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OVERVIEW OF MINING IN ALASKA

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You asked about mining in Alaska. Specifically, you were interested in the history of mining in the state, including a timeline, the socioeconomic impact of mining in Alaska, and a description of selected large-scale mines.

BRIEF HISTORY OF MINING IN ALASKA

Mining was an extremely important component in Alaska's early development and economy. The lure of gold brought prospectors by the thousands to Alaska. Cities such as Fairbanks, Juneau, and Nome, as well as many other communities, were founded on mining. While the discovery and production of gold in the late 1800s is what many associate with mining in Alaska, the later discoveries and production of zinc, lead, silver, coal, and construction materials such as sand, gravel, and rock have all played a role in the state's mining industry. Numerous roads and other infrastructure in the state were originally constructed to serve the mining industry. While mining diminished in the state in the mid-20th century, the industry has experienced a renaissance over the last few decades.

According to our review of the subject, the history of mining in Alaska can be disaggregated into three general time-periods:

- Discovery (mid-late 1800s) to World War II;
- World War II to the late 1980s; and
- Late 1980s to present day.

We discuss prominent aspects of each of these epochs below, followed by a chronological timeline of important events in Alaska's mining history. [1]

Early Discovery and Exploration—Thousands Lured to Alaska by Gold

Gold exploration and mining initially began in the area with the Russian explorers in the mid-1800s. After the acquisition of Alaska by the United States in 1867, exploration and production gradually increased for both placer mining and eventually lode (or hard rock) mining.[2] In 1880, Joe Juneau and Richard Harris (founders of the city of Juneau) found large pieces of quartz mixed with gold in Southeast Alaska at what became the Gold Creek Mine. Subsequently, numerous prospectors were lured to the new town site of Juneau. Two years later, gold deposits were also found on Douglas Island, across the channel from

[1] We compiled information on mining in Alaska from numerous sources including State of Alaska Departments of Commerce, Community and Economic Development, Natural Resources, and Labor and Workforce Development. Additionally, we obtained information from the Resource Development Council for Alaska and the Alaska Miners Association. We use some of the information we obtained from these entities verbatim in this report. Also, we spoke at length with Steve Borell, P.E., executive director of the Alaska Miners Association, who provided us with much valuable information on the topic. Mr. Borell can be reached at (907) 563-9229.

[2] Gold mining operations may be carried out by either *placer* mining or *lode* (also called hard rock) mining. Placer mining is a method of using water to excavate, transport, concentrate, and recover heavy minerals from alluvial or placer deposits. This can be done individually by one prospector and was the technique used in the early days of mining and on many small-scale mines today. Lode mining refers to ground level and underground mining of lode deposits—minerals that are bound to other rock requiring that the rock be crushed and pulverized before extraction of the minerals begins. Most of the large gold mines both historically and today are lode mines.

Juneau, resulting in the creation of the Treadwell Mine. According to Steve Borell, executive director of the Alaska Miners Association, the Treadwell Mine soon became the largest gold mine in the world.[3]

Gold discoveries in the Yukon in 1896 launched the famous Klondike gold rush. Thousands of prospectors passed through Juneau on their way to the Yukon and the rush created the city of Skagway. The Klondike gold rush also spread "gold fever" across the United State and elsewhere, which subsequently contributed to many prospectors coming to Alaska for exploration.

Gold was discovered in Nome in 1898 bringing many treasure hunters seeking their fortunes. Another large gold strike was made in the Tanana Hills in interior Alaska early in the 20th century, which contributed to the founding of Fairbanks. This find would eventually become one of the most productive in Alaska. The Kennecott copper deposit was discovered in the Valdez-Cordova area around the same time. The Kennecott eventually proved to contain the richest copper ore deposits ever found and the mine remained in operation until 1938. Also, the Independence Gold Mine in Hatcher Pass was founded in the same time period and operated until World War II.

We provide more detail on three important early mines in Alaska's history—the Independence, Kennecott and Treadwell—in the last section of this report.

While the most prominent Alaska gold strikes in the early years were in the Fairbanks, Juneau, and Nome areas, there were numerous other discoveries throughout the state of both gold and other minerals. We touch on a few of these below.[4]

- In 1892 gold was discovered at Pitka's Bar on Birch Creek, leading to the development of the Circle Mining District;
- Turnagain arm experienced a gold rush in 1895, which led to the development of the towns of Sunrise and Hope;
- Gold was discovered at Valdez Creek in 1903;
- In 1908 gold was discovered in the Iditarod area. This discovery led to other finds in the area including the Innoko-Tolstoi-Ophir and Aniak-Tulusak districts; and
- The Goodnews Bay platinum placer deposit was discovered in 1926.

New mining practices started to emerge during the early part of the 20th century and large companies began buying individual mining claims and hiring workers. Proceeds from sales were used to purchase equipment such as hydraulic hoses, draglines, and dredges. New mills that could crush rock were built at the lode mines. The industrialization of gold mining practices continued until 1942 when President Roosevelt ordered the closure of all nonessential mines to free up men for the war. Gold mining throughout Alaska and the United States came to an abrupt halt.

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[3] Steve Borell, P.E., executive director of the Alaska Miners Association (AMA), can be reached at (907) 563-9229. The AMA is a non-profit corporation headquartered in Anchorage that works to promote the mining industry in Alaska *http://www.alaskaminers.org/*.

[4] For more details on the early history of mining in Alaska, you may wish to review a report produced by the State of Alaska's Department of Commerce, Community, and Economic Development entitled "Alaska Mineral History" available at *http://alaskamining.com/alaskamininghistory1.html*.

World War II until the 1980s—Dry Period for Mining

The wartime ban was lifted in 1946, but gold mining was slow to recover. After the war, gold could be sold only to the U.S. government at a fixed rate of $35 per ounce. Additionally, postwar inflation skyrocketed, and gold mining became an unprofitable venture. According to Steve Borell of the Alaska Miners Association, and other sources, lode mining *production* in Alaska was virtually non-existent for more than 40 years. Other factors that contributed to the drying up of mining in the state over these decades, including the following:

- Numerous base metal mines in operation during World War II led to a overcapacity of these materials;
- In the late-1960s oil was identified in Prudhoe Bay and Alaska became focused on the oil industry (to the detriment of other industries, some believe); and
- According to Mr. Borell, the Alaska Native Claims Settlement Act of 1971, and the Alaska National Interest Lands Conservation Act of 1980, effectively took many millions of potentially minable lands "off the table" for development.

1980s to Present—Mining Resurgence in the State

Since the 1980s mining has rebounded in the state and is now a robust industry again. This resurgence occurred for a number of reasons. For one, the excess capacity of minerals around the world created around WWII began to ease and prices for gold, which was deregulated in 1971, and other minerals began to rise. Gradually, mining became economically feasible again. Also, while large scale production had not been occurring in the decades preceding this time, exploration had continued in a modest way.

In 1989, the Greens Creek Mine (silver, zinc, gold, and lead) and the Red Dog Mine (zinc, lead, and silver) began production and proved that large mines could operate successfully in the state. Today Greens Creek employs around 340 and the Red Dog around 550. With the advent of these endeavors, the mining industry in Alaska began a period of steady and continuous growth. Today there are six large mines operating in the state and many more in development. Along with Greens Creek and the Red Dog, the following large mines are in production in Alaska (2010 employees in parentheses):

- Usibelli Coal Mine, (130);
- Fort Knox Gold Mine, (500);
- Pogo Gold Mine, (300); and
- Kensington Gold Mine, (200).

We provide more detailed information on these mines in the final section of this report.

In addition to these six large mines, the following is a list of potential large mines in various stages of development across the state.

- Rock Creek/Big Hurrah (gold);
- Nixon Fork (gold and copper);

- Chuita (coal);
- Wishbone Hill (coal);
- Donlin Creek (gold);
- Livengood (gold);
- Pebble Project (copper, gold, and molybdenum); and
- Niblack (gold, silver, copper, and zinc**).**

Additionally, there are an estimated 200 smaller placer mines in operation throughout the state. Most of these are one to three person operations but a few have up to 20 employees, according to Mr. Borell. Also, there are a number of commercial ventures throughout the state that equip recreational miners (often tourists) and set them up panning in historically rich placer mining grounds.

Alaska Mining Timeline

Below we provide a chronological listing of some of the notable occurrences in Alaska mining history.[5] (A number of these items we touched on earlier in this report.) We also suggest you review a document produced by the Alaska Division of Geological and Geophysical Surveys entitled "Historical Sketch on Mining on Alaska," which we include as Attachment A. The sketch provides an excellent 5-page history of mining in Alaska.[6]

- 1880 Joe Juneau and Richard Harris (founders of the city of Juneau) discovered gold in Southeast Alaska. Eventually, large mining complexes—including the Treadwell, Perseverance, and Alaska Juneau Consortia—that collectively employed up to 3,500, were started and remained active in Juneau until World War II.
- 1885 Turnagain arm experienced a gold rush leading to the development of the towns of Hope and Sunrise. Turnagain arm experienced around 100 years of varying mining activity.
- 1886 The Interior's first gold rush occurred when gold was discovered on Franklin Bar of the Fortymile River. The Fortymile district produced over 568 thousand ounces of placer gold.
- 1888 Gold discovered on the Kenai Peninsula.
- 1892 Gold discovered on Birch Creek setting off a rush to what became known as the Circle Mining district, which has produced over 1 million ounces of gold.

[5] Please note that while we reviewed many sources for this timeline and made efforts to include the major events in Alaska mining history, important happenings may have eluded us.

[6] A number of the items we include in our timeline come from this document.

- 1896 The Klondike gold strike in the Yukon Territory captured the imagination of thousands of treasure seekers worldwide and triggered numerous placer-mining endeavors in Alaska.

- 1898 Many flock to the beaches of Nome after gold is discovered. The Cape Nome district produced over 5 million ounces of gold.

- 1902 Gold discovered at Valdez Creek.

- 1905 The Kennecott copper deposit, discovered in the early 1900s, was commissioned as a mine in 1905 and operated for 33 years producing 590 thousand tons of copper and 9 million ounces of silver.

- 1908 Iditarod joined the gold rush districts and produced over 1.5 million ounces of gold. The discovery led to others in the area including the Innoko-Tostoi-Ophir and Aniak-Tuluksak districts.

- 1914 Gold was discovered on Livengood Creek by N.R. Hudson and Jay Livengood. The village of Livengood, 50 miles from Fairbanks, was founded near their placer mining operation. In 2007, a lode gold deposit was discovered and over $58 million has been invested in developing the site through 2010.

- 1917 The Treadwell Mine experiences a cave-in that eliminated three of the five large mining ventures in the Juneau gold belt, seriously affecting the Juneau economy.

- 1920 By 1920 copper production was only half that of the peak World War I years, primarily because of declining market conditions.

- 1926 Platinum was discovered at Goodnews Bay. Eventually, a bucket-line dredge that operated continuously for 40 years was installed.

- 1930s The worldwide depression had a mixed impact on Alaska mining. Many metal prices (including copper) declined dramatically; tin, antimony, mercury, and industrial materials production also suffered. However, President Roosevelt nearly doubled the price of gold in 1934 (to $35 an ounce), which resulted in an increase in gold-mining activities.

- 1938 What is now referred to as the Independence Mine was once two mines: the Alaska Free Gold Mine and Independence Mine. In 1938 the two were bought together under one company, the Alaska-Pacific Consolidated Mining Company (APC). In its peak year, 1941, APC employed 204 men, blasted nearly a dozen miles of tunnels, and produced 34,416 ounces of gold worth $1,204,560 ($17,208,000 in today's dollars).

- 1940s World War II greatly affected the Alaska mining industry. Increased costs, high defense priorities, and military needs for manpower cause gold production to slip dramatically.

- 1942 President Roosevelt signs Executive Order L-208 closing all gold mines in the United States because gold extraction was considered

nonessential for the war effort. Gold mining in Alaska starts a long dry period.

- 1943 The Usibelli Coal Mine, near Healy, starts operation. The family-owned mine has been in production continuously since then.

- 1955 The need for uranium in nuclear weapons and for energy applications led to the discovery and development of the Bokan Mountain uranium-thorium mine near Ketchikan. The mine operated intermittently from 1955-1971.

- 1950s The fixed price of gold leads to the continued demise of the gold-mining industry. By the 1960s, most gold mining operations—with the exception of a number of resilient small operators—had ceased business altogether.

- 1968 Oil discovered in Prudhoe Bay. This was good for sand and gravel production but mining as an industry was largely ignored or put on the back burner.

- 1970s-80s Throughout the 1970s and early 1980s, the sand and gravel industry dominated mineral production in Alaska.

- 1970s The Red Dog (1968), Greens Creek (1979), Ambler mineral belt (1970s), and Quartz Hill (1974) were all discovered around this time. The use of helicopters in exploration helped to overcome the long-standing access problem.

- 1971 Gold prices were deregulated and interest in the industry began to slowly build up.

- 1984 The Valdez Creek Mine, a placer mine using standard open-pit mining methods, produced around 460,000 ounces of gold during operations from 1984-1985.

- 1989 Alaska's mineral industry enters a new phase with the development of large lode mines in the 1980s. The Red Dog Mine in northwestern Alaska begins producing zinc, lead, and silver in 1989 and continues to be one of the world's largest zinc producers.

- 1989 The Greens Creek Mine, on Admiralty Island near Juneau, began production of zinc, lead, silver, and gold. The mine is among the top 10 silver producers in the world.

- 1996 The Fort Knox Mine near Fairbanks began gold production. The open-pit mine was the largest in Alaska from 1997-2007 and has produced around a million ounces of gold.

- 2006 The Pogo Mine near Delta Junction began mining gold after being discovered in 1995. The underground mine produced almost 1.5 million ounces from 2006 to 2010.

- 2010 The Kensington Mine near Juneau began modern gold production in July of 2010 utilizing underground mining methods. The mine employs around 200 men and women.

- 2011 Mining exploration continues at a robust pace in Alaska. Many discoveries throughout Alaska have been made over the last several decades and may one day become mines. Among the projects in advanced exploration phases are the Pebble project (copper-gold-molybdenum) near Lake Iliamna, the Donlin Creek gold project near Aniak, the Niblack (copper-zinc-gold-silver) project near Ketchikan, and the Bokan Mountain (rare earth mineral) project also near Ketchikan.

SOCIOECONOMIC IMPACT OF MINING

Mining and the Alaskan economy have been interrelated since the United States purchased the territory in 1867. The total value of minerals produced from 1880 to 1980, excluding oil and gas, amounts to almost $20 billion in 1980 dollars. The total value of metals, industrial minerals, coal, peat and other mineral commodities produced in Alaska from 1880 to 2009 is slightly less than $27.2 billion.[7]

The success of the Alaskan mining industry, like agriculture, commercial fishing, logging, or other resource operations, hinges on complex economic factors that include commodity prices, inflation, availability of manpower, energy, materials, technology, government policy, accessibility, economics, and development of infrastructure.

Mining was Alaska's largest industry from before the turn of the century until World War II. The discovery of gold brought thousand to the state and played a significant role in the formation of population centers including Fairbanks, Juneau, Nome and many smaller communities. Additionally, large mines such as the Alaska Juneau, Treadwell, Independence, and Kennecott employed many as the territory was growing. While mining was essentially dormant from the 1940s to the 1980s, it is again an important—albeit small compared to the oil industry—economic factor in the state.

Metal mining has reestablished itself as a major industry in Alaska and has experienced continuous steady growth over the last few decades. During the last decade, Alaska's mining employment has outpaced the nations' by nearly 40 percent and most of Alaska's other private industries, according to Alaska Department of Labor and Workforce Development (DOLWD) data.

Mining jobs have higher earnings than any other industry except oil and gas with an average salary of more than $90,000 a year—nearly twice the statewide average-annual earnings.[8] One reason for the high salaries is that the industry employs skilled occupations such as heavy equipment operators, miners, drillers, and others. These types of occupations tend to pay well without requiring a college degree. Also, nearly three-quarters of all wage and salary earnings from mining stay within the state due to Alaska residents making up about three-quarters of all workers in the mining industry, according to the DOLWD.

[7] This information was provided by David Szumigala, former senior mineral analyst, Division of Geological and Geophysical Surveys who subsequently retired from the state and is now employed by the Fort Knox Mine near Fairbanks (907) 488-4653. The value is not adjusted for inflation.

[8] This is the average salary for miners working in the large scale mines. It does not figure in the hundreds of smaller scale placer miners.

The most recent economic data available on mining in Alaska come from a January 2012 McDowell Group report produced for the Alaska Miners Association entitled "The Economic Benefits of Alaska's Mining Industry."[9] Below we highlight some of the findings from this report, a copy of which we include as Attachment B. (The estimated benefits listed are for 2011.)

- 4,500 direct mining jobs in Alaska;
- 9,000 total direct and indirect jobs attributed to the mining industry in Alaska;
- $620 million in total direct and indirect payroll;
- Average annual wages of around $100,000;
- $17 million in local government revenue through property taxes and payments in lieu of taxes;
- Nearly $148 million in state government revenues through rents, royalties, fees, and taxes (up 170 percent from 2010);
- Mostly year-round jobs for residents of more than 120 communities throughout Alaska;
- $3.8 billion in gross mineral production value (including production from all the large mine, placer mines, and rock, sand, and gravel operations); and
- $172 million in payments to Alaska Native corporations.[10]

We also include, as Attachment C, the introduction to a report entitled "Alaska's Mineral Industry 2009" co-authored by David Szumigala. Dr. Szumigala recently retired as senior mineral analyst with the Division of Geological and Geophysical Surveys and was a primary source for the McDowell Group Report.[11] The tables that track the value of the Alaska mineral industry and mine employment from 1981-2009 and mine employment throughout the last decade can be found on the third and fourth pages of this document.[12]

Finally, for another perspective on the economic impacts of mining in Alaska, we include, as Attachment D, the section on the mining industry from a March 2012 report on the Alaska economy from Dr. Scott Goldsmith of the University of Alaska Anchorage, Institute of Social and Economic Research (ISER). Dr.

[9] The McDowell Group is a Juneau-based research agency that provides a variety of consulting services regarding resource development industries (among others) (*http://www.mcdowellgroup.net/index.htm*).

[10] All Alaska Native corporations benefit from mining industry activity – through the Alaska Native Claims Settlement Act's royalty sharing provisions (sections 7(i) and (j)). Benefits also include jobs for shareholders and business partnerships.

[11] David Szumigala is currently employed by the Fort Knox Mine near Fairbanks (907) 488-4653. The current lead contact person at the Division of Geological and Geophysical Surveys regarding mining is Melanie Werdon (907) 451-5082.

[12] The entire 94-page Alaska's Mineral Industry 2009 report can be accessed at *http://dggs.alaska.gov/webpubs/dggs/sr/text/sr064.PDF*.

Goldsmith's report contains a great deal of data on the mining industry and includes the following paragraphs on the sector.[13]

> The mining sector consists of three different activities: (1) hard rock mining for export, (2) coal mining that serves both local and export markets, and (3) production of construction materials—sand, gravel, and rocks—for the local market. Hard rock mining and about half of the coal mining activity comprise the economic base portion of this sector.
>
> The economic base, in turn can be divided into three components: exploration and development of new mineral prospects (Donlin Creek and Pebble); production of zinc, lead, gold, and silver from large-scale mines (Red Dog, Fort Knox, Pogo, and Greens Creek and Kensington); and production of a variety of minerals from smaller operations that include both business and recreational operations. Most direct employment is associated with operations of the large-scale mines although exploration and development employment, which varies considerably from year-to-year, can be significant when a large prospect, such as a Donlin Creek or Pebble is under investigation or development. Only primary processing of minerals occurs within the state.

A potential growth area in Alaska mining in the years and decades to come may be in "rare earth minerals" also called rare earth elements (REE).[14] These REEs are necessary to produce many types of electronics, including computers, clean energy products, and sensitive military hardware. Until the mid-1980s, the United States dominated REE production; however, China now has a near monopoly—over 95 percent—of the world's production of REEs. In recent years, China has implemented restrictions regarding the export of these minerals to other countries, including the United States.

Exploration for REEs is currently underway on Prince of Wales Island in Southeast Alaska. The site, Bokan Mountain, is thought to hold about 3.8 million tons of rare minerals or, as United States Senator Lisa Murkowski said in December 2010, "more than enough to break China's stranglehold on the market and protect America's access to the rare earths that are vital to the production of cutting-edge technologies in this country." Studies indicate that rare earth minerals may be present in around eight different regions of the state, primarily in southeast Alaska, the Seward Peninsula near Nome, and the Ambler district on the south slopes of the Brooks Range.

While mining has been and is an important economic factor in Alaska, the industry is not without its critics. Metals mining is a controversial topic in Alaska manifested in environmental concerns surrounding the proposed Pebble Mine and law suits over impacts from existing mines such as the Red Dog. Many of these concerns focus on potential negative environmental impacts from mining and the corresponding adverse effects on other important state industries such as fisheries or tourism. Mining proponents with whom we spoke believe that Alaska's robust regulatory system provides sufficient checks and balances to ensure the environmentally responsible development of mineral resources.

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[13] The 132-page report entitled "Revised with Selected Updates, Structural Analysis of the Alaska Economy: What are the Drivers?" from March 2012, can be accessed through ISER's internal publications database at *http://www.iser.uaa.alaska.edu/publications.php.*

[14] Rare earth minerals are set of seventeen chemical elements in the periodic table, specifically the fifteen lanthanoids plus scandium and yttrium.

BRIEF DESCRIPTION OF SELECTED CURRENT AND HISTORICAL MINES

In this final section, we provide more detail on three historical mines (Independence, Kennicott and Treadwell), and all current large mines.[15]

Independence Mine

Located in the Hatcher Pass area, the Independence Mine was once two mines: The Alaska Free Gold Mine and Independence Mine. In 1938 the two were bought together under one company, the Alaska-Pacific Consolidated Mining Company (APC). With a block of 83 mining claims, APC became the largest producer in the Willow Creek Mining District. The claims covered more than 1,350 acres and included 27 structures. In its peak year, 1941, APC employed 204 men, blasted nearly a dozen miles of tunnels, and produced 34,416 ounces of gold worth $1,204,560; $17,208,000 in current dollars.

Kennicott Mine

The Kennicott copper deposit was discovered by Clarence Warner and Jack Smith in the early 1900s in the Chitina Valley near McCarthy. Production of the rich deposits began after the completion of the 186-mile-long Copper River and Northwestern Railroad in 1911. The mine eventually proved to contain the largest and richest copper ore deposits ever found. The Kennicott operated 33 years producing 590K tons of copper and 9 million ounces of silver.

Treadwell Mine

The Treadwell gold mine was the largest mine of the Alaskan Panhandle and, in its time, the largest gold mine in the world. During its operation from 1881 to 1922 over 3 million troy ounces of gold were extracted from the Treadwell. The mine was owned and operated by John Treadwell who was a carpenter and builder who came to Alaska prior to the Klondike Gold Rush. Treadwell had twelve years of experience in both placer and lode mines before embarking on this endeavor. The Treadwell was composed of four sub-sites and at its peak employed over 2,000 people.

Red Dog Mine

The Red Dog Mine is located in northwestern Alaska, approximately 82 miles north of Kotzebue, and 46 miles inland from the coast of the Chukchi Sea. The mine is the largest zinc producer in the world and is owned by NANA Regional Native Corporation and operated by Teck Cominco Alaska. Full production started in 1990 and, in 2008, shipped 567,911 tons of zinc and 135,143 tons of lead in the form of concentrates. The mine was further credited with 7,498,024 ounces of silver production. It employs over 500 individuals (including contractors), over 50 percent of whom are NANA shareholders.

The Red Dog produces more than one million tons of zinc and lead concentrates annually using conventional open-pit mining, milling, and flotation technologies. All concentrates are exported to world markets via the DeLong Mountain Transportation System, which connects the mine and mill site to port facilities on the Chukchi Sea.

[15] Descriptions of these mines came (in some cases verbatim) from the State of Alaska Department of Commerce, Community and Economic Development, Office of Economic Development, or the Division of Mining, DNR.

Fort Knox Mine

The Fort Knox mine is the largest surface gold mine in Alaska. The mine is part of a complex that currently consists of two open-pit gold mines (Fort Knox and True North), and the Fort Knox mill, where gold is recovered through the cyanide vat leach process and cyanide heap leaching. Fort Knox began operations in 1996 as a stand-alone mine. It was converted to a regional gold processing facility with the permitting and development of the True North satellite open-pit mine in 2001. The True North mine is a small satellite operation (now being reclaimed) located about six miles northwest of Ft. Knox. The mine is operated by Fairbanks Gold Mining, Inc., a wholly owned subsidiary of Kinross Gold Corporation. A Canadian gold company, Kinross is currently the world's seventh largest primary gold producer. Total Ft. Knox production in 2008 amounted to 329,105 ounces from 12.78 million tons of ore.

Greens Creek Mine

The Greens Creek Mine, owned by Hecla Mining Company, was commissioned in 1989 and is located near Juneau. It is among the top ten silver producers in the world and the largest Southeast Alaska for-profit employer. It employs around 550 and is the largest payer of property taxes in Juneau. Production at Greens Creek in 2008 was 7,145,711 ounces silver, 67,269 ounces gold, 62,603 tons of zinc, and 50,887 tons of lead from 734,910 tons of ore.

Usibelli Coal Mine

This is Alaska's only coal mine and has been in continuous operation since 1943. It produced over two million tons in 2010 and exported around 50 percent of that amount. The Usibelli Mine is family-owned and located in the Alaska Range near the town of Healy. The mine fuels 40 percent of Interior Alaska's electricity and employed 130 individuals in 2010.

Pogo Mine

Discovered in 1994, the Pogo Mine site is located in the upper Goodpaster River valley, 85 miles southeast of Fairbanks. Production of gold in 2010 was 347,219 ounces, pushing total mine production over a million ounces of gold. The project is primarily owned by Sumitomo Metal Mining Company. The mine employs approximately 300 direct employees and 100 contractors and paid more than $36 million in wages in 2010. Capital spending at the mine exceeded $10 million in 2010.

Kensington Mine

The Kensington Gold Mine is located approximately 45 miles north of Juneau and 35 miles south of Haines, Alaska. The mine site is within the City and Borough of Juneau and the Tongass National Forest. Production started in July 2010 and an average of approximately 125,000 ounces of gold annually over an initial mine life of 10 plus years is expected. The underground mining operation includes placing tailings as paste backfill to fill mined areas and provide support for ongoing mining. The project employs around 200 full-time employees.

We hope you find this information to be useful. Please let us know if you have questions or need additional information.

Attachment A

"Historical Sketch of Mining in Alaska," appended April 7, 2011 by Dr. David Szumigala, recently retired senior minerals geologist, Alaska Division of Geological & Geophysical Surveys

From Bundtzen, T.K., Eakins, G.R., and Conwell, C.N., 1983, Alaska mineral resources 1981-82: Alaska Division of Geological & Geophysical Surveys Annual Report 1981-82, 153 p., 4 sheets, scale 1:2,500,000. (Available at DGGS website - http://dggs/webpubs/dggs/ar/text/ar1981-82.PDF)

HISTORICAL SKETCH OF MINING IN ALASKA

Mining and the Alaskan economy have been interrelated since the United States purchase of the territory in 1867. Total value of minerals produced from 1880 to 1980, excluding oil and gas, amounts to almost $20 billion in 1980 dollars. Total value of metals, industrial minerals, coal, peat and other mineral commodities produced in Alaska from 1880 to 2009 is slightly less than $27.2 billion. The value is unadjusted for inflation.

The success of the Alaskan mining industry, like agriculture, commercial fishing, logging, or other resource operations, hinges on complex economic factors that include commodity prices, inflation, availability of manpower, energy, materials, technology, government policy, accessibility, and a changing economic infrastructure.

Centuries before Russian settlement, Tlingit and Athabascan Indians, Aleuts, and Eskimos utilized Alaskan marble, copper, jade, and materials such as obsidian for carved utensils, art ornaments, religious objects, and weapons of war. Copper ornaments from Alaska were objects of trade throughout the Pacific Northwest and as far south as California.

The arrival of European explorers did not initially stimulate mineral-resource development in Alaska. In 1838, Russian-American traders discovered the mercury sulfide, cinnabar, 21 miles east of Aniak in southwestern Alaska. Because they were primarily exploiting fur bearers in the territory, the traders opted not to develop this discovery. The first recorded mining venture was in 1848 on the Russian River, Kenai Peninsula (Berry, 1973). Peter Doroshin, a mining engineer, spent 2 years developing the prospect, but only recovered a few ounces of gold.

From 1854 to 1857, the Russians mined coal from thin seams near Port Graham and utilized this energy resource to fuel ocean steamers. A similar interest in coal was generated on Admiralty Island, but no deposits were mined. By the 1860s, Russian Americans finally began to view Alaska as a potential source of minerals. Unfortunately for the Russian Empire, Baron Edward Stoeckl, the Russian minister to the United States, completed the Treaty of Cession of Russian America on March 30, 1867 (Naske, 1973). Hence, the rugged and distant territory became the property of the United States for $7.2 million.

Shortly after the purchase, Canadian and American prospectors from the Cassiar District in British Columbia floated down the Stikine River and prospected in Southeastern Alaska. The first recorded mineral location was a copper discovery on Prince of Wales Island west of Ketchikan in 1867. Placer deposits at Windham and Holkham bays yielded over 2,000 ounces of gold from 1869 to 1871. Alaskan hard-rock mining commenced at the Stewart Mine near Sitka in the mid-1870s. In 1880, Joe Juneau and Richard Harris discovered placer gold near the present city of Juneau. These modest deposits were pathfinders to huge, low-grade gold lodes, and by 1882 several mines were in production. Eventually, large mining complexes (including the Treadwell, Perseverance, and Alaska-Juneau Consortia, with 1,000- 3,500 employees, maintained "the heartbeat of Juneau" (Stone and Stone, 1980) until the end of World War II.

Prospectors initially explored interior Alaska regions such as Fortymile (1886) and Circle (1893), but important coastal discoveries at Unga Island (1889) and Sunrise on the Kenai Peninsula (1893-94) also resulted in small gold rushes and gold production. The 1896 Klondike strike in

the Yukon Territory captured the imagination of thousands of treasure seekers worldwide and triggered more than 34 placer-mining stampedes in Alaska, including the Nome (1898), Fairbanks (1902) lditarod (1909), and Livengood (1914) rushes.

The gold boom was accompanied by other developments in the territory. Copper mining began in Southeastern Alaska around 1900, and by 1905, 10 mines employing almost 400 people were in operation west of Ketchikan. Copper from lodes in Prince William Sound was shipped as concentrates to west-coast smelters at about the same time. Production of the rich Kennicott deposits in Chitina Valley began after completion of the 186-mile-long Copper River and Northwestern Railroad in 1911. In 1902, tin was first mined on the Seward Peninsula; at the same time, shipments of marble, gypsum, and garnet left Southeastern Alaska mines for west coast markets.

Production of gold peaked in 1906 at 1,034,000 ounces and was maintained at high levels until World War I. Copper production peaked in 1916, when 59,927 tons of copper metal were produced from 30 mines in the Chitina Valley, Prince William Sound, and Ketchikan District. During the critical copper shortages of World War I, Alaska's copper contribution amounted to more than 10 percent of United States production. World War I demand for strategic minerals such as tungsten, antimony, tin, and chromium stimulated small-scale mining ventures. During this period, an all-time high of 8,300 workers were employed in Alaskan mines.

Production of many commodities, including gold and copper, declined after World War I. Rich, shallow placer gold deposits that built towns like Fairbanks and Nome were finally depleted of easily won deposits, and materials and manpower shortages caused by the war began to have their effect. The great 1917 Treadwell cave-in that eliminated three of five large mining ventures in the Juneau gold belt seriously affected the Juneau economy. By 1920, copper production was only half that of the peak war years, primarily because of declining market conditions. Nevertheless, positive developments conducive to mineral development were on the horizon. Completion of the Alaska Railroad resulted in the first significant Alaskan coal exploitation in the Matanuska and Healy coal fields. The latter produced coal generated electricity for the large power plant that energized Fairbanks Exploration Company (F. E.) bucket-line gold dredges in the Fairbanks district. Larger companies throughout the territory acquired large tracts of ground and installed dredges in similar fashion. Successful development of the Alaska Juneau Gold Mine stimulated gold production in the Panhandle.

Erratic high prices of strategic metals in the late 1920s stimulated mercury and antimony production. Platinum was discovered at Goodnews Bay in 1926. Eventually, a bucket-line dredge that operated continuously for 40 years was installed. Much of Alaska's silver production has been derived as a byproduct of copper and gold refining; however, high silver prices following World War I stimulated development of primary lodes in the Hyder, Kantishna, Kaiyuh Hills, and various interior Alaska mineral belts.

The effect of the worldwide depression of the 1930s on the Alaskan mineral industry was mixed. Many metals prices (including copper) declined so dramatically that even the rich Kennicott lodes in the Chitina Valley were out of production for much of 1932 and 1933. Most copper mines in Prince William Sound closed permanently. Tin, antimony, mercury, and industrial-minerals extraction also suffered. However, Franklin Roosevelt nearly doubled the price of gold in 1934 (to $35/ounce), which resulted 'in an enormous increase in gold-mining activities. By 1940, Alaska led the nation in gold production, with numerous gold lodes and over 50 dredges recovering over $25 million in gold; 7,500 people were employed by the mining industry throughout the territory.

World War II greatly affected the Alaskan mineral industry. Increasing costs, high defense priorities, and military needs for manpower caused gold production to slip dramatically. Executive order L-208 closed all gold mines in the United States, because gold extraction was considered nonessential to the war effort. Mines like the Alaska-Juneau were reopened on a permit basis because of their importance to local economies. Wartime needs led to modest production of antimony, mercury, tungsten, chromium, and asbestos. Platinum at Goodnews Bay was produced throughout the war. The military buildup stimulated the need for coal, sand, and gravel, and these industries expanded enormously.

After World War II, high operating costs and a changing Alaskan economy negatively affected the industry as a whole. By 1950, severe increases in the cost of metallic-lode production resulted in the closure of most operations. However, low-priced, military-surplus heavy equipment was readily adaptable to the small-scale placer mine, and resumption of dredging activities by larger companies resulted in a partial recovery of the placer industry by 1950. Strategic-mineral production declined after 1945, but increased with the onset of the Korean War. Coal production continued at high levels because of a large Alaskan military presence. Sand and gravel extraction reached new highs and by 1950, outstripped all other minerals in value. In 1951, 2,500 people were involved in the mineral industry.

Federal strategic-mineral stockpiling programs ceased in the late 1950s and with them, most Alaskan strategic minerals production. However, commodities such as platinum, mercury, and tin were mined because of their high unit value on the free market in 1955. In 1957, mercury production from southwest Alaska amounted to almost 20 percent of the United States requirements, and this high level of production continued until 1963. The need for uranium in nuclear weapons and for peaceful energy applications led to the discovery and development of the Bokan Mountain uranium-thorium mine near Ketchikan. This mine was operated intermittently from 1955 to 1971. From 1959-68, Fairbanks Exploration (F E) recovered gold with a dredge near Chicken. Likewise in 1957, F E commenced large-scale dredging activities near Hog River in western Alaska.

The fixed price of gold led to the eventual demise of the gold-mining industry, and a slow but steady fall off in activity was evident in the 1950s and 1960s. By 1964, most large-scale dredging activities of the FE and other companies had ceased. More resilient small mining companies continued operations, but at reduced scales.

Discovery of oil and gas on the Kenai Peninsula spurred sand and gravel production in the late 1950s and early 1960s; similar discoveries of petroleum at Prudhoe Bay and subsequent construction of the trans-Alaska Pipeline System had an even larger effect. In 1974, Alaska was second only to populous California in sand and gravel production. As Alaska's urban areas expanded, increasing amounts of sand, gravel, and building stone were quarried.

Needs for local sources of petroleum drilling muds resulted in the development of a barite mine near Petersburg. The Vietnam War caused prices of antimony, mercury, and tungsten to climb, and significant quantities of all three commodities were produced in Alaska during this period. However, changing industrial applications and environmental issues concerning mercury caused serious declines in their development in Alaska throughout most of the 1970s.

Gold production continued to decline and dropped to 15,000 ounces in 1971 -the lowest since 1880. Employees in Alaska's mines numbered less than 300. However, the gold price was decontrolled in 1972, and there was a steady increase in production since that time. Several large floating bucket-line dredges were reactivated, and many new operations surfaced

throughout the state in the late 1970s. Gold production in 1981 was 134,200 ounces at a value of $55.2 million. The Valdez Creek Mine, a placer gold mine using standard open pit mining methods, produced 459,162 ounces of refined gold during operations from 1984 to 1995.

Throughout the 1970s and early 1980s, the sand and gravel industry dominated mineral production. The platinum dredge at Goodnews Bay ceased operations in 1976, after 41 years of continuous operation, but resumed in 1981 under new ownership and continued sporadically until 1996. Antimony and mercury were last produced in 1986 and 1988 respectively. Small amounts of silver, jade, copper, tungsten, and tin continue to be shipped from Alaskan mines.

Hard-rock (lode) mineral exploration based on systematic stream-sediment, soil and rock sampling, as well as deposit models, began in the mid-a950s as helicopters became more common and overcame the age-old problem of access. Mineral exploration flourished from 1974 to 1983, with peak expenditures adjusted to 2009 dollars of $225 million in 1979. The Red Dog (1968), Greens Creek (1979), Ambler mineral belt (1970s) and Quartz Hill (1974) deposits were all discovered during this time.

Alaska's mineral industry entered a new phase with the development of large lode mines in the 1980s. The Red Dog Mine in northwestern Alaska began producing zinc, lead, and silver in 1989 and was the largest zinc mine in the world for many years. Mining is by open-pit methods. The Red Dog Mine began a new phase of mining in 2010 with first production from the Aqqaluk deposit. The Aqqaluk deposit is expected to be the main ore supply for the mine for the next 25 years.

The Greens Creek Mine, on Admiralty Island near Juneau, also began production in 1989. Zinc, lead, silver and gold are produced from this massive sulfide deposit by underground mining methods and the mine is considered the fifth-largest primary silver producer in the world. Exploration at and near the mine has continued to add to the mine's reserves.

Usibelli Coal Mine near Healy has been in continuous operation since 1943 as a surface coal mining operation. By 1970 Usibelli Coal Mine was the only commercial coal mine operating in Alaska and supplied Alaska customers. The first overseas coal shipment from the mine was in 1985 and since that time about 50 percent of the mine production is consumed in Alaska by six power plants and about 50 percent of the production is shipped to customers in South Korea and other Pacific Rim destinations. Production in 2010 exceeded 2 million tons.

The Fort Knox Mine near Fairbanks was discovered in 1987 and initial production began in 1996. Gold mineralization is low-grade, hosted in a granitic body, and mined by open-pit methods. The Fort Knox Mine was the largest gold mine in Alaska from 1997 to 2007. Total production from 1996 to 2010 exceeded 4.9 million ounces of gold. Heap-leach operations begun in 2009 will extend the mine life by producing gold from stockpiled low-grade ore.

The Pogo Mine near Delta Junction began mining gold in 2006 after being discovered in 1995. The underground mine produced almost 1.5 million ounces of gold from 2006 to 2010. The current mine life extends to 2017, but an active exploration program has made discoveries that will likely extend the mine life.

The Kensington Mine near Juneau began modern gold production in 2010 by underground mining methods. The current mine connects the historic Kensington and Jualin gold mines. Gold production in 2010 was 43,119 ounces of gold, but planned annual gold production is 120,000 ounces and the mine currently has a 12-year mine life.

Mineral exploration continues at a robust pace in Alaska. Many discoveries have been made over the past several decades and the larger discoveries may one day become mines. These projects span Alaska. Some of the projects that are in the advanced exploration phase include the Pebble copper-gold-molybdenum project near Lake Illiamna, the 40-million-ounce Donlin Creek gold project near Aniak, the Niblack copper-zinc-gold-silver project near Ketchikan, the Livengood gold project near Livengood, and the Palmer copper-zinc-gold-silver project near Haines.

References

Berry, M.J., 1973, A history of mining on the Kenai Peninsula: Seattle, Alaska Northwest Publishing Company, 214p.

Naske, Claus M., 1973, An interpretive history of Alaskan statehood: Alaska Northwest Publishing Company, 192 p.

Stone, David, and Stone, Brenda, 1980, Hard rock gold; the story of the great mines that were the hearbeat of Juneau: Juneau, Alaska, Juneau Centennial Committee, 108 p.

Attachment B

"The Economic Benefits of Alaska's Mining Industry," January 2012, McDowell Group

The Economic Benefits of Alaska's Mining Industry

January 2012

Mining is a growing force in Alaska's economy

providing jobs for thousands of Alaskans and millions of dollars of personal income throughout Alaska. Alaska's mining industry includes exploration, mine development, and mineral production. Alaska's mines produce zinc, lead, gold, silver, coal, as well as construction materials, such as sand, gravel, and rock.

In 2011, Alaska's mining industry provided:

- **4,500 direct** mining **jobs** in Alaska.
- **9,000 total** direct and indirect **jobs** attributed to Alaska mining industry.
- **$620 million** in total direct and indirect **payroll**.
- Some of Alaska's highest paying jobs with an estimated **average annual wage of $100,000**, over twice the state average for all sectors of the economy.
- **$17 million** in **local government revenue** through property taxes and payments in lieu of taxes.
- **$148 million** in **state government revenue** through rents, royalties, fees, and taxes, up 170% from 2010.
- **$172 million** in payments to **Alaska Native corporations**.
- **Mostly year-round jobs for residents** of more than **120 communities** throughout Alaska, half of which are found in rural Alaska where few other jobs are available.

Largest Producing Mines and Selected Advanced Exploration Projects

State and Local Government Tax Obligations

	Land Status	Mining License Tax	State Royalty Payments	Local Govt. Tax Payments
Producing Mines				
Usibelli Coal	State	X	X	X
Greens Creek	Private	X		X
Red Dog	Private	X		X
Fort Knox	State/Mental Health Trust	X	X	X
Nixon Fork	Federal	X		
Pogo	State	X	X	
Kensington	Private/Federal	X	X	X
Advanced Exploration Projects (Projected Payments)				
Chuitna Coal Project	State/Mental Health Trust/ Private/Borough	X	X	X
Wishbone Hill	State/Mental Health Trust/ Private	X	X	X
Donlin Gold	Private	X		
Livengood	State/Mental Health Trust	X	X	
Niblack	State/Federal	X	X	
Pebble Project	State	X	X	X

2011 Economic Benefits

estimated

Exploration

- **$300 million** spent on exploration, up 13% from 2010.
- **60 exploration projects** spending more than $100,000, of which **30 projects spent more than $1 million**.
- **$2.8 billion** spent on exploration since 1981.

Development

- **$175 million** spent on **mine construction,** down 40% from 2010.

Production

- **$3.8 billion** in **gross mineral production value** from Red Dog, Greens Creek, Fort Knox, Pogo, Kensington, and Usibelli Coal mines, placer mines, and rock, sand, and gravel operations, up 16% from 2010.
- More than **200 placer mines** produced **70,000 ounces** of gold, as well as platinum.
- **$80 million in production value** from more than 120 active rock quarries, and sand and gravel operations.
- Export value of **$1.3 billion**, or **31%** of Alaska's **total exports** (2010).

Usibelli Coal Mine
Coal
- Alaska's only operating coal mine, exporting half of its production in 2011
- Fuels 40% of Interior Alaska's electricity
- Founded in 1943
- 138 employees in 2011

Greens Creek Mine
Silver, zinc, gold, and lead
- Among the world's top 10 silver producers
- Largest Southeast Alaska for-profit employer, in terms of payroll
- Largest payer of property tax in the City & Borough of Juneau
- Discovered in 1975, producing from 1989 to 1993, and continuously since 1996
- 355 employees in 2011

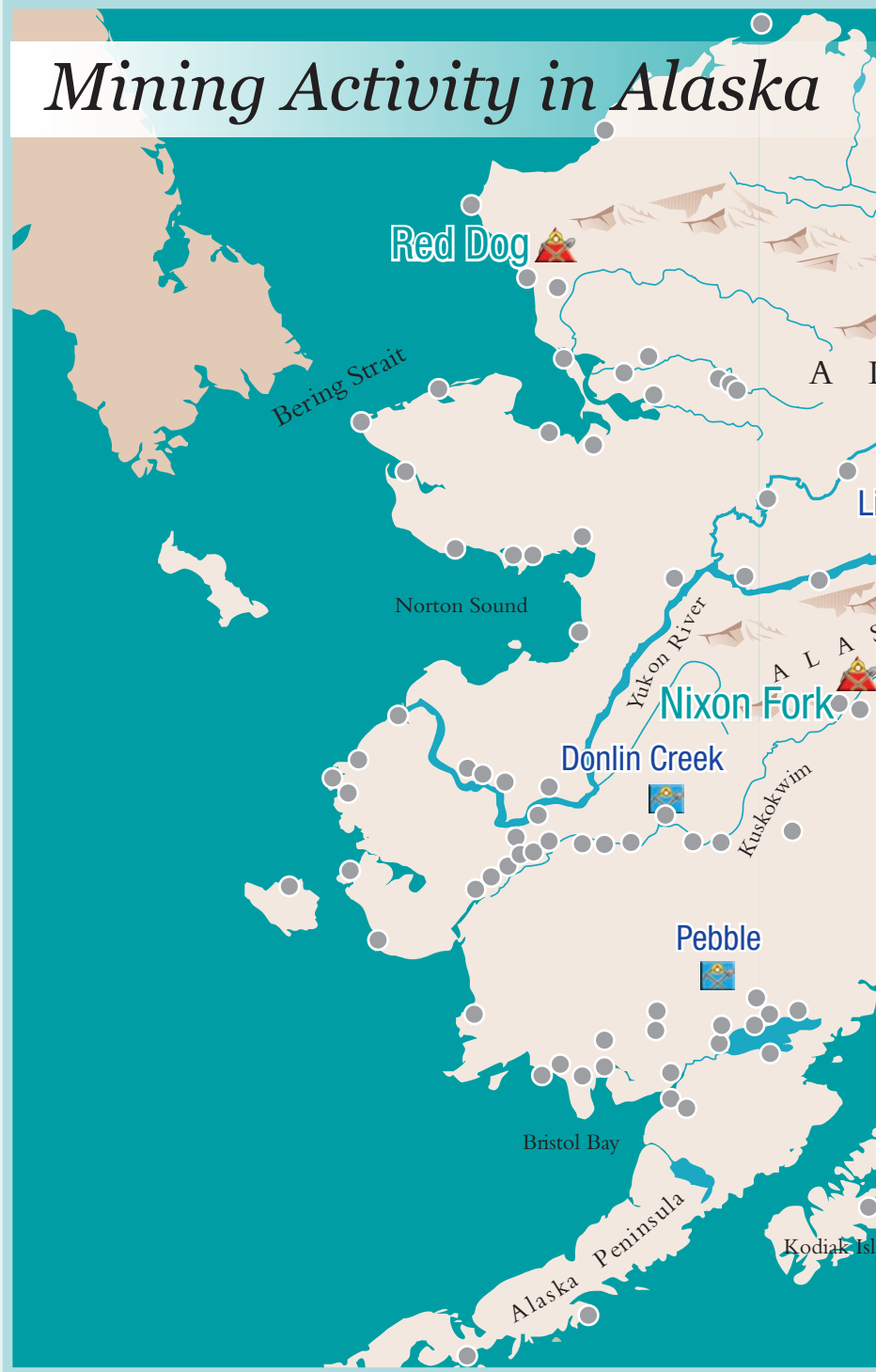
Red Dog Operations
Zinc, lead, and silver
- One of the world's largest zinc concentrate producers
- Only taxpayer in the Northwest Arctic Borough
- Discovered in 1968, producing since 1989
- 620 employees (including 130 contractors) in 2011

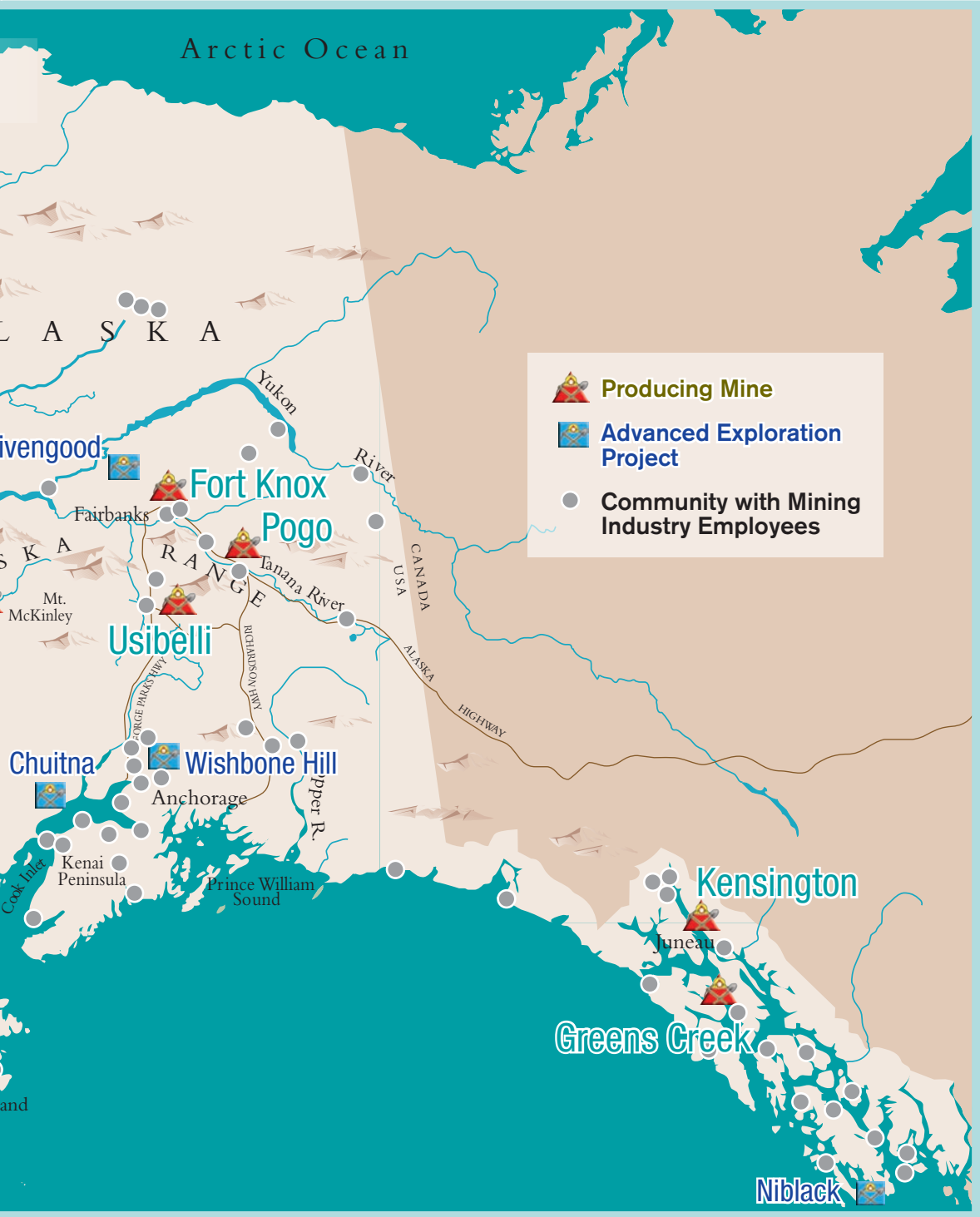
Fort Knox Mine
Gold
- Alaska's largest surface gold mine
- Largest single property taxpayer in the Fairbanks North Star Borough
- Discovered in 1984, producing since 1996
- 500 employees in 2011

Pogo Mine
Gold
- Discovered in 1994, producing since 2006
- 312 full-time employees and 150 full-time contractors in 2011
- Paid more than $51 million in wages in 2011
- Capital spending exceeded $11 million in 2011

Kensington
Gold
- 2011 marked the first full year of production
- Expect nearly 90,000 ounces of gold in 2011
- Adding infrastructure to provide long-term, sustainable production
- 230 employees in 2011

Nixon Fork
Gold and copper
- Discovered in 1917, intermittent production since 1920s
- Production suspended in 2007, re-opened in 2011
- 100 jobs in 2011





Chuitna
Coal

- Currently in the permitting process
- 300-350 expected production jobs

Wishbone Hill
Coal

- First mined in 1916
- Project feasibility study completed in November 2011
- 75-125 potential production jobs

Donlin Gold
Gold

- Discovered in 1988, continued exploration since 1995
- Permitting process expected to start in 2012
- 87% Calista shareholder hire at its camp operation
- Up to 1,400 potential production jobs, depending on the production timeline

Livengood
Gold

- Placer mining began in 1914, lode deposit discovered in 2007
- Pre-feasibility Study expected by June 2012
- Approximately 500 potential production jobs

Niblack
Gold, silver, copper, and zinc

- Ongoing exploration for more than 10 years
- $26 million invested since 2009
- 200-300 potential production jobs

Pebble Project
Copper, gold, and molybdenum

- Discovered in 1987, ongoing exploration and environmental studies since 2002
- Over $400 million invested through 2010
- 800-1,000 potential production jobs

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Strengthening Local Economies and Communities

Mining companies strengthen Alaska's local economies by employing Alaska residents from more than 120 Alaska communities located in 26 out of 29 Alaska boroughs or census areas. The industry also purchases supplies and services from hundreds of Alaska businesses.

These mining companies are also a significant source of stable revenue for local governments, as well as significant state government revenue. In 2011, Alaska's mining industry paid:

An estimated total of **$17.2 million to local governments,** including:

- $8.9 million in payment in lieu of taxes (PILT) by Red Dog to the Northwest Arctic Borough.
- $5.6 million in property taxes paid by Fort Knox to the Fairbanks North Star Borough.
- $1.4 million in property taxes paid by Greens Creek to the City and Borough of Juneau.
- $1.2 million in property taxes paid by Kensington to the City and Borough of Juneau.
- Tax payments to other local governments, including Denali Borough, City of Nome and others.
- Mining industry employees also pay local property and sales taxes.

Mining companies paid an estimated **$148 million to state government** in royalties, rents, fees, and taxes, up 170% from 2010.

The mining industry also paid **$70.1 million in other state government-related revenues,** including:

- $28 million to the Alaska Railroad Corporation – $21 million for moving coal and $7 million for moving sand and gravel.
- $41.1 million to Alaska Industrial Development & Export Authority for the use of state-owned facilities (DeLong Mountain Regional Transportation System and Skagway Ore Terminal).

- $1.0 million to the Alaska Mental Health Trust for rents and royalty payments, and construction material sales.

Partnering with Alaska Native Corporations

All Alaska Native corporations benefited from mining industry activity – in 7(i) and (j) royalty sharing payments, in jobs for shareholders, or through business partnerships.

- $169.9 million in net proceeds from Red Dog Operations to NANA and distributed $82.0 million to other Alaska Native regional and village corporations.
- 56% of the 550 year-round jobs at Red Dog are filled by NANA shareholders, including Teck Cominco, NANA Lynden and NANA Management Services jobs.
- Calista Corporation anticipates $2 million in royalties and other revenue for mineral agreements, including lode exploration, placer gold production, and construction material sales.
- Calista shareholders, descendants and spouses predominantly fill the exploration camp jobs at Donlin Gold.

Many Alaska Native corporations have taken the opportunity to develop businesses that serve the mining sector, including: NANA Regional Corporation, Calista Corporation, The Kuskokwim Corporation, Central Council Tlinglit & Haida Indian Tribes of Alaska, Goldbelt, Inc., Kake Tribal Corporation, Klukwan, Inc., Prince of Wales Tribal Enterprise Consortium, Iliamna Development Corporation, Pedro Bay Corporation, Alaska Peninsula Corporation, Kijik Corporation, Igiugig Native Corporation, Tenalian Incorporated, and Tyonek Native Corporation.

Every Alaska Native region has some form of mining potential, ranging from gravel operations to gold, silver, copper, nickel, lead, zinc, platinum, tungsten, manganese, rare earth minerals, jade, limestone, and coal deposits. Several Alaska Native corporations, such as NANA Regional Corporation, Calista Corporation, The Aleut Corporation, Sealaska Corporation, CIRI, Doyon Ltd., Ahtna Inc. and Arctic Slope Regional Corporation, are actively evaluating the mining potential in their regions.

Special thanks to Dave Szumigala, Alaska Department of Natural Resources, and Lisa Harbo, Alaska Department of Commerce, Community and Economic Development for their assistance. Other sources used in this report include: State of Alaska Departments of Commerce, Community and Economic Development, Labor and Workforce Development, Natural Resources, and Revenue, Alaska Railroad Corporation, Alaska Industrial Development & Export Authority, various local and borough governments, and mining companies. Prepared in consultation with McDowell Group, Inc.

Attachment C

"Alaska's Mineral Report 2009," D.J. David Szumigala, L.A. Harbo, and R.A. Hughes

Alaska's Mineral Industry 2009

D.J. Szumigala[1], L.A. Harbo[2] and R.A. Hughes[3]

INTRODUCTION

Alaska has long been considered a frontier compared to most of North America and it still maintains that status with regard to mineral resources. The state's abundance of natural resources has drawn explorers for the past two centuries and remains the driving force in its economy. Juneau, Nome, Fairbanks, and other towns across the state were built around early mining camps, and mining remains a significant local source of employment, infrastructure, and government revenue. The unmatched geologic diversity of Alaska hosts a wide range of metallogenic settings and mineral commodities. The great mineral potential of the state is evident in past production from world-class deposits—placer gold from the Fairbanks and Nome mining districts; copper from the Jumbo, Bonanza, Erie, Mother Lode, and Green Butte mines in the Kennecott district; gold from the Alaska–Juneau and Treadwell mines near Juneau; and placer platinum from the Goodnews Bay mining district. Alaska's world-class deposits currently in production are Red Dog, Greens Creek, and Fort Knox mines. The Pebble, Donlin Creek, and Money Knob deposits indicate that there are still extremely large mineral deposits to be developed in Alaska; undoubtedly other world-class Alaska mineral deposits remain to be discovered.

Alaska is strategically located along the Pacific Rim and offers prospective land, sanctity of title, a state-sponsored geological and geophysical mapping effort, a reasonable permitting process, capable workforce, exploration incentives, and inventive infrastructure equity-sharing programs. More than 190 million acres of federal, state, and Native lands are open for mineral-related activities and mining. It is the policy of the State of Alaska to encourage the settlement of its land and the development of its resources by making them available for maximum use consistent with the public interest.

The total value of Alaska's mineral industry in 2009 was $2.964 billion, $204.2 million and 6.5 percent lower than the 2008 value of $3.1706 billion. The decline in total value primarily is explained by lower metal prices, increased operating costs, and a worldwide economic slowdown. Table 1 shows the estimated annual value of the mineral industry in Alaska from 1981 through 2009, as divided between exploration and development investments, and the gross value of the mineral products. This total value, although it is a combination of expenses and receipts, is an effective way of tracking the annual strength of the mineral industry and reflects the amount of capital invested in Alaska. The year 2009 was the 14th consecutive year with a total value exceeding $1 billion and the fourth consecutive year with production value above $2 billion.

Exploration activities continued for a wide variety of commodities across all regions of Alaska, with new discoveries and expansion of recently announced mineral resources. Exploration expenditures were $180.0 million in 2009, a 48 percent decrease from the $347.3 million expended in 2008. The year 2009 was the fifth consecutive year with expenditures of more than $100 million. Development expenditures in Alaska declined in 2009 to approximately $330.8 million from $396.2 million in 2008, a nearly 17 percent decrease, and 2009 was the sixth year with development expenditures above $200 million. Mineral production volumes increased for most metals; however, declining prices for most metals subdued production values. The value of mineral production in 2009 increased more than 1 percent, to $2,455.6 million, from $2,427.1 million in 2008.

Figure 1 shows the regions of the state as defined for this report. Table 1 and figure 2 show the estimated value of the mineral industry in Alaska per year from 1981 through 2009, as divided between exploration and development investments, and the gross value of mineral products. Company information is generally used to define the exploration and development parameters. Average metal prices are calculated from the daily London PM closing price for gold, and from the average weekly spot price on the London Metal Exchange for the other metals. It is important to note that these prices are used to calculate the value of metals produced in the state, but do not take into account the costs of min-

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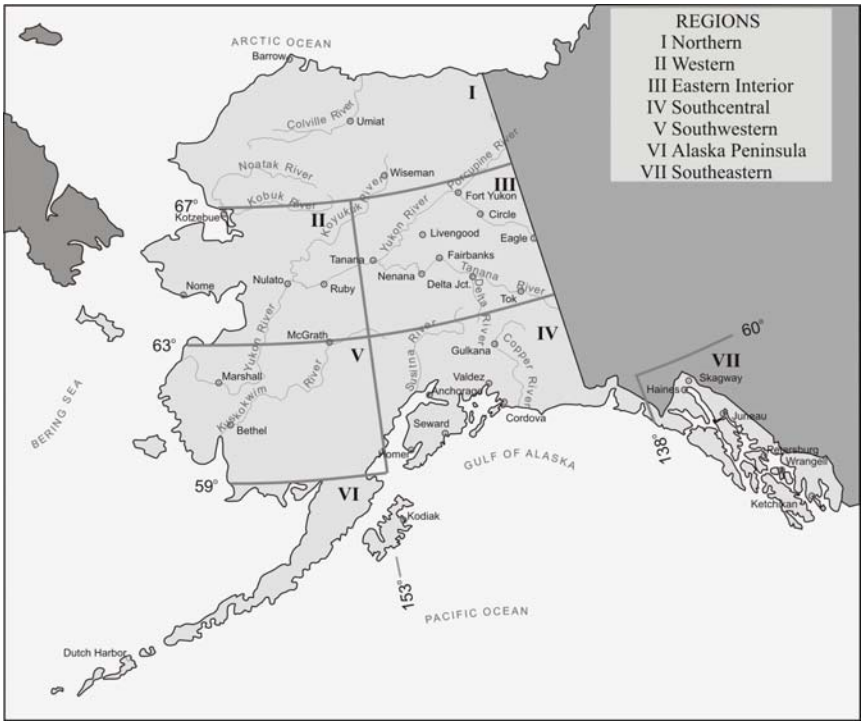


Figure 1. Regions of mineral activity as described in this report.

ing or transportation, or smelter charges and penalties. Coal prices are estimated from average coal prices for similar grade material around the Pacific Rim. Industrial material prices are based on regional rates provided by some operators.

Please note that the formatting and presentation of data in some tables has changed compared to previous editions of this report, reflecting changes in data collected and accounting practices by the mining industry. Whenever possible, the authors have worked to maintain consistency of data for seamless year-to-year comparisons. Most changes are noted in footnotes in the affected tables.

This summary of Alaska's mineral industry activity for 2009 is the 29th in the series of annual reports, and is made possible by information provided through press releases, company annual and financial reports, phone interviews, other research, and replies to questionnaires mailed by the Alaska Division of Geological & Geophysical Surveys (DGGS). This report is part of a cooperative venture between DGGS and the Division of Economic Development in the Department of Commerce, Community and Economic Development (Commerce). Commerce provides the funding to print the report. Information in this report supersedes data previously published in DGGS Information Circular 60.

EMPLOYMENT

Figure 3 displays employment within various segments of Alaska's mineral industry. Table 2 lists estimated employment in the Alaska minerals industry for the past nine years and figure 4 shows the trends in that employment from 2000 through 2009. Total minerals industry employment in 2009 is estimated to be 3,280 full-time-equivalent jobs, a decrease of 112 jobs (3.3 percent) from the estimated 2008 total of 3,392 full-time-equivalent jobs. The largest change in employment compared to 2008 was the drop in mineral development jobs from 516 to 371, a 28 percent decrease. Exploration jobs also decreased from 546 jobs in 2008 to 422 in 2009, a 23 percent decrease.

Mineral production employment increased significantly in 2009, with 2,487 jobs across all production sectors in 2009 compared to 2,330 jobs in 2008. Lode gold mining jobs increased 13 percent in 2009, adding 93 jobs. Placer gold mining employment also increased significantly in 2009, with 123 full-time-equivalent jobs added to the 312 jobs estimated for 2008, a 39 percent increase. The high price of gold was the most significant factor in the increase in gold miners and likely influenced the increase in recreational miners reported from 2008 to 2009. Full-time-equivalent jobs decreased in the base-metals sector by 62 jobs, or 13 percent, from 2008 to 2009. Modest employment increases were seen in the polymetallic, and sand and gravel mining sectors.

The average monthly wage for mining in Alaska during 2009 was $7,588, according to the Alaska Department of Labor & Workforce Development (DLWD), compared to an average monthly wage for all industries in Alaska of $3,886. Mining jobs in Alaska have higher

Table 1. Total value of the mineral industry in Alaska by year (in millions of U.S. dollars).

Year	Exploration (expenditure)	Development (expenditure)	Production (value)	Total (calculated)
1981	$ 76.3	$ 24.7	$ 188.6	$ 289.6
1982	45.6	41.6	196.4	283.6
1983	34.1	27.9	212.4	274.4
1984	22.3	53.4	199.4	275.1
1985	9.2	34.1	226.6	269.9
1986	8.9	24.3	198.5	231.7
1987	15.7	100.3	202.4	318.4
1988	45.5	275.0	232.2	552.7
1989	47.8	134.3	277.0	459.1
1990	63.3	14.3	533.0	610.6
1991	39.9	25.6	546.5	612.0
1992	30.2	29.6	560.8	620.6
1993	30.3	27.7	448.7	506.7
1994	31.1	45.0	507.5	583.6
1995	34.3	148.6	537.2	720.1
1996	44.7	394.0	590.4	1,029.1
1997	57.8	168.4	936.2	1,162.4
1998	57.3	55.4	921.2	1,033.9
1999	52.3	33.8	1,032.9	1,119.0
2000	34.9	141.7	1,106.4	1,283.0
2001	23.8	81.2	917.3	1,022.3
2002	26.5	34.0	1,012.8	1,073.3
2003	27.6	39.1	1,000.7	1,067.4
2004	70.8	209.1	1,338.7	1,618.6
2005	103.9	347.9	1,401.6	1,853.4
2006	178.9	495.7	2,858.2	3,532.8
2007	329.1	318.8	3,367.0	4,014.9
2008	347.3	396.2	2,427.1	3,170.6
2009	180.0	330.8	2,455.6	2,966.4
TOTAL	**$ 2,069.4**	**$ 4,052.5**	**$ 26,433.3**	**$ 32,555.2**

Source: Alaska's Mineral Industry reports published annually by DGGS/ Commerce.

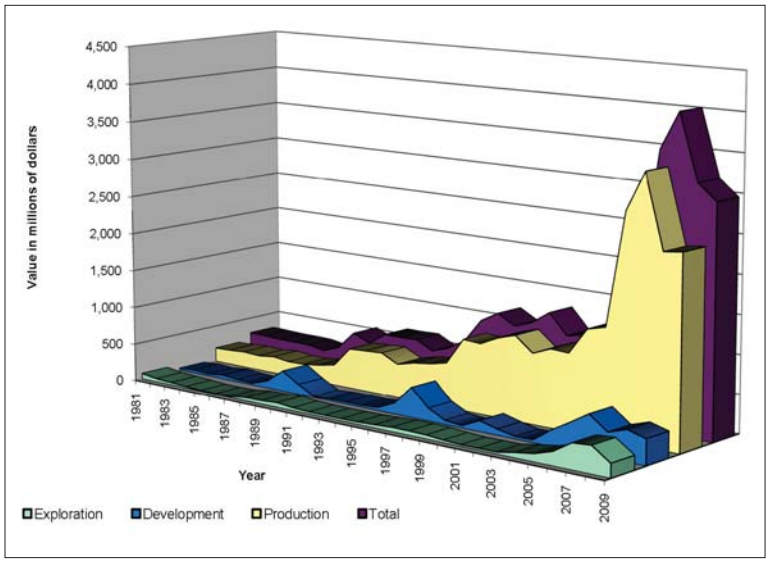
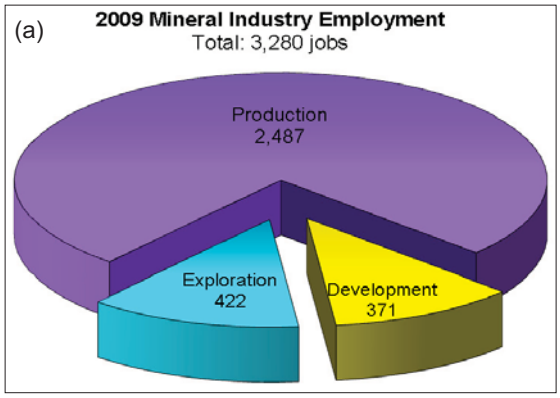


Figure 2. Alaska's mineral industry total value, 1981–2009.

wages than any other industry except oil and gas. The average annual earnings for a mining job were $91,100 in 2009, according to DLWD. Mining jobs pay nearly twice the Alaskan average annual earnings of $46,600. Mining wages in Alaska totaled $183,375,314 in 2009. The agency reported that there were 2,126 mining jobs in Alaska in 2009, with total employment in all industries in Alaska during 2009 at 320,265 jobs. Mining employment was reported in most regions of Alaska, with 685 jobs in the Fairbanks North Star Borough, 380 jobs in the Anchorage municipality, and 281 jobs in the City and Borough of Juneau. During the last 10 years, according to the DLWD, employment growth by Alaska's mining industry has outpaced growth of the United States' aggregate mining industry employment by nearly 40 percent; expansions in Alaska's mining industry employment have also eclipsed employment growth in most of Alaska's other private industries. The DLWD statistics do not include the self employed, such as the majority of placer operators; their employment data also does not often include jobs in the exploration and development phases of mining. Jobs in these mining phases are often grouped by the DLWD in the engineering, environmental, or construction industries. Consequently, mining's contributions to employment and earnings in Alaska could be underestimated.

The average monthly wage for metal mining in Alaska during 2009 was $7,795, according to the DLWD. They also report that the average employment during 2009 was 1,767 full-time-equivalent jobs in metal mining, more than 300 in coal mining and nonmetallic mineral mining and quarrying, and 9,321 in support activities for mining, oil, and gas.



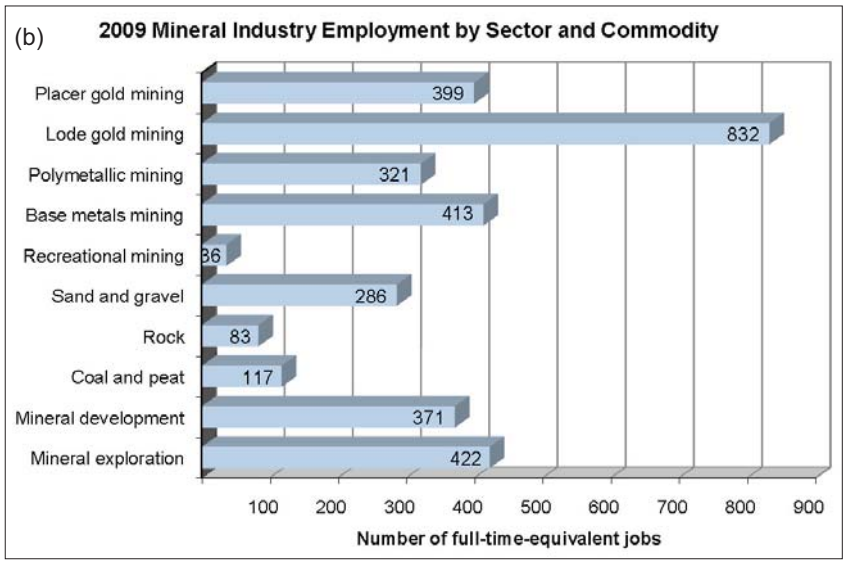


Figure 3. 2009 mineral industry employment in Alaska by (a) category and (b) sector and commodity.

Table 2. Estimated Alaska mine employment, 2001–2009[a].

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Gold/silver mining									
Placer	176	148	82	64	86	242	208	282	399
Lode	337	413	325	433	411	704	808	739	832
Polymetallic mining	275	262	295	265	250	245	276	317	321
Base metals mining	559	580	388	508	449	457	457	475	413
Recreational mining	210	180	175	175	175	45	54	30	36
Sand and gravel	556	702	349	567	400	337	284	277	286
Rock	137	177	35	475	148	104	124	93	83
Coal and peat[b,c]	153	121	85	94	101	106	113	117	117
Tin, jade, soapstone, ceramics, platinum	20	20	20	- -	- -	- -	- -	- -	- -
Mineral development	333	135	64	283	498	848	735	516	371
Mineral exploration	79	86	88	184	303	435	499	546	422
TOTAL	**2,835**	**2,824**	**1,906**	**3,048**	**2,821**	**3,523**	**3,558**	**3,392**	**3,280**

[a]Reported man-days are calculated on a 260-day work year to obtain average annual employment unless actual average annual employment numbers are provided.
[b]This figure does not include all of the man-days associated with peat operations; most of those man-days are included in sand and gravel numbers.
[c]Coal and peat figures were combined in 2009 to maintain confidentiality.
- - = Not reported.

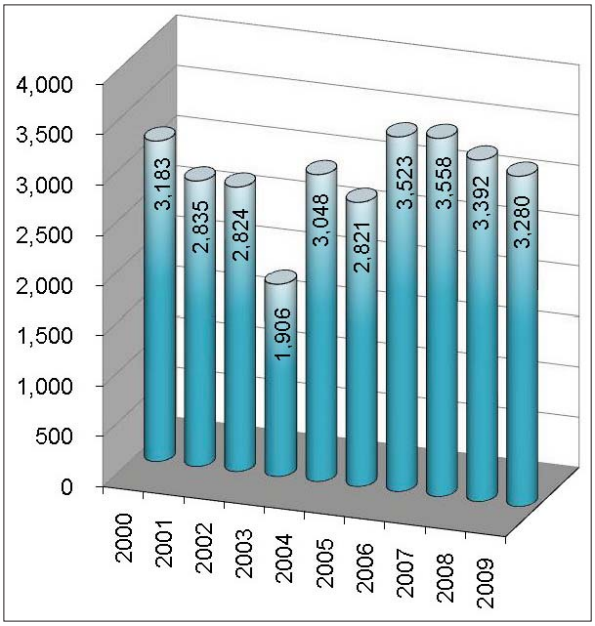


Figure 4. Total mineral industry employment in Alaska from 2000 through 2009.

Nonmetallic mineral product manufacturing provided 328 jobs, including an average of 315 jobs in cement and concrete manufacturing for 2009. Primary metal manufacturing provided 23 full-time-equivalent jobs, while metal and mineral merchant wholesalers provided an average of 114 jobs during 2009.

Nearly three-quarters of all wage and salary earnings from mining stay within the state, according to the DLWD, because Alaska residents comprise three-quarters of all workers in the mining industry. Mining wages for Alaska residents totaled more than $145.3 million in 2009. Workers in the mining industry live in 26 of Alaska's 29 boroughs and census areas, and they often reside in a different borough or census area than where they work. Mines are often the largest, or among the largest, employers in their borough or census area. Mines are also located in remote areas of the state where other employment opportunities are scarce, with half of all mining jobs, as tabulated by the DLWD, located in rural Alaska (fig. 5).

Labor & Workforce Development statistics are collected using different methods than the employment figures collected for this report; thus there is no direct correlation between the two sets of employment figures. For example, the DLWD mining employment and wage statistics are based on 77 reporting units (companies) consisting of one coal, 42 metal ore, and 34 nonmetallic mineral, quarrying units.

In 2009, Greens Creek, Red Dog, and Pogo mines were the largest employers in Juneau, the Northwest Arctic Borough, and Southeast Fairbanks Census Area, respectively. Fort Knox Mine and Usibelli Coal Mine are both the third-largest employers in their respective boroughs. Kensington Mine will likely become one of the top ten private employers in Juneau by 2011.

The Alaska mining industry also created an estimated 1,900 indirect jobs, according to a 2009 study prepared for the Alaska Miners Association Inc. by the McDowell Group Inc. Mining companies strengthen Alaska's local economies by employing Alaska residents from more than 120 Alaska communities and by purchasing supplies and services from hundreds of Alaska businesses.

GOVERNMENT REVENUES FROM ALASKA'S MINERAL INDUSTRY

Revenues are paid to the State of Alaska by the minerals industry through a number of instruments. Those instruments include State claim rentals, production royalties, annual labor, coal land rentals, coal royalties, material (rock, sand, and gravel) sales from state and mental health trust and State Pipeline Coordinator's Office managed lands, miscellaneous fees, state fuel taxes, corporate income taxes, and mining license taxes. Municipalities also receive revenues from the minerals industry for property taxes, payments in lieu of taxes (PILT), severance taxes, and sales taxes. The total revenues paid to the state and municipalities for 2009 amounted to more than $70.2 million (this number will be revised by the figure for State corporate income tax; that figure was not available at time of printing), an increase from the $67.9 million paid in 2008. See table 3 for an itemized listing of revenues paid. The 2009 revenues are incomplete because 2009 corporate income tax data was not available for this publication.

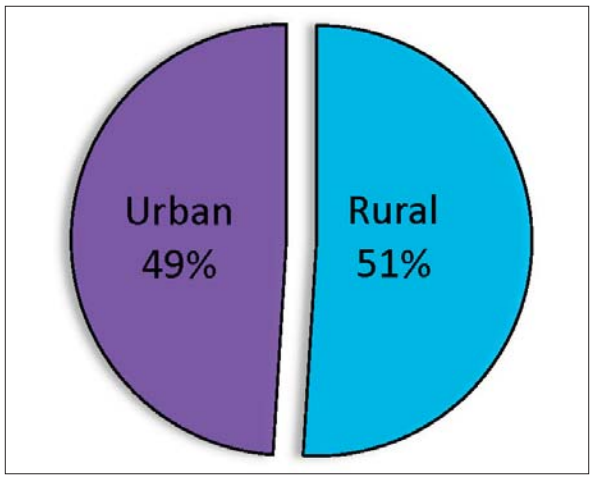


Figure 5. Alaska mining employment, 2009. Note Urban Alaska includes Anchorage, Fairbanks North Star Borough, and Juneau. Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section.

Revenues to the State of Alaska and municipalities from mineral-industry-specific fees, rent, sales, royalties, and taxes are shown in figure 6.

State mineral and coal rents and royalties amounted to $6,441,734 during 2009 compared to $6,629,451 for 2008. Details of the payments by item are shown in table 3. The State of Alaska mining laws grant the holder of a mining claim exclusive right to the locatable minerals in the ground covered by that mining claim. State mining claims have recording, rental, and other fees associated with them. Mining claim location certificates and recording fees must be recorded in the recording district office in which the claim is located within 45 days of the posting date. Recording fees change from time to time and

Table 3. Revenues paid to the State of Alaska and municipalities by Alaska's mineral industry, 2004–2009.

	2004	2005	2006	2007	2008	2009
State mineral rents and royalties[a]						
State claim rentals	$ 2,657,939	$ 3,308,752	$ 3,460,803	$ 4,649,795	$ 3,082,071	$ 3,295,631
Production royalties[b]	162,637	124,338	171,220	800,548	1,518,622	1,368,526
Annual labor	226,191	332,439	155,007	163,279	380,169	482,858
Subtotal	**$ 3,046,767**	**$ 3,765,529**	**$ 3,787,030**	**$ 5,613,622**	**$ 4,980,862**	**$ 5,147,015**
State coal rents and royalties						
Rents	236,532	257,112	337,764	253,376	248,841	374,433
Royalties[b]	1,239,257	1,476,250	1,473,948	1,443,050	1,399,748	920,286
Bonus	-	129,880	10	-	-	-
Subtotal	**$ 1,475,789**	**$ 1,863,242**	**$ 1,811,722**	$ 1,696,426	$ 1,648,589	$ 1,294,719
State material Sales						
Mental Health	76,267	129,409	89,634	24,835	37,734	170,996
Division of Land	467,360	944,905	1,582,769	2,615,810	2,818,107	4,323,601
SPCO	112,047	46,877	118,904	57,056	182,237	179,875
Subtotal	**$ 655,674**	**$ 1,121,191**	**$ 1,791,307**	**$ 2,697,701**	**$ 3,038,078**	**$ 4,674,472**
State mining miscellaneous fees						
Filing fees	1,300	8,465	965	1,750	2,750	1,787
Penalty fees	26,110	20,280	46,249	24,005	18,876	115,819
Explore incentive app filing fee	-	-	-	-	-	-
Bond pool payment	35,426	32,331	36,721	43,909	39,429	70,548
Surface coal mining app fee	3,116	3,150	10,897	10,458	3,023	1,800
APMA mining fees	14,550	17,131	17,475	20,877	23,811	19,519
Subtotal	**$ 80,502**	**$ 81,357**	**$ 112,307**	**$ 100,999**	**$ 87,889**	**$ 209,473**
AIDEA - Facilities use fees	15,730,000	15,607,000	15,476,000	16,218,000	16,190,000	15,918,000
State Fuel Taxes				726,563	428,214	877,952
State corporate income tax	2,104,144	23,641,883	71,299,684	61,331,540	12,919,787	N/A[c]
Mining License Tax[d - f]	10,317,238	18,637,996	79,141,526	54,408,227	16,044,139	29,725,100
State Total	**$ 33,410,114**	**$64,718,198**	**$173,419,576**	**$142,793,078**	**$55,337,558**	**$57,846,731**
Payments to Municipalities	$ 10,999,663	$11,975,892	$ 14,388,329	$15,827,501	$12,599,399	$12,387,540
TOTAL[g]	**$ 44,409,777**	**$76,694,090**	**$187,807,905**	**$158,620,579**	**$67,936,957**	**$70,234,271**

[a]Includes upland lease and offshore lease rentals.
[b]Reported on a cash basis - payments actually received during the given year.
[c]Preliminary data not available for 2009.
► Only subchapter C corporations pay income tax.
► This report may not reflect 100% of the returns received in a year.
► Data from 2004 through 2008 has been updated to reflect revenue to the state for the succeeding fiscal year; ex.: FY 07 receipts are shown in calendar year 2006.
[d]Includes metals, coal, and material.
[e]Mining license tax has been adjusted to reflect actual receipts for the succeeding fiscal year for the period 2003 to 2008; see note for income tax above.
[f]2009 numbers are preliminary and are subject to revision.
[g]2009 total is incomplete and will be revised.

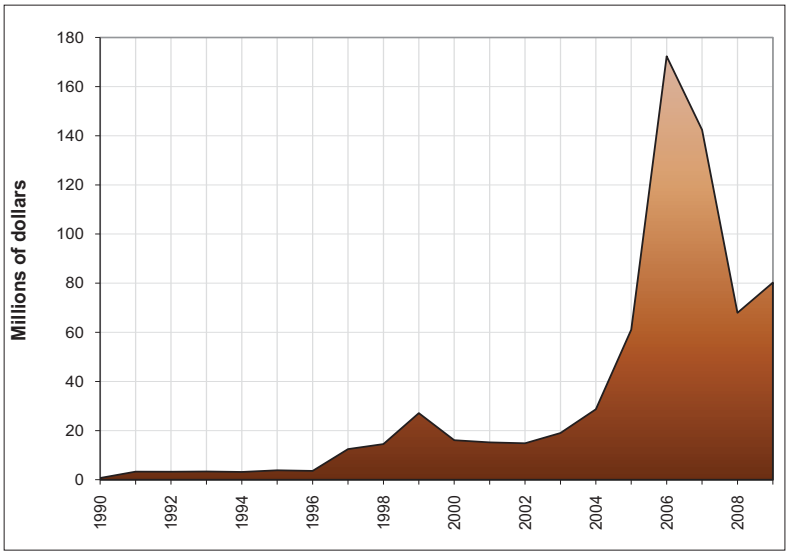


Figure 6. Mining industry revenue to State of Alaska and municipalities from 1990 to 2009.

the Recorder's Office should be contacted for the correct fee; recording fees are also posted at the following web site address: http://dnr.alaska.gov/ssd/recoff/fees.cfm. Rental fees under regulation 11 AAC 86.215 are shown in table 4, and must be paid according to the instructions on the back of the certificate form.

Annual rental fees for State mining claims, leasehold locations, upland mining leases, offshore mining leases, and prospecting sites increased in 2009. Alaska Statute directs DNR to revise the annual rental rates to match the changes in the Consumer Price Index (CPI) for Anchorage as compiled by the U.S. Department of Labor. The statute requires DNR to make the revisions every ten years, so the more than 60 percent increase in 2009 represents ten years increase to the CPI. The new rates began for mining claim payments due November 30, 2009, which cover mining claims for the "mining fiscal year" that runs September 1, 2009, through August 31, 2010. The first rental payment covers the period from the date of posting the claim to the following September 1st. Annual labor must be performed on a mining claim each year. The annual lease rate for coal properties is $3.00 per acre. The rental payments may be credited against royalties to the extent that they do not exceed the royalties.

In 1989, the Alaska State Legislature enacted a new production royalty law, Alaska Statute 38.05.212, which requires holders of state mining locations to pay a production royalty on all revenues received from minerals produced on state land. The production royalty requirement applies to all revenues received from minerals produced from a state mining claim or mining lease during each calendar year. Payment of royalty is in exchange for and to preserve the right to extract and possess the minerals produced. The production royalty is 3 percent of the net income as determined under the Mining License Tax Law AS 43.65 and regulation 15 AAC 65. Department of Natural Resources regulations 11 AAC 86.760–796 provide details regarding the production royalty requirements.

The state sells rock, sand, and gravel from its lands at a prescribed rate for use in construction. Lands involved in those sales include Mental Health Land Trust, Division of Lands, and State Pipeline Coordinator's Office (SPCO). Sales of these materials generated $4,674,472 during 2009, compared to $3,038,078 during 2008. Other common variety minerals that could be involved in this category include riprap, limestone, slate, peat, and any other substances from the ground that are not designated through the location system for mining claims

Table 4. Alaska state annual claim rental rates by size and maturity. Rental rates were adjusted in 2009 in accordance with the Consumer Price Index for Anchorage as prescribed by statute AS 38.05.211.

Years Since Location	Rental Per Quarter Section Size Claim	Rental Per Traditional Quarter–Quarter Section Size Claim	Rental for All Leases (per acre fee)
0–5	$140	$ 35	$0.88
6–10	$280	$ 70	$1.75
11 or more	$680	$170	$4.25

(for example, gold, silver, and other metals) or leasing (for example, energy minerals such as coal, oil, and gas). Materials are measured and sold by the cubic yard. The price charged for materials depends on the type, or size, of sale, but prices are based on a competitive or fair market price of material in the area. Contact the DNR information office for further information (see Appendix F for contact information).

Claim and leaseholders on state land are assessed miscellaneous fees; these amounted to $209,473 in 2009 compared to $87,889 in 2008. Miscellaneous fees are segregated in table 3 and comprise filing fees, penalties, exploration incentive application fees, bond pool payments, surface coal mining application fees, and Annual Placer Mining Application (APMA) fees.

Fuel tax collected by the State for 2009 amounted to $877,952, compared to $428,214 during 2008. These numbers were collected from mining companies and are likely not entirely complete. The motor fuel tax was suspended for one year on September 1, 2008. The motor fuel tax is $0.08/gallon and is collected for all fuel for mining operations. Fuel used for heating and stationary power plant is not taxable and application for refund of the full amount may be made to the State of Alaska. Off-highway fuel use for equipment and vehicles, mobile power plants, pumps, and unlicensed vehicle operation is partially refundable at the rate of $0.06/gallon of gasoline or diesel fuel.

The Mining License Tax was established by statute (AS 43.65) to collect taxes on net income from mining operations after a 3.5 year initial production grace period provided to taxpayers to help return their initial investment. The rates on mining net income are as follows: No tax if net income is $40,000 or less; $1,200 plus 3 percent if over $40,000; $1,500 plus 5 percent if over $50,000; and $4,000 plus 7 percent if over $100,000. The total Mining License Tax collected for 2009 was $29,725,100, compared to $16,044,139 in 2008. Mining License Tax returns are confidential and cannot be reported by individual/entity.

Corporate income taxes are assessed on all corporations having net income from mining operations in the state. The preliminary total for corporate income tax collected by the state during 2009 from mining operations was not available at press time. The corporate income taxes collected from mining in 2008 amounted to $12,919,787. Corporate income taxes are confidential and can't be reported by individual corporation. The corporate income tax rate is set by statute and is shown in table 5.

Mining companies were the largest taxpayers in the City and Borough of Juneau and the Fairbanks North Star Borough. Red Dog Mine paid $6.7 million to the Northwest Arctic Borough in 2009 as Payment in Lieu of Taxes. Mining companies contributed to the Denali Borough through PILT and severance tax payments. The Alaska Industrial Development & Export Authority (AIDEA) was paid annual user fees of $15.9 million for use of the State-owned road and port, the DeLong Mountain Regional Transportation System, by Teck Alaska Inc., operator of the Red Dog Mine, and for use of the Skagway Ore Terminal by Minto Explorations Ltd., subsidiary of Capstone Mining Corp. (formerly Sherwood Copper Corp.).

ACKNOWLEDGMENTS

This report on Alaska's mineral industry is intended to provide current, accurate, and technically reliable information. The authors wish to thank all companies, agencies, and individuals that responded to the questionnaires or phone calls and provided information about their activities and operations. Without their voluntary and timely information this report would not be possible. DGGS mailed and emailed more than 700 questionnaires in December 2009 and continued sending additional questionnaires through 2010. We received 115 responses and followed questionnaire requests with phone calls and other means of contact. Dave Szumigala (DGGS), Rich Hughes (Commerce), and Lisa Harbo (Commerce) prepared the body of the text, tables, graphic illustrations, and appendices with information supplied by many individuals. Some photos and images used in this report were provided by members of the public; these contributions are greatly appreciated. Where appropriate, these people have been acknowledged in the text. Information and text previously compiled for DGGS Information Circular 60 were used extensively.

The booklet's design, layout, and cover are by Joni Robinson (DGGS); Paula Davis (DGGS) edited the final version. Commerce's Division of Economic Development paid printing costs.

Table 5. State corporate income tax rate.

Net Income	Base Tax	Plus %	Of Amount Over
<$10,000	$ - -	1%	$ - -
10,000–20,000	100	2%	10,000
20,000–30,000	300	3%	20,000
30,000–40,000	600	4%	30,000
40,000–50,000	1,000	5%	40,000
50,000–60,000	1,500	6%	50,000
60,000–70,000	2,100	7%	60,000
70,000–80,000	2,800	8%	70,000
80,000–90,000	3,600	9%	80,000
>$90,000	$ 4,500	9.40%	$ 90,000

Attachment D

"Structural Analysis of the Alaska Economy," (Mining section), March 2012, Dr. Scott Goldsmith, UAA and ISER

D. MINING

The mining sector consists of three different activities: (1) hard rock mining for export, (2) coal mining that serves both local and export markets, and (3) production of construction materials—sand, gravel, and rocks—for the local market. Hard rock mining and about half of the coal mining activity comprise the economic base portion of this sector.

The economic base, in turn can be divided into three components: exploration and development of new mineral prospects (Donlin Creek and Pebble); production of zinc, lead, gold, and silver from large-scale mines (Red Dog, Fort Knox, Pogo, and Greens Creek and Kensington); and production of a variety of minerals from smaller operations that include both business and recreational operations. Most direct employment is associated with operations of the large-scale mines although exploration and development employment, which varies considerably from year-to-year, can be significant when a large prospect, such as a Donlin Creek or Pebble, is under investigation or development. Only primary processing of minerals occurs within the state.

VALUE OF OUTPUT

In 2010 the estimated market value of the four most important products of the mining industry—zinc, lead, gold, and silver—was $3.00 billion, based on world prices.[18] Zinc, produced at the Red Dog Mine, was the most valuable product, closely followed by gold.

The value of coal production in 2010 was $73 million, and the value of production of construction materials was $52 million. Aside from the export of a portion of coal production, these products are for the Alaska market and, consequently, not considered part of the economic base of the mining industry.

[18] The values reported by the State of Alaska, Department of Natural Resources are based on the prices of refined metals. The values at the mine mouth are considerably lower, particularly for metals requiring significant refining.

Table III.D1. Value of Mining Production

Part A:

Calendar Year	1990	1995	2000	2001	2002	2003	2004	2005	2006
Annual Production									
Zinc (000 tons)	181	360	669	635	718	715	680	684	675
Lead (000 tons)							151	131	157
Gold (000 oz.)	232	142	546	551	562	528	457	427	576
Silver (000,000 oz.)	10	1	18	17	18	19	17	12	99
Coal (000,000 tons)	1.6	1.7	1.5	1.5	1.2	1.1	1.5	1.4	1.4
Price $/metric ton									
Zinc	$1,640	$1,230	$1,230	$969	$852	$896	$1,160	$1,480	$3,500
Lead	$1,010	$1,080	$961	$962	$961	$965	$1,200	$1,350	$1,710
Gold (Million $)	$12.4	$12.4	$9.0	$8.8	$10	$11.7	$13.2	$14.3	$19.5
Silver (Thousand $)	$155	$166	$161	$140	$148	$157	$207	$236	$373
Value of Production (Million $)									
Zinc	$254	$345	$682	$508	$503	$536	$651	$862	$2,003
Lead	$31	$34	$52	$56	$62	$64	$121	$115	$184
Gold	$89	$56	$152	$149	$174	$192	$192	$190	$336
Silver	$51	$7	$90	$73	$82	$95	$113	$86	$130
Other	$0.20	$0.00	$2.30	$1.99	$2.27	$0.00	$0.00		

Part B:

Calendar Year	2007	2008	2009	2010
Annual Production				
Zinc (000 tons)	696	626	712	667
Lead (000 tons)	167	153	167	146
Gold (000 oz.)	727	801	780	914
Silver (000,000 oz.)	20	15	16	14
Coal (000,000 tons)	1.3	1.5	1.9	2
Price $/metric ton				
Zinc	$3,400	$1,955	$1,714	$2,244
Lead	$2,728	$2,640	$1,912	$2,398
Gold (Million $)	$24.7	$30.83	$34.39	$43.3
Silver (Thousand $)	$431	$482	$472	$649
Value of Production (Million $)				
Zinc	$2,048	$1,055	$1,068	$1,312
Lead	$389	$287	$260	$284
Gold	$511	$698	$759	$1,119
Silver	$270	$219	$229	$282
Other	$2.83			

Source: Production and Value--State of Alaska, Department of Natural Resources, Alaska's Mineral Industry. Price—U.S. Geological Survey.
Value of production is based on market price.
Other includes mercury, tin, antimony, platinum, copper, chromium.

PERSPECTIVE

Alaska ranked 5th among states in 2011 in the value of production.

Table III.D2. Non-Fuel Mineral Production in the U.S., 2011

Rank	State	Value (Billion $)	Percent of U.S.
1	Nevada	$10.4	14.0%
2	Arizona	$8.2	11.2%
3	Minnesota	$5.1	6.9%
4	Utah	$4.6	6.2%
5	**Alaska**	**$3.8**	**5.1%**
6	Florida	$3.2	4.4%
Total US		$74.00	

Source: U.S. Geological Survey, Mineral Commodity Summaries 2012.

DIRECT JOBS

There were 2.254 thousand direct annual average wage and salary jobs in mining in 2005. In addition, there were about 700 self-employed engaged in mining for a total of 4.1 thousand. Although there are a small number of employees in the mining support sector associated with metal mining, we have included them all in the petroleum production sector.

Table III.D3. Mining—Wage and Salary and Total Jobs (Thousand)

Part A:

	1990	1995	2000	2001	2002	2003	2004	2005
Wage and Salary (212) (Annual Average)				NA	1.47	1.45	1.38	1.57
Proprietors (Self-Employed)								
Total	1.73	2.07	2.68		2.31	2.53	2.13	2.3

Part B:

	2006	2007	2008	2009	2010
Wage and Salary (212) (Annual Average)	1.76	2.0	2.1	2.0	2.3
Proprietors (Self-Employed)					
Total	2.64	3.7	3.7	3.5	4.1

Source: USDC BEA Regional Economic Accounts Web site, wage and salary employment—Table SA27, total employment—Table SA25.
NAICS codes in parentheses.

A separate employment estimate for the mining industry prepared by the Alaska Department of Natural Resources is slightly higher. This higher estimate is largely due to the inclusion of mining exploration support activities (part of NAICS code 213) as well as some construction employment associated with the development of new mines. This data source shows considerable variation from year-to-year in exploration and development, as one would expect. However, it also shows more variation in the categories of sand and gravel and rock than one might expect.

Table III.D4. Mining—Wage and Salary Employment, Alaska DNR

Part A:

	1990	1995	2000	2001	2002	2003	2004	2005	2006
Total	3,510	3,406	3,183	2,835	2,824	1,906	3,048	2,821	3523
Exploration	374	157	83	79	86	88	184	303	435
Development	95	637	345	333	135	64	283	498	848
Coal	115	120	121	121	100	65	90	95	95
Sand And Gravel	645	577	603	556	702	349	567	400	337
Recreational	315	255	250	210	180	175	175	175	45
Rock	160	200	150	137	177	35	475	148	104
Other (Gold, Silver, Base, Etc.)	1,806	1,460	1,631	1,399	1,444	1,130	1,274	1,202	1,659

Part B:

	2007	2008	2009	2010
Total	3,558	3,392	3,280	3,872
Exploration	499	246	422	520
Development	735	516	371	537
Coal	102	110	117	140
Sand And Gravel	284	277	286	313
Recreational	54	30	36	35
Rock	124	93	83	11
Other (Gold, Silver, Base, Etc.)	1,760	2,120	1,965	2,316

Source: State of Alaska, Department of Natural Resources, Alaska's Mineral Industry.

DIRECT EARNINGS

Wage and salary payroll for the mining industry in 2010 was $221 million and including benefits total compensation was $277 million. Proprietor income was modest and total earnings totaled $279 million. This amount excludes any payroll associated with mining support (NAICS 213) or construction employment engaged in development of new mines.

Table III.D5. Mining—Payroll, Compensation, and Earnings (Million $)

Part A:

	1990	1995	2000	2001	2002	2003	2004	2005
Payroll				NA	$93.9	$96.0	$95.1	$112.4
Compensation				NA	$110.4	$118.2	$119.5	$138.5
Proprietor Income				NA	$10.4	$9.5	$13.3	$15.5
Total Earnings	$83.6	$94.7	$114.0	NA	$127.0	$132.1	$133.8	$158.1

Part B:

	2006	2007	2008	2009	2010
Payroll	$142.1	$163.0	$194.5	$185.7	$220.6
Compensation	$178.0	$200.7	$242.3	$235.5	$277.0
Proprietor Income	$11.2	$10.3	$2.3	$2.3	$2.4
Total Earnings	$189.2	$211	$244.6	$237.8	$279.4

Source: USDC BEA Regional Economic Accounts Web site. payroll—Table SA07, compensation—Table SA06, total earnings—Table SA05
Payroll (wages and salaries for salaried workers) includes cash allowances and payments in kind.
Compensation includes payroll plus benefits.
Total Earnings is compensation of wage and salary employees and income of the self-employed.

AVERAGE EARNINGS

The average wage was $98 thousand in 2010 and average total compensation was $123 thousand.

Table III.D6. Mining—Average Annual Wage and Compensation (Thousand $)

	1990	1995	2000	2001	2002	2003	2004	2005
Wage				NA	$ 63.9	$ 66.1	$ 68.8	$ 73.2
Compensation				NA	$ 79.4	$ 84.4	$ 87.1	$ 90.1

	2006	2007	2008	2009	2010
Wage	$80.7	$83.3	$90.7	$92.0	$97.9
Compensation	$101.0	$112.9	$113.0	$116.6	$122.9

Source: ISER estimate based on USCE BEA Regional Economic Accounts.

SOURCE OF ECONOMIC CONTRIBUTION

The economic contribution of the mining industry comes from a combination of payroll and procurement associated with production of minerals, expenditures associated with exploration and development, and royalties paid to resource

owners. Exploration and development expenditures fluctuate considerably from year-to-year.

Table III.D7. Mineral Exploration and Development Expenditures

(Million $)

Part A:

	1990	1995	1996	2000	2001	2002	2003	2004	2005	2006
Total	$78	$183	$439	$177	$105	$61	$67	$280	$452	$508
Exploration	$63	$34	$45	$35	$24	$27	$28	$71	$104	$179
Development	$14	$149	$394	$142	$81	$34	$39	$209	$348	$693

Part B:

	2007	2008	2009	2010
Total	$648	$743	$511	$557
Exploration	$329	$347	$180	$264
Development	$319	$396	$331	$293

Source: State of Alaska, Department of Natural Resources, Alaska's Mineral Industry.

Several large producing and proposed mines located on private and Native land pay royalties to the landowners. In particular, the Red Dog mine (the largest zinc mine in the world) pays royalties to the NANA Regional Native Corporation, and under the terms of ANCSA (Alaska Native Claims Settlement Act), shares 62% of those royalties with the other Regional Native Corporations. Red Dog mine royalty payments have increased from $17 million in 2005 to $170 million in 2011, due to both the increase in the price of zinc and the terms of the royalty agreement. Of this total $82 million was shared with the other Native Corporations pursuant to the 7(i) sharing provision of ANCSA. The royalty is calculated as a share of profits, and the rate jumped to 25% after the development costs of the mine were paid off. It will eventually rise to 50%.

STATE AND LOCAL GOVERNMENT REVENUES

The mining license tax and the corporate income tax have been the largest components of state revenues from mining in recent years, followed by rents and royalties, sales, and fees. State revenues increased rapidly after 2000 to peak at $173.4 million in 2006 but have since moderated. Total state revenue in 2010, based on information from the Alaska Department of Natural Resources (ADNR), was $72.2 million (excluding income tax revenues). (Mining revenue reported by the Alaska Department of Revenue is smaller, partly because they do not separately identify all categories of revenues paid by the mining industry.)

Local government revenues from mining activity (including payments in lieu of taxes) were $14.22 million in 2010 (ADNR).

Table III.D8. Mining State and Local Revenues (Million $)

Part A:

	1990	1995	2000	2001	2002	2003	2004	2005
State Total			**$6.89**	**$5.44**	**$5.61**	**$8.54**	**$17.69**	**$49.11**
Corp Tax		NA	$0.30	$0.02	$0.22	$0.41	$2.10	23.64
Mining License Tax		$0.48	$1.86	$0.49	$0.38	$3.25	$10.32	$18.64
Mineral Rents		$0.75	$2.06	$1.84	$2.06	$2.62	$3.05	$3.77
Coal Rents		$2.04	$2.09	$1.37	$1.12	$1.30	$1.48	$1.86
Material Sales		$0.48	$0.52	$1.65	$1.77	$0.89	$0.66	$1.12
Misc Fees		$0.09	$0.08	$0.07	$0.06	$0.07	$0.08	$0.08
Local Total*			**$9.20**	**$9.76**	**$9.70**	**$10.51**	**$11.00**	**$11.98**

Part B:

	2006	2007	2008	2009	2010
State Total	**$173.42**	**$142.79**	**$55.40**	**$60.41**	**$72.27**
Corp Tax	$71.30	$61.33	$13.00	$2.56	NA
Mining License Tax	$79.14	$54.41	$16.04	$29.73	$43.33
Mineral Rents	$3.79	$5.61	$4.50	$5.15	$8.66
Coal Rents	$1.81	$1.70	$1.65	$1.30	$2.38
Material Sales	$1.80	$2.70	$3.04	$4.67	$0.32
Misc Fees	$0.11	$0.10	$0.09	$0.21	$0.56
Local Total*	**$14.39**	**$15.83**	**$12.60**	**$12.39**	**$14.24**

Source: State of Alaska, Department of Natural Resources, Alaska's Mineral Industry.
* Includes payments in lieu of taxes.

GROSS DOMESTIC PRODUCT

Gross Domestic Product in 2009 was $933 million. It is small relative to the value of output because mining is very capital-intensive with a relatively small labor component.

Table III.D9. Mining--Gross Domestic Product (Million $)

1990	1995	2000	2001	2002	2003	2004	2005
		$380	$265	$236	$248	$404	$590

2006	2007	2008	2009	2010
$866	$994	$909	$933	NA

Source: USDC BEA Regional Economic Accounts Web site.

MEASUREMENT ISSUES

This sector has good data contained in the annual Alaska's Mineral Industry report. However, information on proprietor activity—participants, income, value of output, residence—is very limited. Construction employment associated with the development of mineral prospects and transportation employment associated

with shipping of inputs and products should be included when calculating the importance of the sector.

PRIMARY DATA SOURCES

U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts Web site.

Alaska Department of Labor, Annual Employment and Earnings.

Alaska Department of Natural Resources, Alaska's Mineral Industry, annual.

Alaska Department of Revenue, Revenue Sources, semi annual.

U.S. Department of Commerce—Statistical Abstract.

U.S. Geological Survey, Historical Statistics for Mineral and Material Commodities in the United States.

RECENT LITERATURE

McDowell Group. *The Economic Impact of Alaska's Mining Industry*, prepared for the Alaska Miners' Association, Annual.

McDowell Group and Information Insights. *The Economic Impact of the Fort Knox Mine on the Fairbanks North Star Borough*, February 1999.

Northern Economics. *An Assessment of the Contribution of the Red Dog Mine Operations to the Economy of the Northwest Arctic Borough*, prepared for the Alaska Industrial Development and Export Authority, October 2002.

L. A. Peterson and Assoc. *The Role of Placer Mining in the Alaska Economy*, for the Alaska Department of Commerce and Economic Development, January 1986.

Power, Thomas. *The Role of Metal Mining in the Alaska Economy*, prepared for the Southeast Alaska Conservation Council and the Northern Alaska Environmental Center, February 2002.

Larson, Eric. And Bradford Tuck. *Mineral Mining Sector Report*. ISER for AIDEA and ADCED, October 1989.

Gilbertsen, Neal, and Dan Robinson. Natural Resources: Mining and Timber, *Alaska Economic Trends*, December 2003.

Tromble, Kristen, and Brigitta Windisch-Cole. Metal Mining: Revival of a Basic Industry, *Alaska Economic Trends*, November 1997.

Tromble, Kristen. Case Study of a Layoff—Life After Greens Creek, *Alaska Economic Trends*, January 1996.