T E . . i l a .
A a a' M i i g l .

P a . :

- Coeur Alaska works with Central Council Tlinglit & Haida Indian Tribes of Alaska and the Berners Bay Consortium, which includes Goldbelt, Inc., Kake Tribal Corporation, and Klukwan, Inc., to provide

## Other Measures of Economic Impact

- Mining offers additional benefits to the Alaska economy, including:
  - Development of workforce skills that are often transferable to sectors of the economy other than mining.
  - Direct support for student performance (scholarships and internships) and endowments for faculty and research at the University of Alaska.
  - Public and private infrastructure investment that has broad benefit beyond the primary use of a mining venture.

## Alaska's Mineral Endowment and the Future of Mining in Alaska

- Although Alaska is effectively unexplored, there are 7,200 known mineral occurrences, not including coal or industrial/construction materials deposits. With this resource potential, and with exploration expenditures in the state totaling $1.3 billion between 2006 and 2010, the mining industry clearly sees a bright future in Alaska. Further, with strong base and precious metals prices, international market conditions are right for further growth in Alaska's mining industry, thus bringing even greater economic benefit to Alaskans.
- With 44 million acres of privately-held land, much of which was selected for its mineral potential, ANCSA corporations and their shareholders will play a key role in future development of the mining industry in Alaska.

## [illegible] 2010

| | |
|---|---|
| [illegible] | |
| Direct mining industry employment in Alaska | 4,100 |
| Direct mining industry payroll in Alaska | $297.4 million |
| [illegible] ([illegible]) | |
| Total employment attributable to the Alaska mining industry | 8,200 |
| Total payroll attributable to the Alaska mining industry | $565.1 million |
| [illegible] | |
| Total exploration investment in Alaska, 1981-2010 | $4.6 billion |
| Exploration expenditures | $264 million |
| Development expenditures | $293 million |
| [illegible] | |
| Payments to state government | $109 million |
| Rents, royalties, taxes | $55 million |
| Facilities use fees to AIDEA | $29 million |
| Mining commodity movement to AKRR | $25 million |
| Payments to local governments | $14 million |

The mining industry, and the minerals and metals it produces, are an essential component of the average American's way of life. According to the Mineral Information Institute, nearly 5.9 billion tons of minerals and energy fuels had to be produced in 2010 to supply the needs of the U.S., averaging 38,052 pounds of minerals per year for each American.[1] For instance, based on statistics from the U.S. Geological Survey, each year every American used:

- 8,509 pounds of stone to make roads, buildings, bridges, and other construction uses
- 5,599 pounds of sand and gravel to make concrete, asphalt, roads, blocks, and bricks
- 12 pounds of copper in buildings, electrical and electronic parts, plumbing, and transportation
- 11 pounds of lead for transportation, batteries, electrical, communications, and TV screens
- 6 pounds of zinc to make paint, rubber, skin creams, rust resistant metals, and for use in nutrition and health care; and,
- 6,792 pounds of coal to produce energy.[2]

Mining is more than just extracting mineral resources from the earth; it involves reconnaissance exploration, prospect assessment, advanced exploration, pre-development engineering and environmental research, mine construction, production, final reclamation and post-reclamation monitoring. This chapter describes the various phases of the mining "cycle" of activity and some Alaska projects in each phase of this cycle.

The beginning of the mining cycle is exploration, or more specifically, reconnaissance exploration – typically a regional program aimed at defining areas that may be prospective for a specific mineral, and then discovering previously unrecognized mineral deposits with economic potential.

Following discovery comes more focused exploration, sometimes termed target exploration or advanced exploration. This is a process where the deposit is sampled to determine grade and tonnage and the feasibility of profitable mining. It is this stage of mineral resource development that is the most complex. Dozens of constantly changing economic, financial and technical forces influence mine feasibility. Low

Increased exploration expenditures in Alaska generally followed worldwide trends. With the increase in mineral commodity prices in 2010, there was expanded venture capital available for mineral exploration. As

The Donlin Gold Project is a joint venture between NovaGold and Barrick Gold Corporation. The advanced gold exploration project is located approximately 280 miles by air from Anchorage in Southwest Alaska, about 12 miles north of the Kuskokwim River near the small community of Crooked Creek. The Donlin Gold property is under lease agreements with Calista Corporation for the sub-surface rights and The Kuskokwim Corporation for the surface rights. In 2010, there was an average of about 28 workers employed on the project. Should the mine be developed, preliminary estimates for Donlin Gold's operations could total 1,000 jobs. A mine life of 27 as Tw 6.88 0 Td 0(-)Tj 0.005 Tc 0.156 Tw 0.42740 Td [

( )

The Livengood gold deposit is located 70 miles north of Fairbanks. The p

A

Significant spending (more than $1 million) on exploration was made on a number of other projects in 2010 and 2011, including Whistler Project (Kiska Metals Corporation), MAN Project (Pure Nickel Inc.), Chisna Project (Ocean Park Ventures), Kugruk Project (TintinaGold Resources, Inc.), Palmer Project (Constantine Metal Resources Ltd.), Lucky Shot (Harmony Cold Corporation), Bokan Mountain (Ucore Rare Metals Inc.), 40 Mile Project (Full Metal Minerals), Tetlin (Contango ORE Company), Bluff Project (Millrock Resources Inc.), Ambler Project (NovaGold Resources), Vinasale Project (Freegold Ventures), Raintree West Project (Kiska

## Alaska Mine Development Projects

In 2010, mine development investment in Alaska totaled an estimated $293.3 million. Twenty-

Source: *Special Report 65, Alaska's Mineral Industry*, DGGS/DCCED.

Source: *Special Report 65, Alaska's Mineral Industry*, DGGS/DCCED.

These estimates of the value of Alaska mineral production are based on global prices for refined metal products. The value of Alaska's production as it leaves the state is lower, because much of metal is contained in concentrates rather than a refined form. Export data provides a partial measure (not all of Alaska's precious metal production is exported) of the value of Alaska mineral production as it leaves Alaska.

Sneoncee of Alaskal

## A A A ( A)

The most current federal government accounting of mining employment in Alaska indicates 4,078 full and part

Source: Bureau of Economic Analysis.

- Metal mine drilling
- Non-metallic mine drilling

Mining-related activity falls into several other NAICS categories as well, though it is combined with non-mining employment. This includes the professional services sector, where a number of mineral exploration firms are classified. These firms typically work under contract for mining companies, therefore their employment could be considered indirect.

Some of the types of businesses and professionals engaged in exploration projects include:

- Geological exploration services
- Drilling services
- Camp support services
- Helicopter support services
- Construction services
- Scientific and other professional research services

Of these services, DOLWD provides mining specific data only for drilling services. However, even this is only a partial measure as some drilling jobs are included in the construction sector.

There is also other direct mining industry employment that is not captured at all in DOLWD data. Notably, DOLWD data does not include self-employed "proprietors." In the mining industry this could include small-scale placer mining operations. It could also include any individual working under contract, such as an exploration geologist.

According to DOLWD data, metal mining employed an average of 1,968 wage and salary workers in 2010, compared to 1,767 workers during 2009, an increase of 11 percent. Alaska's metal mining industry generates some of the highest paying jobs in Alaska, with an average annual wage of $100,140 in 2010, more than double the state average of $47,700 for all sectors of the economy. Only the oil industry generates higher annual wages than the mining industry in Alaska. Including coal mining and non-metallic mineral mining or quarrying activity, mining employment in 2010 averaged 2,256 employees with an average annual wage of $96,859.

Below is a graph showing the seasonality influence of Alaska's monthly mining activity (largely associated with exploration) on total employment.

Source: Department of Labor and Workforce Development.

A A A A A ,
A ( / )

DGGS/DCCED provides a broader measure of mining industry employment in Alaska. In its report, *Alaska's Mineral Industry 2010*, DGGS/DCCED estimated mining industry employment at 3,872 full-time equivalent jobs, an increase of 592 jobs (or 18 percent) from the 2009 total of 3,280. This estimate includes both direct and some indirect employment, as conventionally defined. It is based on survey data collected from approximately 160 businesses, agencies, and individuals in Alaska that are engaged in some aspect of mining in the state.

The DGGS/DCCED estimate includes production employment such as that reported by DOLWD as well as a(d)-c4(to)-4(

- supports state government activity throughout the state, including payroll for state workers, and program support (such as education funding). The mining industry paid approximately $43.3 million in mining license tax to the State of Alaska in 2010 (all state revenues from the mining industry are described in detail later in this report). The Mining License Tax is a mining-specific tax not paid by other industries.

- are an important source of revenues for several jurisdictions in Alaska. In 2010, approximately $14.2 million in local government revenue was generated through property tax payments and payments in lieu of taxes made by Alaska's mining industry. Fort Knox paid $4.7 million in property taxes to the Fairbanks North Star Borough, making it the Borough's largest single property tax payer. Greens Creek Mine, which paid $1.4 million in property taxes to the City & Borough of Juneau, is the largest property tax payer in the Borough. Red Dog Operations' payment in lieu of taxes (PILT) to the Northwest Arctic Borough totaled $6.7 million, by far the single largest source of revenue for the Borough. These payments support local government jobs, payroll and public services in the communities closest to the mining operations.

- has supported communities and economies statewide. The Fort Knox Mine offers a specific example of how infrastructure benefits extend well beyond the mining industry. Because the Fort Knox Mine is a major purchaser of Golden Valley Electric Association (GVEA) power, other GVEA customers enjoy lower electric power rates. Earlier research by GVEA estimated a savings of 7 percent for residential consumers and 10 percent for commercial consumers because of the large steady base load from the miners. Lower cost power frees up household spending for local purchase of other goods and services.

All of these factors together mean that the mining industry has significant multiplier effects throughout the Alaska economy.

Input-output models provide industry multipliers. IMPLAN™, a widely-used input-output model for analyzing the economic impact of industrial and commercial development projects, provides statewide multipliers for several mining and mining-related sectors, as illustrated in the following table.

| Sector | | |
|---|---|---|
| Coal mining | 1.74 | 1.72 |
| Lead and zinc mining | 1.94 | 1.96 |
| Gold and silver mining | 2.10 | 1.93 |
| Rock quarrying | 1.92 | 1.92 |
| Sand and gravel mining | 1.47 | 1.70 |

Construction of industrial bw Tw 73t /MCID 26 >>BDC 0.002 T Tmrucs/MCID 32 >>BDCEMC /P 6 >>Bpt3.

For example, an employment multiplier of 1.74 means that for every coal mining job in the economy, 0.74 of an additional job is created in the state. Similarly, for every coal mining payroll dollar, with a multiplier of 1.72, an additional $0.72 in payroll is generated in the support sector. These multipliers should be considered conservative, as published IMPLAN™ data does not capture all the economic effects of mining in Alaska, such as Red Dog's royalty payments to NANA, which are widely distributed throughout the state.

Other components of the mining industry have somewhat lower multipliers. For example, mining of sand and gravel has an employment multiplier of 1.47. Seasonal exploration programs may also have lower multipliers than producing mines, as the proportion of non-residents in the labor force is likely to be higher than in producing mines.

Some states have significantly higher mining industry multipliers than Alaska; however those states have businesses that produce the materials consumed in mining, such as explosives, chemical reagents used in ore processing, and other supplies, materials and equipment.

## Total Employment and Payroll Effects

If an average employment multiplier of 2.0 is assumed (slightly lower than the metal mining multiplier, to account for lower multipliers in construction materials mining), total direct and indirect mining industry employment in Alaska included approximately 8,200 jobs. With a labor income multiplier of 1.9, total direct, indirect and induced labor income in 2010 was approximately $565.1 million.

## Economic Output

Economic output – a measure of total spending – is another indicator of the total economic impact of mining in Alaska. The total value of mineral production in Alaska was $3.1 billion in 2010. However this estimate of value overstates economic impact in Alaska because it is based on refined commodity prices, not the value of the concentrates that are produced by and exported from Red Dog Operations and Greens Creek, for example. In terms of economic impacts, a more relevant measure of the value of Alaska mineral production would be the value of concentrates that are produced by Alaska mines, plus the value of dore gold bars produced in Alaska and exported for further refining, and the value of construction materials (sand, gravel and rock) produced and used in Alaska. Though this kind of measure is not available from any published