

Division of Geological & Geophysical Surveys
SPECIAL REPORT 48



Alaska's Mineral Industry 1993

Division of Geological & Geophysical Surveys
Division of Economic Development
Division of Mining & Water Management



Front cover, top: Polar Mining Inc. of Fairbanks operated a unique blast-hole drill rig during the winter of 1993-94 on Lower Goldstream paystreak. Don May Jr. designed the drill that has a Caterpillar-225 excavator chassis and power plant as primary components. The 6.5-inch-diameter (15.5 centimeter) drill is operated by one man and averages 4,000 feet (1,720 meters) per day during the winter blasting season. Since drilling began in 1989 until the end of 1993, this unique "home-made" drill has logged 1,250,000 feet (381,000 meters) or 237 miles (381 kilometers) of drill holes and has enabled Polar Mining to cut blast-hole drilling costs by 75 percent. Don May Jr. applied for patent rights for his invention in 1989. Polar Mining operates the largest placer gold mine in eastern interior Alaska on ground leased from the Alaska Gold Company. (Photo by Don May Sr.)

Front cover, lower left: A winter view of Red Dog mine complex in the De Long Mountains of northwest Alaska. The mine is owned by NANA Corporation and operated by Cominco Alaska Inc. In 1993, production of 539,800 tons (489,600 tonnes) of polymetallic concentrate made Red Dog the largest producer of zinc in North America. (Photo by Cominco Alaska Inc.)

Front cover, lower right: Nixon Fork Mining Company geologists Richard Flanders and Larry Freeman examine copper-gold mineralization in a prospecting trench in the Mystery Creek drainage, a part of the Nixon Fork copper-gold skarn deposit, 35 miles (56 kilometers) northeast of McGrath. The company plans to produce gold with underground mining methods by 1995. (Photo by Doug Lyman)

Back cover, upper left: Helicopter and multicoil electromagnetic probe north of Nome. In 1993, DGGs contracted with WGM Mining and Geological Consultants Inc. of Anchorage and its subcontractor Dighem Surveys and Processing Inc. to complete both magnetic and electromagnetic surveys in four areas of the state. (Photo by Robert L. Gordon, Dighem)

Back cover, upper right: One of the finished geophysical maps—a color-contoured aeromagnetic map of the Nome district—illustrates the type of product the 1993 surveys produced. These maps are available at the DGGs Fairbanks office.

Back cover, lower left: ASA Inc. geologist Jeff Huber, left, at a new copper-gold porphyry prospect that was drilled in 1993 near Von Frank Mountain. ASA Inc. discovered the prospect during a regional exploration program. (Photo by Richard Flanders)

Back cover, lower right: A Palmer-based Woods Air Service DC-3 delivers fuels to the Nixon Fork copper-gold project 35 miles (48 kilometers) northeast of McGrath. (Photo by Richard Flanders)



ALASKA'S MINERAL INDUSTRY 1993

by
T.K. Bundtzen, R.C. Swainbank,
A.H. Clough, M.W. Henning,
and E.W. Hansen

DIVISION OF GEOLOGICAL &
GEOPHYSICAL SURVEYS

SPECIAL REPORT 48



STATE OF ALASKA
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DEPARTMENT OF COMMERCE & ECONOMIC DEVELOPMENT
Paul Fuhs, Commissioner

DIVISION OF ECONOMIC DEVELOPMENT
Christopher H. Gates, Director

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NOTE: Mention of any company or brand name does not constitute endorsement by any branch or employee of the State of Alaska.

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MINING CLAIM POLICIES 39

From 1992 to 1993, federal claim filings dropped 53 percent, the largest reduction in the state's history, while state mining claims remained at about the same level.

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After a 20-year hiatus, the state contracted for sophisticated new airborne geophysical surveys to complement the continuing geologic mapping and geochemical surveys.

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Governor Hickel signed a minerals agreement with Yukon Territory. The Department of Natural Resources, according to the provisions of the Alaska Statehood Act, filed the last state land selections with the federal Bureau of Land Management.

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Alaska is proud to be a leader in responsible mineral development. As the world looks to the Arctic regions, Alaska serves as a proven model for environmentally sound technology. We understand how to perform under harsh conditions, and are willing to share this knowledge with our northern neighbors.

We have seen some significant changes for the industry in 1993. As of this writing, after 16 years, the Alaska Mental Health Trust Lands litigation is nearing final resolution. The reconstituted trust lands will open greater opportunities for Alaskans. The development of these resources will serve the needs of our mental health community and release land for exploration and development.

Alaska has taken the lead in coal technology with the Healy Clean Coal power plant. This project will not only improve the technological options for the world, it will make Alaska's coal more competitive on the world market.

During 1993, we conducted airborne geophysical surveys of four key mineral provinces in interior Alaska. The information was made available to the public in early 1994. We are encouraged by the positive response of exploration companies.

Over the last 25 years, Alaska has met the challenge of doing development right. We have accomplished this by strictly adhering to the public decision-making process. But Alaskans can no longer afford to allow those who would abuse that public process to do so, deliberately attempting to make development economically impossible.

Alaska is a land of tremendous challenge and tremendous opportunity. We welcome the mineral industry, and we look forward to working with you in doing the job right.

Walter J. Hickel
Governor

FOREWORD

Alaska's Mineral Industry, 1993, DGGS Special Report 48, is the 13th annual report jointly produced by the Department of Natural Resources and the Department of Commerce and Economic Development. The primary objective of this report is to provide accurate annual information about Alaska's mineral industry. This report depends on the voluntary cooperation of those who provide information about their projects and activities—government agencies, private industry, Native corporations, and individuals.

Alaska's mineral industry continued to struggle with low prices for base metals and coal, a result of a three-year international recession. Mineral production during 1993 totaled \$448 million, down 18 percent from the 1992 value of \$561 million. The temporary closure of the Greens Creek silver-polymetallic mine on Admiralty Island near Juneau, previously the nation's largest silver mine, was a blow to the Alaskan mining industry. Low lead and zinc prices continued to cause difficulties for the Red Dog Mine, which is owned by NANA Corporation and operated by Cominco Alaska Inc. However, smaller placer gold mines benefited from increasing gold prices and a longer production season.

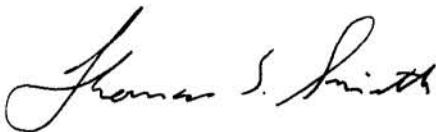
Industrial mineral production improved, and Usibelli Coal Mine produced a record 1.59 million tons of coal, despite difficulties in maintaining their 11-year Korean coal export agreement.

Expenditures for exploration and development were \$58 million, about the same as in 1992. Fairbanks Gold Inc. continued to develop its Fort Knox gold deposit near Fairbanks, and Echo Bay Alaska continued exploration work at its A-J gold project in the Juneau Gold Belt of southeast Alaska.

Mine employment declined 9 percent due mainly to the closure of the Greens Creek Mine.

The state performed airborne geophysical surveys of four Alaska mining districts and released the resulting data and maps to the public in early 1994. The Department of Natural Resources also filed the last state land selections with the U.S. Bureau of Land Management. These selections completed the land grant given to Alaska's citizens by the 1959 Alaska Statehood Act.

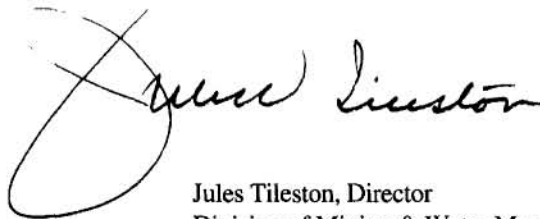
Development of new gold mines near Fairbanks and Juneau and in other regions of the state and planned industrial mineral export projects near Nome and Anchorage should result in growth for the industry during the next few years.



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Alaska's Mineral Industry 1993

by

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EXECUTIVE SUMMARY

This report reviews mineral industry activity in Alaska during the 1993 calendar year. As in past years, the report is cooperatively produced by the Department of Commerce and Economic Development and the Department of Natural Resources. Much of the information it contains is based on returns of a 1993 Division of Geological & Geophysical Surveys questionnaire that was mailed to mining companies, Native corporations, consultants, metal recycling firms, and government agencies.

Table 1 and figure 1 illustrate the expenditures for exploration and development and the value of production for the last four years. The total value of the Alaskan mineral industry, as measured by value of production and the sum of exploration and development expenditures, was \$506.6 million in 1993, down 18 percent from the \$620.6 million estimate for 1992.

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⁴Alaska Division of Mining & Water Management, 3601 C Street, Anchorage, AK 99503.

⁵Alaska Division of Mining & Water Management, 3700 Airport Way, Fairbanks, AK 99709.

Table 1. Total value of mineral industry in Alaska, 1990-93

	1990	1991	1992	1993
Exploration	\$ 63,255,594	\$ 39,908,539	\$ 30,200,000	\$30,257,489
Development	14,326,500	25,574,350	29,590,300	27,667,636
Production	533,024,500	546,468,907	560,826,400	448,713,643
TOTAL	\$610,606,594	\$611,951,796	\$620,616,700	\$506,638,768

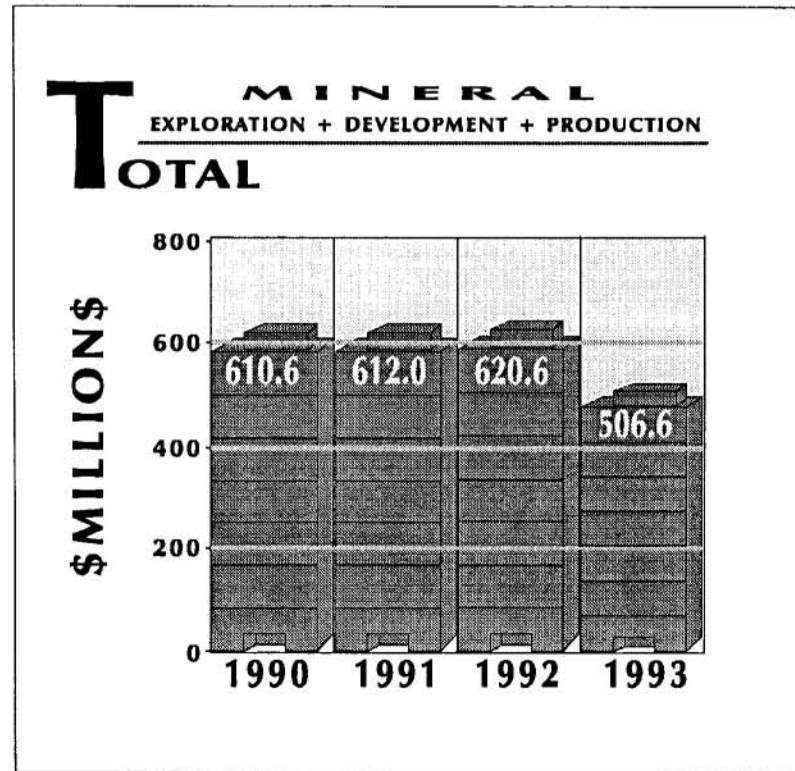


Figure 1. Total value of Alaska's mineral industry in millions of dollars.

EMPLOYMENT

The mineral industry provided 3,136 year-round-equivalent jobs, down 9 percent from 3,246 jobs in 1992 (table 2; fig. 2). This decline resulted in large part from the closure of the Greens Creek polymetallic mine on Admiralty Island. Employment declined slightly in placer gold, industrial mineral, coal mining, and mineral development industries.

Placer mining employed the largest percentage of the mine work-force (1,205 jobs; 38 percent), followed by sand and gravel extraction (580 jobs; 18 percent), base metal mining (376 jobs; 12 percent), mineral exploration

and development (296 jobs; 9 percent), recreational mining, (which includes commercial mine-tourist ventures) (270 jobs; 8.5 percent), building-stone quarrying (205 jobs; 6 percent), coal mining (109 jobs; 3.5 percent), and all other mine-related employment (77 jobs; 2.5 percent).

PRODUCTION

Because of the three-year-long international recession, the Alaskan mining industry continued to struggle with weak prices for base metals and coal. Our final estimate for the value of Alaska's mineral production in 1993 is \$448.7 million, down 18 percent from the 1992 total of \$560.8 million (table 1). Volume produced and the value realized decreased significantly for most major mineral commodities including gold, silver, lead, and zinc. Three factors contributed to most of the decline in production: (1) April closure of the Greens Creek polymetallic mine near Juneau, formerly the nation's largest producer of silver; (2) more than 50 percent reduction in the amount of gold won from Cambior's Valdez Creek Mine, Alaska's largest gold mine; and (3) a 25 percent loss in value of sulfide concentrates shipped from the Red Dog and Greens Creek mines due mainly to low lead, silver, and zinc prices.

The majority of the state's placer gold mines benefited from improved gold prices and a long, warmer-than-average mining season. And, there were signs in the fourth quarter of 1993 that the recession was over, which should result in better market conditions for base and precious metals. However, production declines in Alaska's larger metal mines overshadow the improved performance.

Industrial mineral and coal producers fared better than the larger metal mines. Nevertheless the work force at Usibelli Coal Mine Inc., which produces almost all of Alaska's coal, had to absorb a comprehensive and voluntary cuts in wages and benefits. Such cost cutting was necessary for Usibelli to continue its coal export contract with the Korean Electric Power Company in South Korea.

Table 2. Alaskan mine employment, 1990-93^a

	1990	1991	1992	1993
Gold/silver/mining				
Placer	1,151	1,240	1,251	1,205
Lode	N/A	N/A	N/A	N/A
Polymetallic	265 ^b	235 ^b	240 ^b	26
Base metals	350	331	349	376
Recreational	315	320	325	270
Sand & gravel	645	685	640	580
Building stone	160	165	145	205
Coal	115	115	115	109
Peat	N/A	45	40	49
Tin, jade, soap-stone, ceramics, platinum	40	25	20	20
Mineral development	95	133	164	132
Mineral exploration	374	268	137	164
TOTAL	3,510	3,562	3,426	3,136

^aCalculated on a 260-day work year.

^bRevised estimate based on new company data.

N/A—Not available.

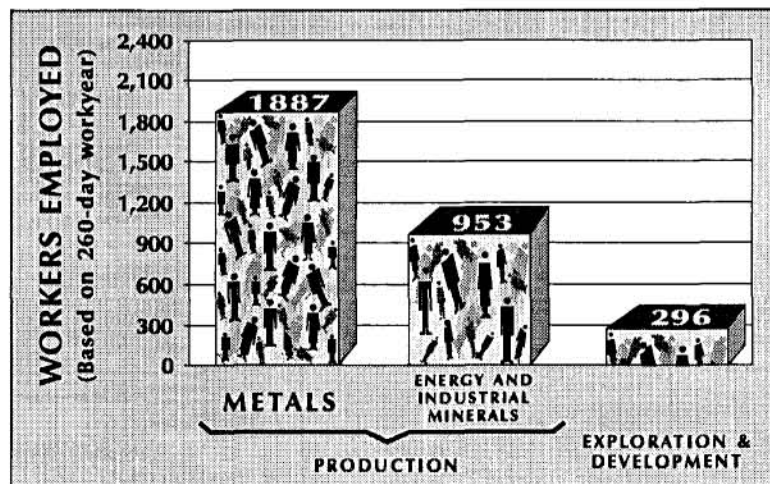


Figure 2. Mineral industry employment by category, 1993.

Sound Quarry Inc.'s new rock quarry operation near Nome, with shipment of riprap to various Alaskan markets, helped the Nome economy. Large volumes of shot rock, crushed stone, sand and gravel, and riprap were mined in southeastern Alaska to construct access roads for the forest products industry and for commercial development near Juneau and Ketchikan. The Alaska Railroad, using unit trains, hauled about 2.7 million tons (2.44 million tonnes) of sand and gravel to the Anchorage metropolitan area for highway and commercial construction projects.

DEVELOPMENT

Alaskan mineral development during 1993 continued at about the same level as in 1991 and 1992. An estimated \$27.7 million was expended on 36 development projects throughout the state, with most of the work concentrated in the eastern interior, southcentral, and northern regions (fig. 3).

Fairbanks Gold Mining Inc. continued to develop the Fort Knox gold deposit near Fairbanks. Cominco Alaska Inc. initiated a comprehensive program to increase concentrate production at the Red Dog zinc, lead, and silver mine northeast of Kotzebue. Nevada Consolidated Goldfields Inc. initiated a new project to develop a high-grade, underground gold mine at Nixon Fork near McGrath.

The National Park Service withdrew its objection to construction of the Healy Clean Coal Project (HCCP) near Healy. The Healy project will introduce state-of-the-art emission control technologies during operation. An agreement, which allows plant construction to proceed, was reached in June 1994 between the environmental law firm Trustees for Alaska (TFA) and plant operator Golden Valley Electric Association (GVEA). TFA had filed a lawsuit that sought to block construction of the HCCP plant, but has agreed to drop the lawsuit; in return, GVEA would initiate an aggressive conservation incentive program for its customers.

EXPLORATION

Echo Bay Alaska worked on the state's largest exploration project at the old A-J mine near Juneau. Since 1991, Echo Bay's work in the Juneau Gold Belt has accounted for nearly 50 percent of the total state-wide exploration dollars. Other active exploration companies, including Kennecott Exploration, Cominco Alaska Exploration, and American Copper and Nickel, continued metallic mineral exploration projects throughout the state.

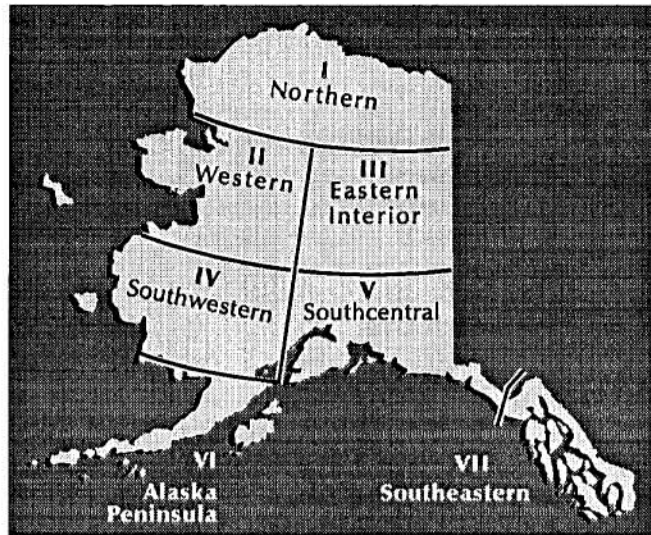


Figure 3. *Regions of mineral activity in Alaska as described in this report.*

The appearance of new firms including Westmin Resources, American Barrick, Teck, Hemlo Gold Mines and Starcore, seems to indicate that outside firms view Alaska as a good place to invest their exploration dollars.

GOVERNMENT ACTIONS

The U.S. Department of Interior's Appropriations Act that went into effect in fiscal year 1993 requires annual rental fees of \$100 per federal mining claim. These fees must be paid to the U.S. Bureau of Land Management within 90 days of staking a new claim. Annual rental fees for federal claims must be paid by August 31 of each calendar year, with fees for both 1992 and 1993 due on August 31, 1993. The total number of federal mining claims held in Alaska fell from 20,949 in 1992 to 9,899 in 1993, a reduction on 53 percent (Appendix A). This represents one of the largest one-year drops in federal claim filings ever recorded in Alaska. In contrast, Alaska state claims dropped from 29,221 in 1992 to 27,726 in 1993 or a reduction of only 5 percent. The total number of federal mining claims held nationwide dropped 76 percent. The somewhat reduced impact on Alaska mining activity might reflect the prevalence of federal claim groups in Alaska being controlled by small mining companies that are subject to a "small miner" exemption status offered in the Appropriations Act.

Alaska Governor Walter J. Hickel announced at the November, 1993, Alaska Miners Association annual convention in Anchorage that more than 550,000 acres (222,590 hectares) of Alaska State lands would be re-opened to mineral entry. These lands had been closed

through various administrative orders—mainly land-disposal programs—during the past 18 years.

For the first time in 20 years, the Alaska Division of Geological & Geophysical Surveys, through a Capital Improvement Projects appropriation passed by the Alaska legislature, undertook new, airborne geophysical surveys and geological mapping programs in four Alaskan mining districts. The products (maps) of the program were released to the public in 1994.

ACKNOWLEDGMENTS

This report is designed, produced, and distributed by the Department of Natural Resources, Division of Geological and Geophysical Surveys (DGGS), Division of Mining & Water Management (DOM), and the Department of Commerce and Economic Development, Division of Economic Development (DED). Since statehood, DGGS and predecessor agencies have published annual summaries of Alaska mining activity in the agencies annual report series. Beginning in 1982, DGGS and the then newly created Office of Mineral Development (now a part of DED) teamed up to produce a more comprehensive report to provide in-depth coverage of the industry. The Division of Mining & Water Management joined the effort in 1984. The current Alaska's Mineral Industry Report is published in the DGGS Special Report series and is available from the three participating agencies. In November 1993 T.K. Bundtzen, E.E. Harris, and J.M. Robinson mailed approximately 975 mineral questionnaires to mineral exploration firms, Native corporations, mine operators, and government agencies that oversee or regulate mining activities. A total of 195

completed questionnaires were returned to DGGS. We thank all those who have given us the information that is absolutely essential to the continued success of this report series.

We thank Shari Howard of the Department of Transportation and Public Facilities, Irene Anderson of Sitnasuak Native Corporation, Bruce Carr of the Alaska Railroad Corporation, and Peter Nagel of Alyeska Pipeline Service Company for providing detailed information on industrial mineral activity throughout the state. Tom Turner (Anchorage Recycling Center), Connie Karl (K & K Recycling), Jim McFarland (United Battery Systems), and Jim Norman (ABS Alaskan) gave us an in-depth look at Alaskan metal recycling efforts statewide.

Tom Bundtzen wrote the executive summary, development, production, and metal recycling sections, researched mineral revenues, mineral-related environmental issues, and updated appendixes F and G. Dick Swainbank wrote chapters on exploration, drilling, and airborne geophysical studies, and updated appendixes C and D. Erik Hansen provided information on claim activity summarized in appendixes A and B, and coauthored the mining tax and regulatory chapter with Swainbank. Al Clough was responsible for much of the information describing mineral related activities in southeast Alaska. Mitch Henning contributed data on mining activities in southcentral Alaska. We thank Mike Nelson for supplying an update on the School of Mineral Engineering at UAF.

The production team consisted of Ann-Lillian Schell for cover design, Greg Laird for computer graphics, Fran Tannian for editing and publication design, and Joni Robinson for desktop publishing.

EXPLORATION

Exploration expenditures during 1993 are estimated to have been \$30.3 million, based on the responses of 70 companies to a questionnaire mailed by the State Division of Geological & Geophysical Surveys (fig. 4; table 3). This was about the same as the \$30.2 million reported for the previous year.

Table 3 compares the 1993 exploration expenditures with those of prior years, and table 4 shows the distribution of the expenditures by region and by deposit type. Table 5 shows the sharp decline in the number of active mining claims in the state; most of the claims relinquished were federal, reflecting the \$100 per claim "rental" or "holding" fee imposed in 1992, but first charged in August 1993. Some companies did the annual assessment and also paid the fee, so the total federal claim assessments may not be available for some time.

NORTHERN REGION

Exploration expenditures in the northern region were reported as \$1.52 million in 1993, almost three times the 1992 expenditures. Most of this increase occurred in placer and base metal exploration.

METALS

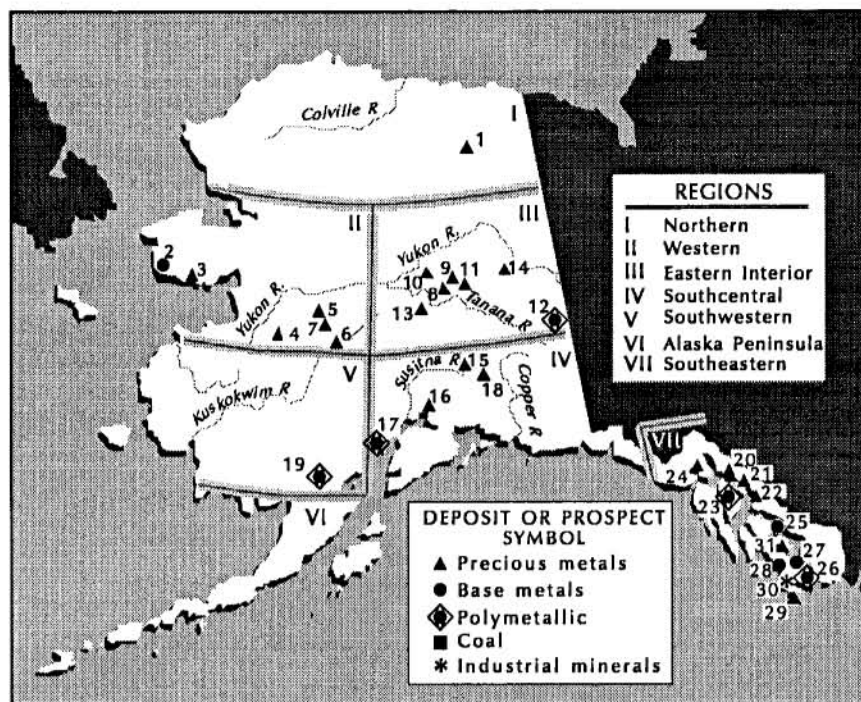
Several companies examined the Lik base-metal deposit near Cominco Alaska's Red Dog Mine, but only minor exploration was reported there in 1993. The U.S. Bureau of Mines, Alaska Division of Geological & Geophysical Surveys, U.S. Geological Survey, and the U.S. Bureau of Land Management continued their joint evaluation of the National Petroleum Reserve, along the northern flank of the Brooks Range. This area contains rocks that correlate with the package hosting Lik and

Red Dog and with several interesting base metal occurrences that were known prior to this cooperative study. Eight new barite deposits have been identified by the study (Schneider, 1993).

Exploration for base and precious metals continued in the Ambler mineral belt and elsewhere along the south flank of the Brooks Range, but placer gold was the most sought after commodity in the northern region. After relative inactivity for the past few years, expanded placer mining in the Wiseman and Chandalar placer camps renewed the search for placer gold reserves. Companies and individuals reporting activity include Silverado Mines U.S. Inc. at Nolan Creek near Wiseman, Gold Dust Mines Inc. at Chandalar Lake, George and Jim Lounsbury at Union Gulch near Wiseman, Slisco Inc. on the Hammond River near Wiseman, Robert Pelkey on the South Fork of the Koyukuk River, and Lloyd Swenson of Slate Creek Mining. The most intense activity was on Nolan Creek where Silverado used ground-penetrating radar as a placer exploration tool. The radar data was checked by reverse-circulation drilling to expand reserves for combined summer open pit and winter underground mining.

COAL

Arctic Slope Consulting Group, subsidiary of Arctic Slope Regional Corporation (ASRC), reported the following coal exploration activities in the Deadfall Syncline area: (1) reclamation to damaged tundra areas adjacent to the permitted Aluaq mine site; (2) transportation of bagged, contaminated beach gravel from a 1992 diesel-oil spill



I Northern Region

- 1. Silverado U.S. Inc.—Nolan Creek

II Western Region

- 2. Kennecott Exploration—Aurora Creek, Gold Hill
- 3. Bering Straits Native Corp.—Bluff area, Mt. Distin
- 4. Echo Bay Alaska Inc.—Illinois Creek
- 5. Flat Creek Mining Co.—Timber and Flat Creeks
- 6. Consolidated Nevada Goldfields Co.—Nixon Fork
- 7. ASA—Von Frank Mountain

III Eastern Interior Region

- 8. La Teko Resources Ltd.—Ryan Lode
- 9. American Copper and Nickel Co.—Fairbanks district
- 10. ASA—Sawtooth Mountain
- 11. AMAX Gold Exploration—Fairbanks district
- 12. Lodestar Exploration—Taurus
- 13. Noranda Exploration Co. Ltd.—Liberty Bell
- 14. WGM—Stoneboy Creek

IV Southcentral Region

- 15. Rowallan Mine Partnership—Valdez Creek
- 16. North Pacific Mining—Toklat

- 17. Westmin Resources Ltd.—Johnson River
- 18. Noranda Exploration Co. Ltd.—Zackly

V Southwestern Region

- 19. Cominco Alaska—Pebble Copper

VI Alaska Peninsula Region

VII Southeastern Region

- 20. Echo Bay Alaska Inc./Coeur Alaska Inc.—Kensington joint venture
- 21. Hyak/Coeur Alaska—Jualin
- 22. Echo Bay Alaska—Alaska-Juneau mine
- 23. Kennecott Greens Creek Mining Co.—Greens Creek
- 24. Dale Henkins/Roger Eichman—Dream
- 25. Kennecott Exploration—Gold Fork
- 26. Red Dodson—Bokan Mountain
- 27. Salisbury and Associates/ACNC—Dolomi
- 28. Cominco Alaska—Big Harbor-Trocadero
- 29. Lac Mineral Ltd.—Niblack
- 30. Ashgrove Cement West—View Cove
- 31. Sealaska Corp.—Sevenmile

Figure 4. Selected exploration projects in Alaska, 1993.

and from the lining of a spill depository; (3) rebagging of stored, bulk coal for village use; and (4) final back-filling of the Deadfall Syncline (Aluaq) test mine pit. ASRC plans an aggressive 1994 underground coal development effort with the U.S. Bureau of Mines serving as technical consultants to the project.

INDUSTRIAL MINERALS

The NANA Corporation performed some regionwide reconnaissance for base and precious metals

in 1993 and continued exploratory work on its well-known jade deposits in the Kobuk Valley.

WESTERN REGION

Exploration expenditures reported in 1993 in the western region were \$3.35 million, almost double the 1992 investment. Work on the Illinois Creek deposit accounted for a major part of the investment, but several prospects around the region received substantial commitments.

Table 3. Reported exploration expenditures in Alaska by commodity, 1982-93

	Base metals	Polymetallic ^a	Precious metals	Industrial minerals	Coal and peat	Other	YEARS TOTAL
1982	\$31,757,900	N/A	\$ 10,944,100	\$ --	\$ 2,900,000	\$ 15,300	\$ 45,617,300
1983	9,758,760	N/A	20,897,555	2,068,300	1,338,454	70,000	34,133,069
1984	4,720,596	N/A	14,948,554	270,000	2,065,000	279,500	22,283,650
1985	2,397,600	N/A	6,482,400	--	270,000	--	9,150,000
1986	1,847,660	N/A	6,107,084	170,000	790,000	--	8,914,744
1987	2,523,350	N/A	11,743,711	286,000	1,150,000	31,000	15,734,061
1988	1,208,000	N/A	41,370,600	160,200	2,730,000	--	45,468,800
1989	3,503,000	N/A	43,205,300	125,000	924,296	5,000	47,762,596
1990	5,282,200	N/A	57,185,394	370,000	321,000	97,000	63,255,594
1991	4,789,500	N/A	34,422,039	92,000	603,000	2,000	39,908,539
1992	1,116,000	3,560,000	25,083,000	25,000	425,000	--	30,209,000
1993	910,000	5,676,743	23,382,246	163,500	--	125,000	30,257,489
TOTAL	\$69,814,566	\$9,236,743	\$295,771,983	\$3,730,000	\$13,516,750	\$624,800	\$392,394,842

^a Polymetallic deposits considered as a separate category for the first time in 1992.

N/A—Not available.

-- Not reported.

Table 4. Reported exploration expenditures and employment in Alaska by commodity and region, 1993

	Northern	Western	Eastern interior	South- western	South- central	Alaska Peninsula	South- eastern	TOTAL
Exploration expenditures								
Base metals	\$ 475,000	\$ --	\$ 395,000	\$ 30,000	--	--	\$ 10,000	\$ 910,000
Polymetallic ^a	--	332,000	1,570,000	315,000	\$180,000	290,000	2,989,743	5,676,743
Precious metals								
Placer	920,000	125,500	466,500	68,000	522,400	--	38,000	2,140,400
Lode	--	2,890,000	4,601,071	430,000	756,100	--	12,564,675	21,241,846
Coal and peat	--	--	--	--	--	--	--	--
Industrial minerals	--	--	15,000	--	80,500	--	68,000	163,500
Other	125,000	--	--	--	--	--	--	125,000
TOTAL	\$1,520,000	\$3,347,500	\$7,047,571	\$843,000	\$1,539,000	\$290,000	\$15,670,418	\$30,257,489
Exploration employment								
Employment								
Workdays	1,700	5,070	10,739	1,029	1,548	80	22,653	42,539
Workyears ^b	7	20	38	3	6	0	87	164 ^c
Number of companies reporting ^{**}	6	13	25	8	15	1	9	70

-- No expenditures reported.

^aJade, platinum, gemstones.

^bBased on 260-day workyear.

^cSmall discrepancy on total due to rounding.

^{**}Same companies active in more than one area.

Table 5. Summary of claim activity, 1988-93

Year	1988	1989	1990	1991	1992	1993
New claims						
State	8,062	3,928	2,573	3,391	2,606	2,042
Federal	3,786	1,562	1,888	1,299	695	601
Subtotal	11,848	5,490	4,461	4,690	3,301	2,643
Active claim assessment						
State	N/A	N/A	32,275	29,754	26,615	25,684
Federal	N/A	N/A	25,792	23,222	20,254	9,298
Subtotal	63,694	64,225	58,067	52,976	46,869	34,982
Total state	N/A	N/A	34,848	33,145	29,221	27,726
Total federal	N/A	N/A	27,680	24,521	20,949	9,899
TOTAL	75,542	69,715	62,528	57,666	50,170	37,625

N/A—Not available.



The State of Alaska contracted for an airborne geophysical survey of about 494 square miles (1,280 square kilometers) around Nome on the Seward Peninsula. DGGs staff also conducted bedrock and surficial geologic mapping of the Nome district in cooperation with Sitsnasuak Native Corporation and Bering Straits Native Corporation. Results of both surveys are now available at the Division of Geological & Geophysical Surveys office in Fairbanks (Alaska Division of Geological & Geophysical Surveys, Bundtzen and others, 1994).

METALS

Alaska Gold, in conjunction with its dredge operations at Nome and in preparation of a conventional open-pit development, had a small churn-drilling program in 1993. Although the existing thawfields were still active, no new thawfield drilling was done in 1993.

Kennecott Exploration continued its cooperative venture with Bering Straits Native Corporation and Hawley Resource Group. Trenching was completed at the newly discovered Twin Mountain gold-polymetallic prospect west of Snake River (fig. 5). Aspen Exploration Company and ASARCO Inc. also conducted

Figure 5. Kennecott Exploration geologists show DGGs crew an exploration trench at Twin Mountain prospect about 13 miles (21 kilometers) northeast of Nome. Kennecott has an agreement with Sitsnasuak and Bering Straits Native Corporations to explore the corporation's lands in the Nome district. (Photo by T.K. Bundtzen)

limited reconnaissance exploration in the Nome district. Cominco Alaska Exploration Inc. explored various portions of the Seward Peninsula, but details of their work are unknown.

Elsewhere on the Seward Peninsula, Berg-Wetlesen operated a rotary drill program at Candle; Len Grothe of Lost River Mining did considerable trenching for placer deposits near Cape Nome; and Jeff Keener (Nordwand Mining) explored placer gold in the Council mining district.

Echo Bay Alaska operated the largest exploration project in the western region, at the Illinois Creek gold-silver property east of Kaltag on the Yukon River. The property is owned by North Pacific Mining Co., a subsidiary of the Cook Inlet Region Inc. The 1993 program included ground-based geophysics, trenching, and 61,465 feet (18,735 meters) of reverse-circulation drilling.

East from Illinois Creek ASA Inc. continued its search for igneous-hosted gold deposits around Von Frank Mountain (fig. 6). The 1993 program consisted of geologic mapping, geochemical sampling, and 2,000 feet (610 meters) of diamond drilling. Gold mineralization is associated with chalcopyrite, pyrite, and rare molybdenite in quartz stock-work veining within a 69 million-year-old quartz diorite stock, which is a cupola of the Von Frank pluton. Drill intercepts include 429 feet (131 meters) with an average grade of 0.013 ounces per ton (0.45 grams per tonne) gold, and up to 135 feet (41 meters) of 0.035 ounces per ton (1.2 grams per tonne) gold.

Consolidated Nevada Goldfields Corporation (CNG), an affiliate of the Australian company Gwalia Consolidated, continued the work done by Nixon Fork Mining Company at the Nixon Fork gold-copper skarn deposit (fig. 7). CNG had a mapping and geochemical sampling program in 1993 along with development drilling of 13,000 feet (3,962 meters) of core. A very encouraging drill intercept of 29.3 feet (8.93 meters) of 16.3 ounces per ton (559 grams

per tonne) gold bodes well for the proposed accelerated development of this high-grade property.

Flat Creek Mining had a small reverse-circulation, exploratory drilling project in conjunction with its operation on Flat Creek, and Green Mining and Exploration had a similar program on Birch Creek in the Ruby area.



Figure 6. Boyles Brothers "BB-15" drill rig explored a copper-gold porphyry prospect on Von Frank Mountain about 70 miles (100 kilometers) northeast of McGrath. Fairbanks based-exploration firm ASA Inc. found the prospect in 1992, and began a drill program the following year. (Photo by Richard Flanders)

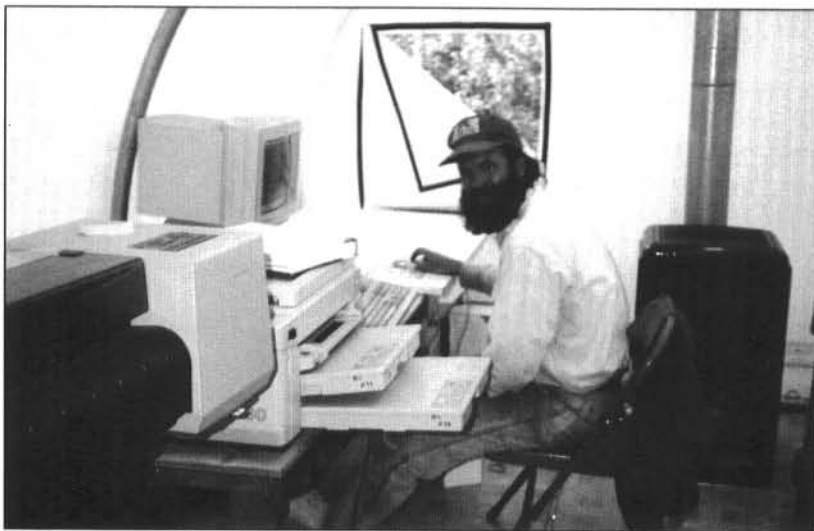


Figure 7. Larry Freeman drafts drill sections with a computer at Nixon Fork Mining Company gold project about 40 miles (60 kilometers) northeast of McGrath. (Photo courtesy of Richard Flanders)

COAL

Doyon Ltd. continued to investigate its holdings in the Tonzona field in the western Alaska Range—south-east of McGrath and at Loudon near Galena—with a view to providing coal for small-scale power plants for McGrath and Galena. The Native corporation is working closely on the studies with the Alaska Department of Community and Regional Affairs, Division of Energy. A cost analysis suggests that 8 megawatts of demand would be required to make the proposed coal power plant economically viable.

INDUSTRIAL MINERALS

No exploration was reported for industrial minerals in the western region; however, if the Sound Quarry at Cape Nome continues to produce riprap and armorstone, some exploration may be necessary.

EASTERN INTERIOR REGION

Even though 1993 exploration expenditures in the eastern interior region dropped to 7.05 million, or 18 percent lower than from 1992, the area remained the second most active in the state. Virtually all activity was related to metals, and only a small effort was expended in exploration of placer deposits. The number of work-days reported (9,989) was also down by 26 percent from the 1992 work days reported.

In addition to the 338 square miles (875 square kilometers) airborne geophysical surveys, geologic and geochemical investigations were carried out by DGGs in the Circle district (Alaska Division of Geological &

Geophysical Surveys, Wiltse and others, 1993; Newberry and others, 1994).

METALS

Most of the total exploration in interior Alaska was in the immediate vicinity of Fairbanks, with hardrock gold as the target.

At the Ryan Lode Mine on Ester Dome, 10 miles (16 kilometers) west of Fairbanks, La Teko Resources completed drilling a 63,500 foot (19,355 meter) reverse-circulation hole and a 5,300 foot (1,615 meter) diamond-drill hole to confirm reserves and condemn areas for physical plant locations (fig. 8). The efforts concentrated on the Ryan Lode shear zones that cut through a sequence of pelitic and calcareous metamorphic rocks and the Curlew deposit which is hosted in a small intrusion. Drilling extended the known mineralization at the Ryan Lode to a depth of 1,000 feet (305 meters). Additional resources were found in the 91.3 million-year-old quartz monzonite at the Curlew deposit. Proven and probable mineable reserves amount to 14.6 million tons (13,24 million tonnes) of ore grading 0.056 ounces per ton (1.92 grams per tonne) or a mineable resource of 822,000 ounces (25,564 kilograms) gold. Mineral Development Associates of Reno, Nevada, when making the estimate, applied a constraint that separated low-grade from high-grade ores. The method is used only for open-pit mineable reserves and does not consider the resources known to exist below the depths of the projected open pit.



Figure 8. Reverse-circulation drill rig explores the Ryan lode system on Ester Dome, about 8 miles (12 kilometers) northwest of Fairbanks. Ryan Lode Mines Inc. completed 63,500 feet (19,355 meters) of reverse-circulation drilling during 1993. (Photo courtesy of Ryan Lode Mines Inc.)

La Teko also had an active exploration program about 20 miles (32 kilometers) north of Fairbanks at the True North prospect west of Pedro Dome. Drilling of 3,500 feet (1,067 meters) of reverse-circulation hole in 1993 allowed calculation of a proven and probable reserve of 120,000 ounces (4,117 kilograms) gold in 0.082 ounces per ton (2.8 grams per tonne) gold in 1.46 million tons (1.32 million tonnes) of rock. The veins are found in sheared schist and quartzite, though intrusive rocks are found nearby.

All fire assays from both projects are being reevaluated using the metallic-screen method, which might result in an increase in overall gold values. La Teko will continue exploratory drilling at the True North project during 1994.

American Copper and Nickel Company (ACNC) had a 6,090 foot (5,524 meter) reverse-circulation drill program at the Eagle Creek Property about 10 miles (16 kilometers) north of Fairbanks, until late 1993 when ACNC allowed the prospect to revert to the former owners, Can-Ex Resources (US) Inc. Gold-bearing veins at Eagle Creek are hosted in granite porphyry bodies. ACNC also allowed all of its leases on Ester Dome to revert to Silverado Mines Ltd., and further work in 1994 will be managed by its affiliate Tri-Con Mining Ltd.

AMAX Gold Exploration Inc. had an active exploration program in 1993 in the Fairbanks area, concentrating on the Golden Summit project of Freegold Recovery Inc. and Fairbanks Exploration Inc. This large project, consolidated from several ownerships, trends in an east-west direction near the Fairbanks Gold Mining Inc.'s Fort Knox Gold property. Activity included soil sampling, geologic mapping, airborne and ground geophysics. At the True North prospect, about 10 miles (16 kilometers) west, La Teko Resources Ltd. announced plans to acquire AMAX's interest. Grateful Dog Mining company continued its exploration on Hattie Creek and above Treasure Creek a few miles north of the city.

Elsewhere in interior Alaska, ASA Inc. continued exploration, including diamond drilling, west of Livengood in the Elephant Mountain-Sawtooth Mountain region, where the target is hardrock gold.

Noranda Exploration, funded by Hemlo Gold, had two projects in interior Alaska. At the Liberty Bell prospect near Healy, operating on an option from Liberty Bell Mining Company, Noranda mapped and sampled several mineralized zones. At the Taurus prospect north-east of Tok, optioned from Lodestar Resources Ltd., Noranda completed a small reverse-circulation drilling project before releasing the option on this mineralized 56-million-year-old copper-gold porphyry pluton.

WGM Inc. continued exploration of the Stoneboy Creek area of the Upper Salcha and Upper

Chena River areas in the Yukon-Tanana uplands east of Fairbanks.

Cominco Alaska Exploration Inc. also reported exploration in interior Alaska at undisclosed locations. BHP-Utah Inc. continued to hold ground in the Circle area.

Fifteen companies reported exploration for placer gold throughout interior Alaska in 1993. In the Tofty-Eureka area, Thurman Oil and Mining Inc. had two small programs, including some drilling. As in years past, John Shilling of Thanksgiving Mining prospected on Thanksgiving and McKinley Creeks in the Rampart area. In the Bonfield district, Gypsy Luck was active on Moose Creek.

In the Circle district A-J Mining spent part of the summer mapping and sampling on Faith Creek. Lyle Colledge sampled on Bottom Dollar Creek. On Crooked Creek DOXAUCO Enterprises Inc. prospected for gold and diamonds, and explored for gold on the north fork of Twelvemile Creek. Knaebel Mining Ventures had a small drilling program on Deadwood Creek near Central. Bob Cacy of Points North conducted geochemical and magnetic surveys on Portage and Crooked Creeks. On the South Fork of Harrison Creek, Windy Hill Mining completed a geophysical survey.

In the Fairbanks district, Coromandel Mining Company did extensive exploration on Bear Creek. Sweepstakes Mining spent time prospecting on Kokomo Creek at the eastern end of the district. Herring Exploration and Mining company continued exploration of Palmer Creek in the upper Chena area, digging test pits with a backhoe.

In the upper reaches of the Delta River, on Broxon Gulch, Glacier Six Enterprises had an aggressive exploration program for placer gold in conjunction with its development and production projects. Little exploration activity was reported from the Fortymile area in 1993, but Mall Mining prospected on American Creek near Eagle; W.M. Masengale was active on Chicken Creek; and James Gerth of Younger Creek Mining prospected in the Fortymile district Creek with his partner Mike Berry.

COAL

There was no reported exploration for coal in 1993.

INDUSTRIAL MINERALS

Al Vezey of Lakloey Inc. reported exploration and drilling for aggregate and riprap in the Delta Junction area.

DIAMONDS

Since the incidental finds of diamonds during sluicing in the Circle area in 1982, there has been a modest

amount of interest in the possibility of a local source of the stones. In the last few years, since the diamond discoveries in the Northwest Territories, the interest in the Circle-Chena area has been heightened. Verdstone Gold Corporation of Surrey, British Columbia, has been prospecting for diamonds in the Circle area and, more recently, on the Clums Fork area, about 120 miles (190 kilometers) northeast of Fairbanks. The company intends to drill a structure known as the "Crazy Eight" exploration target. Carissa Mining and Whiskey Creek Resources explored the Circle district, and reported the identification of lamproite indicator minerals. Several other gold prospectors in the Circle area indicate an interest in diamonds.

TsNIGRI, the Russian partner of Tri-Valley Corporation, reported the discovery of an alluvial diamond during prospecting efforts in the Richardson district 70 miles (105 kilometers) southeast of Fairbanks.

SOUTHCENTRAL REGION

Exploration expenditures in 1993 were \$1.54 million, up very slightly from the \$1.46 million reported in 1992. As in the past few years, most of the activity was related to precious metals either in the primary deposits or in polymetallic deposits. An airborne magnetic-electromagnetic survey of the Valdez Creek area contracted by the State may spur interest in this area in 1994 (Alaska Division of Geological & Geophysical Surveys, 1994d).

METALS

The largest program in southcentral Alaska was at the Johnson River polymetallic deposit west of Cook Inlet at the foot of the Iliamna Volcano. Westmin Resources Ltd. of Vancouver drilled 6,600 feet (2,000 meters) of diamond-drill hole to test the continuity of the quartz-sulfide vein stockwork, and plans to test the deeper extension in 1994. Some geotechnical work and evaluation of transportation routes was also conducted in 1993. The deposit which is owned by the Cook Inlet Regional Inc. (CIRI) is hosted in sedimentary and volcanic rocks of the Jurassic, Talkeetna Formation. Proven and probable reserves amount to 1,099,825 tons (997,542 tonnes) grading 0.32 ounces per ton (10.35 grams per tonne) gold, 0.24 ounces per ton (7.84 grams per tonne) silver, 8.37 percent zinc, 1.17 percent lead, and 0.76 percent copper.

North Pacific Mining Company (NPMC), a subsidiary of CIRI, also reported positive results from metallurgical testing of its Red Mountain chromite deposit near Seldovia in lower Cook Inlet. Dr. Michael Nelson, of the University of Alaska's School of Mineral Engineering, and Metals Refining Company of Orem, Utah, assisted NPMC in this work.

Cominco Alaska Exploration Inc. reported exploration in the region at undisclosed locations. Earle Foster continued sampling at his Golden Flower claims in the Upper Chulitna mining district a few miles north of the Golden Zone Mine. Recent work suggests that the gold is associated with a composite 65 million-year-old intrusion of shoshonitic affinity.

Noranda Exploration Company Ltd. had a modest exploration program at the Zackly copper-gold skarn deposit in the McLaren River area. This property is owned by Pacific Northwest Resources Company.

Eleven companies reported exploration for gold placer deposits in the southcentral region in 1993, following the trend of the last few years. One of the largest investments was made by Cambior Alaska Inc., which had a 5,688 foot (1,734 meter) reverse-circulation drilling project ahead of its mine development on Valdez Creek. Penn-Jersey Drilling Inc. also invested in 1,065 feet (325 meters) of reverse-circulation drilling further up Valdez Creek. Arnold and Sally Echola spent several days excavating pits on Gold Creek, a tributary to Valdez Creek.

At the Blue Ribbon Mine in the Cache Creek area west of Talkeetna, Empire Exploration Inc., with partner Frontier Mining Inc., conducted exploration for placer gold and associated tin, PGM, REE, and chromium. The mine site is located on a strike with a persistent, north-east-trending, gold-bearing shear zone in the Dutch Hills. Cottonwoods Mining Company did a little prospecting on Dollar Creek in the Yentna district. Halloran Operations sampled for placer gold in the Willow Creek and Kahiltna River drainages. Ed Ellis of Lake Creek Placers Inc. prospected on undisclosed area of the southern Alaska Range for paleoplacers in conglomerates of the Tyonek Formation (fig. 9). Good gold and PGE (platinum group elements) values are reported.

Jack LaCross explored his placer claims at Twin and Mills Creeks near Collinsville. Nearby, the Boles brothers sampled auriferous quartz veins and felsic dikes on Bird Creek near Petersville. Roland Boehne drilled placer pay streaks on Yacko Creek in the Nelchina district.

In the Willow Creek district east of Talkeetna Arnold Mason prospected for gold on Willow Creek. Elsewhere in the southcentral region, Mrak Placer Mine prospected at an undisclosed location, and Lynn Rill drilled in the Copper River drainage.

On the Kenai Peninsula, Alyeska Management Services did some prospecting on claims owned by Outside Mining Company at Canyon Creek.

Longtime placer miner Howard McWilliams evaluated his 41 patented federal mining claims on Chunilna and Johns Creeks about 30 miles (48 kilometers) northeast of Talkeetna. McWilliams used results from more

Figure 9. 'Trencherman' minihoe used by Lake Creek Placers Inc. in the Cache Creek district west of Talkeetna to evaluate placer deposits on Lake Creek. The portable unit was slung in with a Jet Ranger model helicopter. (Photo courtesy of Ed Ellis)



than 1,000 samples to estimate that nearly 15 million cubic yards (11.4 million cubic meters) contain significant quantities of gold in the range of 0.05 ounce gold per cubic yard (2.4 grams per cubic meter).

COAL

No exploration activity was reported in this district in 1993.

INDUSTRIAL MINERALS

There was no reported exploration for rock, sand, or gravel in southcentral Alaska in 1993.

SOUTHWESTERN REGION

Exploration activity was down dramatically in 1993 with \$843,000 invested. In 1992 reported expenditures were \$2.81 million.

The Nyac area was the target of a State-sponsored airborne magnetic survey in 1993 (Alaska Division of Geological & Geophysical Surveys, 1994c).

METALS

Cominco Alaska Exploration continued exploration programs in the Iliamna Mining district and concentrated work on and adjacent to the Pebble Copper porphyry deposit.

Misco-Walsh Mining Company continued a long term evaluation of hardrock and residual deposits at the polymetallic Golden Horn prospect near Flat in the historic Iditarod district. Much of the 1993 work centered on metallurgical studies of concentrates. American Barrick Inc. also explored Doyon lands in

the Iditarod district and examined the Golden Horn deposit.

Starcore Resources Ltd. teamed up with Alaska Earth Resources and Calista Corporation to explore platinum deposits at Goodnews Bay, which was the site of the largest U.S. producer of placer platinum before 1976 (fig. 10). The 1993 efforts included a detailed airborne geophysical survey of the Red and Susie Mountain areas. Teck Corporation also worked with Calista to further evaluate the lode gold potential of the old Donlin district north of Crooked Creek on the Kuskokwim River.

Five companies reported placer gold exploration in 1993. Larry Wilmarth of Julian Creek Mine prospected at the George River with trenching, and Paul Sayer of Little Creek Mine reported the same activity at Little and Bedrock Creeks near Ophir.

Lyman Resources of Alaska put in a drainage trench on Queen Gulch near Donlin Creek. On Ophir and Dodge Creeks, R & W Mining put in some shafts and test-pits. James Wylie did a little heavy metal prospecting in the vicinity of Platinum at Goodnews Bay.

COAL AND INDUSTRIAL MINERALS

No exploration was reported in southwest Alaska in 1993 for coal or industrial minerals.

ALASKA PENINSULA REGION

Although only \$290,000 was invested in exploration on the Alaska Peninsula in 1993, this investment was a large increase over the \$8,600 expended in 1992.



Figure 10. Gilbert Kilbuck of the village of Platinum takes notes detailing the location and geologic description of a soil sample he collected on Red Mountain above the old Platinum Mine Camp, seen in the background of this photo. Kilbuck was part of a crew of eight Calista shareholders hired by Alaska Earth Sciences to help collect soil samples during a late season platinum exploration program for Starcore of Vancouver. In spite of last October's poor weather conditions, 3,221 soil samples were collected by the Platinum and Goodnews Bay crew members. (Photo by June McAtee, Calista Corporation)

METALS

All of the reported 1993 activity was exploration for polymetallic deposits similar to the Pebble Copper copper-gold porphyry and other polymetallic epithermal deposits. Many of these metals are associated with recent geothermal activity in this tectonically active region.

COAL AND INDUSTRIAL MINERALS

There was no exploration for coal or other industrial minerals on the Alaska Peninsula in 1993.

SOUTHEASTERN REGION

Exploration expenditures in southeast Alaska in 1993 were \$15.7 million, up 5 percent from the \$14.9 million invested in 1992. Almost all of the exploration was for metals—80 percent for gold and 20 percent for polymetallic deposits with precious-metal credits.

METALS

Echo Bay Alaska Inc. operated Alaska's largest program at its Alaska-Juneau (A-J) Mine near Juneau

(fig. 11). In addition to a large drilling and mapping program, the company began to convert to trackless vehicles, and rebuilt the Sheep Creek portal to protect it from avalanche danger and facilitate entry of larger mining equipment. At the end of 1993 the company had 80 employees, many of them graduates of the University of Alaska-Southeast mining school or former workers from the mothballed Greens Creek mine. A-J reserves remain at about 100 million tons (90.7 million tonnes) grading 0.051 ounces per ton (1.75 grams per tonne) of gold.

At Kensington venture, north of Juneau, partners Echo Bay and Couer Alaska Inc. continued project work on permitting, mine geology, and design.

Coeur d'Alene Mines also optioned the Jualin property north of Juneau. This old mine is on the southeast side of the mountain that contains the Kensington Mine. Work at the Jualin Mine in 1993 consisted of a thorough review of existing information and limited geochemical sampling.

Kennecott-Greens Creek Mining Company, with partners Hecla and Yukon Pacific, conducted a large exploration drilling program at the Greens Creek deposit on Admiralty Island. The exploration added significant



Figure 11. *Project geologist Lance Miller (left) of Echo Bay Alaska and fellow workers inspect diamond-drill coring from the Alaska Juneau project at Thane, 4 miles (6 kilometers) south of Juneau. (Photo by Al Clough)*

new reserves. The newly discovered West ore deposit contains 11 million tons (10.0 million tonnes) grading 0.13 ounces per ton (4.49 grams per tonne) gold, 11.83 ounces per ton (405 grams per tonne) silver, 3.99 percent lead, and 13.42 percent zinc.

Kennecott completed exploration programs at the Ruby Tuesday polymetallic property on Prince of Wales Island—600 feet (183 meters) of diamond drilling, at the Gold Fork gold and silver deposit near Juneau—1,200 feet (366 meters) of drilling; and at the Glacier Creek polymetallic deposit near Haines.

Hyak Mining Company conducted smaller exploration programs for gold in the Jualin Mine area and for polymetallic targets at Freshwater Bay on Chichagof Island west of Juneau. Earle Foster continued his exploration at Porcupine Creek in the Haines area during 1993. ASARCO had a modest program at Helm Bay north of Ketchikan.

American Copper and Nickel Company (ACNC) drilled 2,225 feet (678 meters) of core at its Hetta Inlet

polymetallic prospect on Prince of Wales Island.

Lac Minerals conducted a large exploration program at the Niblack Anchorage polymetallic, massive-sulfide deposit on Prince of Wales Island, west of Ketchikan. The 1993 work included drilling, ground geophysics, and mapping.

The Sealaska Native Corporation conducted a moderate regional reconnaissance program throughout the southeast panhandle and concentrated their work on a polymetallic deposit near Klawock.

COAL

No coal exploration was reported in southeast Alaska during 1993.

INDUSTRIAL MINERALS

Sealaska Corporation drilled 1,500 feet (451 meters) to investigate extensive deposits of high-purity, chemical-grade limestone at Calder Bay on Prince of Wales Island.

DEVELOPMENT

Alaskan mineral development expenditures totaled \$27.7 million in 1993 compared with \$29.6 million in 1992, or a reduction of about 6 percent (tables 6 and 7). Work continued at several established metallic projects including the Fort Knox, Red Dog, and Valdez Creek mine sites as well as a new development at Nixon Fork near McGrath. Development work also continued at two coal projects in the southcentral region (Wishbone Hill and Beluga projects) and at Healy (Healy Clean Coal Project) (fig. 12).

NORTHERN REGION

METALS

Cominco Alaska began a comprehensive development and redesign program aimed at increasing concentrate production at the Red Dog mine in northwestern Alaska. This expansion will increase production output of the concentrator primarily by increasing capacity of the grinding circuits. The result will be to achieve a daily sulfide concentrate output of 1,800 tons per day (1,633 tonnes per day) or about 657,000 tons per year (595,900 tonnes per year). The primary improvements include (1) addition of forced air ventilation to SAG mill motors, (2) installation of two 1,250 horse power ball mills to the secondary grinding circuit, (3) installation of an additional 450 horse power zinc regrind tower mill, and (4) modification of filter presses to expand dewatering capabilities of concentrates. The 25-month-long redesign program is expected to cost \$21 million and be completed by October, 1995.

Silverado Mines U.S. Inc. stripped and drilled its Nolan

Creek bench placer deposit in the Wiseman district in order to prepare it for production in 1994. They also began underground development programmed to provide pay for the summer sluicing season.

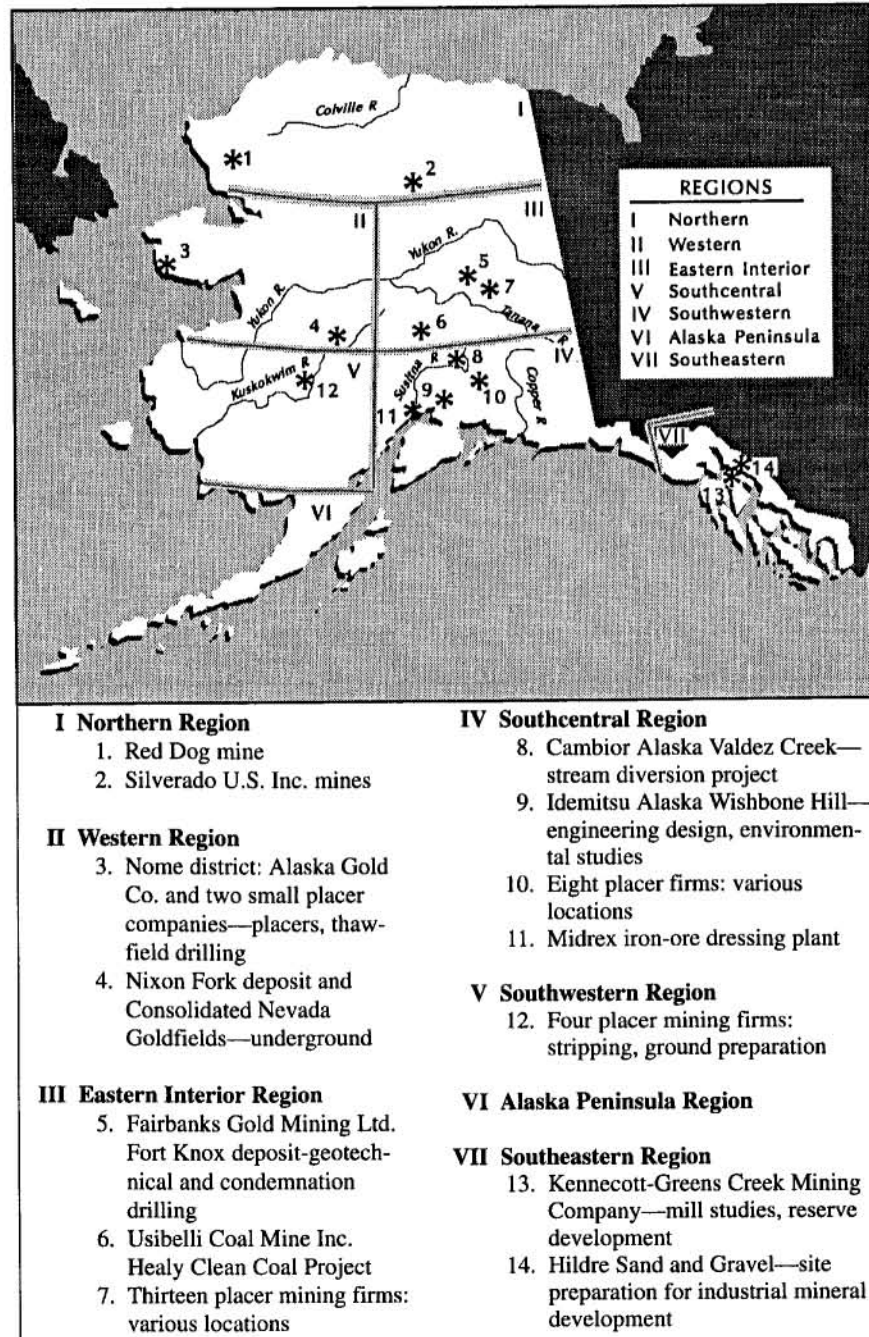


Figure 12. Selected mineral development projects in Alaska, 1993.

Table 6. Reported mineral development expenditures in Alaska by commodity, 1982-93

	Base metals	Polymetallics	Precious metals	Industrial minerals	Coal and peat	TOTAL
1982	\$ 10,270,000	N/A	\$ 19,320,000	\$ 4,251,000	\$ 7,750,000	\$ 41,591,000
1983	19,500,000	N/A	7,112,500	1,000,000	250,000	27,862,500
1984	10,710,500	N/A	15,058,555	579,000	27,000,000	53,348,055
1985	13,000,000	N/A	16,890,755	1,830,000	2,400,000	34,120,755
1986	3,260,800	8,000,000	12,417,172	124,000	530,000	24,331,972
1987	38,080,000	48,000,000	13,640,848	188,000	342,000	100,250,848
1988	165,500,000	69,000,000	40,445,400	--	--	274,945,400
1989	118,200,000	411,000	6,465,350	7,000,000	2,196,000	134,272,350
1990	--	4,101,000	7,136,500	30,000	3,079,000	14,346,500
1991	--	8,000,000	14,994,350	262,000	2,318,000	25,574,350
1992	80,000	4,300,000	23,151,300	404,000	1,655,000	29,590,300
1993	--	10,731,136	15,103,000	433,500	1,400,000	27,667,636
TOTAL	\$378,601,300	\$152,543,136	\$191,735,730	\$16,101,500	\$48,920,000	\$788,335,272

N/A Figures not available prior to 1986.

-- Not reported.

Table 7. Reported mineral development expenditures and employment in Alaska, 1993

	Northern	Western	Eastern interior	South-central	South-western	Alaska Peninsula	South-eastern	TOTAL
Development expenditures								
Base metals	--	--	--	--	--	--	--	--
Polymetallic	\$10,300,000	--	--	--	--	--	\$ 431,136	\$10,731,136
Precious metals								
Placer	415,000	\$ 90,000	\$ 698,500	\$ 4,545,000	\$69,500	--	85,000	5,903,000
Lode	--	1,200,000	8,000,000	--	--	--	--	9,200,000
Coal and peat	250,000	--	150,000	1,000,000	--	--	--	1,400,000
Industrial minerals	--	300,000	75,000	12,500	--	--	41,500	429,000
Other	--	--	--	4,500	--	--	--	4,500
TOTAL	\$10,965,000	\$1,590,000	\$8,923,500	\$5,562,000	\$69,500	--	\$557,636	\$27,667,636
Development employment								
Exploration employment								
Workdays	12,780	3,780	5,610	9,201	350	--	2,590	34,311
Workyears ^a	49	15	21	35	2	--	10	132
Number of companies reporting ^b	5	4	9	9	4	--	5	36

-- Not reported.

^aBased on a 260-day workyear.^bSome companies were active in several areas.

In the Koyukuk-Nolan district, Lounsbury Mining and Slate Creek Mine both reported stripping activities in preparation for production in 1994.

COAL

Development activities by Arctic Slope Consulting Group (ASCG) continued in the Deadfall Syncline area on the westernmost North Slope. ASCG provided bulk sample testing of coal from the Alauq mine for burning in North Slope villages.

In 1994, ASCG plans to expand a development project to determine the feasibility of exporting bituminous coal at a daily production rate of 13,230 tons (12,000 tonnes) to circum-Pacific or European markets. Participants in this ongoing development project include the U.S. Bureau of Mines, which is providing technical guidance on permafrost, reclamation, and water quality issues, and the John T. Boyd Company, which is involved with an underground, longwall-mine design as well as rock mechanics research.

WESTERN REGION

METALS

In late June, 1993, Consolidated Nevada Goldfields (CNG) acquired the Nixon Fork gold-copper skarn deposit northeast of McGrath from Central Alaska Gold Company, the previous operator. During the year, CNG's operator, Nixon Fork Mining Co., conducted a development trenching program and initiated onsite environmental studies (figs. 13 and 14). The most recent calculations put mineable, diluted, proven and probable reserves at 94,100 tons (85,348 tonnes) grading 1.42 ounces per ton (48.4 grams per tonne) gold with copper and bismuth credits. A feasibility study completed by Pincock, Allen and Holt Inc. concluded that positive cash flow could be generated at a mining rate of 150 tons per day (136 tonnes per day) producing about 60,000 ounces (1,866 kilograms) gold annually using underground mining methods. The company believes that aggressive exploration during mine development will find more reserves. Development and production activities scheduled for 1994 and 1995 are contingent on acquiring capital for the project.

The Alaska Gold Company, which operates two bucketline stacker dredges and one opencut mine in the Nome district, completed a modest churn drilling program that prepared ground for future placer production. Other placer mining firms that reported development work in the western region include Alaska Eldorado Gold Co. (Nome district), and Green Mining and Exploration (Ruby district).

INDUSTRIAL MINERALS

Sound Quarry Inc. and Board of Trade Inc. conducted construction and stripping activities in conjunction with development of its stone quarry at Cape Nome about 15 miles (24 kilometers) southeast of Nome (fig. 15).

EASTERN INTERIOR REGION

METALS

Development work was continued by Fairbanks Gold Mining Inc., the operating subsidiary for Amax Gold Inc., at the Fort Knox deposit northeast of Fairbanks. The 1993 work consisted of baseline and optimization studies including development drilling east of the main deposit on Monte Cristo Creek and a diligent effort to acquire permits necessary to open the mine. The Alaska Legislature appropriated funds to construct an electrical intertie from Fairbanks to the mine site, a distance of about 15 miles (24 kilometers). If put into production, Fort Knox would require 30-35 megawatts of electric power—equal to a significant percentage of the

baseload annually used in Fairbanks. Current proven and probable reserves at Fort Knox, unchanged from 1992, are 174 million tons (158 million tonnes) grading 0.024 ounces per ton (0.82 grams per tonne) gold or a total of 4,117,000 ounces (128,051 kilograms) gold.

Thirteen opencut-mining firms and one underground-placer-mining firm reported a variety of development activities related to preparing placer deposits for production. Late in 1993, Little Eldorado Group constructed a mine road and portal, and then started a decline to access underground reserves on Little Eldorado Creek in the Fairbanks district. The company completed about 500 feet (152 meters) of the decline by the end of the year.

The following placer mining companies conducted development stripping, road construction, and drilling: Robert Pelky on South Fork, Forty-mile River; Windy Hill Mining on South Fork of Harrison Creek, Circle district; Thurman Oil and Mining on the Eureka Creek in the Manley-Tofty district; John Klemencic on the Forty-mile River; B and B Mining (interior location not given); Thanksgiving Mining on Thanksgiving Creek in the Rampart district; Cooks Mining at two locations on lower Fairbanks Creek in the Fairbanks district; Goldstream Mining Inc. on Gilmore Creek also in the Fairbanks district; Herning Exploration and Mining Company at Palmer Creek on the East Fork of the Chena River; Charles Hammond at Forty-five Pup, Forty-mile district; and Young Creek Mining also in the Forty-mile district.

Glacier Six Enterprises continued a bulk sampling program of a gold-platinum placer deposit at East Broxon Gulch, in the Delta district and designed a production-level plant that is expected to operate during 1994.

Polar Mining Inc., which operates a large opencut placer gold mine on Lower Goldstream Creek, worked on processing and sizing mine tailings to provide several types of aggregate products for interior Alaska construction firms.

COAL

Usibelli Coal Mine Inc. conducted reserve assessment and permitting activities at its Gold Run Pass coal deposit, which is on Alaska State coal leases near Healy.

The Healy Clean Coal Power project (HCCP) near Healy came a few steps closer to reality in 1993 with completion of permitting and intertie routing work. The HCCP project is one of thirteen projects throughout the U.S. selected by the U.S. Department of Energy (DOE) to test and implement clean coal technologies. Golden Valley Electric Association (GVEA) currently operates a 25 megawatt mine-mouth power plant using coal from Usibelli Coal Mine Inc. for fuel. The HCCP project is designed to produce 53 megawatts of power using Usibelli coal for fuel. About 45 percent of the total project

cost of \$227 million will be funded by DOE; the remaining funding comes from private and public sources within Alaska. In late August, the U.S. National Park Service (NPS) withdrew the objection it had previously held to the HCCP project that a stack plume would jeopardize air quality in nearby Denali National Park. GVEA assured the Park Service that the existing 25 megawatt plant would limit its emissions so, when the new HCCP plant is up and running, total emissions from both plants would not exceed current emissions levels.

SOUTHCENTRAL REGION

METALS

Cambior Alaska completed a major stream-diversion project at Alaska's largest gold mine at Valdez Creek east of Cantwell. The project was begun in December, 1992, and completed in mid-March 1993, at a total cost of \$6.2 million. The wash plant for the placer mine was moved closer to the currently productive A-8 pit during 1993.

The following placer mining firms conducted development stripping, access improvements, plant construction, and camp maintenance in the southcentral region: Cottonwood Mining Company on Dollar Creek in the Cache Creek district; Arnold J. Mason on North Creek in the Nelchina district; Arnold and Sally Echola on Gold Creek east of Cantwell; Frank Mize (southcentral region unspecified); Mrak Placer Mine in the Hatcher Pass district; Mary Lou Redmond in the Indian River area south of Cantwell; and Howard McWilliams at his Chunilna Creek placer claims.

Gerald Anderson constructed a washing plant on Yacko Creek also in the Nelchina district and plans to be in production in 1994.

Empire Exploration Inc. worked on a program to expand reserves at the Blue Ribbon Mine in the Cache Creek district. Lake Creek Placers stripped, trenched, surveyed, and accessed a large, low-grade placer deposit containing both platinum and gold at Lake Creek also in the Cache Creek district.

Martin Herzog tested a bench deposit on his claims in Upper Cache Creek.

INDUSTRIAL MINERALS

Fairway Gravel conducted development work at its Funny River Road pit on the Kenai Peninsula.

COAL

Two coal development projects were ongoing in southcentral Alaska. Idemitsu-Alaska Inc. continued reserve-base evaluations, engineering design, and economic analysis for its Wishbone Hill coal export project near Palmer. Idemitsu controls high-quality bituminous

coal resources situated on both Alaska State coal leases and lands leased from Cook Inlet Regional Corporation. Diamond Chuitna Project and DRven Corporation continued engineering and environmental design work on the Beluga coal reserves north of Cook Inlet. The large Beluga subbituminous coal resources are leased from the State of Alaska. Both coal projects are being maintained so that they can be rapidly brought to production when market conditions improve.

PROPOSED IRON-ORE REDUCTION PROJECT

An interesting development in 1993 was the expression of interest by Midrex Corporation, a subsidiary of Kobe Steel Corporation, to construct a 200,000 ton- (181,400 tonne)-per-year iron reduction plant near Port McKenzie on Cook Inlet near Anchorage. Development of the Alaska Pacific Iron Project (APIP) would import 1.8 million tons (1.63 million tonnes) of iron oxide from South America, using Cook Inlet natural gas to produce high-grade iron briquettes and export of a finished product to steel mills in the Far East. The APIP project, expected to cost \$200 million, would be funded by private investors. The proposed deep-water port and load-out facility to service such a plant could also be used to export coals from the Beluga and Wishbone Hill coal projects.

SOUTHWESTERN REGION

METALS

Four placer mining companies reported modest levels of development work in the southwestern region. Millie Creek Mining constructed diversion ditches and settling ponds at Millie Creek and in the Aniak district.



Figure 13. Mark Musial of Golder and Associates and Ken Elordi of Boyles Brothers remove a split spoon sampler from a drill during tests of a proposed tailings dam site at Nixon Fork project near McGrath. (Photo by Richard Flanders)

Lyman Resources in Alaska Inc. stripped overburden at Snow Gulch north of Crooked Creek. Robbies Bonanza Mining constructed a camp at Ophir Creek in the Innoko district in preparation for mine activities in 1994 or 1995. Wilbur and Ann Williams conducted unspecified work at their Granite Creek mine in the Iditarod district.

Jim Wylie trenched the Mountain Top mercury mine south of Sleetmute. Low mercury prices, caused by international environmental restrictions placed on mercury usage, continue to deter development of the Mountain Top mercury-gold property.

SOUTHEASTERN REGION

METALS

Kennecott Greens Creek Mining Company continued development drifting at its Greens Creek polymetallic mine on Admiralty Island west of Juneau. This work

was designed to test costs and efficiencies of several mining methods for a projected restart of the underground operations when market conditions improve.

Earle Foster conducted unspecified development work at his patented placer claims in the Porcupine district near Haines.

INDUSTRIAL MINERALS

Hildre Sand and Gravel (Hildre) stripped and cleared ground at its new Montana Creek pit north of Juneau. The reserves at the company's ACME pit near Juneau are nearly depleted, and reclamation efforts are underway. Hildre also plans to expand crushing capacity at the Montana Creek pit, which will become the major producer for the company later in the 1990s.

The City of Thorne Bay drilled, shot, and stripped a mine site to prepare for the production of shot rock at Thorne Bay Quarry.



Figure 14. Ken Elordi and Bill Lowry of Boyles Brothers Inc. drill a test-water well in the Mystery claim area of the Nixon Fork project. Aquifer studies were initiated by Nixon Fork Mining Co., operator of the project during the 1993 development program. (Photo by Richard Flanders)



Figure 15. Sound Quarry Inc. crew constructs a causeway for riprap shipments to various Bering Sea villages at the company's Cape Nome Quarry about 15 miles (22 kilometers) southeast of Nome. (Photo by T.K. Bundtzen)

PRODUCTION

The value of Alaska's primary mineral production for 1993 is estimated at \$448.7 million, a decrease of \$112.1 million or 20 percent from 1992. Total gross value for individual commodities are zinc, 53 percent; gold, 15 percent; sand and gravel, 9 percent; coal, 8 percent; stone, 6 percent; silver, 5 percent; and combined lead, platinum, tin, jade, and peat, 3 percent. Mineral production statistics compiled in table 8 originate from 255 placer gold, coal, and lode metallic mines, and sand and gravel and stone quarries that operated in all seven regions of the state (fig. 16). Figures 17, 18, and 19 show historical production trends for gold, sand and gravel, and coal—three important components of the Alaskan mining industry. The mineral production estimates for 1993 are based on (1) data compiled from 195 questionnaires returned by mining companies, individuals, Native corporations, and government agencies; (2) a phone survey of metallic mineral and industrial mineral producers; (3) from Alaska Placer Mining Application Permit (APMA) records supplied by the Division of Mining & Water Management; and (4) from regional summaries provided by the Alaska Department of Transportation and Public Facilities, the U.S. Bureau of Land Management, and the U.S. Forest Service.

Unit value data was provided by about 40 percent of the industrial mineral and energy mineral producers; however, for metals, we compute value from average commodity prices reported in international mining journals and magazines. Hence, the gross values stated for each metal does not take into account transportation, refining, or other financial costs incurred during the mining process.

Metals continued to dominate mineral production and accounted for 77 percent of the 1993 Alaskan mineral value despite significant declines from the previous year. The overall values for metals dropped \$113.6 million from 1992 to 1993 mainly due to plummeting base metal prices and the closure of the Greens Creek Mine. Even though average prices increased 6 percent for gold and 12 percent for silver, prices dropped 22 percent for lead and 20 percent for zinc. Zinc and lead production have accounted for more than 50 percent of total mineral industry product value for each of the last three years (table 8). Despite the significant declines in value, Alaska remains the nation's number one producer of zinc, mainly from the Red Dog mine, which accounts for over half of the mine-produced zinc in the United States. Alaskan lead production is ranked third nationally behind Missouri and Arkansas.

Gold was produced at 196 placer mines and one lode mine (table 9). Overall, Alaska gold production continues to be influenced by the fortunes of a few large operations, even though gold is mined in every region of the state except the Alaska Peninsula (table 9). Cambior Alaska was again Alaska's largest gold mine and produced 35,560 ounces (1,106 kilograms) gold in 1993 or 19 percent of the state total bullion output. Rounding out the top ten producers are Greens Creek Mine, the Alaska Gold Company operations near Nome, Polar Mining near Fairbanks, Thurman Oil and Mining in the Eureka district, Alaska Placer Development near Livengood, GHD Resources in the Tofty district, Cooks Mining east of Fairbanks, Green Mining and Exploration in the Ruby district, and Paul and Company in the Circle district. These 10 operations produced 103,228 ounces (3,201 kilograms) gold or 54 percent of the state total. In selected previous years, the 10 top gold mines accounted for 60 percent (1992), 57 percent (1991), 49 percent (1990), 61 percent (1989), 59 percent (1988) and 58 percent (1987) of total Alaska gold output. In the two years in which the percentage dipped below 55 percent, the three largest operations in some combination performed poorly.

Even though Alaska gold output decreased 27 percent from 1992 to 1993, many small- to medium-sized placer gold mines reported to us that they benefited from a longer operating season and a 6-percent increase in gold prices. Throughout interior Alaska the 1992 mining season for placer miners was cut short at least one month by a late breakup in mid-May and a bitter cold snap in early September (September 9, to be exact). The improved situation for most placer mines from 1992 to 1993 seems to be reflected in the unit cost estimates provided by a selected number of placer miners. The estimates show that the average cost to produce an ounce of gold decreased from \$318 in 1992 to \$300 in 1993 (table 10).

Annual Alaska gold production from 1979 to 1993 is summarized in table 11. During the past 15 years, 2,851,412 ounces (88.7 metric tonnes) of gold worth \$1.1 billion at the time of sale was recovered from Alaska's placer and lode mines. Approximately 93 percent of the total gold output during 1979-93 has been placer gold, whereas 7 percent has been recovered from lode sources; about half of the hardrock total was a byproduct from the Greens Creek polymetallic mine. The high water mark for the gold mining industry in the last two decades seems to have been from 1987-89, when gold production in each reporting year exceeded \$100 million

and accounted for 39 percent to 51 percent of the total value of Alaska mineral production. The total gold production amount during 1979-93 constitutes about 8.6 percent of the total 33,054,166 ounces (1,028 tonnes) gold mined in Alaska from 1880-1993 (Appendix G).

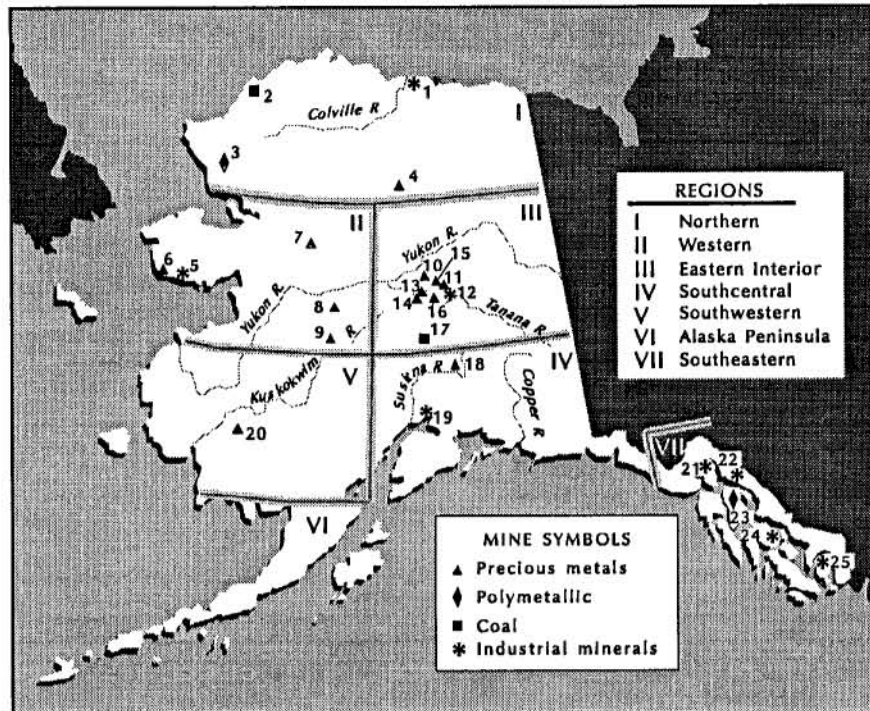
Industrial mineral production improved in 1993. Much of the demand for sand and gravel and stone continues to be in the state's most populous areas near Juneau, Anchorage, and Fairbanks, where new roads and retail construction remains healthy.

Coal production from the Usibelli Coal Mine at Healy remained steady at about 1.59 million short tons (1.44 million tonnes). However, reduced export prices and a dispute with the Alaska Railroad Corporation, which transports the coal, led to a temporary cessation of shipments from Healy to Seward. This dispute was resolved in a timely manner with no negative impact on the export of Alaska coal.

NORTHERN REGION

METALS

Cominco Alaska Inc. milled 1.87 million tons (1.70 million tonnes) of lead-zinc-silver ore at the Red Dog mine complex in northwest Alaska and shipped 465,600 tons (422,400 tonnes) of zinc concentrate, 48,700 tons (44,200 tonnes) of lead concentrate, and 25,500 tons (23,100 tonnes) of bulk Imperial Smelter Feed (ISF) concentrate from the port of Kivalina north of Kotzebue to overseas and Canadian refiners (fig. 20; table 12). Cominco increased production approximately 15 percent in 1993 from 1992 levels in order to offset decreasing metal prices. Red Dog mine remains the largest



<p>I Northern Region</p> <p>1. Sagavanirktok River—gravel 2. Deadfall syncline—coal 3. Red Dog Mine—lead-zinc-silver 4. Silverado U.S. Inc. mines—gold</p> <p>Metallic mines 11 Industrial mineral producers 3</p>	<p>IV Southcentral Region</p> <p>18. Valdez Creek Mine—gold 19. Palmer/Wasilla area—gravel pits</p> <p>Metallic mines 20 Industrial mineral producers 14</p>
<p>II Western Region</p> <p>5. Cape Nome Quarry—rock, sand and gravel 6. Alaska Gold Co.—gold 7. Taiga Mining/Hogatzta—gold 8. Green Mining and Exploration—gold 9. Rosander Mining—gold</p> <p>Metallic mines 34 Industrial mineral producers 5</p>	<p>V Southwestern Region</p> <p>20. NYAC Mining Co.—gold</p> <p>Metallic mines 18 Industrial mineral producers 2</p>
<p>III Eastern Interior Region</p> <p>10. Alaska Placer Development—gold 11. Polar Mining Co.—gold 12. Earthmovers—gravel 13. Thurman Oil & Mining—gold 14. GHD Resources—gold 15. Paul and Company—gold 16. Cooks Mining—gold 17. Usibelli Coal Mining Inc.—coal</p> <p>Metallic mines 112 Industrial mineral producers 11</p>	<p>VI Alaska Peninsula Region</p> <p>Metallic mines 0 Industrial mineral producers 2</p>
<p>VII Southeastern Region</p> <p>21. Red Samm Construction—gravel 22. Hildre Sand and Gravel—gravel 23. Greens Creek Mine—zinc, silver, gold, lead 24. U.S. Forest Service—rock, sand and gravel 25. Sealaska Corporation—rock, sand and gravel</p> <p>Metallic mines 3 Industrial mineral producers 15</p>	

Figure 16. Selected production projects for 1993.

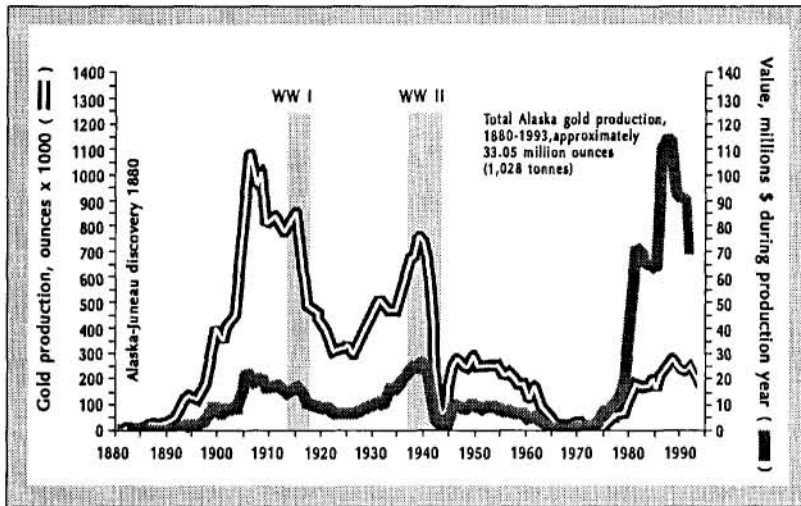


Figure 17. Amount and value of gold production in Alaska, 1880-1993.

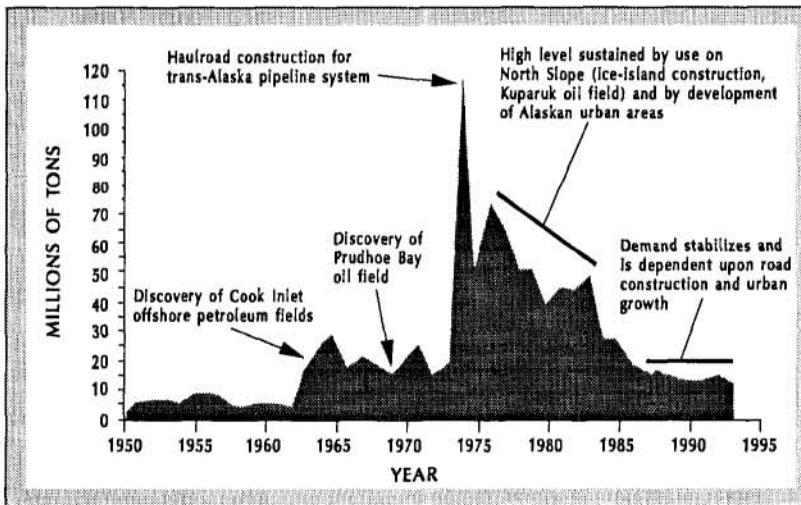


Figure 18. Sand and gravel production in Alaska, 1950-93.

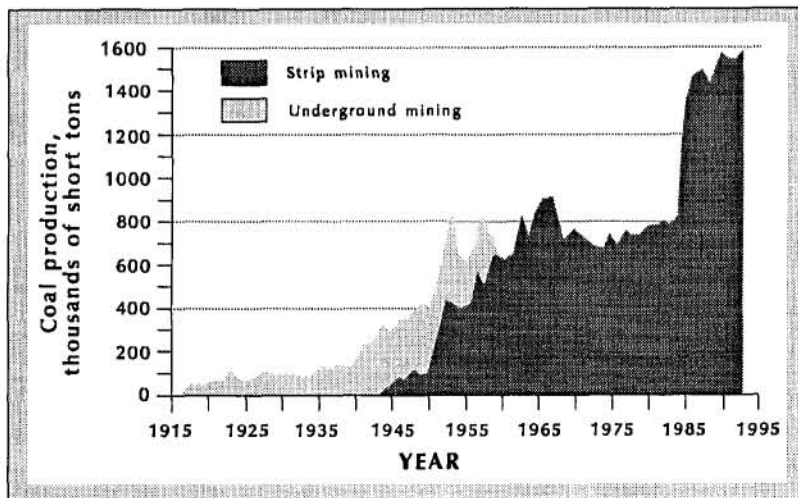


Figure 19. Coal production in Alaska, 1915-93.

zinc producer in North America, and was responsible for 64 percent of 1993 U.S. mine production of zinc. Cominco plans to further increase production output of the concentrator at the Red Dog mine site primarily by increasing capacity of the grinding circuits. This construction work will increase concentrate output to 20 percent to 657,000 tons (595,900 tonnes) annually by late 1995.

In an effort to reduce costs during difficult times, Cominco froze wages during 1993, and has extended the freeze into 1994 until zinc prices improve. Low zinc prices have halted 22 international zinc mines, and this halt has resulted in a 9 percent reduction in the amount of zinc produced worldwide. Prospects for improved zinc prices are considered good because of increasing uses of galvanized sheet steel in the auto industry. For example galvanized sheet steel in the Japanese auto industry increased from 180 pounds per car (82 kilograms per car) in 1981 to 590 pounds per car (267 kilograms per car) in 1991, and is forecasted to be 1,000 pounds per car (453 kilograms per car) by 1995.

An estimated 10 placer mines produced 5,254 ounces (164 kilograms) refined gold, up 17 percent from 1992. Nearly all of the production was derived from the Koyukuk-Nolan district of the central Brooks Range. About 65 gold miners were involved in 1993 activities. Slate Creek Mine (Paul and Jim Hunt) worked ground leased from Lloyd Swenson on Slate Creek near Coldfoot; the partners encountered heavy equipment problems throughout the season. Compass Mining Company (John Hall), as it has for many years, operated a small underground drift mine on Linda Creek also in the Koyukuk-Nolan district. Slisco Inc. extracted pay from an openpit placer operation on the Hammond River near Wiseman.

Silverado Mines U.S. Inc. began a multiyear placer operation on

Table 8. Estimated mineral production in Alaska, 1991-93^a

Metals	Quantity			Estimated values ^b		
	1991	1992	1993	1991	1992	1993
Gold (ounces)	243,900	262,530	191,265	\$ 88,291,800	\$ 88,463,000	\$68,640,800
(kilograms)	7,585	8,163	5,948			
Silver (ounces)	9,076,854	9,115,755	5,658,958	39,114,490	34,913,341	\$24,333,519
(kilograms)	281,382	283,500	175,994			
Platinum (ounces)	15	W	3			
(grams)	465	W	95	5,325	W	1,235
Lead (tons)	69,591	68,664	38,221	33,403,680	31,585,440	13,759,560
(tonnes)	63,119	62,278	34,667			
Zinc (tons)	278,221	274,507	268,769	278,221,000	301,957,700	236,516,720
(tonnes)	252,346	248,978	243,774			
Tin (pounds)	6,800	1,500	21,000	22,100	5,910	50,610
(kilograms)	3,084	680	9,526			
Subtotal				\$439,058,395	\$456,925,391	\$343,302,444
Industrial minerals						
Jade and soapstone (tons)	16.0	1.5	2.6	\$ 12,000	\$ 30,000	\$ 20,000
(tonnes)	14.5	1.4	2.4			
Sand and gravel (million tons)	14.2	14.6	13.2	45,448,512	42,200,000	40,636,815
(million tonnes)	12.8	13.2	11.9			
Building stone (million tons)	3.0	2.9	3.6	22,500,000	22,971,000	26,205,784
(million tonnes)	2.7	2.6	3.3			
Subtotal				\$ 67,960,512	\$ 65,201,000	\$66,862,599
Energy minerals						
Coal (tons)	1,540,000	1,531,800	1,586,795	\$ 39,000,000	\$ 38,300,000	\$ 38,103,600
(tonnes)	1,396,780	1,389,340	1,439,223			
Peat (cubic yards)	75,000	70,000	72,000	450,000	400,000	445,000
(cubic meters)	57,345	53,552	55,051			
Subtotal				\$ 39,450,000	\$ 38,700,000	\$ 38,548,600
TOTAL				\$546,468,907	\$560,826,391	\$448,713,643

^aProduction data from DGGs questionnaires, U.S. Bureau of Mines data files (1991-1992), phone interviews with mine operators, Alaska Department of Transportation and Public Facilities, and other sources.

^bValues calculated from 1993 average prices of gold (\$359/oz), zinc (\$0.44/lb), lead (\$0.18/lb), silver (\$4.30/oz), and tin (\$2.41/lb); all other values provided by mine operators.

W—Withheld.

a high bench level of Nolan Creek, and exploited pay streaks from both opencut and underground drift mines. The underground deposits were purchased from veteran drift miner Paul Dionne of Inside-Out Mining Company. Silverado's 1993 efforts will be expanded in 1994 when both placer mines reach full production.

Gold Dust Mines Inc. again operated a successful large opencut placer mine on Tobin Creek near Chandalar Lake east of the Wiseman area.

John Thomas worked pay on Prospect Creek south of Wiseman and east of the trans-Alaska pipeline corridor.

Table 9. Reported refined gold production, number of operators, and industry employment in Alaska, 1992-93

Region	Number of operators		Production in ounces of gold		Number of employees	
	1992	1993	1992	1993	1992	1993
Northern	12	10	4,500 (141 kg)	5,254 (164 kg)	50	65
Western	33	34	49,500 (1,540 kg)	49,733 (1,547 kg)	290	294
Eastern interior	106	112	72,500 (2,256 kg)	77,233 (2,402 kg)	498	524
Southcentral	21	20	92,880 (2,889 kg)	42,268 (1,313 kg)	305	240
Southwestern	24	18	13,500 (420 kg)	9,254 (288 kg)	103	77
Southeastern	3	3	32,650 (1,016 kg)	7,523 (234 kg)	175	45 ^a
TOTAL	199	197	262,530 (8,163 kg)	191,265 (5,948 kg)	1,421	1,245

^aIncludes a percentage of employment from Greens Creek polymetallic mine.

Table 10. Production costs for selected Alaska placer gold mines, 1989-93

Mine size	1989	1990	1991	1992	1993	1989	1990	1991	1992	1993
	Number of mines					Production in ounces				
Small ^a	11	8	21	23	19	2,977	1,856	3,582	3,842	3,919
Medium ^b	5	11	8	6	4	6,461	12,132	8,431	5,759	5,825
Large ^c	5	5	5	5	2	98,816	54,497	84,539	128,992	25,335
TOTAL	21	24	34	34	25	108,254^d (3,359 kg)	68,485^e (2,124 kg)	96,552^f (3,002 kg)	138,593^g (4,310 kg)	35,079^h (1,091 kg)
	Unit cost/ounce					Total reported mine cost in millions of \$				
Small ^a	\$263	\$302	\$284	\$245	\$263	\$ 784,177	\$ 560,600	\$ 1,018,606	\$ 940,000	\$ 1,031,500
Medium ^b	238	273	298	255	327	1,538,000	3,314,000	2,518,239	1,460,000	1,905,125
Large ^c	324	348	376	322	300	31,972,300	18,990,000	31,857,228	41,650,000	7,605,000
TOTAL	\$317	\$334	\$366	\$318	\$300	\$34,294,477	\$22,864,600	\$35,394,073	\$44,050,000	\$10,541,625

^a10-650 oz gold/yr.^b650-2,500 oz gold/yr.^c>2,500 oz gold/yr.^d43 percent of total Alaskan placer gold production.^e36 percent of total Alaskan placer gold production.^f46 percent of total Alaskan placer gold production.^g61 percent of total Alaskan placer gold production.^h19 percent of total Alaskan placer gold production.Table 11. Alaska lode and placer gold production, 1979-93^a

Year	Refined ounces placer	Number placer producers ^b	Refined ounces lode	Number lode producers	Total refined ounces produced	Total Value (at time of sale)
1979	65,000	135	--	--	65,000	\$ 18,000,000
1980	72,209	145	2,791	2	75,000	32,000,000
1981	125,800	207	8,400	3	134,200	55,200,000
1982	164,200	326	9,800	2	174,000	69,960,000
1983	168,860	296	140	2	169,000	67,600,000
1984	174,895	281	105	1	175,000	63,000,000
1985	188,420	266	1,580	2	190,000	61,175,000
1986	159,685	195	315	3	160,000	60,800,000
1987	226,200	202	3,500	3	229,700	104,516,230
1988	250,285	208	15,215	4	265,500	112,837,000
1989	247,948	217	36,669	5	284,617	108,723,694
1990	192,800	216	38,900	2	231,700	89,204,000
1991	204,380	202	39,520	2	243,900	88,291,800
1992	228,400	197	34,130	2	262,530	88,463,000
1993	183,915	196	7,350	1	191,265	68,640,800
TOTAL	2,652,997 (82.51 metric tonnes)	NA	198,415 (6.17 metric tonnes)	NA	2,851,412 (88.68 metric tonnes)	\$1,088,411,524
Percent of total	93	NA	7	NA	100	NA

^aData derived from State of Alaska Annual Mineral Reports and DGGs questionnaires for the years 1979-93.^bDoes not include recreational or nonmechanized placer mines.

-- Not reported.

NA—Not applicable.

Paradise Valley Inc. worked pay on Birch Creek southeast of Wild Lake, which in past years has featured recreational mine opportunities for visiting tourists.

INDUSTRIAL MINERALS AND SEMI-PRECIOUS STONE

Most of the construction stone and sand and gravel production reported to us originated from North Slope pits and quarries servicing the petroleum industry. Despite an overall decline in oil and gas related activities, petroleum firms extracted about 20 percent more sand and gravel in 1993 than in 1992 (table 13). Alyeska Pipeline Service Company (Alyeska) reopened five

gravel pits on the floodplain of the Sagavanirktok River, after a 10-year hiatus. Alyeska indicated that about 20 material sites were exploited for maintenance and repair work along the trans-Alaska pipeline system (TAPS) in the northern region. Nearly all of the sand and gravel used by ARCO Alaska and British Petroleum (BP) was recycled from previous drilling pads in the Prudhoe, Kuparuk, and Milne Point petroleum fields.

Stewarts Jewel Jade Mines (Stewarts) processed 2,000 pounds (907 kilograms) of jade originally mined from the Kobuk River valley of the western Brooks Range. Stewarts reported difficulties in finding skilled

Figure 20. Water reservoir at the Red Dog zinc-lead-silver mine complex. The mine is operated by Cominco Alaska Inc., and the deposit is owned by NANA Corporation. Despite low metal prices, Red Dog mine continues to be the largest U.S. producer of zinc. (Photo courtesy of Cominco Alaska Inc.)



Table 12. Cominco Alaska's Red Dog Mine, production statistics, 1989-93

	1989	1990	1991	1992	1993
Ore milled (tons)	33,300	998,700	1,599,300	1,582,000	1,874,800
(tonnes)	30,200	904,200	1,450,900	1,435,200	1,700,600
Ore grade					
Zinc	20.4%	26.5%	22.5%	19.9%	18.4%
Lead	7.8%	8.5%	8.0%	6.0%	5.8%
Silver					
(oz/ton)	3.6	3.8	2.8	2.9	2.8
(g/tonne)	123	130	96	99	96
Concentrate					
Zinc (tons)	N/A	337,400	410,700	405,900	465,600
(tonnes)		308,100	372,600	368,200	422,400
(grade)		58.9%	57.1%	57.0%	54.8%
Lead (tons)	N/A	56,800	78,800	28,000	48,700
(tonnes)		51,400	69,500	25,400	44,200
(grade)		55.1%	57.2%	57.0%	50.9%
Bulk concentrate (tons)	8,532	49,600	34,100	41,000	25,500
(tonnes)	7,740	45,000	31,000	37,200	23,100
Bulk concentrate (grade)					
Zinc	40.3%	31.7%	32.8%	23.0%	16.2%
Lead	18.5%	22.9%	20.9%	27.0%	38.9%
Total concentrate (tons)	8,532	443,600	521,400	474,900	539,800
(tonnes)	7,740	402,500	473,100	430,800	489,700
Employees	228	350	331	349	378

SOURCE: Jim Kulas, Cominco Alaska Inc.

technicians capable of operating the cutting and polishing equipment.

COAL

Arctic Slope Consulting Group (ASCG) again provided about 750 tons (680 tonnes) of high quality, bituminous coal from the Deadfall Syncline area for use in villages of the Arctic Slope Regional Corporation. The coal is mined by opencut methods, bagged and

hauled by sleds to tidewater, and barged to various North Slope villages during the summer shipping season. The coal has a heating value of 13,078 Btu, a sulfur content of 0.23 percent, 5 percent moisture, and an ash content of about 6 percent. ASCG continues to seek an export market for its deposits in the Deadfall Syncline area, where the deposits contain measured reserves of 60 million tons (54.4 million tonnes) of the high quality bituminous coal.

Table 13. *Reported sand and gravel production and industry employment in Alaska by region, 1993*

Region	Companies and agencies reporting ^a	Tons	Estimated unit value (\$/ton) ^b	Total value	Estimated number of employees
Northern	3	559,800	\$4.50	\$ 2,519,100	30
Western	4	447,101	6.45	2,883,800	21
Eastern Interior	7	3,741,478	2.45	9,166,621	151
Southcentral	11	5,164,000	2.25	11,619,000	220
Southwestern	2	315,000	5.00	1,575,000	15
Alaska Peninsula	2	165,500	2.48	410,440	10
Southeastern	10	2,769,523	4.50	12,462,854	133
TOTAL	39	13,162,402 (11,938,298 tonnes)	NA	\$40,636,815	580

^aFive phone-canvas responses and 34 returned questionnaires.

^bValues are based on price and cost estimates for about 24 percent of the total product value and 40 percent of the operators.

NA—Not applicable.



Figure 21. Alaska Gold Company's Dredge Number 6 working the submarine beach, an ancestral shoreline of Norton Sound, west of the Nome city airport. Opencut mining may eventually replace these historic producers of placer gold in the Nome district. (Photo by T.K. Bundtzen)

WESTERN REGION

METALS

During 1993, in the western region, 34 placer mines recovered 49,733 ounces (1,547 kilograms) gold and employed 294 workers, about the same level of employment as in 1992 (table 9). Leading bullion producers were Alaska Gold Company's two bucketline stacker dredges in the historic Nome district. Dredge Number 5 operates on the third beach, an ancestral shoreline of Norton Sound, while Dredge Number 6 operates on a more youthful strand line west of the Nome airport (fig. 21). About 2 miles (3 kilometers) north of Nome, Alaska Gold produced gold from an opencut placer mine that was developed by winter stripping and summer sluicing, much like methods practiced by Polar Mining in the Fairbanks district. Alaska Gold Company might phase out both dredge operations in the future and rely on production from the large-scale opencut mining operations. Alaska Gold produced 22,000 ounces (684 kilograms) refined gold, or about 44 percent of the western region total bullion output.

Western Arctic Mining produced gold on Iron Creek northeast of Nome, but suffered an early curtailment of sluicing due to poor weather conditions. Bart Pettigrew mined on Anvil Creek and Dan Walsh mined high bench levels on Dexter Creek; both streams were responsible for a substantial percent of past production of gold in the Nome district. Steve Pomrenke mined a strandline deposit near the Tripple and McDonald Creek drainages about 2 miles (3 kilometers) southeast of the

Nome-Kougarok road. Betty Krutzch mined placers in Specimen Gulch, another ancestral bench level of Anvil Creek along the west flank of Dexter Mountain. Other mines active in the Nome area in 1993 include the operation of a 1.5 cubic foot (43 liter) bucketline dredge by Engstrom Dredging Company on Basin Creek (fig. 22) and Andy Hehlin on Nome beach.

Tundra Exploration (Rheinhardt Berg) operated an open-pit placer mine on Mina Creek in the Candle district but reported that recovery was significantly less than had been indicated by reserve drilling. AU Mining continued its longstanding placer mine operation on the Candle bench south of Candle townsite.

N.B. Tweet and Sons recovered gold from its floating 1.5 cubic foot (43 liter) bucketline stacker dredge in the Kougarok district. This third generation Alaskan mining venture has worked pay in the Kougarok district since the turn-of-the-century gold rush era. Nearby Dick Creek Mining again mined pay on Dick Creek, and Don Mullikan worked auriferous gravels on Boulder Creek.

An estimated 175 hand miners and suction-dredge operators recovered placer gold from public beach deposits along a 40-mile-long (60-kilometer-long) stretch of the Norton Sound coast (fig. 23). Most of the hand miners operate on beaches from Hasting Creek 15 miles (24 kilometers) southeast of Nome, to Cripple River, about 20 miles (32 kilometers) west of Nome.

East of the Seward Peninsula and into the Lower Koyukuk and Yukon River drainage basins, placer mining activities continued at about the same level as established in the last five years. Taiga Mining Company again leased a 6 cubic foot (170 liter) bucketline stacker dredge from Alaska Gold Company at Hogatza and produced pay from a mixture of virgin ground and dredge tailings.

Flat Creek Mining Company continued to mine pay on Flat Creek in the Ruby district. Nearby Green Mining and Exploration mined a full season on Long Creek as they have for a number of years. The company indicated that the Long Creek paystreak (on federal land) had only a year or so of remaining reserves, and future mine development and production would soon start on Birch Creek (state claims).

Rosander Mining company completed its 20th year of placer mining on Colorado Creek, tributary to the Innoko River. Rosander continues to mine the upper portions of the drainage, where most of the remaining reserves are being prepared for production.



Figure 22. The 1.5-cubic-foot dredge of Engstrom Dredging at Basin Creek about 20 miles (32 kilometers) northeast of Nome. Engstrom Dredging brought the dredge to Basin Creek from Pajarra Creek in 1959 and has produced gold since. (Photo by T.K. Bundtzen)

INDUSTRIAL MINERALS

Four companies and agencies reported that 447,101 tons (405,520 tonnes) of sand and gravel were bailed from pits in the western region. Stebbins Native Corporation extracted a modest amount of sand and gravel from Cape Stebbins on Norton Sound for housing foundations and airport reconstruction. DOTPF repaired portions of the Nome-Teller and Nome-Council road systems on the Seward Peninsula. Board of Trade Inc. mined sand and gravel from unspecified sites in the Nome area for infrastructure and road construction projects. Martinsen Gravel and Crane (Martinsen) continued to supply sand and gravel for various construction projects also in the Nome area. The company developed a large gravel pit near Hasting Creek on land owned by Sitnasuak Corporation; Martinsen plans to substantially increase production in 1994 (fig. 24).

Sound Quarry Inc., owned by Sitnasuak and Bering Straits Native Corporations (BSNC), operated a rock quarry at Cape Nome about 15 miles (24 kilometers) southeast of Nome, and produced 136,201 tons (123,534 tonnes) of rock worth \$2.1 million (fig 25; table 14). Subcontractor Red Samm Construction Company drilled, shot, and processed about 55 percent of the armor rock, while Board of Trade Inc., a local Nome-based industrial mineral producer, completed the remaining 45 percent of the quarry work. The rock products were shipped to a DOTPF armor rock stockpile at Nome and to Point Hope, Shismaref, and Bethel for riprap applications. The rock quarry work provided jobs for about 55 Nome residents from mid-June to November, with 50 percent of the work force made up of Sitnasuak and BSNC shareholders.

Before dismantling the tactical-fighter-wing base at Galena, the U.S. Air Force quarried gravel and conducted minor road work.

EASTERN INTERIOR REGION

METALS

The eastern interior region includes the north flank of the Alaska Range and much of the Yukon-Tanana upland. Since the late 19th century the following districts—Fairbanks, Circle, Hot Springs, Fortymile, Tolovana, Rampart,

Richardson, Kantishna, Eagle, Tanana, and Bonfield—have yielded 11.42 million ounces (355 metric tonnes) gold, or 35 percent of Alaskan gold production (fig. 26).

For the first time in several years, the eastern interior led the state in gold output. Our canvass indicates that 112 placer mines in this region produced 77,233 ounces (2,402 kilograms) gold worth \$27.8 million in 1993, an increase of 5 percent in the number of active mines and 7 percent in gold output from 1992. Mine employment estimates increased from 498 in 1992 to 524 in 1993 (table 9).

The Fairbanks mining district was again the largest producing placer camp in the region. We estimated that 24 placer mines produced 34,500 ounces (1,072 kilograms) gold and 5,400 ounces (167 kilograms) silver and employed about 143.



Figure 23. Recreational mine setup on the beaches east of Nome. A small water pump on the left supplies a controlled stream of water to the sluice on the right. The paydirt is shoveled into the box. (Photo by T.K. Bundtzen)



Figure 24. Martinsen Gravel and Crane mines sand and gravel at the Hastings Creek pit, southeast of Nome. The land is owned by Sitnasuak Corporation. (Photo by T.K. Bundtzen)

Polar Mining Inc. operated two large placer mines on lower Goldstream and Fish Creeks in the Fairbanks district. The company operates all year with miners stripping overburden during the winter by blasting and ripping, and sluicing auriferous gravels in the summer. At their largest mine on Lower Goldstream Creek, 35,000 cubic yards (26,760 cubic meters) are processed daily. Polar Mining provided 48-54 year-round jobs and was Alaska's third largest producer of gold in 1993.

Other Fairbanks district placer mining firms reported successful seasons. Alf Hopen mined on Little Eldorado Creek; Cook's Mining mined an opencut on Upper Fairbanks Creek; Goldstream Mining worked pay on Gilmore Creek; Cassiterite Placers finished a program on Fox Creek; Don Stein worked Pedro Creek; and Herning Exploration and Mining mined a test cut on Palmer Creek, tributary to Chena River (fig. 27).

Roberts Mining finished its five-year drift-mining program on Dome Creek, about 18 miles (29 kilometers) northeast of Fairbanks. The company, which pioneered modern drift-mining technology in the interior, moved to Little Eldorado Creek late in the year, and expect production in 1994 under a new organization—the Little Eldorado Group.

Alaska Placer Development (APD) worked the Livengood bench for the tenth year, and sluiced 82,500 cubic yards (63,080 cubic meters) of auriferous pay, which was less than the output of the previous year due to the problems with the stripping schedule. The company expects an improved 1994 season.

Activity levels increased in the Tofty, Rampart, and Eureka districts where seven placer mines collectively produced 15,085 ounces (469 kilograms) gold. GHD Resources operated the third largest placer mine in the eastern interior at Tofty, west of Manley Hot Springs. The company sluiced 89,000 cubic yards (68,050 cubic meters) and reported a byproduct of tin as well as gold and silver. About 340,000 cubic yards (259,960 cubic meters) of overburden were removed by both mechanical and hydraulic methods. GHD Resources sold the Tofty property, effective January 1, 1994, to the original owner Cassiterite Placers, which will resume production



Figure 25. Sound Quarry Inc. and Board of Trade Inc. teamed up to quarry rip rap at the Cape Nome rock quarry southeast of Nome. (Photo by T.K. Bundtzen)

Table 14. Reported stone production and industry employment in Alaska by region, 1993^a

Region	Companies and agencies reporting ^b	Tons	Estimated unit value (\$/ton) ^c	Total value	Estimated number of employees
Northern	--	--	--	--	--
Western	1	136,201	\$15.45	\$2,104,423	42
Eastern Interior	4	68,000	7.00	272,000	5
Southcentral	3	659,000	7.50	4,942,500	18
Southwestern	--	--	--	--	--
Alaska Peninsula	--	--	--	--	--
Southeastern	5	2,698,123	7.00	18,886,861	140
TOTAL	13	3,561,324 (3,230,120 tonnes)	--	\$26,205,784	205

^aIncludes riprap, shot rock, crushed stone, and building (ornamental) stone; does not include jade.

^bDerived from 12 questionnaires and one phone interview.

^cUnit value based on data supplied by seven operations that make up 49 percent of the total value.

at Tofty in 1994. Thurman Oil and Mining operated two large placer mines on Cooney and Rhode Island Creeks in the nearby Eureka district.

Other mines in the area include Russell Mining in the Rampart area; Kelly Mining near Manley Hot Springs; Salter and Associates on Joe Bush Creek, Eureka district; and Thanksgiving Mining on Thanksgiving Creek in the Rampart district. Phil Ramsted continued to operate a placer mine on Golden Creek west of the Tofty area (fig. 28).

Alice Bayless and Mike Busby worked a paystreak on ground leased from the Alaska Gold Company on Chicken Creek in the Fortymile district. At nearby Fortyfive Pup, Charles Hammond worked 18,000 square feet (1,675 square meters) of bedrock in two cuts, but reported only fair returns. He expects to encounter better ground in 1994.

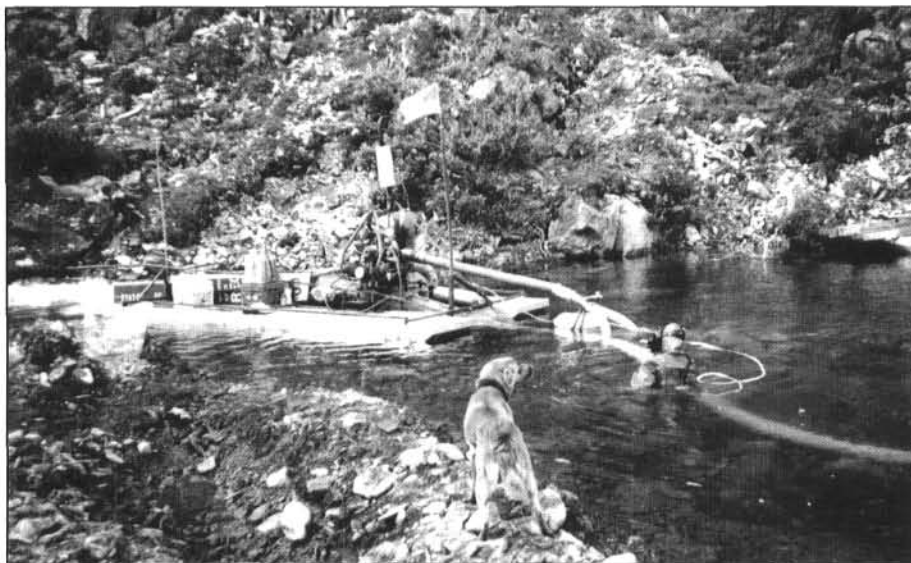


Figure 26. A suction dredge operator recovers gold in the Fortymile district. (Photo by Judd Peterson)

In the Delta and Bonfield districts of the northcentral Alaska Range, 1993 activity continued at the same level as 1992; an estimated 3,456 ounces (107 kilograms) were reported from eight mine operations. Gypsy Luck Mine successfully designed a water recirculation system, and then mined a paystreak on Moose Creek north of Ferry. Moose Creek has yielded nearly 45 percent of the 80,492 ounces (2,503 kilograms) total recorded gold production in the Bonfield district. Tachick Mining Company also mined on Moose Creek, and will resume production in 1994.

Near Delta, Jensen Mining again worked McCumber Creek, a tributary to Jarvis Creek. Glacier Six Enterprises worked East Broxon Gulch at the head of the Delta River, deep in the Alaska Range. The company has tested fine gold recovery and has concluded that the overall success of the mine will depend on fine gold recovery.

Despite recent declines in the number of placer mines, about 18 operations produced an estimated 11,188 ounces (348 kilograms) of gold in the Circle district. Paul and Company continued to operate the largest placer mine in the Circle district, and mined in Porcupine Creek on ground leased from Helen Warner. The company operated a washing plant at a rate of 170 cubic yards per hour (130 cubic meters per hour) for 1,500 hours and processed a total of 255,000 cubic yards (194,973 cubic meters) of auriferous gravel. The company will use selective mine methods to increase the head-grade of the large but low-grade placer paystreak.

Greenhorn Mining mined Ketchum Creek at 25 percent capacity, and plans to be in full operation in 1994. Jim Wilde mined on Switch Creek and, like Greenhorn Mining, plans to increase production in 1994. Long time

placer producer Points North again mined on Portage Creek and reported another successful mining season. Points North will lease the ground in 1994 and focus on a regional exploration program with a major mineral firm. Ed Lapp and Son Inc. sluiced placer pay on Eagle Creek for 70 days in 1993 and expect to double their production in 1994.

In the Tanana district, Wayne Gibson mined on Golden Creek.

INDUSTRIAL MINERALS

During 1993 sand and gravel and stone production in the eastern interior region declined 10 percent and 34 percent respectively from 1992 levels. Nevertheless, seven companies and government agencies reported that 3,741,478 tons (3,382,296 tonnes) of gravel worth \$9.2 million were extracted from pits throughout the region, but concentrated mainly in the Fairbanks area. Alyeska Pipeline Service Company activated 34 pits in the eastern interior to repair and maintain infrastructure for the trans-Alaska pipeline. DOTPF reported the following breakdown for materials used to rebuild highways, repair bridge reinforcements, and construct various transportation infrastructures such as river erosion control projects. Private sources provided 68,000 tons (31,621 cubic yards) of riprap. Private sources also account for 1,237,332 tons (1,122,260 tonnes) of pit-run gravel and 174,502 tons (158,274 tonnes) of unspecified processed materials. DOTPF pits accounted for 904,897 tons (820,741 tonnes) of both pit-run and processed materials.

Rolling Stone Inc. (Mitch Loveless) again mined about 30,000 tons (27,200 tonnes) of gravel from his 41-Mile Richardson Highway pit; estimated gravel

reserves at the site total about 2 million tons (1.8 million tonnes).

Evans Industries (Dave Evans) mined sand and gravel and crushed rock at his Dry Creek mine site on the George Parks Highway near Healy. His "renewable" deposit yielded about 17,000 tons (15,420 tonnes) in 1993.

Kurt's Construction extracted gravel from his Milton Road pit near Delta Junction, and Exclusive Landscaping and Excavating worked a gravel deposit at 7-Mile Richardson Highway.

COAL AND PEAT

Usibelli Coal Mine Inc. (UCM) mined a record 1,586,795 tons (1,439,220 tonnes) of subbituminous coal from its Poker Flats and Gold Run pits near Healy. UCM shipped 803,995 tons (729,223 tonnes) to six interior Alaska power plants including a mine-mouth plant near Healy; the remaining 782,800 tons (710,000 tonnes) were shipped to the Korean Electric Power Company power plant in South Korea (fig. 29). Interior Alaska power plants are operated by the Fairbanks Municipal Utilities System, the University of Alaska Fairbanks, Fort Wainwright Army Base, Eielson Air Force Base, Golden Valley Electric Association (GVEA), and Clear Air Force Station. These six sources of electricity collectively generate about 155 megawatts of electric power.

On September 30, the Alaska Railroad Corporation, which hauls coal from Healy to various markets, halted coal shipments to the Port of Seward in a dispute with Suneel Alaska Inc. and UCM over freight rates. Suneel Alaska Inc., the company that operates the Seward Coal terminal where Alaska's coal is shipped to South Korea, had previously paid \$9.50 (US) per metric ton to the railroad to haul the coal from Healy to Seward. After international coal prices dropped \$3.27 (US) from 1992-1993, Suneel paid about \$8.40 (US) per metric ton to the railroad for shipping the coal. The railroad maintained that they were losing money on the coal haul and could not continue to transport coal to Seward at the 1993 rates. Usibelli Coal Mine was shut down for one week in October during difficult contract negotiations.



Figure 27. Goldstream Mining works a paystreak on Gilmore Creek in the Fairbanks mining district using technology that required only modest amounts of water and simultaneously reclaims land. (Photo by John Larsen, Goldstream Mining)



Figure 28. Phil Ramsted Jr., operator, feeds a dry-land dredge with a dragline on Golden Creek in the Tozimoran district northwest of Tanana. (Photo by Kathie Charlie)

Concern over losing the Korean export contract led UCM to successfully negotiate a comprehensive wage/benefits cut with both its union and nonunion mine employees. Hence, Usibelli employees in effect agreed to pay the Alaska Railroad the \$1.10 per ton price difference for the freight rates and saved the Korean export contract and about one third of the jobs of the mine

work force at Healy. Coal shipments to Seward were resumed in late October. Usibelli Coal Mine Inc. celebrated its 50th year of operation in 1993 and published a special mining history and mine operational summary in its annual newsletter (Green, 1993).

Great Northwest Inc. again mined and sold peat from gravel and peat-bog deposits on College Road that are leased from the University of Alaska.

SOUTHCENTRAL REGION

METALS

Gold mining declined in the southcentral region during the 1993 calendar year. Our survey shows that 42,268 ounces (1,313 kilograms) gold were extracted by 20 mining operations throughout the region, a 55 percent reduction from the 1992 production levels. Cambior Alaska again operated Alaska's largest gold mine at its Valdez Creek property about 55 miles (88 kilometers) east of Cantwell (fig. 29). During the year, the mine provided 164 full-time jobs and processed 409,600 cubic yards (311,115 cubic meters) grading 0.087 ounces per cubic yard) gold. However, the 1993 production of 35,560 ounces (1,106 kilograms) gold was less than half of the 86,052 ounces (2,676 kilograms) refined gold produced in 1992. The Valdez Creek placer mine has dominated Alaskan gold production for nearly a decade, but like any mine, will eventually shut down. By the end of 1993 about 16 months of ore reserves remained to be mined.

Smaller placer mining firms continued at levels similar to those of 1991 and 1992. Ed Ellis recovered placer gold and a small byproduct of platinum from his Lake Creek placer claims in the Cache Creek district west of Talkeetna. Much of the production was derived from several bulk samples processed through a washing plant equipped with Gemini tables. Bedrock has not

been reached in the Lake Creek glacial outwash placer deposit, which is many miles downstream from presumed lode sources in the Petersville area. Potential resources of the fine-grained glacial gold are still being evaluated.

Arnold Mason operated on North Creek in the Nelchina district. Ross Bevins mined pay on Fortress Creek in the Talkeetna Mountains. Aaron Benjamin worked claims on Upper Dollar Creek in the Cache Creek area, and Doug Weathers operated a floating plant on Upper Cache Creek.

Mary Lou Redmond reported a small amount of production from her placer claims in the Indian River area of the upper Chulitna River region. Jack LaCross again worked his newly acquired placer ground on Twin and Mills Creeks in the Collinsville area across the Kahiltna River but reported difficulties with heavy rainfall that affected his ability to operate mining equipment in the steep terrain. Consolidated Placer Dredging was again active on Johns Creek, tributary to Chunilna River (fig. 30).

The Mrak-Aklestad partnership continued to operated a small but efficient placer gold mine in the Hatcher Pass area. The company reported that a shortened season limited the output to about 4,000 cubic yards (3,630 cubic meters) of pay, but they intend to increase mine output in 1994. Arnold J. Mason suction dredged a small paystreak in the Hope district of the Kenai Mountains during a 60-day season and plans to mine at similar levels in 1994. Also in the Hope district of the Kenai Mountains, longtime suction dredge operator John Trautner (Alyeska Management Services) again mined pay on Canyon Creek, Trautner hopes to patent his claims in the near future.

INDUSTRIAL MINERALS

The strongest statewide performance of the sand and gravel industry during 1993 came from the



Figure 29. Valdez Creek gold mine, 50 miles (80 kilometers) east of Cantwell, has been Alaska's largest gold mine for nine of the last ten years and is one of the largest producing placer gold mines in the world. The mine, operated by Cambior Alaska Inc., produced 35,560 ounces (1,106 kilograms) of gold in 1993. Photo of pit A-7-1X looks north to the stream diversion pond. (Photo by Cambior Alaska Inc.)

southcentral region. Eleven firms and government agencies reported that 5,164,000 tons (4,683,748 tonnes) worth \$11.6 million were bailed from pits throughout the southcentral region. Nearly 65 percent of that total came from the Palmer-Wasilla area. The Alaska Railroad Corporation (ARC) reported a large increase from previous years in the amount of gravel hauled on the railroad. According to ARC, 2,663,400 tons (2,415,700 tonnes) of gravel were hauled from pits in the Palmer area to the Anchorage metropolitan area, an increase of 700,000 tons (634,900 tonnes) from 1992 and 900,000 tons (816,300 tonnes) from 1991. Road resurfacing work throughout Anchorage, a major roadbed replacement job along the Glenn Highway between Palmer and Peters Creek, and an improved commercial construction market in Anchorage all contributed to the biggest increase in gravel use since the mid-1980s construction boom.

Smaller-scale sand and gravel outfits reported generally improved market conditions for their products. Fairway Gravel mined from its open pit on Funny River Road near Soldotna. Jackson Construction Company mined nearly 50,000 tons (45,350 tonnes) of sized gravel from an open-pit operation on private land in Soldotna. Herman Brothers Construction Company hauled pit-run sand and gravel from its mine site at 1.5 Mile of the Wasilla-Palmer Road. Harris Sand and Gravel extracted an estimated 55,000 tons (49,885 tonnes) from two pits in the Valdez area—all to satisfy local market demand. Minor activity was reported from Luke's Mining Company in Homer, which reported that its business suffered because of weak markets there. NR Enterprises mined about 30,000 tons (27,210 tonnes) at Tazlina Point at Mile 113 Richardson Highway for use in the Glennallen area.

The Cordova district of the U.S. Forest Service estimates that 650,000 tons (589,550 tonnes) of shot rock and riprap, and about 720,000 tons (653,040 tonnes) sand and gravel were permitted to Chugach Alaska Corporation for construction of 34 miles (54 kilometers) of road on south Montague Island. Construction figures included both 1992 and 1993 calendar years.

PEAT

At its Palmer openpit, Landscape Supply Company mined 9,000 cubic yards (6,880 cubic meters) of peat to be used for horticultural applications in the Palmer-Wasilla area.

SOUTHWESTERN REGION

METALS

Our records show that 18 placer gold mining companies produced 9,254 ounces (288 kilograms) gold in 1993, down 31 percent from 1992 levels (table 9). Decreased activity at two operations in the Innoko and Aniak-Nyac districts were responsible for most of the production decline. Robbies Bonanza Mining (RBM) took out a cut on Ophir Creek near the site of one of the first gold discoveries in the Innoko district. RBM has a problem keeping up with government paperwork in the absence of a post office at Ophir.

Little Creek Mine (Paul Sayer), which has mined nearly continuously in the Innoko district for 20 years, again sluiced a paystreak on Little Creek during a 100-day mining season. The mine operator worries that reclamation and turbidity requirements undermine the economic viability of the operations during the current low bullion prices, but is optimistic that improved market conditions will help offset costs.

In 1993, the veteran placer mining firm of Magnuson Mining Company (Magnuson) sold its extensive holdings of patented federal claims on Ganes Creek to Talkeetna miner Doug Clark. Magnuson has operated a placer mining venture on Ganes Creek since 1955 and pioneered the mining of high bench gravels with modern hydraulic methods. In the mid-1980s, Magnuson recovered a disc-shaped 121 ounce (3.8 kilogram) gold nugget on a bench level of Ganes Creek, the third largest known to have been recovered in Alaska.



Figure 30. The washing plant of Consolidated Placer Dredging Inc. on Johns Creek northeast of Talkeetna is mounted on tractor-style tracks for ease in moving to new locations. (Photo courtesy of Consolidated Placer Dredging Inc.)

Over the hill and east of Ganes Creek, Anderson and Son Mining again mined a 2 acre (0.8 hectare) fraction on Yankee Creek, another major headward tributary to the Innoko River. The company worked the mine from June 1 to September 30, and plan a similar scale of mining operation in 1994.

In the Iditarod district, Misco-Walsh Mining Company prepared gold-polymetallic concentrates from the Golden Horn deposit for metallurgical work. The company has mined residual deposits at the Golden Horn in past years and plans to resume a limited pilot program in 1994. Other mining firms and miners active in the Iditarod district include Flat Creek Placers on Flat Creek, Richard Wilmarth on Chicken Creek, and Alvin Agoff on Prince Creek.

Two mines were active in the upper George River basin. Julian Creek Mine worked a small opencut on Julian Creek for the eighth consecutive year. The company had predicted years ago that the paystreak would soon be exhausted, and that day may have finally come. Julian Creek Mine announced that placer mining would probably be discontinued in 1994, and prospecting for lode sources of the gold would be initiated. On Granite Creek, a distant tributary to the east, L.E. Wyrick again mined pay from shallow bench and modern stream deposits. Several distinct types of gold are found in the deposit suggesting multiple lode sources. Mark Matter again took out a small cut on Marvel Creek east of the NYAC mining camp.

Lyman Resources in Alaska Inc. worked on Snow Gulch, an auriferous tributary of Donlin Creek north of Crooked Creek on the Kuskokwim River. Prospecting for new ground has become a priority for the company, and efforts in 1994 will focus on stripping frozen overburden from a potentially larger pay zone.

NYAC Mining Company was again active in the Aniak district south of Aniak (fig. 31). This effort has become a partnership with Calista Corporation.

Dave Penz again prepared and mined a cut on Buster Creek, which is a tributary to Kako Creek east of Marshall.

INDUSTRIAL MINERALS

Industrial mineral production was limited to road maintenance and construction by Calista Corporation in unspecified locations throughout the Calista region.

ALASKA PENINSULA REGION

INDUSTRIAL MINERALS

Glacier Sand and Gravel leased ground on Amaknak Island near Unalaska from Unalaska Corporation. The quarry produced approximately 80,000 tons (72,560 tonnes) of aggregate and stone products. Koniag Inc. operated a quarry site on Afognak Island to support the transportation infrastructure related to the forest products industry.

SOUTHEASTERN REGION

METALS

For Kennecott-Greens Creek Mining Company's underground polymetallic mine on Admiralty Island near Juneau, the 1993 calendar year was both challenging and disappointing. The company mined approximately 77,780 tons (70,550 tonnes) of massive sulfide ore which contained in concentrate form 1,721,878 ounces (53,550 kilograms) silver, 7,350 ounces (228 kilograms) gold, 3,513 tons (3,186 tonnes) lead, and 9,489 tons (8,606 tonnes) zinc. However, as a result of low metal prices, operations were suspended on April 1, 1993, causing a loss of 217 full-time jobs. Activities since the shutdown have included the maintenance of surface facilities, underground development, mine expansion planning, and development drilling. These latter activities continue with the objective of resuming

Figure 31. *Bryan Anderson, crew manager for NYAC Mining Co., pans gold in the company's Bear Creek placer cut as students from the natural science camp learn the process. Students at the 10-day camp came from Calista villages in southwest Alaska to study wildlife habitats and natural resource management, geology, and reclamation practices. (Photo by June McAtee, Calista Corporation)*



production when market conditions improve. A workforce of 26 regular full-time employees were on the mine site at the end of 1993.

The only other area that produced metals in southeastern Alaska was the Porcupine district near Haines. Snow Lion Mining Company worked 8,000 cubic yards (6,116 cubic meters) of pay on Porcupine Creek for 100 days, but encountered problems with removing the extremely coarse, boulder-rich overburden that overlies the bedrock paystreak. The boulders are huge glacial erratics—some are the size of cars.

Big Nugget Mining Company again mined about 9,000 cubic yards (6,880 cubic meters) of gold-bearing gravels on lower Porcupine Creek below the Snow Lion Mining Company operation (fig. 32). The company indicated that a similar level of production would continue into 1994.

INDUSTRIAL MINERALS

The southeastern region continued to use significant amounts of sand and gravel and stone for commercial construction, road improvements including logging road construction, and a variety of municipal developments. Our survey of fifteen separate private firms and government agencies indicates the 2.77 million tons (2.51 million tonnes) of sand and gravel worth \$12.4 million and 2.70 million tons (2.45 million tonnes) of stone worth \$18.89 million were mined from pits and quarries throughout the southeastern region. The \$31.29 million combined value for both commodities amounts to 47 percent of the total statewide production of industrial minerals.

Sealaska Corporation sold approximately 1.39 million tons (1.26 million tonnes) of shot rock to various contractors for use in road construction and other industrial uses.

The Stikine area of the Tongass National Forest produced 1,148,930 tons (1,042,080 tonnes) of quarry road rock and minor amounts of gravel for use in road maintenance and construction.

DOTPF reported that aggregate and stone product uses for road construction and repair projects in the southeastern region roughly totaled 1.2 million tons (1.08 million tonnes). No specific breakdowns by area were given.

Hildre Sand and Gravel of Juneau completed one of its best years ever. The company produced 175,000 tons (158,725 tonnes) of pit-run gravel from its Montana Creek materials site and 255,000 tons (230,000 tonnes) from the ACME pit site at Lemon Creek. Both are pond and dredge operations that employ bailers and dragline equipment as well as sizing apparatus. The longtime producing ACME pit is expected to be depleted in 1994, and the company plans to expand a crushing operation at its Montana Creek site.

Red Samm Construction Company mined 15,000 tons (13,600 tonnes) of gravel from its Lemon Creek site, and 145,000 tons (131,515 tonnes) of crushed rock at Lena Point also near Juneau. Activity levels will be similar in 1994.

A third Juneau operator, Bruce Morley Inc., bailed pit-run gravel and installed a scale to facilitate material sales from the Ludwig pit on Douglas Island. Morley also initiated a stripping operation in order to produce more gravel.

Two municipalities reported use of industrial materials. The City of Ketchikan mined a modest amount of gravel from an unspecified openpit operation; the City of Thorne Bay used crushed aggregate, shot rock, and gravel for road construction and for a solid-waste-facility site development.



Figure 32. *Big Nugget Mine operated an open-cut placer mine and also provided panning opportunities for tourists at their mine on Porcupine Creek near Haines. (Photo by Judd Peterson)*

DRILLING

Total drilling in Alaska in 1993 was 277,531 feet (84,591 meters), compared with 444,449 feet (135,502 meters) in 1992. The absence of thawfield drilling accounts for 65,000 feet (19,812 meters) of the decline. For the first time in a decade, no coal exploration drilling was reported (tables 15, 16, and 17).

Large drilling projects during 1993 included Von Frank Mountain, Nixon Fork and Illinois Creek in Western Alaska, Ryan Lode and True North near Fairbanks, Johnson River in Cook Inlet, and the Alaska-Juneau, Greens Creek, and Niblack in Southeast Alaska.

Tables 13 and 14 list the reported drill footages over the last decade and the reported 1993 footages by area. Table 15 lists the 13 companies reporting significant drilling projects in 1993. The 1993 results continue the decline which began in 1991. Reverse-circulation drilling in 1993 exceeded diamond-drilling for the first time since our drill survey began nine years ago.

Table 15. *Companies reporting significant drilling projects in Alaska in 1993*

Alaska Gold Company	Green Mining & Exploration
American Copper & Nickel Company	Kennecott Exploration Inc.
ASA Inc.	Kennecott-Greens Creek
Consolidated Nevada Goldfields Corp.	Lac Minerals Ltd.
Cambior Alaska Inc.	La Teko Resources Ltd.
Echo Bay Alaska Inc.	Silverado Mines U.S. Inc.
	Westmin Resources Ltd.

PLACER DRILLING

As expected, no thawfield drilling was reported in 1993, but a surprising increase in placer exploratory drilling was reported in the northern, western, and southcentral regions.

COAL DRILLING

For the first time, no exploratory drilling for coal was reported in 1993. Most of the existing coal projects have identified sufficient reserves for the foreseeable future. Blast-hole drilling continued at Usibelli Coal Mine near Healy.

HARD ROCK DRILLING

Most of the diamond-drilling reported for the year came from underground operations in southeast Alaska at the A-J and Kennecott-Greens Creek Mines and at the Lac Minerals Ltd. Niblack property. Westmin Resources Ltd.'s drilling at the Cook Inlet Johnson River property is expected to continue in 1994—possibly from underground exploration drifts.

Diamond drilling was also reported at the Ryan Lode Mine, at the Nixon Fork Mine, and at the Von Frank Mountain and Sawtooth Mountain igneous-hosted gold projects. Reverse-circulation drilling was done mainly at North Pacific Mining Company's Illinois Creek property in western Alaska and at the Ryan Lode Mine on Ester Dome in the eastern interior.

Table 16. *Drilling footage reported in Alaska, 1985-93^a*

	1985	1986	1987	1988	1989	1990	1991	1992	1993
Placer exploration	46,000	32,400	50,250	152,000	97,250	78,930	51,247	6,740	25,216
Placer thawfield	34,000	227,000	130,000	300,000	210,000	105,000	130,000	65,000	--
Placer subtotal	80,000	259,400	180,250	452,000	307,250	183,930	181,247	71,740	25,216
Coal subtotal	8,700	28,800	19,900	26,150	38,670	18,195	16,894	12,875	--
Hardrock (core)	--	--	95,600	223,630	242,440	648,600	205,805	211,812	124,325
Hardrock (rotary)	--	--	19,500	130,220	89,790	112,355	110,850	148,022	127,990
Hardrock subtotal	131,700	50,200	115,100	353,850	332,230	760,955	316,655	359,834	252,315
TOTAL (feet)	220,400	338,400	315,250	832,000	678,170	963,080	514,796	444,449	277,531
TOTAL (meters)	67,177	103,144	96,088	253,593	206,700	293,547	156,910	135,502	84,591

^aDoes not included 756,000 feet of rotary blast-hole drilling in 1993.

-- Not reported.

Table 17. Drilling footage by region in Alaska, 1993

Type of drilling	Northern	Western	Eastern interior	South-central	South-western	Alaska Peninsula	South-eastern	TOTAL
Placer exploration	4,000	14,463	--	6,753	--	--	--	25,216
Placer thawfield	--	--	--	--	--	--	--	--
Placer subtotal	4,000	14,463	--	6,753	--	--	--	25,216
Coal subtotal	--	--	--	--	--	--	--	--
Hardrock core	100	15,000	6,800	6,200	--	--	96,225	124,325
Hardrock rotary	--	61,465	66,525	--	--	--	--	127,990
Hardrock subtotal	100	76,465	73,325	6,200	--	--	96,225	252,315
TOTAL (feet)	4,100	90,928	73,325	12,953	--	--	96,225	277,531
TOTAL (meters)	1,250	27,715	22,350	3,948	--	--	29,329	84,591

-- Not reported.

METAL RECYCLING INDUSTRY

Although prices for nonferrous metals continued to be weak, Alaskan scrap dealers and recycling centers reversed the metal recycling industry's declines of the last several years. Recycling has rebounded to levels established in the late 1980s when high metal prices and social concerns caused a boom for scrap dealers. Our survey shows that six firms and organizations collected, baled, and shipped 4,944,790 pounds (2,242,958 kilograms) of

nonferrous scrap and 31,834 tons (28,874 tonnes) of ferrous scrap worth \$6.3 million to lower 48 and overseas buyers, more than double the \$3.1 million shipped to market in 1992 (table 18). There was a marked increase in the volume of aluminum scrap and lead-based batteries recycled statewide. Ferrous scrap also continued to be in strong demand throughout the Pacific Rim, and this demand benefited Alaska scrap exporters.

Table 18. Reported scrap metal exports from Alaska, 1992-93^a

Commodity	1992 Quantity		Estimated ^b value	1993 Quantity		Estimated value
	pounds	kilograms		pound	kilograms	
Nonferrous scrap						
Aluminum	444,186	201,480	\$ 235,418	2,526,664	1,146,095	\$1,617,064
Copper	260,237	118,043	239,420	582,680	264,304	635,121
Brass	16,803	7,621	35,280	110,795	50,257	243,749
Radiators	24,300	11,022	72,900	11,696	5,307	35,088
Stainless steel	53,162	23,660	312,900	11,253	5,104	56,265
Lead	--	--	--	1,701,700	771,891	252,306
Magnesium	7,314	3,317	6,500	--	--	--
Zinc	892	405	490	--	--	--
Undistributed nonferrous scrap	--	--	--	356,420	161,672	712,840
Ferrous scrap	47,284,590	21,448,290	2,150,000	63,656,860	28,874,751	2,705,416
Glass	--	--	--	1,034,000	469,022	N/A
TOTAL			\$3,052,908			\$6,257,849

^aAll production data in 1992 provided by K & K Recycling Inc. (Fairbanks) and Alaska Metal Recycling (Anchorage). All production data in 1993 provided by K & K Recycling Inc. (Fairbanks), Jackovich Construction and Industrial Supply Inc. (Fairbanks), Alaska Metals Recycling (Anchorage), Anchorage Recycling Center (Anchorage), Battery Specialist (Anchorage), ABS Alaskan (Fairbanks), and United Battery Services (Portland, Oregon).

^bValue estimates determined from average 1993 commodity prices of refined metal or scrap as reported in *Mining Journal* and by individual operators. We emphasize that price estimates do not include transportation, preparation, or refining costs.

-- Not reported.

K & K Recycling Inc. (K & K) continued to be interior Alaska's largest exporter of scrap metals. In 1993, K & K recycled 558,186 pounds (253,190 kilograms) of nonferrous scrap and 1,228.4 tons (1,114.2 tonnes) of ferrous metals (fig. 33). Most nonferrous scrap is shipped by tractor trailers to dealers outside Alaska; ferrous scrap is sometimes shipped via the Alaska Railroad.

Anchorage nonferrous recycling efforts were again spearheaded by the Anchorage Recycling Center (ARC), which accounts for approximately 70 percent of the nonferrous scrap exported from Alaska. Besides increasing its aluminum output to about 2,110,000 pounds (957,096 kilograms), the company organized and coordinated nonferrous scrap shipments from many sites in rural Alaska.

ARC also collected 517 tons (469 tonnes) of glass and researched its use in local construction projects. Three main applications are now being tested in Alaska (1) as drainage material, (2) as "glass-spalt" in pavement, and (3) in the subbase of primary and secondary roads. DOTPF joined with "Friends of Recycling" to test crushed glass applications in road-fill applications in the Juneau area. DOTPF also shipped bulk samples of glass to the environmental business firm of Clean Washington Center in Washington State, where crushed glass is being tested in various transportation uses. Elmendorf Air Force Base is purchasing crushed glass and using it in landfill applications because of its ability to "shed water" and thus prevent excessive dispersion of landfill materials.

Alaska Metal Recycling of Anchorage baled and shipped 23,000 tons (20,856 tonnes) of ferrous scrap to Taiwan, about the same amount as in 1992. Ferrous scrap prices have increased as much as 30 percent on world markets in the last two years, and the demand is expected to continue.

ABS Alaska of Fairbanks continued its longtime lead recycling efforts and accounted for about 40 percent of the total 1,701,700 pounds (771,890 kilograms) of

lead recycled in Alaska. The spent lead-acid batteries are shipped to reprocessing plants in California. ABS also manufactures lead-acid automotive batteries at its battery plant in Fairbanks.

United Battery Systems (UBS) of Portland, Oregon, and its Anchorage subsidiary, Battery Specialists Inc., handled the remainder of the lead-acid batteries collected in Alaska, and shipped up to 250,000 pounds (113,400 kilograms) of lead scrap per month to destinations outside the state. Both firms coordinate the collection of batteries from many Alaskan communities, including Bethel, Kodiak, Juneau, the Kenai Peninsula, Wasilla, and the North Slope. Operations in the Fairbanks North Star Borough are handled through Jackovich Industrial and Construction Supply.

Most lead-acid batteries from all Alaskan sources are processed in California, although Alaskan battery shipments have been previously made to China, Taiwan, and Indonesia.

Twenty-four service companies and several major North Slope petroleum producers teamed up to barge 7,600 tons (6,893 tonnes) of surplus drill steel and oil-field metals in their annual "operation sealift" efforts. The 1993 calendar year may be the last time that scrap metal is removed from the North Slope by barge, and future scrap shipments will probably be trucked down the Dalton Highway. Previous sealifts have removed a total of 27,500 tons (24,860 tonnes) of scrap from the North Slope.

Most of the scrap dealers surveyed foresee increased or constant levels of metal recycling in Alaska for 1994. Although many in the general public view metal recycling as essentially an environmental cleanup effort, much of the ferrous scrap and selected nonferrous commodities are profitably recycled by Alaskan small businesses. Additionally, many metal recycling efforts incorporate value-added components such as remanufactured lead-acid batteries for reuse and sale in Alaska.

Figure 33. *K & K Recycling loads ferrous scrap at their metal recycling plant in North Pole. Ferrous scrap prices continued to improve in 1993. (Photo courtesy of Connie Karl, K & K Recycling)*



MINING CLAIM POLICIES

How much tax liability a company incurs for an Alaskan mining project depends mainly on whether the land ownership is federal, state, or private (including Native corporations). Most environmental regulations, which relate to clean air and water or to land reclamation, may also have differing standards on different lands. Figures 34 and 35 illustrate current reclamation practices of the Alaskan placer industry.

After passage of the Alaska Mine Reclamation Act (SB544) by the Alaska legislature in 1990, bonding for mine reclamation, with part reimbursable upon satisfactory closure, is required on all mined land in Alaska. A bonding pool is available at a rate of \$150 per acre, of which 75 percent may be refundable. Federal regulations may change this on federal land.

Taxes in Alaska include the municipal taxes, the State Mining License Tax (MLT), and the Federal and State Corporate Income Tax (CIT). Table 19 summarizes taxes paid by the mining industry (excluding the state corporate income tax) to the State of Alaska during the last three calendar years. Recent changes in state tax law prevent municipalities from taxing in-situ resources, but fixed assets and goods may be taxed.

RENT ON STATE MINING CLAIMS AND LEASES

In 1989, the Alaska State Legislature enacted a law which requires holders of state mining locations to make an annual cash rental payment.



Figure 34. Reindeer stop to take a drink at Basin Creek near Nome where Engstrom Dredging completed reclamation of an area previously mined by their bucketline dredge. State law requires reclamation of mined lands in Alaska. (Photo by T.K. Bundtzen)



Figure 35. Stan Gelvin reclaimed a previously mined area on Portage Creek in the Circle district. The pond is used by water fowl and other wild game. (Photo by Kathie Charlie)

Table 19. Revenues paid to the State of Alaska by Alaska's mineral industry, 1991-93^a

	1991	1992	1993
State claim rentals	\$626,164	\$537,355	\$523,661
Production royalties	11,736	7,815	7,917
Mining license	598,971	465,153	425,607
Coal rents and royalties			
Royalties	\$1,188,063	\$1,294,825	\$1,486,100
Rents	130,363	198,835	198,835
Subtotal	1,318,426	1,493,660	1,684,935
Material sales			
Mental Health	34,141	104,845	5,300
Division of Land	706,220	491,235	561,414
SPCO	0	161,408	150,000
School fund	3,548	3,279	3,011
Subtotal	743,911	760,769	719,725
Total	\$3,299,208	\$3,264,752	\$3,361,845

^aDoes not include state corporate income taxes, which were not released for this study, or taxes paid to individual municipalities.

This annual rent applies to mining claims, leasehold locations, and upland leases as well as off-shore mining leases on state land.

For mining claims and leasehold locations the yearly rental is \$20 for the first five years, \$40 for the second five years, and \$100 per year thereafter. For leases the yearly rent is \$.50 per acre for the first five years, \$1.00 per acre for the next five years, and \$2.50 per acre thereafter.

The annual rental year begins at noon on September 1 and ends at noon September 1 of the following year. The rental payment is due on September 1 and it must be received by the state no later than November 30 of that year. The penalty for failure to make a timely payment is abandonment of the claim or lease.

For new claims the first rental payment is due no later than 90 days after the date the location notice is posted on the ground. This payment covers that portion of the rental year from the date of staking to September 1, and the payment is not prorated. It is the locator's responsibility to pay the \$20 rental payment within 90 days of staking the claim; the locator will not be billed for the first rental payment.

Rental payments are not required to be made for claims located on state-selected lands, but a payment must be made within 90 days from the date the state receives conveyance of the land from the federal government. A nonrefundable deposit to cover the first rental year can be made at any time.

Further information can be obtained from: Alaska Division of Mining & Water Management at 3700 Airport Way, Fairbanks, Alaska, 99709, (907) 451-2788; Public

Information Center, 3601 C St., Suite 200, Anchorage, AK, 99510, (907) 762-2261.

RENT ON FEDERAL MINING CLAIMS

In October 1992, the federal government passed the Interior Appropriation Act which imposes a yearly mining claim rent (called a maintenance fee) of \$100 per claim on federal mining claims. This payment must be made to the Bureau of Land Management (BLM) no later than August 31. Failure to make a timely payment constitutes abandonment of the claims.

For new claims, the first \$100 maintenance fee must be paid to BLM within 90 days of staking the claim on the ground. This payment covers that portion of the rental year from the date of staking to August 31, and the payment is not prorated. In addition to the maintenance fee, the locator of a new federal mining claim must also pay BLM a \$25

location fee and a \$10 service fee.

Claimants with ten claims or less, under certain conditions, can obtain a waiver and thus avoid having to pay the yearly \$100 maintenance fee. For further information regarding federal mining claim fees, please contact BLM in Anchorage at (907)271-5960 or in Fairbanks at (907)474-2250.

MINING LICENSE TAX

This tax applies to mining production from state-, federally, and privately owned land in Alaska. A mining license tax form must be filed by anybody who either operates a mining property or who receives royalty payments based on production from a mining property.

The tax is due on the last day of the fourth month following the close of the tax year, which for most miners means that the tax is due on April 30. Upon application, the Alaska Department of Revenue may grant a reasonable extension of time for filing a tax return, but no extension may be made for more than six months. Also keep in mind that an extension of time for filing the return does not extend the time for payment of the total amount of taxes due.

This tax is calculated on the net income after deducting depletion, depreciation, mining expenses, and royalties paid. If the net taxable income is \$40,000 or less, there is no tax to be paid. If the income is over \$40,000 but not over \$50,000, the tax is 3 percent of the entire taxable income. Any taxable income over \$50,000 but not over \$100,000 is taxed at 5 percent, and any taxable income over \$100,000 is taxed at 7 percent.

Advance royalty payments received by a claim owner are not subject to the mining license tax until the tax year in which the mined material to which the payment relates is actually extracted from the ground.

If a claim owner receives a royalty payment in kind (such as raw gold), the gross income is the fair market value of the mined minerals on the date that the payment is received. Only depletion is allowed to be deducted from the claim owner's gross income.

A temporary tax exemption for a new mining operation can be applied for by recording an Affidavit of Initial Production within 90 days after the initial production date. If the Department of Revenue determines that an operation qualifies as a new mine, the department will issue a Certificate of Exemption. The tax exemption is for three and one-half years and does not apply to mining of sand and gravel.

A new tax exemption will not be granted when changes in ownership of an existing operation take place unless the new owner makes extensive capital additions or improvements, and the previous mining operation has been closed, shut down, or abandoned for more than one mining season.

Further information on the mining license tax can be obtained through the Alaska Department of Revenue at P.O. Box 110420, Juneau, Alaska, 99811-0420; phone contacts are available at (907)465-4661.

PRODUCTION ROYALTY TAX

This tax pertains to mineral production on state land only. A production royalty tax form must be filed by anyone who either operates a mining property or who received royalty payments based on production from a mining property.

A production royalty return must be filed and payment received by the Division of Mining & Water Management no later than May 1, if any metals were extracted and removed from the state mining property during the previous calendar year regardless of whether the metals were sold or kept as inventory. If no minerals were produced, a tax return is not required to be filed.

Upon receipt of written request, the Division of Mining & Water Management may grant an extension of time to file a production return and to pay the royalty payment. The written request must be received no later than 10 days before the May 1 due date, and the extension, if granted, may not exceed 120 days. Interest accrues on the unpaid balance of a royalty payment during the term of an extension.

For the claim operator the royalty tax is a flat 3 percent of the net income as calculated under the mining license tax as describe above. A credit can be deducted for the claim rental paid for the claim or claims if production occurs.

Claim owners who receive a royalty payment from the operator must pay a 3 percent production royalty of the gross income, and only depletion is allowed to be deducted. If a royalty payment in kind is received, the 3 percent production royalty is calculated on the fair market value of the minerals on the date the payment is made.

Advance royalty payments received by a claim owner are not subject to the production royalty tax until the year in which the mined material to which the payment relates is actually extracted from the ground.

There is no temporary tax exemption granted from payment of the production royalty tax even if a mining operator has obtained a temporary exemption from the mining license tax.

If a production royalty return is not filed or any production royalty payment is not made when due, then all acquired mineral rights are deemed to be abandoned to the state. A locator or successor-in-interest of an abandoned mining property may not relocate the lost mining property for one year.

Claim owners who wish to submit completed tax returns and payments in person may do so at the following addresses: Division of Mining and Water Management, 3601 C Street, Suite 880, Anchorage; Division of Mining and Water Management, 3700 Airport Way, Fairbanks. Tax returns and payments submitted by mail must be sent to Division of Mining and Water Management, P.O. Box 107016, Anchorage, AK, 99510-7016.

NEW MINERAL-DISTRICT STUDIES

In 1993 the State of Alaska began to inventory its subsurface resources and geological structure using state-of-the-art airborne geophysical methods. The purpose of the seven-year project is to systematically evaluate the mineral resources of state lands and lands of mixed ownership in established mining districts.

The Alaska Division of Geological & Geophysical Surveys (DGGS), as contracting agency coordinated the aeromagnetic and electromagnetic surveys of four areas—Circle, Nome, Valdez Creek, and Nyac mining districts. The work was contracted to WGM Mining and Geological Consultants Inc. of Anchorage and its subcontractor Dighem Surveys and Processing Inc. ERA Aviation Inc. of Anchorage provided the Aerospatiale AS350B-1 helicopter to carry the survey equipment.

In conjunction with the geophysical work, DGGS staff completed modern 1:63,360-scale ground-based geologic mapping in two of the four areas surveyed. Integrating airborne geophysical and ground-based geologic mapping yields more complete information about the subsurface resources. These maps have been made available to the public at nominal cost.

Cooperative ventures were sought in areas of mixed land ownership. For example, in the Nome area, Bering Straits Native Corporation contributed previously flown geophysical data for about one-fifth of the mining district. And in the Nyac mining district, Calista Native Corporation provided partial funding for the geophysical work.

During the 1993 season, flying along flight lines that were spaced only one-quarter mile apart, the project surveyed 494 square miles (1,280 square kilometers) at Nome, 338 square miles (865 square kilometers) near Circle, 183 square miles (468 square kilometers) at Nyac, and 75 square miles (192 square kilometers) near Valdez Creek. Only an aeromagnetic survey was completed in the Nyac area. In the other three areas the project acquired both magnetic and electromagnetic data. The Bering Straits Native Corporation contribution added about 100 square miles (259 square kilometers).

By measuring small variations in the earth's magnetic field, the magnetic survey can assist in the subsurface mapping of rock layers or bodies containing various magnetic minerals. Discontinuities in rock layers such as faults or folds are easily detected, and the survey

can also pinpoint areas where local variations in the magnetic field might be caused by processes related to mineralization. The electromagnetic survey investigates subsurface conductivity, (or, the related property, resistivity), by measuring changes in the propagation of electromagnetic waves at various frequencies. This information by itself can be useful in mapping geologic faults, groundwater conditions or rock layers containing conductive minerals such as graphite. Mineral deposits containing ore minerals such as pyrite or spalerite can be detected even if deeply buried, and conductive clay is often associated with deposits of gold and silver that can therefore be detected by association. When the electromagnetic survey data is combined with the magnetic survey, one or more of the probable causes of the electromagnetic variations can often be eliminated, helping to pinpoint the most useful targets for further private-sector exploration.

Figure 36 shows the general configuration of the platform, figure 37 shows a typical sensor array, and figure 38 shows a miniature of the results of the Nome survey.

Even modest exploration programs can inject several millions of dollars into a local economy. It is an axiom in the mining industry that many major mines begin with the ideas and efforts of individual prospectors who then demonstrate the value of their prospect to larger companies with the financial ability to fund the more expensive phases of ground-based geophysics and drilling. Very commonly the actual development of the mine requires a third level of partnership, usually with a large company with the ability to expend substantial capital needed to develop the mine. Ultimately, the State of Alaska, private land owners, and municipalities receive revenue through rents, royalties, the Mining License Tax, and property taxes from the individuals and companies developing mines. For example, a large project such as Red Dog will create substantial new wealth over its projected mine life. With these possible benefits, this mineral assessment program is truly an investment, one of the few that creates no new bureaucracy and, once complete, requires no ongoing maintenance or repairs. Better still, just as present-day geologists rely on information gathered at the turn of the century, this data will be as useful in 100 years as it is now.

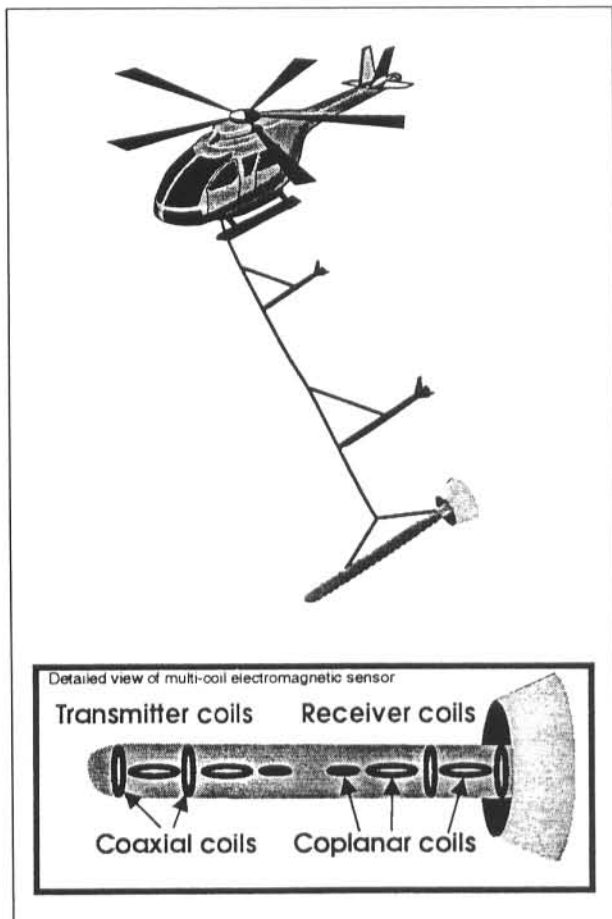
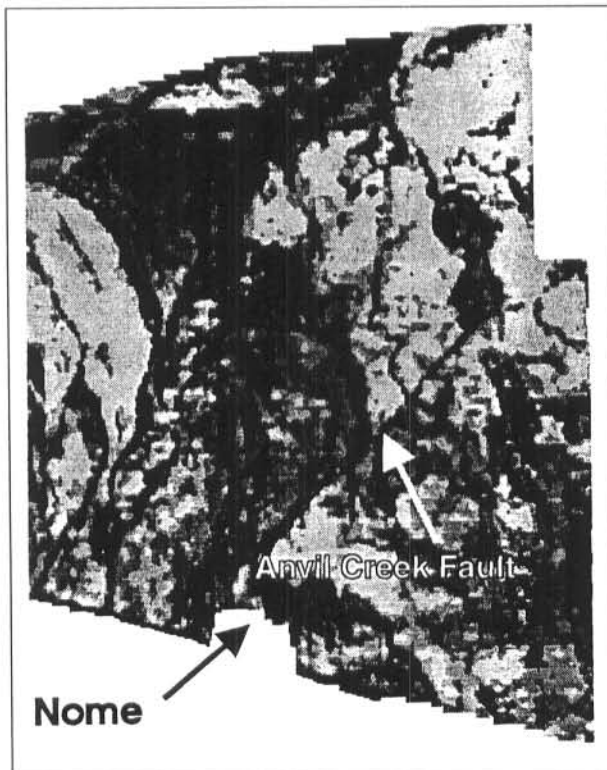
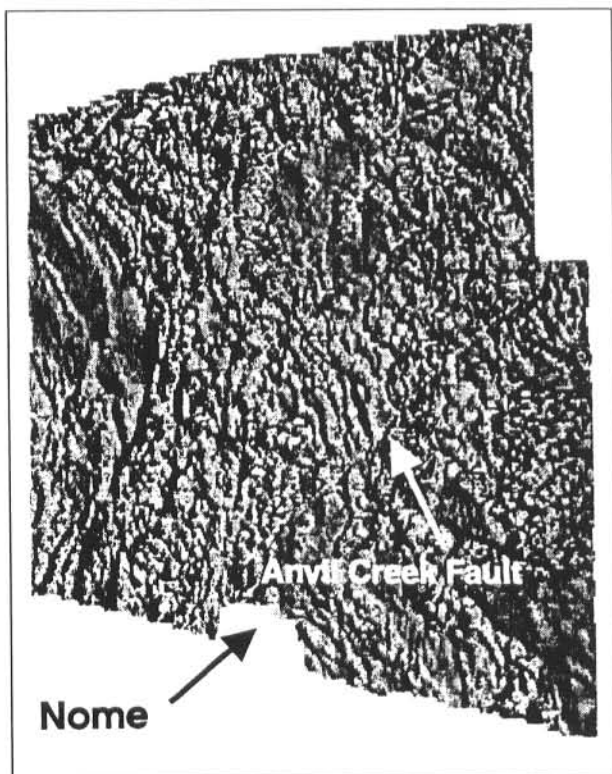


Figure 36 (top left). Schematic of survey instruments and components. Helicopter position was tracked by electronic navigation (GPS) and radar altimeter. Sensors included a magnetometer to investigate lithology and structures, a VLF unit to detect conductive trends, and a multicoil electromagnetic system (detail in insert) to detect changes in electrical properties of the rocks and sediments in the survey area.

Figure 37 (lower left). Shadow graphic of aeromagnetic survey of Nome area.

Figure 38 (lower right). Shadow graphic of 900-Hz coplanar resistivity survey of Nome area.



GOVERNMENT ACTIONS

On October 27, 1993, Governor Walter Hickel and John Ostachek, Government Leader of Yukon Territory, Canada, signed a Memorandum of Agreement (MOA) that outlined a joint mineral development program between the Yukon Territory and Alaska. The MOA covers (1) sharing of geological information, (2) protection of the northern environment, (3) public awareness, and (4) mutual cooperation programs. Alaska state agencies including Division of Geological & Geophysical Surveys, Division of Mining & Water Management, Division of Economic Development, and the Department of Environmental Conservation are expected to be involved as the MOA takes effect.

The U.S. Geological Survey, the Alaska Division of Geological & Geophysical Surveys, the Russian Academy of Sciences, and the Geological Committee of Far Northeast Russia issued a joint report, *Metallogenesis of Mainland Alaska and the Russian Northeast*, which summarizes a four-year study comparing the geology and mineral deposits of the two areas (Nokleberg and others, 1993). The 292-page USGS Open-File Report contains detailed descriptions of metallogenic belts, a regional geological synthesis, and tabular summaries of 316 lode and placer deposits from Alaska, and 292 lode and placer deposits from the Russian Northeast.

DNR Commissioner Harry Noah announced in late December 1993 that final state land selections—about 650,000 acres (263,120 hectares) of general grant, community grant, and university grant lands—had been filed with BLM. The selections completed a three-year program involving DNR, the Alaska Department of Fish and Game, DOTPF, the Pipeline Coordinator's Office, and other state agencies that recommended which eligible federal lands should be selected. DGGs completed a reconnaissance evaluation of the mineral potential of about 20.6 million hectares (51 million acres) of eligible federal lands. The State of Alaska's right to file new land selections ended on January 4, 1994, thirty-five years after passage of the Alaska Statehood Act.

The Alaska Statehood Act awarded 104.6 million acres (42.6 hectares) to the new state from the federal government, which is 28 percent of the land area of the state. Currently about 91 percent of Alaska state lands

are open to mineral entry. The vast bulk of energy resources and significant amounts of mineral resources currently being extracted in Alaska are taken from Alaska state lands.

In November 1993, Alaska's Governor Hickel announced at the Alaska Miners Association annual convention that 550,000 additional acres (222,640 hectares) of state land previously closed to mineral entry were being reopened to mineral leasing. These lands had been closed for up to 18 years by various department orders, mainly for land disposal programs.

In early November the U.S. House of Representatives passed the Rahall Bill (HR322), which would replace the 1872 Mining Law with an 8 percent gross royalty and strict leasing requirements. The U.S. Senate passed parallel legislation (SB775) that replaces provisions of the 1872 Mining Law with net royalties and less severe lease restrictions than those in the Rahall Bill. A joint conference version of the two bills is currently being drafted by Congress. About 80 percent of federal land in Alaska is already closed permanently to mineral entry, but replacing the 1872 Law with restrictive legislation might negatively affect the mineral industry in southeastern Alaska (Tongass National Forest), in southcentral Alaska (Chugach National Forest), and statewide on other federal lands.

The fiscal year 1995 budget submitted by the Interior Department might seriously affect federally funded earth-science and minerals research in Alaska. The nationwide research budget for the U.S. Bureau of Mines would be reduced from \$25 million to \$4 million, and offices of the Alaska Field Operation Center of the Bureau of Mines would be closed. The U.S. Geological Survey Branch of Alaskan Geology also faces budget and staff reductions in favor of other programs in the lower 48. Large cuts in the office of the U.S. Minerals Management Service would reduce the staff by one-third. The U.S. Bureau of Mines has 32 employees in Alaska with offices in Anchorage and Juneau. The Branch of Alaskan Geology has 28 employees in Anchorage and 18 in Menlo Park, California. The Minerals Management Service employs about 150 people in Anchorage.

**UNIVERSITY OF ALASKA FAIRBANKS
SCHOOL OF MINERAL ENGINEERING: AN UPDATE**

The University of Alaska Fairbanks began in 1917 as the Alaska College of Agriculture and School of Mines. The current School of Mineral Engineering carries on the University's tradition of education for the mining, petroleum, and environmental industries.

The school offers bachelor's and master's degrees in geological engineering, mining engineering, and petroleum engineering. It also offers a master's degree in mineral preparation engineering and Ph.D. degrees in all four of the disciplines mentioned, in cooperation with other schools or colleges at the University. The school has offered petroleum engineering courses in Anchorage since 1988, and will begin offering mining and geological engineering courses there in the autumn of 1994. Through its mining extension program, the school also offers nonacademic courses to hundreds of interested individuals throughout the state of Alaska.

Enrollment in the school in 1993 was 141 students, a record number for the second successive year. This included 86 undergraduate students and 55 graduate students. Enrollment among the four disciplines offered by the school included 45 students in geological engineering, 35 in mining engineering, 45 in petroleum engineering, and seven in mineral preparation engineering. The school awarded 22 degrees in 1993; eight undergraduate and 14 graduate. Four of these degrees were in geological engineering, four in mining engineering, 12 in petroleum engineering, and two in mineral preparation engineering. In 1993 a total of 300 students enrolled in mining extension courses.

Mining and petroleum engineer Dr. Robert H. Trent is beginning his second year as dean of the school. The faculty consists of 13 instructional and eight research members.

The school conducts numerous research projects relating to the mineral and petroleum industries in Alaska. Research in the school is currently funded at almost \$3 million. Table 20 summarizes current and recent projects. The school is noted for its expertise in processing and drying Alaska coals, in mining and processing placer deposits of precious metals, in mining and excavation methods for permafrost, and in specialized recovery methods for Alaska petroleum. Developing areas of expertise include sophisticated modeling techniques for heat flow, ground control, dust generation, and ventilation in permafrost excavations, development of biological remediation methods for

mining waste water, and recovery of gas hydrate deposits. In the past year, new research projects in subsurface hydrology, slope stability, coal processing, and surface mine reclamation have been initiated. Most of the projects emphasize the unique conditions found in Alaska.

The school receives significant support from industry and individuals, on both the state and national levels. All eligible students receive scholarships, provided from generous endowments made by individuals and companies in the mining and petroleum industries. Twenty-six scholarships were awarded in 1993 with a total value of almost \$20,000. Students have also received scholarships awarded on a nationwide basis. In 1993, petroleum engineering students were recognized for the excellence of their technical papers, winning the First Place Undergraduate and Second Place Graduate awards at the annual conference of the Society of Petroleum Engineers and the First Place Undergraduate award at the Society of Petroleum Engineers' Western Division Annual Conference.

Graduate students in the school are supported by fellowships from the U.S. Bureau of Mines, the Alaska Science and Technology Foundation, the Alaska Department of Environmental Conservation, the U.S. Environmental Protection Agency, the U.S. Geological Survey, Ryan Lode Mines Inc., the Polar Ice Coring Office of the National Science Foundation, and the U.S. Department of Energy.

Industry and individuals also make generous cash and in-kind contributions to the instructional programs of the school. In 1993, cash contributions included \$10,100 from Alaska Women in Mining, \$5,000 from BP Exploration, \$120,000 from Cook Inlet Region Inc., and \$3,000 from Fairbanks Gold Inc. Eagle-PC, a mine development software program valued at \$30,000, was donated by Integrated Software Technology, a subsidiary of Morris-Knudsen Inc.

Faculty members are active in many professional societies, including the Alaska Miners Association, the Society for Mining, Metallurgy, and Exploration, the Association of Engineering Geologists, the Canadian Institute of Mining and Metallurgy, the Operations Research Society of America, the Metallurgical Society, the American Water Well Association, the Society of Petroleum Engineering, the American Chemical Society, and the American Association of Petroleum Geologists.

Table 20. *Recent and currently funded research projects*

Title	Sponsor	Amount	Investigator	End date
Characterization of oil	DOE	\$ 585,000	Sharma (PDL)	June 1993
Applications of enhanced recovery methods to the West Sak Reservoir	UAF Natural Resources Fund	16,900	Khataniar (PDL)	February 1995
Effect of gold mine effluent water on plant growth	Ryan Lode Mines	14,000	Nelson (MIRL) & Karlsson (SALRM)	December 1993
Vehicle traction on frozen and partially frozen ground	CRREL	30,000	Nelson (MIRL)	December 1993
Economic evaluation of vat leach plant designs for northern locations	USBM	30,000	Walsh & Nelson (MIRL)	May 1994
Treatment of precious mine waste waters—Alaskan testing of biological methods	ASTF, USBM, and Ryan Lode Mines	461,871	Nelson (MIRL) & Arps (IAB)	December 1994
Roof support systems for development openings in alluvial permafrost	USBM	111,523	Bandopadhyay & Nelson (MIRL)	September 1994
Ventilation of underground placer mines in alluvial permafrost	USBM	110,400	Bandopadhyay & Nelson (MIRL)	September 1995
Schrader Bluff Reservoir characterization	ASTF, CONOCO	350,000	Sharma (PDL)	June 1995
Hydrocarbon miscible slug injection for improved recovery from Schrader Bluff Reservoir	DOE, CONOCO	600,000	Sharma (PDL)	October 1995
Reclamation of abandoned placer mine site, Mile 101 Steese Highway	EPA, ADEC	143,000	Nelson (MIRL)	December 1995
Chromite processing	CIRI, NPMC	120,000	Nelson (MIRL)	December 1995
Determination of rock strength	Ryan Lode Mines	19,587	Huang (MIRL)	December 1994
Modelling of rock coring mechanism	NSF PICO	44,000	Huang (MIRL)	June 1994
Sensitivity analysis of frozen soil sampling	NSF PICO	1,600	Huang (MIRL)	June 1994
Economics of coal-water fuel production	UAF	40,000	Walsh (MIRL)	July 1995
Pulverized coal injection in iron smelters	DOE	70,000	Walsh (MIRL)	July 1995
TOTAL		\$2,747,881		

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METRIC CONVERSION TABLE

U.S. unit	Multiply by	Metric unit
MASS		
ounce, troy (oz t)	0.0311	kilogram (kg)
ounce, avoirdupois (oz avdp)	0.0283	kilogram (kg)
pound, avoirdupois (lb)	0.4536	kilogram (kg)
ton, short (2,000 lb)	0.9072	tonne (mg)
tonne (mg)	1.102	ton (2,000 lb)
LENGTH		
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
AREA		
mile ² (mi ²)	2.590	kilometer ² (km ²)
acre	2.471	hectare
VOLUME		
yard ³ (yd ³)	0.7646	meter ³ (m ³)
gallon	3.785	liter

SOURCE: Hansen, W.R., ed., 1991, *Suggestions to Authors of the United States Geological Survey* (7th ed.).

APPENDIX A
Total active claims and new claims staked in 1991, 1992, and 1993^a
(listed by quadrangle)^b
Compiled by Erik Hansen (DOM)

Quadrangle	Active claims assessment work			New claims staked						Total active claims ^c		
	1991	1992	1993	Federal			State			1991	1992	1993
				1991	1992	1993	1991	1992	1993			
13 Umiat	0	0	0	15	0	0	0	0	0	15	0	0
14 Sagavanirktok	0	0	0	0	0	0	0	0	0	0	0	0
15 Mt. Michelson	0	0	0	0	0	0	0	0	0	0	0	0
17 Point Hope	0	0	0	0	0	0	0	0	0	0	0	0
18 De Long Mts.	1,388	1,384	661	0	0	0	0	0	0	1,388	1,384	661
23 Philip Smith Mts.	5	3	2	3	0	0	2	0	0	10	3	2
26 Noatak	66	66	0	0	0	0	0	0	0	66	66	0
27 Baird Mts.	126	125	7	0	0	0	0	0	0	126	125	7
28 Ambler River	111	117	71	0	0	0	0	0	5	111	117	76
29 Survey Pass	34	32	34	0	0	0	0	0	0	34	32	34
30 Wiseman	1,346	1,279	962	2	4	278	7	48	5	1,355	1,331	1,245
31 Chandalar	645	548	394	17	0	9	12	16	16	674	564	419
32 Christian	2	1	1	0	0	0	0	0	0	2	1	1
35 Kotzebue	0	13	28	0	0	0	0	15	15	0	28	43
36 Selawik	0	0	0	0	0	0	0	0	0	0	0	0
37 Shungnak	28	22	0	0	0	0	0	0	0	28	22	0
38 Hughes	54	54	54	0	0	0	0	0	0	54	54	54
39 Bettles	360	266	136	5	0	10	0	0	0	365	266	146
43 Teller	382	327	258	0	0	0	60	0	0	442	327	258
44 Bendeleben	819	792	530	0	0	0	75	15	13	894	807	543
45 Candle	470	433	313	8	0	0	7	20	4	485	453	317
47 Melozitna	117	85	49	0	0	0	0	0	24	117	85	73
48 Tanana	914	1,025	929	0	0	0	168	66	70	1,082	1,091	999
49 Livengood	4,187	2,740	3,049	0	0	33	143	288	153	4,330	3,028	3,235
50 Circle	3,296	3,386	2,440	8	0	0	270	520	477	3,574	3,906	2,917
51 Charley River	182	183	178	0	0	0	0	0	0	182	183	178
52 Nome	625	420	67	61	23	4	64	30	11	750	473	82
53 Solomon	332	360	117	0	0	0	95	12	8	427	372	125
54 Norton Bay	110	110	0	0	0	0	0	0	0	110	110	0
55 Nulato	1,632	1,631	1,591	0	0	0	0	0	5	1,632	1,631	1,596
56 Ruby	764	768	668	0	0	0	18	30	27	782	798	695
57 Kantishna River	133	80	44	15	58	0	0	0	0	148	138	44
58 Fairbanks	2,252	1,518	2,260	0	0	0	149	131	195	2,401	1,649	2,455
59 Big Delta	2,677	2,842	2,902	541	88	0	789	363	213	4,007	3,293	3,115
60 Eagle	1,268	1,448	968	5	0	0	84	131	170	1,357	1,579	1,138
63 Unalakleet	0	0	0	0	0	0	0	0	0	0	0	0
64 Ophir	365	342	362	0	0	0	12	61	15	377	403	377
65 Medfra	254	255	254	0	0	0	1	0	2	255	255	256
66 Mt. McKinley	338	238	273	0	0	0	25	0	2	363	238	275
67 Healy	3,536	3,001	1,629	42	12	0	204	44	90	3,782	3,057	1,719
68 Mt. Hayes	3,339	1,678	1,207	16	2	0	23	2	80	3,378	1,682	1,287
69 Tanacross	1,360	520	374	0	0	0	166	101	14	1,526	621	388
72 Holy Cross	6	12	6	0	0	0	0	0	0	6	12	6
73 Iditarod	664	568	222	0	3	6	6	11	0	670	582	228
74 McGrath	75	290	75	0	0	0	0	0	0	75	290	75
75 Talkeetna	1,514	940	869	0	2	0	89	183	68	1,603	1,125	937
76 Talkeetna Mts.	629	723	514	0	1	0	109	117	61	738	841	575
77 Gulkana	18	17	3	0	0	0	10	0	2	28	17	5
78 Nabesna	304	337	191	0	0	0	39	0	0	343	337	191
81 Russian Mission	44	43	40	0	0	0	0	0	0	44	43	40
82 Sleetmute	155	158	109	0	0	0	0	0	0	155	158	109
83 Lime Hills	12	12	12	0	0	0	3	0	0	15	12	12

^aTotal count based on all documents recorded through January 1, 1993.

^bQuadrangles numbered northwest to southeast according to DGGS-DOM numbering and Kardex systems.

^cExcluding an undetermined number of claims on state-selected land.

APPENDIX A—Continued

Quadrangle	Active claims assessment work			New claims staked						Total active claims		
	1991	1992	1993	Federal			State			1991	1992	1993
				1991	1992	1993	1991	1992	1993			
84 Tyonek	4,307	4,200	4,713	0	0	0	44	82	67	4,351	4,282	4,780
85 Anchorage	607	596	441	17	7	0	182	78	64	806	681	505
86 Valdez	268	341	25	4	0	0	41	18	0	313	359	25
87 McCarthy	193	187	209	0	0	0	0	0	0	193	187	209
91 Bethel	59	43	35	0	0	0	2	0	4	61	43	39
92 Taylor Mts.	290	246	90	0	0	0	0	2	0	290	248	90
93 Lake Clark	386	295	335	0	0	0	1	1	0	387	296	335
94 Kenai	12	11	12	0	0	0	0	0	0	12	11	12
95 Seward	1,523	1,322	157	141	67	95	5	13	13	1,669	1,402	265
96 Cordova	2	1	0	1	3	0	0	1	0	3	5	0
97 Bering Glacier	298	255	390	0	0	0	4	0	0	302	255	390
101 Goodnews	39	0	0	0	0	0	0	0	0	39	0	0
102 Dillingham	0	0	0	0	0	0	0	0	0	0	0	0
103 Iliamna	1,194	1,140	631	0	0	0	450	147	0	1,644	1,287	631
104 Seldovia	2	10	10	0	0	0	0	0	0	2	10	10
105 Blying Sound	0	0	0	0	0	0	0	0	0	0	0	0
107 Icy Bay	0	0	0	0	0	0	0	6	14	0	6	14
108 Yakutat	1	11	1	0	0	0	0	0	0	1	11	1
109 Skagway	493	483	430	1	92	1	0	0	99	494	575	530
111 Mt. Fairweather	2	1	2	0	0	0	0	0	0	2	1	2
112 Juneau	2,807	2,663	1,399	174	58	76	1	25	20	2,982	2,746	1,495
113 Taku River	0	0	0	0	0	0	0	0	00	0	0	0
114 Sitka	379	171	57	11	27	8	0	4	0	390	202	65
115 Sumdum	176	82	75	38	0	0	0	0	0	214	82	75
116 Port Alexander	1	1	0	0	0	0	0	0	0	1	1	0
117 Petersburg	482	532	180	26	51	19	2	0	0	510	583	199
118 Bradfield Canal	294	500	45	2	2	0	0	0	0	296	502	45
119 Craig	938	917	405	113	169	62	0	9	8	1,051	1,095	475
120 Ketchikan	398	206	114	32	1	0	15	0	0	445	207	114
121 Dixon Entrance	184	206	61	0	25	0	0	0	0	184	231	61
122 Prince Rupert	0	0	0	0	0	0	0	0	0	0	0	0
123 Hagemeister Island	240	216	196	0	0	0	0	0	0	240	216	196
126 Mt. Katmai	0	0	0	0	0	0	0	0	0	0	0	0
127 Afognak	2	2	2	0	0	0	0	0	0	2	2	2
128 Bristol Bay	0	0	0	0	0	0	0	14	0	0	14	0
130 Karluk	0	0	0	0	0	0	0	0	0	0	0	0
133 Chignik	71	67	22	0	0	0	0	0	0	71	67	22
135 Trinity Islands	373	115	92	0	0	0	14	2	8	387	117	100
138 Port Moller	17	17	0	0	0	0	0	0	0	17	17	0
TOTAL	52,976	46,029	34,982	1,299	695	601	3,391	2,606	2,042	57,666	49,330	37,625

APPENDIX B
1993 Prospecting sites on State lands
Compiled by Erik Hansen (DOM)

Quadrangle	New sites	Extensions	Total
17 Point Hope	8	0	8
30 Wiseman	8	3	11
31 Chandalar	12	0	12
48 Tanana	11	0	11
49 Livengood	63	23	86
50 Circle	626	93	719
52 Nome	25	14	39
53 Solomon	11	8	19
57 Kantishna River	0	3	3
58 Fairbanks	40	5	45
59 Big Delta	124	46	170
60 Eagle	31	1	32
65 Medra	8	0	8
67 Healy	83	22	105
68 Mt. Hayes	17	0	17
69 Tanacross	17	7	24
75 Talkeetna	25	8	33
83 Lime Hills	6	0	6
84 Tyonek	18	0	18
85 Anchorage	13	0	13
86 Valdez	16	0	16
91 Bethel	1	0	1
94 Kenai	6	0	6
95 Seward	4	0	4
109 Skagway	36	0	36
112 Juneau	5	0	5
119 Craig	1	0	1
120 Ketchikan	4	0	4
135 Trinity Islands	3	0	3
TOTAL	1,222	233	1,455

APPENDIX C

State and federal agencies and private interest groups involved in mineral development activities, 1993

(Note: The 1994 Service Directory of the Alaska Miners Association lists technical and professional consultants and companies available for work in Alaska. The report is available for \$12 from the Association's Anchorage office.)

STATE OF ALASKA AGENCIES

DEPARTMENT OF COMMERCE AND ECONOMIC DEVELOPMENT

State Office Building, 9th Fl.
P.O. Box 110800 (mailing)
Juneau, AK 99811-0800
(907) 465-2500

Function: *Promotes economic development in Alaska.*

Division of Economic Development

State Office Building, 9th Fl.
P.O. Box 110804 (mailing)
Juneau, AK 99811-0804
(907) 465-2017

751 Old Richardson Hwy., Suite 205
Fairbanks, AK 99701
(907) 452-7464

Function: *Primary advocacy agency in state government for economic growth. Researches and publishes economic data on Alaska's mining industry. Provides information and assistance to new or developing businesses. Attracts capital investment by advertising Alaska's resource potential. Provides research staff aid for the Alaska Minerals Commission.*

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

410 Willoughby Ave., Ste. 105
Juneau, AK 99801-1795
(907) 465-5010
Public Information (907) 465-5060

Function: *Issues permits for activities, including mining, that affect air or water quality or involve land disposal of wastes. Sets air- and water-quality standards. Inspects, monitors, and enforces environmental quality statutes, regulations, and permits. Reviews all federal permits.*

Northern Regional Office
610 University Avenue
Fairbanks, AK 99709-3643
(907) 451-2360

Southcentral Regional Office
3601 C St., Ste. 1334, Frontier Bldg.
Anchorage, AK 99503-5940
(907) 563-6529
Permit Information (907) 563-6529
(collect calls accepted)

Nome District Office
P.O. Box 1815
Nome, AK 99762-1815
(907) 443-2600
(907) 443-5961(fax)

Southeastern Regional Office
410 Willoughby Ave., Ste. 105
Juneau, AK 99801-1795
(907) 465-5350
Permit Information (907) 465-5342
(collect calls accepted)

DEPARTMENT OF FISH AND GAME

1255 W. 8th St.
P.O. Box 25526 (mailing)
Juneau, AK 99802-5526
(907) 465-4100

Habitat and Restoration Division
(907) 465-4105

Function: *Protects habitat in fish-bearing fresh waters and manages refuges, sanctuaries, and critical habitats. Requires permits for any work involving: the blockage of fish passage; equipment crossings or operation in fresh waters used by anadromous fish; use, diversion, or pollution of streams containing anadromous fish; construction, exploration, or development work in state game refuges, game sanctuaries, and critical habitat areas.*

Northern Regional Office
Habitat and Restoration Division
1300 College Rd.
Fairbanks, AK 99701-1599
(907) 451-6192

Southcentral Regional Office
Habitat and Restoration Division
333 Raspberry Rd.
Anchorage, AK 99518-1599
(907) 267-2285

Southeastern Regional Office
Habitat and Restoration Division
802 3rd St., 2nd Floor
P.O. Box 240020 (mailing)
Douglas, AK 99824-0020
(907) 465-4290

OFFICE OF MANAGEMENT AND BUDGET

Division of Governmental Coordination
240 Main St., Suite 500
P.O. Box 110030 (mailing)
Juneau, AK 99811-0030
(907) 465-3562

Function: *Conducts coordinated state review of permits for mining projects within Alaska's Coastal Management Zone. Provides information to applicants on project design for consistency with the policies and standards of the Alaska Coastal Management Program. Coordinates state response to direct federal actions, including proposed regulations, that affect Alaska's mining industry.*

Southcentral Regional Office
3601 C St., Ste. 370, Frontier Bldg.
Anchorage, AK 99503-5930
(907) 561-6131
Fax: (907) 561-6134

Southeastern Regional Office
240 Main St., Suite 500
P.O. Box 110030 (mailing)
Juneau, AK 99811-0030
(907) 465-3562

DEPARTMENT OF NATURAL RESOURCES

400 Willoughby Ave., 5th Fl.
Juneau, AK 99801-1724
(907) 465-2400

Division of Forestry

3601 C St., Ste. 1058, Frontier Bldg.
P.O. Box 107005
Anchorage, AK 99510-7005
(907) 762-2501

Function: *Establishes guidelines to manage mining in state forests.*

Northern Regional Office
3700 Airport Way
Fairbanks, AK 99709-4699
(907) 451-2660

Southcentral Regional Office
3601 C St., Ste. 1008, Frontier Bldg.
P.O. Box 107005
Anchorage, AK 99510-7005
(907) 762-2117

Southeastern Regional Office
400 Willoughby Ave., 5th Fl.
Juneau, AK 99801-1724
(907) 465-2491

Division of Geological & Geophysical Surveys

794 University Ave., Ste. 200
Fairbanks, AK 99709-3645
(907) 451-5000

Function: *Conducts geological and geophysical surveys to determine the*

potential of Alaskan land for production of metals, minerals, fuels, and geothermal resources; locations and supplies of construction materials; potential geologic hazards to buildings, roads, bridges, and other installations and structures; and other surveys and investigations as will advance knowledge of the geology of Alaska and general geologic inventories. Publishes a variety of reports that contain the results of these investigations. Advises the public and government agencies on geologic issues. Maintains a library of geologic bulletins, reports, and periodicals. Maintains a drill-core storage facility at Eagle River.

Geologic Materials Center
P.O. Box 772805
Eagle river, AK 99577-2805
(907) 696-0079

Division of Land

3601 C St., Ste. 814, Frontier Bldg.
P.O. Box 107005
Anchorage, AK 99510-7005
(907) 762-2692

Function: *Manages surface estate and resources, including materials (gravel, sand, and rock). Handles statewide and regional land-use planning. Issues leases, material-sale contracts, mill-site permits, land-use permits, and easements for temporary use of State land and access roads.*

Northern Regional Office
3700 Airport Way
Fairbanks, AK 99709-4699
(907) 451-2700

Southcentral Regional Office
3601 C St., Ste. 1080, Frontier Bldg.
Anchorage, AK 99510-7005
(907) 762-2253

Southeastern Regional Office
400 Willoughby Ave. 4th Floor
Juneau, AK 99801-1724
(907) 465-3400

Division of Mining & Water Management

3601 C St., Ste. 822, Frontier Bldg.
P.O. Box 107016
Anchorage, AK 99510-7016
(907) 762-2163

A. Mining

Function: *Principal agency for management of mining and reclamation on state land in Alaska. Maintains a mining information office in Fairbanks. Issues property rights to leasable minerals; adjudicates locatable mineral filings. Issues permits for hard-rock and placer-mining activity. Maintains records of mineral locations, permits,*

and leases. Provides technical, legal, and land-status information. Administers the Alaska Surface Mining Control and Reclamation Act (ASMACRA), which includes permitting and inspection of coal mining activity and reclamation of abandoned mines.

B. Water Management

Function: *Manages water resources of the state; issues water-appropriation permits and certificates; responsible for safety of all dams in Alaska; conducts surveys to determine the locations, quantity, and quality of ground and surface water.*

Northern Regional Office
3700 Airport Way
Fairbanks, AK 99709-4699
(907) 451-2790 (Mining)
(907) 451-2772 (Water)

Southeastern Regional Office
400 Willoughby, 4th Floor
Juneau, AK 99801
(907) 465-3400

Division of Parks and Outdoor Recreation

3601 C St., Ste. 1200, Frontier Bldg.
P.O. Box 107001
Anchorage, AK 99510-7001
(907) 762-2600

Function: *Manages approximately 3,000,000 acres of state park lands primarily for recreational uses, preservation of scenic values, and watershed. Responsible for overseeing mining access, recreational mining activity, and valid mining-claim holdings within state park lands.*

Northern Regional Office
3700 Airport Way
Fairbanks, AK 99709-4699
(907) 451-2695

Southcentral Regional Office
3601 C St., Ste., 1280, Frontier Bldg.
P.O. Box 107001 (mailing)
Anchorage, AK 99510-7001
(907) 762-2616

Southeastern Regional Office
400 Willoughby Ave., 3rd Fl.
Juneau, AK 99801-1724
(907) 465-4563

History and Archaeology Section
3601 C St., Ste. 1278, Frontier Bldg.
P.O. Box 107001 (mailing)
Anchorage, AK 99510-7001
(907) 762-2626

DEPARTMENT OF PUBLIC SAFETY

450 Whittier St.
P.O. Box 111200 (mailing)
Juneau, AK 99811-1200
(907) 465-4322

Division of Fish and Wildlife Protection
5700 East Tudor Rd.
Anchorage, AK 99507-1225
(907) 269-5509

Function: *Enforce state laws, in particular AS Title 16. Acts as enforcement arm for Alaska Department of Fish and Game.*

DEPARTMENT OF REVENUE

State Office Bldg.
11th Fl., Entrance A
P.O. Box 110400 (mailing)
Juneau, AK 99811-0400
(907) 465-2300

Income and Excise Tax Audit Division

State Office Bldg.
11th Fl., Entrance B
P.O. Box 110420 (mailing)
Juneau, AK 99811-0420
(907) 465-2320

Function: *Issues licenses for mining, production, and sale of minerals. Administers mining-license tax is based on net income, including royalties. New mining operations—except sand and gravel mining—can apply for and receive certificates of tax exemption for the first year of operation. Tax returns must be filed annually.)*

UNIVERSITY OF ALASKA

Fairbanks, AK 99775-0760

College of Natural Sciences

Department of Geology & Geophysics
408 Brooks Building
(907) 474-7565

Function: *Provides undergraduate and graduate education in geology and geophysics and conducts basic and applied research in geologic sciences. Offers B.S., M.S., and Ph.D. program options in general geology, economic geology, petroleum geology, geophysics, and ice-snow-permafrost geophysics.*

School of Mineral Engineering

Duckering Bldg., Rm. 437
(907) 474-7366

Function: *Provides undergraduate and graduate education programs in geological engineering, mining engineering, mineral preparation engineering, and petroleum engineering. Offers mining extension programs in both urban and rural areas. Through research programs conducts laboratory and field studies to promote mineral and energy development.*

Mineral Industry Research Laboratory (MIRL)

O'Neill Resources Bldg., Rm. 212B
(907) 474-7135

Function: Conducts applied and basic research in exploration, development, and utilization of Alaska's mineral and coal resources with emphasis on coal characterization, coal preparation, mineral beneficiation, fine gold recovery, hydrometallurgy, and environmental concerns. Publishes reports on research results and provides general information and assistance to the mineral industry.

Mining Extension Program

Duckering Bldg., Rm. 401
(907) 474-7702

Function: Offers prospecting and introductory mineral and mining courses under an open admissions policy.

Mining and Petroleum Training Service

University of Alaska Anchorage
155 Smithway, Ste. 101
Soldotna, AK 99669
(907) 262-2788

Function: Provides direct training and assistance to mine operators, service and support companies and governmental agencies in mine safety and health, mining extension, vocational mine training and technical transfer. Specialized training services in hazardous materials, first aid and CPR, industrial hygiene and professional safety education and consulting are available on demand.

University of Alaska Southeast

Institute of Mining Technology
P.O. Box 22434
Juneau, AK 99802-2434
(907) 463-4840
Fax: (907) 465-6864

Function: The IMT is designed to train students for entry-level positions in the mining industry. Students receive their training both in the classroom and at the IMT underground mine training site (the Maggie-Kathleen). Students will also receive their Mine Safety and health Administration (MSHA) certification required by Federal Law. Training sessions last six weeks.

FEDERAL AGENCIES**U.S. DEPARTMENT OF THE INTERIOR**

Office of the Secretary
1689 C St., Ste. 100
Anchorage, AK 99501-5151
(907) 271-5485

Function: Coordinates the Department of the Interior's policy and stewardship with DOI bureaus for the management of over 200 million acres of public land in Alaska. The Special Assistant to the Secretary also serves as the Chairman of the Federal Subsistence Management Board.

Bureau of Land Management

Alaska State Office
222 West 7th Ave., #13
Anchorage, AK 99513-7599
(907) 271-3343
Mineral Law Branch - (907) 271-3791
Public Room - (907) 271-5960

Function: Administers federal public lands (except national parks, wildlife refuges, national monuments, national forests, and military withdrawals). Issues leases for all federal leasable minerals including oil and gas, coal, phosphates, and oil shale. Arranges for sale of minerals other than leasable or salable materials, including sand, gravel, or stone. Issues right-of-way and special-use permits. Monitors mining operations to insure protection of surface resources. Maintains land-status plats and issues patents. Records federal mining claims and annual assessment affidavits.

Anchorage District Office
6881 Abbott Loop Rd.
Anchorage, AK 99507-2599
(907) 267-1232

Arctic District Office
1150 University Ave.
Fairbanks, AK 99709-3844
(907) 474-2300

Nome Field Office
P.O. Box 925
Nome, AK 99762
(907) 443-2177

Glennallen District Office
P.O. Box 147
Glennallen, AK 99588
(907) 822-3217

Kobuk District Office
1150 University Ave.
Fairbanks, AK 99709-3844
(907) 474-2330

Steese-White Mountain District Office
1150 University Ave.
Fairbanks, AK 99709-3844
(907) 474-2350

Kotzebue Field Office
P.O. Box 1049
Kotzebue, AK 99752
(907) 442-3430
(907) 442-2720 (fax)

Tok Field Office
P.O. Box 309
Tok, AK 99780
(907) 883-5121

Fairbanks Support Center and Land Information Office (Public Room)

1150 University Ave.
Fairbanks, AK 99709-3844
(907) 474-2250

Function: Primary contact for information on interior and northern regions.

U.S. Bureau of Mines

Alaska Field Operations Center
3301 C. St., Ste. 525
Anchorage, AK 99503-3935
(907) 271-2455

Function: Alaska programs are designed to aid development of a viable mineral industry in Alaska with emphasis on field programs focused towards the identification of type, amount and distribution of mineral deposits in Alaska. The field information is augmented by other Bureau programs which provided information on beneficiation technologies (research); economic feasibility studies (potential supply); and economic and environmental effects of mineral development (policy analysis). Information is provided to other government agencies to aid land planning and land use decisions, and to the private sector to identify targets of opportunity for further exploration and/or development.

Juneau Branch - AFOC
P.O. Box 20550
Juneau, AK 99802-0550
(907) 364-2111

U.S. Fish and Wildlife Service

Region 7 Office
1011 East Tudor Rd.
Anchorage, AK 99503
(907) 786-3542

Function: Administers the federal public lands in national wildlife refuges, issues special-use permits for activities on refuges, reviews permits and applications for various mining activities on all private and public lands and waters, and provides information to regulatory agencies on fish and wildlife and their habitat. Makes recommendations to regulatory agencies to mitigate adverse environmental impacts.

Fairbanks Fish and Wildlife Enhancement
Ecological Service/Endangered Species
Branch

101 12th Ave., Rm. 232
Box No. 20 (mailing)
Fairbanks, AK 99701
(907) 456-0388

Juneau Fish and Wildlife Enhancement
Federal Bldg., Rm. 417
P.O. Box 21287 (mailing)
Juneau, AK 99802
(907) 586-7240

Anchorage Fish and Wildlife
Enhancement
605 West 4th Ave., Rm. 62
Anchorage, AK 99501
(907) 271-2787

U.S. Geological Survey
Geological Division
4200 University Dr.
Anchorage, AK 99508-4663
(907) 786-7495

Water Division
4230 University Dr.
Anchorage, AK 99508
(907) 786-7100

Alaska Distribution USGS Section
(for maps and brochures)
Federal Bldg.
101 12th Ave.
Fairbanks, AK 99701
(907) 456-0244

U.S. Geological Survey Earth Science
Information Center
Geologic Division
4230 University Dr., Rm. 101
Anchorage, AK 99508-4667
(907) 786-7012

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. Conducts 1:250,000-scale geologic mapping under the auspices of the Alaska Mineral Resource Assessment Program (AMRAP). Publishes and distributes nearly all available topographic maps of Alaska.

National Park Service
Alaska Regional Office
2525 Gambell St.
Anchorage, AK 99503
(907) 257-2626

Function: Administers lands within the national park system in Alaska. Manages oil and gas operation and 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.

U.S. DEPARTMENT OF LABOR
Mine Safety and Health Administration
117 107th Ave. NE., Rm. 100
Bellevue, WA 98004-5997
(206) 553-7037

Mine Safety and Health Administration
1000 Bucannon Blvd.
Suite 4
Boulder City, NV 89005

Juneau Field Office
Federal Building
107 West 9th
P.O. Box 22049 (mailing)
Juneau, AK 99802-2049
(907) 586-7165

Mine Safety and Health Administration
205 North 4th St., Rm. 103
Coeur d'Alene, ID 83814
(208) 667-6680

Function: Administers health and safety standards to protect the health and safety of metal, nonmetal and coal miners. Cooperates with the State to develop health and safety programs and develops training programs to help prevent mine accidents and occupationally caused diseases. Under agreement with the Coal Mine Safety and Health Office, the MSHA metal/nonmetal section has assumed responsibility for enforcement and training activities at coal mines in Alaska.

Mine Safety and Health Administration
Coal Mine Safety and Health, District 9
P.O. Box 25367
Denver, CO 80225
(303) 233-2647

Function: Administers health and safety standards according to the Code of Federal Regulations to protect the health and safety of coal miners; requires that each operator of a coal mine comply with these standards. Cooperates with the State to develop health and safety programs and develops training programs to help prevent coal or other mine accidents and occupationally caused diseases in the industry.

U.S. DEPARTMENT OF AGRICULTURE
U.S. Forest Service
Regional Office
Federal Bldg.
P.O. Box 21628
Juneau, AK 99802-1628
(907) 586-7862

Function: Provides joint administration of general mining laws on national forest system lands with the Bureau of Land Management. Cooperates with Department of Interior agencies in the review and issuance of mineral leases. Issues permits for disposal of sand, gravel, and stone.

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 10 Regional Office
1200 6th Ave.
Seattle, WA 98101
(206) 442-5810

Function: Issues National Pollutant Discharge Elimination System (NPDES) permits under the Clean Water Act to regulate effluent discharges. Maintains regulatory and review authority over wetland and NEPA/EIS-related issues.

Alaska Operations Office
222 West 7th Ave., #19
Anchorage, AK 99513-7588
(907) 271-5083

Alaska Operations Office
410 Willoughby Ave., Ste. 100
Juneau, AK 99801
(907) 586-7619

U.S. DEPARTMENT OF THE ARMY
Corps of Engineers
Regulatory Branch
P.O. Box 898
Anchorage, AK 99506-0898
Write: Attention: CENPA-CO-R-S
Call: Chief of Enforcement Section
(907) 753-2720 or (800) 478-2712
(in Alaska only)

Function: Regulates work in navigable waters of United States and discharge of dredged or fill material into United States waters, including wetlands. Examples of regulated mining activities include construction of berms, dikes, diversion pads, stockpiles, and reclamation activities.

COOPERATIVE STATE-FEDERAL AGENCIES

Alaska Public Lands Information Center
250 Cushman St., Ste. 1A
Fairbanks, AK 99701
(907) 451-7352

Function: Clearinghouse for general information on outdoor recreation in Alaska. Information sources include U.S. Forest Service, U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, U.S. Geological Survey, National Park Service, Alaska Departments of Natural Resources and Fish and Game, and Alaska Division of Tourism.

BOARDS AND COMMISSIONS

Alaska Minerals Commission
P.O. Box 80148
Fairbanks, AK 99708
(907) 479-6240

Function: *The Mineral Commission was created by the Alaska State Legislature in 1986 to make recommendations to the Governor and the Legislature on ways to mitigate constraints on the development of minerals in Alaska. The Commission has published annual reports since 1987.*

Citizens' Advisory Commission on Federal Areas

3700 Airport Way
Fairbanks, AK 99709
(907)451-2775

Function: *The Citizens' Advisory Commission on Federal Areas was established in 1981 by the Alaska Legislature to protect the rights of Alaskans to continue their traditional uses of federal lands throughout the state. This was done in response to Congressional enactment in December 1980 of the Alaska National Interest Lands Conservation Act (ANILCA), which placed millions of acres of federally owned lands into conservation system units with restrictive land-use and management requirements.*

Alaska Water Resources Board

P.O. Box 107005
Anchorage, AK 99510
(907) 762-2575

Function: *The Alaska Water Resources Board serves as an advisory group to the Governor on all matters relating to use and appropriation of water in the State of Alaska. The board has been particularly supportive of water resources legislation, including amendments to the Alaska Water Use Act for reservations of water and instream uses, basin-wide water rights adjudications, and housekeeping amendments to improve water-rights adjudication. The board has taken a keen interest in the state's water quality programs and water quality standards.*

Alaska Science & Technology Foundation

550 West 7th Ave., Ste. 360
Anchorage, AK 99501-3555
(907) 272-4333

Function: *The Foundation was created to make public funds available for long-term investment in economic development and technological innovation within the State and to improve the health status of its residents. Through the awarding of grants for basic and applied research, the Foundation will enhance the State's economy and help build its science and engineering capabilities.*

CHAMBERS OF COMMERCE

Alaska State Chamber of Commerce

217 Second St., Suite 201
Juneau, AK 99801
(907) 586-2323
Fax: (907) 463-5515

Function: *The State Chamber of Commerce researches and formulates positions on Alaskan resource development. Recommendations for consideration are submitted to the State Chamber of Commerce board of directors.*

Juneau Chamber of Commerce

124 West 5th Ave.
Juneau, AK 99801
(907) 586-6420

Greater Fairbanks Chamber of Commerce

709 2nd Ave.
Fairbanks, AK 99701
(907) 452-1105

Anchorage Chamber of Commerce

441 West 5th Ave., Ste. 300
Anchorage, AK 99501
(907) 272-2401

PUBLIC INTEREST GROUPS AND ASSOCIATIONS

Alaska Miners Association, Inc.

Statewide Office
501 West Northern Lights Blvd., Ste. 203
Anchorage, AK 99503-2565
(907) 276-0347
Fax: (907) 278-7997

Anchorage Branch

501 West Northern Lights Blvd., Ste. 203
Anchorage, AK 99503-2565
(907) 276-0347

Fairbanks Branch of AMA

P.O. Box 73069
Fairbanks, AK 99707
(907) 451-6650

Juneau Branch of AMA

3100 Channel Dr., #2
Juneau, AK 99801
(907) 586-4161

Kenai Branch of AMA

47660 Falls Creek Dr.
Homer, AK 99603
(907) 235-6396

Nome Branch of AMA

P.O. Box 1974
Nome, AK 99762
(907) 443-2632

Alaska Women in Mining

Fairbanks Branch
P.O. Box 83542
Fairbanks, AK 99708
(907) 479-9750

Juneau Branch

P.O. Box 34044
Juneau, AK 99804
(907)586-4161

Anchorage Branch

P.O. Box 240334
Anchorage, AK 99524
(907) 276-6762

Alaskans for Juneau

P.O. Box 22428
Juneau, AK 99802-2428
(907) 463-5065

American Institute of Professional Geologists

7828 Vance Dr., Ste. 103
Arvada, CO 80003
(303) 431-0831

Alaska Section

P.O. Box 9-2082
Anchorage, AK 99509
(907) 562-3279

Miners Advocacy Council

P.O. Box 73824
Fairbanks, AK 99707
(907) 479-0471

Northwest Mining Association

10 North Post St., Ste. 414
Spokane, WA 99201
(509) 624-1158

Placer Miners of Alaska

P.O. Box 81110
Fairbanks, AK 99708
(907) 479-3100

Resource Development Council for Alaska, Inc.

121 W. Fireweed, Suite 250
Anchorage, AK 99503
(907) 276-0700

Society for Mining, Metallurgy, & Exploration

P.O. Box 625002
Littleton, CO 80162-5002
(303) 973-9550

Secretary Treasurer-John Rishel

1505 Atkinson Dr.
Anchorage, AK 99504
(907) 337-0511

Southeast Alaska Conservation Council (SEACC)

419 6th St., Ste. 328
Juneau, AK 99801

Trustees for Alaska
725 Christensen Dr., Ste. 4
Anchorage, AK 99501

Western Mining Council
Kenai Peninsula Chapter
Old Nash Rd.
Seward, AK 99664
(907) 224-5963

ORGANIZED MINING DISTRICTS

Circle Mining District
P.O. Box 80674
Fairbanks, AK 99708
(907) 488-6058

Fairbanks Mining District
105 Dunbar
Fairbanks, AK 99701
(907) 456-7642

Forty-Mile Miners Association
47660 Falls Creek Dr.
Homer, AK 99603
(907) 235-6396

Haines Mining District
P.O. Box 149
Haines, AK 99827
(907) 766-2228

Iditarod Mining District
John Miscovich
General Delivery
Flat, AK 99584

Juneau Mining District
P.O. Box 20765
Juneau, AK 99802
(907) 789-4065

Kantishna Mining District
P.O. Box 84608
Fairbanks, AK 99708

Koyukuk Mining District
P.O. Box 9142
Coldfoot, AK 99701

Livengood-Tolovana Mining District
P.O. Box 55698
North Pole, AK 99707
(907) 488-6453

Valdez Creek Mining District
P.O. Box 875534
Wasilla, AK 99687-5534

Yentna Mining District
13004 NE 9th Ave.
Vancouver, WA 98685

MINERAL EDUCATION PROGRAMS

ALASKA MINERALS AND ENERGY RESOURCE EDUCATION FUND (AMEREF)
c/o RDC
121 W. Fireweed Lane, Suite 250
Anchorage, AK 99503
(907) 276-0070

Function: A nonprofit corporation formed to help prepare students in grades four through eight to make informed decisions about Alaska's mineral and energy resources.

Alaska Department of Education
801 W. 10th St., Ste. 200
Juneau, AK 99801-1894
(907) 465-8719

NATIVE REGIONAL CORPORATIONS

AHTNA INCORPORATED
Main Office
P.O. Box 649
Glennallen, AK 99588-0649
(907) 822-3476
(907) 822-3495 (fax)

Anchorage Office
406 Fireweed Lane, Ste. 101
Anchorage, AK 99503
(907) 274-7662
(907) 274-6614 (fax)

THE ALEUT CORPORATION
4000 Old Seward Hwy, #300
Anchorage, AK 99503-6087
(907) 561-4300
(907) 563-4328 (fax)

ARCTIC SLOPE REGIONAL CORPORATION
P.O. Box 129
Barrow, AK 99723-0129
(907) 852-8633
(907) 852-8533
(907) 852-5733 (fax)

Anchorage Office
301 Danner Ave., Suite 300
Anchorage, AK 99518-3035
(907) 349-2369
(907) 349-5476 (fax)

BERING STRAITS NATIVE CORPORATION
P.O. Box 1008

Nome, AK 99762-1008
(907) 443-5252
(907) 443-2985 (fax)

BRISTOL BAY NATIVE CORPORATION
800 Cordova Street
P.O. Box 100220 (mailing)
Anchorage, AK 99510-0220
(907) 278-3602
(907) 276-3924 (fax)

CALISTA CORPORATION
601 W. 5th Ave., Suite 200
Anchorage, AK 99501-2225
(907) 279-5516
(907) 272-5060 (fax)

CHUGACH ALASKA CORPORATION
560 E. 34th Ave., Ste. 200
Anchorage, AK 99503-4196
(907) 563-8866
(907) 563-8402 (fax)

COOK INLET REGION INC. and its subsidiary North Pacific Mining Corporation
P.O. Box 93330
Anchorage, AK 99509-3330
(907) 274-8638
(907) 279-8836 (fax)

DOYON LTD.
201 1st Ave., Suite 300
Fairbanks, AK 99701
(907) 452-4755
(907) 456-6785 (fax)

KONIAG INCORPORATED
4300 B St., Suite 407
Anchorage, AK 99503
(907) 561-2668
(907) 562-5258 (fax)

NANA REGIONAL CORPORATION
P.O. Box 49
Kotzebue, AK 99752
(907) 442-3301
(907) 442-2866 (fax)

Anchorage Office
1001 E. Benson Blvd.
Anchorage, AK 99508
(907) 265-4100
(907) 265-4311 (fax)

SEALASKA CORPORATION
One Sealaska Plaza, Ste. 400
Juneau, AK 99801
(907) 586-1512
(907) 586-9223 (fax)

APPENDIX D

Selected significant mineral deposits and mineral districts in Alaska^a

The alphabetized list of mineral deposits and mineral districts is keyed to the list of explanatory paragraphs that follow. For example, The Lik deposit in the alphabetized list is "Lik, 1, (fig 39)." This says that the location of Lik is shown as number 1 in figure 39.

- Alaska-Juneau, 100, (fig. 41).
 Anderson Mountain, 54, (fig. 39).
 Aniak - Nyac mining district, 84, (fig. 41).
 Apex-El Nido, 104, (fig. 41).
 Apollo-Sitka mines, 86, (fig. 41).
 Arctic, 9, (fig. 39).
 Avan Hills, 12, (fig. 41).
 Baultoff, 75, (fig. 40).
 Bear Mountain, 21, (fig. 40).
 Big Creek/Ladue, 58, (fig. 39).
 Big Hurrah, 32, (fig. 41).
 Binocular and other prospects, 72, (fig. 39).
 Bohemia Basin, 103, (fig. 41).
 Bokan Mountain, 122, (fig. 41).
 Bonanza Creek, 45, (fig. 40).
 Bond Creek, 73, (fig. 40).
 Bonnifield district massive sulfide deposits, 54, (fig. 39).
 Bornite, 8, (fig. 39).
 Brady Glacier, 98, (fig. 41).
 BT, 54, (fig. 39).
 Buck Creek, 23, (fig. 40).
 Candle Creek, 39, (fig. 41).
 Candle district, 39 (fig. 41)
 Cape Creek, 22, (fig. 40).
 Carl Creek, 74, (fig. 40).
 Casca VABM, 53, (fig. 39).
 Castle Island, 111, (fig. 39).
 Chandalar mining district, 17, (fig. 41).
 Chichagof, 101, (fig. 41).
 Chistochina, 68, (fig. 41).
 Circle mining district, 52, (fig. 41).
 Claim Point, 82, (fig. 41).
 Coal Creek, 63, (fig. 40).
 Copper City, 119, (fig. 39).
 Cornwallis Peninsula, 110, (fig. 39).
 Delta massive sulfide belt, 55, (fig. 39).
 Denali prospect, 67, (fig. 39).
 Drenchwater, 3, (fig. 39).
 Dry Creek, 54, (fig. 39).
 Ear Mountain, 25, (fig. 40).
 Ellamar, 78, (fig. 39).
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^aThis generalized summary does not describe all of the known 6,400 mineral deposits in Alaska.

NOTE: In cooperation with DGGs and the Russian Academy of Sciences, the USGS recently released Open-File Report 93-339 (Nokleberg and others, 1993), *Metallogenesis of mainland Alaska and the Russian northeast*, which describes 273 lode deposits and 43 significant placer districts in Alaska.

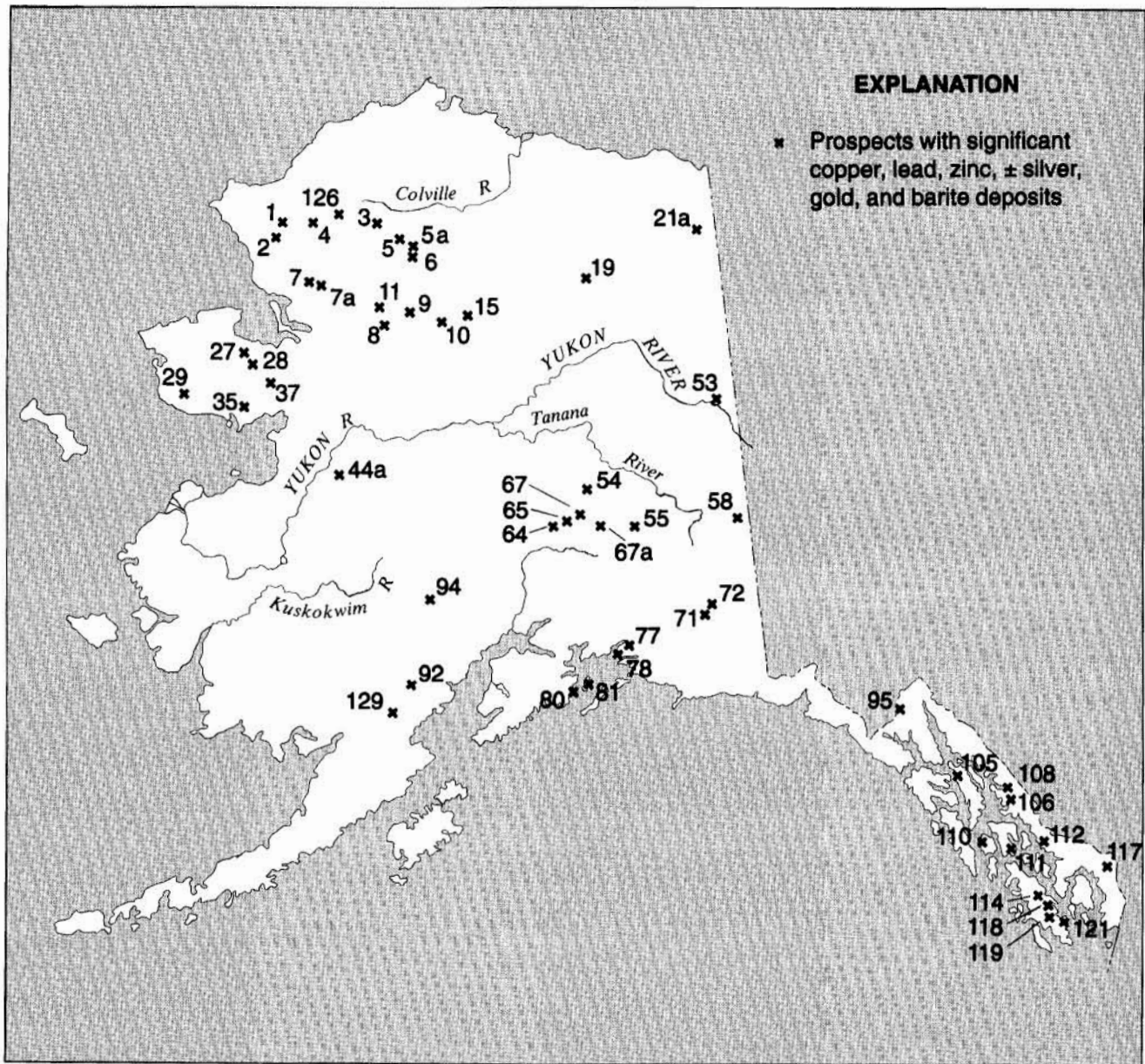


Figure 39. Significant copper, lead, zinc with credits of silver, gold, and barite deposits in Alaska, 1993.

Map
no.

- 1 **Lik** - Major strata-bound massive sulfide (Zn-Pb-Ag-Ba) deposit in black shale and chert. Proven reserve (Lik) estimate of 21.77 million tonnes (24 million tons) of 9% Zn, 3.1% Pb, and 48 g/tonne (1.4 oz/ton) Ag (fig. 39).
- 2 **Red Dog** - At least two major strata-bound massive sulfide deposits hosted in Pennsylvanian or Mississippian shale; similar to locality 1. Main deposit at Red Dog contains measured reserves of 58.2 million tonnes (64.02 million tons) at 18.4% Zn, 5.5% Pb, 93 g/tonne (2.7 oz/ton) Ag. Inferred reserves are 14.1 million tonnes (15.5 million tons) of 10.0% Zn, 2.7% Pb, and 41 g/tonne (1.2 oz/ton) Ag. Nearby Hilltop deposit contains significant undisclosed reserves (fig. 39).
- 3 **Drenchwater** - Mississippian and Pennsylvanian shales and cherts contain three strata-bound base metal occurrences spatially related to acid volcanics. In the lowest unit, a siliceous mudstone, contains a 0.6 m (2-ft) layer with up to 23% Zn. An overlying gray chert contains up to 11% Zn and up to 5% Pb with some Ag in fracture fillings. At the top of the overlying tuffaceous layer, Ag-bearing Zn and Pb mineralization outcrops discontinuously for at least 1,982 m (6,500 ft), and contains up to 26% Zn and 51% Pb in grab samples (fig. 39).
- 4 **Ginny Creek** - Epigenetic, disseminated Zn-Pb-Ag deposits with barite in sandstone and shale of Noatak Sandstone of Late

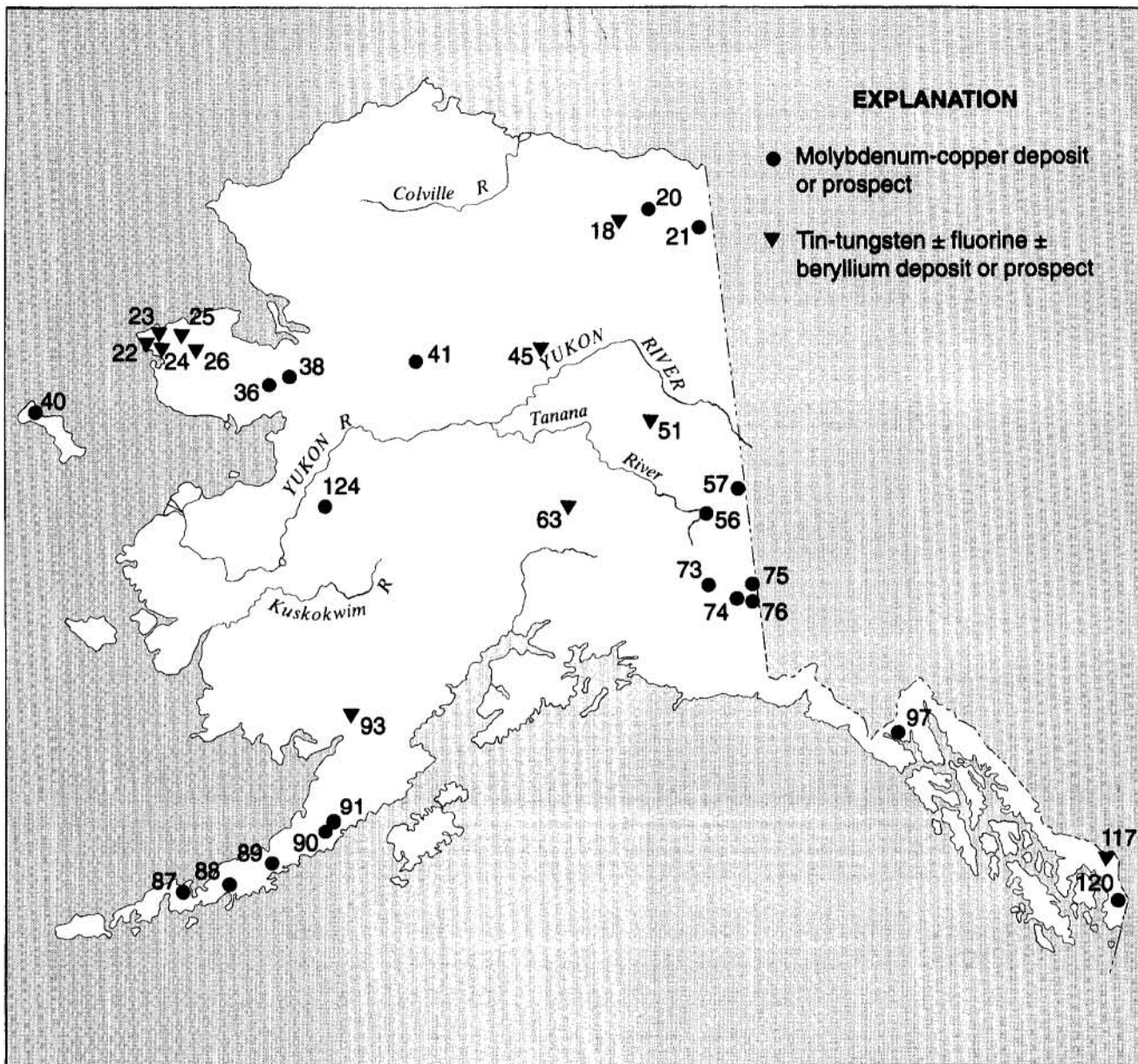


Figure 40. Significant molybdenum-copper and tin-tungsten with credits of fluorite and beryllium deposits in Alaska, 1993.

- Devonian through Early Mississippian age. Random grab samples of surface float contain 0.3% to 3.0% Zn and highly variable amounts of Pb and Ag (fig. 39).
- 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% Cu, 34% Pb, 28.8% Zn, 1.4 g/tonne (0.04 oz/ton) Au, and 1,028 g/tonne (30 oz/ton) Ag (fig. 39).
- 5a **Kivliktort Mountain** - Mineralized float is widespread on the north flanks of the mountain, apparently spatially related to the contact between shales at the base of the hills and coarse-grained siliceous clastic rocks on the upper slopes. Rock samples containing up to 30% Zn have been reported (fig. 39).
- 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% Cu, 0.37% Cd, 46% Zn, 44% Pb, 4.8 g/tonne (0.14 oz/ton) Au, and 507 g/tonne (14.8 oz/ton) Ag (fig. 39).
- 7 **Omar** - Epigenetic replacement deposits of Paleozoic age; include bedded barite occurrences. Grab samples contain 15.3% Cu, 0.15% Pb, 0.95% Zn, 0.05% Co, and 10 g/tonne (0.3 oz/ton) Ag (fig. 39).
- 7a **Frost** - Possible 8.2 million tonnes (9 million tons) barite in pods, lenses, and wavy-banded quartz-calcite-barite veins. Chalcopyrite and galena occur in the veins which cross cut Paleozoic limestone and dolomite for a minimum distance of 1.6 km (1 mi). Selected samples contain up to 13.2% Zn (fig. 39).

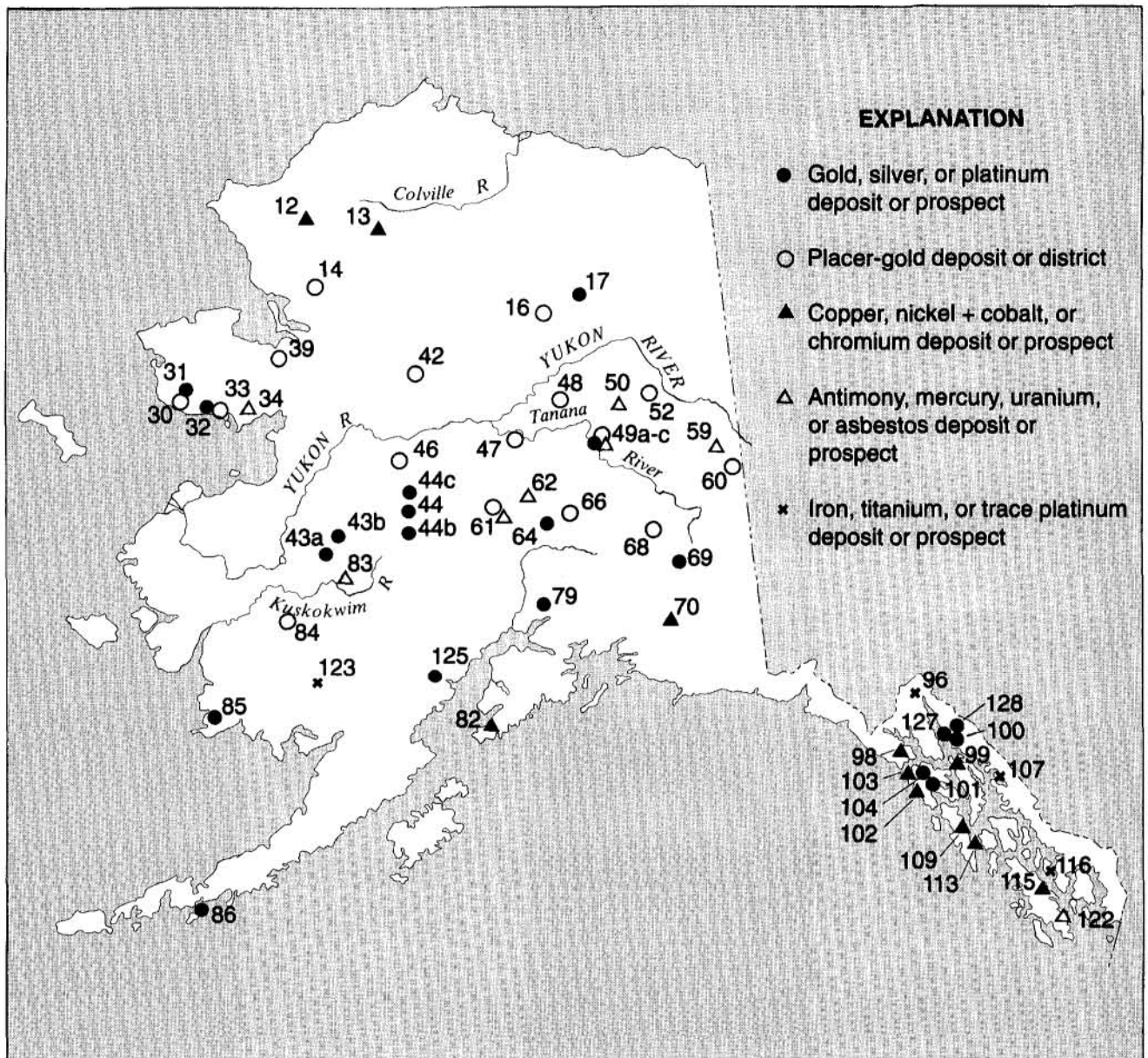


Figure 41. Significant gold, silver, platinum, and strategic mineral deposits in Alaska, 1993.

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|---|--|
| <p>8 Bornite - Major strata-bound Cu-Zn deposit in brecciated carbonate rock of Devonian age; 4.56 million tonnes (5.0 million ton) orebody contains 4.0% Cu and accessory Zn and Co. Larger reserve estimate of 36.2 million tonnes (40 million tons) of about 2% Cu and undisclosed amount of Zn and Co. At grade of 1.2% Cu, reserves are 91 million tonnes (100 million tons) (fig. 39).</p> <p>9 Arctic - Major volcanogenic (Cu-Zn) massive sulfide deposit hosted in sequence of metarhyolite, metatuff, and graphitic schist of Devonian age; indicated reserves of 36.3 million tonnes (40 million tons) grade 4.0% Cu, 5.5% Zn, 0.8% Pb, 55 g/tonne (1.6 oz/ton) Ag, and 0.69 g/tonne (0.02 oz/ton) Au (fig. 39).</p> <p>10 Sun - Major (Cu-Pb-Zn-Ag) massive sulfide deposit in sequence of middle Paleozoic metarhyolite and metabasalt. Average grades are 1 to 4% Pb, 6 to 12% Zn, 0.5 to 7% Cu, 103 to 377 g/tonne (3 to 11 oz/ton) Ag (fig. 39).</p> | <p>11 Smucker - Middle Paleozoic volcanogenic massive sulfide deposit; 915 m (3,000 ft) long and up to 58 m (190 ft) wide contains significant tonnage of Cu-Pb-Zn ore that grades 1.5% Pb, 5 to 10% Zn, 103 to 343 g/tonne (3 to 10 oz/ton) Ag, with minor Au (fig. 39).</p> <p>12 Avan Hills - Disseminated chromite in layered ultramafic rocks; grab samples contain up to 4.3% Cr with 0.51 g/tonne (0.015 oz/ton) PGM (fig. 41).</p> <p>13 Misheguk Mountain - Chromite occurrences similar to those in Avan Hills (fig. 41).</p> <p>14 Klery Creek - Lode and placer Au deposits worked intermittently from 1909 through 1930s. Total production through 1931, mostly from placer deposits, estimated at 974 kg (31,320 oz) Au (fig. 41).</p> |
|---|--|

- 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 (fig. 39).
- 16 **Koyukuk-Nolan mining district** - Major placer Au district; from 1893 to 1993, produced an estimated 10,101 kg (324,804 oz) Au. Significant deep placer reserves remain (fig. 41).
- 17 **Chandalar mining district** - Major Au producing district; substantial production in excess of 1,964 kg (63,158 oz) Au through 1993 from lode and placer sources; lode Au found in crosscutting quartz veins that intrude schist and greenstone. Active development of placer deposits and lodes in progress. Inferred lode reserves estimated to be 40,800 tonnes (45,000 tons) with grade of 69 g/tonne (2 oz/ton) Au (fig. 41).
- 18 **Porcupine Lake** - Stratiform fluorite occurrences and argentiferous enargite, tetrahedrite associated with felsic volcanic rocks of late Paleozoic age. Reported grades of up to 25% to 30% fluorite (CaF₂) reported, with grab samples of 4.8% Cu (fig. 40).
- 19 **Wind River** - Strata-bound Pb-Zn massive sulfide prospects; reported grades of up to 5% Pb (fig. 39).
- 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% Sn and 0.15% W (fig. 40).
- 21 **Bear Mountain** - Major stockwork Mo-W-Sn occurrence in intrusive breccia. Rock samples containing up to 0.8% Mo and 0.6% W occur within a 14 ha (35 acre) area where soil samples average more than 0.2% MoS₂, and an adjacent 10 ha (25 acre) area where rubble contains wolframite has soils averaging greater than 0.12% WO₃. Rubble crop in this area indicates a Tertiary porphyry system as the source of the Mo and W (fig. 40).
- 21a **Galena Creek** - Steeply dipping veins contain up to 21% Cu, 3.5% Zn, and 1.3% Pb with 189 g/tonne (5.5 oz/ton) Ag on the east side of the creek, and a large area of disseminated mineralization and veinlets contains predominantly Zn on the ridge west of the creek (fig. 39).
- 22 **Cape Creek** - Major placer Sn producer. More than 454 tonnes (500 tons) Sn produced from 1935 to 1941; from 1979 to 1990, produced 940 tonnes (1,040 tons) Sn. Derived from Cape Mountain in contact zone of Cretaceous granite and limestone (fig. 40).
- 23 **Buck Creek** - Major placer Sn producer. More than 998 tonnes (1,100 tons) Sn produced from 1902 to 1953 (fig. 40).
- 24 **Lost River** - Major Sn, fluorite, W, and Be deposit associated with Cretaceous Sn granite system. More than 317 tonnes (350 tons) Sn produced from skarn and greisen lode sources. Measured reserves amount to 22.3 million tonnes (24.6 million tons) that grade 0.15% Sn, 16.3% CaF₂, and 0.03% WO₃, based on 13,720 m (45,000 ft) of diamond drilling (fig 40).
- 25 **Ear Mountain** - Placer Sn district and Sn-Cu-Au-Ag-Pb-Zn skarn mineralization of Cretaceous age. Area also anomalous in U (fig. 40).
- 26 **Kougarok Mountain** - Sn deposit hosted in quartz-tourmaline-topaz greisen of Cretaceous age. Grades may average 0.5% Sn and 0.01% Ta and Nb, but a high grade resource of 136,050 tonnes (150,000 tons) grading 1% + Sn has been identified, with incrementally higher tonnage at lower grades (fig. 40).
- 27 **Hannum** - Stratiform, carbonate-hosted Pb-Zn-Ag massive sulfide deposit of mid-Paleozoic age in heavily oxidized zone that ranges from 9 to 46 m (30 to 150 ft) thick. Mineralized zone reported to assay up to 10% Pb, 2.2% Zn, 1.4 g/tonne (0.04 oz/ton) Au, and 60.3 g/tonne (1.76 oz/ton) Ag (fig. 39).
- 28 **Independence Creek** - Pb-Zn-Ag massive sulfide deposit; high-grade ore shipped in 1921 contained 30% Pb, 5% Zn, up to 5,141 g/tonne (150 oz/ton) Ag. Mineralization restricted to shear zone in carbonates (fig. 39).
- 29 **Sinuk River region**- Several Pb-Zn-Ag-Ba-F bearing massive sulfide deposits and layered Fe deposits in carbonate and metavolcanic rocks of Nome Group. Mineralized zones extend for over 2,440 m (8,000 ft) along strike (fig. 39).
- 30 **Nome mining district** - Major placer Au producer. Production from 1897-1993 in excess of 149,982 kg (4,822,569oz) Au all from placers. Sporadic Sb and W production in past (fig. 41).
- 31 **Rock Creek** - About 6.6 million tons grading 2.5 g/tonne (0.072 oz/ton) Au in vein swarms and stringers in an area 457 m (1,500 ft) long, 152 m (500 ft) maximum width and 91 m (300 ft) deep (fig. 41).
- 32 **Big Hurrah** - Epigenetic vein deposit in black slate and metasedimentary rocks of the Soloman schist. Deposit contains some W mineralization and has produced over 840 kg (27,000 oz) Au from nearly 45,350 tonnes (50,000 tons) milled ore. Proven, inferred, and indicated reserves total 94,328 tonnes (104,000 tons) that grade 21 g/tonne (0.61 oz/ton) Au, 19 g/tonne (0.55 oz/ton) Ag, and credits of WO₃ (fig. 41).
- 33 **Solomon mining district** - Major placer Au district; produced over 12,472 kg (401,030 oz) through 1993.. Three structurally controlled Au deposits in Bluff area—Daniels Creek, Saddle, and Koyana Creek—contain minimum inferred reserves of 5.9 million tonnes (6.5 million tons) grading 3.4 g/tonne (0.1 oz/ton) Au (fig. 41).
- 34 **Kachauik** - U prospect in Cretaceous alkalic intrusive rocks. Highly anomalous geochemical values and U concentrations of 1,000 ppm reported (fig. 41).
- 35 **Omalik** - Vein-type Pb-Zn-Ag massive sulfide prospect in Paleozoic carbonate rocks; from 1881 to 1900, produced 363 tonnes (400 tons) of Pb-Zn ore that averaged about 10% Pb and 1,371 g/tonne (40 oz/ton) Ag. Grades of oxidized Zn ore reported to be up to 34% Zn (fig. 39).
- 36 **Windy Creek** - Disseminated Mo-Pb-Zn mineralization in quartz veins and skarns with reported values as high as 0.15% Mo (fig. 40).
- 37 **Quartz Creek** - Significant Pb-Zn-Ag mineralization; reported grades of 15% combined Pb-Zn and 343 g/tonne (10 oz/ton) Ag (fig 39).
- 38 **Placer River** - Significant Mo-F mineralization disseminated in intrusive rocks. Reported values of 0.2% Mo (fig. 40).
- 39 **Candle/Inmachuk district** - Placer deposits with 7,717 kg (248,130 oz) production from 1902-1993; significant reserves

- remaining in a large ancestral channel system. Large base metal sulfide concentrations and U values in concentrates (fig. 41).
- 40 **Poovookpuk Mountain** - Porphyry Mo mineralization. Reported grades of up to 0.25% Mo (fig. 40).
- 41 **Purcell Mountain** - Mo and Ag occurrences associated with Cretaceous alkalic igneous plutons, alaskite, and bostonite dikes (fig. 40).
- 42 **Koyukuk-Hughes mining district** - Production of 7,084 kg (227,788 oz) Au from 1930 to 1993, mainly from Alaska Gold Company dredge at Hogatza; dredge reactivated in 1981, but deactivated in 1984, and reactivated again in 1990. Nonfloat mechanized operation on Utopia Creek produced significant amount of placer Au from 1930 to 1962 (fig. 41).
- 43a **Iditarod district** - Major placer Au district; produced 48,492 kg (1,559,260 oz) Au through 1993. Significant reserves of lode-Au and lode-W at Golden Horn deposit Chicken Mountain, and other known lodes in region associated with shear zones and monzonite intrusive rocks of Late Cretaceous age (fig. 41).
- 43b **Innoko-Tolstoi mining district** - Major placer Au district with significant lode Au-Sb-Hg potential; lode sources for placers are volcanic-plutonic complexes of Late Cretaceous and dike swarms that intrude Mesozoic flysch; mining district produced 18,296 kg (588,302 oz) Au through 1993 almost all from placer deposits. New discovery on Vinasale Mountain south of McGrath is Au-polymetallic deposit in monzonite stock (fig. 41).
- 44 **Nixon Fork** - Promising Au-Cu deposits; Nixon Fork mine produced 1,851 kg (59,500 oz) Au from Late Cretaceous skarns associated with quartz monzonite-Devonian limestone contact zones. Indicated reserve of about 10,886 kg (350,000 oz) Au in 258,500 tonnes (285,000 tons) of ore (fig. 41).
- 44a **Illinois Creek** - Near-surface geologic resource is 5.76 million tonnes (6.35 million tons) at 2.4 g/tonne (0.070 oz/ton) gold and 51.47 g/tonne (1.5 oz/ton) silver (fig. 39).
- 44b **Vinasale Mountain** - Intrusive hosted gold deposit. Au mineralization is associated with arsenopyrite and pyrite and within zones of phyllic and silicic alteration hosted within a 69 Ma quartz monzonite stock. Both disseminated and veinlet mineralization exist. A geologic resource of 14,351,000 tons with an average grade of 0.067 opt Au was identified in 1991 (fig. 41).
- 44c **Von Frank Mountain** - Gold and very weak copper mineralization are associated with chalcopyrite, pyrite, and rare molybdenite within a zone of quartz stockwork veining hosted in a 69 Ma quartz-diorite stock. The stock is a cupola of the larger Von Frank Pluton. Drill intercepts include thicknesses up to 429 feet with an average grade of 0.013 opt Au. Higher grade intercepts include 0.035 opt Au up to 135 ft. (fig. 41).
- 45 **Bonanza Creek** - Skarn-type W mineralization along intrusive contact; no published information available (fig. 40).
- 46 **Ruby mining district** - Placer Au-Sn district; produced more than 14,611 kg (469,795 oz) Au from 1931 to 1993; mining district also contains Pb-Ag prospects with grades reportedly as high as 2,811 g/tonne (82 oz/ton) Ag (fig. 41).
- 47 **Hot Springs mining district** - Placer Au-Sn district; produced more than 17,432 kg (560,532 oz) Au and over 326,590 kg (720,000 lb) cassiterite through 1993. Includes Eureka and Tofty subdistricts (fig. 41).
- 48 **Livengood-Tolovana mining district** - Placer Au district; produced more than 14,928 kg (480,013 oz) Au since discovery in 1914 to 1993. Substantial reserves remain mainly on Livengood Bench, a Pliocene ancestral channel (fig. 41).
- 49 **Fairbanks mining district** - Nationally ranked Au-producing district; largest producer in Alaska. Produced about 247,899 kg (7,971,028 oz) Au from placer deposits. Major lode-Au and lode-Sb producer; produced more than 9,472 kg (304,548 oz) Au and over 1.8 million kg (4 million lb) Sb from veins and shear zones through 1990. Production of W exceeded 4,000 STU since 1915, all derived from skarn near Cretaceous quartz monzonite.
- 49a **Fort Knox** - Disseminated Au deposit within granodiorite/quartz monzonite pluton near Fairbanks. Proven and probable reserves, open at depth, are 128,000 kg (4,117,000 oz) of gold in 158.3 million tonnes (174.5 million tons) of rock (fig. 41).
- 49b **Ryan lode** - Based on a 0.51 g/tonne (0.015 oz/ton) cutoff, total reserves in the metasediment-hosted Ryan Lode and subparallel igneous-hosted Curlew Shear are 25,573 kg (822,200 oz) of gold in 13.2 million tonnes (14.6 million tons) of rock. A geologic resource of about 74,468 kg (2.4 million oz) occurs within the total shear zone system (fig. 41).
- 49c **Grant Mine** - A series of subparallel Au-bearing quartz veins in the schist and quartzite of Ester Dome. Indicated reserves, 1990, on one vein system, the O'Dea, are 192,285 tonnes (212,000 tons) of 12 g/tonne (0.36 oz/ton) Au. Other similar vein systems have been identified within the property (fig. 41).
- 50 **Mt. Prindle** - Significant U-rare-earth mineralization in Mesozoic alkaline igneous rocks. Rock geochemical values of up to 0.7% U; up to 15% rare-earth elements reported (fig. 41).
- 51 **Twin Mountain** - Significant W mineralization associated with skarn development along contact zone of quartz monzonite stock of Cretaceous age (fig. 40).
- 52 **Circle mining district** - Currently one of Alaska's largest producing placer-Au district; produced 31,717 kg (1,019,843 oz) Au since discovery in 1893 to 1993. Has significant potential for Sn, W, and Au mineralization from variety of lode sources (fig. 41).
- 53 **Three Castle Mountain, Pleasant Creek, Casca VABM** - Strata-bound Pb-Zn massive sulfide mineralization. Reported grades of up to 17% Zn and 2% Pb (fig. 39).
- 54 **Bonnifield district massive sulfide deposits (Anderson Mountain, Dry Creek, Sheep Creek, Virginia Creek, BT, Liberty Belle)** - Significant volcanogenic Cu-Pb-Zn-Ag massive sulfide deposits of Devonian to Mississippian age in Bonnifield mining district. Potential for high-grade deposits reported. Includes Liberty Bell strata-bound Au-B deposit and mineralization in Sheep Creek; latter contains Sn as well as base metals (fig. 39).
- 55 **Delta massive sulfide belt** - Contains at least 30 known volcanogenic massive sulfide deposits and occurrences. Grades from 0.3% to 1.1% Cu, 1.7% to 5.7% Zn, 0.5% to 2.3% Pb,

- 24 to 69 g/tonne (0.7 to 2.0 oz/ton) Ag, and 0.61 to 2.1 g/tonne (0.018 to 0.061 oz/ton) Au; estimated potential reserve of 34.6 million tonnes (40 million tons) for all deposits (fig. 39).
- 56 **Mosquito, Peternie** - Porphyry Mo prospects of early Tertiary age; reported grades of up to 0.17% Mo (fig. 40).
- 57 **Taurus** - Significant major porphyry Cu-Au prospect of Paleocene age. East Taurus Zone contains inferred reserves of 126 million tonnes (140 million tons) grading about 0.30% Cu and .34 g/tonne (0.01 oz/ton) Au, and 0.03% Mo (fig. 40).
- 58 **Big Creek, Ladue** - Strata-bound Pb-Zn-Ag massive sulfide prospects in metavolcanic rocks (fig. 39).
- 59 **Slate Creek** - At least 50 million tonnes (55 million tons) of 6.3%, high-quality chrysotile asbestos in serpentinized ultramafic rocks of Permian(?) age (fig. 41).
- 60 **Fortymile mining district** - Major placer Au district. Produced over 16,491 kg (530,265 oz) placer and very minor lode Au since discovery in 1886 to 1993 (fig. 41).
- 61 **Kantishna mining district** - Major placer Au and lode Ag-Au-Pb-Zn-Sb-W district. Produced 3,089 kg (99,307 oz) placer and lode-Au, about 9,549 kg (307,000 oz) lode Ag, and 2.3 million kg (5million lb) Sb from shear zones and vein deposits hosted in metamorphic units of Yukon-Tanana terrane. Nearly 90 lode deposits have been identified; potential exists for significant Ag-Au-Pb-Zn resources. Metalliferous strata-bound base metal deposits occur in schist and quartzite (fig. 41).
- 62 **Stampede mine** - Major Sb deposit; produced more than 1.42 million kg (3.5 million lb) Sb from large shear zone in polymetamorphic rocks of Yukon-Tanana terrane (fig. 41).
- 63 **Coal Creek** - Greisen-hosted Sn-Cu-W deposit in "McKinley" age pluton (55 million-year-old). Reported reserves of 4.54 million tonnes (5 million tons) of ore that grade 0.28% Sn and 0.3% Cu with credits of W, Ag, and Zn (fig. 40).
- 64 **Golden Zone mine** - Major Au-Cu-Ag deposits in Late Cretaceous breccia pipe. Produced more than 49 kg (1,581 oz) Au, 268 kg (8,617 oz) Ag, and 19,051 kg (42,000 lb) Cu. Estimated reserves are 7,153 kg (230,000 oz) of Au in about 1.8 million tonnes (2 million tons) ore (figs. 39 and 41).
- 65 **Nim Prospect** - Porphyry Cu-Ag-Au deposit of Late Cretaceous age. Reported grades of up to 5.0% Cu and 309 g/tonne (9 oz/ton) Ag (fig. 39).
- 66 **Valdez Creek district** - About 13,307 kg (427,875 oz) Au production through 1993. Cambior Alaska Inc., the largest placer mine in Alaska, operates in this district (fig. 41).
- 67 **Denali Prospect** - At least six small, strata-bound Cu lodes in volcanic sedimentary rocks of Triassic age that may contain 4.54 million tonnes (5 million tons) ore that grade about 2% Cu with credits of Ag (fig. 39).
- 67a **Zackly** - Disseminated copper and gold in a garnet-pyroxene skarn and marble. Reserves are estimated as 1.27 million tonnes (1.4 million tons) grading 2.6 percent Cu and 6.0 g/ton (0.175 oz/ton) Au (fig. 39).
- 68 **Chistochina** - Porphyry Cu prospects of Tertiary age and placer-Au district; produced more than 5,637 kg (181,261 oz) Au and small amount Pt from placer deposits (fig. 41).
- 69 **Nabesna mine** - Classic high-grade Au skarn that envelopes quartz diorite of Jurassic(?) age; produced over 2,068 kg (66,500 oz) Au from about 79,816 tonnes (88,000 tons) of ore from 1930 to 1941 (fig. 41).
- 70 **Spirit Mountain** - Massive and disseminated Cu-Ni mineralization in mafic-ultramafic complex (fig. 41).
- 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. From 1911 to 1938, produced more than 544 million kg (1.2 billion lb) Cu and 311,028 kg (10 million oz) Ag from 4.35 million tonnes (4.8 million tons) ore. Some reserves remain (fig. 39).
- 72 **Binocular and other prospects** - Kennecott-type Cu-Ag massive sulfide deposits (fig. 39).
- 73 **Bond Creek - Orange Hill** - Two major porphyry Cu-Mo deposits of Late Cretaceous age; reported inferred reserves of 770 million tonnes (850 million tons) ore that grade 0.3 to 0.5% Cu and 0.03% Mo (fig. 40).
- 74 **Carl Creek** - Porphyry Cu prospect in altered intrusive complex; similar to locality 73 (fig. 40).
- 75 **Baultoff** - Porphyry Cu prospect in altered intrusive rocks; inferred reserves of 132 million tonnes (145 million tons) of 0.20% Cu similar to locality 73 (fig. 40).
- 76 **Horsfeld** - Porphyry Cu prospect; similar to locality 73 (fig. 40).
- 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 1.5 million kg (3.3 million lb) Cu from 44,760 tonnes (49,350 tons) ore (fig. 39).
- 78 **Ellamar** - Strata-bound Cu-Zn-Au massive sulfide deposit in sediment of Eocene(?) Orca Group. Produced more than 7.3million kg (16 million lb) Cu, 1,596 kg (51,307 oz) Au, and 5,960 kg (191,615 oz) Ag from about 273,764 tonnes (301,835 tons) ore (fig. 39).
- 79 **Willow Creek, Independence, Lucky Shot, War Baby** - Major lode-Au (Ag-Cu-Pb-Zn-Mo) in veins that cut Mesozoic quartz diorite. Produced more than 18,860 kg (606,400 oz) Au from lode sources and about 1,729 kg (55,600 oz) Au from associated placer deposits (fig. 41).
- 80 **Latouche, Beatson** - Major strata-bound Cu-Zn-Ag massive sulfide deposits in Orca Group sedimentary rocks and mafic volcanic rocks. Produced more than 93 million kg (205 million lb) Cu from 5.4 million tonnes (6 million tons) ore. Inferred reserves of 4.53 million tonnes (5 million tons) ore that grade 1% Cu, 1.5% Pb+Zn (fig. 39).
- 81 **Rua Cove** - Major strata-bound Cu-Zn massive sulfide deposit in complex ore shoots enclosed in mafic volcanic rocks of Orca Group. Reported reserves of over 1 million tonnes (1.1 million tons) ore that grade 1.25% Cu (fig. 39).
- 82 **Red Mountain and Claim Point** - Significant Cr occurrence associated with layered ultramafic complexes of Tertiary age at Red Mountain near Seldovia. More than 35,419 tonnes (39,951 tons) metallurgical-grade ore shipped through 1976;

- huge low-grade Cr resource may remain, of which 27 million tonnes (30 million tons) grade 5.1% Cr₂O₃ (fig. 41).
- 83 **Red Devil** - Major Hg-Sb deposit; high-grade epithermal Hg-Sb deposit hosted in shear zones in Kuskokwim Group sedimentary rocks. More than 1.24 million kg (35,000 flasks) Hg produced from 68,025 tonnes (75,000 tons) ore (fig. 41).
- 84 **Aniak/Nyac mining district** - Significant placer Au district. Aniak mining district produced 16,442 kg (528,670 oz) Au from placer deposits, mainly from the Nyac and Donlin Creek areas (fig. 41).
- 85 **Goodnews Bay** - Major placer Pt district; estimated to have produced over 17,261 kg (555,000 oz) refined PGE metals from 1934 to 1976; one of the largest known PGE metal resources in United States. Possible resources of 45 million m³ (60 million yd³) of deep, PGE-bearing gravels remain. Lode source believed to be Alaskan-type zoned ultramafic complex of Jurassic or Cretaceous age. Possible significant offshore placer potential (fig. 41).
- 86 **Apollo-Sitka mines** - Major lode Au deposits; produced more than 3,347 kg (107,600 oz) Au from ore that averaged about 7.5 g/tonne (0.22 oz/ton) Au. Inferred reserves are 678,440 tonnes (748,000 tons) grading 26 g/tonne (0.76 oz/ton) Au, 74 g/tonne (2.16 oz/ton) Ag, with base metal credits (fig. 41).
- 87 **Pyramid** - Late Tertiary porphyry Cu-Mo deposit; inferred reserves of 113 million tonnes (125 million tons) ore that grade 0.4% Cu and 0.03% Mo reported (fig. 40).
- 88 **Ivanof** - Late Tertiary porphyry Cu prospect; grades of up to 0.72% Cu reported. Potential for large tonnages (fig. 40).
- 89 **Weasel Mountain, Bee Creek** - Porphyry Cu-Mo prospect of late Tertiary to Quaternary age; grades of up to 0.48% Cu and 0.035% Mo reported. Potential for moderate tonnages of low-grade mineralization (fig. 40).
- 90 **Mike deposit** - Porphyry Mo prospect of late Tertiary age; grades of up to 0.21% Mo reported. Potential for large tonnages of low-grade Mo mineralization (fig. 40).
- 91 **Rex deposit** - Porphyry Cu prospect similar to locality 90; grades of up to 0.3% Cu reported. Potential for moderate reserves of low-grade mineralization (fig. 40).
- 92 **Kasna Creek** - Major stratiform Cu-Pb-Zn and skarn-sulfide deposits of Mesozoic age in mafic, volcanic, and sedimentary rocks; reported reserves of over 9,070,000 tonnes (10 million tons) ore that grade more than 1% Cu (fig. 39).
- 93 **Sleitat Mountain** - High-grade east-west-trending, Sn-W-Ag topaz-quartz greisen system hosted in 59 million-year-old old binary granite and in hornfels. Zone up to 1,915 m (3,000 ft) long and 152 m (500 ft) wide. One drill-hole showed 26 m (85 ft) of 1.8% Sn, and 0.4% W. Inferred resources are 58 to 96 million kg (128 to 212 million lb) Sn in 26.3 million tonnes (29 million tons) ore (fig. 40).
- 94 **Jimmy Lake** - Complex Cu-Ag-Sn mineralization of late Tertiary(?) age; reported grades of up to 3,599 g/tonne (105 oz/ton) Ag and 3% Cu (fig. 39).
- 95 **Haines Barite** - Major stratiform Ba-Pb-Zn-Cu-Ag deposit in pillow basalt-dominated section of Paleozoic or Triassic age; consists of 15- to 18-m (48- to 60-ft)-thick zone of 60% barite with upper zone [0.6 to 2.4 m (2 to 8 ft) thick] of massive sulfides that contain 2% Pb, 3% Zn, 1% Cu, up to 137 g/tonne (4 oz/ton) Ag, and 4 g/tonne (0.12 oz/ton) Au. Estimated to contain 680,250 tonnes (750,000 tons) of 65% barite with Zn and Ag credits (fig. 39).
- 96 **Klukwan** - Major Fe-Ti deposits in zoned ultramafic complex of Mesozoic age; reported to contain 2.7 billion tonnes (3 billion tons) of material that contains 16.8% Fe and 1.6 to 3.0% Ti (fig. 41).
- 97 **Nunatak** - Porphyry Mo deposit; reported reserves of 7.7 million tonnes (8.5 million tons) ore that grades 0.125% Mo and 117 millions tonnes (129 million tons) of 0.04% Mo (fig. 40).
- 98 **Brady Glacier** - Major Ni-Cu deposit in layered gabbro-pyroxenite complex of Tertiary age. Proven reserves of 91 million tonnes (100 million tons) ore that grade 0.5% Ni, 0.3% Cu reported and about 0.03% Co; also contains PGE concentrations (fig. 41).
- 99 **Mertie Lode and Funter Bay mining district** - Contains substantial reserves of lode Au mineralization. Past production totaled about 466 kg (15,000 oz) Au. Deposits also contain significant Ni-Cu and Pb-Zn-Ag mineralization. Funter Bay deposit contains reported reserves of 507,920 tonnes (560,000 tons) that grade 0.34% Ni, 0.35% Cu, and 0.15% 0Co in gabbro-pipe system (fig. 41).
- 100 **Alaska-Juneau** - Major lode Au deposit that consists of 30 to 90 m (100- to 300-ft) wide zone that contains an echelon, Au-bearing quartz veins in metamorphic rocks; produced more than 109,482 kg (3.52 million oz) Au from 80 million tonnes (88.5 million tons) ore from 1893 to 1944. Reserves (all categories), of 96 million tonnes (105.7 million tons) of 1.7 g/tonne (0.05 oz/ton) Au remain (fig. 41).
- 101 **Chichagof and Hirst Chichagof** - Major lode-Au deposits in quartz veins that cut Mesozoic graywacke; produced more than 23,949 kg (770,000 oz) Au, most of which was produced at Chichagof mine. Inferred leased reserves estimated to be 3,110 kg (100,000 oz) Au (fig. 41).
- 102 **Mirror Harbor** - Ni-Cu mineralization in layered-gabbro complex of Mesozoic age; reported proven reserves of 7,256 tonnes (8,000 tons) of 1.57% Ni and 0.88% Cu and reported inferred reserves of several million tons ore that grade 0.2% Ni and 0.1% Cu (fig. 41).
- 103 **Bohemia Basin** - Major Ni-Cu-Co mineralization in layered mafic complex similar to locality 102; reported reserves of 20 million tonnes (22 million tons) ore that grade 0.33 to 0.51% Ni, 0.21 to 0.27% Cu, and 0.02% Co, all of which are recoverable with standard flotation technology (fig. 41).
- 104 **Apex-El Nido** - Significant lode Au-W deposits that occur as crosscutting veins in graywacke; produced more than 1,555 kg (50,000 oz) Au (fig. 41).
- 105 **Greens Creek** - Major sediment-hosted Pb-Zn-Cu-Ag-Au volcanogenic massive sulfide deposit of Devonian or Triassic age; most recent reserve estimate is about 12.5 million tonnes (13.8 million tons) ore that grades about 456 g/tonne (13.3 oz/ton) Ag, 4.1 g/tonne (0.12 oz/ton) Au, 12.8% Zn, and 4.0% Pb (fig. 39).
- 106 **Sumdum** - Volcanogenic Cu-Pb-Zn massive sulfide deposit in Mesozoic metamorphic complex with potential strike length of

- over 3,048 m (10,000 ft). Inferred reserves of 24 million tonnes (26.7 million tons) ore that grade 0.57% Cu, 0.37% Zn, and 10 g/tonne (0.3 oz/ton) Ag reported (fig. 39).
- 107 **Snettisham** - Fe-Ti deposit in mafic zoned-intrusive complex; reported grades of about 18.9% Fe and 2.6% Ti (fig. 41).
- 108 **Tracy Arm** - Strata-bound Cu-Zn-Pb massive sulfide prospect in Mesozoic schist; over 335 m (1,100 ft) long and up to 3.7 m (12 ft) thick. Reported grades of 1.5% Cu, 3.9% Zn, 26 g/tonne (0.76 oz/ton) Ag, and 0.44 g/tonne (0.013 oz/ton) Au (fig. 39).
- 109 **Red Bluff Bay** - Significant chrome mineralization in Mesozoic ultramafic complex (probably ophiolite); reported reserves of 517 tonnes (570 tons) of material that grade 40% Cr and 26,303 tonnes (29,000 tons) that grade 18 to 35% Cr (fig. 41).
- 110 **Cornwallis Peninsula** - Volcanogenic Cu-Pb-Zn-Ag-Ba massive sulfide deposit of Triassic(?) age; reported grades of up to 20% Pb-Zn and 788 g/tonne (23 oz/ton) Ag 9 (fig. 39).
- 111 **Castle Island** - Stratiform barite deposit of Triassic age hosted in carbonate and pillow basalt; about 776,390 tonnes (856,000 tons) of raw and refined barite produced from 1963 to 1980; also contains Zn, Pb, and Cu sulfides. Reported to be mined out (fig. 39).
- 112 **Groundhog Basin** - Area contains several massive sulfide prospects in Mesozoic schist and gneiss whose origins are now thought to be plutonic associated. Reported grades of up to 8% Pb, 994 g/tonne (29 oz/ton) Ag, and 17 g/tonne (0.5 oz/ton) Au. Sn has also been recently identified. Area also contains potential for porphyry Mo deposits (fig. 39).
- 113 **Snipe Bay** - Ni-Cu deposit in zoned mafic-ultramafic complex; inferred reserves of 390,000 tonnes (430,000 tons) of 0.3% Ni, 0.3% Cu, and 4.4 g/tonne (0.13 oz/ton) Ag reported (fig. 41).
- 114 **Kasaan Peninsula** - Major skarn-type Cu-Fe-Au massive sulfide deposit of Jurassic age; area has produced over 12.7 million kg (28 million lb) Cu, and 1,711 kg (55,000 oz) Ag. Reported reserves of 3.6 million tonnes (4 million tons) ore that grade 50% Fe and less than 2% Cu (fig. 39).
- 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, 2.3 million kg (5 million lb) Cu, over 622 kg (20,000 oz) PGM, and Au and Ag credits were produced from 294,775 tonnes (325,000 tons) ore (fig. 41).
- 116 **Union Bay** - Significant Fe-Ti mineralization in ultramafic complex; area also contains Pt and V concentrations (fig. 41).
- 117 **Hyder mining district** - Area produced more than 22,675 tonnes (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 (figs. 39 and 40).
- 118 **Jumbo** - Cu-Fe-Mo-Ag skarn deposit; produced more than 4.5 million kg (10 million lb) Cu, 8,708 kg (280,000 oz) Ag, and 218 kg (7,000 oz) Au from 113,375 tonnes (125,000 tons) ore. Zoned magnetite-Cu skarns are associated with epizonal granodiorite pluton of Cretaceous age. Reported reserves of 589,550 tonnes (650,000 tons) ore that grade 45.2% Fe, 0.75% Cu, 0.3 g/tonne (0.01 oz/ton) Au, and 2.74 g/tonne (0.08 oz/ton) Ag (fig. 39).
- 119 **Copper City** - Stratiform Cu-Zn-Ag-Au massive sulfide deposit hosted in late Precambrian or earliest Paleozoic Wales Group. Reported grades of up to 12.7% Cu, 2.7% Zn, 86 g/tonne (2.5 oz/ton) Ag, and 6.9 g/tonne (0.2 oz/ton) Au (fig. 39).
- 120 **Quartz Hill** - World-class porphyry-Mo deposit in composite felsic pluton (25 million-year-old); possible resource of 1.36 billion tonnes (1.5 billion tons) ore that grades 0.136% MoS₂, including 444 million tonnes (490 million tons) probable resource with grades of 0.219% MoS₂ (fig. 40).
- 121 **Niblack** - Volcanogenic Cu-Pb-Au-Ag massive sulfide deposit hosted in Precambrian(?) Wales Group or Ordovician to Silurian Descon Formation; produced more than 635,000 kg (1.4 million lb) Cu, 342 kg (11,000 oz) Au, and 467 kg (15,000 oz) Ag (fig. 39).
- 122 **Bokan Mountain** - Numerous U-Th prospects associated with Jurassic peralkaline intrusive complex; from 1955 to 1971, produced more than 108,840 tonnes (120,000 tons) ore that graded about 1% U₃O₈. Contains inferred reserves of about 36.2 million tonnes (40 million tons) of 0.126% Nb and up to 1% REE metals (fig. 41).
- 123 **Kemuk Mountain** - Magmatic Fe-Ti deposit hosted in Cretaceous(?) pyroxenite. Inferred reserves of 2.17 billion tonnes (2.4 billion tons) that average 15 to 17% Fe, 2 to 3% TiO₂, and 0.16% P₂O₅ (fig. 41).
- 124 **McLeod** - Porphyry Mo deposit that contains quartz-molybdenite fissure veins in quartz-feldspar porphyry. Chip samples contain up to 0.09% Mo (fig. 40).
- 125 **Johnson River** - Epigenetic(?) quartz-sulfide stockwork or massive sulfide deposit hosted in volcanoclastic, pyroclastic, and volcanic rocks of Jurassic Talkeetna Formation. Deposit has drilled out reserves at a \$50/tonne cutoff with no cut of high Au assays, 997,542 tonnes grading 10.35 gram Au, 7.84 gm Ag, 0.76% Cu, 1.17 Pb, and 8.37% Zn (fig. 41).
- 126 **Nimiuktuk River** - Small hill of massive, high-grade barite estimated to contain at least 1.36 million tonnes (1.5 million tons) barite. Widespread stream-sediment Ba anomalies in area indicate further barite potential (fig. 39).
- 127 **Kensington** - Stockworks of quartz veins in sheared and chloritized quartz diorite produced 9,886 tonnes (10,900 tons) grading 6 g/tonne (0.18 oz/ton) Au prior to 1930. Recent reserve estimates indicate at least 10.4 million tonnes (11.5 million tons) grading 4.9 g/tonne (0.143 oz/ton) Au. Subparallel Horrible vein system contains 3.56 million tonnes (3.93 million tons) grading 3.7 g/tonne (0.11 oz/ton) Au (fig. 41).
- 128 **Jualin** - Five quartz-fissure veins in Cretaceous quartz diorite, more than 4,573 m (15,000 ft) of underground workings; produced 1,505 kg (48,387 oz) Au, mainly prior to 1930. Reserves estimated at 0.97 million tonnes (1.07 million tons) of 12 g/tonne (0.349 oz/ton) Au (fig. 41).
- 129 **Pebble Copper** - Cu-Au porphyry with identified resource of 454 million tonnes (500 million tons) grading 0.35% Cu and 0.4 g/tonne (0.012 oz/ton) Au with Mo in the 0.03% to 0.04% range (fig. 39).

Appendix E

Mining licenses issued by the Alaska Department of Revenue, 1993

Entries include in this order: company name, (region), address, resource, site of operation, mining district, and license number. Alaska Peninsula Region (APR), Eastern Interior Region (EIR), Northern Region (NR), Southcentral Region (SCR), Southwestern Region (SWR), Southeastern Region (SER), Undistributed (UR), Western Region (WR), and N/A indicates specific information not provided.

A & L Mining (WR)

Ralph S. Anderson
P.O. Box 974
Nome, AK 99762
Gold
Coffee Creek
Kougarok district
ML 93 0358 1

A.C.E. General Construction (EIR)

1818 Old Steese Highway North
Fairbanks, AK 99712
Gold
Goldstream: First Chance Creeks
Fairbanks district
ML 93 0304 1

Abbey, James (NR)

5190 Amherst #29
Fairbanks, AK 99709
Gold
South Fork Koyukuk River
Nolan district
ML 93 00398 1

Alaska Apollo Resources Inc. (APR)

P.O. Box 10438
Phoenix, AZ 85064
Gold
N/A
Alaska Peninsula district
ML 93 0016 1

Alaska Gold Company (WR)

P.O. Box 640
Nome, AK 99762
Gold
Submarine Beach; Third Beachline
Cape Nome district
ML 93 0292 1

Alaska Gold Company (WR)

P.O. Box 640
Nome, AK 99762
Gold
Third Beachline
Cape Nome district
ML 93 0293 1

Alaska Placer Development Inc. (EIR)

P.O. Box 81467
Fairbanks, AK 99708-1467
Gold
Livengood Creek
Tolovana district
ML 93 0283 1

American Copper & Nickel Co. (EIR)

4860 Robb Street, Suite 201
Wheat Ridge, CO 80033
Gold
Ester Dome Uplands
Fairbanks district
ML 93 0303 1

American Copper & Nickel Co. (EIR)

4860 Robb Street, Suite 201
Wheat Ridge, CO 80033
Gold
Treasure Creek & Tributaries
Fairbanks district
ML 93 0310 1

Anchorage Sand & Gravel (SCR)

KRC Aggregate Inc.
1040 O'Malley Road
Anchorage, AK 99515
Sand & gravel
Palmer loading terminal
ML 93 0246 1

Anderson, Gerald I. (SCR)

1013 E. Diamond Blvd
Box 168
Anchorage, AK 99515
Gold
Yacko Creek
Nelchina district
ML 93 0037 1

Anderson & Son Mining (SWR)

P.O. Box 277
McGrath, AK 99627
Gold
Innoko River
Innoko district
ML 93 0063 1

Anderson Mining (EIR)

Wayne & Randi Anderson
1901 Cheechako Drive
Fairbanks, AK 99709
Gold
Tenderfoot Creek
Fairbanks district
ML 93 0330 1

APP Mining (WR)

P.O. Box 1230
Nome, AK 99762
Gold
Anvil Creek
Nome district
ML 93 0338 1

APP Mining (WR)

P.O. Box 1230
Nome, AK 99762
Gold
Oregon Creek
Nome district
93 0339 1

ASA Inc. (EIR)

2700 Cushman Street
Fairbanks, AK 99701
Gold
Rampart district
ML 93 0308 1

AU Mining Company (WR)

P.O. Box 292
Willow, AK 99688
Gold Candle Creek, Kiwalik
Fairhaven district
ML 93 0240 1

AU Mining Company (WR)

P.O. Box 292
Willow, AK 99688
Gold
Jump Creek
Fairhaven district
ML 93 0254 1

AU Mining Company Co. (WR)

Rhinehart Berg
General Delivery
Candle, AK 99728
Gold
Mud Creek
Fairhaven district
ML 93 0284 1

Aurora Mining (EIR)

Lester Lines
P.O. Box 103820
Anchorage, AK 99510
Gold
North Fork Harrison Creek
Circle district
ML 93 0118 1

AWS Mining & Exploration (WR)

14660 S. 1000 W.
Bluffdale, UT 84065
Gold
Beachline
Council district
ML 93 0268 1

B & B Mining (NR)

Bernard Wright
3910 Tilleson Way
North Pole, AK 99705
Gold
Magnet Creek
Koyukuk-Nolan district
ML 93 00395 1

Bailey, S. Randolph (SCR)

7031 Gibbs Hill Circle
Anchorage, AK 99504
Gold
Seattle Creek
Seward district
ML 93 0035 1

Bauer, Tod (SCR)

P.O. Box 871502
Wasilla, AK 99687-1502
Gold
Eldorado Creek
Valdez Creek district
ML 93 0064 1

Bayless Mining (EIR)

Michael Busby
47660 Falls Creek Drive
Homer, AK 99603
Gold
Chicken Creek
Fortymile district
ML 93 0163 1

Beaver Loop Sand & Gravel (SCR)

Patrick & Mary Doyle
HC01 Box 1225
Kenai, AK 99611
Sand & gravel
Beaver Loop Road
Kenai district
ML 93 0291 1

Beck, Jessie D. (EIR)

P.O. Box 611
Petersburg, AK 99833
Gold
South Fork Fortymile River
Fortymile district
ML 93 0030 1

Beerman, W.J. (SCR)

2416 S. 1st Street
Yakima, WA 98901
Gold
Chistochina district
ML 93 0096 1

- Beistline, Earl H. (EIR)**
P.O. Box 80148
Fairbanks, AK 99708-0148
Gold
Cripple Creek
Fairbanks district
ML 93 0089 1
- Beistline, Earl H. (EIR)**
P.O. Box 80148
Fairbanks, AK 99708-0148
Gold
Mastadon Fork
Circle district
ML 93 0094 1
- Beistline, Earl H. (EIR)**
P.O. Box 80148
Fairbanks, AK 99708-0148
Gold
Eagle Creek
Circle district
ML 93 00401 1
- Bell, Bill (SCR)**
%Jerry Holland
P.O. Box 2288
Soldotna, AK 99669
Gold
Kahiltna River
Yentna district
ML 93 0080 1
- Bell, Rocky (NR)**
P.O. Box 353
Sterling, AK 99672
Gold
Emery Creek
Koyukuk district
ML 93 0129 1
- Benjamin, Aaron (SCR)**
P.O. Box 473
Talkeetna, AK 99676
Gold
Dollar Creek
Yentna district
ML 93 0244 1
- Berg, Rhinehart (WR)**
RD #1 Box 1439
Stroudsburg, PA 18360
Gold
Kugruk River: Mina Creek
Fairhaven district
ML 93 0211 1
- Berg, Rhinehart (WR)**
RD #1 Box 1439
Stroudsburg, PA 18360
Gold
Candle Creek
Fairhaven district
ML 93 0212 1
- Berg-Wetlesen (WR)**
P.O. Box CDL
Kotzebue, AK 99752
Gold
Kugruk River
Fairhaven district
ML 93 0303 1
- Berglund, Arthur (SCR)**
HC01 Box 6275
Palmer, AK 99645
Gold
Willow Creek
Willow Creek district
ML 93 0038 1
- Bering Straits Native Corp. (WR)**
P.O. Box 1008
Nome, AK 99762
Sand & gravel
Manilia Creek
Cape Nome district
ML 93 0181 1
- Bevans, Russ & Hutton, Pete (SCR)**
HC78 Box 2655
Chugiak, AK 99567
Gold
Fortress Creek
Willow Creek district
ML 93 0205 1
- Blake, Thomas Kerry (WR)**
P.O. Box 543
Nome, AK 99762
Gold
Dome-Telegram Creek
Nome-Council district
ML 93 0331 1
- Board of Trade Inc. (WR)**
P.O. Box 967
Nome, AK 99762
Sand & gravel
Cape Nome
Cape Nome district
ML 93 0263 1
- Boles, John: Boles, J.W. (SCR)**
1810 Talkeetna Street
Anchorage, AK 99508
Gold
Bird Creek
Yentna district
ML 93 0159 1
- Botnan, Ted R. (EIR)**
3555 Mendenhall Loop Rd. #71
Juneau, AK 99801
Gold
Independence: Treasure Creeks
Fairbanks district
ML 93 0049 1
- Boulanger, Frank J. (EIR)**
5104 N. Harbor Drive
San Diego, CA 92106
Gold
South Fork Fortymile River
Fortymile district
ML 93 0046 1
- Boulder Creek Mining Co. #2 Limited Partnership (EIR)**
8231 Xavier Way
Everett, WA 98203
Gold
Boulder Creek
Hot Springs district
ML 93 0112 1
- Bouton, Glenn D. & Lela (NR)**
665 Farmers Loop Rd.
Fairbanks, AK 99712
Gold
Chapman Creek
Koyukuk district
ML 93 0005 1
- Bradley, Joe L. (SCR)**
2811 Spenard Rd.
Anchorage, AK 99503
Gold
Mills Creek
Yentna district
ML 93 0342 1
- Bras, Cy (EIR)**
P.O. Box 2764
Kenai, AK 99611
Gold
Canyon Creek
Fortymile district
ML 93 0227 1
- Brooks Range Exploration Company (NR)**
3035 Madison Way
Anchorage, AK 99508
Gold
N/A
Koyukuk district
ML 93 0127 1
- Brooks Range Ventures Inc. (NR)**
3035 Madison Way
Anchorage, AK 99508
Gold
Lake Creek
Koyukuk district
ML 93 0132 1
- Brooks, Ronald A. (EIR)**
P.O. Box 10916
Fairbanks, AK 99710
Gold
Nome Creek
Tolovana district
ML 93 0253 1
- Bucholz, Gary (WR)**
2004 Old Steese North
Fairbanks, AK 99712
Gold
Bear Creek
Melozitna district
ML 93 0032 1
- Burns, John R. (EIR)**
P.O. Box 5
Chicken, AK 99752
Gold
Davis Creek
Fortymile district
ML 93 0002 1
- Bute, Alan & Superman, Gary (SCR)**
HC01 Box 1510
Kenai, AK 99611
Gold
Stetson Creek
Seward district
ML 93 0160 1
- Cacy, Robert J. (EIR)**
P.O. Box 106
Central, AK 99730
Gold
Portage Creek
Circle district
ML 93 0343 1
- Caprock Corporation (SCR)**
730 17th Street, Suite 800
Denver, CO 80202
Gold
Valdez: White Creeks
Valdez Creek district
ML 93 0083 1
- Carlson, Gary (EIR)**
P.O. Box 87073
Wasilla, AK 99687
Gold
Confederate Creek
Fortymile district
ML 93 0359 1
- Carlson, Robert D. (SCR)**
P.O. Box 771375
Eagle River, AK 99577-1375
Gold
Upper Cache Creek
Yentna district
ML 93 0333 1
- Cassiterite Placers Inc. (EIR)**
413 Cowles Street
Fairbanks, AK 99701
Gold
Fox Gulch
Fairbanks district
ML 93 0040 1
- Caswell, James W. (EIR)**
P.O. Box 196
Cantwell, AK 99729
Gold
Nenana
Bonnifield district
ML 93 0098 1
- Central Alaska Mining (EIR)**
P.O. Box 80649
Fairbanks, AK 99708
Gold
Harrison Creek
Circle district
ML 93 0360 1
- Chase, Ernest M. (SWR)**
P.O. Box 141
Aniak, AK 99558
Gold
Flat Creek
Marshall district
ML 93 0103 1
- Christoffersem, Fred (SCR)**
P.O. Box 1189
Valdez, AK 99686
Gold
Mineral Creek
Prince William Sound district
ML 93 0302 1

Clara Bea, Inc. (WR)
P.O. Box 853
Kotzebue, AK 99752
Gold
Candle Creek
Fairhaven district
ML 93 0077 1

Clara Bea, Inc. (WR)
P.O. Box 853
Kotzebue, AK 99752
Gold
Candle Creek
Fairhaven district
93 0165 1

Cleveland, C.W. (EIR)
10520 Azalea Glen Road
Glendale, OR 97442
Gold
North Fork Harrison Creek
Circle district
ML 93 0281 1

Cloud, Joseph L. (NR)
HC01 Box 475
Kenai, AK 99611
Gold
Boulder Creek
Koyukuk district
ML 93 0116 1

Colledge, Lyle (EIR)
P.O. Box 60478
Fairbanks, AK 99706
Gold
Bottom Dollar Creek
Circle district
ML 93 0095 1

Colzani, Robert (WR)
P.O. Box 1955
Nome, AK 99762
Gold
Anvil Creek
Nome district
ML 93 0280 1

Cominco Alaska Exploration (APR)
5660 B Street
Anchorage, AK 99518
Gold
Talarik Creek and Kuktuli
Bristol Bay district
ML 93 0229 1

Conklin, Mike (EIR)
39 Pickwick Park Drive East
Greenacres, FL 33463
Gold
North Fork Fortymile River
Fortymile district
ML 93 0145 1

Cook, Fred A. (EIR)
P.O. Box 311
Delta Junction, AK 99737
Gold
Portage Creek
Bonnifield district
ML 93 0122 1

Cook's Mining (EIR)
P.O. Box 70456
Fairbanks, AK 99707-0456
Gold
Fairbanks Creek
Fairbanks district
ML 93 0052 1

Cook's Mining (EIR)
P.O. Box 70456
Fairbanks, AK 99707-0456
Gold
Fairbanks Creek
Fairbanks district
ML 93 0111 1

Cook's Mining (EIR)
P.O. Box 70456
Fairbanks, AK 99707-0456
Gold
Fairbanks: Deep Creeks
Fairbanks district
93 0245 1

Corazza, Richard A. (EIR)
P.O. Box 1320
Homer, AK 99603
Gold
Loper Creek
Circle district
ML 93 0252 1

Corbin, R. Dale (SCR)
6909 Timothy Street
Anchorage, AK 99502
Gold
Matanuska: Alfred Creeks
Nelchina district
ML 93 0267 1

Cormandel Mining Co. (EIR)
P.O. Box 84330
Fairbanks, AK 99708
Gold
Bear Creek
Fairbanks district
ML 93 0374 1

Couch, Frank/Porter, J.L. (SCR)
149 Farnsworth
Soldotna, AK 99669
Gold
Stetson Creek
Seward district
ML 93 0001 1

Couch, Frank/Porter, J.L. (SCR)
149 Farnsworth
Soldotna, AK 99669
Gold
Crescent Creek
Seward district
ML 93 0015 1

Cox, Cecil (EIR)
P.O. Box 72875
Fairbanks, AK 99707
Gold
Fortymile River
Fortymile district
ML 93 0120 1

Cox, Cecil (EIR)
P.O. Box 72875
Fairbanks, AK 99707
Gold
Fortymile River
Fortymile district
ML 93 0121 1

Craigren, Bert/Marlow, Chip (EIR)
633 Pleasure Drive
North Pole, AK 99705
Gold
Robinson Creek
Fortymile district
ML 93 0222 1

Crow Creek Mine (SCR)
Camden & Cynthia Toohey
P.O. Box 113
Girdwood, AK 99587
Gold
Crow Creek
Seward district
ML 93 0230 1

Dart, James C. (EIR)
P.O. Box 18
Manley Hot Springs, AK 99756
Gold
Boulder Creek
Hot Springs district
ML 93 0007 1

Demby, Richard (EIR)
P.O. Box 82204
Fairbanks, AK 99708-2204
Gold
Slate Creek
Rampart district
ML 93 0305 1

Dempsey, Dan (SCR)
P.O. Box 606
Glennallen, AK 99588
Gold
Mineral Creek
Valdez Creek district
ML 93 0239 1

DEPEM (EIR)
105 Dunbar Avenue
Fairbanks, AK 99701
Gold
Wolf: Goose Creeks
Fairbanks district
ML 93 00397 1

DEPEM (EIR)
105 Dunbar Avenue
Fairbanks, AK 99701
Gold
Pedro: Twin Creeks
Fairbanks district
ML 93 0036 1

Derrick Enterprises (EIR)
P.O. Box 73574
Fairbanks, AK 99707-3574
Gold
Crooked Creek
Circle district
ML 93 0336 1

Dia-Tech Associates (EIR)
Thomas W. Bergman
602 Calle Juarez, Suite B
San Clemente, CA 92673
Gold
Clums Fork: Volcano Creek
Circle district
ML 93 0179 1

Dick Creek Mining (WR)
Mark Gumaer
P.O. Box 1682
Nome, AK 99762-1682
Gold
Dick Creek
Serpentine district
ML 93 0348 1

Dionne, Paul (NR)
P.O. Box 9072
Coldfoot, AK 99701
Gold
Nolan Creek
Koyukuk district
ML 93 0042 1

Domeier, Thomas (EIR)
HC04 Box 9379
Palmer, AK 99645
Gold
Confederate Creek
Fortymile district
ML 93 0067 1

Echo Bay Exploration Inc. (WR)
3100 Channel Drive Suite 2
Juneau, AK 99801
Gold
N/A
Kaiyuh district
ML 93 0321 1

Edgerton, Judd (EIR)
P.O. Box 3885
Palmer, AK 99645
Gold
Napoleon Creek
Fortymile district
ML 93 0242 1

Ellis, Ed (SCR)
P.O. Box 824
Cooper Landing, AK 99572
Gold
Lake Creek
Yentna district
ML 93 0101 1

Emerson, Robert C. (EIR)
1811 Phillips Field Road
Fairbanks, AK 99701
Gold
St. Patrick: Happy: Eva Creeks
Fairbanks district
ML 93 0173 1

Empire Exploration Inc. (SCR)
P.O. Box 142593
Anchorage, AK 99514-2593
Gold
Cottonwood Creek and tributaries
Yentna district
ML 93 0344 1

Engstrom Dredging (WR)

Ron Engstrom
P.O. Box 536
Nome, AK 99762
Gold
Basin Creek
Cape Nome district
ML 93 00392 1

Eriksson, Krister (SCR)

P.O. Box 398
Glennallen, AK 99588
Gold
Falls Creek
Prince William Sound district
ML 93 0380 1

Faa, Thomas E. (EIR)

P.O. Box 666
Wamic, OR 97063
Gold
Moose Creek
Bonnifield district
ML 93 0051 1

Fabrizio, Jerry L. (SER)

#1646 4739 University Way N.E.
Seattle, WA 98105
Gold
Porcupine Creek
Haines district
ML 93 0060 1

Fairbanks Gold Mining Inc. (EIR)

P.O. Box 73726
Fairbanks, AK 99707-3726
Gold
Fish Creek
Fairbanks district
ML 93 0361 1

Faulkner, Harry Sr. (SWR)

P.O. Box 1307
Bethel, AK 99559
Gold
Ophir Creek
Aniak district
ML 93 0301 1

Flat Creek Mining Co. (WR)

P.O. Box 81464
Fairbanks, AK 99708-1464
Gold
Timber Creek
Ruby-Poorman district
ML 93 0106 1

Flat Creek Placers (SWR)

John E. & John R. Fullerton
16935 Maplewild S.W.
Seattle, WA 98166
Gold
Flat Creek
Iditarod district
ML 93 0183 1

Flat Pick Mining (EIR)

Gordon Fulton
P.O. Box 115
Central, AK 99730
Gold
Switch Creek
Circle district
ML 93 0345 1

Fleming, Mitch (NR)

P.O. Box 9102
Coldfoot, AK 99701
Gold
Myrtle Creek
Koyukuk district
ML 93 0008 1

Fogarty, James & Sharon (EIR)

3034 Dyke Road
North Pole, AK 99705
Gold
Walker Creek
Fairbanks district
ML 93 0079 1

Foss, Elmer W. (EIR)

P.O. Box 73252
Fairbanks, AK 99707-3252
Gold
Bedrock Creek
Circle district
ML 93 0074 1

Franklin, Patricia (EIR)

1213 Coppet St.
Fairbanks, AK 99709
Gold
Fairbanks Creek
Fairbanks district
ML 93 0306 1

G.A. Hanks & Sons (EIR)

18908 Old River Road
West Sacramento, CA 95691
Gold
Lost Chicken Creek
Fortymile district
ML 93 0140 1

Garrabrant, Robert (SCR)

10224 Colville
Eagle River, AK 99577
Gold
Willow Creek
Willow Creek district
ML 93 0018 1

Gavora, Steven R. (EIR)

1967 Camomile Lane
Fairbanks, AK 99712
Gold
Fairbanks Creek
Fairbanks district
ML 93 0375 1

Gelvin, Stanley M. (EIR)

P.O. Box 30149
Central, AK 99730
Gold
Ketchum Creek
Circle district
ML 93 0107 1

Geosearch (SCR)

8650 Cameron Drive
Anchorage, AK 99518
Gold
Liberty: Five Mile Creeks
Nelchina district
ML 93 0062 1

Gerald W. Hooper & Associates (NR)

P.O. Box 875272
Wasilla, AK 99687-5272
Swift Creek
Koyukuk district
ML 93 0307 1

Gerke Group (WR)

4324 Thompson #2
Anchorage, AK 99508
Gold
3 m. from Tubutulik River
Solomon district
ML 93 0146 1

GHD Resources (EIR)

P.O. Box 10499
Fairbanks, AK 99710
Gold
Cache Creek & Sullivan Bench
Manley Hot Springs
ML 93 0134 1

GHD Resources (WR)

P.O. Box 10499
Fairbanks, AK 99710
Gold
Kiwalik River
Candle district
ML 93 0141 1

Gibson, Wayne E. (EIR)

1610 Southern
Fairbanks, AK 99701
Gold
Golden Creek
Melozitna district
ML 93 0243 1

Girdwood Mining Company (SCR)

P.O. Box 1089
Girdwood, AK 99587
Gold
Crow Creek
Anchorage district
ML 93 0231 1

Glacier Six Enterprises (EIR)

Vic E. Justis
Rt #2 Box 735
Soldotna, AK 99669
Gold
East Broxson Gulch
Fairbanks district
ML 93 0177 1

Glanville, Carl (SER)

HC 67 Box 1195
Anchor Point, AK 99556
Gold
N/A (Beach)
Cape Yakataga district
ML 93 0017 1

Glassburn, Don (EIR)

P.O. Box 107
Central, AK 99730
Gold
Gold Dust Creek
Circle district
ML 93 0150 1

Global Resources Inc. (WR)

P.O. Box 1042
Nome, AK 99762
Gold
American Creek
Cape Nome district
ML 93 0346 1

Global Resources Inc. (WR)

P.O. Box 1042
Nome, AK 99762
Gold
Cripple River
Cape Nome district
ML 93 0347 1

Godfrey, Phil (SER)

P.O. Box 3097
Bellevue, WA 98009-3097
Sand & gravel
Lena Point
Juneau district
ML 93 0186 1

Godfrey, Phil (SER)

P.O. Box 3097
Bellevue, WA 98009-3097
Sand & gravel
Lemon Creek
Juneau district
ML 93 0187 1

Gold Dust Mines (NR)

Del Ackels
P.O. Box 61520
Fairbanks, AK 99706-1520
Gold
Big Creek
Chandalar district
ML 93 0241 1

Gold Dust Mines (NR)

P.O. Box 61520
Fairbanks, AK 99706-1520
Gold
Tobin Creek
Chandalar district
ML 93 0226 1

Gold Gulch Tours Inc. (SCR)

P.O. Box 91087
Anchorage, AK 99509
Gold
Kahiltna River
Yentna district
ML 93 0194 1

Gold Star Mining (EIR)

Ross Novak
P.O. Box 83200
Fairbanks, AK 99708-3200
Gold
Eureka Creek
Hot Springs district
ML 93 0365 1

Goldstream Mining Inc. (EIR)

1937 Old Steese Hwy. N.
Fairbanks, AK 99712
Gold
Gilmore Creek
Fairbanks district
ML 0072 1

Golovin Native Corporation (WR)
P.O. Box 62099
Golovin, AK 99762
Sand & gravel
Native Corp Lands
Golovin district
ML 93 0334 1

Goodson, Richard (EIR)
P.O. Box 12
Chicken, AK 99732
Gold
Fortymile River
Fortymile district
ML 93 0279 1

Gradney, Hank & Ledoff, Melvin (EIR)
P.O. Box 74400
Fairbanks, AK 99707-4400
Gold
Deadwood Creek
Circle district
ML 93 0009 1

Granath, Gene Alfred (SCR)
P.O. Box 574
Kenai, AK 99611
Gold
Falls Creek
Seward district
ML 93 0161 1

Granite Creek Mining (SWR)
P.O. Box 261
McGrath, AK 99627
Gold
Granite: Homestake Creeks
Aniak district
ML 93 0158 1

Grateful Dog Mining (EIR)
McPherson, Roger
1100 Southwood Lane
Fairbanks, AK 99712
Gold
O'Connor Creek
Fairbanks district
ML 93 0174 1

Gravel Station, The (SCR)
Ingeborg M. Turner
P.O. Box 3489
Palmer, AK 99645
Sand & gravel
Peppil Pit
Palmer area
ML 93 0264 1

Gravel Station, The (SCR)
Ingeborg M. Turner
P.O. Box 3489
Palmer, AK 99645
Sand & gravel
Horning property
Palmer area
ML 93 0265 1

Green, John (SCR)
7405 Island Drive
Anchorage, AK 99504
Gold
Busch Creek
Valdez Creek district
ML 93 0362 1

Greens Creek Mining Company (SER)
3000 Vintage Blvd., Suite 200
Juneau, AK 99801
Gold, Silver, Lead, Zinc, Copper
Greens Creek, Admiralty Island
Juneau district
ML 93 0288 1

Greger, Scott/Klopman, Jamin (SWR)
P.O. Box 101
Red Devil, AK 99656
Gold
Taylor Creek
Aniak district
ML 93 0081 1

Greif, Richard & John (EIR)
2564 Steese Hwy N.
Fairbanks, AK 99712
Gold
Treasure Creek
Fairbanks district
ML 93 0178 1

Groppel, Chris L. (EIR)
P.O. Box 1060
Delta Junction, 99737
Gold
Tenderfoot Creek
Fairbanks district
ML 93 0213 1

Hall, John B. (NR)
P.O. Box 2700
Fairbanks, AK 99707-2700
Gold
Linda Creek
Koyukuk district
ML 93 0175 1

Ham Mining Company (EIR)
Harold A. Mitchell
P.O. Box 65
Chicken, AK 99732
Gold
Mosquito Fork
Fortymile district
ML 93 0200 1

Hannah, John (EIR)
P.O. Box 61117
Fairbanks, AK 99706-1117
Gold
No Name Creek
Fairbanks district
ML 93 0108 1

Hansen, James H. & Kathleen L. (WR)
P.O. Box 246
Nome, AK 99762
Gold
Niokluk River/Crooked Creek
Soloman district
ML 93 0137 1

Hard Rock Inc. (SER)
P.O. Box 129
Haines, AK 99827
Sand & gravel
5.5 Mile Haines Hwy
Porcupine district
ML 93 0290 1

Harrell, Ernest & Rena (SCR)
2025 Village Drive
Wasilla, AK 99654
Gold
Willow Creek
Willow Creek district
ML 93 0262 1

Hassel, Gerald L. (EIR)
P.O. Box 49
Ester, AK 99725
Gold
Ready Bullion Creek
Fairbanks district
ML 93 0043 1

Hawley Resource Group (WR)
941 E. Dowling Rd. #300
Anchorage, AK 99518
Gold
Snake River
Cape Nome district
ML 93 0341 1

Hayden, Forest A. (EIR)
P.O. Box 110930
Anchorage, AK 99511-0930
Gold
Baby Creek
Fortymile district
ML 93 0055 1

Hebert, Gary/Kralman, M.L. (NR)
1087 Vicki Lane
North Pole, AK 99705
Gold
Nolan: Acme Creeks
Koyukuk district
ML 93 00400 1

Heflinger, Fred (EIR)
P.O. Box 82390
Fairbanks, AK 99708-2390
Gold
Walker's Fork
Fortymile district
ML 93 00391 1

Heflinger Mining Company (EIR)
665 10th Ave., #307
Fairbanks, AK 99701
Gold
Livengood Creek
Livengood district
ML 93 0176 1

Hendrickson, Bernhardt S. (SCR)
3949 Dunkirk Drive
Anchorage, AK 99502
Gold
Falls Creek
Seward district
ML 93 0219 1

Henshaw, Byron (SCR)
P.O. Box 873316
Wasilla, AK 99687-3316
Gold
Valdez Creek
Valdez Creek district
ML 93 0385 1

Herndon & Thompson Leasing Co. (SCR)
41745 Bear Creek Drive
Homer, AK 99603
Sand & gravel
Homer district
ML 93 0249 1

Herndon & Thompson Leasing Co. (SCR)
41745 Bear Creek Drive
Homer, AK 99603
Sand & gravel
Homer district
ML 93 0250 1

Herning, Bruce G. (EIR)
P.O. Box 73846
Fairbanks, AK 99707-3846
Gold
Palmer Creek
Fairbanks district
ML 93 0275 1

Herzog, Martin M. (SCR)
3817 South Carson St., #428
Carson City, NV 89701
Gold
Cache Creek
Talkeetna-Yentna district
ML 93 0162 1

High Bench Mining (WR)
Dan Walsh
4600 Mars Drive
Anchorage, AK 99507
Gold
Dexter Creek
Cape Nome district
ML 93 0259 1

Hofbauer, Thomas & Laura (SCR)
P.O. Box 5604
Ft. Richardson, AK 99505
Gold
Canyon Creek
Hope district
ML 93 0204 1

Hoffman, Russell D. (SCR)
HC 60 Box 153
Copper Center, AK 99573
Gold
Chistochina River
Chistochina district
ML 93 0276 1

Holland, Lee (EIR)
HC 33 Box 32940
Nenana, AK 99760
Gold
Ester Creek
Fairbanks district
ML 93 0164 1

Hope Mining Company (SCR)
P.O. Box 101827
Anchorage, AK 99510-1827
Gold
Resurrection, Gold Gulch
Hope district
ML 93 0237 1

Hopen, Alf (EIR)
P.O. Box 74246
Fairbanks, AK 99707-4246
Gold
Chatanika River
Fairbanks district
ML 93 0125 1

House, Conrad H. (WR)
3911 Tilleson Way
North Pole, AK 99705
Gold
Swift Creek
Ruby district
ML 93 0003 1

Hunt, Howard J. (APR)
6924 E 6th
Anchorage, AK 99504
Gold
Silver Creek
Iliamna district
ML 93 00390 1

Island Leasing (SER)
D.J. Burnham
1330 East Huffman Rd. #453
Anchorage, AK 99515
Gold
Gulf of Alaska
Yakataga district
ML 93 0023 1

J & B (NR)
Raynor, Jeff & Hankins, Barry
1665 Eagle River Road
Eagle River, AK 99577
Gold
Hammond River
Koyukuk district
ML 93 0255 1

Jackson Mining Company (EIR)
936 Coppet St.
Fairbanks, AK 99709
Gold
Totatlanika River
Bonnifield district
ML 93 0349 1

Jensen, Daniel D. (EIR)
P.O. Box 12
Delta Junction, AK 99737
Gold
McCumber Creek
Delta River district
ML 93 0277 1

Jiles, O.J. (NR)
5250 Auburn-Folsom Rd.
Loomis, CA 95650
Gold
Hammond River
Koyukuk district
ML 93 0217 1

Jim Cline Enterprises (SCR)
James A. Cline
P.O. Box 2
Glennallen, AK 99588
Sand & gravel
ML 93 0357 1

Jones, Robert & Janet (SCR)
P.O. Box 274
Copper Center, AK 99578
Gold
Valdez: Grogg Creeks
Valdez Creek district
ML 93 0363 1

Jong, Cheryl (WR)
1100 W. 32nd Ave., #19
Anchorage, AK 99503
Gold
Humboldt Creek
Kougorok district
ML 93 0013 1

KC Mining Company (EIR)
P.O. Box 10657
Fairbanks, AK 99710
Gold
Faith Creek
Circle district
ML 93 0054 1

Keeling, Zeno (EIR)
P.O. Box 71373
Fairbanks, AK 99707
Gold
Robinson Creek
Fortymile district
ML 93 0050 1

Keener, Jeffrey O. (WR)
491 Ookpik Way
Fairbanks, AK 99709
Gold
Auburn Ravine
Council district
ML 93 0327 1

Keller, Robert W. (EIR)
P.O. Box 113
Healy, AK 99743
Gold
Totatlanika River
Bonnifield district
ML 93 0192 1

Kelly, Timothy (EIR)
1530 W. 13th Ave.
Anchorage, AK 99501
Gold
N/A
Manley Hot Springs district
ML 93 0350 1

Kiana Corporation (SER)
P.O. Box 129
Haines, AK 99827
Sand & gravel
4.5 Mile Haines Hwy
Porcupine district
ML 93 0289 1

Kiehl, Don T. (EIR)
3210 Marneet Ln
North Pole, AK 99705
Gold
Gold King Creek
Bonnifield district
ML 93 0300 1

Kiehl, Tim (EIR)
P.O. Box 71205
Fairbanks, AK 99707-1205
Gold
Gold King Creek
Bonnifield district
ML 93 0317 1

Kile, Eric & Alvin (EIR)
P.O. Box 140424
Anchorage, AK 99514-0424
Gold
Canyon Creek
Fortymile district
ML 93 0193 1

Kirkendall, Dave (EIR)
P.O. Box 254
Winthrop, WA 98862
Gold
North Fork Fortymile River
Fortymile district
ML 93 0258 1

Klemencic, John (EIR)
4540 Laurel Cye. Blvd. #2
North Hollywood, CA 91607
Gold
Fortymile River
Fortymile district
ML 93 0027 1

Knapman, Susan S. (EIR)
P.O. Box 254
Central, AK 99730
Gold
26 Pup, Deadwood Creek
Circle district
ML 93 0299 1

Knowlton, Clifford (EIR)
2245 John Evans Ln.
Fairbanks, AK 99712
Gold
Deadwood Creek
Circle district
ML 93 0012 1

Korobko, John (EIR)
1967 Yankovich Road
Fairbanks, AK 99709
Gold
N/A
Fairbanks district
ML 93 0006 1

Krizak, Rudy W. Jr. (WR)
P.O. Box 1253
Nome, AK 99762
Gold
Albion: Crooked Creeks
Cape Nome district
ML 93 0351 1

Krzykowski, Ben (EIR)
P.O. Box 60091
Fairbanks, AK 99706-0091
Gold
Big Eldorado Creek
Fairbanks district
ML 93 0088 1

Kurt's Construction (EIR)
Kurt A. Ueek
HC 60 Box 3560
Delta Junction, AK 99737
Sand & gravel
Milton Road area
Delta district
ML 93 0195 1

L & R Mining Company (EIR)
Ted Leonard
P.O. Box 51
Salcha, AK 99714
Gold
Salcha River
Fairbanks district
ML 93 00402 1

L.B.M.B. Mining Company (SWR)
Robert Bornand
332 Sycamore
Exeter, CA 93221
Gold
Murray: New York Creeks
Aniak district
ML 93 0203 1

Lankford, Steve (SCR)
HC 89 Box 540
Willow, AK 99688
Gold
Albert Creek
Nelchina district
ML 93 0184 1

Lapp, Ed (EIR)
General Delivery
Central, AK 99730
Gold
Cripple Creek
Circle district
ML 93 0089 1

Lapp, Ed (EIR)
General Delivery
Central, AK 99730
Gold
Mastadon Fork: My Creeks
Circle district
ML 93 0094 1

Las, Alan E. (EIR)
P.O. Box 83717
Fairbanks, AK 99708-3717
Gold
Smith: Pool Creeks
Fairbanks district
ML 93 0029 1

Lasley, Don (EIR)
3605 Arctic Blvd., #251
Anchorage, AK 99503
Gold
North Fork Harrison Creek
Circle district
ML 93 0156 1

Lawler, Monty/Toby (SCR)
P.O. Box 386
Kasilof, AK 99610
Gold
Chistochina River
Chistochina district
ML 93 0130 1

Lee, Dan (EIR)
HC03 Box 8383
Palmer, AK 99645
Gold
Walker's Fork
Fortymile district
ML 93 0172 1

**Lefever Davide E./
Alexander Michael R. (SCR)**
P.O. Box 521171
Big Lake, AK 99652
Gold
Wet Gulch
Willow Creek district
ML 93 0061 1

Light, Bill & Clara (NR)
P.O. Box 248
Tok, AK 99780
Gold
Koyukuk district
ML 93 0087 1

Lillian Creek Mine Inc. (EIR)
P.O. Box 60334
Fairbanks, AK 99756
Gold
Lillian Creek
Tolovana district
ML 93 0364 1

Losonsky, Steve (EIR)
P.O. Box 80321
Fairbanks, AK 99708
Gold
Hunter Creek
Rampart district
ML 93 0058 1

Loud, Richard L. (EIR)
P.O. Box 10570
Fairbanks, AK 99710
Gold
Birch Creek
Circle district
ML 93 0233 1

Lounsbury, James (NR)
365 Henderson Road
Fairbanks, AK 99709
Gold
Union Gulch
Koyukuk district
ML 93 0201 1

Lovs, Marin (EIR)
2326 St. Ellas Drive
Anchorage, AK 99517
Gold
Birch Creek
Circle district
ML 93 0117 1

Lucky 7 Mining Company (EIR)
P.O. Box 71614
Fairbanks, AK 99707-1614
Gold
Fish Creek: Little Chena River
Fairbanks district
ML 93 0028 1

Luvada, Terry (EIR)
317 Baranof Avenue
Fairbanks, AK 99701
Gold
American Creek
Circle district
ML 93 0376 1

**Lyman Resources in Alaska Inc.
(SWR)**
P.O. Box 192
McGrath, AK 99627
Gold
Snow Gulch: Crooked Creek
Iditarod district
ML 93 0082 1

MacDonald, Robert J. (EIR)
2829A Wrondel Way
Reno, NV 89502
Gold
Sourdough Creek
Fairbanks district
ML 93 0155 1

Magnuson, Robert Jr. (SWR)
P.O. Box 101
McGrath, AK 99627
Gold
Innoko River
Innoko district
ML 93 0352 1

Magnuson, Warren D. (SWR)
P.O. Box 55
McGrath, AK 99627
Gold
Ganes Creek
Innoko district
ML 93 0266 1

**Malatesta, J.A./Lindsey, P.
(SCR)**
P.O. Box 318
Clam Gulch, AK 99568
Gold
Valdez: White Creeks
Valdez Creek district
ML 93 0109 1

Manns, Mick & Cecilia (NR)
Paradise Valley
Bettles, AK 99726
Gold
Birch Creek
Koyukuk district
ML 93 0328 1

Martin Mining (SCR)
Edward D. Martin Jr.
P.O. Box 521
Cooper Landing, AK 99572
Gold
Quartz Creek
Seward district
ML 93 0388 1

Martinson, Elmer Emery (WR)
P.O. Box 452
Nome, AK 99762
Gold
Kougarok River
Cape Nome district
ML 93 0325 1

Mascott Mining Inc. (NR)
P.O. Box 264
Ridgway, CO 81432
Gold
Vermont Creek: Hammond River
Koyukuk district
ML 93 0170 1

Mason, Arnold J. (SCR)
P.O. Box 140467
Anchorage, AK 99514-0467
Gold
North Creek
Nelchina district
ML 93 0047 1

Mastel, Fred (SCR)
6400 O'Malley Road
Anchorage, AK 99516
Gold
Quartz Creek
Seward district
ML 93 0318 1

Mat-Su Aggregate (SCR)
Merwin L. Armeson
P.O. Box 737
Palmer, AK 99645
Sand & gravel
ML 93 0356 1

Matter, Mark (SWR)
P.O. Box 44
Aniak, AK 99557
Gold
Marvel Creek
Aniak district
ML 93 0048 1

**Maxwell, Barbara or Leslie
(EIR)**
3910 Loc Sault Ave.
Anchorage, AK 99516
Gold
Fortymile River: Canyon Creek
Fortymile district
ML 93 0214 1

May, Don (EIR)
4545 Woodriver Drive
Fairbanks, AK 99709
Gold
Goldstream Creek
Fairbanks district
ML 93 0097 1

McClain, John & Floretta (EIR)
P.O. Box 436
Soldotna, AK 99669
Gold
Ester Creek
Fairbanks district
ML 93 0191 1

McClanahan, Robert C. (EIR)
P.O. Box 41
Chicken, AK 99732
Gold
Bailey Creek
Fortymile district
ML 93 0274 1

Metco Inc. (SCR)
HCR 64 Box 300
Seward, AK 99664
Sand & gravel
Tract H Folz Subdivision
Seward district
ML 93 0221 1

Miller, Douglas & Sadie (EIR)
P.O. Box 9940
Alamo, TX 98516
Gold
Bonanza Creek
Circle district
ML 93 0071 1

**Miller Creek Mining Company
(EIR)**
Fred D. Wilkinson
P.O. Box 2702
Fairbanks, AK 99707-2702
Gold
Crooked Creek
Circle district
ML 93 0272 1

Millie Creek Mine (SWR)
Scott Greger
P.O. Box 101
Red Devil, AK 99656
Gold
Taylor Creek
Aniak district
ML 93 0238 1

Minex Alaska Inc. (APR)
Yoram Palkovitch
P.O. Box 103
Girdwood, AK 99587
Gold
Beach deposits
Kodiak district
ML 93 0022 1

**Mining Management Corp., The
(SCR)**
P.O. Box 91725
Anchorage, AK 99509-1725
Gold
Valdez Creek
Valdez Creek district
ML 93 0033 1

- Miscovich, Andy Emil (EIR)**
P.O. Box 1489
Fairbanks, AK 99707-1489
Gold
Dome Creek
Fairbanks district
ML 93 0278 1
- Miscovich, Andrew W. (EIR)**
P.O. Box 71489
Fairbanks, AK 99707-1489
Gold
Chatham Creek
Fairbanks district
ML 93 0139 1
- Miscovich, John A. (SWR)**
1093 Greengrove Street
Orange, CA 92667
Gold
Otter Creek
Iditarod district
ML 93 0084 1
- Miscovich Mining Company (WR)**
Howard P. Miscovich
P.O. Box 89
Ruby, AK 99768
Gold
Ruby district
ML 93 0056 1
- Monzulla, Vincent C. (EIR)**
2920 Monzulla Lane
Fairbanks, AK 99712
Gold
Victoria Creek
Fairbanks district
ML 93 0311 1
- Morris, Wm. H. & Mary D. (EIR)**
P.O. Box 33
Chicken, AK 99732
Gold
South Fork Fortymile River
Fortymile district
ML 93 0004 1
- Mrak Placer Mine (SCR)**
Wm. Mrak
P.O. Box 1963
Palmer, AK 99645
Gold
Willow Creek
Willow district
ML 93 0059 1
- Mullikin, Christopher (WR)**
P.O. Box 790
Homer, AK 99603
Gold
Boulder: Turner Creeks
Kougarok district
ML 93 0313 1
- Mullikin, Donald E. (WR)**
P.O. Box 790
Homer, AK 99603
Gold
Black Creek
Kougarok district
ML 93 0315 1
- Mullikin, Donald E. (WR)**
P.O. Box 790
Homer, AK 99603
Gold
Boulder Creek
Kougarok district
ML 93 0316 1
- N.B. Tweet & Sons (WR)**
P.O. Box 1107
Nome, AK 99762
Gold
Kougarok River
Kougarok district
ML 93 0070 1
- Nana Regional Corporation (NR)**
1001 E. Benson Blvd.
Anchorage, AK 99508
Silver, lead, zinc
Red Dog deposit
Noatak district
ML 93 0251 1
- Nana Regional Corporation Inc. (WR)**
1001 E. Benson Blvd.
Anchorage, AK 99508
Gold
Virginia Creek
Fairhaven district
ML 93 0260
- Nelson, Bob (EIR)**
General Delivery
Florida City, FL 33034
Gold
North Fork Fortymile River
Fairbanks district
ML 93 0154 1
- Nevers, Harold A. (EIR)**
8148 Pinewood Drive
Juneau, AK 99801
Gold
American Creek
Fortymile district
ML 93 0202 1
- Newmont Exploration Ltd. (SER)**
1700 Lincoln Street
Denver, CO 80203
All Types
Nunatak Patented Claims
Glacier Bay district
ML 93 0287 1
- Niesen, Randy/Smith, Blair (SCR)**
P.O. Box 520155
Big Lake, AK 99652-0155
Gold
Falls Creek
Yentna district
ML 93 0220 1
- Nome Gold Joint Venture (WR)**
Suite A-7925 East Harvard
Denver, CO 80231
Gold
Rock Creek
Nome district
ML 93 0128 1
- Noranda Exploration Inc. (EIR)**
P.O. Box 2380
Vancouver, BC V6B 3T5
Canada
Gold
Big: McCord Creeks
Fortymile district
ML 93 0026 1
- Noranda Exploration Inc. (SCR)**
Suite 100 1285 W. Pender St.
Vancouver, BC V6E 4B1
Canada
Gold
Maclaren River
Valdez Creek district
ML 93 0282 1
- Noranda Exploration Inc. (EIR)**
Suite 100 1285 W. Pender St.
Vancouver, BC V6# 4B1
Canada
Gold
Eva: Wilson: Moose Creeks
Bonnifield district
ML 93 0314 1
- Nordeen, William H. (NR)**
P.O. Box 9013
Coldfoot, AK 99701
Gold
Emma Creek
Koyukuk district
ML 93 0010 1
- Northern Lights Mining (EIR)**
544 North 600 West
Cedar City, UT 84720
Gold
Jay: Rye: Flat Creeks
Fairbanks district
ML 93 0320 1
- Nuway Mining Company Inc. (SCR)**
P.O. Box 1067
Kasilof, AK 99610
Gold
N/A
ML 93 0019 1
- O'Donnell, Franklin L. Jr. (EIR)**
711 Caraday Road
Salcha, AK 99714
Gold
Moose Creek
N/A
ML 93 0269 1
- Oliver, Jim (SCR)**
2208 Eureka #9
Anchorage, AK 99503
Gold
Big Creek
Yentna district
ML 93 0232 1
- Olson, Alan (WR)**
P.O. Box 165
Palmer, AK 99645
Gold
Candle Creek
Fairhaven district
ML 93 0273 1
- Olson, Steven (EIR)**
P.O. Box 58443
Fairbanks, AK 99711
Gold
Eagle Creek
Circle district
ML 93 0148 1
- Omega Mining Company (EIR)**
Richard K. Ott
P.O. Box 2748
Fairbanks, AK 99707-2748
Gold
Omega Creek
Manley Hot Springs district
ML 93 0384 1
- Owen, Ted (EIR)**
12307 E. Stillwater Way
Redding, CA 96003
Gold
Walker's Fork tributary: Copper Creek
Fortymile district
ML 93 0257 1
- Pacific Mining Inc. (EIR)**
1300 East 74th
Anchorage, AK 99518
Gold
Porcupine Creek
Circle district
ML 93 0335 1
- Paraclete Resources Pty., Ltd. (SER)**
Don Leichman
102 Bearshit Lane
Cape Yakatage, AK 99560
Gold
White River: Lawrence: Felton Creeks
Yakatage district
ML 93 0021 1
- Parr, Glen C. & Shirley B. (EIR)**
HC1 Box 3104
Healy, AK 99743-9605
Gold
Walker Creek
Bonnifield district
ML 93 0092 1
- Parry, J.M. (EIR)**
P.O. Box 71656
Fairbanks, AK 99707-1656
Gold
No Grub Creek
Fairbanks district
ML 93 0152 1

Parsons, Anthony C. (WR)
P.O. Box 1496
Nome, AK 99762-1496
Gold
Dome Creek
Kougarok district
ML 93 0228 1

Paul and Company (EIR)
P.O. Box 83102
Fairbanks, AK 99708-3102
Gold
Porcupine Creek
Circle district
ML 93 0041 1

Peck, Art (EIR)
205 6th Avenue
Fairbanks, AK 99701
Gold
Ketchum Creek
Circle district
ML 93 0379 1

Penz, Dave (SWR)
P.O. Box 29
Russian Mission, AK 99657
Gold
Buster Creek
Marshall district
ML 93 0157 1

Petefish, Vernon (EIR)
P.O. Box 721
Lyndon, KS 66451
Gold
Little Boulder Creek
Hot Springs district
ML 93 0073 1

Philpott, Roy (NR)
P.O. Box 72198
Fairbanks, AK 99707-2198
Gold
Smith Creek
Koyukuk district
ML 93 0110 1

Pike, Gary R. (NR)
c/o E. Gallagher
575 Canoro Road
North Pole, AK 99705
Gold
Prospect Creek
Koyukuk district
ML 93 0337 1

Pike, John (EIR)
1091 Ichabod Street
North Pole, AK 99705
Gold
Little Boulder Creek
Manley Hot Springs district
ML 93 0143 1

Placer Dome U.S. Inc. (EIR)
5631 Silverado Way, #H
Anchorage, AK 99518
Gold
Hutlinana Creek
Hot Springs district
ML 93 0113 1

Plano, Dan & Cindy (SWR)
P.O. Box 878275
Wasilla, AK 99687-8275
Gold
Innoko River: Anvil Creek
Innoko district
ML 93 0298 1

Polar Mining Inc. (EIR)
4545 Woodriver Drive
Fairbanks, AK 99709
Gold
Tenderfoot: Buckeye Creeks
Richardson district
ML 93 0366 1

Polar Mining Inc. (EIR)
4545 Woodriver Drive
Fairbanks, AK 99709
Gold
Fish Creek
Fairbanks district
ML 93 0312 1

Pomrenke, Steve G. (WR)
P.O. Box 308
Nome, AK 99762
Gold
Triple Creek
Cape Nome district
ML 93 0297 1

Prince Creek Mining Company (SWR)
P.O. Box 2791
Palmer, AK 99645-2791
Gold
Yukon River
Iditarod district
ML 93 0329 1

Pushcar, Jerry & Marilyn (WR)
P.O. Box 1604
Nome, AK 99762-1604
Gold
Lower Willow Creek
Nome district
ML 93 0169 1

Pyne, Eric (EIR)
P.O. Box 82694
Fairbanks, AK 99708-2694
Gold
N/A
Tolovana district
ML 93 0296 1

Quartz Creek Exploration Company (SCR)
Milo E. Flothe
P.O. Box 242
Sterling, AK 99672
Gold
Quartz Creek
Hope district
ML 93 0185 1

R & D Developmental Mining (EIR)
P.O. Box 61233
Fairbanks, AK 99706-1233
Gold
Hope Creek
Circle district
ML 93 0198 1

R.A. Hanson Company Inc. (SWR)
P.O. Box 7400
N. 8700 Crestline
Spokane, WA 99207
Gold
Salmon River and tributaries
Goodnews district
ML 93 0123 1

R.A. Hanson Company Inc. (SWR)
P.O. Box 7400
N. 8700 Crestline
Spokane, WA 99207
Gold
Salmon River and tributaries
Goodnews district
ML 93 0124 1

Rainbow Mining and Development (SCR)
P.O. Box 5228
Wasilla, AK 99687-5228
Gold
Peters Creek
Yentna district
ML 93 00396 1

Reader, Chuck (WR)
P.O. Box 125
Nome, AK 99762
Gold
Dome Creek
Cape Nome district
ML 93 0133 1

Red Samm Construction Inc. (SER)
P.O. Box 3097
Bellevue, WA 98009
Sand & gravel
Lena Point
Juneau district
ML 93 0188 1

Red Samm Construction Inc. (SER)
P.O. Box 3097
Bellevue, WA 98009
Sand & gravel
Lemon Creek
Juneau district
ML 93 0189 1

Redmond, Richard (WR)
P.O. Box 8700
Indian, AK 99540
Gold
Macklin Creek
Kougarok district
ML 93 0387 1

Regner, Leo A. (EIR)
P.O. Box 72733
Fairbanks, AK 99707-2733
Gold
Lillywig: Ingle Creeks
Fortymile district
ML 93 0090 1

Rian, Daryl (EIR)
1077 Cube Avenue
North Pole, AK 99705
Gold
Ester Creek
Fairbanks district
ML 93 0025 1

Rife, Mack (EIR)
801 John Cole Rd.
Fairbanks, AK 99712
Gold
Porcupine Creek
Circle district
ML 93 0377 1

Roberts, Robert (EIR)
P.O. Box 225
Tok, AK 99780
Gold
Stone House: Chicken Creeks
Fortymile district
ML 93 0044 1

Roberts, Roger L./Bonn, Tom (SWR)
P.O. Box 7
Ophir/Takotna, AK 99675
Gold
Innoko River
Innoko district
ML 93 0105 1

Roberts Mining (EIR)
P.O. Box 82182
Fairbanks, AK 99708-2182
Gold
Dome Creek
Fairbanks district
ML 93 0144 1

Roland, James G. (EIR)
710 McGrath Rd.
Fairbanks, AK 99712
Gold
Moose Creek
Bonnifield district
ML 93 0353 1

Rosander Mining Company (WR)
P.O. Box 129
McGrath, AK 99627
Gold
Colorado Creek
Innoko district
ML 93 0091 1

Rowley, Donald R. (EIR)
P.O. Box 60311
Fairbanks, AK 99706-0311
Gold
Steamboat: Pedro Creeks
Fairbanks district
ML 93 0367 1

RSH Company (SER)
Ralph S. Horecny
P.O. Box 211474
Auke Bay, AK 99821
Sand & gravel
Lemon Creek USMS 204
Juneau district
ML 93 0322 1

RSH Company (SER)

Ralph S. Horecny
P.O. Box 211474
Auke Bay, AK 99821
Sand & gravel
Lemon Creek USMS 609
Juneau district
ML 93 0323 1

Rubel, John (EIR)

8183 Richardson Highway
Salcha, AK 99714
Gold
Banner Creek
Fairbanks district
ML 93 0225 1

Salter, Ed (EIR)

P.O. Box 30
Manley, AK 99756
Gold
Joe Bush Creek
Hot Springs district
ML 93 0093 1

Sayer, Paul (SWR)

P.O. Box 10
Homer, AK 99603
Gold
Innoko Creek
Innoko district
ML 93 0167 1

Schene, Earl L. (EIR)

P.O. Box 66
Chicken, AK 99732
Gold
Uhler Creek
Fortymile district
ML 93 0149 1

Schnabel, John J. (SER)

P.O. Box 149
Haines, AK 99827
Gold
Porcupine Creek
Juneau district
ML 93 0034 1

Seuffert, George Jr. (EIR)

P.O. Box 156
Central, AK 99730
Gold
Deadwood Creek
Circle district
ML 93 0126 1

Shepard, M. Dennis (EIR)

P.O. 82504
Fairbanks, AK 99708-2504
Gold
Chatanika River
Fairbanks district
ML 93 0368 1

Shilling, John A. (EIR)

P.O. Box 81424
Fairbanks, AK 99708-1424
Gold
Thanksgiving: Omega Creeks
Hot Springs district
ML 93 0099 1

Sides, John (EIR)

2741 Perimeter Drive
North Pole, AK 99705
Gold
Deadwood Creek
Circle district
ML 93 0045 1

Silverado Mines (U.S.) Inc. (NR)

2580-1066 West Hastings Street
Vancouver, BC V6E 3X3
Canada
Gold
Nolan: Fay: Archibald Creeks
Koyukuk district
ML 93 0153 1

Simonson, Ralph (EIR)

72382 Palmer Jct. Rd.
Elgin, OR 97827
Gold
Totatlanika River
Bonnifield district
ML 93 0224 1

Simpson, Fishell & Biddle (EIR)

2130 Nottingham Drive
Fairbanks, AK 99709
Gold
Eureka Creek
Manley Hot Springs district
ML 93 0319 1

Skidmore, Samuel C. (EIR)

P.O. Box 70470
Fairbanks, AK 99707-0470
Gold
Vault Creek
Fairbanks district
ML 93 0223 1

Skookum Mining (EIR)

P.O. Box 10139
Fairbanks, AK 99710
Gold
Portage Creek
Circle district
ML 93 0011 1

Smith, Sherman (SCR)

P.O. Box 770
Cooper Landing, AK 99572
Gold
Near Lower Trail Lake
Seward district
ML 93 0295 1

Smith, William L. (SCR)

906 Cunningham
Anchorage, AK 99501
Gold
Silvertip Creek
Seward district
ML 93 0182 1

Snyder, Donald Lee (EIR)

P.O. Box 54
Chicken, AK 99732
Gold
South Fork Fortymile River
Fortymile district
ML 93 0378 1

Sobanja, Hans (NR)

P.O. Box 10196
Fairbanks, AK 99710
Gold
Gold Creek
Koyukuk district
ML 93 0326 1

Sound Quarry Inc. (WR)

P.O. Box 2011
Nome, AK 99762
Sand & gravel
Cape Nome
Cape Nome district
ML 93 0180

Sovle, Harold L. (SCR)

2840 E. 142nd Ave.
Anchorage, AK 99516
Gold
Windy Creek
Yentna district
ML 93 0104 1

Spernak & Son Inc. (SCR)

James A. Spernak
8223 Sand Lake Road
Anchorage, AK 99502
Sand & gravel
Anchorage district
ML 93 0389 1

Stebbins Native Corporation (WR)

P.O. Box 70110
Stebbins, AK 99671
Sand & gravel
Corporation Property
N/A
ML 93 0210 1

Stepp, Vernon E. (EIR)

290 Pearl Drive
Fairbanks, AK 99712
Gold
Circle B-2
Circle district
ML 93 0031 1

Stone Boy Inc. (EIR)

P.O. Box 100059
Anchorage, AK 99510-0059
Gold
Fairbanks district
ML 93 0294 1

Stough, Richard (EIR)

P.O. Box 711
Wrangell, AK 99929
Gold
Dome Creek
Fortymile district
ML 93 0065 1

Strange, Philip D. (SCR)

P.O. Box 871478
Wasilla, AK 99687
Gold
N/A
Willow Creek district
ML 93 0354 1

Swan, James W. (NR)

452 Winter Ave.
Fairbanks, AK 99712
Gold
Gold Creek
Koyukuk district
ML 93 0069 1

Swartwood, Tom (EIR)

P.O. Box 3472
Palmer, AK 99645
Gold
Totatlanika Creek
Bonnifield district
ML 93 0215 1

Swenson, Richard A. (EIR)

P.O. Box 16205
Two Rivers, AK 99716
Gold
Doric Creek
Hot Springs district
ML 93 0369 1

Tachick, Wayne H. (EIR)

P.O. Box 3503
Soldotna, AK 99669
Gold
Moose Creek
Bonnifield district
ML 93 0039 1

Taiga Mining Company Inc. (WR)

4740 E. 115th Avenue
Anchorage, AK 99516
Gold
Bear Creek and Tributaries
Hughes district
ML 93 0119 1

Taiga Mining Company Inc. (WR)

4740 E. 115th Avenue
Anchorage, AK 99516
Gold
Aloha Creek
Hughes district
ML 93 0135 1

Taiga Mining Company Inc. (WR)

4740 E. 115th Avenue
Anchorage, AK 99516
Gold
Clear Creek
Hughes district
ML 93 0136 1

Tallini, Roger P. (EIR)

P.O. Box 3474
Flagstaff, AZ 86003
Gold
South Fork Fortymile River
Fortymile district
ML 93 0190 1

Thomas, Martha (NR)

P.O. Box 10996
Fairbanks, AK 99710
Gold
Prospect Creek
Koyukuk district
ML 93 0340 1

- Thomas, Scott (EIR)**
P.O. Box 71645
Fairbanks, AK 99707-1645
Gold
Deadwood Creek
Circle district
ML 93 0382 1
- Three "G" Mining (SCR)**
Jack LaCross
P.O. Box 648
Talkeetna, AK 99676
Gold
Mills: Twin: Cottonwood Creeks
Yentna district
ML 93 0196 1
- Thurman Oil & Mining (EIR)**
925 Aurora Drive
Fairbanks, AK 99709
Gold
Upper Glenn Creek
Hot Springs district
ML 93 0086 1
- Thurman Oil & Mining (EIR)**
925 Aurora Drive
Fairbanks, AK 99709
Gold
Cooney Creek
Hot Springs district
ML 93 0100 1
- Thurman Oil & Mining (EIR)**
925 Aurora Drive
Fairbanks, AK 99709
Gold
Eureka Creek
Hot Springs district
ML 93 0381 1
- Thurman Oil & Mining (EIR)**
925 Aurora Drive
Fairbanks, AK 99709
Gold
Boston: Eureka Creeks
Hot Springs district
ML 93 00399 1
- Thurneau, Neil (EIR)**
P.O. Box 50
Chicken, AK 99732
Gold
Walker's Fork; Younger Creek
Fortymile district
ML 93 0355 1
- Tilleyson Mining & Reclamation (WR)**
P.O. Box 55823
North Pole, AK 99705-5823
Gold
Californai Creek
Ruby district
ML 93 0078 1
- Tillicum Resources (EIR)**
1615 Madison
Fairbanks, AK 99701
Gold
Fox Creek
Fairbanks district
ML 93 0075 1
- Timber Creek Mining (NR)**
John Denslinger/Frank Baldwin
1061 Chenoweth Loop W.
The Dalles, OR 97058
Gold
Weise Creek
Kiana district
ML 93 0261 1
- Timmons, David W. (NR)**
P.O. Box 9134
c/o Coldfoot CPU
Fairbanks, AK 99701
Gold
Sawyer Creek
Koyukuk district
ML 93 0114 1
- Tourangeau, Eugene (EIR)**
P.O. Box 649
Delta Junction, AK 99737
Gold
Rainy Creek
Fairbanks district
ML 93 00393 1
- Trans Alas-Can Gold (SCR)**
3605 Arctic Blvd. #1382
Anchorage, AK 99503
Gold
White Creek
Valdez Creek district
ML 93 0020 1
- Trautner, John G. (SCR)**
P.O. Box 909
Girdwood, AK 99587
Gold
Canyon Creek
Hope district
ML 93 0332 1
- Treasure Creek Mining (EIR)**
Donald M. Read
P.O. Box 71638
Fairbanks, AK 99707-1638
Gold
Vault Creek
Fairbanks district
ML 93 0057 1
- Treesh, James W. (EIR)**
18550 Man O'War Road
Eagle River, AK 99577
Gold
Squaw Gulch
Fortymile district
ML 93 0285 1
- Trinity Mining (WR)**
Cheryl Jong
1100 W. 32nd Ave., #19
Anchorage, AK 99503
Gold
Washington Creek
Kougorok district
ML 93 0142 1
- Trudeau, Wally (EIR)**
P.O. Box 82514
Fairbanks, AK 99708-2514
Gold
Jack Wade Creek
Fortymile district
ML 93 0199 1
- Tuluksak Dredging Ltd. (SWR)**
415 W. 8th Ave.
Anchorage, AK 99501
Gold
Tuluksak River
Aniak district
ML 92 0168 1
- Turner, Alfred C. (WR)**
Route 1 Box 523
Woolwine, VA 24185
Gold
Saunders Creek
Nome district
ML 93 0066
- Turner, Alfred C. (WR)**
Route 1 Box 523
Woolwine, VA 24185
Gold
Saunders Creek
Nome district
ML 93 0102 1
- University of Alaska (EIR)**
910 Yukon Drive #211
Fairbanks, AK 99775
Gold
First Chance Creek
Fairbanks district
ML 93 0383 1
- Usibelli Coal Mine Inc. (EIR)**
P.O. Box 1000
Healy, AK 99743
Coal
Gold Run Pass Mine
Bonnifield district
ML 93 0208 1
- Usibelli Coal Mine Inc. (EIR)**
P.O. Box 1000
Healy, AK 99743
Coal
Poker Flats
Bonnifield district
ML 93 0209 1
- Vanostrand, Tom C. (EIR)**
P.O. Box 314
Healy, AK 99743
Gold
Platt: Fox Creeks
Bonnifield district
ML 93 0324 1
- Velikanje, Betty K. (WR)**
2600 Draper Drive
Anchorage, AK 99517
Gold
Salmon River
Kougorok district
ML 93 0197 1
- Vogt, Ray A. (EIR)**
2108 Central Avenue
Fairbanks, AK 99701
Gold
Dome Creek
Fairbanks district
ML 93 0053 1
- Voytilla, Earl W. (EIR)**
P.O. Box 58211
Fairbanks, AK 99711
Gold
Tanana River
Richardson district
ML 93 0235 1
- Voytilla, Earl W. (EIR)**
P.O. Box 58211
Fairbanks, AK 99711
Gold
Tenderfoot Creek
Richardson district
ML 93 0236 1
- Wales Native Corporation (WR)**
P.O. Box 529
Wales, AK 99783
Sand & gravel
1/4 mile northeast of Village Creek
Nome district
ML 93 0247 1
- Wales Native Corporation (WR)**
P.O. Box 529
Wales, AK 99783
Sand & gravel
Nome district
ML 93 0248 1
- Watts, Donald L. (EIR)**
P.O. Box 81515
Fairbanks, AK 99708-1515
Gold
Grubstake Creek
Bonnifield district
ML 93 0386 1
- Weathers, Douglas & Edith (SCR)**
P.O. Box 8082
Nikiski, AK 99635
Gold
Cache Creek
Yentna district
ML 93 0206 1
- Weaver, Vernon (EIR)**
P.O. Box 74
Chicken, AK 99732
Gold
Meyers Fork
Fortymile district
ML 93 0370 1
- Wells, Lu L. (EIR)**
P.O. Box 74393
Fairbanks, AK 99707-4393
Gold
Kokomo
Fairbanks district
ML 93 0286 1

Wescott, Andrew (EIR)

1132 Lakeview Terrace
Fairbanks, AK 99701
Gold
Fox Creek Gulch
Fairbanks district
ML 93 0147 1

White, Paul & Peede, Patrick (EIR)

255 Peede Rd.
North Pole, AK 99705
Gold
Newman Creek
Fairbanks district
ML 93 0068 1

Wiggers, Dan A. Sr. (NR)

HC 30
Box 5382
Wasilla, AK 99654
Gold
Hammond River
Koyukuk district
ML 93 0256 1

Wilde Enterprises Inc. (EIR)

P.O. Box 30068
Central, AK 99730
Gold
Switch Creek
Circle district
ML 93 0371 1

Willford, Frank E. & Vivian D. (EIR)

752 Wanda Drive
North Pole, AK 99705
Gold
Hoosier Creek
Rampart district
ML 93 0151 1

Williams, Wilbur & Ann (SWR)

3407 Spenard Rd., Space 42
Anchorage, AK 99503
Gold
Granite Creek
Iditarod district
ML 93 0166 1

Willis, Dean L. (EIR)

P.O. Box 30063
Central, AK 99730
Gold
Crooked Creek
Circle district
ML 93 0085 1

Wilmarth, David (SWR)

P.O. Box 111037
Anchorage, AK 99511-1037
Gold
George River
Aniak district
ML 93 0218 1

Wilmarth, Richard (SWR)

P.O. Box 33
Red Devil, AK 99656
Gold
Chicken Creek
Iditarod district
ML 93 0014 1

Wise, Kenneth G. (EIR)

P.O. Box 212313
Anchorage, AK 99521-2313
Gold
Mosquito & South Forks, Fortymile
River
Fortymile district
ML 93 0115 1

Wolff, Gordon C. (SCR)

618 W. 86th Ct.
Anchorage, AK 99515
Gold
Peters Creek
Yentna district
ML 93 0234 1

Wood, James Lee (EIR)

P.O. Box 58597
Fairbanks, AK 99711
Gold
Little Boulder Creek
Hot Springs district
ML 93 0076 1

Woodman, Kim (EIR)

P.O. Box 704
Homer, AK 99603
Gold
Loper Creek
Circle district
ML 93 0372 1

Woodruff, Charles B. (EIR)

P.O. Box 2278
Fairbanks, AK 99707-2278
Gold
Hot Springs district
ML 93 0271 1

Wrede, Ron (EIR)

2116 N.E. 80th
Seattle, WA 98115
Gold
Deadwood Creek
Circle district
ML 93 0216 1

Wrede, Ron (EIR)

P.O. Box 71
Central, AK 99730
Gold
Crooked Creek
Circle district
ML 93 0270 1

Wright, Richard L. (NR)

3910 Tilleson Way
North Pole, AK 99705
Gold
Magnet Creek
Koyukuk district
ML 93 00394 1

Yoder, Brian (NR)

3070 Amber Ave.
Fairbanks, AK 99709
Gold
Sheep Creek
Chandalar district
ML 93 0373 1

Yukon Mining Company Inc. (WR)

P.O. Box 101454
Anchorage, AK 99510-1454
Gold
Golden Creek
Melozitna district
ML 93 0131 1

Yukon Placer (EIR)

James Munsell
P.O. Box 81155
Fairbanks, AK 99708-1155
Gold
Little Minook Creek
Rampart district
ML 93 0171 1

Yutan Construction Company (EIR)

Carroll-Vondra Inc.
P.O. Box 71775
Fairbanks, AK 99707-1775
Sand & gravel; stone
Brown's Hill
Fairbanks district
ML 93 0207 1

Zimmer, George (SCR?)

P.O. Box 140174
Anchorage, AK 99514-0174
Gold
Quartz Creek
Seward district
ML 93 0024 1

APPENDIX F
continued

Year	Gold		Silver		Mercury		Antimony		Tin		Lead		Zinc		Platinum		Copper		Chromium	
	(oz)	(m\$)	(oz)	(t\$)	(flask ^a)	(t\$)	(lb)	(t\$)	(lb)	(t\$)	(tons)	(t\$)	(tons)	(t\$)	(oz)	(t\$)	(lb)	(m\$)	(tons)	(t\$)
1950	289,285	10.13	52,638	48.0	W	W	W	W	158,000	170.3	144	27.5	W	W	W	W	12,000	0.03	--	--
1951	239,628	8.38	32,870	29.8	28	W	1,718,000	2,061.6	138,000	198.0	21	7.2	W	W	W	W	2,000	0.01	--	--
1952	240,571	8.42	31,825	28.7	40	W	740,000	1,406.0	180,000	243.9	1	0.3	W	W	W	W	--	--	--	W
1953	253,771	8.88	35,387	32.1	1,023	270.0	W	W	98,000	105.9	--	--	--	--	17,489	1,696.4	--	--	W	W
1954	248,511	8.70	33,694	31.8	1,046	276.0	--	--	398,000	409.9	--	--	--	--	18,790	1,615.9	8,000	0.02	2,953	208.0
1955	249,294	8.73	33,693	30.4	43	12.0	--	--	172,000	182.5	1	0.3	--	--	17,253	1,466.5	2,000	0.01	7,082	625.3
1956	204,300	7.33	26,700	24.1	3,414	837.0	134,400	150.0	--	--	1	0.3	--	--	17,934	1,829.3	--	--	7,200	711.5
1957	215,467	7.54	28,862	26.0	5,461	1,349.0	71,120	80.0	--	--	9	3.0	--	--	15,479	1,377.6	--	--	4,207	431.0
1958	186,000	6.53	24,000	22.0	3,380	774.0	--	--	--	--	--	--	--	--	10,284	647.9	10,000	0.03	--	--
1959	171,000	5.99	22,000	20.0	3,750	852.0	--	--	--	--	--	--	--	--	10,698	770.3	72,000	0.04	--	--
1960	180,000	6.30	23,000	21.0	4,450	938.0	W	W	--	--	--	--	--	--	13,352	1,054.8	82,000	0.04	--	--
1961	114,228	3.99	--	--	4,080	816.0	--	--	--	--	--	--	--	--	16,133	1,274.5	184,000	0.06	--	--
1962	165,142	5.78	--	--	3,843	711.0	--	--	--	--	--	--	--	--	12,520	951.5	--	--	--	--
1963	99,000	3.48	6,100	9.0	400	76.0	W	W	--	--	5	1.1	--	--	12,322	961.1	--	--	--	--
1964	58,000	2.05	7,200	6.0	303	95.0	46,400	60.3	--	--	--	--	--	--	13,010	1,522.2	22,000	0.01	--	--
1965	43,000	1.51	5,000	6.0	180	104.0	46,400	60.3	--	--	14	4.0	--	--	10,365	1,368.2	64,000	0.03	--	--
1966	27,325	0.96	7,000	9.0	185	101.0	16,000	19.2	--	--	19	4.3	--	--	9,033	1,273.7	--	--	--	--
1967	22,948	0.80	6,000	9.0	161	79.0	20,000	22.0	--	--	--	--	--	--	7,888	1,238.4	W	W	--	--
1968	21,000	0.81	3,000	6.5	156	78.0	6,000	6.0	--	--	--	--	--	--	8,433	1,652.9	--	--	--	--
1969	21,227	0.88	2,000	4.2	238	100.0	94,000	100.0	--	--	2	0.5	--	--	8,500	2,321.2	--	--	--	--
1970	38,400	1.38	4,000	7.0	3,100	1,260.0	365,000	410.0	--	--	--	--	--	--	6,015	925.1	W	W	--	--
1971	34,000	1.36	2,000	4.0	675	285.0	68,000	74.0	34,000	47.0	--	--	--	--	5,407	625.6	--	--	--	--
1972	8,639	0.56	1,000	2.0	125	44.0	160,000	185.0	W	W	--	--	--	--	6,478	985.5	--	--	--	--
1973	15,000	1.86	13,200	22.0	70	52.5	420,000	515.0	10,000	12.0	6	2.0	--	--	5,524	964.5	--	--	--	--
1974	16,000	2.56	1,500	3.5	70	52.5	80,000	95.0	W	W	--	--	--	--	4,351	1,067.0	--	--	--	--
1975	14,980	3.35	6,000	25.0	--	--	120,000	145.0	22,000	60.0	--	--	--	--	3,726	623.3	--	--	--	--
1976	22,887	6.90	6,500	24.0	--	--	160,000	165.0	W	W	14	6.0	--	--	3,212	515.2	--	--	8,000 ^c	1,200.0 ^c
1977	50,000	7.80	8,000	20.0	--	--	W	W	W	W	--	--	--	--	6,891	1,119.8	--	--	--	--
1978	60,000	12.00	6,000	50.0	--	--	W	W	W	W	--	--	--	--	--	--	--	--	--	--
1979	65,000	18.00	6,500	93.0	--	--	100,000	125.0	100,000	830.0	--	--	--	--	--	--	--	--	--	--
1980	75,000	32.00	7,500	111.0	--	--	--	--	120,000	984.0	31	29.0	--	--	--	--	--	--	--	--
1981	134,200	55.20	13,420	111.3	W	W	--	--	106,000	700.0	--	--	--	--	900	200.0	--	--	--	--
1982	175,000	69.90	22,000	198.0	--	--	--	--	198,000	1,365.0	--	--	--	--	W	W	--	--	--	--
1983	169,000	67.60	33,200	332.0	--	--	22,400	45.0	215,000	1,100.0	--	--	--	--	W	W	--	--	--	--
1984	175,000	62.13	20,000	159.0	5	1.5	135,000	225.8	225,000	400.0	--	--	--	--	W	W	--	--	--	--
1985	190,000	61.18	28,500	171.0	27	10.0	65,000	98.0	300,000	650.0	--	--	--	--	W	W	--	--	--	--
1986	160,000	60.80	24,000	134.4	12	2.8	45,000	67.5	340,000	890.0	--	--	--	--	W	W	--	--	--	--
1987	229,707	104.51	54,300	391.0	--	--	--	--	288,000	460.0	--	--	--	--	W	W	--	--	--	--
1988	265,500	112.84	47,790	282.0	W	W	--	--	300,000	950.0	--	--	--	--	25	13.8	--	--	--	--
1989	284,617	108.7	5,211,591	27,300.0	--	--	--	NR	194,000	672.0	9,585	7,700.0	19,843	29,400.0	--	--	--	--	--	--
1990	231,700	89.20	10,135,000	50,675.0	--	--	--	--	57,000	200.0	44,220	30,954.0	181,200	253,680.0	--	--	--	--	--	--
1991	243,900	88.29	9,076,854	39,110.0	--	--	--	--	6,800	22.1	69,591	33,403.7	278,221	278,221.0	15	5.3	--	--	--	--
1992	262,530	88.46	9,115,755	34,913.0	--	--	--	--	1,500	5.9	68,664	31,585.0	274,507	301,957.7	--	--	--	--	--	--
1993	191,265	68.64	5,658,958	24,333.0	--	--	--	--	21,000	50.6	33,221	13,759.6	268,769	236,516.7	3	1.2	--	--	--	--
Other ^c	--	--	--	--	1,438	--	--	--	--	--	--	--	--	--	71,946	17,091.9	--	--	--	--
TOTAL	33,054,166	1,873.61	59,215,843	192,678.4	40,945	9,910.5	11,070,800	6,655.1	7,287,700	12,523.5	251,581	120,411.4	1,023,218	1,099,775.9	668,540^d	65,812.4	1,373,793,932	228.04	39,951	3,426.7
(metric)	(1,028		(1,842		(1,411,521		(5,021		(3,305		(228,183		(928,059		(20,793		(632,152		(35,419	
tonnes)		tonnes)		kg)		tonnes)		tonnes)		tonnes)		tonnes)		kg)		tonnes)		tonnes)		tonnes)

^aFrom published and unpublished state and federal documents.

^b76-lb flask.

^cNot traceable by year.

^dCrude platinum; total production of refined metal is about 575,000 oz.

W = Withheld.

-- = Not reported.

t\$ = Thousand dollars.

m\$ = Million dollars.

APPENDIX G

Production of industrial minerals, coal, and other commodities in Alaska, 1880-1993

Year	Coal		Sand and gravel		Building stone ^a		Barite		Other ^b \$
	s. tons	m\$	s. tons	m\$	s. tons	m\$	s. tons	t\$	
1880-1899 ^c	19,429	0.14	--	--	7,510	0.04	--	--	--
1900	1,200 ^d	0.02 ^d	--	--	510	0.01	--	--	--
1901	1,300 ^d	0.02 ^d	--	--	700	0.01	--	--	500
1902	2,212 ^d	0.02 ^d	--	--	800	0.01	--	--	255
1903	1,447	0.01	--	--	920	0.01	--	--	389
1904	1,694	0.01	--	--	1,080	0.02	--	--	2,710
1905	3,774	0.02	--	--	970	0.02	--	--	740
1906	5,541	0.02	--	--	2,863	0.03	--	--	19,965
1907	10,139	0.05	--	--	3,899	0.03	--	--	54,512
1908	3,107 ^d	0.01 ^d	--	--	2,176	0.03	--	--	81,305
1909	2,800	0.02	--	--	1,400	0.01	--	--	86,027
1910	1,000 ^d	0.01 ^d	--	--	W	W	--	--	96,408
1911	900 ^d	0.01 ^d	--	--	W	W	--	--	145,739
1912	355 ^d	0.01 ^d	--	--	W	W	--	--	165,342
1913	2,300	0.01	--	--	W	W	--	--	286,277
1914	1,190	0.01	--	--	W	W	--	--	199,767
1915	1,400	0.03	--	--	W	W	--	--	205,061
1916	12,676	0.05	--	--	W	W	--	--	326,731
1917	54,275	0.27	--	--	W	W	--	--	203,971
1918	75,816	0.41	--	--	W	W	--	--	171,452
1919	60,894	0.35	--	--	50,014	0.29	--	--	214,040
1920	61,111	0.36	--	--	37,044	0.27	--	--	372,599
1921	76,817	0.49	--	--	59,229	0.31	--	--	235,438
1922	79,275	0.43	--	--	54,251	0.30	--	--	266,296
1923	119,826	0.76	--	--	83,586	0.41	--	--	229,486
1924	99,663	0.56	--	--	35,294	0.26	--	--	348,728
1925	82,868	0.40	--	--	32,193	0.19	--	--	454,207
1926	87,300	0.46	--	--	33,283	0.20	--	--	423,000
1927	104,300	0.55	--	--	41,424	0.22	--	--	--
1928	126,100	0.66	--	--	63,347	0.31	--	--	--
1929	100,600	0.53	--	--	54,766	0.26	--	--	194,000
1930	120,100	0.63	--	--	66,234	0.33	--	--	157,300
1931	105,900	0.56	--	--	59,175	0.29	--	--	108,000
1932	102,700	0.53	--	--	54,167	0.27	--	--	223,400
1933	96,200	0.48	--	--	56,291	0.28	--	--	--
1934	107,500	0.45	--	--	64,234	0.36	--	--	46,155
1935	119,425	0.50	--	--	74,049	0.38	--	--	46,755
1936	136,593	0.57	--	--	76,379	0.38	--	--	45,807
1937	131,600	0.55	--	--	50,057	0.25	--	--	147,048
1938	159,230	0.62	--	--	189,090	0.21	--	--	125,302
1939	143,549	0.60	42,332	0.02	--	--	--	--	--
1940	170,174	0.88	515,011	0.10	--	--	--	--	--
1941	241,250	0.97	530,997	0.09	--	--	--	--	1,367,000
1942	246,600	0.99	W	W	--	--	--	--	1,124,000
1943	289,232	1.84	W	W	--	--	--	--	--
1944	352,000	2.37	712,496	0.50	--	--	--	--	2,350,309
1945	297,644	1.87	W	W	--	--	--	--	5,910,704
1946	368,000	2.36	W	W	--	--	--	--	2,005,241
1947	361,220	2.55	W	W	219,000	1.00	--	--	5,927,319
1948	407,906	2.79	W	W	67,341	0.33	--	--	1,257,699
1949	455,000	3.60	W	W	W	W	--	--	7,181,886

^aBuilding-stone production figures for 1880-1937 are for the southcentral and interior regions of Alaska only.

^bIncludes 2.4 million lb U₃O₈ (1955-71); 505,000 tons gypsum (1905-26); 286,000 lb WO₃ (intermittently 1916-80); 94,000 lb asbestos (1942-44); 540,000 lb graphite (1917-18; and 1942-50); and undistributed amounts of zinc, jade, peat, clay, soapstone, miscellaneous gemstones, and other commodities (1880-1993).

^cProduction not traceable by year.

^dWhen state (territorial) and federal figures differ significantly, state figures are used. Figures for sand and gravel production in 1974 show state estimates

(118,740,000 s. tons; 240.94 m\$) and federal (42,614,000 s. tons; 88.96 m\$). The federal estimate was not added to total production.

^eMarble quarried on Prince of Wales Island, southeastern Alaska (1900-41).

m\$ = Million dollars.

t\$ = Thousand dollars.

-- = Not reported.

W = Withheld.

Year	Coal		Sand and gravel		Building stone ^a		Barite		Other ^b
	s. tons	m\$	s. tons	m\$	s. tons	m\$	s. tons	t\$	\$
1950	421,455	3.03	3,050,020	2.38	W	W	--	--	2,100,000
1951	494,333	3.77	6,818,000	3.54	W	W	--	--	3,600,000
1952	648,000	5.77	6,817,800	3.54	W	W	--	--	9,052,000
1953	861,471	8.45	7,689,014	5.08	47,086	0.17	--	--	1,231,350
1954	666,618	6.44	6,639,638	6.30	283,734	0.47	--	--	1,572,150
1955	639,696	5.76	9,739,214	8.24	265,740	0.29	--	--	1,552,427
1956	697,730	6.37	9,100,000	8.30	50,000	0.02	--	--	1,551,500
1957	842,338	7.30	6,096,000	8.79	528,000	1.95	--	--	2,751,000
1958	759,000	6.93	4,255,000	3.87	615,000	2.07	--	--	695,000
1959	602,000 ^d	5.88 ^d	5,600,000	5.10	54,000	0.20	--	--	1,338,000
1960	669,000 ^d	5.95 ^d	5,892,000	5.35	80,000	0.30	--	--	975,000
1961	650,000 ^d	5.87 ^d	5,241,000	4.19	--	--	--	--	--
1962	675,000 ^d	6.41 ^d	5,731,000	5.36	--	--	--	--	--
1963	853,000	5.91	16,926,000	22.01	W	W	W	W	2,589,000
1964	745,000	5.01	26,089,000	18.49	W	W	W	W	4,912,000
1965	860,000 ^d	5.88 ^d	29,959,000	33.93	W	W	W	W	5,296,000
1966	927,000	6.95	17,457,000	21.79	W	W	44,000	350.0	6,167,000
1967	930,000	7.18	22,300,000	26.25	W	W	W	W	4,924,000
1968	812,000 ^d	5.03 ^d	17,515,000	20.73	W	W	91,000	W	4,117,000
1969	728,000 ^d	4.65 ^d	16,205,000	18.62	1,954,000	3.90	90,000	850.0	5,163,000
1970	786,000 ^d	5.28 ^d	20,375,000 ^d	26.07 ^d	6,470,000	10.01	134,000 ^d	1,875.0	7,994,000
1971	748,000 ^d	5.05 ^d	26,391,000	41.99	2,658,000	5.07	102,000 ^d	1,075.0	--
1972	720,000 ^d	6.26 ^d	14,187,000	15.21	652,000	3.01	W	W	--
1973	700,000 ^d	6.23 ^d	19,350,000	19.01	5,967,000	12.00	112,000	1,792.0	12,846,000
1974	700,000	7.34	118,740,000 ^d	240.94 ^d	5,484,000	12.95	110,000	1,895.0	14,495,000
			42,614,000	88.96					
1975	766,000	7.81	48,145,000	95.78	8,877,000	26.65	2,000 ^d	30.0	12,731,000
1976	705,000	8.00	74,208,000 ^d	204.73 ^d	6,727,000	20.09	W	W	14,019,000
1977	780,000 ^d	12.00 ^d	66,126,000	134.25	4,008,000	17.47	--	--	14,486,000
1978	750,000	15.00	51,100,000	122.00	3,437,000	14.65	22,000	750.0	--
1979	750,000	16.00	50,900,000	104.90	3,650,000	15.45	20,000	800.0	930,000
1980	800,000	16.00	40,000,000	86.00	3,700,000	15.40	50,000	2,000.0	97,500
1981	800,000	17.60	46,000,000	88.20	4,200,000	19.30	--	--	256,000
1982	830,000	18.00	45,000,000	91.00	3,400,000	15.60	--	--	150,000
1983	830,000	18.00	50,000,000	105.00	5,270,000	25.00	--	--	242,000
1984	849,161	23.75	27,000,000	95.00	2,700,000	16.00	--	--	875,875
1985	1,370,000	39.73	28,184,080	112.06	2,500,000	12.00	--	--	559,000
1986	1,492,707	40.10	20,873,110	75.76	4,200,000	20.32	--	--	384,800
1987	1,508,927	42.35	16,696,374	42.66	1,805,000	11.62	--	--	388,400
1988	1,551,162	44.30	17,264,500	48.75	3,600,000	24.65	--	--	389,000
1989	1,452,353	41.46	14,418,000	39.88	2,914,000	20.34	--	--	1,492,000
1990	1,576,000	44.99	15,013,500	40.82	3,200,000	22.10	--	--	400,000
1991	1,540,000	39.00	14,160,011	45.45	3,000,000	22.50	--	--	462,000
1992	1,531,800	38.30	14,599,746	42.20	2,900,000	22.97	--	--	430,000
1993	1,586,545	38.10	13,162,402	40.64	3,561,324	26.21	--	--	465,000
Other ^d	--	--	--	--	2,300,000 ^e	W	79,000	W	--
TOTAL	45,218,428	701.60	1,082,814,243	2,190.87	102,601,160	427.06	856,000	11,417.0	176,487,872
(metric	(41,014,021		(982,112,518		(93,059,252		(776,563		
tonnes)	tonnes)		tonnes)		tonnes)		tonnes)		

Mining districts^a

		Production (in troy ounces)		
		Total production	Placer gold	Lode gold
1.	Lisburne district	0	0	0
2.	Noatak district	7,800	7,800	0
3.	Wainwright district	0	0	0
4.	Barrow district	0	0	0
5.	Colville district	0	0	0
6.	Canning district	0	0	0
7.	Sheenjek district	0	0	0
8.	Chandalar district	63,158	45,758	17,400
9.	Koyukuk-Nolan district	324,804	324,804	0
10.	Shungnak district	15,000	15,000	0
11.	Squirrel River district	40,600	40,600	0
12.	Fairhaven-Inmachuk district	347,671	347,671	0
13.	Candle district	248,130	248,130	0
14.	Serpentine district	4,220	4,220	0
15.	Port Clarence district	40,946	40,946	0
16.	Kougarok district	171,015	171,015	0
17.	Cape Nome district	4,822,569	4,822,569	0
18.	Council and Solomon districts	1,044,013	1,017,013	27,000
19.	Koyuk district	83,532	83,532	0
20.	Koyukuk-Hughes district	227,788	227,788	0
21.	Kaiyuh district	5,400	5,400	0
22.	Anvik district ^b	0	0	0
23.	Marshall district	123,319	123,319	0
24.	Bethel district	42,945	42,945	0
25.	Goodnews Bay district	29,700	29,700	0
26.	Aniak-Tuluksak district ^c	566,751	566,751	0
27.	Iditarod district	1,559,260	1,556,330	2,930
28.	McGrath-McKinley district	190,500	131,000	59,500
29.	Innoko-Tolstoi district	696,047	695,891	156
30.	Ruby-Poorman district	469,795	469,795	0
31.	Kantishna district	99,307	91,401	7,906
32.	Hot Springs district	560,532	560,532	0
33.	Gold Hill-Melozitna district ^d	11,059	11,059	0
34.	Rampart district	187,061	187,061	0
35.	Tolovana-Livengood district	480,013	480,013	0
36.	Yukon Flats district	0	0	0
37.	Circle district	1,019,843	1,019,843	0
38.	Black district	0	0	0
39.	Eagle district	52,000	52,000	0
40.	Fortymile district	530,265	530,061	204
41.	Chisana and Nabesna districts	144,500	78,000	66,500
42.	Tok district	0	0	0
43.	Goodpaster district	2,350	2,050	300
44.	Fairbanks district	8,275,576	7,971,028	304,548
45.	Bonnifield district	80,492	73,792	6,700
46.	Richardson district	118,570	116,270	2,300
47.	Delta River district	5,647	5,647	0
48.	Chistochina district	181,261	181,261	0
49.	Valdez Creek district	427,875	426,294	1,581
50.	Yentna-Cache Creek district	196,754	196,754	0
51.	Redoubt district	105	105	0
52.	Iliamna-Bristol Bay district	1,570	1,570	0
53.	Kodiak and Unga Island district	112,400	4,800	107,600
54.	Homer district	16	16	0
55.	Hope-Sunrise-Seward district	130,178	65,178	65,000
56.	Anchorage district ^e	0	0	0
57.	Willow Creek-Hatcher Pass district	664,788	55,788	609,000
58.	Prince William Sound district	137,715	15	137,700
59.	Nelchina district	13,860	13,860	0
60.	Nizina district	148,500	148,500	0
61.	Yakataga district	18,040	18,040	0
62.	Yakutat district ^f	13,200	2,200	11,000
63.	Porcupine district	80,373	80,373	0
64.	Juneau and Admiralty districts	7,260,248	80,000	7,180,248
65.	Chichagof district	770,000	0	770,000
66.	Petersburg-Sumnum district	15,000	15,000	0
67.	Kupreanof district	0	0	0
68.	Hyder district	219	219	0
69.	Ketchikan district	62,000	4,000	58,000
SUBTOTAL		32,926,280	23,490,707	9,435,573
Undistributed ^g		127,886		
Total Production (troy ounces)		33,054,166		
(metric tonnes)		(1,028)		

TOTAL GOLD PRODUCTION IN ALASKA BY MINING DISTRICT 1880-1993



^aMining district names and boundaries revised slightly from those defined by Ransome and Kerns (1954) and Cobb (1973). Sources of data: U.S. Geological Survey, U.S. Bureau of Mines, and Territorial Department of Mines Records 1880-1930; U.S. Mint Records 1930-1969; State of Alaska production records 1970-1993. Entries of "0" generally mean no specific records are available.

^bIncluded in Marshall district.

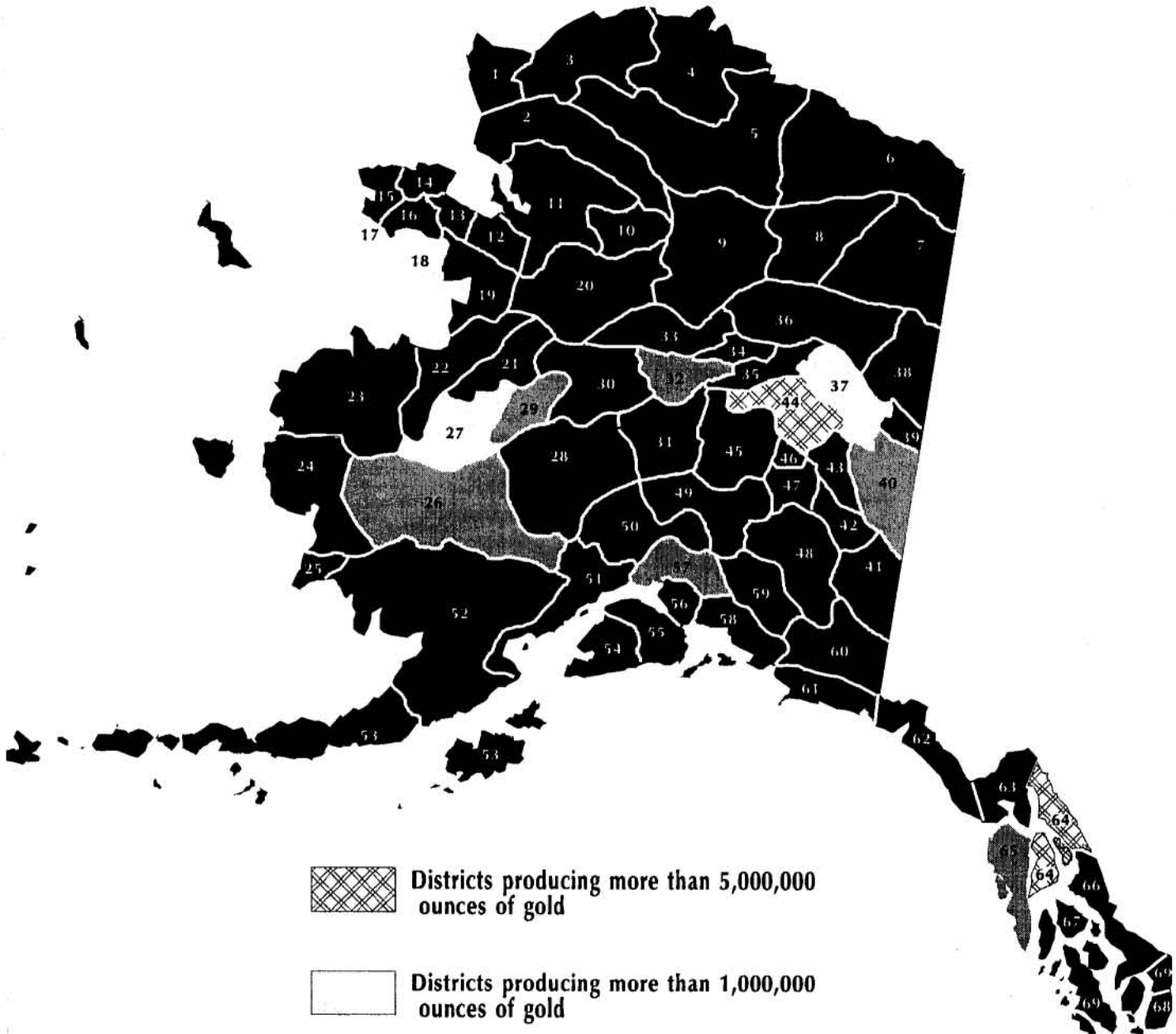
^cIncludes Georgetown and Donlin districts.

^dIncludes Tanana precinct.

^ePlacer gold included in Willow Creek/Hatcher Pass district.

^fIncludes lode production from Glacier Bay and placer production from Lituya Bay district.

^gProduction that cannot be credited to individual districts due to lack of specific records or for reasons of confidentiality.



 Districts producing more than 5,000,000 ounces of gold

 Districts producing more than 1,000,000 ounces of gold

 Districts producing more than 500,000 ounces of gold

