Alaska Mining Reawakens

by R. David Carnes

A Sleeping Industry Awakens

In 1988, Alaska's sleeping giant- the hardrock mining industry-showed signs of awakening from a forty-four year slumber. The slumber that began in 1944 when the Alaska-Juneau (AJ) Mine closed. Signs of renewed activity for the industry came from Interior Alaska with Citigold Alaska, Inc., and Tricon Mining, Inc., producing 21,500 ounces of gold-silver bullion from lode deposits on Ester Dome, near Fairbanks.

Even more important to the industry were mining development activities; an estimated $269 million was spent constructing roads, ports, mines, mills, and support facilities for the Greens Creek Mine in Southeastern Alaska, and the Red Dog Mine in Northwestern Alaska. These two mines will bring Alaska back as a leading minerals producing state, a status it has not enjoyed for 45 years. Reopening of the AJ, Kensington, and Jualin mines in the Juneau area, coupled with ongoing production statewide from placer operations, coal mines, and industrial minerals sites, will account for substantial minerals production for many years to come.

This article outlines some recent developments in Alaska's resurgent mining industry and will give a few brief sketches of projects which could substantially add to Alaska's mining industry.

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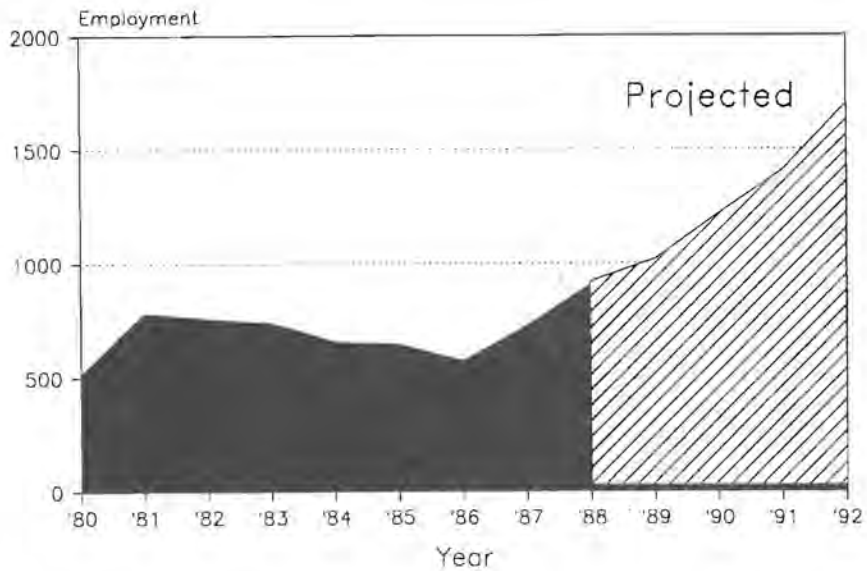
Higher Mineral Prices & Large Reserves Rejuvenate Industry & Employment

Rejuvenation of Alaska's mining industry has been influenced by several factors, the most important being a rise and stabilization of the price of gold (approaching $400/ounce), accompanied by favorable prices for silver, zinc, and lead. In addition to improved prices, higher grades and/or larger reserves of Alaskan mines accounted heavily for the revival.

As evidence of the industry's growth, total mining employment for 1988 increased almost 50% over 1987 (4,900 in 1988 versus 3,300 in 1987).(see Editors Note.) These figures represent employment in all phases of the

Figure 1

Direct Mineral Mining Employment 1980-1992



Sources: Alaska Department of Labor, Research & Analysis; Projections:U.S. Bureau of Mines

Editors Note:

This definition of mining employment is inconsistent with Alaska Department of Labor definitions of mining employment. The employment figures in Figure 1 refer to Alaska Department of Labor mining employment (excluding oil & gas mining).

industry, including construction workers of developing mines and small independently owned placer mines. Another sign of a rebound was that the value of exploration, development, and production expenditures rose to $546.4 million in 1988 compared to $318.4 million in 1987. The reevaluation of the major mines in Southeast Alaska, plus development of the Greens Creek and Red Dog mines account for most of the rise in these expenditures.

Direct mining employment figures for the years 1980 to 1988 are shown in Figure 1. These figures are reported by the Alaska Department of Labor and represent only segments of Alaska's hardrock mining industry. They do not include every phase of exploration and development activities such as a construction crew building an access road. Nor do they include self-employment operations, such as most small industrial mineral or placer mining operations.

Placer Gold Mining – A Dominant Producer & Employer

Placer gold mining operations contributed substantially to 1988 mine production levels and employment. Western Gold (West Gold) Exploration and Mining Company produced an estimated 30,000 ounces of gold by processing material offshore of Nome with the bucketline dredge "Bima". Two other large dredges were operated inland from the city of Nome by Alaska Gold Company, while Windfall Gold Mining Corporation engaged in an open-cut and sluicing operation in the same general area. Approximately 98,500 ounces of gold was produced in the Western mining district of Alaska and provided employment for 425 persons, the largest number for any area of the state.(See Figure 2.)

Another large placer gold mining operation was located in the Southcentral district of Alaska. In 1988 the Valdez Creek Mining Company, east of Cantwell, produced 52,961 ounces of raw gold and was the largest single placer producer in the state. However as of September 1989 this mine suspended operations.

Supplementing the large operators, small gold placer operations in the state numbered approximately 200. This level is similar to 1987; however, it is about half the active operations listed in 1984. The decline was a result of two court injunctions affecting U.S. Department of Interior managed lands. A lawsuit initiated in 1985 resulted in the prohibition of mining in three national conservation units until the National Park Service completed environmental assessments. Meanwhile the Bureau of Land Management (BLM) was required to complete similar cumulative assessments on placer mines on BLM lands in Alaska. These actions resulted in the loss of about 175 jobs and a decrease of 22,000 ounces of gold production.

Coal, Sand and Gravel – Small but Important Mining Operations

Coal production in the state remained about the same as for 1987, totaling 1.55 million tons. All coal mining production was from the Usibelli Coal Mine, near Healy. Approximately 811,000 tons of coal was shipped to the Korean Electric Power Company in Honan, South Korea. An additional 14,000 tons of coal was sent to Japan's Electric Power Development Corporation for testing, while approximately 727,000 tons fueled six Interior Alaska power plants.

Sand and gravel production increased slightly in 1988 to 17.2 million tons, an increase of about a half million tons over 1987 production. Crushed stone production increased to 3.6 million tons in 1988, double the 1987 production. This increase was attributed to infrastructure development at the Red Dog Mine, the Bradley Lake hydroelectric project, and the development of Southeastern Alaska mines, specifically the Greens Creek Mine.

Project Sketches: Alaska's Major Mining Projects

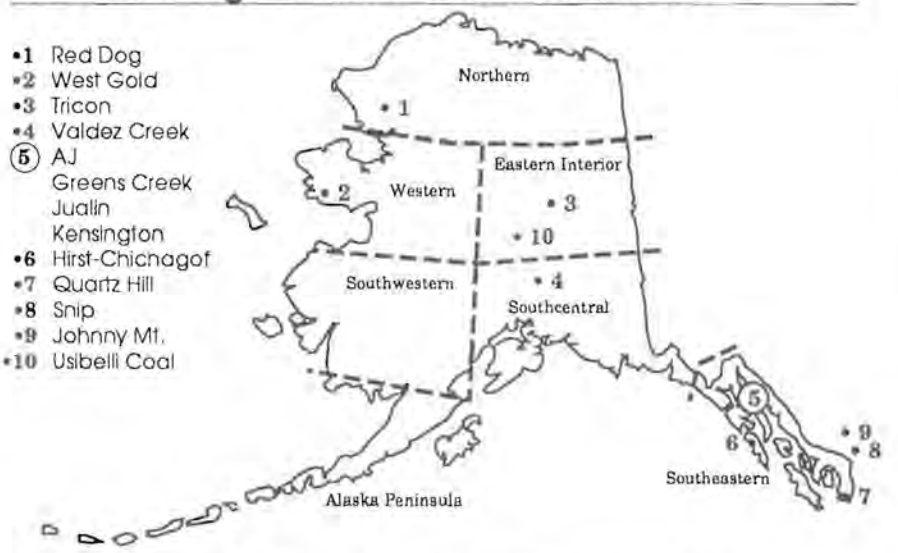
☐ Greens Creek Mine

In March 1989, the Greens Creek Mining Company brought a 1,000 ton per day mine into production. The deposit was discovered in 1974 by Pan Sound Joint Venture. Following the discovery, an extensive drilling program was conducted and excavation of a test adit (a horizontal entrance) was completed in 1979. This adit permitted underground exploration drilling to outline the ore body and the recovery of bulk ore samples for preliminary testing. By the end of 1983, ample ore reserves had been delineated, land holdings and access had been guaranteed by Congress through the passage of the Alaska National Interest Lands Conservation Act, and precious metal prices had sustained a near-constant level.

The Greens Creek deposit, as presently outlined, contains recoverable reserves

Figure 2

Alaska Mining Districts & Select Mine Sites



Source: Dept. of Natural Resources, Geological & Geophysical Surveys.

of 3.5 million tons of ore grading 24 oz./ton silver, 0.18 oz./ton gold, 9.7% zinc, and 3.9% lead. Annual production from the mine is estimated at 6.5 million ounces of silver, 36,000 ounces of gold, 25,000 tons of zinc, and 9,000 tons of lead. This level of production will make the Greens Creek Mine the largest silver producer in the United States.

The mine employs about 225 workers plus administrative staff. The workers and their families reside in Juneau. Employees commute the 18 air-miles between Juneau and the mine by ferry and bus. Mine facilities and bulk ore concentrate storage facilities are located at Hawk Inlet on the western side of Admiralty Island. Ore concentrates are shipped via ocean vessels to smelters and refineries in Europe and Japan.

Present ore reserves will provide for at least 10 years of production. However, the deposit has yet to be fully outlined, so additional years of production can be anticipated.

☐ Red Dog Mine

At the close of 1988 the Red Dog Mine, located 90 miles north of Kotzebue, was 60% complete. A 52-mile access road had been completed in 1987, at an approximate cost of over $55 million.

During 1988, major efforts were directed to port site construction, erection of the concentrate storage building, installation of fuel tanks, and installation of ship loading facilities. Camp accommodations and service buildings were constructed, and initial work on the concentrator mill foundation and the tailings impoundment dam were started. The concentrator was prefabricated in the Philippines and installed during the summer of 1989.

Production will commence in early 1990. The Red Dog deposit contains recoverable reserves of 85 million tons of ore, grading 17.1% zinc, 5% lead, and 2.4 oz./ton silver. Production is set at 750,000 tons of total concentrates per year. At peak production the Red Dog Mine will be the largest zinc mine in the western world.

When in full production, the mine will employ about 200 people. Cominco Alaska, Inc., the operator, is attempting to employ local personnel. It is their intent to begin operations with 50% local hires and increase that number towards 100% by year 10 of production. With known reserves, the mine life is expected to exceed 50 years.

The Red Dog deposit was discovered in 1968. The land area was withdrawn from mineral entry due to the Alaska Native Claims Settlement Act (ANCSA), and subsequently selected by the Regional Native Corporation - NANA established by ANCSA. In 1982, Cominco Alaska, Inc., and NANA reached a settlement on development of the deposit on NANA lands. When financial commitments were assured through the Alaska Industrial Development and Export Authority for development of the transportation system, the project became a reality.

☐ Alaska-Juneau (AJ) Mine

In 1986, Echo Bay Mines, Ltd. of Edmonton, Alberta, Canada, acquired the option to develop the Alaska-Juneau (AJ) Mine from Barrick Resources Corporation. The AJ Mine and associated Perseverance Mine had produced 3.5 million ounces of gold, 1.9 million ounces of silver, and 40.2 million pounds of lead from 1880-1944.

After purchase from Barrick, Echo Bay and their project operators, WGM, Inc., of Anchorage, Alaska, began assessing the potential of reopening the mine. In 1987, a 1,000 ton bulk ore sample was evaluated, and although test results were not encouraging the company pushed ahead using conventional gravity and cyanide recovery methods. A road was constructed to the original Sheep Creek adit, the old entry was excavated and access made possible using the old tunnel. An intense underground drilling program was conducted during 1987-1988. Detailed work has been conducted outlining new ore reserves and confirming old reserve grades. A large decline was driven in 1988 connecting various underground levels. Reserves of nearly 100 million tons of minable ore have been delineated and initial plans for production have been made.

When operational, the mining rate will be 20,000 tons of ore per day. At this rate, approximately 250,000 ounces of gold would be produced annually. The mine will employ 450 workers and all personnel will reside in Juneau. Extensive construction will take place installing a processing mill underground, erecting new surface facilities, and building an impoundment dam to create hydroelectric power and store tailings in the Sheep Creek valley approximately 3 miles south of the downtown Juneau area. Mine life is being set at 15 years, but this figure could be substantially increased after production gets underway in 1993.

☐ Kensington Mine

Echo Bay Mines, Ltd., through their subsidiary Echo Bay Exploration, and Coeur D'Alene Mines, are in the final stages of evaluating the old Kensington Mine, located approximately 50 miles north of Juneau. The property was acquired for $20 million from the Placid Oil Company through a Chapter 11 bankruptcy sale.

In 1988, Echo Bay constructed a two-mile road from tidewater at the abandoned community of Comet to the mine entrance, at approximately the 800-foot elevation level. A 5,800-foot long adit was driven and a bulk metallurgical sample was taken for studies and mine design purposes. Underground drilling began in 1989 to outline the ore body and establish mine reserves. Preliminary daily production rate is set at 3,000 tons per day.

The mine would employ 250 to 300 workers. As with the Greens Creek Mine, the support infrastructure would be based in Juneau. Workers will rotate to the mine site on a bi-weekly basis, rather than a daily basis. The mine life would be about 10 years.

☐ Jualin Mine

In 1988 a six-mile access road was constructed from the shoreline on the north side of Berners Bay to the site of the Jualin Mine along Johnson Creek. The Jualin Mine, first placed into operation in 1885, was acquired in the mid-1970s by Hyak Mining Company. In 1983 and 1984 Bear Creek Mining Company performed diamond core drilling in an attempt to outline new reserves. In 1987,

International Curator Resources, Ltd., acquired an option on the property and undertook the assessment of the ore body. During 1988, 22,000 feet of core drilling was completed bringing the total geologic reserves to over 2.0 million tons of ore containing 0.309 oz/ton of gold. Prior to July of 1989, Placer Dome U.S., a San Francisco based company, acquired a 50% interest in the mine. Work in 1989 has consisted of driving an 800-foot decline and obtaining 100-500 tons of ore for a bulk sample.

If feasibility studies are encouraging, the mine start-up date will be 1991. Initial estimates set the mining rate at 500 tons/day with an estimated average work force of 60 persons. The mine life is estimated at about 10 years.

☐ Chichagof Mine/
Hirst-Chichagof Mine

An assessment program was conducted in 1988 at the Chichagof Mine, located north of Sitka. In 1981, a new vein was discovered near the Golden Gate No. 4 Vein, and Golden Sitka Resources, Inc., was formed to explore and develop the properties. Also, feasibility studies were conducted on the potential of dredging for placer gold in the waters of Klag Bay by Ott Water Engineers for Coastal Development Corporation.

☐ Quartz Hill

Reviewing the awakening of Alaska's mining industry would not be complete without acknowledging U.S. Borax's Quartz Hill molybdenum deposit. This deposit, located 45 miles east of Ketchikan, contains in excess of 1.5 billion tons of ore, averaging 0.135% molybdenite per ton. This amounts to approximately 11% of the world's known molybdenum supply.

To date, U.S. Borax has invested over $100 million in the project. After 8 years, in 1988 the revised Draft Environmental Impact Statement was completed.

This deposit, when developed, would provide 800-1,000 permanent jobs. Ketchikan would be the main supply center for both personnel and supply needs.

Original estimates anticipated that this deposit would be in production in 1987. Unfortunately, delays in environmental studies, and more importantly, a decrease in the price of molybdenum has made a start-up production date uncertain. No matter when the mining of the deposit becomes a reality, it remains a major component in the revitalization of the Alaska mining industry.

☐ Canadian Mine Development

The resurgence and stabilization of the price of gold has created new Canadian interests in mining operations in British Columbia that will have Alaska infrastructure support. The evaluation of the Tulsequah Chief Mine, located about 50 air miles from Juneau, by Cominco/Redfern Mining Companies has delineated an ore body with over 50,000 ounces of gold and 2.3 million ounces of silver. In 1957, when the mine closed, remaining ore reserves were estimated at 780,000 tons containing 10,140 tons of copper, 12,480 tons of lead, and 62,000 tons zinc. If placed into production, logistical support would come through Juneau.

South of Wrangell, Alaska, Skyline Resources of Vancouver, British Columbia, developed the Johnny Mountain Mine to produce 200 tons per day. This production will be increased in the future to 300 tons per day with 686,000 tons of reserves at 0.57 oz/ton gold. This mine employs 75 workers.

To the south of the Johnny Mountain Mine, Cominco, Ltd., is exploring the Snip gold property and conducting feasibility studies for a strip mine. An estimated reserve of 1.58 million tons averaging 0.64 oz./ton gold is available at Snip. In the Sulphurets area, reserves of 850,000 tons averaging 0.35 oz./ton gold and 22.9 oz./ton silver is known.

In 1986, Curragh Resources, Inc. reopened the Faro Mine at Faro, Yukon Territory. Concentrates of lead and zinc from the 13,500 ton per day mill are trucked to Skagway, Alaska, for ocean transport to worldwide smelters. With over 17.5 million tons of outlined reserves, production can be assured for several years in the future.

Alaska Is Likely to Return As A Prominent Precious Metals Producer

As Alaska's mining industry stirs from its slumber, Alaska will rise in national standing as a mining state. Present gold production of 265,000 ounces places the state sixth in the nation behind Nevada, California, South Dakota, Utah, and Montana. A reopening of the AJ, Kensington, and Jualin mines, plus the addition of 36,000 ounces of gold from the Greens Creek Mine, would increase Alaska's annual gold production to an estimated 673,000 ounces per year by 1993. While this number would not surpass the 3,621,233 ounces of gold produced in 1988 from Nevada, or the 729,272 ounces from California, it would raise the state to number three in annual gold output. When the Red Dog Mine reaches full production capacity, Alaska will become the number two silver producer in the nation. Together, these two parameters assure Alaska's return as a major precious metals producing state.

Bibliography

Alaska Miners Association, Juneau Branch, *Abstracts of Professional Papers*, Conference Juneau, April 20-21, 1989, 36 pp.

Bundtzen, T.K., C.B. Green, R.J. Peterson, and A.F. Seward. *Alaska's Mineral Industry*, 1987. Alaska Division of Geological and Geophysical Surveys, Special Report 41, 1988, 69 pp.

Green, C.B. and T.K. Bundtzen. *Summary of Alaska's Mineral Industry in 1988*. Alaska Division of Geological and Geophysical Surveys, Public Data File 89-7, Feb. 1989, 6 pp.

Jones, B.K. *The Mineral Potential and Mining Economics of Southeast Alaska*. The Southeast Conference, March 1988, 34 pp.

The McDowell Group. *Juneau's Mining Industry*. Juneau Economic Development Council, November 1988, 45 pp.

The Socio-Economic Impacts of Development and Operation of the Alaska Juneau Mine, Echo Bay Exploration, Inc., February 1989, 54 pp.

U.S. Bureau of Mines. Mineral Industry Surveys - *The Mineral Industry of Alaska in 1988*, undated, 4 pp.

U.S. Bureau of Mines. *Annual Production and Value Data By State - Commodity: Gold*, January 1989, 1 p.