ALASKA LEGISLATURE COMMITTEE FILES 1999-2000 8672
10035 HOUSE TRANSPORTATION

Figure 12

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

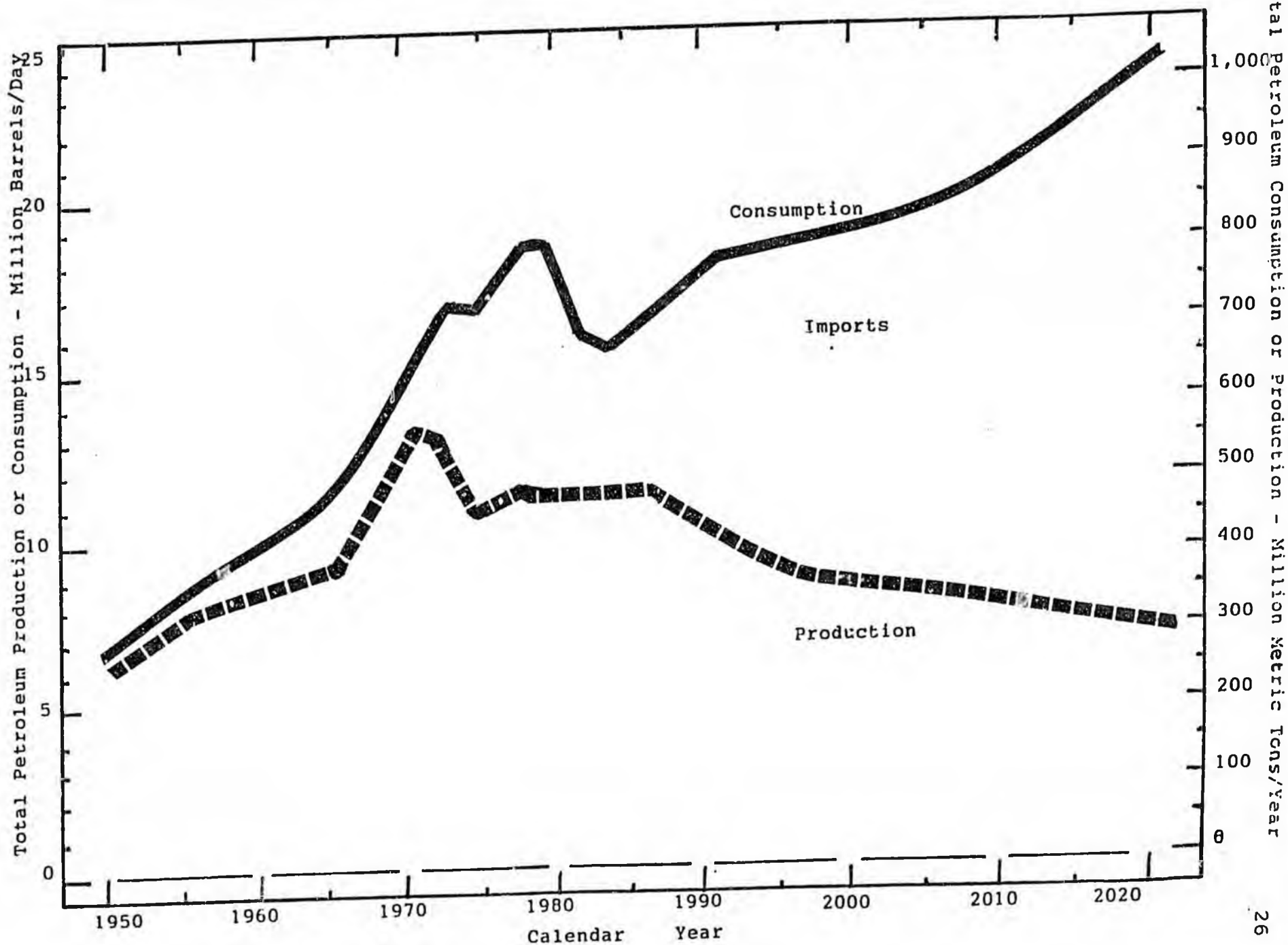
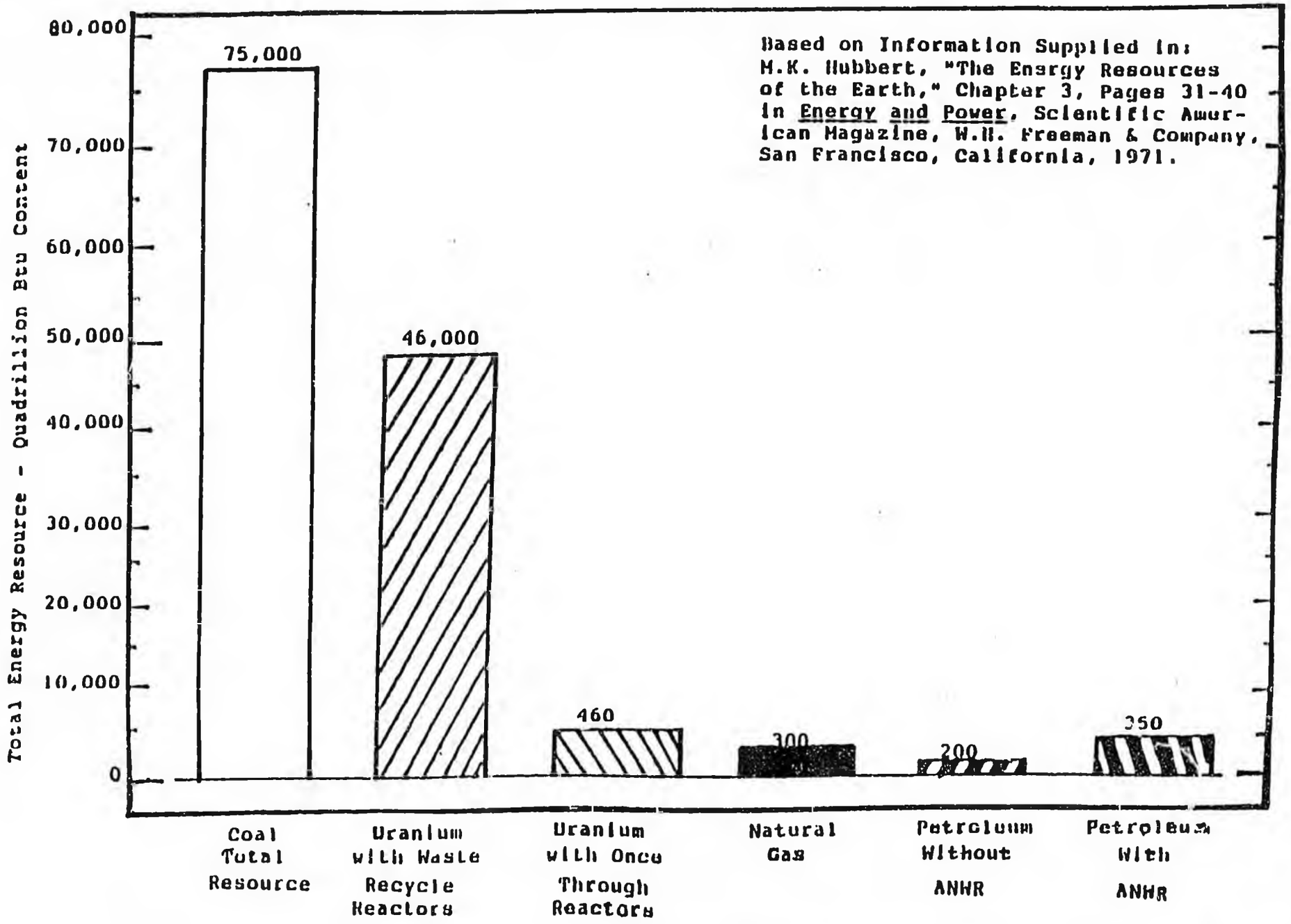


Figure 13

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

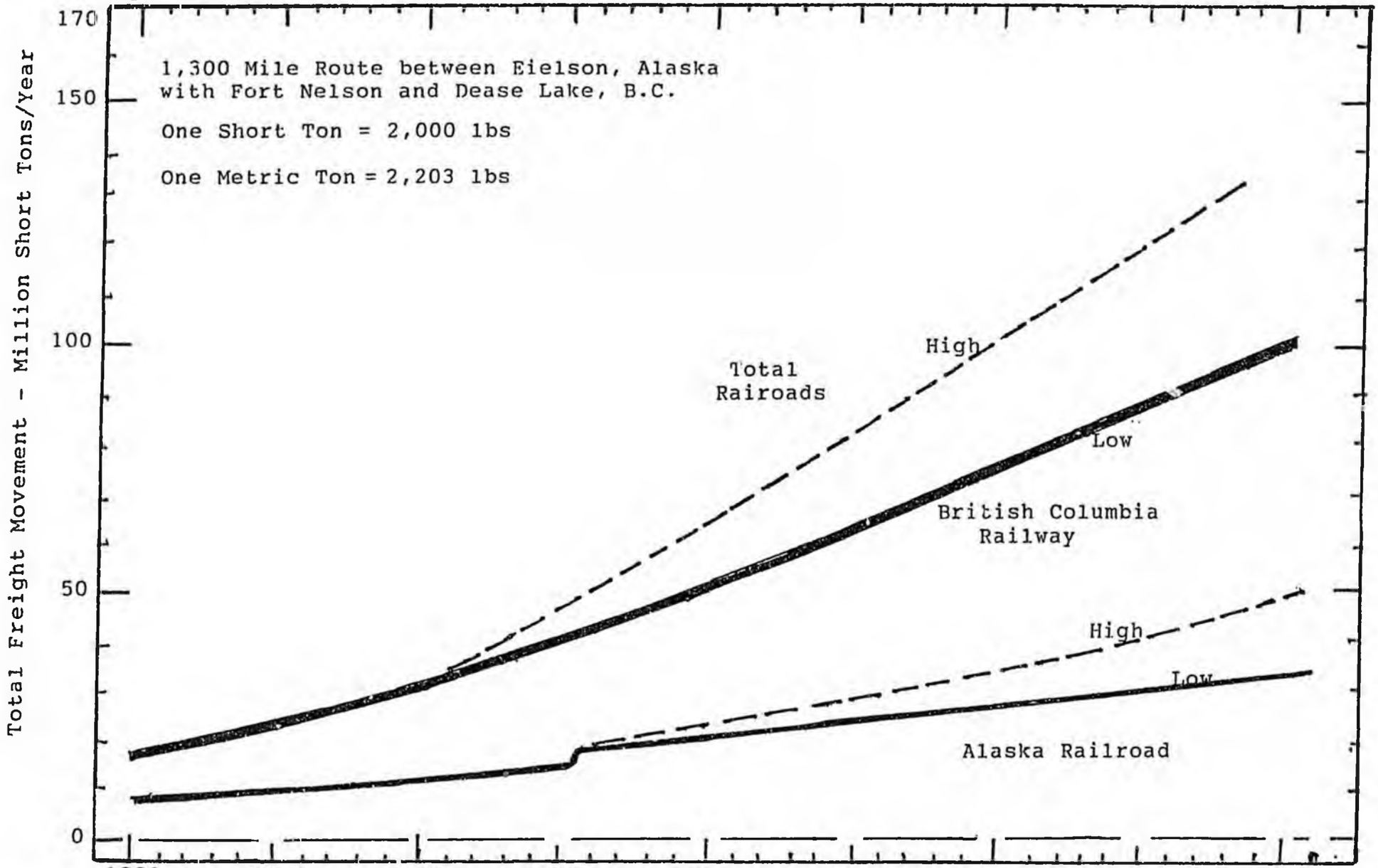


TABLE 15

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

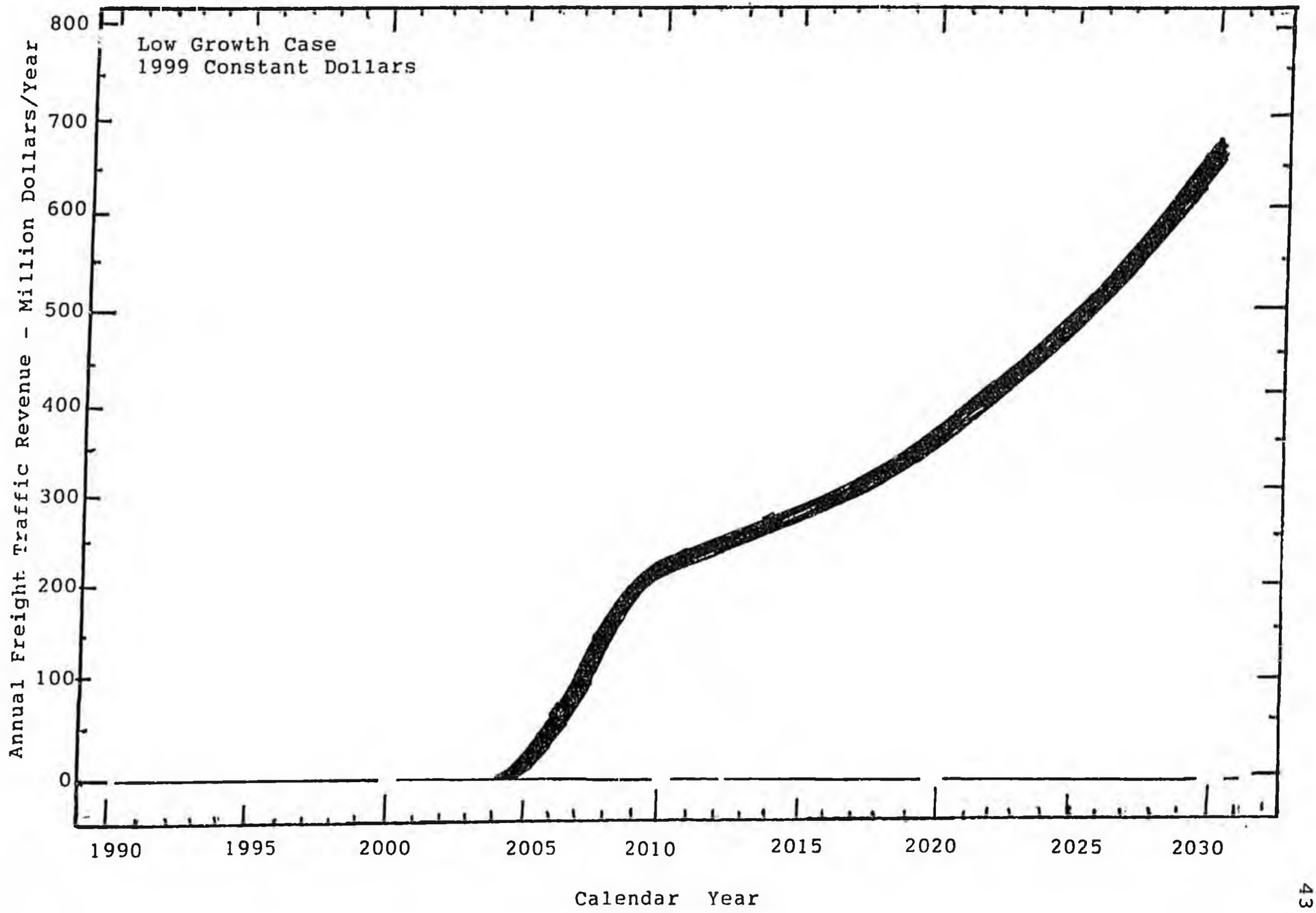


TABLE 16

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**

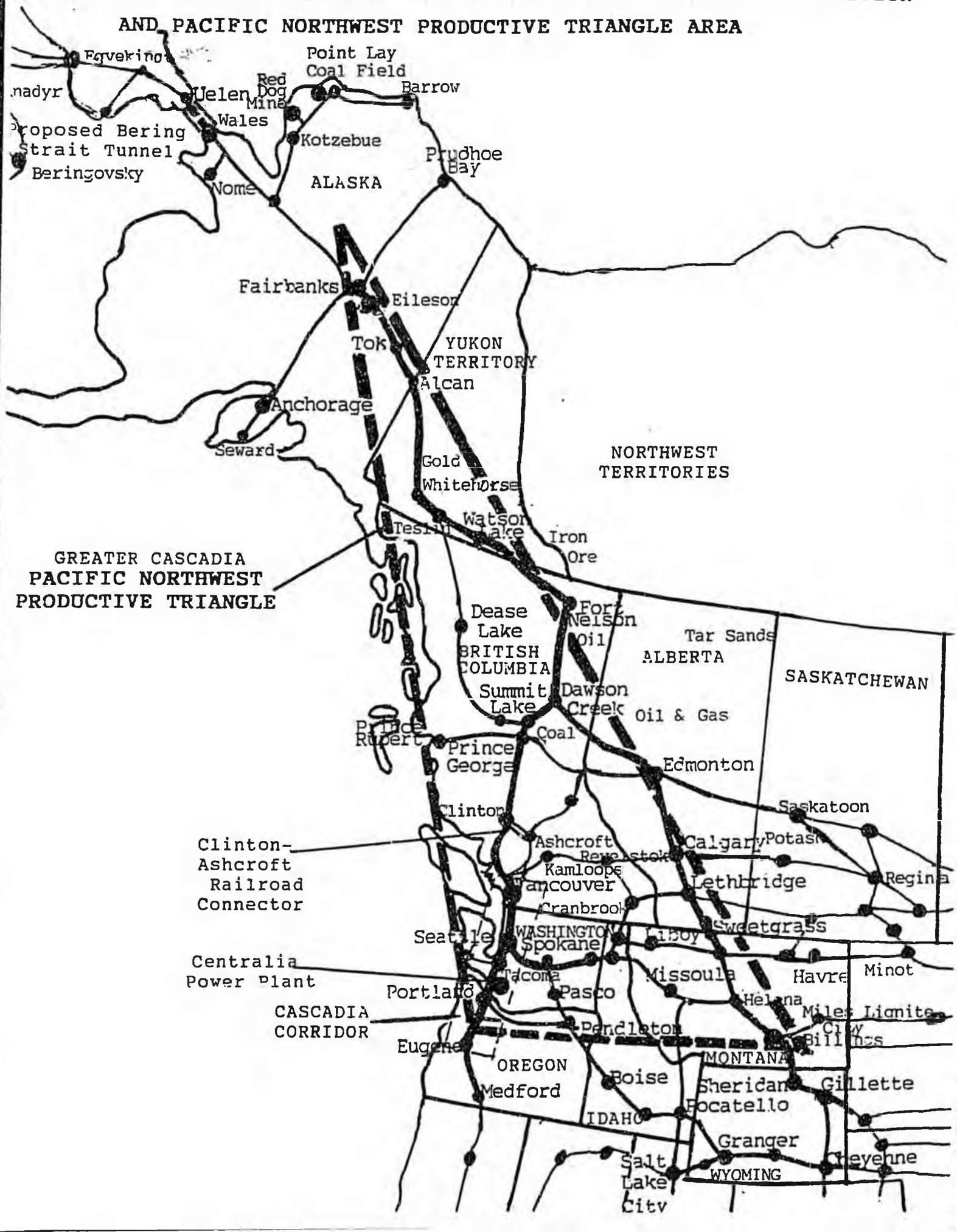
traffic with an average haul distance of 205 miles, as compared to 305 miles for the British Columbia Railway. The total revenue generated from freight traffic on the Alaska Railroad was $48 million in 1991, which was 75 percent of the total. The passenger traffic on the Alaska Railroad constituted 25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

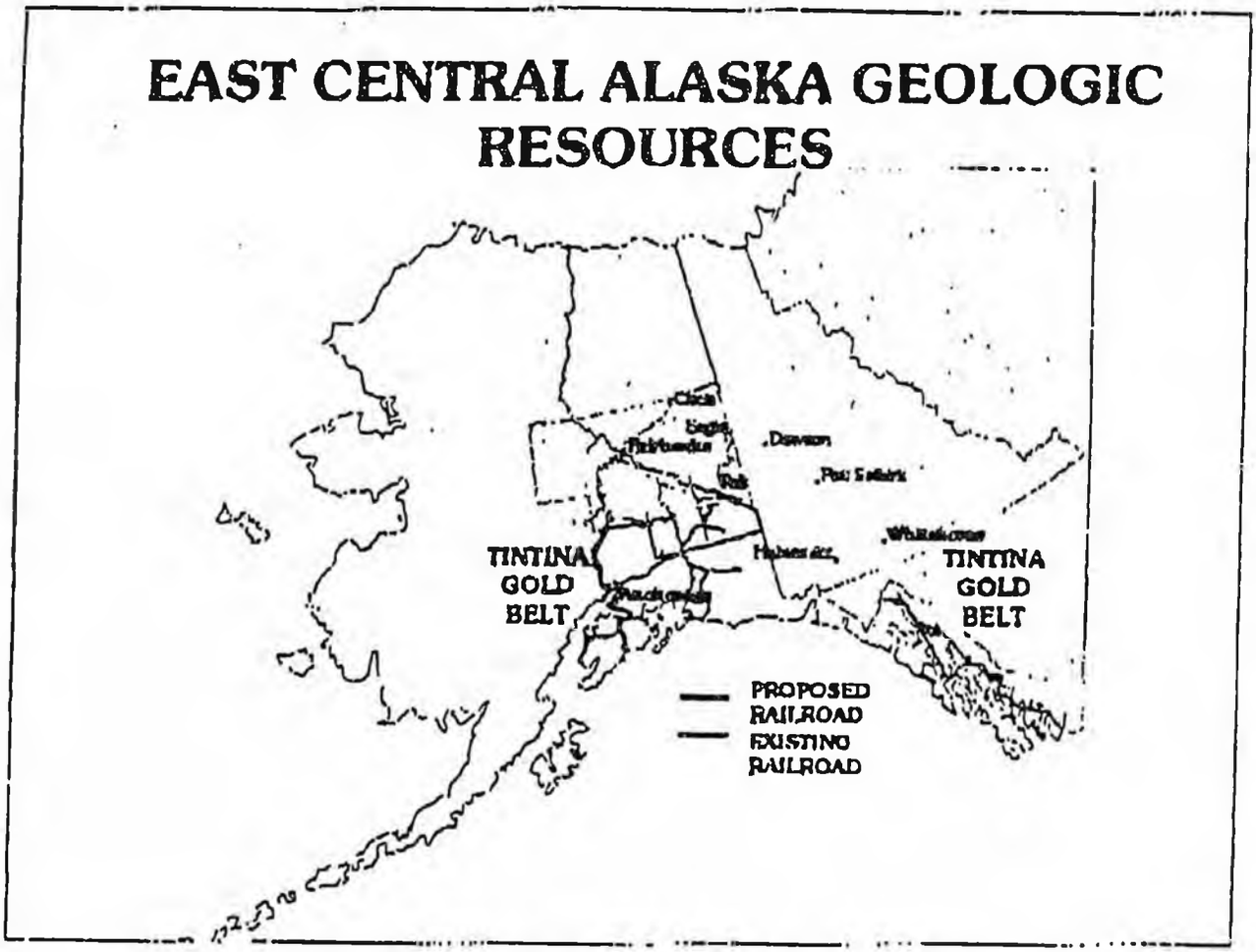
Comments by

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

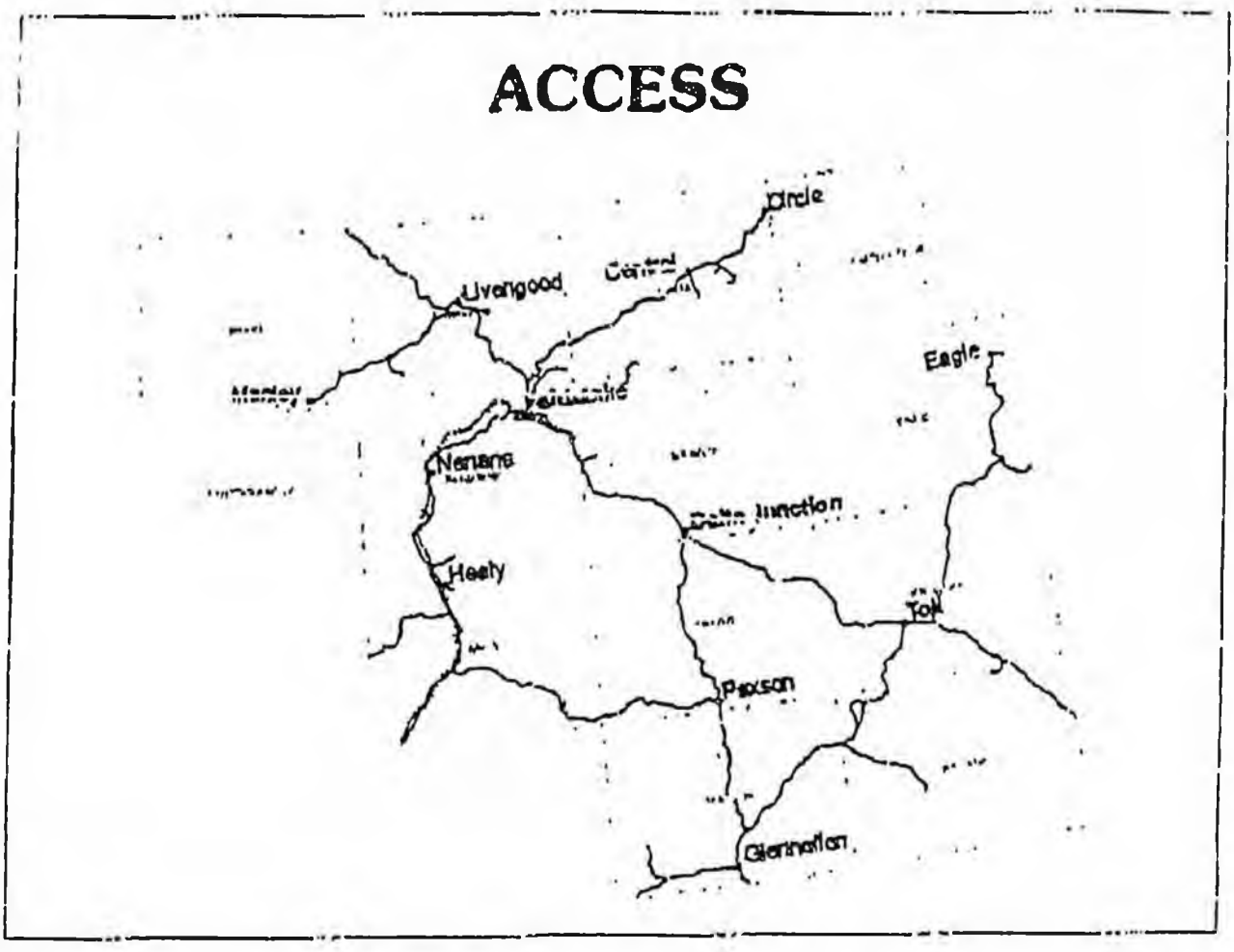


•East Central Alaska includes the central portion of a regional international Alaska - Canada mineral trend that informally has acquired the designation of "Tintina Gold Belt."

•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.

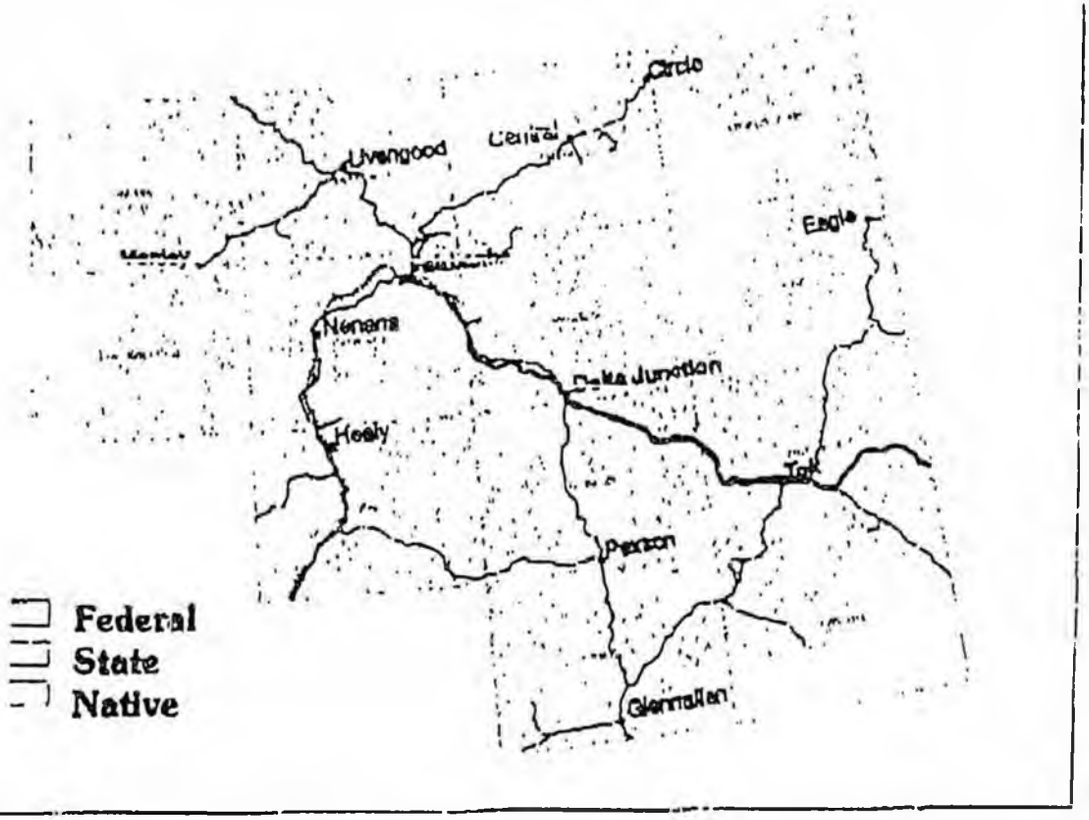
•The existence of a road and railroad transportation network has been a significant positive factor in fostering mineral exploration and development in East-Central Alaska.

•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.

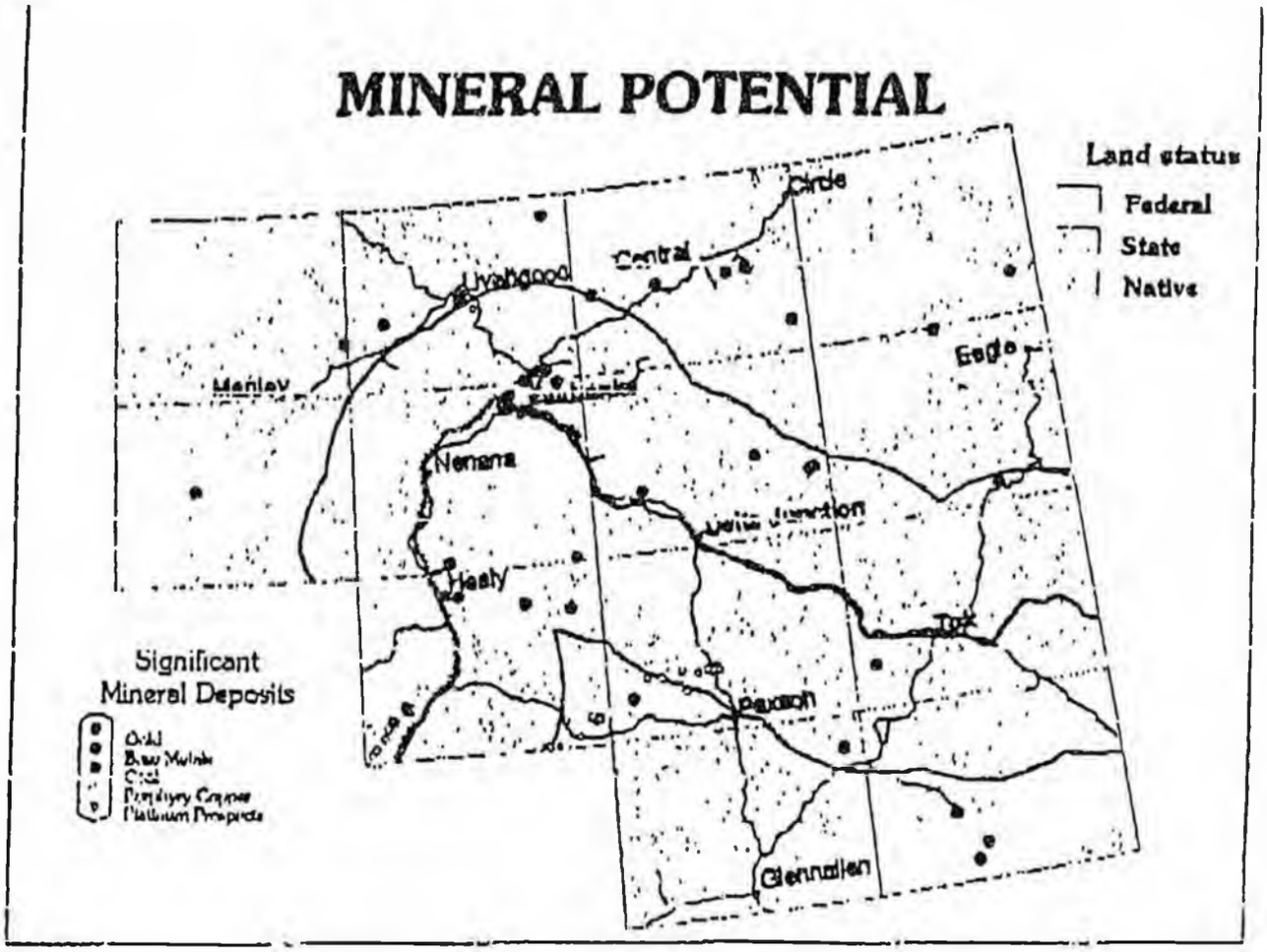
•Fairbanks is a world-scale mining center. Delta Junction is the terminal supply point for developing the recently discovered Pogo gold deposit. Tok serves the Fortymile and Delta mineral districts. The town of Healy supports the states largest active coal mine and is a local supply center for mineral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

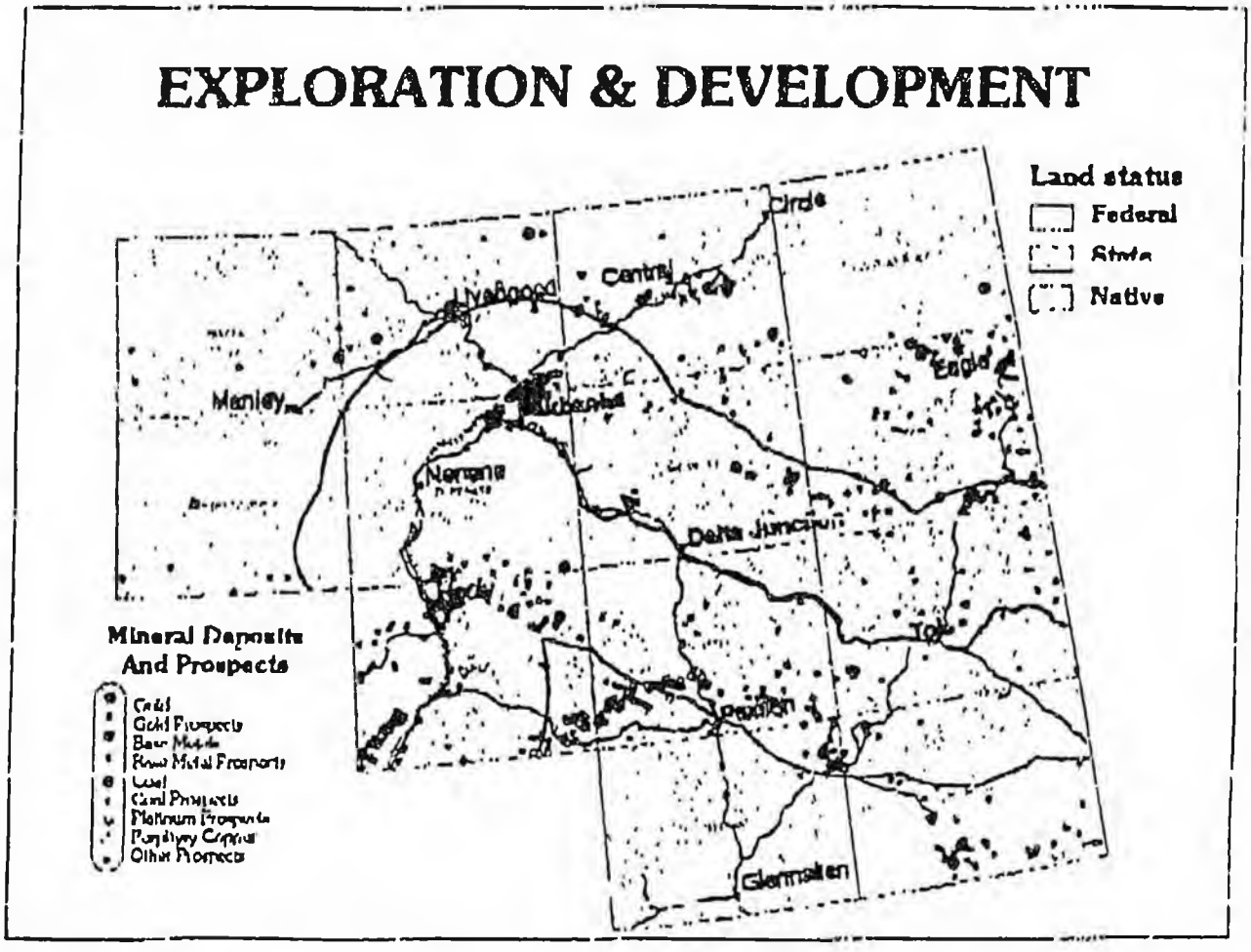
•A majority of the most valuable known mineral deposits of East-Central Alaska are located within fifty miles of the proposed or existing Alaska Railroad, e.g., Usibelli Coal Mine (1.4 billion tons), Fort Knox Gold Mine (6 million ounces), Pogo Prospect (5.2 million + ounces), True North Prospect (1.3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



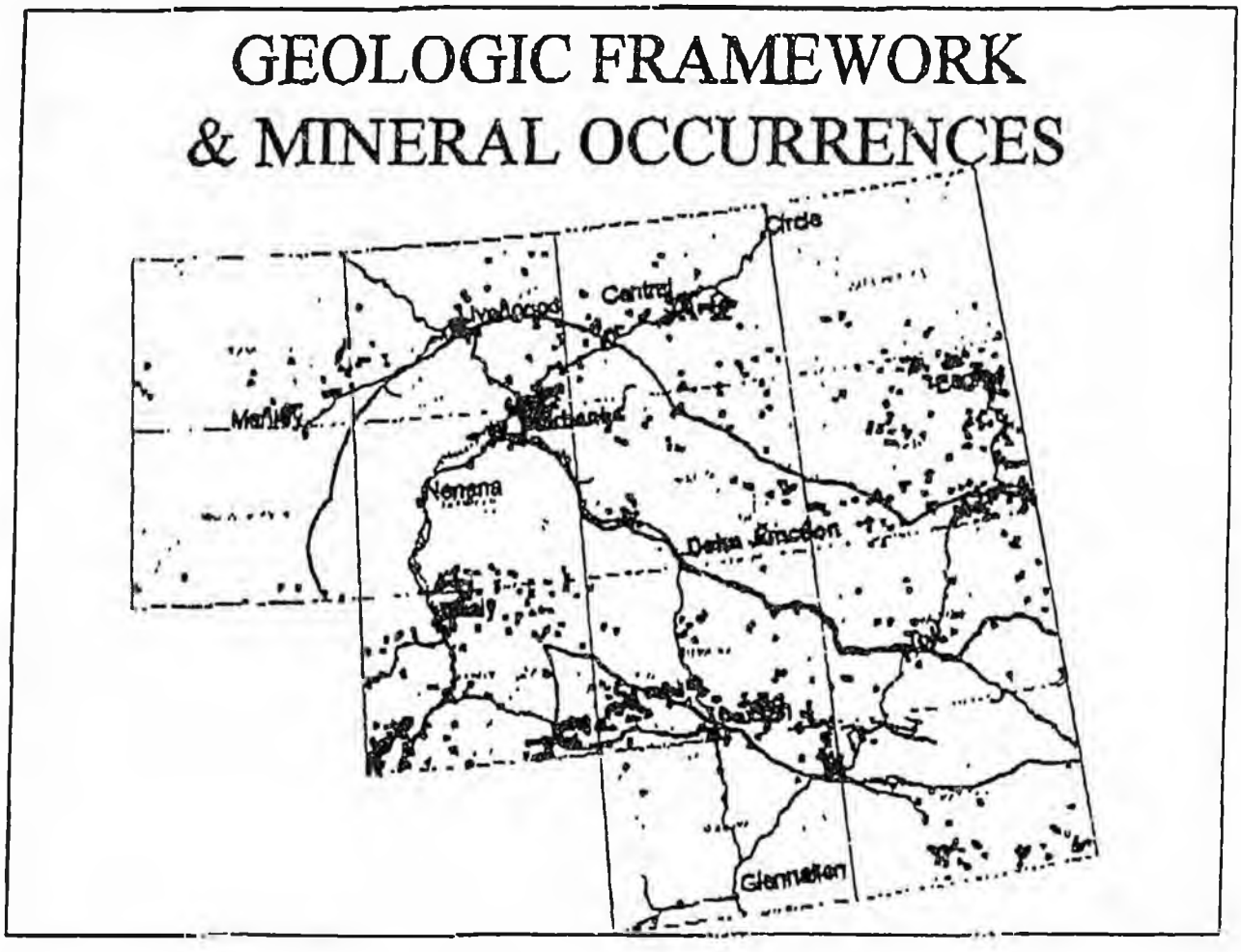
•In addition to these "significant"deposits, there are scores of other lode gold, base metal massive sulfide, copper porphyry, and nickel-copper-PGM, tungsten, and tin prospects within the rail-belt corridor and many more surrounding the corridor.

•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



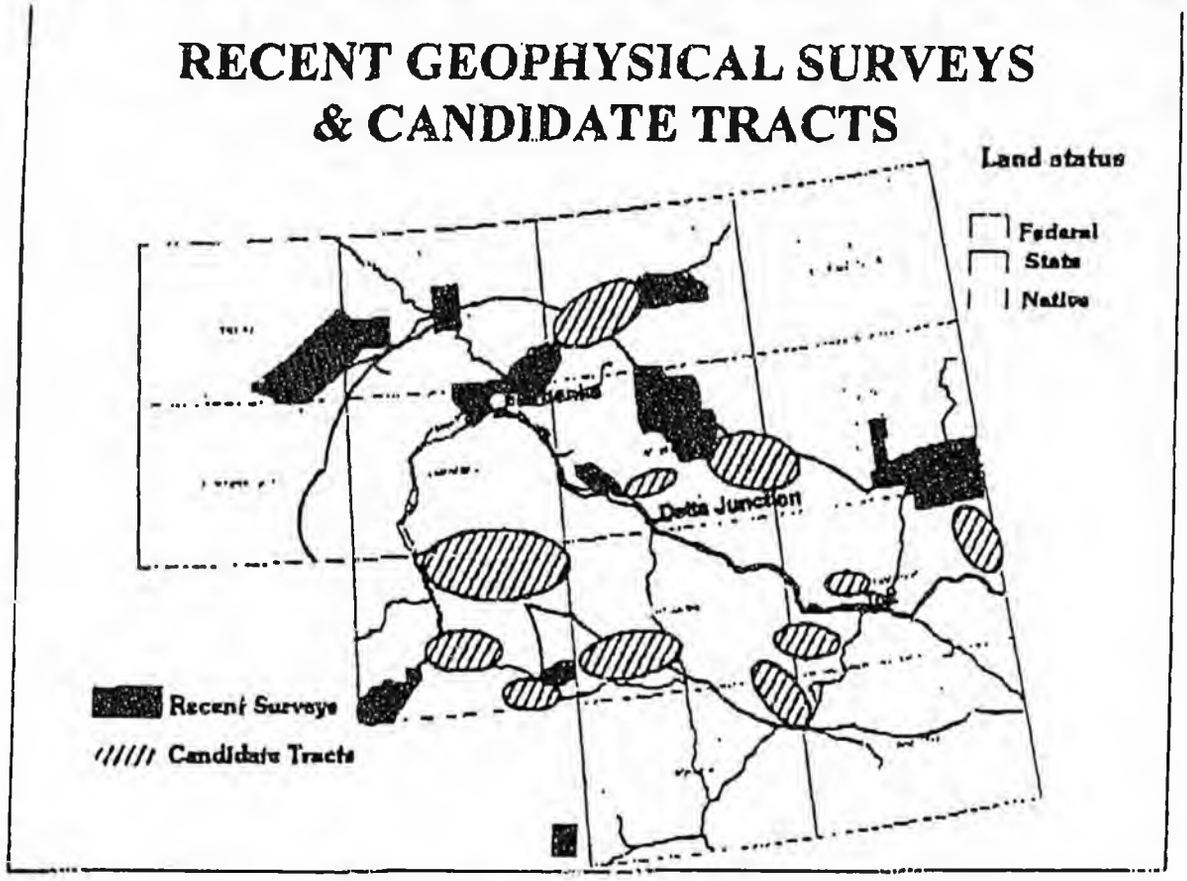
Historically, Placer gold deposits and districts have proved effective in identifying areas hosting significant lode deposits of several mineral commodities. If placer gold deposits are added to the lode occurrences previously shown, one gets a feel for just how widespread indications of mineralization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

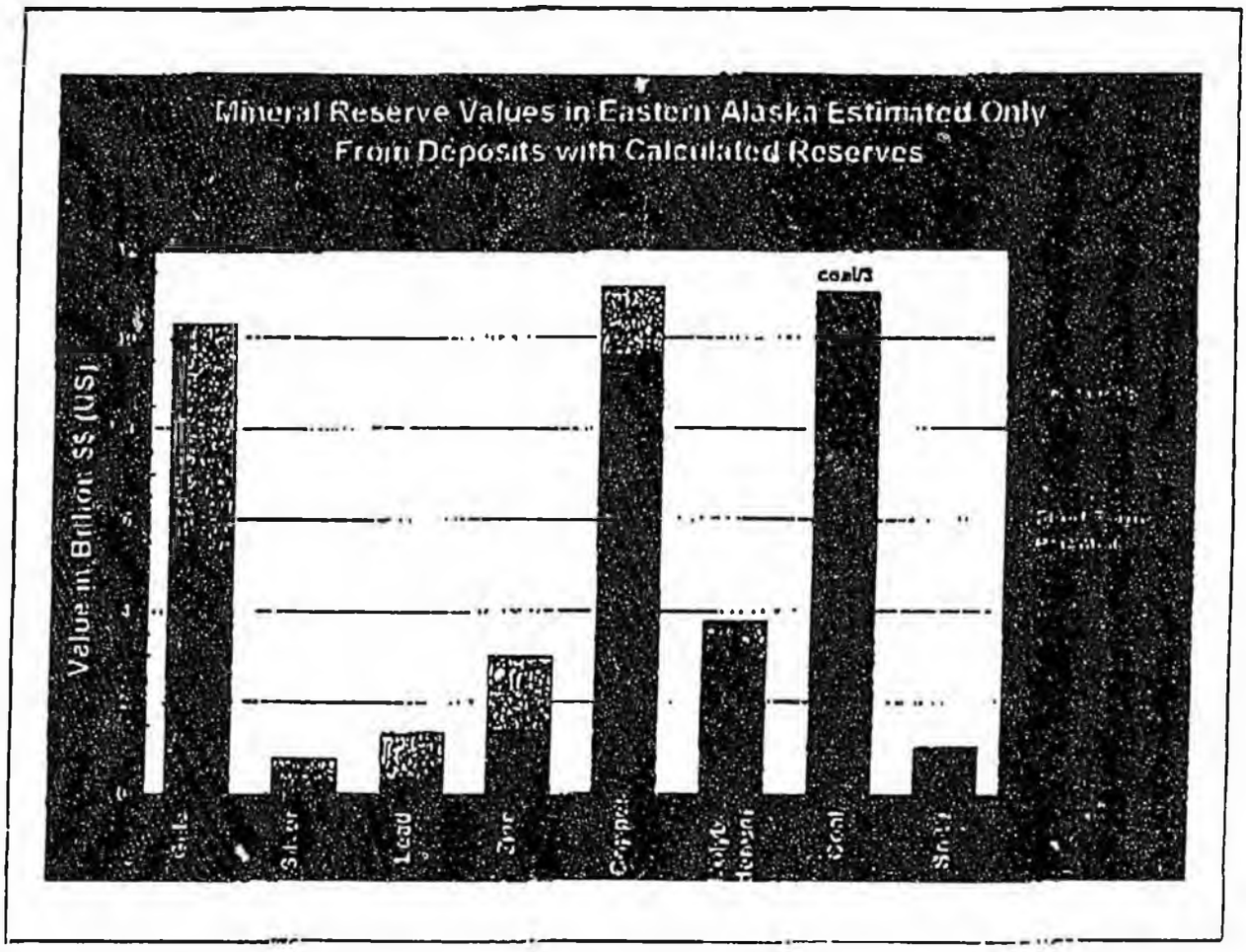
•The gray polygons shown in this figure represent airborne-geophysical survey data that is available for 4,441 square miles of high potential mineral terrane.

•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.

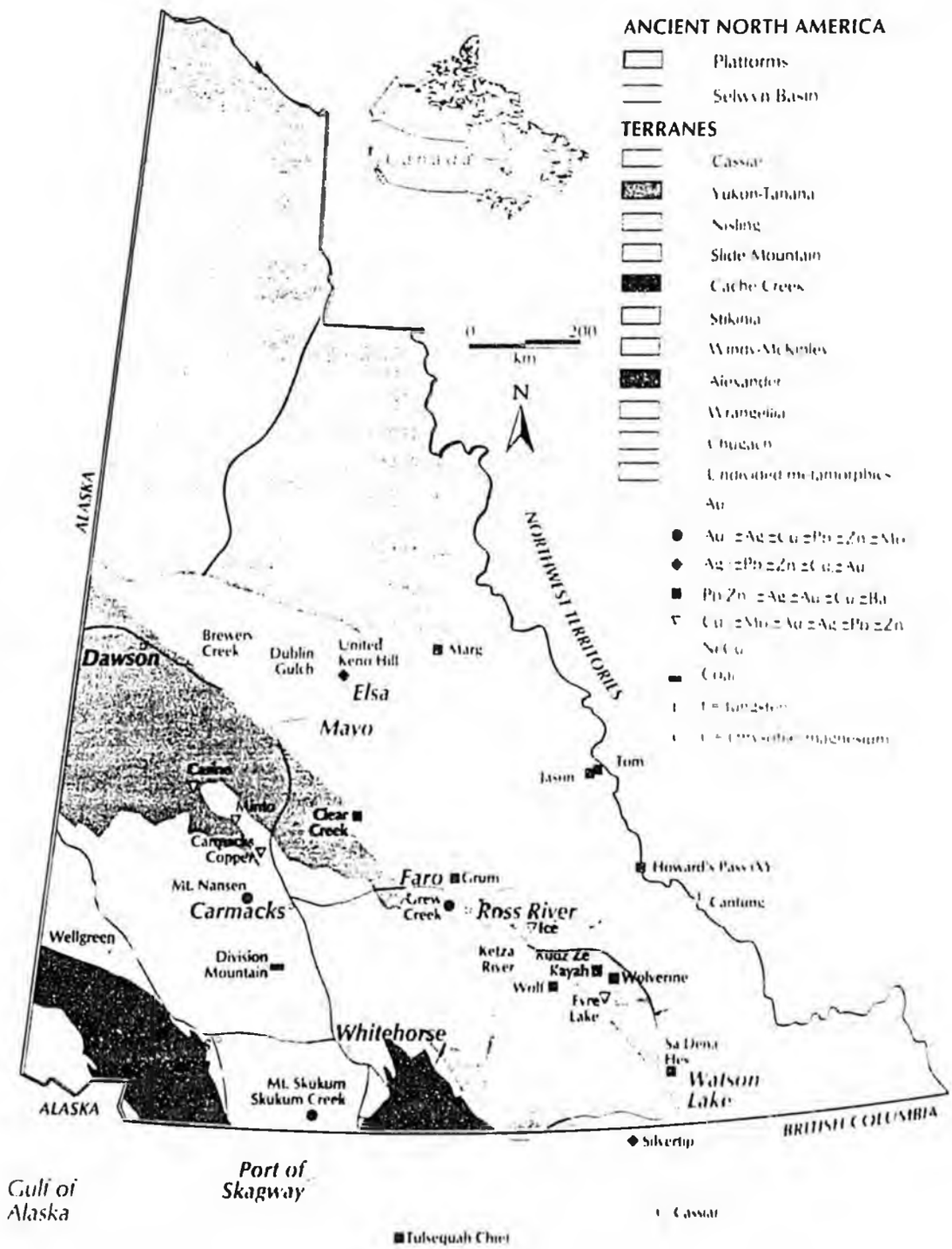
•From a global perspective, the Tintina Gold Belt has recently been recognized by the mineral industry as an "emergent district." That is, a region in which additions to reserves are expected to follow regularly with continued exploration. This is a young exploration region with a limited knowledge base.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

Klondike Placer Miners Association
P.O. Box 4427, 3151-3rd Avenue
Whitehorse, Yukon Y1A 3T5
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Placer Geologist
Yukon Geology Program
Phone (867) 667-3134
Fax (867) 667-3198

Grant Lowey
Placer Geologist
Yukon Geology Program
Phone (867) 667-8511
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)
325-300 Main Street
Whitehorse, Yukon Y1A 2B5
Phone (867) 667-3211
Fax (867) 667-3193

Publications Desk
(located at the Whitehorse Mining Recorders Office)
102-300 Main Street
Whitehorse, Yukon Y1A 2B5
Phone (867) 667-3266
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	

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Publications Desk (DIAND)
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Fax 667-3267

Topographical map sales
Mac's Fireweed Books
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Klondike Placer Miners Association
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BREWERY CREEK MINE

Viceroy Resource Corporation

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Chair: Ron Netolitzky

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Brewery Creek Mine
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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

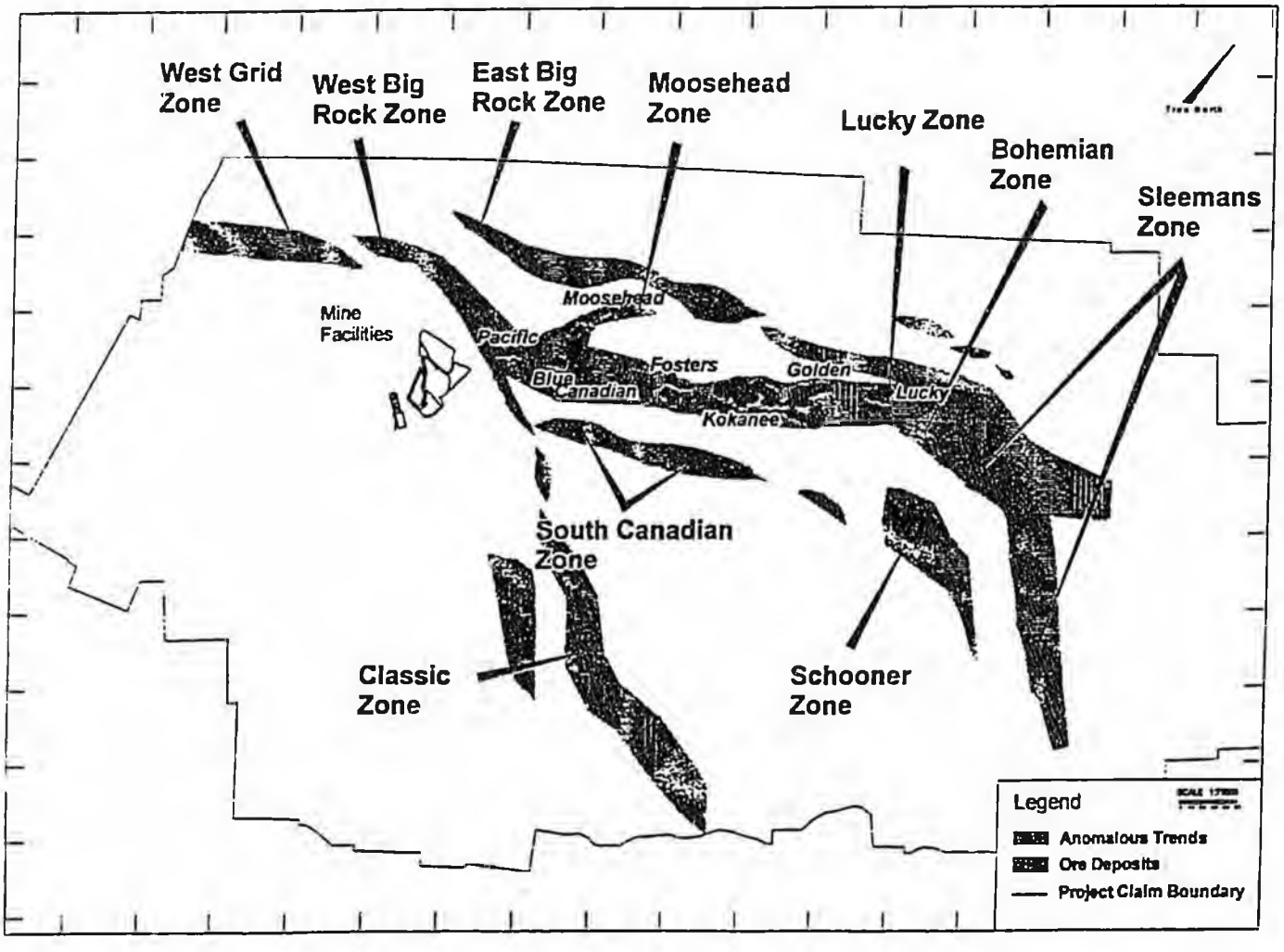
Corp. and Baja Gold Inc. shareholders approved a merger with Viceroy Resource Corporation in May, 1996. Viceroy owns 100% of Brewery Creek. The first bar of gold was poured on November 15, 1996, and the mine reached full production in May, 1997. The Brewery Creek Mine is the largest lode gold mine ever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

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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.

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Chief Executive Officer: Dale Corman

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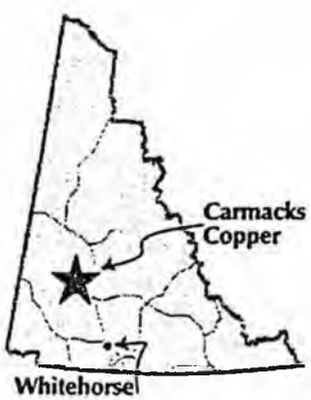
PROJECT STATUS

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

Corporate headquarters
Suite 1910, 777 Bay Street
Toronto, Ontario M5G 2C8

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

Cassiar Mining Inc.

President and Chief Operating Officer: Barney Kovacs

Corporate headquarters
Suite #804, 470 Granville Street
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.

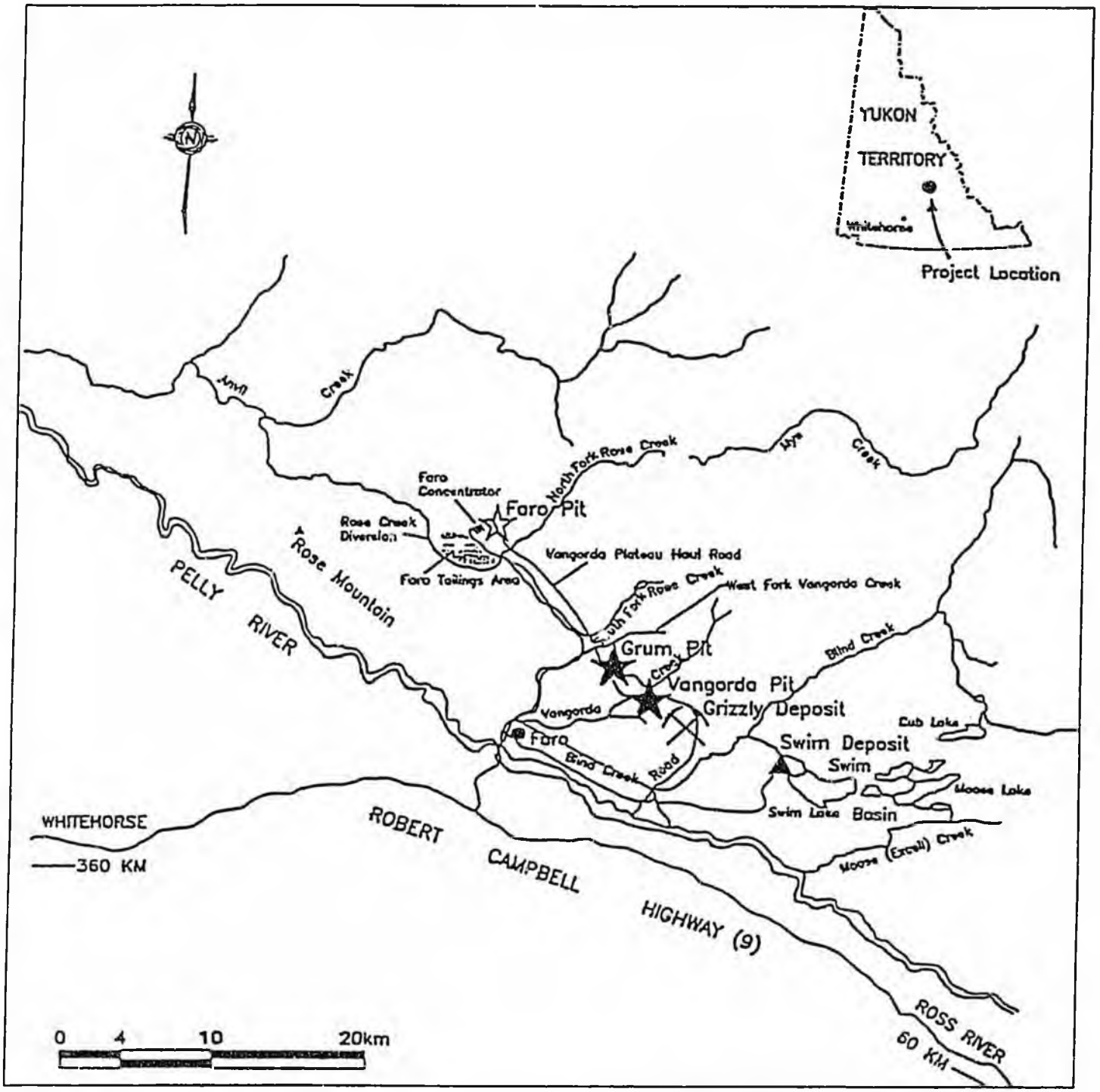
The Anvil Range mineral assets of Cyprus Anvil, including the Grum and Grizzly deposits, were acquired in November, 1985 by a predecessor partnership of Curragh Inc. Curragh resumed operations at the Faro mine in the spring of 1986 and made its first shipment of concentrates in June, 1986. In 1989, development 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
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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

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Box 49305
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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

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Vancouver, British Columbia V6B 1L8

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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.

CORRECTION

THE FOLLOWING DOCUMENT(S)
HAVE BEEN REFILMED TO
ASSURE LEGIBILITY OR PAGINATION

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.

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GEOLOGY, MINERALOGY AND ORE RESERVES

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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.