The mineral mining sector includes the exploration, development, and production of metals, industrial minerals, and coal. Until recently most mining in Alaska was for gold, coal, and sand and gravel. However, large amounts of zinc, silver, and other minerals are now being mined at the newly developed Red Dog zinc mine near Kotzebue and the Greens Creek silver mine near Juneau. In addition, a number of large prospects are under active consideration for development. If brought into production, they would increase the size of this sector.

In 1988, before the opening of the Red Dog and Greens Creek mines, which are world-scale, the mining sector contributed less than one percent to the state’s total wage and salary employment, wages and salaries, and gross state product. Although the contribution of mining increased in the late 1980s, it is still small in relation to what petroleum contributes. Like the petroleum sector, mining is capital intensive: it requires few but highly skilled workers. Total employment is thus lower, but average wages are higher than in most industries. Average annual wages in mineral mining are second only to those in the petroleum sector and are nearly 70 percent higher than the state average.

Gold is mined in many locations on various scales using techniques ranging from dredging operations in the Northwest to seasonal recreational placer mining operations in the Interior. Sand and gravel mining also occurs throughout the state, but is concentrated in areas such as Anchorage where there is a demand from construction projects. Coal is mined at the Usibelli coal mine near Fairbanks. A planned mine at Wishbone Hill, north of Palmer, is scheduled to begin operation in 1991, and would produce approximately half as much coal for export as the Usibelli mine does.

Most of the gold and other metals mined in Alaska are sold outside the state prior to processing, while most of the sand and gravel are sold within the state. Just over half the coal is used for power generation within Alaska—the rest is exported to Korea. Most of the zinc and other minerals extracted at the Red Dog mine will be sold outside Alaska.

Further information on the Alaska Economic Database is available from the Division of Business Development of the Alaska Department of Commerce and Economic Development. This database was prepared under the sponsorship of the Alaska Industrial Development and Export Authority and the Alaska Department of Commerce and Economic Development by the Institute of Social and Economic Research, University of Alaska Anchorage. This overview was prepared by Marybeth Holleman of ISER.
dramatically in 1989 as the Greens Creek mine began full production. In 1988, just under 48,000 ounces of silver were mined. In 1989, Alaska produced 5,211,591 ounces of silver, of which 99 percent came from Greens Creek. Greens Creek also produces lead and zinc.

The Red Dog zinc mine may produce some silver, and is expected to produce about 560,000 tons of zinc concentrate a year. At full production it will be the largest producer of zinc not only in the U.S., but also in the world, comprising about 18 percent of total world production and 65 percent of U.S. zinc production. Red Dog will also produce lead and barite.

Demand for sand and gravel in Alaska is driven by construction projects for the petroleum industry, for other heavy construction, and for housing as well as commercial building. Fluctuations in output in the last 20 years follow fluctuations in the Alaska business cycle.

Coal has been mined in Alaska since 1855. In 1943, Usibelli began the first strip mine and is today the sole commercial producer of coal. As illustrated in Figure 2, production from the 1950s through 1984 was relatively stable at just under 1 million tons annually, most of which was used for electric power generation. After 1985, Usibelli nearly doubled production and began shipping coal to Korea. Idemitsu-Kosan, a Japanese corporation, will extract an estimated 1 million tons annually from the Wishbone Hill site, all of which will be shipped to Japan.

Exports

Half the coal and most of the metals mined in Alaska are exported. As shown in Figure 3, total metal production value for 1989 was approximately $138.5 million (in 1982 dollars). This increase of 47 percent from 1988 was due to the startup of the Greens Creek silver mine. Red Dog zinc and lead, all of which will be exported, will increase annual export value by over $600 million. Total coal production value for 1989 was nearly $42 million. Usibelli shipped nearly half of this coal—705,258 tons—to Korea.

Exploration and Development

Exploration expenditures grew on average 40 percent annually between 1975 and 1980 while prices for gold and silver grew almost 15 percent annually over the same period. During the last nine years, exploration expenditures for precious metals increased by 83 percent. In 1988, total exploration expenditures were three times higher than in 1987; over 90 percent of that spending was for gold, silver, and platinum-group metals.

Development expenditures involve the construction of facilities to mine specific minerals. As shown in Figure 4, total mineral mining development expenditures fluctuate from year to year but increased modestly on an annual basis prior to Red Dog Mine development. Red Dog expenses account for a major
portion of development expenses beginning in 1987 and extending for five years. In 1987, Red Dog expenses, as shown with expenses for base metals, were $55 million; in 1988, they were about $200 million. Expenses are expected to total $420 million through 1991. After that, the entire sector should return to levels of less than $100 million per year. The final cost of Greens Creek development was approximately $114 million.

**Prices**

Extraction of Alaska’s minerals is directly affected by world market prices. Rising world prices are often followed by rising levels of exploration for and production of metals and minerals. The Red Dog zinc mine, however, as the world’s largest producer, may affect and even control the world price of zinc.

The price of gold increased on average 13 percent annually from 1968 through 1987. The price of silver increased on average 3.9 percent annually. Coal prices, which vary depending on the terms of the contracts under which coal is sold, increased from 1.6 to 3.6 percent annually.

The value of production is price times quantity produced. This measure changes when either price or quantity changes, and thus it is of limited value for tracking fluctuations in the level of industry activity over time. Nevertheless, it is a useful measure for comparing minerals.

As shown in Figure 3, between 1980 and 1989 the average value of production of the mining sector increased, but growth in metal and coal production was partially offset by a drop in production of industrial minerals—sand and gravel production decreased by 8.3 percent. In 1988, gold accounted for nearly half of the total state value, and together with coal and sand and gravel accounted for 89 percent of the total value of all minerals produced in Alaska. In 1988, that changed with the opening of the Greens Creek silver mine; the figures again changed dramatically in 1990 with production from the Red Dog zinc mine.

**Employment**

Because mineral mining, like oil and gas extraction, is capital intensive, relatively highly skilled workers are required. Thus, production involves a small but highly paid workforce.

In mineral mining, much of the employment is also seasonal. Placer mining, recreational mining, and sand and gravel mining require extensive outdoor labor and operate on a much smaller scale in winter. In 1988, 4,353 people were employed in the summer (estimated to be five months long), but only 1,835 were employed in the winter. This implies that summer employment can be nearly 2.5 times the level of winter employment. However, employment in twelve-month jobs has increased by about 3.4 percent annually, while the number of five-month jobs has decreased on average 2.8 percent annually in the past decade. These changes indicate a shift in types of mining—from seasonal placer mining to year-round larger scale operations.

Figure 5 combines five- and twelve-month jobs into year-round equivalent employment in production, development, and exploration. In 1987 and 1988, development employment increased significantly, primarily because of construction at the Red Dog site, which required about 400 people in 1987 and over 900 people in 1989. At full production it will employ about 300 people. Greens Creek now permanently employs 235 people. These two projects have significantly added to production employment totals.

![Figure 5. Year-Round Equivalent Employment in Mining](image)

Source: ISER calculations from Alaska’s Mineral Industry.

Production employment in coal mining was constant for many years until it increased by 30 percent with Usibelli’s expansion in 1985. The Wishbone Hill mine will employ about 185 people to mine half the coal Usibelli does with 120 people, because it will use more labor intensive techniques. Jobs in the sand and gravel industry, which are almost entirely five-month jobs, fluctuated from 271 in 1981, to 1,600 at the height of the Anchorage construction boom in 1984, to 752 in 1988.

**Wages**

When compared with wages in similar industries within the state, mineral mining wages have not increased much in recent years, as illustrated in Figure 6. But in comparison with mineral mining wages in other states, the average wage in Alaska has increased. From 1972 through 1979, average wages in Alaska were similar to those in California and Colorado. But by 1984, average wages in Alaska were 45 percent...
higher than those in Colorado, and 32 percent higher than those in California.

Production Costs

Mining equipment and railroad transportation are major costs of business. In Alaska, the costs of construction machinery and railroad transportation have increased relative to those elsewhere in the U.S. From 1973 to 1986, the price of construction machinery increased on average nearly 2 percent annually.

Mineral mining provides income to the state through mining license taxes, rents, royalties, and corporate income taxes. None of these are very significant costs at this time. For coal mining, taxes represent about 2 percent and royalties about 4 percent of total costs. The mining license tax is the largest source of state revenue from the mineral mining sector—it has averaged one million dollars a year. The state also collects rent from mining operations on state land. Coal mining operations are assessed $3 an acre; others pay from 50 cents to $2.50 an acre, depending on how long they've been in operation.

Beginning with production, the state collects a royalty on net profits. Coal mining is assessed a 5 percent royalty; all other mineral mining operations are assessed a 3 percent royalty. And finally, on mines classified as corporations, the state assesses a 3 percent corporate income tax before deductions, which may reduce this tax to 2 percent.