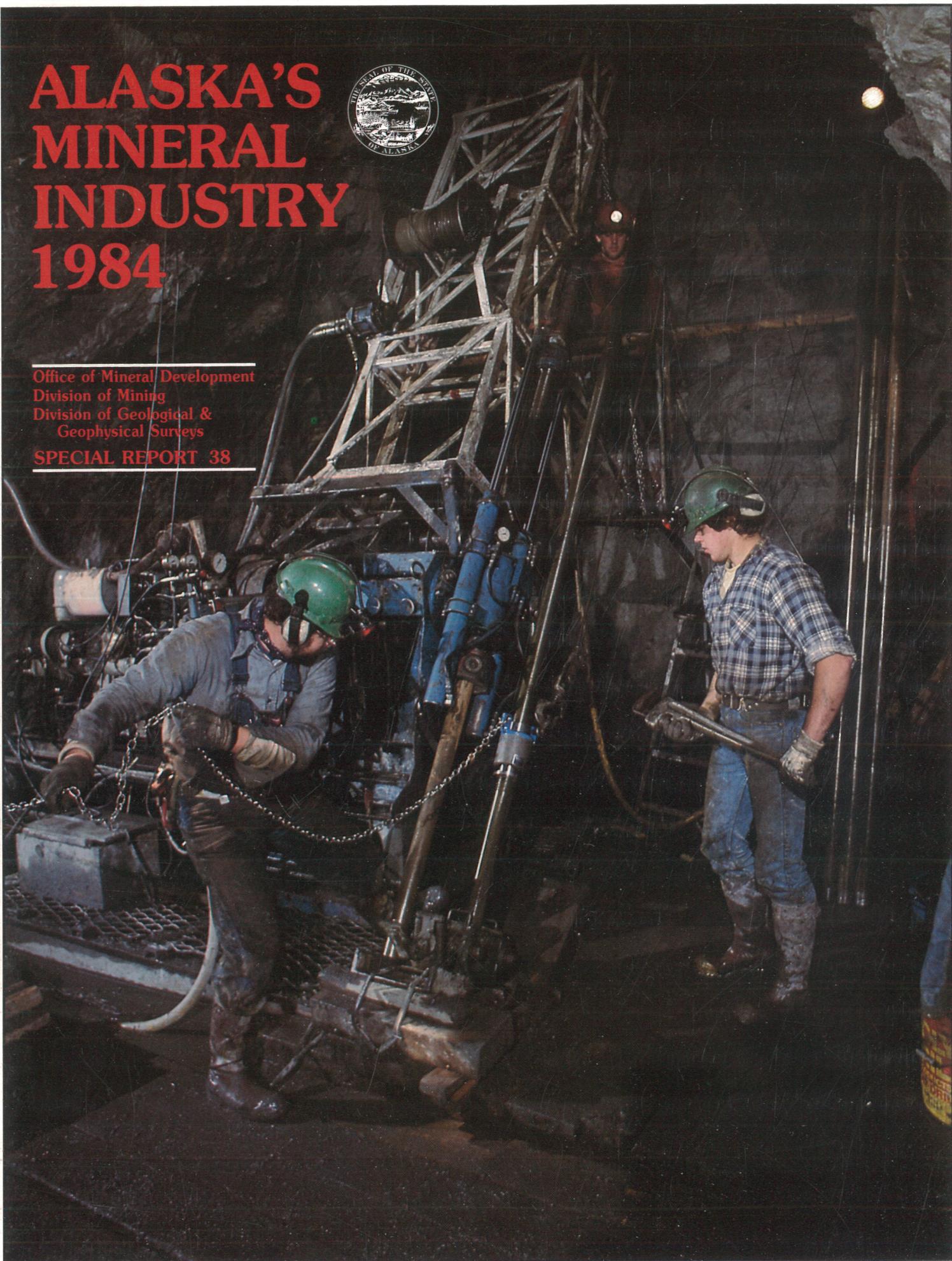


ALASKA'S MINERAL INDUSTRY 1984



Office of Mineral Development
Division of Mining
Division of Geological &
Geophysical Surveys
SPECIAL REPORT 38



Front cover: *Underground exploration drill at the Greens Creek project (Noranda Exploration, Inc.) on Admiralty Island, southeastern Alaska. Photograph by M.W. Kelley, 1984.*

SPECIAL REPORT 38

ALASKA'S MINERAL INDUSTRY 1984

By

G.R. Eakins, T.K. Bundtzen, L.L. Lueck,
C.B. Green, J.L. Gallagher, and M.S. Robinson



STATE OF ALASKA
Bill Sheffield, *Governor*

FAIRBANKS, ALASKA
1985

STATE OF ALASKA

DEPARTMENT OF COMMERCE AND ECONOMIC DEVELOPMENT

Loren H. Lounsbury, *Commissioner*

Office of Mineral Development

John F.M. Sims, *Director*

DEPARTMENT OF NATURAL RESOURCES

Esther C. Wunnicke, *Commissioner*

Division of Geological and Geophysical Surveys

Ross G. Schaff, *State Geologist*

Division of Mining

Pedro Denton, *Director*

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 400 Willoughby Center (4th floor), Juneau, 99801. Also available from the Office of Mineral Development, 675 7th Avenue, Station A, Fairbanks, Alaska 99701.

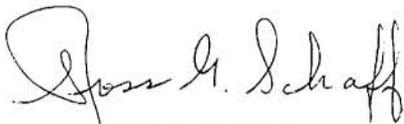
FOREWORD

Special Report 38, 'Alaska's Mineral Industry - 1984,' is the fourth annual report produced by the Department of Commerce and Economic Development's Office of Mineral Development and the Department of Natural Resources' Division of Geological and Geophysical Surveys. Joining the two agencies in the production of the 1984 report is the Department of Natural Resources' Division of Mining.

The primary objective of this report is to provide the public and private sectors and government agencies with reliable, current information on Alaska's mineral industry. The report is wholly dependent on the cooperation of companies and individuals who provide information on their projects and activities.

The value of the mineral industry to the Alaskan economy in 1984 remained essentially unchanged from the adjusted 1983 gross worth of \$274.3 million. While exploration expenditures were down—reflecting low commodity prices and a lagging recovery of the world's mining and smelting industries—expenditures on mineral-development projects increased nearly 100 percent in 1984 due to large investments in the Seward Coal Terminal and the Quartz Hill, Red Dog, and Greens Creek projects.

The consummation of the Usibelli-Suneel coal-export project was of major economic and symbolic importance. In late December, the first unit-train deliveries of coal from the Usibelli Coal Mine arrived at Suneel's port loading facility in Seward for shipment to Korea in January 1985. The export of Usibelli coal will signal to the Pacific Rim that Alaska is serious about supplying resources to this growing market and that Alaska can deliver those resources.



*Ross G. Schaff
Director and State Geologist
Division of Geological and
Geophysical Surveys*



*John F.M. Sims
Director
Office of Mineral Development*



*Pedro Denton
Director
Division of Mining*

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Executive summary

This report summarizes the exploration, development, and production activities of the mineral industry in Alaska, excluding oil and gas, during 1984. In order of gross value, the principal minerals produced were a) 30 million tons of industrial materials, including sand, gravel, and stone valued at approximately \$111 million; b) 175,000 oz of gold valued at \$63 million, and c) 849,000 tons of coal valued at approximately \$24 million. Although more gold was produced during 1984 than during 1983, lower prices decreased the value by 7 percent. Coal production was up 6 percent as a result of the shipment of coal from the USIBELLI COAL MINE to the Seward Coal Terminal in late 1984.

Exploration expenditures in 1984 (\$22.8 million) were down 35 percent from 1983 and dropped 70 percent below the record level of 1981 (fig. 1). The decline in exploration expenditures reflects low base- and precious-metal prices. However, expenditures on property development reached a new high of \$53.6 million, up 91 percent from 1983. A multimillion-dollar investment in the Seward Coal Terminal and large expenditures on the Quartz Hill, Red Dog, and Greens Creek projects are primarily responsible for the increase. Total combined expenditures for exploration, development, and production for 1984 were \$275.8 million, compared with an adjusted level of \$274.3 million for 1983 (fig. 1). Thus, overall mineral-industry activity remained essentially the same for 1983 and 1984.

The development of some important mineral projects in the state may be decided in the near future. In north-west Alaska, progress continues at the Red Dog zinc-lead-silver property owned by NANA REGIONAL CORPORATION and operated by COMINCO ALASKA, INC. On-site activity during 1984 included additional orebody drilling, foundation and pad drilling for the mill site and infrastructure, and geotechnical studies for a proposed 55-mi-long road to link the mine with a port on the Chukchi Sea. Acquisition of an access corridor to the Chukchi Sea is critical to the project's development. Because the desired route passes through the Krusenstern National Monument, an access provision under Title 11 of the Alaska National Interest Lands Conservation Act (ANILCA) and a land exchange between NANA REGIONAL CORPORATION and the U.S. Department of Interior are being sought. The Final Environmental Impact Statement for the project was issued in 1984.

In February 1984, an analysis of the Red Dog project was coordinated and published by the Department of Commerce and Economic Development's Office of Mineral Development for Governor Sheffield. The report examined the project in light of COMINCO'S request for state funding of infrastructure needs. In December 1984, a Resolution of Intent was signed between COMINCO ALASKA, INC., and the Commissioner of the Department of Commerce and Economic Development. Provisions of this agreement identify the Alaska Industrial Development Authority as the state agency that may provide financing for construction of the De Long Mountains Regional Transportation Project, which will include road and port facilities.

NORANDA MINING, INC., proceeded with development of the Greens Creek silver-gold-base metal deposit

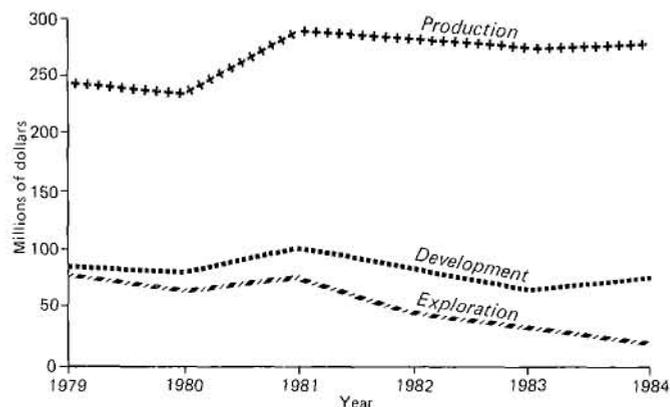


Figure 1. Value of mineral activity in Alaska, 1979-84.

located 18 mi west of Juneau. In 1984, the company completed about 21,000 ft of surface and subsurface drilling and about 850 ft of underground development. The most recent tonnage and grade figures for the Greens Creek deposit are 3.9 million tons that grade 11.7 oz/ton silver, 0.1 oz/ton gold, 7.5 percent zinc, 2.5 percent lead, and 0.4 percent copper. Incremental reserves of significantly higher grade material that were identified during a 1984 deep-level drilling program are not included. Recent engineering studies resulted in some revisions to the proposed mining plan and projected daily production. GREENS CREEK JOINT VENTURE partners may soon decide to begin construction of a road and mill site. The Greens Creek project was incorporated into a nonwilderness area of Admiralty Island National Monument in 1980. In 1983, a draft Environmental Impact Statement (EIS) for the monument included a preferred alternative that would exclude 17,225 acres near the northern boundary—including the Greens Creek deposit—and add 18,174 acres of the popular Young Lake area to the national conservation unit. A decision by the Secretary of the Department of Agriculture on the boundary adjustment is pending.

In 1984, U.S. BORAX conducted less on-site work on the Quartz Hill project than in previous years. The company has invested more than \$100 million in exploration and development of what may be the world's largest molybdenum deposit. Attention is now directed toward the selection of a submarine tailings-disposal site in either Boca de Quadra or Wilson Arm. Although Wilson Arm was initially ruled out because preliminary estimates indicated insufficient volume, recent bathymetry and compaction studies by U.S. BORAX show that Wilson Arm is capable of holding tailings for the life of the mine. Conservationists and fishermen have expressed opposition, but the Sheffield administration indicated it will consider the Wilson Arm option if further research supports the studies by U.S. BORAX. A Final Environmental Impact Statement will probably be released in the latter half of 1985, and current plans call for molybdenum production by the early 1990s.

GCO MINERALS and HOUSTON OIL AND MINERALS announced the discovery of an extension of the Lik zinc-lead-silver deposit, which is located about 12 mi from the Red

Dog deposit in the De Long Mountains. Drilling during the 1984 season intercepted mineralized zones that may be a faulted offset of the Lik deposit.

In March, the Juneau City-Borough, the Alaska Electric Light and Power Company, and BARRICK PETROLEUM CORPORATION, ALASKA, INC., (BPC) signed a lease agreement that gives BPC rights to explore and mine for gold on about 3,300 acres of city- and utility-owned land at the Alaska-Juneau Mine in Juneau and the Treadwell Mine in Douglas.

The coming year will be important for Alaska's coal industry. The USIBELLI COAL MINE'S successful delivery of coal from Healy to Korea has spurred optimism about the export of other Alaska mineral products to the Pacific Rim market. By December 31, 1984, three unit-train deliveries that totaled 36,790 tons of coal had arrived at Seward, and the loading of a 50,000-ton-capacity collier was underway despite minor startup difficulties at the port facility. USIBELLI will double their present annual-production rate from 0.8 to 1.6 million tons under the 15-yr contract with the KOREA ELECTRIC POWER COMPANY. Expansion of the mine work force and acquisition of additional equipment to handle increased production are complete.

DIAMOND ALASKA'S Chuitna coal project in the Beluga coal field moved closer to development following the 1984 announcement of a joint feasibility study with the ELECTRIC POWER DEVELOPMENT COMPANY of Japan for possible export of 4 million tons of coal as early as 1989.

Several other notable activities occurred in the mineral industry in 1984. WGM, INC., and SUM RESOURCES, operators for CAMINDEX MINERALS, produced nearly 20,000 oz of placer gold from their Valdez Creek Mine in south-central Alaska. This may represent the largest gold production from a single mining operation in over 25 yr; several years of production at this level are assured. The discovery of placer diamonds in the Circle mining district north of Fairbanks was confirmed in 1984, and bulk samples will be collected and tested by DGGs in 1985. SILVERADO MINES, LTD., TRICON MINING, and AUREX, INC., completed an extensive two-phase exploration program that included surface drilling and underground drilling and drifting at the Grant Mine near Fairbanks. Substantial ore tonnages were discovered, and a decision on development is expected in 1985. NERCO MINERALS, INC., awarded a \$144,000 grant to the University of Alaska Mineral Industry Research Laboratory (Fairbanks) to evaluate a hydrometallurgic process for recovery of base and precious metals from sulfide ores; several complex ores from Alaska and from other western states will be tested. This research may result in technological advances that could revolutionize metal-extraction techniques in Alaska.

A joint Alaska Division of Geological and Geophysical Surveys (DGGs) and U.S. Geological Survey (USGS) project established the Geologic Materials Center at Eagle River. The center will eventually house core and rock samples that represent over \$1 billion worth of mineral exploration in Alaska. This collection will be a substantial asset to both industry and the state in evaluating Alaska's mineral and petroleum resources. DGGs will operate the facility.

The Department of Natural Resources' Division of Mining (DOM) was created in January 1984 to provide a closer

working relationship between the mineral industry and the state. The agency manages mining on state-owned land (including upland and offshore mineral leases), assists with permits, and operates the Mining Information Offices.

The Department of Education, with the financial support of private industry through the Alaska Mineral and Energy Resources Educational Fund (AMEREF), is developing a public-school mineral-education program entitled, 'Alaska Resources Kit: Minerals.' The educational program is designed for elementary grades four through six and may be used in junior-high schools.

Many difficulties faced the mineral industry in 1984. The controversy over water-quality issues continued to cloud the future of placer mining in Alaska. Effluent limitations in 1984 state and federal permits were contradictory. While Alaska's 5-NTU (nephelometric-turbidity unit) standard mandated crystal-clear discharge water, federal settleable-solids standards permitted discharge of turbid water. Inadequate knowledge of subsurface resources continued to be a serious shortcoming in federal and state land-use-planning efforts. About 175 million acres of Alaska lands are now within national and state conservation units where mineral entry is severely restricted or banned (fig. 2). Additionally, federal, state, and local land-use plans may restrict further mineral entry on some remaining acreage. The proposed federal resource-management plan for the Steese National Conservation Area and the White Mountain National Recreation Area, which includes the Circle mining district, the most active placer-mining district in the state, will close 1 million acres to placer mining. According to the EIS for these areas, the new management plans will impose additional costs of from 10 to 100 percent on existing operations and severely restrict mineral exploration and development. This management plan affects not only mines within the units, but also those mines that border the conservation and recreation areas.

Placer miners are using more effective washing plants than in previous years, and gravel-classifying equipment (trommels and vibrating screens) is becoming more commonplace. Recovery devices such as spiral concentrators and jigs are also appearing, and use of new technologies and settling ponds has resulted in the discharge of cleaner water from placer mines. Miners are hoping that realistic solutions can be reached on critical water-quality issues.

The state's offshore-mining program has resumed after several years of inactivity, and DOM is processing applications for offshore-prospecting permits. More than 850 applications have been received, primarily in the Cook Inlet, Seward Peninsula, Goodnews Bay, and Cape Yakataga areas, and at several locations in southeast Alaska (fig. 3). No applications were processed from 1975 to 1984, and additional applications are not being accepted by DNR. Each area of existing applications is in review and may be reopened if DOM determines that offshore mining is in the best interest of the state and is consistent with the Alaska Coastal Management Program.

Comments concerning problems that face the mineral industry were included on approximately one-half the questionnaires returned from the DGGs annual survey. A tabulation of these comments from 1983 and 1984 may be obtained from DGGs on request (Lueck and Eakins, 1985).

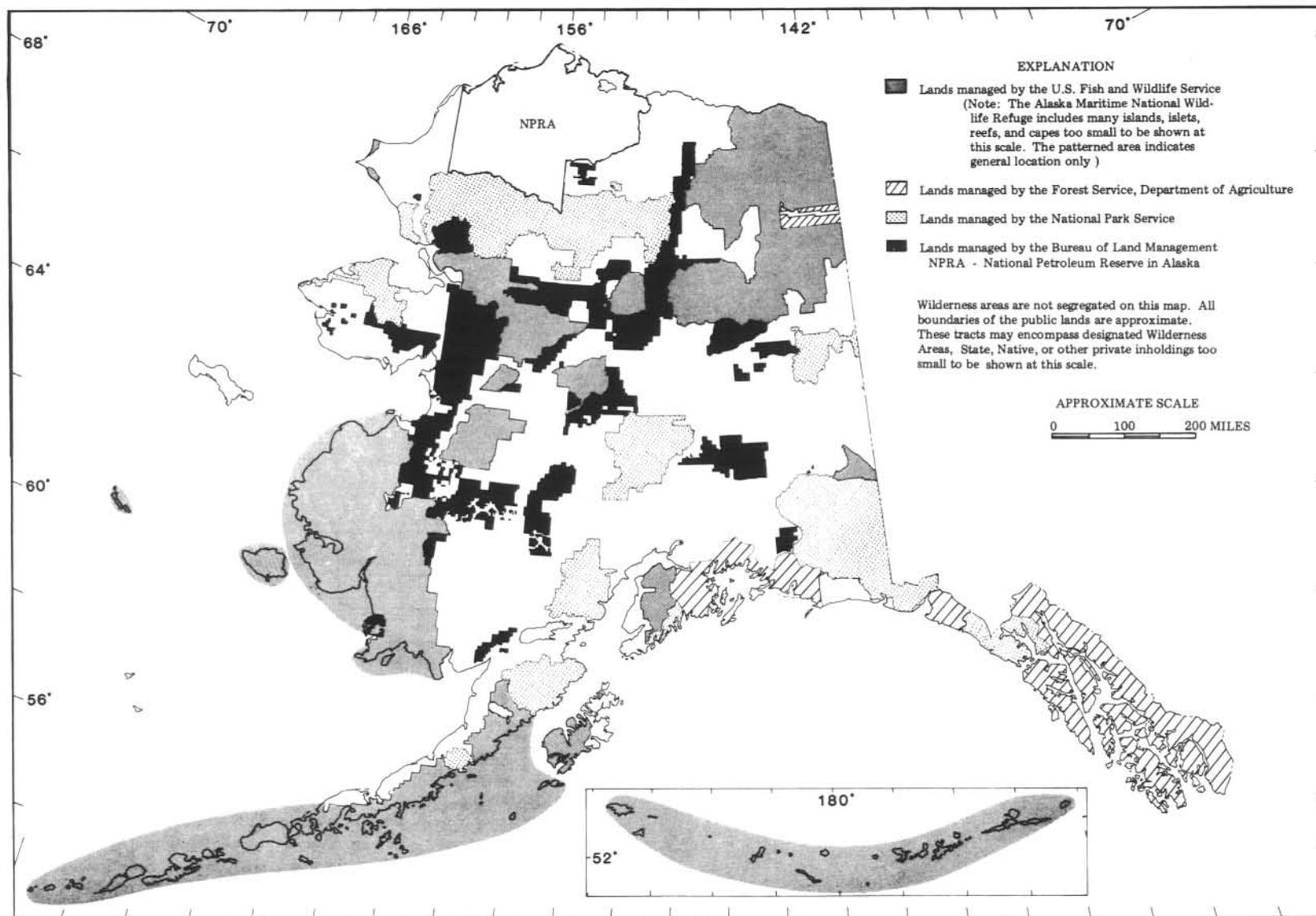


Figure 2. Distribution of national-interest lands and conservation units established by the Alaska National Interest Lands Conservation Act of 1980 (boundaries as of January 1984). From U.S. Geological Survey (1984).

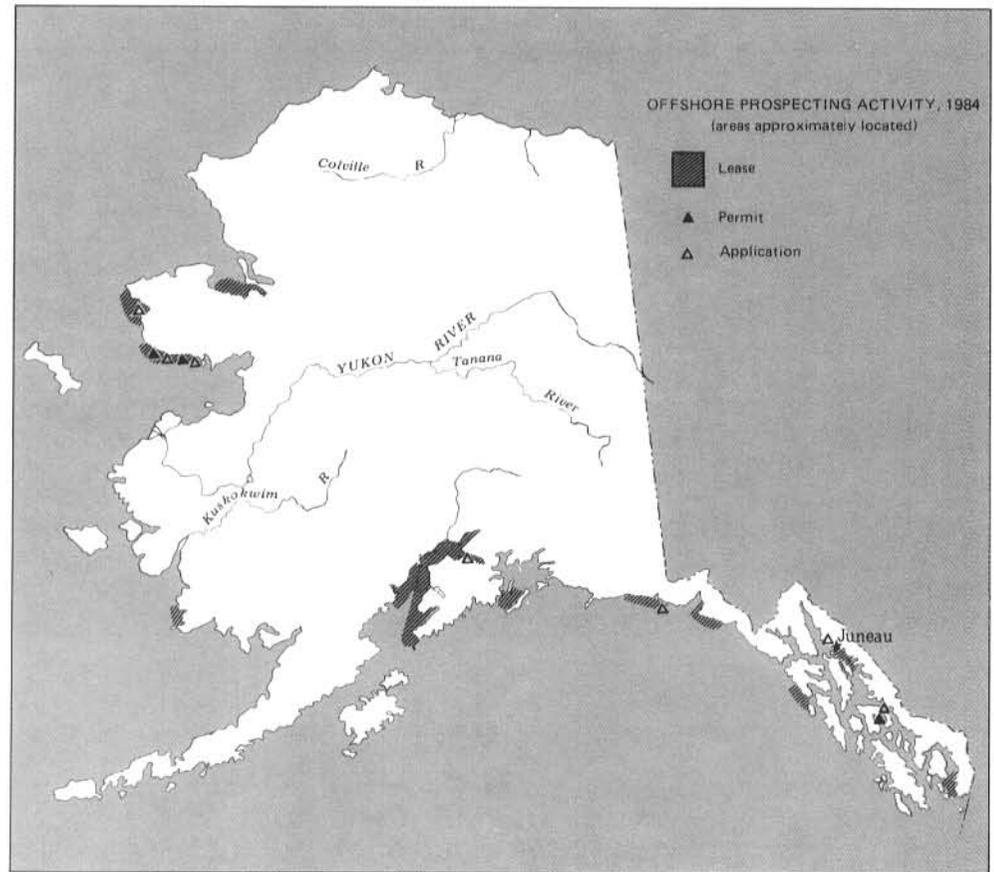


Figure 3. Approximate areas of offshore-prospecting-permit applications, permits, and leases.

Acknowledgments

This report is jointly designed, produced, and distributed by the Alaska Department of Natural Resources' Division of Geological and Geophysical Surveys (DGGS) and Division of Mining (DOM) and the Department of Commerce and Economic Development's Office of Mineral Development (OMD). The success of this series of reports on Alaska's mineral industry continues to be largely dependent on information provided voluntarily by the private sector. We thank Alaska's miners, industry explorationists, consultants, and Native corporations for their excellent cooperation. We acknowledge W.F. Coghill (Alaska Railroad) for providing detailed statistics concerning rail mineral haulage and Dennis Campaign of Alaska Gold Company for his summary of mining activity near Nome. Jason Bressler (WGM, INC.) provided data for the Valdez Creek district in south-central Alaska.

D.A. Coleman (DGGS) mailed out over 800 questionnaires and helped compile the data. A.G. Sturmman (DOM),

C.H. Stevenson (DOM), and L.L. Lueck (DGGS) compiled the claim statistics shown in appendix A. T.K. Bundtzen (DGGS) and G.R. Eakins (DGGS) wrote the executive summary, and Eakins wrote the exploration section. Bundtzen wrote the development and production sections and compiled the statistics used in those sections. M.S. Robinson (DGGS), Bundtzen, and Lueck compiled the list of selected significant mineral deposits shown in appendix C. J.L. Gallagher (DOM) provided data for appendixes B and D and information on offshore prospecting. C.B. Green (OMD) designed the initial report format and wrote the drilling section, and R.B. Forbes described the diamond discoveries in the Circle district. K.S. Pearson (DGGS) prepared the illustrations, and Jim Deagen (OMD) oversaw preparation of the cover and printing of the report. Bundtzen, C.L. Daniels (DGGS), Eakins, Gallagher, Green, V.L. Reger (DGGS), and Sims edited the report.

Exploration activity during 1984

Introduction

The \$22.3 million expended for mineral exploration in Alaska during 1984 marked a 35-percent decline from 1983 expenditures and a 51-percent decline from 1982 (fig. 4, table 1). The most active year for exploration in Alaska was 1981, when over \$73 million was spent. The decline in exploration activity is also reflected in the number of new claims staked: 8,400 during 1984 compared with 10,745 during 1983, 14,958 during 1982, and 27,397 during 1981 (fig. 5). Figure 6 shows the number of claims (by year) on which annual assessment work was filed.

Mineral activities for 1984 are summarized by region (fig. 7). The eastern interior and the Alaska Peninsula and Kodiak regions showed the greatest declines, while the southeastern and western regions showed limited increases in activity. For the first time, the largest proportion of exploration dollars was spent in the south-central region. Reported expenditures by region and commodity are shown in table 2; selected noteworthy exploration projects for 1984 are shown in figure 8.

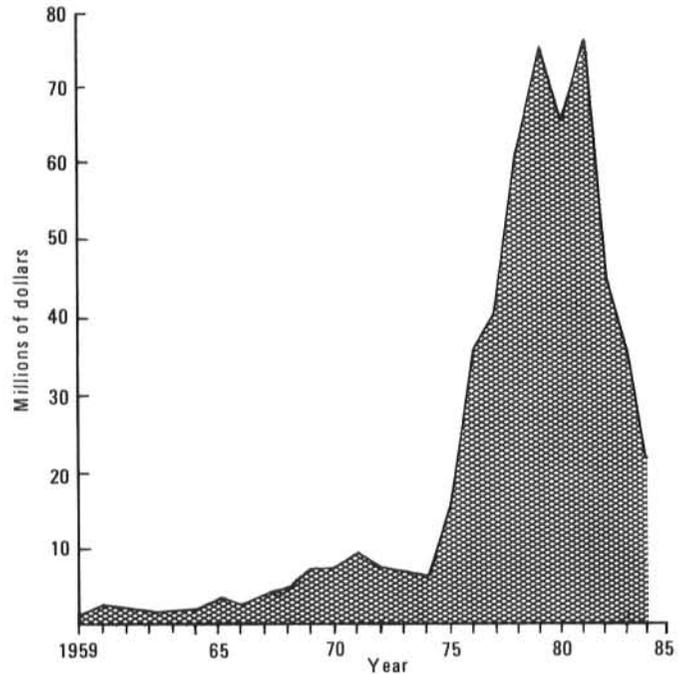


Figure 4. Mineral-exploration expenditures in Alaska, 1959-84.

Northern region

The northern region covers the northern one-third of the state and includes the Brooks Range and the North Slope (the location of the largest oil field in North America). Reported exploration expenditures in the northern region totaled \$2,557,500, compared with \$2,518,660 in 1983. The northern region gained prominence as a major mineral province during the late 1970s when several major deposits were discovered in the 100-mi-long Ambler sequence along the south flank of the Brooks Range (Hitzman and others, 1982) and in the De Long Mountains. Exploration and claim staking were intense for several years. Because of the lack of transportation systems and low metals prices, 1984 activity in the Ambler district was reduced to performing assessment work on existing claim blocks. However, small-scale gold operations continued in the Wiseman and Chandalar Quadrangles. Activities in the De Long Mountains in the western Brooks Range included development work at Red Dog and rewarding exploration of ground that adjoins both the Red Dog and Lik deposits.

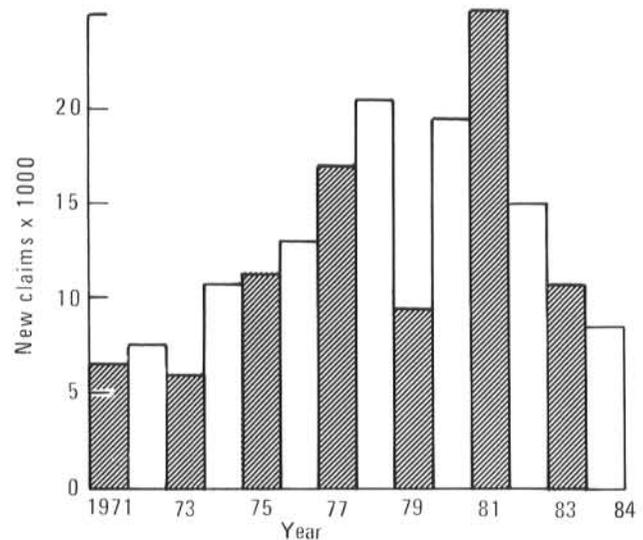


Figure 5. New claims filed in Alaska, 1971-84.

Table 1. Reported exploration expenditures in Alaska by commodity groupings, 1981-84.

	1981	1982	1983	1984
Metals	\$63,535,400	\$42,702,000	\$30,656,315	\$19,669,150
Industrial materials	10,300,000	--	2,068,300	270,000
Coal	2,341,000	2,900,000	1,338,454	2,065,000
Other ^a	127,000	15,300	10,000	279,500
Unspecified	--	--	60,000	--
Total	\$76,303,400	\$45,617,300	\$34,133,069	\$22,283,650

^aIncludes jade, soapstone, uranium.

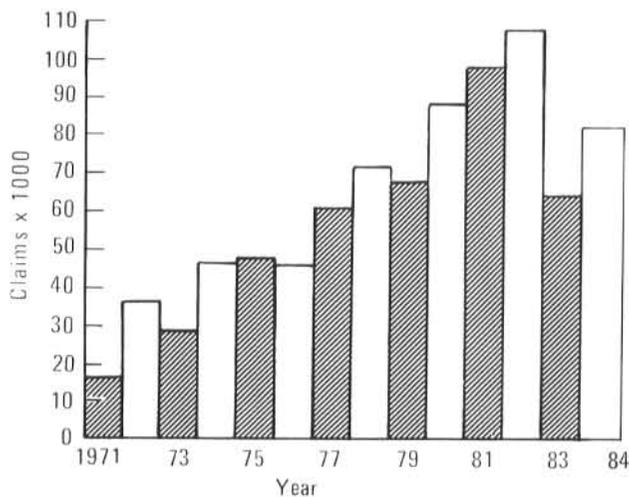


Figure 6. Assessment work filed in Alaska, 1971-84.

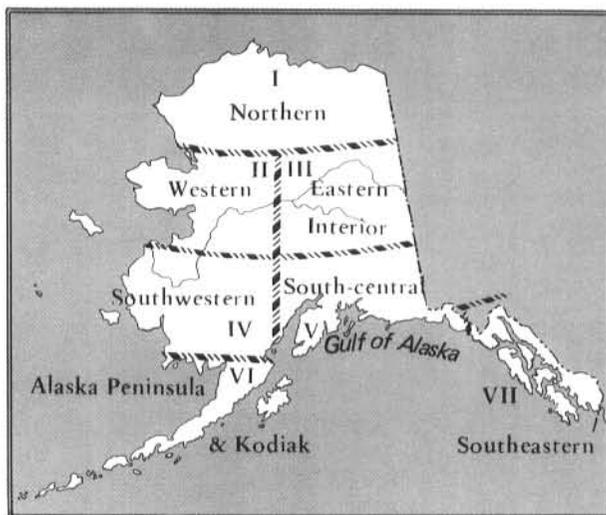


Figure 7. Regions of mineral activity in Alaska, 1984.

Metals

The most prominent mineral property in Alaska during 1984 was the Red Dog deposit owned by the NANA REGIONAL CORPORATION and operated by COMINCO ALASKA, INC. Although this world-class zinc-lead-silver deposit is described in the development section of this report, exploratory work at the site continues. COMINCO staked additional claims and conducted assessment work (including diamond drilling and geophysical and geochemical surveys) on a large group of older claims in the Noatak area.

GENERAL CRUDE OIL MINERALS COMPANY (GCO) and HOUSTON OIL AND MINERALS continued their evaluation of the Lik deposit, which is located about 12 mi northwest of the Red Dog deposit. The latest published ore reserves are 24 million tons that grade 9 percent zinc, 3.1 percent lead, and 1.4 oz/ton silver. In 1984, a northern extension of the Lik orebody, offset by faulting, was discovered and drilled. Although the drilling is insufficient to calculate reliable reserve tonnages and grades, a substantial addition to the Lik deposit is indicated. One drill hole intercepted a 174.5-ft-thick section that averaged 8.9 percent zinc, 3.5 percent lead, and 2.3 oz/ton silver. At this time, the company does not have a production schedule for the Lik deposit. GCO holds several thousand claims in the Noatak zinc belt (De Long Mountains) and is supporting COMINCO'S request for a state loan to construct both a haul road from the Red Dog deposit to the Chukchi Sea and port facilities at tidewater. GCO also holds claims in the Ambler district.

KENNECOTT CORPORATION (formerly BEAR CREEK MINING COMPANY) holds the Ruby Creek (Bornite) copper-zinc deposit in the Cosmos Hills and the nearby Arctic deposit in the Ambler district. Based on drill-hole data, indicated reserves at Arctic are 35 to 40 million tons that average 4.0 percent copper, 5.5 percent zinc, 0.8 percent lead, 1.6 oz/ton silver, and 0.02 oz/ton gold (Jay Hammitt, oral commun., 1985). In addition, KENNECOTT holds the Sunshine Creek, Horse Creek, Ambler 4B-Puzzle, Picnic Creek, Dead Creek, DH, and Nora prospects. Their 1984 exploration and assessment work in the Ambler district included diamond drilling, geologic mapping, geophysical surveys, and geochemical sampling. To the west, in the Noatak district, KENNECOTT conducted similar work on the Husky claim group in a joint venture with the NANA DEVELOPMENT CORPORATION.

Table 2. Reported exploration expenditures in Alaska by region and commodity, 1984.

Commodity	Region							No region specified
	Northern	Western	Eastern interior	South-western	South-central	South-eastern	Alaska Peninsula	
Metals	\$1,663,000	\$4,938,000	\$2,732,100	\$1,021,500	\$5,245,350	\$2,866,200	\$1,010,000	\$193,000
Industrial materials	200,000	--	--	--	70,000	--	--	--
Coal and peat	690,000	--	200,000	--	1,175,000	--	--	--
Other	4,500	--	275,000	--	--	--	--	--
Total	\$2,557,500	\$4,938,000	\$3,207,100	\$1,021,500	\$6,490,350	\$2,866,200	\$1,010,000	\$193,000

ANACONDA MINERALS COMPANY and its partner, SUNSHINE MINING COMPANY, conducted assessment work on several claim groups in the Ambler mining district, including the Tom Tom and Smucker prospects. ANACONDA dropped its joint venture with SUNSHINE MINING COMPANY in the Sun deposit. NORANDA EXPLORATION, INC., and GCO conducted annual assessment work on Ambler mining district claims. Both companies are partners with KENNECOTT on some claims. In the Chandalar mining district (eastern Brooks Range), exploration and development work on lode and placer deposits owned by the LITTLE SQUAW GOLD MINING COMPANY (Spokane) were suspended during 1984. However, Eskil Anderson of LITTLE SQUAW reported that placer testing during 1983 was successful and that placer production will probably resume in 1985. During 1983, CANADIAN BARRANCA CORPORATION, LTD., produced over 2,000 oz of placer gold from properties owned by the LITTLE SQUAW GOLD MINING COMPANY in the Chandalar mining district. A 100-ft-thick pay zone is reported in the Tobin Creek placer gravels; gravels on Little Squaw Creek tested \$8 to \$12/yd³ at \$300/oz gold.

BURKE MINING ENTERPRISES of Fairbanks had a two-person crew in the Wiseman Quadrangle for 90 days testing placer-gold claims; ALMINCO (Anchorage) also did reconnaissance work in the area. MITCH FLEMING trenched to test his ground on Slate and Myrtle Creeks in the Wiseman area.

Industrial minerals

A three-person crew employed for 180 days by GEODE EXPLORATION AND DREDGE TECHNOLOGY (Anchorage) drilled and tested for construction-grade gravel near the shore of Kotzebue Sound and the Little Noatak and Shiliak Rivers. The City of Kotzebue, NANA REGIONAL CORPORATION, and the Alaska Department of Transportation and Public Facilities supported the project; a 400,000-yd³ reserve was identified.

The NANA REGIONAL CORPORATION, which operates a jade-products industry in Kotzebue, conducted limited geologic mapping of their jade claims in the Jade Mountains during 1984.

Coal

Northern Alaska is underlain by some of the most extensive coal deposits in the United States. Information on these resources has been acquired from petroleum well logs on the North Slope and from several site-specific coal investigations, but relatively little reserve data is available for most northern coal fields.

During 1984, a state-funded coal project was conducted in the northwestern part of the region along the Chukchi Sea. Following a proposal to the state legislature by the Alaska Native Foundation, a special appropriation was made to the state Department of Community and Regional Affairs to administer a program to determine the coal resources of the

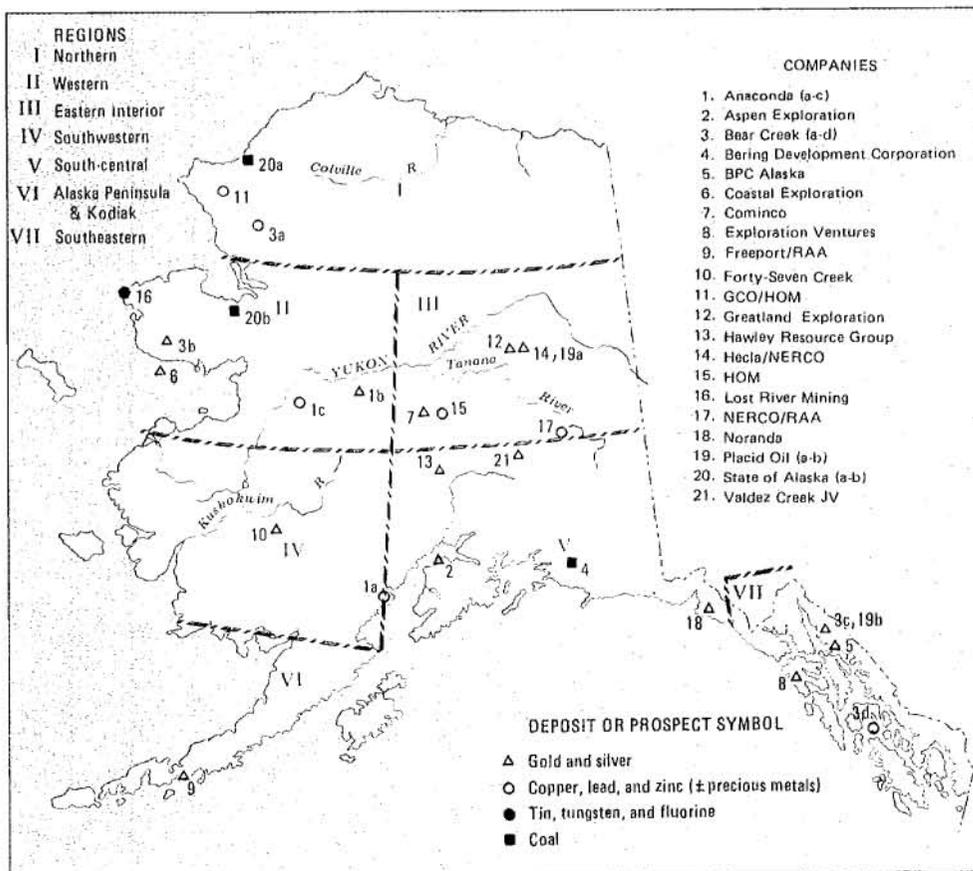


Figure 8. Selected mineral-exploration projects in Alaska, 1984.

area. The study's goal is to learn if coal resources in the region can be economically substituted for imported fuel oil now used for heat and power in remote villages of northwest Alaska.

As part of this program, HOWARD GREY AND ASSOCIATES was contracted to drill 27 exploratory holes up to 150 ft deep in the Cape Beaufort area and 47 holes up to 110 ft deep in the Deadfall syncline. A detailed report on the project was compiled by ARCTIC SLOPE CONSULTING ENGINEERS (1984). According to the report, reserves for the Cape Beaufort and Deadfall syncline fields are:

	Cape Beaufort coal (tons)	Deadfall syncline coal (tons)
Measured reserves	22,409,000	15,810,000
Potential resources	25,000,000	59,000,000

The report concluded that the Deadfall syncline was the preferred site for continued study because of both the large reserve and the superior quality of the coal.

Western region

The western region includes the highly mineralized Seward Peninsula and the historic placer-gold districts in west-central Alaska. Total expenditures reported during 1984 were \$4,938,000, a substantial increase over the \$3,770,510 reported for 1983. Some coal prospects that received considerable attention during the last few years were inactive in 1984, but several sites were subject to fairly intense exploration by large firms.

Metals

The most active prospect in the region is the Illinois Creek base- and precious-metal lode deposit located about 40 mi southwest of Galena in the Kaiyuh Mountains. The deposit consists of mineralized replacements, skarns, and stockworks in a porphyry-copper environment. ANACONDA MINERALS COMPANY reported that a 50-person crew conducted mapping, trenching, and geochemical and geophysical surveys on the project; 21,339 ft of drilling was completed. Tonnage and grade information are not available at this time. An eight-person crew from ANACONDA conducted geologic and geochemical surveys in the Ruby-Poorman mining district uplands. The company also did some diamond drilling and soil sampling on the Kelly Creek gold prospect in the American River area (northern Seward Peninsula) and on the Storm tin-silver lode prospect in the McGrath area. ANACONDA temporarily suspended exploration on the company's Kougarok Mountain tin-tantalum prospect located 80 mi north of Nome.

A 15-person crew from KENNECOTT conducted diamond core drilling, geologic mapping, geochemical and geophysical surveys, and other assessment work on claims in the Mt. Distin area 20 mi north of Nome on Bering Straits Native Corporation land.

Len Grothe of Nome reported that LOST RIVER MIN-

ING COMPANY had a drilling program in the Nome area and tested placer-gold ground at several sites. LOST RIVER'S Cape Creek mine on the western Seward Peninsula is the principal tin producer in Alaska.

M.T. KILLION of Fairbanks located a lode-tin prospect and a placer-gold prospect on the Seward Peninsula. WORLD EVANGELISM (San Diego) conducted mapping and geochemical work near Cape Nome and tested a number of claims for base and precious metals.

During 1982 and 1983, HAWLEY RESOURCE GROUP conducted drilling at the old Big Hurrah gold-tungsten mine on the south coast of the Seward Peninsula and reported potential for an open-pit operation. The property is one of several west-coast properties owned by CORNWALL PACIFIC (Vancouver). Assessment work was performed during 1984, and the company is seeking money for development.

Well-known prospector and miner RHINEHART BERG, with partners THOR WETLESEN and J. BULLOCK, used bulldozers and loaders to trench placer ground on Short Creek in the Kugruk River valley and on Jump Creek, a tributary of Candle Creek.

Modern and ancient beach sands have been mined in the Nome area since 1898, and the potential for recovering gold from offshore sands has attracted mining companies for many years. This potential prompted several offshore sampling programs and the organization of several mining ventures. Most ventures never reached the production stage, but according to M.R. Mott, some offshore mining was conducted near Bluff, 50 mi east of Nome, from 1939 to 1941.

POWER RESOURCES CORPORATION (POWERCO; Lakewood, Colorado) recently proposed a major operation to mine gold from submerged beaches in Norton Sound near Nome. Several state offshore-mining leases owned by AMERICAN SMELTING AND REFINING COMPANY (ASARCO) were optioned by POWERCO for development during the 1985 season. POWERCO plans to mine 900,000 yd³ of gold-bearing gravel annually using a continuous bucket-line dredge mounted on a barge. Extensive drilling has delineated at least a 17-yr reserve. The gold occurs in submerged beach deposits that formed when wave and tidal action concentrated the auriferous Nome River till during periods of lower sea level. The dredge will reportedly be operated between 100 ft and 2.5 mi from shore, and from 1 mi east to 11 mi west of Nome. According to POWERCO, no field work was conducted during 1984, but the company is working on obtaining mining permits.

COASTAL EXPLORATION and GREATLAND EXPLORATION, LTD., also employed eight people for 56 days in 1984 to conduct an offshore project in Norton Sound and reported testing offshore material with a 12-in.-diam suction dredge.

In 1983, PHOENIX MARINE EXPLORATION, INC., towed a dredge to the Bluff area east of Nome to dredge 16 million yd³ of material for its gold content. Unfortunately, the dredge was grounded during a storm before it was put into operation, and the collapse of financial backing, the failure to procure permits, and damage to the barge make a continuation of the venture very unlikely.

Coal

HAWLEY RESOURCE GROUP continued a mapping- and geophysical-exploration program at Chicago Creek on the Seward Peninsula. The state-funded project (administered by DGGs) has proven 3.4 million tons of lignite; feasibility studies are underway.

Eastern interior region

The eastern interior region covers most of 16 U.S. Geological Survey 1:250,000-scale quadrangles and includes the central and eastern parts of the Alaska Range, the Yukon-Tanana Upland, and numerous placer- and lode-mining districts. The region hosted the largest number of placer operations (170) in the state during 1984. Numerous exploration programs were also conducted. A total of \$3,207,100 was reportedly spent for exploration, down from \$9,166,329 in 1983. Gold was the principal interest, but several explorationists reported interest in tin, tungsten, and antimony.

Metals

PLACID OIL COMPANY (Anchorage) continued their exploration program—primarily for precious metals—in the Cleary area about 20 mi northeast of Fairbanks. The company acquired a large claim block that includes the Kavilita, Cleary, and Hy Yu lode systems, which they have explored by drilling and underground work during the past few years. PLACID reported geologic mapping and sampling, surface drilling, and trenching on the properties during 1984. Up to 14 people were employed on the project. Other exploration in the Cleary area included trenching for silver lodes on the Hart claims by ALASKA MINERAL SERVICES and on Cleary Hill by HARVEY McKIBBEN and JOE TAYLOR. MOHAWK RESOURCES OF ALASKA, INC., (a subsidiary of MOHAWK OIL AND GAS, INC., and operator of a small custom mill at Fox 10 mi north of Fairbanks) conducted an exploration program in the Fairbanks mining district that included annual assessment work, soil-and-rock geochemistry, drilling, geologic mapping, and geophysical surveys (fig. 9). The LOUNSBURY BROTHERS and ROBERT GRIEG continued their exploration program at the Clipper Mine on Ester Dome (fig. 10).

During August 1984, NERCO MINERALS COMPANY - RESOURCE ASSOCIATES OF ALASKA (NERCO-RAA, Fairbanks) and HECLA MINING COMPANY (Wallace, Idaho) announced their joint agreement to explore for gold, tungsten, and other metals in the Fairbanks mining district. Prospects included over 14,000 acres of mining claims controlled by NERCO-RAA. During the summer, the joint venture conducted geologic mapping, sampling, geochemical and geophysical surveys, and trenching on the claims. Although the program resulted in encouraging results, HECLA withdrew its participation in order to consolidate its activities under its merger with RANCHERS EXPLORATION AND DEVELOPMENT CORPORATION.

NERCO-RAA has extensive holdings in the east-central Alaska Range south of Tok. According to a company geologist, at least 35 stratiform mineral deposits and some replacement-type massive-sulfide occurrences are located within the 400-mi² mineralized area known as the Delta schist belt. About 40 million tons of mineralized material, including lead,

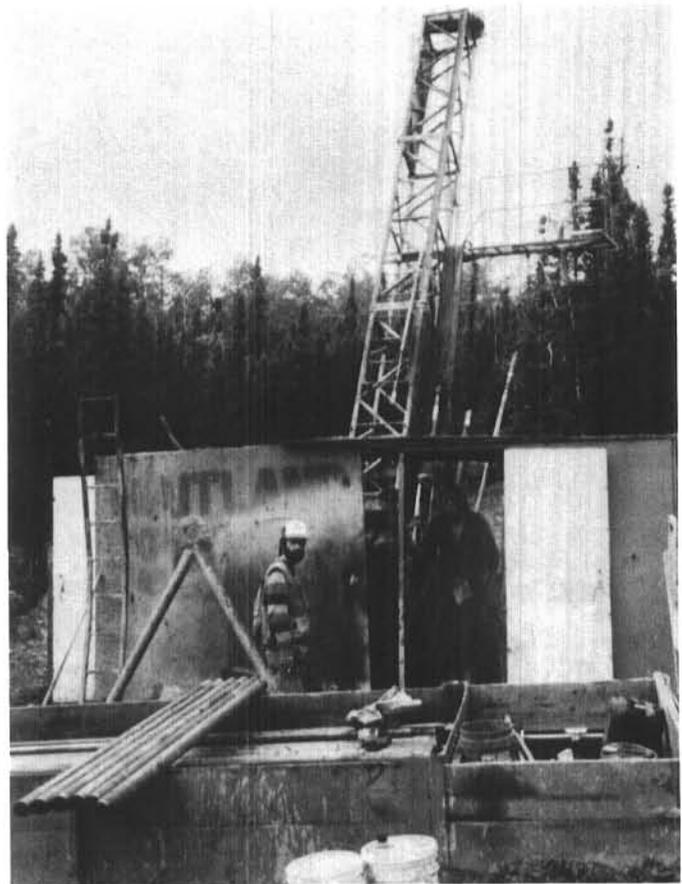


Figure 9. Mohawk Resources Longyear-38 drill exploring Soo Gold Mine system, Pedro Dome area, Fairbanks mining district. Photograph by Mark Hall, 1984.

zinc, copper, silver, and gold, are contained in a thick sequence of Devonian metavolcanic and metasedimentary rocks. Because of the poor base-metals market, NERCO-RAA is concentrating on assessment work on precious-metal-rich zones on about 2,300 state claims in the Delta area.

NERCO-RAA operates a joint venture with TETON EXPLORATION DRILLING COMPANY, INC., a subsidiary of UNITED NUCLEAR CORPORATION. The venture is exploring the copper-gold skarn deposits of the Zackly and Zackly Extension (south flank Alaska Range, Mt. Hayes Quadrangle). These deposits are especially attractive because of the favorable access and high ore grade. In 1984, the joint venture conducted geologic mapping and sampling of the mineralized areas. NERCO-RAA, with GETTY OIL and PHELPS DODGE, conducted a geophysical survey of volcanogenic massive-sulfide prospects in the Alaska Range (Bonni-field mining district) about 50 mi south of Fairbanks. During 1984, NERCO funded the University of Alaska Mineral Industry Research Laboratory to evaluate a hydrometallurgical process for precious- and base-metal recovery from sulfide ores. Samples from NERCO MINERALS' properties in the Alaska Range and from other western states will be tested.

SILVERADO MINES, LTD., expanded their exploration and development activities (see details in development section)



Figure 10. Longyear-47 underground diamond-drilling program, Clipper Gold Mine, Ester Dome area, Fairbanks mining district. Photograph by K. Greig, 1983.

at the Grant Gold Mine 7 mi northwest of Fairbanks on Ester Dome. SILVERADO'S partners, AUREX, INC., (a subsidiary of MARUBENI AMERICAN CORPORATION) and TRI-CON MINING, INC., are supplying about \$5 million for the work. Drilling indicates a reserve of more than 1 million tons of ore in veins that have a lateral extent of over 3,000 ft. The most favorable published drilling results are a 5-ft intercept that ran 4.5 oz/ton at the 195-ft level and an 18-ft intercept that ran 0.52 oz/ton at the 600-ft level.

Also located on Ester Dome are 16 claims on the Ryan gold lode presently held by ST. JOE AMERICAN CORPORATION. In recent years, ST. JOE completed a successful surface drilling program that blocked out a large tonnage of mineralized rock, but an attempt to develop the property with a decline was unsuccessful. Work in 1984 consisted of limited sonic drilling to meet annual assessment requirements.

COMINCO ALASKA, INC., (Anchorage) employed eight people for 60 days to conduct a diamond-drilling, geophysics, geochemistry, and geologic-mapping program at the Liberty Bell Mine (Bonnifield mining district) in the central Alaska Range. Just south of the Bonnifield mining district in the Healy A-6 Quadrangle, NORTHERN LIGHTS EXPLORATION COMPANY of Anchorage used geophysics and geologic mapping to explore for base and precious metals and to conduct assessment work on 814 claims. AMAX EXPLORATION, INC., explored for massive-sulfide ores in the Bonnifield mining district with encouraging results.

GEORESEARCH COMPANY OF ALASKA (Fairbanks) participated in exploratory work in the Clearwater Mountains (central Alaska Range) and the Livengood and Fairbanks mining districts. A variety of exploration methods that included trenching, geophysics, and geochemistry were used in the search for tungsten, antimony, gold, silver, and lead.

THANKSGIVING MINING COMPANY used a backhoe to trench placer ground on Thanksgiving and Slate Creeks in the Eureka and Rampart areas, where they also operated a placer mine. JEFF BURTON AND ASSOCIATES had three people in the Cleary Summit area for 10 days to map and conduct geochemical surveys in the search for gold. Five people with

BTW MINING AND EXPLORATION CORPORATION (Anchorage) excavated test pits in the Mt. Hayes and Chandalar Quadrangles in a gold-exploration program.

During early 1984, NORTHGATE EXPLORATION, LTD., announced plans to continue investigating the Step Mountain zinc-lead property north of Eagle in the Charley River Quadrangle.

GREATLAND EXPLORATION, LTD., (Anchorage) had a five-person crew drill and survey their Little Eldorado project on Little Eldorado Creek north of Fairbanks. The prospect is a deep (up to 180 ft) placer-gold deposit that may be mined by underground methods.

Numerous other small-scale operators reported spending from a few to several thousand dollars on exploration of their claims in the eastern interior region in 1984.

Alaska gold study

The study of Alaska placer-gold deposits became an official project of the USGS in 1984. Shortly thereafter, DGGS also became a participant in the project. Many Alaskan miners have taken part in the study by allowing access to their properties, contributing information, and donating samples of gold and heavy-mineral concentrates for analysis.

During the summer of 1984, USGS and DGGS geologists visited over 100 mining operations, including most mines in the Eureka, Tofty, Rampart, and Livengood-Tolovana mining districts, and many in the Fairbanks, Circle, Bonnifield, and Iditarod mining districts. During these visits, preliminary analytical data were reported to 35 miners who provided samples in 1983.

The Alaska gold study has several objectives: a) to characterize the deposits by mineral and trace-element content, b) to determine possible lode and other sources of gold in placer deposits, c) to study processes of placer formation, d) to contribute to knowledge of the principles of placer prospecting, and e) to determine whether minerals associated with gold in placer deposits may suggest the presence of economic deposits of other metals. Laboratory analyses of the 1984 samples will be reported to individual miners in 1985. The study will continue in the eastern interior and northern regions during 1985.

Crooked Creek diamond discovery

Recent reported discoveries of two diamonds in the Circle mining district northeast of Fairbanks have created strong interest among miners and geologists. JIM REGAN'S 1982 discovery of a small diamond (0.3 ct) in a sluice box on Crooked Creek (near Central) was followed by FRANK WARREN'S recovery of a second and larger diamond (1.4 ct) during placer mining on the same creek in 1984 (fig. 11). The source and concentration of diamonds in the Crooked Creek drainage is not known, and the significance of the discoveries cannot be gauged until placer gravels are tested for indicator minerals and diamond content.

Although rumors of accidental diamond finds have circulated throughout Alaska for many years, the Crooked Creek diamonds appear to be the first documented discoveries in the state, with the exception of two diamond inclusions found in native platinum from Goodnews Bay (Mertie, 1976).

The discovery of placer diamonds does not necessarily indicate a local source. Like some placer gold, alluvial dia-

monds may have experienced more than one cycle of erosion, transport, and deposition en route to their present location. In some cases, the primary diamond source in minable alluvial deposits has not been located; in other cases, persistent prospecting has led to the source.

Southwestern region

The southwestern region, which includes the Kuskokwim River basin and the lower Yukon River, hosts a northeast-trending mercury belt. During the past few years, several major exploration companies have shown considerable interest in base and precious metals in this area, but activity has been modest compared with other regions. Exploration expenditures during 1984 were \$1,021,500 compared with \$1,315,000 during 1983.

Metals

HANSON PROPERTIES, INC., (Spokane) and its partner SIMPLOT MINERALS spent the season exploring at the Goodnews Platinum Mine located south of Goodnews Bay. For many years, this was the only producing platinum mine in the United States. For the past 2 yr, the new owners have concentrated on establishing adequate reserves before reactivating the old 8-ft³ bucketline dredge. Last summer, they ran a magnetometer survey and operated a drill, backhoe, and dragline to sample for platinum and gold. They employed 10 people for 175 days to do assessment work on 167 placer claims and 159 lode claims.

COMINCO ALASKA, INC., had a 12-person crew in the Nushagak River area during 1984 doing diamond drilling, geologic mapping, and geochemical surveys for base and precious metals. MISCO-WALSH continued assessment work on the Golden Horn gold-tungsten shear-zone deposit in the Iditarod mining district.

The FORTY SEVEN CREEK MINES (Homer) had a three- to eight-person crew in the Sleetmute A-6 Quadrangle

over a 6-mo period. They tested placer and lode claims for precious and base metals, made dozer cuts, and tested material in their washing plant. Although reserves of 2.5 to 3 million yd³ were calculated, operations ceased late in the year, and the exploration equipment was reportedly freighted to Sleetmute. JMF AND ASSOCIATES (Bethel) conducted exploration work on 22 claims in the Goodnews Bay Quadrangle. The JULIAN CREEK MINING COMPANY (Red Devil) had a crew of seven people excavate prospect pits on placer-gold claims in the Taylor Mountains, Sleetmute, and Iditarod Quadrangles.

NORANDA EXPLORATION, INC., ANACONDA MINERALS COMPANY, and AMAX each explored in the southwestern region, but specific information on their programs is not available.

Alaska Peninsula and Kodiak region

Although exploration activities on Unga Island focused attention on the region during 1983, little activity was reported for that area in 1984. Exploration expenditures for the region dropped from \$7,732,000 in 1983 to \$1,010,000 in 1984.

Metals

ALASKA APOLLO GOLD MINES, LTD., (Vancouver) reported an aggressive exploration program for precious metals on Unga Island near the old Apollo and Sitka Mines in 1983, but in 1984 their work was limited to building roads and preparing drill sites on the Shumagin claim group. During early 1984, the company publicly stated that they had defined about 500,000 tons of ore that would probably average 0.3 oz/ton gold, 1.0 oz/ton silver, plus base-metal values. Recent news reports indicate the firm is waiting for additional financing to continue exploration and development work on the island.

NERCO-RAA has interests on Unga Island, but was not active in the area during the past year. NERCO-RAA is in a

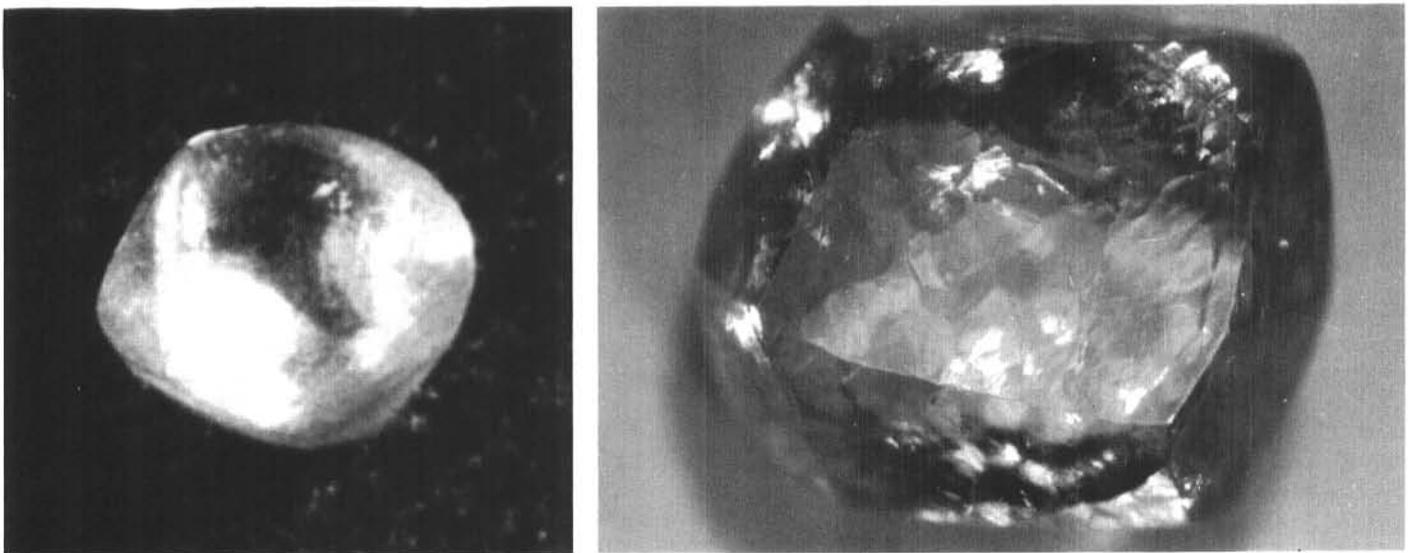


Figure 11. Raw diamonds (magnification approximately 15x) discovered on Crooked Creek, Circle mining district, Alaska: left) 0.3 ct Regan diamond discovered in 1982 (photograph copyrighted by Jim Regan, 1984); right) 1.4 ct Warren diamond discovered in 1984 (photograph by Jane Smith, 1984).

strong position to explore the Alaska Peninsula because they have exclusive exploration leases on 4,260 mi² of Aleut Native Corporation land and 4,300 mi² of Bristol Bay Native Corporation land. During 1984, NERCO-RAA, in a joint venture with FREEPORT EXPLORATION COMPANY (Reno), explored prospects and claims on the Peninsula using trenching operations and geologic and geochemical surveys.

ANACONDA MINERALS COMPANY had a 15-person crew on their Manhattan Prospect-Pat claims in the Chignik Quadrangle for 1 mo in 1984. They used diamond drilling, rock geochemistry, and geophysics to evaluate the gold-silver-lead-zinc potential of the claims.

South-central region

South-central Alaska includes the area south and east of the Alaska Range, exclusive of the southeastern panhandle. Numerous small-scale operators conducted relatively small exploration programs, but total exploration expenditures for the region were above the 1983 level because of three major metal projects and two coal projects. Exploration expenditures in 1984 were \$6,490,350 compared with \$5,077,570 in 1983.

Metals

The VALDEZ CREEK JOINT VENTURE operated the Denali Mine on Valdez Creek in the southwestern part of the Healy Quadrangle. The operator of the joint venture is SUM RESOURCES, INC. (Canada). Other partners include CAMINDEX MINES, LTD., SULLIVAN MINES, NORFRAN INDUSTRIES, LTD., TALCORP, INC., BARRICK PETROLEUM CORPORATION, ALASKA, and WGM, INC. WGM conducted an extensive program of drilling, mapping, and geophysical surveys to outline a series of buried channels. (This project is also described in the development section of this report.)

The most intensely explored prospect in south-central Alaska during 1984 was the Johnson River copper-lead-zinc-silver-gold deposit located about 10 mi southwest of Tuxedni Bay on the west side of Cook Inlet. ANACONDA MINERALS COMPANY, in a joint venture with the COOK INLET REGIONAL CORPORATION, employed up to 50 people on the project for 3½ mo. The principal interest is gold, and exploration consisted of 20,000 ft of drilling, geophysical and geochemical surveys, and geologic mapping. ANACONDA geologists discovered additional gold, lead, and silver mineralization at Difficult Creek about 6 mi northeast of the Johnson River prospect. This site is also on Cook Inlet Regional Corporation land. Published figures for one drill hole at Johnson River listed 30 ft of mineralization with 1.2 oz/ton of gold, 24.8 percent zinc, 2.8 percent lead, and 1.7 percent copper. Trenching at Difficult Creek yielded assays of 15.4 percent lead, 0.3 oz/ton gold, and 2.3 oz/ton silver.

A mineral project much in the public eye in Alaska during 1984 was the offshore gold-dredging operation in Cook Inlet proposed by ASPEN EXPLORATION CORPORATION (Denver, with offices in Anchorage). R.V. Bailey, president, stated that ASPEN spent \$900,000 during the past 5 yr testing the offshore heavy-metal values in Cook Inlet; \$400,000 was spent in 1984. Exploration, which included geologic mapping, beach sampling at numerous sites, and 6,400 mi of low-level aeromagnetic surveys, suggests the presence of linear deposits

of gold-bearing gravel to 80-ft depths in Cook Inlet. However, numerous public hearings and meetings with state agencies revealed significant opposition by fishermen, environmental organizations, and local residents to the proposed dredging. Applications to dredge on more than 1 million acres of submerged land in Cook Inlet are pending decisions in 1985.

A plan to dredge for gold offshore at Point Woronzof (near Anchorage International Airport) was announced by HELEN MARIE DAVIS in 1981. In December 1984, the director of DOM stated that the lease had been assigned to another group of investors who had conducted two phases of mineral sampling that did not bear out the predicted gold values. The lease was relinquished, and because the ex-lessees waived the confidentiality of the geologic data they gathered, it is available to the public for use in materials sales, engineering studies, and scientific research.

HOUSTON OIL AND MINERALS tested the tin-silver-copper sheeted-vein system at Coal Creek near Hurricane Station on the Parks Highway. An announcement in 1983 stated that drilling indicated a 5-million-ton deposit that averages 0.2 percent tin and 0.5 percent copper, with minor silver and zinc. A company geologist said they are optimistic that the project will continue.

GOLDEN ZONE, INC., (managed by HAWLEY RESOURCE GROUP) continues to evaluate veins, shear zones, porphyry-type deposits, skarn zones, and a breccia pipe at the Golden Zone property on the south flank of the central Alaska Range. The mine, which has been closed for many years, produced high-grade gold, silver, and copper ore. According to Hawley and Reed (1985), recent exploration indicates up to 5 million tons of proven, probable, and possible ore that are minable by open-pit methods.

NORANDA EXPLORATION, INC., leased a coastal section between the White River and Icy Bay in the Yakataga area from NORTH COAST MINING, INC., and a nine-person crew conducted drilling, sample processing, and mapping for 4 mo during 1984. Some metallurgic-processing studies were performed by the University of Alaska (Fairbanks) on the Yakataga sands. Gold-bearing beach sands have been known in the Yakataga area since 1887, and intermittent, small-scale placer mining has continued to the present. About 15,000 to 16,000 oz of gold have been recovered from the area. The very fine gold, reported to be between 80 and 150 mesh, is generally not recoverable by standard methods.

ALASKA GOLD MINES, LTD., (Richmond, B.C.) conducted a bulk-sampling program of beach sands in the Bering Glacier A-4 Quadrangle during 1984. The major shareholder in the operation, CUSAC INDUSTRIES, LTD., stated in a news release on the project that they had used a test pilot plant and had excavated trenches 10 ft deep and 50 ft long. According to CUSAC INDUSTRIES, LTD., further pilot-plant studies will be conducted in 1985.

A consulting firm hired by the VAN ZELST GROUP mapped and conducted assessment work on claims in the McCarthy Quadrangle. BEAVER SLIDE MINING COMPANY used core drilling and geophysics to test claims staked in the southern Talkeetna Mountains. KOTTER CONTRACTING and COLBY ENTERPRISES hired a consultant to plan exploration in the Nelchina mining district. GOLD CORD MINE drilled and trenched at the Gold Cord Mine and Sheared Claims in the Willow Creek mining district; some underground

development was also conducted in the Gold Cord Mine.

According to Bundtzen and others (1984), the GENEVA PACIFIC CORPORATION donated 500 claims to the St. Elias National Park-Preserve and sold their other properties. However, the firm notified DGGs that they retained a significant number of claims in the Wrangell Mountains.

Industrial minerals

CHUGACH MINERALS, INC., (Anchorage) trenched, sampled, mapped, and conducted aerial surveys to determine the gravel reserves of their Chugach Mine on the Kenai Peninsula. They estimate reserves of 40 million tons and expect to begin development and production during 1985.

Coal

Coal resources of south-central Alaska are very extensive, and exploration drilling has been conducted in several fields during the past decade. Recently announced plans for large-scale production of coal for export and power generation brighten prospects for major development in the near future.

ROCKY MOUNTAIN ENERGY (a subsidiary of UNION PACIFIC RAILROAD) and HAWLEY RESOURCE GROUP rotary drilled and mapped for 90 days in the Wishbone Hill area of the Matanuska coal field. This was the second year the joint venture evaluated their state leases. They were successful bidders during 1984 on additional state leases that adjoin their prior holdings. Several coal mines in the area have been inactive for the past 17 yr. The current drilling venture, named the Wishbone Hill project, is continuing coincidentally with the Matanuska Power Project (MPP ASSOCIATES), a consortium of ROCKY MOUNTAIN ENERGY CORPORATION, SIGNAL ENERGY CORPORATION, HAWLEY RESOURCE PROPERTIES, INC., and COOK INLET REGION, INC. The Matanuska Power project is studying the viability of a mine-mouth power plant that would produce 170 megawatts of electricity. Estimates of reserves on both the newly leased tracts and the existing leases indicate a 20-yr supply of coal (700,000 tons/yr). A comprehensive feasibility study scheduled for 1985 will determine the viability of the project, and if the results of the study are positive, commercial electrical generation could begin by 1991.

BERING DEVELOPMENT CORPORATION, an Alaskan joint-venture corporation with KOREA ALASKA DEVELOPMENT CORPORATION and CHUGACH ALASKA CORPORATION, drilled approximately 15,000 ft in the Monument Mountain and Cochrane Creek areas in the Bering River coal field east of Cordova. This was the fourth year the joint venture explored the high-rank, highly folded and faulted coal beds on 33,000 acres of land owned by the CHUGACH ALASKA CORPORATION. A 58-million-ton coal reserve has been identified in five seams, and plans are being made to produce from 1 to 1.5 million short tons/yr for export to Korea by 1989.

Southeastern region

Southeastern Alaska includes the southern panhandle and the islands in the Alexander Archipelago. Mineral exploration in this highly mineralized region has remained at a fairly high level for many years, and exploration expenditures increased substantially, from \$1,953,000 in 1983 to \$2,886,200 in

1984.

Metals

A joint venture by QUEENSTAKE RESOURCES (USA), INC., (Vancouver) and EXPLORATION VENTURES COMPANY (EVENCO, Spokane) undertook an ambitious program of exploration, rehabilitation, and development at the old Chichagof Gold Mine and other properties in the Chichagof mining district on Chichagof Island. Exploration drilling and underground work are being conducted to test several vein systems. A major target is the down-dip extent of the Big Croppings vein. The project could be advanced to the feasibility stage during 1985. A mill capable of handling 200 to 300 tons/day of old tailings and 100 tons/day of underground ore is proposed. The tailings consist of 456,000 tons of material that average 0.110 oz/ton gold, and the underground ore is expected to average 0.5 oz/ton gold.

KENNECOTT, with partners SOUTHEASTERN MINERALS COMPANY, MARMOT MINING EXPLORATION COMPANY, ALYU MINING CORPORATION, and HAWLEY RESOURCE GROUP, supported a 20-man crew for 50 days at the Jarvis Glacier (Boulderado) prospect in the Skagway B-4 Quadrangle (Haines mining district). The prospect contains high-grade copper and zinc with precious-metals credits. The partnership conducted 1,955 ft of diamond-core drilling, geophysical surveys, and detailed geologic mapping. Assessment work was completed on 332 claims.

KENNECOTT and its partners had a 10-person crew at the old Jualin Mine in the Berners Bay mining district north of Juneau. The Jualin Mine produced 30,000 oz of gold from 1885 to 1920. During 50 days in the field, KENNECOTT diamond drilled 949 ft of core, collected geochemical samples, and completed detailed geologic mapping and geophysical surveys. Drilling during 1983 and 1984 located thin intercepts of moderate-grade gold mineralization in quartz veins. The most promising intercepts were located in the immediate vicinity of the old workings.

KENNECOTT, with HAWLEY RESOURCE GROUP, had a 12-person, 30-day program in the Duncan Canal - Zarembo Island area in the Petersburg B-3 Quadrangle. Base and precious metals were sought on the Frenchy prospect (fig. 12).

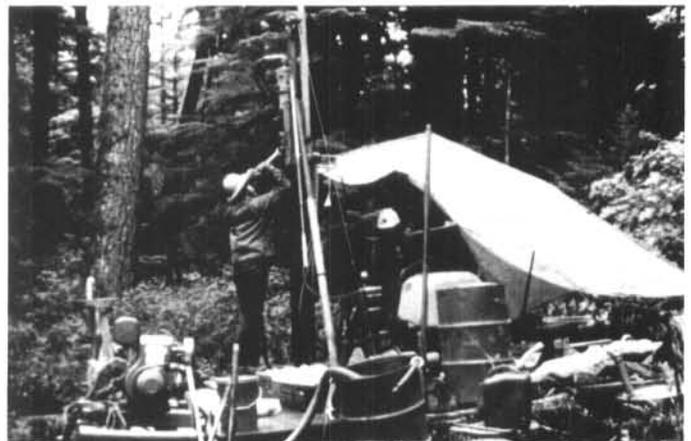


Figure 12. Drill station at Kennecott's Frenchy prospect on Zarembo Island, southeast Alaska. Photograph by David Simpson, 1984.

NORANDA EXPLORATION, INC., and partners, HOUSTON OIL AND MINERALS and LONG LAC, explored claim blocks on southeastern Prince of Wales Island for precious and base metals. Claim groups included Ruby Tuesday on the South Arm of Cholmondeley Sound, Dena at Niblack Anchorage, and Kaigan at McLead Bay. These deposits were described by Herreid (1964), Herreid and others (1978), and Peek (1975). Work included geochemical and geophysical prospecting and drill-site and helipad preparation. Assessment work was completed on 251 claims.

BARRICK PETROLEUM CORPORATION, ALASKA, INC. (BPC), a subsidiary of BARRICK RESOURCES CORPORATION (Toronto), continued their study of the possibility of reopening the gold-silver lode mines at Juneau. The Juneau City-Borough and the Alaska Electric Light and Power Company signed a lease agreement with BPC in March 1984. In 1984, work consisted of copying approximately 1,000 maps and drawings of the Alaska Juneau, Perserverance, and Treadwell Group Mines, company reports, and other records of interest. WGM, INC., completed a preliminary assessment of ore reserves and defined exploration targets on the properties.

WGM, INC., also conducted exploration programs in southeastern Alaska using geochemical and geophysical surveys, mapping, and underground work. Projects included the Apex and El Nido Mines on the north end of Chichagof Island and the LCM property at Silver Bay 12 mi southeast of Sitka.

PULSAR RESOURCES (US), INC., (Hyder) with CUBE RESOURCES and MINERAL BASIN MINING COMPANY, used a five-person crew to conduct geochemical and geophysical surveys, geologic mapping, trenching, staking, and road work at the Alaska Star property near Hyder. They are ex-

amining the gold potential of 3,500 acres of mining claims.

GALACTIC RESOURCES, INC., and joint venture partner TOUCHSTONE RESOURCES COMPANY did assessment work on 264 nickel-copper-cobalt claims on Yakobi Island and 111 claims at Mirror Harbor on Chichagof Island. Published open-pit reserves for the Yakobi Island properties are 15 million tons that average 0.37 percent nickel, 0.22 percent copper, and 0.04 percent cobalt. Platinum metals may also be recoverable.

NERCO-RAA completed assessment work on 385 claims on Hawk Inlet (Admiralty Island) 15 mi southwest of Juneau. Their objective is the discovery of a massive-sulfide deposit similar to that of Greens Creek. EXXON MINERALS conducted some mapping at the Black Crag claims about 26 mi east of Wrangell. ORBEX MINERALS (Vancouver) sampled bedrock at the Salt Chuck Copper-Palladium Mine on Prince of Wales Island.

PLACID OIL explored the Kensington lode-gold property north of Juneau. They were in the field 108 days, drilled a total of 5,400 ft in 15 surface holes, and did rock and geochemical sampling.

Other major exploration firms reportedly present in southeastern Alaska include HOUSTON OIL AND MINERALS, GCO, AMAX EXPLORATION, INC., and HUNT OIL COMPANY.

The discovery of the giant Windy Craggy massive-sulfide deposit in British Columbia north of Haines, Alaska, continues to draw interest (fig. 13). Exploration of the deposit, which reportedly contains over 90 million tons of 3.0 percent copper, 0.1 percent cobalt, and significant gold, silver, and zinc, is being conducted by GEDDES RESOURCES, LTD., which holds sole title to the property. Assessment work, including drilling, was conducted in 1984.



Figure 13. Drill rig at Windy Craggy copper-cobalt-gold deposit, northwestern British Columbia near Haines, Alaska. Photograph by T.K. Bundtzen, 1984.

Mineral development in 1984

Introduction

Mineral-development expenditures in Alaska during 1984 rose to \$53.3 million, an increase of about 91 percent from 1983 (table 3). A multimillion-dollar investment in the Seward Coal Terminal and generally high levels of activity at the Greens Creek and Red Dog prospects are responsible for most of the increase. Although some deposits in this section may not fit a narrow definition of development, they are included because industry announcements of activities place them in the development category (fig. 14). In some cases, development-stage projects are not included because some companies indicated they do not distinguish between exploration, production, or development expenditures in their records.

The large increase (in dollar value) occurred despite a significant decrease in the number of mineral-development projects described in previous years. This decrease reflects adverse commodity-market conditions or engineering difficulties.

No field work was done on the Alaska Asbestos project, a joint venture between DOYON REGIONAL CORPORATION and GCO MINERALS. However, laboratory testing of fiber quality continued at the Ontario Research Foundation. Probable markets for asbestos will be Europe or the Pacific Rim.

Development activities on the Mikado vein system in the Chandalar mining district (central Brooks Range) have been delayed, but exploratory work may resume on the property in 1985. Development work at the Apollo Mine on Unga Island by ALASKA APOLLO GOLD MINES, LTD., and at EN-SERCH CORPORATION'S Independence Mine at Hatcher Pass has been halted pending successful exploration efforts and improved gold prices.

Initial attempts to mine Gastineau mill tailings at Thane south of Juneau failed because of design problems with the mill equipment. The operator, JUNEAU MINING COMPANY, is trying to resolve the challenging engineering obstacles.

Red Dog project, Cominco-NANA Regional Corporation, De Long Mountains, northern region (loc. 1, fig. 14)

The Red Dog property is a world-class, black-shale hosted,

zinc-lead-silver-barite deposit that is Mississippian to Pennsylvanian in age (Plahuta and others, 1983). The property is located in the De Long Mountains of northwestern Alaska, about 80 mi north of Kotzebue (fig. 15). The deposit is owned by NANA REGIONAL CORPORATION and operated by COMINCO ALASKA, INC. Both fine-grained layered sulfides and coarse-grained vein sulfides are present. COMINCO geologists believe the deposits formed as submarine exhalations in a tensional tectonic environment.

Tikkanen (1983) and Green (1983) summarized the exploration history of the deposit. By 1984, 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 about 5,000 ft long, 1,500 ft wide, and 100 ft thick. The nearby Hilltop deposit is up to 95 ft thick, dips to the south, and locally contains metal values similar to the Main deposit.

On-site activity during 1984 concentrated on additional grid-style drilling of the Main orebody with a large-diameter diamond drill. Numerous geotechnical studies included a) compilation of initial designs for the mill, tailings dam, and mine site, and drilling of three foundation-pad sites; b) compilation of a geotechnical report on the proposed road based on field-engineering studies that included drilling; and c) completion of the EIS, which includes a preliminary development and production schedule (table 4). Hank Giegerich, president of COMINCO, ALASKA, estimates that the mine will initially process 1½ million tons of ore annually and eventually expand its capacity to 2 million tons. Up to 700,000 tons of sulfide concentrate will be shipped during a 3-mo shipping season. In full production, the mine will produce 580,000 tons of zinc concentrate, which will make it the largest producer of zinc in the free world (table 4). Zinc is a bluish-white metal used for corrosion-resistant applications in manufacturing, die casting, and the steel and automobile industries.

NANA REGIONAL CORPORATION currently receives \$1 million/yr in advance royalties and will eventually receive up to 50 percent of the net proceeds during mine life. Red Dog will employ up to 400 NANA residents and provide \$10 million annually in revenues to NANA and other Native corporation shareholders. Additionally, COMINCO and NANA REGIONAL CORPORATION will pay the State of Alaska \$12 million annually in projected mining and corporate income taxes.

Table 3. Mineral-development expenditures in Alaska by commodity, 1981-84.

	1981	1982	1983	1984
Base metals	\$ 5,945,000	\$10,270,000	\$19,500,000	\$10,710,500 ^a
Precious metals	11,400,000	19,320,000	7,112,500	15,058,555 ^b
Industrial and structural materials	7,000,000	4,251,000	1,000,000	579,000
Coal and peat	345,000	7,750,000	250,000	27,000,000
Total	\$24,690,000	\$41,591,000	\$27,862,500	\$53,348,055

^aIncludes \$600,000 for placer tin-tungsten developments.

^bIncludes \$8,582,140 from 34 placer-gold-mining companies.

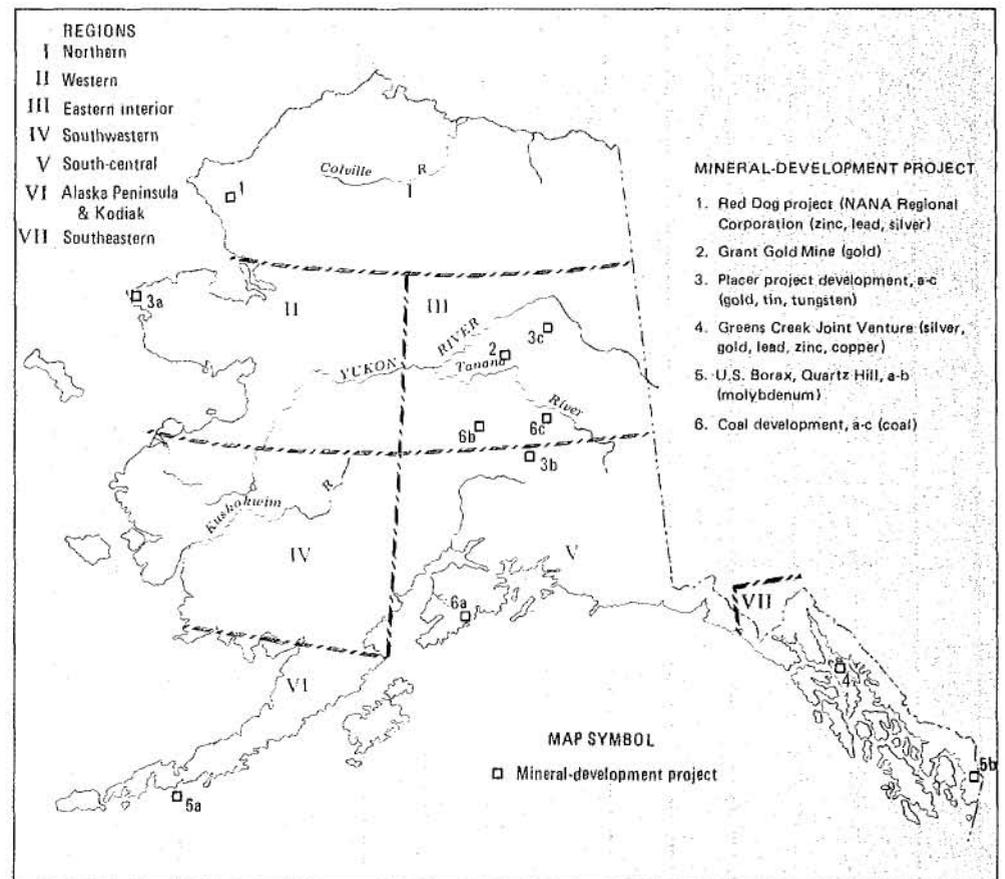


Figure 14. Selected mineral-development projects in Alaska, 1984.

An important priority for the project will be approval of a 55-mi-long access corridor to the Chukchi Sea through the Cape Krusenstern National Monument. A land exchange between NANA REGIONAL CORPORATION and the U.S. Department of Interior has been signed and is awaiting Congressional approval.

The capital cost of the Red Dog project is estimated at \$400 million, 60 percent of which will be used for mine development and construction of mine facilities. The remaining 40 percent (\$160 million) will be used to construct road and port facilities. COMINCO will finance the mine and mill facilities with conventional equity and bank loans, but is asking the state to provide a \$150-million financing package for road and port construction. In December 1984, a Resolution of Intent was signed between COMINCO ALASKA, INC., and the Department of Commerce and Economic Development. A financing plan is being developed through the state's Alaska Industrial Development Authority. Approval, funding, and implementation will require legislative action in 1985.

Grant Gold Mine (Fairbanks District), eastern interior region (loc. 2, fig. 14)

A joint-venture between SILVERADO MINES (U.S. INC.), TRI-CON MINING, INC., and AUREX, INC., a subsidiary of MARUBENI AMERICAN CORPORATION, is working to place the Grant gold property (on the flank of Ester Dome near Fairbanks) in production. From 1979 to

1981, the operator, TRI-CON MINING, INC., was engaged in an aggressive exploration-and-development program on the Irishman, O'Dea, and other gold-bearing shear zones on the Grant property. Exploration and production activities on the property have been intermittent since 1925. Prior to 1950, about 6,000 tons of high-grade ore were selectively mined from the Irishman vein. Principal underground workings consist of 3,600 ft of drifts, crosscuts, and raises on and above the 200-ft levels of the O'Dea breccia and O'Dea west zones (Bundtzen and Kline, 1981). Host rock for the quartz-sulfide vein deposits is polymetamorphic schist of undetermined age. Pre-1984 mill tests on 2,500 tons of development ore produced 1425.6 oz of gold and 392.6 oz of silver. Initial recovery from the pilot mill was under 70 percent, but recent metallurgical testing by Conwell (1982) and the company indicates that recoveries in the 85- to 94-percent range are possible.

During 1984, a two-phase, \$1.9-million exploration program was completed on the Grant Mine. The Phase I drilling program, begun in April, defined a substantial ore tonnage on the O'Dea vein system, which extends 4,000 ft on strike and is up to 1,000 ft deep. The Phase II program was completed in December 1984 and consisted of surface rotary and diamond drilling that confirmed Phase I findings. A preliminary feasibility study will be prepared by TRI-CON MINING, INC., and a production decision is expected in early 1985.



Figure 15. Drill rig on Red Dog deposit, northwestern Alaska. Photograph courtesy of Cominco Alaska, Inc., 1984.

Table 4. Production and employment summary, Red Dog project, northwestern Alaska.^a

Employment	Construction	Production
Mine	50	400
Road and port	250	0
Service industries	100	230
Total	400	630

Production forecast (tons)	Initial stage	Full production
Zinc concentrate	450,000	580,000 ^b
Lead concentrate	80,000	120,000
Total concentrate	530,000	700,000
Mined ore ^c	1,500,000	2,000,000

^aInformation from Giegerich and Parker (1985).

^bEquivalent to 5 percent of free-world zinc demand in 1990.

^cMill designed for 6,400 TPD for 235 days/yr, advancing to 312 days/yr.

Miscellaneous placer projects (loc. 3a-c, fig. 14)

Thirty-six mining operations reported \$9,082,140 in expenditures for development of placer-gold, tin, and tungsten deposits. About \$3.1 million was spent by 34 relatively small placer-mining companies. The average expenditure for each company was \$85,600 compared to a reported expenditure of about \$55,000 each in 1983. Reported total expenditures for 1984 represent a large increase from 1983, which in part represents improved questionnaire responses, but probably also reflects accelerated company efforts to offset the reserve-base depletion that is occurring in various Alaska placer districts. Most questionnaire respondents were small companies preparing for initial production from a variety of placer deposits, including bench, modern-stream, and semiresidual deposits. As in past years, chief expenditures for development work consisted of grid-style churn, resonant, and reverse air-circulation drilling; overburden removal; general ground preparation; camp construction; and minor road building.

Eleven of the 36 respondents were mining companies that invested \$250,000 to \$4,000,000 on placer activities in all but the southeastern and Alaska Peninsula and Kodiak regions of the state. Some development costs focused on improving water quality in existing mines by either using new technology or by building additional settling ponds. GOLD DUST MINES (Circle mining district) is an example of the former case. GOLD DUST MINES contracted IHC Holland, known worldwide for dredge manufacturing, to build a mobile washing plant that uses jigs, revolving trommels, and cyclone separators. The plant is designed to enhance gold recovery and reduce water requirements during mine operation. During initial 1984 operations, considerable success was reported in achieving both objectives.

One of the most significant development projects is the Valdez Creek Joint Venture project in the historic Denali mining district north of the Denali Highway in south-central Alaska. The property was acquired by a joint-venture group of six companies headed by CAMINDEX MINES, INC., LTD., of Canada. WGM, INC., operator for CAMINDEX, used a sophis-

ticated combination of drilling, geology, geophysics, and engineering to prove adequate reserves and prepare several high-grade placer deposits in buried fluvial channels on Valdez Creek for production. Nearly 50 percent of the reported placer-development expenditures were for this project. From August 1983 to spring 1984, WGM proved reserves of 69,000 oz gold with grades that exceed 0.1 oz gold/yd³. The mine was put into production by the joint venture using SUM RESOURCES (Montreal) as operator.

Most production in the district is derived from a preglacial paleochannel of Valdez Creek known as the Tammany channel (Smith, 1981). The project area is buried by over 100 ft of glacial drift. Smith (1970) showed that bedrock depressions buried by glacial drift in the Denali area could be defined using relatively inexpensive, shallow seismic-exploration methods. By 1979, placer consultants speculated that extensions of the known Tammany channel and other channels may be buried beneath glacial drift; reconnaissance drilling in 1981 confirmed this hypothesis. Exploration methods used by the current joint venture include 30,000 ft of reverse-circulation, conventional air-rotary, and churn drilling and refraction-seismic, magnetic, and resistivity geophysical surveys (Bressler and others, 1985). Detailed exploration efforts by WGM identified at least three superimposed gold-bearing paleochannels: a) the Tammany channel, discovered and partially exploited since 1904; b) an older 'A' channel discovered by the 1981 drilling; and c) remnants of a 'B' channel discovered by development drilling in 1984 (fig. 16). The producing paleochannels are covered by overburden (at a 5:1 ratio) that must be removed by the conventional bench-excavation techniques used in large, open-cast, hard-rock mines. The development is significant because Tammany channel properties continue to produce and because similar gold-bearing terrane may exist in glaciated regions of south-central and southeastern Alaska.

LOST RIVER MINING actively stripped and drilled ground to improve their reserve base in preparation for future mining of their placer-tin properties on the western Seward Peninsula. They indicated that additional work is needed to improve their depleted reserve base.

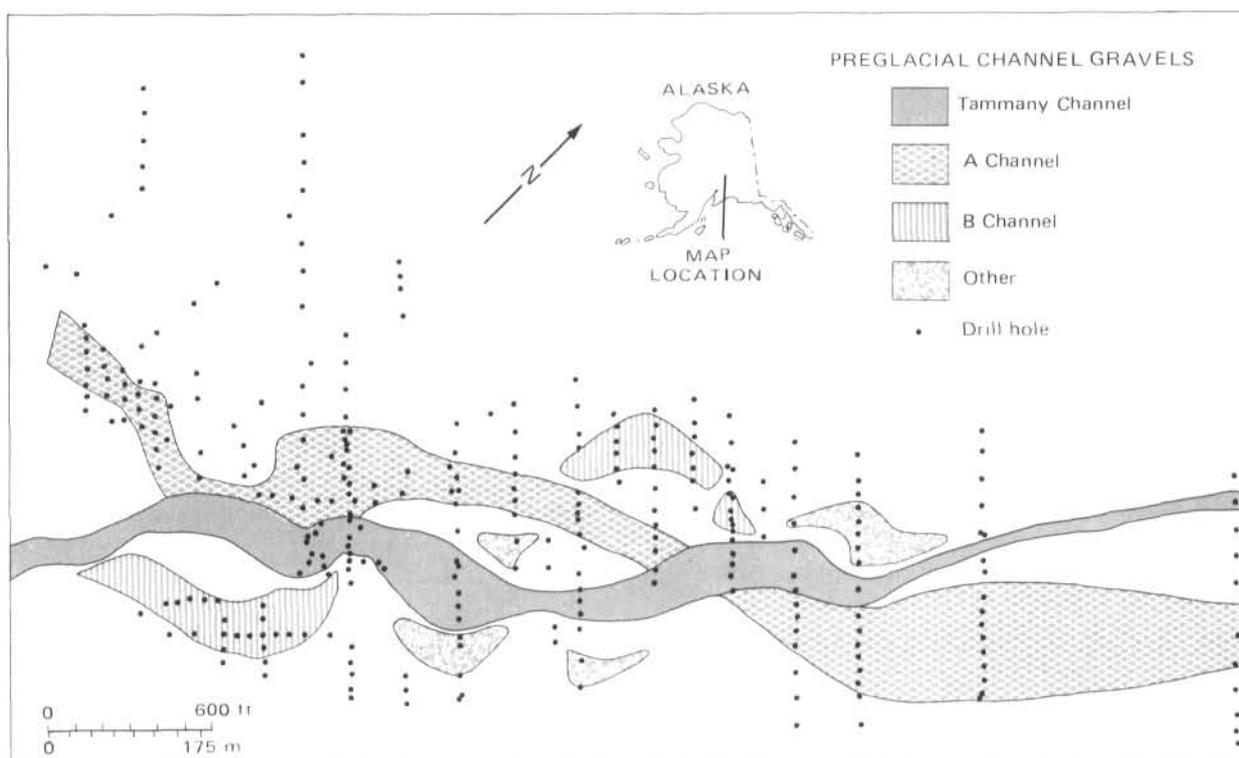


Figure 16. Geologic plan of preglacial channel gravels in the Valdez Creek district showing gold-development drilling scheme. Modified from Bressler and others (1985).

Greens Creek Joint Venture, southeastern region (loc. 4, fig. 14)

During 1973, PAN SOUND JOINT VENTURES, a group composed of MARIETTA RESOURCES INTERNATIONAL, EXALAS RESOURCES CORPORATION, TEXAS GAS RESOURCES CORPORATION, and NORANDA EXPLORATION, INC., began mineral-exploration activities in southeastern Alaska. In 1977, PAN SOUND JOINT VENTURES announced the discovery of significant base- and precious-metal deposits at Greens Creek, about 18 mi southwest of Juneau. Initial drilling results in 1974 indicated the presence of high-grade, apparently stratiform, massive-sulfide mineralization in volcanic-sedimentary rocks of middle Paleozoic or Triassic age. According to Scherkenbach and others (1985), metamorphosed chemical and carbonaceous clastic sedimentary rocks host the orebodies along the limb of an overturned anticline. The setting for the deposit may be a back-arc or strike-slip extensional basin with characteristics of polymetallic, volcanogenic, massive-sulfide and shale-hosted exhalative deposits. The deposit has crude similarities to the Roseberry or Mount Isa deposits in Australia.

By the end of 1984, over 85,000 ft of core drilling from about 170 surface and subsurface stations and about 5,000 ft of drifting established proven and indicated reserves of 3.5 to 4.0 million tons of ore that contain 10.3 oz/ton silver, 6.4 percent zinc, 2.1 percent lead, and 0.09 oz/ton gold. About 21,500 ft of drilling (using two Longyear-38 rigs) and 850 ft of underground drifting were completed during 1984. Underground work involved driving 10-ft² crosscuts into the unmineralized hanging wall to establish drilling stations. The

1984 program successfully identified deep, higher grade reserves. Precious-metal grades may increase with depth along the limb of the overturned anticline, where the mineralization appears to be localized in several trough-shaped pods.

The original mining plan, which proposed cut-and-fill methods, was changed to open-stope methods after revised cost and engineering analyses were completed. The mine-mill complex could begin operation in 1987 at 300 tons per day (TPD) and increase to 600 TPD. About 100 to 150 people would be employed. Many industry analysts believe this project is the most likely major hard-rock mining venture in the state to achieve new production (fig. 17).

The passage of ANILCA in December 1980 allowed development of the Greens Creek deposit, which is located in a nonwilderness area in 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, and confirmed the validity of eight core mining claims. Other important portions of the claim block have not been officially validated even though geology, shallow drilling, geochemistry, and geophysics attest to continuity of ore horizons in this ground. ANILCA specifies that claims must be perfected and declared valid by December 2, 1985. In 1983, NORANDA requested relief from the time restraint for evaluating these claims and asked for minor adjustments in the boundary of Admiralty Island National Monument. In June 1983, the company submitted a request to the U.S. Forest Service for a boundary adjustment. In December 1983, a draft EIS for a boundary adjustment was released. The preferred

alternative would exclude 17,225 acres that include the Greens Creek deposit by moving the northern boundary of the Monument; 18,174 acres in the popular Young Lake recreational area would be added to the Monument. A decision by the U.S. Secretary of Agriculture is pending.

In 1983, ANACONDA MINERALS COMPANY acquired the interest previously held by the MARTIN MARIETTA CORPORATION. Also, ANACONDA and NORANDA acquired equal shares of interest formerly held by BRISTOL BAY RESOURCES. Presently ANACONDA and NORANDA each hold 39.5-percent interests; other owners are TEXAS GAS RESOURCES CORPORATION (12.3 percent) and EXALAS RESOURCES CORPORATION (8.7 percent).

Quartz Hill molybdenum deposit, U.S. Borax, southeastern region (loc. 5, fig. 14)

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 minable ore that grades 0.136 percent molybdenum. This figure includes 490 million tons of near-surface ore that grades better than 0.219 percent molybdenum. The mineralization is hosted in a 25-m.y.-old composite felsite pluton that intrudes metamorphic and plutonic rocks of the Coast Range batholith.

At the time of discovery, 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 socio-economics have been collected.

Depending on metals prices, the mine could annually add from \$267 million to \$457 million to the nation's foreign-trade exports and up to \$65 million to Alaskan personal income, equal to over 20 percent of total personal income in the Ketchikan Borough. To date, the company has invested over \$100 million on exploration and development.

U.S. BORAX continued work on their Quartz Hill project



Figure 17. Greens Creek portal, Admiralty Island, southeast Alaska. Photograph by T.K. Bundtzen, 1984.

in 1984, but fewer on-site investigations were conducted than during previous years. Attention is now directed toward the choice of a site for submarine-tailings disposal in either Boca de Quadra or Wilson Arm. Wilson Arm was initially ruled out because preliminary estimates indicated it was too small to contain all the tailings. However, recent compaction studies by contractors for U.S. BORAX show that Wilson Arm is capable of holding the tailings for the life of the mine. Conservationists have expressed opposition to the Wilson Arm option, but the Sheffield administration has indicated that it will consider the Wilson Arm option, provided further research supports this alternative. Current plans call for the production of molybdenum by the early 1990s; the original late 1980s startup schedule was significantly delayed because of low market demand. The development schedule includes careful research of the market and continued environmental monitoring.

Coal development projects (loc. 6a-c, fig. 14)

The past and coming year are important to the coal-mining industry in the eastern interior and south-central regions of the state. In late 1984, the successful delivery of coal from the USIBELLI COAL MINE to Seward for shipment to Korea spurred optimism about the export of other Alaskan mineral products to Pacific Rim markets. This coal-export program was facilitated by a complex financing plan for construction of the Seward Coal Terminal, which is owned and operated by SUNEEL ALASKA CORPORATION, a subsidiary of SUNEEL SHIPPING COMPANY, LTD. A partnership between the State of Alaska, the Alaska Railroad, the City of Seward, the Republic of Korea's Ministry of Energy Resources, the Korea Electric Power Company (KEPCO), and the USIBELLI COAL MINE arranged for a \$21-million loan through the Chemical Bank of America to support construction of the facility. The port and upland facilities at Seward will handle over 800,000 tons of coal/yr from the USIBELLI COAL MINE at Healy. In anticipation of the development of other coal or bulk-material exports, the terminal is designed to handle 3 million tons of material annually. Eleven million tons of USIBELLI coal are scheduled to move through Seward to Korea during the 15-yr contract period (Suneel Alaska Corporation, 1984).

Vessels of up to 120,000 dead-weight tons can dock at Seward, where the harbor has been dredged to 60 ft. The project obtained a 55-yr lease from the Alaska Railroad for the onland infrastructure, and project components include a new railroad spur, a receiving hopper system, an extensive conveyor-belt system, junction towers, rail shakers, a stacker reclaimer named 'Big Dipper' (fig. 18), a sophisticated dust-control system, a spray fire-fighting unit, and an 1,800-ft-long trestle system. The stockpile capacity is 120,000 tons, and unit trains are unloaded at a rate of 3,000 tons/hr. SAMSUNG HEAVY INDUSTRIES, COMPANY, LTD., and PERATROVICH, NOTTINGHAM, AND DRAGE, INC., designed the Seward Coal Terminal; SAMSUNG manufactured the heavy machinery.

Plans by a Fairbanks group (JARVIS COAL COMPANY) to develop the Jarvis Creek coal field south of Delta Junction in the eastern interior region progressed during 1984 (fig. 19). Last year, a federal coal lease was finalized and an EIS statement was completed. In 1984, the Federal Defense Agency

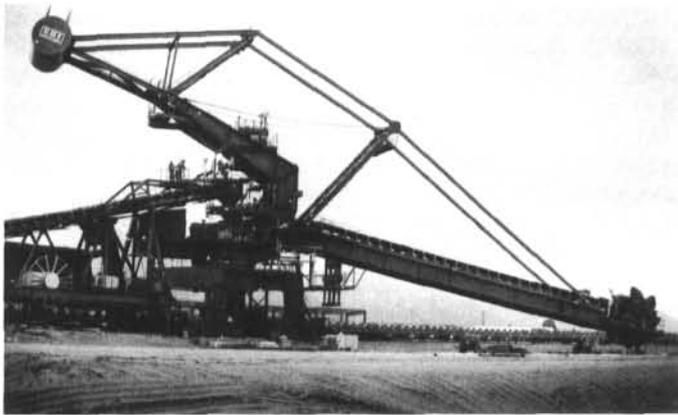


Figure 18. Stacker reclaimer at Suneel-operated Seward Coal Terminal. Photograph by Carole Jaffa, 1984.

announced that the Fort Greely power plant will convert to coal, and negotiations for a coal supply are presently underway with the JARVIS COAL COMPANY. A production startup date of 1986 or 1987 is projected. The Copper River Valley Cooperative in Glennallen is also considering converting their oil-fired power plant to coal, which may provide another market.

DIAMOND ALASKA COAL COMPANY, a subsidiary of the DIAMOND SHAMROCK CORPORATION, continued work on marketing steam coal from its Beluga coal-field leases. Test results from a bulk sample taken in 1983 showed that the coal was clean burning and easy to fire and performed extremely well in electrostatic-precipitator tests. Field activity



Figure 19. Jarvis Creek coal project near Fort Greely, Alaska. Photograph by R.D. Merritt, 1984.

on the Beluga leases was minor in 1984, with some on-going environmental baseline studies and revegetation of the bulk-sampling site. In September 1984, DIAMOND ALASKA entered into a joint feasibility study with the Electric Power Development Corporation (EPDC) of Japan; the study will be completed in 1985. DIAMOND ALASKA has identified 350 million short tons of recoverable coal for development in the initial mining unit.

In 1984, PLACER U.S. established a road route, identified borrow pits, and filed right-of-way applications for its coal leases in the Beluga coal field. PLACER U.S. also met with EPDC and the NISSHO IWAI CORPORATION (Japan) to study a means of developing and marketing Beluga coal.

Mineral production in 1984

Introduction

The value of Alaska's 1984 mineral production is estimated at \$199.4 million, a decrease of 6 percent from adjusted 1983 levels (table 5). The leading minerals were sand and gravel (\$95.0 million), gold (\$63.0 million), coal (\$23.8 million) and building stone (\$16.0 million). The collective value of tin, platinum, silver, and antimony decreased about 50 percent from 1983 levels; overall metals values declined 8 percent because of falling commodity prices. Principal gold, coal, and industrial-mineral mines and quarries are shown in figure 20.

This report uses production statistics from 196 DGGS questionnaires returned by private companies and individuals and from personnel with the U.S. Bureau of Mines, the U.S. Geological Survey, the Alaska Railroad, and the University of Alaska. Knowledgeable individuals were also consulted. Historic production levels for gold, sand and gravel, and coal are compiled in figures 21, 22, and 23. Because virtually all information is provided voluntarily, the totals for 1984 mineral production (tables 5 and 6) are probably conservative.

Coal and peat production remained about the same as or slightly higher than 1983 levels; however, most other commodities showed production fluctuations (table 5). Although aggregate use increased in Alaskan urban areas, sand-and-

gravel output dropped 11 percent from 1983, partly because of a decline in construction activities in the North Slope oil fields. Antimony prices in 1984 more than doubled from previous years because of the increased use of antimony in fire retardants and in other industrial applications; primary markets appear to be manufacturers in Belgium and West Germany. Spot-market prices for antimony rose to as much as \$7/lb in late 1984, and several selected high-grade shipments of stibnite ore (antimony sulfide) from interior Alaska were purchased by various buyers. The value of antimony production shown in table 5 is probably conservative because it is based on the average 1984 price level. Small amounts of silver were produced as byproducts of placer-gold mining and from hard-rock ore. Minor amounts of platinum were produced during development activities in the southwestern region of Alaska. Approximately 225,000 lb of tin were recovered from nearly 300,000 lb of cassiterite concentrate, but lower tin prices dropped values significantly below 1983 levels.

Approximately 280 large and small placer mines employed about 1,700 people between April and November. At least 550 people were seasonally employed by sand-and-gravel and building-stone operators. At least 75 people were involved in small-scale extraction activities at hard-rock jade, mercury, and antimony mines, and the USIBELLI COAL COMPANY employed 115 people at Healy. Therefore, at least 2,580

Table 5. Reported mineral production in Alaska, 1982-84.^a

Metals	Volume			Value ^b		
	1982	1983	1984	1982	1983	1984
Gold (oz)	174,900	169,000	175,000	\$ 69,960,000	\$ 67,600,000	\$ 63,000,000
Mercury (lb)	W	--	380	W	--	1,500
Antimony (lb)	--	22,400	135,000	--	25,000	225,792
Platinum (oz)	W	W	W	150,000	100,000	W
Silver (oz)	22,000	33,200	20,000	198,000	332,000	159,000
Tin (lb)	198,000	215,000	225,000	1,365,000	1,100,000	400,000
Subtotal				\$ 71,673,000	\$ 69,157,000	\$ 63,786,292
Industrial minerals, coal, and peat						
Jade and soapstone (ton)	W	2.3	5.5	W	42,000	16,500
Sand and gravel (mt)	45.0	50.0	27.0	91,000,000	105,000,000 ^c	95,000,000
Building stone (mt)	3.4	5.3	2.7	15,600,000	20,000,000	16,000,000
Subtotal				\$106,600,000	\$125,042,000	\$111,016,500
Coal (ton)	830,000	803,000	849,161	18,000,000	18,000,000	23,775,000
Peat (yd ³)	10,000	15,000	125,000	150,000	200,000	859,375
Subtotal				\$ 18,150,000	\$ 18,200,000	\$ 24,634,375
Total				\$196,423,000	\$212,399,000	\$199,437,167

^aProduction data from DGGs questionnaires, interviews with mine operators, U.S. Bureau of Mines data, and confidential information.

^bAverage price of gold in 1984 assumed \$360/oz, silver \$7.60/oz, antimony \$1.65/lb, coal (FOB Healy) \$28/ton; other values of mineral production were supplied directly by mine operators.

^cOriginal 1983 figures adjusted by August 1984 U.S. Bureau of Mines release.

W = withheld

mt = million short tons

people were employed in mineral-production activities during 1984; a significant percentage of those involved in seasonal gold mining depend on that work for their total annual income.

As in past years, gold and byproduct-silver production are difficult to estimate. Sources of information used to estimate placer-gold production include a) conversations with 15 consultants familiar with mining activities statewide, b) DGGs questionnaires that include production data from 48 mechanized placer mines, c) information from DGGs and DOM personnel working in placer-mining regions where they obtained data from about 40 operations in four of the seven regions outlined in this report, d) company news releases and annual reports to stockholders, and e) estimates of total gold bullion received by several refiners of Alaskan placer gold.

About 250 mechanized placer mines (table 6) and 25 to 30 recreational-mining ventures produced at least 175,000 oz of gold and nearly 20,000 oz of silver in 1984, an increase of 3.5 percent from 1983. Within the error limits of this survey, gold production probably remained at the same level as last year despite a 15-percent drop in the number of operators from 1983. Activity levels in the districts fluctuated in 1983 and 1984 as a result of weather conditions, reserve depletion, equipment failures, regulatory problems, and the declining price of gold. The 12-percent drop in the average price of gold and silver from January 1, 1984, to January 1, 1985, is probably the major reason for the decline in the number of mecha-

nized operations. Many 1983 operators who did not operate in 1984 had low-tenor ground and high operating expenses and could not survive gold prices that plunged to below \$350/oz by mid-season. Although the inactivity of these operations is significant in terms of employment and supplyside activities, total gold production did not substantially decrease. The greatest decreases in activity occurred in the Livengood, Circle, Porcupine, and Nyac areas; all decreases (except in the Nyac area) were primarily attributed to either exhaustion of reserves or low gold prices. Many 1984 operators improved their recovery methods and substantially increased production to offset decreasing gold prices.

Controversial water-quality issues continue to plague the placer-mining industry. In December 1984, the 9th U.S. Circuit Court of Appeals reversed Environmental Protection Agency action on 170 placer-mining permits issued in 1977. The 1977 action ordered monitoring of the 5-yr permits, but did not set standards for arsenic and mercury. G.M. Zemansky and the Trustees for Alaska opposed these permits, and the federal court ruled in their favor. Natural arsenic and mercury commonly occur with gold mineralization associated with placer deposits in interior and southwestern Alaska. Hence, naturally high mercury-arsenic concentrations occur in streams and ground water in these areas. The total effect of this court decision on the placer industry is not clear at this time.

Complex regulatory and legal issues continue to delay development in the Nyac district of southwest Alaska. For

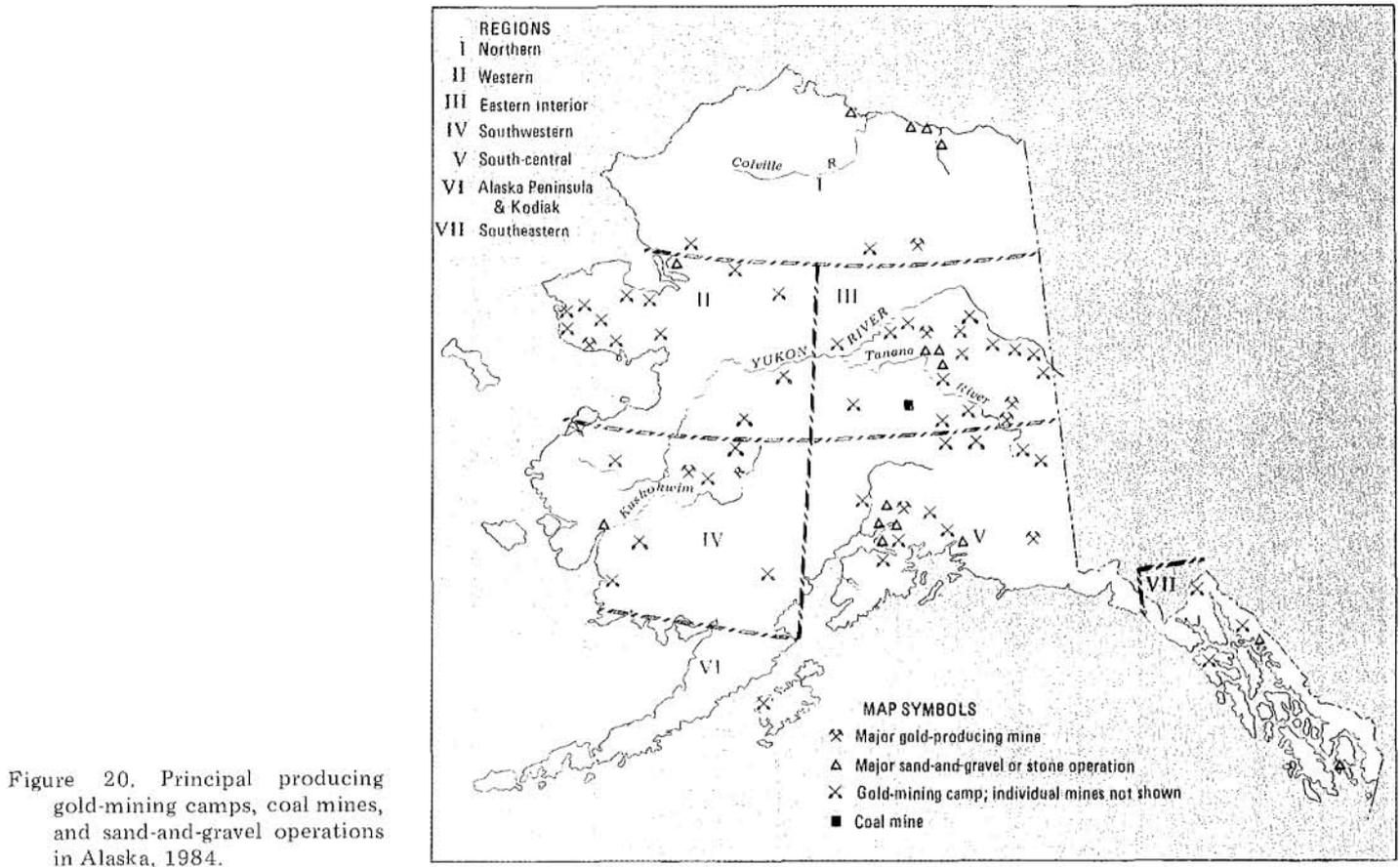


Figure 20. Principal producing gold-mining camps, coal mines, and sand-and-gravel operations in Alaska, 1984.

nearly 2 yr, Tuluksak village community leaders opposed the activities of the NORTHLAND DREDGING COMPANY in the Tuluksak River drainage. The company operates a floating bucket-line dredge 40 mi upriver at Nyac. The Tuluksak River was mined by dredges and mechanized operations from 1925 to 1964, and mining activities resumed in 1981. According to local communities, the mining activity not only damages their salmon resource; they also claim that the mining company does not employ local people. Joe Fisher, operator for NORTHLAND DREDGING, responded that his 20 seasonal employees, including several from a local village and Bethel, work in the company powerhouse as well as on the dredge. Fisher also maintains that \$250,000/yr was invested in the local economy when the dredge was in operation. The company may not resume operations because of local anti-development feelings that now plague the project.

Large, permanent federal-land withdrawals that encompass almost 175 million acres of Alaska and state land-use plans for some of the remaining areas continue to complicate mineral-resource exploration and development. Many state land-use plans currently in review address access, types of use, time limits, and restrictions or bans on mineral entry. Final land-use decisions can result in primary-, secondary-, and incompatible-use designations in contrast to broad multiple-use concepts. Proposed plans for the White Mountain National Recreation Area and the Steese National Conservation Area pose a potential threat to the placer-mining industry in the

Circle mining district north of Fairbanks. Both plans may seriously curtail placer mining in the Chatanika, Nome, and Birch Creek drainages, and most miners hope that regulations in these and other state plans can be changed.

Forecasts for 1985 and for future mineral output will be influenced by local and federal environmental regulations, state and federal mineral policy, world mineral-commodity prices, statewide construction levels, and exhaustion or development of old and new reserves. Most DGGs questionnaire respondents indicated that their exploration and production levels will be reduced in 1985. As predicted in the 1983 report (Bundtzen and others, 1984), sand-and-gravel consumption decreased somewhat in 1984 because new techniques used for runway and pad construction on the North Slope require less aggregate. However, high levels of aggregate use in the Prudhoe Bay area will continue as the smaller petroleum fields are developed. Lower oil prices and decreasing state revenues are expected to continue in 1985, which will cause a leveling off or decline in sand-and-gravel production in urban areas. Building-stone production may follow a similar trend.

Both the price of gold and water-quality issues will significantly affect placer-gold-mining activities. Some loss of production will result from gold prices of \$300/oz or lower. Additionally, reserve depletion is occurring in some areas, and although new areas have been successfully explored, short-term loss of production has not been replaced. If solutions are not reached on water-quality standards, the Alaska placer-

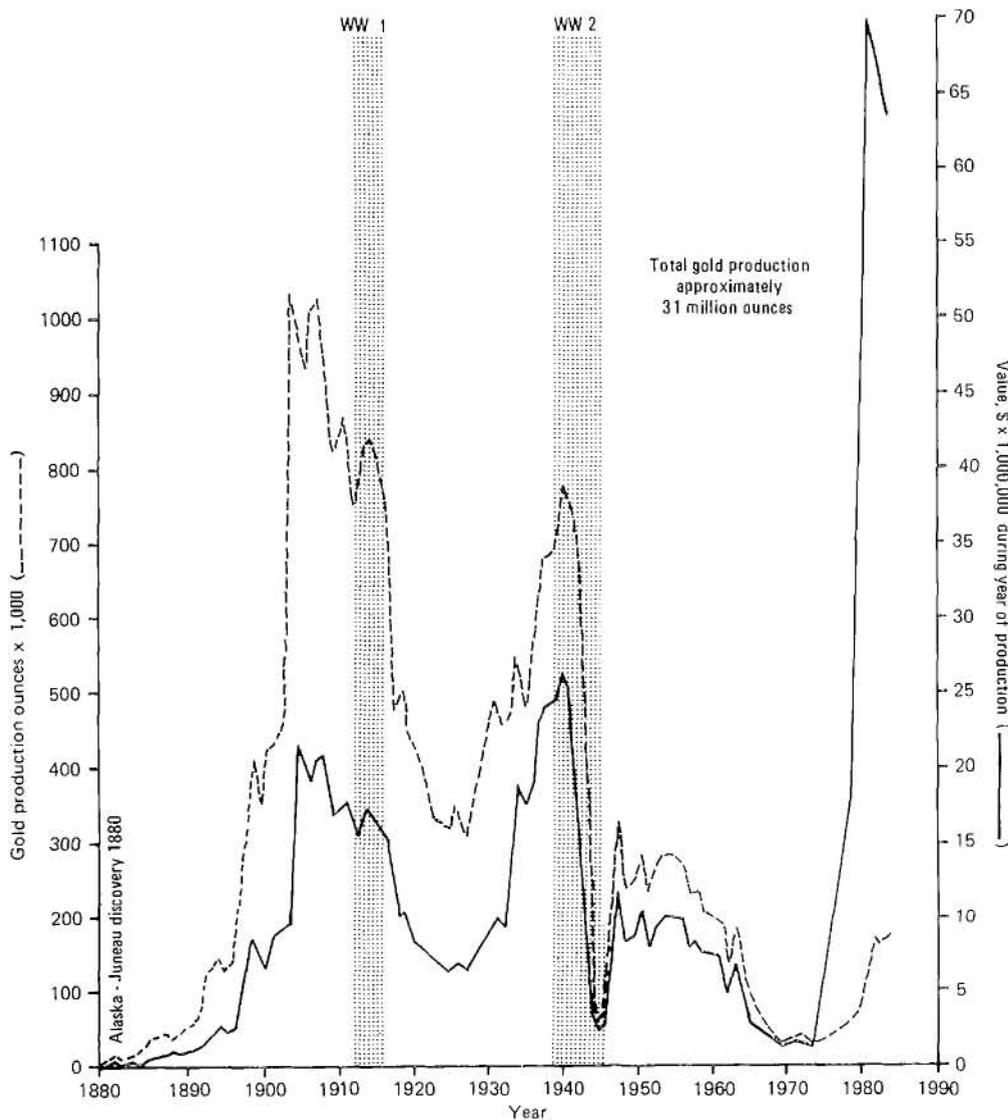


Figure 21. Gold production in Alaska, 1880-1984.

mining industry may be drastically reduced in size and importance.

Metal commodity markets continue to be depressed despite a nationwide economic recovery and significantly increased consumption of metals during 1984. Some mineral economists (Prechter, 1984) believe that the United States economy is midway through a 6-yr deflationary cycle that began in 1981. Prechter predicts that commodity prices should resume an upward trend in the late 1980s, coincident with the planned hard-rock production schedules of Red Dog, Greens Creek, and Quartz Hill.

Coal may have a bright future in Alaska. The 1984 production rate from Healy will double by 1986 because of exports to Korea; these activities demonstrate the feasibility of exporting coal to Pacific Rim markets. Advanced exploration and predevelopment engineering studies are being conducted on several coal projects in interior and south-central Alaska. Cape Beaufort and Chicago Creek are the sites of state-supported coal-drilling projects and feasibility studies.

Metals

Northern region

At least 20 placer miners recovered 15,000 oz of gold and 1,500 oz of silver, nearly double the 1983 output. CHANDALAR DEVELOPMENT CORPORATION did not resume hard-rock gold mining at the Little Squaw Mikado vein system (Chandalar Lake); this project has been inactive since 1982. Lode production may resume if additional reserves are found in the largely unexplored vein system. Regionwide placer production increased because water conditions improved dramatically and new reserves were developed. Most production occurred on Emma, Linda, Vermont, Archibald, and Nolan Creeks near Coldfoot, and on Davis and Grubstake Creeks near Bettles in the historic Wiseman mining district.

TIMBER CREEK MINING developed and produced gold from placer deposits on Weise and Timber Creeks 10 mi north of Klery Creek in the western part of the Kobuk mining

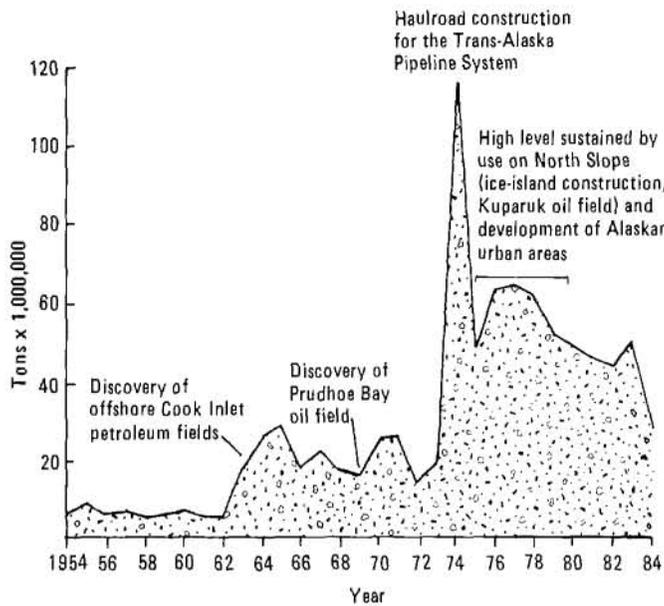


Figure 22. Sand-and-gravel production in Alaska, 1954-84.

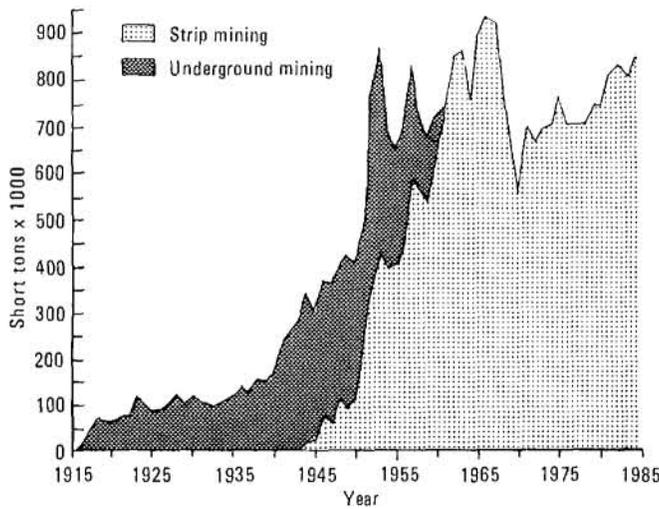


Figure 23. Coal production in Alaska, 1915-84.

district. Much of the 1984 effort concentrated on construction of settling ponds and extensive repair of the company airstrip.

Western region

About 30 placer mines produced an estimated 36,000 oz of gold and 5,500 oz of silver, a slight decrease from 1983. Poor weather and mechanical breakdowns contributed to production losses at several mines.

As in past years, the largest producer was the ALASKA GOLD COMPANY, which usually operates two dredges at

Table 6. Gold production in Alaska by region and district, 1984.

Region and district	Mechanized 1984 operators	Production (troy oz)
Northern Chandalar Shungnak Koyukuk-Nolan	20	15,000
Western Nome Kougarok Koyukuk-Hughes Port Clarence Fairhaven Ruby Solomon Koyuk Council	30	36,000
Eastern Interior Circle Livengood-Tolovana Fairbanks Fortymile Manley-Eureka Richardson Bonnifield Kantishna Rampart	140	70,400
South-central Cache Creek Nizina Chistochina Valdez Creek Kenai Peninsula Nelchina	35	37,500
Southwestern Innoko-Tolstoi Iditarod-George River Moore Creek Nyac Crooked Creek Lake Clark-Mulchatna	23	16,000
Southeastern and Alaska Peninsula	2	100
TOTAL	250	175,000

Nome and one at Hogatza near Hughes. Dredges No. 5 (fig. 24) and No. 6 at Nome were in full operation, but the Hogatza dredge was inactive because of difficulties that included water-quality-permitting problems. Dredge No. 5 operated for 148 days, from May 29 to October 24, with a short shutdown due to temporary loss of pond water midway through the season. Dredge No. 6 operated from May 29 to November 12, the longest season for either Nome dredge since 1964. The Nome dredges primarily process virgin ground that requires extensive thaw-field drilling and ground preparation. The

Hogatza dredge mined both previously processed, clay-rich tailings and new ground at a ratio of about 1:1. The water-quality issue may be mitigated for future operation at Hogatza; at least 20 settling ponds have been used at the site in past years. According to Dennis Campian, manager of ALASKA GOLD, INC., (Nome), the operations have generally been successful in the past 2 yr, but the company is anxiously following gold prices. About 110 people were employed at Nome, and 14 people were seasonally employed at Hogatza, primarily in development and exploration activities.

The ENGSTROM, TWEET, and PETERSON families continued to operate small-capacity ($1\frac{1}{2}$ to $2\frac{1}{2}$ ft³) floating bucket-line dredges in Quartz and Henry Creeks and in the Council and Kougarok areas, respectively. AU MINING leased ground from the RHEINHART BERG - THOR WETLESEN PARTNERSHIP and had a good season in the Candle mining district on the Seward Peninsula. The LINFORS - READER PARTNERSHIP did not report any production on Dome Creek in the Nome area because of mechanical difficulties and economic factors. However, some gold was taken from their Iron Creek properties in the Pilgrim River drainage. CONRAD HOUSE mined gold on Swift Creek in the Ruby mining district, but spent considerable time building or repairing settling ponds and repairing equipment. YUKON MINING COMPANY developed and produced gold in the Illinois Creek area of the Kaiyuh Hills. ROSANDER MINING COMPANY mined at Colorado Creek north of the Cripple Mountains, and DEGAN MINING COMPANY operated a mine on Madison Creek in the Tolstoi mining district. A partnership headed by DOUGLAS SHERRER (McGrath) developed deep ground with drifts and shafts on Boob Creek (Tolstoi mining district) and recovered a modest amount of gold during development activities. They plan additional underground drifting and preproduction activities during 1985.

LOST RIVER MINING continued to operate their placer-tin mine at Cape Creek on the western Seward Peninsula. The mining venture strips about 35 to 40 ft of overburden to process 3 to 6 ft of gravel that overlies bedrock. Although 10 men recovered over 300,000 lb of cassiterite concentrate, the highest production in recent years, the overall production value decreased because of declining tin prices.

Eastern interior region

The eastern interior region produced about 70,500 oz of gold and 10,000 oz of silver, or about 40 percent of the total statewide gold production. This is a 16-percent decrease from 1983. Overall lower gold prices, exhaustion of immediate reserves, and water-quality restrictions took their toll on the region's production, and at least 14 mining operations that operated in 1983 shut down in 1984. As shown in the development section of this report, some new reserves were delineated.

The Circle mining district continued to be Alaska's largest placer district and accounted for about half the 1984 production in the eastern interior region. The number of mechanized operations decreased because of rapid exhaustion of mineralized ground in this crowded district. Reserves on Nome Creek and on other drainages are being mined out, but almost all questionnaire respondents indicated they were maintaining ongoing exploration efforts with a special emphasis on en-

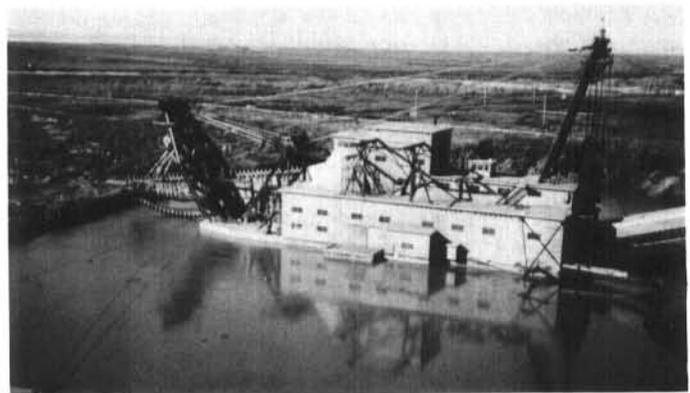


Figure 24. Alaska Gold Company Dredge No. 5 near Nome, Alaska. Photograph by J.T. Kline, 1981.

hanced gold-recovery technology. In particular, the largest and most successful operations, including GOLD DUST MINES, GREENHORN MINING, and GHD RESOURCES, are attempting to improve fine-gold recovery by using more sophisticated recovery techniques.

Placer mining in the Fortymile mining district continued at about the same level as previous years. Principal producers include ALBETT MINING and AURUM PHILOSOPHUM, INC., on Chicken Creek and ROYANN MINING and KAVIC MINING, INC., on Jack Wade Creek. Bench-gravel deposits are being developed and explored to increase reserves. Some operators of small suction dredges complained about water quality in the Fortymile River; they contend that the larger mechanized mines cause excessive siltation that hinders their operations.

Placer mining activities increased somewhat in the Rampart and Manley areas after a poor performance in 1983. Successful producers include HOOSIER CREEK MINING COMPANY on Hoosier Creek and THANKSGIVING MINING COMPANY on Thanksgiving and Slate Creeks.

At least 14 operations produced placer gold in the Fairbanks mining district in 1984, four less than in 1983. The largest and most successful producers include EARTH-MOVERS, INC., which operates out of their large pit near Ester; EVECO, INC., which produces placer gold as a by-product of sand-and-gravel mining near Fox; and the LAST CHANCE MINING COMPANY on Fish Creek, a tributary of Fairbanks Creek. GREATLAND EXPLORATION is drilling a deeply buried placer on Little Eldorado Creek, a tributary of Goldstream Creek. CHENA MINING expects to resume production in 1985 in the upper Chena River drainage after they complete a successful development stage on their East Fork claims. Following a year of inactivity, a small amount of placer gold was mined by HIGH BENCH PLACERS in the Richardson mining district near Delta.

The Bonnifield mining district in the Alaska Range continued to produce gold bullion at levels established in previous years. Mining operations were conducted on Grubstake, Eva, California, Iron, Long, Moose, and Daniels Creeks. Poor recovery of fine 'glacial' gold has been a recurrent problem in many operations. Improved techniques for fine-gold recovery could dramatically improve the economic viability of placer ground in this historic district.

At least 17 operations in the Kantishna mining district produced about 7,500 oz of gold, almost the same as that produced in 1983. Moose, Eureka, Glacier, Caribou, Glenn, Spruce, and Rainy Creeks were the principal producers. Of note is the recovery of 91-oz and 28-oz nuggets from a mining operation in the western part of the district. The former is believed to be the fifth largest nugget discovered in Alaska.

No tin production was recorded from Tofty or the Tozimoran area near Tanana.

Antimony ore made its way to the European market from several interior Alaska mining sites. High spot-market prices in Europe resulted in two shipments from the Fairbanks mining district and one from near Eagle Summit in the Circle mining district; all were small lots that contained at least 50-percent stibnite. HCA INTERNATIONAL (Sarasota, Florida) indicated that a mining crew was employed to conduct underground development work at the Sawtooth antimony-lode deposit west of Livengood, and work on this property is said to be in progress.

Southwestern region

Twenty-four placer mines in the southwestern region recovered at least 16,000 oz of placer gold, an apparent 3-percent increase from 1983 levels despite the absence of recorded production from the Nyac mining district. Several larger operations in the Iditarod, Crooked Creek, and Innoko mining districts had good seasons, and new ground was broken on Granite, Deadwood, and Taylor Creeks in the central Kuskokwim Mountains. The most successful operations include the MAGNUSON MINE on Ganes Creek (Innoko mining district), the MISCO-WALSH MINE (Miscovich) on Otter Creek (Iditarod mining district), and the LYMAN OPERATION at Snow Gulch in the Crooked Creek area. Miscovich is also attempting to market tungsten(scheelite)-gold concentrates collected by placer sluicing and beneficiation of hard-rock ore from the Golden Horn shear zone at Discovery Creek (Iditarod mining district). FLAT CREEK PLACERS, long-time producers on Happy Creek in the Iditarod mining district, spent most of 1984 developing reserves on Chicken and Flat Creeks and the Willow Bench near Flat. ALASKA CONSTRUCTION AND MINING began stripping operations at Deadwood Creek after temporarily halting production at their ground on Moore Creek. L.E. WYRICK started production on Granite Creek in the remote headwaters of George River. The WILMARTH BROTHERS continued their operations on Julian Creek (also a tributary of George River).

The NORTHLAND DREDGING operation did not resume production from their rebuilt 3-ft³ dredge on the Tuluksak River. The activities of the TULUKSAK DREDGING COMPANY, which has been operating a dredge in the Nyac area since 1973, are unknown.

JIM WYLLIE operated the Mountain Top Cinnabar Mine in the Sleetmute-Oskawalik area and recovered a small amount of mercury using retort techniques.

South-central region

At least 20 placer-mining operations recovered 37,500 oz of gold and 4,500 oz of silver from the south-central region, an increase of over 75 percent from 1983. Virtually all increased production can be attributed to the mining operation on

Valdez Creek near the Denali Highway. During 1983, WGM, INC., operator for CAMINDEX MINES, INC., successfully developed a series of deeply buried, superimposed paleo-placer channels (fig. 25). In 1984, an estimated 19,859 oz of placer gold (average fineness 852) were recovered from about 160,000 yds³ of pay gravel; stripping totaled about 800,000 yds³, a waste-ore ratio of about 5:1 (Bressler and others, 1985). Average grade is 0.105 oz/yd³ gold and 0.018 oz/yd³ silver with an average 1984 value of about \$38/yd³ for all sluiced material. The open-pit operation used a 1,500-yd³/day washing plant that incorporated a 40-ft-long, 5-ft-wide standard sluice box equipped with Hungarian riffles. At least 49,000 oz of similar-grade reserves remain, which assures future production from these properties. Seventy people were employed at the mine site from April to October. The Valdez Creek Mine was apparently the largest single gold producer in Alaska in 25 yr. (Specific exploration and development components of this project are described in the development section of this report.)

Other important placer-gold-producing mines include NELCHINA MINES, INC., (A.L. Renshaw) on Yako Creek in the Nelchina mining district; FORTUNE MINING COMPANY in the Hatcher Pass region; J AND S MINING COMPANY and K AND K MINING COMPANY in the Cache Creek mining district; and JONES AND COMPANY near Sexton in the Sunrise mining district. Operating levels during 1984 for some former significant producers such as TALMO, INC., in the Wrangell Mountains or RANCHERS EXPLORATION AND DEVELOPMENT - HECLA properties in the Chistochina mining district are unknown.

Questionnaire returns were again numerous from suction-dredge operators on the Kenai Peninsula. This enthusiastic group of miners includes BUCY ASSET MANAGEMENT II and OUTSIDER MINING on Canyon Creek, DIANNE HALL on Resurrection Creek, and GAEDE AND LINDMAN DREDGING at Heaven's Gate.

DAN RENSHAW and GOLD CORD DEVELOPMENT CORPORATION again drove underground drifts and searched for faulted portions of the Gold Cord vein at Hatcher Pass. ENSERCH, INC., temporarily halted activity on the gold lodes at the Independence Mine in Hatcher Pass.



Figure 25. SUM Resources placer operation on Valdez Creek in Denali mining district, south-central Alaska. Photograph by Jason Bressler, 1984.

Southeastern and Alaska Peninsula and Kodiak regions

Very little production occurred in southeastern Alaska and the Alaska Peninsula and Kodiak regions. A few ounces of gold were recovered by suction-dredge operators in the Haines mining district. JOHN SCHNABEL began operating his mechanized washing plant at the mouth of Porcupine Creek, but work was suspended due to court litigation on claim ownership. Small amounts of gold were produced during bulk testing of Yakataga beach sands by CUSAC RESOURCES (Canada). Suction dredges recovered modest amounts of gold from beach sands on Kodiak Island.

Gold production could increase rapidly if plans to process tailings on Chichagof Island and at Juneau are realized; development of beach sands at Yakataga may also be promising.

Industrial minerals

The value of industrial-mineral production totaled over \$111 million during 1984, a decrease of 11 percent from an adjusted level of \$125 million in 1983 (table 5).

Although U.S. Bureau of Mines earlier figures for sand-and-gravel production in 1984 showed a significant decrease from 1983, recent DGGs questionnaires and phone canvasses indicate that aggregate production in Alaskan urban areas increased in 1984. However, some decrease in North Slope production is evident. The volume of sand-and-gravel production in the last several years has probably been overestimated (table 5).

Statewide use of sand and gravel and building stone continued to be concentrated in the North Slope oil fields and in Alaska's four largest urban areas: Anchorage, Fairbanks, Juneau, and Ketchikan. For the first time in nearly a decade, gravel use in the Anchorage metropolitan area nearly equaled that of the North Slope, which reflects a building boom and rapid urban growth in south-central Alaska. However, much construction is being funded by state revenues derived from North Slope oil production, and with the decreased revenue projections for 1985, a leveling off of sand-and-gravel use in urban Alaska is expected.

Fill continues to be the primary use of gravel (85 to 92 percent by volume), followed by concrete aggregate (4 to 5 percent), asphaltic concrete (3 percent), road base and covering (2 percent), and snow-and-ice control and gunnite (4 percent).

Portland cement was produced by grinding imported clinker in Anchorage, and agricultural limestone was mined on the Kenai Peninsula. Building stone was quarried at several locations statewide for structural materials.

Northern and western regions

Respondents interviewed by telephone indicated that sand-and-gravel use on the North Slope and in western Alaska decreased slightly from 1983, but production of at least 12.6 million tons (about 45 percent of the sand and gravel used statewide in 1984) was realized. The principal use continues to be infrastructure development associated with the Kuparuk, Milne Point, and Duck and Seal Island oil fields in the nation's most northern petroleum province. ARCO ALASKA, INC., the largest producer and consumer of sand and gravel, continued pad-and-pipeline assembly at Kuparuk. SHELL OIL'S

primary use of sand and gravel was construction of gravel islands for their Seal Island field. CONOCO, SOHIO, and the NORTH SLOPE BOROUGH were the other major producers and consumers of aggregate. ARCO ALASKA, INC., is seeking U.S. Army Corps of Engineers permits to allow construction of a 121-acre gravel pit east of drill-site 3B in the Kuparuk River oil field. The nearly 7.5-million-ton reserve would be used to construct a central processing facility and related infrastructure. SHELL primarily uses gravel for island construction in the Beaufort Sea. Wayne Simpson (SHELL OIL) indicated that from 280,000 to 1,400,000 tons of aggregate have been used for each gravel island depending on water depths, which have varied from 5 to 30 ft.

HERBERT (IVAN) STEWART mined jade boulders from his Jewel Jade claims on Dahl Creek near Kobuk and on Promise Creek on the Shungnak River. Mining activities consisted principally of winching large boulders from the flood plain. The boulders are sawed in the field and later flown to Anchorage where they are used for high-quality jewelry products. The region's remoteness is a limiting factor in the operation.

NANA REGIONAL CORPORATION also mines jade and operates a shop in Kotzebue; the handcrafted jade is marketed throughout the United States and Europe.

Eastern interior region

Seven major pits and more than six smaller operations produced 1.65 million tons of aggregate, an apparent increase of over 60 percent from 1983. The chief producer continues to be FAIRBANKS SAND AND GRAVEL, which baled pit-run aggregate using a 4½-ft³ bucket-clam dredge on a state lease on the Tanana River flood plain. Other significant producers include EARTHMOVERS, INC., H & H CONTRACTORS, WARREN TRUCK AND TRACTOR, EVECO, INC., and INTERIOR EXCAVATION; all mine a blend of either pit-run aggregate from modern flood-plain deposits or placer-mine tailings in the Fox, Goldstream, and Ester areas. EVECO, INC., (Fox) employed a sophisticated washing plant equipped with a spiral concentrator and produced several sizes of aggregate as well as a substantial quantity of placer gold (fig. 26).



Figure 26. EVECO, Inc., gold and sand-and-gravel washing plant with spiral concentrators, Fox, Alaska. Photograph by R. Frawley, 1984.

The CARROLL-VONDRA PARTNERSHIP (YUTAN CONSTRUCTION COMPANY) again operated the BROWN'S HILL QUARRY near Badger Road, east of Fairbanks. An estimated 600,000 tons of basalt were produced for use as riprap, road metal, crushed fill, and ornamental stone. The company also processed small amounts of pit-run gravel. The 10-percent increase in production from the previous year is attributed to a large contract that extended seasonal operations through January 1985; hence, mining occurred for 8 rather than 5 consecutive months. About 15 people were employed at the quarry in 1984.

The Chena Lakes Recreation area, managed by the Fairbanks North Star Borough Parks and Recreation Department, was officially opened in 1984. This popular lake-and-park recreation area, which attracted 50,000 visitors in 1984, was built from rehabilitated sand-and-gravel pits created during construction of the Moose Creek Dam in the late 1970s. The pits were contoured, landscaped, and stocked with land-locked salmon and trout after naturally filling with water (fig. 27).



Figure 27. Chena Lakes Recreation area, showing rehabilitated gravel pits near Fairbanks, Alaska. Photograph by T.K. Bundtzen, 1984.

Southwestern region

Available records indicate that only a few hundred tons of pebbly lag deposits were mined from point-bar deposits along the Kuskokwim River to meet demands for aggregate in McGrath, Bethel, and other river communities. Increased gravel production will depend on initiation of state-sponsored construction projects such as the proposed relocation or reconstruction of the City of McGrath's runway.

South-central region

A dramatic increase in aggregate production occurred in south-central Alaska, the state's largest population center. Construction projects funded by state revenues and the general growth in the Anchorage metropolitan area spurred these activities. At least seven large and 25 small pits produced 10.1 million tons of aggregate, an apparent increase of 106 percent from 1983. This production accounts for about 40 percent of all sand and gravel used in the state. Several operators estimated that the average price of free-on-board (FOB) gravel in Anchorage ranges from \$4.50 to \$4.90/ton and that the total value of aggregate production in south-central Alaska exceeded \$40 million.

Most gravel used in Anchorage was deposited in the Palmer-Wasilla area by meltwater streams on or adjacent to Pleistocene glaciers. Geologic maps by Daniels (1981a,b) and Reger (1981a-c) show the extent of many ice-marginal meltwater deposits.

Most gravel is shipped by unit train to Anchorage on the Alaska Railroad. Freight records for 1975-84 (Secretary of Transportation, 1984) show the level of gravel haulage (table 7). In 1984, about 6,537,000 tons of gravel were hauled from Palmer to Anchorage, a 49-percent increase from the previous record level of 1983. Pits operated by ANCHORAGE SAND AND GRAVEL accounted for just under half of the total rail haul, followed by ALASKA GRAVEL SALES, BIG LAKE SAND AND GRAVEL, STEPHEN AND SONS, and other companies.

The railroad operated eight 80-car unit trains daily to transport gravel during the heavy construction season. Last

Table 7. Major commodity tonnages hauled by Alaska Railroad, 1975-84^a (thousands of tons).

Fiscal year	Sand and gravel	Bulk petroleum	Coal	Other ^b	Total
1975 ^c	1	557	584	720	1,862
1976	104	624	607	853	2,188
1977	700	532	550	523	2,305
1978	727	374	593	484	2,178
1979	637	220	524	427	1,808
1980	396	252	590	503	1,741
1981 ^c	1,797	379	653	533	3,362
1982 ^c	2,754	439	654	656	4,503
1983 ^c	4,398	462	626	522	6,008
1984 ^c	6,537	498	642	595	8,272

^aModified from Secretary of Transportation (1984).

^bIncludes forest and agricultural products and manufactured goods.

^cIndicates years that line operated at a profit.

year, four GP-49 locomotives designed for heavy industrial hauls were acquired. Sand-and-gravel haulage accounts for about 20 percent of the railroad's total operating revenue. Mineral-based hauls—gravel, coal, and bulk petroleum—now account for over half of all operating revenue and 92 percent of all tonnage hauled on the Alaska Railroad. The sand-and-gravel and coal industries figure significantly in the last 4 yr of the railroad's profitability; the railroad was previously plagued by net-operating deficits. With a healthy mix of tourism and manufactured-goods and minerals backhauls, the historic Alaska Railroad (now state owned) should operate at a profit for years to come.

In addition to the rail haul, about 1,000,000 tons of aggregate were trucked from the Palmer and Eagle River areas to Anchorage. STEPHAN AND SONS also mined over 300,000 tons of aggregate from the Pioneer pit in Anchorage.

On the Kenai Peninsula, CENTRAL SAND AND GRAVEL produced over 50,000 tons of sand and gravel from their operation near Kenai. HOMER SAND AND GRAVEL screened, sized, and sold pit-run baled aggregate from their operation near Anchor Point. BRASS MONKEY RANCH sold modest amounts of sand and gravel to various users along the Edgarton Highway in the Copper River valley.

SUNRISE EXPLORATION SERVICES mined high-quality building stone from their quarry on the Hope Road off the Seward Highway. Granitic rock was quarried by the City of Valdez (subcontracted to a private operator) from a mine

6 mi east of the city. The rock was used to construct a seawall at the Port of Valdez.

Southeastern region

Four pits in the southeastern region reported 220,000 tons of sand-and-gravel production, primarily from stream-bed, pit-run material, for use in Ketchikan and Juneau. The value of aggregate in the southeastern region averaged \$3.44/ton in 1984. The largest producer continued to be HILDRE SAND AND GRAVEL (JUNEAU REDI-MIX, INC.); the company mined pits at Lemon Creek north of Juneau. The City of Ketchikan and two other operators of small pits in the region were responsible for other aggregate production.

KETCHIKAN REDI-MIX AND QUARRY, INC., mined 45,000 tons of basalt for shot rock (stated value \$1.70/ton), which matched levels established in previous years. Equivalent production levels are predicted for 1985.

Coal and peat

Principal coal fields in Alaska are shown in figure 28. The USIBELLI COAL MINE, the only major operating coal mine in Alaska, produced 849,161 tons of subbituminous coal from a dragline-strip-mine operation in the Late Miocene Suntrana Formation, Nenana coal field (fig. 29). Of this, 642,000 tons were shipped by rail to the Fairbanks area to use in power plants operated by the University of Alaska, the Fairbanks

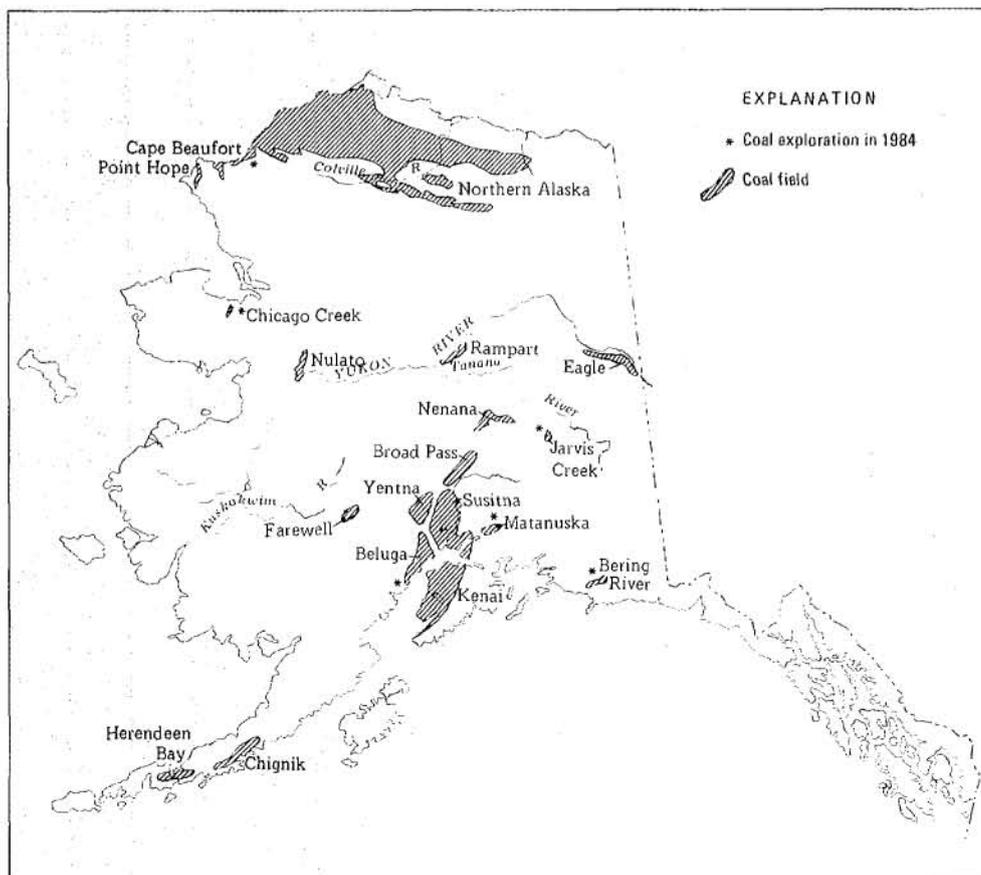


Figure 28. Principal coal fields in Alaska.

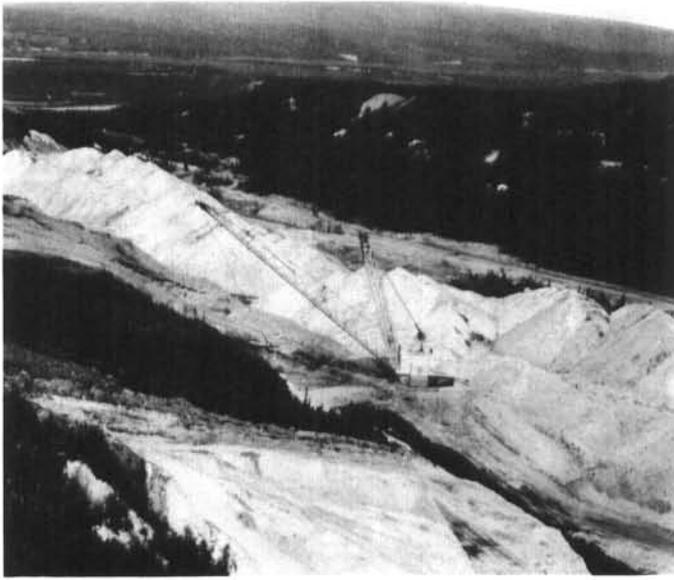


Figure 29. Ace-in-the-Hole dragline at Usibelli Coal Mine, Healy, Alaska. Photograph by R.D. Merritt, 1983.

Municipal Utilities System, and several military bases. About 12,700 tons were sold for individual space-heating needs and unspecified Alaska Railroad uses. The market breakdown for the Healy operation is summarized in table 8.

The shipment of USIBELLI coal to KEPCO represents an important new development in Pacific Rim trade. By the end of 1984, 36,790 tons of coal had arrived at Seward, and the loading of a 50,000-ton ore ship was underway, despite minor difficulties at the port facility. By late 1986, USIBELLI expects to increase its present production of 800,000 tons/yr to over 1.6 million tons/yr. More than 11 million tons of coal will be moved through the Seward Coal Terminal during the 15-yr contract period. Overall benefits include a direct boost to the Alaskan economy, improved trade relations with the Republic of Korea, and a pioneering effort between the public and private sectors in the mining, transportation, and energy industries. Specific data on the Seward Coal Terminal are described in the development section of this report.

At least 125,000 yds³ of horticultural peat valued at nearly \$860,000 were produced in Alaska in 1984, an ap-

Table 8. Market breakdown for 1984, Usibelli Coal Mine, Healy, Alaska.^a

Site location	Tons coal
Military power plants along rail belt (Clear, Eielson, Ft. Wainwright)	424,073
GVEA power plant (mine mouth, Healy)	163,104
Municipal Utilities System power plant, Fairbanks	153,299
University of Alaska	59,094
Local home heating and Alaska Railroad	12,795
Suneel shipments to Korea	36,796
TOTAL	849,161

^aInformation provided by George Lightwood, Usibelli Coal Mine, Healy, Alaska.

parent enormous increase from previous years. However, peat production has been significantly understated in previous DGGS - OMD surveys. Chief producers continue to be three large distributors in the Anchorage area: GORDER EXCAVATING, A AND A SERVICES, and NORTHWEST LANDSCAPING. These companies collectively account for 80 percent of the statewide peat production. Peat producers in the Anchorage area sell a raw-peat product valued at \$3.50 to \$4/yd or a refined horticultural peat blended with sand and 'red' loam (a distinctive Anchorage area soil) valued at \$7 to \$10/yd. The red loam is a high-quality agricultural soil that is becoming quite scarce in the Anchorage area and is in high demand for use in blended peat products.

Three small and one large company continue to produce horticultural peat in the Fairbanks area. Their products are similar to those produced in Anchorage. GREAT NORTHWEST LANDSCAPING is the interior's largest producer. Peat continues to be evaluated as a potential energy or horticultural resource in several bush villages, including McGrath and Dillingham.

Drilling activity in 1984

Introduction

Contract drilling of placer, coal, and hard-rock deposits in 1984 totaled 330,700 ft. This represents a 35-percent increase in mineral drilling activity from an adjusted 1983 total of 245,500 ft. Contract placer drilling increased from 53,000 to 129,000 ft; coal drilling increased from 12,000 to 25,700 ft; and hard-rock drilling decreased slightly, from an adjusted 180,500 ft in 1983 to 176,000 ft in 1984 (table 9).

Although total footage for 1984 exceeded that of 1983,

the number of companies that conducted major drilling programs in Alaska decreased from 20 in 1983 to 17 in 1984 (table 10). A summary of drilling contractors active in Alaska in 1984 is presented in table 11.

Placer drilling

Contract placer drilling totaled 129,000 ft in 1984. Exploration drilling accounted for 31,000 ft and consisted primarily of reverse-circulation rotary, resonant, or sonic

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

The balance (98,000 ft) was from thaw-field drilling in which frozen placer gravels are drilled to bedrock to install thaw pipes. During the summer season, cold water is pumped into the thaw pipes and percolates back up through the frozen gravel, thawing the ground for dredging.

Low gold prices and new regulatory requirements may seriously affect placer-exploration drilling for operating mines and new projects. If the early-1985 gold price of \$300/oz continues through the year, the income of many operators may be less than the cost of mining.

Table 9. Mineral-drilling footage in Alaska, 1982-84.

	1982	1983	1984
Placer	124,000	53,000	129,000
Coal	80,000	12,000	25,700
Hard rock	200,000	180,500	176,000
Total	404,000	245,500	330,700

Table 10. Companies that conducted drilling programs in Alaska, 1984.

Alaska Gold Company	Noranda Exploration, Inc.
Anaconda Minerals Company	Noranda Mining, Inc.
Bear Creek Mining Company	Placid Oil Company
Chugach Alaska Corporation	Queenstake Resources
Cominco Alaska, Inc.	Ranchers Exploration and Development Corporation
Enserch Exploration, Inc.	Silverado Mines
GCO Minerals Company	SUM Resources
Houston International Minerals, Inc.	Valley Coal Company
Mohawk Oil and Gas, Inc.	

Table 11. Drilling contractors active in Alaska, 1984.

Alaska Drill Supply & Equipment Company Anchorage, Alaska	Exploration Supply & Equipment, Inc. Anchorage, Alaska	Sedcore Exploration, Ltd. Fairbanks, Alaska
Alsinco Fairbanks, Alaska	Hardrock Construction Ketchikan, Alaska	Skidmore Machine & Tool Company Fairbanks, Alaska
Ambler Explorations Anchorage, Alaska	Interstate Exploration, Inc. Anchorage, Alaska	Southeast Drilling Company, Inc. Ketchikan, Alaska
Arctic Resources Drilling, Inc. Anchorage, Alaska	Longyear, Inc. Anchorage, Alaska	Sprague & Henwood, Inc. Scranton, Pennsylvania
Boyles Brothers Drilling Company Anchorage, Alaska	M-W Drilling, Inc. Anchorage, Alaska	Thibideau Drilling Contractors Fairbanks, Alaska
Caron North American Anchorage, Alaska	NANA-Coates Diamond Drilling, Inc. Anchorage, Alaska	Thrasher & Associates, Inc. Nome, Alaska
Denali Drilling Anchorage, Alaska	Penn Jersey Wasilla, Alaska	Wink Brothers Drilling, Inc. Juneau, Alaska
Diamond Drill Contracting Company Anchorage, Alaska	Salisbury & Dietz, Inc. Spokane, Washington	

Coal drilling

Total footage for coal drilling in 1984 was 25,700 ft. Three projects had drilling programs: the Valley Coal project in the Wishbone Hill area of the Matanuska Valley; the Bering River coal project on CHUGACH ALASKA CORPORATION land near Cordova; and a state-funded project at Cape Beaufort in northwest Alaska.

As in 1983, no drilling occurred on the Beluga coal-field leases because the exploration programs of the two major leaseholders were completed in 1982. Leases in the Yentna coal field were not drilled.

Coal drilling is expected to decrease in 1985. Although the recent state lease sale in the Matanuska Valley resulted in the sale of three tracts, 1985 activity on these leases is expected to consist of surficial work with no significant drilling until 1986. A 17,000-ft drilling program that is planned for the Bering River project may constitute the bulk of 1986 coal drilling.

Hard-rock drilling

Total footage in 1984 for hard-rock drilling was 176,000 ft, 3 percent below the 1983 total of 180,500 ft. Over 75 percent of the footage was associated with detailed exploration of precious-metal deposits. Additional footage included completion of annual assessment requirements and limited additional exploration on base-metal or other mineral projects.

The 4,300 ft of geotechnical drilling that was done for the Red Dog project, including foundation drilling for the road, dam, and mill facilities, is not included in the total hard-rock drilling footage.

Over 38,000 ft of exploration drilling, including over 14,000 ft of diamond core drilling, was done on the Grant Mine property near Fairbanks. About 12,000 ft of surface rotary drilling was done to intercept near-surface vein systems,

and 12,000 ft of surface auger drilling was used to geochemically sample the bedrock interface below the deep soil horizon.

Continued low precious- and base-metal prices may trim exploration budgets, and hard-rock drilling footages may

fall in 1985. About 46,000 ft of exploration drilling is planned to explore extensions of the orebody at Greens Creek in 1985. However, little drilling is expected at Red Dog or Quartz Hill because reserves on these projects have been adequately delineated.

Alaska geologic materials center

In December 1984, DGGs and the U.S. Geological Survey established the Alaska GEOLOGIC MATERIALS CENTER in a 6,000 ft² renovated building at Eagle River (fig. 30). The facility is designed to collect, catalog, store, and study geologic materials in a central location. Before establishment of the Center, drill core from National Petroleum Reserve Alaska (NPRa) was stored by the Alaska Oil and Gas Conservation Commission (AOGCC), and mineral-exploration companies maintained private core-storage warehouses around the state. Now, nonproprietary drill core, records, and other materials are being transferred from the AOGCC and mining companies to the Center, where they will be permanently maintained by DGGs.

Soon after the GEOLOGIC MATERIALS CENTER opened in late 1984, it housed over 35,000 ft of NPRa drill

core from 68 test wells and 43 core tests, and 1,454 ft of core from the Navarin and St. George basins. Ditch cuttings and core chips from 660 wells and 49,000 thin sections of paleontologic, mineral, thermal alteration-kerogen, and vitrinite-reflectance specimens will arrive by May 1985. By the end of 1985, the Center is scheduled to acquire several thousand feet of diamond drill core from mineral properties in the Ambler and Nabesna districts, courtesy of KENNECOTT and ANACONDA MINERALS COMPANY.

All information, with a catalog of core and surficial samples, will be available for study by quadrangle. Geologic materials on hand are available for inspection.

The University of Alaska, Fairbanks, plans to develop a smaller core library; coordination between the two facilities is planned.



Figure 30. The Alaska Geologic Materials Center in Eagle River, Alaska, was established by the U.S. Geological Survey and DGGs in 1984.

The Alaska resources kit: minerals

The 'Alaska Resources Kit: Minerals' is an educational kit for use in Alaska public schools. It is designed to provide quality supplemental materials to students as they learn about the role of mineral-and-energy resources in society and in our everyday lives.

The kit was developed through a joint effort of the State Department of Education, the Mineral Information Institute and a group of Alaskan educators who prepared the curriculum. Funding was initially provided through legislation that granted funds to finance research and development of the kit.

The cost of publishing and distributing 200 kits to Alaskan public schools will be funded by private industry. The Alaska Mineral and Energy Resource Education Fund

(AMEREF) was created to raise funds to underwrite production. The kits will be field tested in the spring of 1985 and distributed in the fall of 1985.

The kit includes take-home activities, games, writing projects, rock and mineral samples, mineral-testing kits, historical books, posters, videotapes, film strips, and cassette tapes. Kit materials are designed to be used separately or in conjunction with standard curriculum programs such as Alaska history, science, and writing.

For information on the kit and on tax-deductible donations to help underwrite the program, contact AMEREF, 2000 W. International Airport Road, Suite A-1, Anchorage, 99502 (telephone 907-248-6565).

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Appendix A

Total active claims and new claims staked in 1984*
(listed by quadrangle**)

Quadrangle (listed by DGGGS quadrangle-numbering system)	Active claims assessment work (through Dec. 31, 1984)	1984 New claims staked (Jan. 1 - Dec. 31, 1984)		Total active claims - 1984
		Federal	State	
15 Mt. Michelson	0	0	1	1
17 Point Hope	548	0	0	548
18 De Long Mts.	6,735	0	14	6,749
23 Phillip Smith Mountains	20	2	0	22
26 Noatak	5,721	0	0	5,721
27 Baird Mtns.	46	7	0	53
28 Ambler River	2,369	0	0	2,369
29 Survey Pass	584	0	0	584
30 Wiseman	1,616	169	74	1,859
31 Chandalar	736	4	182	922
32 Christian	1	0	0	1
37 Shungnak	77	7	0	84
38 Hughes	11	0	0	11
39 Bettles	400	232	6	638
43 Teller	1,616	0	9	1,625
44 Bendeleben	1,739	16	72	1,827
45 Candle	330	0	0	330
47 Melozitna	39	0	0	39
48 Tanana	1,501	6	120	1,627
49 Livengood	2,893	0	370	3,263
50 Circle	3,875	0	217	4,092
51 Charley	183	0	0	183
52 Nome	496	0	2	498
53 Solomon	750	0	152	902
54 Norton Bay	10	0	0	10
55 Nulato	5,203	1,065	0	6,268
56 Ruby	954	6	320	1,280
57 Kantishna River	348	20	0	368
58 Fairbanks	2,228	0	342	2,570
59 Big Delta	1,272	33	104	1,409
60 Eagle	5,775	5	429	6,209
63 Unalakleet	50	4	46	100
64 Ophir	578	1	63	642
65 Medfra	490	0	140	630
66 Mt. McKinley	258	0	0	258
67 Healy	3,037	242	156	3,435
68 Mt. Hayes	3,563	169	136	3,868
69 Tanacross	1,208	0	0	1,208
73 Iditarod	468	62	69	599
74 McGrath	366	0	0	366
75 Talkeetna	1,649	21	595	2,265
76 Talkeetna Mts.	2,254	8	274	2,536
77 Gulkana	97	7	7	111
78 Nabesna	325	12	0	337
81 Russian Mission	31	0	0	31
82 Sleetmute	288	0	4	292
83 Lime Hills	444	0	13	457
84 Tyonek	5,189	0	121	5,310
85 Anchorage	1,063	0	251	1,314
86 Valdez	185	33	117	335
87 McCarthy	89	0	0	89
91 Bethel	478	0	3	481
92 Taylor Mountains	117	0	153	270

*Replaces 'Selected new major claim blocks and additions to claim blocks staked in 1983' in 1984 edition of this report. Data based on 1984 assessment affidavits and location notices received by Division of Mining, Mining Information Offices by December 31, 1984.

**Quadrangles numbered northwest to southeast according to DGGGS-DOM numbering and kardex system.

Quadrangle (listed by DGGs quadrangle-numbering system)	Active claims assessment work (through Dec. 31, 1984)	1984 New claims staked (Jan. 1 - Dec. 31, 1984)		Total active claims - 1984
		Federal	State	
93 Lake Clark	113	0	236	349
94 Kenai	8	0	0	8
95 Seward	904	340	162	1,406
96 Cordova	35	1	0	36
97 Bering Glacier	303	0	38	341
101 Goodnews	48	0	0	48
102 Dillingham	18	0	0	18
103 Iliamna	127	0	102	229
104 Seldovia	108	0	0	108
105 Blying Sound	3	0	0	3
107 Icy Bay	6	0	24	30
108 Yakutat	0	0	9	9
109 Skagway	452	127	6	585
111 Mt. Fairweather	21	0	0	21
112 Juneau	1,464	31	24	1,519
113 Taku River	3	0	0	3
114 Sitka	784	38	2	824
115 Sumdum	354	4	0	358
116 Port Alexander	184	0	0	184
117 Petersburg	1,219	305	0	1,524
118 Bradfield Canal	51	105	0	156
119 Craig	673	20	8	701
120 Ketchikan	512	9	0	521
121 Dixon Entrance	143	0	0	143
122 Prince Rupert	8	0	0	8
123 Hagemeister Is.	497	0	0	497
126 Mt. Katmai	24	0	0	24
127 Afognak	1	0	0	1
130 Karluk	0	0	12	12
133 Chignik	105	0	0	105
135 Trinity Islands	125	0	51	176
138 Port Moller	16	0	0	16

Appendix B

Alaska state, federal, and private agencies involved in mineral-development activities, 1984

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 - Loren Lounsbury

Function: Promote economic development in Alaska.

Office of Mineral Development (OMD)

675 7th Avenue, Station A

Fairbanks, Alaska 99701

(907) 452-7464

Director - John F.M. Sims

Function: Primary advocacy agency in state government for mining industry. Provide liaison between state government and private sector. Researches and publishes economic data on Alaskan mining industry.

B. Department of Environmental Conservation (DEC)

3220 Hospital Drive

Pouch O

Juneau, Alaska 99811

(907) 465-2606

Public Information (907) 465-2606

Commissioner - William R. Ross

Function: Issue permits for activities, including mining, that affect air or water quality or involve land disposal of wastes. Set air- and water-quality standards. Inspect, monitor, and enforce environmental-quality statutes, regulations, and permits. Review all federal permits.

Southcentral Regional Office

437 E Street, Suite 200

Anchorage, Alaska 99501

(907) 274-2533

Permit Information (907) 279-0254

Northern Regional Office

675 7th Avenue, Station K

Pouch 1601

Fairbanks, Alaska 99707

(907) 452-1714

Permit Information (907) 452-2340

Southeastern Regional Office

9000 Old Glacier Highway

Box 2420

Juneau, Alaska 99803

(907) 789-3151

Permit Information (907) 465-2615

C. Department of Fish and Game (ADF&G)

P.O. Box 3-200

Juneau, Alaska 99802

(907) 465-4100

Commissioner - Don W. Collinsworth

Function: Protects habitat in fish streams and manages refuges, sanctuaries, and critical habitats. 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 habitats.

Also 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.

Southcentral Regional Office

333 Raspberry Road

Anchorage, Alaska 99502

(907) 344-0541

Central Regional Office

565 University Avenue

Fairbanks, Alaska 99701

(907) 479-3104

Southeastern Regional Office

P.O. Box 20

Douglas, Alaska 99824

(907) 465-4290

Western Regional Office

Kashervaroff and Mission Road

P.O. Box 686

Kodiak, Alaska 99615

(907) 486-4791

Northwestern Regional Office

State Office Building, 1st floor

P.O. Box 1148

Nome, Alaska 99762

(907) 443-2825

D. Department of Natural Resources (DNR)

400 Willoughby Center, 5th floor

Pouch M

Juneau, Alaska 99811

Commissioner - Esther C. Wunnicke

(907) 465-2400

Northcentral Regional Director - Jerry L. Brossia

4420 Airport Way

Fairbanks, Alaska 99701

(907) 479-2243

1. Division of Geological and Geophysical Surveys (DGGS)

3601 C St., Frontier Building, 8th floor

Pouch 7-028 (mailing)

Anchorage, Alaska 99510

(907) 276-2653

State Geologist - Ross G. Schaff

Deputy State Geologist - William W. Barnwell

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 public and government agencies on geological questions. Performs assays and other mineralogical analyses at DGGG laboratory at University of Alaska, Fairbanks. Publishes professional reports and brochures. Maintains library of geological bulletins, reports, and periodicals.

Fairbanks Office
794 University Avenue, 2nd floor
794 University Avenue, Basement (mailing)
Fairbanks, Alaska 99701
(907) 474-7147

Juneau Office
400 Willoughby Center, 3rd floor
Pouch M (mailing)
Juneau, Alaska 99811
(907) 465-2491, Ext. 35

Eagle River Office
P.O. Box 772116
Fish Hatchery Road
Eagle River, Alaska 99577
(907) 688-3555

Geologic Materials Center
Fish Hatchery Road
Eagle River, Alaska 99577

DGGG Mineral Laboratory and Assay Office
O'Neill Resources Building, 2nd floor
University of Alaska
794 University Avenue, Basement (mailing)
Fairbanks, Alaska 99701
(907) 474-7122

2. Division of Mining (DOM)
555 Cordova Street, Olympic Building
Pouch 7-016 (mailing)
Anchorage, Alaska 99510
(907) 276-2653
Director - Pedro Denton

Function: Principal state agency for management of mining industry in Alaska. Maintains Mining-Information Offices in Anchorage, Fairbanks, Juneau, and Ketchikan. Assumes minerals functions of defunct Division of Minerals and Energy Management such as mining-claim adjudication; uplands and offshore mining leasing; coal leasing; and administration of the Alaska Surface Mining Control and Reclamation Act (ASMIRA), which includes permitting and inspection of coal mining activity, reclamation of abandoned mines, and permitting of hard-rock and placer activity on state lands.

Mining Information Offices are located at the DGGG Fairbanks and Juneau offices (above) and at:

State Office Building, 2nd floor
P.O. Box 7438 (mailing)
Ketchikan, Alaska 99901
(907) 225-4181

3601 C Street, Frontier Building, 10th floor
Pouch 7-005 (mailing)
Anchorage, Alaska 99510
(907) 786-2205

400 Willoughby Center, 4th floor
Juneau, Alaska 99801
Pouch M (mailing)
(907) 465-3400, Ext. 39

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

Function: Manages surface estate and resources, including materials (gravel, sand, and rock) and water. Handles statewide and regional land-use planning. Issues water-appropriation permits and certificates, leases, material-sale contracts, mill-site permits, and land-use permits and easements for temporary use of state land and access roads. Responsible for safety of all dams in Alaska.

Northcentral Regional Office
4420 Airport Way
Fairbanks, Alaska 99701
(907) 479-2243
District Manager - Richard Thompson

Southcentral Regional Office
3601 C Street, Frontier Building
Pouch 7-005 (mailing)
Anchorage, Alaska 99510
(907) 276-2653
District Manager - Margaret J. Hayes

Southeastern Regional Office
400 Willoughby Center, Suite 400
Pouch M (mailing)
Juneau, Alaska 99801
(907) 465-3400
District Manager - Paula T. Burgess

4. Division of Forestry
555 Cordova Street, Olympic Building
Pouch 7-005 (mailing)
Anchorage, Alaska 99510
(907) 276-2653
State Forester - John L. Sturgeon

Function: Establish guidelines to manage mining in state forests.

Southcentral Region Forestry Office
3601 C Street, Frontier Building
Pouch 7-005 (mailing)
Anchorage, Alaska 99510
(907) 786-2120
Regional Forester - Joseph Wehrman

Northcentral Region Forestry Office
3726 Airport Way
Fairbanks, Alaska 99701
(907) 479-2243
Regional Forester - Lester Fortune

Southeast Region Forestry Office
400 Willoughby Center, 5th floor
400 Willoughby Avenue (mailing)
Juneau, Alaska 99801
(907) 465-2191
Regional Forester - Paul Maki

E. Department of Public Safety

450 Whittier Street
Pouch N (mailing)
Juneau, Alaska 99811
(907) 465-4322

Commissioner - Robert J. Sundberg

1. Division of Fish and Wildlife Protection

5700 East Tudor Road
P.O. Box 6188 Annex (mailing)
Anchorage, Alaska 99502
(907) 269-5532

Director - Colonel Robert M. Henderson

Function: Enforcement of federal, state, and municipal laws, in particular AS Title 16, including that chapter pertaining to fishways, construction, and material damage done to spawning beds. Acts as enforcement arm for Alaska Department of Fish and Game.

'I' Detachment

1979 Peger Road
Fairbanks, Alaska 99701

Commander - Lieutenant Terry C. Jordan

F. Department of Revenue

Entrance A, 11th floor
State Office Building
Pouch S (mailing)
Juneau, Alaska 99811
(907) 465-2300

Commissioner - Mary Nordale

1. Public Services Division

1111 West 8th Street
Pouch SA (mailing)
Juneau, Alaska 99811
(907) 465-2392
Director - Sally Smith

Function: Issues licenses (including mining of minerals for production and sale) and requires filing of nonresident affidavits and bonding.

2. Audit Division

Entrance B, 11th floor
State Office Building
Pouch SA
Juneau, Alaska 99811
(907) 465-2320

Director - Martin J. Richard

Function: Administers mining-license tax, which is based on net income, including royalties. Upon application, will grant certificate of tax exemption for first 3½ yr of new mining operations, except for mining of sand and gravel. Tax returns must be filed annually.

Anchorage Field Office
201 East 9th Avenue
Anchorage, Alaska 99501
(907) 276-5364

Fairbanks Field Office
State Office Building
675 7th Avenue, Station G
Fairbanks, Alaska 99701
(907) 452-1513

Juneau Field Office
1111 West 8th Street, Room 108
Pouch SA (mailing)
Juneau, Alaska 99801
(907) 465-2333

G. University of Alaska

Fairbanks, Alaska 99701

1. College of Natural Sciences

Department of Geology & Geophysics (B.S., M.S., Ph.D.)
Brooks Building, Room 408
(907) 474-7565

Department Head - Donald M. Triplehorn

Function: Provides undergraduate and graduate education in geology and geophysics and conducts basic and applied research in geological sciences. Offers program options in general geology, economic geology, petroleum geology, geophysics, and ice-snow-permafrost geophysics.

2. School of Mineral Engineering

Brooks Building, Room 209
(907) 474-7366

Acting Dean - Donald J. Cook

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 Resources Building

(907) 474-7135 or 7136
Director - Donald J. Cook

Function: Conducts applied and basic research on 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 mineral industry.

3. Arctic Environmental Information and Data Center (AEIDC)
707 A Street
Anchorage, Alaska 99501
(907) 279-4523
Director - David Hickok

Function: Engages in information management, transfer, and dissemination, applied research, and investigation into resource development and environmental problems. Provides information and data on Alaska and circumpolar 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 (mailing)
Anchorage, Alaska 99513
State Director - Michael Penfold
(907) 271-5960 - Public Room

Function: Administers federal public lands (except National Parks, National Refuges, National Monuments, and military withdrawals) and leases of all federal leasable minerals, for example oil and gas, coal, phosphates, or oil shale, including those of reserved minerals. Arranges for sale of other than locatable and leasable minerals, for example, sand, gravel, or stone. 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 East 72nd Avenue
Anchorage, Alaska 99507
(907) 267-1200
District Manager - Wayne Boden

Fairbanks District Office
North Post, Fort Wainwright
P.O. Box 1150
Fairbanks, Alaska 99707
(907) 356-5399
District Manager - Carl D. Johnson

2. U.S. Geological Survey (USGS)
Office of the Special Assistant for Alaska
Gould Hall
4200 University Drive
Anchorage, Alaska 99508
(907) 271-4396
Special Assistant to the Director for Alaska -
Max Brewer

Function: Investigates and reports on physical resources, configuration and character of land surface, composition and structure of underlying rocks, and quality, volume, and distribution of water and minerals.

Alaska Distribution Center (for maps and brochures)
101-12th Avenue
Federal Building
Fairbanks, Alaska 99701
(907) 456-0244

Public Inquiries Office (for information and publications)
4230 University Drive, Room 101
Anchorage, Alaska 99508-4664
(907) 561-5555

Fairbanks Branch of Alaskan Geology
University of Alaska
O'Neill Resources Building, 2nd floor
P.O. Box 80586 (mailing)
College, Alaska 99708
(907) 474-7245

3. U.S. Bureau of Mines (USBM)
2221 East Northern Lights Boulevard, Suite 110
Anchorage, Alaska 99504
(907) 274-9521
Chief - Donald P. Blasko
Supervisor - Robert Hoekzema

Function: Assures that mineral supplies are adequate for national needs. Estimates mineral availability by investigating mineral production of deposits, mineralized districts, and mining districts. Productivity estimates consider size, grade, geologic setting, mining-transportation costs, metallurgical character, environmental constraints, and economic or political factors. Conducts research to improve productivity by lowering human, environmental, or economic costs. Publishes results. Maintains Alaska mineral-resource library and record of mines, prospects, and mineral occurrences that are available for public consultation either in person or by mail.

Juneau Field Office
P.O. Box 550
Juneau, Alaska 99802
(907) 364-2111
State Liaison - Tom Pittman

Fairbanks Field Office
206 O'Neill Resources Building
University of Alaska
Fairbanks, Alaska 99701
(907) 479-4277
Supervisor - James Barker

4. National Park Service (NPS)
Alaska Regional Office
2525 Gambell Street
Anchorage, Alaska 99503-2892
(907) 271-4020
Regional Director - Roger J. Contor
Chief, Mining and Minerals - Lynn S. Griffiths

Function: Administers lands within the National Park System in Alaska. Manages valid prior-right mining claims in parklands through plans of operation under Mining in Parks Act, National Park Service regulations, and other applicable federal and state laws and regulations.

B. U.S. Department of Labor

1. Mine Safety and Health Administration (MSHA)
117-107th Avenue, NE, Room 100
Bellevue, Washington 98004
(206) 442-7037
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.

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 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 inspector 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 - Michael A. Barton

Function: Helps meet national mineral and energy needs by encouraging and supporting environmentally sound mineral enterprises on federal lands that are under USFS jurisdiction, consistent with other surface resource values. Provides joint administration of general mining laws on National Forest System lands with Bureau of Land Management. Cooperates with Department of Interior agencies in issuing mineral leases to mitigate surface impact from such activities. Issues permits for disposal of sand, gravel, and stone.

D. U.S. Environmental Protection Agency (EPA)

Alaska Operations Office, Region X
3200 Hospital Drive, Suite 101
Juneau, Alaska 99801
(907) 586-7619
Director - Ronald A. Kreizenbeck

Regional Headquarters
1200 6th Avenue
Park Place Building
Seattle, Washington 98101
(206) 442-1200

Regional Administrator - Ernesta Barnes

Function: Under Clean Water Act, regulates effluent discharges through issuance of National Pollutant Discharge Elimination System (NPDES) permits.

Fairbanks headquarters (mining season only)
Federal Building, Box 19
101 12th Avenue
Federal Building, Box 19
Fairbanks, Alaska 99701
(907) 456-0366
Placer Mining Coordinator - Bub Loiselle

- E. Department of the Army
U.S. Army Corps of Engineers
Regulatory Branch
Pouch 898
Anchorage, Alaska 99506
District Engineer - Colonel Neil E. Saling

Function: Regulates work in navigable waters of United States and discharge of dredged or fill material into waters of United States, including wetlands. Examples of regulated mining activities include roads, bridges, docks, pads, stockpiles, diversions, and causeways.

Write: Attention: NPACO-R-S, or
Call: Carol Gorbics (907) 552-2203

NONGOVERNMENTAL GROUPS AND ASSOCIATIONS

Alaska Miners Association, Inc.
Statewide Office
509 West 3rd Avenue, Suite 17
Anchorage, Alaska 99501
(907) 276-0347

Anchorage Branch
Jim Williams, Chairman
P.O. Box 101260
Anchorage, Alaska 99510
(907) 561-3127

Fairbanks Branch
Roger Burggraf, Chairman
P.O. Box 73069
Fairbanks, Alaska 99707
(907) 451-6650

Haines Branch
Merrill Palmer, Chairman
P.O. Box 222
Haines, Alaska 99827
(907) 766-2567

Juneau Branch
Ray Renshaw, Chairman
P.O. Box 2311
Juneau, Alaska 99805
(907) 789-7579

Ketchikan Branch
Ralph Yetka, Chairman
P.O. Box 928
Ward Cove, Alaska 99928
(907) 247-2449

Nome Branch
Ron Engstrom, President
P.O. Box 536
Nome, Alaska 99762
(907) 443-2586

Sitka Branch
 Barton Southwick
 P.O. Box 255
 Sitka, Alaska 99835
 (907) 747-8194

Alaska Women in Mining
 DeLois Burggraf
 P.O. Box 73941
 Fairbanks, Alaska 99707
 (907) 479-2596

American Institute of Mining Engineering (AIME)
 Sukumar Bandopadhyay, Chairman Alaska Branch
 School of Mineral Engineering
 108 Brooks Building
 University of Alaska
 Fairbanks, Alaska 99701

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

Ross G. Schaff, President Alaska Chapter
 Alaska State Division of Geological & Geophysical
 Surveys
 3601 'C' Street, Suite 800
 Pouch 7-028 (mailing)
 Anchorage, Alaska 99501
 (907) 276-2653

Miners Advocacy Council
 Bob Aumiller
 P.O. Box 83909
 College, Alaska 99708
 (907) 488-2402

Miners Rights Action Group
 Ken Manning
 P.O. Box 80325
 College, Alaska 99708
 (907) 479-4890

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

Placer Miners of Alaska
 Rosalyn Stowell
 P.O. Box 339
 Fairbanks, Alaska 99707
 (907) 456-5832

Resource Development Council for Alaska, Inc.
 444 7th Avenue, Box 100516
 Anchorage, Alaska 99510
 (907) 278-9615

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

ORGANIZED MINING DISTRICTS

Circle Mining and Recording District
 Bob Ault, President
 P.O. Box 1872
 Central, Alaska 99730

Fairbanks Mining District
 Don Stein, President
 105 Dunbar
 Fairbanks, Alaska 99701

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

Kantishna Mining District
 Sam Koppenburg, President
 SRD Box 9070
 Palmer, Alaska 99645

Koyukuk Mining District
 Robert Aumiller, President
 SR 71188
 Fairbanks, Alaska 99701

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

Seward Mining District
 Tom Williams, President
 Box 66
 Hope, Alaska 99605

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

Appendix C

Selected significant mineral deposits in Alaska
(locations shown in figs. 31-33)*

- | Map
no. | |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Lik, SU - Major strata-bound massive-sulfide (Zn-Pb-Ag-Cd-Ba) deposits in black shale and chert. Proven reserve (Lik) estimate of 24 million tons of 9 percent Zn, 3.1 percent Pb, and 1.4 oz/ton Ag. |
| 2 | Red Dog - At least two major strata-bound massive-sulfide deposits hosted in Pennsylvanian or Mississippian shale; similar to locality 1. According to COMINCO ALASKA (February 1982), Main deposit at Red Dog contains at least 85 million tons of 17.1 percent Zn, 5 percent Pb, 2.4 oz/ton Ag; nearby Hilltop deposit contains significant undisclosed reserves. |
| 3 | Drenchwater - Strata-bound (Pb-Zn-Ag) massive-sulfide occurrence associated with black shale, chert, and felsic 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 through 4 and locality 7. |
| 4 | Ginny Creek - Epigenetic, disseminated Zn-Pb-Ag deposits with barite in sandstone and shale of Upper Devonian through Lower Mississippian Noatak Sandstone. Random grab samples of surface float contain 0.3 to 3.0 percent Zn and highly variable amounts of Pb and Ag. |
| 5 | Story Creek - Epigenetic replacement deposits of Zn-Pb-Ag-Cu-Au hosted in brecciated zones in Devonian Kanayut Conglomerate or Lower Mississippian Kayak Shale. Grab samples of high-grade material contain up to 0.43 percent Cu, 34 percent Pb, 28.8 percent Zn, 0.04 oz/ton Au, and 30 oz/ton Ag. |
| 6 | Whoopee Creek - Epigenetic replacement deposits of Zn-Pb-Cu-Ag-Au-Cd in breccia zones in Devonian Kanayut Conglomerate or 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 - Epigenetic replacement deposits of Paleozoic age; include bedded-barite occurrences. Grab samples contain 15.3 percent Cu, 0.15 percent Pb, 0.95 percent Zn, 0.05 percent Co, and 0.3 oz/ton Ag. |
| 8 | Bornite - Major stratiform Cu-Zn deposit in carbonate rock; 5 million tons grade 4 to 12 percent Cu. Larger reserve estimate of 40 million tons of about 2 percent Cu and undisclosed amount of Zn and Co. |
| 9 | Arctic - Major volcanogenic (Cu-Zn) massive-sulfide deposit hosted in sequence of metarhyolite, metatuff, and graphitic schist of Devonian age; indicated reserves of 35 to 40 million tons grade 4.0 percent Cu, 5.5 percent Zn, 0.8 percent Pb, 1.6 oz/ton Ag, and 0.02 oz/ton Au. |
| 10 | Sun - Major (Cu-Pb-Zn-Ag) massive-sulfide deposit in sequence of mid-Paleozoic metarhyolite and metabasalt; indicated 1976 gross-metal value of Cu, Pb, Zn, and Ag was over \$1 billion. |
| 11 | Smucker - Mid-Paleozoic volcanogenic massive-sulfide deposit; contains significant tonnage of Cu-Pb-Zn ore that grades 1.5 percent Pb, 5 to 10 percent Zn, 3 to 10 oz/ton Ag, with minor Au. |
| 12 | Avan Hills - Disseminated chromite in layered ultramafic rocks; grab samples contain up to 2.5 percent Cr. |
| 13 | Misheguk Mountain - Chromite occurrences similar to those in Avan Hills. |
| 14 | Klery Creek - Lode- and placer-Au deposits worked intermittently from 1909 through 1930s. Total production through 1931, mostly from placer deposits, estimated at 31,320 oz. |
| 15 | Ernie Lake - (Ann Creek) Strata-bound massive-sulfide occurrence in metarhyolite, metatuff, and marble. Gossan zones strongly anomalous in Cu-Pb-Zn and Ag. |
| 16 | Koyukuk-Nolan district - Major placer-Au district; from 1893 to present, produced more than 300,000 oz Au. Significant deep placer reserves remain. |
| 17 | Chandalar district - Major Au-producing district; substantial production in excess of 30,000 oz Au from both lode and placer sources; lode gold found in crosscutting quartz veins that intrude schist and greenstone. Active development of placer deposits and lodes in progress. |
| 18 | Porcupine Lake - Stratiform fluorite occurrences associated with felsic volcanic rocks of late Paleozoic age. Grades of up to 25 to 30 percent fluorite reported. |
| 19 | Wind River - Strata-bound Pb-Zn massive-sulfide prospects; grades of up to 5 percent Pb reported. |
| 20 | Esotuk Glacier - Disseminated Mo-Sn-W-Pb-Zn mineralization in skarns associated with Devonian(?) schistose quartz monzonite. Grab samples contain up to 0.08 percent Sn and 0.15 percent W. |
| 21 | Bear Mountain - Major stockwork Mo-W-Sn occurrence in intrusive breccia. Grab samples contain up to 1 percent Cu, 0.16 percent Zn, and 0.002 percent Mo. |

*This list is not a definitive summary of Alaska's significant mineral deposits or mineral belts; numerous state and federal summaries provide more detailed information about individual deposits.

- 22 **Cape Creek** - Major placer-Sn producer. More than 500 tons Sn produced from 1935 to 1941; at least 200 tons produced in last 10 yr.
- 23 **Buck Creek** - Major placer-Sn producer. More than 1,100 tons Sn produced from 1902 to 1953.
- 24 **Lost River** - Major Sn, fluorite, W, and Be deposit associated with Cretaceous tin-granite system. More than 350 tons Sn produced from skarn and greisen lode sources. Inferred reserves of 38 million tons of Sn-W-Be-fluorite ore, based on 45,000 ft of diamond drilling.
- 25 **Ear Mountain** - Placer-Sn district and Sn-Cu-Au-Ag-Pb-Zn skarn mineralization of Cretaceous age. Area also anomalous in uranium.
- 26 **Kougarok Mountain** - Sn deposit hosted in quartz-tourmaline-topaz greisen of Cretaceous age. Grades may average 0.5 percent Sn and 0.01 percent Ta and Nb.
- 27 **Hannum** - Stratiform, carbonate-hosted Pb-Zn-Ag massive-sulfide deposit of mid-Paleozoic age in heavily oxidized zone that ranges from 30 to 150 ft thick. Mineralized zone reported to assay up to 10 percent Pb, 2.2 percent Zn, 0.04 oz/ton Au, and 1.76 oz/ton Ag.
- 28 **Independence Creek** - Pb-Zn-Ag massive-sulfide deposit; high-grade ore shipped in 1921 contained 30 percent Pb, 5 percent Zn, and 150 oz/ton Ag. Mineralization restricted to shear zone in carbonates.
- 29 **Sinuk River** - Stratiform Pb-Zn-Ag-Ba-F massive-sulfide deposits and layered iron deposits of Precambrian or Paleozoic age. Mineralized zones extend over 8,000 ft along strike.
- 30 **Nome district** - Major placer-Au and lode-Au producer. Production in excess of 4,348,000 oz Au. Sporadic Sb and W production in past.
- 31 **Big Hurrah** - Epigenetic vein deposit in black slate and metasediments of York Slate. Deposit contains some W mineralization and has produced over 20,000 oz Au from nearly 50,000 tons milled ore.
- 32 **Solomon district** - Major placer-Au district; produced over 250,000 oz Au.
- 33 **Kachauik** - Uranium prospect in Cretaceous alkalic intrusive rocks. Highly anomalous geochemical values and uranium concentrations of 1,000 ppm reported.
- 34 **Omalik** - Stratiform or vein-type Pb-Zn-Ag massive-sulfide prospect in Paleozoic carbonate rocks; from 1881 to 1900, produced 300 to 400 tons of Pb-Zn ore that averaged about 10 percent Pb and 40 oz/ton Ag. Grades of oxidized Zn ore reported to be up to 34 percent Zn.
- 35 **Windy Creek** - Disseminated Mo-Pb-Zn mineralization in quartz veins and skarns with reported values as high as 0.15 percent Mo.
- 36 **Quartz Creek** - Significant Pb-Zn-Ag mineralization; grades of 15 percent combined Pb-Zn and 10 oz/ton Ag reported.
- 37 **Placer River** - Significant Mo-F mineralization disseminated in intrusive rocks. Values of 0.2 percent Mo reported.
- 38 **Candle Creek** - Placer-Au deposits with significant reserves. Placer concentrates reported to have significant uranium and galena concentrations.
- 39 **Poovookpuk Mountain** - Porphyry-Mo mineralization. Grades of up to 0.25 percent Mo reported.
- 40 **Purcell Mountain** - Uranium, Mo, and Ag occurrences associated with Cretaceous alkalic igneous plutons, alaskite, and bostonite dikes.
- 41 **Koyukuk-Hughes district** - Production of 209,000 oz Au from 1930 to 1975, mainly from Alaska Gold, Inc., dredging operation at Hogatza; dredge reactivated in 1981 but deactivated in 1984. Non-float mechanized operation on Utopia Creek produced significant amount of placer Au from 1930 to 1962.
- 42 **Flat district** - Major placer-Au district; produced at least 1,374,404 oz Au through 1984. Potential exists for occurrence of significant lode-Au and W reserves at Golden Horn deposit and other known lodes in region associated with shear zones and Late Cretaceous monzonite intrusives.
- 43 **Innoko-Tolstoi district** - Major placer-Au district with significant lode Au-Sb-Hg potential; lode sources for placers are Late Cretaceous volcanic-plutonic complexes and dike swarms that intrude Mesozoic flysch; district produced more than 540,000 oz Au from placer deposits.
- 44 **Nixon Fork** - Promising Au-Cu deposits; Nixon Fork Mine produced more than 40,000 oz Au from Late Cretaceous skarns associated with quartz monzonite-Devonian limestone contact zones.
- 45 **Bonanza Creek** - Skarn-type W mineralization along intrusive contact; no published information available.
- 46 **Ruby district** - Placer Au-Sn district; produced more than 420,000 oz Au from 1931 to 1960; district also contains Pb-Ag prospects with grades reportedly as high as 82 oz/ton Ag.
- 47 **Hot Springs district** - Placer Au-Sn district; produced more than 450,000 oz Au and over 720,000 lb cassiterite through 1981. Includes Eureka and Tofty subdistricts.

- 48 **Livengood-Tolovana district** - Placer-Au district; produced more than 425,000 oz Au since discovery in 1914. Substantial reserves remain.
- 49 **Fairbanks district** - Seventh largest Au-producing district in United States; largest producer in Alaska. Produced more than 7,750,000 oz Au from placer deposits. Major lode-Au and Sb producer; produced more than 250,000 oz Au and over 4 million lb Sb from veins and shear zones through 1970. Production of W exceeds 4,000 short-ton units since 1915, all derived from tectite and skarn near Cretaceous quartz monzonite.
- 50 **Mt. Prindle** - Significant uranium-rare earth mineralization in Mesozoic alkaline igneous rocks. Rock geochemical values of up to 0.1 percent U_3O_8 ; up to 15 percent rare-earth elements reported.
- 51 **Twin Mountain** - Significant W mineralization associated with skarn development along contact zone of quartz monzonite stock of Cretaceous age.
- 52 **Circle district** - Currently Alaska's largest producing placer-Au district; produced 900,000 oz Au since discovery in 1893. Has significant potential for tin, tungsten; and gold mineralization from variety of lode sources.
- 53 **Three Castle Mountain, Pleasant Creek, Casca VABM** - Strata-bound Pb-Zn massive-sulfide mineralization. Grades of up to 17 percent Zn and 2 percent Pb reported.
- 54 **Totatlanika River lode zone, Anderson Mountain, Dry Creek, Virginia Creek** - Significant Devonian-Mississippian volcanogenic Cu-Pb-Zn-Ag massive-sulfide deposits in Bonfield district. Potential for high-grade deposits reported. Includes Liberty Bell strata-bound Au deposit and Sheep Creek; latter contains Sn and base metals.
- 55 **Delta massive-sulfide belt** - Contains at least 30 known volcanogenic massive-sulfide deposits and occurrences. Grade ranges are 0.3 to 1.1 percent Cu, 1.7 to 5.7 percent Zn, 0.5 to 2.3 percent Pb, 0.7 to 2.0 oz/ton Ag, and 0.018 to 0.061 oz/ton Au; estimated potential reserve tonnage of 40 million tons for all deposits.
- 56 **Mosquito, Peternie** - Porphyry-Mo prospects of early Tertiary age; grades of up to 0.17 percent Mo reported.
- 57 **Taurus** - Major porphyry Cu-Mo prospect of Paleocene age with at least 500 million tons of mineralization. Potential for large tonnage of 0.5 percent Cu and 0.05 percent Mo reported.
- 58 **Big Creek, Ladue** - Strata-bound Pb-Zn-Ag massive-sulfide prospects in metavolcanic rocks.
- 59 **Slate Creek** - 61 million tons of 5 to 6 percent high-quality chrysotile asbestos in serpentized ultramafic rocks of Permian(?) age.
- 60 **Fortymile district** - Major placer-Au district. Produced in excess of 417,000 oz Au since discovery in 1886.
- 61 **Kantishna district** - Major placer-Au and lode Ag-Au-Pb-Zn-Sb-W district. Produced more than 92,000 oz placer Au, about 260,000 oz lode Ag, and several million lb Sb from shear zones and vein deposits hosted in Precambrian metamorphic units. Potential exists for significant Ag-Au-Pb-Zn deposits. Metalliferous strata-bound occurrences occur in schist and quartzite.
- 62 **Stampede Mine** - Major Sb deposit; produced more than 3.5 million lb Sb from large shear zone in Precambrian metamorphic rocks.
- 63 **Purkypile** - Significant Ag-Sn-Be mineralization associated with 56-m.y.-old 'McKinley' granitic intrusion. Grades of up to 4.5 percent Sn reported. Potential exists for uranium and W mineralization.
- 64 **Golden Zone Mine** - Major Au-Cu-Ag deposits in Late Cretaceous breccia pipe. Produced more than 1,581 oz Au, 8,617 oz Ag, and 42,000 lb Cu. Proven reserves of about 10 million tons of 0.1 oz/ton Au with Cu and Ag reported.
- 65 **Nim Prospect** - Late Cretaceous porphyry Cu-Ag-Au deposit. Grades of up to 5.0 percent Cu and 9 oz/ton Ag reported.
- 66 **Coal Creek** - Greisen-hosted Sn-Cu-W deposit in 55-m.y.-old ('McKinley' age) pluton. Reserves of 5 million tons of ore that grade 0.28 percent Sn, 0.3 percent Cu, with credits of W, Ag, and Zn reported.
- 67 **Denali Prospect** - At least six small strata-bound Cu lodes in Triassic volcanic-sedimentary rocks that may contain 5 million tons ore that grade about 2 percent Cu with credits of silver.
- 68 **Chistochina** - Porphyry-Cu prospects of Tertiary age and placer-Au district; produced more than 177,000 oz Au and small amount Pt from placer deposits.
- 69 **Nabesna Mine** - Classic high-grade Au skarn that envelops quartz diorite of Jurassic(?) age; produced in excess of 66,960 oz gold from about 88,000 tons of ore from 1930 to 1941.
- 70 **Spirit Mountain** - Massive and disseminated Cu-Ni mineralization in mafic-ultramafic complex.
- 71 **Kennecott deposits** - Major stratiform Cu-Ag massive-sulfide deposits localized near contact between Chitstone Limestone and Nikolai Greenstone of Triassic age; contained some of highest grade Cu lodes mined in North America. Produced more than 1.2 billion lb Cu and 12 million oz Ag from 4.8 million tons ore. Some reserves remain.

- 72 **Binocular and other prospects** - Kennecott-type Cu-Ag massive-sulfide deposits.
- 73 **Bond Creek-Orange Hill** - Two major Late Cretaceous porphyry Cu-Mo deposits; inferred reserves of 850 million tons ore that grade 0.3 to 0.5 percent Cu and 0.03 percent Mo reported.
- 74 **Carl Creek** - Porphyry-Cu prospect in altered intrusive complex; similar to locality 73.
- 75 **Baultoff** - Porphyry-Cu prospect in altered intrusive rocks; similar to locality 73.
- 76 **Horsfeld** - Porphyry-Cu prospect; similar to locality 73.
- 77 **Midas Mine** - Significant strata-bound Cu-(Ag-Au-Pb-Zn) massive-sulfide deposit in volcanic-sedimentary rocks of Tertiary Orca Group. Produced more than 3.3 million lb Cu from 49,350 tons ore.
- 78 **Ellamar** - Strata-bound Cu-Zn-Au massive-sulfide deposit in sediment of Eocene(?) Orca Group. Produced more than 16 million lb Cu, 51,307 oz Au, and 191,615 oz Ag from about 301,835 tons ore.
- 79 **Willow Creek, Independence, Lucky Shot, War Baby** - Major Au-(Ag-Cu-Pb-Zn-Mo) lodes in veins that cut Mesozoic quartz diorite. Produced more than 448,082 oz Au from lode sources and about 35,000 oz Au from associated placer deposits.
- 80 **Latouche, Beatson** - Major strata-bound Cu-Zn-Ag massive-sulfide deposits in Orca Group sedimentary rocks and mafic volcanic rocks. Produced more than 205 million lb Cu from 6 million tons ore. Inferred reserves of 5 million tons ore that grade 1 percent Cu, 1.5 percent Pb+Zn, and 1 oz/ton Ag may remain.
- 81 **Rua Cove** - Major strata-bound Cu-Zn massive-sulfide deposit in complex ore shoots enclosed in mafic volcanic rocks of Orca Group. Reserves in excess of 1.1 million tons ore that grade 1.25 percent Cu reported.
- 82 **Red Mountain** - Significant Cr occurrence associated with layered ultramafic complex of Tertiary age at Red Mountain near Seldovia. More than 36,000 tons metallurgical-grade ore shipped through 1976; huge low-grade chrome resource may remain.
- 83 **Red Devil** - Major Hg-Sb deposit; moderate-grade ore hosted in shear zones in Kuskokwim Group sedimentary rocks. More than 35,000 flasks Hg produced from 75,000 tons ore.
- 84 **Nyac district** - Significant placer-Au district. Aniak district (of which Nyac is a part) produced more than 230,000 oz Au from placer deposits.
- 85 **Goodnews Bay** - Major placer-Pt district; estimated to have produced over 540,000 oz platinum-group metals (PGM) from 1934 to 1976; largest known resource of PGM in United States. Possible reserves of 60 million yd³ of deep, platinum-bearing gravels remain. Lode source believed to be Alaskan-type zoned ultramafic complex of Cretaceous age.
- 86 **Apollo-Sitka Mines** - Major lode-Au deposits; produced more than 107,900 oz Au from ore that averaged about 0.22 oz/ton Au. Inferred reserves reportedly equal to ore mined.
- 87 **Pyramid** - Late Tertiary porphyry Cu-Mo deposit; inferred reserves of 125 million tons ore that grade 0.4 percent Cu and 0.03 percent Mo reported.
- 88 **Ivanof** - Late Tertiary porphyry-Cu prospect; grades of up to 0.72 percent Cu reported. Potential for large tonnages.
- 89 **Weasel Mountain, Bee Creek** - Late Tertiary to Quaternary porphyry Cu-Mo prospect; grades of up to 0.48 percent Cu and 0.035 percent Mo reported. Potential for moderate tonnages of low-grade mineralization.
- 90 **Mike deposit** - Late Tertiary 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 similar to locality 90; grades of up to 0.3 percent Cu reported. Potential for moderate reserves of low-grade mineralization.
- 92 **Kasna Creek** - Major stratiform Cu-Pb-Zn and skarn-sulfide deposits of Mesozoic age in mafic volcanic and sedimentary rocks; reserves of over 10 million tons ore that grade 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 of Late Tertiary(?) age; grades of up to 105 oz/ton Ag and 3 percent Cu reported.
- 95 **Haines Barite** - Major stratiform Ba-Pb-Zn-Cu-Ag deposit in pillow-basalt-dominated section of Paleozoic or Triassic age; consists of 48- to 60-ft-thick zone of 60-percent barite with 2- to 8-ft-thick upper 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 in Mesozoic zoned ultramafic complex; reported to contain 1 to 5 billion tons of material that contain 11 to 20 percent Fe and 1.6 to 3.0 percent Ti.

- 97 **Nunatak** - Porphyry-Mo deposit; reserves of 8.5 million tons ore that grade 0.125 percent Mo and 129 million tons of 0.026 percent Mo reported.
- 98 **Brady Glacier** - Major Ni-Cu deposit in layered gabbro-pyroxenite complex of Tertiary age. Proven reserves of 100 million tons ore that grade 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 Au. Deposits also contain significant Ni-Cu and Pb-Zn-Au mineralization. Funter Bay deposit contains reported reserves of 560,000 tons that grade 0.34 percent Ni, 0.35 percent Cu, and 0.15 percent Co in gabbro-pipe system.
- 100 **Alaska-Juneau** - Major lode-Au deposit that consists of 100- to 300-ft-wide zone containing en-echelon, gold-bearing quartz veins in metamorphic rocks; produced more than 3.52 million oz Au from 88.5 million tons ore from 1893 to 1944.
- 101 **Chichagof and Hirst Chichagof** - Major lode-Au deposits in quartz veins that cut Mesozoic graywacke; produced more than 770,000 oz Au. Chichagof Mine produced about 700,000 oz Au and 200,000 oz Ag; Hirst Chichagof Mine produced about 67,980 oz Au and 20,000 oz Ag.
- 102 **Mirror Harbor** - Ni-Cu mineralization in layered-gabbro complex of Mesozoic age; probable reserves of 8,000 tons of 1.57 percent Ni and 0.88 percent Cu and inferred reserves of several million tons ore that grade 0.2 percent Ni and 0.1 percent Cu reported.
- 103 **Bohemia Basin** - Major Ni-Cu-Co mineralization in layered mafic complex similar to locality 102; reserves of 22 million tons ore that grade 0.33 to 0.51 percent Ni, 0.21 to 0.27 percent Cu, and 0.04 percent Co reported.
- 104 **Apex-El Nido** - Significant lode Au-W deposits that occur as crosscutting veins in graywacke; produced more than 50,000 oz Au.
- 105 **Greens Creek** - Major sediment-hosted Pb-Zn-Cu-Ag-Au volcanogenic massive-sulfide deposit of Devonian or Triassic age; proven reserves of 4.0 million tons that grade 10 percent combined Pb-Zn-Cu, 10 oz/ton Ag, and 0.10 oz/ton Au.
- 106 **Sumdum** - Volcanogenic Cu-Pb-Zn massive-sulfide deposit in Mesozoic metamorphic complex with potential strike length of over 10,000 ft. Inferred reserves of 26.7 million tons ore that grade 0.57 percent Cu, 0.37 percent Zn, and 0.3 oz/ton Ag reported.
- 107 **Snettisham** - Fe-Ti deposit in mafic zoned-intrusive complex; grades of about 18.9 percent Fe and 2.6 percent Ti reported.
- 108 **Tracy Arm** - Strata-bound Cu-Zn-Pb massive-sulfide prospect in Mesozoic schist; 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 Mesozoic ultramafic complex (probably ophiolite); reserves of 570 tons of material that grade 40 percent Cr and 29,000 tons that grade 18 to 35 percent Cr reported.
- 110 **Cornwallis Peninsula** - Volcanogenic Cu-Pb-Zn-Ag-Ba massive-sulfide deposit of Triassic(?) age; grades of up to 20 percent Pb-Zn and 23 oz/ton Ag reported.
- 111 **Castle Island** - Stratiform barite deposit of Triassic age hosted in carbonate and pillow basalt; about 850,000 tons of production from 1963 to 1980; contains Zn, Pb, and Cu sulfides. Reported to be mined out.
- 112 **Ground Hog Basin** - Area contains several stratiform massive-sulfide prospects in Mesozoic schist and gneiss whose origins are unknown. 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 zoned mafic-ultramafic complex; inferred reserves of 430,000 tons of 0.3 percent Ni, 0.3 percent Cu, and 0.13 oz/ton Ag reported.
- 114 **Kasaan Peninsula** - Major skarn-type Cu-Fe-Au massive-sulfide deposit of Jurassic age; area has produced over 28 million lb Cu and 55,000 oz Ag. Reserves of 4 million tons ore that grade 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 Alaskan-type zoned mafic-ultramafic pluton. From 1900 to 1941, 5 million lb Cu, over 20,000 oz PGM, and Au and Ag credits were produced from 325,000 tons 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 high-grade W-Cu-Pb-Zn-Ag ore from 1925 to 1951 from crosscutting ore shoots in Texas Creek granodiorite of Tertiary age. Area also contains potential for porphyry Mo-W mineralization and massive-sulfide skarn Pb-Ag-Au-W deposits.
- 118 **Jumbo** - Cu-Fe-Mo-Ag skarn deposit; produced more than 10 million lb Cu, 280,000 oz Ag, and 7,000 oz Au from 125,000 tons ore from classic, zoned magnetite-Cu skarns associated with Cretaceous epizonal granodiorite pluton. Reserves of 650,000 tons ore that grade 45.2 percent Fe, 0.75 percent Cu, 0.01 oz/ton Au, and 0.08 oz/ton Ag reported.

- 119 **Copper City** - Stratiform Cu-Zn-Ag-Au massive-sulfide deposit hosted in late Precambrian Wales Group. 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 in 25-m.y.-old composite felsic pluton; proven reserves of 1.5 billion tons ore that grade 0.136 percent Mo, which includes 490 million tons with grades that exceed 0.2 percent Mo.
- 121 **Niblack** - Volcanogenic Cu-Pb-Au-Ag massive-sulfide deposit hosted in Precambrian(?) Wales Group or Ordovician-Silurian Descon Formation; produced more than 1.4 million lb Cu, 11,000 oz Au, and 15,000 oz Ag.
- 122 **Bokan Mountain** - Numerous U-Th prospects associated with Jurassic peralkaline intrusive complex; from 1955 to 1971 produced more than 120,000 tons ore that graded about 1 percent U_3O_8 .
- 123 **Kemuk Mountain** - Magmatic Fe-Ti deposit hosted in Cretaceous(?) pyroxenite. Inferred reserves of 2.4 billion tons that average 15 to 17 percent Fe, 2 to 3 percent TiO_2 , and 0.16 percent P_2O_5 .
- 124 **McLeod** - Porphyry-Mo deposit that contains quartz-molybdenite fissure veins in quartz-feldspar porphyry. Chip samples contain up to 0.09 percent Mo.
- 125 **Illinois Creek** - Epigenetic(?) deposit that contains Pb-Zn sulfide veins along contact between altered quartz monzonite porphyry and schist.
- 126 **Johnson River** - Epigenetic quartz-sulfide stockwork deposit hosted in volcanoclastic, pyroclastic, and volcanic rocks of Jurassic Talkeetna Formation. Average grades of 9.4 to 24.8 percent Zn, 2.8 percent Pb, 1.7 percent Cu, and 0.6 to 1.2 oz/ton Au reported.
- 127 **Nimiuktuk River** - Hill of massive, high-grade barite estimated to contain at least 1.5 million tons barite. Widespread stream-sediment Ba anomalies in area indicate further barite potential.

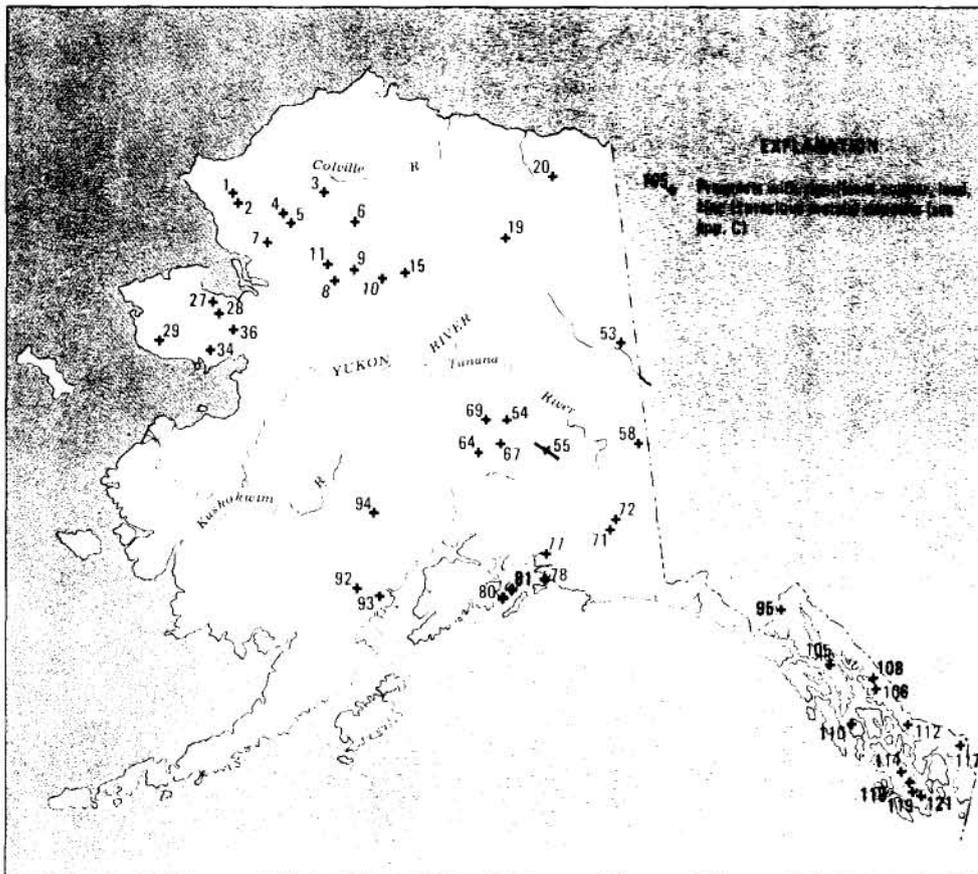


Figure 31. Significant copper, lead, zinc (\pm precious metals) deposits in Alaska.

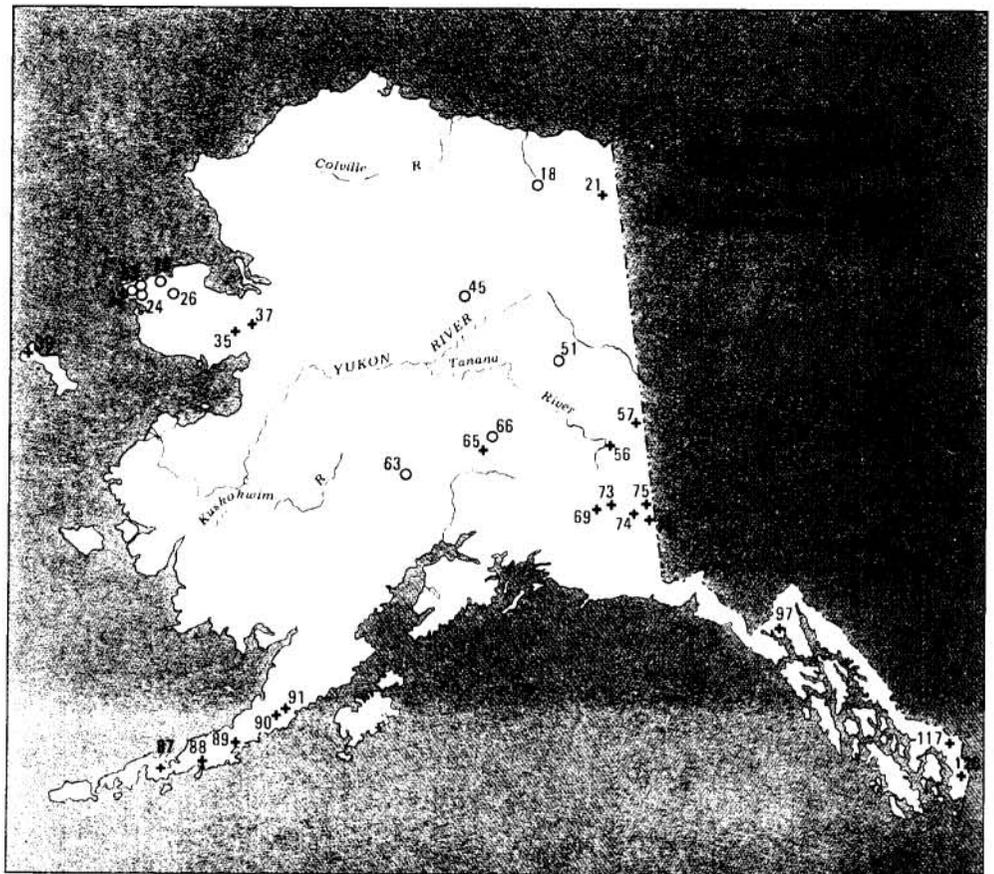


Figure 32. Significant molybdenum-copper and tin-tungsten ± fluorine ± beryllium deposits in Alaska.

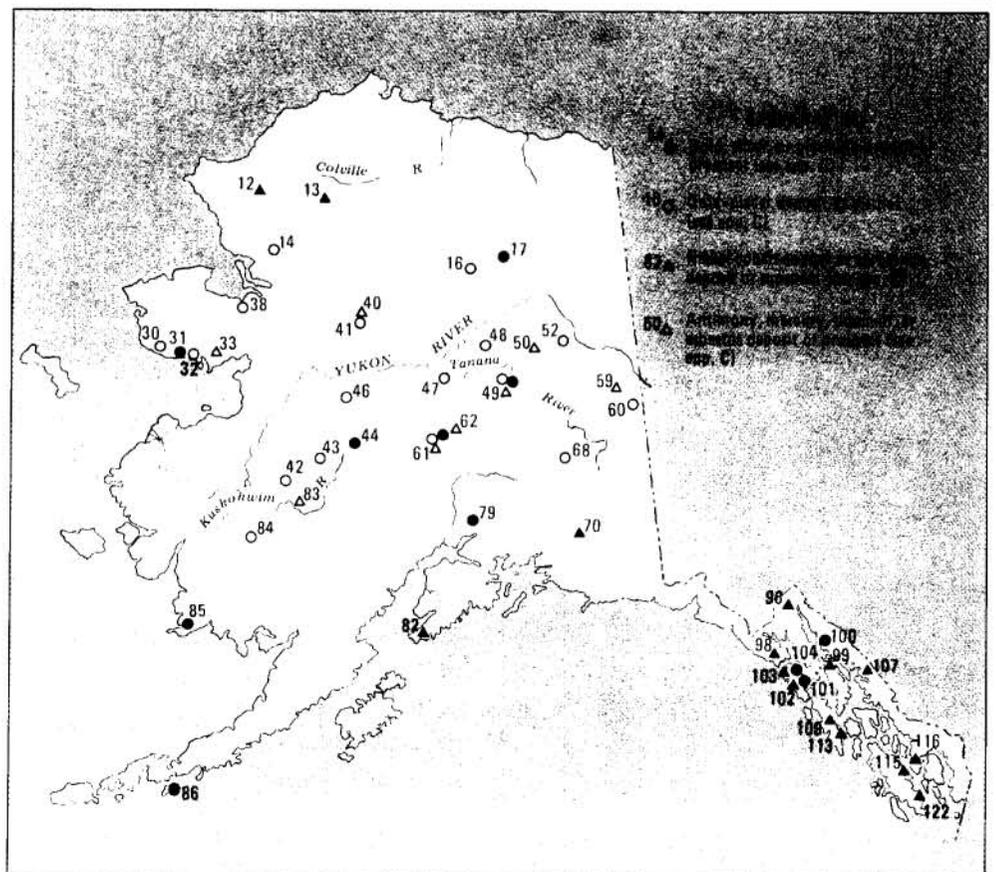


Figure 33. Significant gold, silver, and strategic-mineral deposits or districts in Alaska.

Appendix D

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Mining licenses issued by the Alaska Department of Revenue, 1984* (placer gold unless otherwise noted)

<p>A & G MINING VENTURES Guy R. Fahrenbruch 3605 Arctic, No. 1841 Anchorage, AK 99503</p>	<p>ALEUTIAN AGGREGATE VENTURES P.O. Box 4-D Anchorage, AK 99509-6004 (sand, rock)</p>	<p>ASPEN EXPLORATION CORP. (2) R.V. Bailey 3525 S. Tamarac St., Ste. 350 Denver, CO 80237</p>	<p>BEDROCK CO. P.O. Box 1505 Fairbanks, AK 99707</p>
<p>AU PLACER, INC. Box 2310 Fairbanks, AK 99701</p>	<p>ALKAM CORP. 3874 Caravelle Dr. Anchorage, AK 99502</p>	<p>AULT ENTERPRISES (2) Robert W. & Lynea L. Ault P.O. Box 82330 Fairbanks, AK 99708</p>	<p>BEERMAN, WILLIAM J. 2416 S. First St. Yakima, WA 98901</p>
<p>AU MINING, INC. 5441 Camelot Dr., No. D Anchorage, AK 99508</p>	<p>AL-VON MINING CO., INC. (2) Box 4-1214 Anchorage, AK 99509</p>	<p>AURUM PHILOSOPHURUM William S. Massengale SR 30024 Fairbanks, AK 99701</p>	<p>BEISTLINE, EARL H. P.O. Box 80148 Fairbanks, AK 99708</p>
<p>ADD VENTURES LTD. 720 M St., Ste. 7 Anchorage, AK 99501</p>	<p>AMERICAN CREEK PARTNERS Don deLima Box 81467 Fairbanks, AK 99708</p>	<p>AUSTIN, JEFFREY M. Box 1303 Seward, AK 99664</p>	<p>BELFIELD, J.W. & HENRICKS, R.J. Dixon Apartments No. 2A4 10th St. Fairbanks, AK 99701</p>
<p>AGRICOLA MINING CO. Stephen A. Greene P.O. Box 80834 College, AK 99708</p>	<p>ANACONDA MINERALS CO. (6) 2000 W. International Rd. Suite A-1 Anchorage, AK 99502 (lode, exploration, placer gold)</p>	<p>B & B MINING Bernard D. & Betty D. Wright No. 137 Gold Rush Estates Fairbanks, AK 99701</p>	<p>BENZEL, RUSSEL K. P.O. Box 82250 Fairbanks, AK 99708</p>
<p>ALAMIN MINING CORP. (2)** P.O. Box 93 International Falls, MN 56649</p>	<p>ANCHORAGE SAND & GRAVEL CO., INC. 1813 E. First Ave. Anchorage, AK 99501 (sand, gravel)</p>	<p>BPC RESOURCES CORP. G. Last 24 Hazelton Ave. Toronto, Ontario M5R 2E2</p>	<p>BIEDERMAN, CHARLIE & MAURICE LAWRENCE 330 3rd Ave., Apt. 304 Fairbanks, AK 99701</p>
<p>ALASKA APEX & MINING (2) James P. Conway SR B, Box 7660 Palmer, AK 99645 (sand, gravel, placer gold)</p>	<p>ANDERSON, TURV, GARTH, & BUD Anderson Road Fairbanks, AK 99701</p>	<p>BPS, INC. c/o Nick Begich 202043 E. 74th Ave. Anchorage, AK 99507</p>	<p>BIG LAKE SAND & GRAVEL, INC. P.O. Box 17-304 Big Lake, AK 99687 (gravel)</p>
<p>ALASKA COPPER-NICKEL PROPERTIES First Bank Trust Dept. 306 W. Superior St. Duluth, MN 55802</p>	<p>ANDERSON, WAYNE S. SR 20013 Fairbanks, AK 99701</p>	<p>BTW MINING & EXPLORATION CORP. (2) SRA 1721 4640 E. 113th Ave. Anchorage, AK 99507</p>	<p>BIG M. MINING George T. Massie P.O. Box 1042 Nome, AK 99762</p>
<p>ALASKA GOLD CO. (3) P.O. Box 640 Nome, AK 99762</p>	<p>ANDRESEN, CARL I. Bear Creek Mining, operator P.O. Box 10-0001 Anchorage, AK 99510</p>	<p>BADGER MINING Box 1393 Fairbanks, AK 99707</p>	<p>BIG WINDY MINING Harold W. Shope 300 Second Ave. Fairbanks, AK 99701</p>
<p>ALASKA GRAVEL SALES, INC. Felix F. Martinez 1422 K St. Anchorage, AK 99501 (sand, gravel)</p>	<p>ANNASARA ENTERPRISES Collin Towse, James Davies, Dan Cobin, Jr. P.O. Box 871594 Wasilla, AK 99687</p>	<p>BALDWIN, FRANK 1061 Chenawith Loop The Dalles, OR 97058</p>	<p>BIRDSELL, RUSSELL L. P.O. Box 1908 Cave Creek, AZ 85331</p>
<p>ALASKA MINERAL SERVICES (2) Scott Haskins 100 C St. Fairbanks, AK 99701</p>	<p>ANVIL MINING, INC. (2) P.O. Box 1694 Nome, AK 99762</p>	<p>BARELKA, MR. & MRS. PAUL L. 1215 9th Ave. Fairbanks, AK 99701</p>	<p>BITTLINGMAIER, KURT 3900 Arctic Blvd. Anchorage, AK 99503</p>
<p>ALASKA MINES LTD. James F. Meyers Box 61007 Anchorage, AK 99502</p>	<p>ARCTIC ALLUVIAL CONSULTANTS (2) Robert Flounders 2090 Innes Anchorage, AK 99515</p>	<p>BARTLING, ROGER P.O. Box 82970 Fairbanks, AK 99708</p>	<p>BLACK, GERALD D. Box 513 Kenai, AK 99611</p>
<p>ALASKA MINING & EXPLORATION Stephen F. Wells P.O. Box 100844 Anchorage, AK 99510 (underground gold, silver, etc.)</p>	<p>ARCTIC KNIGHT MINING CO. Philip K. Canon & Jack Dunshie P.O. Box 60675 Fairbanks, AK 99706</p>	<p>BATTEST, HAROLD H. 912 6th Ave. Fairbanks, AK 99701</p>	<p>BLAKELY, AMY & DON, & CLIFF LEWIS Apt. 7-D, 1725 University Ave. Fairbanks, AK 99701</p>
<p>ALASKA MINING PARTNERS (2) P.O. Box 1316 Milton, WA 98354</p>	<p>ARCTIC MINING CORP. P.O. Box 2019 Anchorage, AK 99510</p>	<p>BAUMGARTNER, IRVING K. Box 3147 Soldotna, AK 99669</p>	<p>BLISS, PATRICK J. 715 L St., Ste. 8 Anchorage, AK 99501</p>
<p>ALASKA SILVEINIA MINES Joseph C. Manga P.O. Box 844 Fairbanks, AK 99707 (lode silver, lead)</p>	<p>ARNARIAK, ADAM, SR. P.O. Box 95 Togiak, AK 99678</p>	<p>BAYLESS, HOWARD Copper Center, AK 99573 Albett Mining (op.) c/o Bob Ditman Box 201 Copper Center, AK 99573</p>	<p>BLUEBIRD ASSOC., INC. Gilbert A. Lamb General Delivery Central, AK 99730</p>
<p>ALDER CREEK MINES Patricia E. Sather 1213 Coppet Fairbanks, AK 99701</p>	<p>ARNOLD, GLADYS N. & BRONELL M. SR Box 1409 Eagle River, AK 99577</p>	<p>BEAR CREEK MINING (3) Jay Hammitt 1111 E. Dowling Road Anchorage, AK 99502</p>	<p>BLUE WATER MINING CO. Harold A. Nevers 8148 Pinewood Dr. Juneau, AK 99801</p>
		<p>BECKDAHL MINING CO. 305 Bentley St. F Fairbanks, AK 99701</p>	<p>BOEH-PETE MINING CO. P.O. Box 10-2013 Anchorage, AK 99511</p>
			<p>BONANZA MINING CO. Elden L. Reese SRC Box 8451 Palmer, AK 99645</p>

*Only licenses received by the Division of Mining, Fairbanks, as of January 15, 1985 are listed. Totals: 804 licenses; 621 licensees.
**Numbers in parentheses indicate number of separate licenses issued to single individual, partnership, or company, if more than one.

- BOTTOM DOLLAR MINING CO.**
P.O. Box 58098
Fairbanks, AK 99701
- BOULDER CREEK MINING CO.**
Les & Dorothy Fickes
P.O. Box 2618
Fairbanks, AK 99707
- BOUTON, GLENN D. & LELA M., & VERN H. (4)**
SR 3 Box 30608
Fairbanks, AK 99701
- BOWMAN, HOWARD N.**
P.O. Box 7
Iliamna, AK 99606
- BOYLE, VALE E. (3)**
629 W. 13th Ave.
Anchorage, AK 99501
- BRACKEN, EVERETT O. (2)**
Box 1098
Juneau, AK 99802
(various lode, placer gold)
- BRADLEY, BILL**
289 Marydale Court
Soldotna, AK 99669
- BRANDL, PHILIP (2)**
SRA Box 246
Anchorage, AK 99507
- BRASS MONKEY RANCH**
Margarete E. Brittain
SR Box 330 - Kenny Lake
Copper Center, AK 99573
(gravel)
- BREAID, JAMES D.**
Box 2116
Fairbanks, AK 99707
- BRIGGS, GLENN G.**
Box 77-0517
Eagle River, AK 99577
- BRODIS, ROGER F.**
P.O. Box 10211
Fairbanks, AK 99710
- BROOKS CO. (2)**
P.O. Box 534
Cooper Landing, AK 99572
- BRUCE, FARRELL L.**
General Delivery
Chicken, AK 99732
(lode gold)
- BUCHANAN, PERRY S.**
Box 1306
Seward, AK 99664
- BUCK, DARRIN**
P.O. Box 1281
Medical Lake, WA 99022
- BUCY ASSETT MANAGEMENT II (2)**
Gary F. Bucky
2213 W. 46th
Anchorage, AK 99502
- BUGLI, JOHN**
P.O. Box 21
Soldotna, AK 99669
- BURGESS, ROBERT F. & J.B. WORD**
SR Box 80395
North Pole, AK 99705
- BURKE ENTERPRISES**
Alan T. Chaffin
P.O. Box 10531
Fairbanks, AK 99710
- BURNS, DAVID R. & JACK P. JOHNSON (2)**
P.O. Box 265
Gakona, AK 99586
- BURNS, JOHN R.**
Mi. 54, Taylor Hwy.
Chicken, AK 99732
- BUROW, CARL R.**
2201 S. Cushman, No. 23
Fairbanks, AK 99701
- BUSBY, ROBERT C.**
SRA Box 50-D
Homer, AK 99603
- BUSTER CREEK MINING**
Homer E. Hoogendorn
Box 117
Nome, AK 99762
(lode gold)
- BUTTER, JOHN B. & STEVE SIMS**
217.5 Engineers Cut-off, Spur Rd.
Juneau, AK 99801
- BUZBY, RICHARD J. & SAUNDRA L.**
8807 Honeysuckle Apt. A
Anchorage, AK 99502
- BYRD, DICKIE L. (2)**
P.O. Box 10084
Fairbanks, AK 99710
- C & W/RED FOX GOLD MINE**
P.O. Box 10
Central, AK 99730
- CALIFORNIA OIL INDEPENDENTS, INC.**
777 S. Main St., Ste. 77
Orange, CA 92668
- CAMINDEX RESOURCES, INC.**
A.D. McKenzie
330 Bay St., Ste. 1120
Toronto, Ontario M5H 2S8
CANADA
- CANADIAN BARRANCA CORP., LTD.**
515 12220 Stony Plain Road
Edmonton, Alberta T5N 2Y4
CANADA
- CAPE COMPANY**
Dick Medley
HC64 Box 53
Pierce, ID 83546
- CARLO & SONS MINING CO.**
2113 Southern
Fairbanks, AK 99701
- CARLSON, ROBERT D.**
6655 Holly Lane
Anchorage, AK 99502
- CASSITERITE PLACERS, INC.**
General Delivery
Manley Hot Springs, AK 99756
(lode)
- CASTLE, NANCY J.**
SR Box 2518
Anchorage, AK 99507
- CASTLE CREEK MINES**
Fred R. & Patricia L. Hall
P.O. Box 83557
Fairbanks, AK 99708
- CAVANAGH, DAVID L. & GARY MCCARTHY**
P.O. Box 689
Girdwood, AK 99587
- CENTRAL SAND & GRAVEL**
M. Kathryn Thomas & William A. Joyce
Box 1594
Soldotna, AK 99669
(gravel, sand)
- CEREPA, ALEXANDER P. & LONA F.**
P.O. Box 1
Kenai, AK 99611
- CHANDALAR ENTERPRISES**
SR 20218 A
Fairbanks, AK 99701
- CHARLEY GRAVEL CO.**
Ernie Charley
P.O. Box 117
Gakona, AK 99586
(sand, gravel)
- CHASE BROTHERS**
426 Patsy St.
Anchorage, AK 99504
- CHENA MINING CO.**
W. Martin Exploration Inc.
8540 Williwa Ave.
Anchorage, AK 99504
- CHERMESKE, VERN & RON MOORE**
Box 17312
Big Lake, AK 99687
- CHICKAMAN MINING CO.**
Earl L. Schene
General Delivery
Chicken, AK 99732
- CHRISTIE, KNOX N., & LORENA N. (2)**
P.O. Box 801
Kodiak, AK 99615
- CHUGACH MINERALS, INC.**
J. Dennis Stacey
SRA Box 8766
Indian, AK 99540
(sand, gravel)
- CHUNILNA MINERALS & EXPLORATION, INC.**
Anchorage, AK 99510
Haviland Mining Co., operator
Box 104360
Anchorage, AK 99510
- CINCO MINING (5)**
John R. Autrey
P.O. Box 404
Houston, TX 77001-0404
- CIRCLE CONSTRUCTION CO.**
L&B Mining
1015 10th Ave.
Fairbanks, AK 99701
- CIRCLE MINING CO.**
Frank R. Warren
P.O. Box 11
Central, AK 99730
- CITIES SERVICE MINERALS CORP.**
P.O. Box 300
Tulsa, OK 74102
(lode copper & others)
- CLARA BEA, INC. (3)**
D.B. Vial & B.W. Comstock
15105 S.W. 98th
Tigard, OR 97223
- COAL FACTS, LTD.**
55 E. Center St.
Provo, UT 84604
- COASTAL EXPLORATION**
James Lawler
Box 386
Kasilof, AK 99610
- COLDFOOT ARCTIC MINING INC.**
Northward Building, Ste. 105
Fairbanks, AK 99701
- COLDFOOT EXPLORATION (2)**
Lawrence E. Brown
SR Box 30325
Fairbanks, AK 99701
- COLE, JOHN H.**
SR Box 110725
Fairbanks, AK 99701
- COLLINS, JESSE T.**
P.O. Box 74760
Fairbanks, AK 99707
- COMINCO ALASKA, INC.**
5660 B St.
Anchorage, AK 99502
- COMPASS MINING CO.**
John B. Hall
P.O. Box 2700
Fairbanks, AK 99707
- CONGDON, CARL J.**
925 Commerce St.
Fairbanks, AK 99701
- CONLIN, MICHAEL M.**
P.O. Box 102976
Anchorage, AK 99510
- CONNER, MIKE A. (2)**
SRB 7343-A
Palmer, AK 99645
(lode gold, silver, platinum, placer gold)
- COOK'S MINING**
Mary Cook
P.O. Box 393
Fairbanks, AK 99707
- COOPER, WILLIAM**
No. 58, Gold Rush Estates
Fairbanks, AK 99701
- COPPER VALLEY CONSTRUCTION CO., INC.**
P.O. Box 165
Glennallen, AK 99588
(gravel)
- CORAZZA, RICHARD & CANDICE SLOAN-SUNDELAND**
Box 1320
Homer, AK 99603
- CORONA MINING CO.**
Robert M. Lucas
P.O. Box 5578
Fullerton, CA 92635

- COSTELLO, RONALD E.
General Delivery
Bettles, AK 99726
- COYLE, WALDO E. & RUBY S.
P.O. Box 466
Kenai, AK 99611
(gravel)
- CRAIG GRAVEL CO.
Jack Craig
Box 133
Gakona, AK 99582
(sand, gravel)
- CRESCENT GOLD MINES (3)
Edward E. & Jennie Ellis
Box 824
Cooper Landing, AK 99572
(lode & placer gold)
- CREVICE CREEK MINING
William P. Fickus
General Delivery
Bettles, AK 99726
- CROUSE, LARRY
2398 Elliott Hwy.
Fairbanks, AK 99701
- CUEVAS, DANIEL & PEGGY
P.O. Box 2195
Truckee, CA 95734
- CULLETT, THERESA A.
P.O. Box 526
Shady Cove, OR 99539
- CURRINGTON, RICHARD, et al.
660 Fairbanks St., C-2
Fairbanks, AK 99701
- CURTIS, EDGAR J.
7716 Island Dr.
Anchorage, AK 99504
(lode gold, silver, other)
- D & L MINING
Deveer Disheroon
General Delivery
Manley Hot Springs, AK 99756
- D-LOG, INC.
Ferral L. Woods
P.O. Box 81410
College, AK 99708
- DNL MINING (2)
Donald L. Watts
P.O. Box 81515
College, AK 99708
- D & O VENTURES (2)
Clifford H. Driskell
235 E. 9th Ave.
Anchorage, AK 99501
- DALOYON, GARY L. &
DAVID B. FULTON
2008 Esquire Ave.
Fairbanks, AK 99701
- DAMAN, JOE W.
Box 344
Sultan, WA 98294
- DAN CREEK PLACER MINES (2)
Tim Jacobson
P.O. Box 401
Gig Harbor, WA 98335
- DANIELS CREEK MINING
Arthur G. Scott
9 Margaret Ave.
Fairbanks, AK 99701
- DART, JOHN R.
General Delivery
Manley Hot Springs, AK 99756
- DAVERT, EDWARD J.
3757 S. 162nd St.
Seattle, WA 98188
- DAVIS, ROBERT V. (2)
P.O. Box 790
Juneau, AK 99802
- DEBOER, MAURICE E.
729 Oceanview Dr.
Anchorage, AK 99515
- DECAMILLE, LYN C.
P.O. Box 1062
Willow, AK 99688
- DEGNAN MINING CO. (2)
Joseph A. & Caroline H. Degnan
Box 0045
McGrath, AK 99627
- DELTA AMALGAMATED MINING
CO.
William J. Smith
P.O. Box 1083
Delta Junction, AK 99737
- DENALI MINING LTD.
1113 W. Fireweed Lane, Ste. 203
Anchorage, AK 99503
- DETERDING, LOUIS
2085 Van Horn Road
Fairbanks, AK 99701
- DIAMOND LAKE GRAVEL
Everett K. Rains
P.O. Box 17-445
Big Lake, AK 99687
(gravel)
- DISCOVERY MINING
James W. Belfield
P.O. Box 1934
Fairbanks, AK 99707
- DISHAROON, DEEVEER &
R.C. PITTMAN
P.O. Box 122
Twisp, WA 98856
- DOBNIK MINING (4)
Rudy, Adolf A., & Sara Dobnik
Box 341
Bethel, AK 99559
- DODIES DREAM ASSOC. (2)
Walter W. & Doris Kopp
P.O. Box 1935
Fairbanks, AK 99707
- DUGGER, MICHAEL B.
Box 94
Central, AK 99730
- DUVAL CORP.
4715 E. Ft. Lowell Rd.
Tucson, AZ 85712
- E & E MINING (2)
Fred I. Erikson & Marty Evans
Box 871312
Wasilla, AK 99687
- EF CO.
Edward J. Armstrong, James C.
Forrest, and John Thomas
Box 98
Central, AK 99730
- ES MINING CO.
Rudolf Vetter
P.O. Box 342
Fairbanks, AK 99707
- EAGLE CREEK MINING
Richard D. Burton
General Delivery
Chicken, AK 99732
- EAGLE DOME AGGREGATE, INC.
P.O. Box 4-D
Anchorage, AK 99509
(sand, gravel)
- EBERHARDT, DAVID
SR 50503
Fairbanks, AK 99701
- EMERSON, ROBERT C., et al. (2)
1811 Phillips Field Road
Fairbanks, AK 99701
- ENDICOTT MINING
Box 673
Fairbanks, AK 99701
- ENSERCH EXPLORATION, INC.
G.R. Ryan
1817 Wood St.
Dallas, TX 75201
(lode gold, silver)
- ESTES, W. DON
Box 2377
Soldotna, AK 99669
- EUREKA MINING (2)
George D. Bailey
Box 2052
Fairbanks, AK 99707
- EVECO MINING INC.
Alice C. Ebenal
SR Box 20526
Fairbanks, AK 99701
- EVENSON, JEFFREY E.
SRA Box 1763-H
Anchorage, AK 99507
- EWSIGN, FRED
SR 61180
Fairbanks, AK 99701
- 4-GOLD MINING & EQUIPMENT
& OTHER LESSEES
P.O. Box 101827
Anchorage, AK 99510
- 45 PUP MINING CO. (3)
Charles R. Hammond
General Delivery
Chicken, AK 99732
- FAA, TOM
General Delivery
Healy, AK 99743
- FAIRBANKS MINING CO.
Box 83024
Fairbanks, AK 99708
- FAIRBANKS SAND & GRAVEL,
INC.
P.O. Box 686
Fairbanks, AK 99707
(gravel)
- FAULKNER, HARRY E., SR. &
JEANNINE D.
P.O. Box 1307
Bethel, AK 99559
- FERN DEVELOPMENT CO., INC.
G.F. Kalmbach
5950 Kincaid Road
Anchorage, AK 99502
(underground gold)
- FINN BEAR MINING &
EXPLORATION CO., INC.
P.O. Box 150
Anchor Point, AK 99556
(lode gold, silver, platinum)
- FIX, HOWARD C.
Box 403
Northway, AK 99764
- FLATPICK MINING (4)
Gordon Fulton, & Dickey Livestock
Box 118
Central, AK 99730
- FLAT CREEK PLACERS
John E. & Richard S. Fullerton
General Delivery
Flat, AK 99584
- FLEMING, MITCH
General Delivery
Wiseman, AK 99790
- FLETCHER, DOUGLAS C.
44509 McKenzie Hwy.
Leaburg, OR 97489
(lode gold)
- FORREST, JAMES C. &
EDWARD J. ARMSTRONG
P.O. Box 82591
Fairbanks, AK 99708
- FORT PLACER, LTD.
P.O. Box 1765
Fort Smith, AR 72901
- FORTRESS MINING
Lloyd J. Osborn
SRC Box 8458
Palmer, AK 99645
- FORTUNE MINING CO. OF
ALASKA
Ernest & Rena Harrell
Route 2, Box 8B
Willow, AK 97827
- FOSTER, EARLE C. & RHEA L. (2)
8450 Golden St.
Anchorage, AK 99502
- FOSTER, GARY P.
1850 Greendale Dr.
Anchorage, AK 99504
- FOUR BROTHERS MINING
P.O. Box 81117
College, AK 99708
- FOX GULCH TRIO
Harvey Case, John Turner, &
Ronald Way
22 Glacier, No. 7
Fairbanks, AK 99701
- FRALEY EQUIPMENT, INC.
C.C. Hawley & Assoc., operator
7015 Old Seward Hwy.
Anchorage, AK 99502
- FRONTIER MINING & EQUIPMENT
Wallace E. Blasingame
P.O. Box 56673
North Pole, AK 99705
- FRY, CLARENCE
P.O. Box 905
Homer, AK 99603

- FUTURE'S DREAM PLACER MINE
George Huston & Ray Jennings
SR Box 89
Willow, AK 99687
- GCO MINERALS CO.
1031 W. 4th Ave., Ste. 300
Anchorage, AK 99501
- GHD RESOURCES:
Gold Exploration Program 1981
P.O. Box 10499
Fairbanks, AK 99710
- GAEDE & LINDMAN DREDGING
P.O. Box 3121
Soldotna, AK 99669
- GALAXY MINERALS, INC.
P.O. Box 467
Fairbanks, AK 99707
- GALIPEAU, DARYL &
LEE M. CARTER (2)
120 Crestview Dr.
Colville, WA 99114
- GAME CREEK MINING CO.
420 Ocean View Dr.
Anchorage, AK 99515
- GARDNER, LAYNE
284 Cindy Dr.
Fairbanks, AK 99701
- GEIGER, RONALD E. (2)
SRC Box 8456
Palmer, AK 99645
- GELVIN, EDWIN C. &
STANLEY M.
Box 18
Central, AK 99730
- GEORGE, ROY T.
61 Clark St., No. 2
Salinas, CA 93901
- GERAGHTY MINING
Richard W. Geraghty
405 Juneau Ave.
Fairbanks, AK 99701
- GIBSON PLACER MINING
Wayne & Ellen Gibson
1610 Southern
Fairbanks, AK 99701
- GILL, TERRY
Box 10
Port Alsworth, AK 99653
- GLACIER PRODUCTS
Rolle F. Goeber
P.O. Box 5
Valdez, AK 99686
(sand, gravel)
- GLACIER VIEW MINING &
DEVELOPMENT
SRC Box 8456
Palmer, AK 99645
- GLANVILLE LUMBER CO.
Carl Glanville
SR Box 1195
Anchor Point, AK 99556
(gravel)
- GODFREY REDI-MIX
Phil Godfrey
P.O. Box 1954
Bellevue, WA 98009
(gravel)
- GOLD DUST MINES
D.M. & R. Ackels
Box 2151
Fairbanks, AK 99707
- GOLDEN EAGLE MINE
Henry Thicke
Route 1
Bangor, WI 54614
- GOLDEN NUGGET MINING (2)
Donald A. Saunders
2831 Baxter Rd., No. 2D
Anchorage, AK 99509
(lode gold, silver, mercury, etc.,
placer gold)
- GOLDEN SANDS MINING CO.,
INC.
1475 Sand Piper Way, No. 52
Salt Lake City, UT 84117
- GOOD ROCK PLACER ASSOC.
Edward T. McHenry &
Doug McRae, Sr.
Box 1333
Seward, AK 99664
- GORESEN, EDMUND J.
P.O. Box 91
Seward, AK 99664
- GREAT AMERICAN MINING
George R. Haskins
P.O. Box 1777
Fairbanks, AK 99707
- GREAT LAND NORTH
Dennis Wilfer
P.O. Box 192
Fairbanks, AK 99707
- GREATLAND EXPLORATION,
LTD. (2)
3512 Campbell Airstrip Road
Anchorage, AK 99504
- GREEN CONSTRUCTION CO.
2015 Grand Ave.
Des Moines, IA 50312
(sand, gravel)
- GREEN MINING & EXPLORATION
SR 22135
Fairbanks, AK 99701
- GREYBEARD MINING
Ronald E. Smith
P.O. Box 772
Haines, AK 99827
- GUTHERIE, HOWARD P.
P.O. Box 61367
Fairbanks, AK 99701
- H & S MINING
Leo T. Harbour
Box 4728
Eielson AFB, AK 99702
- HAAB, VINCENT M.
P.O. Box 103578
Anchorage, AK 99510
- HAGGLAND, JAMES P.
P.O. Box 81464
Fairbanks, AK 99708
- HALL, DIANE M.
14200 Hancock Dr.
Anchorage, AK 99515
- HALL, FRANK M.
P.O. Box 1073
Juneau, AK 99802
- HALLOUGIL CORP.
Paul Gallagher
SR 51329-B
Fairbanks, AK 99701
- HALVERSON, VINCENT E. &
MORRIS WOLTERS
3307 81st Ave. W.
Anchorage, AK 99502
- HAMBLIN, MARKAY E.
General Delivery
Palmer, AK 99654
- G.A. HANKS & SONS
Box 2533, Hwy. 16
W. Sacramento, CA 95691
- HANLING, VICTOR R.
P.O. Box 86
Central, AK 99730
- HANSEN GOLD (10)
James H. & Kathleen L. Hansen
Box 246
Nome, AK 99762
(lode gold, platinum, placer gold)
- HANSON, ALLEN W.
3010 W. 30th
Anchorage, AK 99503
- HANSON PROPERTIES, INC. (2)
P.O. Box 7310
Spokane, WA 99207
- HAPPY VALLEY GRAVEL
O.J. & Ella M. McGann
P.O. Box 174, Happy Valley
Anchor Point, AK 99556-0174
(gravel)
- HARD ROCK MINING CO.
John D. Lewis, Jr.
P.O. Box 110-721
Anchorage, AK 99511
- HARRIS SAND & GRAVEL, INC.
P.O. Box 1347
Valdez, AK 99686
(gravel)
- HARTT, JOHN & JUDITH D.
156½ Second Ave.
Fairbanks, AK 99701
- HASSON, PETER & RINDA
P.O. Box 13171
Trapper Creek, AK 99683
- HAWLEY RESOURCE
PROPERTIES, INC.
8740 Hartzell Road
Anchorage, AK 99507
(coal)
- HAYDEN EXPLORATION &
MINING (2)
Forest A. Hayden
SR Box 5495E
Anchorage, AK 99516
- HEAVY METALS MINING
Valerie M. Therrien
779 8th Ave.
Fairbanks, AK 99701
- HEFLINGER MINING &
EQUIPMENT CO. (3)
Carl F. & Fred Heflinger
665 10th, Apt. 307
Fairbanks, AK 99701
- HENDRICKSON, BERNHARDT S.
(2)
3549 Dunkirk Dr.
Anchorage, AK 99502
(lode gold)
- HENRY, WARREN M. &
MARY LOU
P.O. Box 4-2395
Anchorage, AK 99509
- HERNING EXPLORATION &
MINING
Bruce G. Herning
P.O. Box 73846
Fairbanks, AK 99707
- HERZOG, MARTIN & JEAN
SR A Box 234
Anchorage, AK 99507
- HIL MIL MINING
Ellsworth E. Domres
4507 Crescent Beach Road
Onekama, MI 49675
- HILL, KENNETH E.
SR 10683, 1.1 Mi. Gold Hill Road
Fairbanks, AK 99701
- HOLLYWOOD ROAD SAND &
GRAVEL
William & Grace Elkins
SR 12860
Wasilla, AK 99687
(sand, gravel)
- HOOVER, CARLTON L. &
EUPHA L.
P.O. Box 97
c/o Parker House
Tok, AK 99780
- HOPEN, ALF
Box 74246
Fairbanks, AK 99707
- HOUSE, CONRAD H.
SR 80384
Fairbanks, AK 99701
- HOUSE, LEE, & RUDY KRIZAK
4 Broadfield
Jackson, TN 38301
- HOUSTON, JAMES D.
604 W. 26th Ave., No. 273
Anchorage, AK 99503
- HOWELL, FLOYD
SRA 3514-C
Anchorage, AK 99502
- HUERMORE, GEORGE D., &
JOE DONALD
3302 Dozbrandt, No. 3
Anchorage, AK 99503
- HUGHLEY, HOWARD
P.O. Box 38
Hope, AK 99605
- INTERIOR ALASKANS ASSOC.
Richard L. Loud
SR 51515, 742 Bennet Rd.
Fairbanks, AK 99701
- INTERIOR MINERALS CORP.
1668 Market St.
Fairbanks, AK 99701
- IVY MINING CO.
Joseph V. Strunka
P.O. Box 550
Fairbanks, AK 99707-0550

JFM & ASSOC.
John F. Malone
Box 1032
Bethel, AK 99559

JACKSON, CHARLES T.
P.O. Box 110085
Anchorage, AK 99511

JACKSON, RODNEY D. &
LARRY DUNLEVY
3953 James Dr.
Anchorage, AK 99504

JAQUES, DARRELL E.
208 Wendell St.
Fairbanks, AK 99701

JENSEN, DANIEL D. (2)
Box 12
Delta Junction, AK 99737

JIM CRO MINE
Paul J. Barry & Kenneth L. Lover
SRA Box 6681
Wasilla, AK 99687

JOHN, ROBERT S., &
KEVIN BERGMAN
General Delivery
Fairbanks, AK 99701

JOHNSON & SONS (2)
General Delivery
Manley Hot Springs, AK 99756

JOHNSON, JAMES H.
P.O. Box 81634
Fairbanks, AK 99708

JOHNSON, THOMAS
Box 608
Nome, AK 99762

JONES, JOHN C.
P.O. Box 74603
Fairbanks, AK 99707

JONES, W. DEERING (3)
MP 49 3/4 Anchorage & Swd. Hwy.
Moose Pass, AK 99631

JOSEPH, ANTHONY
Box 294, 260 Muldoon Rd.
Anchorage, AK 99504

JUNEAU BOWL MINING CO.
Thomas E. Byron
231 E. 46th Ave., No. 2
Anchorage, AK 99503
(lode gold)

JUNEAU MINING CO., INC.
P.O. Box 1007
Juneau, AK 99802

K & E MINING
Timothy J. Kelly & Fred Erikson
General Delivery
Manley Hot Springs, AK 99756

K & K MINING
Keith R. & Kenneth C. Mitchell
4850 Alpha Circle
Anchorage, AK 99516

KLK, INC. & KANTISHNA MINING
CO. (2)
SRD Box 9070
Palmer, AK 99645

KACHEMAK MINING CORP.
SRA Box 50-D
Homer, AK 99603

KALBERG, PETER
Box 1067
Willow, AK 99688

KAMPS, ALBERT W.
P.O. Box 1
Ruby, AK 99768

KANTISHNA LOAD
Larry F. Goldsby
P.O. Box 4-2404
Anchorage, AK 99509

KANTISHNA MINES LTD.
Mark Anthony
2020 Lake Otis Pkwy.
Anchorage, AK 99508
(lode, placer gold, silver)

KANTISHNA MINING CO.
Box 102596
Anchorage, AK 99510

KAVIC MINING CO.
P.O. Box 1411
Fairbanks, AK 99707

KEB ENTERPRISES
Michael Keb
1139 1st Ave.
Fairbanks, AK 99701

KEISLING, KELLY L. &
DENIS DEWANE
P.O. Box 91
Moose Pass, AK 99631

KELLIHER, MAURICE
P.O. Box 216
Nome, AK 99762

KENDRICK BAY MINING CO.
c/o Standard Metals Corp.
645 Fifth Ave.
New York, NY 10022
(exploration)

KENNECOTT CORP.
111 E. Dowling Rd.
Anchorage, AK 99502

KILE, ALVIN L. & ERIC E.
Box 8-424
Anchorage, AK 99508

KIMBALL, JAMES R.
General Delivery
Chicken, AK 99732

KIM-CAT MINING
Henry C. Cline & Vernon L. Olsen
P.O. Box 55579
North Pole, AK 99705

KLEWEIN, WALTER F.
1587 Crescent Dr.
Anchorage, AK 99508

KLIGIN ARCTIC CONSTRUCTION
Box 11-1156
Anchorage, AK 99511

KNAEBEL MINING
VENTURES (2)
P.O. Box 81467
Fairbanks, AK 99708

KOSYDAR, LESLIE M.
P.O. Box 495
Sterling, AK 99672

KOUTCHAK, DOROTHY N.
P.O. Box 137
Kotzebue, AK 99752

KOYUKUK GOLD CO.
Dennis J. Stacey
5331 E. 26th Ave., No. 6
Anchorage, AK 99504

KRAGER, WILLIAM R. (4)
3612 Northpoint Dr.
Anchorage, AK 99502

KRITZMAN, HENRY E.
SRA Box 476-K
Anchorage, AK 99507

KRKOVICH, REGINALD D.
P.O. Box 557
Juneau, AK 99802

KROSHUS, GLEN O.
P.O. Box 60948
Fairbanks, AK 99706

KURKA, WALTER J.
General Delivery
Palmer, AK 99645

KVAMME, KATHERINE & SONS
General Delivery
Akiak, AK 99552

LAB MINING, INC.
Rt. 7, Box 70882
Fairbanks, AK 99701

L & B MINING (3)
David B. Parent
1015-10th Ave.
Fairbanks, AK 99701
(lode, placer gold)

LC MINING (2)
P.O. Box 1062
Willow, AK 99688

LAKE HOOD ASSOC.
Edgar Curtis
Lake Hood
Anchorage, AK 99502

LAKEWOOD ASSOC.
Cliff Alexander
Box 602
Fairbanks, AK 99707

LANDTEC NATURAL
RESOURCES CO.
John S. Adams
4201 Pinnacle Circle
Anchorage, AK 99504

LANGE, ROBERT L.
5002 Cambridge Way
Anchorage, AK 99503

LANGLOE, MONA L.
P.O. Box 870463
Wasilla, AK 99687

LARSON, MARVIN A., & EDNA C.
345 Birchwood Dr.
Moraga, CA 94556

LASPESA, JOSEPH S.
90 Dorchester Road
Buffalo, NY 14213

LAST CHANCE MINING CO. (2)
Walter, Ruth, Robert, &
Ronnie Roman
P.O. Box 141
Fairbanks, AK 99707

LAYLAND FAMILY, INC.
James R. Moody
4300 E. 3rd
Anchorage, AK 99504

LAYMAN, JAMES R. (3)
P.O. Box 44
Eagle, AK 99738

LEACH, JAMES B., III
P.O. Box 7540
Big Lake, AK 99607

LEIBEG, GARY L.
SRA Box 323 F
Anchorage, AK 99507

LEONARD, HARRY
General Delivery
Wiseman, AK 99726
Two Bear Mining, Lounsbury Mining,
JV, operator
Box 2222
Fairbanks, AK 99707

LILLIAN CREEK MINE, INC.
Ronald L. Tucker
P.O. Box 60334
Fairbanks, AK 99701

LINDPHIL MINING CO.
Walter T. Phillips & Stanley Lindsag
P.O. Box 3304
Homer, AK 99603

LINDROS, DAVID G.
P.O. Box 91 (Grays River) SR-4-4014
Grays River, WA 98621

LINENSCHMIDT, HARVEY B.
2802 Wesleyan Dr.
Anchorage, AK 99508

LINFORS, HUGO & C.M. READER
P.O. Box 355
Nome, AK 99762

LITTLE CREEK MINE (2)
Philip Sayer
Box 2353
Homer, AK 99603

LITTLE ELDORADO PROJECT
James B. Haynes
P.O. Box 101715
Anchorage, AK 99510

LIVENGOOD GOLD MINES, INC.
Box 81467
Fairbanks, AK 99708

LONDON, JOHN R. & LUCILLE A.
1801 State St.
Anchorage, AK 99504

LORD, WALLACE J. (2)
c/o Sunrise Inn
Cooper Landing, AK 99572

LOSONSKY, STEVE M.
P.O. Box 80321
College, AK 99708

LUCAS, DONALD L.
1803 Kepner St.
Anchorage, AK 99504
Les Cobb (operator)
General Delivery
Rampart, AK 99767

LUCKY SEVEN MINING CO.
Walter Roman & family
P.O. Box 141
Fairbanks, AK 99707
(gravel)

M&M MINING (2)
Rodney D. Mitchell
SR Box 50718
Fairbanks, AK 99701

- MAGIC CIRCLE, INC.
Phil Menges
SR Box 20803
Fairbanks, AK 99701
- MAGNUSON, WARREN E. &
ALICE M.
P.O. Box 55
McGrath, AK 99627
- MAJIK MINING CO.
Stan Jackson
Box 7
Soldotna, AK 99669
- MANIA MINING
Scott B. Thorngren
236 Farewell
Fairbanks, AK 99701
- MANLEY MINING CO.
J. Hook
General Delivery
Manley Hot Springs, AK 99756
- MANNS, ALAN R. &
MILES WALKER
General Delivery
Bettles, AK 99726
- MANNS, ALBERT, CECELIA
& FAMILY
General Delivery
Bettles, AK 99726
- MANUEL, PAUL
Box 287
Copper Center, AK 99573
- MARK ANTHONY, ROBERT
2020 Lake Otis Pkwy.
Anchorage, AK 99508
- MASCOTT MINING CO. (2)
Daniel K. & Pearse M. Walsh
Box 504-A & Box 179
Nome, AK 99762
- MASON, ARNOLD J.
203 E. St.
Fairbanks, AK 99701
- MASSIE, GEORGE M.
P.O. Box 507
Bonsall, CA 92003
- MAXWELL, LESLIE L. &
FOREST A. HAYDEN (2)
SRA Box 5482 & SR Box 5495
Anchorage, AK 99516
- MCCARTHY, REYNOLDS, MCLINN
3605 Arctic Blvd., No. 476
Anchorage, AK 99503
- MCCLAIN, JOHN E.
P.O. Box 436
Soldotna, AK 99669
- MCCLUNG & SONS MINING
John R. McClung
626 Chatinika Loop
Eagle River, AK 99577
- MCCOMBE, R.S. & MURIEL
General Delivery
Chicken, AK 99732
- MCCRARY, WAYNE
General Delivery
Chicken, AK 99732
- MCGUIRE, SEAN E. (2)
General Delivery
Bettles, AK 99726
- MCINTOSH, RICHARD, L.
SR 2, Box 22139
Fairbanks, AK 99701
- MCMASTER, JIMMY K.
Box 416
Talkeetna, AK 99676
- MCWILLIAMS, HOWARD F.
P.O. Box 1317
Anchorage, AK 99510
- MEINING, EINAR T. (2)
1111 F St.
Anchorage, AK 99501
- MELDRUM, BILL, ELLIS
ROBERTS, & BOB ROBERTS (2)
General Delivery
Chicken, AK 99732
- MENDENHALL, KEITH JR.
308 Kody Dr.
Fairbanks, AK 99701
- MERKES ENTERPRISES (2)
Leon N. Merkes
Box 8
Sterling, AK 99672
- METCALF, JAMES C.
Box 72933
Fairbanks, AK 99707
- METCO, INC.
Frank Dieckgraef
P.O. Box 895
Seward, AK 99664
- MIDNIGHT MINING ASSOC. (4)
Robert Aumüller, et al.
SR 71188
Fairbanks, AK 99701
- MIKNICH, CHARLES M.
SRA Box 1550G, 3600 Taiga Dr.
Anchorage, AK 99507
- GEORGE L. MILLER
CONSTRUCTION, INC.
P.O. Box 2057
Fairbanks, AK 99707
- MILLER, HERSHEL D.
289 Merypole Court
Soldotna, AK 99669
- MISCOVICH, ANDREW W. (2)
Box 1489
Fairbanks, AK 99707
- MISCOVICH, HOWARD P.
Box 262
Galena, AK 99741
- MISCOVICH & WALSH MINING
CO.
John A. Miscovich
P.O. Box 4D
Anchorage, AK 99509
- MOHAWK OIL & GAS, INC. (2)
Mohawk Resources
Bill Ferguson
P.O. Box 74224
Fairbanks, AK 99707
- MONROE, JOHN B.
P.O. Box 23561
Fairbanks, AK 99701
- MONZULLA, VINCENT & LINDA
2920 Monzulla Lane
Fairbanks, AK 99701
- MORRIS, CLAUDE H., JR.
P.O. Box 546
Girdwood, AK 99587
- MORRIS, WILLIAM H. & MARY D.
General Delivery
Chicken, AK 99732
- MRAK PLACER MINE
Mrak, Aklestad, Herman & Herman
P.O. Box 1963
Palmer, AK 99645
- MULLIKIN, DONALD E.
Box 790
Homer, AK 99603
- MUNJAR, WALTER L. &
SAMUEL L. (3)
750 Foxtail Dr.
Fairbanks, AK 99701
- MURPHY, DENNIS J.
P.O. Box 462
Kenai, AK 99611
- MURPHY, WAYNE A.
P.O. Box 2172
Kodiak, AK 99615
- N-R ENTERPRISES
Douglas W. & Carol R. Neeley
P.O. Box 165
Glennallen, AK 99588
(gravel)
- NELCHINA MINES
A.L. Renshaw, Jr.
1850 Wickersham Dr.
Anchorage, AK 99507
- NELSON, LARRY C.
413 Glacier Ave.
Fairbanks, AK 99701
- NELSON, ROBERT R. (2)
P.O. Box 55462
North Pole, AK 99705
- NEMEC, WILLIAM J.
P.O. Box 83032
Fairbanks, AK 99708
- NEUBAUER, JACK
General Delivery
Manley Hot Springs, AK 99756
- NEW OSKAWALIK ENTERPRISES
Hall M. Green
Box 4315
Anchorage, AK 99510
- NIKISHKA SAND & GRAVEL
Merril M. McGahan
Box 7110 NRB
Kenai, AK 99611
(gravel, topsoil)
- NIXON FORK MINE
Theodore J. Almasy &
Margaret L. Mespelt
General Delivery
McGrath, AK 99627
(lode gold, silver, base metals,
tin, bismuth, uranium)
- NOME CREEK MINING (2)
M.A. Pavey
3288 Adams St., Apt. 203
Fairbanks, AK 99701
- NORANDA EXPLORATION,
INC. (4)
J.S. Drechsler, Jr.
139 E. 51st Ave.
Anchorage, AK 99503
(placer, base, precious, &
ferro-alloy exploration)
- NORCROSS-STONEBURG MINING
CO.
James H. Norcross
Rt. 1, Box 2332
Chugiak, AK 99567
- NORDEEN, WILLIAM H.
General Delivery
Wiseman, AK 99726
- NORDLUM, ROGER
Box 171
Kotzebue, AK 99752
- NORFRAN INVESTMENTS, INC.
R.E. Ford
67 Valentine Dr.
Don Mills, Ontario M3A 37J
CANADA
- NORTHERN MINERALS
Paul Nantvidt
P.O. Box 60750
Fairbanks, AK 99706
- NORTHERN OIL OPERATIONS,
INC.
Drawer 3293
Kenai, AK 99611
- NORTHERN VENTURES
Richard J. Anderson &
Walter T. Nielson
SR Box 80951
Fairbanks, AK 99701
- NORTHLAND GOLD DREDGING,
JV
139 E. 51st
Anchorage, AK 99503
- NORTHWEST EXPLORATION,
INC.
P.O. Box 1765
Fort Smith, AR 72902
- NUGGET ESTATE MINING CO.
Edward W. & Grace J. Montgomery
P.O. Box 60430
Fairbanks, AK 99706
- NUTTING, PAT & JACK (2)
P.O. Box 2656
Chugiak, AK 99567
- O'CARROLL, JOHN J.
General Delivery
McGrath, AK 99627
- OFFICER, CASEY W.
2615 S.E. Courtney, No. 75
Milwaukie, OR 97222
- OLD YELLOW MINING
P.O. Box 608
Elgin, OR 97827
Ralph Simonson, rep.
Healy, AK 99743
- OLSON, ALAN G. &
VICTOR E. LOYER
Box 165
Palmer, AK 99645
- OLSON, RICHARD A.
SR 20682 B
Fairbanks, AK 99701

- OMEGA MINING CO., INC.
332 N. Boundary St.
Fairbanks, AK 99701
- ORO FINO MINING CO.
P.O. Box 5
Valdez, AK 99686
- OTTER DREDGING CO.
John A. Miscovich
General Delivery
Flat, AK 99584
- OUTLOOK INVESTMENTS
5331 Arctic Blvd.
Anchorage, AK 99502
- PMX MINE
David & Mavis E. McClug
4312 Zodiac
Anchorage, AK 99507
- PACIFIC RIM MINING CO. (2)
4751 Old Seward Hwy., Box A-164
Anchorage, AK 99503
- PAGE, MAURICE E.
Mi 92 Taylor Hwy.
Chicken, AK 99732
- PALMER ENTERPRISES (2)
Stanley D. Palmer
P.O. Box 634
Soldotna, AK 99669
- PAN ALASKAN GOLD MINES,
PAN CENTRAL EXPLORATIONS
LTD., & PAN CENTRAL
ALASKA, INC.
Rose Palmer
301-67 Richmond St., W.
Toronto, Ontario M5H 1J5
CANADA
- PANNER CONSOLIDATED
John B. Wentz
4048 Teal Ave.
Fairbanks, AK 99701
- PARADISE PEEK
John B. Ritter
1750 Engineers Cutoff, Spur Rd.
Juneau, AK 99801
- PARGUT, WALTER T.
P.O. Box 2334
Fairbanks, AK 99707
- PARKER, CURTIS C.
P.O. Box 246
Mojave, CA 93501
- PARR, GLEN C.
Rt. 1, MP 260 Parks Hwy.
Healy, AK 99743
- PARRY, JAMES M. (2)
P.O. Box 1656
Fairbanks, AK 99707
- PASKVAN, CHARLES A.
J.C. Anpas, Inc., operator
SR Box 50248
Fairbanks, AK 99701
- PASQUAL, PETE (2)
General Delivery
Wiseman, AK 99726
- PATTERSON, H.M., &
G.M. HOSLER
729 15th Ave.
Fairbanks, AK 99701
- PAYCHECK MINING
Stella D. Lavender
General Delivery
Boundary, AK 99790
- PAYTON PLACE, INC.
William C., Charles J., &
Grace L. Payton
P.O. Box 334
Healy, AK 99743
- PEET, LEE & JAMES R.
MARIOTTE
P.O. Box 93
Central, AK 99730
- PENN JERSEY DRILLING CO.
Lawrence A. Schachle
SR Box 2201
Wasilla, AK 99687
- PENZ, LOWELL (2)
5435 31st Ave., S.W.
Rochester, MN 55902
- PHILLIPS, GERALD C. (2)
SR Box 10408-B
Fairbanks, AK 99701
- PHILLIPS, NORMAN L., &
NORMAN L., Jr.
P.O. Box 81092
Fairbanks, AK 99708
- PHILLIPS, ORVILLE H.
Box 278
Soldotna, AK 99669
- PIERCE, ALBERT H.
Box 529
Haines, AK 99827
- PLACER CREEK MINING CO. (2)
SR Box 7500
Palmer, AK 99645
- PLACER LTD.
116 Minnie St.
P.O. Box 81978
Fairbanks, AK 99701
- PLACID OIL CO. (2)
550 W. 7th Ave., Ste. 110
Anchorage, AK 99501
John R. Graham
1023 Smythe
Fairbanks, AK 99701
- PLACK, PHILIP E. & PAUL W.
P.O. Box 2325
Palmer, AK 99645
- POINTS NORTH
Robert Cacy
Box 106
Central, AK 99730
- POKER CREEK MINING
William J. & Shirley B. Aldridge
6300 Lost Circle
Anchorage, AK 99502
- POLAR MINING, INC. (3)
Donald J. May & James L. Regan
4545 Wood River Dr.
Fairbanks, AK 99701
- PRIMROSE MINING CO. (2)
David J. Moore
Box 1158
Seward, AK 99664
(lode gold)
- PRINGLE, A.W. (2)
General Delivery
Manley Hot Springs, AK 99756
- PURCELL, MIKE H., &
NEIL KITAMURA
6300 Petersburg St.
Anchorage, AK 99507
- QUARTZ CREEK EXPLORATION
CO.
Milo E. Flothe
Route 2, Box 242
Sterling, AK 99672
- REB CO.
Randolph E. Burgess
P.O. Box 5540
North Pole, AK 99705
- RGU MINING CO.
Douglas L. & S. Miller
P.O. Box 1587
Fairbanks, AK 99707
- R & R MINING
Fred & Earl Negus
General Delivery
Talkeetna, AK 99676
- RT & J MINING (2)
Rodney D. Jackson
P.O. Box 632
Kenai, AK 99611
- R & W MINING
John E. Wortman
General Delivery
McGrath, AK 99627
- RANCHERS EXPLORATION &
DEVELOPMENT CORP. (2)
The Territorial Corp., operator
P.O. Box 6217
Albuquerque, NM 87197
- RASMUSSEN, MICHAEL J. &
MERLIN P.
SRA Box 438-L
Anchorage, AK 99507
- RED HAT MINE
Milton C. Jauhola
P.O. Box 00245
Nenana, AK 99760
- REDMOND, MARY LOU, et al. (3)
Box 8700
Indian, AK 99540
- RED TAPE MINING CO.
Milan Martinek
SRB Box 7459
Palmer, AK 99645
- RED TOP MINING CO., INC.
370 David Dr.
Alamo, CA 94507
- REGAN, JOHN E.
P.O. Box 1176
Fairbanks, AK 99707
- RESOURCE ASSOC. OF
ALASKA (2)
3230 Airport Way
Fairbanks, AK 99701
Johnson Mining Co., operator
Box 104
Central, AK 99730
- RIVERS, RAYMOND D., &
MICHAEL R. WARD
Box 20603
Fairbanks, AK 99701
- ROBESON, VICKI L., &
FRANK H. KNAPP
P.O. Box 85
Trapper Creek, AK 99688
- ROCK & FLAKE MINING &
EXPLORATION
A. Mark Gumaer
P.O. Box 1673
Fairbanks, AK 99707
- ROCK HARD MINING CO.
John H. & Margaret H. Wagner
20402 Dawn Dr.
Lago Vista, TX 78641
- ROCK N' OTHER FELLERS
Warren E. Jackson
2347 Loussac Dr.
Anchorage, AK 99503
- ROCKY TRAILS MINING CO.
Donald E. Dippel (4)
P.O. Box 157
Lehi, UT 84043
(lode gold, placer)
- ROGERS & BABLER
Godfrey/Tellefsen Partnership
1301 E. 64th Ave.
Anchorage, AK 99502
(gravel)
- ROTHBURN, ROBERT
P.O. Box 167
Central, AK 99730
- ROUGH TOP MINING CO., INC.
Albert M. Hagen
General Delivery
Manley Hot Springs, AK 99756
- ROYANN MINING (2)
Edward R. Stugart
SR Box 70241
Fairbanks, AK 99701
- RUBEL, JOHN D.
8183 Richardson Hwy.
SR 90574
Fairbanks, AK 99701
- RUBY MINING
Albert W. Kangas
Box 1
Ruby, AK 99768
- RUSSELL, GENE (2)
1695 W. Bakerview Rd.
Bellingham, WA 98225
- RYBACHEK, STANLEY C.
P.O. Box 55698
North Pole, AK 99705
- S & F MINING, INC.
Mike C. Shupe
1035 W. Northern Lights Blvd.
Anchorage, AK 99503
- S & G ENTERPRISES
Kelly M. Sprague & F.E. Gray
200 W. 34th St., No. 621
Anchorage, AK 99503
- SACKETT, LLOYD
6820 A-1
Palmer, AK 99645
- SALLAK, INC.
Mario Kallas
P.O. Box 974
Palmer, AK 99645

- SALTER, EDWARD &
RICHARD A. SWENSON
General Delivery
Manley Hot Springs, AK 99756
- SANDFORD RESOURCES, INC.
P.O. Box 516
Carlsbad, NM 88221
- SAVAGE, BRUCE D.
General Delivery
Manley Hot Springs, AK 99756
- SAVAGE, FLOYD L.
SR 20554
Fairbanks, AK 99701
- SCHERTENLEIB, CAL J.
SR Box 80822-H, Newby Rd.
Fairbanks, AK 99701
(gravel)
- SCHMUCK, ARTHUR J.
P.O. Box 343
Nenana, AK 99760
- SCHROEDER, GEORGE E.
P.O. Box 874967
Wasilla, AK 99687
- SEPA MINING CO.
Sidney R. Reed
P.O. Box 73193
Fairbanks, AK 99707
- SEWARD PENINSULA MINING
CO. (3)
Edwin L. Hatch
P.O. Box 1801
Nome, AK 99762
- SHAWVER, GEORGE L.
3721 S.E. Filbert St.
Milwaukie, OR 97222
- SHILLING, JOHN A. (2)
P.O. Box 81424
College, AK 99708
- SHORT GULCH MINING CO.
Keith E. Tryck
P.O. Box 9
Ruby, AK 99768
- SIKOVSKI, WES
3240 Latouche, No. 14
Anchorage, AK 99508
- SILVERADO MINES (U.S.),
INC. (5)
Tri-Con Mining, Inc., operator
P.O. Box 2357
Fairbanks, AK 99707
- SILVER STAR MINING CO. (2)
Paul J. Melvin & Francis W. Barry
323 W. Harvard
Anchorage, AK 99501
- SIMS, JOHN E.
SR Box 71151, 1/2 Mi Badger Rd.
Fairbanks, AK 99701
- SINGIN SAM'S RAINBOW
MINE (2)
Garland H. & Arlene R. Ackman
P.O. Box 1411
Fairbanks, AK 99707
- SIPES, JOHN
Box 55254
North Pole, AK 99705
- SLAP SHOT MINING
Lyle College
P.O. Box 207
Gakona, AK 99586
- SLAUGHTER, BOB, & NICK
FIDLER
5009 Seton Circle
Anchorage, AK 99504
- SMITH BENCH MINING
PARTNERS
1615 9th St. NW
Grand Rapids, MN 55744
- SMITH, HAROLD B.
P.O. Box 1787
Palmer, AK 99645
Eclipse Mining Co., operator
P.O. Box 1489
Palmer, AK 99645
(part of Smith entry)
- SMITH, SHERMAN C.
Box 770
Cooper Landing, AK 99572
- SMITH, WILLIAM L.
3948 Lore Rd.
Anchorage, AK 99507
- SNEED, STEVEN E. & GENE
3700 Rabbit Creek Rd.
Anchorage, AK 99516
- SOULE, BETTY M., & HAROLD L.
SRA Box 239
Anchorage, AK 99507
- SOUTHWELL, JOSEPH H.
P.O. Box 511
Glennallen, AK 99588
- SPEERSTRA, HARRY F. (2)
Box 186
Glennallen, AK 99588
- SPRUCE SAND & GRAVEL, INC.
5331 E. 26th Ave., No. 6
Anchorage, AK 99508
(sand, gravel)
- STATIS, DEMETRIOS
Pioneers Home, Pouch 7-027
Anchorage, AK 99510
- STEFANOWSKI, JAMES W.
P.O. Box 161
Talkeetna, AK 99676
- STEIN, DONALD
105 Dunber
Fairbanks, AK 99701
- STEVENS, BERTHA E. &
KENNETH DAHL
P.O. Box 681
Bethel, AK 99559
- STEVENSON, DALE V.
P.O. Box 670346
Chugiak, AK 99567
- STEWART, JIM
SR 71185
Fairbanks, AK 99701
Tok Gold Exploration & Mining Co.
Box 18944
Oklahoma City, OK 73154
- STEWART'S JEWEL JADE
CLAIMS (4)
Herbert I. Stewart
531 W. 4th Ave.
Anchorage, AK 99501
(jade, gold placer)
- STEWART, JACKIE J. (2)
P.O. Box 813
2470 Jack Warren Rd.
Delta Junction, AK 99737
- STICKMAN & SONS &
DAUGHTERS
Donald J. Stickman
Box 114
Galena, AK 99741
- STRAIGHT CREEK MINING
David E. Paxton
SR Box 20264
Fairbanks, AK 99701
- STRANGE, ROBERT T.
5883 Rowan
Anchorage, AK 99507
- STRATTON, DAVID J. & SUSAN J.
32 Craig Ave.
Fairbanks, AK 99701
- STUBBLEFIELD, Y.R. & J.T.
Box 570
Soldotna, AK 99669
- SUNDANCE MINING & DIVING
Dick V. Bell
P.O. Box 2995
Soldotna, AK 99669
- SUNDT, ARNE & A.L. RENSHAW
General Delivery
Talkeetna, AK 99676
- SUNRISE EXPLORATION
SERVICES
Roger B. Moore & Bill H. How
Box 51
Hope, AK 99605
- SUPERDOCK, GEORGE G.
Box 77
Central, AK 99730
- SURPRISE BAY MINING CO.
John M. Kinney
P.O. Box 858
Seward, AK 99664
- SWAINBANK, RICHARD C. (3)
dba Geoprize Ltd.
Box 81315
Fairbanks, AK 99708
(lode, placer gold, silver, copper,
molybdenum)
- SWAVELY, RONALD L. (2)
P.O. Box 114
Eagle River, AK 99577
(lode, placer gold)
- SWEEPSTAKES MINING
Loren J. Larson
1112 Lakeview Terrace
Fairbanks, AK 99701
- SWEETSIR, MICHAEL A.
General Delivery
Ruby, AK 99768
- SWENSON, LLOYD D.
1843 Bridgewater
Fairbanks, AK 99701
- TACHICK, WAYNE H.
Box 3503
Soldotna, AK 99669
- TAKU MINING & DIVING (2)
Dennis J. Murphy
P.O. Box 2942
Kenai, AK 99611
- TALCORP, INC.
R.W. Brissenden
Toronto-Dominion Centre
Ste. 2200, Commercial Union Tower
Toronto, Ontario M5R 2E2
CANADA
- TALLMAN DAVID T. (2)
203 Bunnell
Anchorage, AK 99508
- TANSY, ROY J. & IRENE W.
P.O. Box 231
Copper Center, AK 99573
- TAYLOR, JUNE M.
P.O. Box 101
Eagle, AK 99738
- TERRY, MICHAEL D.
P.O. Box 49
Central, AK 99730
- THE MINING CO.
Scott Haskins
147 Kelsan Way
Fairbanks, AK 99701
- THERALL, IVAN
Chisana Airport
Glennallen, AK 99588
- THOENNES, MARK R.
2068 Bridgewater
Fairbanks, AK 99701
(lode)
- THOMAS, JOHN C. (3)
P.O. Box 98
Central, AK 99730
- THORNEAU, NEIL
Box 107
Eagle, AK 99738
- THREE C MINE
Jack LaCross
Rt. 1, Mi 260 Parks Hwy.
Healy, AK 99743
- THREE CHANNEL MINING CO.
Harlow Thompson
SR Box 20135
Fairbanks, AK 99701
- THREE RIVERS MINING CO.
Joseph A. Riendl
P.O. Box 2875
Anchorage, AK 99501
- THURMAN OIL & MINING (4)
925 Aurora Dr.
Fairbanks, AK 99701
- TOM-KAT MINING CO.
Burton Carver
Box 40
Soldotna, AK 99669
- TOOHEY, CYNTHIA D. &
CAMLEO W. (3)
P.O. Box 113
Girdwood, AK 99587
- TRANS-ARCTIC EXPLORATION
Robert W. Beck
Box 294
Nenana, AK 99760
- TRAUTNER, JOHN J. (3)
Box 593
Girdwood, AK 99587

- TRAXLER, ROY E., &
NAIMY BIRKLID
Jackson Mining Co., operator
936 Coppet St.
Fairbanks, AK 99701
- TRICO MINING
Royce Clanton & Sue Sprague
1630 George Bell Court
Anchorage, AK 99505
- TUCKER, JOYCE L., SR., et al.
Box 1051
Nome, AK 99762
- TUCKER, ROBERT &
JAMES LEGGETT (2)
3101 Rose St.
Anchorage, AK 99508
- TULUKSAK DREDGING
General Delivery
Nyac, AK 99642
- TURNER, WAY, O'MEARA
PARTNERSHIP
409 Dunkel St.
Fairbanks, AK 99701
- TWEET, N.B. & SONS
P.O. Box 503
Teller, AK 99778
- TWEITEN, OSCAR
P.O. Box 162
Fairbanks, AK 99707
- TYREE, LLOYD L. (2)
P.O. Box 3-4027 ECB
Anchorage, AK 99501
- UNSDERFER, TONY
Tonsina Court, Box 30
Eagle River, AK 99577
- UPPER BIRD CREEK MINING
3605 Arctic Blvd., Ste. 1018
Anchorage, AK 99503
- URBON, KATHY L., &
DAN BAUMILLER (2)
301 Erceg
Fairbanks, AK 99701
- V.O. MINING
Tom C. Van Ostrand
P.O. Box 314
Healy, AK 99743
- V & W MINING CORP.
Ron Wendt
P.O. Box 870624
Wasilla, AK 99687
- VAN ZELST, THEODORE W. (2)
1213 Wagner Road
Glenview, IL 60025
(lode copper)
- VELIKANJE, BETTY K. (2)
2600 Draper Dr.
Anchorage, AK 99503
- VEZEY, S. ALLEN (2)
106 Rangeview Road
Fairbanks, AK 99701
- VIDAL, ANGEL
4357 Spenard, Apt. C
Anchorage, AK 99503
- W & H GRAVEL SALES
Bob E. Wortham, & Carolyn Hans
P.O. Box 403
Soldotna, AK 99669
(sand, gravel)
- WARD, RONALD D., &
LAHVATA J.
P.O. Box 6
Central, AK 99730
- WARNER, DARELL H.
2455 George Washington Way,
Apt. 267
Richland, WA 99352
- WATERFIELD, HENRY W. (3)
P.O. Box 4-1A
Anchorage, AK 99509
(lode, placer gold)
- WATKINS, JAMES P. & LYNN
P.O. Box 2323
Palmer, AK 99645
- WAYSON, MARK N.
1148 Sunset Dr.
Fairbanks, AK 99701
- WEASEL CREEK MINING CO.
Sammuel J. Spaulding
1036 E. 7th
Anchorage, AK 99501
- WHITE, HARRY O., &
CARL F. THOMAS
STR 1, Box 2672
Chugiak, AK 99567
- WHITE, MICHAEL P.
P.O. Box 2794
Fairbanks, AK 99707
- WHITE, PAUL W. &
PATRICK D. PEEDE
SR Box 60995-A
Fairbanks, AK 99701
- WIATER, ALEX (2)
432½ So. Franklin, No. 5
Juneau, AK 99801
- WIETCHY, DANIEL M. (2)
dba Promise Land Mining Co.
P.O. Box 60472
Fairbanks, AK 99706
- WILD RIVER VENTURES
Wallace E. & Bonnie L. Gordon
General Delivery
Bettles, AK 99726
- WILKINSON, FRED D. (5)
dba Miller Creek Mining Co.
P.O. Box 2702
Fairbanks, AK 99707
- WILLIAMS, WILBUR H., &
ANN J. (2)
General Delivery
Flat, AK 99584
- WILLS, JERRE,
Box 1111
Homer, AK 99603
- WILMARTH, RICHARD C., &
LARRY
General Delivery
Red Devil, AK 99656
- WILSON CONSTRUCTION INC.
John R. Wilson
Box 813
Cordova, AK 99574
(gravel)
- WILSON ENTERPRISES
Donald L. Wilson
General Delivery
Bettles, AK 99726
- WINDY CREEK TIMBERLINE
MINING CO.
Roy J. & Iyone W. Tansy
P.O. Box 231
Copper Center, AK 99573
- WISBEY, DELBERT E.
P.O. Box 8871
Anchorage, AK 99508
- WITHROW, ALFRED L.
General Delivery
Bettles, AK 99726
- WOLFF, ROBERT V.
General Delivery
Boundary, AK 99790
- WORD, J.B.
General Delivery
Manley Hot Springs, AK 99756
- WRIGHT, JULES
P.O. Box 60113
Fairbanks, AK 99706
- WRIGHT P.M., INC.
P.O. Box 60783
Fairbanks, AK 99706
- WYLIE, JAMES R.
P.O. Box 208
Aptos, CA 95001-0208
- WYMAN, LEWIS B.
P.O. Box 3285
Palmer, AK 99645
- WYRICK, L.E., & MARILYN A.
General Delivery
Red Devil, AK 99656
- YOUNG, DONALD E. &
DAVID E. PAXTON
SR Box 20264
Fairbanks, AK 99701
- YOUNG, ROBERT V.
P.O. Box 211
Talkeetna, AK 99676
- YUKON MINING CO., INC. (2)
P.O. Box 101454
Anchorage, AK 99510
- YUKON MINING CO. OF ALASKA,
INC. (3)
Kenneth H. Manning &
George W. Seuffert
P.O. Box 80325
Fairbanks, AK 99708
- YUTAN CONSTRUCTION CO. (2)
Carroll-Vondra, Inc.
James A. Carroll & Lewis F. Vondra
P.O. Box 1775
Fairbanks, AK 99707
(basalt)
- ZAISER, CLARENCE &
RAY FARRAR (2)
General Delivery
Ruby, AK 99768
- ZIMMER, GEORGE W.
2009 E. 3rd, Apt. 18E
Anchorage, AK 99501
- ZOLTON, JERRY L.
P.O. Box 58322
Fairbanks, AK 99701
- ZUCCHINI, AL, & CARSON HOLT
P.O. Box 1695
Fairbanks, AK 99701

Back cover: *Upper left - Exploration drill at Jarvis Glacier project, Kennecott Corporation. Photograph by D.S. Rosenkrans, 1984.*

Upper right - Greens Creek camp (Noranda Exploration, Inc.) on Admiralty Island, southeastern Alaska. Photograph by M.W. Kelley, 1984.

Center - GCO Minerals exploration camp at the Lik deposit, De Long Mountains, western Brooks Range, Alaska. Photograph by D.S. Kennedy, 1984.

Lower left - HIC placer-recovery plant at Gold Dust Mine, Circle mining district, Alaska. Photograph by J.F.M. Sims, 1984.

Lower right - Placer-recovery plant with spiral concentrator at EVECO, Inc., mine in Fox, Alaska. Photograph by R.F. Frawley, 1984.

