

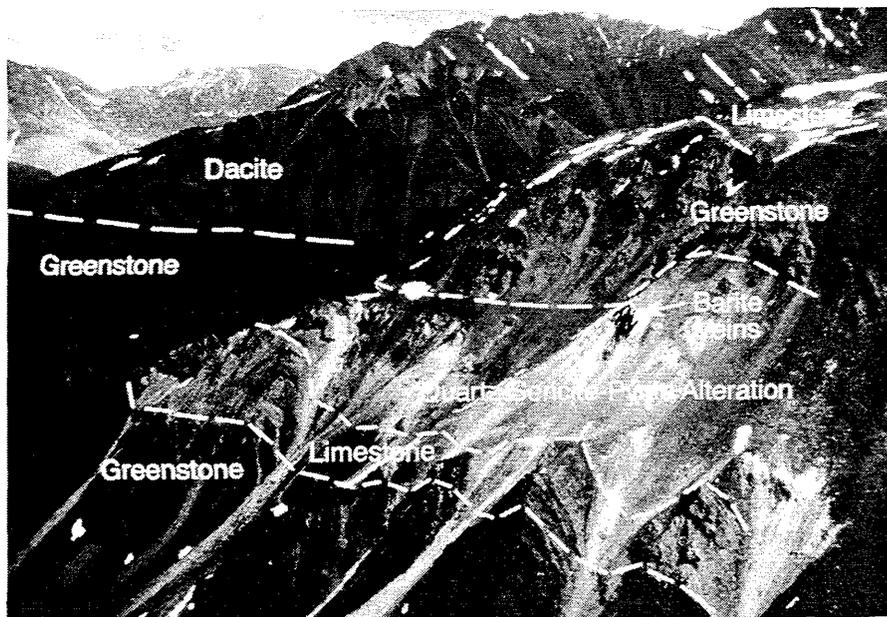
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Alaska's

Mineral Industry 1993:

A Summary

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



Surface geology of the recently discovered Toklat massive sulfide-barite prospect in the Talkeetna Mountains, southcentral Alaska. Photo courtesy of Tom Crafford, North Pacific Mining Company.

PRODUCTION—for 1993, down 20 percent to \$446 million. Metal prices began to improve late in 1993.

EXPLORATION AND DEVELOPMENT—1993 expenditures at \$55.5 million, about the same as 1992. Six new companies started exploration programs.

EMPLOYMENT—down 9 percent to 3,137 full-time equivalent jobs.

MINING CLAIMS—largest one-year reduction of number of active federal claims in the state's history. Active state mining claims, about the same.

NEW SURVEYS—state made airborne geophysical surveys in four Alaska mining districts. Maps available in early 1994.

GOVERNMENT ACTIONS—Department of Natural Resources filed last State of Alaska land selections with the Bureau of Land Management.

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**NATURAL
RESOURCES**

ALASKA'S MINERAL INDUSTRY 1993: SUMMARY

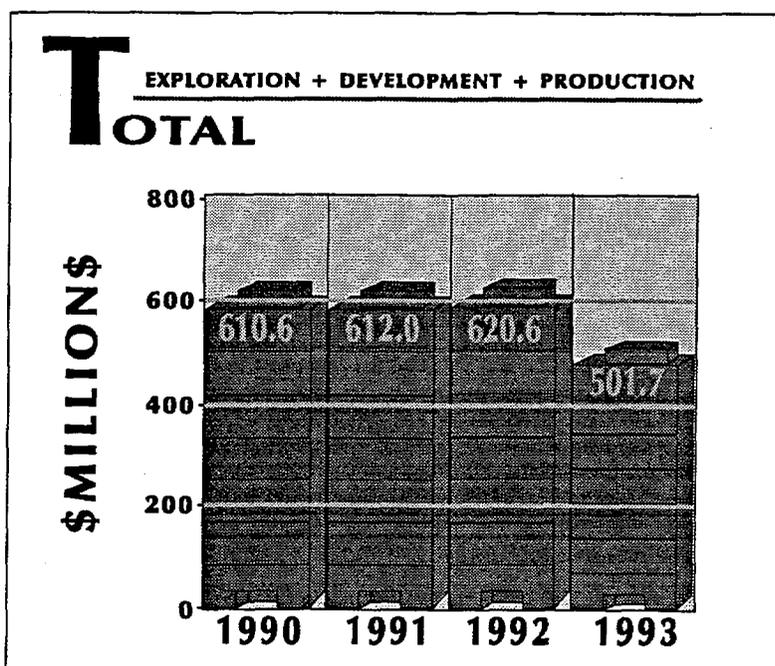
by
T.K. Bundtzen,¹ R.C. Swainbank,² A.H. Clough,³ M.W. Henning,⁴ and E.W. Hansen⁵

INTRODUCTION

This report summarizes mineral industry activity in Alaska during the 1993 calendar year. As in past years the Department of Natural Resources produced the report in cooperation with the Department of Commerce and Economic Development. Much of the information it contains is based on returns of a Division of Geological & Geophysical Surveys' questionnaire which was mailed in late 1993 to approximately 950 companies, individuals and organizations. We anticipate more questionnaires will be returned after this report is released, and the updated information will be included in the final annual minerals report to be released later in the year.

Total value of the Alaska mineral industry, as measured by the value of production and the sum of exploration and development expenditures, was \$501.7 million in 1993, down 19 percent from the \$620.6 million estimate for 1992 (table 1).

The Alaska mining industry continued to struggle with low prices for base metals and coal that were caused by the three-year-long international recession. A preliminary estimate for the value of Alaska's mineral production in 1993 stands at \$446.2 million, down 20 percent from the 1992 total of



Alaska mineral industry total value in millions of dollars, 1990-1993.

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	\$28,244,524
Development	14,326,500	25,574,350	29,590,300	27,258,636
Production	533,024,500	546,468,907	560,826,400	446,216,044
TOTAL	\$610,606,594	\$611,951,796	\$620,616,700	\$501,719,204

\$560.8 million. Most major mineral commodities including gold, silver, lead, zinc, and sand and gravel decreased in volume produced and value realized. Three factors contributed to most of the production declines: (1) the April closure of the Greens Creek polymetallic mine, formerly the nation's largest producer of silver; (2) more than 50 percent

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reduction in the amount of gold won from Cambior's Valdez Creek Mine, Alaska's largest gold mine; and (3) low zinc and lead prices, which resulted in a significant loss in value of those metals recovered from ores at the Red Dog and Greens Creek mines.

Production declines in Alaska's larger metal mines overshadowed improved performance of the approximately 197 smaller placer gold mines. The smaller mines benefited from improved gold prices and a long, warmer-than-average mining season. In addition, there were signs in the fourth quarter of 1993 that the international recession was over, a change which should result in price increases for base and precious metals.

Industrial mineral and coal producers fared better than the larger metal mines. However, the workforce at Usibelli Coal Mine Inc., which produces almost all of Alaska's coal, had to absorb voluntary wage and benefit cuts so Usibelli could continue a coal-export contract with the Korean Electric Power Company in South Korea.

Sound Quarry Inc. operated a new rock quarry near Nome, shipped riprap to various Alaskan markets, and had a positive economic impact on residents of the Nome area.

Despite production declines, mineral industry preproduction activities continued at nearly the same level as the previous year. Reported 1993 exploration and development activities are estimated to be \$55.5 million, compared with about \$59.6 million reported in 1992. Amax Gold Inc. continued to develop the Fort Knox gold deposit near Fairbanks. Echo Bay Alaska worked on the state's largest exploration project at the old A-J mine near Juneau. 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 exploration dollars. The National Park Service withdrew its objections to construction of

the Healy Clean Coal power plant near Healy, which will employ state-of-the-art emission control technologies during power generation.

The mineral industry provided about 3,137 direct full-time equivalent jobs, down 9 percent from 3,426 jobs in 1992 (table 2). Much of the job loss can be attributed to the closure of the Greens Creek Mine.

The U.S. Department of Interior Appropriations Act that went into effect in fiscal year 1993 requires annual rental fees of \$100 per federal mining claim. The 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 September 1 of each calendar year with the combined 1993 and 1994 payments due on August 31, 1993. As a result, the total number of active federal mining claims in Alaska fell 61 percent from 21,451 in 1992 to 8,376 in 1993—the largest drop in federal claim filings in the state's history.

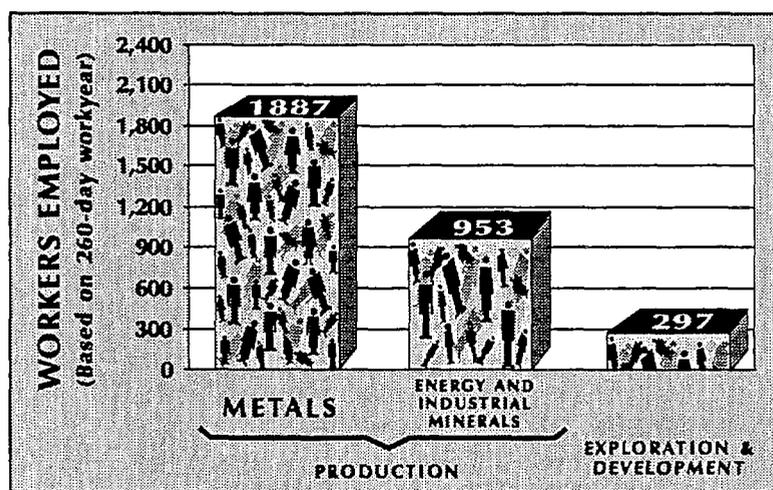
Table 2. Alaskan mine employment, 1990-93^a

	1990	1991	1992	1993
Gold/silver/mining				
Placer	1,151	1,240	1,251	1,205
Lode	--	--	--	--
Polymetallic	265	235	240	26
Basemetals	350 ^b	330 ^b	349 ^b	376
Recreational	315	320	325	270
Sand & gravel	645	685	640	580
Building stone	160	165	145	205
Coal	115	115	115	109
Peat	--	45	40	49
Tin, jade, soap-stone, ceramics, platinum	40	25	20	20
Mineral development	95	133	164	130
Mineral exploration	374	268	137	167
TOTAL	3,510	3,562	3,426	3,137

^aCalculated on a 260-day work year.

^bRevised estimate based on new company data.

-- = Information not available.



Mineral industry employment by category, 1993.

However, the 61 percent drop in Alaska compares with a 76 percent drop nationwide. The smaller percentage of lapsed federal claims in Alaska than in the rest of the nation may reflect the prevalence of federal claim groups in Alaska being controlled by small mining companies that are afforded a small-miner exemption by the Appropriations Act.

In contrast, Alaska state claims dropped from 27,879 in 1992 to 27,469 in 1993, a reduction of only 1.5 percent. In addition, Governor Walter J. Hickel announced at the Alaska Miners Association annual convention in November in Anchorage that more than 550,000 acres (222,590 hectares) of Alaska state lands would be reopened to mineral entry. These lands had been closed through various administrative orders—mainly land disposal programs—during the previous 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 magnetic and electromagnetic geophysical surveys in four Alaska mining districts. The maps and reports of the Nome area survey were released February 4, 1994, and the rest of these geophysical surveys are expected to be released to the public in March 1994.

PRODUCTION

Although metal production declined significantly from 1992, metals continued to dominate mineral production and accounted for 77 percent of 1993 Alaska mineral value. Overall values for metals dropped \$113.6 million from 1992 to 1993 due mainly to plummeting base-metal prices and the closure of Greens Creek Mine. Even though the average price for gold increased 6 percent and silver increased 12 percent, the price of lead dropped 25 percent and that of zinc dropped 20 percent. Zinc and lead production have accounted for more than 50 percent of total mineral industry production value for each of the last three years (table 3).

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 International Smelter Feed (ISF) concentrate from the port of Kivalina, north of Kotzebue, to overseas and Canadian refiners. Cominco increased production approximately 15 percent in 1993 from 1992 levels, which somewhat offset the decreasing metal prices. Red Dog Mine remains the largest 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 at the Red Dog mine site primarily by increasing capacity of the grinding circuits. By late 1995 this construction work will increase concentrate output to 657,000 tons (595,900 tonnes) annually.

In an effort to reduce costs during difficult times, Cominco froze wages during 1993 and extended the freeze into 1994, when zinc prices are expected improve. Low zinc prices have halted 22 zinc mines worldwide, resulting in a 9 percent reduction in the international production of zinc. Prospects for improved zinc prices are considered excellent, because of increasing uses of galvanized sheet in the auto industry and in home construction. For example, galvanized sheet-steel use in the Japanese auto industry increased from 82 kilograms per car in 1981 to 267 kilograms per car in 1991, and is forecast to be 453 kilograms per car by 1995.

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) of silver, 7,350 ounces (228 kilograms) of gold, 3,513 tons (3,186 tonnes) of lead, and 9,489 tons (8,606 tonnes) of zinc. However, as a result of low metal prices, operations were suspended on April 1, 1993, resulting in a loss of 217 full-time jobs. Activities since the shutdown have included the maintenance of surface facilities, underground development, expansion planning, and development drilling. These latter activities continue with the objective of resuming production when market conditions improve. A workforce of 26 regular full-time employees were on the minesite at the end of the year.

Cambior Alaska again operated Alaska's largest gold mine at its Valdez Creek placer property about 55 miles (88 kilometers) east of Cantwell. 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 (3.5 grams per cubic meters) gold. However, the 1993 production of 35,560 refined ounces (1,106 kilograms) of gold was less than half of the 86,052 ounces (2,676 kilograms) of refined gold produced in 1992. Cambior had expected the 1993 production decline because of a stream diversion project and preparation of next year's mine phase; increased gold production levels are planned for 1994.

Overall Alaska gold output continues to be greatly influenced by the fortunes of a few large operations. Approximately 198 placer mines and one lode mine (the Greens Creek Mine) produced 191,200 ounces (5,946 kilograms) of gold worth \$68.6 million in 1993,

Production value distribution by commodity. Estimated value of Alaska mineral production for 1993 totaled \$446.2 million.

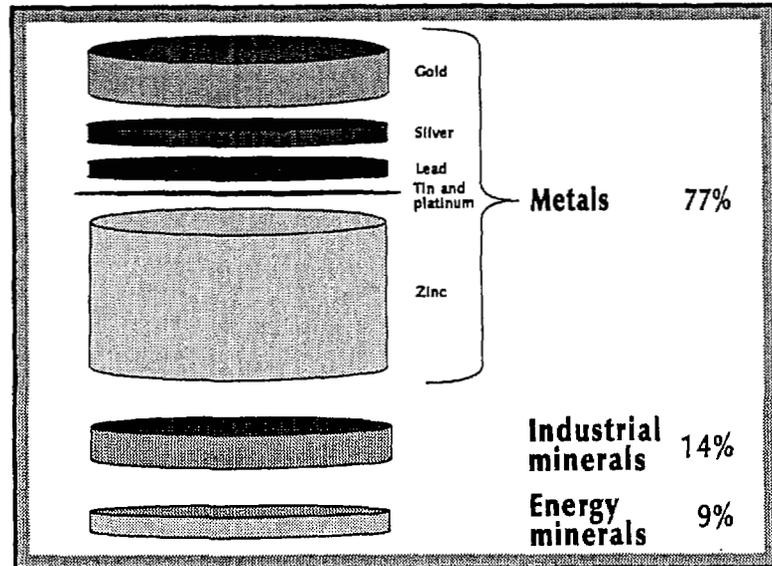


Table 3. Estimated mineral production in Alaska, 1991-93^a

Metals	Quantity			Estimated values ^b		
	1991	1992	1993	1991	1992	1993
Gold (ounces)	243,900	262,530	191,200	\$ 88,291,800	\$ 88,463,000	\$68,640,800
(kilograms)	7,585	8,163	5,946			
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	13.6	45,448,512	42,200,000	39,650,000
(million tonnes)	12.8	13.2	12.3			
Building stone (million tons)	3.0	2.9	3.4	22,500,000	22,971,000	24,695,000
(million tonnes)	2.7	2.6	3.1			
Subtotal				\$ 67,960,512	\$ 65,201,000	\$64,365,000
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	\$446,216,044

^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 27 percent drop in amount and a 21 percent decrease in value from 1992 levels. The significant declines in production from the Greens Creek lode mine and Valdez Creek placer operation alone accounted for a greater loss than the industry-wide reduction of 71,330 ounces (2,218 kilograms) from 1992 to 1993. Rounding out the top ten gold producers besides Greens Creek and Cambior Alaska were (not necessarily in order) the Alaska Gold Company dredges at Nome, Polar Mining near Fairbanks, Alaska Placer Development near Livengood, Thurmond Oil and Mining in the Eureka district, GHD Resources in the Tofty district, Cooks Mining east of Fairbanks, Green Mining and Exploration near Ruby, and Paul and Company in the Circle district.

Smaller placer mining firms generally experienced better working conditions and increased gold output in 1993 because of a much longer and warmer mining season. Throughout interior Alaska the 1992 mining season had been cut short by at least one month by late breakup and a bitter cold snap in early September. The industry also benefited from the 6 percent increase in gold prices from 1992 to 1993. The success of most placer miners contrasts with declines seen in other aspects of metal mining. Placer mines employed 1,205 workers or 37 percent of all Alaskan mining jobs. Placer mining continues to be a small-business industry that provides many jobs in rural Alaska.

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 about half its total production to six interior Alaska power plants and the remainder to the Korean Electric Power Company power plant in South Korea. The 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 plants collectively generate about 155 megawatts of electric power.

On September 30, in a dispute over freight rates with Suneel Alaska Inc. and UCM, the state-owned Alaska Railroad halted coal shipments to the Port of Seward. Suneel Alaska Inc., annually ships approximately 882,000 tons (800,000 tonnes) of Usibelli coal to South Korea from the Seward terminal. Suneel had paid \$9.50 (US) per metric ton to the railroad to haul the coal. However, after international coal prices dropped \$3.27 (US) per ton from 1992 to 1993, Suneel reduced its payments to the railroad to about \$8.40 (US) per ton for shipping the coal. The railroad maintained that at that reduced rate it was losing money and could not continue to haul the coal. Usibelli's mine was shut down for one

week in October 1993 during difficult contract negotiations. Concern over losing the Korean export contract led UCM to successfully negotiate a comprehensive wage and benefit cut with both its union and nonunion employees. In effect, Usibelli employees agreed to make up the \$1.10-per-ton difference for the freight rates by the railroad and saved the Korean export contract and about one third of the jobs of the mine workforce at Healy. Coal shipments resumed in late October.

Industrial mineral production remained at about the same level as that established in previous years. Total estimated value for Alaskan industrial minerals during 1993 was \$64.3 million compared with \$65.2 million in 1992. Sand and gravel pits, stone quarries, and related haul firms provided about 785 full-time-equivalent jobs in 1993.

Oil companies extracted about 20 percent more sand and gravel in 1993 than in the 1992 season from state-owned North Slope pits. The material was used for infrastructure and drill programs. Private and publicly leased pits throughout interior, southcentral, and southeastern Alaska provided sand and gravel, road metal, and riprap for Department of Transportation and Public Facilities (DOTPF) and federally-funded road construction projects. Logging-road construction continued at about the same levels as 1992 in both the Tongass and Chugach National Forests.

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. Subcontractor Red Samm Construction drilled, shot, and processed about 55 percent of the armor stone, while Board of Trade Inc., a local Nome-based company, completed the remaining 45 percent of the quarry work. The rock products were shipped to a DOTPF armor-stone stockpile at Nome and to Point Hope, Shismaref, and Bethel for riprap applications. The rock quarry work provided about 60 jobs from mid-June to November to residents of the Nome area, with 55 percent of the workforce made up of Sitnasuak and BSNC shareholders.

A record volume of ferrous scrap was shipped to markets outside Alaska. More than 7,000 tons (6,349 tonnes) of recycled scrap metal from the oil field service community at Deadhorse was hauled to General Metals Inc., a major west-coast scrap dealer. The scrap metal was shipped out on three barges used in the 1993 Sealift effort that hauled supplies to Alaska's North Slope oil fields. Alaska Metal Recycling of Anchorage shipped about 21,000 tons (19,047 tonnes) of similar scrap metal collected from various interior and southcentral Alaska junkyards to buyers in Thailand.

DEVELOPMENT

Alaska mineral development expenditures totaled \$27.3 million in 1993, compared with \$29.6 million expended in 1992 (table 4). Work continued at several established metallic development projects including the Fort Knox, Red Dog, and Valdez Creek mine sites, as well as at a new gold mine development at Nixon Fork, near McGrath. Development work continued at two coal projects in the southcentral region (Wishbone Hill and Beluga Coal projects) and at Healy (Healy Clean Coal Project).

Cominco Alaska began a comprehensive development redesign to expand production of the Red Dog mine and mill facility in northwestern Alaska. The 25-month-long redesign project is expected to cost \$21 million and be completed by October 1995.

Cambior Alaska completed a stream diversion project at its Valdez Creek placer mine, which was begun in December 1992 and finished in mid-March 1993 at a total cost of about \$6.2 million. The wash-plant was moved closer to the new pit A8 during the same period.

Development work was continued by Fairbanks Gold Inc., the operating subsidiary for Amax Gold Inc., at the Fort Knox gold deposit near Fairbanks. The 1993 work consisted of base-line and optimization studies including development drilling east of the main deposit and an exhaustive pursuit of permits and public relations. The Alaska Legislature appropriated funds to construct an electrical intertie from Fairbanks to the mine site; Fort Knox will require about 35 megawatts of electric power. Current proven and probable reserves, 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) of gold.

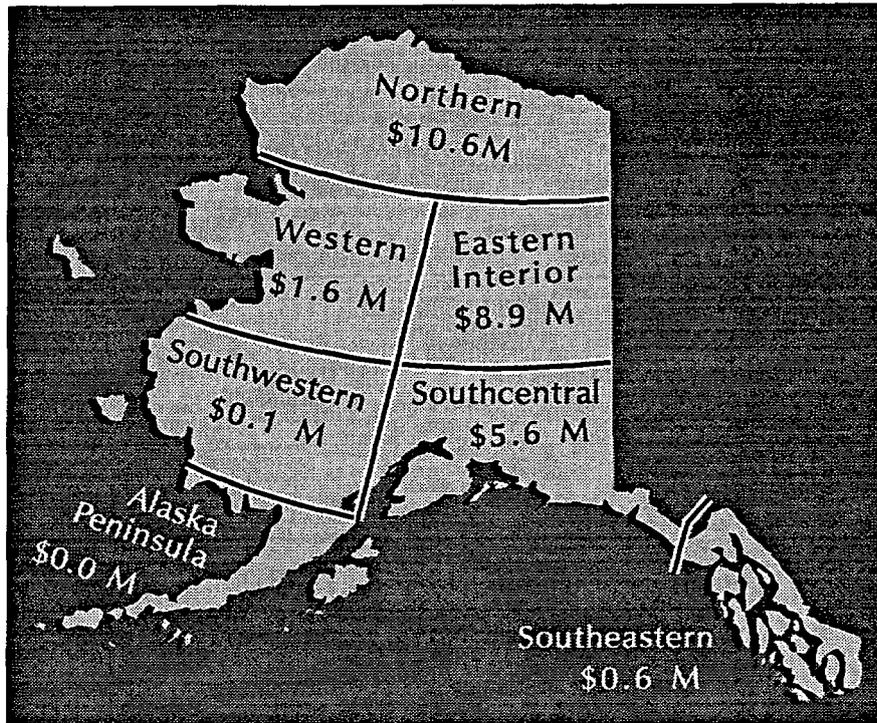
In late June 1993 Consolidated Nevada Goldfields (CNG) acquired the Nixon Fork gold-copper-bismuth skarn deposit northeast of McGrath from Central Alaska Gold Company, the previous operator. During the year, CNG conducted detailed drilling and trenching programs and onsite environmental studies. The 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 CNG could generate positive cash flow using underground mining methods at a rate of 150 tons per day, producing about 60,000 ounces (1,866 kilograms) of gold annually. 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 Healy Clean Coal Power Project (HCCP) near Healy inched a few steps closer to reality in 1993 with completion of permitting and intertie routing work. The HCCP project is one of thirteen projects nationwide 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 an additional 53 megawatts of power using Usibelli coal for fuel. DOE will fund about 45 percent of the total project cost of \$227 million; the remainder will come from private and public sources within Alaska. In late August, the U.S. National Park Service (NPS) withdrew its objection to the HCCP project. NPS previously believed that a stack plume would jeopardize air quality in nearby Denali National Park. The Park Service was given assurances by plant operator GVEA 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 will not exceed current emission levels.

The Anchorage-based environmental law firm Trustees for Alaska opposes the Healy Clean Coal project and has appealed a November 1993 Anchorage Superior Court ruling that upheld the project's license from the Alaska Public Utilities Commission. Although the significance is not known, at the time of this writing the judge has upheld the appeal.

Two coal development projects continued 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 reserves 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 and the Mental Health Lands issue is resolved.

One interesting development in 1993 was the expression of interest by Midrex Corporation, a subsidiary of Kobe Steel Corporation, to construct a 200,000-ton-per-year (181,400-tonne) iron-reducing plant near Port McKenzie on Cook Inlet near Anchorage. Development of the Alaska Pacific Iron Project (APIP) would result in the annual importation of 1.8 million tons (1.63 million tonnes) of iron oxide from South America, use of Cook Inlet natural gas to produce high grade iron briquettes, and export of a finished product to steel mills



Distribution of development expenditures by region. Estimated Alaska development expenditures for 1993 totaled \$27.3 million.

Table 4. Reported mineral development expenditures and employment in Alaska, 1993

	Northern	Western	Eastern interior	South-central	South-western	Alaska Peninsula	South-eastern	TOTAL
Exploration expenditures								
Base metals	--	--	--	--	--	--	--	--
Polymetallic	\$10,300,000	--	--	--	--	--	\$ 431,136	\$10,731,136
Precious metals								
Placer	15,000	\$ 90,000	\$ 698,500	\$ 4,536,000	\$69,500	--	85,000	5,494,000
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	\$10,565,000	\$1,590,000	\$8,923,500	\$5,553,000	\$69,500	--	\$557,636	\$27,258,636
Exploration employment								
Exploration employment								
Workdays	12,280	3,780	5,610	9,156	350	--	2,590	33,766
Workyears ^a	47	15	21	35	2	--	10	130
Number of companies reporting ^b	4	4	9	8	4	--	5	34

-- = No expenditures reported.

^aBased on a 260-day workyear.

^bSome companies were active in several areas.

in Taiwan. The APIP project is expected to cost \$180 million. A proposed construction of a 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 in southcentral Alaska.

EXPLORATION

Preliminary mineral exploration expenditures in 1993, as reported by 70 mining companies and consultants, were \$28.2 million compared with \$30.2 million reported by 80 companies in 1992 (table 5). Every region of Alaska, except the Alaska Peninsula, reported exploration projects. Selected projects are described below. As in previous years, exploration projects in eastern interior and southeastern Alaska accounted for the majority (79 percent in 1993) of the total expenditures.

Northern Region

NANA Corporation continued grassroots exploration for jade and base metals on Native- and state-owned land throughout its region.

Arctic Slope Consulting Group, subsidiary of Arctic Slope Regional Corporation (ASRC), conducted 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 and from the lining of a spill depository; (3) rebagging of stored bulk coal for village use; and (4) final backfilling 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.

Tricon Mining Inc. employed ground-penetrating radar and drilling to investigate deeply buried placer gold deposits on Nolan Creek in the historic Wiseman district. The company plans to develop the paygravels with underground and opencut mining methods in 1994.

Western Region

Kennecott Exploration teamed up with Bering Straits Native Corporation and Hawley Resource Group to explore and trench a polymetallic-gold quartz vein deposit in the Twin Creek drainage west of Nome. Because of favorable results encountered in 1993, Kennecott plans to do follow-up work at the prospect in 1994.

Echo Bay Alaska leased the Illinois Creek silver-gold deposit near the Yukon River from North Pacific Mining Corporation. With a crew of 25 employees Echo Bay conducted extensive drilling and trenching programs

and geochemical and geophysical surveys. Published reserves are 4,113,802 tons (3,731,220 tonnes) of ore grading 0.071 ounces per ton (2.4 grams per tonne) gold and 1.47 ounces per ton (50 grams per tonne) silver.

ASA Inc. mapped, sampled, and drilled a copper-gold porphyry deposit on Von Frank Mountain about 70 miles (112 kilometers) northeast of McGrath in the northern Kuskokwim Mountains.

Eastern Interior Region

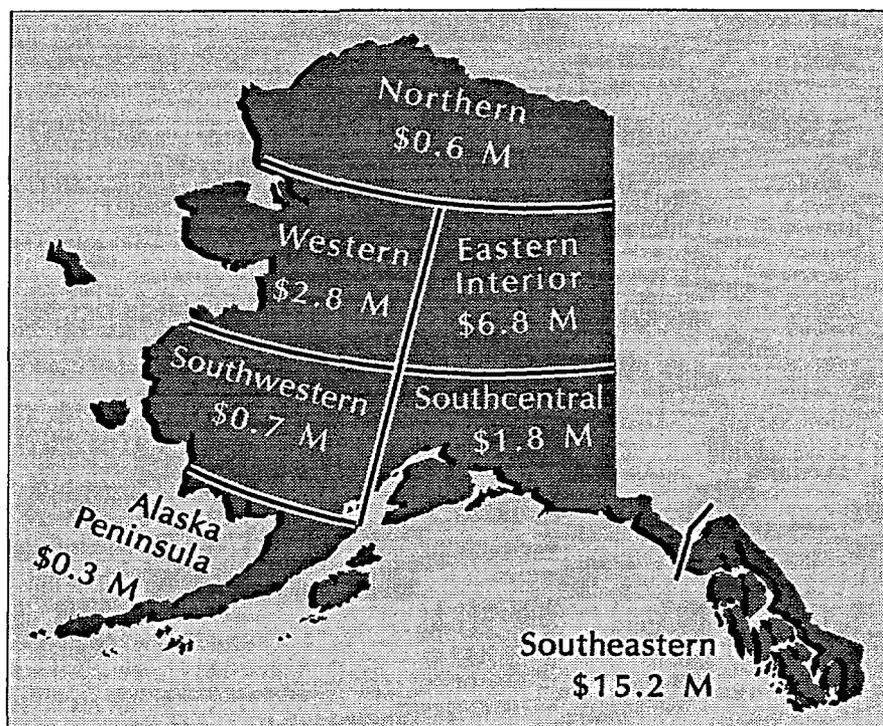
Ryan Lode Mines Inc., a subsidiary of LeTeko Resources, conducted the second largest exploration project in the state on Ester Dome in the Fairbanks district. Company work included a large drill program and engineering and environmental studies. The most updated analysis provided by the company shows proven and probable, mineable reserves of 820,000 ounces (25,502 kilograms) of gold in the Ryan and Curlew deposits and 120,000 ounces (3,732 kilograms) of gold in the True North deposit.

AMAX Gold Exploration optioned the Golden Summit and True North claim groups on Cleary Summit in the Fairbanks district from Freegold Recovery and Fairbanks Exploration Inc. AMAX conducted drilling, geochemical sampling, mapping, and airborne geophysical surveys. Ryan Lode Mines Inc. optioned the True North property from AMAX in 1993 and expects to buy it in 1994.

American Copper and Nickel Inc. (ACNC) continued to explore the Eagle Creek property in the Fairbanks district, and initiated a grassroots exploration program in the Bonfield and Tok mining districts in search of polymetallic, massive sulfide deposits. Late in 1993 ACNC dropped its option on the Eagle Creek claim group near Fairbanks. The claim group reverted back to lease holder Can-Ex Resources (US) Inc.

Veteran placer miners Bill Shaffer, Earl Beistline, and Mike Roberts formed Little Eldorado Group to explore and develop deeply buried placer gold deposits on Little Eldorado Creek in the Fairbanks district. The company built an access road and a portal and drove a decline from the portal to access underground placer gold reserves.

Hemlo Gold Mines Inc., operator for Noranda Joint Venture and a newcomer to the Alaska mining scene, explored the Taurus copper-gold porphyry deposit near Tok, the Zackly copper-gold skarn near Paxon, and the Liberty Bell massive sulfide deposit near Healy. Zackly was optioned from Pacific Northwest Resources Company. Taurus was optioned from Lodestar Explorations, and Liberty Bell was optioned from Liberty Bell Mining Company. Hemlo Gold Mines plans more work at the Liberty Bell and Zackly deposits in 1994.



Regional distribution of exploration expenditures. Estimated Alaska exploration expenditures for 1993 totaled \$28.2 million.

Table 5. Reported exploration expenditures and employment in Alaska by commodity and region, 1993

	Northern	Western	Eastern interior	Southwestern	Southcentral	Alaska Peninsula	Southeastern	TOTAL
Exploration expenditures								
Base metals	\$ 530,000	\$ 330,000	\$ 395,000	\$ 30,000	--	--	\$ 10,000	\$ 1,295,000
Polymetallic ^a	--	--	110,000	300,000	\$1,100,000	290,000	2,097,743	3,897,743
Precious metals								
Placer	15,000	97,500	422,731	21,000	487,400	--	56,000	1,099,631
Lode	--	2,412,000	4,840,000	375,000	200,000	--	13,029,650	21,856,650
Coal and peat	--	--	--	--	--	--	--	--
Industrial minerals	--	--	15,000	--	500	--	30,000	45,500
Other	50,000	--	--	--	--	--	--	50,000
TOTAL	\$595,000	\$2,839,500	\$6,782,731	\$726,000	\$1,787,900	\$290,000	\$15,223,393	\$28,244,524
Exploration employment								
Employment								
Workdays	1,014	3,720	10,792	1,220	3,437	750	22,560	43,493
Workyears ^b	4	14	41	5	13	3	87	167 ^c
Number of companies reporting	5	9	24	7	15	1	9	70

-- = No expenditures reported.

^aJade, platinum, gemstones.

^bBased on 260-day workyear.

^cSmall discrepancy on total due to rounding.

Southcentral Region

Cambior Mines Inc. conducted a reverse-circulation drill program to increase mineable reserves at the Valdez Creek mine east of Cantwell.

Westmin Resources, another newcomer to the Alaska mining scene, teamed up with North Pacific Mining Corporation to explore the Johnson River polymetallic deposit on the west side of Cook Inlet, and conducted drilling and geotechnical work including transportation route evaluations. Proven and probable reserves are 813,670 tons (738,000 tonnes) grading 0.28 ounces per ton (9.75 grams per tonne) gold, 0.97 percent copper, and 9.18 percent zinc.

Longtime placer miner Howard McWilliams evaluated his 41 patented federal mining claims on Chunilna and Johns Creeks about 30 miles (48 kilometers) north-east of Talkeetna. McWilliams used results from more than 1,000 samples to estimate that nearly 15 million cubic yards (11.4 million cubic meters) contain significant quantities of gold in the 0.05 ounce gold per cubic yard (2.4 grams per cubic meter) range.

Southwestern Region

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 teamed up with Alaska Earth Resources and Calista Corporation to explore platinum deposits at Goodnews Bay, the site of the U.S.'s largest past producer of placer platinum. Teck Corporation also worked with Calista to evaluate further the lode gold potential of the old Donlin district north of Crooked Creek on the Kuskokwim River.

Southeastern Alaska

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 reserves to the existing resource base. 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.

Echo Bay Alaska, as it did in 1992, carried out the largest exploration project in Alaska at its Alaska-

Juneau mine near Juneau. In addition to a large drilling and mapping program, the company began to convert the A-J Mine to a trackless operation, and also 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 now-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 the Kensington venture, north of Juneau, partners Echo Bay and Couer Alaska Inc. continued project work on permitting, mine geology, and design.

Couer Alaska Inc. entered into an option agreement with Hyak Mining and International Curator for the Jualin Mine near Berners Bay north of Juneau.

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

Kennecott Exploration conducted surface drilling at the Gold Fork property east of Juneau.

DRILLING

Incomplete returns show 12 companies reported drilling a total of 262,318 feet (79,954 meters) during 1993, a reduction of 40 percent from 1992. Placer and coal exploration and development drilling activity represented most of the total reduction. Core drilling at 105,325 feet (32,103 meters) was only half that of 1992. In contrast, reverse circulation rotary drilling increased from the previous year and totaled 152,793 feet (46,571 meters), which is 58 percent of all drilling done in 1993.

GOVERNMENT ACTIONS

In 1993 the Alaska Division of Geological & Geophysical Surveys (DGGs), through a capital improvements project approved by the Alaska Legislature, contracted WGM Inc. and its subcontractor Dighem Inc. to fly high-resolution geophysical surveys over about 1,100 square miles (2,812 square kilometers) in the Nome, NYAC, Valdez Creek, and Circle mining districts. The results of the Nome survey were available February 4, and the rest are to be released by DGGs in March 1994. DGGs staff geologists carried out detailed geological mapping and geochemical sampling in conjunction with the geophysical surveys in the Nome and Circle districts.

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 DGGS, Division of Mining, 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 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. 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 51 million acres (20.6 million hectares) 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 million hectares) to the new state from the federal government, or 28 percent of the land area of the state. The vast bulk of energy and significant amounts

of mineral resources currently being extracted in Alaska are derived from Alaska state lands. Currently about 91 percent of Alaska state lands are open to mineral entry.

In November 1993 Alaska's Governor Hickel announced at the Alaska Miners Association 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 expected to be signed into law by President Clinton in 1994. About 80 percent of federal land in Alaska is already closed permanently to mineral entry, but replacing the 1872 Mining Law with legislation thought by many as punitive in nature would probably have serious consequences for 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 Fields Operation Center of the Bureau of Mines would be closed. The Branch of Alaskan Geology of the U.S. Geological Survey 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.

DEPARTMENT OF NATURAL RESOURCES
Division of Geological & Geophysical Surveys
Division of Mining

DEPARTMENT OF COMMERCE AND ECONOMIC DEVELOPMENT
Division of Economic Development

