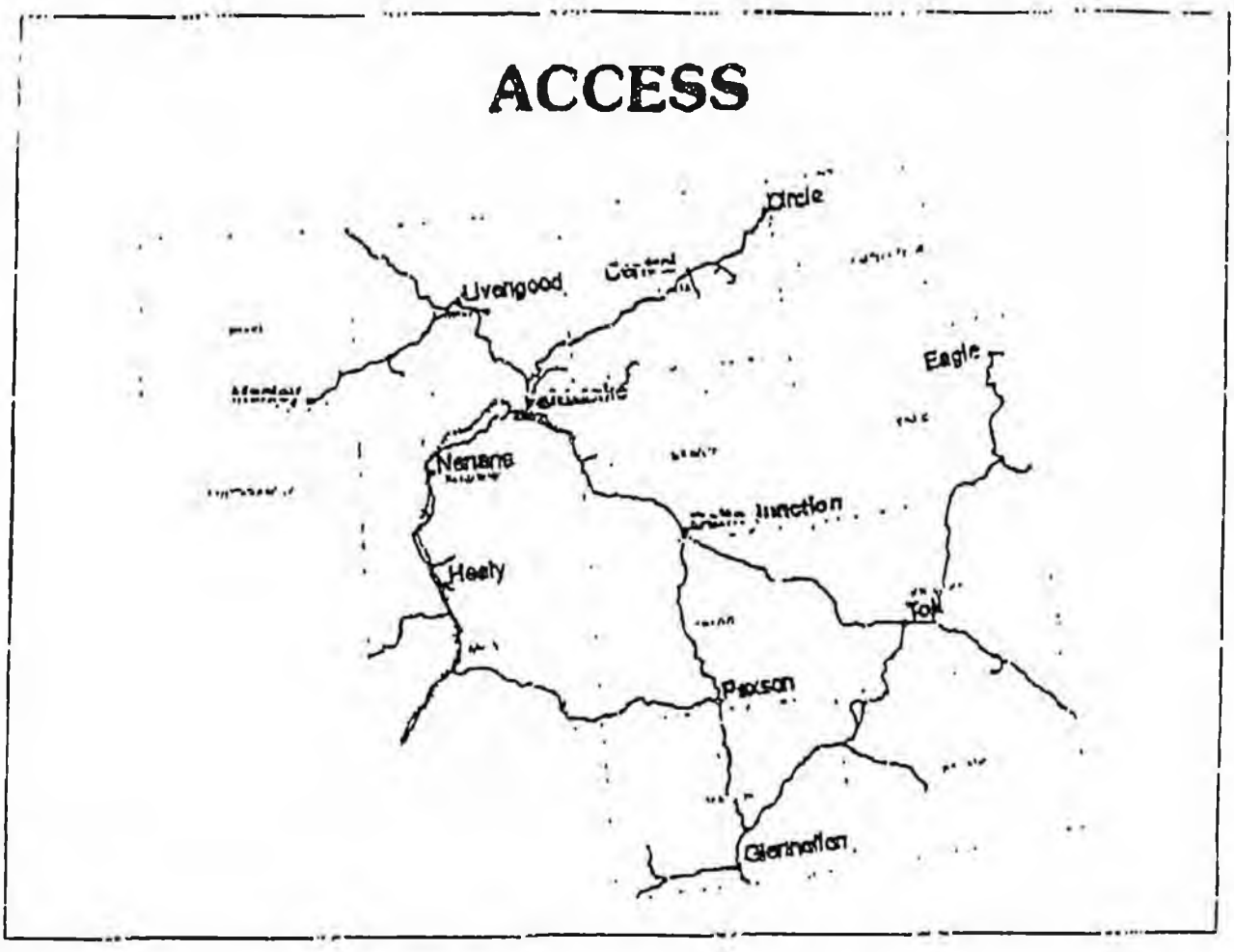


•East Central Alaska includes the central portion of a regional international Alaska - Canada mineral trend that informally has acquired the designation of "Tintina Gold Belt."

•The proposed extension of the Alaska Railroad is located within a highly mineralized portion of the Tintina Gold Belt.

•Gold is not the only mineral commodity within the "Gold Belt." This region also contains significant coal deposits, and copper, lead, zinc, nickel, and platinum group metal prospects.

ACCESS



•The area shown in this and the following graphics represents about 78,000 square miles. As an indication of scale, it is about 100 miles (160+ km) between Fairbanks and Delta Junction.

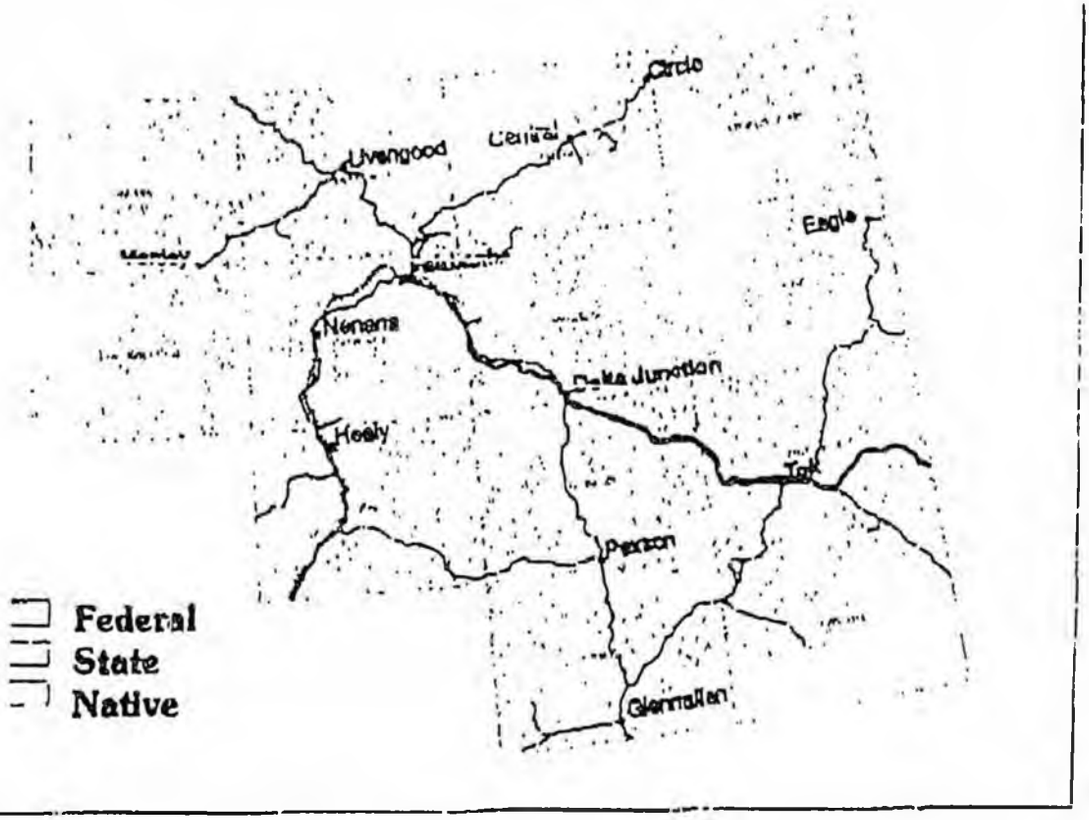
•The existence of a road and railroad transportation network has been a significant positive factor in fostering mineral exploration and development in East-Central Alaska.

•The Fairbanks commercial center; serviced by the Alaska Railroad, the Parks Highway, and the Alaska Highway; disburses equipment, supplies, and services to regional towns and villages that serve as staging areas for mineral exploration and development ventures.

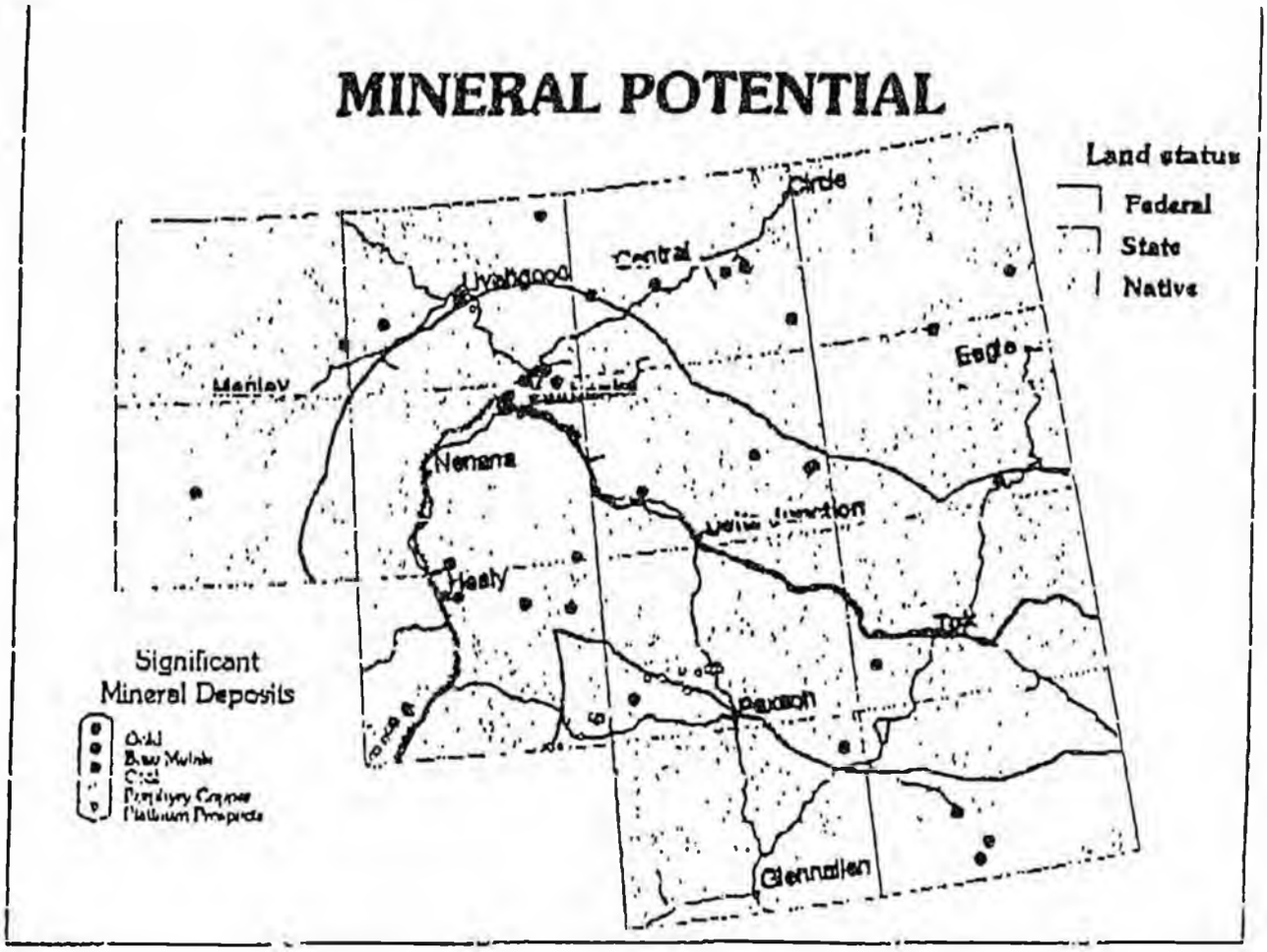
•Fairbanks is a world-scale mining center. Delta Junction is the terminal supply point for developing the recently discovered Pogo gold deposit. Tok serves the Fortymile and Delta mineral districts. The town of Healy supports the states largest active coal mine and is a local supply center for mineral exploration in the Bonnifield and Chulitna districts

•A large percentage of East Central Alaska lies within fifty miles of an existing road.

LAND OWNERSHIP



•There are three classes of major land owners in Alaska: 1) the federal government; 2) the state of Alaska; and 3) Alaska native regional- and village-corporations. Other private land owners are a small minority when measured by acres in private fee-simple ownership. Most of that individually held private land in East-Central Alaska is concentrated around Fairbanks and Delta Junction.



•Using a non-quantitative definition of "significant," there are about thirty significant mineral deposits or prospects within the existing and proposed 100-mile wide rail-belt corridor.

•The majority of known significant mineral deposits in East-Central Alaska are located on state or native controlled land.

•Much of the land selected by the state of Alaska and the Native Corporations was purposely chosen because of perceived high mineral potential. In spite of the existence of several known significant mineral deposits, these lands are under-explored.

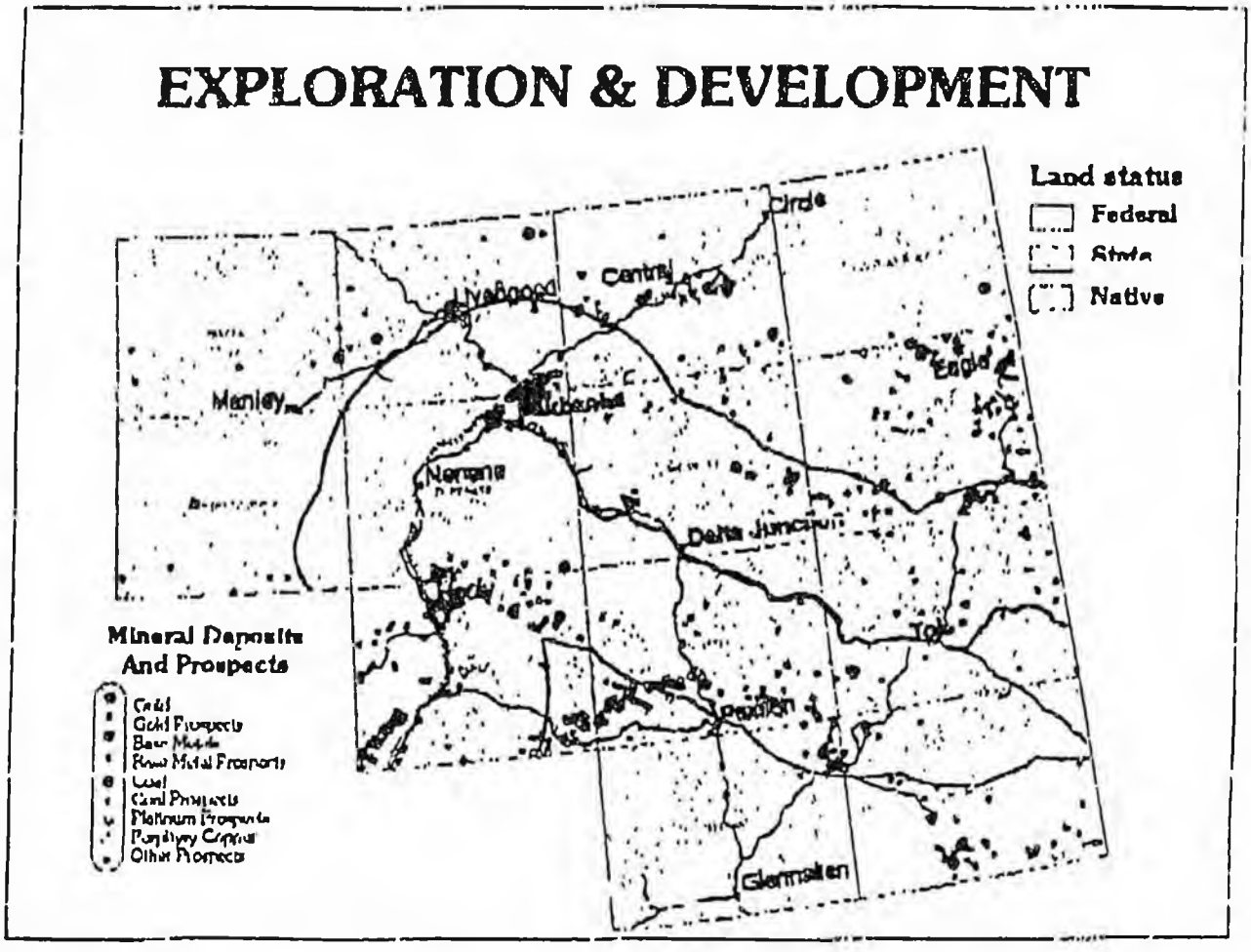
•A majority of the most valuable known mineral deposits of East-Central Alaska are located within fifty miles of the proposed or existing Alaska Railroad, e.g., Usibelli Coal Mine (1.4 billion tons), Fort Knox Gold Mine (6 million ounces), Pogo Prospect (5.2 million + ounces), True North Prospect (1.3 million ounces), Ryan Lode (0.8 million ounces).

•The region hosts several other significant prospects and mineral districts, e.g. the Bonnifield gold and massive sulfide copper-lead-zinc district east of Healy; the copper-lead-zinc Delta District southwest of Tok; the Richardson gold district northwest of Delta Junction.

•There is growing interest in a series of nickel-copper-platinum group metal prospects north of Paxson.

•There are brief references for some of these deposits in the appendices of the *Alaska Mineral Industry 1998* annual report published by the Alaska Division of Geological and Geophysical Surveys.

EXPLORATION & DEVELOPMENT



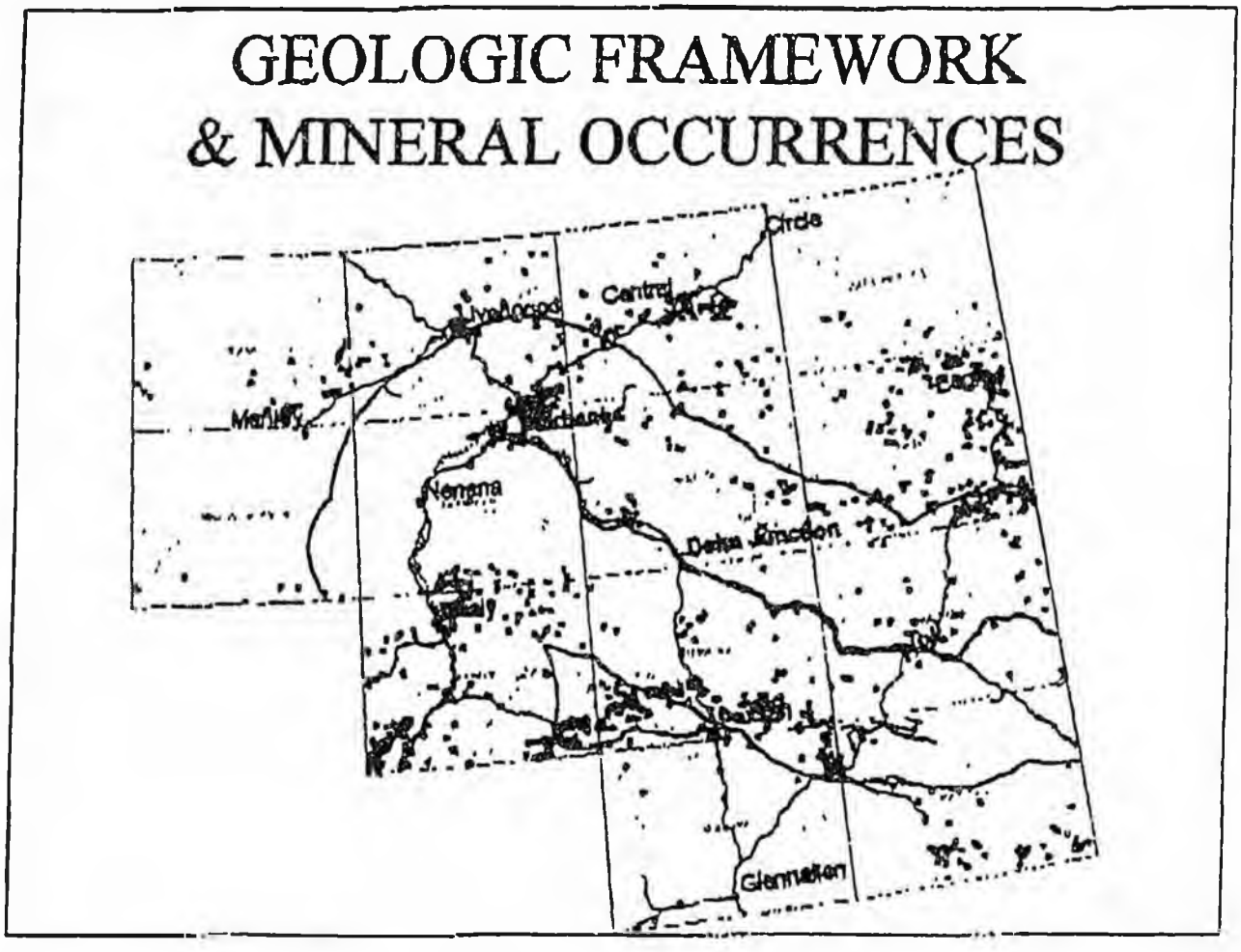
•In addition to these "significant"deposits, there are scores of other lode gold, base metal massive sulfide, copper porphyry, and nickel-copper-PGM, tungsten, and tin prospects within the rail-belt corridor and many more surrounding the corridor.

•There is active ongoing private-sector mineral exploration in all of East-Central Alaska's mineral districts.

•The Pogo deposit north of Delta Junction is undergoing active development.

•Currently, the area southeast of Fairbanks within the proposed railroad corridor is experiencing the highest level of exploration activity in East-Central Alaska.

GEOLOGIC FRAMEWORK & MINERAL OCCURRENCES



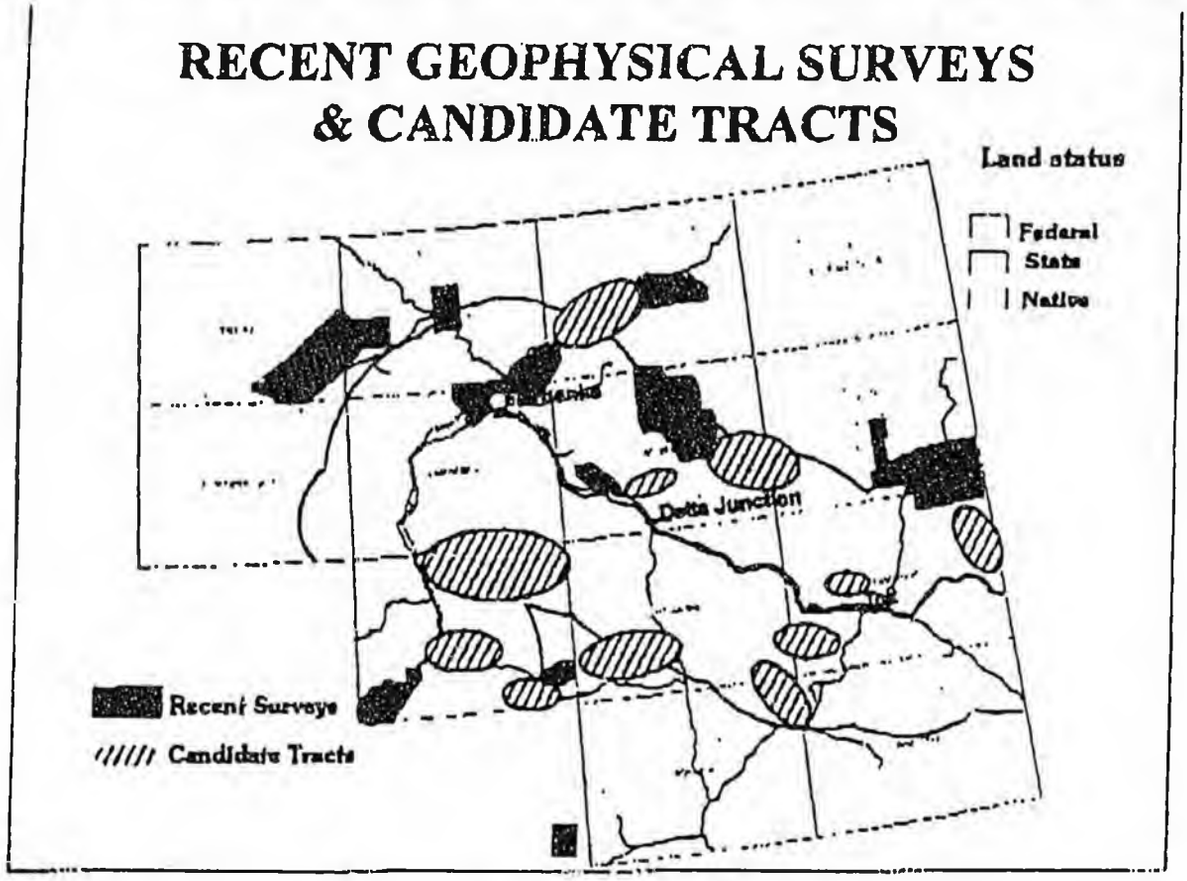
Historically, Placer gold deposits and districts have proved effective in identifying areas hosting significant lode deposits of several mineral commodities. If placer gold deposits are added to the lode occurrences previously shown, one gets a feel for just how widespread indications of mineralization are within East-Central Alaska.

•Both lode and placer deposits exist within a framework of varied and complex geology. By world standards, this geology is very poorly understood. We really have only crude initial hypotheses for most of the East-Central Alaska area. Most of this country has not been geologically mapped at scales useful for detailed mineral exploration.

•Much of the geologic mapping that does exist is derived from regional scale (1 inch = 4 miles) maps that were generated from field data collected between 1950 and 1975.

•In spite of the many prospects and other evidence of mineralization, the recent discovery of the rich Pogo gold deposit just thirty miles from the Alaska Highway is an indication of how superficially East-Central Alaska has been explored to date.

RECENT GEOPHYSICAL SURVEYS & CANDIDATE TRACTS



•Beginning in 1993, the state of Alaska has maintained an annual airborne-geophysical/geological ground-truth geologic mapping and mineral inventory program in an effort to improve the general knowledge of the geology and mineral resource potential of state lands.

•The airborne-geophysical/geological mapping programs are centered on historical mining districts or on lands nominated by various members of the Alaska geological community because of their perceived high mineral potential.

•To date nine of the sixteen tracts that have been geophysically surveyed are within East-Central Alaska. Modern ground-truth geologic maps at a scale of 1:63,360 (1 inch = 1 mile) are available for six of these tracts. The Fortymile mining district is currently being mapped by the Alaska Division of Geological and Geophysical Surveys. That mapping is being coordinated with geological investigations being conducted in Canada by the Yukon Geology Program and the Geological Survey of Canada.

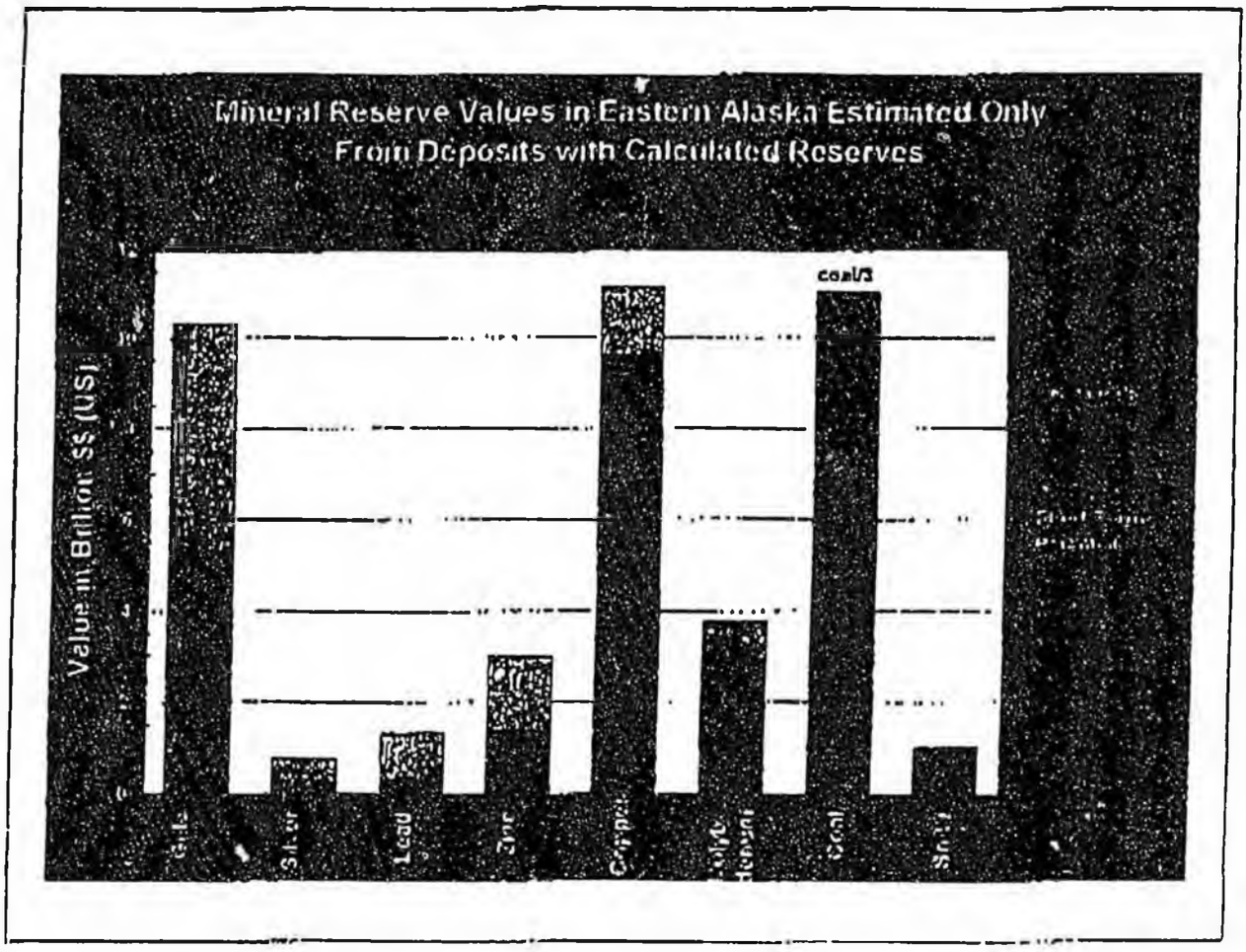
•The gray polygons shown in this figure represent airborne-geophysical survey data that is available for 4,441 square miles of high potential mineral terrane.

•The geophysical data for the northwestern-Pogo tract, north of Delta Junction is scheduled for released before the end of January, 2000.

•These new geophysical and geological data have catalyzed a tremendous private sector investment in mineral exploration and development within East-Central Alaska.

•In addition to the nine tracts already surveyed, the proposed rail-belt corridor includes all or portions of eight additional candidate areas: Steese, Salcha, southeastern-Pogo, Sixty-mile Butte, Ladue River, Delta, Mentasta Pass, Broxson Gulch, and Bonnifield.

•Completing the remaining surveys is contingent upon special annual appropriations.



•These are productive and exciting days in the history of Alaska's mineral industry. Recent years have included new discoveries or major mineral reserve expansions in Southeast Alaska at Greens Creek, at Donlin Creek in Southwest Alaska, at the Red Dog zinc mine in Northwest Alaska. East-Central Alaska is more than holding its own with the discovery of the Fort Knox, True North, and Pogo lode gold deposits. A summary of the estimated gross value of the currently identified mineral reserves in East-Central Alaska serves as an initial benchmark for the future. What sets East-Central Alaska apart from other areas of the state is the superior access, and the variety of mineral commodities that we know are present in this 78,000 square mile area.

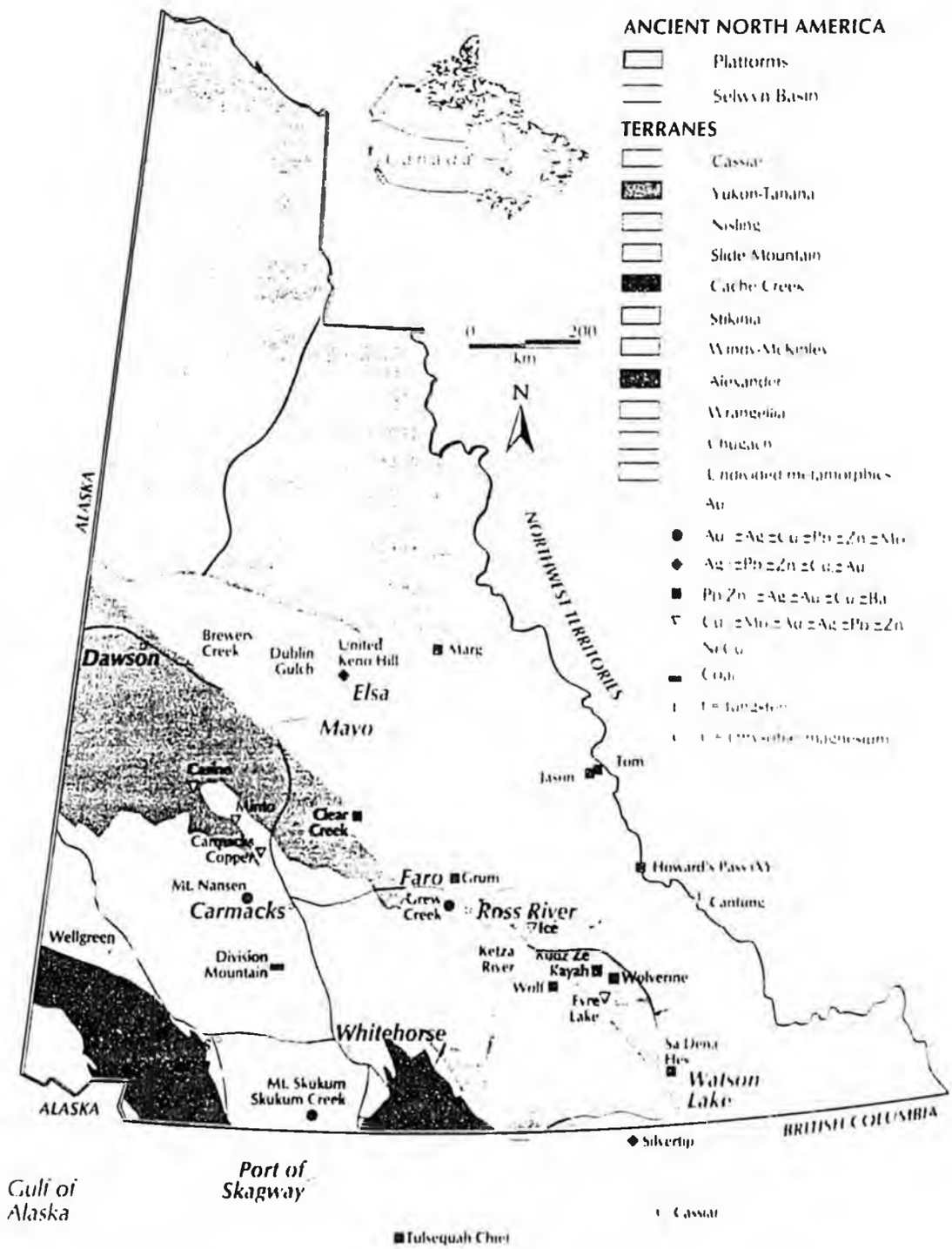
•From a global perspective, the Tintina Gold Belt has recently been recognized by the mineral industry as an "emergent district." That is, a region in which additions to reserves are expected to follow regularly with continued exploration. This is a young exploration region with a limited knowledge base. There is still a lot of room for success.

Section 6:

Written material provided by **Jesse Duke**,
Yukon Department of Economic Development,
Mineral Resources Branch

YUKON MINERAL PROPERTY UPDATE

Prepared by Mineral Resources Branch
Department of Economic Development
Government of the Yukon



Yukon

YUKON MINERAL PROPERTY UPDATE

Prepared by Mineral Resources Branch
Department of Economic Development
Government of the Yukon

January, 2000

CONTENTS

MINERAL RESOURCES BRANCH SERVICES

MINERAL RESOURCES BRANCH

This branch of the Department of Economic Development provides the following services to the exploration and mining community.

- Administers, in partnership with DIAND, the Yukon Geology Program.
- Maintains an extensive database of Yukon mining and exploration projects.
- Provides funding to individuals, partnerships and junior mining companies through the Yukon Mining Incentives Program.
- Provides information on the Yukon Mineral Exploration Tax Credit.
- Provides information to potential investors on the Yukon's mineral potential and mining investment opportunities.
- Assists exploration and mining companies through the regulatory process by providing advice on contacts, processes and timing requirements.
- Disseminates information about the Yukon's exploration and mining industry and the work of the Yukon Geology Program by attending trade shows and mining conferences.
- Provides technical expertise on behalf of the Yukon government on regulatory review committees and working groups.
- Provides information about Yukon's mineral resources through the Department of Economic Development website at *www.economicdevelopment.yk.ca.*

If you want to find out more about the Yukon's mineral resources, contact Jesse Duke, Yukon Mining Facilitator, at (867) 667-3422.

YUKON MINERAL PROPERTY UPDATE

The information in the Mineral Property Update was compiled by the Department of Economic Development, Mineral Resources Branch. Data was obtained from press releases, Yukon Minfile, mining company websites, property production records, initial environmental evaluations and from information graciously supplied by property owners. Contributions by the Department of Indian Affairs and Northern Development – Exploration and Geological Services Division, and the staff at the Yukon Geology Program are gratefully acknowledged.

In some instances, employment and power requirement figures were not available and estimates were used. Please let us know of any errors or omissions. Although the Department of Economic Development cannot take responsibility for the accuracy of the data provided, we would like to keep this document as accurate and up-to-date as possible.

PLACER MINING INFORMATION

"The potential for new placer discoveries in the Yukon remains high."
William LeBarge, Placer Geologist, Yukon Geology Program

The first placer miners in the Yukon were Indians who recovered native copper nuggets from the White River area in southwestern Yukon. After 1850, prospectors and explorers began to report fine gold on river bars and coarse gold in the Fortymile and Sixtymile rivers. On August 17, 1896, the discovery of nugget gold on Bonanza Creek set off the Klondike gold rush.

Placer mining is still an important sector in the Yukon's economy; in fact, placer mining has contributed to the Yukon economy for over 100 years. In 1999, a total of 89,573 ounces of placer gold, valued at C$28.3 million, were produced from 171 placer mines employing 600 people. Most of the placer operations are small and family-run.

Placer gold is getting more difficult to find as reserves in traditional placer mining areas decline. Most placer gold exploration and mining is concentrated in unglaciated areas of the Yukon. By expanding our knowledge of placer gold deposits and applying it to other areas, we may be able to discover new sources of placer gold in different geological settings.

Many people living outside the Yukon would like to find out more about placer mining. Besides the difficulty in actually finding gold, there are various rules and regulations to become familiar with. Please call one of the contacts below to obtain a general summary of the history of placer mining in the Yukon, an overview of the geological setting of placer gold deposits and some of the factors you must consider when mining for gold.

The staff at the Yukon Geology Program or the Mineral Resources Branch can provide you with information and advice regarding placer mining in the Yukon. Publications on placer mining in the Yukon are available through the Publications Desk of the Yukon Geology Program.

CONTACTS

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Placer Geologist
Yukon Geology Program
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Fax (867) 667-3198

Grant Lowey
Placer Geologist
Yukon Geology Program
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Fax (867) 393-6232

Whitehorse Mining Recorder (DIAND)
Placer claim maps
102-300 Main Street
Whitehorse, Yukon Y1A 2B5
Phone (867) 667-3190
Fax (867) 667-3267

Placer Section Mineral Development (DIAND)
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Fax (867) 667-3193

Publications Desk
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Fax (867) 667-3267

YUKON TOP MINING PROJECTS, 2000

Property	Reserves	Status
OPERATING MINES		
Brewery Creek Viceroy Resource Corporation	**Mineable reserve:** 11,800,000 tonnes 1.13 grams/tonne gold	55,000 ounces of gold production expected in 1999.
UNDER CONSTRUCTION		
Minto Asarco Inc./Minto Explorations Ltd.	**Mineable reserve:** 6,510,000 tonnes 2.13% copper, 9.3 grams/tonne silver 0.62 grams/tonne gold	Water license is signed. Construction has commenced. Production decision depends on metal prices.
DEVELOPMENT PROJECTS		
Keno Hill United Keno Hill Mines Ltd.	**Geological resource:** 838,758 tonnes 4.58% lead, 3.76% zinc 1022.06 grams/tonne silver	On hold.
Dublin Gulch New Millenium Mining Ltd.	**Mineable reserve:** 50,400,000 tonnes 0.93 grams/tonne gold	Undergoing final stages of environmental assessment.
Kudz Ze Kayah Cominco Ltd.	**Mineable reserve:** 11,300,000 tonnes 0.93% copper, 1.52% lead, 5.89% zinc 133.0 grams/tonne silver 1.34 grams/tonne gold	Environmental screening report complete. Water license is signed.
Carmacks Copper Western Copper Holdings Ltd.	**Mineable reserve:** 14,109,800 tonnes 1.01% copper, 0.51 grams/tonne gold	Undergoing final stages of environmental assessment.
Division Mountain Coal Cash Resources	**Geological resource:** 52.9 million tonnes 2.42% residual moisture 28.45% ash, 25.79% volatiles 43.18% fixed carbon, 0.43% sulphur 5,216 kCal/kg (9,328 BTU/lb)	On hold.
Wolverine Expatriate Resources/ Atna Resources	**Geological resource:** 6,237,000 tonnes 12.66% zinc, 1.33% copper, 1.55% lead 370.9 grams/tonne silver 1.76 grams/tonne gold	Metallurgical studies and pre-feasibility planning underway.
EXPLORATION PROJECTS		
Wolf Atna Resources/ YGC Resources	Zn-Pb-Ag volcanogenic massive sulphide target Inferred resource of 4.1 million tonnes grading 6.2% zinc, 1.8% lead and 84 grams/tonne silver	Delineation drill program complete (6,625 m, 30 holes). Deposit strike length 600 m, down-dip length 450 m, good continuity of sulphide mineralization, deposit is open.
Mt. Skukum/Skukum Creek: Goddell Omni Resources Arkona	**Mineable reserve:** *Rainbow Zone:* 956,949 tonnes @ 6.3 grams/tonne gold, 193.5 grams/tonne silver *Kuhn Zone:* 148,781 tonnes @ 8.78 grams/tonne gold, 167.70 grams/tonne silver *Goddell Zone:* 900,000 tonnes @ 7.0 grams/tonne	On hold.
Fyre Lake Pacific Ridge Exploration	**Preliminary resource:** 15.4 million tonnes within which 8.2 million tonnes grade 2.1% copper, 0.11% cobalt, 0.73 grams/tonne gold	Preliminary reserve estimate based on wide-spaced drill holes.
Clear Creek Redstar Resource Corporation	Gold-bismuth and gold-arsenic intrusive-related targets.	1999 drill program complete.
Scheelite Dome Copper Ridge Explorations inc.	Intrusive-related gold prospect.	1999 drill program complete.
Ice Expatriate Resources Ltd.	Drill-indicated mineral resource of 4,561,863 tonnes grading 1.48% copper, including 3.4 million tonnes of near-surface mineralization at same grade.	Additional exploration planned.

STAGES OF MINING

PERMITTING PROCESS STAGES		*YUKON PROJECTS*
	REGIONAL EXPLORATION	
	• Prospecting	*Finlayson Lake area*
	• Regional surveys	*McQuesten Intrusive Belt (Mayo to Dawson area)*
		Dawson Range Cu/Au Belt
	PRELIMINARY EXPLORATION	
	• Discovery of mineralization	*Wolf*
	• Delineation of mineral zone	*Division Mountain*
	• Magnitude of deposit	*Clear Lake*
		Grew Creek
Environmental baseline studies		*Hyland Gold*
	ADVANCED EXPLORATION	*Marg*
	• Diamond drilling	*Ice*
	• Trenching	*Ketza River*
		Mount Skukum/Skukum Creek
	PRELIMINARY FEASIBILITY STUDY	*Wellgreen*
Permitting process begins		*Wolverine*
	• Ore reserves	
Company submits project overview	• Scale of operation	*Fyre Lake*
	• Development plan	*MacMillan Pass – Tom, Jason*
Company submits Initial Environmental Evaluation (IEE)	• Capital costs	*Howard's Pass*
	• Operating costs	*Casino*
	• Cash flow	
	• Net present value	
	TEST MINING PROGRAM	
	• Sink shaft	*Cantung*
	• Obtain bulk sample	*Silvertip*
	• Test ore continuity	*Dublin Gulch*
	• Identify underground problems	*Carmacks Copper*
		Sa Dena Hes
		Tulsequah Chief
	FINAL FEASIBILITY	*Kudz Ze Kayah*
Water licence application		
	• Similar to preliminary but more detailed	
	• Budget for operating and capital costs	
	• Cash flow projection	
Water licence received	**CONSTRUCT MINE, MILL AND PLANT**	*United Keno Hill*
		Minto
	PRODUCTION	*Cassiar*
		Brewery Creek
	RECLAMATION	

CONTACTS (Yukon area code is 867)

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Ali Wagner
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(claim sheets, mining legislation information)
Phone 667-3190
Fax 667-3267

Publications Desk (DIAND)
Phone 667-3266
Fax 667-3267

Topographical map sales
Mac's Fireweed Books
Phone 668-6104
Toll-free 1-800-661-0508

Yukon Prospectors Association
Phone 668-7985
E-mail ypa@northland.com

Klondike Placer Miners Association
Phone 667-2267
Fax 668-7127

Yukon Chamber of Mines
Phone 667-2090
Fax 668-7127
E-mail ycmines@internorth.com

BREWERY CREEK MINE

Viceroy Resource Corporation

President and CEO: Clynton Nauman
Chair: Ron Netolitzky

Corporate headquarters
Suite 2200, Oceanic Plaza
1066 West Hastings Street
Vancouver, British Columbia V6E 3X2

Phone (604) 688-9780
Fax (604) 682-3941
E-mail info@viceroyresource.com

Brewery Creek Mine
Bag 5040
Dawson City, Yukon YOB 1GO

Phone (867) 993-6057
Fax (867) 993-5606
Web site www.viceroyresource.com

PROJECT STATUS

In production

Location
57 km east of Dawson City

Ownership
Viceroy Resource Corporation

Commodity
Gold

Ore type
Oxide

Mineable reserve
11.8 million tonnes @ 1.13 grams/tonne
(428,577 contained ounces of gold)

Mining method
Open-pit heap leach, carbon adsorption/desorption/recovery

Stripping ratio
1.5:1

Current mine life
4.0 years

Recovery rate
78%

Production
1997: 72,387 ounces of gold
1998: 79,396 ounces of gold
1999: 34,682 ounces of gold to September 30
(55,000 ounces are forecast for 1999)

Cash costs per ounce
US$200

Cash cost per tonne
US$8.19

Employees
143

Power
2 MW, on-site diesel

HISTORY

Gold mineralization in the Brewery Creek area was discovered in 1987 by Noranda Exploration after investigating a regional geochemical anomaly identified in a survey funded by the Canada-Yukon Mineral Development Agreement. Follow-up exploration work including extensive geochemical and geophysical surveys, mapping, prospecting and 9,000 feet of reverse circulation and diamond drilling were carried out from 1988 to 1992. In 1992, Loki Gold Corporation acquired a 100% interest in the property and began mine development work. A total of $17 million was spent on the property before the start of construction. Loki Gold's Class A Yukon Water License was signed on August 9, 1995 and construction began immediately. Loki Gold

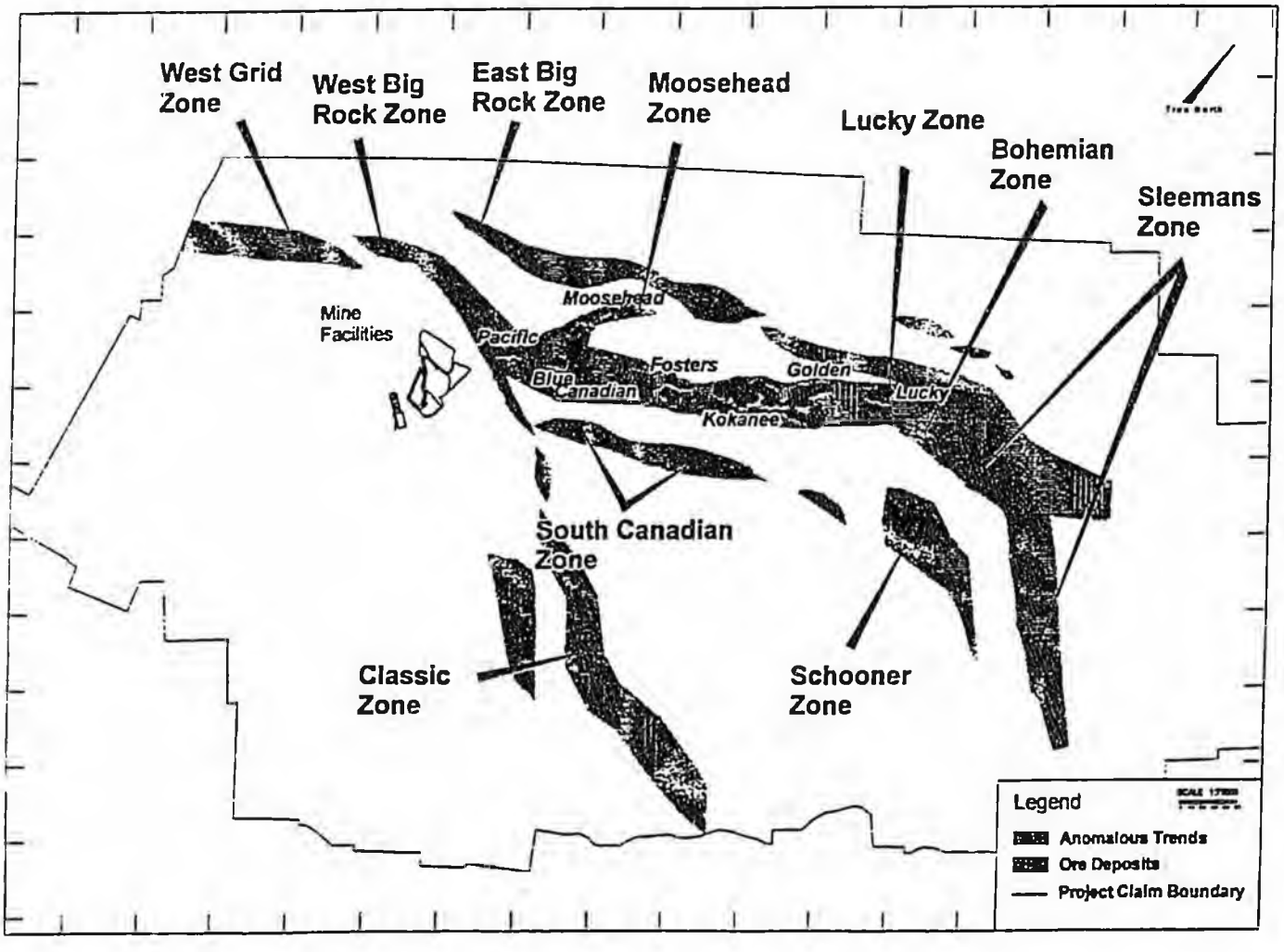
Corp. and Baja Gold Inc. shareholders approved a merger with Viceroy Resource Corporation in May, 1996. Viceroy owns 100% of Brewery Creek. The first bar of gold was poured on November 15, 1996, and the mine reached full production in May, 1997. The Brewery Creek Mine is the largest lode gold mine ever constructed in the Yukon.

PROJECT SUMMARY

The Brewery Creek Mine consists of 801 claims and leases covering 16,160 hectares located between 540 m and 1,225 m elevation, 55 km east of Dawson City, Yukon. It is a year-round heap leach operation with seasonal open-pit mining of 11,000 tonnes of ore per day – 2,000,000 tonnes between April and October each year. Heap leaching of the ore takes place throughout the year. Most gold production takes place during the third and fourth quarters. A total of 80 mine and maintenance personnel work 12-hour days, during a 14-day on and seven-day off rotation. Most employees reside at the mine camp, which has a permanent capacity of 124 rooms. The work force is 100% Yukon-based. A socio-economic agreement has been signed with the Tr'ondek Hwech'in First Nation which provides for employment, a scholarship fund, finder's fees and a framework for exploration and joint-venture activities on other First Nations land. It also provides for First Nations representation at technical, operational and environmental management meetings.

Brewery Creek Mine Property Plan

Ore Deposits & Anomalous Gold Trend Zones



Modified from November 24, 1999, Viceroy Resource Corporation press release.

GEOLOGY AND MINERALOGY

Gold mineralization is structurally controlled and primarily contained in sedimentary and intrusive rocks in the hanging wall of reactivated thrust faults. The host rocks include porphyritic quartz monzonite, hornblende monzonite, interbedded sandstones and greywackes and fine-grained ash tuffs and pyroclastics. Gold primarily occurs as submicron-size particles with arsenopyrite and pyrite as growth bands around larger sulphide grains.

A total of eight main oxide deposits were originally delineated at Brewery Creek. From east to west these are the Lucky, Golden, Kokanee, Fosters, Canadian, Moosehead, Blue and Pacific deposits. Collectively, these deposits are referred to as the Reserve Trend. The Upper Fosters and Canadian oxide deposits have been mined out. Current production is from the Kokanee, Golden, Lucky and Blue pits.

ORE CHARACTERISTICS

Gold production at the Brewery Creek Mine comes largely from oxide ore and minor amounts of transition (mixed oxide/sulphide) ore. Since most of the gold is concentrated in the outer rim, limited oxidation is required to liberate it from the sulphide minerals. Sulphide mineralization generally lies down-dip from known oxide reserves and is refractory. Initial work indicates that the sulphide ore may be amenable to bio-oxidation with gold recoveries in the range of 90%.

It was found in 1999 that sedimentary-hosted oxide ore has a longer-than-estimated leach cycle than the intrusive-hosted ore.

INFRASTRUCTURE

The mine facility consists of a large permanent heap leach pad, an adsorption, desorption and gold recovery (ADR) plant, process and overflow ponds and ancillary facilities, including a power plant, water supply systems, mine service buildings and an assay laboratory. Mine service buildings include a two-bay maintenance shop, mine offices, warehouse and cold storage, and ambulance garage.

The leach pad is divided into 10 discrete cells, each nominally 83 m wide and 462 m long, which provide the ability to apply solution to one cell while simultaneously washing and detoxifying ore in other cells. The current pad layout provides space to accommodate 18,000,000 tonnes of stacked, run-of-mine ore. The pad capacity is expandable. The design of the pregnant solution ponds is conventional.

A multiple-layer liner system has been installed under the heap to collect process solution and direct it to the recovery plant, as well as prevent leakage to the environment. Of prime concern, because of the severe winter conditions, is the possible loss of solution to the ponds and subsequent freezing of the drip emitter system during an equipment failure. Temperatures have dipped to as low as -43.5°C. To prevent this, the following features were incorporated into the design.

- Ore under leach is covered with a layer, or frost cover, of ore to act as an insulator.
- All outside piping is insulated and heat traced.
- Waste heat from the diesel generator engines is used to heat the outgoing barren solutions.
- A waste oil-fired heat exchange is used to heat circulating solutions.

Ore processing employs a sodium cyanide, heap leach of run-of-mine gold ore. Gold recovery from pregnant leach solutions is by activated carbon adsorption and pressurized caustic solution desorption followed by electrowinning onto steel wool and on-site smelting to gold bullion.

A new, intermediate leach circuit, which doubles the solution handling capacity, was completed during the third quarter of 1998.

PRODUCTION

1997

From Kokanee and Golden pits; full production achieved in May, 1997.

Total gold	72,387 ounces
Total ore mined	2,100,000 tonnes
Total waste mined	3,600,000 tonnes
Stripping ratio	1.71:1
Total ore to leach pad	2,000,000 grading 1.87 grams/tonne gold
Cash cost	US$184/ounce

Note 1: The mine produced a total of 72,387 ounces of gold during 1997, 66,545 ounces of which were produced at a cash operating cost of US$184 per ounce after full

commercial production was achieved in May, 1997. The additional 5,842 ounces of gold were commenced prior to achieving commercial production status.

Note 2: Gold recovery at 78% is taking 350 to 360 days versus the predicted 240 days.

1998

From Kokanee and Golden pits; production for 1998.

Gold production	79,396 ounces
Total ore mined	2,707,000 tonnes
Average grade of ore mined	1.46 grams/tonne gold
Total waste mined	4,033,000 tonnes
Total material mined	6,740,000 tonnes
Total ore to leach pad	2,238,000 tonnes grading 1.46 grams/tonne gold
Cash cost	US$187/ounce

1999

From Kokanee, Golden, Lucky and Blue pits; production for the nine months ending September 30, 1999.

Gold production	34,682 ounces
Total ore mined	1,890,000 tonnes
Total waste mined	4,442,000 tonnes
Total material mined	6,332,000 tonnes
Total ore to leach pad	1,852,000 tonnes
Cash cost	US$289/ounce

Gold production from the Brewery Creek Mine is approximately 20,000 ounces less than planned for due to shortfalls incurred in the third quarter. Approximately 60% or 12,000 ounces of the shortfall is related to longer than estimated leach cycles for sedimentary ores (comprising 15% of 1999 production). In addition, in late August, a short-term imbalance in the chemistry of the leach solutions delayed production of approximately 5,000 ounces, while a small mine production shortfall accounted for the balance of the variance. Normal production levels are anticipated from the mine in the fourth quarter of 1999.

The revised 1999 forecast for the mine is 55,000 ounces of gold at a cash operating cost of US$250 per ounce.

Beyond 1999

Mine reclamation costs are estimated at C$6 million. ($0.30 per tonne of ore is being set aside to cover these costs.) Viceroy is undertaking a review for 2000 of reclamation and decomissioning costs.

Viceroy is implementing changes to the operating plan at Brewery Creek to reflect current market conditions.

Mineable reserves as of September 30, 1999 stood at 11.8 million tonnes at 1.13 grams/tonne gold (equivalent to 428,577 contained ounces of gold).

ENVIRONMENTAL CONSIDERATIONS AND RECLAMATION

A full environmental review, including baseline studies, heritage and archaeological investigations and an estimate of socio-economic impacts was completed for the Brewery Creek Mine. The following environmental design considerations were included:

- layout of the plant, facilities and roads to minimize adverse visual impacts;
- disposal of over 70% of mine waste in the spent pits;
- a multi-layer liner system, installed under the leach pad to prevent leakage to the environment and to direct collected process solution to the recovery plant;
- a leak detection system to act as a further safeguard against leakage;
- double lining of process ponds with polyethylene, including two overflow solutions, one pregnant and one barren; and
- equipping process ponds with internal leak detection systems.

Monitoring of wildlife and air and water quality is ongoing during mine operations.

Post-mining reclamation, estimated at $6 million will be extensive. Final effluent solution will be treated to destroy residual cyanide. Large portions of the heap-leach area will be covered with growth material and revegetation programs undertaken. All buildings and surface structures will be removed or buried, leaving the area as close to its original state as possible.

In 1997, Viceroy Resource Corporation was named the environmental leader of the Canadian mining industry by the Social Investment Organization of Canada.

EXPLORATION

In 1997, Viceroy Resource Corporation added 483,000 ounces of gold (based on visual estimates, at least 50% of the resource is considered oxide mineralization) to the geologic resource at the Brewery Creek Mine.

In 1998 and 1999, reverse circulation drilling and trenching focused on expanding oxide resources at the Bohemian and Schooner zones.

LUCKY ZONE

Drilling in 1997 adjacent to the Lucky Zone added a resource of 1,700,000 tonnes grading 2.63 grams gold/tonne (0.09 ounces/ton).

In the Lucky and East Big Rock zones drilling also intercepted mineralized faults that may represent sulphide feeder zones.

BOHEMIAN ZONE

A new oxide resource of 364,000 tonnes grading 0.52 grams gold/tonne was defined at the Bohemian Zone in 1997. Continued drilling in 1998 included one of the best holes drilled on the property to date at 4.42 grams/tonne gold over 46 m including 10 m of 11.24 grams/tonne gold. In-fill and step-out drilling will be completed during the fourth quarter in order to establish a reserve on the Bohemian Zone.

CLASSIC ZONE

A new oxide resource of 10,900,000 tonnes grading 0.52 grams gold/tonne was defined at the Classic Zone in 1997. Additional trenching and drilling was carried out in 1999.

NORTH SLOPE ZONE

At the North Slope Zone, a new sediment-hosted resource of 2,200,000 tonnes grading 2.01 grams gold/tonne was defined in 1997. Additional drilling was carried out in 1999.

SCHOONER ZONE

At the Schooner Zone, one trench returned 1.27 grams/tonne gold over 66 m. Trenching and drilling were carried out in 1999, around the Schooner Zone and the 200-m prospective area between the two zones, in order to establish a geologic resource. Trenching tested gold-in-soil anomalies 2.5 km east of the Schooner Zone with the expectation of extending the strike length of the Reserve Trend.

As of September 30, 1998, Viceroy Resource Corporation had 19 properties either staked or under option as part of their Yukon regional exploration program for "Brewery Creek-type" bulk mineable targets throughout the Yukon, including the McQuesten and Sprogge projects. Significant exploration work was carried out in 1998 on these properties.

In 1999, Viceroy sold its 22 Yukon regional properties to NovaGold Resources Inc. for 3.4 million common shares.

CANTUNG PROPERTY

North American Tungsten Ltd.

President: Stephen Leahy
Chief Executive Officer: Udo E. von Doehren

Corporate headquarters
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Vancouver, British Columbia V6E 4C4

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Toll free	1-800-478-5550
E-mail	natung@westpac.bc.ca
Web site	www.westpac.bc.ca

PROJECT STATUS

Mine is on care and maintenance status

Location
300 km north of Watson Lake

Ownership
North American Tungsten Ltd.

Commodity
Tungsten

Ore type
Oxide

Mineable reserve
1.270 million tonnes

Tungsten: 1.2%

Mining method
Underground

Employees when in operation
350

Mine life
Closed

HISTORY

The Cantung deposit was first discovered in 1954 by A. Berglund for Northwestern Exploration Ltd. The property was staked in 1955 and drilled in 1956. When the claims lapsed in November, 1958, the property was restaked by the Mackenzie Syndicate (Leitch, Highland Belt, Area Exploration Ltd., Dome Minerals Ltd., Ventures Ltd. and Lake Expanse Gold Minerals Ltd.), which formed a new company, Canada Tungsten Mining Corporation Ltd. (Cantung) and drilled 11 holes in 1959 and 41 holes in 1960. Falconbridge, Amax and Dome financed production which commenced in November, 1962. Production was suspended for a year in 1963-64 because of low metal prices, and was interrupted in 1967 by a mill fire. Falconbridge sold its interest in 1966 and Dome sold its interest about 1985.

A new deposit, the E-zone, was discovered with four deep surface holes in 1971 and explored with an additional eight surface holes, a 1,250 m adit and detailed underground drilling in 1972-73. Open-pit mining of the original Cantung orebody was completed in September, 1973 and milling began on underground ore from the E-Zone during the first half of 1974.

An expansion of mill capacity to 1,000 tpd was completed in mid-1979 but production was halted by a strike from November, 1980 to May, 1981. The mine was closed most of 1983 because of low metal prices and then operated at half capacity until May, 1986 when it closed indefinitely due to low tungsten prices and a labour dispute. In 1985, Amax transferred all of its tungsten assets, including the Mactung deposit, to Canada Tungsten Inc. but retained majority control.

Canada Tungsten Inc. and Aur Resources Ltd. merged in 1996. In 1997, North America Tungsten acquired 100% interest in both the Cantung and Mactung deposits. The mine has been on care and maintenance status.

PROJECT SUMMARY

The Cantung Mine and minesite is located 300 km north of Watson Lake, Yukon along the Nahanni Range Road. Although the mine is situated in the Northwest Territories, the town of Watson Lake was the staging area for trucking the tungsten ore and for supplying the minesite.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Cantung deposit is one of several tungsten skarn deposits, including Mactung, located along the eastern margin of the Selwyn Basin. Tungsten mineralization is associated with scheelite-bearing skarn within contact metamorphosed and metasomatized Lower Paleozoic carbonate rocks.

The original tungsten orebody was a lens 180 m long, 90 m wide and 25 m thick that developed in the overturned limb of a tight syncline. It is situated about 300 m vertically above the intrusive contact, within a particularly clean, massive lower Cambrian limestone which has only been found near the mine. Reserves in the original Cantung deposit were originally calculated at 1.18 million tons grading 2.47% WO_3 and 0.45% Cu. The main Cantung deposit was underlain by the Chert zone, which contained 3.5 million tons grading 0.65% WO_3. Total production from the pit was about 1.66 million tons grading about 1.75% WO_3 (which included some chert ore).

The E-Zone, situated about 550 m north and 300 m lower than the original deposit, occurs along a flat-lying intrusive contact within the same limestone horizon. Original reserves in the E-Zone were about 4 million tons grading 1.6% WO_3 and 0.22% Cu, which made it, at the time, the largest tungsten deposit being mined in the free world. An extension was discovered about 150 m west in 1984, from which intersections on the first five holes ranged from 1.2 to 3.0% WO_3, across thicknesses of one to 16 m.

Both the Cantung and E-Zone deposits consist of pyrrhotite, scheelite and chalcopyrite in a diopside skarn. Scheelite and skarn show a direct relationship. Minor constituents include garnet, epidote, actinolite and sphalerite.

Up to its shutdown in 1986, the Cantung mine produced about 31,185 tons of tungsten metal, or about 85% of Canadian production to date. At its peak, the mine produced 1,200 tonnes of ore per day, six days per week. Remaining ore reserves are in the E-Zone, and are given as 1.27 million tonnes (1.4 million tons) grading 1.2% tungsten over a three-year mine life at 1,100 tonnes per day.

Promising exploration targets in the area include a scheelite-bearing, pyrrhotite-rich diopside skarn within a hornfelsed lower Cambrian argillite about 2 km southwest of the townsite. One of the 1,979 holes returned 1.04% WO_3 across 4 m.

PRODUCTION AND DEVELOPMENT PLANS

North American Tungsten Ltd. is a Canadian public company whose assets include the Cantung Mine, the Mactung deposit and the Hemerdon Mine in England; together these comprise about 15% of the western world's known tungsten reserves. The company plans to take advantage of its proprietary and patented technology to process tungsten ore. The process, called Gas Sparging Technology, was originally developed and patented by the U.S. Bureau of Mines. North American Tungsten has further developed the Gas Sparging Technology, which will reduce tungsten ore processing costs by 50% and virtually eliminate the environmentally hazardous waste products traditionally associated with tungsten production.

North American Tungsten anticipates an increase in tungsten prices as excess supply from China, which has kept the price down for over ten years, is depleted.

In 1999, tungsten prices increased as a result of a decline in tungsten production from China. In addition, the U.S. army has announced that it intends to use a so-called "green bullet," which utilizes tungsten instead of lead in the core. Use of "green bullets" by the U.S. and, potentially, other NATO countries, could consume significant tungsten.

North American Tungsten anticipates a six-month time period for start-up of the mine, at a cost of about $1 million. A $3 million reclamation bond posted for the Cantung Mine was included in the purchase of the Cantung property in addition to a 4% NSR to Aur Resources Inc. of which 1% would be used to replace the $3 million bond.

CARMACKS COPPER PROPERTY

Western Copper Holdings Ltd.

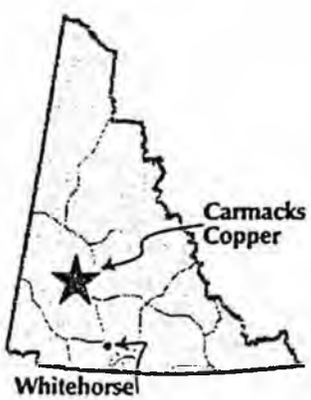
President: Thomas Patton
Chief Executive Officer: Dale Corman

Corporate headquarters
1650–1185 West Georgia Street
Vancouver, British Columbia V6E 4E6

Phone	(604) 684-9497
Fax	(604) 688-4670
E-mail	info@westerncopper.com
Web site	www.vwesterncopper.com

PROJECT STATUS

Permitting stage



Location
28 km northwest of Carmacks, 193 km north of Whitehorse

Ownership
Western Copper Holdings Limited

Commodity
Copper, silver, gold

Ore type
Oxide

Geological reserve
22.4 million tonnes grading 1.1% copper

Mineable reserve
14,109,800 tonnes grading 0.99% copper and 0.51 grams/tonne gold

Mining method
Open-pit, solvent extraction electrowinning (SXEW)

Mine life
8.5 years

Capital cost
C$66 million

Cash costs
C$0.87/pound or US$0.62/pound

Copper production per year
31-32 million pounds of cathode copper

Estimated number of employees
90

Power
7 MW, on-site diesel or grid extension

HISTORY

Copper was first discovered in the Carmacks Copper area in the late 1800s, but it wasn't until the late 1960s that the property was staked by G. Wing of Whitehorse. Subsequent exploration was carried out by the Dawson Range Joint Venture (Straus Exploration Inc., Great Plains Developments of Canada Ltd., Trojan Consolidated Minerals Ltd., and Molybdenum Corporation of America). Archer Cathro and Associates Limited acted as manager and earned the right to acquire abandoned properties. The G. Wing residual interest was acquired by A. Arsenault in 1971; the Arsenault interest is held under an option agreement to Archer Cathro and Associates Ltd. In 1989, the property, including the rights to the Arsenault Option, was optioned to Western Copper Holdings Ltd. who farmed-out a 50% interest to Thermal Exploration Co. Archer Cathro and Associates retain a 3.0% NSR royalty to a maximum of C$2.5 million.

A total of 12,900 m (43,000 feet) of drilling in 80 diamond drill holes and 11 reverse circulation drill holes has been completed on the property, mostly in the No. 1 zone. In addition, several kilometres of surface trenching has been carried out across the main deposit.

PROJECT SUMMARY

The Carmacks Copper project covers 1,000 hectares. Access is by a 35 km gravel road from Carmacks, which is 175 km north of Whitehorse. Access to tidewater and port facilities is available through the port of Skagway, Alaska. The project is expected to be a low-cost producer of cathode copper, employing solvent extraction and electrowinning techniques to recover oxide copper from an open-pit mineable reserve of 14,109,900 tonnes grading 0.99% copper. The mine operation will employ 90 people, the majority of whom will reside in the town of Carmacks. A favourable feasibility study has been completed. The environmental permitting process is on-going.

GEOLOGY, MINERALOGY AND ORE RESERVES

The copper deposits are generally fault bounded and zoned mineralogically with copper oxide and copper carbonate minerals at surface, and mixed oxides and sulphides at depth. Copper mineralization is primarily malachite with lesser azurite, cuprite, covellite and other copper minerals. There are 14 mineralized zones on the property. The No. 1 zone is the best explored and has a geological resource of 22.4 million tonnes grading 1.1% copper and a significant gold credit. The No. 1 zone has been defined by trenching and drilling over a 700 m strike length and down-dip for 450 m. The average width of the deposit is 34 m. An open-pit mineable reserve of 14 million tonnes averaging 0.99% copper has been calculated and will be the basis for a production decision. The total geological resource at a cutoff grade of 0.20% is 20,715,596 tonnes at 0.98% copper. The open-pit mineable reserve, diluted at 10% is 14,109,800 tonnes averaging 1.01% total copper at a 0.35% total copper cutoff. The reserves are classified as proven plus probable.

INFRASTRUCTURE

The mine facility will consist of an ultimate leach pad, processing facilities, open pit and waste dump, water and power distribution services, propane storage and distribution, fire protection, diesel fuel storage, sewage treatment and communications, trailers for offices, changehouse, operations camp, gatehouse and first-aid, and pre-engineered buildings for warehouse and shops, laboratory, water supply and distribution pumphouses. Off-site infrastructure includes 13 km of property access road (the road has been cleared and surveyed), 45 km of 138 kV overhead transmission line and 10,000 tonnes of acid storage facilities at Skagway to accommodate ocean shipping schedules and transportation to site.

The process facilities, ultimate leach pad, open pit and waste dump will occupy an area of approximately 100 hectares. Crushing and pad loading will only take place during 200 days of the year. Leaching of ore will be year-round with solution heating during winter operation. Copper will be recovered from the oxide ore by sulfuric acid heap leaching of crushed minus 19 mm agglomerated ore. Pregnant leach solution (PLS) will be treated in a solvent extraction plant to purify and concentrate the weak leach solution to a more concentrated solution suitable for electrowinning. High purity copper cathodes will be produced in an electrowinning plant for shipment from the ice-free port of Skagway. A pilot test plant, partially funded under the Canada-Yukon Mineral Development Agreement, operated from October, 1993 to February, 1994 and produced positive test results. A 220-ton bulk sample was crushed and placed in a 25-foot high crib for leaching. The test confirmed that copper can be recovered by solvent extraction during the colder winter months.

The first phase of the leach pad area has been cleared to ensure permafrost is thawed and to clarify the foundation condition.

PRODUCTION

The open-pit mine plan calls for a stripping ratio of 425 tonnes waste to 1 tonne ore. The project will treat on average 1,763,700 tonnes of oxide ore per year, to produce 14,310 tonnes of copper cathodes per year, at a recovery rate of 80%. Based on a mine life of 8.5 years, and a capital cost of C$66 million, including contingencies, the project is expected to yield 31 to 32 million pounds of cathode copper per annum at an average operating cost of C$0.87 or US$0.62 per pound. Additional tests, based on the scoping study, are planned.

CASINO PROPERTY

Great Basin Gold Ltd.

President: Robert Dickinson
Chairman: Robert Hunter

Corporate headquarters
#1020–800 West Pender Street
Vancouver, British Columbia V6C 2V6

Phone	(604) 684-6365
Fax	(604) 684-8092
Toll free	1-800-667-2114
E-mail	info@hdgold.com
Web site	www.hdgold.com

PROJECT STATUS

Prefeasibility complete, project is on-hold

Location
300 km northwest of Whitehorse

Ownership
Great Basin Gold Ltd.

Commodity
Copper, gold, molybdenum

Ore type
Oxide and sulphide

Geological resource
675 million tonnes
Copper: 0.25%
Gold: 0.48 grams/tonne
Molybdenum: 0.02%

Measured resource
178.2 million tonnes
Copper: 0.30%
Gold: 0.38 grams/tonne
Molybdenum: 0.03%

Mining method
Open-pit, conventional milling

Stripping ratio
1.06:1

Mine life
19 years

Mill feed
25,000 tonnes/day, 9.125 million tonnes/year

Employees
500

Power
38 MW, on-site diesel

HISTORY

The Casino area has been explored for placer gold since 1912 and for silver-lead-zinc vein systems since the 1930s. However, the bulk tonnage porphyry potential of the Casino property was not recognized until 1967, when a soil survey by Casino Silver Mines Ltd. returned widespread anomalous copper and molybdenum values. During the period 1967-1973 several property operators, including Brameda Resources Ltd. and Teck, completed 18,023 m of drilling which confirmed a several hundred million ton gold-copper-molybdenum resource. However, gold was not systematically assayed for and reserve calculations at the time did not reflect the gold content of the Casino deposit. The property became dormant for a number of years until 1991 when Big Creek Resources Ltd. and Archer Cathro and Associates (1981) Ltd. optioned the property from Casino Silver Mines Ltd. and began a 4,729 m large-diameter drill program (21 holes) designed to evaluate the gold content of the property and to better define the copper and molybdenum grades. Pacific Sentinel Gold, through merger arrangements with

Big Creek and Casino Silver, and by renegotiating the Archer Cathro management contract, acquired 100% interest in the property in 1991. In 1994, they carried out a $4.5 million program of delineation drilling (68,000 m in 215 holes), metallurgical, environmental and engineering studies. Although no exploration was carried out on the property from 1995-1997, environmental baseline and project scoping studies continued. In 1997, Pacific Sentinel Gold Corp. and Consolidated North Coast Industries Ltd. merged to become Great Basin Gold Ltd.

PROJECT SUMMARY

The Casino property covers 132 square km. Access to tidewater and port facilities is available through the port of Skagway, Alaska. The project has the potential to be a large bulk tonnage producer of copper, gold and molybdenum over a project life in excess of 20 years. A prefeasibility metallurgical and mine planning program has been completed. The company now plans to advance the Casino project by assessing recently developed recovery and mill processes; investigating power, transportation and other government incentive programs; monitoring commodity price and foreign exchange rate movements; and introducing the project to major mining companies for financing and acquisition. Geotechnical, infrastructure, environmental and socio-economic programs have also been undertaken. The permitting process is not yet underway.

GEOLOGY, MINERALOGY AND ORE RESERVES

The deposit is hosted by the Casino Complex, a suite of igneous intrusive rocks with an intense hydrothermal alteration overprint. The deposit area has not been glaciated. Mineralization is found in three different zones: an oxide-leached zone, a supergene zone, and a hypogene zone. The uppermost zone is an oxide gold-bearing leached zone from which copper has been largely carried away by descending groundwater. The leached zone is underlain by a copper enriched supergene gold-copper zone where dissolved copper has been redeposited. Below the supergene zone is the hypogene zone, which contains primary gold and copper mineralization that has not been affected by surface weathering or supergene enrichment. The deposit measures 1,100 m by 1,600 m and is open to the north and east. Primary hypogene mineralization below the supergene zone has been drilled to a depth of 798 m and is open to depth within most areas.

The Casino deposit contains a measured resource of 178.2 million tonnes of supergene sulphide and hypogene sulphide ore at an average grade of 0.38 grams/tonne (0.011 ounces/ton) gold, 0.30% copper and 0.028% molybdenum, based on a net smelter return cutoff value of C$7/tonne. This includes a 60 million tonne supergene sulphide resource grading 0.367% copper, 0.413 grams/tonne gold, 0.029% of molybdenum and a 117 million tonne hypogene resource grading 0.269% copper, 0.356 grams/tonne gold and 0.027% molybdenum.

PRODUCTION

The open-pit mine plan calls for the prestripping and stockpiling of 50.6 million tonnes of predominantly lower grade oxide material which will expose the sulphide ore for sustained mining. The overall waste to ore ratio will be 1.06:1 after prestripping is complete. Direct mining from the open-pit will provide mill feed for 19 years to a 25,000 tonne/day (9.125 million tonnes/year) concentrator. During the course of mining, 50.7 million tonnes of low-grade sulphide material (0.187% copper, 0.222 grams gold/tonne and 0.010% molybdenum) will be stockpiled to provide an additional six years of mill feed after pit operations have ceased.

Extensive metallurgical testing of several possible process options for the mineral zones has been completed. Conventional, low-cost, flotation processing of supergene and hypogene sulphide ores is currently the optimum ore processing method for the Casino project. Conventional crushing, grinding and flotation of sulphide ore on average recovers 72% of gold, 80% of copper and 62% of molybdenum. Concentrates produced are a copper-gold concentrate, grading 21% copper and 23.6 grams gold/tonne, and a molybdenum concentrate forecast to grade 53%.

Net smelter return (from 1995) is estimated at US$14.85 based on US$1.20/pound copper, US$395/ounce gold, US$7/pound molybdenum, a 0.74 exchange rate and standard treatment and transport charges. Based on a 25,000 ton/day milling operation, annual output will average 48 million pounds copper, 3.5 million pounds molybdenum and 79,400 ounces gold over the 19-year reserve life. Head grades during the first six years are expected to average 0.392% copper, 0.028% molybdenum and 0.45 grams/tonne gold (0.013 ounces gold), netting 63 million pounds of copper and 98,000 ounces of gold per year. Head grades during the 19-year life of the mine are calculated to average 0.30% copper, 0.376 grams/tonne gold, and 0.028% molybdenum.

CASSIAR MINE

Cassiar Mines and Metals Inc.

Chairman: Clifford Frame

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Phone (416) 204-1455
Fax (416) 204-1450

Cassiar Mining Inc.

President and Chief Operating Officer: Barney Kovacs

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Vancouver, British Columbia V6C 1V5

Phone (604) 669-3010
Fax (604) 669-3017
E-mail cassiar@portal.ca
Web site www.cassiarmm.com

PROJECT STATUS

Chrysotile asbestos fibre production

Location
100 km southwest of Watson Lake

Ownership
Cassiar Mines and Metals Inc.

Commodities
Chrysotile asbestos, magnesium

Reserves
Chrysotile asbestos: 3 million tonnes of 10% high-grade

Magnesium: 20 million tonnes of serpentine ore grading 23.5% of contained magnesium metal

HISTORY

The Cassiar asbestos deposit was the first major orebody discovered in the Cassiar area. The mine produced 37 million tonnes of 7.23 per cent asbestos fibre during open pit mining between 1953 and 1990. In the early 1980s, an underground orebody was located downdip and to the south of the main open pit. It was mined underground for less than a year until Cassiar Mining Corporation went into receivership. In January, 1994, B.C. Chrysotile acquired from the receiver the Crown Grants, the existing tailings pile and certain assets of the abandoned mine for $184,040. B.C. Chrysotile was owned 30% by Mineral Resources Corporation, 50% by Black Hill Minerals and 20% by Strategic Industry Investments Ltd. In 1994 and 1995, Pacific Resources Holdings, an affiliate of Mineral Resources Corporation, advanced $510,420 and $68,417 on behalf of Mineral Resources Corporation to B.C. Chrysotile to meet its working capital requirements. At the end of 1995, the assets of Black Hill were placed into administration and the assets of B.C. Chrysotile were frozen by the administrator. In 1996, Mineral Resources Corporation launched a takeover bid for Pacific Resources Holdings and subsequently increased their interest in the B.C. Chrysotile project from 50% to 80%. In May, 1998, Mineral Resources Corporation announced the acquisition of the remaining 20% of Cassiar Chrysotile Inc. as well as a name change to Minroc Mines Inc. In 1999, Minroc changed its name to Cassiar Mines and Metals Inc.

In July, 1999, Cassiar Mines and Metals Inc. and Aluminum of Korea Ltd. entered into a Memorandum of Understanding for the development of a large-scale magnesium metal project. Aluminum of Korea (KORALU) acquired a 35% interest in the project in conjunction with an initial financing of US$25 million, and, ultimately, may acquire a 65% interest by providing full project financing. KORALU would also have an off-take sales agreement to purchase the magnesium metal product. On December

20, 1999, Cassiar Mines and Metals Inc. announced that the first production of chrysotile asbestos was achieved.

PROPERTY SUMMARY

The Cassiar plant site is on a 720 hectare Crown Grant in British Columbia, approximately 100 km southwest of Watson Lake. An all weather paved highway connects the mine site to Watson Lake, Yukon and Dease Lake, British Columbia.

GEOLOGY, MINERALIZATION AND RESERVES

The Cassiar orebody is a stockwork of chrysotile fibre veins developed in serpentinite, situated on the western edge of the Cassiar ultramafic body. The stockpiles of serpentine on surface at the plant site contain 20 million tonnes of stored serpentine, or greenstone, which contain some eight billion pounds of magnesium metal and 700,000 tonnes of chrysotile fibre, sufficient for 50 years production of magnesium metal and 20 years production of chrysotile fibres at the highest production rate planned.

PRODUCTION

Cassiar Mines and Metals Inc. plans a two-phase project for recommissioning of the Cassiar plant. The first phase involves the production and marketing of high-grade chrysotile fibre at a rate of 18,000 tonnes of chrysotile fibre product annually. The ore feed will be obtained directly from the 3 million tonnes of 10% high-grade run of mine stockpile and surface reserve in close proximity to the processing plant, and from additional stockpiles on surface, and potentially, underground reserves. The production of chrysotile fibre will be carried out utilizing wet process methods on feed from the tailings for the lower grade range of fibres, and dry process from stockpile material to produce the higher quality end range of fibres.

After the installation of additional equipment in the plant, chrysotile fibre production can increase to 50,000 tonnes of fibre annually. Additional ore feed will be obtained from the 17 million tonne resource of serpentine tailings containing 4% chrysotile fibre in close proximity to the plant.

First stage refurbishment has now been completed at a capital cost of $3.5 million. An additional $10 million capital expenditure was made for the development of the wet process plant. Further capital expenditure investments will be made on an on-going basis to increase the combined wet and dry fibre production to the full planned level of 50,000 tonnes per year.

The second phase involves construction of a magnesium metal production plant facility with an annual capacity of 150 to 200 million pounds of magnesium metal. The total capital cost of the plant and facility will be in the order of US$600 million. The first production of magnesium metal is planned for 2003. Upgrading the Cassiar plant site for chrysotile fibre production is the first stage of the development.

The metal will be produced from the existing stockpile of serpentine ore on surface, which contains some 20 million tonnes of serpentine grading 23.5% magnesium metal. The cleaned serpentine from the production of chrysotile asbestos is ideal material for the extraction of magnesium metal. The surface ore reserve is sufficient to support a magnesium metal plant production rate of 150 million pounds of magnesium metal annually for over 50 years. In addition, there are underground mine reserves of an additional 18,247,000 tonnes.

Cassiar Mines and Metals Inc. has carried out preliminary engineering and economic investigations and tests to interpret requirements for the plant.

Approximately 40 workers from northern B.C. and the Yukon have been hired to work at the Cassiar plant site.

CLEAR LAKE PROPERTY

United Keno Hill Mines Ltd.

President and Chief Executive Officer: Gerald Gauthier

Corporate headquarters
8th Floor, 350 Bay Street
Toronto, Ontario M5H 2S6

Phone (416) 360-5575
Fax (416) 360-4419

Location
70 km east of Pelly Crossing

Ownership
United Keno Hill Mines Ltd.

Commodities
Zinc, lead, silver

Ore type
Sulphide

Drill-indicated reserves
6.1 million tonnes

Zinc: 11.34%

Lead: 2.15%

Silver: 40.8%

PROJECT STATUS

Inactive

HISTORY

Claims in the Clear Lake area were first staked in 1965, following discovery of the Faro ore body, 80 km to the southeast. Preliminary property exploration followed by drilling was carried out, but the claims were allowed to lapse. In 1974, a syndicate of Conwest companies (Chimo Gold Mines Limited, Consolidated Canada Farday and International Mogul Mining Ltd.) and Teck Corp Ltd. restaked a large claim block in the area. U.S. Steel (Essex Metals Limited) acquired the Teck interest in 1975 and formed the Macmillan Joint Venture, which conducted exploration and drilling. In 1978, the Clear Lake massive sulphide deposit was discovered by drilling one 109-m hole. Additional drilling was carried out from 1979 to 1984. Getty Canada Metals Ltd. acquired Conwest Syndicate's interest in 1980. In early 1988, Total Erickson Resources merged with Getty Resources to form Total Energold Corp. In late 1989, Total Energold purchased Conwest's interest in the property to hold a 79.6% interest, with a subsidiary of U.S. Steel Corp. holding the other 20.4%. Total Energold then added more Clear Lake claims to the property.

In 1991, Total Energold announced a joint venture with Mitsui Kinzoku Resources of Canada Ltd., a wholly owned subsidiary of Mitsui Mining & Smelting of Japan. Mitsui acquired a 19.375% interest in the property for a cash payment of C$1.55 million. It also had an option to increase its interest in the property to 70% by making additional cash payments totalling C$2.45 million and by funding C$5.33 million in exploration over the next four years. Energold was the operator and would, under certain conditions, retain a 10% net profits royalty and 30% working interest. At the same time, Total Energold purchased U.S. Steel's interest in the property for US$1 million.

Under the Energold and Mitsui Joint Venture, additional drilling, geophysics, mapping, trenching and soil sampling were carried out between 1991 and 1993. A total of 19

drill holes totalling 4,500 m were drilled in 1991, in conjunction with geophysical surveys. The 1992 program consisted of diamond drilling (3,100 m), mapping, soil geochemistry, line cutting and geophysical surveys. Six holes, totalling 1,456 m, were drilled in 1993. Baseline environmental studies were conducted.

The joint venture agreement was terminated and in October, 1999, United Keno Hill Mines Ltd. announced that they had acquired the Clear Lake property from Energold Minerals Inc.

PROPERTY SUMMARY

The Clear Lake property, on NTS map sheet 105L, is located 70 km east of Pelly Crossing and about 110 km northwest of Faro. There is a winter road to the property from Pelly Crossing. The property consists of 636 claims.

GEOLOGY, MINEROLOGY AND ORE RESERVES

The Clear Lake deposit is a shale-hosted stratiform lead, zinc and silver massive sulphide deposit located in a fault-bounded wedge of Devono-Mississippian Earn Group shales, immature sandstones and minor exhalites. The property is bisected by the Tintina Fault. The main deposit consists of a 1,000-m long by 120-m wide sigmoidal-shaped sulphide body that consists mostly of laminated and framboidal pyrite. Other minerals include galena, sphalerite, barite, siderite and calcite. The deposit is folded, faulted and overturned.

Drill-indicated reserves consist of approximately 30 million tons of massive sulphide, mostly pyrite, including 6.1 million tonnes (5.53 million tons) grading 11.34% zinc, 2.15% lead and 40.8% silver, using a cutoff grade of 7% combined zinc-lead.

DIVISION MOUNTAIN PROPERTY

Cash Resources Ltd.

President: Robert Carne

Corporate headquarters
#1016–510 West Hastings Street
Vancouver, British Columbia V6B 1L8

Phone (604) 683-1610
Fax (604) 688-2578

PROJECT STATUS

Additional exploration work planned

Location
90 km north-northwest of Whitehorse

Ownership
Cash Resources Ltd.

Commodity
High volatile bituminous B coal

Drill-indicated raw coal reserves
52.9 million tonnes

Proposed mining method
Open-pit, 365 days per year

Proposed processing method
Washing plant, 365 days per year

Proposed adjoining development
20 MW, independent power plant

Potential employment
340 people

HISTORY

Three coal seams were mapped by D.D. Cairnes of the Geological Survey of Canada in 1907. The seams are exposed in the Teslin Creek cut, 2 km north of Division Mountain; an additional coal occurrence was located by Cairnes near the base of the eastern flank of Red Ridge, approximately 5 km northwest of the Teslin Creek showings.

The Division Mountain coal property is currently held under territorial coal licences and coal leases totalling 3,223 square km, owned by Cash Resources Ltd. A field program, including linecutting, geophysics, excavator trenching, hydrological surveys and diamond drilling, was funded by Cash Resources Ltd. and managed by Archer, Cathro and Associates (1981) Ltd. from 1992 to 1998. Large diameter diamond drilling has totalled 10,558 m in 64 holes. Extensive environmental, archaeological and sociological studies have also been carried out.

The property was optioned to Usibelli Coal Mine Inc. of Alaska in November, 1988. In the spring of 1999, Usibelli carried out a program of excavation trenching and 20 reverse circulation drill holes totalling 1,874 m. Coal measures were discovered in a previously undrilled area, 10 km east of Division Mountain. Usibelli dropped its option due to prevailing thermal coal market conditions, despite the high exploration potential of the project.

PROJECT SUMMARY

The Division Mountain coal deposit is located only 20 km from the main electrical distribution grid for the Yukon and 280 km by highway from a deep sea port at Skagway, Alaska. Current access into the property is by a 31-km four-wheel drive road, leaving the Klondike Highway at Braeburn, Yukon. The coal at Division Mountain is similar to or better than the quality of most British Columbia export thermal coals.

GEOLOGY, EXPLORATION AND ORE RESERVES

Coal occurs in at least 14 major seams at Division Mountain within a 50-m stratigraphic interval near the base of the Upper Jurassic Tanglefoot Formation. Aggregate coal thickness (in seams greater than one metre thick) ranges up to 32 m. An unaudited, preliminary resource calculation has been made using a cross-sectional modelling method conforming with the standardized coal reporting system developed by the Geological Survey of Canada. Indicated reserves currently stand at 52.9 million tonnes of near surface high volatile bituminous coal with a stripping ratio of 3.5 bank cubic metres of waste per tonne of raw coal. Washability tests indicate that a high quality export coal suitable for electric power generation can be produced with an 8% total moisture content and averaging 12.2% ash, 27.6% volatile matter, 52.1% fixed carbon and .046% sulphur with a calorific value of 6,170 calories/gram (11,018 Btu/pound) on an as-received basis.

PRODUCTION PLANS

Results of coal analysis suggest that Division Mountain coal is ideally suited for thermal power generation with characteristics comparable to Alberta high volatile bitunimous coals used to generate over 90% of the power needs of that province. The coal is also suitable for supply to the rapidly expanding use of Pulverized Coal Injection (PCI) technology in Japanese and Korean steel industries. Cash Resources has completed environmental baseline data collection required for the development of the coal reserves with an associated 20 megawatt mine-mouth electrical generating facility using mine-run and waste coal.

DUBLIN GULCH PROPERTY

New Millennium Mining Ltd.

President: Gordon Lister

Corporate headquarters
#360, R131-757 West Hastings Street
Vancouver, British Columbia V6C 1A1

Phone (604) 988-7214
Fax (604) 988-0781

PROJECT STATUS

Bankable feasibility study complete, permitting nearing completion

Location
40 km north of Mayo

Ownership
New Millennium Mining (100% owned by First Dynasty Mines)

Commodity
Gold (tungsten)

Ore type
Gold in quartz veins

Geological resource
98.9 million tonnes

Gold: 1.19 grams/tonne

Mineable reserve
50.4 million tonnes containing 1.5 million ounces gold

Gold: 0.93 grams/tonne

Mining method
Open-pit, 150 days per year

Processing method
Heap leach, 365 days per year

Mine life
10 years

Employees
179

Housing
Camp

Power
4 MW, grid or on-site diesel

HISTORY

Placer gold was discovered in Haggart Creek below Dublin Gulch in 1895 and in the Dublin Gulch and the Klondike area in 1898. Scheelite was identified in the Dublin Gulch placers in 1904 and lode gold was discovered in 1907. The history of hardrock exploration in the Dublin Gulch area is complex. The ground was explored in 1970 by a subsidiary of Placer Dome Inc., primarily looking for lode gold deposits in the intrusive rocks. Queenstake Resources Ltd. acquired ground in the area in 1977 and optioned their holdings to Ivanhoe Goldfields Ltd. in 1991. Ivanhoe discovered an intrusive-hosted porphyry gold deposit and granted an option to Amax Gold Inc. to earn a 50% interest in the Dublin Gulch property. Amax drilled 46 reverse circulation holes totaling 5,651 m in 1992, in addition to extensive rock and soil sampling, but decided to drop the option. Ivanhoe Goldfields drilled an additional ten reverse circulation holes (2,078 m) during 1993 and carried out baseline environmental studies including hydrology, meteorology, water quality and wildlife monitoring. In 1994, Ivanhoe Goldfields Ltd. became a wholly owned subsidiary of First Dynasty Mines Ltd. In 1995, 24,400 m of drilling (151 holes), metallurgical testing, engineering and economic studies were carried out. In 1996, Ivanhoe

Goldfields changed its name to New Millennium Mining Ltd. During 1994, the company completed 11,418 m of reverse circulation and diamond drilling, 380 m of exploration trenching, 233 geotechnical test pits and 700 soil samples. A bankable feasibility study has been completed on the property, and project permitting is at an advanced stage, although the project is currently on hold pending higher gold prices.

PROJECT SUMMARY

The Dublin Gulch project is an advanced exploration project covering a low-grade, bulk tonnage intrusive-hosted gold deposit located 40 km northeast of Mayo, Yukon. The property is accessible by an all-weather road. A bankable feasibility study has been completed and an Initial Environmental Evaluation report was submitted to the federal government in 1996. The company has invested more than US$10 million to bring the Dublin Gulch project to the development stage and has signed a framework agreement with the First Nation of Na Cho Ny'a'k Dun. Further development is on hold pending higher gold prices.

GEOLOGY, MINERALOGY AND ORE RESERVES

The deposit is hosted in and around the Cretaceous Dublin Gulch granodiorite stock. Mineralization is found in sheeted, low sulphide quartz veins containing gold and bismuth along the north side of the intrusion, scheelite skarn zones around the margins, and in auriferous quartz-arsenopyrite veins in the intrusion and in the host rocks. Gold occurs as native gold in gangue or associated with bismuth minerals, with lesser amounts of gold contained in arsenopyrite.

The main ore zone is the Eagle, with an estimated resource of more than three million ounces of gold. Three other zones on the property, the Olive, Shamrock and Steiner zones, contain similar gold mineralization.

The mineable gold reserve at Dublin Gulch (from the 1997 feasibility study) is 1,510,000 ounces gold out of a total estimated resource of 3 million ounces of gold. The total mineable reserve (proven and probable) is 50.4 million tonnes at 0.93 grams/tonne gold out of a total geological resource of 98.9 million tonnes grading 1.19 grams/tonne.

PRODUCTION PLANS

Although inferred reserves indicate that a large open-pit mine with well over 100 million tonnes may be possible, the current concept is to initially develop a higher grade core of approximately 50 million tonnes grading 1.19 grams/tonne gold or better.

Highlights from a bankable feasibility study completed by Rescan Engineering Ltd. include:

Gold recovery	79.6%
Net recoverable	1.2 million ounces or 36,560 kg
Stripping ratio	0.8:1 (waste to ore)
Throughput rate	35,000 tonnes per day (seasonal)
Average annual production	135,000 ounces per year
Initial capital cost	US$106.7 million
Average cash production cost	US$221 per ounce (including reclamation)

It was suggested in the feasibility study that using a larger haul fleet, contract mining, optimizing the crushing/conveying circuits, and optimizing the heap-leach pad construction and operation would improve the project economics, as well as increasing the mineable reserves.

The mine would consist of an open pit in the Eagle Zone, mined at 20,000 tonnes per day producing 10,000 tonnes per day mine waste rock. Based on 50 million tonnes of reserve, the mine would have a life expectancy of approximately 10 years. Ore would be crushed and conveyed or trucked to a cyanide heap leach pad. Pregnant solution would be processed using an adsorption-desorption gold recovery (ADR) method and the resulting gold collected would be poured into dore bars on site.

A 1997 agreement between First Dynasty Mines Ltd. and Cornucopia Resources Ltd. for Cornucopia to acquire New Millennium Mining was cancelled. New Millennium Mining Ltd. is in the advanced stages of environmental permitting. While the feasibility study concluded that Dublin Gulch would have a cash cost of production below the average of North American producers, the current gold price has meant that the project is currently unfeasible, and is on hold.

FARO PROPERTY

Deloitte & Touche Inc.

(Interim Receiver)
BCE Place, Suite 1400, 181 Bay Street
Toronto, Ontario M5J 2V1

Phone (416) 601-6150
Fax (416) 601-6390

Grum Deposit

Commodity
Zinc, lead, silver, gold

Ore type
Sulphide

Geological resource
30.8 million tonnes

Lead: 3.1%

Zinc: 4.9%

Silver: 49 grams/tonne

Mineable reserve
16.9 million tonnes

Lead: 3.0%

Zinc: 4.9%

Silver: 47 grams/tonne

Grizzly Deposit

Commodity
Lead, zinc, silver, gold

Ore type
Sulphide

Geological resource
21,356,000 tonnes

Lead: 5.54%

Zinc: 7.33%

Silver: 81.10 grams/tonne

Gold: 0.87 grams/tonne

Mining method
Will be underground

PROJECT STATUS

Inactive

Swim Deposit

Commodity
Lead, zinc, silver

Ore type
Sulphide

Drill indicated resource
4.75 million tonnes

Lead: 3.8%

Zinc: 4.7%

Silver: 42 grams/tonne

The Faro area lead-zinc deposits are located in the Anvil Mountain Range within the Selwyn Basin, immediately northeast and adjacent to the Tintina Trench. The age of the stratigraphic sequence in the Anvil district ranges from late Precambrian to Permian. The sulphide deposits are located in a 150-m thick stratigraphic interval straddling the Mt. Mye formation and the Vangorda Formation contact. Mineralization is one of two types; massive sulphides and quartzose disseminated sulphides. The Cretaceous granodiorite-quartz monzonite Anvil batholith intruded and uplifted the sedimentary package.

There are five major lead-zinc deposits in the Vangorda plateau area. From northwest to southeast, they are Faro, Grum, Vangorda, Grizzly (formerly called the Dy deposit) and Swim. The status of each deposit is as follows.

Vangorda	mined out
Faro	mined out .
Grum	open-pit mine, 4 to 5 years of reserves left
Grizzly	advanced exploration stage, would be mined by underground methods
Swim	undeveloped

HISTORY

Prospector Al Kulan discovered and staked the Vangorda lead-zinc deposit in 1953. The property was optioned to Prospector Airways, and diamond drilling between 1953 and 1955 was carried out. Kerr-Addison Mines Limited eventually acquired Prospector Airways, but interest in the property waned for a number of years because of depressed metal prices, declining metal markets and the remoteness of the area.

In 1962, Kerr-Addison resumed exploration in the Vangorda plateau area, and the Swim lead-zinc deposit, eight km southeast of Vangorda, was discovered in 1963. At the same time, Dynasty Explorations, under the direction of Dr. Aaro Aho, commenced a detailed exploration program on several claim groups in the Faro area in 1964 and discovered the Faro lead-zinc deposit in 1965. Cyprus Anvil, a joint venture between Cyprus Mines (60%) and Dynasty (40%), was formed in December, 1965 to develop the Faro deposit.

Anvil Mining Corporation (later Cyprus Anvil Mining Corporation) commenced open-pit mining operations on the Faro lead-zinc deposit in late 1969 at rates of up to 10,000 per day. The mine was officially opened on January 28, 1970. The mine was open from 1969 to 1982.

In 1973, the Grum lead-zinc deposit was discovered by a joint venture between AEX Minerals and Kerr Addison while testing a gravity anomaly. Cyprus Anvil Mining Corporation purchased the Grum property in 1979.

Concentrate production from the Faro deposit was halted in 1982 because of falling metal prices, low productivity, high operating costs and the added burden of the debt load brought about by expansion. Between June, 1983 and October, 1984, some open-pit waste stripping operations were carried out, but production ceased completely by the end of 1984.

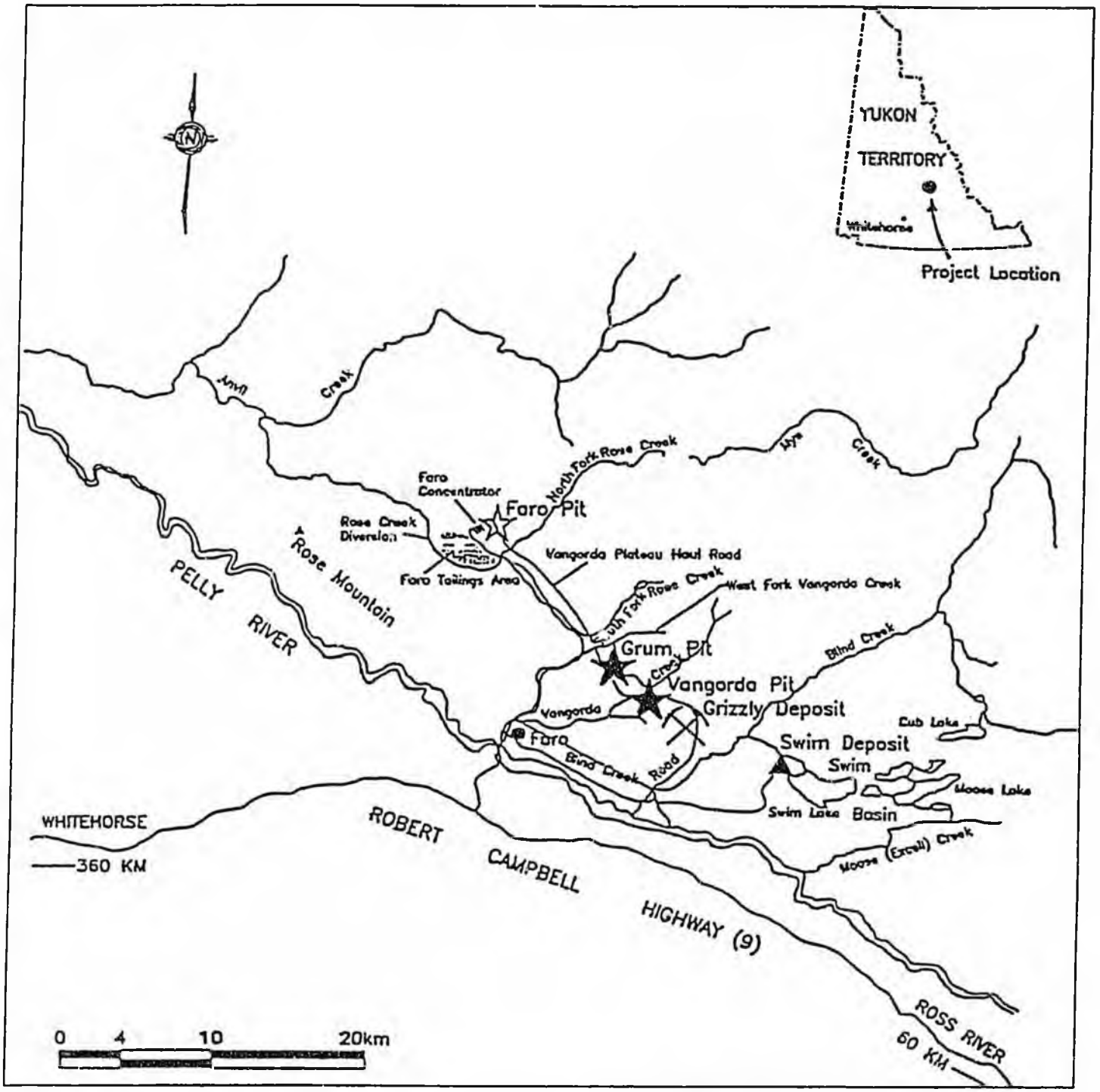
The Anvil Range mineral assets of Cyprus Anvil, including the Grum and Grizzly deposits, were acquired in November, 1985 by a predecessor partnership of Curragh Inc. Curragh resumed operations at the Faro mine in the spring of 1986 and made its first shipment of concentrates in June, 1986. In 1989, development of the Vangorda Plateau was begun with stripping of the Grum and Vangorda deposits. Ore removal commenced at the Vangorda pit and supplemented the mill feed. Ore removal from the Grum pit continued, but was not significant.

Curragh carried out an extensive program of surface drilling on the Grum deposit to delineate reserves and obtain samples for metallurgical testing in preparation for production. Preparation of the Grum deposit for mining commenced in 1989.

In early 1990, an underground operation was initiated just southwest of the Faro pit from a portal in the pit. This operation closed in October, 1992 after mining 1.8 million tonnes of ore.

In 1991, Curragh began stripping the Grum deposit. As of October, 1991, the total waste requiring stripping from Grum was 193.2 million tonnes for a stripping ratio of 6.70:1. The ore reserves in the Faro pit were exhausted in August of 1992 and remnant ore was salvaged by early 1993.

In late 1992, sufficient stripping in the Grum open-pit had been done to expose the top of the Grum deposit and to extract some 15,000 tonnes of mineralization for testing in the Faro concentrator. After removing 21.4 million tonnes, Grum stripping was suspended in December, 1992.



Modified from an Anvil Range Mining Corporation figure.

All mining operations ceased in April, 1993 due to low metal prices. Curragh was forced into receivership by its creditors.

Anvil Range Mining formed in 1994 to acquire the Faro properties from the receiver for a purchase price of $27 million. A nine-month $75-million pre-stripping and mill refurbishment program was carried out. Anvil Range Mining began concentrate production from the Grum open pit in August, 1995 and resumed production from the Vangorda open pit in September, 1995. The first concentrates were shipped from Skagway to Asia and Europe in September, 1995. The mining operation achieved commercial production on November 1, 1995.

By the end of 1996, the Vangorda pit was mined out, and mining operations were suspended because of low metal prices and other factors, including lower head grades, mechanical problems in the mill and lower metal recoveries which contributed to less than planned production. The mill continued to process low-grade stockpiles at 50% capacity until March 31, 1997.

In February, 1997, Anvil Range Mining Corp. announced the closing of a private placement of 4.1 million common shares for a total of $9.4 million with Cominco. ARM also secured a $15 million loan at 8.5% interest from its principal shareholder, Cominco, in July, 1997. The loan was advanced to ARM in two tranches.

Stripping of the Grum pit started in August, 1997. The mine re-opened at full production in November, 1997 and operated until January 16, 1998, when Anvil Range announced that it planned to file for court protection from creditors. On April 21, 1998, an interim receiver was appointed to review the company's assets.

On July 28, 1999, the Yukon government, Department of Indian Affairs and Northern Development (DIAND) and Cominco received the go-ahead to form a holding company that will control the fixed assets of the Faro mine. The holding company will prepare the mine for sale when metal prices improve. Cominco will have the first option to operate the mine, but if Cominco chooses not to exercise that option, the property will be actively marketed in order to find another buyer.

HISTORICAL PRODUCTION

When operating in 1989, the Faro operations supplied 3% of the western world's zinc and 5% of its lead concentrates, making Curragh Resources, the operator at that time, the sixth largest zinc producer in the world.

ANVIL RANGE MINING CORPORATION

Production for the 14 months ended December 31, 1996 was 345,700 tonnes of zinc concentrate and 186,000 tonnes of lead concentrate. From September, 1995 to December 31, 1996, ARM loaded 25 ships for a total of 383,000 dry metric tonnes of zinc concentrates and 181,000 dry metric tonnes of lead concentrates. The concentrate tonnage equates to 566.9 million pounds of payable metal. To produce this amount of concentrate, 28.8 million tonnes of waste and 4.5 million tonnes of ore were moved. The mill processed 4.8 million tonnes of ore, at an average head grade of 5.14% for zinc and 3.04% for lead. Recoveries in the mill averaged 71.3% for zinc and 76.7% for lead.

Concentrates were dried to approximately 7% moisture before being loaded into specially designed shipping containers for trucking to the port of Skagway, Alaska. The lead and zinc concentrates were loaded separately into pots which had a capacity of 11-12 tonnes of concentrate. Four pots could be carried on a tractor-trailer unit. Concentrates were transferred to a storage building prior to loading onto vessels for shipment to smelters in Europe and Japan.

Power for the Grum project, 22 MW, was provided from the Whitehorse-Aishihik-Faro grid.

The target recovery rates for the Grum open pit were 78% for zinc and 80% for lead.

Anvil Range investigated the feasibility of building a crushing and grinding unit adjacent to the Grum site and transporting the ground ore by slurry pipeline to the mill. They made significant improvements to the milling and concentrating facilities. Two 40-foot high column cells were added (the largest in the western world), a Provox custom digital control system was installed, and improvements to the regrind circuit increased recovery.

FARO MINE DEVELOPMENT

1953	Vangorda lead-zinc deposit discovered and staked by prospector Al Kaulan.
1953-1955	Prospector Airways optioned the property and conducted drilling programs.
1955-1962	Kerr-Addison Mines acquired the property but due to depressed metal prices, little work was done.
1962	Exploration resumed.
1965	Faro lead-zinc deposit discovered; a joint venture between Cyprus Mines and Dynasty was formed to develop the Faro deposit.
1969 (late)	Open pit mining of Faro pit commenced (offical opening January 28, 1970).
1969-1982	Cyprus Anvil Mining Corporation operated the mine.
1973	Grum lead-zinc deposit discovered.
1975	In March, a tailings pond spill occurred when 245,000 cubic metres of tailings slurry contaminated Rose Creek.
1982	Concentrate production halted.
1983	Some open-pit waste stripping operations was carried out (June, 1983 to October, 1984).
1984	All production ceased completely by the end of 1984..
1985	Curragh Inc. acquired the property in 1985 and resumed operations in 1986.
1989	The Faro operations supplied 3% of the western world's zinv and 5% of its lead concentrates, making Curragh Inc. the sixth largest zinc producer in the world.
1990	Underground mining at Faro pit took place.
1991	Stripping of Grum deposit began.
1992	Ore reserves in Faro pit are exhausted; test work done on Grum deposit.
1993	Mining operations ceased due to low metal prices and Curragh was forced into receivership by its creditors.
1994	Anvil Range Mining Corporation acquired the Faro property from the receiver and resumed production in August, 1995, from Grum, then Vangorda.
1996	Anvil Range Mining Corporation filed a decommissioning plan.
1996	By the end of 1996, the Vangora pit was mined out but the mill continued to process low-grade stockpiles at 50% capacity until March, 1997.
1997	The mine reopened at full production in November, 1997 and operated until January 16, 1998.
1998	On April 21, 1998, an interim receiver was appointed to review the company's assets. By 2000, the Faro property may be managed by DIAND, the Yukon government and Cominco until a new owner acquires the property.

Reclamation and environmental work

In 1995, Anvil Range Mining filed the Initial Comprehensive Abandonment Plan with the Yukon Water Board. Anvil Range Mining accrued the cost of reclamation and closure monitoring at the rate of $0.42 per tonne of mill feed.

To fund the closure and reclamation costs, Anvil Range Mining, after negotiating with DIAND, established a Reclamation Security Trust (RST). Payments to the RST were made under the provisions of a formula tied to the price of zinc, with a minimum quarterly payment of $175,000 being required subject to available cash flow. The fund is managed by an independent trustee, who obtains independent investment counsel for investment decisions. There is a $100 million cap on the fund.

Tailings

In 1996, Anvil Range Mining also filed the Tailings Reprocessing Feasibility Study. Over 50 million tonnes of flotation tailings accumulated from the Faro mill operation from 1969 to 1992.

GRIZZLY DEPOSIT

The Grizzly deposit was discovered in 1976 by Cyprus Anvil Mining Company (CAMC). For the next five years, CAMC drilled 52 holes and developed a preliminary interpretation and mineral inventory. Curragh Resources acquired the property in 1985 and, between 1989 and 1991, drilled an additional 21 holes. In 1991, three holes were drilled to test a fault in the Dy deposit, and five holes were drilled to test the path of a proposed decline. Ten holes were drilled through overburden to test the proposed portal site. The Dy deposit was re-named the Grizzly deposit in 1996.

The Grizzly deposit is similar to the other deposits in the Faro area. It is a multi-layered, polydeformed, sediment-hosted sequence of exhalative, massive and disseminated pyritic sulphides.

There are two main mineralized horizons:

- "A" horizon: relatively lead enhanced; and
- "B" horizon: relatively zinc enhanced.

Collectively, the two horizons are referred to as the "AB" zone. The internal structure of the deposit is poorly understood, but the current thinking is that the structural complexity known to exist at Vangorda and Grum will be exhibited at Grizzly.

Geological reserves have been calculated by various parties. The most recent determination, by Curragh, by means of a polygonal method, suggests that the Grizzly deposit has probable and possible reserves of 21.3 million tonnes grading 5.54% lead, 7.33% zinc, 81.1 grams/tonne silver and 0.87 grams/tonne gold using a 9% Pb+Zn cutoff grade.

The ore reserves lie between approximately 500 m and 850 m below the surface. Mining would be only by underground methods. Additional exploration is required before this deposit would be mined.

Anvil Range commissioned a pre-feasibility study in 1996 for the Grizzly project. It is estimated that the initial development and underground exploration phase will take 27 months, cost approximately $26 million and include driving twin access ramps, drilling, metallurgical testing and a feasibility study. If a production decision results, shaft construction would take a further 34 months and cost an estimated $52 million, plus an additional $27 million for new and replacement mine equipment. It is estimated that at a production rate of 1.5 million tonnes of ore per year, the Grizzly mine's life would be 11.5 years, which could be extended by continued exploration.

SWIM DEPOSIT

The Swim is the easternmost of five synsedimentary stratiform lead-zinc-silver deposits located in an arcuate belt along the south flank of the Anvil Batholith. The Swim deposit strikes northwest and dips about 25° northeast. Drilling in 1996 outlined 4.75 million tonnes grading 4.7% zinc, 3.8% lead and 42 grams/tonne silver (using a 6% lead + zinc cutoff) with minor copper and gold values, within an 18 million-tonne deposit of massive sulphides that is roughly 460 m long and 150 m wide. Average thickness is about 21 m, with a maximum thickness of 85 m.

FYRE LAKE PROPERTY

Pacific Ridge Exploration Ltd.

President: John Brock

Corporate headquarters
#1407–675 West Hastings Street
Vancouver, British Columbia V6B 1N2

Phone (604) 687-4951
Fax (604) 687-4991
E-mail jsbrock@istar.ca

PROJECT STATUS

Reserve delineation ongoing

Location
160 km northwest of Watson Lake

Ownership
Pacific Ridge Exploration Ltd. has an 80% interest in half of the property. Welcome Opportunities has the other 20%. Pacific Ridge owns 100% of the remaining claims.

Commodity
Copper, cobalt, gold

Ore type
Sulphide

Drill-indicated reserves (preliminary estimates based on wide-spaced drill-holes)
15.4 million tonnes, within which 8.2 million tonnes grade (using a 1% copper cut-off)

Copper: 2.1%

Cobalt: 0.11%

Gold: 0.73 grams/tonne

HISTORY

Massive sulphide mineralization was first discovered in the Fyre Lake area on the property in 1960 by Cassiar Asbestos Corporation, and since then various companies, including Atlas Explorations (1966-67), Amax Potash Limited (1976), Welcome North Mines Ltd. (1980-81) and Placer Dome Explorations (1990-91), have explored the area. A total of 23 shallow packsack (224 m) and 20 AX (1,423 m) drill holes were completed during this period.

In 1995, Pacific Ridge (formerly Columbia Gold) optioned the core group of claims from Welcome Opportunities Ltd. and, by 1997, had acquired 80% interest in the claims by spending $6 million ($3 million to earn 50% and an additional $3 million to earn up to 80%). Upon a positive feasibility study, Welcome Opportunities may elect to either arrange all production financing and place the property into production, thereby increasing its interest to 55% with Columbia retaining a 45% joint venture interest, or Welcome may convert its interest to a 2% Net Smelter Return Royalty. Pacific Ridge fully owns the remaining 411 claims on the property. During 1996 and 1997, the company drilled 115 drill holes and has partially defined a copper-cobalt-gold resource. An economic scoping study has been completed and preliminary metallurgical tests have been carried out. The company is seeking a joint venture partner to finance on-going exploration work.

PROJECT SUMMARY

The Fyre Lake property is situated approximately 160 km northwest of Watson Lake. It consists of claims covering 88 square km in the Finlayson Lake district immediately east of Fire Lake, along the North River drainage. The property is 30 km southeast of the Wolverine project of Expatriate and Atna Resources.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Finlayson Lake District is underlain by a Late Paleozoic metamorphosed volcano-sedimentary assemblage of the Yukon-Tanana terrane which is regionally bounded to the southwest by the Tintina Fault

and to the northeast by the Finlayson Lake fault zone. Copper-cobalt-gold mineralization is hosted by a well deformed and moderately metamorphosed chlorite to quartz-chlorite schist sequence which is interpreted to be a succession of basic to intermediate flows with interbedded tuffs and volcanically-derived fine-grained sedimentary rocks belonging to the middle unit of the layered metamorphic sequence. The chloritic schist sequence is overlain by a micaceous quartz schist unit, which is in turn overlain by a thick sequence of phyllite of the upper metasedimentary sequence.

The Fyre Lake project covers over 9 km of favourable host rocks with several geochemical-geophysical targets indicative of volcanogenic massive sulphide mineralization. To date, the company has focused its attention to delineating the Kona deposit (23,200 m in 115 holes).

The Kona deposit to date consists of two parallel northwest-trending zones of copper-cobalt and gold massive sulphide mineralization found in horizons with thickness from eight to 40 m over a length of 1,500 m and width of 250 m. Massive sulphide mineralization in the Kona deposit consists of pyrite, chalcopyrite, pyrrhotite and sphalerite, while semi-massive sulphide mineralization consists of thinly-laminated pyrite, chalcopyrite +/- pyrrhotite within alternating laminae of very fine-grained siliceous chlorite schist. Banded and massive magnetite layers host trace to 10% sulphides, usually chalcopyrite, pyrite and rarely bornite.

Preliminary estimates by Pacific Ridge management show the Kona deposit to contain 15.4 million tonnes within which 8.2 million tonnes grade 2.1% copper, 0.11% cobalt and 0.73% grams/tonne gold, using a 1.0% copper cut-off. The ultimate size of the Kona deposit remains to be drill tested. Two additional large targets remain to be explored by drilling.

MINE PLAN

The company commissioned a preliminary resource estimate for the Kona deposit with the northwest portion of the deposit holding potential for open-pit mining and the deeper southeastern extension being a prospective underground target.

Preliminary scoping by a major independent engineering firm indicates a 20 million tonne resource would be economic, half of which could be mined by open-pit and half by underground methods. The study assumes a reserve of 10 million tonnes of open-pit ore grading 2.0% copper, 0.7 grams/tonne gold and 0.12% cobalt and a further 10 million tonne reserve to be mined underground at a grade of 3.0% copper, 1.0 grams/tonne gold and 0.12% cobalt. The study was based on metal prices of US$1 copper, US$10 per pound cobalt and US$365 per ounce gold. The deposit is presumed to be mined at a rate of 6,700 tonnes per day or 2.2 million tonnes per year. Mining would yield approximately 95 million pounds of copper, 3.5 million pounds of cobalt and 37,000 ounces of gold annually for the ten-year life. The study projects operating costs of $20 per tonne during the open-pit phase and $36 per tonne during the underground phase. Initial capital costs are projected to be $246 million, including $85 million specifically for on-site treatment and recovery of cobalt. A further $27 million would be required for underground mining operations.

Preliminary metallurgical testwork by Lakefield Research indicates the massive sulphide mineralization is amenable to a two-stage standard flotation process, the first stage of which would involve the collection of a copper gold concentrate with recoveries estimated at 90% for copper and 70% for gold. Concentrate grades range from 21% to 23% copper and 10 to 15 grams gold/tonne. Tests suggest 50% to 75% of the cobalt is recoverable in a two-stage pyrite concentrate.

GREW CREEK PROJECT

Owner: A. Carlos
Whitehorse, Yukon

Phone (867) 668-6309

PROJECT STATUS

Available for option

Location
35 km west of Ross River

Ownership
A. Carlos

Commodity
Gold, silver

Ore type
Oxide

Geological reserve
773,012 tonnes

Silver: 33 grams/tonne

Gold: 8.9 grams/tonne

Proposed mining method
Open-pit, 365 days per year

Processing method
Conventional mill, dore bar, 365 days per year

Power
3 MW, on-site diesel generation

HISTORY

The original Grew Creek claims were staked by Whitehorse prospector A. Carlos in 1983 and optioned by the Mincan JV (Hudson Bay Mining and Minerals), which carried out an extensive exploration program from 1984 to 1986.

In 1987, the claims were optioned by Noranda, who subsequently signed a joint-venture agreement with Golden Nevada Resources and Brenda Mines. Results of the 1987 program triggered a flurry of claimstaking and exploration activity in the area. A large-scale exploration program continued in 1988. In 1989, Golden Nevada changed its name to Goldnev Resources and renegotiated the joint venture agreement to give it a 100% interest in the property.

In 1992, Wheaton River Minerals took an option to conduct an underground development program. This program was expected to confirm grade, continuity of mineralization and ground conditions, and would have been an important step in preparing the deposit for production.

In April, 1992, Wheaton River Minerals approached the Yukon government for financial assistance in developing the Grew Creek orebody. The government carried out a review of the information supplied by Wheaton River. There were several issues for which additional information and analysis were required in order to properly assess the near-term economic viability of the Grew Creek deposit and the potential life of the deposit. Wheaton Rivers' proposal for conducting underground exploration was not funded and it subsequently dropped its option.

YGC Resources Ltd. optioned the property in 1993. Wheaton River Minerals sold the Ketza River mine assets and known reserves through Ketza River Holdings to YGC Resources. Ketza River Holdings is a 100%-owned subsidiary of Wheaton River Minerals and was formed to cover the assets of the Ketza River Mine.

YGC completed a $150,000 drilling program at Grew Creek in 1995 and a 17 diamond-drill hole program in 1996. YGC terminated its option agreement with Carlos in January, 1997.

PROJECT SUMMARY

The Grew Creek deposit can be mined by open-pit methods with a stripping ratio of 9:1, waste to ore. Metallurgical testing by Noranda in 1988 indicated that recoveries of 92% to 94% are possible using simple cyanide processing.

The Grew Creek property is located approximately 35 km west of Ross River and one km from the Robert Campbell Highway and the Whitehorse power grid. The property consists of 332 claims and is owned by A. Carlos of Whitehorse.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Grew Creek epithermal gold deposit is hosted by Eocene volcanic and sedimentary rocks deposited in a pull-apart basin within the Tintina Fault zone. The gold occurs in stockwork quartz veins and hydrothermal breccias cutting hydrothermally altered rhyolite.

In the main zone, rhyolitic tuffs are juxtaposed by an east-west fault against a cyclic sequence of fluvial sediments. The faulted contact is partly intruded by a quartz-feldspar porphyry dyke. The pyroclastic rocks, dyke, fault and sediments all dip steeply to the north. The volcanic rocks are hydrothermally altered to illite-quartz and illite-quartz-adularia assemblages, with an outer propylitic halo.

Mineralization consists of pyrite, marcasite, arsenopyrite, chalcopyrite, argentite, electrum, silver selenides, galena and sphalerite. Fluorite is also present in the Tarn zone. Gangue minerals include quartz, adularia, carbonates, and quartz pseudomorphs after calcite. In the main zone, gold and silver occur as micron-size grains in chalcedony stringer stockworks and adjacent silicified tuffs. There is a good correlation between gold and silver, with a gold:silver ratio of about 1:4 for ore-grade mineralization, which occurs in an elongated zone trending west northwest. The mineralization is strongly anomalous in arsenic and mercury, but mercury shows only a weak correlation with gold and silver. Most high mercury values lie along the fault, above the gold-silver zone.

Initial drilling on the main zone gave a best intersection of 11.7 grams/tonne Au and 150.9 grams/tonne Ag across 31.4 m while the best section exposed in a trench assayed 3.6 grams/tonne Au and 15.3 grams/tonne Ag across 13 m. The 1989 drilling focused on the main zone, with the best hole returning 10.5 grams/tonne Au over 13 m.

The Tarn zone, located 2 km to the east, consists of quartz-fluorite-chalcedony stockworks and localized silicification within a 900 x 100 m zone of sericitized rhyolite dykes and tuff. The best assays were 150 ppb Au across 2.0 m in a trench and 520 ppb Au over 1.5 m in a drill hole.

Prospecting in the area is difficult due to a thick cover of glacial till. Plouffe (1989) showed that gold is concentrated in the silt- and clay-size fraction down ice from the Grew Creek deposit, but the common pathfinder elements Ag, Sb, As and Hg show little correlation with the gold distribution.

In 1991, a trench in the K410 zone, 15 km northwest of the deposit, uncovered intensely iron-stained, highly fractured acid-leached volcanic rocks. Carlos excavated four hand pits to bedrock in 1992 and encountered intensely clay-altered Eocene sediments with hematite-rich bands. Samples from the pits returned anomalous values of mercury and barium, and a heavy mineral concentrate from 45 kg of glacial till in Pit #2 assayed 9,320 ppb Au.

The 1993 diamond drilling intersected strongly altered volcanic rocks beneath a zone of hydrothermal alteration exposed in a surface trench.

The 1994 drilling showed that mineralization in the South Zone consists of an extensive quartz-adularia stringer stockwork of low-grade Au-Ag values. The best intersections were 2.33 grams/tonne Au and 4.1 grams/tonne Ag over 10.4 m. The South Zone mineralization appears to be connected with the Main Zone mineralization, but further drilling between the two zones needs to be carried out to confirm this theory. Drilling in the Main Zone confirmed earlier reported grades. The best intersection was 1.69 grams/tonne Au and 3.0 grams/tonne Ag over 24 m.

PRODUCTION PLANS

In 1989, Orcan Mineral Associates estimated geological reserves of 773,012 tonnes grading 8.9 grams/tonne Au and 33.6 grams/tonne Ag at a cut-off grade of 0.2 grams/tonne and containing a higher grade reserve of 184,947 tonnes grading 12.1 grams/tonne Au.

YGC was proposing to mine the Grew Creek ore and truck it 98 km to the Ketza River mill for processing. The Ketza River mill is a 320 tonne per day carbon-in-pulp (CIP) milling complex. The Ketza River mine operated from 1988 to 1990 and produced 100,000 ounces of gold from oxide ore.

HOWARD'S PASS (XY) PROPERTY

Placer Dome North America

Corporate headquarters
#600, 1055 Dunsmuir Street
Box 49305
Bentall Postal Station
Vancouver, British Columbia V7X 1L3

Phone (604) 661-1991
Fax (604) 661-3786
Web site www.placerdome.com

PROJECT STATUS

Inactive

Location
55 km northwest of Cantung

Ownership
Placer Dome North America

Commodity
Zinc, lead

Ore type
Sulphide

Geological reserve
(includes Howard's Pass and Anniv deposits)
113.4 million tonnes

Zinc: 5.4%

Lead: 2.1%

HISTORY

Placer Development Ltd., operating as Canex Placer, carried out a regional reconnaissance and grid geochemical and mapping program in 1968, 1971 and 1972. After lead-zinc mineralization was discovered, it staked the X, Y, DON and NOD claims over what was to become the Howard's Pass, or, sometimes, the XY deposit.

A staking rush ensued from October, 1972 to April, 1973. Canex Placer drilled in 1973 and 1974. In 1975, Canex entered into a joint venture with Essex Metals and drilled additional holes and constructed a road to the property from the Cantung Road. An adit was driven in 1980 and underground holes drilled in 1981. Essex Metals interest was transferred to Cygnus Mining Ltd. in April, 1982. Placer Development Ltd. was amalgamated into Placer Dome Inc. in August, 1987.

The Anniv and OP claims were staked 22 km northwest of the main Howard's Pass deposit by Canex Placer in 1972, following a regional geochemistry program and discovery of the Howard's Pass showing. After initial property work in 1973 and 1974, Canex Placer entered into a joint venture with Essex Metals (U.S. Steel Western Hemisphere Inc.) and carried out drill programs from 1975 to 1979. In 1982, Essex's interest was transferred to Cygnus Mining Ltd. In 1994, Placer Dome restaked parts of the original claim holdings. Archer Cathro and Associates (now Expatriate Resources) restaked part of the original claim block as the Nod claims in 1994.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Howard's Pass (XY) and the Anniv deposits are defined over part of a 35-km-long basin.

The Howard's Pass (XY) deposit is a sheet-like stratiform sulphide deposit ranging up to 50 m thick and extending several kilometres along strike. It is hosted in a sequence of carbonaceous chert and mudstone comprising part of the Selwyn Basin. The major sulphide minerals are sphalerite, galena and pyrite. They are finely rhythmically interlaminated with carbonaceous chert, calcareous mudstone and limestone. The shaley host rocks have a high (6 to 7%) carbon content and formed in an euxenic basin. The mineralized zone is thought to have formed through expulsion of metal-rich, insterstitial fluid during shale compaction, and deposition in brine pool basins. The Howard's Pass deposit has been explored within an area 7,620 m long and 2,4[illegible]8 m wide. The deposit averages about 10% combined zinc-lead and 17.1 grams/tonne silver across an average thickness of about 16.8 m. There is a large exotic Holocene supergene zone at surface from groundwater over the downhill edge of the deposit.

Drill-indicated reserves for the Howard's Pass (XY) deposit combined with the Anniv deposit were given in 1982 as approximately 113.4 million tonnes averaging 5.4% zinc and 2.1% lead. Inferred reserves for both deposits are in excess of 362.9 million tonnes. The high-grade core area of the Howard's Pass deposit has a drill-indicated, diluted ore reserve of 8.2 million tonnes grading 10.6% zinc and 5.5% lead.

The Anniv deposit is 1,524 m long, 335 m wide and up to 45.7 m thick (average 12.2 m). The Anniv is more continuous and less contorted than the Howard's Pass deposit and has average grades of about 8 to 9% zinc and lead and 17.1 to 34.3 grams/tonne silver.

EXPLORATION PLANS

The Howard's Pass and Anniv deposits are being monitored by Placer Dome.

ICE PROPERTY

Expatriate Resources Ltd.

President and Chief Executive Officer:
Harlan Meade

Corporate headquarters
#1016, 510 West Hastings Street
Vancouver, British Columbia V6B 1L8

Phone (604) 688-2568
Fax (604) 688-2578
E-mail expat@expatriateresources.com
Web site www.expatriateresources.com

Location
60 km east of Ross River

Ownership
Expatriate Resources Ltd. (100%)

Commodities
copper, minor gold, silver, cobalt

Ore type
Sulphide, oxide

Indicated mineral resources
4,561,863 tonnes

Copper: 1.48%

PROJECT STATUS

Exploration planned

HISTORY

The Ice claims were staked in February, 1996 by Expatriate Resources Ltd. to cover a previously unstaked copper soil geochemical anomaly identified during a 1973 survey by Archer, Cathro & Associates Limited. High-grade secondary oxide copper mineralization on surface was discovered in May, 1996 and additional claims were staked. Exploration work in 1996 and 1997 consisted of geological mapping, grid and reconnaissance soil sampling, airborne and ground magnetic and electromagnetic surveys. A total of 34 diamond drill holes (2704 m) in 1996 and 87 diamond drill holes (7880 m) in 1997 were completed. No exploration work was carried out on the property in 1998 and 1999.

PROPERTY SUMMARY

The Ice property is 100% owned by Expatriate Resources Ltd. It is located 60 km east of Ross River on NTS map sheet 105 G/14 in the northern part of the Finlayson Lake volcanogenic massive sulphide district. The Ice property is 70 km northwest of the Kudz Ze Kayah deposit. The property consists of 1,105 claims covering some 22,000 hectares located west of the Pelly River and north of the Robert Campbell Highway. Access is by helicopter from the Robert Campbell Highway, 18 km to the south, or along a winter trail.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Ice deposit is underlain by Devonian to Triassic igneous and sedimentary rocks consisting of basalt, ultramafic and mafic plutonic rocks, ribbon chert and associated argillite, sandstone and marble. Most exploration to date has focused on a 600 m by 400 m area. The "Cyprus-type" mineralization is hosted in a relatively undeformed ophiolite sequence belonging to Slide Mountain Terrane, consisting of a basalt breccia unit lying within a thick package of interlayered massive to pillowed basalts and deep-water sedimentary rocks. The best mineralization is contained within an area 350 m long and 50 m wide of thick massive sulphide accumulations.

Primary mineralization is composed of pyrite, chalcopyrite and localized bornite within a fine quartz ± carbonate gangue in a massive to semi-massive sulphide horizon and underlying stockwork sulphide zone. Secondary copper minerals consist of cuprite, malachite, black copper oxides and chalcocite.

The Ice deposit is estimated to contain an indicated mineral resource of 4,561,863 tonnes grading 1.48% copper with minor gold, silver and cobalt, including about 3.4 million tonnes of near-surface, open-pittable mineralization at the same grade.

Although drilling has largely closed off the Ice deposit itself, most of the favorable stratigraphy on the rest of the large claim block remains untested.

JASON PROPERTY

MacPass Resources Ltd.

Registered office
Anton, Campion, Macdonald, Oyler, Buchan
(Barristers and Solicitors)
Suite 200, 204 Lambert Street
Whitehorse, Yukon Y1A 1Z4

Phone (867) 667-7885
Fax (867) 667-7600

Location
13 km from Macmillan Pass

Ownership
MacPass Resources Ltd.

Commodities
Lead, zinc, silver

Ore type
Sulphide

Indicated mineral resources
14.1 million tonnes

Lead: 7.09%

Zinc: 6.57%

Silver: 79.9 grams/tonne

PROJECT STATUS

Inactive

HISTORY

The Jason deposit was staked in 1974 by C.L. Smith, representing the Ogilvie Joint Venture. Smith explored with mapping, geochemistry, geophysics and drilling. Interests in the property were acquired by Ogilvie Mining Corp. Ltd. in 1978, which then drilled 17 holes. In 1979, the property was optioned by Pan Ocean Oil Ltd., who carried out drilling from 1979 to 1981. Pan Ocean Oil Ltd. was acquired by Aberford Resources Ltd in late 1981. Abermin carried out mapping, geochemistry and environmental studies and drilled nine holes in 1982. In 1985, Aberford carried out joint feasibility and environmental studies with Hudson Bay Mining and Smelting on the Jason and Tom deposits, and then transferred its interest to Abermin Corp. Abermin Corp. was acquired by CSA Gold Corp. in 1991. At this time, all owners with interest in the Jason property transferred their interest into a private Yukon corporation, MacPass Resources Ltd.

Phelps Dodge Corp. of Canada Ltd. optioned the property in 1990 and drilled additional reconnaissance holes, but dropped its option in 1992.

PROPERTY SUMMARY

The Jason property is located about 13 km southeast of Macmillan Pass on the Yukon-Northwest Territories border, 400 km northeast of Whitehorse, and is accessible via the North Canol Road. A 700-m airstrip is situated midway between the Tom and Jason properties.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Jason deposits are hosted by Lower Earn Group shales and turbidites near the eastern margin of Selwyn Basin in the Macmillan Fold Belt. The deposits consist of lead, zinc, silver, barium and iron precipitated from exhaled hydrothermal brines near the margins of a small

graben. The mineralized zones are situated at the same stratigraphic level as the mineralization at the Tom deposit. The Jason deposits are well zoned.

Drilling has defined total geological reserves in three zones: South, Main and End zones. The South Zone contains indicated and inferred geological reserves of 9.01 million tonnes grading 9.43% lead, 5.19% zinc and 119.0 grams/tonne silver. The Main Zone contains indicated geological reserves of 4.55 million tonnes grading 2.08% lead, 9.75% zinc and 2.1 grams/tonne silver. The End Zone contains 0.54 million tonnes of inferred geological reserves grading 10.30% lead, 2.78% zinc and 80.2 grams/tonne silver. An arbitrary cut-off grade of 8% lead plus zinc was used in the tonnage calculations.

Total geological reserves of the Jason deposit are 14.1 million tonnes grading 7.09% lead, 6.57% zinc and 79.9 grams/tonne silver using a cutoff grade of 8% zinc + lead.

Approximately 32,500 m of surface diamond drilling has been carried out on the Jason property to date.

KETZA RIVER PROPERTY

YGC Resources Ltd.

Director: Robert Stroshein
26 Liard Road
Whitehorse, Yukon Y1A 3L4

Phone/fax (867) 668-2489

Location
50 km south of Ross River

Ownership
YGC Resources Ltd.

Commodity
Gold, silver

Ore type
Sulphide, oxide

Mineable reserve
230,000 tonnes

Gold: 10.9 grams/tonne

Mining method
Undetermined

Power
3 MW, on-site diesel

PROJECT STATUS

Drilling and exploration planned to find new zones and increase ore reserves

HISTORY

Exploration activity began in the Ketza River district in 1947 with the discovery of silver-lead veins on the nearby Iona property by Hudson Bay Mining and Smelting Company Limited. On the Ketza property to the west, gold was discovered in 1954 and 1955 by prospectors working for Conwest Exploration Company Limited. From 1955 until 1960, Conwest explored the Ketza River sulphide gold deposit with trenching and 59 drill holes and outlined 75,000 tonnes grading 12 grams/tonne Au. Work completed by Conwest was frequently conducted under harsh conditions, often involving a two-day sled dog or packhorse trip to and from the site for supplies. Packhorses were also used for drill moves. Given a $35 gold price and difficulties in working in this remote location, the project was mothballed.

The Ketza River property was optioned by Pacific Trans-Ocean Resources in late 1983. Pacific Trans-Ocean and Canamax entered a joint venture agreement to explore and develop the property in early 1984, with Canamax the operating partner. After three years of aggressive exploration, an oxide reserve totalling 495,800 tonnes at 18 grams gold/tonne was established. A sulphide reserve of equal size but lower grade was delineated. A production decision based solely on the oxide reserve, was approved early in 1987. Facilities for a 320 tonne per day mining and milling operation were constructed in 1987. The first gold bar was poured on April 28, 1988 and the mine was officially opened on July 21, 1988. In April, 1989 Canamax Resources Inc. purchased Pacific Trans-Ocean's share of the property and became 100% owner of the Ketza River Mine.

The mine operated from July, 1988 until October, 1990 when the oxide reserves were depleted. The mine produced over 100,000 ounces of gold.

In 1992, Wheaton River Minerals Ltd. purchased the property and equipment of the former Ketza River Mine. Responsibility for all operations at the Ketza River site shifted to Wheaton River on August 24, 1992 with the formal closing of the agreement in late November, 1992. In August, 1993, Wheaton River Minerals optioned the

Shamrock zone of the Ketza River mine property to Hemlo Gold Mines. Wheaton River Minerals (WRM) formed Ketza River Holdings (KRH), a 100% owned subsidiary, to cover the assets of the Ketza River Mine. WRM sold KRH to YGC Resources Ltd. for shares.

In 1995 and 1996, YGC Resources Ltd. carried out an extensive exploration program including diamond drilling. In 1997, YGC Resources Ltd. concluded a deal with BYG Natural Resources where BYG purchased 16.5% of the issued and outstanding shares of YGC. BYG would receive 50% of future mine production. The property was dormant in 1998 and 1999.

PROJECT SUMMARY

The Ketza Mine area is located 50 km south of Ross River, Yukon. The property consists of 322 quartz claims, fractions and leases covering approximately 6,100 hectares.

GEOLOGY AND MINERALOGY

A total of 100,000 ounces of gold was produced between April, 1988 and November, 1990.

The Ketza property currently has mineable gold reserves of 230,000 tonnes oxide and sulphide, grading 10.9 grams/tonne gold and possible reserves of 1,764,000 tonnes at 0.0915 ounces per ton gold.

INFRASTRUCTURE

There is a 340 tonne per day CIP (Carbon-In-Leach) mill, supporting infrastructure and a camp on-site.

EXPLORATION AND DEVELOPMENT PLANS

YGC conducted a diamond drilling program in 1995 during which additional oxide gold mineralization was identified. Exploration and a reinterpretation of the property geology at Ketza River led to the discovery of two new oxide zones, the Fork Zone and the McGiver Zone, and an extension to the B-Mag Zone. The company spent close to $500,000 on the property during 1995.

YGC drilled 21 widely-spaced diamond-drill holes on the Shamrock Zone during 1996. The holes were drilled over a strike length of 1,300 m across a width of 700 m and over a vertical interval of 750 m, with the objective of defining controls to gold mineralization within a large, coincident gold-in-soil, magnetic and visual colour anomaly. Assay results and observed styles of mineralization are consistent with YGC's exploration target of a bulk tonnage, low-grade disseminated and stockwork deposit within a portion of the large anomalous area. An intensive program of prospecting and mapping was completed in 1996 to investigate a number of other gold geochemical and coincident geophysical anomalies on the Ketza property.

In 1997, BYG Natural Resource acquired 16.5% of YGC Resources. The agreement called for the milling of Ketza ores at the Mount Nansen mill and for revenues to be shared 50/50 net of costs with BYG advancing pre-production costs. BYG also acquired net smelter return royalties on the Ketza River property. In 1997, YGC Resources continued to explore the Ketza River property. Diamond drilling in the area of the McGiver, Nu and B-mag zones was directed towards demonstrating continuity between the zones. Drill hole KR-97-587 suggested a connecting mineralization between the Nu zone and McGiver, with an intersection of 6.1 m grading 16.3 grams/tonne Au in oxide mineralization. Drilling also intersected a new zone of oxide mineralization named the McDood. Two intersections 100 m apart returned assays of 6.7 grams/tonne Au over 4.7 m and 4.6 grams/tonne Au over 5.8 m. The 1997 program was aimed at increasing oxide reserves on the former producing mine property in preparation for possible production in 1998. In 1997, YGC also conducted work on the Shamrock Zone, a bulk-tonnage low-grade gold target. The Shamrock Zone was tested with widely spaced drilling in 1996 which returned numerous intersections. The 1997 work included detailed mapping, sampling and re-logging of all core drilled by previous operators.

KUDZ ZE KAYAH PROPERTY

Cominco Ltd.

President: David Thompson

Corporate headquarters
500 - 200 Burrard Street
Vancouver, British Columbia V6C 3L7

Phone (604) 682-0611
Fax (604) 685-3019
Web site www.cominco.com

PROJECT STATUS

Water licence received in 1999

Location
110 air km southeast of Ross River

Ownership
Cominco Ltd.

Commodity
Copper, lead, zinc, silver, gold

Ore type
Sulphide

Mineable reserve
11.3 million tonnes
Copper: 0.93%
Lead: 1.52%
Zinc: 5.89%
Silver: 133.0 grams/tonne
Gold: 1.34 grams/tonne

Geological reserve
13 million tonnes
Copper: 1.00%
Lead: 1.30%
Zinc: 5.50%
Silver: 125 grams/tonne
Gold: 1.20 grams/tonne

Mining method
Open-pit, 365 days per year

Processing method
Conventional mill, 365 days per year

Mine life
11 years

Employees
170

HISTORY

Cominco carried out a geochemical survey in 1977 in the Finlayson Lake area, but the survey was too wide-spaced to reveal evidence of the ABM deposit. In 1992, Cominco returned to the area to follow up on anomalous base metal stream silt samples which had been collected in 1988 by the GSC. In late 1993, quartz-sericite altered rhyolite rocks and a 15-cm piece of banded massive sulphide-magnetite float were noted, but the source of mineralization was not found until geophysical surveys revealed a major anomaly under the valley. The initial discovery hole was drilled in April, 1994. A large regional airborne electromagnetic and magnetic survey was flown and a total of 8,500 m in 52 diamond-drill holes were completed in 1994 in a helicopter-supported, low impact exploration program.

The 1995 exploration program included construction of a tote road from the Robert Campbell Highway (approximately 20 km), 15,000 m of diamond drilling in 120 holes, sampling, and engineering and environmental activities. The purpose of the drilling was to define the ore reserve, assess mining methods and confirm the absence of important mineralization under possible locations for mill, tailings, and waste rock sites. Cominco spent $3.5 million during 1995 on advanced exploration and $800,000 on grassroots exploration. During 1996 and 1997, Cominco drill-tested targets outlined by airborne geophysics. Exploration work comprising geological mapping, geochemistry and geophysics is ongoing. The company's 1997 exploration budget for the area was about $2 million compared with $4.2 million in 1996. Environmental permitting began in 1996 and was completed in December, 1997. The company received its type "A" water licence late in 1999.

PROJECT SUMMARY

The Kudz Ze Kayah property, host of the ABM mineral deposit, is owned by Cominco Ltd. and located 110 air km southeast of Ross River, Yukon. The gently dipping sheet-like ABM deposit lies below a U-shaped valley, covered by 2 to 10 m of glacial overburden. An unnamed north-flowing tributary to Finlayson Creek, locally called "Geona Creek," drains beaver ponds which, in part, overlie the deposit. Finlayson Creek drains into the Finlayson River which forms part of the Upper Liard system draining to the Beaufort Sea.

Cominco has spent a total of $11 million to find and delineate the ABM deposit and take it to the feasibility stage. Cominco and the Ross River Dena Development Corp. signed a socio-economic participation agreement in May, 1995. A management advisory committee comprised of representatives from Cominco and the Ross River Kaska Dena will be established to implement the terms of the agreement, which cover contracting opportunities, employment, training, temporary land use interruption and environmental management with respect to the Kudz Ze Kayah project. Project environmental permitting began in 1996 with the submission of environmental assessment documentation.

GEOLOGY, MINERALOGY AND ORE RESERVES

The ABM deposit is hosted by a thick sequence of Devonian-Mississippian-age felsic volcanic pyroclastics comprising quartz and feldspar crystal tuffs, fine lapilli ash tuffs, and ash tuffs with lesser rhyolite flows or sills. Immediately above the deposit are felsic pyroclastics which are intensely deformed and altered to quartz-muscovite-carbonate schists containing fine pyrite and quartz veinlets.

Exploration work in 1994 delineated the approximate extent of the ABM deposit, roughly estimated to contain 13 million tonnes grading 1.0% copper, 1.3% lead, 5.5% zinc, 125 grams/tonne silver and 1.2 grams/tonne gold. This estimate was based on 50 holes drilled on 100 m centres. By the end of 1996, a total of 139 drill holes had outlined a mineable open-pit reserve of 11.3 million tonnes grading 5.9% zinc, 1.5% lead and 0.9% copper, plus 1.3 grams/tonne gold and 133 grams/tonne silver, based on 50-m spacings, and in some cases, 25-m spacings.

In 1995, construction of a tote road from the Robert Campbell Highway was carried out in addition to diamond drilling, sampling and engineering and environmental studies. A 50-person camp was constructed on site. Project permitting began in 1996, with the submission of environmental assessment documentation. Environmental permitting was completed in December, 1997. Preliminary plans call for a mine/concentrator operation producing about 175,000 tonnes per year of lead, zinc and copper concentrate over a 10 to 12-year period. No production decision has been made.

MARG PROPERTY

United Keno Hill Mines Ltd.

President and Chief Executive Officer: Gerald Gauthier

Corporate headquarters
8th Floor, 350 Bay Street
Toronto, Ontario M5H 2S6

Phone (416) 360-5575
Fax (416) 360-4419

PROJECT STATUS

On hold

Location
42 km northeast of Keno City

Ownership
United Keno Hill Mines Ltd.

Commodity
Copper, lead, zinc, silver, gold

Ore type
Sulphide

Geological resource
6.092 million tonnes

Copper: 1.76%

Lead: 2.46%

Zinc: 4.6%

Silver: 62.7 grams/tonne

Gold: 1.0 grams/tonne

Mining method
Not determined

Processing method
Conventional milling

HISTORY

The Marg property was first staked by Canadian Superior Exploration Ltd. in 1965 on a GSC stream sediment anomaly and explored with soil sampling, mapping, and hand trenching in 1965 and 1966 in a joint venture with United Keno Hill Mines Limited. Canadian Superior performed additional trenching and detailed geochemistry in 1967.

The property was restaked as Flash in July, 1977 by Mountaineer Mines Limited and Welcome North Mines Limited and as Tudl in 1982 by ZX Joint Venture (Chevron, SMD Mining and Enterprise Exploration Limited), who explored with mapping, geochem sampling and trenching in 1982 and 1984. In 1986, All North Resources Ltd. optioned a $66^{2}/_{3}$% interest in the property and performed soil sampling, hand trenching and VLF, mag, Max-Min and IP surveys. The remaining $33^{1}/_{3}$% interest is held by SMD Mining, which changed its name to Cameco in 1989.

NDU Resources Ltd. bought the All-North interest in 1987. NDU delineated volcanogenic massive sulphide lenses on the property and advanced the property through diamond drilling. NDU Resources Ltd. was merged with United Keno Hill Mines in April, 1998.

PROJECT SUMMARY

The Marg property is located 42 km northeast of Keno City and, until recently, was owned by NDU Resources Ltd. NDU Resources conducted a large diamond drilling program on the property from 1987 until 1990. No exploration was conducted on the property from 1991 to 1995.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Marg deposit consists of four stacked massive sulphide lenses hosted by Devono-Mississippian felsic metavolcanic rocks. From bottom to top, the sulphide lenses are designated A, B, C and D, with the upper, or D Zone, being the most continuous, and also the thickest (up to 23 m). The sulphide lenses strike east-northeast, dip southeast, and are elongated in a down-dip direction. Along strike, they grade into massive carbonate. The lenses average 6.1 m in thickness, but can be up to 23 m thick.

EXPLORATION AND PRODUCTION PLANS

The All-North interest was sold to NDU Resources Ltd. in 1987, who staked additional claims and explored by prospecting, mapping, Max-Min and pulse-EM surveys, airstrip construction, road building and 6,037.5 m of diamond drilling (33 holes in 1988). Exploration in 1989 consisted of mapping, VLF, mag and pulse-EM geochem surveys and 5 drill holes. NDU added more Marg claims in 1990 and drilled 10 holes totalling 4,119.4 m.

NDU conducted an exploration and 26-hole drilling program on the property during 1996. Two drills were working on the property. One drill extended reserves on the D horizon and underlying A, B, and C horizons. The second drill explored targets elsewhere on the property.

Diamond drilling in 1996 more than doubled the area of previously defined mineralization. The results demonstrate remarkable lateral continuity over a 1,200 m strike length and up to 700 m down-dip.

Surface exploration drilling consisting of seven holes was completed in early August, 1997. Core samples were sent for metallurgical testing.

As of December, 1997, drill-indicated reserves for the Marg were 6,092,000 tons at an average grade of 1.76% copper, 2.46% lead, 4.6% zinc, 0.29 ounces per ton gold and 1.8 ounces per ton silver. The nearby Blende deposit hosts a drill-indicated resource of 21,495,000 tons of open-pittable material with an average grade of 3.04% zinc, 2.79% lead and 1.6 ounces per ton silver.

NDU Resources and United Keno Hill Mines merged in April, 1998. Their respective properties were consolidated. Plans call for a resumption of production at United Keno Hill's Elsa silver mine at an average rate of 500 tons per day. First year production is forecast at approximately 6 million ounces of silver at an average cost of approximately US$3 per ounce. Once production has resumed, initial activities will concentrate on the further expansion of the mineral resources at Elsa, and then on establishing the feasibility of the Marg deposit. The economics of a new 2,500 to 3,000 tons/day mill to be constructed at Elsa will be examined.

MINTO PROPERTY

Minto Explorations Ltd.

President: Lutz Klingmann

Corporate headquarters
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West Vancouver, British Columbia V7V.

Phone (604) 921-7570
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E-mail mintoexpl@telus.net
Web site www.mintomining.com

PROJECT STATUS

Under construction; production expected in late 2000 or early 2001

Location
240 km northwest of Whitehorse

Ownership:
Minto Explorations Ltd., Asarco Inc.

Commodities
Copper, silver, gold

Ore type
Sulphide

Mineable reserves
6,510,000 tonnes
Copper: 2.13%
Silver: 9.3 grams/tonne
Gold: 0.62 grams/tonne

Geological reserves
8,818,000 tonnes
Copper: 1.73%
Silver: 7.5 grams/tonne
Gold: 0.48 grams/tonne

Mining method
Open-pit and underground, 360 days per year

Mine life
12 years

Employees
79

Power
2 MW, diesel generation at the mine

HISTORY

Anomalous copper concentrations were first detected during a program of stream sediment sampling in the Minto area in 1970. The MINTO claim group was staked by Asarco Inc./Silver Standard Mines Ltd. (The Dawson Range Syndicate) in 1971. The DEF claim group was staked to the north of, and adjoining, the MINTO claim group by an exploration consortium managed by United Keno Hill Mines Ltd., also in 1971. Both properties were explored from 1972 to 1974. The first significant drill intersection was made in July, 1973 and subsequent extensive diamond drilling outlined an ore deposit. A feasibility study was completed under the joint direction of Asarco Inc. and United Keno Hill Mines Ltd. in 1976, but the project did not proceed at that time due to poor indicated financial returns. Drill programs were conducted in 1984 and 1985 by United Keno Hill Mines. (The UKHM holdings were acquired by Falconbridge Limited.)

Minto Explorations Ltd. was incorporated in April, 1993 specifically for the acquisition of the Minto property interests held by Asarco Inc. and Teck Corp. (the MINTO claims and leases) and by Falconbridge Limited (the DEF claims and leases) and for the further exploration and development of the Minto property. Teck Corp. and Asarco each sold their interest in the MINTO claims to Minto Explorations for shares in the company, and provided initial working capital of $375,000 by

purchasing further shares. An agreement was signed with Falconbridge Ltd. for the acquisition of the DEF claims and leases on June 9, 1993. The essence of the agreement is that a cash payment of $1 million will be made to Falconbridge Ltd. after a production decision has been made and project financing secured. The agreement has a term of 30 months.

1996 construction

The initial 16 km of access road along the west side of the Yukon River, and the bridge across Big Creek, were constructed in September and October.

1997 construction

The remaining 12.8 km of access road were constructed, with only final grading and minor cleanup to be done after the 1998 spring break-up.

The site for the permanent camp was excavated in September. A water well to supply domestic water for the camp for drilled to a depth of 72 m, tested and equiped. A set of septic tanks was installed and a leach field was constructed. A camp services unit was built in Whitehorse during the winter months and this was then moved to the site. The unit includes a water purification system and water storage for both fire protection and domestic purposes.

In October, the mill site was excavated and various on-site roads and the pit perimeter for the first phase of mining were contructed. Two used grinding mills were purchased in the United States, dismantled and shipped to the Yukon and across the Yukon River.

1998 construction

Detailed engineering was completed in 1998. The mill footings were constructed in September. Ketza Construction Corp. of Whitehorse placed a total of 1,688 m^3 of concrete over a period of eight weeks.

The company purchased a used, eight-unit, 42-person camp and a new, seven-unit kitchen-diner-changehouse complex. These units were erected and all services, such as sewage disposal, potable water supply and power distribution for the camp, were installed.

Final grading, minor clean-up and reclamation were done along the 28.8-km long access road. The road is now in excellent condition and approximately 60 loads of freight were hauled to the site during the three months of construction.

A grout curtain, designed to control seepage through the foundation of the tailings-water dam, was also completed.

The two mill motors were reconditioned and placed in storage in Okanagan Falls, B.C.

1999 construction

A short construction program was completed in September. The two grinding mills were moved to the site, mill components were cleaned, sandblasted and painted, and the two mills were assembled. Svedala Canada Inc. completed a detailed inspection of the mills and a proposal for final installation has been submitted. Some roadwork and preparations to permit construction to continue through the coming winter were also completed.

Cost of construction

The following are the construction costs in Canadian and American dollars.

	Canadian $	American $
1996	909,294	657,765
1997	2,557,106	1,849,758
1998	3,585,663	2,390,515
1999	426,102	282,745
Total to date	7,471,166	5,180,783
Numbers rounded off	7,471,000	5,181,000
To the start of production, 2001	19,816,000	13,475,000
Total	**27,287,000**	**18,656,000**
Contingency		1,500,000
Feasibility study estimates (May, 1995)	25,822,000	19,127,400

The permitting process for the Minto project was completed, with the granting of a Type A water use licence in 1998 and a production licence in 1999. Due to continued low copper and gold prices in 1999, and delays in receiving the Type A Water Licence, start-up of operations is now expected in late 2000 or early 2001. The Minto project is viable under current market conditions.

PROJECT SUMMARY

Minto Explorations Ltd. is proposing to develop the Minto property located approximately 240 km northwest of Whitehorse, on the west side of the Yukon River. The orebody is located in the upper reaches of the Minto Creek watershed, approximately 10 km upstream of the Yukon River confluence, at an elevation of 2,660 to 2,900 feet. Access is by barge across the Yukon River from Minto Landing, then via road.

The Minto project will employ 76 people. Approximately 70% of the positions are expected to be filled by residents of Whitehorse, 15% by residents of Carmacks and the Little Salmon First Nation, 10% by residents of Pelly Crossing and the Selkirk First Nation and 5% by residents of Faro. The Minto project is situated on traditional Selkirk First Nation land. The Selkirk First Nation selected an area surrounding the property as Category A Settlement Land under an agreement negotiated with the Government of Canada and the Government of the Yukon. The title to the mining claims and leases and the access road right-of-way held by Minto Explorations Ltd. are protected under the Umbrella Final Agreement and the Selkirk First Nation Final Agreement respectively. The Selkirk First Nation actively supports the project and a comprehensive co-operation agreement was signed with Minto Explorations Ltd. on September 16, 1997.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Minto deposit is hosted in a flat-lying, tablular zone of foliated biotite granodiorite and quartzofeldspathic gneisses enclosed in a Klotassin granodiorite. The main ore zone is 335 m long, 247 m wide and 6 to 61 m thick, with an average width of 30 m. The principal ore minerals are chalcopyrite and bornite in variable proportions with significant gold and silver values. The in-situ geological reserve for the deposit above a cut-off grade of 0.50% copper is 8,818,000 tonnes with 1.73% copper, 0.48 grams/tonne gold and 7.5 grams/tonne silver. The reserve contains 336 million pounds of copper, 140,500 ounces of gold and 2.176 million ounces of silver. The ore that will be mined as per the current mine design is 6,510,000 tonnes with 2.13% copper, 0.62 grams/tonne gold and 9.3 grams/tonne silver.

MINE PLAN

The proposed Minto project would entail an open pit and underground operation, waste rock stockpiles, a tailings storage facility and a conventional copper flotation mill. These facilities will occupy an area of approximately 141 hectares. The stripping ratio is 4.9:1. The mill will be designed to process 550,000 tonnes per year. Ore will be treated by conventional flotation to produce annually up to 35,000 tonnes of copper concentrate which will contain, on average, 28.5 million pounds of payable copper, 11,000 ounces of gold, and 155,000 ounces of silver during the first five years of production. The tailings impoundment will be located within the Minto Creek valley, approximately 850 m east of the mill and will have a capacity of 6.5 million tonnes. Concentrate will be trucked on a daily basis to the Port of Skagway, or to Fort Nelson, for shipment to smelters. To bring the Minto deposit into production, Minto Explorations Ltd. signed a joint venture agreement on June 17, 1996 with Asarco Inc., where Asarco Inc. will acquire 70% interest in the project in consideration for providing up to US$25 million for project development. Minto Explorations Ltd. retains a 30% interest in the project and is the operator.

ASARCO Inc. and Grupo Mexico, S.A de C.V. announced a merger in October, 1999, where Grupo Mexico would acquire all outstanding shares of ASARCO Inc.

MOUNT NANSEN PROPERTY

BYG Natural Resources Inc.

PROJECT STATUS

Federal government is maintaining mine site

Location
60 km west of Carmacks

Commodity
Gold, silver

Ore type
Sulphide

Geological reserves
Brown-McDade Zone

Oxide reserve: nearly depleted

Sulphide reserve: 220,000 tonnes grading 6.8 grams/tonne Au and 57 grams/tonne Ag

Flex Zone

Oxide mineable reserve: 81,700 tonnes grading 7.37 grams/tonne Au and 312 grams/tonne Ag

Webber Zone

Oxide reserve: 102,500 tonnes grading 7.83 grams/tonne Au and 466.4 grams/tonne Ag

Huestis Vein

Mineable sulphide reserve: 148,600 tonnes grading 11.75 grams/tonne Au and 79.7 grams/tonne Ag

Mining method
Open-pit and underground, 365 days per year

Processing method
Conventional mill, 365 days per year

Mine life
4 years

Employees
65

Power
2 MW, on-site diesel generation

HISTORY

Placer gold was originally discovered on Nansen Creek in 1899. The first recorded lode gold discovery on the current Mount Nansen property was made by prospectors Brown and McDade in 1943.

The first underground work was conducted on the Brown-McDade zone in 1947 by the Spud Huestis Syndicate. After a few years of mine development, mapping, surface trenching and sampling, the property remained inactive until 1962 when the Mount Nansen Syndicate acquired the Brown-McDade, Webber and Huestis deposits and conducted additional exploration. Mount Nansen Mines Ltd. was acquired by Peso Silver Mines Ltd. which conducted exploration over the next three years on all three deposits. A 270-tonne per day floatation mill was constructed during 1967-68. A total of 14,500 tonnes of development muck produced during 1967-68 had an

estimated average grade of 7.8 grams/tonne Au and 162 grams/tonne Ag, while mill feed of 5,236 tonnes produced from stopes during 1969 had an estimated average grade of 11.7 grams/tonne Au and 282 grams/tonne Ag. Low gold recovery rates, estimated at 60% to 65% led to the mine closure in April, 1969. In late 1975, a total of 5,450 tonnes at an estimated grade of 16.8 grams/tonne Au and 248.8 grams/tonne Ag was produced from the Huestis deposit and processed during May, 1976, but the mine once again shut down shortly after. As of 1976, over 4,572 m of underground development was completed on the three veins. Approximately 22,680 tonnes of ore were treated in the flotation mill in 1975 and 1976.

In 1984, BYG Natural Resources Inc. (BYG) acquired the properties and combined them with additional claims to form the current property. BYG and Chevron Minerals Ltd. carried out an exploration program from 1985 to 1987. Over $5 million was expended on geological mapping, geochemical and geophysical surveys, trenching, 2,605 m of diamond drilling (41 holes) and 1,283 m of rotary percussion drilling (17 holes). During 1988, BYG continued exploring on its own by carrying out surface trenching and 85 holes (5,397 m) of diamond drilling. A previously unrecognized near-surface oxide zone was discovered and the underground sulphide reserves were expanded. Metallurgical testing, mill flow sheet designs, tailings disposal and environmental impacts were studied at this time, and commercial gold production began on January 1, 1997. Production continued intermittently until February, 1999, when all mining and operations ceased.

BYG owns 100% of the Mount Nansen project, subject to royalties.

Between 1994 and 1997, BYG conducted exploration consisting of diamond drilling on the Brown-McDade and Flex (990 m, 12 holes in 1994), Flex and Huestis (1,490 m, 21 holes in 1995), Webber and Flex (780 m, 10 holes in 1996) and Vince Vein (745 m, 9 holes in 1997). During 1997, a program of overburden stripping and excavator trenching was completed on the Flex zone. During 1998, a further 16 holes (1,092 m) were drilled on the Flex Zone.

In May, 1999, BYG Natural Resources went into receivership (D. Manning and Associates) and was convicted of violating its water license. In July, 1999, the federal government took over mine-site maintenance.

PROJECT SUMMARY

The Mount Nansen mine is located 60 km west of the village of Carmacks, Yukon and is accessible by a gravel road from Carmacks to the minesite. The property consists of 257 mining claims and 30 mining leases covering an area of 53 square km. There are another 524 mining claims owned by BYG immediately surrounding the main Mount Nansen property. It is an open-pit mine with a three-year mine life based on reserves from the Brown-McDade zone which is expected to be extended by the discovery of additional oxide ore reserves in the Webber and Flex zones. It is expected that the mine life could be extended if viable metallurgical processes are developed for potential sulphide ore on the property.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Mount Nansen district is underlain by metamorphosed intrusive, sedimentary and volcanic rocks of the Yukon-Tanana terrane. These rocks are intruded by Early Cretaceous felsic plutonic rocks and overlain by Mid-Cretaceous Mount Nansen mafic to intermediate volcanic rocks and related sub-volcanic feldspar porphyry dykes and plugs.

The Mount Nansen property is host to four distinct gold deposits: Brown-McDade, Webber, Huestis and the Flex Zone. The zones are situated in a series of anastomosing veins in northwesterly trending faults or shear zones. The gold and silver mineralized structures consist of fault-shear-hosted veins and associated clay-rich and bleached alteration zones. The veins occur in a 2.5-km wide corridor which has been traced over a strike length of 15 km. Clay-rich leach zones near the surface are underlain by blankets or lenses of gold-rich supergene ores.

Brown-McDade Zone

The Brown-McDade Zone lies at the southeasterly end of the belt. It is 55 m long by 200 m wide and consists of quartz veins and associated feldspar porphyry dykes. The oxide ore of the Brown-McDade is currently being mined by a small open pit. A mineable open-pit reserve of 110,000 tonnes grading 12.33 grams/tonne gold and 78 grams/tonne silver was outlined in the open pit, with an additional 80,000 tonnes of low-grade mineralization. Most of this was mined out by late 1998. Underground resources are estimated at 222,000 tonnes grading 6.8 grams/tonne gold and 57.0 grams/tonne silver below the open pit.

Webber Zone

A diluted oxide reserve of 102,500 tonnes grading 7.83 grams/tonne gold and 466.4 grams/tonne silver has been established in the Webber deposit from extensive trenching, drilling and underground development.

Huestis Vein

Mineable sulphide reserves of 148,600 tonnes grading 11.75 grams/tonne gold and 79.7 grams/tonne silver have been defined on the Huestis vein by trenching, diamond drilling and detailed underground sampling. The ore is sulphide-rich and refractory.

Flez Zone

A preliminary, shallow open-pit design encloses a calculated mineable resource of 81,700 tonnes grading 7.37 grams/tonne gold and 312.5 grams/tonne silver.

There is a geological sulphide reserve on the Flex Zone of 599,247 tonnes grading 8.88 grams/tonne gold and 190 grams/tonne silver.

PRODUCTION

The initial capacity of the mill was 700 tonnes per day.

Gold production from surface oxide ores commenced during the week of October 18, 1996 and the company poured the first bar of gold on November 23, 1996. Commercial production began on January 1, 1997. The mill was established to process 700 tonnes per day; intended yearly production is 50,000 ounces of gold. The gold was sold through Gerald Metals Inc.

In January, 1997, the company produced 2,700 troy ounces of gold and 13,000 troy ounces of silver. Ore throughput increased to 450 tonnes per day which is 64% of design capacity. Recoveries averaged 88% and the head grade averaged 0.235 ounces equivalent gold/ tonne.

The unanticipated presence of clay-alteration minerals in the ore forced the daily milling rate down to less than 325 tonnes during the first nine months of operations. The problem was solved by installing a semi-autogenous grinding mill (SAG). Also, record rainfall aggravated existing difficulties milling the gold-rich, clay-altered ores and restricted capacity to 36%. The SAF mill was operational by the end of August, 1997. During July and August, 1997, the mill operated largely on stockpiled ores leaving the high-grade open-pit clay-altered ores to be mined and processed when the SAG mill became operational.

Unseasonably heavy rainfall created a water imbalance problem in late 1997. There was inadequate provision for run-off of the rainfall, which led to an environmental discharge danger. BYG engineered a water treatment system in the spring of 1997 by transporting facilities from the Canamax mine controlled by YGC. The treatment facility enabled the company to meet water quality discharge levels.

The mine re-started production at the end of January, 1998 and delivered its first gold and silver for sale in April, 1998. At first, production was limited to 50% of the mill's 700 tonne per day capacity, then installation of new pumping facilities allowed the mill to operate at full capacity. BYG estimated that it would be able to produce gold at an operational cost of $160 per ounce.

The company downsized in 1998 and carried out exploration and drilling programs to delineate additional oxide ore reserves on the Mount Nansen mine property, particularly on the nearby Flex Zone. The mine shut dowr in the spring of 1999

Total production in 1998
472 kg (15,190 ounces) gold • 1,208 kg (38,849 ounces) silver

MOUNT SKUKUM/SKUKUM CREEK GODDELL PROPERTIES

Omni Resources

President: Jon Bergvinson

Corporate headquarters
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Phone (604) 688-6477
Fax (604) 688-9530

PROJECT STATUS

Reserve delineation ongoing

Mount Skukum/
Skukum Creek Goddell

Location
40 km west of Carcross

Ownership
Omni Resources, Arkona Resources,
Trumpeter Yukon Gold

Commodity
Gold, silver

Ore type
Mount Skukum: quartz-carbonate

Skukum Creek: quartz-sulphide

Goddell: breccia

Mineable reserve (November, 1997)
Rainbow Zone-Skukum Creek: 956,949 tonnes

Silver: 193.5 grams/tonne

Gold: 6.3 grams/tonne

Kuhn Zone-Skukum Creek: 148,781 tonnes

Silver: 167.70 grams/tonne

Gold: 8.78 grams/tonne

Goddell Shear Zone: 900,000 tonnes

Gold: 7.0 grams/tonne

Mining method
Underground, 365 days per year

Mine life
8 years

Processing method
Conventional mill, 365 days per year

Employees
80

Power
3 MW, on-site diesel generation

HISTORY

The Wheaton River area first received attention in the early 1890s when prospectors discovered gold-bearing quartz-stibnite veins. With the completion of the White Pass and Yukon Route Railroad in 1903, the area became more accessible to prospecting and numerous other gold and silver occurrences were located between that year and 1906. Stibnite mineralization was discovered approximately 11 km east of Mount Skukum at Goddell Gully in 1909, and in 1922, gold-silver mineralization was discovered on the southeast side of Skukum Creek approximately 5.3 km southeast of Mount Skukum.

Exploration activity slowed with the beginning of World War One and did not resume until the 1960s when activity increased and stibnite veins in the Goddell Gully, Becker-Cochrane, Wheaton River and Skukum Creek areas were re-examined. During the 1970s, most of the exploration

activity in the Wheaton River District was carried out in search of copper, molybdenum and uranium.

In 1981, exploration activity peaked in the Wheaton River District due to an increase in the price of gold and the discovery of gold-bearing quartz-carbonate veins in the Mount Skukum volcanic complex by AGIP. The project became the site of the Mount Skukum Gold Mine which, from 1986 to 1988, mined 223,439 tons of ore and recovered 77,796 ounces of gold by underground methods. In 1986, Omni Resources Inc. reported geological reserves of 745,000 tonnes grading 7.9 grams/tonne gold and 305 grams/tonne silver on their Skukum Creek property. From 1985 to 1988, Berglynn Resources Inc. carried out an exploration program on the Goddell Gully property located at the southeast corner of the Mount Skukum property and adjoining ground held by Omni Resources Inc. This program led to the intersection of high-grade gold mineralization in drill core. The Omni, Berglynn and Mount Skukum Gold Mine properties were dormant from 1991 to the mid-1990s.

Omni Resources completed a drill program on the Goddell gold project in 1995. The five-hole, 2,820 m diamond-drill program confirmed a large, well-mineralized shear zone. The shear zone is open to extension in depth and length. Omni Resources completed a 620-m decline in December, 1996 at the Goddell Shear Zone. Underground crews have extended the decline by 600 feet to the east and established drill stations at 50-m intervals.

PROJECT SUMMARY

The Mount Skukum and Skukum Creek deposits are located approximately 65 km southwest of Whitehorse at the termination of the Annie Lake Road. The Goddell Shear Zone, part of the Skukum Creek property, is under option from Arkona Resources Inc. and 276 Taurus Ventures. In April, 1996, Omni Resources entered into an agreement with Trumpeter Yukon Gold whereby Trumpeter would finance Omni through equity over one year to earn a 50% joint interest in Omni's holdings. Trumpeter Yukon Gold is a company controlled by BYG Natural Resources of Carmacks. The agreement further provides the opportunity for Trumpeter to enter into a 50/50 joint venture with Omni on the Mount Skukum properties. In October, 1997, Omni Resources announced that they had purchased a 100% interest in the RACA claim group which lies on strike and northeast of the Skukum Creek deposit.

MOUNT SKUKUM DEPOSIT

Mineralization on the Mount Skukum property consists of gold within epithermal quartz carbonate veins hosted in an Eocene volcanic caldera complex. Underground mine production began on the Main Cirque body in 1986, at a rate of 300 tonnes per day and continued until August, 1988, when that orebody was exhausted. Approximately 223,400 tons of ore were mined and 77,796 ounces of gold were recovered. The mineral processing facility remains on site. It is a conventional Merrill-Crow crushing, grinding, cyanidation, zinc precipitation circuit with cyanide destruction using the Inco SO_2 system. It is estimated that about 98,885 tonnes of oxide ore grading 14.75 grams/tonne gold remain at the Lake Zone. There has been no development on Mount Skukum since 1989.

SKUKUM CREEK AND GODDELL DEPOSIT

The Skukum Creek property was originally staked in 1922 and obtained by Omni Resources in 1984. Exploration and development proceeded quickly on the property from 1985 to 1988. The program, financed largely through flow-through share funding, included more than 24,000 m of surface and underground diamond drilling and 2,200 m of underground development on the 1300 and 1350 levels. The Skukum Creek orebody includes the Rainbow and Kuhn sulphide-rich veins which contain moderate gold and significant silver values. Several attempts to bring the property into production have failed. The Goddell gold-bearing breccia, part of the Skukum Creek property, was drilled in 1995 and 1996. The Omni/Trumpeter joint venture has spent $4.4 million on exploring and developing the Goddell Shear Zone, which was purchased from Arkona Resources Inc. (60%) and 276 Taurus Ventures (10%). The mineralized strike length of the Goddell Shear Zone is now over 1,100 feet and is still open to the east and at depth. A final feasibility study was planned for 1998 for mining Omni's Skukum Creek deposit. Production rates are anticipated at 500 to 700 tons per day. The feasibility study is on hold pending economic conditions.

SA DENA HES PROPERTY

Cominco Ltd.

President: David Thompson

Corporate headquarters
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Vancouver, British Columbia V6C 3L7

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Fax (604) 685-3019
Web site www.cominco.com

PROJECT STATUS

Care and maintenance

Location
50 km northeast of Watson Lake

Ownership
Cominco Ltd. (25%), Teck (25%),
Korea Zinc (50%)

Commodity
Lead, zinc, silver

Ore type
Sulphide

Geological resource
3.2 million tonnes
Lead: 3.70%
Zinc: 12.90%
Silver: 57 grams/tonne

Mineable reserve
1.4 million tonnes
Lead: 2.3%
Zinc: 10.2%
Silver: 44 grams/tonne

Mining method
Underground, 365 days per year

Processing method
Conventional mill, 365 days per year

Employees
100

Power
6 MW, on-site diesel generation

HISTORY

Mineralization was discovered on the Sa Dena Hes property in 1962 by the Frances River Syndicate. The property was worked on at various times by Atlas Explorations, Cima Resources, and Canamax Resources. Curragh Resources (80%) and Hillsborough Resources Limited (20%), as joint venture partners, acquired the property in 1989 from Canamax Resources. Between April, 1989 and August, 1990, the Joint Venture spent a further $5.3 million on a field program of geological exploration and diamond drilling. Following completion of the detailed geological assessment, the Joint Venture decided to proceed with construction of the project and work commenced in October, 1990.

In early 1991, a socio economic agreement was signed by the Joint Venture, the Kaska Dena First Nation, the Town of Watson Lake and the Government of the Yukon. The objective of the agreement was to ensure that business and employment opportunities were available to local residents on a preferential basis. In addition, an agreement between the Joint Venture and the Kaska extended business, employment, and training opportunities to the Kaska, as well as an option to purchase a 10% interest in the mine.

The Sa Dena Hes mine began production in August, 1991 and ceased operations in December, 1992 because of low metal prices. In September, 1993, the Ontario Court appointed Coopers & Lybrand as the interim receiver acting for the Bank of Nova Scotia for the Sa Dena Hes and Stronsay (Cirque) assets.

The Sa Dena Hes and Stronsay (Cirque) lead-zinc properties were bought by Teck (25%), Cominco (25%), Korea Zinc (40%) and Samsung (10%) in December, 1993. The four partners paid an estimated $43 million for the Sa Dena Hes and the Stronsay (Cirque) properties. There has been no production at Sa Dena Hes since closure in 1992.

PROJECT SUMMARY

The Sa Dena Hes lead-zinc mine is located approximately 45 km north of Watson Lake. It is owned by Teck Resources (25%), Cominco (25%), and Korea Zinc (50%). The property covers approximately 5,600 hectares.

Production began at the Sa Dena Hes mine in August, 1991 and ceased operations in November, 1992 due to low zinc prices. During the 14 months of operation, the mine produced 607,500 tonnes of concentrate containing 374,400 tonnes of payable zinc and 290,200 tonnes of lead. Infrastructure on site includes the underground mine, ore handling facilities, a 1,500 tonne per day conventional mill, loadout facilities, tailings and reclamation system, shops, warehouse, security and first-aid office, a 200-person camp, administration building, and a 6.2 MW power plant.

GEOLOGY, MINERALOGY AND ORE RESERVES

The mineable reserve on the property is estimated to be 1.4 million tonnes grading 2.5% lead, 10.2% zinc, and 44 grams/tonne silver.

EXPLORATION AND PRODUCTION PLANS

In August, 1997, Cominco announced that Sa Dena Hes might open in the second quarter of 1998. Pre-operational work, including contract tenders for road upgrading and underground rehabilitation, was initiated. Cominco, Teck and Korea Zinc upgraded the mine's infrastructure and prepared for the mid-1998 start. However, due to poor market conditions, the re-opening was cancelled in December, 1997.

At full production, the operation would produce 75,000 tons per year of zinc concentrates and 15,000 tons per year of lead concentrates. Output would be sold into Asian markets, with Korea Zinc the most likely smelter.

In October, 1997, Cominco and the Liard First Nation signed a socio-economic participation agreement related to the Sa Dena Hes mine.

SILVERTIP PROPERTY

Silvertip Mining Corporation/ Imperial Metals Corporation

President: Pierre Lebel

Corporate headquarters
420–355 Burrard Street
Vancouver, British Columbia V6C 2G8

Phone (604) 669-8959
Fax (604) 687-4030
Web site www.imperialmetals.com

PROJECT STATUS

Exploration for additional reserves

Location
Northern British Columbia, 80 km west of Watson Lake

Ownership
Silvertip Mining Corp. (subsidiary of Imperial Metals Corp.)

Commodities
Silver, lead, zinc, gold

Ore type
Sulphide

Mineable reserves
2.57 million tonnes

Silver: 325 grams/tonne

Lead: 6.4%

Zinc: 8.8 %

Gold: 0.63 grams/tonne

Mining method
Open-pit for the first 2 years then underground, 365 days per year

Mine life
4–5 years

Employees
Approximately 140 when operational

HISTORY

The Silvertip deposit was first discovered in 1982, at which time it was thought to be a shale-hosted zinc-lead deposit. When spectacular silver-rich mineralization was intersected in the underlying limestone formation, the property became classified as a major precious-base metal deposit. Over the next three years over $15 million was spent on intensive exploration that attempted to define the mineral reserve. Underground exploration took place in 1985, 1989 and 1990, revealing that the mineralization was deposited in a network of irregularly-shaped cave systems.

In 1997, exploration was focused on the expansion of known ore bodies. Two new zones of high-grade massive sulphide mineralization were discovered through geological mapping, seismic surveying and 8,000 m of follow-up drilling. The zones are known as the Silver Creek Extension Zone and the Discovery North Zone. A 1998 geophysical exploration program identified several additional anomalies, outside of the known deposit.

In April, 1999, Imperial optioned a 60% interest in Silvertip to Peruvian Gold Limited whereby Peruvian must spend $5 million over three field seasons with a minimum commitment of $450,000 in 1999. Imperial retains operatorship throughout the option period, preserving cash and offsetting the risk associated with deep drilling, and retains the right to buy back a 20% interest in the property by making subsequent expenditures of $2 million.

A total of 5.65 line/km of CSAMT survey was completed in July, 1999 as part of phase one. The survey revealed three well defined areas exhibiting anomalously conductive signatures. A 2,000-m drill program to test the anomalies was completed in the fall of 1999. Results were most

encouraging with one hole intersecting 31 m grading 318 grams/tonne silver, 8.65% zinc and 5.53% lead. A decision was made to proceed immediately with underground drilling. Existing underground openings were dewatered in December and drilling will commence in January, 2000.

PROJECT SUMMARY

Silvertip Mining Corporation, a wholly owned subsidiary of Imperial Metals Corporation, has applied to the B.C. government to develop the Silvertip property. The property is located in northern British Columbia, 80 km west of Watson Lake, Yukon. Access is by a 25-km two-wheel drive gravel road from kilometre 1,128 of the Alaska Highway. The property covers approximately 227 square km.

The company submitted an environmental assessment application in 1998.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Silvertip prospect is located south of the Midway Deposit on a branch of the Tootsee River called Silvertip Creek.

"The deposits occur in a carbonate and clastic sedimentary sequence of the Cassiar terrane, which has been intruded into the west by the mid-Cretaceous Cassiar batholith. The sediments include the Kechika, Sandpile, McDame and Earn groups. The deposits are situated on the west limb of a broad, open, northwest trending synclinorium, the core of which is occupied by volcanics, sediments and ultramafic rocks of the Devonian-Triassic Sylvester Allochthon. Massive sulphide zones in the Midway deposits occur in limestones of the upper part (Unit MLS) of the mid-Devonian McDame Group. This unit is unconformably overlain by clastic sediments of the Upper Devonian-Mississippian Earn Group, which consists of two upward-coarsening sequences of turbiditic flows. Several exhalative horizons, consisting of fine-grained massive to laminated silica and/or barite, with pyrite, sphalerite and minor galena occur in the Earn Group sediments. Two of these, the Upper and Discovery zones, occur near the base of the second cycle, and contain lead-zinc-silver mineralization. Sulphides within the exhalite zones are restricted in extent although exhalites are widespread and may be stratigraphically correlatable." (from B.C. Minfile 1040 038)

"Galena, sphalerite, and tetrahedrite replacement mineralization occur in highly oxidized zones in the Mid-Devonian McDame Group limestone just west of a fault zone separating McDame carbonates from a down-dropped block of Upper Devonian to Mississippian Earn Group clastic sediments. A sulphide zone 12 m in length was exposed underground, but surface mineralization is generally oxidized, with residual galena and minor sphalerite. Stannite has been identified in the sulphide assemblage, and a magmatic-hydrothermal source is suspected." (B.C. Minefile, 093M 055)

The deposit contains a total resource of 2.57 million tonnes of high-grade silver-lead-zinc-gold massive sulphide mineralization grading 325 grams/tonne silver, 6.4% lead, 8.8% zinc and 0.63 grams/tonne gold.

PRODUCTION

The project will employ up to 150 people during the construction stage, and approximately 140 people during operation. The first two years of production will remove 0.74 million tonnes of ore by open-pit mining. The remaining 1.83 million tonnes will be removed by underground mining throughout the following two to three years.

The Goldstream Mill from Revelstoke, B.C., will be moved to the Silvertip site and upgraded. A crushing and dense media separation (DMS) circuit will then be added and the mill will treat 1,500 to 2,000 tonnes of ore per day. Conventional crushing, grinding and flotation processes will be used. Waste rock will be stored underwater either in the flooded open pit or in a storage facility that will be built in the Silvertip Creek valley. Seven to 10 daily truck-loads of concentrated ore, each containing 40 to 50 tonnes, will be transported to either Skagway, AK, Stewart, B.C., or Fort Nelson, B.C.

TOM PROPERTY

Hudson Bay Exploration and Development

President: Edward Yarrow

Corporate headquarters
#405, 470 Granville Street
Vancouver, British Columbia V6C 1G8

Phone (604) 684-1454

Location
13 km southeast of Macmillan Pass

Ownership
Hudson Bay Exploration and Development

Commodities
Lead, zinc, silver

Ore type
Sulphide

Mineable reserves
9,283,700 tonnes
7.5% zinc
6.2% lead
69.4% silver

PROJECT STATUS

Inactive

HISTORY

Extensive work has been carried out on the Tom property since it was first staked by Hudson Bay Mining and Smelting in 1951. It was explored with mapping and hand trenching in 1951, and 37 drill holes (5,435 m) between 1951 and 1953. From 1966 to 1979, additional exploration work, including 1809 m of drifting and 75 underground drill holes (3,617 m), were completed. Hudson Bay Mining and Smelting completed part of a major feasibility study between 1980 and 1982 including additional underground work, engineering and environmental studies. A joint feasibility study with Aberford Resources Ltd., which included the nearby Jason deposit, was completed in 1985. At this point, a total of 3,523 m of underground development, 4,970 m of underground diamond drilling and 14,630 rn of surface drilling had been completed on the property.

In July, 1988, Cominco Ltd. optioned the Tom property for a 60% interest through expenditures of $5.5 million and cash payments totalling $4 million before the end of 1993. Cominco remapped the property and drilled four holes (2,226 m) in 1988, four holes (2,175 m) in 1989, seven holes (3,578 m) in 1990 and eight holes (2,882.7 m) in 1991. Cominco dropped its option in 1992.

PROPERTY SUMMARY

The Tom deposit is located about 13 km southeast of Macmillan Pass on the Yukon-Northwest Territories border and is accessible via the North Canol Road. A 700-m airstrip is situated midway between the Tom and Jason properties.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Tom property is underlain by fine-grained black clastic rocks of the Devono-Mississippian Earn Group. Mineral consists mainly of galena, sphalerite and barite and is concentrated in three zones: Tom East, Tom West

and Tom Southeast. The Tom West zone is a tabular body 1,200 m long and up to 40 m thick which dips 70 degrees west. It extends down-dip for 360 m. The Tom East zone consists of fault-bounded pods of high-grade laminated barite, chert, sphalerite and galena near the hinge of an anticline. The Tom Southeast zone is thinner and higher grade than most of the Tom West zone. It consists of a tablular body 400 m long and 0.5 to 6.0 m thick, which dips 60 to 70 degrees east.

Mineable reserves for the Tom East and West zones are published at 9,283,700 tonnes grading 7.5% lead, 6.2% zinc and 69.4% silver using a 7% zinc + lead cutoff, a 15% dilution factor and 90% recovery.

Summary of tonnage and grades, Tom deposit.

	Tonnes	Silver grams/tonne	Zinc %	Lead %
Tom West Zone				
Geological reserves	13,385,400	28.5	6.53	3.19
Mining reserves	6,864,800	42.6	7.16	4.44
Tom East Zone				
Geological reserves	2,337,100	167.3	9.68	12.8
Mining reserves	2,418,900	145.4	8.42	11.13
Tom Deposit - Total				
Geological reserves	15,722,500	49.1	7.00	4.61
Mining reserves	9,283,700	69.4	7.49	6.19

(1) geological reserves - 5% zinc + lead cut-off

(2) mining reserves - 7% zinc + lead cut-off, 15% dilution factor, 90% recovery

TULSEQUAH CHIEF PROPERTY

Redfern Resources Ltd.

President: Terence Chandler

Corporate headquarters
900–999 West Hastings Street
Vancouver, British Columbia V6C 2W2

Phone (604) 669-4775
Fax (604) 669-5330
E-mail chandler@redfern.bc.ca

PROJECT STATUS

Permitting complete

Location
100 km south of Atlin, B.C.

Ownership
Redfern Resources Ltd. (100%)

Commodities
Copper, lead, zinc, gold, silver

Ore type
Sulphide

Geological resource
8.93 million tonnes
Copper: 1.31%
Lead: 1.24%
Zinc: 6.61%
Silver: 107.56 grams/tonne
Gold: 2.53 grams/tonne

Mineable reserve
7.56 million tonnes
Copper: 1.32%
Lead: 1.23%
Zinc: 6.63%
Silver: 105.2 grams/tonne
Gold: 2.51 grams/tonne

Mining method
Underground, 343 days per year

Processing method
Conventional mill, 365 days per year

Mine life
9 years minimum

Employees
199

Power
12 MW, on-site diesel

HISTORY

In 1923, W. Kirkham of Juneau, Alaska discovered the Tulsequah Chief deposit while prospecting in the Tulsequah River valley. The initial discovery of a highly mineralized showing located above the present 6,500 level adit (400 m above sea level) initiated a wave of prospecting activity in the area. The ensuing years of intensive prospecting efforts culminated in the 1929 discovery of the Big Bull deposit some seven km to the south. The Sparling, Banker and Polaris-Taku deposits were also discovered in 1929. The Tulsequah and Big Bull deposits were acquired by Cominco in 1946 and were put into production by 1951. For six years, both deposits

were mined at an average rate of 482 tonnes/day. In 1957, due to low metal prices, Cominco was forced to close its operations with substantial reserves in place. From 1957 until 1971, the mine site lay dormant and unexplored.

During operations in the 1950s, the Tulsequah Chief deposits were considered to be shear-zone controlled. In 1971, re-examination of the local geology by Cominco geologists led to identification of volcanogenic massive sulphide (VMS) mineralization. Ten years passed before the next wave of exploration commenced. In 1981, 1:250,000 and 1:50,000 mapping was conducted. This work was followed in 1982 by airborne Dighem and Questor Input AEM geophysical surveys conducted by Cominco and Redfern Resources Ltd., respectively. The 1:50,000 mapping work was originally published in 1984 and then in 1987 it was further refined and re-published for Cominco.

In 1987, ongoing discussions between Cominco and Redfern led to an agreement whereby Redfern acquired the right to earn up to a 40% interest in the Tulsequah Chief deposits. Redfern secured a 100% interest in 1992 and continued exploration until 1994. All work since 1994 has been focused on feasibility and permitting. Redfern has spent $24 million on exploration, delineation drilling, metallurgical testing, environmental work, engineering design and feasibility studies on the property since 1987.

PROJECT SUMMARY

The Tulsequah Chief project, 100% owned by Redfern Resources Ltd., is a former base and precious metal producing mine hosting copper, lead, zinc, gold and silver mineralization. The project site is located in the British Columbia Coastal Mountain Range near the Alaska border, some 64 km northeast of Juneau, Alaska. Access to the property is currently by helicopter or fixed wing from Atlin or Juneau. Redfern is proposing a 160-km access road to be constructed from the minesite to the existing road near Atlin and operated as a restricted access road under the B.C. Mining Right-of-Way Act. The project will employ about 200 people. The crews will be flown in from either Vancouver, Smithers or Whitehorse and the workers will reside in a mine camp. Power requirements are estimated at about 12 MW. Redfern has completed all environmental baseline studies begun in May, 1994. The Tulsequah Chief project completed its environmental review and received approval from the B.C. government in 1998. In May, 1999, the project also received a Special Use Permit (SUP) for the construction of the access road. Construction is contingent on metal prices and financing.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Tulsequah Chief property is predominately underlain by folded, faulted and metamorphosed pre-Permian, volcano-dominated rocks of the Mount Eaton Group as well as intrusive rocks of the coast Plutonic Belt. The Tulsequah Chief property contains Kuroko-type volcanogenic massive sulphide deposits which are believed to have precipitated on the sea floor adjacent to fumaroles associated with felsic submarine volcanism. Sulphide mineralization consists of thin-banded to massive pyrite with lesser amounts of sphalerite, chalcopyrite and galena. The mineable ore reserve is estimated to contain 7.6 million tonnes grading 1.32% copper, 1.23% lead, 6.63% zinc, 2.51 grams/tonne gold and 105.2 grams/tonne silver. This reserve is open to expansion.

PRODUCTION PLANS

Underground mine production is estimated at 2,466 tonnes per day over a minimum nine-year mine life. The proposed milling plan involves gravity concentration within the grinding circuit, followed by differential flotation to recover free gold and to produce separate copper, lead and zinc concentrates. It is estimated that in full production, the mine will deliver 52,620 ounces of gold and 2,655,000 ounces of silver per year. Redfern Resources is proposing construction of a year-round 160 km access road to be constructed from the minesite to the existing road near Atlin, B.C. From here concentrate would be hauled to port facilities in Skagway, Alaska.

Redfern has been meeting with smelter representatives in Asia and North America seeking buyers for the copper and zinc concentrates from the Tulsequah project and concurrently has been reviewing options for project financing. Letters are in hand from smelters in Japan and Canada expressing an interest in buying 100% of the bulk copper-lead, plus precious metal concentrates. Redfern is also conducting discussions with certain operating mining companies which have expressed an interest in participation, either through joint venturing or via corporate merger.

UNITED KENO HILL PROPERTY

United Keno Hill Mines Ltd.

President and Chief Executive Officer: Gerald Gauthier

Corporate headquarters
8th Floor, 350 Bay Street
Toronto, Ontario M5H 2S6

Phone (416) 360-5575
Fax (416) 360-4419

Elsa Mine
Elsa, Yukon Y0B 1J0

PROJECT STATUS

Oh hold

Location
Elsa

Ownership
United Keno Hill Mines Ltd.

Commodities
Silver, lead

Ore type
Sulphide

Mineable reserve
520,000 tonnes
Lead: 6.64%
Zinc: 4.95%
Silver: 1049 grams/tonne (32.77 ounces per ton)

Geological resource
944,000 tonnes
Lead: 4.80%
Zinc: 3.90%
Silver: 930 grams/tonne

Mining method
Underground, 365 days per year

Processing method
Conventional mill, 365 days per year

HISTORY

Silver and lead mineralization was first discovered on the property in 1903. Treadwell Yukon Company Limited acquired the better showings in the area and began shipping hand-cobbed ore in 1921. Treadwell mined the deposits from 1921 to 1941; a total of 1.5 billion grams of silver were produced during this time. In 1945, Frobisher Exploration Company Ltd. and Conwest Exploration Company Ltd. formed Keno Hill Mining Company Ltd. United Keno operated the mine from 1946 until 1988. A strike from September, 1980 to May, 1981 severely curtailed production. Low silver prices forced the mine to close from July, 1982 to August, 1983. In January, 1989, the mine was closed due to low silver prices. From 1946 to 1988 about 5.08 billion grams of silver were produced from the Hector-Calumet, Galkeno, Bellekeno, Elsa, Keno (No. 3 & 9), Lucky Queen, Silver King, Sadie-Ladue and Husky mines. In 1990, Archer, Cathro and Associates mined over 100 tonnes of high-grade ore from open-pits on the Lucky Queen, Keno #3 and Keno #9 veins.

In July, 1990, BLM Mines Inc., a unit of Bharti Laamanen Mining Inc. (BLM) of Sudbury, Ontario, purchased the 44.8% interest in United Keno Hill Mines Ltd. formerly held by Falconbridge Ltd. In 1991, Romith Investments and Stephen Powell each acquired directly or indirectly, 50% of the issued and outstanding common shares of BLM. In September, 1993, United Keno Hill retained mine engineers Watts, Griffis and McOuat Ltd. (WGM) of Toronto to undertake a complete review of its Elsa area properties, geological reserves and mine plans. A surface drilling program was completed in the Silver King, Husky SW and Bellekeno areas during the summer of 1994. From mid-October, 1994 to April, 1995, underground drilling and rehabilitation were conducted on the

Bellekeno and Silver King mines. A feasibility study on the property was completed in October, 1996, and a merger with NDU Resources was completed in March, 1998. Since then, the company has attempted to raise financing to re-open the mine.

PROJECT SUMMARY

The United Keno Hill silver vein deposits are located in Elsa, approximately 354 km north of Whitehorse. The property is owned by United Keno Hill Mines Limited (UKHM) and consists of several underground and open-pit silver-lead-zinc mines in the Keno Hill-Galena Hill area. The Elsa operations have been in production since the initial discovery of silver in 1906. Between 1947 and 1989, United Keno Hill Mines produced 148 million ounces of silver, 482 million pounds of lead and 4 million pounds of cadmium from the Elsa operations.

GEOLOGY, MINERALOGY AND ORE RESERVES

More than 65 mineral deposits and prospects have been identified within the Keno Hill district. All of the mineable silver veins to date occur in an area 26 km long and one to 6.4 km wide. The deposits consist of mineralized vein faults 0.3 to 30 m wide in the Keno Hill quartzite. Underground mineable reserves, mostly in the Bellekeno and Silver King veins, stand at 520,000 tonnes grading 1049 grams/tonne silver (32.77 ounces/ton), 6.64% lead, and 4.95% zinc. Geological reserves are 944,000 tonnes grading 930 grams/tonne silver, 4.8% lead and 3.9% zinc.

PRODUCTION PLANS

United Keno Hill Mines Ltd. has been conducting surface and underground exploration with the goal of increasing existing reserves to support an initial five-year mine life at a historic average grade of approximately 1,300 grams/tonne silver. The company hired Watts, Griffis and McOuat Ltd. of Toronto to oversee the 1994-1995 exploration programs and to undertake a complete review of its Elsa area properties, geological reserves and mine plans. A surface drilling program was completed in the Silver King, Husky SW and Bellekeno areas during the summer of 1994. From mid-October, 1994 to April, 1995 an underground drilling ($5 to $8 million) and rehabilitation program was conducted on the Bellekeno and Silver King mines, which increased reserves at both mines. A Type B Water License from the Yukon Water Board was issued for this work. Water treatment facilities were constructed in the fall of 1994 for three of the mine sites, and the Bellekeno and Silver King mines are now substantially rehabilitated. New 5 kV lines and transformers provide a modern electrical system in each mine, and new compressors and re-engineered ventilation deliver the necessary underground working environment. The underground program was halted in April, 1995 to compile and assess the data and plan the next step.

In 1996, the company resumed the underground exploration and development program on the Bellekeno and Silver King Mines in an effort to increase reserves and establish mineable ore reserves. Environmental fieldwork and background data gathering also continued.

Rescan Engineering completed a feasibility study on the property in October, 1996. The feasibility study supports the company's view that it can reduce costs and increase efficiency. The effectiveness of the proposed mining methods and mine development strategies has been confirmed and the feasibility study suggests substantial improvement over historic operating costs and recoveries. United Keno Hill Mines adopted the recommendations of the feasibility study and, based on its conclusions, plans to implement a program of rehabilitation and development intended to permit the recommencement of commercial production from Elsa in 1998. In March, 1997, United Keno Hill Mines ceased work on the property pending raising capital.

In July, 1997, United Keno Hill Mines, NDU Resources Ltd., (Marg and Blende properties) and Yukon Gold and Mineral Development Company entered into letters of intent respecting the reactivation of UKHM's mines and mill at Elsa, and the evaluation of the merits of a joint operation between UKHM and NDU involving a common milling facility and related infrastructure utilizing UKHM's present facilities at Elsa. The agreement with Yukon Gold and Mineral Development was terminated in December, 1997, leaving NDU Resources and United Keno Hill Mines to complete their merger.

The Yukon Water Board issued a water license to United Keno Hill Mines in August, 1997. The water license has been signed by DIAND. The company is now attempting to raise the production capital necessary to complete surface rehabilitation and mine development.

United Keno Hill Mines Ltd. plans to resume production at Elsa at an average rate of 500 tons per day. First year production is forecast at approximately 6,000,000 ounces

of silver at an average cost of approximately US$3 per ounce. Once production has resumed, initial activities will concentrate on further expansion of the mineral resources at Elsa, and then on establishing the feasibility of the Marg deposit and the economics of a new 2,500 to 3,000 tons per day mill to be constructed at Elsa. Pre-production and working capital is estimated at $15 million. A bus in and out operation on a rotational schedule with on-site bunkhouse accommodation is contemplated.

In August, 1998, United Keno Hill Mines Ltd. accepted a proposal from Procon Mining and Tunnelling Ltd. for the provision of contract rehabilitation, development and mining services at Elsa. These services are expected to reduce capital requirements by approximately 40%.

In October, 1999, United Keno Hill Mines Ltd. acquired the Clear Lake lead, zinc, silver deposit in the central Yukon from Energold Minerals Inc. through issuance of shares. Energold has agreed to provide United Keno with up to $2 million in working capital financing subject to certain terms and conditions relating to security.

WELLGREEN PROPERTY

Northern Platinum Ltd.

President: John McGoran

Corporate headquarters
#206–837 West Hastings Street
Vancouver, British Columbia V6C 1B6

Phone (604) 669-3522
Fax (604) 669-3522

PROJECT STATUS

Exploration ongoing

Location
125 km northwest of Haines Junction

Ownership
Northern Platinum Ltd.

Commodities
Copper, nickel, platinum, palladium

Ore type
Sulphide

Geological resource
50,032,466 tonnes

Copper: 0.35%

Nickel: 0.36%

Platinum: 0.54 grams/tonne

Palladium: 0.34 grams/tonne

Mining method
Open-pit, 365 days per year

Processing method
Conventional mill, on-site smelter

Mine life
12 years

Power
35 MW

HISTORY

The Wellgreen deposit was discovered in 1952 by the Yukon Mining Corporation Limited and optioned to Hudson Bay Mining and Smelting Ltd. From 1952 to 1955, Hudson Bay explored with 4,267 m of drifting and raising from four levels, two internal shafts and 19,815 m of surface and underground drilling. The property was transferred in 1955 to Hudson-Yukon Mining Company Ltd. They conducted a Turam survey in 1968, drilled 762 m, prepared a feasibility study in 1969, and arranged a marketing agreement with Sumitomo in 1970. Due to underground problems, initial production from the 544 tonne/day mill was delayed from September, 1971 to May, 1972, and was suspended in July, 1973 after treating only 171,652 tonnes. Total production was 33,853 tonnes of concentrate grading 7.4% nickel and 6.6% copper.

The property was optioned in June, 1986 by the Kluane Joint Venture wh[illegible]rried out grid soil sampling, mapping, prospecting, bulldozer trenching and test geophysical surveys. Hudson-Yukon was purchased by Galactic Resources Ltd. in June, 1986 and merged with All-North Resource Ltd. in November, 1986. In 1987, additional soil sampling, bulldozer trenching, geophysical surveys, underground rehabilitation and 4,932 m of diamond drilling in 45 holes were carried out. In 1988, the 4,250 level was rehabilitated and 34 underground holes were drilled totaling 5,500 m. On surface, bulldozer trenching and 37 holes totalling 6,073 m were drilled in addition to bulldozer trenching. Metallurgical tests and a preliminary feasibility study were carried out in 1988 and 1989.

J.P. Sheridan and Northern Platinum optioned the property in June, 1994 from All-North Resources. All-North Resources granted an option to earn an 80% interest to Sheridan in return for $80,000 cash and a commitment to spend $4 million on exploration by November 30, 2002. Sheridan, in turn, assigned the

option to Northern Platinum, retaining back-in rights for half of that company's interest at the feasibility stage. Sheridan is a director of Northern Platinum. Northern Platinum has been carrying out reserve evaluation drilling, underground sampling and exploration.

In the summer of 1999, Northern Platinum Ltd. received Vancouver Stock Exchange approval to purchase Kaieteur Resource Corp. (formerly named All-North Resources Ltd.) and J. Patrick Sheridan's 20% interest in the Wellgreen property for $25,000 cash and 150,000 Northern Platinum shares. Northern Platinum now owns 100% interest in Wellgreen, subject to a 1.5% net smelter return in favour of Hudson Bay Mining and Smelting Co. Ltd. Upon completion of a positive feasibility study, Belleterre Quebec Mines Limited has the right to back into the project for a 50% interest upon paying 50% of Northern Platinum costs.

PROJECT SUMMARY

The Wellgreen platinum group metal (PGM) rich, copper-nickel deposit is located in the southwestern Yukon, approximately 317 km northwest of Whitehorse and 125 northwest of the town of Haines Junction. The property consists of 91 claims held under a renewable 21-year mining lease which expires December 5, 1999. An intensive underground sampling program took place on the Wellgreen deposit during the winter of 1997-98. The goal of the program was to determine the grade and tonnage of massive sulphides which could quickly be extracted if a mining operation was to commence.

GEOLOGY, MINERALOGY AND ORE RESERVES

Mineralization on the Wellgreen property occurs within a variably serpentinized, 20-km-long ultramafic body, known as the Quill Creek Complex, that intrudes Permian sedimentary and volcanic rocks. Three main zones of PGM-enriched copper-nickel mineralization have been outlined on the Wellgreen property, the East Zone, the West Zone and the North Zone. Proven and probable reserves are estimated to be 50.03 million tonnes grading 0.35% copper, 0.36% nickel, 0.54 grams/tonne platinum, and 0.34 grams/tonne palladium.

Northern Platinum did not conduct any exploration on the property during 1995. During the 1996 program, a total of 57 holes were drilled. The drill results confirmed previous tonnage and grade calculations, and several zones of higher grade material were indicated. A mining plant, complete with compressors, generators, office facilities, bunk house and cook house facilities has been established near the portal of the adit.

During the summer of 1997, drilling took place on the Linda claims, southeast of the Wellgreen deposit. Assays over 1.3 m of massive sulphides returned average grades of 4.12% Ni, .89% Cu, .06 ounces/ton Pt and .043 ounces/ton Pd. The lower showing is disseminated to semi-massive sulphides over a width of 20 feet of broken rock ranging from 2.94% Cu and 3.02% Ni, with platinum and palladium assays as high as 0.13 ounces/ton Pt and 0.40 ounces/ton Pd. Drilling in the vicinity of the lower showing intersected sulphide mineralization grading 0.175 % Cu and 0.187 % Ni over 20 feet.

PRODUCTION

A 1989 preliminary feasibility report by consultants Watts, Griffis and McOuat proposed open-pit mining at 10,000 tonnes per day (3.65 million tonnes per year) at an average stripping ratio of 3.5:1; processing by conventional mill producing a concentrate with approximately 15% combined copper and nickel as well as PGMs and the cobalt, gold and silver in the ore; and, a Noranda reactor type smelter to reduce the shipping cost. The smelter would produce a 40% copper-nickel matte on site. Capital costs were estimated at $228 million and operating costs were thought to be about $18.61 per tonne ore. The power requirements are expected to be about 35 MW and the project should employ 400 to 500 people.

WOLF PROPERTY

Atna Resources Ltd.

President: Peter DeLancey

Corporate headquarters
#1550, 409 Granville Street
Vancouver, British Columbia V6C 1T2

Phone	(604) 684-2285
Fax	(604) 684-8887
Toll free	1-800-789-ATNA
E-mail	atna@atna.com
Web site	www.atna.com

PROJECT STATUS

Exploration planned

Location
90 km southeast of Ross River

Ownership
Joint venture between Atna Resources Ltd. (65%) and YGC Resources Ltd. (35%)

Commodities
Zinc, lead, silver

Ore type
Sulphide

Inferred resource
4.1 million tonnes

Zinc: 6.2%

Lead: 1.8%

Silver: 84 grams/tonne

HISTORY

The first recorded discovery of mineralization on the Wolf property was in 1955, but it wasn't until 1966 that Newmont Mining Corp. staked claims, constructed a tote road and carried out mapping, soil sampling and hand trenching. Hesca Resources Ltd. restaked the property in 1972 and drilled two X-ray holes in 1974. Newmont and Asamera restaked in 1976 and explored in 1977 and 1978 with geochemical, geophysical and mapping surveys, trenching and drilling. Amax, who transferred its interest to Canamax Resources in 1982, staked in 1982 and carried out surface work in 1983.

YGC Resources Ltd. staked the Wolf claims in 1990 and Cominco surrounded the Wolf claims a few days later with the Fox claims. YGC tied on the Lynx claims in 1991. Later in 1991, Cominco optioned the Wolf and Lynx claims from YGC and performed mapping, geochemistry and geophysics. The option was dropped and in 1995, YGC then optioned the Wolf claims to Atna Resources. Atna carried out lithogeochemical sampling and reconnaissance geological mapping in 1995 and 1996, followed by three diamond drill holes (399 m) in 1996. The three holes intersected significant, but subeconomic zinc, lead and silver. In 1997, Atna carried out a C$400,000 drill program (nine holes, 2,956 m) and intersected massive sulphide mineralization. Continued drilling (30 holes, 6,625 m) in 1998 located the down-dip extension of the mineralized upper horizon. A total of 31 diamond drill holes over a 600 m strike length and a 500 m down-dip width into the deposit have been completed. The property was dormant in 1999. Atna has completed its option requirements (65% interest for expenditures of $1.5 million over a five-year period) and the Wolf property is now managed by a joint venture between Atna and YGC Resources.

PROJECT SUMMARY

The Wolf property is located approximately 90 km southeast of Ross River, Yukon, on NTS map sheets 105G/5 and 6 in the Finlayson Lake volcanogenic massive sulphide camp. The property is 45 km west of Cominco's Kudz Ze Kayah deposit and 65 km from the Wolverine deposit. The property, as of early 1999, consists of 23 mineral claims covering an area of 481 hectares. Access is by helicopter from Ross River or from the Hoole airstrip, located on the Hoole River, 22 km north of the property.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Wolf property is underlain by Devonian to Mississippian volcanic rocks, including felsic tuffs, pyroclastic flows, trachyte flows, mudstones, and carbonates which form an arcuate belt nearly 5 km wide and 130 km long. The belt lies within the Pelly Mountains and hosts numerous volcanogenic massive sulphide showings.

The Wolf deposit is hosted in one of four stratigraphic levels of volcanogenic massive sulphide and exhalative barite mineralization. The deposit is a tabular massive sulphide horizon across a 600 m strike length and approximately 500 m in the down-dip direction. Most of the mineralization is hosted in a higher grade "keel" that has a strike length of 125 m, a down-dip length of 400 m, an average thickness of 12 m and dips 45 degrees to the south. The stratigraphy may have been overturned.

The Wolf deposit has an inferred resource of 4.1 million tonnes grading 6.2% zinc, 1.8% lead and 84 grams/tonne silver.

The Wolf deposit is open along strike and down-dip. Discovery of the East Slope Zone, 1200 m east of the Wolf deposit has enhanced the exploration potential of the property.

WOLVERINE PROPERTY

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PROJECT STATUS

Metallurgical studies in progress; drilling is planned

Location
130 km southeast of Ross River

Ownership
Joint venture between Expatriate Resources Ltd. (60%) Atna Resources Ltd. (40%)

Commodities
Zinc, copper, lead, silver, gold

Ore type
Sulphide

Geological (drill-indicated) resource
6.237 million tonnes

Zinc: 12.66%

Copper: 1.33%

Lead: 1.55%

Silver: 370.9 grams/tonne

Gold: 1.76 grams/tonne

HISTORY

The property was originally staked as the Fetish claims in July, 1973 by Finlayson JV (Chevron Canada Limited, Union Oil Company of Canada Ltd., and Marietta Resources International Ltd. and Messrs. L.T. and Harris Clay), which conducted grid soil sampling, mapping and trenching later in the year and drilled two holes. Additional Fetish claims were staked in August, 1974. The property was restaked as the Kink claims in September, 1982 by Archer, Cathro and Associates and optioned briefly to Esso Mineral Limited, who conducted airborne and geophysical surveys later in the year.

By July, 1993, only one Kink claim remained and the rest of the property was restaked as the Foot 1-20 claims by Atna Resources, which later added the Pak and Toe claims. Atna explored with prospecting, geological mapping, and soil and silt geochemistry in September, 1993. The property was optioned by Westmin Resources Limited and a drill program in 1995 resulted in the discovery of the Wolverine deposit on the Kink claims. By the end of 1995, Westmin had earned a 60% interest in the project and entered into a 60/40 joint venture, with Westmin as operator.

In February, 1998, Boliden Limited acquired the assets of Westmin Resources Limited. In May, 1998, Boliden Westmin Ltd. entered into a letter of intent with Expatriate Resources Ltd. to sell its interest in mineral properties and assets in the Finlayson Lake area, including Boliden Westmin's 60% interest in the Wolverine project. Expatriate completed the sale agreement with Boliden in March, 1999 and became the operator of the Wolverine

joint venture. Boliden currently has a 42% equity interest in Expatriate.

In 1999, joint venture partners Expatriate Resources and Atna Resources spent $200,000 conducting metallurgical and marketing investigations on the Wolverine ore. Results indicate that two of the metallurgical processes investigated would provide saleable products and are economically attractive.

Cost benefit analysis and planning for the start of the pre-feasibility study and a review of exploration and permitting requirements is in progress.

PROJECT SUMMARY

The Wolverine property is located approximately 130 km southeast of Ross River and 201 km east of Cominco's Kudz Ze Kayah project. The volcanogenic massive sulphide deposit has a mineral resource of over 6 million tonnes of zinc, copper, lead, silver and gold. In 1996, an airstrip was constructed near the Wolverine deposit. Environmental, geotechnical and metallurgical work is continuing. In May, 1997, metallurgical concerns regarding the selenium content in the sulphide minerals were reported. The selenium content is greater than what is normally treated by copper and zinc smelters; however, the joint venture partners have received positive results from metallurgical investigations, conducted in 1999.

Discussions with the Ross River Dena Development Corp. were initiated in 1997 to negotiate a socio-economic agreement with members of the local First Nation community.

GEOLOGY, MINERALOGY AND ORE RESERVES

The Wolverine deposit is a high-grade volcanogenic massive sulphide (VMS) body. The zinc-copper-lead-silver-gold mineralization is hosted within a thick sequence of felsic volcanic rocks interbedded with argillaceous and epiclastic sedimentary rocks of probable Devonian age within the Yukon-Tanana terrane. The main sulphide minerals in the deposit, in decreasing order of abundance, are pyrite, sphalerite, chalcopyrite and galena. Most of the silver occurs with argentian tetrahedrite, with the remainder occurring in galena and electrum.

The 1996 field program, which cost an estimated $6 million, commenced with construction of an air strip near the Wolverine deposit. Drilling started in mid-March and was completed in October. The known Wolverine Zone was expanded to the northwest with the discovery of the Lynx Zone immediately to the west. Exploration was also done on the Fisher Zone and Toe Claims. The 1996 drilling program significantly expanded the known area of mineralization at Wolverine and brought the number of massive sulphide intersections from 15 in 1995 to 49 to the end of the 1996 program. Systematic geological and geochemical evaluation of the numerous airborne geophysical targets on the remainder of the claims was also carried out in 1996.

During the 1997 program, the Sable Zone was discovered 1.6 km southeast of the Wolverine Zone by recognition of the footwall-type alteration zone in a drill hole. Thin zones of high-grade massive sulphides were intersected in two holes along with significant alteration. Chalcopyrite and pyrrhotite veins in chlorite-altered footwall rocks suggest feeder-style alteration associated with a massive sulphide deposit.

Drilling in 1997 of the Wolverine deposit took place on the margins of the deposit as outlined by the 1995 and 1996 drilling. Of the 22 successfully completed holes drilled in the Wolverine deposit during 1997, 19 intersected ore grade mineralization. In January, 1998, a new mineral resource estimate for Wolverine was released: 6,237,000 tonnes at a grade of 12.66% Zn, 1.55% Pb, 1.33% Cu, 370.9 grams/tonne Ag and 1.76 grams/tonne Au. Most of the tonnage (5.9 million tonnes) is in the main Wolverine and Lynx lenses. The mineral resource within these lenses is classified as indicated; 44% of the estimated tonnage occurs within 25 m from a drill intersection, 48% of the estimated tonnage occurs between 25 and 50 m from a drill intersection and 8% of the estimated tonnage occurs between 50 and 75 m from a drill intersection. The average thickness of 5.1 m decreased slightly as a consequence of the 1997 drilling taking place largely on the edges of the lenses. The deposit is now effectively delimited along strike but is open down-dip to the edge of the joint venture claim.

APPENDIX:
YUKON MINERAL DEPOSITS

The following tables list Yukon mineral deposits which have reserves. These deposits are listed numerically on the Yu' on mineral deposits map on page A–2 to 3.

The tables are comprised of information gathered from a variety of sources including Yukon Minfile, company press releases and web sites, DIAND and Yukon Geology Program publications, and other historical sources of information.

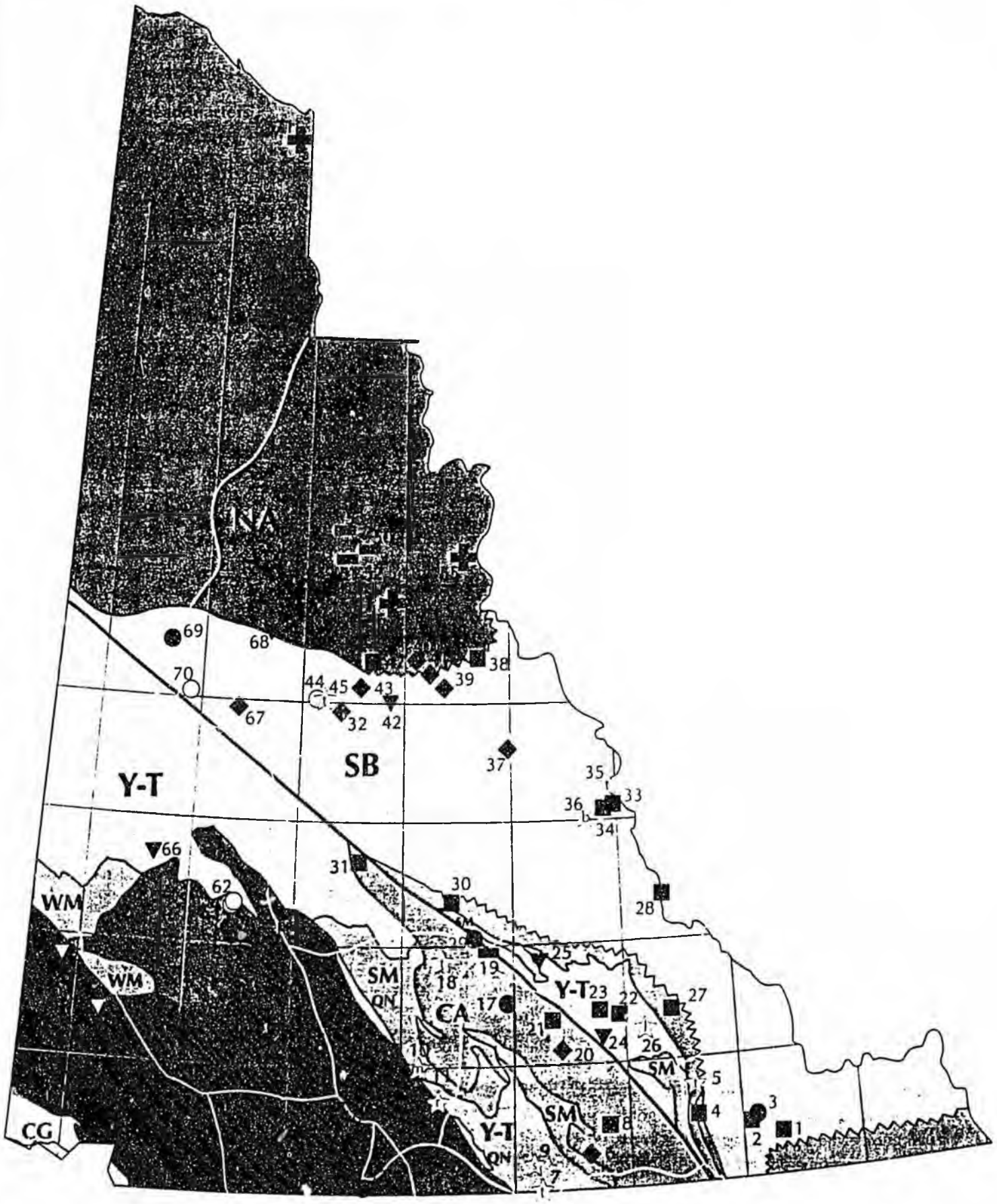
The tables are divided into commodities.

- Copper
- Gold
- Lead-zinc
- Silver
- Tungsten
- Other
- Coal

Each table contains the following information.

- Name of deposit
- Corresponding number on Yukon mineral deposits map
- Other names the deposit is known by
- Owner or contact
- Commodity or commodities
- Yukon Minfile reference number
- N.T.S. map sheet
- Latitude and longitude
- Location
- Reserves in tonnes
- Grade
- Comments

YUKON MINERAL DEPOSITS – Map



YUKON MINERAL DEPOSITS – Legend

CRATON

- Platforms
- SB — Selwyn Basin

TERRANES

- CA — Cassiar
- Y-T — Yukon-Tanana
- Nisling
- SM — Slide Mountain
- CC — Cache Creek
- Stikinia
- WM — Windy-McKinley
- Alexander
- Wrangellia
- CG — Chugach
- Undivided metamorphics

- Au
- Au (±Ag, ±Cu, ±Pb, ±Zn, ±Mo)
- Ag (±Pb, ±Zn, ±Cu, ±Au)
- Pb-Zn (±Ag, ±Au, ±Cu, ±Ba)
- Cu (±Mo, ±Au, ±Ag, ±Pb, ±Zn
- Ni-Cu
- Coal
- Iron

t – b = barite
t = tungsten
m = moly
r = rhodonite
j = jade
s = tin

1. Mel
2. McMillan
3. Hyland Gold
4. Sa Dena Hes
5. Bailey
6. Hart
7. Logtung
8. Logan
9. IC
10. Red Mountain
11. Mariin
12. Venus
13. Skukum
14. Goddell
15. Mt. Reid (Skukum Creek)
16. Whitehorse Copper
17. Ketza
18. Risby
19. Whiskey Lake
20. Tintina (Eagle)
21. Wolf
22. Wolverine Lake
23. Kudz Ze Kayah
24. Fyre
25. Ice
26. King Arctic
27. Matt Berry
28. Howard's Pass
29. Grew Creek
30. Faro, Grum, Vangorda, Grizzly (DY), Swim
31. Clear Lake
32. United Keno Hill
33. Tom
34. Jason
35. Mactung
36. Samovar (Tea)
37. Plata/Inca
38. Goz
39. Craig
40. Vera
41. Val
42. Marg
43. Clark
44. Dublin Gulch
45. Garnet (Rav Gulch)
46. Pagisteel
47. Blende
48. Marathon (Airstrip)
49. Pole (Wernecke)
50. Garlic Ring
51. Illtyd (Bonnet Plume Coal)
52. Pan Ocean (West Illtyd)
53. Deslaurier
54. Spaceship
55. Crest
56. Wellgreen
57. Canalask
58. Division
59. Williams Creek
60. Minto/Dei
61. Tantalus
62. Laforma
63. Brown-McDade
64. Mount Nansen (Webber, Huestis, Flex)
65. Antoniuk
66. Casino
67. Zeta
68. Hart River
69. Marn
70. Brewery Creek
71. Boundary

Canada

YUKON GEOLOGY PROGRAM

Yukon Government

COPPER

WHITEHORSE COPPER [16] Coyne H. & Sons, and others	*Commodity:* *Copper* *(Cu, Au, Ag)*	**Minfile:** 105D 053 **Map:** 105D/11 60°40'N; 135°05'W Whitehorse	**Reserves:** 2,982,000 **Grade:** 1.0% Cu	***Status:*** *Inactive, former producer. Discovered in 1887. Mine operated intermittently from 1900 to 1982 and a total of 10,130,000 tonnes was mined with an average grade of 1.5% Cu. Approximately 177,000 oz Au and 2.6 million ounces of Ag were extracted. Total value of production in 1993 was C$496 million. 1990-91: 500 m of rotary drilling in 7 holes, geophysical survey and trenching.*
FYRE [24] Pacific Ridge Exploration Ltd.	*Commodity:* *Copper* *(Cu, Au, Co)*	**Minfile:** 105G 034 **Map:** 105G/02 61°14'N; 130°31'W 160 km NW of Watson Lake	**Reserves:** 15,400,000 (drill-indicated) **Grade:** Within the 15.4 million, 8.2 million tonnes grade 2.1% Cu, 0.73 g/t Au and 0.11% Co	***Status:*** *Inactive. Discovered in 1960. 1996: extensive geological, geochemical and geophysical surveys, 71 diamond-drill holes (9,532 m). 1997: 44 diamond-drill holes (13,500 m). Preliminary scoping study and preliminary metallurgical tests complete.*
ICE [25] Expatriate Resources Ltd.	*Commodity:* *Copper* *(Cu, Au, Ag, Co)*	**Minfile:** 105G/118 **Map:** 105G/14 61°52'N; 131°21'W 65 km E of Ross River	**Reserves:** 4,561,863 tonnes (drill-indicated) **Grade:** 1.48% Cu	***Status:*** *Under active exploration. Discovered in 1995. 1996: airborne magnetics/electromagnetics, ground geophysics, geochemistry, mapping and prospecting, followed up by a diamond-drill program. 1997: 7,880 m diamond-drill program. 1998: ore-reserve calculations completed. Includes open-pittable resources.*
MARG [42] United Keno Hill Mines Ltd.	*Commodity:* *Copper* *(Cu, Zn, Pb, Ag, Au)*	**Minfile:** 106D 009 **Map:** 106D/01 64°01'N; 134°28'W 50 km ENE of Elsa	**Reserves:** 6,092,000 (geological) **Grade:** 1.76% Cu, 4.6% Zn, 2.46% Pb, 62.7 g/t Ag, 1.0 g/t Au	***Status:*** *Inactive. Discovered in 1965. 1987: airstrip construction and road building. 1990: 4,119 m diamond drilling in 10 holes. 1995-96: 29 drill holes. 1997: winter road into site completed to facilitate development. 1996 reserves are drill-indicated. Deposit limits have not been defined.*
WILLIAMS CREEK [59] (Carmacks Copper) Western Copper Holdings Ltd.	*Commodity:* *Copper* *(Cu, Ag, Au)*	**Minfile:** 115I 008 **Map:** 115I/07 62°21'N; 136°42'W 28 km NW of Carmacks	**Reserves:** 14,100,000 (mineable); 22,400,000 (geological) **Grade:** 14,100,000 at .99% Cu, 0.51 g/t Au 22,400,000 at 1.1% Cu	***Status:*** *Permitting stage. Discovered in 1970. 1993: construction of test facility for heap leaching during cold winter months. Test plant results are positive. Feasibility study completed in November, 1994. Three studies submitted to RERC and the property is in the final stages of the permitting process. 1995: additional geotechnical work completed. 1999: project review continuing under the EARP process.*
MINTO (Def) [60] Minto Exploration Ltd.	*Commodity:* *Copper* *(Cu, Ag, Au)*	**Minfile:** 115I 021 **Map:** 115I/11 62°37'N; 137°14'W 80 km NW of Carmacks	**Reserves:** 8,818,000 (geological); 6,510,000 (mineable) **Grade:** 8,818,000 at 1.73% Cu, 7.54 g/t Ag, 0.48 g/t Au; 6,510,000 at 2.13% Cu, 9.26 g/t Ag, 0.62 g/t Au	***Status:*** *Mine development. Discovered in 1971. 1972: airstrip construction. 1974: winter road construction. 1995: diamond drilling in new zones, geotechnical drilling in area of reserves. Reserves are based on exploration to the end of 1992. Received a class A water licence in 1998: Production license received in 1999. Proposed open pit followed by underground mining operation using conventional mill. Company has completed a feasibility study and plans final construction in late 2000 or early 2001.*
CASINO [66] Great Basin Gold Ltd.	*Commodity:* *Copper* *(Cu, Mo, Au, Ag)*	**Minfile:** 115J 028 **Map:** 115J/10 62°44'N; 138°50'W 150 km NW of Carmacks	**Reserves:** 675,000,000 (geological), 178,200,000 (mineable) **Grade:** 675,000,000 at 0.25% Cu, 0.02% Mo, 0.48 g/t Au; 178,200,000 at 0.303% Cu, 0.028% Mo, 0.376 g/t Au	***Status:*** *Inactive. Feasibility stage. Discovered in 1967. 1994: extensive infill and geotechnical diamond drilling, metallurgical, environmental, engineering studies. No exploration in 1995, baseline environmental studies continue. Detailed project preleasibility study completed with open-pit mining proposed. 1997: environmental studies continue.*
HART RIVER [68] (Mark) Inco Limited	*Commodity:* *Copper* *(Cu, Zn, Pb, Au, Ag)*	**Minfile:** 116A 009 **Map:** 116A/10 64°38'N; 136°51'W 100 km NW of Elsa	**Reserves:** 523,454 **Grade:** 1.45% Cu, 3.65% Zn, 0.87% Pb, 1.37g/t Au, 50 g/t Ag	***Status:*** *Inactive. Discovered in 1955. 1969: construction of winter road and underground development. Feasibility study completed in 1969. 1994: 6 diamond-drill holes totalling 1,653 m. Reserves are proven and also additional 544,322 tonnes probable ore at similar grade.*
CASH [72] Cash Resources Ltd.	*Commodity:* *Copper* *(Cu, Mo, Au, Ag, Pb, Zn, Sn)*	**Minfile:** 115I 037 **Map:** 115I/05 62°25'N; 136°42'W 80 km NW of Carmacks	**Reserves:** 36,300,000 (geological) **Grade:** 0.17% Cu, 0.018% MoS_2, 0.2 g/t Au, 0.4-9.1 g/t Ag	***Status:*** *Inactive. Discovered in 1969. 1974: airstrip construction. 1989: construction of access road. 1993: linecutting. Reserves are drill-indicated from 1977.*

GOLD

HYLAND GOLD [3] (Porker, Piglet, Quiver, Sow) **Adrian Resources Ltd., Cash Resources Ltd.**	*Commodity: Gold (Au, Pb, Ag)*	**Minfile:** 95D 011 **Map:** 95D/12 60°31'N; 127°51'W 65 km NE of Watson Lake	**Reserves:** 6,750,000 **Grade:** 2.0 g/t Au	***Status:** Inactive. Discovered in 1954. 1954-1986: intermittent exploration. 1988: bulldozer trenching, soil sampling, 4 holes (376 m), road construction. 1989: winter access road construction. 1990: 41 reverse circulation percussion holes drilled (3,800 m). 1995: 3 diamond-drill holes (439.2 m). Reserves are based on trench assays. This is a low-grade oxide gold deposit with open-pit potential.*
VENUS [12] **United Keno Hill Mines Ltd.**	*Commodity: Gold (Au, Ag, Pb, Zn)*	**Minfile:** 105D 005 **Map:** 105D/02 60°10'N; 134°38'W 15 km S of Carcross	**Reserves:** 100,000 **Grade:** 8.37 g/t Au, 247 g/t Ag, 2.09% Pb, 1.49% Zn	***Status:** Inactive, former producer, mill. Discovered in 1901. Minor production 1910-11, 1925, and 1968-69. 1979: mill construction. Operations suspended, October, 1981, pending higher metal prices. 1987-88: some surface exploration work. 1994: feasibility study on remediation of mine tailings under Federal Arctic Environmental Strategy. Reserves are proven and calculated across a 1.5 m width.*
SKUKUM [13] (Mount Skukum) **Omni Resources Ltd.**	*Commodity: Gold (Au, Ag)*	**Minfile:** 105D 158 **Map:** 105D/03 60°12'N; 135°28'W 40 km W of Carcross	**Reserves:** 98,885 (oxide ore) **Grade:** 14.75 g/t Au	***Status:** Inactive, former producer, mill. Discovered in 1981. Operated from 1986 to 1988 and produced 29,622,270 g Au from 201,461 tonnes of Cirque Zone ore, with an average grade of 13.0 g/t Au. Silver grades are not reported.*
GODDELL [14] **Omni Resources Ltd., Arkona Resources, Trumpter Yukon Gold**	*Commodity: Gold (Au, Sb, Ag)*	**Minfile:** 105D 025 **Map:** 105D/03 60°12'N; 135°17'W 85 km SSW of Whitehorse	**Reserves:** 900,000 (mineable) **Grade:** 7.0 g/t Au	***Status:** Active exploration. Discovered in 1906. Around 1906, trenching and a short adit. 1986: road construction, trenching and mapping. 1987: VLF-EM surveys. 1988: 4 diamond-drill holes (1,976 m). 1990: 7 diamond-drill holes (1,540 m). 1997: underground adit extended 182 m, over 8,500 m of undergound drilling (37 holes). 1998: geochemistry, geophysics and diamond drilling.*
MT. REID [15] (Skukum Creek) **Omni Resources Ltd.**	*Commodity: Gold (Au, Ag)*	**Minfile:** 105D 022 **Map:** 105D/03 60°11'N; 135°25'W 35 km W of Carcross	**Reserves:** Rainbow Zone, 956,949 (mineable); Kuhn Zone, 148,781 (mineable) **Grade:** Rainbow Zone, 6.3 g/t Au, 193.5 g/t Ag; Kuhn Zone, 8.78 g/t Au, 167.70 g/t Ag	***Status:** Active exploration. Discovered in 1922. 1985-88: Omni/Skukum Gold J.V., extensive surface and underground exploration and development. Bio-leach tests were positive. Metallurgical tests returned recoveries of 92% for Au and 94.5% for Ag. 1996: 15 hole underground drilling program. 1997: surface drilling around deposit. 1998: geochemistry, geophysics and diamond drilling.*
KETZA [17] (Ketza River) **YGC Resources Ltd.**	*Commodity: Gold (Au, Ag)*	**Minfile:** 105F 019 **Map:** 105F/07 61°30'N; 132°16'W 50 km S of Ross River	**Reserves:** 234,000 (mineable) **Grade:** 10.9 g/t Au	***Status:** Former producer, mill. Discovered in 1954. Production from 1988 to 1990 of over 100,000 ounces of gold. The 1995 exploration program identified new oxide reserves (Fork Zone) of unreported proportions. 1996: detailed geological mapping, prospecting, core-relogging and diamond-drill program. 1997: diamond drilling in the McGiver, Nu and B-mag zones.*
GREW CREEK [29] **A. Carlos**	*Commodity: Gold (Au, Ag)*	**Minfile:** 105K 009 **Map:** 105K/02 62010'N, 133008'W 35 km W of Ross River	**Reserves:** 773,012 (geological) **Grade:** 8.9 g/t Au, 33.6 g/t Ag	***Status:** Inactive. Discovered in 1984. 1995: drilling program 1996 17-hole (1,560 m) drill program. Reserves are from 1989 study. Contains a higher grade reserve of 184,947 tonnes grading 12.1 g/t Au.*
DUBLIN GULCH [44] **New Millennium Mining Ltd.**	*Commodity: Gold (Au)*	**Minfile:** 106D 025 **Map:** 106D/04 64°02'N, 135°43'W 20 km NW of Elsa	**Reserves:** 50,400,000 (mineable), 98,900,000 (geological) **Grade:** 0.93 g/t Au, 1.19 g/t Au (geological)	***Status:** Feasiblity study phase. First explored in 1970. 1995: diamond drilling (24,500 m in 151 holes), metallurgical testing, engineering studies, economic evaluations and environmental baseline studies. 1998: permitting under CEAA, continued environmental monitoring and baseline studies, results of feasibility study positive with gold recovery of 80% and a stripping ratio of 0.8:1; reserves for an open-pit mineable deposit.*
LAFORMA [62] (Mount Freegold) **FM Resources Corp.**	*Commodity: Gold (Au)*	**Minfile:** 115I 054 **Map:** 115I/07 62°16'N; 137°06'W 50 km NW of Carmacks	**Reserves:** 152,261 **Grade:** 5.62 g/t Au	***Status:** Former producer. Discovered in 1931. 1939-40: 1,286 tonnes milled 1995: continued diamond drilling and trenching. 1995: rehabilitation of the C3 adit for a bulk test.*
BROWN-MCDADE [63] (Big Thing, Dome) **B.Y.G. Natural Resources Inc.**	*Commodity: Gold (Au, Pb, Cu, Sb, Zn, Fe, As)*	**Minfile:** 115I 064 **Map:** 115I/03 62°03'N; 137°17'W 45 km W of Carmacks	**Reserves:** Open pit mined out, 220,000 (underground) **Grade:** 6.8 g/t Au, 57 g/t Ag	***Status:** Past, open-pit producer. Discovered in 1943. 1994-95: diamond drilling, topographic survey, geotechnical drilling, tailings storage study, road construction, tailings dam stripping, construction and rehabilitation of mill and mine buildings. 1996: BYG received a class A water license; production rates at the end of year reached 600 tonnes/day. 1999: mine shut down. Federal government is maintaining the mine site.*

GOLD (continued)

MOUNT NANSEN [64] (Webber, Huestis, Flex) B.Y.G. Natural Resources Inc.	*Commodity:* *Gold* *(Au, Ag)*	**Minfile:** 115I 065 **Map:** 115I/03 62°03'N; 137°08'W 45 km W of Carmacks	*Flex Zone Geological Reserve* 220,000 tonnes Grade 6.8 g/t Au, 57 g/t Ag *Webber Zone Mineable Reserve* 102,500 tonnes Grade 7.83 g/t Au, 466.4 g/t Ag *Huestis Vein Mineable Reserve* 148,600 tonnes Grade 11.75 g/t Au, 79.7 g/t Ag	***Status:*** *Under active exploration, former producer, mill. Discovered in 1945. Production from Brown-McDade: 1945-47, 1966-67, 1996-99, and from Webber, Huestis: 1968-69, 1976. 1995: expansion and rehabilitation of the existing mill. Flex zone was slated for production after depletion of the Brown-McDade.*
ANTONIUK [65] (Mount Freegold) FM Resources Corp.	*Commodity:* *Gold* *(Au)*	**Minfile:** 115I 111 **Map:** 115I/06 62°16'N; 137°05'W 50 km NW of Carmacks	**Reserves:** 4,200,000; 136,000 **Grade:** 4,200,000 at 1.2 g/t Au; 136,600 at 1.62 g/t Au	***Status:*** *Inactive. Discovered in 1931. 1987: the 4.2 million tonne reserve calculated using 0.5 g/t cutoff grade and a 0.8:1 stripping ratio. Cyanide leach test shows that mineralization is amenable to heap leaching.*
MARN [69] Battle Mountain	*Commodity:* *Gold* *(Au, Ag, Cu, W)*	**Minfile:** 116B 147 **Map:** 116B/07 64°29'N; 138°48'W 55 km NE of Dawson	**Reserves:** 275,000-330,000 **Grade:** 8.6 g/t Au, 1% Cu, 0.1% W, 17 g/t Ag	***Status:*** *Inactive. Discovered in 1914. 1979: mapping and geochemical sampling. 1980: mapping, sampling, 8 holes drilled (1,004 m). 1981: mapping, surveying, hand trenching, 8 holes (950 m). 1982: mapping, 1983: 13 holes (1,617 m). 1985: Control Source Audio Magnetotellurics survey, 2 holes (867 m). 1993: geological mapping, geochemistry and geophysical surveys. 1996: geology, geochemistry and geophysics program.*
BREWERY CREEK [70] Viceroy Resource Corporation	*Commodity:* *Gold* *(Au)*	**Minfile:** 116B 160 **Map:** 116 B/01 64°03'N; 138°14'W 57 km E of Dawson City	**Reserves:** 11,800,000 **Grade:** 1.13 g/t Au	***Status:*** *Production stage. Discovered in 1987. Began heap leach production in Nov. 1996. Reserve figure proven and probable as of Sept. 30, 1999. Forecast 1999 production of 55,000 oz. gold. Ore consists of 8 low-grade oxide gold deposits. On-minesite exploration to increase reserves.*
NUCLEUS [75] ATAC	*Commodity:* *Gold* *(Au)*	**Minfile:** 115I 006 **Map:** 115I/06 62°20'N; 137°20'W	**Reserves:** 4,170,000 **Grade:** 4,170,000 at 1.06 g/t Au including 211,900 at 3.16 g/t Au	***Status:*** *Inactive. Discovered in 1968. 1991: 739 m diamond drilling in 5 holes. Large reserve calculated in 1974 and the small higher grade reserve was calculated in 1988. Deposit open to the north and east. Could be developed as an open-pit-mining, heap leach operation.*

LEAD-ZINC

MEL [1] (Jean) **International Barytex Resources Ltd.**	*Commodity:* *Lead-Zinc* *(Zn, Pb, Barite)*	**Minfile:** 95D 005 **Map:** 95D/06 60°21'N; 127°24'W 80 km NE of Watson Lake	**Reserves:** 6,778,000 **Grade:** 7.1% Zn, 2.03% Pb, 54.69 % $BaSO_4$	***Status:*** *Under active exploration. Discovered in 1967. 1985: airstrip construction. Reserves are drill-indicated and calculated in 1989. 1994: deep drilling totalling 3,123 m, resulting in increasing the drill-indicated inventory. 1995: diamond drilling and geophysical work. 1998: development work conducted.*
MCMILLAN [2] (Quartz Lake) **Noranda Inc.**	*Commodity:* *Lead-Zinc* *(Zn, Pb, Ag)*	**Minfile:** 95D 006 **Map:** 95D/12 60°32'N; 127°50'W 64 km NE of Watson Lake	**Reserves:** 1,500,000 **Grade:** 6.54% Zn, 5.6% Pb, 102.5 g/t Ag	***Status:*** *Inactive. Discovered in 1930. 1990: soil sampling, trenching (7 trenches, 810 m) to test gold potential of property. 1993: reclamation program.*
SA DENA HES [4] (Mount Hundere) **Cominco**	*Commodity:* *Lead-Zinc* *(Zn, Pb, Ag)*	**Minfile:** 105A 012 **Map:** 105A/10 60°31'N; 128°53'W 50 km NE of Watson Lake	**Reserves:** 3,200,000 (geological); 1,400,000 (mineable) **Grade:** 3,200,000 at 12.90% Zn, 3.7% Pb, 57 g/t Ag; 1,400,000 at 10.2% Zn, 3.5% Pb, 44 g/t Ag	***Status:*** *Inactive, former producer, mill. Discovered in 1962. Curragh Resources and Hillsborough Resources brought the property into production in September 1991. Production was halted in December, 1992 due to low metal prices. Cominco acquired the property and has the mine on care-and-maintenance.*
LOGAN [8] **Energold Minerals Inc.**	*Commodity:* *Lead-Zinc* *(Zn, Ag)*	**Minfile:** 105B 099 **Map:** 105B/07, 10 60°30'N; 130°27'W 110 km WNW of Watson Lake	**Reserves:** 12,247,000 **Grade:** 6.17% Zn, 26.4 g/t Ag	***Status:*** *Inactive. Discovered in 1979. 1988: geochemical survey, IP survey, trenching, 6,771 m diamond drilling in 44 holes. Reserves are drill-indicated and lie within 200 m of surface (open-pittable). Deposit is unusual in that it contains zinc and silver but no significant lead.*
WOLF [21] **YGC Resources Ltd.**	*Commodity:* *Lead-Zinc* *(Zn, Pb, Cu, Ag, Au)*	**Minfile:** 105G 008 **Map:** 105G/05 61°20'N; 131°30'W 110 SE of Ross River	**Reserves:** 4,100,000 (inferred) **Grade:** 6.2% Zn, 1.8% Pb, 84 g/t Ag	***Status:*** *Active exploration. Discovered in 1955. 1967: road construction to within 2 km of showing, mapping, soil sampling and hand trenching. 1976-77: geochemistry, EM and mag surveys, mapping, hand trenching, bulldozer trenching and 3 drill holes (528 m). 1991-92: contour and grid soil sampling, geological mapping and UTEM and magnetic surveys. 1998 30 diamond-drill holes (6,625 m).*
WOLVERINE LAKE [22] (Fetish, Kink) **Expatriate Resources Ltd., Atna Resources Ltd.**	*Commodity:* *Lead-Zinc* *(Cu, Pb, Zn, Au, Ag)*	**Minfile:** 105G 072 **Map:** 105G/08 61°26'N; 130°08'W 135 km SE of Ross River	**Reserves:** 6,237,000 (drill-indicated) **Grade:** 1.3% Cu, 1.5% Pb, 12.7% Zn, 1.76 g/t Au, 371 g/t Ag	***Status:*** *Active exploration. Discovered in 1973. 1973-93: grid soil sampling, mapping, trenching, 2 drill holes (24.9 m), airborne and Max-Min EM surveys, prospecting, soil and silt geochemistry. 1995: mapping, sampling and geophysical surveys, 24 diamond-drill holes (6,442 m). 1996: 64 drill holes (18,810 m), airborne geophysical survey, regional mapping, geochemical surveys, and airstrip construction. 1997: drilled 22 holes. Metallurgical studies underway.*
KUDZ ZE KAYAH [23] (Abm, Tag) **Cominco Ltd.**	*Commodity:* *Lead-Zinc* *(Cu, Pb, Zn, Ag, Au)*	**Minfile:** 105G 117 **Map:** 105G/07 61°27'N; 130°36'W 115 km SE of Ross River	**Reserves:** 11,300,000 (mineable) **Grade:** 5.9% Zn, 1.5% Pb, 0.9% Cu, 133 g/t Ag, 1.3 g/t Au	***Status:*** *Inactive. Discovered in 1994. 1994: airstrip construction. 1995 construction of tote road. 15,000 m of diamond drilling (120 holes), sampling, and engineering and environmental activities. Environmental permitting complete. Class A water licence signed. Open-pit*
MATT BERRY [27] (Barb) **International Barytex Resources Corp.**	*Commodity:* *Lead-Zinc* *(Ag, Pb, Zn)*	**Minfile:** 105H 021 **Map:** 105H/06, 11 61°28'N; 129°25'W Frances Lake	**Reserves:** 533,434 (drill-indicated) **Grade:** 103 g/t Ag, 6.1% Pb, 4.8% Zn	***Status:*** *Inactive. Discovered in late 1930s. Reserves were calculated in 1989. 1993: 53 km of line cutting.*
HOWARD'S PASS [28] (Summit Lake, XY, Anniv, Op) **Placer Dome Inc.**	*Commodity:* *Lead-Zinc* *(Zn, Pb)*	**Minfile:** 105I 012 **Map:** 105I/06 62°28'N; 129°13'W 55 km NW of Cantung	**Reserves:** 113,400,000 (geological) including 8,200,000 (drill-indicated) **Grade:** 113,400,000 at 5.4% Zn, 2.1% Pb; 8,200,000 at 10.6% Zn, 5.5% Pb	***Status:*** *Inactive. Discovered in 1972. 1974: building of winter road, airstrip and tote roads. 1977: access road built. 1980-81: adit. 1982: drill-indicated geological reserves are for both the Howard's Pass and Anniv deposits. 1991 cleanup work. The second reserve quoted is drill-indicated, diluted high grade ore from the core area of the Howard's Pass deposit. In addition, inferred reserves for both deposits are in excess of 362.9 million tonnes*

LEAD-ZINC (continued)

Faro Pit [30] Interim Receivership: Deloitte and Touche Inc.	*Commodity:* Lead-Zinc (Zn, Pb, Ag, Au)	Minfile: 105K 061 Map: 105K/06 62°21'N; 133°22'W Faro	Reserves: No reserves, mined out	*Status: Former producer, mill. Discovered in 1965. Production began in September, 1969 under Cyprus Anvil Mining Corporation. A total of 32.8 million tonnes grading 5.48% An, 3.6% Pb and about 32 g/t Ag were milled to the end of 1982 when operations ceased due to depressed metal prices. Mining resumed in 1986 under Curragh Resources. Underground mining began within the pit in January, 1990. The Faro orebody was mined out in 1992 and the tailings were diverted to disposal in the Faro pit. About 23.74 million tonnes grading 4.42% Zn, 2.98% Pb and 36.6 g/t Ag were milled from 1986 to 1992. Total production from the Faro orebody was 56.58 million tonnes grading 5.03% Zn, 3.34% Pb, and 33.93 g/t Ag.*
Vangorda [30] Interim Receivership: Deloitte and Touche Inc.	*Commodity:* Lead-Zinc (Zn, Pb, Ag, Au)	Minfile: 105K 055 Map: 105K/06 62°15'N; 133°12'W Faro	Reserves: mined out	*Status: Former producer, mill. Discovered 1953. Stripping of deposit began in 1989 under Curragh Inc. and mining commenced in 1990. Mining ceased in 1993. Anvil Range resumed production from Vangorda Sept., 1995 to the end of 1996. Original reserves were 6.29 million tonnes grading 4.56% Zn, 3.46% Pb, 48 g/t Ag and 0.65 g/t Au.*
Swim [30] Interim Receivership: Deloitte and Touche Inc.	*Commodity:* Lead-Zinc (Zn, Pb, Ag, Au)	Minfile: 105K 046 Map: 105K/06 62°13'N; 133°02'W Faro	Reserves: 4,750,000 (drill-indicated) Grade: 4.7% Zn, 3.8% Pb, 42 g/t Ag	*Status: Discovered 1963. Drill-indicated reserves are within 18-million-tonne deposit of massive sulphide roughly 460 m long and 150 m wide, average thickness of 21 m.*
Grum [30] Interim Receivership: Deloitte and Touche Inc.	*Commodity:* Lead-Zinc (Zn, Pb, Ag, Au)	Minfile: 105K 056 Map: 105K/06 62°16'N; 133°13'W Faro	Reserves: 16,900,000 (mineable) Grade: 4.9% Zn, 3.0 % Pb, 47 g/t Ag	*Status: Discovered 1973. Mining commenced under Anvil Range Mining in August, 1995. Production ceased January 16, 1998.*
Grizzly (Dy) [30] Interim Receivership: Deloitte and Touche Inc.	*Commodity:* Lead-Zinc (Zn, Pb, Ag, Au)	Minfile: 105K 101 Map: 105K/03 62°14'N; 133°09'W Faro	Reserves: 21,356,000 (probable and possible) Grade: 7.33% Zn, 5.54% Pb, 81.1 g/t Ag, 0.87 g/t Au	*Status: Discovered 1976 as Dy deposit. Renamed Grizzly deposit in 1996. Reserves calculated using 9% Pb+Zn cutoff grade. Underground mining only, more exploration needed. Prefeasibility completed in 1996 by Anvil Range.*
Clear Lake [31] United Keno Hill Mines Ltd.	*Commodity:* Lead-Zinc (Zn, Pb, Ag)	Minfile: 105L 045 Map: 105L/14 62°47'N; 135°08'W 80 km NW of Faro	Reserves: 6,100,000 (drill-indicated) Grade: 11.34% Zn, 2.15% Pb, 40.8 g/t Ag	*Status: Inactive. Discovered in 1965. 1993: program tested coincident gravity and magnetic anomalies peripheral to the known mineralized area. Also, 1,364 m diamond drilling in 6 holes, gravity and magnetometer surveys, auger-assisted soil testing. Reserve geological, using a cutoff grade of 7% combined Pb-Zn.*
Tom [33] Hudson Bay Mining and Smelting	*Commodity:* Lead-Zinc (Pb, Zn, Ag, Ba)	Minfile: 115O 001 Map: 105O/01 63°08'N; 130°06'W MacPass	Reserves: 9,283,700 (mineable) Grade: 7.5% Pb, 6.2% Zn, 69.4 g/t Ag	*Status: Inactive. Discovered in 1951. 1979-81: underground work. 1980-82: feasibility study. 1991: 2,883 m diamond drilling in 7 holes. Reserve calculated using a 7% Zn+Pb cutoff, 15% dilution, 90% recovery.*
Jason [34] MacPass Resources Ltd.	*Commodity:* Lead-Zinc (Pb, Zn, Ag, Ba)	Minfile: 105O 019 Map: 105O/01 63°10'N; 130°10'W MacPass	Reserves: 14,100,000 (geological) Grade: 7.09% Pb, 6.57% Zn, 79.9 g/t Ag	*Status: Inactive. Discovered in 1974. 1991: 2553 m diamond drilling in 8 holes. Camp was cleaned up and 88 fuel barrels removed. Reserves (geological) calculated using a cutoff grade of 8% Zn+Pb. Mineralization occurs in 3 zones.*
Goz [38] (Goz Creek) Fairfield Minerals Ltd.	*Commodity:* Lead-Zinc (Zn)	Minfile: 106C 020 Map: 106C/07 64°26'N; 132°31'W 150 km ENE of Elsa	Reserves: 1,400,000 (drill-indicated) Grade: 10.0% Zn sulphide, 3.5% Zn oxide	*Status: Inactive. Discovered in 1973. 1975: 4,208 m diamond drilling in 35 holes. Upper dolomite is considered to have a potential for 10.9 million tonnes grading 8% Zn.*
Blende [47] United Keno Hill Mines Ltd.	*Commodity:* Lead-Zinc (Zn, Pb, Ag)	Minfile: 106D 064 Map: 106D/07 64°25'N; 134°40'W 70 km NE of Elsa	Reserves: 19,400,000 (geological) Grade: 3.04% Zn, 2.81% Pb, 55.9 g/t Ag	*Status: Inactive. Discovered in 1961. NDU Resources conducted a 596 m drill program over 7 holes during 1994. Water quality studies continuing. Drill-indicated open-pittable geological resource based on 1991 drilling. Mineralization is still open to the west, where it projects beneath talus cover.*

SILVER

HART [6] (CMC) **W. Hyde**	***Commodity:*** *Silver* *(Ag, Pb, Zn)*	**Minfile:** 105B 021 **Map:** 105B/07 60°20'N; 130°44'W 120 km NW of Watson Lake	**Reserves:** 97,000 **Grade:** 1025 g/t Ag	***Status:*** *Inactive. Discovered in 1947. 1987: extensive trenching, detailed fracture analysis, 609.6 m drilling in 4 holes on TM zone. Reserves calculated in 1987.*
TINTINA [20] (Eagle) **Tintina Mines Ltd.**	***Commodity:*** *Silver* *(Ag, Zn, Pb)*	**Minfile:** 105G 006 **Map:** 105G/03 61°09'N; 131°09'W 115 km SE of Ross River	**Reserves:** 90,900 **Grade:** 686 g/t Ag, 10.0% Zn, 6.0% Pb	***Status:*** *Inactive. Discovered in 1961. 1962: winter road construction and underground work. 1987: 1,712 m diamond drilling in 15 holes, trenching. Reserves were calculated in 1979 and are drill-indicated and inferred.*
UNITED KENO HILL [32] **United Keno Hill Mines Ltd.**	***Commodity:*** *Silver* *(Au, Ag, Pb, Zn)*	**Minfile:** 105M 001 **Map:** 105M/13, 14 63°55'N; 135°30'W Elsa	**Reserves:** 520,000 (mineable), 944,000 (geological) **Grade:** 520,000 at 6.64% Pb, 4.95% Zn, 1049 g/t Ag; 944,000 at 4.8% Pb, 3.9% Zn, 930 g/t Ag	***Status:*** *Former producer, mill. Discovered in 1903. From 1921-1988, there has been 4.8 million tonnes milled which produced 6.9 million grams of Ag, 322 million kg of Pb, and 198 million kg of Zn. Operations suspended in January, 1989. 1994: diamond and reverse circulation drilling, geophysics on the Silver King, Husky SW and Bellekeno areas, and a winter (1995) program of rehabilitation and de-watering of the Bellekeno and Silver King mines, as well as underground diamond drilling and ore delineation. 1997: placed on care-and-maintenance.*
PLATA/INCA [37] **Big Blackfoot Resources Ltd.**	***Commodity:*** *Silver* *(Ag, Pb, Au)*	**Minfile:** 105N 003 **Map:** 105N/09 63°53'N; 132°02'W 180 km N of Ross River	**Reserves:** 206,000 **Grade:** 3.3 g/t Au, 267.5 g/t Ag	***Status:*** *Under active exploration. Past, open-pit producer. Discovered in 1969. 1973: construction of winter road, bush airstrip and 25 km of tote roads, grid soil sampling, detailed mapping and bulldozer trenching. 1976, 1983, 1984, 1990: 450, 1360 tonnes mined and shipped to smelter. 1984-85: 260 m cross-cut driven 100 m vertically below no. 2 vein open pit, drilled 13 holes. 1987: 670 m of holes drilled and mined from no. 4 and no. 6 veins. 1998: 16 drill holes (200 m).*
CRAIG [39] **Manson Creek Resources**	***Commodity:*** *Silver* *(Ag, Zn, Pb)*	**Minfile:** 106C 073 **Map:** 106C/03 64°09'N; 133°20'W 105 km NE of Elsa	**Reserves:** 964,000 (drill-indicated) **Grade:** 13.5% Zn, 8.5% Pb, 112 g/t Ag	***Status:*** *Active exploration, feasibility study phase. Discovered in 1976. 1986: hand trenching. 1998: exploration of several showings within the area.*
VERA [40] (Rusty Mountain) **Manson Creek Resources**	***Commodity:*** *Silver* *(Ag, Pb, Zn)*	**Minfile:** 106C 083 **Map:** 106C/05 64°18'N; 133°44'W 70 km NE of Elsa	**Reserves:** 850,000 (drill-indicated) **Grade:** 306 g/t Ag, 3.7% Pb + Zn	***Status:*** *Active exploration. Discovered in 1978. 1984: 12 holes diamond drilling, environmental studies. Reserves calculated in 1981. The 1984 drilling expanded the potential reserves to 1.36 million tonnes. 1998: re-evaluation work.*
VAL [41] **Manson Creek Resources**	***Commodity:*** *Silver* *(Ag, Pb, Zn, Cu)*	**Minfile:** 106C 085 **Map:** 106C/05 64°16'N; 133°41'W 95 km NE of Elsa	**Reserves:** 66,000 **Grade:** 1030 g/t Ag	***Status:*** *Active exploration. Discovered in 1978. 1978: mapping, geochemistry surveys, hand trenching and drilled 10 holes (456 m). 1979: explored with mapping, geochemistry surveys, trenching and 39 drill holes (3,157 m), 9 holes (1,304 m) in 1980 and 16 holes (630 m) in 1981. 1982: trenching and prospecting. 1988: drilling and environmental studies along the proposed road route, re-evaluation work.*
CLARK [43] **15966 Yukon Inc.**	***Commodity:*** *Silver* *(Ag, Pb, Zn)*	**Minfile:** 106D 011 **Map:** 106D/02 64°07'N; 134°57'W 80 km NE of Mayo	**Reserves:** Above adit level - indicated 129,350, above adit level - inferred 65,400, below adit level - indicated 85,500, below adit level - inferred 46,800 **Grade:** Above adit level - indicated 220 g/t Ag, 4.99 g/t Pb, 4.58 g/t Zn; above adit level - inferred 192 g/t Ag, 4.54 g/t Pb, 4.61 g/t Zn, below adit level - indicated 304 g/t Ag, 6.51 g/t Pb, 4.45 g/t Zn; below adit level - inferred 350 g/t Ag, 7.36 g/t Pb	***Status:*** *Inactive. Discovered in 1967. 1968: prospecting, soil sampling, road construction and bulldozing. 1970-1988: exploration consisted of bulldozer trenching, 11 winkie hole (164 m), geochemistry and geophysical surveys, 59 diamond-drill holes totalling 6,121 m, 455 m of cross cutting and drifting 100 m below the surface at 1,000 m elevation.*

SILVER (continued)

ZETA [67] R. Berdahl	*Commodity:* *Silver* *(Ag)*	**Minfile:** 115P 047 **Map:** 115P/14 63°59'N; 137°17'W 105 km E of Dawson	**Reserves:** 980,000 **Grade:** 557.6 g/t Ag	***Status:*** *Inactive. Discovered in 1983. 1984: trenching, mapping, mag, VLF EM, geochemistry surveys and 10 holes (883 m) drilled. 1988: 4 holes drilled (138 m).*
GROUNDHOG [73] (Jeff, Lorne) St. Cyr Mineral Explorations Ltd.	*Commodity:* *Silver* *(Ag, Pb, Zn)*	**Minfile:** 105F 029 **Map:** 105F/10 61°37'N; 132°52'W 50 km SSW of Ross River	**Reserves:** 200,951 **Grade:** 91.9 g/t Ag, 4.01% Zn, 3.18% Pb	***Status:*** *Inactive. Discovered in 1956. 1978: road construction. 1979-80: shipped 1,010 tonnes of hand-sorted galena ore. 1988: shipped 21 tones bulk sample. 1991: trenching. Reserves are probable and drill-indicated for seven separate deposits.*
LOGJAM [74] 7188 Yukon Ltd.	*Commodity:* *Silver* *(Ag, Au, Zn, Pb)*	**Minfile:** 105B 038 **Map:** 105B/04 60°02'N; 131°36'W 65 km E of Teslin	**Reserves:** 69,854 **Grade:** 392 g/t Ag, 3.01 g/t Au, 3.0% Zn, 2.0% Pb	***Status:*** *Inactive. Discovered in 1944. 1965-67, 1981: underground work, road construction. 1987: surface geology, geochemistry, 601 m of diamond drilling in 9 holes, underground development. 1988: road construction. Reserves are probable with an additional equal tonnage of possible ore.*
PESO/REX [76] M.J. Moreau	*Commodity:* *Silver* *(Ag, Pb)*	**Minfile:** 106D 021 **Map:** 106D/04 64°00'N; 135°54'W 60 km NW of Carmacks	**Reserves:** 139,373 **Grade:** 717 g/t Ag, 3.7% Pb	***Status:*** *Inactive. Discovered in 1910. 1991: Aurum Geological Consultants conducted a small sampling and evaluation program. Proven and probable reserves in the Rex and No. 1 veins.*

TUNGSTEN

BAILEY [5] (Pat, Morning Star) **North American Tungsten Ltd.**	*Commodity:* *Tungsten* *(W, Cu, Mo)*	**Minfile:** 105A 017 **Map:** 105A/15 60°46'N; 128°51'W 80 km N of Watson Lake	**Reserves:** 272,160 **Grade:** 0.96% WO_3	***Status:*** *Inactive. Discovered in 1963. 1992: reconnaissance prospecting and geochemical sampling. Mineralization located in 3 zones over a strike length of 4 km. Reserves from B-zone.*
LOGTUNG [7] **Nordac Resources Ltd.**	*Commodity:* *Tungsten* *(W, Mo)*	**Minfile:** 105B 039 **Map:** 105B/04 60°01'N; 131°37'W 65 km E of Teslin	**Reserves:** 229,000,000 (geological) **Grade:** 0.14% WO_3, 0.05% MoS_2	***Status:*** *Active exploration. Discovered in 1976. 1977-81: Canamax option, road construction. 1993: NDU Resources has the right to earn 50% interest by spending $1 million over 3 years and granting 50% interest in adjacent NDU claims. 1993: work program to assess Au by prospecting, geochemical surveys, and 2 diamond-drill holes (234 m). Open-pit mineable. 1998: Nordac acquired claims, conducts exploration south of deposit.*
JC [9] (Fis, Fur, Fxe, Viola) **Placer Dome Inc., Cominco Ltd.**	*Commodity:* *Tungsten* *(W, Sn, Cu, Zn)*	**Minfile:** 105B 040 **Map:** 105B/04 60°12'N; 131°42'W 65 km E of Teslin		***Status:*** *Inactive. Discovered in 1967. 1968: bulldozer trenching. 1974: drilled two holes (38.1 m). 1978-80: mapping and geochemistry sampling, trenching. 1978: magnetic surveys. 1979-80: 8 holes (804.7 m).*
RISBY [18] **Ron Berdahl**	*Commodity:* *Tungsten* *(W)*	**Minfile:** 105F 034 **Map:** 105F/14 61°52'N; 133°23'W 45 km S of Faro	**Reserves:** 2,700,000 **Grade:** 0.81% WO_3	***Status:*** *Inactive: Discovered in 1968. 1979-82: geological mapping, geochemical and geophysical surveys, and 5,971 m diamond drilling in 40 holes. Reserves are estimated.*
MACTUNG [35] **North American Tungsten Ltd.**	*Commodity:* *Tungsten* *(W)*	**Minfile:** 105O 002 **Map:** 105O/08 63°17'N; 130°09'W MacPass	**Reserves:** 57,200,000 **Grade:** 0.95% WO_3	***Status:*** *Inactive. Discovered in 1962. 1970: tote road. Western world's largest tungsten deposit. 1973, 1979, 1985: underground work. 1985: road construction. Engineering, environmental and feasibility studies essentially complete, awaiting higher tungsten prices.*
GARNET [45] (Ray Gulch) **New Millennium Mining Ltd.**	*Commodity:* *Tungsten* *(W)*	**Minfile:** 106D 027 **Map:** 106D/04 64°02'N; 135°45'W 20 km NNE of Elsa	**Reserves:** 7,260,000 including 3,600,000 **Grade:** 7,260,000 at 0.87% WO_3; 3,600,000 at 0.93% WO_3	***Status:*** *Inactive. First staked in 1942. 1963-64: bulldozer trenching. 1978-79, 1981: extensive geochemistry and geophysical surveys. 1981: trenching. Diamond drilling: 21 holes (2,423 m) in 1979, 64 holes (11,278 m) in 1980, 3 holes (751 m) in 1982. Mapping, geochemistry and VLF-EM surveys and trenching in 1982. 1991: mapping, geochemistry, geophysics and 16 diamond-drill holes (2,500 m). 1992: 1,129.9 m of reverse circulation drilling. 1993: 10 reverse-circulation drill holes (2,079 m), and several test pits.*

OTHER

PAGISTEEL [46] Archer, Cathro & Associates (1981) Ltd.	*Commodity:* *Iron* *(Fe)*	**Minfile:** 106D 049 **Map:** 106D/16 64°50'N; 134°17'W 115 km NE of Elsa	**Reserves:** 9,100,000 **Grade:** 29.2% soluble iron	*Status: Inactive. Discovered in 1898. First staked in 1962. 1967: winter road and airstrip construction, magnetometer survey and 15 holes (1448.7 m). 1980-82: radiometric and rock geochemical surveys, prospecting and hand trenching. 1989: mapping and relogging and sampling drill core. Reserves based on drill results.*
CREST [55] (Snake River) Chevron Resources Canada	*Commodity:* *Iron* *(Fe)*	**Minfile:** 106F 008 **Map:** 106F/2, 3, 5, 7 65°15'N; 133°02'W Yukon/NWT border	**Reserves:** 5.5 billion **Grade:** 46% Fe	*Status: Inactive, feasibility study phase. Discovered in 1961. 1963-64: 2 bulk samples totalling 110 tonnes were shipped out for metallurgical test; feasibility study completed. Stripping ratio less than 1:1. This reserve figure includes 18.2 billion tonnes, at slightly higher ratios, averaging 46% Fe, 25% SiO_2 and 0.35% phosphorous.*
BOUNDARY [71] Withdrawn from Staking	*Commodity:* *Iron* *(Fe)*	**Minfile:** 117A 072 **Map:** 117A/09 68°30'N; 136°31'W 150 km W of Inuvik		*Status: Gem stone occurrence first noted in 1971. Spectacular suite of approximately 30 unusual phosphate minerals, including lazulite and kulanite.*
KING ARCTIC [26] (Easy, Frances, Lind, Mary Elizabeth, Snow) M. Rosequist	*Commodity:* *Jade*	**Minfile:** 105H 014 **Map:** 105H 03 61°06N; 129°25W 120 km N of Watson Lake		*Status: Inactive, former open-pit producer. Discovered in 1964. 1989-90: shipped 70 tonnes and 40 tonnes. 1991-94: road building and jade production.*
RED MOUNTAIN [10] Tintina Mines Ltd.	*Commodity:* *Molybdenum* *(Mo)*	**Minfile:** 105C 009 **Map:** 105C/13 60°59'N; 133°45'W 80 km NE of Whitehorse	**Reserves:** 187,300,000 including 21,300,000 **Grade:** 187,300,000 at 0.167% MoS_2; 21,300,000 at 0.293% MoS_2	*Status: Inactive. Discovered in 1967. 1978-82: 21,391 m diamond drilling, and metallurgical studies. Drill-indicated geological reserves calculated in 1982. Larger reserve calculated using a 0.10% MoS_2 cutoff and smaller reserve used a cutoff of 0.25% MoS_2. 1994: 6 diamond-drill holes (243 m).*
STORMY [77] Open	*Commodity:* *Molybdenum* *(Mo, W)*	**Minfile:** 105F 011 **Map:** 105F/07 61°30'N; 132°48'W 60 km SW of Ross River	**Reserves:** 13,608 **Grade:** 0.73% Mo	*Status: Inactive. Discovered in 1955. 1989: old drill core reassayed. Two separate mineralized zones, one molybdenum, one tungsten. Reserves are probable and calculated in 1959.*
WELLGREEN [56] (Quill Creek) Northern Platinum Ltd.	*Commodity:* *Nickel* *(Ni, Cu, P.G.E., Au, Ag)*	**Minfile:** 115G 024 **Map:** 115G/05 61°28'N; 139°32'W 35 km NW of Burwash Landing	**Reserves:** 50,032,466 (geological) **Grade:** 0.36% Ni, 0.35% Cu, 0.54 g/t Pt, 0.34 g/t Pa	*Status: Active exploration, former producer. Discovered in 1952. Produced from 1972 to 1973. 1988: 4,250 level rehabilitated, 5,500 m underground diamond drilling (37 holes), metallurgical testing, preliminary feasibility studies. Reserves released in 1989. Deposit also contains significant amounts of rhodium, iridium, osmium and gold. 1996: 57 rotary percussion drill holes (3,900 m). 1997: rehabilitation and resampling of underground workings. 1998, geology and geochemistry.*
CANALASK [57] Expatriate Resources Ltd.	*Commodity:* *Nickel* *(Ni, Cu, P.G.E)*	**Minfile:** 115F 045 **Map:** 115F/15 61°57'N; 140°32'W 50 km S of Beaver Creek	**Reserves:** 390,235 (main zone) **Grade:** 1.35% Ni	*Status: Inactive. Discovered in 1952. 1994: diamond-drill program (6 holes) and metallurgic testing. 1995: continued drilling. Main zone has a length of 107 m, a width of 15 m and is cut off at the west by a fault. Two other zones are also present but of lower grade. Deposit remains open along strike and to depth. 1997: 10 holes totalling 1,203 m.*
MARLIN [11] (Eve, Evelynn Creek) Sidrock	*Commodity:* *Rhodonite*	**Minfile:** 105C 017 **Map:** 105C/11 60°42'N, 133°20'W 70 km NNW of Teslin		*Status: Open-pit producer. Discovered in 1955. 1987-88: road upgraded. 27.3 tonnes shipped out in 1987, 20 tonnes 1988, 60 tonnes in 1989. 1992 repaired road, mapping at 1:5,000 scale and mined 40 tonnes. Exploration trenching 1992. 1998: 35 tonnes mined.*
SAMOVAR [36] (Tea, Brock) Coyne H. & Sons Ltd.	*Commodity:* *Barite* *(Ba)*	**Minfile:** 105O 020 **Map:** 105O/02 62°21'N; 130°36'W Jeff Lake	**Reserves:** 250,000 **Grade:** S.G. 4.24	*Status: Open-pit producer. Discovered in 1975. Deposit amenable to open pit mining with no stripping ratio. 1998: production of 3,000 tonnes.*
WALT [78] (Cathy) Coyne H. & Sons Ltd.	*Commodity:* *Barite* *(Ba)*	**Minfile:** 105O 021 **Map:** 105O/07, 08 63°17'N; 130°33'W MacPass	**Reserves:** 450,000 **Grade:** S.G. 4.25	*Status: Inactive. Discovered in 1973. 1993: mapping, prospecting and bulk sampling. Reserves based on 1980 drilling within main (Cathy) zone.*

COAL

Whiskey Lake [19] Nadahini Mining Corporation	*Commodity:* *Coal*	**Minfile:** 105F 048 **Map:** 105F/15 61°58'N; 132°32'W 5 km SW of Ross River	**Grade:** Low-volatile bituminous to semi-anthracite, calorific value 12,920 G. BTU	***Status:** Former open-pit producer. Discovered in 1964. 1980: 13 percussion holes drilled (1520 m). 1986: small open-pit mine opened. Approximately 101,000 tonnes of coal mined between 1986 and 1992. 1987: 730 m of reverse-circulation drill holes. 1988: 15,240 m of drilling was completed.*
Marathon [48] (Airstrip) Pan Ocean Limited	*Commodity:* *Coal*	**Minfile:** 106E 013 **Map:** 106E/03 65°13'N; 135°17'W 145 km N of Elsa	**Reserves:** 18,000,000 (inferred) **Grade:** High-volatile bituminous C non-coking	***Status:** Inactive. Discovered in 1905. 1979: mapping and 1 hole drilled (111 m). One hole drilled in 1980 (276 m). Specifications of coal: yield 70.4%; moisture 4.8%, ash 18.9%, volatiles 30.8%, fixed carbon 45.1%; specific energy 9,500 BTU/lb.*
Pole [49] (Wernecke) Pan Ocean Limited	*Commodity:* *Coal*	**Minfile:** 106E 021 **Map:** 106E/01 65°12'N; 135°01'W 145 km NNE of Elsa	**Reserves:** 105,000,000 indicated; 29,000,000 inferred **Grade:** High-volative bituminous C non-coking	***Status:** Inactive. Discovered in 1977. 1978: mapping and 1 hole drilled (117 m). 1980: 2 holes drilled (660 m). Specifications of coal: yield 67.8%; moisture 4.6%, ash 11.1%, volatiles 36.0%, fixed carbon 48.4%; specific energy 10,700 BTU/lb.*
Garlic Ring [50] Pan Ocean Limited	*Commodity:* *Coal*	**Minfile:** 106E 032 **Map:** 106E/07 65°20'N; 134°51'W 160 km NNE of Elsa	**Reserves:** 9,000,000 indicated; 6,000,000 inferred **Grade:** High-volative bituminous C non-coking	***Status:** Inactive. Acquired in 1977. 1980: diamond-drill program, 2 holes (484 m). Two seams which average 2.6 m and 3.4 m thick. Reserves based on 1980 drilling.*
Illtyd [51] (Bonnet Plume Coal) Abermin Corporation	*Commodity:* *Coal*	**Minfile:** 106E 035 **Map:** 106E/06, 07 65°15'N; 135°00'W 160 km N of Elsa	**Reserves:** 37,700,000 (mineable) **Grade:** High-volative bituminous C non-coking (Thermal)	***Status:** Inactive. Discovered in 1977. 1977-79: geological mapping, diamond drilling, mining, environmental and thermal power plant studies. Saleable reserves are open-pittable coal based on stripping ratio of 10m³ of waste per tonne of coal. The coal has the following characteristics: yield: >23%; moisture 5.1%, ash 17%, volatiles 33.6%, fixed carbon 44.2%, sulphur <0.5%; specific energy 9,500 BTU/lb and ash fusion temp. >1316°C.*
Pan Ocean [52] (West Illtyd) Pan Ocean Limited	*Commodity:* *Coal*	**Minfile:** 106E 036 **Map:** 106E/03 65°14'N; 135°01'W 145 NNE of Elsa	**Reserves:** 48,000,000 **Grade:** High-volative bituminous C non-coking	***Status:** Inactive. Discovered in 1977. 1980: mapping and 2 holes (555 m).*
Deslaurier [53] Pan Ocean Limited	*Commodity:* *Coal*	**Minfile:** 106E 037 **Map:** 106E/02 65°26'N; 135°26'W 210 km N of Mayo	**Reserves:** Indicated 61 million, inferred 44 million **Grade:** yield 72.3%, ash 11.2% , volatiles 33.3% , fixed carbon 51.2% , moisture 4.2%	***Status:** Inactive. First acquired in 1977. Coal grade high volatile bituminous. 1979-80: diamond drilling, 3 holes, for a total of 612 m. Four seams correlated with Illtyd deposit 106E 035. The upper seam is 8.0 m thick and the lower seam is 5.0 m thick. Deposit occurs within a monocline and is separated into two blocks by a fault.*
Spaceship [54] Pan Ocean Limited	*Commodity:* *Coal*	**Minfile:** 106E 038 **Map:** 106E/02 65°13'N; 134°55'W 150 km NNE of Elsa	**Reserves:** Inferred 158,000,000 **Grade:** High-volative bituminous C non-coking	***Status:** Inactive. First acquired in 1977. 1980: mapping and 2 holes (689 m) drilled.*
Division [58] (Division Mountain) Cash Resources Ltd.	*Commodity:* *Coal*	**Minfile:** 115H 013 **Map:** 115H/08 61°20'N; 136°05'W 90 km N of Whitehorse	**Reserves:** 52,900,000 (drill-indicated) **Grade:** 8% moisture, 12.2% ash, 27.6% volatile matter, 52.1% fixed carbon, 0.5% sulphur, calorific value 6170 calories/g	***Status:** Advanced exploration. Property discovered in 1907. 1970-71: road construction. 1995: large-diameter diamond drilling (2,000 m) and excavator trenching. Environmental, archaeological and sociological studies have been initiated in preparation for permitting. An initial submission to the federal government is in progress. 1997-98: program of excavator trenching and diamond drilling. Reserves drill-indicated and open-pittable.*
Tantalus [61] (Tantalus Butte)	*Commodity:* *Coal*	**Minfile:** 115I 003 **Map:** 115I/01 62°07'N; 136°16'W 5 km N of Carmacks	**Grade:** High-volative bituminous B non-coking	***Status:** Inactive, past underground producer. First discovered in 1905. 1923: development commenced with an adit. Production averaged about 454 tonnes per year until 1938. Mine reopened in 1948 until 1967, total production for this period approximately 119,000 tonnes. Mine reopened in 1969 and mined 109,770 tonnes to the end of 1976. 1977: 42 percussion holes (3,476.8 m), resistivity, IP, gravity and downhole EM surveys. Underground fire in 1978 caused the mine to be sealed and production was shifted to the surface. 1978: 31 percussion holes drilled (1,535.9 m) and bulldozer trenching.*
Whitehorse Coal [79] Whitehorse Coal Corp.	*Commodity:* *Coal*	**Minfile:** 105D 042 **Map:** 105D/06, 11 60°30'N; 135°15'W 25 km SW of Whitehorse	**Reserves:** 458,000 **Grade:** High-ash anthracite	***Status:** Inactive. Discovered in 1901. 1942: minor production. 1988: 2,721 tonne bulk sample for testing. Reserves are drill-indicated. Coal ranked as a meta-anthracite with 3.5% moisture, 38.2% ash and a calorific content of 19,765 KJ/kg.*

Section 7:

Remarks to the conference by **Don Lowell**,
Alaska Transportation Consultants,
and … abstract by **Dr. Paul A. Metz**,
University of Alaska Fairbanks

Alaska Transportation Consultants

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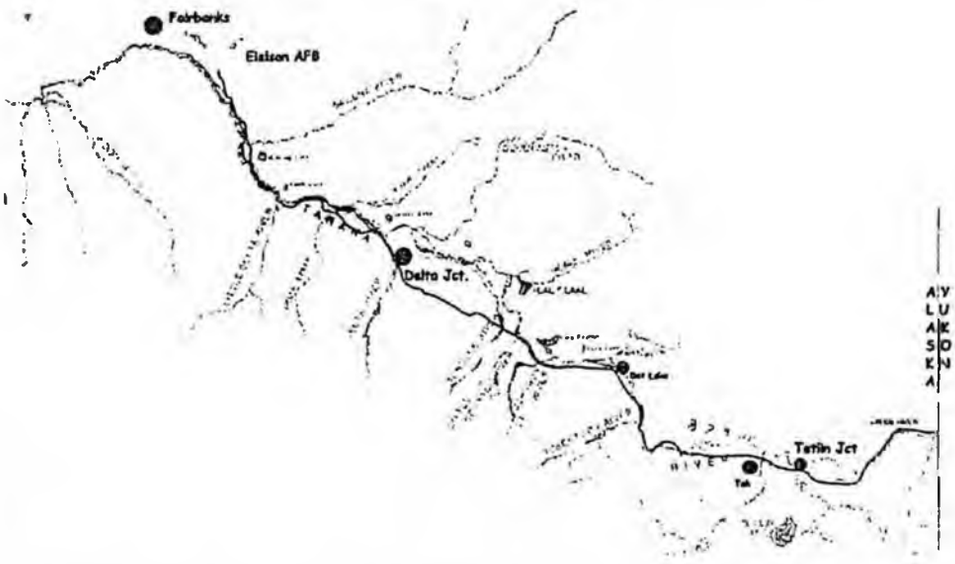
PROPOSAL TO UPDATE THE ENVIRONMENTAL ASSESSMENT
EXTENDING THE ALASKA RAILROAD FROM FAIRBANKS, ALASKA TO THE CANADIAN BORDER

Background

In 1983 the State of Alaska completed an environmental assessment of a railroad corridor between Eielson Air Force Base, near Fairbanks, and the Yukon border. Constrained by geometric standards and geological features, the route identified left the existing track near Eielson, crossed the Tanana River to its south bank near Harding Lake and proceeded to where it crossed the Delta River at Delta Junction. Following the Tanana River valley, the route departed the drainage near Tetlin Junction and crossed over into the Ladue River valley where it proceeded to the Alaska/Yukon Border.



This study specifically did not address the economic feasibility of extending the railroad system to the border but instead, concentrated on the identification of a practical route that was environmentally acceptable. Some of the many topics studied included agriculture, wildlife, water quality, wetlands, archaeological resources, land use, 4(f) properties, construction costs and maintenance considerations.

Since 1983, the U.S. Dept. of the Interior, as trustee for the Alaska Native Corporation land selections, has identified and transferred ownership of many lands along the route. In addition environmental concerns focused on sensitive species or environments that could impact the routing or eventual construction of a railroad need to be reassessed and the route needs to be reviewed and modified to comply with updated railroad geometric standards and rolling stock considerations.

Proposal

Alaska Transportation Consultants, a non-profit corporation dedicated to expanding Alaska's transportation systems, proposes to update this environmental assessment because it is essential to those determining the feasibility of connecting Alaska's railroad to the Canadian system. The updated study would address all of the geometric, geological and environmental aspects presented in the original report and would include current estimates for construction along the proposed route.

The final reassessment will be coordinated with State and Federal agencies and private concerns as required and will be submitted for endorsement to the State Administration.

The estimated cost to complete this comprehensive update is $100,000.

Mineral Resource Potential and Engineering Geology along the Proposed Route of the Extension of the Alaska Railroad from Healy Alaska to the Yukon Territory, Canada

Abstract

By

Paul A. Metz, Ph.D., P.G.
Associate Professor of Geological Engineering
Department of Mining and Geological Engineering
University of Alaska Fairbanks,
Fairbanks, Alaska

The proposed extension of the Alaska Railroad to the Canada will follow the southern margin of the Yukon-Tanana Uplands Schist Terrain from just north of Healy, Alaska to the Canadian Border near Beaver Creek, Yukon Territory. The Yukon-Tanana Uplands Schist Terrain and the Wrangell Terrain to the south have been important past producing areas of precious and base metals. The Yukon-Tanana Uplands Schist Terrain in Alaska has yielded at least 18 million ounces of placer gold and approximately 1.5 million ounces of lode gold during the 20th Century. The Yukon-Tanana Terrain in the Yukon Territory has produced approximately the same amount of placer gold during the same time period and major amounts of lead, zinc, and silver. The Wrangell Terrain produced over one billion pounds of copper in the first half of the 20th Century in Alaska and significant amounts of copper and gold in the Whitehorse Mining District, Yukon Territory in the later half of the century.

Today the Yukon-Tanana Schist Terrain is host to drill indicated reserves of at least 40 million troy ounces of gold. The terrain is one of the most active gold exploration areas of North America. The terrain is host to a variety of surface mineable gold deposit types and has great potential for the discovery of vein gold, gold skarn, and precious metal enriched massive sulfide deposit types that will be extracted by underground mining methods.

The Wrangell Terrain is host to Porphyry Cu, Porphyry Cu-Mo, and Porphyry Mo type mineral deposits. These are potentially very large tonnage base metal deposits that would require either local smelting of the sulfide concentrates or the availability of rail transportation of the concentrates to smelters as a prerequisite for their development. The terrain has good potential for future development of base and precious metal skarn deposits. Minerals deposit in the Fairbanks, Bonnifield, Richardson, Delta, Fortymile, Nabesna, and Tok Mining Districts are tabulated by deposit type and distance to the proposed rail-link.

The engineering geology of the right-of-way of the proposed rail-link contains significantly less geologic hazards than the existing right-of-way of the Alaska Railroad. The rail-link could provide a significant alternate transportation route for interior Alaska in the event of a major earthquake such as 1964 event that halted road and rail transport in south-central Alaska. The proposed route of the extension in Alaska avoids the major seismic zones south of the Alaska Range. The route in Alaska is within the non-glaciated Yukon-Tanana Uplands Schist Terrain and thus avoids the unstable glacial deposits and over-steepened U-shaped valleys with their inherent slope stability problems that dominate the right-of-way of the existing Alaska Railroad.

Section 8:

Remarks to the Conference by Bill Woolf, staff to Senator Frank Murkowski

Alaska Canada Rail Link Conference
Vancouver, B.C., Canada
January 20, 2000

"Rails to Resources"

William B. Woolf
Legislative Assistant for Natural Resources & Transportation
Office of Senator Frank H. Murkowski
United States Senate

First, thank you all for being willing to dream big dreams.

Dreaming big dreams is what railroading is all about. Railroad stories and myths of railroading appeal to the romantic in us -- from Casey Jones' wild ride to stories about the characters who still ride the rails today.

And the history of railroads in North America is the history of a really big dream -- the development of an entire continent.

The railroad part of it is characterized by a phrase now used by NASA for the space program -- "faster, better, cheaper."

"Faster, better, cheaper" has been the thread running throughout our railroad history.

Steam power blew open the doors to huge changes -- larger loads, bigger cars, and higher speeds.

Steam also made humans far more mobile than they had been before. Instead of taking weeks, a businessman could get from Montreal to Atlanta in days instead of weeks.

It made face-to-face business possible over long distances, reducing both the time -- and the dangers -- of business travel. For the 19th century, that was as stunning a change as telecommunication brought to the 20th.

In the U.S., railroad builders tied down the safety valves after our Civil War. Growth was phenomenal, in part because the government hit on the policy of providing railroad companies with land to defray their costs and give them an instant economic base.

That was first tried in 1856, to help build a railroad from Chicago to Mobile, Alabama. It was so successful that it became general policy after the war, supercharging an age of rail expansion that continued into the early 1900s.

And technological development kept pace -- bigger locomotives, faster trains and heavier cargos.

And because those inevitably brought increased safety risks, rail lines also developed new ways to solve problems, with better couplers and braking systems, standardized track gauge, improvements in communication and switching, and, of course, standard time zones so engineers would know if they were on clear track or not.

But that's all history -- technology not from the last century, but the one before that! Why talk about railroads today?

The fact is there is still no other transportation technology that can do what railroads can. You know that. You wouldn't be here if it wasn't.

Alaska and the Yukon share many similarities, not the least of which is being treated like less-than-desirable relatives from the wrong side of the tracks.

You can chalk that up to any number of causes, up to and including regional economic rivalries, but the fact is that both Alaska and the Yukon, and the United States and Canada as whole nations, are getting shortchanged by the distance -- both literal and figurative -- between these two great regions and the rest of the continent.

Another notable similarity is that both Alaska and the Yukon are both "land poor."

We have the resources, but we can't get the full benefit because "new" territories lack the amenities of older, more populous areas -- especially the transportation options.
We like to think that our "first-world" countries are moving from manufacturing to service economies, and we like to boast about the benefits of our electronically connected businesses, but the truth is that our society still depends on getting material objects -- food, iron ore, lumber or whatever -- from one place to another.

And because Alaska and the Yukon lack the means to do just that efficiently, both our nations are a little poorer than they have to be.

Imagine how both countries would benefit if the resources of Alaska and the Yukon were as accessible as those of Ontario or Illinois....

The Yukon-Tanana Uplands stretch from Faro to north of Fairbanks. The entire region has incredible resource potential. That's been known since the gold rush days along the Yukon River.

Gold is still a draw, but the uplands also contain tremendous amounts of silver, tungsten, copper, lead, zinc, and other ores. But today the area remains mostly as it was then: inaccessible and undeveloped.

Think about this: one of the most productive gold mines in the United States is Fort Knox, just outside of Fairbanks. It produces over 1,000 ounces of gold per day. Fairly soon, we hope to be producing from the 5.2 million ounce reserves of the Pogo deposit, a little east of there.

What's the difference between these two mines and the major deposits deeper in the Yukon-Tanana region? Above all -- it's transportation.

If anything, the Yukon may be even more interesting to miners. 1998 mineral production exceeded $100 million, and the industry continues to play the single largest role in the private sector economy of the territory. But here as well, access plays a huge role in whether a mine can make it or not.

And what about wood products?

One normally doesn't think of the far north as a source of timber, but possibilities abound in both regions.

Within just 15 miles of the corridor from the Yukon to Fairbanks lie 1.4 billion board feet of hardwood pole timber and almost 1.7 billion board feet of mixed pole timber.

Lower grades timber is also plentiful. The Ladue River valley alone could supply a good-size chipping industry.

In the Yukon, the Alaska Highway has allowed a modest forest products industry outside of Watson Lake, but it's stil just a hint of what's readily possible -- but only with transportation.

Timber supply shortages in the Pacific Northwest, combined with demand in both Asian and domestic markets, should be driving new developments for the timber industry -- but it doesn't help to have the products if you can't get them to market.

What else could move by rail? Well, what about agricultural products? The other day I heard from a very excited farmer in Alaska. He wanted us to know that rail transportation of feed and fertilizer coming to Alaska, and rail shipment of his products to market, would be a huge boost to his business.

How much do you want to bet that almost every farmer and would-be farmer in Alaska and the Yukon would feel exactly the same way?

Our land is fertile, and our long days can produce tremendous harvests. But we still need to get supplies in and production out at a reasonable cost. Rail can do that.

What about seafood? That's another big one for Alaska. We harvest fully half of the total United States' seafood production, most of it frozen -- and with most of the frozen product going to Asia by ship.

A gigantic new seafood plant producing finished entrees is just starting operation in Anchorage, and much of it's product will also travel by sea. But it doesn't have to be that way.

What if there were an inexpensive way to move large amounts of high-quality frozen seafoods directly to markets in the midwest and the east? I think we'd see a huge price boost in the industry as those markets began to compete directly with our more traditional customers.

And what about fuel products? Coal -- natural gas -- refined fuels. All of those can be moved by rail, and all would find very receptive audiences in the overcrowded, overpriced eastern half of the continent.

In the late 1800s, railroad tycoon Edward H. Harriman visualized a world-girdling railroad from from the United States through Alaska to Siberia, then across Asia to the capitals of Europe. That plan still has many supporters, but first things first. And the first thing is to complete the system on our own continent.

One route has already been surveyed. During World War II, with Japanese forces in the Aleutians and U-boats sinking convoys in the North Atlantic, we needed a better way to get war materials to our Russian allies. Frederic Delano, a

relative and confidant of Franklin Roosevelt, proposed a rail link. With Roosevelt's support, the U.S. Army Engineers successfully surveyed a very feasible route from Prince George to the Arctic coast in 1942.

But the wartime steel shortage delayed the project, the highway was completed later that year, and by late spring of 1943, Japan had lost its grip on the Aleutians and Germany had suspended U-boat operations in the North Atlantic. And the link through Canada lost its urgency.

We may not be at war today, but that doesn't mean we cannot dust off those old plans and see if they would fit with today's economic conflicts.

Who knows -- they might even fit in with protecting us from another kind of conflict.

As many of you know, the U.S. is studying a possible anti-missile defense, and one possible site is not far from Delta. The huge amounts of material required could most effectively be moved by rail.

So maybe it's time to remember that the Alaska Railroad was originally envisioned by Congress as having up to 1,000 miles of track, but was stopped at least 300 miles short.

That 300 miles would not only get us to Delta, it would get us all the way to the border.

We should not be afraid to think seriously about big projects. Just because they're big doesn't mean they are bad.

I suspect that in today's economy, an Alaska-Yukon link would take far less of either the U.S. or Canada GDP than the first transcontinental links of the 1800s.

And another thing: this is an age of great concern for the environment. If one assumes -- as I do -- that the resources of Alaska and the Yukon inevitably will be developed at some point in the future, then rail looks like a very healthy way to make it possible.

A rail corridor offers controlled access, for one thing. The big objection to transportation projects in wild areas is usually a reaction to the threat of uncontrolled access.

Rail systems can avoid that problem in the simplest possible way -- they don't stop. Nobody gets on, nobody gets off. About the only "impact" is a little noise when the train goes by, and then -- nothing at all.

A rail corridor can also include other things that would lessen the overall impact of future development and allow larger areas to be held in their present pristine form.

Take for example a situation where the movement of energy is a hot ticket item. Rather than building willy-nilly across the countryside, pipelines or power transmission lines could be co-located with a rail line in one corridor just a few hundred yards wide. This makes sense economically, but even more sense environmentally.

It's clear that environmental considerations should -- and will -- play a very large role in the task of deciding on whether, where and how to construct a rail system.
We need to be clear-eyed -- to recognize that development will occur sometime, and when it does, we should be planning to do it right.

The perfect rail route would minimize both environmental risks and construction costs. It would try to come as close as possible to areas of resource abundance, but avoid areas identified as environmentally sensitive. It could provide access to some communities -- and bypass others that preferred a greater degree of isolation.

What's really needed is a comprehensive feasibillity study. It should look at possible routes from all those perspectives and more. It should look at cost projections. It should look at revenue potential and traffic forecasts. And it should look at all those factors with independence and impartiality.

One way to organize such a study is to put it in the hands of a commission. This is the path Senator Murkowski suggested last fall to the Canadian-American Border Trade Alliance. I'm here is to renew that offer today.

The Senator's proposal was this: if there is a significant showing of support, he will introduce enabling legislation in Congress.

Such legislation would suggest parameters for a bilateral U.S.-Canada commission to oversee a comprehensive feasibility study. It would also establish a process for the appointment of commissioners on the U.S. Side, and could authorize the appropriation of funding for the commission's operations. This would get the ball rolling.

Reciprocal action would also have to be taken by the Government of Canada.

Perhaps this is a good point in which to emphasize that this effort must be impartial; as a bilateral government effort it cannot favor any particular plan, proposal or company, either American or Canadian. If any person or company wants to dig deep and come up with the private financing for a railroad, more power to them, but the commission's job must be to develop the best, most objective analysis possible.

As I envision it, the commission would have to include business leaders, academicians, and representatives of the First Nations and Alaska Natives.

It would also need the ability to take on staff members -- with the expertise to ensure that its consultants deliver. We'd need the very best in rail operations, construction engineering, economics, environmental science and other disciplines.

Finally, it should have a date certain by which it would report back to both governments.

A bill could be introduced in Congress by spring. And I know there are members of Parliament who will support the idea on the Canadian side.

We can be the conductor, but you must be the engineer.

It's true that the recent history of North American railroading is one of consolidation instead of expansion... but maybe little more expansion is not a bad thing.

Shall we finish the job of building a TRULY transcontinental system?

Is the track clear? Is the signal green? Then let's get our steam up and get moving!

Thank you.

. . .

Section 9:

Other Information,
HJR 51 (wording of conference resolution)

HOUSE JOINT RESOLUTION NO. 51

IN THE LEGISLATURE OF THE STATE OF ALASKA

TWENTY-FIRST LEGISLATURE - SECOND SESSION

BY REPRESENTATIVES JAMES, Dyson, Harris, Whitaker, Foster, Masek, Kott, Coghill, Davies, Croft, Murkowski, Hudson, Therriault

Introduced: 1/31/00
Referred: House Special Committee on World Trade and State/Federal Relations, Transportation

A RESOLUTION

Expressing support for a cooperative United States-Canada feasibility study on extending the North American rail system through British Columbia and the Yukon Territory to Alaska.

BE IT RESOLVED BY THE LEGISLATURE OF THE STATE OF ALASKA:

WHEREAS rail transportation is the most cost-effective long distance method of overland transportation; and

WHEREAS rail transportation is an essential component of the North American inter-modal transportation system; and

WHEREAS rail transportation is energy efficient, capable of moving goods three to nine times farther per unit of fuel than highway transportation; and

WHEREAS rail transportation emits lower levels of carbon monoxide, carbon dioxide, nitrogen oxides, and volatile organic compounds per ton of freight moved than other modes of freight transportation; and

WHEREAS rail transportation systems allow controlled access to and reduced overall effects on environmentally sensitive regions; and

WHEREAS rail transportation remains an important component of national and

continental defense planning; and

WHEREAS the North American rail transportation system will not be complete until it extends to all states, provinces, and territories on the continent; and

WHEREAS the State of Alaska recently enacted legislation to reauthorize the delineation and acquisition of a rail transportation corridor from the present terminus of the Alaska Railroad to the border between Alaska and the Yukon Territory; and

WHEREAS Alaska, the Yukon Territory, and British Columbia contain extensive oil and gas, mineral, and timber resource reserves that currently are inaccessible, and bilateral cooperation in the development of a freight transportation infrastructure would facilitate the utilization of these resources for the benefit of the United States and Canada; and

WHEREAS a northern rail system may significantly benefit the visitor industry by facilitating the comfortable movement of passengers over long distances while minimizing the effect of such movement on the surrounding environment; and

WHEREAS ongoing research and advancements in rail technology continue to increase the efficiency of rail transportation and ensure rail safety and decrease the effect of rail transportation on the environment;

BE IT RESOLVED that the Alaska State Legislature respectfully requests the government of the United States and the government of Canada to engage in a cooperative feasibility study to examine the costs and benefits of constructing a rail connection to link Alaska and the Yukon Territory by way of northern British Columbia with the existing North American rail transportation system; and be it

FURTHER RESOLVED that the Alaska State Legislature respectfully requests the government of the United States and the government of Canada to establish a bilateral commission representing local governments, business interests, and aboriginal stakeholders to define the goals and objectives for the cooperative feasibility study and to report the results of the study to the appropriate governmental entities of the United States and Canada; and be it

FURTHER RESOLVED that the Alaska State Legislature respectfully requests that funding for operation of the bilateral commission and for the conduct of the cooperative feasibility study be considered a priority for the governments of the United States, Canada, British Columbia, the Yukon Territory, and the State of Alaska.

COPIES of this resolution shall be sent to the Honorable Jean Chretien, Prime Minister of Canada; the Honorable David Collenette, Minister of Transport, Transport Canada; the Honorable Dan Miller, Premier of the Province of British Columbia; the Honorable Piers McDonald, Government Leader, Yukon Territory; the Honorable Bill Clinton, President of the United States; the Honorable Madeleine K. Albright, United States Secretary of State; the Honorable Rodney E. Slater, United States Secretary of Transportation; the Honorable Strom Thurmond, President Pro Tempore of the U.S. Senate; the Honorable Jesse Helms, Chair of the Committee on Foreign Relations of the U.S. Senate; the Honorable John McCain, Chair of the Committee on Commerce, Science, and Transportation of the U.S. Senate; the Honorable J. Dennis Hastert, Speaker of the U.S. House of Representatives; the Honorable Benjamin A. Gilman, Chair of the Committee on International Relations of the U.S. House of Representatives; the Honorable Bud Shuster, Chair of the Committee on Transportation and Infrastructure of the U.S. House of Representatives; and to the Honorable Ted Stevens and the Honorable Frank Murkowski, U.S. Senators, and the Honorable Don Young, U.S. Representative, members of the Alaska delegation in Congress.

1/29/00 NEWS MINER
Fairbanks Daily News-Miner, Saturday, January 29, 2000

Murkowski urges lawmakers to develop state's resources

The Associated Press

JUNEAU--Sen. Frank Murkowski urged the Legislature on Friday to promote development of Alaska's natural resources, saying the nation's booming economy is bypassing the state.

Murkowski also urged warned lawmakers about depending too much on aid from the federal government.

"There are some who seem to think that a substantial permanent fund and a strong congressional delegation are substitutes for a vibrant, sustainable private sector economy," Murkowski said in his annual speech to the Legislature. "That really isn't the case."

Murkowski said government employs 27.4 percent of Alaska's work force—the highest of any state—while the Alaska lags behind the rest of the nation by other economic measures.

"This dependence on government will never produce the type of prosperous economy that is fundamental as a prerequisite to meeting our social, educational and environmental obligations."

Murkowski said the state's per capita income has declined from the highest in the nation 20 years ago to 20th today. And in the last 10 years, he noted, the state has lost 25,000 timber jobs, 2,220 oil and gas jobs, 1,900 mining jobs, and 3 percent of its fish processing employment.

To counter these losses, Murkowski said, the state needs to put state-owned lands into private hands, extend and improve the transportation system, entertain new ideas for developing the North Slope's vast natural gas fields, and exploit Alaska's position as a transportation hub that can serve Asia, Europe and North America.

As an example, he suggested building a railroad between the Red Dog mine north of Kotzebue and a massive coal deposit at Point Lay. The railroad would provide the mine with a source of energy to expand its operations as well as a port for exporting the rest of the coal.

Such a project, Murkowski argued, could be accomplished by the state working with local Native corporations with little involvement by the federal government.

Murkowski suggested extending the Alaska Railroad to the Ambler district's rich mineral deposits and linking the railroad to the Canadian rail system.

He also warned lawmakers against trying to raise more money from oil taxes, as two minority Democrats have proposed.

"This would be a mistake because what is most important, particularly now, is certainty about our business climate," Murkowski said, adding that the industry is already unsettled by the long-running negotiations over BP Amoco's proposed takeover of Atlantic Richfield Co.

Murkowski criticized the Federal Trade Commission for delaying the BP Amoco-Arco deal. The commission is scheduled to meet next week on the deal.

"While some may view the FTC as a friend standing in the way of a bad deal, the disturbing reality for Alaska's economic future is that few new investment decisions are being made during this time where we're hung up, little new exploration is under way, virtually everything is on hold," Murkowski said.

"The federal government 'dragon' is moody," Murkowski said. "Sometimes it's schizophrenic with respect to Alaska," burning the state by halting timber harvests, shutting down mines, limiting access and shutting down fisheries, "but on the other it is helping us with rural sanitation, education, health care, and transportation."

Murkowski said he, Sen. Ted Stevens and Rep. Don Young, all Republicans, still have a list of goals in congress, including:

- Fighting the Clinton administration's policy against road-building in national forests.
- Keeping Glacier Bay open to commercial fishing.
- Defending access to federal land.
- Thwarting any effort to permanently close the Arctic National Wildlife Refuge to oil development.

Murkowski also pledged to introduce federal legislation to protect the Inside Passage from wastewater dumping by cruise ships, an issue that rose to prominence last year when Royal Caribbean Cruise Line admitted dumping oil-contaminated water and other pollutants.

"The ultimate goal is to connect North America with Asia and Europe by way of a rail tunnel under the Bering Sea."

ALASKA STATE REP. JEANNETTE JAMES

1/24/00
Traffic World

Today Alaska, Tomorrow the World

BY LINDA REID

Alaskans, Canadians push railroad linking area with south, then Asia-Europe via Bering Strait

The icy wilderness on the Alaska-Yukon border could be called "the forgotten trade route" — not much used since the last Gold Rush and without much traffic except for the occasional sled dog team. But some Alaskans and Canadians want to change that by building an arctic railway linking Alaska and Canada's Yukon Territory with southern markets.

Sound like a pipe dream? So did Alaska's oil pipeline. And the proposed rail link has gained significant support. The state House of Representatives unanimously voted to establish a right of way for the rail route last year.

Proponents of the north-south link met in Vancouver Jan. 20 to drum up support for their plans. The meeting, sponsored by Alaska State Rep. Jeannette James, a Republican from North Pole, U.S. Sen. Frank H. Murkowski, R-Alaska, and the British Columbia Chamber of Commerce, attracted interested groups from both sides of the border. Murkowski is seeking support for a resolution in Congress that would establish a bilateral commission to study the concept.

If the arctic railway were to go ahead, it would link two of North America's northernmost constituencies with rail networks covering the United States and Canada, providing an outlet for northern resources, reducing the costs of goods and products in the north and forming the basis for a burgeoning tourism industry, its proponents claim.

The primary driving force behind the idea is James, who has championed the idea of an Alaska rail link throughout her eight years in the state legislature.

Murkowski, head of the Senate Energy and Resources Committee, also pushed the concept of an arctic railway at the Sept. 14, 1999, meeting of the Canada-U.S. Interparliamentary Group in Quebec City. At that meeting Murkowski said future growth in the Alaska and Yukon must be aided by a major transportation corridor for pipelines, railways and transmission lines. And he recommended that work should begin to find a route for such a corridor.

The proposed railway would cover a distance of approximately 1,200 miles from Eielson Air Force Base in Alaska to the northern community of St. James, British Columbia.

If there is sufficient interest in the idea, Murkowski said a joint commission would be created to study costs, potential routes, engineering and to undertake an environmental impact study.

James has estimated the cost of surveying and building the railway at $3 million [illegible] and hopes construction can begin within six years.

She bases these hopes on the fact that the U.S. government plans to site an antiballistic missile base near Fairbanks and a rail line would facilitate this effort. Also, she says mining companies in Alaska are backing her plan.

Finally, a route on the Canadian side of the Alaskan border already has been mapped out by Canadian Arctic Railway, a startup British Columbia company owned by David Broadbent, son of the former general manager of the Pacific Great Eastern Railway, which is now crown-owned B.C. Rail.

However, plans for an arctic railway are only part of James' grander scheme. The other part of her plan would see the construction of a Bering Strait Tunnel linking Russia to the United States and Canada.

"The ultimate goal is to connect North America with Asia and Europe by way of a rail tunnel under the Bering Sea," she said in a letter from the state legislature. "There is growing international interest in this project, first suggested in the late 1890s."

And you thought Canadian National's plans for Burlington Northern Santa Fe were ambitious.

— Reid is a freelance writer in Vancouver, British Columbia.

6/9/99

LAYING A SPUR TO THE LOWER 48

Alaska's monster railroad: bane or boon?

By Abraham McLaughlin
Staff writer of
The Christian Science Monitor

MELANIE STETSON FREEMAN - STAFF/FILE

RAIL RUMBLES: Proposals are afloat for a railroad linking Alaska to the Lower 48. In Fairbanks it could meet up with the Alaska Railroad, helping to transport visitors and commercial goods. But not all Alaskans want people to have easy access to the isolated paradise.

ANCHORAGE – There's a big idea floating around up here in Alaska – and it could forever change the face and feel of America's last great frontier.

It's something people have been dreaming about for decades. Now it's rumbling toward reality.

The plan is to build a railroad from Fairbanks – through 850 miles of icy wilderness – down to the Lower 48.

Today just one highway connects Alaska to its southern siblings, so this 83-billion-or-more project would be a big new avenue for trade and tourism.

But more than just a new set of rails, it symbolizes the think-big, can-do spirit thriving in Alaska today.

This is the state that built an 800-mile oil pipeline. It's the state that considered building a massive aquaduct to transport water from melting glaciers to thirsty California.

Yet there's another spirit that runs strong here, too. It revels in the state's natural beauty – and isolation. Minnesota may have 10,000 lakes, but Alaska has 3 million. There are more caribou here than people.

Yes, it's environmentalism. But many people came to Alaska to escape congestion. They like being disconnected from the nation – and want to keep it that way.

It's these two attitudes that largely define the state – and that any big project will have to reconcile to become reality.

And the tension between them won't end with the Lower-48 rail link.

To connect or not to connect

There's a plan to carve out a 55-mile rail tunnel under the Bering Strait to Russia – at a cost of at least $15 billion. It's still a pipe dream, but with global trade growing, it's gaining momentum. Indeed, the tunnel would link much of the world by rail: Trains could run from New York to Beijing and Moscow and

fense – or "star wars" – base near Fairbanks. A rail link would help in building the facility.

Second, many mining companies back the plan – and would use trains to get their products to market more efficiently.

Third, the Canadian Arctic Railway, a start-up company in British Columbia, has mapped out a route for the Canadian section. President David Broadbent says

bald eagles, which, in some places up here, seem as common as sparrows.

Take the waterfront town of Valdez, home of one of the nation's busiest oil-loading ports. Like the rest of Alaska, its dependence on oil is fading. Revenues from the port aren't as high as in the past.

But tourism is speeding ahead. Visitors come to fish for halibut and salmon. Or they take sea kayaks out to Prince William Sound, their paddles plying the waters once sullied by the Exxon Valdez's spilled black goo. It's a sign of the times for this town. Oil is still king, but tourism is challenging.

Unlike oil, "tourism is a renewable resource," says Joe Leahy, a kayak guide in Valdez. "The more tourists the better."

Compared with a road ...

Yet supporters of the rail-link plan are mindful of getting skeptics on board. One selling point is that with a railway – as opposed to a road – access is "controlled," meaning not just anyone with a car can jump on.

"The fewer roads we build, the better off we are," says Ms. James. Some environmentalists have given their backing to the plan.

But other Alaskans will be harder to

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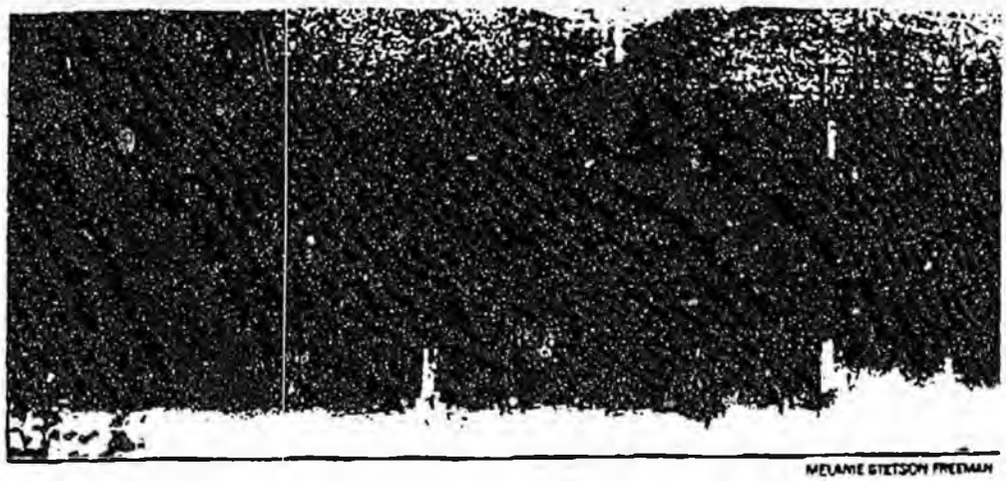

MELANIE STETSON FREEMAN

RAIL RUMBLES: Proposals are afloat for a railroad linking Alaska to the Lower 48. In Fairb could meet up with the Alaska Railroad, helping to transport visitors and commercial gooc not all Alaskans want people to have easy access to the isolated paradise.

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But first things first. Last month, the state House of Representatives gave its unanimous consent to establish a right of way for the rail route down south.

Soon proponents will gather to plot the next steps.

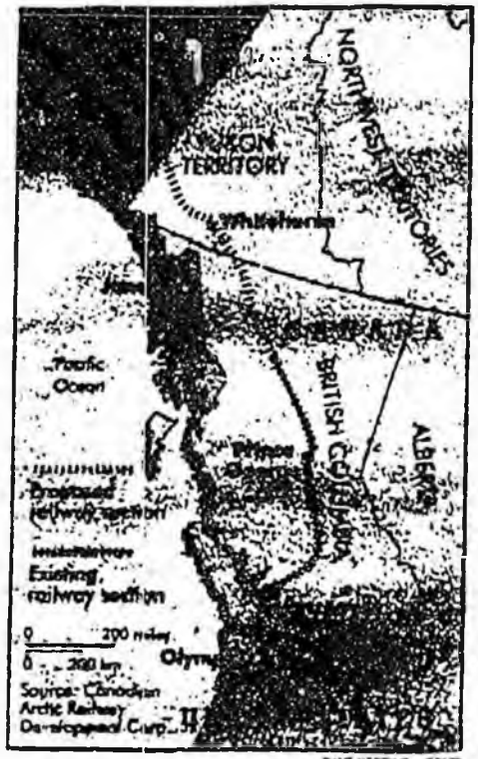
"It's pretty revved up now," says Jeannette James, the state representative who's spearheading the idea. "We in the legislature are moving ahead. And there's lots of private money itching to do something."

She hopes construction will start within six years. Several things make that time frame seem realistic.

First, the US government is moving toward putting an antiballistic missile defense – or "star wars" – base near Fairbanks. A rail link would help in building the facility.

Second, many mining companies back the plan – and would use trains to get their products to market more efficiently.

Third, the Canadian Arctic Railway, a start-up company in British Columbia, has mapped out a route for the Canadian section. President David Broadbent says



DAVE HERRING – STAFF

he already has several New York investors interested in funding the project.

Tourism taking off

Fourth, tourism is growing fast. The number of annual tourist visits to Alaska has doubled to more than 1 million in the past decade.

People come to see melting glaciers or bald eagles, which, in some pla here, seem as common as sparro

Take the waterfront town of home of one of the nation's busi loading ports. Like the rest of Ala dependence on oil is fading. Re from the port aren't as high as past.

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But other Alaskans will be ha convince. They say more links Lower 48 will further comp Alaska's independence.

"We've already got highway barges and boats and airplanes" too many tourists in their Winn says Paul Converse, a longtime re

There's an old native word, sul today that means "new *Cheechakos* is what Alaskans c tourists – when they're being poli

Yet, this struggle between old a between connection and isolation age-old one in this vast, enticing ness. And with the idea of a rail lin ing steam, Alaskans have another to strike a balance between them.

01/19/00 Fairbanks Daily News Miner

Rails from trails—the dream continues

Trans-Alaska route still inspires visionaries

William R. Wood

The recent Alaska Railroad status report before the Fairbanks Chamber of Commerce drew sustained applause. The presentation was timely, informative, concise, and upbeat, a positive contribution to understanding the mission of the railroad, its current usage, its successes and limitations.

Of particular interest was the presentation of planning for the future improvement of equipment, and services, elimination of hazards, and possible extension of the rail line itself.

Planning is under way to reroute the extension from Fairbanks to the North Pole Refinery and Eielson Air Force Base. The intent is to eliminate the hazards of the existing 14 rail crossings in 22 miles or so, probably using overpasses for highway traffic at key points.

A second thrust, it was announced, will be to extend the railroad from Eielson AFB to Fort Greely/Delta Junction should the pending national missile defense site be authorized for that area.

All members of our Alaska congressional delegation have indicated this to be a likely prospect. Word released from Washington this week suggests that the president now considers the national missile defense project to be in the urgent necessity category.

Also mentioned by Johne Binkley, a railroad board member, was the long-held hope to extend the railway to Whitehorse and beyond ultimately to link with the Canadian rail system.

For me this triggered open the gate to a train of memories. I recalled the time in the early '60s when Charles Sargent, dean of engineering at the University of Alaska, showed me a copy of a U.S. Corps of Engineers report on the Defense of Alaska: Trans-Canada and Alaska Western Railroad Survey, 1942. Sargent, a professional civil engineer, and Lee Linck, well-known Fairbanks architect, both participated in doing the field work on that report. A copy is on file at the Rasmuson Library complex, according to one of its able and helpful archivists, Gretchen Lake.

When I talked by phone with Dean Sargent, now retired in Coeur d'Alene, Idaho, he told me of working on field studies for four segments of the proposed trans-Canada/trans-Alaska route: (A) Wood River to Delta; (B) Mouth of the White River to Whitehorse; (C) Stikine Pass area, British Columbia; (D) the Seward Peninsula.

The survey covered a proposed rail route from Teller, Alaska, on the Bering Sea coast to Prince George, British Columbia, and a Pacific ocean port, at Prince Rupert.

But the survey was only a part of the big dream of linking continents together by highway and rail as well as by sea and air.

I recalled Gov. Walter Hickel's North Commission (Northern Operation: Rail Transportation and Highway) created to study Alaska's transportation needs in the mid-'60s.

I have a great recollection of coming from Anchorage to Fairbanks by train with the commission at the beginning of the Great Flood of '67. By chance my seat partner was Bill Lear, inventor and builder of the Lear Jet aircraft, main plant at Reno, Nev. Lear was a visionary with a very practical down-to-earth twist. He could dream, dare, and do. He got the good things done. I found him a most stimulating, thought-provoking conversationalist.

Gov. Hickel brought along to show the commission the silver punch bowl commemorating the Harriman Expedition to Alaska, 1899. I was told by the governor the famous memento is now in the state museum at Juneau.

While there is no mention of trans-Alaska in the expedition's report, the originator and host of the expedition, one of the turn-of-the-century world's wealthiest people, owner of some 20,000 miles the U.S. transcontinental rail system, was an early and strong advocate of the big dream of joining continents together by rail to promote development of resources and bringing diverse peoples together in peace.

The concept of a trans-continental USA system joined to a trans-Canada, including the trans-Yukon-Territory and trans-Alaska, segments to join with the trans-Siberian and on to the trans-Eurasian segment, the Orient Express route was the big dream.

Donald MacDonald of Fairbanks, head of the Alaska Road Commission and called by many "the father of the Alaska Highway," was a strong voice in advocacy of the big dream. A splendid account of this is Kay Kennedy's article in Alaska Life, volume I, No. 7, August 1938. So also was the czar of Russia.

But the vision did not begin with Harriman, the czar of Russia, Donald MacDonald, Dean Sargent or Lee Linck. Its origin is credited to William Gilpin, first territorial governor of Colorado. The concept was featured in his book published in 1891, "The Cosmopolitan Railway, Compacting and Fusing Together All The Worlds Continents."

John Gilpin was not only a visionary, but at thinker with an extraordinary range of experience, a strong executive and innovator in handling public affairs. He was insightful, personable, courteous, and effective.

Terrence Cole, head of the UAF History Department and noted author, tells much more of the story of William Gilpin and his dream of an around-the-world rail system in a well illustrated article, "Bridging the Strait," appearing in the Nov. 19, 1989, issue of Heartland, the magazine section of the Fairbanks Daily News-Miner. "The vision William Gilpin and others, that somehow bridging the Bering Strait can be a sign and even a cause of world peace, is still alive today."

And now you have a bit of the rest of the story of a dream that does not die but runs on and on generation after generation Bringing people and their products together not only by sea and by air but also by land

The proposed extension of the Alaska Railroad to the east and to the west is a small but real part of a dream that persists

William R. Wood is a retired president of the University of Alaska now volunteering his time as executive director of Festival Fairbanks. His columns appear every other Wednesday on the Opinion page.

3/11/99

An Alaska pipedream

No big transportation project has ever 'been a bad idea'

By Charlie Anderson
Staff Reporter

Alaskan politician Jeannette James has a twinkle of a railway in her eye — from Fairbanks to Washington state, through B.C.

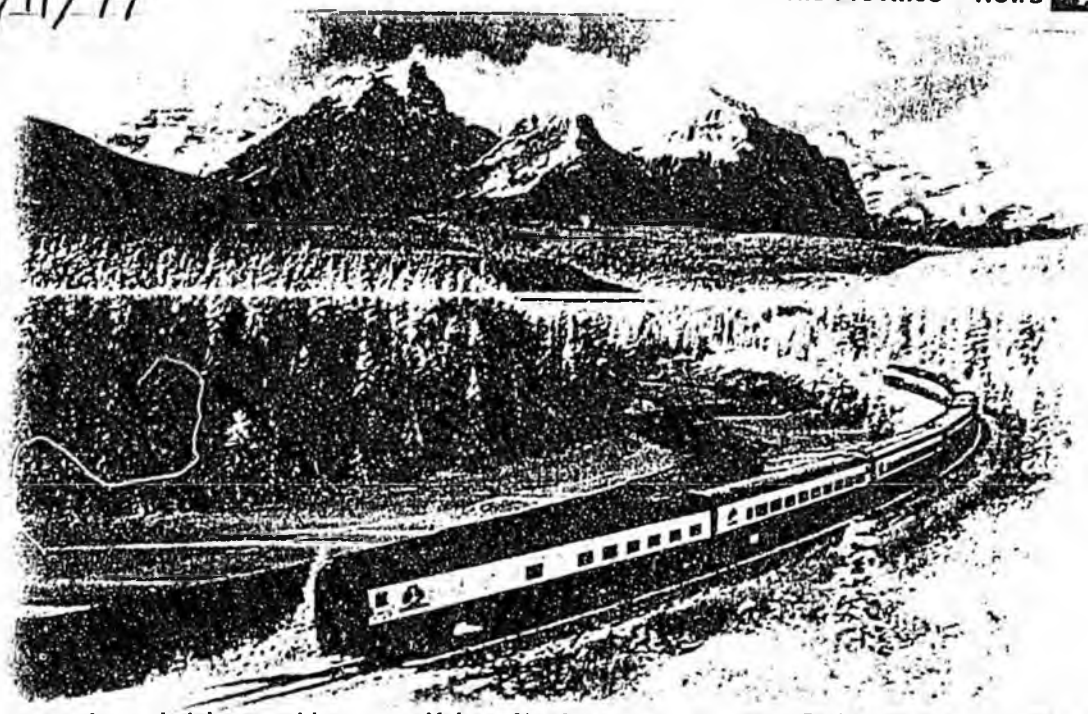
The representative of North Pole, Alaska, has permission from her state legislature to draw a railway line on the map.

And an even grander vision calls for a railway under the Bering Straits and on to Moscow and Beijing.

"There's been a lot of folks talking about it, I want to be able to do something about it," said James, 69, who has been working on the idea in the seven years she's spent in the state House of Representatives.

"We've had interest from Australia and other places if we were ever to go into Russia," said James. "There has been no big transportation project that's been a bad idea. Even the Panama Canal or all those kinds of things are hard to get to happen. But when they're done, they work."

The first part of James' dream is a 1,450-kilometre line from Fairbanks through the Yukon and down to Chipmunk, B.C. which sits at the end of B.C.'s rail system, 240 km northwest of Fort. St James.



Rep. James' vision would open up Yukon, Northern B.C., she says. Freight would pay the way.

The Alaska House of Representatives has just passed a bill authorizing the marking of a right-of-way to the border with the Yukon.

James believes the railway would open up the area by allowing the easier shipping of raw materials from Alaska, the Yukon and Northern B.C.

"This is an area that needs an economic boost and certainly this would really do it," said James, who calculates the cost of surveying and building such a railway would be about $3 million US per mile. That doesn't include the cost of acquiring land or any environmental and land-claim issues.

Any such enterprise would have to be a partnership between state and federal governments.

"With railways, the freight pays the way, with tourism as the frosting on the cake," said James. "Once you have other industries that will create and support the infrastructure, then tourism is a little extra. It piggybacks on the back of real industry."

Carol Lee of BC Rail said she had been alerted to Alaska's idea by a brief call from one of James' staff: "We don't discount the possibility off the cuff, there's always the possibility," said Lee. "We'd have to take a look at the business case. We won't make any commitment without it being economically justifiable."

12/c7c

A Rail Connection Across Canada

Building a railroad that links Alaska to the Lower 48 is a dream that just may become a reality.

BY RICHARD F. SCHMITZ

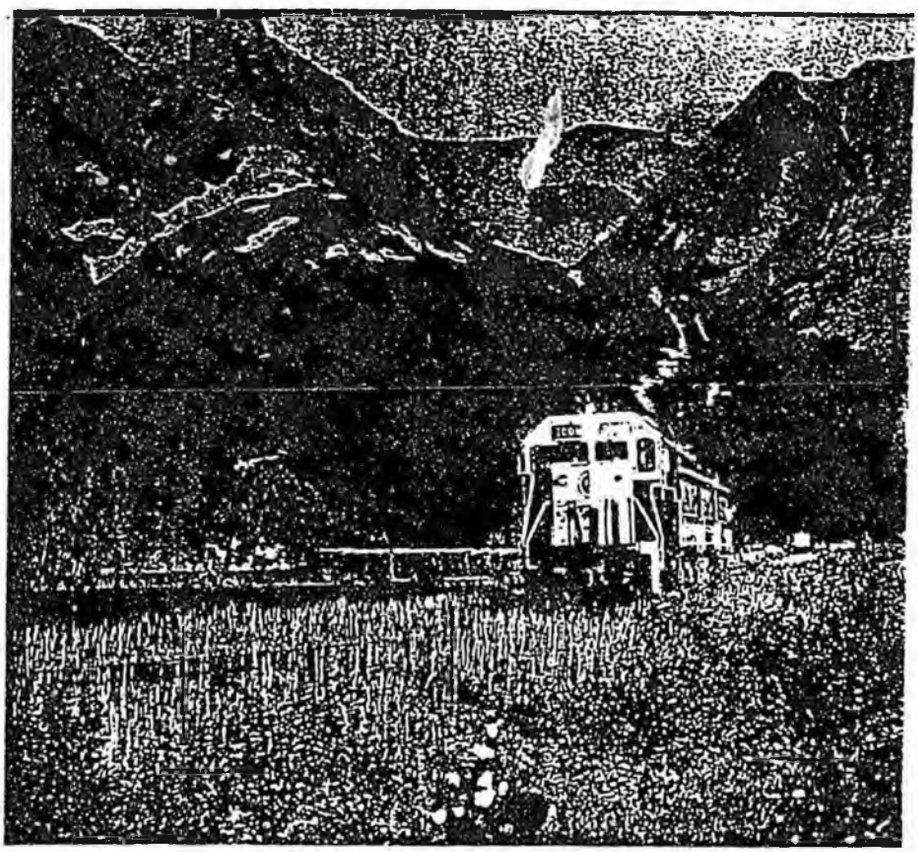
Less than a two day's drive separates the Alaska Railroad, at its easternmost, from the British Columbia railroad, at its northwesternmost, and closing that gap has, in the past year or so, caught the attention of a number of entrepreneurs, legislators and just plain dreamers in Alaska, Yukon and British Columbia.

Foremost among supporters of connecting Alaska with the Lower 48 by rail is North Pole Republican Representative Jeannette James. During the past legislative session James introduced and passed HB 12, which allows for delineation of a rail corridor from existing Alaska Railroad tracks to the Canadian border. Last summer James worked to pass resolutions of support by the state Chamber of Commerce, as well as chambers in Fairbanks, Delta Junction and Dease Lake, B.C.

James has long backed rail development in Alaska, and sees connecting the Alaska Railroad with the rest of the North American rail network as a huge key to insuring a bright–and diverse–future for the state's economy in the new millennium.

"The very first benefit to having surface transportation from the Lower 48 to Alaska will be a reduction in the cost of living. A railroad will allow us to open up resource development that's not possible now because of the high cost of transportation," James said. "A railroad will lead to value-added industries and increased cooperation between Alaska and the northern part of Canada."

HOW?



Clark James Mishler

Another Transportation Option

The Alaska Railroad estimates construction cost for new track in Alaska at $2.5 million to $3 million per mile. With 270 miles separating Eielson Air Force Base from the border, the cost of building that part of the railroad is about $675 million to $810 million. An additional 900 miles of track would be needed to connect existing tracks in Canada to new track in Alaska.

James said tourism, agriculture and mining would get an immediate lift from a rail connection to the Lower 48. Using Delta Junction's agricultural area as an example, James said fertilizer and other supplies could be brought in to farmers while produce could be shipped directly to market–in and out of Alaska.

"I think the critical thing is that a railroad will allow Alaskan growers to supply Alaskan consumers. Alaska's economic future depends on our ability to have value-added industries, such as a freezing plant for produce," James continued. "The financial benefit a state gets from value-added industry is close to five times greater than what it gets from exporting a raw material."

One person who's convinced James is on the right track is U.S. Sen. Frank Murkowski, who's taking an active stand

in support of the issue. "We think it's well worth exploring," said Murkowski aide Bill Woolf.

The first step Murkowski's office is taking is to seat an informal committee, which James will chair, to identify potential users of a railroad to the Lower 48. "A project such as this is of tremendous magnitude. We need to do, what attorneys would call, 'due diligence,'" Woolf said. "We need to look at possible users; we need to look at resources; we need to look at engineering, possible routes and environmental factors."

The goal of this panel, James explained, is to write and pass a resolution and then present it to Murkowski at a meeting with British Columbia and Yukon officials and legislators in late January in Vancouver, B.C. If there is public support for this railroad project, Sen. Murkowski said he will introduce legislation to create a bilateral commission to further study the issue, Woolf said.

Not a New Idea

Opening a rail connection to Alaska has been considered since the first ties of the Alaska Railroad were laid. "Back in the 1970s there was a cursory review," said Alaska Railroad Vice President Jim Blasingame. "It was about a 15- to 20-page report. The province of British Columbia was quite supportive of the idea.

"Rail is still the best way to move bulk matter from point A to point B. It's a basic premise," Blasingame said.

About 270 miles separates the Alaska Railroad at Eielson from the Alaska-Canada border. The British Columbia railroad has a rail bed in place as far north as Dease Lake, less than 100 miles from the southern Yukon community of Watson Lake, although it has been abandoned a little north of Fort Saint James since the 1980s.

Reopening that line is a top priority for Canadian entrepreneur David Broadbent, CEO of the Canadian Arctic Railway. The Canadian Arctic Railway has no locomotives or rolling stock now–but it is betting it will in two or three years, Broadbent said.

"The grade and bridges are there. They're just sitting out there growing weeds," Broadbent said of the 172-mile stretch into Northern B.C. "Our

Sen. Frank Murkowski

If there is public support for this railroad project, Sen. Frank Murkowski said he will introduce legislation to create a bilateral commission to further study the issue.

intention is to open it up and possibly run it as a short line, and then extend it to Whitehorse in six years."

Broadbent gained his railroad experience working 29 years for the British Columbia Railroad. He began as a laborer and worked his way up to engineer of standards and project manager. Later, he founded the North American Rail and Steel Tie Corp., which supplies parts and equipment to railroads, including the Alaska Railroad. Broadbent said he recently sold the company in order to devote his energies full time to the Canadian Arctic Railway.

Broadbent said he has seen a surge of interest in building a railroad to Alaska. "Too many people see railroads as a thing of the past. But that's only true in North America. Elsewhere in the world railroads are expanding. China is committed to building 1,000 kilometers (620 miles) of new track a year.

"When I talk to business people, I get a 'what, are you crazy?' look–at first. But when I explain the good economic sense railroads make, I see a quick change in their attitude," Broadbent continued. "Highways will never open up Northern Canada or Alaska. The Alaska Highway was built 57 years ago, and very little has developed along it since."

Railroads, on the other hand, can attract development. "Traditionally, in the West, railroads would find entrepreneurs and help finance them because that development meant revenue for the railroad as raw materials were brought in and finished products shipped out," Broadbent explained.

Broadbent said two factors must be addressed before any rail connection can be made to Alaska: aboriginal land claims and environmental issues. "Native councils and corporations must be brought in as full partners from the start. I don't mean offering Natives a few jobs–I mean offering them a full and equal partnership," Broadbent said. "As for environmental concerns, railroads have a big advantage over other forms of development because access to sensitive areas can be tightly controlled."

Taking rivers as another example, Broadbent said piers and modular or pre-fab bridge spans can be put in place without ever touching the water flowing below. Railroad construction is relatively low impact, he added. "You could build the railroad to Alaska with 300 to 400 men. You won't need camps every few miles or access roads. That keeps costs down–and it also keeps the environmental impact low."

Expanding Alaska's Reach

Rep. James conceded barge and trucking firms might be less than enthusiastic about bringing a major competitor on board. But James said, "business generates business." Having a rail connection to the rest of North America will be good for all Alaska transportation sectors.

"Goods could come to Alaska by rail and be shipped to Asia from Seward or Anchorage. Having a railroad connection to the Lower 48 will provide an excellent opportunity for Alaska to become a shipping hub to Asian nations. There's tremendous potential there."

James points out that any railroad to the Lower 48 will particularly improve Alaska's connection with Midwest and East Coast states.

"But the overall goal is to develop our own resources. The way I see it, rail is way

ahead of roads or air on this issue. There's less cost; it's more environmentally sound; and rail is just a lot more dependable in bad weather," James said. "Snow, wind, sleet just doesn't affect a train the way it does an airplane or a truck.

"Transportation costs are basically front-loaded," James said. "The more something is handled, the more it costs to ship. That's why, over the long haul, railroad has a big advantage."

"The very first benefit to having surface transportation from the Lower 48 to Alaska will be a reduction in the cost of living. A railroad will allow us to open up resource development that's not possible now because of the high cost of transportation."

Jeannette James
North Pole Republican Representative

James said the Red Dog Mine is a good example of an Alaska enterprise that could benefit from a railroad. At present, ore must be taken from the mine site to the coast where it is put on a lighter and then transferred to a freighter anchored offshore. "Sixty percent of that ore is refined in Alberta. Imagine how much easier–and more cost-effective–it would be to take that ore by rail directly to the refiner."

"If it proves out ... if we someday have that rail connection, Alaska's economy will benefit in a very different way than it did from the pipeline," said Woolf of Murkowski's office. "It will be more than construction. A rail system can go through parts of Alaska where there is no transportation option, and that could give the state a big economic boost. A mine that wasn't feasible will suddenly become feasible."

Rep. James said railroads pay for their own maintenance, while roads and airports are maintained by taxpayers. "With rail, the cost of maintenance is borne by rail users. In comparison, the public pays for maintenance for roads and airports. Rail takes care of its own."

James also points to great potential for growth in tourism that a rail connection will bring. "A railroad will open up Alaska to a whole new group of folks, and it could also greatly increase winter tourism. It certainly will help the tourism industry in Alaska."

The military is yet another sector that could benefit from a rail connection. Of immediate interest is the new missile defense system, which if eventually approved, could be set up at Clear Air Force Station, near Healy, or at Fort Greeley, near Delta Junction. "Certainly if Alaska is chosen (as a missile site), rail transportation is one of the options for moving material. Since such construction would require a great deal of material, obviously a rail component will be looked at," Woolf said.

The last time a new rail line was opened in Alaska was the 1950s when a 180-mile spur was completed from Fairbanks to Eielson. Today that spur carries out products of the North Pole refinery. If Rep. James sees her vision fulfilled, the trains rumbling past her North Pole home will be headed for points much further south than an Air Force base a few miles away. ❑

Agenda
Alaska Canada Rail Link Conference

January 20, 2000
Vancouver, B.C. Canada

7:30 a.m.	**Registration;** Continental Breakfast
9:00 a.m.	**Opening**: Barbara Cotting, Chief of Staff to Rep. James John Winter, B.C. Chamber of Commerce Pam LaBolle, Alaska State Chamber of Commerce Hugo Llorens, United States Consul General
9:25 a.m.	Representative Jeannette James, Conference MC
9:30 a.m.	**First Panel: Peter Fraser, moderator** 15 min: Peter Fraser, Pacific Corridor Enterprise Council 20 min.: Hal Cooper, Cooper Consulting 15 min.: Don Lowell, Alaska Transportation Consultants 20 min.: David Broadbent, et.al. Canadian Arctic Railway 20 min.: Question-answer session with panel 5 min.: Scott Robart, Can-Al Rail Link
11:05 a..m.	**Coffee break**
11:20 a.m.	**Bill Woolf**, Transportation Aide for Sen. Frank Murkowski
11:40 a.m.	Question-answer session: Bill Woolf
12 Noon:	**Lunch** **Steve Hites**, tourism, entertainment
1:00 p.m.	**Second Panel: Rep. Jeannette James, moderator** 20 min.: Milt Wiltse, Alaska Dept. of Natural Resources 20 min.: Jesse Duke, Mining Facilitator, Govt. of Yukon 20 min.: Dr. Paul Metz, University of Alaska Fairbanks 30 min.: Question-answer session with panel
2:30 p.m.	**Gil Carmichael**, Intermodal Transport Institute
3:00 p.m.	**Coffee break** Questions for Gil Carmichael
3:15 p.m.	**Plenary Session, Resolution**
4:15 p.m.	**Wrap-Up**
4:30 p.m.	**Conclusion**

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