Anaconda's exploration drill at recently announced Johnson River gold and base metal find on Cook Inlet Regional Corporation lands. 
photo by Bill Ellis
Available from Alaska Division of Geological and Geophysical Surveys, 794 University Avenue, Basement, Fairbanks, 99701; 3601 C Street (10th Floor), Anchorage, 99503; P.O. Box 7438, Ketchikan, 99901; and 230 South Franklin Street, (Room 407), Juneau, 99801. Also available from the Office of Mineral Development, 675 7th Avenue, Station A, Fairbanks, Alaska 99701.
FOREWORD

Special Report 33, ‘Alaska’s Mineral Industry—1983’ is the third annual report produced jointly by the Department of Commerce and Economic Development, Office of Mineral Development, and the Department of Natural Resources, Division of Geological and Geophysical Surveys, detailing the activities of the mineral industry in Alaska during 1983. A prime objective is to provide both private sector and government agencies with reliable, current information concerning an industry which is expected to grow substantially in importance in the years ahead. The report is dependent on the cooperation of companies and individuals that supplied basic information.

The value of the mineral industry to the State’s economy grew in 1983 to a gross worth of $294.3 million—a rise of 4% over 1982. The gain was due to continued growth of demand for sand, gravel and stone. This more than offset substantial declines in exploration and mine development activity.

A sustained world wide economic recovery will directly benefit the mining industry in Alaska. Major Pacific Rim markets are increasingly seen as vitally important for Alaska’s minerals, however, participation in that marketplace continues to be constrained by the lack of infrastructure necessary to access and transport high bulk products such as coal and base metal concentrates from mine site to ship. Overcoming this limitation will take time and commitment by both public and private sectors of the economy.
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Executive Summary

This report summarizes exploration, development, production, and drilling activities of the Alaskan mineral industry during 1983 (excluding oil and gas). Total value of 1983 production in Alaska was $283.4 million, up nearly 18 percent from the 1982 level. The average 1983 national increase in mineral production was 10 percent. The sand-and-gravel and building-stone industries were responsible for the high overall values. About 169,000 oz of gold was produced from about 300 placer mines in 1983, about the same as the previous year. No lode-gold production was reported.

Although development expenditures decreased $27.8 million—down some 33 percent from record 1982 investments—expenditures did exceed those of previous years. Exploration continued to drop from record levels set from 1979 to 1981. About $34.1 million was spent in 1983, down 24 percent from the 1982 level and over 50 percent from the 1981 level. However, total 1983 'value' for exploration, development, and production was $294.3 million, up nearly 4 percent from the 1982 value of $283 million (fig. 1). Hence, the value of production offset the decreases in preproduction activities. Although most Alaskan mineral analysts predicted a poor 1983 performance, the mineral industry fared better than expected.

Some noteworthy 1983 news events pertaining to mining in Alaska include:

Governor Bill Sheffield recently signed a memorandum of intent to speed the permitting process. The Office of Management and Budget will initiate the development of regulations designed to streamline the permitting process. The agency plans to establish offices in Anchorage, Fairbanks, and Juneau to improve accessibility for those seeking development permits.

In March, the U.S. Department of Interior announced its intention to begin competitive leasing of offshore areas (>3 mi offshore) in the Arctic Ocean, Beaufort Sea, and Bristol Bay regions for mineral exploration. State land, which extends to 3 mi offshore, may be available for leasing by mid-summer.

From July 25-29, a 6,000-mi-long Canadian arctic mine tour was conducted by the Alaska Miners Association. The tour provided a first-hand look at the development of mining in an environment similar to Alaska's. Several Alaskan state officials, including Department of Natural Resources (DNR) Commissioner Esther C. Wumnicke, Department of Commerce and Economic Development Commissioner Richard A. Lyon, and Senators Jan Faiks and Arliss Sturgulowski participated.

Consternation continued among placer miners over water-quality standards administered by the Alaska Department of Environmental Conservation (DEC) and the U.S. Environmental Protection Agency (EPA). Last spring, DEC created a Placer Mining Task Force that consists of miners, state and federal regulators, environmentalists, and legislators. Although progress was claimed in resolving the complex issues involving mining and water quality, a major gold-dredging operation in southwestern Alaska was forced to close over a water-quality issue. DNR records show that in 1983, settling ponds designed for water-quality enhancement were installed in increasing numbers by Alaska's placer miners—up nearly 250 percent from 1979. Two test cases have involved petitions to reclassify the Tolovana River and Nolan Creek to industrial use. In December, DEC denied the Tolovana River reclassification, but granted the Nolan Creek petition submitted by Silverado Mines. However, the Nolan Creek decision is still subject to EPA approval.

Progress is being made toward the Alaska Division of Geological and Geophysical Surveys' (DGGS) goal of creating a core-storage facility at its Eagle River compound. A core and sample library is of great value to both mineral and petroleum firms, and industry cooperation will be encouraged. Last summer, the U.S. Geological Survey (USGS) Western Regional Director agreed to provide $150,000 for renovation of the storage facility.

An estimated 120 Alaskan miners lost about $2 million as a result of the bankruptcy of Delta Smelting and Refining, Ltd., of Richmond, British Columbia, and its sister company, Delta Smelting and Refining of Alaska, Inc. Many miners stored bullion at Delta Smelting for 'startup' funds for the 1983 season. In response to the needs of qualified miners who lost money as a result of the failure, emergency
legislation was enacted to finance working capital for 1983 mining operations.

A state program was enacted in 1980 to provide loans to miners. The program is administered by the Department of Commerce and Economic Development Division of Business Investments. The state will loan up to $5 million to a qualified borrower, depending upon collateral, at 10 percent interest for a maximum term of 15 yr. Through December 31, 1983, 49 loans that total $25,962,743 have been approved.

Governor Bill Sheffield directed DNR Commissioner Esther C. Wunnicke to establish a Division of Mining within the DNR. The governor stated that this division will give specific attention to the state's administration of mining issues. The new division includes the DGGS Mining Information offices and part of the existing Division of Minerals and Energy Management. The new director is longtime Alaskan Pedro Denton.

The future of the Kantishna mining district and Dunkle township mineralized areas was examined and debated in 1983. When nearly 4 million acres surrounding the Mount McKinley National Park were designated Denali National Park-Preserve by the Alaska National Interest Lands Conservation Act (ANILCA) of 1980, both the Kantishna Hills and the Dunkle township were included, along with existing mining claims. Congress mandated a study to determine the resources of the areas and to resolve the conflicts with park values. The final report was due December 2, 1983. In May, DGGS released a mineral-resource-modeling effort of the Kantishna-Dunkle mine-study areas. The model predicted that nationally significant amounts of lode antimony and silver could be produced and that placer-gold production could continue into the year 2000. Copper, gold, and silver production were assessed in Dunkle township. The U.S. Bureau of Mines (USBM) contracted $1.2 million for drilling and exploration of the two mineralized areas, and the National Park Service (NPS) compiled an environmental impact statement (EIS) that summarized seven alternative actions that range from claim condemnation to exclusion of the areas from Denali National Park-Preserve. The study group, which was headed by the DNR and the NPS, presented their recommendations to the Alaska Land Use Council in early December. For the Kantishna Hills, the study group recommended allowing continued mining activities on valid existing claims and mandated the NPS to open portions of the mineralized terrane to additional leasing and mineral development contingent on various environmental factors. The study group recommended a "no action" status for claims in the Dunkle township. The Alaska Land Use Council will make its final recommendations to Congress later this spring. The Kantishna mining district has been an important source of gold, silver, antimony, lead, and zinc since early in the century and continues to produce gold, silver, and antimony. The Dunkle township has produced coal and contains promising prospects for base and precious metals.

Principals in the Greens Creek Project requested a boundary adjustment in the Admiralty Island National Monument to facilitate and remove the time constraints on exploration for possible lateral extensions of the Greens Creek orebody. An EIS has been prepared, and the proposed adjustment has received the full support of the state.

Usibelli Coal Mines, Inc., continued to prepare to export coal to Korea under its 15-yr agreement with the Sun Eel Corporation. Many industry analysts are keenly interested in the outcome of these activities. Most believe that successful shipment of a mineral product to a Pacific Rim market will send positive signals to the investment community that will ultimately affect other mineral-development projects statewide.

One company that has been especially bullish toward the future of mining in Alaska and the western states is NERCO Minerals, a subsidiary of NERCO, Inc., which in turn is the resource-development arm of Pacific Power and Light (Portland, Oregon). During 1981, NERCO Minerals acquired Resource Associates of Alaska (RAA), a successful Fairbanks-based exploration firm that owns mineral prospects throughout the state and has exploration rights to approximately 5 million acres of Native-owned lands. NERCO owns several silver mines in the western states and is one of the largest producers of silver in the United States. NERCO Minerals is presently completing a new six-story corporate-headquarters building in Fairbanks. NERCO Minerals and RAA will move into the new building in the spring of 1984.

While it was a bad year for the mineral-exploration industry, total expenditures did not dip to the $20-million low predicted by most mining-company personnel. Additionally, grass-roots exploration continued, and at least two important discoveries were made or announced in 1983—the Johnson River precious metal - base metal deposits southwest of Anchorage and the Coal Creek tin-copper deposit near Talkeetna; the latter is summarized by Thurow (1983). Some large companies indicated that their expenditures will increase in 1984.

The metals and mineral-commodities markets continue to be sluggish and unresponsive despite a nationwide economic recovery. This reflects large inventories built up over previous years and during the 1981-82 recession. However, bright spots on the horizon include gold, silver, platinum, zinc, and high-technology metals. The effect of environmental
problems on the domestic asbestos market has negatively affected short-term prospects for the Alaska Asbestos project in the Yukon-Tanana Upland.

Some recent state publications that pertain to mining and mineral development in Alaska include:

'Placer mining...its role in the Alaskan economy,' published by the Department of Commerce and Economic Development Office of Mineral Development (OMD). The study, which was conducted by Louis Berger and Associates, showed that 2,552 persons were directly employed in placer mining in 1982 and that direct expenditures were $80.1 to $83.1 million. The total statewide economic impact was estimated at $235 to $244 million.

'Permit guidelines for the mineral industry in Alaska,' by J.P. Fernette, was also published by OMD. This document is a useful working handbook and reference guide for industry personnel and for those in the public and private sectors. It is being updated and will be available in late 1984.

'Alaska's coal provinces and resources,' by State Geologist R.G. Schaff and DGGS coal geologist R.D. Merritt, provides an overview of Alaskan coals, which may account for up to 48 percent of the United States coal base. This paper was presented at the Alaska Resource Development Council's International Conference on Coal, Minerals, and Petroleum in Anchorage in February 1983.

The Division of Minerals and Energy Management (DMEM) published summaries of mining rights, regulations, and statutes. Proposed offshore and onshore mining-lease regulations are in review.

'Matanuska-Susitna Borough, summary of mineral resources,' was authored by Daniel E. Renshaw under contract to DGGS and was published by the borough.

'Mineral terranes of Alaska,' first published in 1979 by the University of Alaska Arctic Environmental Information and Data Center (AEIDC) at a scale of 1:1,000,000, shows ore and host-rock type and the relative size of deposits. A new edition, 'Mineral terranes of Alaska 1982,' was prepared by C.C. Hawley and Associates and is now available from AEIDC.

'Placer mining in Alaska,' by D.J. Cook, is available from the University of Alaska Mineral Industry Research Laboratory (Fairbanks).

The balance of this report examines levels of exploration, development, and production in seven major regions of the state (fig. 2) as originally defined by Eakins and Daniels (1980). Principal commodity groupings include base and precious metals, industrial and structural materials, coal, and peat. Appendix A lists selected new 1983 claim blocks, and appendix B summarizes the addresses and functions of important state and federal agencies, local municipalities, and private-interest groups involved in Alaskan mineral development. Selected significant mineral deposits in the state are summarized in appendix C. Appendix D lists mining licenses issued by the Alaska Department of Revenue in 1983, and appendix E lists selected sand, gravel, and quarry-stone operators in the state.

Acknowledgments

This report is jointly produced and distributed by the Department of Natural Resources Division of Geological and Geophysical Surveys and the Department of Commerce and Economic Development Office of Mineral Development. The success of this and previous reports is largely dependent on information voluntarily provided by the private sector. We thank Alaska's miners, industry explorationists, consultants, and Native corporations for their generally excellent cooperation. We acknowledge T.L. Pittman, Bob Hoekzema, and John Mulligan (USBM) for providing selected statistics for some industrial-minerals and gold production in south-central Alaska. P.R. Holdsworth provided activity information for southeastern Alaska. J.G. Clough and D.A. Coleman (DGGS) provided a listing of new claim blocks. L.L. Lueck (DGGS) researched the addresses for sand-and-gravel and building-stone operators and compiled...
Exploration Activity in 1983

Introduction

Reported exploration expenditures for 1983 indicate a further decline from previous years. The recessionary economy is probably the main reason for the decreased level of activity in 1983. Interest in precious metals, tin, and tungsten remained high, but low metal prices, a generally sluggish economy, and the lack of transportation facilities decreased exploration funding for other metals, coal, and uranium. However, the potential for new discoveries and large-scale mineral production in Alaska has not lessened, and companies are continuing to do assessment work and explore the large number of claims acquired during the past few years. While the response to the DGGS survey of mining activities is not complete, total reported expenditures include those of most major companies.

Total reported 1983 expenditures for exploration were $34.1 million, down 24 percent from 1982 and 56 percent from 1981 (table 1; fig. 3). Exploration

![Figure 3. Mineral exploration expenditures in Alaska, 1959-83.](image)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Base metals</td>
<td>$6,775,000</td>
<td>$28,262,200</td>
<td>$31,757,900</td>
<td>$9,768,760</td>
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<tr>
<td>Precious metals</td>
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<td>10,944,100</td>
<td>20,897,555</td>
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<tr>
<td>Industrial and structural materials</td>
<td>1,250,000</td>
<td>10,300,000</td>
<td>NR</td>
<td>2,068,300</td>
</tr>
<tr>
<td>Coal and peat</td>
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<td>2,341,000</td>
<td>2,900,000</td>
<td>1,338,454</td>
</tr>
<tr>
<td>Miscellaneous**</td>
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<td>15,300</td>
<td>10,000</td>
</tr>
<tr>
<td>Unspecified</td>
<td>52,000,000</td>
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<td>NR</td>
<td>60,000</td>
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<tr>
<td>TOTAL</td>
<td>$65,236,500</td>
<td>$76,303,400</td>
<td>$45,617,300</td>
<td>$34,133,069</td>
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</table>

* 1980 data from reconnaissance survey
** Uranium, gemstones, etc.
NR = not reported
expenditures are reported in both region and commodity groupings (table 2). Other indicators of mineral-exploration activities are the number of claims on which assessment work was performed and the number of new claims staked, both of which sharply declined in 1983 (figs. 4 and 5). A total of 81,335 man-days of employment were reported for exploration activities in 1983.

A surge in prospecting and development of offshore minerals in Alaska has occurred during the past 2 yr. DNR is reactivating the state's offshore program and will issue permits to explore for locatable minerals on tidelands and submerged lands. A permit is issued for 7 yr, and if the permittee shows he has a workable deposit, the permit can be converted to a noncompetitive offshore mining lease that

Table 2. Reported exploration expenditures and employment in Alaska by region and commodity, 1983.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Region</th>
<th>Northern</th>
<th>Western</th>
<th>Eastern Interior</th>
<th>Southwestern</th>
<th>South-central</th>
<th>South-eastern</th>
<th>Alaska Peninsula</th>
<th>No region specified</th>
</tr>
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<tbody>
<tr>
<td>Base metals</td>
<td></td>
<td>$1,515,260</td>
<td>$1,397,000</td>
<td>$2,270,000</td>
<td>$604,500</td>
<td>$2,000,000</td>
<td>$507,000</td>
<td>$465,000</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Precious metals</td>
<td></td>
<td>$153,400</td>
<td>743,510</td>
<td>2,751,575</td>
<td>485,500</td>
<td>539,570</td>
<td>32,000</td>
<td>NR</td>
<td>NR</td>
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<tr>
<td>Placer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lode</td>
<td></td>
<td>250,000</td>
<td>1,500,000</td>
<td>3,104,000</td>
<td>225,000</td>
<td>1,832,000</td>
<td>1,414,000</td>
<td>7,267,000</td>
<td>500,000</td>
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<tr>
<td>Coal and peat</td>
<td></td>
<td>600,000</td>
<td>NR</td>
<td>38,454</td>
<td>NR</td>
<td>700,000</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>NR</td>
<td>130,000</td>
<td>1,002,300</td>
<td>NR</td>
<td>6,000</td>
<td>NR</td>
<td>NR</td>
<td>1,000,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>$2,518,660</td>
<td>$3,770,510</td>
<td>$9,166,329*</td>
<td>$1,315,000</td>
<td>$5,077,570</td>
<td>$1,953,000</td>
<td>$7,732,000</td>
<td>$2,500,000</td>
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</tbody>
</table>

Employment (man-days) 9,902 10,612 24,513 4,828 13,167 5,661 7,952 4,700

NR = not reported
e = estimated
is good for up to 10 yr. Public hearings are held to evaluate environmental effects. Due to an environmental lawsuit, offshore prospecting permits have not been issued since 1975, and about 850 applications are backlogged. However, present exploration and development are underway off the coast of the Seward Peninsula, in Cook Inlet, in the Gulf of Alaska off Icy Bay and Yakutat Bay, in Delarof Harbor at Unga Island, offshore from Baranof Island, and in Gastineau Channel near Juneau (fig. 6). DNR currently administers 70 active permits and nine offshore mining leases. Interest in offshore mineral potential is also being shown by the federal government which, through the Minerals Management Service, is initiating a program to identify United States nonenergy minerals offshore, including Alaska. Individual states are expected to participate in the program, and DGGS may become involved.

The USBM and USGS jointly assessed the mineral resources of the Chugach National Forest under the RARE II program. The area has produced 264,000 oz of gold and 206 million lb of copper. These agencies rated the potential for gold, copper, coal, oil, building stone, and sand and gravel, and identified the presence of antimony, arsenic, cobalt, manganese, molybdenum, nickel, and chromium. The potential for production of these resources is in part dependent upon the final management plan developed for the Chugach National Forest.

Figure 6. Approximate areas of offshore prospecting applications from Department of Natural Resources Division of Minerals and Energy Management, 1983.
Exploration activities compiled in this report are grouped by major commodity and region (fig. 1). Selected mineral-exploration activities are shown on figure 7. The listing by commodity is sometimes arbitrary because explorationists are usually prospecting for several groups of metals at the same time, and many of the prospects are polymetallic.

**Copper, Lead, and Zinc**

**Northern Region**

The northern region includes the Ambler district on the south flank of the Brooks Range, where $12 billion (in-place) worth of copper, lead, zinc, silver, gold, and cobalt has been located in several major deposits within the 100-mi-long 'schist belt.' Due to depressed metal prices and the lack of infrastructure, development is on hold, and most exploration conducted during 1983 was limited to assessment work and testing of claim blocks previously acquired by major mining companies. However, development and exploration in the De Long Mountains in the western Brooks Range are continuing.

The Wulik basin in the De Long Mountains is the site of extensive study and exploration centered around the Red Dog, Lik, and SU deposits. According to Cominco Alaska, Inc., (Cominco) in partnership with NANA Regional Corporation, the Red Dog deposit is in the development stage. This major

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**Figure 7. Selected mineral-exploration projects in Alaska, 1983. Numbers refer to locations in appendix C.**
undertaking is discussed in the development section. Additional drilling last season did not significantly change previously announced reserve estimates for the ‘Main’ deposit. Cominco also continued work on the SU deposit a few miles west of Red Dog, and their assessment work in the Ambler district included drilling, geological, geochemical, and geophysical surveys. General Crude Oil Minerals Company (GCO) and Houston International Minerals Corporation (HIMCO) drilled the Lik lead-zinc-silver deposit in the De Long Mountains adjacent to the SU deposit. The announced reserves of the Lik deposit are 25 million tons grading 12 percent combined lead and zinc, and 1.3 oz of silver per ton. Anaconda Minerals Company (Anaconda) and its partner, Sunshine Mining Company, operated in the Brooks Range as the Ambler Mining Company in 1983. They control several important deposits, including Sun, Smucker, and Picnic Creek. During 1983, the partnership conducted a relatively modest exploration program that consisted of additional drilling, mapping, and geochemical and geophysical surveys. The two companies each also own separate claim blocks. Noranda Exploration, Inc. (Noranda) also remained active in the Ambler district.

Bear Creek Mining Company, a subsidiary of Kennecott Copper Corporation, conducted reconnaissance exploration in the Noatak district, assessment work on their Arctic deposit in the Ambler district, and drilling on their Bornite (Ruby Creek) deposit in the Cosmos Hills. Announced reserves for the Arctic deposit are 40 million tons grading 4 percent copper, 5.5 percent zinc, 1 percent lead, 1.5 oz silver, and 0.02 oz gold/ton. The Bornite deposit contains up to 40 million tons of about 2 percent copper plus zinc and credits of cobalt and silver. Included in these figures are about 5 million tons of ore grading 4 to 12 percent copper.

Western Region

Greatland Exploration of Anchorage has obtained the Omalik lead-zinc-silver property near the old Omalik lead-silver mine (western Darby Mountains) where high-grade ore was once produced. Anaconda staked claims, drilled, mapped, and did assessment work at Illinois Creek, about 40 mi southwest of Galena. They also explored for base metals in the Medfra and Ophir Quadrangles. Patino, Inc., one of the Northgate Group of Companies of Toronto, Canada, explored for base metals in the western region.

Eastern Interior Region

The eastern interior region includes the central and eastern portions of the Alaska Range and the Yukon-Tanana Upland. The Yukon-Tanana Upland contains several recognized placer and lode mineral belts. The discovery of a number of stratiform massive-sulfide deposits in the Alaska Range is very significant, and their full potential is still undefined.

Salisbury and Dietz, Inc., (Spokane, Washington) was awarded a $1.2 million contract to explore mineralized lands in Denali National Park-Preserve. The project was mandated by the ANILCA of December 1980, which instructed the Alaska Land Use Council to conduct resource studies of the Kantishna Hills and Dunkle township areas and report to Congress 3 yr after enactment of the ANILCA. As a participant in this study, DGGS released Report of Investigations 83-12, ‘Mineral resource modeling, Kantishna-Dunkle mine-study areas, Alaska’ (Bundtzen, 1983), which presented a method for estimating the mineral endowment in the mineralized regions. Silver, antimony, gold, various metals, and coal are the principal commodities under investigation. Approximately 5,000 ft of diamond core drilling, 2,000 ft of churn drilling, and bulk sampling of both lode and placer deposits were completed (fig. 8). In addition, an economic evaluation of patented and unpatented claims was conducted by DOWL Engineers of Anchorage, and according to study results, the cost of claim acquisition by the federal government would be $157 million, in the event of adjudication.

South-central Region

Cooper Industries and its parent firm, Geneva Pacific Corporation, have actively explored the McCarthy district in the Wrangell Mountains for
that region. Several strata-bound deposits located by McQuatt, Creek about 13 years, notably at the Binocular prospect.

B. vonian president of Cooper Industries said that although the mandate to assess mineral potential under the project is under study by a joint federal-state team as part of the agreement, Anaconda has an option to explore or develop properties in Alaska. Cooper Industries decided they would not pursue the project.

Recently, the Copper Center. Geneva Pacific Corporation is not presently exploring or developing claims in Alaska.

Bear Creek Mining Company examined a massive-sulfide deposit (with associated tin) near Sheep Creek about 13 mi east of Healy. Watts, Griffith, and McQuatt, Inc. (WGM) in a joint venture with Phillips Petroleum Company, did assessment work on claims that contain base and precious metals in the interior region. Several strata-bound deposits located by RAA and Getty Minerals during 1976 in the Alaska Range are still under active exploration. Deposits at Anderson Mountain, Virginia Creek, Dry Creek, Sheep Creek, and Liberty Bell include precious and base metals. HOMEX, operator for a group that includes Buzby Mines, Getty Minerals, and Phelps-Dodge Corporation, is exploring for base and precious metals in the Bonnfield district. Geoprize, Ltd. (Fairbanks) and Hawley Resources Group performed assessment work and evaluations in the Dunkle mining area on the upper Chulitna River. The area is also under study by a joint federal-state team as part of the mandate to assess mineral potential under the ANILCA legislation.

RAA, discoverer of the ‘Delta’ mineral belt in the old Tok mining district in the eastern Alaska Range, conducted assessment work on a large claim block and did additional mapping and geophysical surveys in the 400 mi² mineralized area. However, Anaconda dropped their option with RAA in late 1982. The district contains at least 35 base-metal massive-sulfide deposits in a thick sequence of Devonian metavolcanic and metasedimentary rocks.

Doyon, Ltd., a Fairbanks-based Native corporation, in partnership with Patino, Inc., conducted geochemical and geophysical surveys and geologic mapping in their search for base metals on extensive Doyon land holdings in the interior. Northern Lights Exploration Company (Anchorage) did assessment work on a large number of claims in the central Alaska Range and prospected for base and precious metals using geochemical and geophysical methods.

Anaconda has an agreement with the Cook Inlet Region, Inc. (CIRI) to explore CIRI’s lands in south-central Alaska. Under the agreement, Anaconda has a sizeable crew on the Johnson River prospect located a few miles south of Tuxedni Bay on the west side of Cook Inlet. Drilling and geochemical and geophysical surveys were conducted to evaluate the deposit for base and precious metals. CIRI stated that exploration will continue for 2 yr before a decision is made on whether or not to develop the property.

Anaconda also continued a widespread exploration program for base and precious metals in the Iliamna, Lake Clark, and Sleetmute Quadrangles. The program included drilling, geochemical and geophysical surveys, new claim staking, and assessment of old claims.

Hawley Resource Group did assessment work and exploration on the Paint River claims in the Iliamna Quadrangle. Hunt Oil Company Minerals Division (Hunt) performed assessment work on several claim groups and staked additional claims in the southern Alaska Range. They are prospecting for base and precious metals. Hunt also prospected several claim groups in the Big River drainage south of McGrath. The area has attracted interest in base and precious metals, molybdenum, tin, gold, and tungsten.

Southeastern Region

Hawley Resources Group did assessment work on the Haines Barite and Mt. Henry Clay claims about 33 mi northwest of Haines. The deposits contain base metals and barite. HIMCO, Anaconda, and AMAX each prospect in southeastern Alaska. Noranda explored the southern part of Prince of Wales Island for base and precious metals, continued exploration and drilling near Niblack Anchorage west of Moira Sound, and investigated prospects near the south end of Dal Island. Cominco and Anaconda are also interested in the Niblack area, which yielded about 1.4 million lb of copper, 1,000 oz of gold, and 15,000 oz of silver from the Niblack Mine prior to 1910. Duval Corporation (Duval) was active in the Ketchikan area and staked antimony-gold claims. WGM, in a joint venture with Phillips Petroleum Company, did assessment work on claims in the Port Alexander Quadrangle. Exxon Minerals Company used various exploration methods on sizeable claim blocks at Twelve Mile Arm and other sites on Prince of Wales Island.

Work on a major copper-cobalt deposit has continued for several years in British Columbia just north of Haines, Alaska. This has stimulated exploration for similar deposits within Alaska’s border. The Canadian prospect is the Windy Craggy property held by Geddes Resources. Geddes’ president told the Northern Miner that drilling indicated over 91 million tons grading 3.04 percent copper and 0.09 percent cobalt and that indicated overall tonnage is over 334 million tons with a grade of 1.52 percent copper and 0.08 percent cobalt. Additionally, and possibly of major significance, high gold values have been found in the footwall of the main sulfide orebody.
The deposit is only 40 mi from the Haines-Alaska Highway and 70 mi from tidewater.

**Tin and Tungsten**

**Western Region**

Anaconda continued drilling, trenching, and geologic studies of a major tin deposit at Kougakok Mountain, 80 mi north of Nome on the Seward Peninsula. The host rock is a hydrothermally altered granitic rock. Anaconda has applied for a permit to construct a 6,000-ft-long airstrip on Budd Creek and a connecting 10-mi-long access road to serve the prospect area. During 1983, the company also diamond drilled, mapped, and conducted geochemical surveys and assessment work on a large number of claims elsewhere in western Alaska. They had a 20-person crew in the field.

The Lost River tin-tungsten-fluorite deposits near Lost River on the western tip of the Seward Peninsula have been extensively drilled in the past, and large reserves are defined at several deposits. Lost River Alaska Corporation did some trenching, sampling, and mapping on the property during 1983, but plans for a townsite and a large mining operation have never materialized due to financial problems, complexities of ore treatment, and lack of a market and transportation.

Duval explored for tin and tungsten in the Medfra Quadrangle using air- and ground-magnetometer surveys. RAA has several gold-tin projects in the Ruby district, but no details are available.

**Interior Region**

Tin and tungsten prospects in the Salcha and Chena River basins east of Fairbanks are being explored by RAA, Union Carbide Corporation, Bear Creek Mining Company, and HIMCO.

**Southwestern Region**

Exploration interest in southwest Alaska has centered on base-metal and silver-tungsten epigenetic and skarn deposits. One of the most active companies in the southwest has been Anaconda, which last year continued grass-roots exploration and drilling at their Farewell silver-tungsten project in the southern Alaska Range. The Flat district, a producing placer-gold district, is also the site of the Golden Horn gold-tungsten shear zone that has recently been extensively drilled. Cominco conducted reconnaissance work for tin, tungsten, and other metals in the southwestern region.

**South-central Region**

Exploration by HIMCO at Coal Creek 5 mi west of the Parks Highway near Hurricane Station resulted in the discovery of a tin-bearing sheeted 'greisen' vein system. The veins contain cassiterite, sphalerite, arsenopyrite, and subordinate pyrite, chalcopyrite, and pyrrhotite. According to Thurow (1983), drilling indicates a 5-million-ton deposit grading better than 0.2 percent tin. Most veins lie within an early Tertiary granite that intrudes older granite and metasedimentary rocks.

**Nickel, Cobalt, Chromium, and Platinum-group Metals (PGM)**

**Southwestern Region**

Hanson Properties, Inc., (Spokane, Washington), which operates the Goodnews Bay platinum dredge, has encountered difficulties in reactivating the dredge. During the 1983 season, most of the company's efforts were directed toward exploring their placer gravel by digging test pits with a backhoe.

**Southeastern Region**

Galactic Resources, Ltd., and Cornucopia Resources, Ltd., have acquired the nickel-copper-cobalt deposits at Bohemia Basin on Yakobi Island from the Aleco Mining Group. The new operators announced that their 1983 drilling, sampling, and mapping program was conducted to determine if economic concentrations of PGM are associated with the sulfide deposits. A 1982 report by the Aleco Mining Group estimated that proven reserves of 15.1 million tons grading 0.37 percent nickel, 0.22 percent copper, and 0.02 percent cobalt at the Bohemia Basin and nearby Takanis deposits on Yakobi Island are recoverable by surface mining with a 2.5 to 1 stripping ratio. Two nearby prospects at Mirror Harbor and Flapjack are estimated to contain 5 million tons of nickel-copper-cobalt mineralization.

Orbex Minerals continued a limited exploration program at the Salt Chuck copper-palladium mine on southern Prince of Wales Island. Between 1900 and 1941, about 5 million lb of copper, 19,000 oz of palladium, and 2,500 oz of platinum (with silver and gold credits) were extracted from about 325,000 tons of ore. The copper and platinum metals are confined to the contact between pyroxene and gabbro in an Alaskan type of zoned basic-ultrabasic complex.
Gold and Silver

Northern Region

Canadian Barranca Corporation, Ltd., explored extensive placer-gold properties owned by the Little Squaw Gold Mining Company in the Chandalar district about 200 mi north of Fairbanks. Placid Oil Company (Placid) was also active in the Chandalar district. Several small operators did assessment work and dug test pits on claims in the Wiseman district. Bill Fickus conducted limited geomagnetic surveys of placer deposits at Crevice Creek. Midnight Mining Association prospected and staked claims in the Prospect Creek area in the northeastern part of the Bettles Quadrangle. Their work included geochemical sampling, mapping, and trenching in their search for base and precious metals.

Western Region

World Evangelism, Inc., (San Francisco) holder of several claim blocks in the southeastern Bendeleben Quadrangle, did additional staking and geophysical and geochemical surveys for both base and precious metals during 1983. Rhinehart Berg and partners tested placer ground with a churn drill in the Candle Creek area, northeastern Seward Peninsula. Omega Energy Corporation (Lancaster, Ohio) conducted modest geochemical and geophysical surveys on the eastern Seward Peninsula, and George Massie and Hugo Lindfors (Iron Creek Company) each conducted a small prospecting program near Nome. During 1983, Noranda drilled to evaluate deep, meandering bench placers on Mud Creek in the Fairhaven district 3/4 mi west of Candle. A company geologist said the gold may be in old strand lines and ancient sand bars. Using a Hawker Sidley Super-drill, the company hopes to identify a multimillion-yard reserve. Greatland Exploration (Anchorage) assessed a large number of claims on the Seward Peninsula, primarily for gold. Coastal Exploration looked at the precious-metal potential in Norton Sound and sought state and federal permits for offshore mining.

The potential for offshore gold placers led to development work off Bluff (east of Nome) by Phoenix Marine Exploration, Inc., (Phoenix) of Anchorage. Phoenix requested permits to dredge about 10 million yd of marine sediments. In September, the dredge, which was being towed by a tug, was grounded and swamped in high seas near Bluff, about 50 mi east of Nome. The dredge was refloated and secured for the winter.

Drilling by the Hawley Resource Group at the old Big Hurrah Gold Mine on the south coast of the Seward Peninsula has been underway for the past two seasons. The principal developer is Cornwall Pacific of Vancouver. The ore contains primarily gold, but tungsten values are also reported. Exploration suggests a potential for an open-pit operation and later underground mining.

Eastern Interior Region

New Dynasty, Inc., evaluated placer and lode ground on the Lucky claims (Livengood district north of Fairbanks) using a resonant drill to obtain 6-in.-diam cores from the frozen ground. Noranda re-entered the old Nabesna Gold Mine in the northern Wrangell Mountains. They built a 2-mi-long road, restored portals, and performed bulk sampling, about 1,200 ft of surface drilling, and underground work that included thawing some ice-filled adits. The property, which is now owned by Kirk Stanley, produced approximately 67,000 oz of gold from about 88,000 tons of ore from 1930 to 1941. This classic gold skarn is located at a contact between a quartz diorite intrusive and limestone. HIMCO had a crew searching for precious metals in the Alaska Range during the 1983 season. Jenson Mining and Construction (Delta Junction) did drilling, bulk sampling, and a magnetometer survey to assess claims in the eastern Alaska Range.

As in past years, gold-exploration continued at high levels in the Fairbanks district (fig. 9). Placid continued to aggressively explore a large claim block...

Figure 9. Rotary drilling at the Soo Mine, Fairbanks district. Photograph by M.S. Robinson, 1982.
in the Cleary area 20 mi north of Fairbanks. Both vein systems and placer deposits are being tested, primarily for precious metals. A 24-person crew conducted surface and underground drilling, aerial surveys, geochemical sampling, trenching, and underground-development activities. Also in the Cleary district, Mohawk Resources Alaska and Alaska Mineral Services each conducted exploration and worked on their mills for processing local ores.

Silverado Mines conducted a limited program at the Grant Mine on Ester Dome and expects to increase their level of activity on this property in 1984. Teton Exploration Drilling (Teton), in a joint venture with RAA, drilled the Zackley property on the south flank of the Alaska Range in the Mt. Hayes Quadrangle. The gold-silver-copper deposit is in a skarn zone that reportedly extends for 1 mi along the granite-limestone contact.

Denali Mining Company leased their Valdez Creek placer property on the south flank of the central Alaska Range to a joint venture that includes Camindex Mines (Camindex), Barrick Resources, TALCORP, and Sullivan Mines, Ltd. Their work is summarized in the development section. Camindex expects to start a mining operation in 1984. Aspen Exploration Corporation (Aspen) of Denver, drilled in the Valdez Creek area and is trying to initiate a placer operation. Gold Mining Company of Fairbanks performed drilling, magnetometer surveys, and trenching on a large number of claims in the Chena and Salcha River areas using Sedcore Drilling, Inc., equipment.

**South-central Region**

WGM assessed the Cliff Gold Mine in the Valdez Quadrangle using geologic mapping and geochemical and geophysical surveys. North Coast Mining Company conducted bulk-sampling operations in the Lawrence Creek placer area near Icy Cape (Cordova Quadrangle) with sample pits up to 20 ft deep. Hawley Resource Group and Greatland Exploration performed assessment work on lode-gold claims in the Talkeetna Mountains.

Aspen is seeking a permit from the U.S. Army Corps of Engineers to sample gravel and mineral deposits at 31 sites along the shore of Cook Inlet from Kalgin Island to Knik Arm and along the coast of the Kenai Peninsula. This is one of the first major offshore mineral-land disposals allowed by the state under new permit procedures. Aspen had applied for permits on one million acres of offshore state land in Cook Inlet, but the state limited the permit area to 100,000 acres. In reality, the company expects to lease a much smaller area once the most promising deposits are located. Sample drilling for gravel, gold, and other heavy metals will be conducted from a boat or barge near shore. The company is considering using airborne geophysical survey methods developed by the Canadian Geological Survey for marine exploration. Onshore drilling and test-pit excavations are also contemplated.

**Southeastern Region**

Plans to undertake prospecting and evaluation at the old Alaska-Juneau and Treadwell gold-lode mines at Juneau were announced in October 1983. A proposal was submitted to the Juneau City-Borough Assembly and the Alaska Electric Light and Power Company, present owners of the properties, by Barrick Resources Corporation of Toronto through its subsidiary, Barrick Petroleum Alaska Corporation (BPC). BPC, reportedly with foreign investors, is seeking to obtain a long-range lease on the extensive low-grade gold properties. The Juneau City-Borough Assembly is studying the proposal. The famous mines produced about 6.5 million oz of gold before the last closure in 1944.

Queenstake Resources, Ltd., and Evenco, Inc., obtained an option for a 50-percent interest in the Chichagof Mine located on the west side of Chichagof Island. The option commits Queenstake to explore and rehabilitate the property, and they also plan to treat old mill tailings. Prior to 1942, the mine produced 647,708 troy oz of gold from 596,478 tons of ore. Enserch Corporation, Inc. continued exploration and work on reentry of the Hirst-Chichagof Mine in October 1983. A proposal was submitted to the Alaska Peninsula-Elektia Assembly to obtain a long-range lease on the extensive low-grade gold properties. Queenstake Resources, Ltd., and Evenco, Inc., is also evaluating old tailings.

Hyak Mining Company announced reserves of 90,000 metric tons grading 0.28 oz of gold/metric ton at their Justin Mine in the Berners Bay Mines group, and additional resources of 11 million metric tons grading 0.11 oz of gold/metric ton are reported. Bear Creek Mining Company leased the mine from Hyak in 1983 and drilled the gold-bearing shear zone.

Amoco Minerals Company had a small crew in the Bradfield Canal Quadrangle doing assessment work, geochemical sampling, and mapping. Noranda, in a venture with Occidental Minerals, examined old gold prospects on Douglas Island. Placid was active in the Berners Bay area north of Juneau at Kensington.

**Alaska Peninsula**

Frequent news releases were made by the Alaska Apollo Gold Mines, Ltd. (Vancouver) regarding their activities in the Alaska Peninsula-Aleutian Island
acres of state land under lease. Diamond Alaska Coal Company manager R.B. Stiles said recently that a $500 million construction project could be launched by 1986. Meadowlark Farms, a subsidiary of AMAX, conducted environmental base-line studies of plant and animal life on leases in the Nenana coal field near Healy.

A Fairbanks group formed the Delta Coal Company to produce and market coal from the Jarvis coal field, which is located about 40 mi south of Delta Junction. A federal lease was obtained, and the EIS was completed. Drilling is planned for 1984, and the expected markets include the Tok and Delta Junction communities and Fort Greely.

In 1981, DGGS was funded by the state to assess the coal resources of northwestern Alaska, principally to help determine if regionally mined coal rather than costly fuel oil could be utilized for heat and power in the villages. Drilling and geological investigations during the 1982 and 1983 seasons indicated a reserve at least 3.4 million tons of lignite at the old Chicago Creek Coal Mine near Deering (Seward Peninsula) and a large but uncalculated reserve of bituminous coal in the Cape Beaufort area on the northwest coast. Other sites investigated [including the Unalakleet area (fig. 12)] appear either not to warrant further work or are located within federal preserves where mining is not allowed.

BLM reports that a preference-right lease to 5,000 acres in northwest Alaska will be issued to the Morgan Coal Company. The lease application was initiated in the 1960s, and several legal issues, including the implications of ANILCA, cloud the future of the lease.

**Mineral Development in 1983**

**Introduction**

Alaskan mineral-development expenditures during 1983 were $27.8 million, down 33 percent from record 1982 levels, but above those of 1980 and 1981 (table 3). Development expenditures for coal in south-central Alaska and asbestos in the eastern interior region were down from last year. The number of precious-metal development projects dropped from 1982 levels, particularly in south-central and interior Alaska. Because the Red Dog project is considered to be in the development stage, base-metal expenditures are up substantially from previous years (table 3).

Some projects described below may not fit a narrow definition of development, but they are included because industry announcements or activities place them in this category (fig. 13). In some cases, development-stage projects are notably absent because the companies involved indicated that their record keeping does not distinguish between exploration, production, or development expenditures. Projects such as the Alaska Gold Company dredges at Nome are considered to be in full production. Other development projects described in previous surveys by Bundtzen; Eakins, and Conwell (1982) and Eakins and others (1983) have been suspended reflecting the nature of development projects responding to complex market conditions, lack of financing, and other economic factors.
The company completed a 20,000-ft surface and underground drilling program at the old Apollo and Sitka Mines on Unga Island in the Shumagin Island group. The Empire Ridge area east of the Apollo Mine may have a potential for production. These activities are further discussed in the development section.

Teton, in a joint venture with RAA, also explored for precious metals on Unga Island. They had a 15-person crew in the area and reported 4,500 ft of drilling. Teton, headquartered in Casper, Wyoming, and a subsidiary of United Nuclear Corporation, opened an office in Anchorage to manage its Alaskan projects.

RAA conducted geochemical and geophysical surveys and geologic mapping on Aleut and Bristol Bay Native Corporation lands on the Alaska Peninsula and the Aleutian Islands looking for precious metals.

E.L. Friend, Jr., and C.C. Lucas filed an application with the U.S. Army Corps of Engineers to dredge for gold on 10 claims near Sandpoint on Popof Island. The material would be removed by divers using a suction dredge.

**Coal**

Hawley Resource Properties, Inc., operator for the Valley Coal Company partnership that includes Rocky Mountain Energy and Sun Eel Shipping Company, conducted a drilling program on Matanuska Valley coal leases northeast of Palmer (fig. 10). The leases cover 3,000 acres in the Wishbone Hill area. Thirty-two holes were drilled on the property and some bulk testing was performed. Substantial reserves of good quality coal in the 12,000 to 13,000 Btu/lb range were discovered. An in-house feasibility study by Rocky Mountain Energy, Inc., is currently in progress.

In 1983, exploration and mapping of the Bering River coal field by the Korean Alaska Development Corporation (KADCO) and the Chugach Natives, Inc., followed two previous drilling seasons. The Chugach Natives, Inc., acquired 70,000 acres of coal lands under the Alaska Native Claims Settlement Act, 30,000 acres of which were scheduled for geologic mapping under an agreement with KADCO. KADCO, which is composed of the Hyundai and Samsung Corporations, and the Chugach Natives, Inc., recently formed the Bering Development Company. The joint venture hopes to annually export over 2 million tons of high-quality coal to South Korea. A state-funded study of the transportation needs of the project was recently completed by the Wheelabrator Frye Company for the city of Cordova.

Placer U.S. (formerly Placer Amex, Inc.) conducted environmental, engineering, and marketing studies on their Beluga coal-field leases. Diamond Alaska Coal Company, in joint venture with Chuitna Coal Company, conducted a bulk-sampling program and preliminary engineering-design and environmental studies in the Beluga coal field southeast of Placer U.S. leases (fig. 11). The joint venture holds 20,000...

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* $1,487,500 derived from 27 small placer-gold-mining companies. NR = not reported.

Figure 13. Selected mineral-development projects in Alaska, 1983.
Mikado Vein System and Little Squaw Gold Mining Company Placer Deposits, Chandalar District, Northern Region
(loc. 1, fig. 13)

Hard-rock gold lodes have been developed intermittently since 1909 near the head of Tobin Creek in the Chandalar district, northern Alaska region. The lodes consist of north-west-trending, crosscutting, quartz-carbonate-gold veins that average about 1 oz/ton gold. In 1979, lode operators for Little Squaw Gold Mining Company resumed development and seasonal production of the Mikado vein system, and ore was processed through a 125 ton/day (TPD) cyanide leach-flotation plant on the property. An estimated 10,000 oz of gold have been recovered during the last several years. Chandalar Development Corporation (CDC) is the current operator.

In the recent past, 25 to 50 individuals were seasonally employed. Various economic factors, including lack of developed reserves and the high cost of operating in this remote region, prevented lode production in 1983. In 1983, underground development drilling and drifting in the 200-ft main level of the Mikado structure and at the new Envelope prospect blocked out ore for the 1984 operating season.

Red Dog Project, Cominco-NANA Regional Corporation, De Long Mountains, Northern Region
(loc. 2, fig. 13)

The Red Dog property is a world-class, black-shale hosted, zinc-lead-silver-barite deposit of Mississippian to Pennsylvanian age (Plahuta and others, 1983). It is located in the De Long Mountains of northwestern Alaska, about 80 mi north of Kotzebue. The deposit is owned by NANA Regional Corporation and operated by Cominco. Two primary mineral deposits have been defined: the 'Main' deposit, which is bisected by Red Dog Creek, and the 'Hilltop' deposit, which is located about 1/2 mi to the south. Both fine-grained bedded and coarse-grained vein sulfides are present. Cominco geologists believe the deposits formed as submarine exhalations in a tectonic environment.

Tikkanen (1983) and Green (1983) summarized the exploration history of the deposit. By 1982, drilling of the 'Main' deposit indicated reserves of 85 million tons of 17.1 percent zinc, 5.0 percent lead, and 2.4 oz/ton silver. The 'Main' orebody is estimated to be 5,000 ft long, 1,500 ft wide, and approximately 100 ft thick. In 1982 and 1983, additional drilling of the 'Main' deposit confirmed the earlier reserve estimates, and drilling of the 'Hilltop' deposit has added significant reserves of fine-grained massive-sulfide ore. The 'Hilltop' deposit is up to 95 ft thick, dips to the south, and contains metal values similar to the 'Main' deposit.

In 1983, the Red Dog project advanced into a preliminary development phase. Environmental, mine-design, mill-tailings-disposal, transportation-network, government-agency-interactions, and overall mine-feasibility studies have been conducted.

At present, a road is favored over rail transport to a Chukchi Sea port facility about 60 mi from the deposit. A draft EIS has been released by the EPA, the lead federal permitting agency. Governor Bill Sheffield recently recommended that the state be involved in the infrastructure planning phase of the project. Infrastructure costs are estimated at 40 percent of the total $390 million in capital costs needed to put the mine into production. A 4-ton bulk sample was obtained for mill testing by drilling large diameter holes through the 'Main' ore zone. Preliminary results indicate that fine grinding and precise metallurgy are necessary to provide high-grade concentrates from the ore.

The agreement between the NANA Regional Corporation and Cominco requires local hire to the maximum extent possible.

Alaska Asbestos, Slate Creek, Eastern Interior Region
(loc. 3, fig. 13)

Alaska Asbestos is a joint-venture project between Tanana Asbestos Corporation, a wholly owned subsidiary of Doyon Regional Corporation (Doyon) and GCO, a subsidiary of International Paper Company. WGM is the principal operator. The joint venture was organized to explore, evaluate, and develop an asbestos deposit on land owned by Doyon near Eagle. Estimates through 1982 show reserves in three deposits of 61 million tons of 5 to 6 percent asbestos fiber that range in quality from 4A through 7D, Quebec Standard Specification. The exploration stage was essentially completed during the 1981-82 operating seasons.

Development drilling utilized a large 12-in. diam core barrel to provide samples for bulk laboratory testing and to support or revise indicated reserve classifications. About 1,000 ft of drilling was conducted in 1983, and results show somewhat higher
fiber grades than those indicated in previous narrow-diameter exploratory drilling. Principal efforts in 1983 were directed at obtaining additional mill tests and researching market opportunities. Doyon recently indicated slippage in development timetables that had previously forecast production by 1990. Pacific Rim countries are expected to be the recipients of the fiber products when a stable marketing system is established.

Miscellaneous Placer-Gold Development Work, Eastern Interior and South-central Alaska (various locations)

Twenty-seven mining companies reported a total of $1.48 million in expenditures (or an average of $55,000 each) for placer-gold developments in eastern interior, southwestern, and south-central Alaska. Most were small companies preparing for initial production from a variety of placer deposits; four companies were involved with ongoing production activities. Development work included grid-style churn, resonant, and reverse air-circulation drilling, overburden removal and general ground preparation, camp construction, and minor road building. The cost of mechanized heavy equipment was not generally included. At one of the larger properties on Valdez Creek, Camindex drilled 10,300 ft on the 1,200-acre Tammany Channel property. Smith (1981) provided a geologic framework for gold-placers in this district and conducted seismic studies of the channel and bench gravels of the area. Reserves of approximately 360,000 yd grading 0.085 oz/yd gold were proven by project consultant WGM in preparation for the 1984 production season.

Independence Mine, Hatcher Pass, South-central Region (loc. 4, fig. 13)

The Independence Gold Mine, located approximately 70 mi north of Anchorage, has produced in excess of 165,500 oz of gold. In 1979, Starkey Wilson obtained an option on the property and, in 1981, Enserch Corporation (Dallas, Texas) became a 50-percent partner. Coronado Mining became the mine operator for the partners. During 1981, extensive underground exploration and development were conducted, and 3,000 tons of ore grading 0.5 oz/ton was stockpiled. The ore occurs in quartz veins that occupy north-northwest-trending shear zones along the southern border of the Talkeetna Batholith. The veins contain pyrite, arsenopyrite, molybdenite, galena, tetrahedrite, and free gold. Stockpiled ore has been treated in a 150-TPD mill near the mine site. The mill contains jig and flotation units, a batch-cyanide system, and a Merrill-Crowe precipitation circuit. The mine and mill facility were dedicated in August 1982. In November 1982, Coronado suspended operations for an undisclosed period, citing problems with recovery in the mill as the reason for closure.

Company officials have not released total expenditures for the project, but some sources estimate development costs through 1983 at $6 million. This figure includes construction of the new mill, living quarters for 30 workers, and several thousand feet of development drifting (including a 3,150-ft access tunnel).

In 1983, the tailings pond was sealed with a bentonite or Hypalom (TM) extract. Test runs of mill ore produced satisfactory results, but production of gold from mill runs is unknown. An undisclosed amount of subsurface work was also conducted on the property.

Alaska Apollo Gold Mines, Ltd., Alaska Peninsula (loc. 5, fig. 13)

The Apollo and Sitka lode systems, located on Unga Island 550 mi southwest of Anchorage, are the most westerly gold mines in North America. Between 1894 and 1906, the Apollo and Sitka veins produced 107,000 oz of gold from 500,000 tons of ore. Minor intermittent activity occurred after 1906. The deposits consist of crosscutting shears and veins that are associated with Tertiary volcanism in the Alaska-Aleutian volcanic arc. The deposits contain gold and silver with substantial amounts of copper, zinc, and lead. The current owner of the property is Alaska Apollo Gold Mines, Ltd., (Alaska Apollo) formerly Catalina Energy and Resources, Ltd., which is headquartered in Vancouver, British Columbia. The following summary includes both exploration and development activities on the property.

During the winter of 1981-82, the Sitka Mine was dewatered to the 250-ft level, and the Apollo No. 1 shaft was dewatered to the 450-ft level. With the shafts dewatered and several levels cleaned out, an intensive but inconclusive program of geologic mapping and sampling was undertaken to substantiate an inferred reserve estimate of 2.2 million tons of ore.

At least $4 million was expended on the property from 1980 to 1983. Work in 1983 included 24 diamond drill holes totalling 20,000 ft, channel
sampling, and the reopening and mapping of underground mine workings. This work resulted in indicated ore reserves of 130,000 tons on the Shumagin structure, one of eight defined ore zones. According to Woodman (1983b), the company acquired land for shipping facilities and has a contract with Phoenix Marine Engineering Company to dredge tailings at the head of Delorof Harbor on Unega Island. Arctic Resources Drilling, Inc. is the project driller. The engineering consulting firm of Pinock, Allen, and Holt, Inc., is working with Alaska Apollo on various feasibility studies. Conceptual mill designs include a 1,000-TPD plant mounted on a floating barge and subsequently 'sunk' into a shoreline facility.

Greens Creek Joint Venture
Southeastern Region
(loc. 6, fig. 13)

During 1973, Pan Sound Joint Ventures, a group composed of Marietta Resources International, Exalas Resources Corporation, Texas Gulf Resources Corporation, and Noranda began mineral-exploration activities in southeastern Alaska. In 1977, Pan Sound Joint Ventures announced the discovery of significant base metal-precious metal deposits at Greens Creek, about 18 mi southwest of Juneau. Initial drilling results indicated the presence of exceptionally high-grade, apparently stratiform massive-sulfide ore bodies in volcanic-sedimentary rocks of Devonian age. By 1978, in-place reserves of 21 million tons grading 10 percent combined copper, lead, and zinc, about 9 oz/ton silver, and 0.10 oz/ton gold were announced. In 1982, reserve estimates increased to 3.5 million tons grading 10 percent combined zinc, lead, and copper, 12 oz/ton silver, and 0.16 oz/ton gold. Ore reserves in 1983 were increased to 4 million tons of 8 to 10 percent zinc, 2 percent lead, 0.5 percent copper, 10 oz/ton silver, and 0.1 oz/ton gold. The passage of ANILCA in December 1980 allowed development of the Greens Creek Joint Venture deposit, which is in a nonwilderness area of the Admiralty Island National Monument. The federal EIS permitting process for mine development was completed in January 1983. The U.S. Forest Service, lead agency in the EIS permitting process, recommended a development plan very similar to the plan proposed by Noranda. Many industry analysts believe this project is the most likely major mining project in Alaska to achieve on-schedule production. The mine is expected to operate at a capacity of 850 TPD and employ several hundred individuals. Workers will commute from Juneau, 18 mi east of the deposit.

The U.S. Forest Service has confirmed the validity of eight core mining claims, but the validity of other important portions of the claim block has not been determined even though geology, shallow drilling, geochemistry, and geophysics attest to continuity of ore horizons in this additional ground. ANILCA specifies that claims must be perfected and declared valid by December 2, 1985. Noranda believes it will be very difficult to obtain all necessary validity information via surface drilling by that date. Additionally, the company argues that such claims are best proved by subsurface development drilling during mine operation, which would eliminate the need for immediate surface trenching, helipad construction, and other environmental disturbances.

In 1983, Noranda requested relief from the time restraint placed on these proved claims by asking for minor adjustments in the boundary of Admiralty Island National Monument. In December 1983, a draft EIS for Admiralty Island National Monument was released. The preferred alternative would move the northern boundary of the Monument to exclude 17,225 acres that include the Greens Creek deposit and add 18,174 acres in the popular Young Lake area to the Monument. While a decision has not been made on this alternative, the state supports the boundary adjustment.

In 1980, a 4,224-ft adit and a 424-ft crosscut were completed to provide access for underground diamond drilling and possible bulk sampling of the orebody. Environmental base-line work included investigations of water quality, wildlife, fishery resources, marine resources, air quality, archaeological resources, and meteorology and a review of socioeconomic factors. Transportation to and from the site has been entirely by helicopter. Road and facility-site studies continued in 1983, and construction of an access road connecting Young Bay to the mine site will commence in 1984.

In 1983, after acquiring the interest previously held by the Martin Marietta Corporation, Anaconda became a partner with Noranda at Greens Creek; both companies now own 33.9 percent of the project. Other owners are Texas Gulf Resources Corporation (12.3 percent), Bristol Bay Resources, a subsidiary of Bristol Bay Native Regional Corporation (11.2 percent), and Exalas Resources Corporation (8.7 percent).

Juneau Gold Mining Company,
Southeastern Region
(loc. 7, fig. 13)

Juneau Gold Mining Company is continuing development of a dredging and milling operation to process 4 million tons of Alaska Gastineau mill
tailings at Thane, 4 mi south of Juneau. Of the 11 million tons of tailings deposited on the tidelands in Gastineau Channel between 1915 and 1920, only an estimated 4 million tons are available for recovery (to a depth of 60 ft) by a floating ‘cutter’ dredge (fig. 14). Rate of production is estimated at 300 tons/hr with an estimated reserve base of about 4½ yr. Key units in recovery of fine gold lost during earlier mining operations are a bank of centrifuges. About 25 percent of the gold is recoverable as ‘free’ gold that can be melted into bullion on-site. Concentrates containing occluded gold will be shipped to Asarco’s Tacoma smelter for processing. Future on-site developments may utilize thiourea as a dissolution agent to recover gold.

**U.S. Borax,**

**Quartz Hill Molybdenum Deposit,**

*Southeastern Region*

(loc. 8, fig. 13)

U.S. Borax continued development work on their Quartz Hill molybdenum deposit. Based on more than 250,000 ft of diamond core drilling conducted from 1974 to 1982, U.S. Borax estimates a mineral deposit in excess of 1.5 billion tons of molybdenite grading 0.136 percent molybdenite. This figure includes several hundred million tons of near-surface ore that grades better than 0.2 percent molybdenite.

Quartz Hill was located in the Tongass National Forest. In December 1978, when the Misty Fiords National Monument was established—and proposed as a wilderness area—Quartz Hill was included. In 1980, with passage of ANILCA, a 149,000-acre exclusion area surrounding Quartz Hill was granted to allow the project to proceed. Since 1975, data on meteorology, snow, hydrology, water quality, vegetation, wildlife, coastal and marine biology, physical and chemical oceanography, archaeology, and socioeconomics have been collected. U.S. Borax estimates the cost of these studies through 1983 has exceeded $14 million, and total project expenditures to date approach $75 million. In July 1982, a final EIS for access-road construction and bulk sampling of the ore body was issued by the U.S. Forest Service.

On August 5, 1983, the Interior Board of Land Appeals approved patent applications submitted by U.S. Borax for 32 lode claims in Misty Fiords National Monument. The 9.5-mi-long access road started last year was completed in August at a cost of over $1 million per mi. Attending the road-opening ceremonies were Senators Ted Stevens and Frank Murkowski, Representative Don Young, and Governor Bill Sheffield. South Coast, Inc., (Ketchikan) employed about 75 workers to complete the task. Subsequently, a 5,000-ton bulk sample was trucked to the dock and eventually delivered to Hanna Research Center in Minnesota. The testing program involves crushing and processing the bulk sample to help design the Borax mill and to establish environmental standards.

Bechtel, Ltd., is conducting various feasibility studies. Work in 1983 included water-supply, power-requirement, and work-force-analysis studies. Conceptually, a power plant located on Tunnel Creek will supply 75 MW of power. Plans also indicate the construction of a refinery at Grays Harbor, Washington, to convert molybdenite concentrates into salable products, including chemicals. Bechtel, Ltd., is searching for sources of fresh water to supply the milling process. Ore would be fed to a primary crusher at the mine site and then conveyed through a 4-mi-long tunnel to a concentrator. Electrical braking on the conveyor system would generate some power requirements for the mine. Tailings from the concentrator would be conveyed through a 6-mi-long tunnel to Boca de Quadra, a possible submarine-disposal site.

In 1983, U.S. Borax announced that workers will be housed in Ketchikan rather than at the mine site. This will eliminate the cost of constructing a town site and will minimize disturbances to the Misty Fiords National Monument.

According to the project timetable, the mine-construction phase will begin in 1984 and production will begin by 1987. However, these phases will require a careful study of market trends and approval of all necessary federal and state permitting agencies. Molybdenum is critical to the manufacture of high-strength steel, high-temperature alloys, and corrosion-resistant materials. Although the molybdenum market is presently depressed, D.L. Finney, Ketchikan manager, believes that world demand will grow sufficiently to accommodate the entry of this major mine into the market.
Mineral Production in 1983

Introduction

The value of 1983 mineral production—excluding petroleum—is estimated at $232.4 million, an increase of over 18 percent from 1982 levels (table 4). Large increases in the value of sand and gravel and building stone are responsible for this increase. Leading the list is sand and gravel, $120.0 million; gold, $67.6 million; building stone, $25.0 million; and coal, $18.0 million. Production of tin, silver, platinum, antimony, soapstone, and jade amounted to approximately $1.6 million, an increase of 14 percent from 1982 levels. Value of sand and gravel, building stone, and silver increased 32, 39, and 67 percent, respectively, over 1982 levels, but gold and tin showed slight declines from the previous year. Coal, platinum, soapstone, and peat remained at about the same levels. Antimony production occurred in the Kantishna district.

Producing gold-mining camps, coal mines, and sand-and-gravel operations in Alaska (1983) were involved in sand-and-gravel and building-stone operations. Placer mines, most of which operated between April and November, employed at least 2,000 individuals.

As in previous surveys by Bundtzen, Eakins, and Conwell (1982) and Eakins and others (1983), production statistics were derived from 220 DGGS questionnaires returned by private companies and individuals, the USBM, the Alaska Railroad, and from private consultations with knowledgeable individuals. Historical production of gold, sand and gravel, and coal are compiled in figures 16-18. Because all information is provided voluntarily, the totals in tables 4 and 5 for 1983 Alaskan nonfuel mineral output are conservative.

Gold production is difficult to estimate. Sources used to obtain 1983 gold-output figures include information from a) 25 consultants familiar with activities in 30 mining districts in Alaska, b) DGGS questionnaires and other volunteered information, including data from about 100 mechanized placer

Table 4. Mineral production in Alaska, 1981-83.a

<table>
<thead>
<tr>
<th>Metals</th>
<th>Volume</th>
<th>Value ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>134,000</td>
<td>174,900</td>
</tr>
<tr>
<td>Gold (oz)</td>
<td>W</td>
<td>None</td>
</tr>
<tr>
<td>Lead (lb)</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Mercury (lb)</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Antimony (lb)</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Platinum (oz)</td>
<td>900</td>
<td>W</td>
</tr>
<tr>
<td>Silver (oz)</td>
<td>13,420</td>
<td>22,000</td>
</tr>
<tr>
<td>Tin (lb)</td>
<td>106,000</td>
<td>198,000</td>
</tr>
<tr>
<td>Tungsten (stu)</td>
<td>305</td>
<td>NR</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>56,267,360</td>
<td>71,673,000</td>
</tr>
<tr>
<td><strong>Industrial minerals, coal, and peat</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jade and soapstone (ton)</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Sand and gravel (mt)</td>
<td>46.0</td>
<td>45.0</td>
</tr>
<tr>
<td>Building stone (mt)</td>
<td>5.36</td>
<td>3.40</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>114,760,000</td>
<td>106,600,000</td>
</tr>
<tr>
<td><strong>Coal (mt)</strong></td>
<td>800,000</td>
<td>830,000</td>
</tr>
<tr>
<td><strong>Peat (yd3)</strong></td>
<td>200,000</td>
<td>W</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>188,627,360</td>
<td>196,423,000</td>
</tr>
</tbody>
</table>

a From DGGS questionnaires, interviews with mine operators, USBM data, and confidential information.
b Average price of gold in 1983 assumed $400/oz.
c Does not include jade from NANA Regional Corporation Kobuk operations.

mt = million short tons
w = withheld
stu = short ton units
NR = not reported
Figure 15. Producing gold-mining camps, coal mines, and sand-and-gravel operations in Alaska, 1983.

Results are summarized in table 5 and show that in 1983, about 296 mechanized placer mines and about 40 recreational ventures produced approximately 169,000 oz of gold and 18,000 oz of by-product silver. These figures represent a decrease of 3.4 percent from 1982 levels. Within the error limits of this survey, gold production remained approximately the same as during the previous year. However, within various districts, gold and silver production fluctuated widely from previous years. Several factors contributed to these fluctuations. In parts of western, northern, and eastern interior Alaska, an exceptionally dry season resulted in water shortages that significantly affected placer-mine production.
Table 5. Gold production in Alaska by region, 1983.

<table>
<thead>
<tr>
<th>Region and district(s)</th>
<th>Major operators</th>
<th>Production (troy ounces)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chandalar</td>
<td>15</td>
<td>6,200</td>
</tr>
<tr>
<td>Shungnak-Noatak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koyukuk-Nolan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nome</td>
<td>35</td>
<td>41,000</td>
</tr>
<tr>
<td>Kougarok</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port Clarence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fairhaven</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ruby</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solomon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koyuk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Council</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koyukuk-Hughes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern Interior</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circle</td>
<td>180</td>
<td>85,000</td>
</tr>
<tr>
<td>Livengood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fairbanks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fortymile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manley-Eureka</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Richardson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bonnistfield</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kantishna</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rampart</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South-central</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cache Creek</td>
<td>38</td>
<td>20,800</td>
</tr>
<tr>
<td>Nizina</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chistochina</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valdez Creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kenai Peninsula</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nelchina</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southwestern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innoko-Tolstoi</td>
<td>25</td>
<td>15,500</td>
</tr>
<tr>
<td>Iditarod-George River</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nyac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crooked Creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goodnews Bay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lake Clark-Mulchatna</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moore Creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southeastern and Alaska Peninsula</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>500</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>169,000</td>
</tr>
</tbody>
</table>

Depletion of reserves, evident in districts such as Circle, Rampart, and Richardson, caused production levels to drop from 1982 levels. The great Klondike district in Yukon Territory also experienced a similar depletion in reserves, but production levels were equal to or above the previous year; over 150 mechanized placer mines operated in the north's 'biggest of all' placer-gold district (fig. 19).
According to DGGS questionnaire respondents, enforcement of environmental regulations in the Nyac area and other mining districts negatively affected gold-production levels. The collapse of Delta Smelting and Refining (Fisher, 1983) left many Alaskan miners with substantial losses. Some miners needed gold held by the company to fund development work in the 1983 season. There was almost no lode-gold production in the state in 1983.

On the positive side, several of the state's largest producers, including Canadian Natural Resources (CNR) at Livengood and the Alaska Gold Company at Nome and Hogatza, had record gold outputs. The Kantishna mining district produced more gold in 1983 than in any year since 1905. Healthy seasons were also recorded in the Wrangell Mountains, Chistochina, and Valdez Creek areas.

The price of gold fluctuated from nearly $480 in January to about $380 at the end of 1983, with an average annual price of $408 or about the same as 1982. Although gold started off stronger in 1983 than in 1982, economic conditions are assumed to be approximately the same in both years.

Silver in Alaska is produced primarily as a byproduct of placer gold. However, two lode mines shipped primary silver ore in 1983, and hence total silver output increased significantly from the previous year. Tin, antimony, platinum, and soapstone were derived from small-scale mineral developments. Total production of sand and gravel was obtained from the USBM; output from various regions of the state was mainly derived from questionnaires and interviews.

Forecast for 1984 mineral output are speculative. Consumption of sand and gravel may significantly decrease because construction of ice islands and other projects on the North Slope is expected to drop from 1983 levels. Building-stone output will probably remain at near record levels because an increase in transportation-facilities construction is expected. Usibelli Coal Mine forecasts a significant increase in coal production in 1984 with the initiation of coal shipments to Korea. On the short term, gold output is expected to remain at approximately the level established during 1980-83. Placer reserves are being depleted in several eastern interior districts where significant production occurs. However, increased lode production; offshore, bench-gravel, and 'deepground' exploitation; improved recovery technology; and mill-tailings recovery may more than offset projected decreases in placer-gold production. Forecasts for production of other metals cannot be made, and exploitation of those commodities is dependent on complex market conditions.

Metals

Northern Region

Gold and silver were the only metals produced in the northern region. Fifteen placer mines produced 6,500 oz of gold and about 700 oz of byproduct silver, about 25 percent less than in 1982. An exceptionally dry year in the Koyukuk-Nolan area and lack of lode production contributed to the decrease. Principal producing streams continue to be Porcupine, Emma, Linda, Vermont, Union, Archibald, and Nolan Creeks in the historic Wiseman district. Water shortages caused some operations to remain dormant throughout the year. However, small-scale operations on Crevice Creek and in the Wild Lake area enjoyed good returns for their efforts. Wild River Ventures continued to operate their underground drift mine and installed additional mining equipment. Small amounts of placer production occurred in the Shungnak and Noatak areas, but specific levels are unknown.

Canadian Barranca Corporation operated their placer mine in the Chandalar district, but CDC did not mill hard-rock gold ore from the Little Squaw-Mikado vein system in 1983. However, they expect to resume lode production in 1984.

Western Region

An estimated 35 placer mines produced at least 41,000 oz of gold and 4,500 oz of silver, an increase of 19 percent from 1982 estimates.
The largest producer continues to be the Alaska Gold Company, which operates two 9-ft³ bucketline dredges in the Nome fields and an 8-ft³ unit at Hogatza on the lower Koyukuk drainage. Experienced dredge hands, success in the thaw fields, and overall company management resulted in one of the company's best performances since their 1975 startup. Approximately 140 individuals worked during the peak of the operating season, and about 35 were employed year-round, a significant economic boost for the historic mining town of Nome. Currently about 1 million yd³ have been blocked out in front of Dredges 5 and 6 by thaw-field development drilling. Hence, the company has achieved their objective of having 2 yr of reserves developed for the dredges. Additionally, at least 25 yr of drilled reserves are said to remain.

Two 2½-ft³-capacity 'gold boats' owned by the Engstrom and Tweet families operated on Quartz and Henry Creeks on the central Seward Peninsula. Steve Peterson operated his floating dredge in the Council area.

Lost River Mining Company operated their placer-tin mine on Cape Creek and shipped 100 barrels of cassiterite to a smelter in Laredo, Texas. This mine continues to be the largest primary source of this strategic metal in the United States; twelve individuals were employed.

A unique discovery occurred on Colorado Creek in the Cripple Mountains 40 mi north of McGrath. During stripping operations, Rosander Mining Company discovered an exceptionally well-preserved woolly-mammoth skeleton in muck overburden. The company subsequently donated the discovery to the University of Alaska Museum (fig. 20), and museum personnel (under the direction of R.C. Betts) excavated the skull, most of the 15,000-yr-old skeleton, and other important artifacts, including hair, skin, and scavenger remains. DGGS arranged to have the skull flown to Fairbanks on a fuel back-haul. The tusks and skull are on display in the museum in Fairbanks.

**Eastern Interior Region**

The eastern interior region produced 85,000 oz of gold, about 50 percent of the state's total gold output—and about the same as previous years. Six mines each produced in the 2,500- to 4,000-oz range, and many others produced at the 'several-hundred-ounce' level. The largest recorded production was that of the CNR placer mine at Livengood, which reported a total production of 11,700 oz of placer gold during 1983.

The Circle district was again the state's most active district with 42 medium-to-large mechanized mines and 80 to 100 smaller and recreational ventures, about the same as last year. Bullion production, however, was down from 1982 levels, largely due to exhaustion of reserves in some drainages. Some of the best performers in the district have improved recovery techniques so they can mine previously worked ground.

Production decreased in the 40-Mile, Manley, Rampart, and Richardson areas due to decreased reserve bases and water shortages; placer reserves in the two latter districts have largely been mined out, and a new phase of exploration is in progress. The Fairbanks, Livengood, Bonnifield, and Kantishna areas showed increases in production of placer gold, with the latter having its best year since 1905 (fig. 21). Approximately 11 barrels of cassiterite were recovered from a placer-mining operation in the Tozi-Moran area west of Tanana.

Nick Begich, Jr., mined approximately 150 tons of silver-gold ore grading 75 oz/ton silver with significant gold values at the Weiler deposit in the Kantishna mining district (fig. 22). The rich ore was flown by helicopter from the mine site to the Denali Park Highway, where it was trucked to Fairbanks. The ore was then concentrated at the Mohawk Oil and Gas Company mill in Fox.
John Millhouse mined 20 tons of high-grade antimony ore from the Slate Creek Mine in the Kantishna district. Early in the year, Tricon, Inc., ran a pilot plant using amalgamation at the Grant Gold Mine in the Fairbanks district, and several hundred tons of mill tailings were run through the improved recovery system.

**Southwestern Region**

Twenty-five well-established operators in the Flat, Innoko, Crooked Creek, George River, and Nyac areas produced 15,500 oz of gold or about 9 percent of total 1983 production in the state (fig. 23). This represents a 20-percent decrease in production from previous years. Much of this decrease is attributed to the shutdown of the Northland Dredging Company's 6-ft³ bucketline dredge in the Nyac district early in the season. The company was refused a permit by the U.S. Army Corps of Engineers to cross the Tulaksak River. This operation was previously one of the largest producers of gold in the 49th state. The company is working to solve environmental and engineering problems so that it may operate in 1984. The 3-ft³ dredge of the Tulaksak Dredging Company, also in the Nyac area, was in production.

The Goodnews Bay platinum dredge operated for 30 days during the 1983 season, but most of the company's efforts continued to center on bulk sampling of previously mined tailings and improvement of recovery methods aboard the dredge.

**South-central Region**

Twenty-five placer mines in the south-central region provided almost 21,000 oz of gold in 1983, about the same level of production as during previous years. No lode gold was produced.
The largest producers include the Ranchers Exploration and Development Corporation on Slate Creek in the Chistochina area; Talmo, Inc., in Wrangell National Park-Preserve; and Nelchina Mines, Inc., in the Nelchina district. Efficient management and innovative recovery systems have contributed to the success of these operations despite their locations in remote, mountainous terrane.

A pilot plant was operated on the Denali bench gravels in the Valdez Creek district in preparation for larger scale mining. Three new placer-mining ventures initiated production in the Chistochina district north of the Nabesna Road cutoff.

Silver Star Mining recovered 24 tons of high-grade silver-gold ore from their mine in the Kotsina drainage in Wrangell National Park-Preserve and intends to increase production in 1984. The Fern Development Corporation continued development preparatory to opening a lode-gold mine in the Willow Creek district. Likewise, Dan Renshaw and Gold Cord Development Corporation drove drift at the Gold Cord Mine to connect underground workings in preparation for lode-gold mining activities. Mill tests and other activities were conducted at the Independence Mine in 1983.

Figure 24. Location of principal coal fields in Alaska.
Southeastern Region and Alaska Peninsula

Metal output from these two widely separated regions is poorly known, but believed to be low. John Schnabel operated a placer mine in the Porcupine district near Haines, and at least two other nearby placer deposits were worked. Gold and silver production may increase dramatically if plans to process mill tailings in the Juneau and Chichagof districts are realized. Activities of the Juneau Gold Mining Company at Thane are described in the development section.

Coal and Peat

Principal coal fields in Alaska are shown in figure 24, and a summary of coal resources in Alaska and representative analyses of Alaskan coals are shown in tables 6 and 7, respectively. The Usibelli Coal Mine, which was the only major coal mine in Alaska during 1983, produced an estimated 803,000 short tons of subbituminous-C coal from a dragline-strip mine operation mining the Suntrana Formation in the Nenana coal field (fig. 25). About 180,000 tons are used to fuel the GVEA power plant at Healy, and the remaining 625,000 tons are hauled on the Alaska Railroad to the University of Alaska, the Fairbanks Municipal Utilities System, and several interior military-installation power plants. About 20,000 tons are sold annually for space-heating needs in interior Alaska.

The 1983 season was one of preparation and expansion for the Usibelli Coal Mine. An initial 1984 test shipment of coal by Sun Eel Corporation for the Korean Electric Power Company will boost 1984 coal production at Healy to about 860,000 tons. A 15-yr contract was finalized during 1983 and provides for the annual export of up to 880,000 tons of coal to South Korea. A harbor and facilities for unloading railroad cars and loading coal onto ships are under construction at Seward; the harbor must be dredged to accommodate the large ships. Hence, coal production at Healy is expected to roughly double from current levels by 1987. Usibelli’s expansion has included a new $6-million tipple (fig. 26), a 46,000-ft² office-workshop complex at the mine, a new fleet of 75-ton WABCO haul trucks, and purchase of a D-10 Caterpillar tractor. The successful delivery of Healy coal to the Korean market may send positive signals to other potential buyers of Alaskan mineral products.

Minor amounts of coal were recovered by individuals in the Homer and Matanuska coal fields for space-heating requirements. The Premier Mine, a former producer in the Matanuska coal field, did not operate in 1983. Owner Paul Omlin sold his interest to a larger consortium interested in a potential export market.

The state of Alaska has been granted approval by the U.S. Department of Interior to administer the Alaska Surface Coal Mining Control and Reclamation Act. The state is drawing on the Abandoned Lands Reclamation Fund to study reclamation needs. The ‘Alaska coal mined land inventory’ (Harker, 1983) was prepared by DOWL Engineers and Plangraphics, Inc., on contract with DMEM. Priorities for measures to correct hazardous conditions are being established, and the regulations adopted for environmental protection have been published.

Horticultural peat is mined from four pits in the Fairbanks area and from at least two pits near Willow. Production during 1983 from all sources is estimated at 15,000 yd³. Peat continues to be evaluated as an energy or horticultural resource in several bush villages, including McGrath and Dillingham.

<table>
<thead>
<tr>
<th>Coal Province/Mine</th>
<th>Measured reserves</th>
<th>Indicated resources</th>
<th>Hypothetical resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Alaska coal province</td>
<td>250</td>
<td>150,000</td>
<td>to 4,000,000</td>
</tr>
<tr>
<td>Cook Inlet-Susitna Lowland coal province</td>
<td>Over 2,500</td>
<td>11,000</td>
<td>over 1,600,000</td>
</tr>
<tr>
<td>Beluga and Yentna fields</td>
<td>2,500</td>
<td>10,000</td>
<td>to 30,000</td>
</tr>
<tr>
<td>Kenai field</td>
<td>0.5</td>
<td>320</td>
<td>to 150,000</td>
</tr>
<tr>
<td>Matanuska field</td>
<td>50</td>
<td>120</td>
<td>to 1,500,000</td>
</tr>
<tr>
<td>Broad Pass field</td>
<td>10</td>
<td>50</td>
<td>to 500</td>
</tr>
<tr>
<td>Nenana-trend coal province</td>
<td>3,500</td>
<td>7,000</td>
<td>to 17,000</td>
</tr>
<tr>
<td>(includes Farewell-Little Tonzona field)</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Other interior coal occurrences</td>
<td>...</td>
<td>...</td>
<td>to 3,000</td>
</tr>
<tr>
<td>Bering River field</td>
<td>60</td>
<td>100</td>
<td>to 3,500</td>
</tr>
<tr>
<td>Chignik Bay-Herendeen Bay fields</td>
<td>20</td>
<td>200</td>
<td>to 3,000</td>
</tr>
<tr>
<td><strong>ALASKA TOTAL</strong></td>
<td><strong>&gt;6,300</strong></td>
<td><strong>&gt;168,000</strong></td>
<td><strong>&gt;5,600,000</strong></td>
</tr>
</tbody>
</table>

*aIncludes offshore deposits to 2,000 ft.*

Table 7. Representative analyses of Alaskan coals on as-received basis.

<table>
<thead>
<tr>
<th>Coal area</th>
<th>Moisture (%)</th>
<th>Volatile matter (%)</th>
<th>Fixed carbon (%)</th>
<th>Ash (%)</th>
<th>Sulfur (%)</th>
<th>Heating value (Btu)</th>
<th>Rank*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arctic Slope</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Foothills</td>
<td>2.10</td>
<td>31.36</td>
<td>53.58</td>
<td>4.15</td>
<td>0.1-0.3</td>
<td>10,000-13,500</td>
<td>Hvcb</td>
</tr>
<tr>
<td>Coastal Plain</td>
<td>8.20</td>
<td>30.36</td>
<td>38.50</td>
<td>3.20</td>
<td>0.2-0.8</td>
<td>7,700-10,700</td>
<td>Subb</td>
</tr>
<tr>
<td>Nulato</td>
<td>1.10</td>
<td>25.40</td>
<td>47.65</td>
<td>3.22</td>
<td>0.2-0.6</td>
<td>9,100-9,750</td>
<td>Hvcb</td>
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<tr>
<td>Eagle</td>
<td>2.15</td>
<td>20.45</td>
<td>40.55</td>
<td>2.22</td>
<td>0.2-0.6</td>
<td>10,900-11,500</td>
<td>Mvb</td>
</tr>
<tr>
<td>Nenana</td>
<td>10.31</td>
<td>21.43</td>
<td>24.45</td>
<td>3.30</td>
<td>0.2-1.2</td>
<td>6,200-9,800</td>
<td>Subc</td>
</tr>
<tr>
<td>Jarvis Creek</td>
<td>20.25</td>
<td>35.45</td>
<td>25.35</td>
<td>5.15</td>
<td>0.3-1.5</td>
<td>7,800-9,500</td>
<td>Subc</td>
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<tr>
<td>Broad Pass</td>
<td>20.35</td>
<td>27.35</td>
<td>24.28</td>
<td>3.20</td>
<td>0.2-0.4</td>
<td>5,500-7,100</td>
<td>Lig</td>
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<tr>
<td>Susitna lowland</td>
<td>10.30</td>
<td>28.40</td>
<td>25.45</td>
<td>3.30</td>
<td>0.1-0.7</td>
<td>6,200-9,500</td>
<td>Subc</td>
</tr>
<tr>
<td>Kenai</td>
<td>20.27</td>
<td>30.38</td>
<td>25.35</td>
<td>3.25</td>
<td>0.2-0.4</td>
<td>6,500-8,500</td>
<td>Subc</td>
</tr>
<tr>
<td>Matanuska Valley</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wishbone Hill</td>
<td>3.9</td>
<td>32.45</td>
<td>38.51</td>
<td>4.22</td>
<td>0.2-1.0</td>
<td>10,400-13,200</td>
<td>Hvbb</td>
</tr>
<tr>
<td>Chickaloon</td>
<td>1.5</td>
<td>14.24</td>
<td>60.72</td>
<td>5.20</td>
<td>0.4-0.7</td>
<td>11,960-14,400</td>
<td>Lvbb</td>
</tr>
<tr>
<td>Anthracite Ridge</td>
<td>3.9</td>
<td>7.11</td>
<td>65.81</td>
<td>7.20</td>
<td>0.2-0.7</td>
<td>10,720-14,000</td>
<td>Sa</td>
</tr>
<tr>
<td>Bering River</td>
<td>1.8</td>
<td>13.17</td>
<td>65.91</td>
<td>2.18</td>
<td>0.1-1.0</td>
<td>11,000-15,000</td>
<td>Lvbb</td>
</tr>
<tr>
<td>Chignik-Herendeen Bay</td>
<td>7.8</td>
<td>32.35</td>
<td>45.51</td>
<td>7.12</td>
<td>0.2-0.4</td>
<td>11,300-11,800</td>
<td>Hvbb</td>
</tr>
</tbody>
</table>

*a* = semi-anthracite; Lvbb = low-volatile bituminous B; Mvb = medium-volatile bituminous; Hvbb = high-volatile B bituminous; Hvcb = high-volatile C bituminous; Subb = subbituminous B; Subc = subbituminous C; Lig = lignite.
Industrial Minerals

Introduction

The value of industrial-mineral production amounted to $145 million during 1983, an increase of over 36 percent from 1982 levels (table 4). Value of both sand and gravel and building stone increased uniformly from the previous year. Statewide uses of sand and gravel continue to be concentrated in the North Slope oil fields and in Alaska’s four largest urban areas— Anchorage, Fairbanks, Juneau, and Ketchikan. Approximately 70 gravel pits and 50 sand quarries operate intermittently to meet government and private construction needs.

Fill constitutes the main use in volume (90 to 93 percent), followed by concrete aggregate and bricks (4 to 5 percent); asphaltic concrete (1 to 2 percent); road base and covering (1 to 2 percent); and snow-and-ice control, gunnites, and plaster (1 percent). Building stone is mainly used in urban areas for reinforcement and ornamental applications.

Northern and Western Region

About 75 percent of sand-and-gravel use in Alaska is concentrated in the North Slope petroleum fields and directly associated with oil-and-gas development projects. A principal use in 1983 continued to be construction of gravel islands in the Beaufort Sea for oil-rig placement; each island requires 1 to 2 million tons of aggregate. Continued development of the Kuparuk oil field and transportation and pipeline construction were other major applications.

Gladden and Stanley (1983) described an innovative new method of gravel mining during construction of the North Slope Borough’s new $10 million Nuiqsut runway. The method employs gravel-bed mining from flood-plain deposits using floating dredges. The gravel is pumped to the construction site via a slurry pipeline. North Slope Borough consultant Mike Weston designed the dredges while Rittenhouse-Zeman and Associates of Anchorage developed the fill-placement system. This unique method could cut aggregate-haulage costs considerably on the North Slope.

The NANA Regional Corporation continued production of high-quality jade in the Jade Mountains east of Kotzebue. Development and production activities on the mine site included diamond core drilling, excavating, slabbing with a diamond saw, and transporting the jade to Kotzebue, where it is marketed under Jade Mountain Products, Inc.

Eastern Interior Region

At least one million tons of aggregate were produced from seven pits in the Fairbanks area. The chief producers include Fairbanks Sand and Gravel, Inc., who operate off the Old Richardson Highway, and EVECO, Inc. (Ace Construction Company) in Fox. Fairbanks Sand and Gravel utilizes a 4½-ft³ bucket-clam dredge on a 27-acre state lease on the Tanana River flood plain. Production during 1983 of 123,888 tons was the same as previous years. EVECO, Inc., employed a sophisticated double-trommel washing plant and produced several sizes of aggregate and substantial quantities of placer gold. Because of excellent exposures of both frozen-muck overburden and ancient stream-gravel deposits, their mine site became the center of attention during the 1983 Fourth International Conference on Permafrost. Scientists from over 50 countries visited with the cooperative and informative mine operators.

The Carroll-Vondra Partnership (Yutan Construction Company) operated the Brown’s Hill Basalt Quarry near Badger Road east of Fairbanks. An estimated 540,000 tons of basalt was produced for use as riprap, road metal, crushed fill, and ornamental stone. The company reports its production is dependent on local economic conditions and on the state’s needs. Weather is an important factor that affects the length of the operating season. Usually 10 individuals are employed from May to October.

About 2 tons of soapstone, talc, and magnesite were quarried in the upper Salcha River area for handicraft applications.

Southwestern Region

About 100,000 tons of aggregate were mined from point-bar and other deposits along the lower Kuskokwim River for use in the Bethel area. The city of McGrath also recovered several hundred tons of pebbly gravel from lag deposits dredged in the Kuskokwim River for road repairs. City planning efforts have concluded that nearby Candle Mine dredge tailings offer the best source of aggregate for construction on a proposed 5,000-ft-long runway.

South-central Region

Eight private pit operators reported a total production of 4,902,457 tons of gravel from south-central Alaska. Pits developed by Anchorage Sand and Gravel in Palmer and Alaska Gravel Sales in the Anchorage municipality are the largest producers. Records submitted by W.F. Coghill of the Alaska Railroad show that in 1983, 4,397,611 tons of gravel...
were hauled from Palmer to Anchorage—a 59 percent increase from the previous record level set in 1982. The high level of gravel haulage during the last 3 yr is an important factor in the railroad’s current operating profitability. The recent acquisition of four new GP-49 locomotives specifically designed for heavy industrial loads (Woodman, 1983a) will facilitate gravel and mineral haulage in the rail belt.

Sherman C. ‘Red’ Smith reported production of agricultural-quality limestone and building stone from quarries on the Kenai Peninsula.

Some soapstone was mined in Grubstake Gulch near Palmer for handicraft applications.

**Southeastern Region**

Incomplete returns from four operations indicate a production of 252,000 tons of sand and gravel in the Southeastern region—down somewhat from previous years. The largest producer was Hildre Sand and Gravel (Juneau Ready-Mix, Inc.), which mines from two Lemon Creek pits north of Juneau.

Ketchikan Ready-Mix and Quarry, Inc., produced approximately 80,000 tons of basalt for shot rock near Ketchikan—exceeding their forecasted 10-percent increase in production from 1982 levels. They also expect to increase production levels in 1984.

**Alaska Peninsula**

About 35,000 tons of sand and gravel were reportedly produced by two operators in the Alaska Peninsula region, primarily by Aleutian Aggregate Ventures (Anchorage), which operated a crushing operation on Unalaska Island.

**Drilling Activity in 1983**

**Introduction**

Contract drilling of placer, coal, and hard-rock deposits in 1983 totalled about 243,000 ft. This represents a 40-percent drop in mineral-drilling activity from an adjusted 1982 total of 404,000 ft. The decline was due to major reductions in coal-exploration drilling and placer thaw-field drilling (the latter was not included in previous annual reports). Hard-rock drilling, expected to decline dramatically, was only slightly below 1982 levels.

**Placer Drilling**

Contract placer drilling totalled 53,000 ft in 1983. Exploration drilling accounted for 23,000 ft and consisted primarily of a combination of reverse-circulation rotary drilling and resonant drilling.

Because much placer exploration involves in-house drilling, this figure does not fully express total placer-exploration footage.

The balance of placer footage was from thaw-field development drilling in which frozen placer gravels are drilled to bedrock to allow the installation of thaw pipes. Cold water, pumped into the pipes during the summer season, percolates back up through the frozen gravel and thaws the ground for dredging.

The reported 1982 placer-drilling total of 30,000 ft included only exploration drilling because thaw-field drill footages were not available. The adjusted 1982 total is 124,000 ft. The 1983 figures, therefore, indicate a 23 percent decrease in exploration footage and a 68 percent decrease in development footage. The large 1982 thaw-field footage represented a one-time effort, however, and future annual totals for development drilling should approximate 1983 levels. Future placer-exploration drilling should also remain at 1983 levels if the price of gold remains in the $400/oz range.

**Coal Drilling**

Total footage for exploration coal drilling in 1983 was 12,000 ft. This compares with 80,000 ft reported in 1982 and represents an 86 percent decline. The final phase of the DGGS ‘Northwest Coal Investigations Project’ included approximately 6,000 ft of rotary drilling. The balance of the total footage was drilled for an exploration project in the Matanuska Valley coal field.

No major state coal leaseholders conducted drilling programs during 1983. Mobil Mining and Coal, a leaseholder in the Yentna area, was inactive in 1983 following a large reconnaissance drilling program in 1982. Neither of the two Beluga leaseholders, Placer U.S. (formerly Placer Amex) nor Diamond Alaska, conducted drill programs in 1983. In 1982, Diamond Alaska drilled 50,000 ft of exploration and geotechnical holes, but that effort concluded the company’s exploration phase. Significant additional coal drilling on the Beluga leases will occur when development begins. In the Ewing River coal field, the Chugach Natives, Inc., continued surficial exploration in 1983, but no drilling was conducted.

The state is evaluating 70,000 acres in the Matanuska Valley for inclusion in a spring 1985 lease sale. The Matanuska Valley coals are of higher rank than subbituminous Beluga or Nenana coals. A strong response to the lease sale may result in significant drilling activity in 1985 or 1986, but drilling levels will probably remain at the present low levels until development of major leases begins.
Hard-rock Drilling

Total footage reported in 1983 for hard-rock drilling was 178,000 ft, down 12 percent from the 1982 level of 200,000 ft. However, given the low metal prices and the worldwide economic weakness that prevailed during 1983, the drop in hard-rock drilling was modest.

As expected, hard-rock drilling continued on properties near or in the development phase. Significant drilling also occurred on recent discoveries where reserves were not well established and on historic precious-metal mines that are being reexamined. A total of 4,900 ft was also drilled under contract to USBM to evaluate the mineral potential of two mining areas in the Denali National Park Preserve.

Strengthening metal prices, concurrent with the drawdown of metal stocks and a continuing general economic recovery, may enhance 1984 base-metal exploration budgets in Alaska. The present high level of exploration activity that is occurring as historical precious-metal properties are reevaluated will continue if gold prices are stable. Therefore, hard-rock drilling footages may increase in 1984.

Table 9. Companies conducting drilling programs in Alaska, 1983.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaconda Minerals Co.</td>
<td>Bear Creek Mining Co.</td>
</tr>
<tr>
<td>Hawley Resources Group</td>
<td>Cominco American Inc.</td>
</tr>
<tr>
<td>Duval Corporation</td>
<td>Enserch Exploration, Inc.</td>
</tr>
<tr>
<td>Houston International Minerals, Inc.</td>
<td>Noranda Exploration, Inc.</td>
</tr>
<tr>
<td>Noranda Mining, Inc.</td>
<td>Placid Oil Co.</td>
</tr>
<tr>
<td>Ranchers Exploration and Development Corporation</td>
<td>Resource Associates of Alaska, Inc.</td>
</tr>
<tr>
<td>Silverado Mines</td>
<td>SUM Resources</td>
</tr>
<tr>
<td>Sunshine Mining</td>
<td>UNC Teton Exploration Drilling</td>
</tr>
<tr>
<td>U.S. Borax and Chemical Co.</td>
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Table 8. Drilling contractors active in Alaska, 1983.

<table>
<thead>
<tr>
<th>Contractor Name</th>
<th>Address</th>
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<tbody>
<tr>
<td>Alaska Drill Supply &amp; Equipment Company</td>
<td>7330 Silver Birch Drive</td>
</tr>
<tr>
<td>Anchorage, Alaska 99502</td>
<td>Anchorage Supply &amp; Equipment, Inc.</td>
</tr>
<tr>
<td>Anchorage, Alaska 99502</td>
<td>6727 Seward Highway</td>
</tr>
<tr>
<td>Anchorage, Alaska 99502</td>
<td>Anchorage, Alaska 99502</td>
</tr>
<tr>
<td>Alsinco</td>
<td>Hardrock Construction</td>
</tr>
<tr>
<td>919 Commerce Street</td>
<td>P.O. Box 6455</td>
</tr>
<tr>
<td>Fairbanks, Alaska 99701</td>
<td>Ketchikan, Alaska 99901</td>
</tr>
<tr>
<td>Arctic Resources Drilling, Inc.</td>
<td>6381 Nielson Way, Suite 101</td>
</tr>
<tr>
<td>Anchorage, Alaska 99502</td>
<td>Anchorage, Alaska 99502</td>
</tr>
<tr>
<td>Boyles Brothers Drilling Co.</td>
<td>Longyear, Inc.</td>
</tr>
<tr>
<td>P.O. Box 4307</td>
<td>5941 Arctic Boulevard, Unit P</td>
</tr>
<tr>
<td>Anchorage, Alaska 99502</td>
<td>Anchorage, Alaska 99502</td>
</tr>
<tr>
<td>Caron North American</td>
<td>M-W Drilling, Inc.</td>
</tr>
<tr>
<td>8000 King Way</td>
<td>P.O. Box 10-378</td>
</tr>
<tr>
<td>Anchorage, Alaska 99502</td>
<td>Anchorage, Alaska 99511</td>
</tr>
<tr>
<td>Denali Drilling</td>
<td>NANA-Coates Diamond Drilling, Inc.</td>
</tr>
<tr>
<td>6000 'A' Street</td>
<td>4706 Harding Drive</td>
</tr>
<tr>
<td>Anchorage, Alaska 99502</td>
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<tr>
<td>Diamond Drill Contracting Co.</td>
<td>Salisbury &amp; Dietz, Inc.</td>
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<tr>
<td>P.O. Box 11037</td>
<td>S. 1815 Lewis</td>
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<tr>
<td>Spokane, Washington 99202</td>
<td>Spokane, Washington 99204</td>
</tr>
<tr>
<td>Sedgwick Exploration, Ltd.</td>
<td>Phillips Field Road</td>
</tr>
<tr>
<td>P.O. Box 60750</td>
<td>Anchorage, Alaska 99706</td>
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<tr>
<td>Skidmore Machine &amp; Tool Co.</td>
<td>P.O. Box 470</td>
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<td>Anchorage, Alaska 99707</td>
<td>Fairbanks, Alaska 99707</td>
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<tr>
<td>Southeast Drilling Co., Inc.</td>
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<tr>
<td>Anchorage, Alaska 99901</td>
<td>Ketchikan, Alaska 99901</td>
</tr>
<tr>
<td>Sprague &amp; Henwood, Inc.</td>
<td>221 W. Olive Street</td>
</tr>
<tr>
<td>Anchorage, Alaska 99901</td>
<td>Seranton, Pennsylvania 18501</td>
</tr>
<tr>
<td>Thibideau Drilling Contractors</td>
<td>3864 Peger Road</td>
</tr>
<tr>
<td>Anchorage, Alaska 99707</td>
<td>Fairbanks, Alaska 99701</td>
</tr>
<tr>
<td>Thrasher &amp; Associates, Inc.</td>
<td>P.O. Box 114</td>
</tr>
<tr>
<td>Nome, Alaska 99762</td>
<td>Wink Bros. Drilling</td>
</tr>
<tr>
<td>Anchorage, Alaska 99762</td>
<td>1101 Mendenhall Peninsula</td>
</tr>
<tr>
<td>Anchorage, Alaska 99801</td>
<td>Juneau, Alaska 99801</td>
</tr>
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References Cited


-----, 1983b, Shumagin Island gold mine shows promise of good returns: Alaska Construction and Oil, v. 24, no. 9, p. 28-30.
Appendix A

Selected New Major Claim Blocks and Additions to Claim Blocks Staked in 1983

<table>
<thead>
<tr>
<th>Quadrangle</th>
<th>Claim-group name</th>
<th>Number of claims in 1983</th>
<th>New claim block or number of claims added</th>
<th>Land status where known</th>
<th>Commodities where known</th>
<th>Claim holder</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F&amp;S</td>
<td>Pb, Zn, Cu lode</td>
<td>Cominco</td>
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<tr>
<td>Northern Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noatak</td>
<td>Oce (and others)</td>
<td>3,578</td>
<td>186</td>
<td>F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiseman</td>
<td>Bench</td>
<td>103</td>
<td>18</td>
<td>F</td>
<td></td>
<td>Placer Silverado Mines (U.S.), Inc.</td>
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<tr>
<td></td>
<td>Gold channel</td>
<td>51</td>
<td>New</td>
<td>F</td>
<td></td>
<td>P. &amp; K. Dolphin</td>
</tr>
<tr>
<td>Chandalar</td>
<td>PN (and others)</td>
<td>130</td>
<td>New</td>
<td>F</td>
<td></td>
<td>L. Jordan and others</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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aData based on 1983 federal and state mining-location notices filed with the Division of Mining, Mining Information Office by January 15, 1984. There is a possible 4-mo information lag between claim staking and receipt of claim notices in the Mining Information Office.
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<th>Claim-group name</th>
<th>Number of claims in 1983</th>
<th>New claim block or number of claims added</th>
<th>Land status where known</th>
<th>Commodities where known</th>
<th>Claim holder</th>
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<td>37 S</td>
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<td>J. Black</td>
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<td>S</td>
<td>Placer</td>
<td>G. and M. Briggs</td>
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</table>
Appendix B
Alaska State, Federal, and Private Agencies Involved in Mineral-development Activities, 1983

STATE OF ALASKA AGENCIES

A. Department of Commerce and Economic Development (DCED)
   State Office Building, 9th floor
   Pouch D
   Juneau, Alaska 99811
   (907) 465-2500
   Commissioner - Richard A. Lyon
   Function: Promotes economic development in Alaska.
   Office of Mineral Development (OMD)
   675 Seventh Avenue, Station A
   Fairbanks, Alaska 99701
   (907) 452-2600
   Director - John F.M. Sims
   Function: Primary advocacy agency within state government for the mining industry. Provides liaison between state government and the private sector. Researches and publishes economic data on Alaskan mining industry. Provides assistance to the mining loan program.

B. Department of Environmental Conservation (DEC)
   3220 Hospital Drive
   Juneau, Alaska 99811
   (907) 465-2600
   Permit Information (907) 465-2607
   Commissioner - Richard A. Neve
   Function: Issues permits for mining activities that affect air or water quality or involve land disposal of wastes. Sets air- and water-quality standards. Inspects, monitors, and enforces environmental-quality statutes, regulations, and permits. Reviews all federal permits.

South-central Regional Office
437 E St., Ste. 200
Anchorage, Alaska 99501
(907) 274-2533
Permit Information (907) 279-0254

Northern Regional Office
675 Seventh Avenue, Station J
Pouch 1601
Fairbanks, Alaska 99707
(907) 452-1714
Permit Information (907) 452-2340

Southeast Regional Office
9000 Old Glacier Hwy.
Box 2420
Juneau, Alaska 99803
(907) 789-3151
Permit Information (907) 465-2615

Nome Office
P.O. Box 11171
Nome, Alaska 99762
(907) 443-2600

C. Department of Fish and Game (ADF&G)
   P.O. Box 3-200
   Juneau, Alaska 99802
   (907) 465-4100
   Commissioner - Don W. Collinsworth
   Function: Protect habitat in fish streams and manage refuges, sanctuaries, and critical habitat. Requires permits for any work involving the blockage of fish passage, equipment crossings or operation in streams with anadromous fish; use, diversion, or pollution of streams containing anadromous fish; construction, exploration, or development work in state refuges, sanctuaries, and critical habitat.

   Advises land management agencies through preparation of a) compilations of fish, wildlife and habitat, and public-use information; b) assessments of habitat requirements and potential impacts; c) guidelines and recommendations for preventing, reducing, or mitigating fish, wildlife, habitat, and human harvest losses.

South-central Regional Office
333 Raspberry Road
Anchorage, Alaska 99502
(907) 344-0541
(907) 344-0541

Central Regional Office
565 University Avenue
Fairbanks, Alaska 99701
(907) 479-3104

Northwestern Regional Office
State Office Building, 1st floor
P.O. Box 1148
Nome, Alaska 99762
(907) 443-2825

D. Department of Natural Resources (DNR)
   State Office Building, 11th floor
   Pouch M
   Juneau, Alaska 99811
   Commissioner - Esther C. Wunicke
   Function: Conducts investigations of Alaskan mineral, fuel, and geothermal potential; geologic hazards; construction materials; underground, surface, and coastal waters of the state; archaeological and cultural resources; general geologic inventory. Advises the public and government agencies on geological questions. Performs assays and other mineralogical analyses at DGGS laboratory at the University of Alaska, Fairbanks. Publishes professional reports and brochures. Maintains a library of geological bulletins, reports, and periodicals.

1. Division of Geological and Geophysical Surveys (DGGS)
   3601 C St., Frontier Building, 8th floor
   Pouch 7-028
   Anchorage, Alaska 99510
   (907) 276-2653
   State Geologist - Ross G. Schaff
   Deputy State Geologist - William W. Barnwell
}

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2. Division of Mining
555 Cordova Street, Olympic Building
Pouch 7-010
Anchorage, Alaska 99510
(907) 276-2653
Director - Pedro Denton

Function: Principal state agency for management of mining industry in Alaska. Maintains mining-information offices formerly operated by DGGS, assumes minerals functions of defunct Division of Minerals and Energy Management such as mining-claim adjudication; mining leasing; offshore-prospecting permitting; coal leasing; and administration of the surface-mining program, which includes permitting, inspection, and reclamation of abandoned mines.

Mining Information Offices are located at the DGGS Fairbanks and Juneau offices (above) and at:
State Office Building, 2nd floor
P.O. Box 7438
Ketchikan, AK 99801
(907) 225-4181
3601 C Street, Frontier Building, 10th floor
Pouch 7-005
Anchorage, Alaska 99510
(907) 786-2205
(all Division of Mining addresses and phone numbers are subject to change in 1984).

3. Division of Land and Water Management (DL&WM)
555 Cordova Street, Olympic Building
Pouch 7-005
Anchorage, Alaska 99510
(907) 276-2653
Director - Thomas J. Hawkins

Function: Manages the surface estate and resources, including minerals (gravel, sand, and rock) and water. Handles statewide and regional land-use planning. Issues water-appropriation permits and certificates, material-sale contracts, and land-use permits and easements for the temporary use of state land and access roads.
2. Audit Division  
State Office Building  
Entrance B, 11th floor  
Pouch SA  
Juneau, Alaska 99811  
(907) 463-2230  
Director - Maureen O'Brien  
Function: Administers the mining tax, which is based on net income, including royalties. Upon application, will grant a certificate of tax exemption for the 3½ yr of new mining operations, except for the mining of sand and gravel. Tax returns must be filed annually.  
Anchorage Field Office  
201 E. Ninth Avenue  
Anchorage, Alaska 99501  
(907) 276-5364  
Fairbanks Field Office  
State Office Building  
675 Seventh Avenue, Station G  
Fairbanks, Alaska 99701  
(907) 452-1513  
Juneau Field Office  
1111 W. Eighth Street, Room 108  
Pouch SA  
Juneau, Alaska 99801  
(907) 465-2333  

F. University of Alaska  
Fairbanks, Alaska 99701  
(907) 474-7365  

1. College of Environmental Sciences  
Division of Geosciences  
Geology & Geophysics Program (B.S., M.S., Ph.D.)  
Department Head - Richard C. Allison  
Function: Provides undergraduate and graduate education in geology and geophysics and conducts basic and applied research in the geological sciences. Offers program options in general geology, economic geology, petroleum geology, geophysics, and ice-snow-permafrost geophysics.  

2. School of Mineral Engineering  
(907) 474-7366  
Dean - Nolan B. Aughenbaugh  
Function: Conducts laboratory and field studies related to minerals and mining. Publishes reports and general information concerning mining and offers assistance to miners.  
Mineral Industry Research Laboratory (MIRL)  
210 O'Neill Resource Building  
University of Alaska, Fairbanks  
Fairbanks, Alaska 99701  
(907) 474-7135 or 7136  
Director - Nolan B. Aughenbaugh  
Function: Conducts applied and basic research on the location, development, and use of Alaska's minerals and coal resources. Conducts studies on exploration, mine and mill development, coal preparation and use, mineral beneficiation, and environmental concerns of the mineral industry.  

3. Arctic Environmental Information and Data Center  
(AEIDC)  
707 A Street  
Anchorage, Alaska 99501  
(907) 279-1523  
Director - David Hickok  
Function: Engages in information management, transfer, and dissemination, and applied research and investigation into resource development and environmental problems. Provides information and data on Alaska and surrounding arctic environments and natural resources.  

FEDERAL AGENCIES  

A. U.S. Department of the Interior  

1. Bureau of Land Management (BLM)  
701 C Street  
P.O. Box 13  
Anchorage, Alaska 99513  
State Director - Michael Penfold  
(907) 271-5960  
Public Room  
Function: Administers federal lands not managed by other agencies, and all leases on federal locatable minerals, e.g., oil, gas and coal, phosphates, and oil shale. Arranges for sale of other than locatable and locatable minerals, e.g., sand, gravel, stone, etc. Issues right-of-way and special-use permits. Monitors mining operations to prevent surface damage. Maintains land-status plats and issues patents. Records federal mining claims and annual assessment affidavits.  
Anchorage District Office  
4700 E. 72nd Avenue  
Anchorage, Alaska 99507  
(907) 267-1200  
District Manager - Wayne Boden  
Fairbanks District Office  
N. Post, Fort Wainwright  
P.O. Box 1150  
Fairbanks, Alaska 99701  
(907) 356-3399  
District Manager - Carl D. Johnson  
Nome Field Office  
Box 923  
Nome, Alaska 99762  
(907) 443-2177  
Fred Payton, Geologist  

2. U.S. Geological Survey (USGS)  
Office of the Special Assistant for Alaska  
Cordova Hall  
4200 University Drive  
Anchorage, Alaska 99504  
Special Assistant to the Director for Alaska - Max Brewer  
Function: Investigates and reports on physical resources, the configuration and character of the land surface, the composition and structure of the underlying rocks, and the quality, volume, and distribution of water and minerals.
2. Coal Mine Safety and Health Administration
P.O. Box 25367
Denver, Colorado
(303) 234-2293
District Manager - John W. Barton
Function: Administers mine safety and health for coal mines. Duties are the same as for mines other than coal, but also certifies permissible equipment for use in coal mines. Does dust inspection. Cooperates with state mine inspectors, who certify foremen and other coal workers. Because there is no mine inspection in Alaska, mine inspectors come to Alaska from Price, Utah, or Denver, Colorado.

C. U.S. Department of Agriculture
U.S. Forest Service (USFS) Regional Office
Federal Building
P.O. Box 1628
Juneau, Alaska 99802
Regional Forester - John A. Sandor

D. U.S. Department of Environmental Protection (EPA)
Alaska Operations Office
5200 Hospital Drive
Juneau, Alaska 99801
(907) 586-7619
Director - Ronald A. Kreizenbeck
Regional Headquarters
1200 Sixth Avenue
Park Place Building
Seattle, Washington 98101
(206) 442-1200
Regional Administrator - Ernesta Barnes
Function: Regulates effluent discharge and air quality. Issues National Pollutant Discharge Elimination System (NPDES) permits to miners.

E. Department of the Army
U.S. Army Corps of Engineers
Regulatory Functions Branch
P.O. Box 898
Juneau, Alaska 99804
District Engineer - Colonel Neil E. Saling
Function: Regulates work in navigable waters of the United States and the discharge of dredged or fill material into the waters of the United States, including wetlands. Examples of regulated mining activities include roads, bridges, docks, pads, stockpiles, diversions, and causeways.
Write: Attention: NPACO-RF-S, or Call: James Wood (907) 552-4942

B. U.S. Department of Labor
1. Mine Safety and Health Administration (MSHA)
117-107th Avenue, NE, Room 100
Bellevue, Washington 98004
(206) 442-7387
Western District, Subdistrict Manager - Martin Rosta
Function: Administers mine health and safety for mines other than coal. Conducts training and safety classes for federal and state mine inspectors and mining personnel. Research in mine safety.
NONGOVERNMEN'TAL GROUPS AND ASSOCIATIONS

Resource Development Council for Alaska, Inc.
444 Seventh Avenue, Box 100516
Anchorage, Alaska 99510
(907) 278-9615

Northwest Mining Association
633 Peyton Building
Spokane, Washington 99201
(509) 624-1158

Alaska Geological Society
P.O. Box 1288
Anchorage, Alaska 99510

Alaska Miners Association, Inc.
509 West Third Avenue, Ste. 17
Anchorage, Alaska 99501
(907) 276-0347

American Institute of Professional Geologists
Box 957
Golden, Colorado 80401
(303) 431-0831

Western Mining Council
Kenai Peninsula Chapter
Oscar H. Bailey, President
Old Nash Road
Seward, Alaska 99664
(907) 224-5963

ORGANIZED MINING DISTRICTS

Forty-Mile Miners Association
Bob Ditman, President
General Delivery
Chicken, Alaska 99732

Circle Mining and Recording District
Del Ackels, President
P.O. Box 1872
Central, Alaska 99730

Seward Mining District
Tom Williams, President
Box 66
Hope, Alaska 99665

Kantishna Mining District
Sam Koppenburg, President
SRD Box 9070
Palmer, Alaska 99646

Livengood-Tolovana Mining District
Rose Rybachek, President
P.O. Box 73069
Fairbanks, Alaska 99707

Yentna Mining District
John Jacobson, President
Anchorage, Alaska
(907) 277-3685

Valdez Creek Mining District
Dave Clark, President
General Delivery
Talkeetna, Alaska 99676

Koyukuk Mining District
Robert Aumiller, President
P.O. Box 80447
College, Alaska 99708

Alaska Miners Association
Nome Chapter
Ron Engstrom, President
General Delivery
Nome, Alaska 99762
Appendix C

Selected Significant Mineral Deposits in Alaska
(locations shown in figs. 27-29)

1. Lik, SU - Major strata-bound massive-sulfide (Zn-Pb-Ag-Cd-Ba) deposits in black shale and chert. Inferred reserve (Lik) estimate of 25 million tons of 12 percent combined Pb+Zn and 1.5 oz/ton Ag.

2. Red Dog - At least two major strata-bound massive-sulfide deposits hosted in Permian or Mississippian shales; similar to locality 1. According to Cominco Alaska (February 1982), the 'Main' deposit at Red Dog contains at least 85 million tons of 17.1 percent Zn, 5 percent Pb, 2.4 oz/ton Ag. The nearby 'Hilltop' deposit contains substantial undisclosed reserves.

3. Drenchwater - Strata-bound massive-sulfide (Pb-Zn-Ag) occurrence associated with black shale, chert, and feldspar volcanic rocks; 60- by 120-ft exposure averages 17.4 percent Zn, 3.0 percent Pb, and 3.3 oz/ton Ag; numerous sulfide occurrences and strong geochemical anomalies between localities 1-4 and locality 7.

4. Ginny Creek - Hill of massive-barite mineralization; minimum estimate of 1 million tons of barite exposed near the surface.

5. Story Creek - Recently discovered massive-sulfide Zn-Pb-Ag-Cu-Au occurrences hosted in brecciated zones within the Devonian Kanayut Conglomerate or the Lower Mississippian Kayak Shale. Grab samples of high-grade material contain 0.43 percent Cu, 34 percent Pb, 28.9 percent Zn, 0.04 oz/ton Au, and 30 oz/ton Ag.

6. Woosee Creek - Recently discovered massive-sulfide Zn-Pb-Cu-Ag-Au-Cd occurrences in brecciated zones within the Devonian Kanayut Conglomerate or the Lower Mississippian Kayak Shale. Random grab samples of mineralized material contain 0.24 percent Cu, 0.37 percent Cd, 44 percent Zn, 0.14 oz/ton Au, and 14.8 oz/ton Ag.

7. Omar-Frost - Cu replacement (similar to Bornite); includes stratiform barite occurrences similar to Ginny Creek (locality 4).

8. Bornite - Major stratiform Cu-Zn deposit in carbonate; 5 million tons grading 4-12 percent copper. Larger reserve estimate of 40 million tons of about 2 percent copper and an undisclosed amount of Zn and Co.

9. Arctic - Major stratiform Cu-Zn deposit in a sequence of metarhyolite, metatuff, and graphitic schist; current drilling indicates reserves of 40 million tons grading 4.0 percent Cu, 5.5 percent Zn, 1.0 percent Pb, and 1.6 oz/ton Ag.

10. Sun - Major strata-bound massive-sulfide deposit in a metarhyolite and schist sequence; drilling through 1976 indicated gross metal values in excess of $1 billion.

11. Smucker - Massive-sulfide deposit; significant tonnage of Cu-Pb-Zn ore; 3,000-ft strike length; active exploration.

12. Avan Hills - Unexplored chromite occurrences and nickel geochronometric anomalies associated with layered ultramafic rocks.

13. Misheguk Mountain - Chromite occurrences in ultramafic rocks; potential exists for similar occurrences.

14. Klery Creek - Lode- and placer-gold deposits worked intermittently from 1909 through the 1930s. Total production through 1931 estimated at 31,320 oz; most production is from placer deposits.

15. Ernie Lake - Strata-bound massive-sulfide occurrence in metarhyolites and metatuffs. Gossan zones are strongly anomalous in Cu-Pb-Zn and Ag.

16. Koyukuk-Nolan mining district - Major placer-Au district; substantial production from 1893 to present. More than 300,000 oz has been produced. Significant deep placer reserves remain.

17. Chandalar mining district - Major Au-producing district; substantial production in excess of 30,000 oz from both lode and placer sources. Significant unmined reserves remain. Active exploration and development of both placer deposits and vein lodes.

18. Porcupine Lake - Stratiform fluorite occurrences associated with felsic volcanic rocks. Grades of up to 25-30 percent fluorite reported.

19. Wind River - Strata-bound massive-sulfide Pb-Zn prospects; grades of up to 5 percent Pb reported.


22. Cape Creek - Major placer-Sn producer. More than 500 tons of Sn produced between 1935 and 1941; at least 500,000 lb produced in recent years.

23. Buck Creek - Major placer-Sn producer. More than 1,100 tons of Sn produced between 1902 and 1953.

24. Lost River - Major Sn, fluorite, W, and Be deposits. More than 400 tons of Sn produced from lode sources. Inferred reserves estimated at 38 million tons of ore, based on 45,000 ft of diamond drilling.

25. Ear Mountain - Placer-Sn district and Sn-Cu-Au-Ag-Pb-Zn skarn associated mineralization. Area is also anomalous in uranium.

26. Kougarok Mountain - Significant discovery of Sn-greisen mineralization; no published information is available on grade and tonnage.
Highly anomalous geochemical values of up to 0.1 percent Pb+Zn and concentrations of 1,000 ppm reported. Stratif orm massive-sulfide Pb-Zn-Ag–Ba–F deposits and layered iron deposits. Mineralized zones extend over 8,000 ft along strike.

Production of W exceeds 4,000 short-ton units and 2.0 percent W over 3,000,000 ft. Production in excess of 4,348,000 oz of Au since discovery in 1893. Has significant potential for high-grade deposits reported.

For high-grade deposits reported.

Significant uranium–rare earth mineralization. Rock geochemical values of up to 0.1 percent U and Ag reported; up to 15 percent rare earth elements also reported.

Significant Pb-Zn-Ag mineralization; grades of up to 17 percent Zn and 2 percent Pb reported.

Significant massive-sulfide Cu-Pb-Zn-Ag prospects. Potential for high-grade deposits reported.

Significant Cu-Pb-Zn-Ag prospects; grades of up to 0.17 percent Cu reported. Significant Pb-Ag prospects in metavolcanic rocks.

Promising Au-Ag deposits; Nixon Fork Mine has produced more than 40,000 oz of Au from lode sources.

Significant W discovery along intrusive contact; no published information available.

Placer Au-Sn district; produced more than 450,000 oz of Au and over 720,000 lb of cassiterite through 1981.
60. Fortymile district - Major placer-Au district. Has produced in excess of 417,000 oz of Au since discovery in 1886.

61. Kantishna district - Major placer-Au and lode Ag-Au-Pb-Zn-Sb-W district. Has produced more than 85,000 oz of placer-Au and about 260,000 oz of lode-Ag and several million lb of Sb. Potential exists for significant Ag-Au-Pb-Zn deposits.

62. Stampede Mine - Major Sb deposit; has produced more than 3.5 million lb of Sb. Stampede area contains anomalous stream-sediment geochemistry indicative of massive-sulfide terranes.

63. Purkypile - Significant Ag-Sn-Be mineralization associated with granitic intrusions. Grades of up to 4.5 percent Sn reported. Potential also exists for uranium and tungsten mineralization.

64. Golden Zone Mine - Major Au-Cu-Ag deposits in breccia pipe. Has produced more than 1,581 oz of Au, 8,617 oz of Ag, and 42,000 lb of Cu. Proven reserves of about 10 million tons of ore grading 0.1 oz/ton Au with Cu and Ag reported.

65. Nim Prospect - Porphyry Cu-Ag deposit. Grades of up to 5.0 percent Cu and 9 oz/ton Ag reported.

66. Coal Creek - Greisen-hosted Sn-Cu-W deposit. Reserves of 5 million tons of ore grading 0.25 percent Sn with credits of W and Cu reported.

67. Denali Prospect - At least six small strata-bound Cu lodes that contain some 5 million tons grading about 2 percent Cu with credits of silver.

68. Chistochina - Porphyry-Cu prospects and placer-Au district; has produced more than 177,000 oz of Au and a small amount of Pt from placer deposits.

69. Nabesna Mine - High-grade Au skarn, has produced in excess of 66,960 oz of gold from about 88,000 tons of ore between 1930 and 1941.


71. Kennicott deposits - Major stratiform massive-sulfide Cu-Ag deposits; contains some of the highest grade copper lodes ever mined. Deposits have produced more than 1.2 billion lb of Cu and 9 million oz of Ag. Some reserves remain.

72. Binocular and other prospects - Kennicott-type massive-sulfide Cu-Ag deposits.

73. Bond Creek-Orange Hill - Two major porphyry Cu-Mo occurrences; inferred reserves of 850 million tons of ore grading 0.3-0.5 percent Cu and 0.03 percent Mo reported.

74. Carl Creek - Porphyry-copper prospect in altered intrusive complex.

75. Bauloff - Porphyry-Cu prospect in altered intrusive rocks.

76. Horstfeld - Porphyry-Cu prospect.

77. Midas Mine - Major strata-bound massive-sulfide Cu-(Ag-Au-Pb-Zn) deposit. Produced more than 1 million lb of Cu.

78. Ellamar - Strata-bound massive-sulfide Cu-Zn-Au deposit. Has produced more than 16 million lb of Cu, 51,307 oz of Au, and 191,615 oz Ag from about 301,855 tons of ore.

79. Willow Creek, Independence, Lucky Shot, War Baby - Major lode-Au (Ag-Cu-Pb-Zn-Mo) deposits. Produced more than 448,082 oz of Au from the lode sources and about 35,000 oz of Ag from associated placer deposits.

80. Latouche, Beston - Major strata-bound massive-sulfide Cu-Zn-Ag deposits. Produced more than 205 million lb of Cu from 6 million tons of ore. Inferred reserves of 6 million tons of ore grading 1 percent Cu, 1.5 percent Pb-Zn, and 1 oz/ton Ag reported.

81. Rua Cove - Major strata-bound massive-sulfide Cu-Zn deposit. Reserves in excess of 1.1 million tons of ore grading 1.25 percent Cu reported.

82. Red Mountain - Significant chrome occurrence associated with ultramafic complex at Red Mountain near Selòvia. More than 26,000 tons of metallurgical-grade ore shipped through 1976.

83. Red Devil - Major Hg-Sb deposit; high-grade Hg ore hosted in shear zones in Kuskokwim Group sediments. More than 35,000 flasks of Hg produced.

84. Nyac district - Significant placer-Au district. Aniak district (of which Nyac is a part) has produced more than 230,000 oz of Au from placer deposits.

85. Goodnews Bay - Major placer-Pt district; estimated to have produced over 540,000 oz of platinum-group metals (PGM) between 1954 and 1976; largest known resource of PGM in U.S. Possible reserves of 60 million yd³ of deep platinum-bearing gravels remain.

86. Apollo-Sitka Mines - Major lode-Au deposits; produced more than 107,900 oz of Au from ore that averaged about 0.22 oz/ton Au. Inferred reserves reportedly equal to ore mined.

87. Pyramid - Porphyry Cu-Mo deposit; reserves of 100 million tons of ore grading 0.5 percent Cu and 0.03 percent Mo/ton reported.

88. Ivanof - Porphyry-Cu prospect; grades of up to 0.72 percent Cu reported. Potential for large tonnages.

89. Weasel Mountain, Bee Creek - Porphyry Cu-Mo prospect; grades of up to 0.48 percent Cu and 0.035 percent Mo/ton reported. Potential for moderate tonnages of low-grade mineralization.

90. Mike deposit - Porphyry-Mo prospect; grades of up to 0.21 percent Mo reported. Potential for large tonnages of low-grade Mo mineralization.

91. Rex deposit - Porphyry-Cu prospect; grades of up to 0.3 percent Cu reported. Potential for moderate reserves of low-grade mineralization.

92. Kasna Creek - Major stratiform massive Cu-Pb-Zn deposit; reserves of over 10 million tons of ore grading more than 1 percent Cu reported.

93. Magnetite Cove - Massive magnetite skarn deposit; grades of up to 30 percent Fe reported; also contains Zn-Cu-Ag mineralization.
94. Jimmy Lake - Complex Cu-Ag-Sn mineralization; grades of up to 105 oz/ton Ag and 3 percent Cu reported.

95. Marmot - Major stratiform barite-Pb-Zn-Cu-Ag deposit; reportedly consists of a 48- to 60-ft-thick zone of 60 percent barite with a 2- to 8-ft-thick basal zone of massive sulfides that contains 2 percent Pb, 3 percent Zn, 1 percent Cu, 2 to 4 oz/ton Ag, and 0.12 oz/ton Au.

96. Klukwan - Major Fe-Ti deposits; reported to contain 1-5 billion tons of 11-20 percent Fe and 1.6-3.0 percent Ti.

97. Nunatak - Porphyry-Mo deposit; reserves of 8.5 million tons of ore grading 0.125 percent Mo and 129 million tons of ore grading 0.026 percent Mo reported.

98. Brady Glacier - Major Ni-Cu deposit in layered mafic complex. Proven reserves of 100 million tons of ore grading 0.5 percent Ni and 0.3 percent Cu reported; also contains significant Co and Pt concentrations.

99. Mertie Lode and Funter Bay district - Contains substantial reserves of lode-Au mineralization. Past production totaled 10,000 to 15,000 oz of Au. Deposits also contain significant Ni-Cu and Pb-Zn-Au mineralization. Funter Bay deposit contains reported reserves of 560,000 tons grading 0.34 percent Ni, 0.35 percent Cu, and 0.15 percent Co.

100. Alaska-Juneau - Major lode-Au deposit; produced more than 3.52 million oz of Au from 88.5 million tons of ore between 1893 and 1944.

101. Chichagof and Hirst Chichagof - Major lode-Au deposits; produced more than 170,000 oz of Au. Chichagof Mine produced about 700,000 oz of Au and 200,000 oz of Ag; Hirst Chichagof Mine produced about 67,980 oz of Au and 20,000 oz of Ag.

102. Mirror Harbor - Ni-Cu mineralization in layered mafic complex; probable reserves of 8,000 tons of 1.57 percent Ni and 0.88 percent Cu, and inferred reserves of several million tons of ore grading 0.2 percent Ni and 0.1 percent Cu reported.

103. Bohemia Basin - Major Ni-Cu-Co mineralization in layered mafic complex; reserves of 22 million tons of ore grading 0.35 percent to 0.51 percent Ni, 0.21-0.27 percent Cu, and 0.94 percent Co reported.

104. Apex-El Nido - Significant lode Au-W deposits; produced more than 50,000 oz of Au.

105. Greens Creek - Major stratiform massive-sulfide Pb-Zn-Cu-Ag-Au deposit; published reserves of 4.0 million tons grading 10 percent combined Pb-Zn-Cu, 1.0 oz/ton Ag, and 0.10 oz/ton Au.

106. Sumdum - Strata-bound massive-sulfide Cu-Pb-Zn deposit with a potential strike length of over 10,000 ft. Inferred reserves of 25,700,000 tons of ore grading 0.57 percent Cu, 0.37 percent Zn, and 0.3 oz/ton Ag reported.

107. Snettisham - Fe-Ti deposit in mafic intrusive complex; grades of about 18.9 percent Fe and 2.5 percent Ti reported.

108. Tracy Arm - Strata-bound massive-sulfide Cu-Zn-Pb prospect; over 1,100 ft long and up to 12 ft thick. Grades of 1.5 percent Cu, 3.9 percent Zn, 0.76 oz/ton Ag, and 0.013 oz/ton Au reported.

109. Red Bluff Bay - Significant chrome mineralization in ultramafic complex; reserves of 570 tons of material grading 40 percent Cr and 29,000 tons grading 18-35 percent Cr reported.

110. Comwallis Peninsula - Major strata-bound massive-sulfide Cu-Pb-Zn-Ag-barite deposit; grades of up to 20 percent Pb-Zn and 28 oz/ton Ag reported.

111. Castle Island - Stratiform barite deposit with about 850,000 tons of production between 1963 and 1980; contains Zn, Pb, and Cu sulfides.

112. Ground Hog Basin - Area contains several stratiform massive-sulfide prospects with reported grades of up to 8 percent Pb, 29 oz/ton Ag, and 0.5 oz/ton Au. Area also contains potential for porphyry Mo deposits.

113. Snipe Bay - Ni-Cu deposit in layered mafic-ultramafic complex; inferred reserves of 430,000 tons of 0.3 percent Ni, 0.3 percent Cu, and 0.16 oz/ton Au reported.

114. Kasaan Peninsula - Major massive-sulfide Cu-Fe-Au deposits; area has produced over 28 million lb of Cu from ore that averaged better than 2 percent Cu. Reserves of 4 million tons of ore grading 50 percent Fe and less than 2 percent Cu reported.

115. Salt Chuck - Cu-PGM-Ag-Au deposit in contact zone between pyroxenite and gabbro within a zoned mafic-ultramafic pluton. From 1900-41, 5 million lb Cu, over 20,000 oz of PGM, and Au and Ag credits were won from 325,000 tons of ore.

116. Union Bay - Significant Fe-Ti mineralization in ultramafic complex; area also contains Pt and V concentrations.

117. Hyder district - Area produced more than 25,000 tons of high-grade W-Cu-Pb-Zn-Ag ores between 1925 and 1951; area also contains potential for porphyry Mo-W mineralization and massive-sulfide skarn Pb-Ag-Au-W deposits.

118. Jumbo - Produced more than 10 million lb of Cu, 280,000 oz of Ag, and 7,000 oz of Au from 125,000 tons of ore. Reserves of 650,000 tons of ore grading 45.2 percent Fe, 0.75 percent Cu, 0.01 oz/ton Au, and 0.08 oz/ton Ag reported.

119. Copper City - Stratiform massive-sulfide Cu-Zn prospects; grades of up to 12.7 percent Cu, 2.7 percent Zn, 2.5 oz/ton Ag, and 0.2 oz/ton Au reported.

120. Quartz Hill - World-class porphyry-Mo deposit; announced reserves of 1.5 billion tons of ore grading 0.36 percent Mo, which includes 300 million tons with grades exceeding 0.2 percent Mo.

121. Niblack - Stratiform massive-sulfide Cu-Pb-Au-Ag-Au deposit; has produced more than 1.4 million lb of Cu, 11,000 oz Au, and 16,000 oz Ag.

122. Bokan Mountain - Numerous U-Th prospects associated with granitic intrusive complex; produced more than 120,000 tons of ore grading about 1 percent U3O8 between 1955 and 1971.
Figure 27. Significant copper, lead, zinc, silver, and gold deposits and prospects in Alaska.
Figure 28. Significant molybdenum or copper and tin, tungsten + fluorine and beryllium deposits and prospects in Alaska.
Figure 29. Significant gold, silver, platinum, and strategic-mineral deposits, prospects, or districts in Alaska.
Appendix D
Mining Licenses Issued by the Alaska Department of Revenue, 1983
(Placer gold unless otherwise noted)

<table>
<thead>
<tr>
<th>License Type</th>
<th>Operator</th>
<th>Address/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALDERS CREEK MINES</td>
<td>Patrick J. Sather</td>
<td>1213 Coppers Street, Fairbanks, AK 99701</td>
</tr>
<tr>
<td>ALEUTIAN AGGREGATE VENTURES</td>
<td>Anchorage, AK 99509</td>
<td>(rock, sand)</td>
</tr>
<tr>
<td>ALDRICH, JAMES &amp; RON</td>
<td>Anchorage, AK 99503</td>
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<tr>
<td>ALEXANDER, CLIFFORD DALE</td>
<td>Anchorage, AK 99701</td>
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<tr>
<td>ALASKA CORPORATION</td>
<td>Anchorage, AK 99502</td>
<td>(rock, sand)</td>
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<td>ALLEMAN, JOHN FRANKLIN</td>
<td>Anchorage, AK 99701</td>
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<tr>
<td>ALPHA MIDAS</td>
<td>James Steward</td>
<td>4832 Polo Verde Ave, Fairbanks, AK 99701</td>
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<tr>
<td>ALRUK ENTERPRISES</td>
<td>Sutton, AK 99674</td>
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<tr>
<td>AMANA ENTERPRISES</td>
<td>Alaska Plaza (2)</td>
<td>Timber Creek</td>
</tr>
<tr>
<td>AMERICA Exploration</td>
<td>P.O. Box 2266</td>
<td>Fairbanks, AK 99707</td>
</tr>
<tr>
<td>AMERICAN CREEK PARTNERS</td>
<td>Dan deJima</td>
<td>Box 81467</td>
</tr>
<tr>
<td>ANACONDA MINERALS</td>
<td>Co. (5)</td>
<td>2550 Donay Street, Suite 1000</td>
</tr>
<tr>
<td>ANCHORAGE SAND &amp; GRAVEL CO., INC.</td>
<td>Anchorage, AK 99501</td>
<td>(sand, gravel)</td>
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<tr>
<td>ANDERSON WHITEN H.</td>
<td>P.O. Box 60681</td>
<td>Fairbanks, AK 99706</td>
</tr>
<tr>
<td>ANNASARA ENTERPRISES</td>
<td>SC Box 3078-M</td>
<td>Wasilla, AK 99687</td>
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<tr>
<td>ANVIL MINING, INC.</td>
<td>Nome, AK 99762</td>
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<tr>
<td>ARCTIC ALLUVIAL CONSULTANTS</td>
<td>Helen Marie Davis</td>
<td>SRA Box 4437</td>
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<tr>
<td>ARCTIC MINING CORPORATION</td>
<td>Anchorage, AK 99510</td>
<td>(placer gold, tin)</td>
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<tr>
<td>ARNEY, ROBERT A., SR.</td>
<td>Anchorage, AK 99504</td>
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<tr>
<td>ASSOCIATION FINANCIAL SERVICES CORP.</td>
<td>The Forum West Bldg., Suite 901</td>
<td>12601 Bel-Red Rd., Bellevue, WA 98005</td>
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<tr>
<td>AULT ENTERPRISES</td>
<td>P.O. Box 9330</td>
<td>Fairbanks, AK 99708</td>
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<tr>
<td>AUMILLER, ROBERT J.</td>
<td>Fairbanks, AK 99701</td>
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<td>AUSTIN, JEFFERY M.</td>
<td>Box 1303</td>
<td>Seward, AK 99664</td>
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<tr>
<td>B &amp; B MINING</td>
<td>Wiseman</td>
<td>Bettesfield, AK 99726</td>
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<td>Bateman</td>
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<td>BAKEN, CARL S.</td>
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<td>BALDRIDGE, JAMES P.</td>
<td>Fairbanks, AK 99708</td>
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<td>BARRY, J.M.</td>
<td>P.O. Box 1656</td>
<td>Fairbanks, AK 99707</td>
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<tr>
<td>BARRY, FRANCIS W. &amp; PAUL M. MELVIN</td>
<td>323 West Harvard</td>
<td>Anchorage, AK 99501</td>
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<td>BARTLING, ROGER</td>
<td>P.O. Box 82970</td>
<td>Fairbanks, AK 99708</td>
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<tr>
<td>BAY, THOMAS C. &amp; JOYCE K. (2)</td>
<td>SRA Box 60 B</td>
<td>Anchorage, AK 99507</td>
</tr>
<tr>
<td>BELL, ALBERT LEE</td>
<td>Box 452</td>
<td>Sterling, AK 99672</td>
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<tr>
<td>BELL, ROCKY J.</td>
<td>Box 363</td>
<td>Sterling, AK 99672</td>
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<tr>
<td>BENSON, DANIEL</td>
<td>Box 13</td>
<td>Delta Junction, AK 99737</td>
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<tr>
<td>BEVARD, KETH EUGENE</td>
<td>P.O. Box 146</td>
<td>Ft. Greely, AK 99735</td>
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<tr>
<td>BIG LAKE SAND &amp; GRAVEL, INC.</td>
<td>Roger A. Riddell</td>
<td>P.O. Box 17-304</td>
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<tr>
<td>BIG WINDY MINING</td>
<td>409 Clara St.</td>
<td>Fairbanks, AK 99701</td>
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<tr>
<td>BILLINGS, HENRY C.</td>
<td>P.O. Box 81117</td>
<td>College, AK 99708</td>
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<td>BIRDSELL, RUSSELL L.</td>
<td>Boundary, AK 99790</td>
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<tr>
<td>BITTINGMAKER, KURT</td>
<td>Box 471 C SRA</td>
<td>Anchorage, AK 99507</td>
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<tr>
<td>BLACK BEAR MINING</td>
<td>Tony Underfier</td>
<td>Tomatina Ct. Box 30</td>
</tr>
</tbody>
</table>

Numbers in parentheses indicate how many separate licenses were issued to a single individual, partnership, or company. In most cases the licenses were issued automatically because two or more Annual Placer Mining Applications were submitted by the same operator. Only operators whose licenses were received by February 1, 1984, are listed. Note that a mining license is not required until actual production begins.
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address Details</th>
</tr>
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<tbody>
<tr>
<td>GOLDEN NUGGET MINING CO.</td>
<td>Box 773, Eagle River, Alaska 99577</td>
</tr>
<tr>
<td>ROYAL GOLD MINING</td>
<td>Box 5012, Anchorage, Alaska 99504</td>
</tr>
<tr>
<td>H &amp; H MINING</td>
<td>Hugh B. Fate, P.O. Box 30588, Fairbanks, Alaska 99701</td>
</tr>
<tr>
<td>F.W. HAAS CO.</td>
<td>5403 Spenard Rd., Anchorage, Alaska 99505</td>
</tr>
<tr>
<td>HAGGLAND, JAMES P.</td>
<td>Box 81464, Fairbanks, Alaska 99708</td>
</tr>
<tr>
<td>HALL, DIANE MARIE</td>
<td>SRA Box 941, Anchorage, Alaska 99502</td>
</tr>
<tr>
<td>HALL, FRANK M.</td>
<td>P.O. Box 1073, Juneau, Alaska 99802</td>
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<tr>
<td>HAMELIN, MARKY</td>
<td>Sr A 5370, Wasilla, Alaska 9967</td>
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<tr>
<td>HAMILTON MINING ENTERPRISES</td>
<td>P.O. Box 156, Chugiak, Alaska 99567</td>
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<tr>
<td>HAMILTON, HUGH, MARSHALL HAMILTON,</td>
<td>134 Farewell Avenue, Fairbanks, Alaska 99701</td>
</tr>
<tr>
<td>DAN HAYER</td>
<td></td>
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<tr>
<td>HAMMOND, CHARLES R</td>
<td>Chicken, Alaska 99732</td>
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<tr>
<td>G.A. HANKS &amp; SONS</td>
<td>Box 2583, Hwy. 16, West Sacramento, California 96611</td>
</tr>
<tr>
<td>HANSEN GOLD</td>
<td>Box 246, Nome, Alaska 99763</td>
</tr>
<tr>
<td>HANSON, ALLEN</td>
<td>3016 W. 30th St., Anchorage, Alaska 99503</td>
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<tr>
<td>HANSON PROPERTIES, INC.</td>
<td>P.O. Box 7210, Spokane, Washington 99207</td>
</tr>
<tr>
<td>HAPPY VALLEY GRAVEL</td>
<td>O.J. McGann, P.O. Box 174, Anchor Point, Alaska 99566</td>
</tr>
<tr>
<td>HAPPY HOLLOW ROAD SAND &amp; GRAVEL</td>
<td>J.T. Elson, A.F.B., Fairbanks, Alaska 99703</td>
</tr>
<tr>
<td>HANKS &amp; SONS</td>
<td>Box 4728, Eielson A.F.B., Fairbanks, Alaska 99703</td>
</tr>
<tr>
<td>HARD ROCK MINING CO.</td>
<td>P.O. Box 7912, Anchorage, Alaska 99511</td>
</tr>
<tr>
<td>HARLING, VIC &amp; LARRY MONAGHAN</td>
<td>Box 86, Central, Alaska 99730</td>
</tr>
<tr>
<td>HARRIS SAND &amp; GRAVEL, INC.</td>
<td>P.O. Box 1347, Valdez, Alaska 99668</td>
</tr>
<tr>
<td>HARTLEY, A.K. (2)</td>
<td>SRA Box 371-J, Anchorage, Alaska 99507</td>
</tr>
<tr>
<td>HASSEN, PETER</td>
<td>P.O. Box 17, Trapper Creek, Alaska 99688</td>
</tr>
<tr>
<td>HAWLEY RESOURCE PROPERTIES, INC.</td>
<td>8740 Hartwell Road, Anchorage, Alaska 99507</td>
</tr>
<tr>
<td>HAYDEN EXPLORATION &amp; MINING (4)</td>
<td>Forest A. Hayden, Box 4953, SRA, Anchorage, Alaska 99507</td>
</tr>
<tr>
<td>HEAVY METALS MINING</td>
<td>779-8th Avenue, Fairbanks, Alaska 99701</td>
</tr>
<tr>
<td>HEPFLINGER MINING &amp; EQUIPMENT CO.</td>
<td>665 10th, Anchorage, Alaska 99701</td>
</tr>
<tr>
<td>HENRY, WARREN M. &amp; MARY LOU</td>
<td>P.O. Box 6-2356, Anchorage, Alaska 99709</td>
</tr>
<tr>
<td>HERNDON &amp; CO.</td>
<td>Box 8361, Fairbanks, Alaska 99708</td>
</tr>
<tr>
<td>HILL, WILLIAM &amp; GRACE ELLIS</td>
<td>Sr 12860, Wasilla, Alaska 99687</td>
</tr>
<tr>
<td>HOGGENDORN, HOMER E. (2)</td>
<td>Box 142, Nome, Alaska 99762</td>
</tr>
<tr>
<td>HOOVER &amp; CARRUTHERS &amp; EUPHORIA L.</td>
<td>P.O. Box 97, Anchorage, Alaska 99511</td>
</tr>
<tr>
<td>HUNTER CREEK MINE</td>
<td>P.O. Box 80321, Fairbanks, Alaska 99708</td>
</tr>
<tr>
<td>INTERIOR ALASKA MINING &amp; EXPLOR.</td>
<td>P.O. Box 828, Delta Junction, Alaska 99737</td>
</tr>
<tr>
<td>INTERIOR MINERALS CORPORATION</td>
<td>1668 Market St., Fairbanks, Alaska 99707</td>
</tr>
<tr>
<td>IVY MINING CO.</td>
<td>Box 750, Fairbanks, Alaska 99707</td>
</tr>
<tr>
<td>J &amp; J BUCKWHEAT ENTERPRISES</td>
<td>Box 142, Galena, Alaska 99741</td>
</tr>
<tr>
<td>J &amp; S MINING</td>
<td>P.O. Box 11, Cantwell, Alaska 99729</td>
</tr>
<tr>
<td>JACOBSON, TIM</td>
<td>P.O. Box 401, Gig Harbor, Washington 98335</td>
</tr>
<tr>
<td>JAMES, RICHARD D. &amp; SONS ENGINEERING</td>
<td>Box 142, Galena, Alaska 99741</td>
</tr>
<tr>
<td>JAMES, WILLIAM P. &amp; SONS ENGINEERING</td>
<td>Box 142, Galena, Alaska 99741</td>
</tr>
<tr>
<td>JENSEN, DANIEL D. (2)</td>
<td>Box 142, Galena, Alaska 99741</td>
</tr>
<tr>
<td>JOHNSTON &amp; SONS</td>
<td>Box 750, Manley Hot Springs, Alaska 99769</td>
</tr>
<tr>
<td>JONES, KENNETH EUGENE</td>
<td>Box 374, Sutton, Alaska 99764</td>
</tr>
</tbody>
</table>
MCCARTHY, GARY & DAVID CAVANAGH
P.O. Box 689
Girdwood, Alaska 99587

MCCOMBE, R.S. & MURIEL
Chicken, Alaska 99732

MCGUIRE, SEAN E. (2)
Wild Lake
Bettes, Alaska 99726

MCINTOSH MINING CO.
SR 2, Box 22130
Fairbanks, Alaska 99701

MT. MCKINLEY GOLD
Doyle Currier
P.O. Box 711
Wasilla, Alaska 99687

MCCLAUGHLIN, JAMES A. (2)
Box 405
Haines, Alaska 99827

MCMASTER, JIMMY K.
Box 416
Talkotna, Alaska 99676

MEAD, LAWRENCE C.
P.O. Box 10526
Fairbanks, Alaska 99701

MEDLEY MINING
Dick Medley &
Albert Weatherford
Rt. no. 1
Fierce, Idaho 83646

MENDING, KINAR T. (2)
1111 1st Street
Anchorage, Alaska 99501

MENGENS, PHIL, JR.
P.O. Box 5938
North Pole, Alaska 99705

MERRKS ENTERPRISES
Leon M. Merrks
Box 8
Sterling, Alaska 99772
(gravel)

MESSICH, DHRG & WILLIAM SEXTON
315 Illinois Street
Fairbanks, Alaska 99701

MESPELT & ALMASY MINING CO.
Theodore J. Almasy &
Margaret L. Mespel
McGrath, Alaska 99627
(lode/basre, precious)

METCO, INC.
Frank Dieckgraef
P.O. Box 695
Seward, Alaska 99664
(gravel)

MIDNIGHT SUN MINING CO.
P.O. Box 83190
Fairbanks, Alaska 99701

MINKICH, CHARLES MARVIN
SRA Box 150G
Anchorage, Alaska 99507

MILLER, HERSHEL & BILL BRADLEY
Box 3523
Kenai, Alaska 99611

THE MINING CO.
John E. McClain
P.O. Box 436
Soldotna, Alaska 99669

MISCOWICH MINING CO.
Box 262
Galena, Alaska 99741

MISCO-WALSH MINING CO.
John A. Miscoovich
P.O. Box 4D
Anchorage, Alaska 99509

MITCHELL, DENNIS
1406 Summitview
Anchorage, Alaska 99504

MOHAWK OIL & GAS,
INC. (3)
P.O. Box 74224
Fairbanks, Alaska 99707

MONAHAN, HAROLD &
ALLEN W. HANSON
Allen W. Hanson
3010 W. 30th
Anchorage, Alaska 99503

MONROE EXPLORATION &
PROSPECTING
7 Eleanor Avenue
Fairbanks, Alaska 99701

MORE, JOHN
P.O. Box 4-604
Anchorage, Alaska 99509

MORE, RON &
VERN CHERWESKI
Box 17012
Big Lake, Alaska 99687

MORROW, JERRY L., SR., &
RAY BETTER
Wiseman, Alaska 99790

MRK PLACER MINE
P.O. Box 1963
Palmer, Alaska 99645

MULLIKIN, DONALD E. &
DAVID L. WILMARTH (2)
Box 790
Homer, Alaska 99603

MUNJAR, WALTER L. &
SAMUKI L.
SR 60444
Fairbanks, Alaska 99701

MURPHY, DENNIS JAY
P.O. Box 462
Kenai, Alaska 99611

MURPHY, WILLIAM A.
P.O. Box 2172
Kodiak, Alaska 99615

N & R ENTERPRISES
Carol R. Neely
P.O. Box 165
Glenallen, Alaska 99888
(gravel)

NEGRUS, FRED & EARL
General Delivery
Talkeetna, Alaska 99776

NELCHINA MINES
A.L. Renshaw, Jr.
1850 Wickersham Drive
Anchorage, Alaska 99507

NELUS, FRED W., JR.
7330 Cantonment Ct.
Anchorage, Alaska 99507
(stibnite)

NEROD, STEVE
o/o Rosander
Colorado Creek
McGrath, Alaska 99627

NESCO, HAMM, OWENS
6151 Ross Valley Rd.
Kelso, Washington 98626

NEUHAUSER, JACK
General Delivery
Manley Hot Springs, Alaska 99756

NEVERS, HAROLD A. (2)
8148 Pinewood Drive
Juneau, Alaska 99801

NEWMONT EXPLORATION,
LTD.
300 Park Avenue, 12th floor
New York, New York 10022
(various)

NILES, JOHN C.
P.O. Box 554
Cooper Landing, Alaska 99572

NORANDA EXPLORATION,
INC. (3)
135 East 51st
Anchorage, Alaska 99503
(placer gold; exp. based, precious;
& ferro alloy)

NORCROSS-STONEBURG
MINING CO.
James H. Norcross
Rt. 1, Box 2322
Chugiak, Alaska 99567

NORREIN, WILLIAM H. &
CLAUDENE M.
Emma Creek
Wiseman, Alaska 99736

NORTH COAST MINING,
INC. (2)
P.O. Drawer 250
Juneau, Alaska 99802

NORTHERN EXPLORATION &
DIVING, INC.
209 Dawn Avenue
Shoreview, Minnesota 55112

NORTHERN MINING CO.
Al Withrow
General Delivery
Betts, Alaska 99726

NORTHERN OIL OPERATIONS,
INC. (2)
Drawer 3293
Kenai, Alaska 99611
(gravel, placer gold)

NORTHERN RESOURCES CO. (5)
Rodney A. Blakestad
P.O. Box 90770
Fairbanks, Alaska 99708

NORTHLAND GOLD DREDGING
Nyea, Alaska 99742

NORTHWEST EXPLORATION,
INC.
P.O. Box 8178
Fairbanks, Alaska 99708

NUGGET ESTATE MINING CO.
P.O. Box 60430
Fairbanks, Alaska 99706

NUGGET SAND & GRAVEL
(2) Glenn W. Ried
Box 349
Petersburg, Alaska 99833
(gravel)

OFFICE, CASEY WILSON
2015 SE Courter no. 75
Milwaukee, Oregon 97522

OLSEN, JOHN ROBERT
General Delivery
Hope, Alaska 99605

OLSON, STEPHEN G.
General Delivery
Boundary, Alaska 99790

OLSON, STEVEN (2)
6 1/2 Mile Old Richardson
Fairbanks, Alaska 99701

OLSON, VERNON JOHN &
HENRY CURTIS CLINE
SR Box 60994
Fairbanks, Alaska 99701

OPHR CREEK MINING
General Delivery
Ruby, Alaska 99586

OPHR CREEK MINING (2)
P.O. Box 173
Trapper Creek, Alaska 99688

ORO FINO MINING CO.
P.O. Box 5
Valdez, Alaska 99786

OTTERT DREDGING (2)
Miscoovich Bros.
Flat, Alaska 99584

P & M RESOURCES, INC.
Michael Howard & Russ Harlee
P.O. Box 10588
Carry's Corner
Fairbanks, Alaska 99710

PMX MINES (2)
David E. McClung, Jr.
4312 Zodiac
Anchorage, Alaska 99507

P & S MINING
1215 9th Avenue
Fairbanks, Alaska 99701

PAGE MINING CO.
General Delivery
Chicken, Alaska 99732

PALMER ENTERPRISES
P.O. Box 634
Soldotna, Alaska 99669

PARR, GLEN C.
Rt. 1, MP 260 Parks Hwy.
Healy, Alaska 99743

PASKVAN, C.
SR Box 50284
Fairbanks, Alaska 99701
WILLIAMS, DOVER T. & BILL R. 
SR 30571 
Fairbanks, Alaska 99701
WILLIAMS, WILBUR A. 
Flat, Alaska 99784
WILLS, JERRE, WINNIE & CHERYL 
Homer, Alaska 99603
WILMARTH, RICHARD CLAIR 
Red Devil, Alaska 99656
WILSON, DONALD (2) 
General Delivery 
Bettles, Alaska 99726
WILSON'S MINING CO. (2) 
Chicken, Alaska 99732
WINDY CREEK TIMBERLINE MINING CO. 
P.O. Box 231 
Copper Center, Alaska 99573
WITHROW MINING CO. (2) 
General Delivery 
Bettles, Alaska 99726
WOLFF, WALTER V. 
c/o Boundary Lodge 
Boundary, Alaska 99780
Wrede, RON 
P.O. Box 7 
Central, Alaska 99730
WRIGHT, JULES (2) 
P.O. Box 60113 
Fairbanks, Alaska 99706
WYMAN, LEWIS 
P.O. Box 231 
Fairbanks, Alaska 99707
WYMAN, LEWIS 
Chicken, Alaska 99732
WYRICK, L.E. 
General Delivery 
Red Devil, Alaska 99656
YOUNG, DONALD E. 
P.O. Box 2468 
Fairbanks, Alaska 99707
YRJANA, ALBERT M. 
Box 5 
Ruby, Alaska 99768
YUKON MINING CO., INC. (2) 
P.O. Box 84455 
Anchorage, Alaska 99510
YUKON MINING CO. OF ALASKA (2) 
P.O. Box 80325 
Fairbanks, Alaska 99708
YUTAN CONSTRUCTION CO. (2) 
Carroll-Vondra, Inc. 
James A. Carroll & Lewis F. Vondra 
P.O. Box 1275 
Fairbanks, Alaska 99707 
(basalt)
ZIMMER, GEORGE W. 
2005 E. 3rd, Apt. 182 
Anchorage, Alaska 99501
ZIMMERMAN MINING & EXPLORATION 
P.O. Box 20186 
Fairbanks, Alaska 99708
ZOLTON, JERRY L. 
P.O. Box 54322 
Fairbanks, Alaska 99701
Appendix E
Selected Sand, Gravel, and Quarry-Stone Operators, 1983

ALAGCO-ALASKA AGGREGATE CORPORATION
7800 Lake Otis Parkway
Anchorage, Alaska 99507

ALASKA APEX & MINING
SR B Box 7860
Palmer, Alaska 99645

ALASKA DEPT. OF NATURAL RESOURCESb
Division of Land and
Water Management
4420 Airport Way
Fairbanks, Alaska 99701

ALASKA GRAVEL SALES, INC.
1422 K Street
Anchorage, Alaska 99501

ALEUTIAN AGGREGATE VENTURES
P.O. Box 4-D
Anchorage, Alaska 99509

ANCHORAGE, CITY OF
Department of Public Works
P.O. Box 400
Anchorage, Alaska 99510

ANCHORAGE SAND & GRAVEL CO., INC.
1813 East First Avenue
Anchorage, Alaska 99501

ASPEN EXPLORATION CORP.
3625 South Tamara St., Ste. 350
Denver, CO 80237

BIG LAKE SAND & GRAVEL, INC.
P.O. Box 17-304
Big Lake, Alaska 99687

BRASS MONKEY RANCH
SR Box 330 - Kenny Lake
Copper Center, Alaska 99755

C.J.'S EQUIPMENT SERVICES
SR Box 80922 II
Fairbanks, Alaska 99701

COPPER VALLEY CONSTRUCTION CO., INC.
P.O. Box 165
Glennallen, Alaska 99588

CORDOVA, CITY OF
Box 1210
Cordova, Alaska 99574

COYLR, WALDO E. & RUBY S.
P.O. Box 486
Kenai, Alaska 99611

DIAMOND LAKE GRAVEL
P.O. Box 17-445
Big Lake, Alaska 99687

DREDGE TEC. a J/V
130 W. International Airport Road, Ste. M
Anchorage, Alaska 99502

EVRCO INC.
P.O. Box 20526
Fairbanks, Alaska 99708

FAIRBANKS SAND & GRAVEL, INC.
P.O. Box 586
Fairbanks, Alaska 99707

FEDERAL AVIATION ADMINISTRATION
701 C Street
P.O. Box 14
Anchorage, Alaska 99513

G.E.M. ENTERPRISES
1011 W. 12th Avenue, No. 3
Anchorage, Alaska 99501

GREEN CONSTRUCTION CO.
2016 Grand Avenue
Des Moines, Iowa 50312

HAPPY VALLEY GRAVEL
P.O. Box 174
Anchor Point, Alaska 99566

HARRIS SAND & GRAVEL, INC.
P.O. Box 1347
Valdez, Alaska 99686

HOLLYWOOD ROAD SAND & GRAVEL
SR 12360
Wasilla, Alaska 99687

JUNEAU, CITY OF
155 S. Seward Street
Juneau, Alaska 99801

KETCHIKAN, CITY OF
334 Front Street
Ketchikan, Alaska 99901

KODIAK, CITY OF
Box 1210
Kodiak, Alaska 99915

KODIAK. CITY OF
Box 1397
Kodiak, Alaska 99915

L. U. S. BUREAU OF INDIAN AFFAIRS
P.O. Box 3-8000
Juneau, Alaska 99801

METCO. INC.
P.O. Box 895
Seward, Alaska 99664

NORTH ALASKA SAND & GRAVEL
SR Box 165
Soldotna, Alaska 99669

NORTHERN OIL OPERATIONS, INC.
Drawer 3293
King, Alaska 99611

NUGGET SAND & GRAVEL
Box 340
Petersburg, Alaska 99833

PENN JERSEY DRILLING CO.
2833 East 72nd Avenue
Anchorage, Alaska 99507

PETERSBURG, CITY OF
P.O. Box 325
Petersburg, Alaska 99833

ROGERS & BAKER
Div. of Mapco Alaska, Inc.
P.O. Box 165
German, Alaska 99912

SODIUM SULFATE CO.
P.O. Box 586
Fairbanks, Alaska 99708

U.S. FOREST SERVICE,
REGION 10
P.O. Box 280
Cordova, Alaska 99570
Box 1628
Juneau, Alaska 99801

W & H SAND AND GRAVEL
P.O. Box 403
Soldotna, Alaska 99669

YUTAN CONSTRUCTION CO.
Carroll-Vondra. Inc.
P.O. Box 1275
Fairbanks, Alaska 99707

©This listing includes information from companies whose mining licenses were received at DGGS by January 1984 and from questionnaire responses.
Other companies may be noted in telephone directories (yellow pages) and in DGGS Special Report 31.
Primary state agency for disposal of geological construction materials; sells mainly to North Slope oil and service companies. Other state agencies (such as the Department of Transportation and Public Works) also use or dispose of materials, but these materials are partly acquired from DNR, and amounts and cash flow are minor compared to total Alaskan production.
upper left — Hank Giegerich, President and General Manager, Cominco-Alaska and John Schaeffer, President, NANA Regional Corporation discuss Red Dog project.
photo by Charlie Green

upper right — Drillers from NANA Region man drill rig on Red Dog project.
photo by Jerry Booth

center — Bulk sample of molybdenum ore from Bear Meadow adit, Quartz Hill deposit, awaiting testing at Hanna Mining Co. Test Pilot Plant in Minnesota.
photo by Engineering Staff, U.S. Borax and Chemical Co.

lower left — Usibelli’s “Ace-in-the-hole” dragline with reclaimed coal mining area in foreground.
photo by Malcolm Lockwood

lower right — Coal mine owner-operator, Joe Usibelli.
photo by Malcolm Roberts