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Alaska's Mineral Industry 2003

Joe Usibelli, on left, and Joe Usibelli, Jr., on right, cutting the ribbon at the grand opening of the Two Bull Ridge coal mine near Healy on July 26, 2003. Opening of the mine coincided with the celebration of 60 years of coal mining by Usibelli Coal Mine Inc. in the Healy area. The Two Bull Ridge Mine is projected to produce coal for at least 20 years at current rates of extraction. Photo by Chris Arend, provided by Usibelli Coal Mine Inc.

Division of Geological & Geophysical Surveys
in cooperation with
Office of Economic Development
Division of Mining, Land & Water

Alaska's Mineral Industry 2003

by
D.J. Szumigala, R.A. Hughes, and R.H. Harris

Division of Geological & Geophysical Surveys

SPECIAL REPORT 58

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EXECUTIVE SUMMARY

Alaska's Mineral Industry 2003 is the twenty-third in a series of annual reports. This report is part of a cooperative venture between the Division of Geological & Geophysical Surveys (DGGS) and the Division of Mining, Land, & Water (DMLW) in the Department of Natural Resources (DNR) and the Office of Economic Development (OED) in the Department of Commerce, Community & Economic Development (Commerce).

The 2003 cumulative value of Alaska's mining industry is $1.067 billion, a decrease of about $6 million from the $1.073 billion reported in 2002. Alaska's mineral industry has topped one billion dollars for eight consecutive years. The 4 percent increase in the exploration investment over the previous year ($27.6 million in 2003 versus $26.5 million in 2002) was compounded by a 15 percent increase in development investment ($39.2 million in 2003 versus $34.1 million in 2002). The decreased value of mineral products ($1,000.7 million in 2003 compared with $1,012.8 million in 2002) led to a lower cumulative value of the mineral industry in 2003 compared to 2002. An increase in placer gold production during 2003 could not offset the decrease in lode metal production from several of Alaska's largest mines and a significant decrease in volume of reported sand and gravel production. Metals, with a value of $888 million, accounted for 89 percent of total production; and zinc continued to be the most valuable metal.

Total minerals industry employment in 2003 is estimated to be 1,906 full-time-equivalent jobs, a drop of about 900 jobs from the 2,824 jobs reported in 2002. Jobs declined across the mineral industry except for exploration. Large mines cut employees during the year while responding to low metal prices. Most of the job decline was in the development and industrial minerals sectors. The rebound in metal prices will likely prompt an increase in mining jobs in 2004.

About 2,443 new state mining claims (296,800 acres), 92 new state prospecting sites (14,720 acres), and 676 new federal claims (595 lode, 81 placer, for a total of 13,520 acres) were staked in 2003. State claim staking increased dramatically from 2002 levels, while the number of new federal mining claims almost tripled from 2002 levels and reached staking levels not seen since 1997. The amount of land in Alaska under claim increased from 2002 to 2003, with approximately 2.9 million acres of land covered by claims or prospecting sites in 2003. The largest groups of claims (mostly state claims) in Alaska occur in the Fairbanks, Pogo, Tangle Lakes (Denali Block), and Pebble areas.

Drilling was conducted during all phases of mining (exploration, development, and production) and drilling totals for 2003 are 270,456 feet of core drilling and 100,178 feet of reverse-circulation drilling. The eastern interior region had the most drilling of all Alaska regions, followed by the southeastern and southwestern regions.

Exploration during 2003 occurred across most regions of the state, with the exception of the Alaska Peninsula area, in which there was no known mineral exploration. Several large projects accounted for most of the exploration expenditures and drill footage: Donlin Creek gold project (Placer Dome Inc.), Pebble copper–gold project (Northern Dynasty Minerals Ltd.), Greens Creek mine exploration (Kennecott Minerals Co./Hecla Mining Co.), Tintina Gold belt projects (Anglo Alaska Gold Corp.), Union Bay platinum–nickel–copper project (Freegold Ventures Ltd./Lonmin PLC) in southeastern Alaska, Nixon Fork gold–copper mine project (St. Andrew Goldfields Ltd.) and Fairbanks mining district gold projects (Kinross Gold Corp.). About 41 percent and about 26 percent of the 2003 Alaska exploration expenditures were spent in southwestern Alaska and eastern interior Alaska, respectively. Gold remained the major exploration commodity, with more than $19 million spent on precious metal exploration in 2003, but polymetallic and platinum-group-element exploration also increased from recent levels. Platinum-group-element exploration increased to almost four times the 2002 levels. Base-metal exploration in 2003 was at historic lows, reflecting continued low zinc and lead prices through much of the year. Higher metal prices during the latter parts of 2003 significantly extended Alaska's field season, with several large projects beginning during the normally waning parts of the exploration season. As in years past, most exploration funds, more than 68 percent, were derived from Canadian sources.

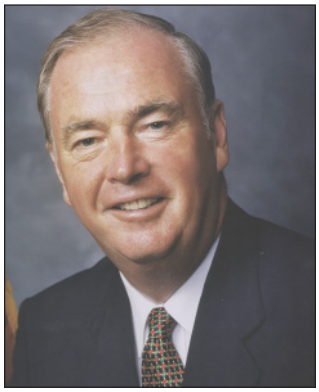
Reported and estimated 2003 mine development expenditures totaled $39.2 million, a slight increase of $5.7 million from the $33.5 million reported for 2002. Mining development projects in 2003 included lode projects at the Kensington (gold) project in southeastern Alaska, Rock Creek (gold) project in western Alaska, and Pogo (gold) project in the eastern interior region. Significant development in the placer sector occurred at the Nolan Creek (gold) project in northern Alaska and Nome placer project in the western region. These projects consisted primarily of feasibility studies and permitting but included substantial drilling at Rock Creek, and underground development and drilling at Nolan Creek.

Gold production was reported from Illinois Creek, Fort Knox, and Greens Creek mines, and at more than 60 placer mines. Silver was produced at Red Dog and Greens Creek mines, which were also the primary producers of zinc and lead concentrates. Greens Creek Mine achieved record production for the second consecutive year while tons milled at Red Dog and Fort Knox decreased very slightly from robust 2002 levels. Placer gold production increased by about 750 ounces compared to 2002 production, while sand, gravel, rock, and other industrial materials saw a significant decrease. Usibelli Coal Mine marked its 60th year of operation, produced 1,088,000 tons of coal, and signed a new 2-year 400,000-tons-per-year contract with South Korean power companies.

Executive Summary, cont'd.

In government actions, the Alaska Division of Geological & Geophysical Surveys (DGGS) conducted a 20-day geologic mapping project near Livengood and released maps and results from a 618-square-mile geophysical survey in the Council area of the Seward Peninsula. Geophysical surveys funded by the U.S. Bureau of Land Management (BLM) and managed by DGGS were released for the Delta River area (portion of the Denali Block) west of Paxson, and in the Sleetmute area of southwestern Alaska. During 2003, changes to the state permitting process were made with the transfer of the Alaska Coastal Management Program and Division of Habitat to the Department of Natural Resources (DNR). DNR issued the final state permits needed for Teck–Pogo Inc.'s Pogo Mine Project on December 18, 2003. A large mine project team was established by state agencies to coordinate state permitting activities for the Pogo Gold Project. DNR also began working as a cooperating agency with the U.S. Forest Service and U.S. Environmental Protection Agency on the necessary permits for the expansion of the Greens Creek tailings facility in southeastern Alaska. On August 6, 2003, DNR and BLM agreed to a new cooperative agreement to allow mining operators on federal lands to continue to use the Alaska Bond Pool. DNR gave awards for outstanding reclamation of mining operations to Steve Pomrenke on Tripple Creek and Betty Krutzsch on Specimen Gulch in the Nome mining district; and Jim Conway and Sam Turner on Bird and Upper Cache creeks near Petersville in the Yentna mining district. Senator Ted Stevens secured $9.6 million in federal congressional appropriations for the Alaska Railroad Corp. to purchase the coal loading facility and terminal in Seward. The conveyance of the eastern portion of the Denali Block from the federal government to state ownership was completed in January. The USGS, DGGS, and BLM continued a number of cooperative projects under the Minerals Data and Information Rescue in Alaska (MDIRA) program. The Bureau of Land Management conducted an extensive field program in the Delta River mining district of eastern and southcentral Alaska.

GOVERNOR'S FOREWORD



I am very pleased that, once again, the value of the mining industry has exceeded the billion-dollar mark in Alaska. I congratulate all of you involved in mining, project development, and mineral exploration for your persistent efforts.

Mining is an important part of our history and an important part of our future. It is the right time to be optimistic about the future of the industry in Alaska, and the benefits it can bring. We should be optimistic because we have geology and land rich almost beyond belief. Alaska is vastly under-explored, but new technology, such as high-precision aerial mapping, and plain hard work is changing that, as recent discoveries have proved. I'm told that there is a saying among mining companies, "If you want to find elephants, you have to look in elephant country." Recent discoveries have proved that Alaska is elephant country.

Alaskans should be optimistic about mining because the State is promoting responsible development and backing it up with its actions. I am proud that the Pogo Gold Mine received all its permits, and the community came together to prevent a last-minute appeal that would have halted construction of the mine. My administration is focused on providing a more streamlined process for permitting mines—a process that is efficient for the applicant, the public, and the agencies. To that end, DNR continues to lead and coordinate state efforts for responsible development of our mineral resources. I think Pogo showed the world the success of this effort. And I believe that the mining industry noticed.

Alaskans should be optimistic about mining because we are finally getting title to all the land we were promised. DNR is working with BLM on what we locally call BLM 2009—a program to finish the state and ANCSA entitlement by 2009, the 50th anniversary of statehood. The program uses new money, new procedures and, we hope, a new law—all intended to substantially finalize Native and State land entitlement by 2009. This will be an important milestone for many industries, mining included. The newly owned state land will spark exploration, with expected discoveries and development to follow.

Finally, right now we should be optimistic about mining because prices are helping us. At this writing gold is over $400 per ounce, and platinum is close to $900. This is a good time to be a miner in Alaska, and I am looking forward to another great year.

Governor Frank H. Murkowski

COMMISSIONERS' FOREWORDS

The Department Commerce, Community & Economic Development (Commerce) and the Department of Natural Resources (DNR) are pleased to bring you the twenty-third annual report on Alaska's mineral industry.

The mission of Commerce is to promote responsible development of Alaska's resources, including the state's mineral resources, through promotion and investment in infrastructure through the Alaska Industrial Development and Export Authority (AIDEA). AIDEA has invested in the Red Dog Mine road and port, the coal loading facility in Seward, and the ore loading facility at Skagway. It has also participated in several projects to enhance the energy infrastructure of the state.

In 2003, for the eighth consecutive year, the total value of the industry exceeded $1 billion. Rising metal prices bode well for the profitability of future and now-producing mines, for moving existing projects forward, and for enticing exploration for new and existing discoveries in the state. Industrial minerals production was reportedly down in spite of the apparent high level of construction activity; this shortfall is believed to reflect reporting deficiencies rather than actual shortfalls.

Existing projects provided 1,906 high paying jobs in 2003, a reported reduction of about 918 jobs from 2002. This decrease reflects efforts to reduce costs and is also due to reporting shortfalls in the rock, sand and gravel industry. Significant improvements in job opportunity are expected in future reports. Permitting for the Pogo project was completed in 2004 and the construction of production facilities has been commissioned. Permitting matured to final phases for the Kensington project and construction is expected to be commissioned soon. Other advanced stage projects include Donlin Creek, Rock Creek, and Nixon Fork.

In the longer term, the Pebble Copper project in southwestern Alaska and the intense exploration that this project has attracted to the area, projects along the south flank of the Brooks Range, projects in the Goodpaster district near Pogo, and others, promise exciting future opportunities.

Edgar Blatchford, Commissioner of Commerce, Community and Economic Development

Once again, I want to compliment the mining industry for a successful year. The expanding industry has brought benefits to Alaskans around the state, and is positioned to bring benefits to many more.

Alaska has become the focal point for a number of exploration and development companies. Mines are being discovered, permitted, and built in Alaska. This Administration encourages resource development and continues to work with the industry, the public, and the agencies to ensure it is done in an efficient, responsible manner. I believe that the Administration's support, along with improving metals prices, has increased exploration and staking activity statewide. The areas around Teck Pogo, the state-conveyed portions of the Denali Block, and the Pebble gold–copper prospect have realized the most activity.

Teck Pogo reached a milestone by receiving permits and starting construction of the Pogo mine. A last minute appeal was received shortly after construction started. I am pleased to have worked with the Governor and numerous other entities and individuals in quickly having the appeal withdrawn, clearing the way for construction to resume and for hundreds of Alaskans to return to their jobs. This process was observed by the industry worldwide and the successful conclusion has proven that resource development is a priority for Alaska.

All permits for the expansion of the tailings impoundment at Greens Creek mine have been issued and construction is well underway. This expansion will extend the life of this underground operation for more than 20 years. Greens Creek continues to be one of the nation's largest silver producers and an important component of the economy in southeastern Alaska. Coeur Alaska is in the final phases of permitting the Kensington project near Juneau, and mine permitting and development activities advanced for Donlin Creek (Placer Dome U.S.), Rock Creek (NovaGold), Pebble (Northern Dynasty), Nixon Fork (Mystery Creek Resources), and Nolan Creek (Silverado Gold Mines).

The Red Dog mine benefits from the increased zinc and lead prices. The Red Dog zinc district and the partnership between Teck Cominco and NANA will continue to be the economic engine for northwestern Alaska for many years to come.

Kinross Gold Corp., which has a significant economic benefit in Interior Alaska, continues its efficient operations of the Fort Knox and True North mines and has increased the mine fleet size. The placer industry was hard hit by low gold prices a few years ago. With increasing gold prices the placer industry should be reinvigorated and allow many of the Alaska placer mining families to return to work.

Alaska's coal mining sector continues to move forward with the changing dynamics for energy and industrial development around the Pacific Rim. It is encouraging to see Usibelli Coal Mine resuming their coal exports to South Korea. The Administration is working with other Asian countries to look to Alaska's vast coal resources to help satisfy their energy needs.

I look forward to another positive year in 2004.

Thomas E. Irwin, Commissioner, Department of Natural Resources

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Alaska's Mineral Industry 2003

D.J. Szumigala[1], R.A. Hughes[2], and R.H. Harris[2]

INTRODUCTION

This summary of Alaska's mineral industry activity for the year 2003 is the twenty-third in the series of annual reports, and is made possible by information provided through phone interviews, replies to many of the 850 questionnaires sent to participants in the mineral industry, press releases, and other sources of information. This report is part of a cooperative venture between the Division of Geological & Geophysical Surveys (DGGS) and the Division of Mining, Land, & Water (DMLW) in the Department of Natural Resources (DNR) and the Division of Trade & Development (DTD) and the Office of Economic Development (OED) in the Department of Commerce, Community & Economic Development (Commerce). Information in this report supercedes data previously published in DGGS Information Circular 50.

Dick Swainbank, long-time author of these reports on the Alaska mineral industry, retired during 2003. In recent years Dick was responsible for gathering and reporting information concerning the development and production sectors of Alaska's mineral industry. The change in authorship during 2003 has resulted in incomplete data collected for the development and production sectors. This will skew some year-to-year comparisons of data presented in the current report, specifically Alaska mine employment, placer gold production, and industrial minerals production.

Figure 1 shows the regions of the state used in this and subsequent sections. Table 1 and figure 2 show the estimated value of the mineral industry in Alaska per year between 1981 and 2003, as divided between exploration and development investments, and the gross value of the mineral products. Company information is used to define the exploration and development parameters. Average metal prices are calculated from the daily London PM closing price for gold, and from the average weekly spot price on the London Metal Exchange for the other metals. These prices are used to calculate the value of metals produced in the state, but do not take into account the costs of mining or transportation, or smelter charges and penalties. Coal prices are estimated from average coal prices for similar-grade material around the Pacific Rim. Industrial material prices are based on regional rates provided by some operators.

The 2003 cumulative value of Alaska's mining industry is $1.067 billion, a decrease of about $6 million from the $1.073 billion reported in 2002. Alaska's mineral industry has topped one billion dollars for eight consecutive years. The 4 percent increase in the exploration investment over the previous year ($27.6 million in 2003 versus $26.5 million in 2002) was compounded by a 15 percent increase in development investment ($39.2 million in 2003 versus $34.1 million in 2002). The decreased value of mineral products ($1,000.7 million in 2003 compared with $1,012.8 million in 2002) led to a lower cumulative value of the mineral industry in 2003 compared to 2002. An increase in placer gold production during 2003 could not offset the decrease in lode metal production from several of Alaska's largest mines and a significant decrease in volume of reported sand and gravel production.

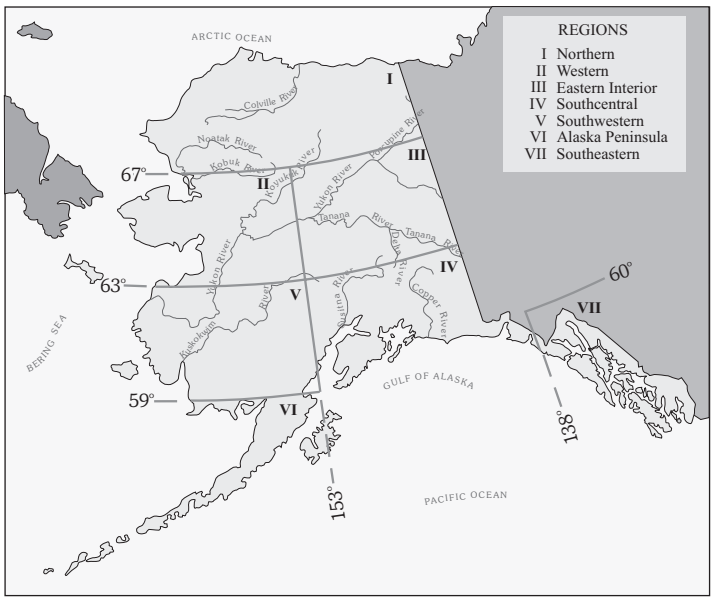

Figure 1. *Regions of mineral activity in Alaska as described in this report.*

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E-mail for D.J. Szumigala: zoom@dnr.state.ak.us
[2]Alaska Office of Mineral Development, 211 Cushman St., Fairbanks, Alaska 99701-4639

Table 1 shows the estimated value of the mineral industry in Alaska per year between 1981 and 2003, as divided between exploration and development investments, and the gross value of the mineral products. These combined values totaled $1,067.4 million in 2003, compared with $1,073.3 million in 2002. The higher level of development investment ($39.2 million) in 2003 compared with the $33.5 million reported in 2002 was offset by the decreased value of mineral products ($1,000.7 million) in 2003 compared with $1,012.8 million in 2002. Although lode metal mine production remained near 2002 levels, rising base- and precious metal prices increased the value of metals production by 8 percent compared to last year. Reported sand, gravel, and rock production is significantly lower than the average value of these products from 2000 to 2002. The exploration investment of $27.6 million in 2003 was slightly higher than the $26.5 million invested in 2002. Slow exploration activity during early 2003 can be attributed to late season availability of venture capital, continued weakness of the Canadian dollar, and attractive tax incentives for investors in Canada based projects.

Exploration during 2003 occurred across most regions of the state, with 70 percent of the exploration funds spent in southwestern and eastern Alaska. More than $19 million was spent exploring on gold and associated precious-metal projects across the state. Several large projects, notably Northern Dynasty's Pebble copper–gold project in southwestern Alaska, Kinross Gold's Fairbanks mining district gold projects in the Interior, and Freegold Ventures–Lonmin's Union Bay platinum–nickel–copper project in southeastern Alaska accounted for most of the exploration expenditures and drill footage.

Mining development projects in 2003 included lode projects at the Greens Creek Mine (silver–zinc–gold–lead) and Kensington (gold) project in southeastern Alaska, Rock Creek (gold) in western Alaska, Pogo (gold) in the

Table 1. *Total value of the mineral industry in Alaska by year (in millions of dollars)*

	Exploration (expenditure)	Development (expenditure)	Production (value)	Total (calculated)
1981	76.3	24.7	188.6	289.6
1982	45.6	41.6	196.4	283.7
1983	34.1	27.9	212.4	274.4
1984	22.3	53.4	199.4	275.1
1985	9.2	34.1	226.6	269.9
1986	8.9	24.3	198.5	231.7
1987	15.7	100.3	202.4	318.4
1988	45.5	275.0	232.2	552.6
1989	47.8	134.3	277.0	459.0
1990	63.3	14.3	533.0	610.6
1991	39.9	25.6	546.5	612.0
1992	30.2	29.6	560.8	620.6
1993	30.3	27.7	448.7	506.7
1994	31.1	45.0	507.5	583.6
1995	34.3	148.6	537.2	720.1
1996	44.7	394.0	590.4	1,029.2
1997	57.8	168.4	936.2	1,162.4
1998	57.3	55.4	921.2	1,033.9
1999	52.3	33.8	1,032.9	1,119.0
2000	34.9	141.7	1,106.4	1,283.0
2001	23.8	81.2	917.3	1,022.3
2002	26.5	34.0	1,012.8	1,073.3
2003	27.6	39.2	1,000.7	1,067.4
TOTAL	**$857.9**	**$1,954.1**	**$12,585.1**	**$15,398.5**

SOURCE: Alaska's mineral industry reports published annually by DGGS.

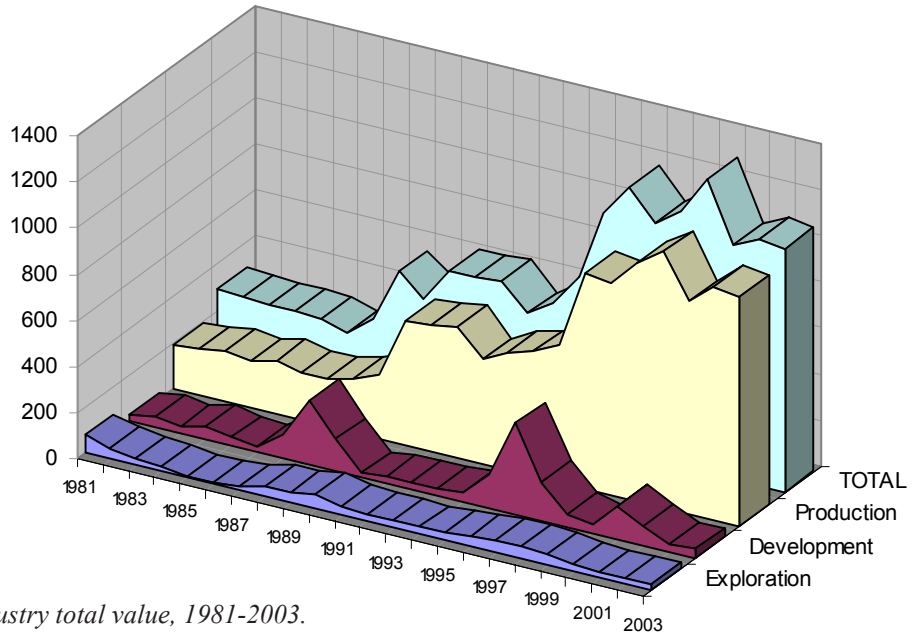


Figure 2. *Alaska's mineral industry total value, 1981-2003.*

eastern interior region, and the Nolan Creek Placer (gold) project in northern Alaska. These projects consisted primarily of feasibility studies and permitting but included substantial drilling at Rock Creek, and underground development and drilling at Nolan Creek. The decline in development spending reflects a shift to feasibility studies and permitting at advanced exploration projects, deferred development spending at Red Dog due to weak zinc prices, and an emphasis on exploration for new resource at the Fort Knox Mine complex.

Greens Creek mine achieved record production for the second consecutive year while tons milled at Red Dog and Fort Knox decreased very slightly from robust 2002 levels. Placer gold production increased about 750 ounces compared to 2002 production, while sand, gravel, rock, and other industrial materials saw a significant decrease following a decline in North Slope oil and gas activity and reduced statewide infrastructure projects.

EMPLOYMENT

Table 2 lists estimated employment in the Alaska mineral industry for the past 7 years. The total minerals industry employment in 2003 is estimated to be 1,906 full-time-equivalent jobs (table 2; fig. 3), a drop of about 900 jobs from the 2,824 jobs reported in 2002. Jobs declined across the mineral industry except for exploration. Large mines cut employees during the year while responding to low metal prices. The rebound in metal prices will likely prompt an

Table 2. *Estimated Alaska mine employment, 1997–2003*[a]

	1997	1998	1999	2000	2001	2002	2003
Gold/silver mining							
Placer	780	710	591	470	176	148	82
Lode	415	345	296	274	337	413	325
Polymetallic	230	275	275	275	275	262	295
Base metals	478	466	549	556	559	580	388
Recreational	270	255	240	250	210	180	175
Sand & gravel	700	658	590	603	556	702	349
Rock	123	121	128	150	137	177	35
Coal	118	128	121	121	121	100	65
Peat	42	40	38	36	32	21	20
Tin, jade, soapstone, ceramics, platinum	20	20	20	20	20	20	20
Mineral development	409	177	135	345	333	135	64
Mineral exploration	277	282	183	83	79	86	88
TOTAL	**3,862**	**3,477**	**3,166**	**3,183**	**2,835**	**2,824**	**1,906**

[a]Calculated on a 260-day work year.

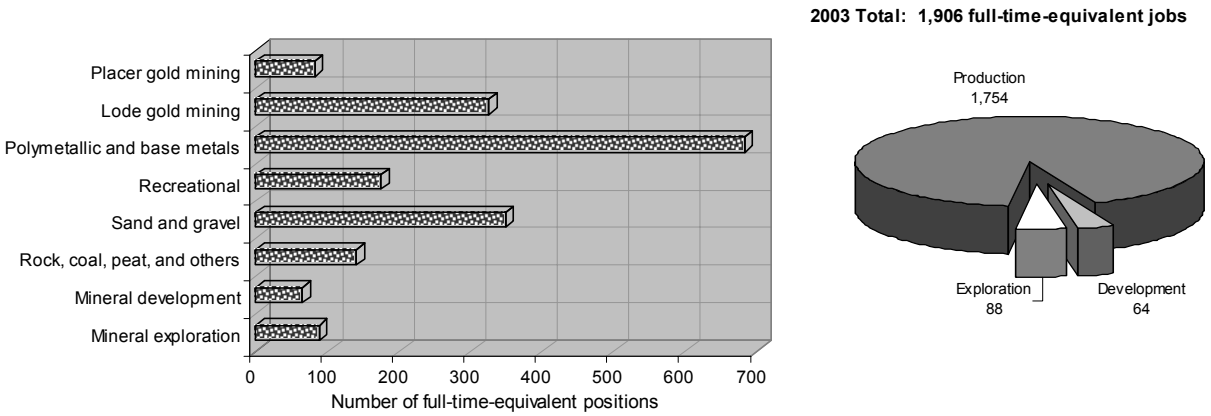


Figure 3. *2003 mineral industry employment by category.*

increase in mining jobs in 2004. Most of the decline was in the development and industrial minerals sectors.

ACKNOWLEDGMENTS

This report on the Alaska minerals industry is intended to provide current, accurate, and technically reliable information. The authors wish to thank all companies, agencies, and individuals that responded to the questionnaires or phone calls and provided information about their activities and operations. Without your voluntary and timely information this report would not be possible.

DGGS mailed more than 800 questionnaires in November 2003 and received 98 responses. Dave Szumigala (DGGS) and Rich Hughes (OED) prepared the body of the text, tables, and appendices with information supplied by many individuals and with the assistance of staff from other agencies. Information and text previously compiled by Rich Harris (DCED) for DGGS Information Circular 50 was used extensively. Where appropriate, these people have been acknowledged in the text.

The cover design is by Joni Robinson, and the graphic illustrations are modified from earlier version made by Fred Sturmann and Joni Robinson of DGGS. Paula Davis (DGGS) edited the final version, and Joni Robinson completed the layout and design. The Department of Commerce, Community & Economic Development paid printing costs.

EXPLORATION

Estimated exploration expenditures in Alaska during 2003 are about $27.6 million, a $1.1 million increase compared to expenditures of $26.5 million in 2002 and the second year in a row of increased exploration funding. The value of mineral exploration is still low compared to spending levels in the late 1980s through late 1990s. Exploration expenditures and employment by region are detailed in table 3. Exploration expenditures by commodity are listed in table 4 and shown in figure 4. The locations of significant exploration projects in Alaska during 2003 are shown in figure 5. Exploration during 2003 occurred across most regions of the state, with the exception of the Alaska Peninsula area, in which there was no known mineral exploration. Several large projects accounted for most of the exploration expenditures and drill footage: Donlin Creek gold project (Placer Dome Inc.), Pebble copper–gold project (Northern Dynasty Minerals Ltd.), Greens Creek mine exploration (Kennecott Minerals Co./Hecla Mining Co.), Tintina Gold belt projects (Anglo Alaska Gold Corp.), Nixon Fork gold–copper mine project (St. Andrew Goldfields Ltd.), Union Bay platinum–nickel–copper project (Lonmin PLC/Pacific North West Capital Corp./Freegold Ventures Ltd., and Fairbanks mining district gold projects (Kinross Gold Corp.). About 41 percent and about 26 percent of the 2003 Alaska exploration expenditures were spent in southwestern Alaska and eastern interior Alaska, respectively. The eastern interior region saw an increase in activity, while exploration in the Seward Peninsula dropped from 2002 levels. Gold remained the major exploration commodity, with more than $19 million spent on precious metal exploration in 2003, but

Table 3. *Reported exploration expenditures and employment in Alaska, 2003*

	Northern	Western	Eastern interior	South-central	South-western	South-eastern	Total
				Exploration expenditures			
Placer	$381,000	$ 65,000	$ 194,116	$ 23,000	$ 35,000	$ 27,000	**$ 725,116**
Lode	416,868	1,870,203	7,312,751	1,692,310	11,339,109	4,245,868	**26,877,110**
TOTAL	**$797,868**	**$1,935,203**	**$7,506,867**	**$1,715,310**	**$11,374,109**	**$4,272,868**	**$27,602,226**
				Exploration employment			
Employment							
Workdays	1,016	2,661	6,929	2,104	6,515	3,657	22,882
Workyears[a]	4	11	27	9	26	15	88
Number of companies reporting[b]	6	16	30	16	14	14	96

[a]Based on 260-day workyear.
[b]Some companies were active in several areas.
No exploration expenditures or employment reported for Alaska Peninsula in 2003.

polymetallic and platinum-group-element exploration also increased from recent levels. Platinum-group-element exploration increased to almost four times the 2002 levels. Base-metal exploration in 2003 was at historic lows, reflecting continued low zinc and lead prices through much of the year. Higher metal prices during the latter parts of 2003 significantly extended Alaska's field season, with several large projects beginning during the normally waning parts of the exploration season. Large staking programs near Lake Iliamna continued through the winter and into 2004. As in years past, most exploration funds, more than 68 percent, were derived from Canadian sources. Nine percent of the exploration funds were from non-U.S. and non-Canadian sources.

Table 5 summarizes the number of new and active (new plus existing) mining claims per year, from 1991 to 2003. The table has been modified to show the number of 20-acre federal mining claims, state prospecting sites, and 40- or 160-acre state mining claims. About 2,443 new state mining claims (296,800 acres), 92 new state prospecting sites (14,720 acres), and 676 new federal claims (595 lode,

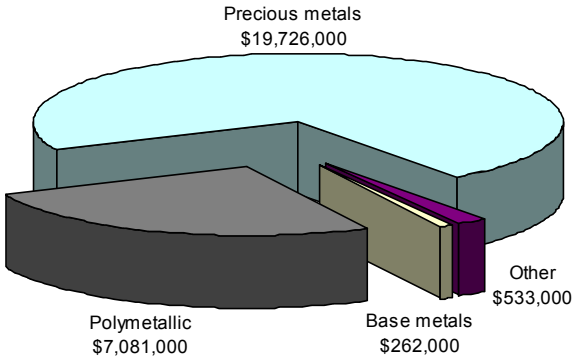


Figure 4. *2003 exploration expenditures by commodity.*

Table 4. *Reported exploration expenditures in Alaska by commodity, 1982–2003*

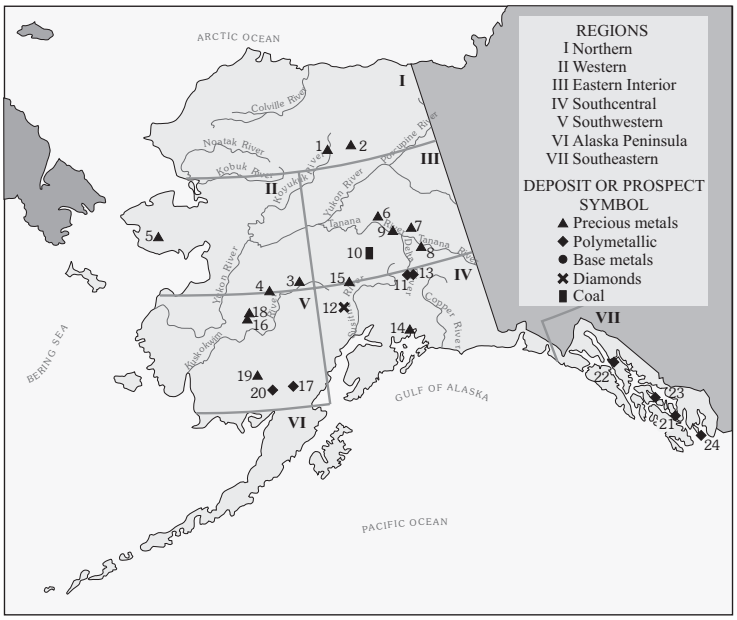
	Base metals	Polymetallic[a]	Precious metals	Industrial minerals	Coal and peat	Other[b]	Total
1982	$31,757,900	$ N/A	$ 10,944,100	$ - -	$ 2,900,000	$ 15,300	**$ 45,617,300**
1983	9,758,760	N/A	20,897,555	2,068,300	1,338,454	70,000	**34,133,069**
1984	4,720,596	N/A	14,948,554	270,000	2,065,000	279,500	**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**
1994	600,000	8,099,054	18,815,560	225,000	2,554,000	810,000	**31,103,614**
1995	2,770,000	10,550,000	20,883,100	100,000	- -	3,000	**34,306,100**
1996	1,100,000	11,983,364	31,238,600	400,000	- -	- -	**44,721,964**
1997	1,700,000	22,347,000	32,960,500	80,000	720,000	- -	**57,807,500**
1998	1,000,000	13,727,000	42,441,000	12,000	87,000	- -	**57,267,000**
1999	3,869,000	3,168,000	44,891,000	1,000	- -	410,000	**52,339,000**
2000	8,545,000	3,933,000	21,579,000	58,500	- -	736,100	**34,851,600**
2001	4,810,000	1,977,000	15,820,000	50,000	10,000	1,106,000	**23,773,000**
2002	1,700,000	5,162,000	17,342,000[c]	185,000	- -	2,113,000	**26,502,000**
2003	262,000	7,081,000	19,726,000	- -	W	533,000	**27,602,000**
TOTAL	**$96,170,566**	**$97,264,161**	**$561,468,743**	**$4,841,500**	**$16,887,750**	**$6,335,900**	**$782,968,620**

[a]Polymetallic deposits considered as a separate category for the first time in 1992.
[b]Includes diamonds and tantalum.
[c]Approximately $2.4 M spent on platinum-group-element exploration during 2003 ($2M in 2001, $650,00 in 2002).
N/A = Not available.
W = Withheld, data included in "Other" column.
- - Not reported.

81 placer, for a total of 13,520 acres) were staked in 2003. State claim staking increased dramatically from 2002 levels, while the number of new federal mining claims almost tripled from 2002 levels and reached staking levels not seen since 1997. The amount of land in Alaska under claim increased from 2002 to 2003, with approximately 2.9 million acres of land covered by claims or prospecting sites in 2003. This is an increase of 11 percent from 2002 levels, but still 22 percent below the 3.7 million acres under mining claim in 1999. Alaska had 8,424 active federal claims in early 2004.

The largest groups of claims (mostly state claims) in Alaska occur in the Fairbanks, Pogo, Tangle Lakes (Denali Block), and Pebble areas. Mining claims in the Fairbanks area now cover 133,480 acres, or more than 208 square miles. Placer claims account for 25 percent of the total claim area in the Fairbanks area. Claims in the Pogo area now cover in excess of 504 square miles. Mining claims in the Tangle Lakes area near the Fish Lake ultramafic complex cover more than 342 square miles. On-Line Exploration Services Inc., as an agent for Northern Dynasty, staked one hundred eleven 160-acre state mining claims covering 18,240 acres (28.5 square miles) near the Pebble property. Avalon Inc., as agent for Big Chunk Corp., staked nine hundred eighty-one 160-acre state mining claims covering 237 square miles in December northwest of the Pebble copper–gold porphyry property. This may be the largest single claim block staked at one time in Alaska history. The Big Chunk property was acquired by Liberty Star Gold Corp. in 2004. Claims in the Pebble area now encompass over 565 square miles.

Increased claim staking activity points to increasing mineral investment in Alaska. The increase in claimstaking



I Northern Region
1. Nolan Creek—Silverado Gold Mines Ltd.
2. Little Squaw Mine—Little Squaw Gold Mining Co.

II Western Region
3. Nixon Fork Mine—St. Andrew Goldfields Ltd.
4. Ganes Creek—Full Metal Minerals Ltd.
5. Area 51—Altar Resources Inc./Royal Pretoria Gold Ltd.

III Eastern Interior Region
6. Fairbanks District
   a. Fort Knox- True North—Kinross Gold Corp.
   b. Gil claims—Kinross Gold Corp./ Teryl Resources Corp.
   c. Ryan Lode, NOAA, and general—Kinross Gold Corp.
   d. Golden Summit—Freegold Ventures Ltd.
   e. West Ridge—Teryl Resources Corp.
   f. Fish Creek—Teryl Resources Corp./Linux Gold Corp.
7. Pogo—Goodpaster mining district
   a. ER and Eagle—AngloGold (USA) Exploration Inc./Rimfire Minerals Corp.
   b. General—Rimfire Minerals Corp.
8. Macomb—Geologix Explorations Inc.
9. Richardson district—Tri-Valley Corp.
10. Jumbo Dome—Usibelli Coal Mine Inc.

IV Southcentral Region
11. MAN—Nevada Star Resources Inc.
12. Shulin Lake—Golconda Resources Ltd./Shulin Lake Mining Inc./Shear Minerals Ltd.
13. Forbes-Emerick—Northridge Exploration
14. Cliff Mine—Western Warrior Resources Inc.
15. Golden Zone—Mines Trust Co.

V Southwestern Region
16. Donlin Creek—Placer Dome Inc.
17. Pebble—Northern Dynasty Minerals Ltd.
18. Flat—Ventures Resource Corp.
19. Shotgun—TNR Gold Corp.
20. Iliamna—Geocom Resources Inc.

VI Alaska Peninsula Region

VII Southeastern Region
21. Union Bay—Lonmin PLC/Pacific North West Capital Corp./Freegold Ventures Ltd.
22. Greens Creek Mine—Kennecott Minerals Co.
23. Woewodski Island—Olympic Resources Group LLC/Bravo Venture Group Inc.
24. Duke Island—Quaterra Resources Inc.

Figure 5. *Selected exploration projects in Alaska, 2003.*

Table 5. *Summary of claim activity by acres, 1991–2003*

Year	State Claims				State Prospecting Sites		Federal Claims	
	New 40 acre	New 160 acre	Total (Active) 40 acre	Total (Active) 160 acre	New	Total (Active)	New	Total (Active)
1991	3,277	0	38,485	0	747	1,735	1,299	23,222
1992	2,650	0	36,947	0	454	1,490	695	20,254
1993	2,110	0	34,908	0	1,412	2,281	601	9,298
1994	4,064	0	35,184	0	810	2,449	341	8,495
1995	4,508	0	31,796	0	1,030	2,850	376	7,766
1996	9,495	0	37,843	0	2,082	3,735	681	9,346
1997	8,671	-	44,001	-	2,474	5,328	1,872	11,320
1998	9,785	-	50,738	-	3,188	7,271	427	11,033
1999	11,977	-	57,012	-	1,755	7,647	308	10,176
2000	4,472	614	54,773	614	1,121	5,834	523	7,805
2001	859	907	50,174	1,519	26	3,105	464	8,248
2002	740	827	44,051	2,347	61	2,139	261	8,100
2003	784	1,659	37,441	4,006	92	1,836	676	8,424

Federal claims = 20 acres, State claims = 40 acres or 160 acres, State prospecting sites = 160 acres.
Information provided by Jack Davis (Land Records Information Section, DNR) and Evvie Garis (USBLM). Table has been reorganized to conform with computer records available after 1990.

suggests that explanation activity will increase in Alaska during 2004 as companies evaluate their land holdings with field investigations.

NORTHERN REGION

Silverado Gold Mines Ltd. and Tri-Con Mining Inc., its contract mining/exploration company, continued placer and lode gold exploration at the Nolan property near Coldfoot and the Dalton Highway, specifically directed at the lode source of the Nolan placer gold deposits, including definition of placer gold targets. Lode gold areas of interest include the Solomon Shear and placer targets include the Treasure Chest area, the Nolan Creek Deep Channel, the Swede Channel, and Mary's Bench. An exploration program was started in early 2003 directed at improving placer reserve definition and discovery of a lode source for the placer gold. The exploration effort consisted of geophysical data analysis, geochemical sampling and analysis, and exploration drilling of target areas. Lode gold exploration involved the analysis of geophysical, geochemical, and geological data provided by government mineral investigation efforts and publications and company records. This work led to the definition of a resistivity-low geophysical anomaly trending northeasterly from about lower Smith Creek, across the west face of Smith Dome, through upper Archibald Creek, upper Fay Creek and into the Hammond River drainage. This anomaly suggested the presence of conductive minerals (sulfides) and a possible lode source of placer gold. Past geochemical sampling by the U.S. Bureau of Land Management showed anomalous gold and associated element values from the area. Tri-Con undertook a geochemical soil-sampling program of the anomalous zone using handheld power augers (fig. 6). Nine lines of auger holes were laid out along the anomalous zone from near Fay Creek to south of Smith Creek; the lines were approximately 90° to the orientation of the indicated shear zone. Soil samples were collected from a total of 290 auger holes and geochemical results from these samples confirmed that an anomalous geochemical target with coincident gold, arsenic, and antimony anomalies existed

Figure 6. *Fawn Glassburn and Richard Lessard using a soil auger drill during lode exploration at the Nolan Creek property. Photo by Rich Hughes.*

on or near the resistivity-low anomaly. This 0.4-mile-wide by 3-mile-long target has been named the Solomon Shear; the anomaly is suspected to be a linear zone (shear) created by a fault system running nearly parallel to Nolan Creek. This fractured zone is thought to have been a conduit for mineral-bearing fluid migration, and a host for mineral deposition. Thirty-six lode claims were staked on the Solomon Shear area during 2003 to ensure complete coverage of the zone.

A placer gold exploration and development-drilling program was undertaken during September and October to define the upper Nolan Creek gold resource and to explore the "Treasure Chest" zone. The Treasure Chest area is an area above Mary's Bench on the side of Smith Dome and a very likely placer deposit target based on geological and geomorphologic interpretation. Twenty-seven holes were drilled on upper Nolan Creek in the upper portion of the Nolan Deep Channel deposit; this drilling defined an inferred resource of placer gold. An additional 27 holes were drilled in the Treasure Chest area. One hole returned a good mineralized intercept with significant amounts of stibnite, indicating the presence of a vein source in the area. Total placer drilling was 1,758 feet and about equally divided between upper Nolan Creek and the Treasure Chest area. A hard rock (vein) drilling program was started during December in the Solomon Shear area, with 5 reverse-circulation drill holes completed for a total of 1,175 feet. The best-mineralized interval was in drill hole 03SH-01, with a five-foot intercept from 25 to 30 foot depth of 0.036 ounces gold per ton. Drill hole 03SH-03 had seven 5-foot gold intercepts from 270 to 440 feet ranging from 0.012 to 0.030 ounces of gold per ton. Drill hole 03SH-05 had four 5-foot intercepts from 405 feet to 500 feet ranging from 0.010 to 0.020 ounces of gold per ton. This drilling program indicates that vein or shear zone mineralization occurs within bedrock in the Solomon Shear.

Higher gold prices have renewed interest in gold properties in the Chandalar mining district. Little Squaw Gold Mining Co. had a major change in management with a new president, CEO, and board of directors. A private placement raised $220,000 for company expansion of the Little Squaw property. The Little Squaw Mine was discovered in 1906 and has 1,500 feet of vertical exposure of gold-bearing quartz veins in Paleozoic schist (fig. 7). Six vein-bearing structures are known and total lode gold resources are 26,493 ounces at a grade of 1.50 ounces per ton. Current placer resources on the Little Squaw property are 390,000 ounces of gold. During 2003, Little Squaw Gold Mining Co. expanded on their 22 patented federal mining claims by staking an additional 81 state mining claims around the core historic mining area. The company is currently seeking a partner to further develop the property.

WESTERN REGION

Late in 2002, St. Andrew Goldfields Ltd. acquired a 51 percent interest in Mystery Creek Resources, which has an option to acquire a 100 percent interest in the historic Nixon Fork gold–copper mine near McGrath. Nixon Fork is a former high-grade (1 ounce per ton) gold producer with gold resources of approximately 190,000 ounces. The Nixon Fork gold mine consists of a 140-ton-per-day mill, workshops, offices, camp facilities, landing strip, power generation facilities, and associated mining equipment. St Andrew released a pre-feasibility study for the Nixon Fork project that describes the exploration and development activities and the estimated capital expenditure of $8,938,000 over a 30-month period to place the Nixon Fork property into production at a rate of 58,000 tons of gold per year. Gold production is projected to commence in the second half of 2004 at an annualized rate of 50,000 ounces of gold, approximately 500,000 pounds of copper, and byproduct silver. Estimated cash costs are $180 per ounce. Capital costs are projected to be $7.5 million, with payback in 1.5 years, based on a gold price of $325 per ounce. St. Andrew's partner, Geoinformatics Exploration Alaska Ltd., compiled and validated a complete geological database for the Nixon Fork property and surrounding areas. The data was used to create a revised geologic model of the mineralization and to identify additional drill targets. Toward the end of the year, from November 2003 to January 2004, a 450-foot exploration and development drift was driven from the Crystal decline to provide sutiable access for an underground drilling program. The purpose of underground drilling is to explore and expand known gold resources at the mine, including the C-3000 and C-3300 zones of gold mineralization.

Figure 7. *Dick Walters holding a piece of high-grade gold ore at the upper adit of the Little Squaw Mine. Photo provided by Little Squaw Gold Mining Co.*

This drilling was begun in January 2004, targeting additional resources on known mineralized zones. All other work at Nixon Fork in 2003 was directed toward permitting and re-commissioning the camp and equipment. During 2003 St. Andrew carried out a prefeasibility study and Roscoe Postle and Associates carried out a resource estimate. Based on the resource estimate and the prefeasibility study that estimated a cost of $10 million to recommence mining operations, St. Andrew embarked on a program to return the Nixon Fork Mine to production. During 2003 the main camp and surface infrastructure was rehabilitated. Underground development and stope preparation are planned to start in July 2004.

Altar Resources Inc. and subsidiary Royal Pretoria Gold Ltd. continued exploration on their gold prospects, with work north of Nome and in the Council area northeast of Nome. Altar worked on the Area 51 property, located 51 miles north of Nome. Soil sample results were up to 0.219 ounces of gold per ton and 1.65 percent arsenic. Rock samples had values up to 1.12 ounces of gold per ton and a trench had a 20-foot wide zone of 0.2 ounces of gold per ton. Mineralization consists of semi-massive pyrite, pyrrhotite, and arsenopyrite hosted in mafic schist. Altar also negotiated a deal with Bering Straits Native Corp. and prospected on residual placer gold properties along Ophir Creek in the Council–Solomon mining district. Some soil samples and 50 stream-sediment silt samples were collected in the most productive stream of this 1-million-ounce mining district. Rio Fortuna Exploration Corp. dropped their option on Altar's Full Auto property and conducted minor exploration on the Divide property.

Full Metal Minerals Ltd. signed a joint-venture agreement with Clark–Wiltz Mining on the Ganes Creek gold property. The Ganes Creek property consists of 252 state mining claims and 2,644 acres of patented mining claims under U.S. Mineral Survey 2288. The exploration target is the bedrock source for one of Alaska's most productive placer gold producing streams, with more than 250,000 ounces of placer production, and common large gold–quartz nuggets, up to 122 ounces. Full Metal contracted Northern Associates Inc. to complete an initial surface mapping and sampling program, focusing on a two- to three-square-mile area. Geologic mapping focused on gathering structural data, including delineating the Yankee–Ganes Creek fault zone and evaluating its control on lode gold mineralization. Lode and placer gold samples were collected for compositional analysis via electron microprobe to determine lode sources and lode types. Suites of unaltered and altered igneous rocks were collected for petrographic and geochemical classification. Soil samples were collected for orientation geochemistry on the ridge one mile south of the historic Independence Mine and on the slope west of Antenna Hill. Reanalysis of selected soil samples collected in 1999 show that a large unevaluated area warranting immediate follow-up sampling is situated between Potosi and Maki creeks. This area represents the middle to upper drainages of two of the richest placer-producing side creeks on the Ganes Creek property.

DGGS released maps and results from a 618-square-mile airborne geophysical survey in the Council area of the Seward Peninsula. Fieldwork including geologic mapping is planned for 2004.

EASTERN INTERIOR REGION

Kinross Gold Corp. (Fairbanks Gold Mining Inc.) continued exploration in the Fairbanks mining district with extensive drilling around the Fort Knox and True North gold deposits. Results from a Fort Knox in-pit drilling program confirmed sufficient continuity of known mineralized zones to justify a major 3-year pit wall layback at an assumed gold price of $325 per ounce. A mix of diamond and reverse-circulation drilling at True North continued throughout the year to focus on the conversion of resources to reserves and to outline the limits of mineralization. Kinross also conducted exploration, mainly drilling, at the Ryan Lode, Gil, and NOAA (or Dark Hollow) properties. The NOAA property, located immediately west of the Fort Knox mine, has two large gold soil geochemical anomalies over granite bedrock. The NOAA property is on BLM-administered lands that have been withdrawn from mineral entry on a portion of the Gilmore Tracking Station. Kinross planned to drill seven reverse-circulation drill holes on the NOAA property in 2003. Kinross also planned to drill 68 exploration holes along extensions of the Ryan Lode orebody.

The 2003 Gil Joint Venture exploration program by Kinross Gold Corp. and Teryl Resources Corp. consisted of: 127 reverse-circulation (RC) drill holes totaling 28,000 feet, 31 core holes totaling 8,917 feet, 4 trenches totaling 1,150 feet, and 358 rock samples collected for geochemical analysis. Additional work included geologic mapping, reclamation, surveying, environmental baseline studies, hydrologic characterization in the area of the Main Gil deposit, and engineering studies for a haul road and other project-related construction activities. The largest share of the exploration program was directed at increasing the level of confidence in the grade and continuity of mineralization at both the Main and North Gil deposits by increasing the nominal drill density and targeting specific areas having complex geology for additional drilling and trenching. Gold mineralization at the Main Gil zone is believed to extend 3,000 feet along strike and to be 70 feet thick, while mineralization at North Gil covers a zone 1,000 feet long and 500 feet wide, and appears to be open in all directions except to the north. Drilling was successful in expanding mineralized boundaries in portions of both zones as well as identifying several high-grade quartz vein targets.

Drilling results on the Gil property during 2003 include both high-grade intersections and thick ore-grade intercepts. Hole GVC03-300 in the North Gil Zone intersected a 35-foot section from 25 to 60 foot depth, at a grade of 0.36 ounces of gold per ton. The remaining five reverse-circulation holes from the North Gil zone (GVR03-288 to -292) also intersected significant intervals between 10 and 40 feet thick with grades from 0.033 to 0.085 ounces of gold per ton. Core drilling at the North Gil area also had significant gold intercepts, including hole GVC03-310 with a 25-foot interval from 40 to 65 feet averaging 0.111 ounces of gold per ton and a 5-foot intercept in core hole GVC03-311 from 45 to 50 feet averaging 0.129 ounces of gold per ton. Six core holes from the North Gil Zone (GVC03-309 to –314) also had mineralized intersections from 5 to 20 feet thick ranging from 0.026 to 0.092 ounces of gold per ton. At least 54 holes (a mix of core and reverse-circulation holes) from 2003 drilling in the Main Gil area had significant gold grades, with intercepts ranging from 5 to 75 feet thick and gold grades from 0.024 to 0.140 ounces per ton. Best gold results were in hole GVC03-316 with a 20-foot intercept from the surface averaging 0.187 ounces of gold per ton and a 20-foot intercept from 105 to 125 foot depth of 0.326 ounces of gold per ton; hole GVC03-335 which intersected 30 feet of 0.280 ounces of gold per ton from the surface, including a 5-foot interval from 5 to 10 feet averaging 1.040 ounces per ton; hole GVR03-398, which intersected 135 feet of 0.087 ounces of gold per ton including 85 feet of 0.121 ounces of gold per ton, and hole GVC03-465 which intersected 25 feet of 0.194 ounces of gold per ton from 225 to 250 feet, and 105 feet of 0.170 ounces of gold per ton from 290 to 395 feet, including 15 feet of 0.529 ounces of gold per ton from 310 to 325 feet.

Elsewhere on the Gil property, exploration work also took place along Sourdough Ridge, the Intersection Area (where the Main Gil and North Gil trends intersect), and in the western portion of the Gil Joint Venture claim block near the Fort Knox Mine. Sourdough Ridge fieldwork outlined two significant calc–silicate units that crop out on the surface for approximately 300 feet in a northeast–southwest trend and remain open to the northeast. In the Intersection Area, drilling confirmed strong gold values exposed in trenching and outlined an east–west trend to the mineralization. One drill hole was collared in the western portion of the Gil Joint Venture block, but did not intersect significant mineralization. This area has not yet been thoroughly investigated.

Teryl Resources Corp. conducted an exploration and drilling program on its 100-percent-owned West Ridge property and its 50 percent option from Linux Wizardry Systems Inc. on the Fish Creek property, both in the Fairbanks District. The West Ridge property contains the Western gold anomaly, approximately 4,000 feet by 3,000 feet in size, with gold-in-soil values up to 0.13 ounces of gold per ton and best gold values of 0.48 ounces of gold per ton from float rock in hand-dug holes. Gold at the Western anomaly is closely associated with high levels of arsenic and antimony, similar to mineralization found at the nearby True North gold deposit. Teryl discovered gold mineralization at the Old Glory prospect on the West Ridge property with mineralization in rock and soil samples up to 0.29 ounces of gold per ton. Avalon Development Corp. completed a rock, close-spaced soil auger sampling, and trenching program at the Old Glory prospect. Rock samples consisted of quartz mica schist and medium-grained diorite intrusion containing abundant sericite alteration associated with brown iron oxide after carbonate and reddish brown hematite after pyrite. Quartz veining ranged from fine chalcedonic veinlets to more than 1 inch wide milky white mesothermal veins with pitted pyrite and minor scorodite after arsenopyrite. Soil sampling results suggest a false bedrock layer of shingled barren quartz mica schist exists about 3 to 4 feet below surface. Once through this false bedrock, soil samples were taken as deep as 6 feet below surface and often contained abundant ocherous red-orange soil at the bedrock interface. Three phases of rock and soil auger sampling completed at the Old Glory prospect expanded the extent of anomalous gold in rocks and soil to an area measuring 1,600 feet northeast–southwest by 1,600 feet northwest–southeast. Soil values in this grid range up to 0.062 ounces of gold per ton with 2,850 parts per million arsenic and 200 parts per million tungsten. Rock samples collected from old prospect pits and trenches within the soil grid returned values up to 0.292 ounces of gold per ton, 5,900 parts per million arsenic and 144 parts per million bismuth. Substantial mineralization occurs at intersections of northeast-trending structures with northwest-trending structures. Arsenic mimics gold to a large degree while tungsten and bismuth mineralization are less definitive. Unaltered quartz veins containing jamesonite were discovered in a shear zone in Trench 1. The rocks are pervasively sericite altered and at the southwest end of Trench 3 a granodiorite intrusive body was encountered which has sericitic alteration similar to other intrusion-hosted gold systems in the region. The extent of this intrusive body is unknown at present. The most significant geochemical results from the three West Ridge trenches totaling 1,000 feet came from the last 50 feet of Trench 3, which averaged 0.017 ounces of gold per ton and intersected a highly oxidized sericite-altered diorite to granodiorite intrusion containing up to 0.087 ounces of gold per ton with 3,140 parts per million arsenic. Ground magnetic and very low frequency electromagnetic (VLF-EM) surveys were also completed over the three trenches.

Teryl Resources negotiated a lease of 440 acres in the Fairbanks mining district from the State of Alaska Mental Health Trust Land Office (TLO). The trust land, named the Black Dome area, is adjacent to the western portion of

Teryl's West Ridge claims and 40 acres are located within the West Ridge claims. The Eldorado Fault cuts through the Black Dome area, the same fault that bounds Kinross Gold's True North gold deposit, approximately three miles to the northeast. Field crews from Teryl's geologic consultant, Avalon Development Corp., sampled a newly discovered old trench at Black Dome, which contains rubble composed of black carbonaceous schist cut by numerous quartz–carbonate veinlets. Most of the carbonate was altered to a soft brown–red oxide, similar to oxide ore at the True North Mine.

In March, Avalon Development Corp. completed a five-hole, reverse-circulation drilling program to test several magnetic anomalies for potential placer and lode gold mineralization on the Teryl–Linux Gold Corp. Fish Creek property. Extremely high grade gold placer accumulations were previously encountered in a narrow right-limit channel during excavation of the Fort Knox mine fresh water dam site but their extent and grade downstream on the Fish Creek property has never been determined. Hole number five intercepted 5 feet of 0.068 ounces of gold per ton between 45 and 50 feet, but the other four holes did not encounter detectable gold. A ground magnetic orientation survey was also completed on the right limit (east) side of Fish Creek Valley, approximately 600 to 700 feet down-valley from the toe of the Fort Knox mine fresh water supply dam. The survey consisted of two lines with 200-foot line spacing and 10-foot station spacing. Total field and vertical gradient magnetic data have a good correlation, with five anomalies identified and possibly three placer gold targets. Two anomalies, estimated to lie 8 to 12 feet below the surface, recommended for further testing are on the west side of Lines 100N and 300N, just east of Fish Creek, and a strong anomaly on the eastern extent of Line 300N.

Freegold Ventures Ltd. drilled three diamond core holes in early 2003 near the Cleary Hill mine area on the Golden Summit project on Cleary Summit in the Fairbanks mining district and confirmed the presence of a wide, lower-grade gold system hosted by quartz veins and stockwork zones. Results from hole CHD2003-01 include an intercept from 41 feet to the end of hole at 408.5 feet, an average of 0.030 ounces of gold per ton with several high-grade intersections included, such as 5.0 feet of 0.283 ounces of gold per ton, 15.2 feet of 0.261 ounces of gold per ton and 26 feet grading 0.127 ounces of gold per ton. Other 2003 drill results include 23.5 feet grading 0.030 ounces of gold per ton in hole CHD03-2 and 14.5 feet grading 0.067 ounces of gold per ton in hole CHD03-3. Drill results were interpreted to confirm the presence of quartz veins and stockwork zones in a vein swarm extending across a north–south distance of 1,300 feet from the Wyoming mine on the south to the Cleary Hill mine on the north. To date, drilling and surface trenching have identified at least 17 mineralized structures in this area. Mineralization is hosted in highly altered schist containing widespread disseminated and high-grade gold mineralization. Freegold announced a joint-venture agreement with Meridian Gold Inc. on two areas of the Golden Summit project late in 2003. Meridian may earn a 50 percent interest in the Golden Summit project by making exploration expenditures totaling $5 million, cash payments of $390,000 over 4 years, and investing a minimum of $300,000 in Freegold through private placements. Meridian may increase its interest to 60 percent by completing an independent, bankable feasibility study. Once Meridian has completed the feasibility study, Meridian may elect within 180 days to increase its interest to 70 percent. Meridian shall be responsible for arranging all production financing. Meridian committed to an airborne magnetic survey over part of the Golden Summit property in late 2003 and an exploration program of $650,000 for 2004.

AngloGold USA Exploration Inc. and partner Rimfire Minerals Corp. conducted exploration on the ER and Eagle gold projects in the Goodpaster area just west of the Pogo gold property. Work on the ER property resulted in drilling 7,090 feet of core in six holes centered over a 5,000-foot by 1,000-foot gold-in-soil anomaly with coincident arsenic, bismuth, and antimony anomalies along a contact between a Cretaceous intrusion and metamorphic country rocks. Drill results included more than 24 narrow intercepts with significant gold mineralization, including 12.8 feet of 0.03 ounces of gold per ton in hole ER03-1, and 0.65 feet of 4.71 ounces of gold per ton in hole ER03-5. Gold mineralization, including visible gold, is hosted in Pogo-style quartz–sulfide veins with sericite and pyrite alteration and some vein breccias. At the Eagle property, AngloGold conducted additional soil sampling to follow up favorable soil results obtained in 2002. Workers investigated an intrusive contact on the east side of the property and four discrete gold–arsenic–bismuth–antimony–tungsten anomalies have been found over a 2-mile by 1-mile area. Rock chip samples from the area sometimes are altered and contain sulfide-bearing quartz veinlets. One rock sample contained 0.25 ounces of gold per ton.

Rimfire Minerals, in a deal with Western Keltic Mines Alaska Inc, acquired an additional 70 percent interest, for a 100 percent interest, in the California–Surf properties along the southeast extension of mineralization in the Pogo area. Rimfire also staked additional claims along the Pogo trend. Mining claims in the Pogo area now cover over 504 square miles.

AngloGold USA conducted first-phase exploration for intrusion-related gold deposits in the Livengood mining district (fig. 8). Further work is planned in 2004 based on encouraging results.

The Uncle Sam project in the Richardson district was optioned by Kennecott Exploration Inc. to Geoinformatics Exploration Ltd., a technology-based exploration company, and is currently held by Geoinformatics Exploration Alaska

Figure 8. *Reverse-circulation drilling at Money Knob, Livengood mining district. Photo by David Szumigala.*

Ltd. Geoinformatics must spend $250,000 on the project over 5 years and Kennecott retains a 2.5 percent net smelter returns production royalty. Kennecott collected about 2,500 soil samples on the property from 1999 to 2001, identified 10 major gold anomalies across the property, and drilled some of the soil gold anomalies. Drill results include 28 feet of 0.094 ounces of gold per ton, 70 feet of 0.094 ounces of gold per ton, and 82 feet of 0.032 ounces of gold per ton. Gold mineralization previously identified by Kennecott is predominantly shear hosted in metamorphic country rocks with additional local zones of hydrothermal breccia and sulfide (pyrite, with lesser arsenopyrite and stibnite) veining. Geoinformatics reinterpreted existing data at the Uncle Sam property, made a first-pass three-dimensional model of structures intersected by previous drilling, and completed a geochemical and structural comparison of mineralized zones at the Uncle Sam property with published work on the Pogo deposit. Geoinformatics is currently developing a strategy for further exploration and plans to conduct field exploration in 2004.

Geologix Explorations Inc. completed initial exploration at its Macomb gold prospect in the northern Alaska Range approximately 50 miles southeast of Delta Junction and 9 miles south of the Alaska Highway. The property is underlain by a Cretaceous biotite hornblende granodiorite dated at 95.2 +/- 0.8 Ma. that has intruded into Yukon–Tanana terrane metamorphic rocks. Geophysical work, including Induced Polarization (IP), resistivity, and magnetic surveys, and soil geochemical surveys identified likely gold targets and four drill holes were completed for a total of 1,394 feet of drilling. Three diamond drill holes were unable to penetrate glacial till overburden that is at least 400 feet thick. The fourth drill hole tested a lower priority target and indicated sporadic low-level gold values scattered throughout a 50-foot-wide altered and faulted structural zone.

Tri-Valley Corp. implemented a two-phase reverse-circulation drilling program to confirm a suspected high-grade-potential deep placer gold target at First Chance Creek along the northeast boundary of its 42-square-mile claim block in the Richardson mining district. Very-high-grade placer gold samples from shafts dug near the creek had been reported in 1906-era Fairbanks newspapers. Tri-Valley sampling of the creek and surrounding materials found placer gold at the surface in this area. Tri-Valley's project manager, Pacific Rim Geological Consulting Inc., designed a program to test gravels from surface to bedrock at a 60–90 foot depth by reverse-circulation drilling with all drill materials to pass through a Denver Gold Saver before disposal of spoils. The first phase of 42 holes was drilled at three locations crossing the First Chance Creek valley. The general target area was 2,000 yards in length by 70 yards wide. Results indicated a potential inferred and probable resource of 38,000 ounces of gold. Phase II of the program has an additional 66 holes planned for 2004.

Usibelli Coal Mine Inc. explored their coal leases on Jumbo Dome, approximately 9 miles north of the Two Bull Ridge mine. Usibelli opened two large trenches and took two large bulk samples of coal from three coal seams. Analyses of the coal indicated very good quality, with approximately 4 percent ash content and 0.11 percent sulfur. These results are encouraging for the proposed Emma Creek Energy Project, a mine-mouth coal-fueled power plant envisioned in the Jumbo Dome area. Usibelli proposes a 200-megawatt power plant within several miles of coal beds at Emma Creek that would be along the Fairbanks to Anchorage utility intertie. The project would need major support from Alaska railbelt utility companies, with capital costs estimated at $420 million.

A number of placer operators continued exploration across the eastern interior region in established mining districts. Much of the placer gold exploration involved auger and reverse-circulation drilling.

SOUTHCENTRAL REGION

Nevada Star Resources Inc. continued to explore the MAN property near Tangle Lakes and the Denali Highway with claim staking, ground geophysical and soil geochemical surveys, rock sampling, trenching, and drilling. The MAN property consists of seven distinct project areas: Canwell, Dunite Hill, Rainy, Fish Lake, Broxson, Eureka, and Summit Hill. Nevada Star acquired a 100 percent interest during 2003 in the Canwell area from FNX Mining Company Inc., subject to a 2 percent net smelter return royalty to American Copper Nickel Co., a subsidiary of Inco Ltd. Nevada Star acquired an additional 80 square miles of ground by staking, to bring its total MAN Property land package to more than 230 square miles, or 145,000

acres. The key new acquisition was the Fish Lake Project, consisting of more than 50 square miles of Alaska State mining claims and with massive sulfide showings up to 3 feet thick in gabbro that grade up to 5.2 percent nickel, 3.3 percent copper, 0.3 percent cobalt, and 0.051 ounces of palladium per ton. The Fish Lake intrusion is a 24-mile-long by 2-mile-wide layered mafic–ultramafic complex, the largest in all of Wrangellia, one of the major flood basalt provinces in the world. Some of the new claim staking covers an area called Summit Hill that is coincident with a 7-mile-diameter annular magnetic anomaly. Limited sampling from a magnetite-rich showing in the Summit Hill area returned 1.58 percent nickel, 1.07 percent copper, 0.009 ounces of platinum per ton, 0.014 ounces of palladium per ton, and 0.003 ounces of gold per ton. Other staking consolidated Nevada Star's land position and covers new target areas over the Dunite Hill, Rainy, Canwell, and Eureka project areas.

Exploration work included constructing a 3.7-mile tractor–ATV trail to the top of Canwell from the Richardson Highway, six trackhoe trenches totaling 1,200 feet at Canwell, and collection and analysis of more than 1,000 rock, trench, and colluvium samples. A surface geophysical program was completed at Dunite Hill, including gravity and a ground loop electromagnetic survey (UTEM™ system—University of Toronto Electromagnetics). Mineralization along five trenches in the Canwell area was exposed for a strike length of 1,100 feet with widths up to 25 feet, with maximum values in 5-foot channel samples of 0.046 ounces of platinum per ton, 0.032 ounces of palladium per ton, 1.58 percent nickel, 0.006 ounces of gold per ton, and 0.48 percent copper. Soil sampling in the Canwell and Rainy areas detected six large platinum–palladium–gold soil anomalies ranging in size from 1,000 to 6,500 feet long and 500 to 1,000 feet wide. Nevada Star drilled a total of 565 feet in three holes at the Fish Lake Complex portion of the property where platinum and palladium mineralization was discovered along with nickel and copper sulfides associated with mafic to ultramafic intrusions. Assays from Nevada Star's surface sampling returned values of up to 0.053 ounces of palladium per ton and 1.3 percent nickel. Encouraging drilling results from hole FL-09 found semi-massive sulfide mineralization consisting of pyrrhotite, pentlandite and chalcopyrite, in clinopyroxenite, with the best intercept being 9 feet containing 0.03 ounces of platinum per ton, 0.03 ounces of palladium per ton, and 0.3319 percent nickel at a 109- to 118-foot depth. Drillhole FL-11 encountered low-grade platinum–palladium–nickel mineralization over the length of the hole. In mid-December, Nevada Star interpreted elevated platinum and palladium concentrations in hole FL-09, and the change in the platinum to palladium ratio from approximately 1:1 to 1:2–1:3 in the overlying horizons, as suggesting that the sulfide mineralization is fractionated with respect to platinum and palladium. Late in the year, Nevada Star announced a letter of intent with Anglo American Exploration Ltd. for approximately 50 percent of the MAN project area over the Fish Lake and Dunite Hill areas.

DGGS, with funding from BLM, released geophysical maps and results from a 603-square-mile geophysical survey over ultramafic intrusions centered on the MAN property. The geophysical results spurred a claim staking rush that ultimately covered more than 80 square miles. By the end of the year, claims in the Tangle Lakes area covered in excess of 342 square miles.

Northridge Exploration planned to dig some trenches on its Forbes Emerick property near Isabel Pass to explore for polymetallic mineralization. The company discovered additional massive sulfide mineralization near the Forbes prospect.

Golconda Resources Ltd. and Shulin Lake Mining Inc. continued exploration on the Shulin Lake diamond property in southcentral Alaska near Talkeetna. In September, the Shulin Lake Joint Venture drilled two holes into a complex circular structure visible on satellite imagery. This structure has a diameter of about 1.25 miles. The holes intersected a volcanic sequence of sandy tuffs and fine ash, indicating to the joint-venture partners that this feature is most likely a volcanic center and the source of the diamond indicator minerals and micro-diamonds found in earlier programs. Indicator minerals selected from these two holes show a chemical composition similar to eclogitic minerals found in lamproitic environments elsewhere. The joint venture plans to drill ten holes for a total of 3,000 feet to test different areas of this circular structure in an effort to intersect volcanic rocks with higher olivine content that possess the greatest diamond potential. The drilling is scheduled for the second half of March 2004.

Western Warrior Resources Inc. concluded an exploration program, including drilling a total of 4,855 feet in six core holes, at the Cliff Gold Mine property, consisting of six patented and two unpatented federal mining claims, 7 miles west of Valdez. The Cliff Mine produced a total of 51,740 ounces of gold and 8,152 ounces of silver from 29,695 short tons milled between 1910 and 1942, for an average recovered grade of 1.74 ounces of gold per ton and 0.27 ounces of silver per ton. Prior to the 2003 drill program no exploration diamond drilling had been conducted at the property. The drill program was successful in intersecting the previously mined vein structures and in determining the geometry of several vein structures. Eighty-eight samples were assayed for gold, silver, and a 31-element geochemical package. Two significant gold intercepts were found in drillhole WW6-03. At 386 feet, a 0.9-foot-wide intercept assayed 0.96 ounces of gold per ton and 0.148 percent arsenic, and at 570 feet a 0.9-foot-wide interval assayed 0.39 ounces of gold per ton and 0.526 percent arsenic. Additionally, a distinct geochemical zoning or sig-

nature of the auriferous vein structures was observed. The gold-bearing veins are generally quartz breccia veins with free gold, less than 3 percent disseminated sulfides consisting of pyrite, arsenopyrite, and minor galena and sphalerite, and clay gouge along vein margins. The vein structure geometry and geochemical signature provide significant data that will be utilized in the next phase of exploration at the property, including staking additional claims in the general area.

Freegold Ventures Ltd. entered into an option/joint venture agreement with CanAlaska Ventures Ltd., whereby Freegold may earn up to a 65 percent interest in the Rainbow Hill Gold project located in the western Clearwater Mountains of central Alaska. Under the terms of the agreement, Freegold may earn a 50 percent interest by expending $2 million over 6 years, making cash payments of $160,000 over 4 years, and issuing 300,000 shares over 4 years. Freegold may increase its interest to 60 percent by completing a positive feasibility study, and 65 percent by putting the project into commercial production. The property is centered on Gold Hill and Lucky Hill where most of the known lode gold occurrences of the Valdez Creek mining district are found. Three miles downstream from the Rainbow Hill property is the past producing Valdez Creek placer gold mine, which produced over 500,000 ounces of gold. Lode gold mineralization in the Rainbow Hill property area consists of gold-bearing, quartz-carbonate-arsenopyrite-pyrite veins up to 12 inches thick in stacked zones, which generally strike east-west and dip variably north or south. Structures that control gold mineralization include east-west trending thrust faults and crosscutting high-angle faults. Drilling by CanAlaska at the TMC zone, located on the south end of Lucky Hill, defined a 90,285 ounce gold resource. Other drill targets on the property include the Gold Hill prospect, the Lucky Saddle prospect and the Lucky Top prospect. Induced Polarization (IP) resistivity geophysical data suggest the mineralized zones are open down dip and along strike to the west where additional drilling has the potential to increase the current estimated gold resource in the area. Freegold also holds the Rob project area, covering historic gold mines east of the Pogo property.

Mines Trust Co. explored the Golden Zone property with 1,000 feet of trenching in the Long Creek area about 1.5 miles south of the Golden Zone breccia pipe. Soil and rock samples were also collected, but no results were announced, other than many sample results had greater than 0.50 percent copper and some sample results were greater than 0.08 percent nickel.

Full Metal Minerals Ltd has an option to earn a 100-percent interest in the Gunsite copper–gold porphyry prospect. Four areas of the property, Prescott Point, West Prescott, Gunsite Pass, and Penger Mountain, have copper-gold-silver mineralization hosted in a Cretaceous dioritic batholith. Mineralization consists of both structurally controlled and disseminated porphyry-type copper and gold. Previous investigations by other operators included surface sampling and an IP survey.

SOUTHWESTERN REGION

The Donlin Creek gold project dominated Alaska's exploration sector over the past several years and is advancing toward the feasibility (development) phase. A new resource announced in late 2002 increased inferred gold resources by nearly 40 percent to 14.8 million ounces grading 0.102 ounces per ton, with a measured and indicated resource of 8.3 million ounces of gold grading 0.102 ounces per ton, using a 0.058 ounce per ton gold cut-off grade. The Donlin Creek deposit is ranked as the 22nd largest gold deposit in the world with 23 million ounces of gold resources. In early 2003, Placer Dome Inc. exercised its back-in right to earn a 70 percent ownership of the Donlin Creek project, and consequently must spend $32 million, complete a feasibility study, and make a positive construction decision for a mine that would produce at least 600,000 ounces of gold per annum to earn that interest. The current timetable, assuming a positive feasibility study, would have production begin in 2009 or 2010. A gold resource calculated in April 2003, at a cutoff of 0.044 ounces of gold per ton, indicates 11.1 million ounces of gold as a measured and indicated resource, with inferred resources at 14.3 million ounces of gold (table 6). Work in 2003 focused on identifying acceptable alternatives for project access, power

Table 6. *2003 Donlin Creek gold resource estimates*

2003 Resource Estimates

0.044 ounces per ton gold cut off grade

Resource Category	Tons (Millions)	Gold Grade Ounces/Ton	Contained Ounces
Measured	8.71	0.091	799,000
Indicated	120.70	0.085	10,343,000
Total M&I:	**129.52**	**0.088**	**11,142,000**
Inferred	156.75	0.091	14,308,000

November 2002 Updated Resource Estimates

0.044 ounces per ton gold cut off grade

Resource Category	Tons (Millions)	Gold Grade Ounces/Ton	Contained Ounces
Measured	7.368	0.097	713,000
Indicated	106.395	0.087	9,220,000
Total M&I:	**113.763**	**0.087**	**9,933,000**
Inferred	205.819	0.087	17,849,000

Note: Tons and Contained Ounces are rounded to the nearest 1,000. Total M&I = Total Measured & Indicated Resource.

supply, and local sources of key consumables. Feasibility and engineering studies are also underway. The modeled Donlin Creek Mine is estimated to have a maximum load demand of approximately 70 megawatts and an average load demand of 55 to 60 megawatts. A subsidiary of Calista Corp. conducted an energy study for the Donlin Creek project and the villages and towns in the region surrounding the proposed mine, with a coal-fired plant based downriver in Bethel as the cheapest option. The Bethel coal-fired plant would produce at least 100 megawatts of power and run on a yearly supply of approximately 400,000 tons of coal, likely shipped from British Columbia, and a 192-mile, 138 kV transmission line would bring electricity to the mine. A 400-mile transmission line from Nenana is also under consideration at a cost of $360 million, but a power plant based in Bethel would create approximately 240 jobs in the Calista region, one of the poorest regions of Alaska, and could be permitted and built by 2009 or 2010. Plans for 2004 include additional test work to further refine the flow sheet, completion of a pre-feasibility study, and continuation of the environmental baseline studies required for permitting. Pending a positive pre-feasibility assessment, the permitting process would begin in the fourth quarter of 2004 and run concurrently with the development of the final feasibility study. The project budget for 2004 is $6 million.

The Pebble property near Iliamna in southwestern Alaska was Alaska's largest exploration project in 2003. Northern Dynasty Minerals Ltd. completed more than 72,000 feet of core drilling on this copper–gold porphyry project to confirm, delineate, and extend higher-grade areas of the Pebble deposit. This year's work also significantly expanded the higher-grade resources at Pebble to an estimated 435 million tons of material grading 0.84 percent copper. Prior to the 2003 drilling program, Northern Dynasty commissioned an independent mineral resource estimate by engineering firm Snowden Mining Industry Consultants Inc. of West Perth, Australia. At that time, Snowden estimated inferred resources in the Pebble deposit of 1.102 billion tons grading 0.012 ounces of gold per ton, 0.30 percent copper, and 0.015 percent molybdenum (0.61 percent copper-equivalent) above a cutoff grade of 0.30 percent copper-equivalent.

Copper equivalent calculations use metal prices of $0.80/lb for copper, $350/oz for gold, and $4.50/lb for molybdenum, using the following formula: copper equivalent = copper percent + (ounces of gold per ton x 0.0292 x 11.25/17.64) + (molybdenum percent x 99.23/17.64), and have not been adjusted for metallurgical recoveries.

Snowden also estimated that the Pebble deposit contains significant amounts of higher-grade mineralization: 299 million tons of 0.017 ounces of gold per ton, 0.43 percent copper and 0.018 percent molybdenum (0.86 percent copper-equivalent) above a cut-off grade of 0.70 percent copper-equivalent. A detailed review and analysis of drill core by Northern Dynasty geologists confirmed that the Pebble deposit was open for expansion and that there was good potential for additional higher-grade mineralization in the deposit. An updated geologic model suggested that the Pebble property is intruded by a series of small stocks with at least three mineralized sources. Several priority areas were identified, including two mineralized granodiorite porphyry stocks. Higher-grade material was modeled to occur at the carapace of the stocks in both the intrusions and surrounding volcanic country rocks.

The 2003 drilling program at Pebble in the resource area was planned to drill angle holes across the northeast-trending mineralization, utilize oriented-core methods to determine the dominant mineralized fracture orientations, tighten the spacing between drill holes from the current 300- to 800-foot spacing, drill deeper holes because many earlier holes bottomed in mineralization, and step-out the drilling to the northeast and southwest. Between May and November 2003, Northern Dynasty drilled 58 holes, totaling 64,727 feet, in the Pebble deposit. Drilling results indicate significant extensions to the higher-grade mineralization within the Pebble deposit. Nine other holes, totaling 6,519 feet, were drilled to test four other prospective zones on the property. Significant drilling results are shown in tables 7a and 7b.

Some spectacular thick and rich drilling results include: hole 3105, located outside the western boundary of the deposit intersected 152.6 feet grading 0.92 percent copper equivalent, drill hole 3114, located 700 feet outside the southeastern boundary of the Pebble deposit, intersected 380 feet grading 0.98 percent copper equivalent, and exploration holes 3107 and 3109 located 6,500 feet and 8,200 feet north of the Pebble deposit, intersected low-grade stockwork gold mineralization over considerable lengths (426 feet grading 0.011 ounces of gold per ton and 170.6 feet grading 0.010 ounces of gold per ton, respectively). Limited surface exploration, consisting of geological mapping and soil geochemical traverses, was also conducted.

Based on the 2003 program, Northern Dynasty believes that Pebble has an excellent configuration for very low cost open-pit mining. The mineralization is very continuous with almost no internal waste and is persistent over a broad area measuring at least 1.86 miles east–west by 1.25 miles north–south. Mineralization begins right at the bedrock surface, which is covered only by a thin veneer of gravel ranging from 15 to 80 feet thick, indicating the deposit will have a very low stripping ratio. The deposit is open to the south, west, and east under thickening Tertiary cover. Currently, the deposit averages 1,150 feet thick and is open to depth. After the 2003 drilling program was completed and the results compiled, the company commissioned Norwest Corp. to make an independent mineral resource estimate at Pebble. Norwest estimated that the

Pebble deposit contains 26.5 million ounces of gold and 16.5 billion pounds of copper within an inferred mineral resource of 3.02 billion tons grading 0.55 percent copper-equivalent (0.0088 ounces of gold per ton, 0.27 percent copper and 0.015 percent molybdenum above a cut-off grade of 0.30 percent copper-equivalent). Importantly, the Norwest estimate significantly expanded the higher-grade resources to 479.5 million tons of 0.014 ounces of gold per ton, 0.42 percent copper and 0.021 percent molybdenum, or 0.84 percent copper-equivalent above a cut-off grade of 0.70 percent copper-equivalent. These higher-grade resources could facilitate rapid recovery of capital costs during the early years of a large-scale mining operation. By one estimate these mineral resources would make the Pebble deposit the largest gold resource and the second largest copper resource in North America, as well as the world's third largest copper–gold porphyry deposit.

On-Line Exploration Services Inc., as an agent for Northern Dynasty, staked one hundred eleven 160-acre state mining claims on the east and west sides of Northern Dynasty's claim block. The total area staked was 18,240 acres (28.5 square miles). Avalon Inc., as agent for Big

Table 7a. *Northern Dynasty Ltd.- Pebble Project, assay results from resource lands drilling*

Drill hole number		From (feet)	To (feet)	Intercept (feet)	Gold (Au) oz per ton	Copper (Cu) %	Molybdenum %	CuEQ[a] %	AuEQ[a] oz per ton
3069		95.5	867.1	771.7	0.012	0.24	0.010	0.55	0.025
3069	Included	546.9	607.0	60.0	0.029	0.39	0.012	1.08	0.050
3070		62.0	724.1	662.1	0.011	0.24	0.003	0.48	0.022
3070	Included	483.9	724.1	240.2	0.014	0.25	0.005	0.58	0.027
3070	Included	604.0	724.1	120.1	0.019	0.24	0.004	0.68	0.031
3071		79.1	729.0	649.9	0.012	0.59	0.026	0.99	0.045
3071	Included	79.1	598.1	519.0	0.013	0.65	0.026	1.08	0.050
3071	Included	79.1	378.9	299.9	0.015	0.81	0.027	1.29	0.059
3072		12.1	617.1	605.0	0.014	0.43	0.015	0.81	0.037
3072	Included	12.1	457.0	444.9	0.015	0.47	0.015	0.88	0.041
3072	Included	12.1	296.9	284.8	0.016	0.54	0.018	0.99	0.046
3076		160.1	1166.0	1005.9	0.010	0.42	0.024	0.77	0.035
3076	Included	439.0	1166.0	727.0	0.010	0.48	0.029	0.85	0.039
3076	Included	626.0	1166.0	540.0	0.011	0.51	0.031	0.93	0.042
3076	Included	770.0	1060.0	290.0	0.013	0.61	0.038	1.09	0.050
3078		349.1	548.9	199.8	0.015	0.44	0.011	0.82	0.038
3079		185.0	588.9	403.9	0.012	0.33	0.009	0.63	0.029
3079	Included	209.0	349.1	140.1	0.015	0.34	0.010	0.72	0.033
3080		75.5	394.0	318.6	0.016	0.29	0.010	0.69	0.032
3080	Included	269.0	394.0	125.0	0.020	0.39	0.015	0.91	0.042
3080	Included	298.9	394.0	95.1	0.022	0.41	0.017	0.99	0.045
3081		109.9	490.2	380.2	0.012	0.27	0.004	0.56	0.025
3081	Included	388.1	490.2	102.0	0.015	0.37	0.005	0.72	0.033
3082		209.0	899.0	690.0	0.013	0.45	0.041	0.96	0.044
3082	Included	716.5	887.5	170.9	0.015	0.63	0.055	1.27	0.058
3083		28.9	114.2	85.3	0.013	0.43	0.010	0.76	0.035
3084		79.1	961.9	882.9	0.013	0.46	0.019	0.86	0.039
3084	Included	141.1	560.0	419.0	0.017	0.60	0.012	1.04	0.048
3085		79.1	1109.6	1030.5	0.013	0.48	0.020	0.87	0.040
3085	Included	79.1	242.8	163.7	0.015	0.55	0.017	0.97	0.044
3085	Included	320.5	550.9	230.3	0.020	0.51	0.023	1.07	0.049
3085	Included	856.0	1109.6	253.6	0.013	0.55	0.021	0.95	0.044
3086		88.9	1302.2	1213.3	0.011	0.34	0.016	0.67	0.031
3086	Included	108.9	548.9	440.0	0.016	0.41	0.011	0.82	0.038
3086	Included	108.9	178.1	69.2	0.015	0.52	0.017	0.93	0.043
3086	Included	449.1	548.9	99.7	0.021	0.59	0.013	1.13	0.052
3087		28.9	989.2	960.3	0.013	0.41	0.025	0.84	0.039
3087	Included	528.5	989.2	460.6	0.018	0.62	0.036	1.21	0.055
3087	Included	539.0	823.5	284.4	0.025	0.70	0.048	1.52	0.069
3087	Included	709.0	823.5	114.5	0.033	0.95	0.052	1.96	0.090
3089		68.9	1159.1	1090.2	0.012	0.36	0.019	0.73	0.034

Table 7a. *Northern Dynasty Ltd.- Pebble Project, assay results from resource lands drilling, cont'd.*

Drill hole number		From (feet)	To (meters)	Intercept (feet)	Gold (Au) oz per ton	Copper (Cu) %	Molybdenum %	CuEQ[a] %	AuEQ[a] oz per ton
3089	Included	68.9	128.9	60.0	0.017	0.45	0.018	0.92	0.042
3089	Included	399.0	838.9	440.0	0.015	0.43	0.020	0.85	0.039
3089	Included	497.0	1006.6	509.5	0.013	0.46	0.023	0.87	0.040
3092		52.5	1036.1	983.6	0.012	0.45	0.018	0.81	0.037
3092	Included	97.4	679.1	581.7	0.014	0.56	0.013	0.94	0.043
3092	Included	97.4	489.2	391.7	0.015	0.60	0.012	0.99	0.045
3093		97.1	378.9	281.8	0.011	0.38	0.012	0.69	0.032
3093	Included	179.1	329.1	149.9	0.014	0.45	0.013	0.83	0.038
3094		357.9	668.0	310.0	0.013	0.36	0.018	0.75	0.034
3094	Included	458.0	648.0	190.0	0.014	0.41	0.021	0.83	0.038
3095		88.9	579.1	490.2	0.012	0.63	0.030	1.06	0.049
3095	Included	88.9	202.1	113.2	0.011	0.75	0.024	1.12	0.051
3095	Included	317.3	515.1	197.8	0.016	0.76	0.032	1.29	0.059
3096		369.1	1306.1	937.0	0.008	0.30	0.020	0.59	0.027
3096	Included	539.4	635.2	95.8	0.011	0.34	0.037	0.79	0.036
3097		99.1	349.1	250.0	0.010	0.45	0.062	1.02	0.047
3098		138.1	736.9	598.8	0.009	0.42	0.047	0.87	0.040
3098	Included	138.1	326.1	188.0	0.013	0.64	0.046	1.18	0.054
3099		18.0	168.0	149.9	0.021	0.62	0.011	1.15	0.053
3100	Hole abandoned - no samples								
3101		231.3	292.3	61.0	0.011	0.52	0.018	0.87	0.040
3101		498.0	1160.8	662.7	0.006	0.29	0.021	0.55	0.025
3102		78.1	253.9	175.9	0.014	0.36	0.007	0.70	0.032
3102		623.0	952.1	329.1	0.011	0.52	0.013	0.83	0.038
3103		116.1	888.1	772.0	0.013	0.04	0.001	0.34	0.015
3104		168.0	828.1	660.1	0.009	0.42	0.016	0.71	0.032
3104	Included	348.1	479.7	131.6	0.010	0.55	0.026	0.92	0.042
3105		158.1	310.4	152.2	0.007	0.62	0.043	1.02	0.046
3106		33.1	718.2	685.0	0.012	0.34	0.008	0.64	0.029
3106	Included	307.1	718.2	411.1	0.013	0.40	0.011	0.75	0.034
3108		36.4	748.0	711.6	0.009	0.41	0.018	0.71	0.033
3108	Included	36.4	208.0	171.6	0.015	0.67	0.017	1.08	0.049
3108		888.1	1027.9	139.8	0.011	0.36	0.014	0.67	0.031
3110		448.2	700.1	252.0	0.013	0.32	0.010	0.65	0.030
3111		276.9	1274.0	997.0	0.012	0.32	0.020	0.70	0.032
3111	Included	353.0	617.1	264.1	0.016	0.29	0.021	0.77	0.035
3111	Included	981.0	1274.0	293.0	0.011	0.42	0.023	0.79	0.036
3112		160.1	1154.9	994.8	0.009	0.35	0.019	0.66	0.030
3112	Included	160.1	282.2	122.0	0.021	0.44	0.011	0.95	0.044
3112	Included	368.1	401.9	33.8	0.012	0.51	0.016	0.85	0.039
3113		227.0	346.5	119.4	0.020	0.22	0.006	0.69	0.032
3113		667.0	1076.1	409.1	0.012	0.29	0.018	0.64	0.029
3114		427.2	1229.0	801.8	0.012	0.46	0.025	0.87	0.040
3114	Included	427.2	1036.1	608.9	0.013	0.52	0.023	0.94	0.043
3114	Included	559.1	939.0	379.9	0.015	0.57	0.022	1.30	0.047
3115		17.4	976.4	959.0	0.011	0.35	0.016	0.68	0.031
3115	Included	17.4	228.0	210.6	0.017	0.46	0.021	0.95	0.043
3115	Included	17.4	128.0	110.6	0.020	0.54	0.021	1.09	0.050
3115	Included	646.7	976.4	329.7	0.013	0.42	0.013	0.80	0.037
3115	Included	788.1	976.4	188.3	0.016	0.46	0.012	0.87	0.040
3116		67.9	816.9	749.0	0.011	0.38	0.016	0.72	0.033
3116	Included	67.9	158.1	90.2	0.015	0.52	0.020	0.97	0.044
3116	Included	657.8	816.9	159.1	0.013	0.57	0.016	0.95	0.044
3116	Included	728.0	816.9	88.9	0.015	0.71	0.019	1.15	0.053
3117		132.9	902.9	770.0	0.010	0.42	0.025	0.77	0.035

Table 7a. *Northern Dynasty Ltd.- Pebble Project, assay results from resource lands drilling, cont'd.*

Drill hole number		From (feet)	To (feet)	Intercept (feet)	Gold (Au) oz per ton	Copper (Cu) %	Molybdenum %	CuEQ[a] %	AuEQ[a] oz per ton
3117	Included	132.9	348.1	215.2	0.013	0.64	0.028	1.09	0.050
3118		272.6	1135.5	862.9	0.010	0.36	0.018	0.68	0.031
3118	Included	790.4	1135.5	345.1	0.011	0.45	0.019	0.80	0.037
3119		18.0	337.9	319.9	0.012	0.38	0.019	0.74	0.034
3119	Included	118.1	297.9	179.8	0.013	0.40	0.018	0.79	0.036
3120		129.6	308.1	178.5	0.006	0.65	0.013	0.86	0.039
3121		43.0	588.9	545.9	0.008	0.38	0.015	0.63	0.029
3121	Included	48.9	169.0	120.1	0.008	0.56	0.014	0.80	0.037
3122		309.1	1179.1	870.1	0.006	0.24	0.009	0.43	0.020
3123	Anomalous Values								
3124		137.1	538.1	400.9	0.011	0.28	0.010	0.57	0.026
3124	Included	438.0	538.1	100.1	0.020	0.30	0.009	0.78	0.036
3125		91.9	699.1	607.3	0.011	0.28	0.010	0.57	0.026
3126		493.4	940.0	446.5	0.008	0.29	0.012	0.53	0.024
3126	Included	493.4	576.8	83.3	0.009	0.44	0.014	0.72	0.033
3126	Included	740.2	940.0	199.8	0.009	0.29	0.012	0.55	0.025
3127		120.1	1317.9	1197.8	0.008	0.32	0.011	0.57	0.026
3127	Included	120.1	268.0	148.0	0.013	0.40	0.012	0.74	0.034
3127	Included	878.0	1038.1	160.1	0.009	0.37	0.012	0.63	0.029
3128		39.4	1148.0	1108.6	0.011	0.30	0.019	0.65	0.030
3128	Included	39.4	76.1	36.7	0.020	0.35	0.015	0.87	0.040
3129		499.7	879.9	380.2	0.008	0.32	0.017	0.58	0.027
3130		67.6	328.1	260.5	0.014	0.19	0.007	0.53	0.024
3130		668.0	1027.9	359.9	0.020	0.54	0.035	1.17	0.053
3130	Included	777.9	1027.9	250.0	0.023	0.65	0.044	1.40	0.064
3131	Hole abandoned - no samples								
3132	Hole abandoned - no samples								
3133		128.0	1107.9	980.0	0.009	0.23	0.010	0.49	0.022
3134		277.9	774.0	496.1	0.013	0.30	0.013	0.66	0.030
3134	Included	357.9	774.0	416.0	0.013	0.33	0.014	0.70	0.032
3134	Included	357.9	419.3	61.4	0.022	0.47	0.018	1.04	0.048
3134	Included	558.1	774.0	215.9	0.015	0.37	0.016	0.79	0.036
3135		978.0	1128.0	149.9	0.016	0.23	0.010	0.63	0.029

All information from Northern Dynasty Minerals Ltd. press releases.

[a]Copper and gold equivalent calculations use metal prices of $0.80/lb for copper, $350/oz for gold and $4.50/lb for molybdenum. Adjustment factors to account for differences in relative metallurgical recoveries for gold, copper and molybdenum will depend upon completion of definitive metallurgical testing by Northern Dynasty or its contractors.

CuEQ = Cu % + (Au oz. per ton x 0.0292 x 11.25/17.64) + (Mo % x 99.23/17.64)

AuEQ= Au oz. per ton + (Cu % x 17.64/11.25) + (Mo % x 99.23/11.25)

Table 7b. *Northern Dynasty Ltd.- Pebble Project, assay results from drilling outside the resource lands*

Drill hole number	From (feet)	To (feet)	Intercept (feet)	Gold (Au) oz per ton	Copper (Cu) %
3073	Anomalous Values				
3074	350.1	549.9	199.8	0.015	0.23
3075	97.1	237.9	140.7	0.015	0.10
3077	9.5	27.9	18.4	0.030	0.01
3088	74.1	89.6	15.4	0.018	0.37
3090	163.7	166.3	2.6	0.482	1.00
3091	247.0	517.1	270.0	0.005	0.27
3107	383.9	809.1	425.2	0.011	0.05
3109	599.1	769.0	169.9	0.010	0.02

Chunk Corp., in December staked nine hundred eighty-one 160-acre state mining claims covering 237 square miles northwest of the Pebble copper–gold porphyry property. This may be the largest single claim block staked at one time in Alaska history. The Big Chunk property was acquired by Liberty Star Gold Corp. in 2004. Mining claims in the Pebble area now encompass more than 565 square miles.

Ventures Resource Corp., with an exploration program managed by WGW Inc., focused on gold targets at its Flat property and Donlin Creek North claims. The Donlin Creek North claims abut Calista–NovaGold–Placer Dome's Donlin Creek deposit. A gridded soil-sampling program was completed on the Flat property between Chicken Mountain and Black Creek. The drilling program included 5,532 feet of NQ core drilling in eight holes at the Golden Apex, Divide, and Golden Hornfels targets on the Flat property. Drill intercepts containing more than 0.015 ounces of gold per ton include drill hole CM-25 at the Divide target, collared in Chicken Mountain monzonite, with 5 feet of 0.794 ounces of gold per ton, 13 feet of 0.032 ounces of gold per ton, and 19 feet of 0.016 ounces of gold per ton. At the Golden Apex target, drill holes GA-1 and GA-2 were collared in intermediate volcanic rocks comagmatic with and adjacent to the Chicken Mountain monzonite. At Golden Apex, core holes GA-1 (700 feet deep) and GA-2 (948 feet deep) were drilled to test a 2,000-foot by 400-foot northeast-trending gold and pathfinder element soil anomaly. Favorable drill intercepts in hole GA-2 include 22 feet of 0.089 ounces of gold per ton, 10 feet of 0.039 ounces of gold per ton and four 4.5- to 5.5-foot intercepts containing 0.033 to 0.208 ounces of gold per ton. Three drill holes, GH-1A, GH-2, and GH-3, at the Golden Hornfels target were collared in hornfelsed siltstone and inclined to cross the contact into the Black Creek gold-bearing intrusion. The holes were drilled through felsic dikes and fractured and altered hornfels and the holes terminated in the gabbroic border phase of the Black Creek intrusion. Hole GH-1A intersected intercepts of 10.5 feet of 0.023 ounces of gold per ton, 5 feet of 0.136 ounces of gold per ton, and 5 feet of 0.099 ounces of gold per ton.

TNR Gold Corp. (formerly TNR Resources Ltd.) conducted ground exploration and a regional airborne magnetic survey on the Shotgun property covering the area of interest under TNR's new option agreement with NovaGold Resources. Targets identified through this work will be advanced and drilled in 2004 along with additional definition drilling on the existing Mose deposit. Several priority exploration targets with geophysical and geochemical signatures similar to the Donlin Creek gold deposits have been identified on the property. The company has an option to earn up to a 50 percent interest from NovaGold in the Shotgun project by spending $3 million on exploration over the next 4 years to advance the project toward a production decision.

Geocom Resources Inc. entered into an agreement with TNR Gold Corp. to earn a 75 percent interest in TNR's option to earn a 70 percent interest in BHP Minerals International Exploration Inc.'s Iliamna Project approximately 60 miles southeast of the Shotgun gold prospect and west of Lake Iliamna. Upon accomplishing its earn-in obligations, Geocom will hold a net 52.5 percent interest in the Iliamna project. To earn its interest, Geocom must expend $500,000 prior to September 26, 2004. The interest earned is subject to a back-in right held by BHP to reacquire a 70 percent interest in the project with obligation to fund the project through a formal feasibility study. BHP can earn an additional 10 percent interest by agreeing to arrange the financing necessary to bring the project into commercial production.

The Iliamna project area is held by 63 unpatented lode mining claims and covers one of three major geophysical anomalies, first identified by BHP in a regional exploration program in 2000. The magnetic geophysical anomaly on the Iliamna project is part of a defined system that stretches over more than 200 square miles. Geocom believes that the Iliamna anomaly is similar in size and characteristics to the Pebble deposit's geophysical signature.

Geocom conducted geologic mapping and geochemical sampling to substantiate the geophysical anomaly followed by a core-drilling program. An IP survey, with 1-mile line spacing, was also completed in the Iliamna project area. This on-ground geophysical work confirmed and further delineated several targets within the sub-regional airborne magnetic anomaly. Because younger, unmineralized rocks and extensive sand and gravel cover the Iliamna area, there were no geological or geochemical data available, and the geophysical results are the only guide for the initial exploration drilling. Four core holes were drilled to test two geophysical targets. Two holes were drilled at the "H" claims area, which constitutes the southern anomaly, and two holes were drilled at the "D" claims area, which constitutes the northern anomaly. At the "D" claim block, two drill holes did not reach bedrock before the drill holes were abandoned at 428 feet and 330 feet. At the "H" claims, drill hole IL-03-H-01 encountered bedrock at 200-foot depth, and was drilled to a final depth of 686 feet. Bedrock is a hornfels or very fine-grained metamorphic rock, which is host to fracture-controlled and disseminated sulfides consisting of chalcopyrite, pyrrhotite, and traces of molybdenite. Drill hole IL-03-H-02 was drilled about 0.6 miles southwest of the first hole, and encountered quartz diorite intrusive rock at 278 feet, which continued to a total depth of 837 feet. The plutonic rock contains disseminated and fracture-controlled chalcopyrite, pyrrhotite, and pyrite as well as fracture-controlled chalcopyrite with potassically altered vein envelopes. Each of these two drill holes ended in a mineralized zone, with weak gold and copper mineralization more than 550 feet

thick. Geocom and TNR believe that the large intervals of copper–gold mineralization in both the intrusion and metamorphic rocks indicate the potential for a large mineralized system and an excellent exploration target for Donlin Creek- and Pebble-type deposits.

Kennecott Exploration Co. conducted exploration throughout the southwestern region of Alaska during 2003. Calista Corp. continued mineral studies across their regional holdings. The U.S. BLM continued their multi-year study of the Aniak mining district.

SOUTHEASTERN REGION

In May 2003 Pacific North West Capital Corp., Freegold Ventures Ltd., and Lonmin PLC entered into a joint-venture agreement on the Union Bay project near Ketchikan. Lonmin is the third largest primary producer of platinum-group metals in the world. Under the agreement, Lonmin funded a $935,000 exploration program in 2003 and has an option on the project, by spending a minimum of $1 million per year from 2004 to 2006 and $750,000 for each year thereafter, as well as funding a full feasibility study, to earn up to 70 percent interest in the property.

In 2003, Pacific North West acted as operator and carried out a mapping, drilling and sampling program. In March, 394 federal lode claims were staked adjacent to existing claims. Work began with detailed channel sampling of the Jaguar Zone in order to define a drill target. More than 820 feet of channel sampling, using a two-cycle, water-cooled Partner rock saw, was completed across the property on the Jaguar, Mt. Burnett, North, and Continental zones. This sampling method worked much better than other methods on the massive, semi-rounded outcrops at Union Bay by minimizing the amount of weathered material in the sample. The program showed lateral and vertical changes in platinum content of the rocks, as well as delineated the relationships between host rock and mineralization. Further work resulted in the discovery of a significant new platinum-bearing zone, the Continental Zone.

The Continental Zone has numerous significant platinum occurrences in magnetite to the west of any previous mineralization and the zone is over an area of 1,600 feet by 1,300 feet. The Chevelle Zone, another new zone about 500 feet northeast of the Continental Zone, is very similar in character to the Continental Zone. Rock sample analyses of these new ore zones had values ranging from 0.029 to 0.408 ounces of platinum per ton and these anomalous results increased the strike length of platinum occurrences at the Union Bay property to nearly 4 miles. A zone of copper–platinum–palladium-bearing sulfides was discovered at Cannery Creek on the western side of the Union Bay property near the margin of the ultramafic complex. The Cannery Creek zone is open to the north and the east.

A diamond drill program totaling 4,490 feet was completed at the Jaguar and North zones. The Jaguar Zone was tested by three drill holes. Drilling encountered a 3.8-foot zone from 405.9 to 409.7 feet assaying 0.27 ounces of platinum per ton and two other significant platinum-bearing zones, up to 4.4 feet wide and 0.027 ounces of platinum per ton, were present in drill holes UB0310 and UB0311. The northwest trend of magnetite mineralization previously identified in the North Zone was tested by eight drill holes. Three drill holes, UB0302, UB0306, and UB0307, had significant platinum intercepts: the interval from 99.4 to 109.4 feet in hole UB0302 assayed 0.038 ounces of platinum per ton, the interval from 382.7 to 386.0 feet in hole UB0306 assayed 0.029 ounces of platinum per ton, and the interval from 386.0 to 389.7 feet in hole UB0307 assayed 0.025 ounces of platinum per ton.

Kennecott Minerals Co. continued exploration to expand ore zones at the Greens Creek Mine and found significant polymetallic mineralization across a fault thought to truncate the large ore body. Drilling of exploration targets on the west side of the Gallagher fault produced interesting results. The most significant find was a 10.3-foot drill interval that assayed more than 45 ounces of silver per ton. The intercept is across the Gallagher fault, an area that has never been mined or explored before. This intercept increases the probability of finding a continuation of the ore body on the other side of the fault, which could add significant mine life to this already long-lived resource.

Bravo Venture Group Inc. completed a joint-venture agreement with property owner Olympic Resources Group LLC to earn a 100 percent interest in the Woewodski Island project near Petersburg, by expending $2 million in exploration and development, issuing 400,000 shares to the property owners, and carrying the holding costs of the claims over a 5-year period. Olympic will retain a variable net smelter return royalty. The exploration program in 2003 examined more than 30 massive-sulfide targets, discovered new volcanogenic massive-sulfide mineralization at the Mad Dog prospect and drilled the Lost Lake prospect on Woewodski Island. Several of the six diamond drill holes, totaling 1,484 feet at the Lost Lake prospect, intersected Greens Creek style volcanogenic massive-sulfide mineralization. Semi-massive and massive sphalerite, galena, and silver occur in a bleached, sericite-altered tuff unit sandwiched between andesitic/basaltic tuff, flow, and agglomerate units of Triassic age.

The best intercepts from the 2003 drilling are 6 feet of 6.34 percent lead, 16.15 percent zinc, and 7.8 ounces of silver per ton; and 4.5 feet of 0.2 percent lead, 18.80 percent zinc, and 1.8 ounces of silver per ton. Significant surface samples of up to 44 ounces of silver per ton, 16.25 percent lead and 27.6 percent zinc from chip samples and 17.4 ounces of silver per ton, 6.78 percent lead and 21.3 percent zinc from channel samples were recovered from the Mad Dog prospect, where lenses of disseminated to massive sphaler-

ite and galena are exposed at tidewater. Sulfides occur in conformable bands up to 2 feet thick and sit within a broader 10- to 26-foot-wide mineralized zone, which strikes west to north–northwest. Three additional state mining claims were staked on the occurrence, bringing the total number of claims at Woewodski Island to 504. Other significant results include gold-enriched mineralization from the Scott's Prospect (0.041 ounces of gold per ton and 2.8 percent zinc from select barite–quartz veins) and the Brushy Creek Prospect (0.017 ounces of gold per ton, 1.8 ounces of silver per ton, and 6.1 percent zinc from select samples of sulfides).

Century Mining Corp. entered into an agreement to acquire a 100 percent interest in ten non-contiguous gold and base-metal properties located in the Juneau Gold Belt by paying $225,000 and issuing 1,014,000 common shares to the Kent Burns Group; an additional 986,000 common shares have been issued to nine other parties. Properties include claims surrounding the Treadwell Mine at Douglas, the Eagle River mine and other properties north of Juneau, federal claims at the Alaska Empire Mine 5 miles north of Greens Creek Mine and claims near Sweetheart Lake. Century also staked claims in anticipation of exploration projects on these properties in 2004.

Quaterra Resources Inc. staked 30 additional claims to cover high-priority geophysical anomalies that fell outside the original claim boundary on their Duke Island property near Ketchikan. In the course of staking, new copper occurrences were discovered and Quaterra planned to evaluate these occurrences during 2004.

DEVELOPMENT

Reported and estimated 2003 mine development expenditures totaled $39.2 million, a slight increase of $5.7 million from the $33.5 million reported for 2002. Significant development activity was reported at Nolan Creek, Rock Creek, Nome placers, Fort Knox, Pogo, Fairbanks district placers, and Kensington projects. Moderate expenditures were reported at several other lode and placer properties in the state. No development activity was reported for Red Dog or Greens Creek mines.

Table 8 shows the regional employment and development investment. Table 9 compares the 2003 investment with that of the previous 21 years. Figure 9 shows the locations of selected development projects.

Table 8. *Reported mineral development expenditures and employment in Alaska by commodity and region, 2003*

	Northern	Western	Eastern interior	South-central	South-western	South-eastern	Total
Development expenditures							
Base metals	$ - -	$ - -	$ - -	$ - -	$ - -	$ - -	**$ - -**
Polymetallic	- -	- -	- -	- -	- -	- -	- -
Precious metals							
Placer	4,766,000	115,000	793,500	4,500	60,000	84,000	5,823,000
Lode	- -	5,000,000	25,310,000	6,000	- -	2,700,000	33,016,000
Coal and peat	- -	- -	- -	- -	- -	- -	- -
Industrial minerals	- -	- -	- -	315,000	- -	- -	315,000
TOTAL	**$4,766,000**	**$5,115,000**	**$26,103,500**	**$325,500**	**$60,000**	**$2,784,000**	**$39,154,000**
Development employment							
Employment							
Workdays	7,200	2,200	5,475	909	330	1,500	**17,634**
Workyears[a]	28	9	21	3	1	6	**68**
Number of companies reporting[b]	1	5	8	6	2	3	**25**

[a]Based on 260-day workyear.
[b]Some companies active in more than one area.
No development expenditures or employment reported for Alaska Peninsula region in 2003.
- - No expenditures reported.

Table 9. *Reported mineral development expenditures in Alaska by commodity, 1982–2003*

	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**
1994	10,000,000	5,000,000	27,392,850	5,000	2,545,000	**44,942,850**
1995	11,200,000	9,590,000	127,165,750	426,000	200,000	**148,581,750**
1996	60,000,000	60,100,000	273,042,000	495,000	400,000	**394,037,000**
1997	133,880,000	7,300,000	26,299,000	500,000	410,000	**168,389,000**
1998	28,000,000	5,600,000	15,602,000	5,355,000	850,000	**55,407,000**
1999	12,500,000	2,500,000	15,864,000	400,000	2,575,000	**33,839,000**
2000	100,000,000	16,400,000	24,699,000	611,000	- -	**141,710,000**
2001	43,800,000	3,300,000	32,719,000	300,000	1,040,000	**81,159,000**
2002	- -	5,700,000	26,655,000	250,000	1,450,000	**34,055,000**
2003	- -	- -	38,839,332	315,000	- -	**39,154,332**
TOTAL	**$777,981,300**	**$268,033,136**	**$800,013,662**	**$24,758,500**	**$58,390,000**	**$1,929,176,598**

N/A = Figures not available prior to 1986.
- - Not reported.

I Northern Region
1. Nolan Placer Mine (Silverado Gold Mines Inc.)—underground placer gold mine

II Western Region
2. Rock Creek, Nome
   a. Rock Creek Project—(Nova Gold Resources Inc.)
   b. Several open-pit and placer mines, Nome project—(Nova Gold Resources, Inc., data analysis)
   c. True North Mine, Kinross Gold Corp. (road and mine construction)

III Eastern Interior Region
3. Fairbanks area
   a. Fort Knox Mine—Kinross Gold Corp. (drilling)
   b. Several open-pit and underground placer mines
   c. True North Mine, Kinross Gold Corp. (road and mine construction)
4. Pogo Project—Teck Corp./Sumitomo Metals Mining America Inc. (permitting)

IV Southcentral Region

V Southwestern Region

VI Alaska Peninsula Region

VII Southeastern Region
5. Greens Creek Mine—Kennecott Mineral Co./Hecla Mining Co. (access drifting, underground drilling)
6. Kensington Mine—Coeur Alaska (optimization studies)

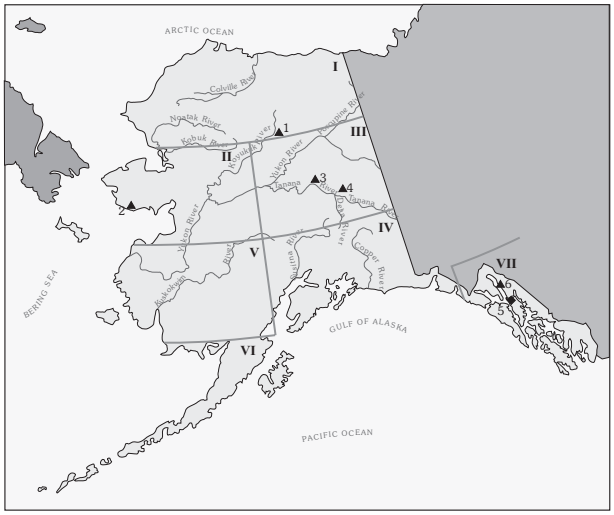


Figure 9. *Selected mineral development projects in Alaska, 2003.*

NORTHERN REGION

Silverado Gold Mines Ltd. undertook significant development activity at their Nolan Creek placer gold project near Wiseman. This activity comprised equipment acquisition, 3,340 feet of underground development and material stoping in the Nolan Deep Channel, surface material development, recovery facility acquisition, construction and operation, soil sampling to locate the hard-rock source of gold, development drilling of selected target areas, and other related activities (fig. 10). The company acquired mining equipment and infrastructure items with a value in excess of $1,700,000 in order to facilitate the development effort.

Other placer mining properties in the Region reported less intense development activity.

WESTERN REGION

Lode and placer development activity was reported from the Western Region. NovaGold Resources Inc. undertook significant effort at its Rock Creek project near Nome after TNR Gold Corp. terminated its option on the Rock Creek project. This activity included engineering, feasibility studies, environmental studies, and 36,000 feet of in-fill drilling. Norwest Corp., an independent engineering firm, and AMEC E&C Services Ltd. completed a detailed Economic Assessment Study. The assessment assumes that Nome Joint Utilities will supply electrical power to the project. The study demonstrated that the project could be rapidly developed into a conventional open-pit mine. The design pit for the Preliminary Economic Assessment had a resource of approximately 11,786,000 tons at an average grade of 0.059 ounces of gold per ton for 550,000 contained ounces and a 4.4:1 strip ratio. Production results were in excess of 100,000 ounces of gold per year at a treatment rate of 5,500 tons per day. Cash costs of $200 per ounce and total costs of $258 per ounce were forecast. Capital costs are estimated to be $40 million. Test work indicates that 80 percent of the recoverable gold can be recovered by conventional gravity and water separation methods; off-site treatment of a resulting concentrate would bring total expected gold recovery to 96 percent. Large mining equipment would be utilized in the mining process. The proposed mine would create about 100 new full-time jobs. NovaGold envisions one year of permitting, construction of mine facilities to begin in late 2005, and production to begin in 2006.

Several placer properties undertook property development activities. NovaGold Resources announced development activity on its placer gold properties in the Nome area. This activity was composed of data acquisition and analysis. A resource of 2.2 million ounces of gold was reported. The Nome project, covering more than 90 square miles of lands owned and controlled by NovaGold, hosts an estimated measured, indicated, and inferred resource of 2.26 million ounces of gold in a 295-million-cubic-yard sand and gravel aggregate resource, based on data from more than 7,000 drill holes.

Other placer development activity was reported in the region.

Figure 10. *980 F Caterpillar loader and DUX 20-ton truck mucking out portal and transporting material to stockpile at Nolan Creek Deep Channel project. Photo provided by Rich Hughes.*

EASTERN INTERIOR

This was the most active region in terms of development activity. Both lode and placer development activities were reported. Lode projects included Kinross's Fort Knox complex and Teck Pogo Inc.'s Pogo project. Placer gold project development activities were also undertaken in the region.

Kinross spent $22.5 million in equipment acquisition and upgrading and in drilling dewatering wells for its Fort Knox mine. A major pit wall layback at an assumed gold price of $325 per ounce is planned to begin in 2004. This major layback comprises a three-year, approximately $60.0 million capital expenditure program mostly in the form of stripping to liberate ore to prolong the economic life of the Fort Knox Mine.

Teck Pogo Inc. continued engineering, permitting, baseline environmental studies, and completion of a final feasibility study for its Pogo underground project in the Goodpaster district. The Teck Cominco–Sumitomo joint venture conducted permitting, environmental baseline studies, mine plan design, and final feasibility studies at its high-grade Pogo gold project northeast of Delta Junction. The latest mining reserve is 7.7 million tons at a grade of 0.47 ounces gold per ton for 3.63 million ounces of gold. The project received a favorable Environmental Impact Statement within 3 years and 1 month of initiating the EIS process, an impressive achievement considering that about 16 months were needed to accommodate a design change from shaft to decline access. All of the key State permits required to begin development of this $250 million underground mine complex were issued by December 18, 2003. The U.S. Army Corps of Engineers issued a wetland permit on January 12, 2004. The only major permit not yet issued is EPA's National Pollution Discharge Elimination System (NPDES) permit, expected in the first quarter of 2004. A winter road was completed to the mine site from the Alaska Highway in late January 2004 and construction will commence upon receipt of the NPDES permit. Contracts for construction of the 50-mile access road, the power line, and site preparation have been tendered and are being awarded subject to receipt of the EPA permit. Operating partner Teck Cominco plans the first gold pour by the end of 2005. Teck anticipates spending $64 million at Pogo in 2004 on capital expenditures. The Pogo Mine is expected to create nearly 700 jobs during construction and 360 full-time jobs during production. An additional 600 indirect jobs would be created in Delta Junction and Fairbanks to support the mine activities.

Six placer projects reported varying degrees of development effort. This activity included overburden stripping, drilling, testing, construction, etc.

SOUTHCENTRAL REGION

Lode, placer gold, and sand and gravel projects reported development activities in this region. Dibble Creek Rock undertook stripping to facilitate sand and gravel mining at Anchor Point.

SOUTHWESTERN REGION

Placer gold project development activity was reported in this district during the year. No lode development activity was reported.

ALASKA PENINSULA REGION

No mineral development activity was reported.

SOUTHEASTERN REGION

Coeur Alaska continued its efforts to permit the Kensington/Jualin Mine complex project north of Juneau. An updated feasibility study for this gold project was completed. The new optimization of the project schedules initial production at 100,000 ounces of gold per year at an average cash cost of $195 per ounce. Current reserves stand at 1.0 million ounces of gold, with an initial 10-year mine life and significant exploration potential. The project is expected to cost approximately $75 million to build. The updated feasibility study reduces the size of the mill facilities and has the potential to significantly reduce capital and operating costs while allowing for future expansion of production as market conditions warrant. Coeur Alaska entered into a memorandum of understanding with state and federal environmental agencies (Alaska Department of Natural Resources, U.S. Forest Service, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers) in July 2003, which outlines the roles and responsibilities of the agencies with respect to the final environmental impact statement for Kensington. Coeur expects to receive all major permits by June 2004.

PRODUCTION

The total value of production from Alaska's mines and quarries in 2003 was $1,000.7 million, down 1.3 percent from $1,013 million reported in 2002.

Gold production was reported from Illinois Creek, Fort Knox, Greens Creek, and at over 60 placer mines. Silver was produced at Red Dog and Greens Creek mines, which were also the primary producers of zinc and lead concentrates.

The increase in average price of zinc from $0.35 per pound in 2002 to $0.38 per pound in 2003 had a positive influence on the profitability of Red Dog and Greens Creek mines. All precious metal producers benefited from the increase in gold and silver prices. The increase was from an average of $310.06 and $4.61, respectively, in 2002 to $363.38 and $4.88, respectively, in 2003.

Table 10 shows the quantity and value of metal and material production from 2001 to 2003. Table 11 lists the miners and mines that were reportedly producing metal in 2003 and that were reported to have had production during the year. Figures 11, 12, and 13 show the historic production of sand and gravel, rock, and coal. Selected production sites are shown in figure 14.

Metals, with a value of $888 million, accounted for 89 percent of the total value of production. Zinc continued to be the most valuable product by a significant margin, re-

porting 54 percent of the total and 60 percent of the metal value. This was followed by gold at 19 percent and 22 percent, respectively. Silver contributed the 3rd most value at 10 percent and 11 percent, respectively, followed by lead at 6 percent and 7 percent, respectively.

Table 12 shows the average metal values used in this report over the last 10 years. Across the board metal price increases are noted from those experienced in 2002; these increases contributed substantially to the value of production in spite of some notable reductions in quantities of metals produced. The metal price increase percentages were: gold, 17 percent; silver, 6 percent; lead, 10 percent; and zinc, 9 percent.

The production estimates included in this report are from 103 questionnaires returned by miners, Native corporations, agencies, and municipalities, supplemented by well over 100 phone surveys and nearly the same number of E-mails sent to probable producers. Additional information was derived from State of Alaska Annual Placer Mining Applications (APMAs) submitted to the DMLW. The inability to contact a substantial number of placer miners, and lack of response from a large number of sand, gravel, rock, and peat producers is believed to make the production estimates conservative for these commodities.

The authors wish to thank the Alaska Railroad Corp., the Alaska Mental Health Trust Land Office, the Alaska Department of Transportation & Public Facilities, the Alaska Division of Mining, Land, & Water, municipalities, the U.S. Forest Service, and the U.S. Bureau of Land Management for providing information for this section of the report.

Some respondents reported costs and unit values, but in general metal values were computed from weekly averages on the London Metal Exchange, and do not take into account mining, shipping, smelting, and other costs incurred by the reporting producer/company.

Tables 13 and 14 show gold production by region of the state, and the placer production by small, medium, and large operations. Hard rock (lode) gold production decreased from 539,713 ounces in 2002 to 504,591 ounces in 2003. Placer production increased slightly from 22,381

Table 10. *Estimated mineral production in Alaska, 2001–2003*[a]

	Quantity			Estimated values[b]		
Metals	**2001**	**2002**	**2003**	**2001**	**2002**	**2003**
Gold (ounces)	550,644	562,094	528,191[c]	$149,246,000	$174,283,000	$ 191,934,000
Silver (ounces)	16,798,000	17,858,183	18,589,100	73,408,000	82,326,000	95,300,000
Copper (tons)	1,400	1,600	0[d]	1,988,000	2,272,000	0
Lead (tons)	127,385	146,462	162,479	56,049,000	61,514,000	64,279,000
Zinc (tons)	634,883	718,106	714,769	507,907,000	502,674,000	536,348,000
Subtotal				**$788,598,000**	**$823,069,000**	**$887,861,000**
Industrial minerals						
Jade and soapstone (tons)	2.0	2.0	0[e]	$ 25,000	$ 25,000	$ 0
Sand and gravel (million tons)	10.4	22.4	11.9	55,221,000	120,698,000	64,140,000
Rock (million tons)	3.1	3.2	0.9	27,176,000	31,442,000	10,406,000
Subtotal				**$82,422,000**	**$152,165,000**	**$74,546,000**
Energy minerals						
Coal (tons)	1,537,000	1,158,000	1,088,000	$ 48,108,000	$ 37,400,000	$ 38,080,000
Peat (cubic yards)	36,000	35,000	35,000[f]	180,000	175,000	175,000
Subtotal				**$ 48,288,000**	**$ 37,575,000**	**$ 38,255,000**
TOTAL				**$919,308,000**	**$1,012,809,000**	**$1,000,662,000**

[a]Production data from DGGS questionnaires, phone interviews with mine and quarry operators, Alaska Department of Transportation and Public Facilities, and federal land management agencies.
[b]Values for selected metal production based on average prices for each year; for 2003—gold ($363.58/ounce unless other value provided by operator); silver ($4.88/ounce); copper ($0.81/lb); zinc ($0.38/lb); lead ($0.23/lb). All other values provided by mine operators. Values rounded to nearest $1,000.
[c]Hardrock gold 504,591 ounces, placer gold 23,600 ounces.
[d]Greens Creek has historically been credited with a small copper concentrate production; no credit was experienced for 2003 production.
[e]Jade and soapstone credit has been dropped.
[f]Projected only; no reports from producers.

Table 11. *Companies and individuals reported to be producing metal in Alaska, 2003*

Operator	Creek	District	Type[a]
	Northern Region		
Compass Mining Inc. (John Hall)	Koyukuk	Koyukuk	O/P Placer
Mann, Mick and Cecilia	Koyukuk	Koyukuk	O/P Placer
Nordeen, William	Koyukuk	Koyukuk	O/P Placer
Overton, Jiles	Koyukuk	Koyukuk	O/P Placer
Slisco, Inc. (Ralph Hamm)	Hammond River	Koyukuk	O/P Placer
Silverado Green Fuels Inc. (Tricon Mining)	Nolan Creek	Koyukuk	O/P & U/G Placer
Teck Cominco Alaska Inc.	Red Dog	Noatak	HR O/P (zinc/lead/silver)
Taiga Mining (Jerry Birch)	Aloha Creek	Koyukuk	O/P Placer
	Western Region		
American Reclamation Group, LLC	Illinois Creek	Kaiyuh	HP O/P (gold/silver)
Anderson, Ralph	Dry Creek	Nome	O/P
Kralik, Jan	Nome Beach	Nome	S/D
K & S Leasing	Nome Beach	Nome	S/D
Sitnasuak Native Corp.		Nome	
Tweet, N. B. & Sons	Kougarok	Nome	O/P
	Eastern Interior		
B & G Resources	Greenhorn Gulch	Circle	O/P Placer
B&G Resources (Doug Colp)	Greenhorn Gulch	Circle	O/P Placer
Berry Enterprises (Doug Colp)	Ketchum Creek	Circle	O/P Placer
Bickell, Harvey D.	Walker Fork	Fortymile	O/P Placer
Blue Sky Mining (Don Kiehl)	Gold King Creek	Bonnifield	O/P Placer
Bras, Cy	Canyon Creek	Fortymile	O/P Placer
Busby, Michael	Chicken Creek	Fortymile	O/P Placer
Earth Movers of Fairbanks Inc. (Jim Thurman)	Fairbanks Creek	Fairbanks	O/P Placer
Edgerton, Judd	Fortymile	Fortymile	O/P Placer
Fairbanks Gold Mining Company, Inc.	Fort Knox Mine	Fairbanks	HR O/P (gold)
Fichtelman, Guy	Mosquito Fork	Fortymile	O/P Placer
Franklin, Patricia S.	Alder Creek Mine	Fairbanks	O/P Placer
Fulton, Gordon	Circle	Circle	O/P Placer
Gelvin, Stanley	Crooked Creek	Circle	O/P Placer
Hopen, Alf	Cleary Creek	Fairbanks	O/P Placer
Jacob, David	Bonnifield	Bonnifield	O/P Placer
Keller, Robert	Bonnifield	Bonnifield	O/P Placer
Kirsch, Bob	Kal Creek	Fortymile	O/P Placer
Koppenberg Mining & Manufacturing	Faith Creek	Circle	O/P Placer
Kukowski, David	Fortymile	Fortymile	O/P Placer
Lillian Creek Mining	Tolovana	Tolovana	O/P Placer
Meder, Raymond	Fairbanks	Fairbanks	O/P Placer
Montgomery, Melvin	Gilliland Creek	Fortymile	O/P Placer
Olson, Gordon	Fortymile	Fortymile	O/P Placer
Olson, Stephan	Liberty Creek	Fortymile	O/P Placer
Placer Mining Services	American Creek	Hot Springs	O/P Placer
Polar Mining (Don May)	Goldstream Creek	Fairbanks	O/P Placer
Polley, Everett & Polly	Fortymile	Fortymile	O/P Placer
Regner, Leo	Ingle Creek	Fortymile	O/P Placer
Richardson Shield LLC	Fortymile	Fortymile	O/P Placer
Stein, Donald	Fairbanks	Fairbanks	O/P Placer
Seuffert , George	Chicken Creek	Fortymile	O/P Placer
Van Dyke, Rudd	Mission	Fortymile	O/P Placer

[a]O/P=Open-pit; HR=Hard-rock; U/G=Underground; S/D=Suction Dredge.

Table 11. *Companies and individuals reported to be producing metal in Alaska, 2003, cont'd.*

Operator	Creek	District	Type[a]
Vogler, Lynn	Circle	Circle	O/P Placer
Wilde, James	Switch/Deadwood	Circle	O/P Placer
Wilder, Richard	Hot Springs	Hot Springs	O/P Placer
Wilkinson, Fred	Circle	Circle	O/P Placer
Willis, Dean	Circle	Circle	O/P Placer
Wolff, Flint L.	Fortymile	Fortymile	O/P Placer
Wright, Robert	Last Chance Creek	Fairbanks	O/P Placer
	Southcentral Region		
Bauer, Todd	Eldorado Creek	Valdez Creek	O/P Placer
Girdwood Mining Company	Crow Creek	Anchorage	O/P Placer
Hoffman, Russell	Chistochina	Chistochina	O/P Placer
Howland, David	Chistochina	Chistochina	O/P Placer
Outsider Mining (John Trautner)	Canyon Creek	Hope-Sunrise	O/P Placer
Zimmer, George	Quartz Creek	Seward	O/P Placer
	Southwestern Region		
Lyman Resources	Queen Creek	Innoko	O/P Placer
Matter, Mark	Marvel Creek	Aniak	O/P Placer
Nyac	Bear Creek	Aniak	O/P Placer
Penz, David	Buster	Marshall	O/P Placer
Rosander Mining Company	Colorado Creek	Innoko	O/P Placer
Sayer, Paul	10 Pup	Innoko	O/P Placer
	Southeastern Region		
Big Nugget Mines (John Schnabel)	Porcupine Creek	Porcupine	O/P Placer
Kennecott/Hecla	Greens Creek Mine	Admiralty Island	HR U/G (zinc/lead/silver/gold)

[a]O/P=Open-pit; HR=Hard-rock; U/G=Underground; S/D=Suction Dredge.

ounces in 2002 to 23,600 ounces in 2003. The slight decrease in hard rock production principally reflects a lower output from Fort Knox. Production is expected to increase in 2004 or in the immediate years thereafter with new production from the Rock Creek, Pogo, and possibly Kensington mines.

Tables 15 and 16 show the value and regional importance of sand, gravel, and rock production. Production of sand and gravel in 2003 was 11.9 million tons, a sharp reduction from 2002 production of 22.4 million tons. Rock production in 2003 was 861,400 tons also a marked reduction from the 2002 production of 3.2 million tons. The 2003 numbers are believed to be very incomplete because of a lack of response by producers to the survey and a lack of follow-up caused by a 3-month vacancy in the Department of Community & Economic Development position that precluded contacting the producers.

Coal production from Usibelli Coal Mine in 2003 was 1.088 million tons, down slightly from the 2002 production of 1.16 million tons. Only 231,000 tons were exported.

NORTHERN REGION

Teck Cominco Ltd.–NANA Regional Corp.'s Red Dog Mine near Kotzebue in northwestern Alaska milled 3,476,700 tons of ore in 2003, down 12,900 tons from 2002. Resulting metal production was higher in 2003 than in 2002 as a result of slightly higher grade feed to the mill circuits. Metal recoveries were equal to or better than last year. Metal production was 137,679 tons of lead, 7,701,000 ounces of silver, and 638,569 tons of zinc (table 17). The ore grade was 21.7 percent zinc, 6.2 percent lead, and 3.1 ounces silver per ton. The higher grade of ore and the average increased price of zinc in 2003 provided for a $50 million operating profit for 2003. Employment was reduced from 560 in 2002 to 388 in 2003 in an effort to reduce costs and improve efficiency. Currently, more than 56 percent of the employees at the mine are NANA shareholders.

Placer gold production was reported from six (6) placer mines in the northern region, most of them in the Koyukuk drainage around Wiseman. The largest in the area, the Nolan Mine of Silverado Green Fuels Inc., sluiced during their development exercise in 2003; 451 ounces were recovered from this effort. Silverado processed approximately 39,363 loose cubic yards during the summer of 2003. This included 19,489 loose cubic yards of gravel from the underground work and an additional 19,874 loose cubic yards of gravel mined from surface locations, namely Wooll Bench, Mary's Bench, and upper Nolan Creek. Other placer

operations in the district brought total placer gold output to 8,051 reported ounces from this region.

Production of sand and gravel in the region was 1.9 million tons, slightly less than the 2.24 million tons produced in 2002. Most of the material was for oil field-related use on the North Slope.

Rock production was 750 tons from the region.

WESTERN REGION

American Reclamation Group LLC continued leaching gold at the Illinois Creek mine; it was, however, reported that the mine was in active reclamation status at the time of reporting. Employment fell from 53 during 2002 to an average of 9 during 2003.

Six (6) placer gold mines reported production in the region for 2003, down by 2 from 2002. Reported production was 1,303 ounces of gold, down significantly from a reported production of 8,965 ounces in 2002. The substantial decrease in mine production for 2003 is believed to be a result of a reporting shortfall and not an actual reduction.

Rock, sand and gravel production was reported to be 675,000 tons for 2003.

EASTERN INTERIOR

Fairbanks Gold Mining Inc. (FGMI), a wholly owned subsidiary of Kinross Gold Corp., is the operator of Fort Knox mine and the satellite True North mine about 25 miles north of Fairbanks. FGMI recovered 391,831 ounces of gold during 2003, down 18,688 ounces from the 410,519 ounces produced during 2002. The ounce shortfall was due primarily to lower gold recovery caused by slightly refractory sulfidic material from deeper, less oxidized zones at True North. Mill throughput was 15,085,000 tons in 2003, with an average head grade of 0.031 ounces gold per ton. Total mined tonnage for 2003 amounted to 43,305,000. Employment averaged 316 persons during the year. See table 18 for further information.

The region continued to host the largest number of placer mines in the State. About 39 mines reported placer

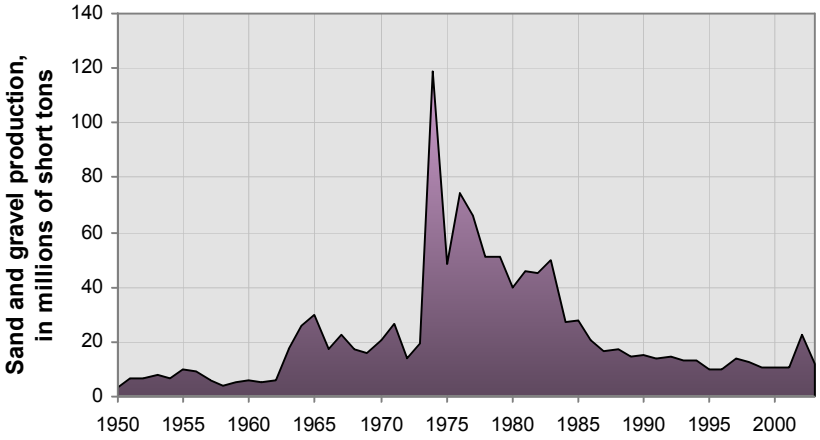


Figure 11. *Sand and gravel production in Alaska, 1950–2003.*

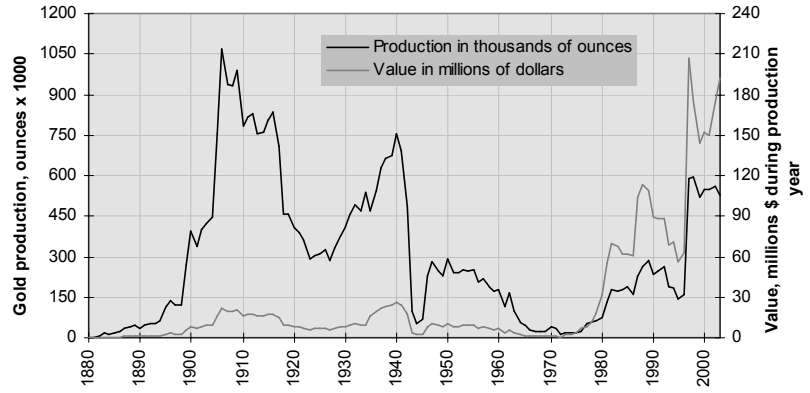


Figure 12. *Amount and value of gold production in Alaska, 1880–2003.*

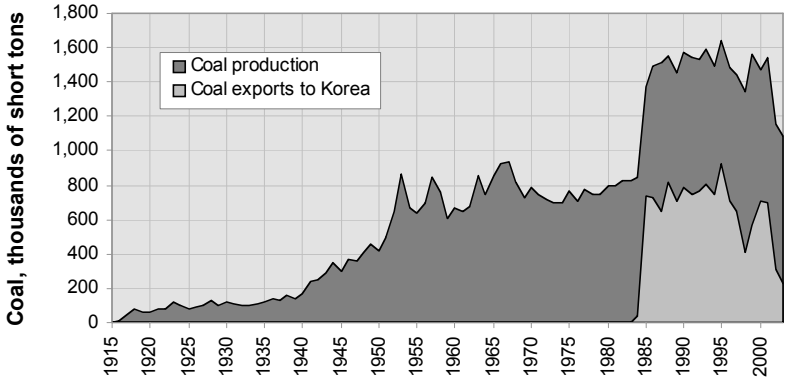


Figure 13. *Coal production in Alaska, 1915–2003, including exports to Korea.*

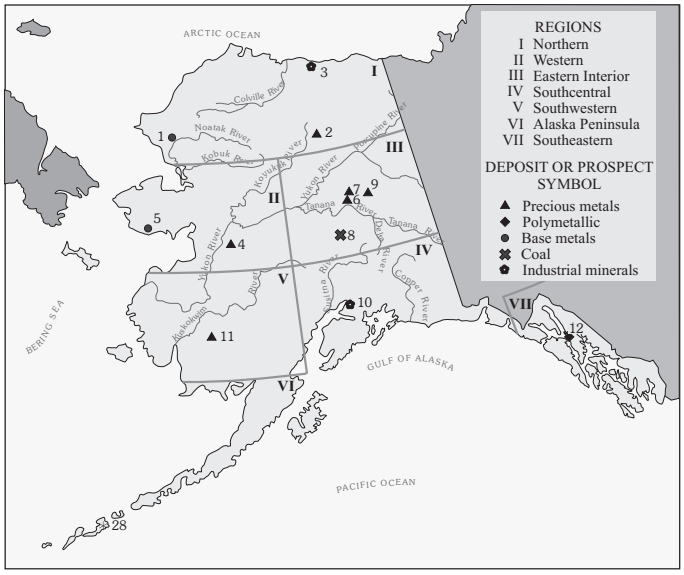


Figure 14. *Selected production projects, 2003.*

I Northern Region

1. Teck Cominco Alaska Inc. Red Dog Mine, Noatak district—zinc–lead–silver (germanium)
2. Gold Placer Mines—gold
3. Prudhoe Bay and Kuparuk pits (numerous)—sand and gravel

II Western Region

4. American Reclamation Group LLC Illinois Creek Mine, Koyukuk–Hughes district—gold–silver
5. Nome—placer gold, sand and gravel

III Eastern Interior Region

6. Polar Mining Inc., Fairbanks district—gold–silver–screened aggregate
7. Kinross Gold Corp. Fort Knox Mine, True North Mine, Fairbanks district—gold–silver; placer mines
8. Usibelli Coal Mine Inc., Bonnifield district—coal
9. Earth Movers of Fairbanks Inc., Fairbanks district—gold placer

IV Southcentral Region

10. Palmer–Anchorage district—sand and gravel

V Southwestern Region

11. NYAC Mining Co., Nyac district—gold–silver

VI Alaska Peninsula Region

VII Southeastern Region

12. Kennecott Minerals Co./Hecla Mining Co., Greens Creek Mine, Juneau–Admiralty district—silver–zinc–gold–lead–copper

Table 12. *Average metal prices, 1993–2003*

	Gold ($/oz)	Silver ($/oz)	Copper ($/lb)	Zinc ($/lb)	Lead ($/lb)
1993	359.00	4.30	0.87	0.44	0.18
1994	386.00	5.41	1.05	0.45	0.35
1995	395.00	5.43	1.33	0.48	0.34
1996	387.60	5.19	1.03	0.49	0.37
1997	330.76	4.91	1.03	0.59	0.28
1998	293.88	5.53	0.75	0.46	0.24
1999	278.70	5.20	0.71	0.49	0.23
2000	279.10	4.96	0.82	0.51	0.21
2001	271.04	4.37	0.71	0.40	0.22
2002	310.06	4.61	0.71	0.35	0.21
2003	363.38	4.88	0.81	0.38	0.23

Table 13. *Reported refined gold production, number of operators, and industry employment in Alaska, 2001–2003*[a]

Region	Number of operators			Production in ounces of gold			Number of employees		
	2001	2002	2003	2001	2002	2003	2001	2002	2003
Northern	11	9	6	631	685	8,051	9	16	36
Western	10	8	6	36,590	35,465	15,063	55	63	13
Eastern Interior	23	22	40	423,699	421,364	403,379	425	415	342
Southcentral	5	3	6	484	153	650	10	11	3
Southwestern	5	6	6	1,386	1,733	1,833	12	14	7
Southeastern	2	2	2	87,854	102,694	99,215	280	281	297
TOTAL	**56**	**50**	**66**	**550,644**	**562,094**	**528,191**	**791**	**800**	**697**

[a]2003 production includes 504,591 ounces gold hardrock projects, and 23,600 ounces of placer sources.

Table 14. *Production for selected Alaska placer gold mines, 1997–2003*

Mine size	1997	1998	1999	2000	2001	2002	2003
			Number of mines				
Small[a]	25	45	38	60	33	43	58
Medium[b]	6	11	13	14	5	4	4
Large[c]	4	7	7	4	4	2	2
TOTAL	**35**	**63**	**58**	**78**	**42**	**49**	64
			Production in ounces				
Small[a]	5,077	10,159	4,710	8,981	5,048	9,931	8,124
Medium[b]	9,373	12,833	13,218	15,186	6,234	4,739	4,976
Large[c]	65,682	72,307	52,300	22,147	11,559	7,711	10,500
TOTAL	**80,132**	**95,299**	**70,228**	**46,314**	**22,841**	**22,381**	**23,600**

[a]<650 oz gold/yr.
[b]650-2,500 oz gold/yr.
[c]>2,500 oz gold/yr.

Table 15. *Reported sand and gravel production and industry employment in Alaska by region, 2003*

Region	Companies and agencies reporting[a]	Tons	Estimated unit value ($/ton)[b]	Total value	Estimated number of employees
Northern	3	1,902,134	4.59	8,730,793	61
Western	4	669,416	5.74	3,842,445	21
Eastern Interior	7	3,407,594	5.14	17,515,033	93
Southcentral	16	4,104,823	5.20	21,345,081	121
Southwestern	2	1,406,201	6.90	9,702,783	45
Alaska Peninsula	1	75	7.22	541	0
Southeastern	6	377,759	7.95	3,003,180	8
TOTAL	**39**	**11,868,002**	**5.26[c]**	**64,139,856**	**349**

[a]From 19 returned questionnaires, over 50 telephone surveys, follow up fax questionnaiers, over 50 emails to probable producers, etc. Also includes data from the Alaska Railroad, Department of Transportation, Division of Mining, Land & Water, U.S. Forest Service, U.S. Bureau of Land Management, Alyeska Pipeline, Regional Corporations, and others.
[b]Values are based on estimates from producers.
[c]Weighted average unit value ($/ton) of sand and gravel production in Alaska.

Table 16. *Reported rock production and industry employment in Alaska by region, 2003[a]*

Region	Companies and agencies reporting[b]	Tons	Estimated unit value ($/ton)[c]	Total value	Estimated number of employees
Northern	1	750	7.32	$ 5,491	0
Western	1	5,988	7.01	41,946	0
Eastern Interior	2	74,799	8.65	647,007	6
Southcentral	5	33,383	8.25	275,410	1
Southwestern	0	- -	- -	- -	0
Alaska Peninsula	0	- -	- -	- -	0
Southeastern	2	746,462	12.60	9,405,421	28
TOTAL	**11**	**861,382**	**12.04[d]**	**$10,375,275**	**35**

[a]Includes shot rock, crushed stone, D-1, riprap, and modest quantities of ornamental stone.
[b]Derived from 19 returned questionnaires, over 50 telephone surveys, follow up fax questionnaiers, over 50 emails to probable producers, etc. Also includes data from the Alaska Railroad, Department of Transportation, Division of Mining, Land & Water, U.S. Forest Service, U.S. Bureau of Land Management, Alyeska Pipeline, Regional Corporations, and others.
[c]Unit value based on data supplied by some operations. Unit values for different stone products vary widely.
[d]Weighted average unit value ($/ton) of rock production in Alaska.

Table 17. *Red Dog Mine production statistics, 1989–2003*[a]

	Tons Milled	Ore Grade Zinc %	Ore Grade Lead %	Ore Grade Silver oz/ton	Total Tons Concentrate Produced[b]	Contained Tons Zinc	Contained Tons Lead	Million Ounces Silver[c]	Employees
1989	33,300	20.4	7.6	3.6	8,532	- -	- -	- -	228
1990	996,700	26.5	8.5	3.6	443,600	191,981	31,187	- -	350
1991	1,599,300	22.5	6.6	2.8	521,400	234,510	43,815	- -	331
1992	1,582,000	19.9	6.0	2.9	474,900	231,363	15,960	- -	349
1993	1,874,600	18.4	5.7	2.8	539,800	255,149	24,788	- -	376
1994	2,339,500	18.8	5.7	2.8	658,000	328,160	32,775	- -	391
1995	2,485,900	19.0	5.8	2.8	753,600	358,676	55,715	3.615	397
1996	2,312,600	18.7	5.0	2.8	765,300	357,680	65,886	4.304	417
1997	2,127,000	20.3	5.2	2.9	799,400	373,097	69,284	4.273	479
1998	2,752,587	21.4	5.2	2.7	1,015,773	490,461	80,193	5.202	466
1999	3,282,788	21.3	5.2	2.7	1,207,160	574,111	97,756	6.205	539
2000	3,365,508	21.0	4.7	2.5	1,211,539	585,030	91,557	5.843	536
2001	3,560,430	19.8	5.0	2.5	1,215,837	570,980	105,000	5.898	559
2002	3,489,600	21.1	5.4	2.7	1,366,480	637,800	118,880	6.750	560
2003	3,476,689	21.7	6.2	3.1	1,397,246	638,569	137,679	7.701	388

[a]Revised slightly from Special Report 50, Alaska's Mineral Industry 1995 (Bundtzen and others), based on new company data.
[b]Totals for years 1990 through 1995 include bulk concentrate.
[c]Estimate based on grade and tonnage.
- - = No data.

SOURCE: Gary Coulter, Jim Kulas, Bob Robinson, and Garth Elsdon, Teck Cominco Alaska Inc.

Table 18. *Fort Knox Gold Mine production statistics, 1996-2003*

	Tons Mined (ore + waste) Ft. Knox	Tons Mined (ore + waste) True North[a]	Tons Mined (ore + waste) Total	Tons Milled (ore) Ft. Knox	Tons Milled (ore) True North[a]	Tons Milled (ore) Total	Ounces Produced	Employment
1996	16,684,000		16,684,000	769,700		769,700	16,085	243
1997	32,380,000		32,380,000	12,163,151		12,163,151	366,223	249
1998	33,294,000		33,294,000	13,741,610		13,741,610	365,320	245
1999	30,350,000		30,350,000	13,819,010		13,819,010	351,120	253
2000	35,600,000		35,600,000	15,000,000		15,000,000	362,929	253
2001	25,957,900	8,448,400	34,406,300	13,282,614	2,377,386	15,660,000	411,220	360
2002	24,583,500	11,461,000	36,044,500	11,887,200	3,371,800	15,259,000	410,519	360
2003	30,597,940	12,707,100	43,305,040	11,473,000	3,611,682	15,084,682	391,831	316

[a]True North began production in 2001.

gold production amounting to 11,548 ounces, up slightly from the 2002 production of 10,845. Total employment for the placer mines in the region is estimated to be 26 full-time jobs.

Usibelli Coal Mine (UCM) marked its 60th year of operation with a celebration attended by more than 1,200 people (front cover photo, figs. 15 and 16). Approximately 65 full-time-equivalent employees produced 1,088,000 tons of coal, 6 percent less than in 2002. Exports amounted to 231,000 tons. The mine supplies six power plants in interior Alaska as well as exports to Korea through the port of Seward. A new 2-year 400,000-tons-per-year contract allowed resumption of coal shipments to South Korea as well as some rehiring during the fourth quarter. The company continued mining the Two Bull Ridge pit and reclaiming the Poker Flats pit during 2003.

Sand, gravel, and rock production amounted to a reported 3,495,000 tons for the year. This is down significantly from the 6,991,000 tons reported during 2002. A significant amount of construction activity was noted in the region during 2003, making the reported production questionable. Alaska Department of Transportation & Public Facilities (DOT&PF) projects in the eastern interior region that required large amounts of sand and gravel included the Badger Road interchange on the Richardson Highway, and a new access route to Tanana Loop on the

University of Alaska Fairbanks campus, named Thompson Drive. However, no earthquake restoration effort was undertaken during this reporting year.

SOUTHCENTRAL REGION

Six small operations reported placer gold production from the region for 2003. A cumulative production of 650 ounces was reported.

Sand, gravel, and rock production amounted to 5,138,000 tons from 16 reporting operations, down significantly from 2002. This region was the largest producer of this product during the year. The reported production for 2002 was 11,297,000 tons from 31 operations.

SOUTHWESTERN REGION

Placer gold production from the region amounted to 1,833 ounces from six (6) operations.

Sand and gravel operations produced 1,406,000 tons of material from the region during 2003.

ALASKA PENINSULA REGION

A small amount of sand and gravel was produced from Bristol Bay Borough lands. No other activity was reported for producers.

SOUTHEASTERN REGION

Greens Creek Mine, a 70-30 joint-venture operation near Juneau between Kennecott Minerals Company and Hecla Mining Co. reported a record mill throughput for the year at 781,200 tons. This was 47,700 tons above last year's production, also a record in the history of production from the mine at the time (table 19). Head grade of the ore was 12.3 percent zinc, 4.6 percent lead, 19.7 ounces silver per ton and 0.19 ounces gold per ton. The concentrates contained 76,200 tons of zinc, 24,800 tons of lead, 11,707,000 ounces of silver and 99,000 ounces of gold as payable metal. Employment averaged 295 full time jobs compared to 262 for 2002.

Greens Creek Mine proposed to expand the mine's tailing disposal site from the current permitted area of 29 acres to 61.3 acres, thereby increasing its use from 2 years to 25 years, based on current extraction rates. The mine currently has an announced 9-year life. A draft environmental impact statement (EIS) released in April concluded that the expansion might need the addition of carbon to the tailings to reduce acid drainage. Significantly, completion of the EIS and supporting state and federal permit requirements for the Greens Creek tailings expansion will allow continuation of operations at this world-class mine for many more years.

Currently, Greens Creek is mining approximately 2,200 tons per day underground from the 200 South, the Southwest and West ore zones. Ore from the underground trackless mine is milled at the mine site. The mill produces silver/gold doré and lead, zinc, and bulk concentrates. The doré is marketed to a precious-metal refiner and the three concentrate products are predominantly sold to a number of major smelters worldwide. Concentrates are shipped from a marine terminal on Admiralty Island, about 9 miles from the mine site (fig. 17). The Greens Creek unit uses electrical power provided by on-site diesel-powered generators. Mill recoveries of ore reserve grades are expected to be 74 percent for silver, 64 percent for gold, 81 percent for zinc, and 69 percent for lead.

Rock, sand, and gravel operations produced 1,124,200 tons of material during the year. At least nine different operations were involved. Production for 2003 was essentially the same as in 2002.

Table 19. *Greens Creek Mine production statistics, 1989–2003*

			Contained Metal[a]					
	Tons Milled	Tons Concentrate	Zinc	Tons Lead	Copper[b]	Ounces Gold	Silver	Employees
1989	264,600	- -	18,007	9,585	- -	23,530	5,166,591	235
1990	382,574	- -	37,000	16,728	- -	38,103	7,636,501	265
1991	380,000	- -	41,850	16,900	- -	37,000	7,600,000	238
1992	365,000	113,827	40,500	16,500	- -	32,400	7,100,000	217
1993[c]	77,780	- -	9,500	3,515	- -	7,350	1,721,878	217
1994	- -	- -	- -	- -	- -	- -	- -	- -
1995	- -	- -	- -	- -	- -	- -	- -	- -
1996[c]	135,000	43,000	9,100	4,200	193	7,480	2,476,000	265
1997	493,000	- -	46,000	19,000	1,300	56,000	9,700,000	275
1998	540,000	- -	58,900	22,700	1,300	60,572	9,500,000	275
1999	578,358	- -	68,527	25,503	1,400	80,060	10,261,835	275
2000	619,438	- -	84,082	31,677	1,400	128,709	12,424,093	275
2001	658,000	- -	63,903	22,385	1,400	87,583	10,900,000	275
2002	733,507	217,200	80,306	27,582	1,600	102,694	10,913,183	262
2003	781,200	- -	76,200	24,800	- -	99,000	11,707,000	295

[a]Reported as paid metals in 2003.
[b]No copper credits in 2003.
[c]Part-year production
- - Not reported.

Figure 15 (top left). *Ace in the Hole Bucyrus-Erie walking dragline demonstrating removal of overburden during Usibelli Coal Mine's 60th year celebration. Photo by David Szumigala.*

Figure 16 (bottom left). *Caterpillar 785 haul truck dumping overburden during mining demonstrations at Usibelli Coal Mine's 60th year celebration. Photo by David Szumigala.*

Figure 17 (right). *One haul truck from Greens Creek Mining Co.'s truck fleet hauling material along the mine's Admiralty Island road system. Photo from the Greens Creek Mining Company Web site (http://www.greenscreek.com).*

DRILLING

Drilling was conducted during all phases of mining (exploration, development, and production) on various projects across Alaska during 2003 (fig. 18). Table 20 lists all companies with significant drill programs in Alaska during 2003. Tables 21 and 22 summarize the drilling activity in Alaska during 2003 by region and type of drilling. Drilling totals for 2003 are 270,456 feet of core drilling and 100,178 feet of reverse-circulation drilling. Hardrock core (sometimes referred to as hardrock diamond drilling) footage in 2003 is approximately 70 percent of the 385,290 feet reported drilled in 2002. Reverse-circulation drilling footage decreased approximately 3 percent from the 103,612 feet reported drilled in 2002. Hardrock core footage for 2003 is approximately 40 percent lower than the average core footage reported in Alaska from 1996 to 2002. Reverse-circulation drilling footage for 2003 is 6 percent lower than the average reverse-circulation drilling footage from 1996 to 2002. Drilling at placer mines was largely unreported for 2003, with 10,108 feet reported to date. The only coal drilling in Alaska occurred at Usibelli Coal Mine.

Significant blasthole drilling occurred at Alaska's lode mines, specifically, the Fort Knox Mine complex (Fort Knox and True North mines), Red Dog Mine, and Greens Creek Mine. The eastern interior region had the most drilling of all Alaska regions, with 37 percent of the total for 2003. The southeastern region had 28 percent of the drilling, followed by the southwestern region with 21 percent. Major drill

Table 20. *Companies reporting significant drilling programs in Alaska, 2003*

Anglo Alaska Gold Corp.
Earth Movers of Fairbanks Inc.
Freegold Ventures Ltd.
Geocom Resources Inc.
Geologix Explorations Inc.
Golconda Resources Ltd.
Gold Cord Development Corp.
Kennecott Minerals Co. & Hecla Mining Co.
Kinross Gold Corp. (Fairbanks Gold Mining Inc.)
Lonmin PLC & Freegold Ventures Ltd & Pacific North West Capital Corp.
Nevada Star Resource Corp.
Northern Dynasty Minerals Ltd.
NovaGold Resources Inc.
Bravo Venture Group Inc. & Olympic Resources Group LLC
Silverado Gold Mines Ltd.
Teryl Resources Corp.
Tri Valley Corp.
Usibelli Coal Mine Inc.
Western Warrior Resources Inc
Ventures Resource Alaska Corp. & WGM Inc.

Figure 18. *Nodwell-mounted drill rig used during lode gold exploration by Silverado Gold Mines Ltd. at the Solomon Shear target on the Nolan Creek property. Photo by Rich Hughes.*

programs were conducted by NovaGold Resources Inc. at the Rock Creek deposit, Northern Dynasty Minerals Ltd. at the Pebble property, Kinross Gold Corp. in the Fairbanks mining district including Fort Knox and True North mines, AngloGold Inc. at several properties in the eastern interior region, Freegold Ventures Ltd./Lonmin PLC/Pacific North West Capital Corp. at the Union Bay property, Western Warrior Resources Inc. at the Cliff Mine, Geocom Resources Inc. at the Iliamna property, Ventures Resource Alaska Corp./WGM Inc. at the Flat property, Bravo Venture Group Inc./Olympic Resources Group LLC on Woewodski Island, and Kennecott Minerals Co. at Greens Creek Mine. Tri-Valley Corp. at First Chance Creek in the Richardson property and Earth Movers of Fairbanks Inc. in the Fairbanks area reported the largest placer drilling operations in Alaska during 2003.

Table 21. *Drilling footage reported in Alaska, 1982–2003*

Year	Placer Exploration	Placer Thawing	TOTAL PLACER	TOTAL COAL	TOTAL HARDROCK	Hardrock Core[a]	Hardrock Rotary[a]	TOTAL FEET
1982	30,000	94,000	**124,000**	**80,000**	**200,000**	- -	- -	**404,000**
1983	23,000	30,000	**53,000**	**12,000**	**180,500**	- -	- -	**245,500**
1984	31,000	98,000	**129,000**	**25,700**	**176,000**	- -	- -	**330,700**
1985	46,000	34,000	**80,000**	**8,700**	**131,700**	- -	- -	**220,400**
1986	32,400	227,000	**259,400**	**28,800**	**50,200**	- -	- -	**338,400**
1987	50,250	130,000	**180,250**	**19,900**	**115,100**	95,600	19,500	**315,250**
1988	152,000	300,000	**452,000**	**26,150**	**353,860**	223,630	130,230	**832,010**
1989	97,250	210,000	**307,250**	**38,670**	**332,230**	242,440	89,790	**678,150**
1990	78,930	105,000	**183,930**	**18,195**	**760,955**	648,600	112,355	**963,080**
1991	51,247	130,000	**181,247**	**16,894**	**316,655**	205,805	110,850	**514,796**
1992	6,740	65,000	**71,740**	**12,875**	**359,834**	211,812	148,022	**444,449**
1993	25,216	- -	**25,216**	- -	**252,315**	124,325	127,990	**277,531**
1994	21,000	- -	**21,000**	**8,168**	**438,710**	347,018	91,692	**467,878**
1995	27,570	- -	**27,570**	- -	**415,485**	363,690	51,795	**443,055**
1996	61,780	- -	**61,780**	**8,500**	**658,857**	524,330	134,527	**729,137**
1997	38,980	- -	**38,980**	**13,998**	**704,510**	523,676	180,834	**757,488**
1998	33,250	- -	**33,250**	**2,300**	**549,618**	505,408	45,670	**585,168**
1999	6,727	- -	**6,727**	- -	**448,797**	369,863	78,934	**455,524**
2000	15,480	- -	**15,480**	- -	**546,268**	418,630	127,638	**561,748**
2001	1,100	- -	**1,100**	**36,151**	**316,068**	240,318	75,750	**353,319**
2002	1,250	- -	**1,250**	- -	**488,902**	385,290	103,612	**490,152**
2003	10,108	- -	**10,108**	**2,000**	**370,634**	270,456	100,178	**382,742**

[a]Core and rotary drilling not differentiated prior to 1987.
- - = Not reported.
Note: 2.6M feet of blasthole drilling reported for 2003 (incomplete).

Table 22. *Drilling footage by region in Alaska, 2003*

Type of drilling	Northern	Western	Eastern interior	South-central	South-western	South-eastern	TOTAL
Placer subtotal	**1,758**	- -	**8,350**	- -	- -	- -	**10,108**
Coal subtotal	- -	- -	**2,000**	- -	- -	- -	**2,000**
Hardrock core	- -	38,971	40,415	6,040	79,056	105,974	270,456
Hardrock rotary	1,175	7,218	91,785	- -	- -	- -	100,178
Hardrock subtotal	**1,175**	**46,189**	**132,200**	**6,040**	**79,056**	**105,974**	**370,634**
TOTAL (feet)	**2,933**	**46,189**	**142,550**	**6,040**	**79,056**	**105,974**	**382,742**

- - = Not reported.
Note: 2,600,000 feet of blasthole drilling reported (incomplete). Drill footages do not include sand and gravel drilling.

GOVERNMENT ACTIONS

Dick Swainbank (fig. 19), co-author of previous annual Alaska's mineral industry reports and longtime mineral development specialist at the Alaska Department of Community & Economic Development, retired in late 2003. Dick had a strong influence over many aspects of mineral activities in Alaska. Mitch Henning, another long-time contributor to this report, also retired in 2003, after long service in the Alaska Department of Natural Resources.

A five-person team from the Minerals Section of the Alaska Division of Geological & Geophysical Surveys (DGGS) conducted a 20-day geologic mapping project near Livengood, 75 miles northwest of Fairbanks. Geochemical results from this work were released in January 2004. A one-inch-to-one-mile-scale geologic map of the 124-square-mile field area will be published in May 2004. DGGS also released a preliminary geologic map of work conducted in the Salcha River–Pogo geophysical tract within the Big Delta Quadrangle from 2000 to 2002. Geologic mapping and geochemical sampling were conducted across an area from the Salcha River near Caribou Creek to the Goodpaster River drainage near the Pogo gold property.

DGGS released maps and results from a 618-square-mile geophysical survey in the Council area of the Seward Peninsula (table 23). Fieldwork including geologic mapping and geochemical sampling is planned for a portion of the survey area during 2004.

Geophysical surveys funded by the Bureau of Land Management and managed by DGGS were released for the Delta River area (portion of the Denali Block) west of Paxson, and in the Sleetmute area of southwestern Alaska (table 24). Existing company aeromagnetic data covering 250 square miles were incorporated into the 600-square-mile Delta River survey. The 2003 Sleetmute total field magnetic and electromagnetic survey covers 640 square miles and is adjacent to the 2000 Aniak geophysical survey. BLM conducted extensive mining district studies in regions in and surrounding the survey areas.

Governor Murkowski appointed Tom Irwin Commissioner of the Alaska Department of Natural Resources in January 2003. Tom had extensive experience in the mineral industry, most recently as Vice President of Kinross Gold and General Manager of Fairbanks Gold Mining Inc.

During 2003, changes to the state permitting process were made with the transfer of the Alaska Coastal Management Program and Division of Habitat to the Department of Natural Resources (DNR). DNR will continue to coordinate the permitting of all mine projects, large and small, and expects to continue improving the cooperative permitting environment.

The Department of Natural Resources issued the final state permits needed for Teck–Pogo Inc.'s Pogo Mine Project on December 18, 2003. Teck–Pogo, a wholly owned subsidiary of Teck Cominco Ltd., requested that the State of Alaska authorize the development of the Pogo Mine Project. Teck–Pogo is authorized to begin construction and use of the Shaw Creek and Goodpaster winter trails immediately to mobilize equipment and supplies. Because the project requires a water discharge permit from the U.S. Environmental Protection Agency (EPA) and a wetlands fill permit from the U.S. Army Corps of Engineers, a Federal Environmental Impact Statement (EIS) was completed. The State of Alaska was a cooperating agency in the EIS process, and has used the EIS to assist in decision making for its authorizations. State agencies involved in these efforts include the departments of Natural Resources, Environmental Conservation, Fish & Game, Law, and Transportation. A large mine project team has been established with representatives from these agencies to coordinate state permitting activities for the Pogo Gold Project.

DNR also began working as a cooperating agency with the U.S. Forest Service and U.S. Environmental Protection Agency on the necessary permits for the expansion of the Greens Creek tailings facility in southeastern Alaska. This expansion will require the approval of a revised solid waste permit from DEC as well as additional revisions to the financial assurances. Work is also in progress to update

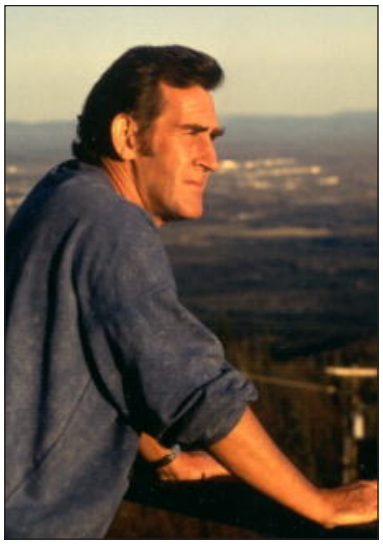


Figure 19. *Dick Swainbank, long-time author of the annual Alaska mineral industry report. Thanks for all of the hard work over the years! Photo provided by Dick Swainbank.*

Table 23. *Detailed state airborne geophysical surveys and follow-up geologic ground-truth mapping as of December 2003*[a]

Nome District western core area	494 sq. miles	Airborne geophysical/ground-truth geological mapping
Nyac District core area	183 sq. miles	Airborne aeromagnetic mapping
Circle District core area	338 sq. miles	Airborne geophysical mapping/ground-truth geologic map
Valdez Creek District	75 sq. miles	Airborne geophysical mapping
Fairbanks District	626 sq. miles	Airborne geophysical mapping/ground-truth geologic map
Richardson District	137 sq. miles	Airborne geophysical mapping
Rampart/Manley-Tofty	1,017 sq. miles	Airborne geophysical mapping/ground-truth geologic map
Upper Chulitna District	364 sq. miles	Airborne geophysical mapping/ground-truth geologic map
Petersville-Collinsville District	415 sq. miles	Airborne geophysical mapping/ground-truth geologic map
Iron Creek District	689 sq. miles	Airborne geophysical mapping/ground-truth geologic map
Ruby District	591 sq. miles	Airborne geophysical mapping/ground-truth geologic map
Fortymile District	1,036 sq. miles	Airborne geophysical mapping/ground-truth geologic maps
Livengood District	229 sq. miles	Airborne geophysical mapping (ground-truth in 2003)
SalchaRiver/North Pogo	1,032 sq. miles	Airborne geophysical mapping/ground-truth geologic maps
Southeast extension of Salcha River/Pogo	91 sq. miles	Airborne geophysical mapping (released winter 2002)
Liberty Bell	276 sq. miles	Airborne geophysical mapping (released winter 2002)
Broad Pass	304 sq. miles	Airborne geophysical mapping (released winter 2002)
Council	618 sq. miles	Airborne geophysical mapping (released winter 2003)
Total: 12 years $5.1 million	**8,515 sq. miles**	**1.3% of Alaska's total area**

[a]Projects funded by the Alaska State Legislature. Projects concentrate on state, Native, state-selected, and Native-selected lands and are managed by DGGS.
Note: Surveys listed above are complete except where noted. Additional areas will be scheduled for surveying at later dates contingent on future funding.

Table 24. *Detailed federal airborne geophysical survey work as of December 2003*[a]

Wrangell/Stikine[b]	1,111 sq. miles	Airborne geophysical mapping
Koyukuk/Wiseman	533 sq. miles	Airborne geophysical mapping
Ketchikan[c]	605 sq. miles	Airborne geophysical mapping
Aniak	1,240 sq. miles	Airborne geophysical mapping
Delta River	603 sq. miles	Airborne geophysical mapping (released 2003)
Sleetmute	641 sq. miles	Airborne geophysical mapping (released 2003)
Total: 7 years $2.04 million	**4,733 sq. miles**	**0.5% of Alaska's total area**

[a]Projects funded mainly by U.S. Bureau of Land Management with contributions by DGGS, local and state governments, and private corporations. Projects concentrate mainly on federal land. Data are released through DGGS.
[b]Major funding came from BLM and the City of Wrangell.
[c]Major funding came from BLM and Ketchikan Gateway Borough. Sealaska Corp., Alaska State Mental Health Land Trust Office, the City of Coffman Cove, and the City of Thorne Bay also contributed funds. Sealaska Corp. also contributed previously acquired geophysical data.

permits for the Red Dog zinc mine.

On August 6, 2003, DNR and the U.S. Bureau of Land Management (BLM) approved a new cooperative agreement to allow mining operators on federal lands to continue to use the Alaska Bond Pool. The cost and application process remained the same and miners may use the state's annual placer mining application (APMA) form to apply for bond pool coverage. The cooperative agreement does not have an expiration date, but DNR or BLM can cancel it with a 90-day notice, and then operators will retain bond coverage through the term of the approved reclamation plan. The bond pool is not available for operations that use cyanide or other chemical leachate. New operations may participate in the pool for a disturbance up to 40 acres; however, a larger disturbance is allowed after providing calculations showing that the reclamation liability will not exceed 33 percent of the unrestricted assets of the bonding pool.

DNR gave reclamation awards to several mining operations in 2003. Steve Pomrenke was recognized for outstanding reclamation of 6 years of placer operations on 19 acres of ground on Tripple Creek in the Nome Mining District. Outstanding reclamation work was completed by Jim Conway and Sam Turner on Pete's/Bird and Upper Cache creeks near Petersville in the Yentna Mining District. These placer miners completed reclamation work on State mining claims that was not performed by the previous claim owners. Reclamation work included disposing of, by means of burial, several thousand tons of abandoned mining equipment including large empty fuel tanks and camp structures. Several tons of scrap metal and usable equipment were removed and salvaged. The willingness of these miners to work with agency personnel, and their action in removing and disposing of the abandoned hazards, was extremely helpful to the State of Alaska. Betty Krutzsch operated a placer mine on patented mining claims along Specimen Gulch in the Nome Mining District for 13 years and completed outstanding reclamation work on 30 acres of ground. Once mining was completed, the disturbed land was recontoured and the stream channel was reconstructed. Mrs. Krutzsch went beyond the minimum reclamation standards by hand seeding and fertilizing the area, as well as planting willow stakes and live willow bundles.

The Alaska Railroad Corp., the state-owned railroad, made a $14.5 million profit in 2003 on revenue that rose more than 20 percent to $127 million. The railroad gets most of its revenue from hauling coal, gravel, and other natural resource freight. The resumption of coal shipments by Usibelli Coal Mine from Healy, a road construction project near Anchorage at Bird Creek, and greater than anticipated deliveries of naphtha from North Pole to the Port of Anchorage were the major factors for the increased revenue. Continued development in southcentral Alaska led to a higher demand for gravel, and the railroad had a 5.3 percent increase in total gravel shipments in 2003.

Senator Ted Stevens secured $9.6 million in federal congressional appropriations for the Alaska Railroad Corp. to purchase the coal loading facility and terminal in Seward. The terminal will be bought for $8 million, with the Alaska Industrial Development and Export Authority to receive $5.5 million for its 49 percent ownership of the terminal, and Hyundai Merchant Marine will receive $2.5 million. The remaining $1.6 million of the federal appropriation will be used to upgrade the terminal's loader so that larger ships can use the facilities.

The conveyance of the eastern portion of the Denali Block from the federal government to state ownership was completed in January. This area, near the junction of the Denali and Richardson highways, has high potential for the discovery of platinum-group metals and other valuable mineral resources.

The Alaska Department of Transportation & Public Facilities (DOT&PF) continued planning for roads and other

Figure 20. *Governor Frank H. Murkowski appointing Tom Irwin Commissioner of the Alaska Department of Natural Resources during a ceremony in Fairbanks, Alaska. Governor Murkowski also appointed Edgar Blatchford Commissioner of the Department of Commerce, Community & Economic Development later in January 2003. Photo by David Szumigala.*

infrastructure across the state. The Industrial Roads Program is studying, planning, and building roads to resources. The Glacier Creek road near the Rock Creek gold property is slated for realignment and upgrading as a federal aid project in the Alaska Highway System program. The 8-mile-long project is expected to cost between $6 million and $8 million and a new 3-mile-long road will replace and provide access to the proposed Rock Creek Mine, other nearby mining properties, and subsistence uses. Another proposed road project is the Crooked Creek Road, a 12- to 14-mile project from the village of Crooked Creek on the Kuskokwim River to the proposed Donlin Creek gold mine. DOT&PF has $4 million for design and construction of this road and estimates that an additional $15- to $18-million investment will be needed before final construction is complete. DOT&PF is also planning other roads, including connecting the Yukon and Kuskokwim rivers, and rehabilitating the 15-mile Williamsport-Pile Bay Road near Lake Iliamna and the Pebble copper–gold deposit.

The U.S. Geological Survey (USGS), in cooperation with other agencies, initiated a 5-year project titled "Tintina metallogenic province integrated studies on geological framework, mineral resources, and environmental signatures." Fieldwork began with studies of the Black Mountain–Tibbs Creek area of the Big Delta B-1 Quadrangle, including geologic mapping, and baseline geochemistry and biogeochemistry studies.

The USGS and BLM continued a number of cooperative projects under the Minerals Data and Information Rescue in Alaska (MDIRA) program. The USGS continued compiling non-rock and lithochemical data scheduled for release in late 2003. The USGS and DGGS continued work on the Alaska Resource Database Files (ARDF) project. Other DGGS-managed, MDIRA-funded projects include compilation of Alaskan bedrock and surficial geology map index project, compilation of DGGS lithochemical data, scanning of USGS bulletins and professional papers dealing with Alaska and providing versions of those documents for public access on the Web, and building a comprehensive database system at DGGS. Other MDIRA-funded projects are in progress at other divisions of DNR, the University of Alaska Fairbanks, and with private contractors.

The Bureau of Land Management conducted an extensive field program in the Delta River mining district of eastern and southcentral Alaska. Lode, placer, industrial, and coal sites were visited and geochemical samples were collected and the analytical results were published. BLM plans to conduct another year of fieldwork and possibly acquire more airborne geophysical data in this area.

The mineral industry paid a total of $16.4 million to the state of Alaska and Alaskan municipalities in 2003 (table 25, following page). These payments increased by more than $1.2 million and eight percent above 2002 values. Mining license taxes more than doubled from 2002, largely due to profitability of Red Dog Mine. Mining companies were the largest taxpayers in the City and Borough of Juneau and the Fairbanks North Star, Denali, and Northwest Arctic boroughs, with total payments of more than $10.5 million.

2004 OUTLOOK

The 2004 outlook is positive for Alaska's mining industry. Increased metal prices will improve the bottom line for Alaska's metal producers and increase funds available for exploration. Construction of the Pogo Mine by Teck Cominco Ltd., to begin in early 2004, is also expected to spur increased mineral exploration in interior Alaska. Six lode mine projects are also in the development phase, and new gold production is expected by early 2005.

Claim staking increased almost twofold on State lands in 2003 compared to the last several years. Significant staking occurred in the Pogo area of eastern Alaska, in the Alaska Range near Paxson in the southcentral region, and in the area surrounding the Pebble property in southwestern Alaska. Exploration expenditures should increase in these large claim areas due to subsequent field geological and geochemical studies in 2004 and beyond.

Alaska remains an exploration frontier, and recent world-class discoveries make Alaska a global exploration priority. Alaska's major mines are showcase examples of modern mining and demonstrate that the Alaskan mining industry is globally competitive, and is poised to become a major player in worldwide commodities markets.

Table 25. *Revenues paid to the State of Alaska and municipalities by Alaska's mineral industry, 1998–2003*[a]

	1998	1999	2000	2001	2002	2003
State mineral rents and royalties						
State claim rentals[b]	$ 1,170,812	$ 1,982,453	$ 1,975,376	$ 1,736,522	$ 1,908,228	$ 2,129,440
Production royalties	9,489	14,214	6,175	1,933	23,447	270,734
Annual labor	118,020	90,720	79,907	103,274	124,741	224,519
Subtotal	**1,298,321**	**2,087,387**	**2,061,458**	**1,841,729**	**2,056,416**	**2,624,693**
State coal rents and royalties						
Rents	331,716	205,983	233,249	198,545	256,927	237,912
Royalties	1,937,899	2,615,858	1,482,803	1,168,043	860,633	1,064,208
Bonus	0	0	372,000	0	0	0
Offshore Prospecting Permits	0	0	0	0	0	0
Subtotal	**2,269,615**	**2,821,841**	**2,088,052**	**1,366,588**	**1,117,560**	**1,302,120**
State material sales						
Mental Health	40,269	32,407	33,928	118,545	151,993	134,512
Division of Land	1,043,602	586,550	449,343	1,515,769	1,595,708	542,311
SPCO	28,491	28,941	41,395	12,894	24,725	208,309
Subtotal	**1,112,362**	**647,898**	**524,666**	**1,647,208**	**1,772,426**	**885,132**
State mining miscellaneous fees						
Filing Fees	2,510	4,288	5,400	3,000	3,000	4,700
Penalty Fees	0	8,000	0	0	450	0
Explore incentive app filing fee	2,000	3,000	0	0	0	0
Bond pool payment	79,929	70,692	50,100	53,866	45,208	44,878
Surface coal mining app fee	6,890	2,500	1,830	3,700	2,530	1,005
APMA mining fees	18,975	19,288	18,550	13,175	11,975	15,113
Subtotal	**110,304**	**107,768**	**75,880**	**73,741**	**63,163**	**65,696**
Mining license[c]	1,797,292	1,296,663	2,712,541	2,068,232	469,270	1,030,845
State total	**6,587,894**	**6,961,557**	**7,462,597**	**6,997,498**	**5,478,835**	**5,908,486**
Payments to Municipalities	**7,934,000**	**8,818,819**	**9,196,500**	**9,763,220**	**9,703,208**	**10,510,048**
TOTAL	**$14,521,894**	**$15,780,376**	**$16,659,097**	**$16,760,718**	**$15,182,043**	**$16,418,534**

[a]Does not include state corporate income taxes, which were not released for this study.
[b]Includes upland lease and offshore lease rentals.
[c]Includes metals, coal, and material.
N/A = not available.
SOURCE: Municipalities, companies, and DNR Financial Services Section.

APPENDIX A

New claims staked in Alaska 1999-2003

Quad no.	Quadrangle name[a]	New federal mining claims					New state mining claims				
		1999	2000	2001	2002	2003	1999	2000	2001	2002	2003
18	De Long Mountains	0	0	0	0	0	4,685	72	79	0	0
23	Phillip Smith Mountains	0	0	0	0	0	0	0	0	1	0
26	Noatak	0	0	0	0	0	1,411	216	112	0	0
27	Baird Mountains	0	0	10	0	0	64	1	0	8	0
28	Ambler River	0	0	0	0	0	0	95	0	0	0
30	Wiseman	13	15	12	12	45	92	33	6	14	54
31	Chandalar	13	10	7	15	26	3	8	14	26	90
32	Christian	0	0	0	0	0	0	0	0	0	0
36	Selawik	0	0	0	0	0	2	0	2	0	0
37	Shungnak	0	0	0	0	0	0	0	14	0	0
38	Hughes	0	0	0	0	0	1	0	1	0	0
39	Bettles	12	1	15	3	15	1	0	0	0	0
43	Teller	0	0	0	0	0	24	0	96	60	2
44	Bendeleben	0	0	0	0	0	56	64	17	52	53
45	Candle	0	0	27	0	0	0	26	51	48	11
47	Melozitna	0	0	0	0	0	0	1	11	0	0
48	Tanana	0	0	0	0	1	11	134	27	43	32
49	Livengood	0	0	0	0	0	38	186	54	151	111
50	Circle	0	0	0	0	0	391	551	111	136	177
52	Nome	0	0	0	0	0	1	9	38	13	13
53	Solomon	0	0	0	0	0	11	39	25	11	6
55	Nulato	0	0	0	0	0	80	28	32	0	40
56	Ruby	0	0	0	0	0	90	4	0	0	1
57	Kantishna River	0	0	0	0	0	8	0	0	0	0
58	Fairbanks	0	0	0	0	0	22	28	55	49	114
59	Big Delta	0	0	0	0	0	2,775	1,547	112	110	478
60	Eagle	0	0	0	0	0	465	761	90	54	71
64	Ophir	0	0	0	0	0	59	12	3	40	14
65	Medfra	0	0	0	0	0	37	0	0	12	6
67	Healy	0	0	0	0	0	78	12	73	139	15
68	Mt. Hayes	0	8	47	36	21	488	517	268	175	471
69	Tanacross	0	0	0	0	0	313	140	46	0	20
73	Iditarod	0	0	0	0	0	0	0	8	28	13
74	McGrath	0	0	0	0	0	16	0	23	117	0
75	Talkeetna	0	0	0	0	0	83	123	65	81	164
76	Talkeetna Mountains	0	0	0	0	0	18	59	17	37	0
77	Gulkana	0	0	0	2	8	231	0	0	0	0
78	Nabesna	0	0	0	0	0	2	0	0	0	0
81	Russian Mission	0	0	0	0	0	0	4	0	5	0
82	Sleetmute	0	0	0	0	0	62	0	0	6	28
83	Lime Hills	0	0	0	0	0	12	0	4	0	5
84	Tyonek	0	0	0	0	0	86	3	2	0	57
85	Anchorage	0	0	0	0	0	107	43	35	48	90
86	Valdez	0	0	0	0	0	1	153	0	9	1
92	Taylor Mountains	0	0	0	0	0	0	12	0	0	2
93	Lake Clark	0	0	0	0	0	0	0	8	2	2
95	Seward	24	24	16	17	21	29	13	5	14	6
96	Cordova	0	0	0	1	0	0	0	0	0	0
97	Bering Glacier	0	0	0	0	0	0	2	3	0	0
102	Dillingham	0	63	0	0	0	0	121	87	0	34
103	Iliamna	0	0	0	0	0	0	2	134	36	238
104	Seldovia	0	0	0	0	0	0	0	0	0	0
109	Skagway	1	0	0	0	0	38	1	12	1	1
112	Juneau	10	1	0	33	68	0	0	1	6	6

Quad no.	Quadrangle name	New federal mining claims					New state mining claims				
		1999	2000	2001	2002	2003	1999	2000	2001	2002	2003
114	Sitka	0	0	0	0	9	0	0	0	0	0
116	Port Alexander	0	2	0	0	0	0	0	0	0	0
117	Petersburg	98	0	6	141	39	2	0	1	0	3
118	Bradfield Canal	0	0	0	0	0	0	0	0	2	0
119	Craig	137	399	223	0	380	0	0	7	0	3
120	Ketchikan	0	0	0	0	0	0	0	0	2	0
121	Dixon Entrance	0	0	0	5	0	0	0	0	0	0
122	Prince Rupert	0	0	95	4	30	0	0	11	0	0
130	Karluk	0	0	0	0	0	0	0	5	18	0
135	Trinity Islands	0	0	0	0	0	74	66	0	13	11
138	Port Moller	0	0	0	0	0	10	0	0	0	0
	TOTALS	**308**	**523**	**464**	**261***	**663**	**11,977**	**5,086**	**1,766**	**1,567**	**2,443**

SOURCE: Data provided by Alaska Department of Natural Resources Land Records Information Section and U.S. Bureau of Land Management.

[a]Unlisted quadrangles did not have any staked mining claims between 1999 and 2003.

*Eight federal claims extend over 2 quadrangles.

APPENDIX B
Prospecting sites in Alaska 1997–2003

Quad no.	Quad name[a]	1997 New	1997 Total	1998 New	1998 Total	1999 New	1999 Total	2000 New	2000 Total	2001 New	2001 Total	2002 New	2002 Total	2003 New	2003 Total
17	Point Hope	0	15	0	0	0	0	0	0	0	0	0	0	0	0
18	De Long Mountains	0	0	0	0	27	27	72	99	0	99	0	91	0	91
26	Noatak	0	48	0	0	0	0	1	1	0	1	0	1	0	0
27	Baird Mountains	0	32	0	32	0	32	0	32	0	22	0	22	0	22
30	Wiseman	2	23	31	38	0	29	11	13	0	13	0	13	0	2
31	Chandalar	37	60	14	46	14	24	0	23	0	11	0	11	0	11
36	Selawik	0	5	1	6	1	7	0	7	3	7	0	7	0	7
38	Hughes	9	9	0	9	1	10	0	8	0	8	0	8	0	8
41	Fort Yukon	0	0	0	0	0	0	0	0	3	3	0	0	0	0
42	Black River	0	1	0	0	0	0	0	0	0	0	0	0	0	0
43	Teller	0	0	0	0	0	0	15	15	0	15	0	15	0	0
44	Bendeleben	89	147	4	143	7	136	0	60	0	44	0	37	0	37
45	Candle	13	21	0	20	6	26	32	46	0	38	0	32	0	0
47	Melozitna	0	192	0	192	144	336	0	144	0	128	0	0	0	0
48	Tanana	18	379	5	289	97	337	27	123	2	107	0	30	4	4
49	Livengood	184	407	111	322	20	147	24	123	0	36	7	15	7	15
50	Circle	176	499	201	528	82	443	32	302	5	138	9	92	1	69
52	Nome	63	173	16	125	21	83	37	102	1	87	0	66	0	30
53	Solomon	12	64	5	53	10	40	0	28	0	23	0	13	0	13
55	Nulato	0	6	2	4	22	26	6	32	0	30	0	16	0	2
56	Ruby	57	76	37	113	8	95	0	48	0	11	0	3	0	3
57	Kantishna River	4	4	0	4	0	4	0	4	0	4	0	4	0	4
58	Fairbanks	63	221	49	149	19	105	0	72	2	32	2	21	2	18
59	Big Delta	295	449	1,968	2,301	967	3,152	405	2,823	1	913	0	555	1	509
60	Eagle	52	145	220	336	27	282	76	316	0	142	1	108	0	32
64	Ophir	46	55	0	53	1	39	177	182	0	182	0	181	0	181
65	Medfra	22	34	0	21	2	10	0	3	0	1	0	1	2	1
66	Mt. McKinley	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	Healy	397	535	245	748	16	597	13	101	0	48	0	34	0	26
68	Mt. Hayes	188	417	73	436	25	408	46	323	8	271	0	258	33	258
69	Tanacross	54	110	22	91	155	219	0	185	0	147	2	2	0	2
73	Iditarod	0	235	0	207	16	180	0	165	4	169	3	152	0	152
74	McGrath	198	218	2	204	16	158	52	65	0	65	0	57	0	5
75	Talkeetna	281	308	63	331	19	282	42	77	0	68	27	64	0	38
76	Talkeetna Mountains	15	40	58	88	2	88	4	75	0	44	4	46	38	80
77	Gulkana	8	8	0	8	0	8	3	3	0	3	0	3	0	3
78	Nabesna	0	0	0	0	0	0	4	4	0	4	0	4	0	4
81	Russian Mission	46	46	0	46	0	46	0	46	0	46	0	46	0	46
82	Sleetmute	46	46	0	46	0	46	0	26	0	26	0	26	0	26

APPENDIX B
Prospecting sites in Alaska 1997-2003

(continued)

Quad no.	Quad name	1997 New	1997 Total	1998 New	1998 Total	1999 New	1999 Total	2000 New	2000 Total	2001 New	2001 Total	2002 New	2002 Total	2003 New	2003 Total
83	Lime Hills	9	9	0	9	0	0	0	0	0	0	0	0	0	0
84	Tyonek	6	20	0	20	0	14	0	0	0	0	0	0	4	4
85	Anchorage	24	98	5	64	10	64	3	62	0	61	1	54	0	51
86	Valdez	0	27	0	16	0	16	25	41	0	41	0	41	0	26
91	Bethel	4	26	0	12	18	22	0	18	0	10	0	0	0	0
92	Taylor Mountains	0	6	32	38	0	32	0	0	0	0	0	0	0	0
95	Seward	2	26	1	20	2	5	0	2	0	2	0	0	0	0
97	Bering Glacier	0	0	2	2	0	2	0	2	0	0	0	0	0	0
102	Dillingham	48	48	0	48	0	44	0	0	0	0	0	0	0	0
103	Iliamna	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104	Seldovia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	Blying Sound	0	7	0	7	0	0	0	0	0	0	0	0	0	0
109	Skagway	6	6	4	10	0	4	0	0	0	0	0	0	0	0
117	Juneau	0	13	0	5	0	5	0	5	0	5	0	5	0	5
123	Sitka	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128	Try Islands	0	14	17	31	0	17	14	28	0	0	5	5	0	5
137	Ketchikan	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS		**2,474**	**5,328**	**3,188**	**7,271**	**1,755**	**7,647**	**1,121**	**5,834**	**26**	**3,105**	**61**	**2,139**	**92**	**1,790**

[a]Unlisted quadrangles did not have any prospect sites staked during 1997-2003.
SOURCE: Data provided by Alaska Department of Natural Resources Land Records Information Section.

APPENDIX C

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. C-1)." This says that the location of Lik is shown as number 1 in figure C-1.

Alaska-Juneau, 100, (fig. C-3).
Anderson Mountain, 54, (fig. C-1).
Aniak district, 84, (fig C-3).
Apex-El Nido, 104, (fig. C-3).
Apollo-Sitka mines, 86, (fig. C-3).
Arctic, 9, (fig. C-1).
Avan Hills, 12, (fig. C-3).
Baultoff, 75, (fig. C-2).
Bear Mountain, 21, (fig. C-2).
Big Creek/Ladue, 58, (fig. C-1).
Big Hurrah, 32, (fig. C-3).
Binocular and other prospects, 72, (fig. C-1).
Bohemia Basin, 103, (fig. C-3).
Bokan Mountain, 122, (fig. C-3).
Bonanza Creek, 45, (fig. C-2).
Bond Creek, 73, (fig. C-2).
Bonnifield district massive sulfide deposits, 54, (fig. C-1).
Bornite, 8, (fig. C-1).
Brady Glacier, 98, (fig. C-3).
BT, 54, (fig. C-1).
Buck Creek, 23, (fig. C-2).
Calder Mine, 133, (fig C-2).
Canwell and Nikolai Complex, 140 (fig. C-3)
Cape Creek, 22, (fig. C-2).
Carl Creek, 74, (fig. C-2).
Casca VABM, 53, (fig. C-1).
Castle Island, 111, (fig. C-1).
Chandalar mining district, 17, (fig. C-3).
Chichagof, 101, (fig. C-3).
Chistochina, 68, (figs. C-2, C-3).
Circle mining district, 52, (fig. C-3).
Claim Point, 82, (fig. C-3).
Coal Creek, 63, (fig. C-2).
Copper City, 119, (fig. C-1).
Cornwallis Peninsula, 110, (fig. C-1).
Council mining district, 33, (fig. C-3).
Delta massive sulfide belt, 55, (fig. C-1).
Denali prospect, 67, (fig. C-1).
Dolphin, 49e, (fig. C-3).
Donlin Creek, 137, (fig. C-3).
Drenchwater, 3, (fig. C-1).
Dry Creek, 54, (fig. C-1).
Duke Island, 141 (fig. C-3)
Eagle Creek, 34, (fig. C-3).
Ear Mountain, 25, (fig. C-2).
Ellamar, 78, (fig. C-1).
Ernie Lake (Ann Creek), 15, (fig. C-1).
Esotuk Glacier, 20, (fig. C-2).
Fairbanks mining district, 49, (fig. C-3).
Fairhaven/Inmachuk district, 39, (fig. C-3).
Fort Knox, 49a, (fig. C-3).
Fortymile mining district, 60, (fig. C-3).
Frost, 7a, (fig. C-1).
Funter Bay mining district, 99, (fig. C-3).
Galena Creek, 21a, (fig. C-1).
Gil Claims, 49f, (fig. C-3).
Ginny Creek, 4, (fig. C-1).
Golden Zone mine, 64, (figs. C-1, C-3).
Goodnews Bay, 85, (fig. C-3).
Grant Mine, 49c, (fig. C-3).
Greens Creek, 105, (fig. C-1).
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[a]This 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 published 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.

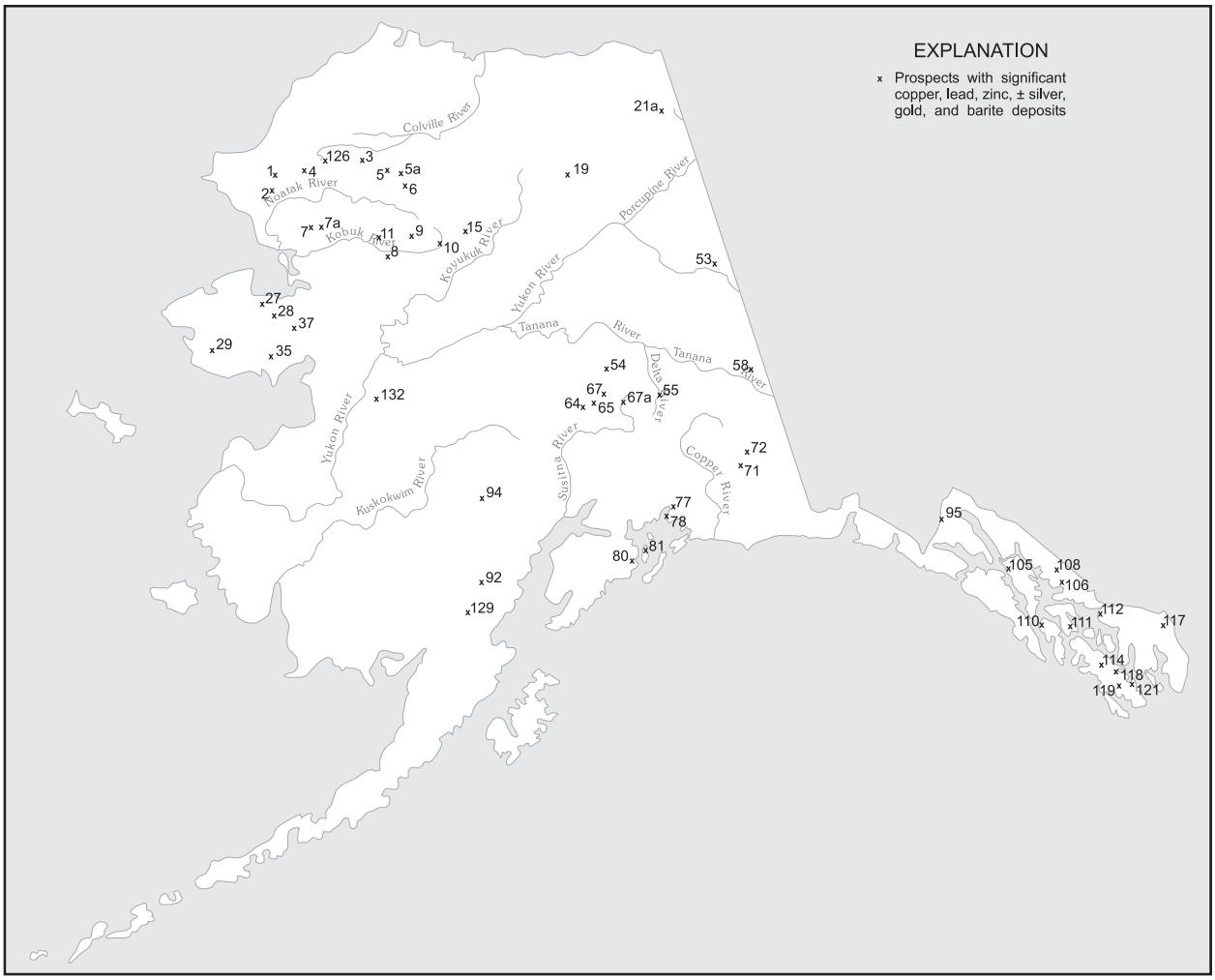


Figure C-1. *Significant copper, lead, zinc with credits of silver, gold, and barite deposits in Alaska, 2003.*

Map no.

1 **Lik**—Major stratabound massive sulfide (Zn–Pb–Ag–Ba) deposit in black shale and chert. Proven reserve (Lik) estimate of 24 million tons of 9% Zn, 3.1% Pb, and 1.4 oz/ton Ag (fig. C-1).

2 **Red Dog**—At least five major stratabound massive sulfide deposits hosted in Pennsylvanian or Mississippian shale; similar to locality 1. Mining from 1989 to 2002 produced 5.9 million tons of Zn, 970,320 tons of Pb, and 59.2 million oz Ag. Deposits, with announced reserves from 2000, include: (a) The Main deposit at Red Dog contains 46.2 million tons of proven ore grading 19.2% Zn, 5.2% Pb, with 2.92 oz/ton Ag. (b) The Aqqaluk deposit contains probable, indicated, and inferred reserves of 73.0 million tons grading 15.2% Zn, 4.03% Pb, and 2.17 oz/ton Ag. (c) The Qanaiyaq (formerly named Hilltop) deposit with an indicated reserve is 10.6 million tons grading 17.8% Zn, 5.5% Pb, and 3.41 oz/ton Ag. (d) Inferred resource in the Paalaaq deposit is 14.3 million tons of 15.0% Zn, 4.0% Pb, and 2.63 oz/ton Ag. (e) Anarraq deposit discovered in 1999 has an inferred reserve of 19.0 million tons of 15.8% Zn, 4.8% Pb, and 2.07 oz/ton Ag (fig. C-1).

3 **Drenchwater**—Mississippian and Pennsylvanian shales and cherts contain three stratabound base metal occurrences spatially related to acid volcanics. The lowest unit, a siliceous mudstone, contains a 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 6,500 ft, and contains up to 26% Zn and 51% Pb in grab samples (fig. C-1).

4 **Ginny Creek**—Epigenetic, disseminated Zn–Pb–Ag deposits with barite in sandstone and shale of Noatak Sandstone of Late 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. C-1).

5 **Story Creek**—Epigenetic replacement deposits of Zn–Pb–Ag–Cu–Au hosted in brecciated zones in Devonian

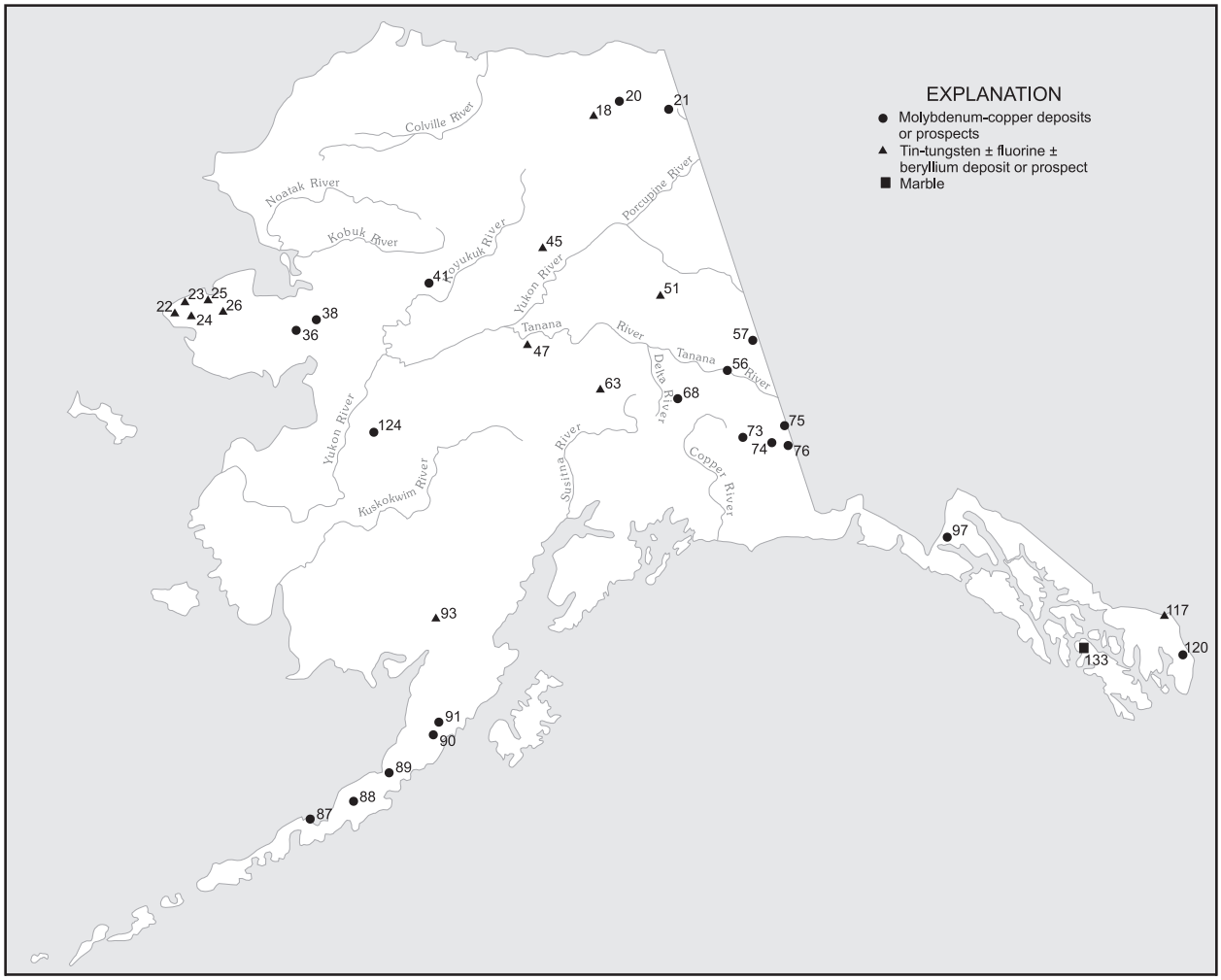


Figure C-2. *Significant molybdenum–copper and tin–tungsten with credits of fluorite and beryllium deposits in Alaska, 2003.*

Kanayut Conglomerate or Lower Mississippian Kayak Shale. Grab samples of high-grade material contain up to 0.43% Cu, 34% Pb, 28.8% Zn, 0.04 oz/ton Au, and 30 oz/ton Ag (fig. C-1).

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. C-1).

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, 0.14 oz/ton Au, and 14.8 oz/ton Ag (fig. C-1).

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 0.3 oz/ton Ag. BLM estimates 35 million tons of 4% Cu (fig. C-1).

7a **Frost**—Possible 9 million tons of 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 mi. Selected samples contain up to 13.2% Zn (fig. C-1).

8 **Bornite**—Major stratabound Cu–Zn deposit in brecciated carbonate rock of Devonian age; 5.0 million ton orebody contains 4.0% Cu and accessory Zn and Co. Larger reserve estimate of 40 million tons of about 2% Cu and undisclosed amount of Zn and Co. At grade of 1.2% Cu, reserves are 100 million tons (fig. C-1).

9 **Arctic**—Major volcanogenic (Cu–Zn) massive sulfide deposit hosted in sequence of metarhyolite, metatuff, and graphitic schist of Devonian age; indicated reserves of 40 million tons grade 4.0% Cu, 5.5% Zn, 0.8% Pb, 1.6 oz/ton Ag, and 0.02 oz/ton Au (fig. C-1).

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, 3 to 11 oz/ton Ag (fig. C-1).

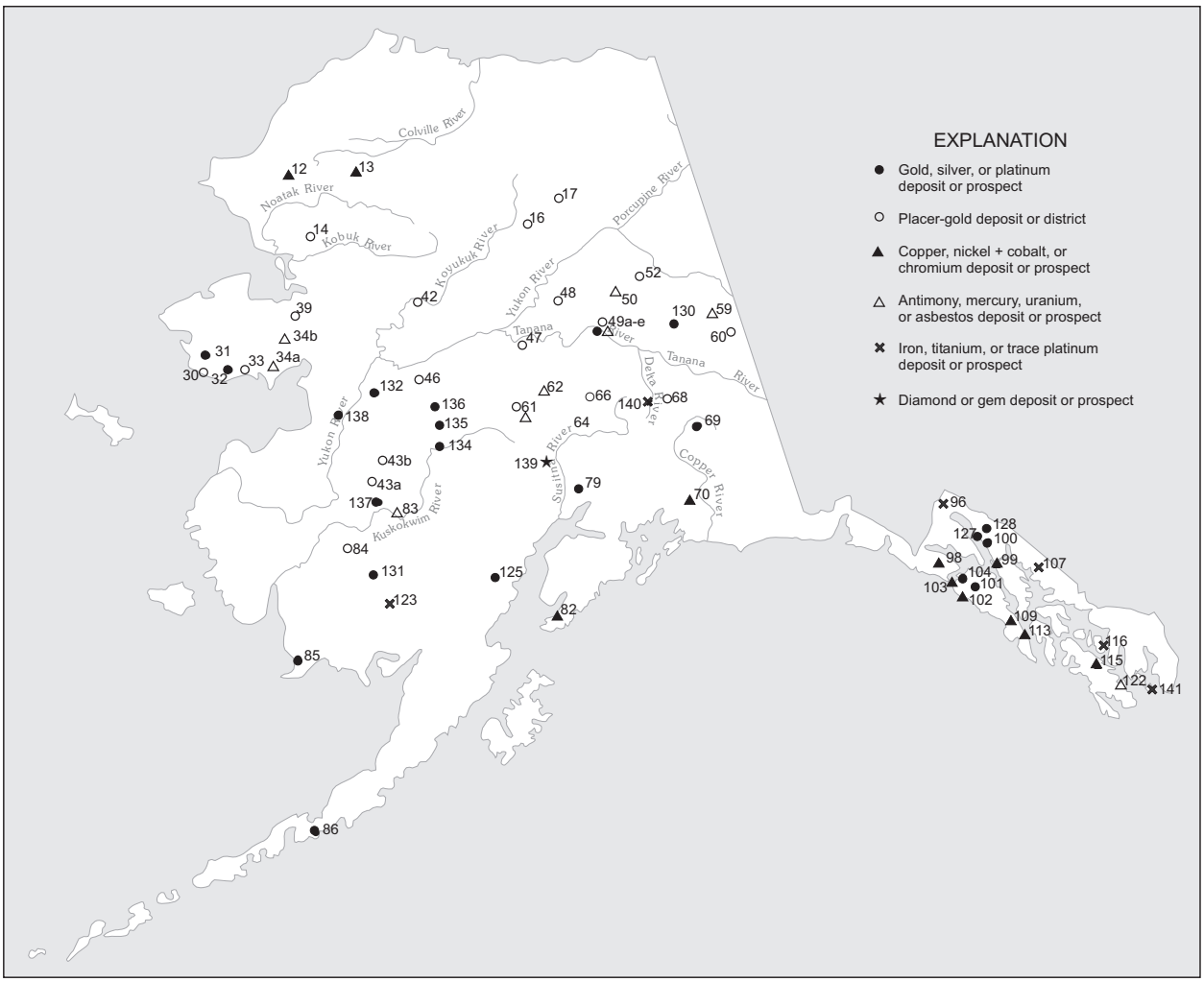


Figure C-3. *Significant gold, silver, platinum, and strategic mineral deposits in Alaska, 2003.*

11 **Smucker**—Middle Paleozoic volcanogenic massive sulfide deposit; 3,000 ft long and up to 190 ft wide; contains significant tonnage of Cu–Pb–Zn ore that grades 1.5% Pb, 5 to 10% Zn, 3 to 10 oz/ton Ag, with minor Au (fig. C-1).

12 **Avan Hills**—Disseminated chromite in layered ultramafic rocks; grab samples contain up to 4.3% Cr with 0.015 oz/ton PGM (fig. C-3).

13 **Misheguk Mountain**—Chromite occurrences similar to those in Avan Hills (fig. C-3).

14 **Klery Creek**—Lode and placer Au deposits worked intermittently from 1909 through 1930s. Total production through 1931, mostly from placer deposits, estimated at 31,320 oz Au (fig. C-3).

15 **Ernie Lake (Ann Creek)**—Stratabound massive sulfide occurrence in metarhyolite, metatuff, and marble. Gossan zones strongly anomalous in Cu–Pb–Zn and Ag (fig. C-1).

16 **Koyukuk–Nolan mining district**—Major placer Au district; from 1893 to 2003 produced an estimated 353,034 oz Au. Gold placers in Nolan Creek mined on surface and underground, both sources of large gold nuggets. Significant deep placer reserves remain (fig. C-3).

17 **Chandalar mining district**—Major Au-producing district; substantial production in excess of 65,860 oz Au through 2003 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 45,000 tons with grade of 2 oz/ton Au (fig. C-3).

18 **Porcupine Lake**—Stratiform fluorite occurrences and argentiferous enargite, tetrahedrite associated with felsic volcanic rocks of late Paleozoic age. Reported grades of up to 30% fluorite (CaF_2) reported, with grab samples of 4.8% Cu (fig. C-2).

19 **Wind River**—Stratabound Pb–Zn massive sulfide prospects; reported grades of up to 5% Pb (fig. C-1).

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. C-2).

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 35-acre area where soil samples average more than 0.2% MoS_2, and an adjacent 25-acre area where rubble contains wolframite has soils averaging greater than 0.12% WO_3. Rubble crop in this area indicates a Tertiary porphyry system as the source of the Mo and W (fig. C-2).

21a **Galena Creek**—Steeply dipping veins contain up to 21% Cu, 3.5% Zn, and 1.3% Pb with 5.5 oz/ton Ag on the east side of the creek, and on the ridge west of the creek a large area of disseminated mineralization and veinlets contains predominantly Zn (fig. C-1).

22 **Cape Creek**—Major placer Sn producer. More than 500 tons Sn produced from 1935 to 1941; from 1979 to 1990, produced 1,040 tons Sn. Derived from Cape Mountain in contact zone of Cretaceous granite and limestone (fig. C-2).

23 **Buck Creek**—Major placer Sn producer. More than 1,100 tons Sn produced from 1902 to 1953 (fig. C-2).

24 **Lost River**—Major Sn, fluorite, W, and Be deposit associated with Cretaceous Sn granite system. More than 350 tons Sn produced from skarn and greisen lode sources. Measured reserves amount to 24.6 million tons that grade 0.15% Sn, 16.3% CaF_2, and 0.03% WO_3, based on 45,000 ft of diamond drilling (fig. C-2).

25 **Ear Mountain**—Placer Sn district and Sn–Cu–Au–Ag–Pb–Zn skarn mineralization of Cretaceous age. Area also anomalous in U (fig. C-2).

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 150,000 tons grading 1% + Sn was identified, with incrementally higher tonnage at lower grades (fig. C-2).

27 **Hannum**—Stratiform, carbonate-hosted Pb–Zn–Ag massive sulfide deposit of mid-Paleozoic age in heavily oxidized zone that ranges from 30 to 150 ft thick. Mineralized zone reported to assay up to 10% Pb, 2.2% Zn, 0.04 oz/ton Au, and 1.76 oz/ton Ag (fig. C-1).

28 **Independence Creek**—Pb–Zn–Ag massive sulfide deposit; high-grade ore shipped in 1921 contained 30% Pb, 5% Zn, up to 150 oz/ton Ag. Mineralization restricted to shear zone in carbonates (fig. C-1).

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 8,000 ft along strike (fig. C-1).

30 **Nome mining district**—Major placer Au producer. Production from 1897–2003 in excess of 4,990,231 oz Au, all from placers. Past sporadic Sb and W production (fig. C-3).

31 **Rock Creek**—550,000 oz Au resource, with about 11.79 million tons grading 0.059 oz/ton Au in vein swarms and stringers in an area 1,500 ft long, 500 ft maximum width and 300 ft deep (fig. C-3).

32 **Big Hurrah**—Epigenetic vein deposit in black slate and metasedimentary rocks of the Solomon schist. Deposit contains some W mineralization and has produced over 27,000 oz Au from nearly 50,000 tons milled ore. Proven, inferred, and indicated reserves total 104,000 tons that grade 0.61 oz/ton Au, 0.55 oz/ton Ag, and credits of WO_3 (fig. C-3).

33 **Solomon and Council mining districts**—Major placer Au districts; produced over 1,046,513 oz through 2003. Three structurally controlled Au deposits in Bluff area—Daniels Creek, Saddle, and Koyana Creek—contain minimum inferred reserves of 6.5 million tons grading 0.1 oz/ton Au (fig. C-3).

34a **Eagle Creek**—U prospect in Cretaceous Kachauik alkalic intrusive rocks. Highly anomalous geochemical values and U concentrations of 1,000 ppm reported (fig. C-3).

34b **Death Valley**—Sandstone-type U prospect with predominantly epigenetic mineralization. Over 11,000 feet of drilling defined a minimum reserve of 1 million pounds of U^3O^8 with average grade of 0.27% U^3O^8 and 9.9 foot thickness within 200 feet of surface (fig. C-3).

35 **Omalik**—Vein-type Pb–Zn–Ag massive sulfide prospect in Paleozoic carbonate rocks; from 1881 to 1900, produced 400 tons of Pb–Zn ore that averaged about 10% Pb and 40 oz/ton Ag. Grades of oxidized Zn ore reported to be up to 34% Zn (fig. C-1).

36 **Windy Creek**—Disseminated Mo–Pb–Zn mineralization in quartz veins and skarn with reported values as high as 0.15% Mo (fig. C-2).

37 **Quartz Creek**—Significant Pb–Zn–Ag mineralization; reported grades of 15% combined Pb–Zn and 10 oz/ton Ag (fig. C-1).

38 **Placer River**—Significant Mo–F mineralization disseminated in intrusive rocks. Reported values of 0.2% Mo (fig. C-2).

39 **Fairhaven/Inmachuk district**—Placer deposits with 348,089 oz production from 1902–2003; significant reserves remaining in a large ancestral channel system. Large base metal sulfide concentrations and U values in concentrates (fig. C-3).

40 **Poovookpuk Mountain**—Porphyry Mo mineralization. Reported grades of up to 0.25% Mo (fig. C-2).

41 **Purcell Mountain**—Mo and Ag occurrences associated with Cretaceous alkalic igneous plutons, alaskite, and bostonite dikes (fig. C-2).

42 **Koyukuk–Hughes mining district**—Production of 258,344 oz Au from 1930 to 2002, mainly from Alaska Gold Co. dredge at Hogatza; dredge reactivated in 1981, but deactivated in 1984, and reactivated again in 1990. Non-float mechanized operation on Utopia Creek produced significant amount of placer Au from 1930 to 1962 (fig. C-3).

43 **Iditarod district**—Major placer Au district; produced 1,562,722 oz Au through 2003. 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. C-3).

44 **Innoko–Tolstoi mining district**—Major placer Au district with significant lode Au–Sb–Hg potential; lode sources for placers are Late Cretaceous volcanic-plutonic complexes and dike swarms that intrude Mesozoic flysch; mining district produced 728,556 oz Au through 2003, almost all from placer deposits (fig. C-3).

45 **Bonanza Creek**—Skarn-type W mineralization along intrusive contact; no published information available (fig. C-2).

46 **Ruby mining district**—Placer Au–Sn district; produced more than 477,477 oz Au from 1931 to 2002; mining district also contains Pb–Ag prospects with grades reportedly as high as 82 oz/ton Ag (fig. C-3).

47 **Hot Springs mining district**—Placer Au–Sn district; produced more than 577,989 oz Au and over 720,000 lb cassiterite through 2003. Includes Eureka and Tofty subdistricts. Magnetite-rich, niobium-bearing carbonatite sill in the Tofty area contains geochemically anomalous Nb, REE, P, and Y (figs. C-2, C-3).

48 **Livengood–Tolovana mining district**—Placer Au district; produced more than 529,513 oz Au since discovery in 1914 to 2003. Substantial reserves remain mainly on Livengood Bench, a Pliocene ancestral channel (fig. C-3).

49 **Fairbanks mining district**—Nationally ranked Au-producing district; largest producer in Alaska. Produced about 8,181,677 oz Au from placer deposits (1902–2003). Major lode Au and lode Sb producer; produced more than 2,979,795 oz Au and over 2000 tons Sb from veins and shear zones through 2003. Production of W exceeded 4,000 short ton units since 1915, all derived from skarn near Cretaceous quartz monzonite (fig. C-3).

49a **Fort Knox**—Disseminated Au deposit within granodiorite/quartz monzonite pluton near Fairbanks. Proven and probable reserves as of December 31, 2002, open at depth, are 1,974,720 oz of Au in 82.28 million tons of rock at an average Au grade of 0.024 oz/ton. Measured and indicated resources are 16.78 million tons containing 335,600 ounces of gold. Fairbanks Gold Mining Inc. at Fort Knox and True North mines produced 2,675,247 oz of Au from 1996 to 2003. (fig. C-3).

49b **Ryan Lode**—Based on a 0.015 oz/ton cutoff, total reserves in the metasediment-hosted Ryan Lode and subparallel igneous-hosted Curlew Shear are 822,200 oz of Au in 14.6 million tons of rock. A geologic resource of about 2.4 million oz occurs within the total shear zone system (fig. C-3).

49c **Grant Mine**—A series of subparallel Au-bearing quartz veins in the schist and quartzite of Ester Dome based on exploration in 1990. Indicated reserves on one vein system, the O'Dea, are 212,000 tons of 0.36 oz/ton Au. Other similar vein systems have been identified within the property (fig. C-3).

49d **True North**—Au occurs in siderite-quartz veins in carbonaceous quartzite and schist within a terrane containing eclogitic rocks. Proven and probable reserves as of December 31, 2002 are 305, 748 oz Au in 7.12 million tons of rock at a grade of 0.043 oz/ton Au, with measured and indicated resource of 37,086 oz Au at grade of 0.041 oz/ton Au in 907,201 tons of rock. Mining began in 2001 and 9.36 million tons of 0.04 oz/ton ore were processed at Fort Knox mill (fig. C-3).

49e **Dolphin—**Recently recognized mineralized intermediate intrusion contains anomalous Au, As, Bi and Sb. Discovery hole in 1995 intercepted 330 ft of 0.049 oz/ton Au (fig. C-3).

49f **Gil Claims**—Gold occurs in two calc-silicate zones within Paleozoic schist units. Gold enrichment occurs along iron-stained shears and within quartz-calcite veinlets. Drilling has identified an in-place Au resource of 433,000 oz at an average grade of 0.04 oz/ton Au (fig. C-3).

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. C-3).

51 **Twin Mountain**—Significant W mineralization associated with skarn development along contact zone of quartz monzonite stock of Cretaceous age (fig. C-2).

52 **Circle mining district**—Currently one of Alaska's largest producing placer Au districts; produced more than 1,064,025 oz Au since discovery in 1893 to 2003. Has significant potential for Sn, W, and Au mineralization from variety of lode sources (fig. C-3).

53 **Three Castle Mountain, Pleasant Creek, Casca VABM**—Stratabound Pb–Zn massive sulfide mineralization. Reported grades of up to 17% Zn and 2% Pb (fig. C-1).

54 **Bonnifield district massive sulfide deposits (Anderson Mountain, Dry Creek, Sheep Creek, Virginia Creek, BT, Liberty Bell)**—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 stratabound Au–B deposit and mineralization in Sheep Creek; latter contains Sn as well as base metals (fig. C-1).

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, 0.7 to 2.0 oz/ton Ag, and 0.018 to 0.061 oz/ton Au; estimated potential reserve of 40 million tons for all deposits. Recent exploration has identified several gold prospects associated with silicified structures in the White Gold trend (fig. C-1).

56 **Mosquito, Peternie**—Porphyry Mo prospects of early Tertiary age; reported grades of up to 0.17% Mo (fig. C-2).

57 **Taurus**—Significant major porphyry Cu–Au prospect of Paleocene age. East Taurus Zone contains inferred

reserves of 140 million tons grading about 0.30% Cu and 0.01 oz/ton Au, and 0.03% Mo (fig. C-2).

58 **Big Creek/Ladue**—Stratabound Pb–Zn–Ag massive sulfide prospects in metavolcanic rocks (fig. C-1).

59 **Slate Creek**—At least 55 million tons of 6.3%, high-quality chrysotile asbestos in serpentinized ultramafic rocks of Permian(?) age (fig. C-3).

60 **Fortymile mining district**—Major placer Au district. Produced over 550,217 oz placer and very minor lode Au since discovery in 1883 to 2003, the longest continuous production of Au (120 years) of any Alaskan mining district (fig. C-3).

61 **Kantishna mining district**—Major placer Au and lode Ag–Au–Pb–Zn–Sb–W district. Produced 99,307 oz placer and lode Au, about 307,000 oz lode Ag, and 2,500 tons 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 stratabound base metal deposits occur in schist and quartzite (fig. C-3).

62 **Stampede mine**—Major Sb deposit; produced more than 1,750 tons Sb from large shear zone in poly-metamorphic rocks of Yukon–Tanana terrane (fig. C-3).

63 **Coal Creek**—Greisen-hosted Sn–Cu–W deposit in "McKinley" age pluton (55 million years old). Reported reserves of 5 million tons of ore that grade 0.28% Sn and 0.3% Cu with credits of W, Ag, and Zn (fig. C-2).

64 **Golden Zone mine**—Major Au–Cu–Ag deposits in Late Cretaceous breccia pipe and skarn deposits. Produced more than 1,581 oz Au, 8,617 oz Ag, and 21 tons Cu. On the basis of recent (1994) drilling, the Pipe, Bunkhouse, and Copper King deposits contain 13.3 million tons grading 0.095 oz/ton Au (figs. C-1, C-3).

65 **Nim Prospect**—Porphyry Cu–Ag–Au deposit of Late Cretaceous age. Reported grades of up to 5.0% Cu and 9 oz/ton Ag (fig. C-1).

66 **Valdez Creek district**—About 508,900 oz Au production through 2003. Cambior Alaska Inc., the largest placer mine in Alaska, operated in this district until September 1995 (fig. C-3).

67 **Caribou Dome (Denali)**—Ten identified stratabound Cu deposits in volcanic sedimentary rocks of Triassic age. Proven and probable ore is 700,000 tons grading 6% Cu with Ag credits, with indicated resources that may contain 2 million tons ore over strike length of 4,000 feet (fig. C-1).

67a **Zackly**—Disseminated Cu and Au in garnet-pyroxene skarn and marble. Reserves are estimated at 1.4 million tons grading 2.6 percent Cu and 0.175 oz/ton Au (fig. C-1).

68 **Chistochina**—Porphyry Cu prospects of Tertiary age and placer Au district; produced more than 181,488 oz Au and small amount Pt from placer deposits (figs. C-2, C-3).

69 **Nabesna mine**—Classic high-grade Au skarn that envelopes quartz diorite of Jurassic(?) age; produced over 66,500 oz Au from about 88,000 tons of ore from 1930 to 1941 (fig. C-3).

70 **Spirit Mountain**—Massive and disseminated Cu–Ni mineralization in mafic-ultramafic complex (fig. C-3).

71 **Kennecott deposits**—Major stratiform Cu–Ag massive sulfide deposits localized near contact between Chitistone 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 600,000 tons Cu and 10 million oz Ag from 4.8 million tons ore. Some reserves remain (fig. C-1).

72 **Binocular and other prospects**—Kennecott-type Cu–Ag massive sulfide deposits (fig. C-1).

73 **Bond Creek–Orange Hill**—Two major porphyry Cu–Mo deposits of Late Cretaceous age; reported inferred reserves of 850 million tons ore that grade 0.3 to 0.5% Cu and 0.03% Mo (fig. C-2).

74 **Carl Creek**—Porphyry Cu prospect in altered intrusive complex; similar to locality 73 (fig. C-2).

75 **Baultoff**—Porphyry Cu prospect in altered intrusive rocks; inferred reserves of 145 million tons of 0.20% Cu; similar to locality 73 (fig. C-2).

76 **Horsfeld**—Porphyry Cu prospect; similar to locality 73 (fig. C-2).

77 **Midas mine**—Significant stratabound Cu (Ag–Au–Pb–Zn) massive sulfide deposit in volcanic sedimentary rocks of Tertiary Orca Group. Produced more than 1,650 tons Cu from 49,350 tons ore (fig. C-1).

78 **Ellamar**—Stratabound Cu–Zn–Au massive sulfide deposit in sediment of Eocene(?) Orca Group. Produced more than 8,000 tons Cu, 51,307 oz Au, and 191,615 oz Ag from about 301,835 tons ore (fig. C-1).

79 **Willow Creek, Independence, Lucky Shot, War Baby**—Major lode Au deposits (Ag–Cu–Pb–Zn–Mo) in veins cutting Mesozoic quartz diorite. Produced more than 606,400 oz Au from lode sources and about 55,600 oz Au from associated placer deposits (fig. C-3).

80 **Latouche, Beatson**—Major stratabound Cu–Zn–Ag massive sulfide deposits in Orca Group sedimentary rocks and mafic volcanic rocks. Produced more than 10,250 tons Cu from 6 million tons ore. Inferred reserves of 5 million tons ore that grade 1% Cu, 1.5% Pb+Zn (fig. C-1).

81 **Rua Cove**—Major stratabound Cu–Zn massive sulfide deposit in complex ore shoots enclosed in mafic volcanic rocks of Orca Group. Reported reserves of over 1.1 million tons ore that grade 1.25% Cu (fig. C-1).

82 **Red Mountain and Claim Point**—Significant Cr occurrence associated with layered ultramafic complexes of Tertiary age at Red Mountain near Seldovia. More than 39,951 tons of metallurgical-grade ore shipped through 1976; huge low-grade Cr resource may remain, of which 30 million tons grade 5.1% Cr_2O_3 (fig. C-3).

83 **Red Devil**—Major Hg–Sb deposit; high-grade epithermal Hg–Sb deposit hosted in shear zones in Kuskokwim Group sedimentary rocks. More than 35,000 flasks Hg produced from 75,000 tons ore (fig. C-3).

84 **Aniak district**—Significant placer Au district. Aniak mining district produced 578,708 oz Au from placer deposits, mainly from the Nyac and Donlin Creek areas (fig. C-3).

85 **Goodnews Bay**—Major placer Pt district; estimated to have produced over 555,000 oz refined PGE metals from 1934 to 1976; one of the largest known PGE metal resources in United States. Possible resources of 60 million yd^3 of deep, PGE-bearing gravels remain. Lode source believed to be Alaskan-type zoned ultramafic complex of Jurasssic or Cretaceous age. Possible significant offshore placer potential (fig. C-3).

86 **Apollo–Sitka mines**—Major lode Au deposits; produced more than 107,600 oz Au from ore that averaged about 0.22 oz/ton Au. Inferred reserves are 748,000 tons grading 0.76 oz/ton Au, 2.16 oz/ton Ag, with base metal credits (fig. C-3).

87 **Pyramid**—Late Tertiary porphyry Cu–Mo deposit; inferred reserves of 125 million tons ore that grade 0.4% Cu and 0.03% Mo reported (fig. C-2).

88 **Ivanof**—Late Tertiary porphyry Cu prospect; grades of up to 0.72% Cu reported. Potential for large tonnages (fig. C-2).

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. C-2).

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. C-2).

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. C-2).

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 10 million tons ore that grade more than 1% Cu (fig. C-1).

93 **Sleitat Mountain**—High-grade east-west-trending, Sn–W–Ag topaz–quartz greisen system hosted in 59-million-year-old granite and in hornfels. Zone up to 3,000 ft long and 500 ft wide. One drill-hole showed 85 ft of 1.8% Sn, and 0.4% W. Inferred resources are 64,000 to 106,000 tons Sn in 29 million tons ore (fig. C-2).

94 **Jimmy Lake**—Complex Cu–Ag–Sn mineralization of late Tertiary(?) age; reported grades of up to 105 oz/ton Ag and 3% Cu (fig. C-1).

95 **Haines Barite/Palmer**—Major stratiform Ba–Pb–Zn–Cu–Ag deposit in pillow basalt-dominated section of Paleozoic or Triassic age; consists of 48- to 60-ft-thick zone of 60% barite with upper zone (2 to 8 ft thick) of massive sulfides that contain 2% Pb, 3% Zn, 1% Cu, up to 4 oz/ton Ag, and 0.12 oz/ton Au. Estimated to contain 750,000 tons of 65% barite with Zn and Ag credits (fig. C-1).

96 **Klukwan**—Major Fe–Ti deposits in zoned ultramafic complex of Mesozoic age; reported to contain 3 billion tons of material that contains 16.8% Fe and 1.6 to 3.0% Ti (fig. C-3).

97 **Nunatak**—Porphyry Mo deposit; reported reserves of 2.24 million tons ore grading 0.067% Mo, 0.16% Cu, and 129.5 million tons of 0.026% Mo, 0.18% Cu (fig. C-2).

98 **Brady Glacier**—Major Ni–Cu deposit in layered gabbro–pyroxenite complex of Tertiary age. Proven reserves of 100 million tons ore that grade 0.5% Ni, 0.3% Cu reported and about 0.03% Co; also contains PGE concentrations (fig. C-3).

99 **Mertie Lode and Funter Bay mining district**—Contains substantial reserves of lode Au mineralization. Past production totaled about 15,000 oz Au. Deposits also contain significant Ni–Cu and Pb–Zn–Ag mineralization. Funter Bay deposit contains reported reserves of 560,000 tons that grade 0.34% Ni, 0.35% Cu, and 0.15% Co in gabbro-pipe system (fig. C-3).

100 **Alaska–Juneau**—Major lode Au deposit that consists of 100- to 300-ft-wide zone that contains en echelon, Au–bearing quartz veins in metamorphic rocks; produced more than 3.52 million oz Au from 88.5 million tons ore from 1893 to 1944. Reserves (all categories) of 105.7 million tons of 0.05 oz/ton Au remain (fig. C-3).

101 **Chichagof and Hirst Chichagof**—Major lode Au deposits in quartz veins that cut Mesozoic graywacke; produced more than 770,000 oz Au, most of which was produced at Chichagof Mine. Inferred leased reserves estimated to be 100,000 oz Au (fig. C-3).

102 **Mirror Harbor**—Ni–Cu mineralization in layered gabbro complex of Mesozoic age; reported proven reserves of 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. C-3).

103 **Bohemia Basin**—Major Ni–Cu–Co mineralization in layered mafic complex similar to locality 102; reported reserves of 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. C-3).

104 **Apex–El Nido**—Significant lode Au–W deposits occurring as cross-cutting veins in graywacke; produced more than 50,000 oz Au (fig. C-3).

105 **Greens Creek**—Major sediment-hosted Pb–Zn–Cu–Ag–Au volcanogenic massive sulfide deposit of Devonian or Triassic age. Production from 1989 to 1993 and 1996 to 2003 is 633,875 tons of Zn, 241,075 tons of Pb, over 8,600 tons of Cu, 107.1 million oz of

Ag, and 760,000 oz of Au. 2003 reserve estimate is 7.48 million tons grading 0.115 oz/ton Au, 14.1 oz/ton Ag, 11.4% Zn, and 4.12% Pb. Inferred resources are 2.7 million tons grading 11.3% Zn, 4.9% Pb, 0.13 oz/ton Au, and 17 oz/ton Ag. (fig. C-1).

106 **Sumdum**—Volcanogenic Cu–Pb–Zn massive sulfide deposit in Mesozoic metamorphic complex with potential strike length of over 10,000 ft. Inferred reserves of 26.7 million tons ore that grade 0.57% Cu, 0.37% Zn, and 0.3 oz/ton Ag reported (fig. C-1).

107 **Snettisham**—Fe–Ti deposit in mafic zoned intrusive complex; reported grades of about 18.9% Fe and 2.6% Ti (fig. C-3).

108 **Tracy Arm**—Stratabound Cu–Zn–Pb massive sulfide prospect in Mesozoic schist; over 1,100 ft long and up to 12 ft thick. Reported grades of 1.5% Cu, 3.9% Zn, 0.76 oz/ton Ag, and 0.013 oz/ton Au (fig. C-1).

109 **Red Bluff Bay**—Significant chrome mineralization in Mesozoic ultramafic complex (probably ophiolite); reported reserves of 570 tons of material that grade 40% Cr and 29,000 tons that grade 18 to 35% Cr (fig. C-3).

110 **Cornwallis Peninsula**—Volcanogenic Cu–Pb–Zn–Ag–Ba massive sulfide deposit of Triassic(?) age; reported grades of up to 20% Pb–Zn and 23 oz/ton Ag (fig. C-1).

111 **Castle Island**—Stratiform barite deposit of Triassic age hosted in carbonate and pillow basalt; about 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. C-1).

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, 29 oz/ton Ag, and 0.5 oz/ton Au. Sn has also been recently identified. Area also contains potential for porphyry Mo deposits (fig. C-1).

113 **Snipe Bay**—Ni–Cu deposit in zoned mafic-ultramafic complex; inferred reserves of 430,000 tons of 0.3% Ni, 0.3% Cu, and 0.13 oz/ton Ag reported (fig. C-3).

114 **Kasaan Peninsula**—Major skarn-type Cu–Fe-Au massive sulfide deposit of Jurassic age; area has produced over 14,000 tons Cu, and 55,000 oz Ag. Reported reserves of 4 million tons ore that grade 50% Fe and less than 2% Cu (fig. C-1).

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, 2,500 tons Cu, over 20,000 oz PGM, and Au and Ag credits were produced from 325,000 tons ore (fig. C-3).

116 **Union Bay**—Significant Fe–Ti mineralization in zoned, Ural-Alaska type ultramafic complex; area also contains PGE and V concentrations. At least 7 zones of PGE–magnetite hydrothermal mineralization associated with pyroxene veins that crosscut magmatic layering (fig. C-3).

117 **Hyder mining district**—Area produced more than 25,000 tons high-grade W–Cu–Pb–Zn–Ag ore from 1925 to 1951 from crosscutting ore shoots in Texas Creek granodiorite of Tertiary age. Area also contains potential for porphyry Mo–W mineralization and massive sulfide–skarn Pb–Ag–Au–W deposits (figs. C-1, C-2).

118 **Jumbo**—Cu–Fe–Mo–Ag skarn deposit; produced more than 5,000 tons Cu, 280,000 oz Ag, and 7,000 oz Au from 125,000 tons ore. Zoned magnetite–Cu skarns are associated with epizonal granodiorite pluton of Cretaceous age. Reported reserves of 650,000 tons ore that grade 45.2% Fe, 0.75% Cu, 0.01 oz/ton Au, and 0.08 oz/ton Ag (fig. C-1).

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, 2.5 oz/ton Ag, and 0.2 oz/ton Au (fig. C-1).

120 **Quartz Hill**—A porphyry Mo deposit hosted in a 25-million-year-old composite felsic pluton. Probable reserves are 232 million tons with a grade of 0.22% MoS_2, and possible reserves are 1.2 billion tons with 0.12% MoS_2 (fig. C-2).

121 **Niblack**—Volcanogenic Cu–Pb–Au–Ag massive sulfide deposit hosted in Precambrian(?) Wales Group or Ordovician to Silurian Descon Formation; produced more than 700 tons Cu, 11,000 oz Au, and 15,000 oz Ag. Current resource is 2.78 million tons at 3.22% Zn, 1.70% Cu, 0.93 oz/ton Ag and 0.081 oz/ton Au. (fig. C-1).

122 **Bokan Mountain**—Numerous U–Th prospects associated with Jurassic peralkaline intrusive complex; from 1955 to 1971, produced more than 120,000 tons ore that graded about 1% U_3O_8. Contains inferred reserves of about 40 million tons of 0.126% Nb and up to 1% REE metals (fig. C-3).

123 **Kemuk Mountain**—Magmatic Fe–Ti deposit hosted in Cretaceous(?) pyroxenite. Inferred reserves of 2.4 billion tons that average 15 to 17% Fe, 2 to 3% TiO_2, and 0.16% P_2O_5 (fig. C-3).

124 **McLeod**—Porphyry Mo deposit that contains quartz-molybdenite fissure veins in quartz-feldspar porphyry. Chip samples contain up to 0.09% Mo (fig. C-2).

125 **Johnson River**—Epigenetic(?) quartz-sulfide stockwork or massive sulfide deposit hosted in volcaniclastic, pyroclastic, and volcanic rocks of Jurassic Talkeetna Formation. Deposit has drilled-out reserves at a $45/ton cutoff with no cut of high Au assays, 1,099,580 tons grading 0.32 oz/ton Au, 0.24 oz/ton Ag, 0.76% Cu, 1.17% Pb, and 8.37% Zn (fig. C-3).

126 **Nimiuktuk River**—Small hill of massive, high-grade barite estimated to contain at least 1.5 million tons barite. Widespread stream-sediment Ba anomalies in area indicate further barite potential (fig. C-1).

127 **Kensington**—Stockwork quartz veins in sheared and chloritized quartz diorite produced 10,900 tons grading 0.18 oz/ton Au prior to 1930. Recent estimates indicate at least 10.95 million tons grading 0.16 oz/ton Au for

1,751,000 oz Au of proven and probable reserves. Subparallel Horrible vein system contains 3.93 million tons grading 0.11 oz/ton Au (fig. C-3).

128 **Jualin**—Five quartz-fissure veins in Cretaceous quartz diorite, more than 15,000 ft of underground workings; produced 48,387 oz Au, mainly prior to 1930. Reserves estimated at 1.07 million tons of 0.349 oz/ton Au (fig. C-3).

129 **Pebble (Copper)**—Cu–Au porphyry with identified resource of 3 billion tons grading 0.27% Cu, 0.0088 oz/ton Au and 0.015 % Mo.2003 resource estimate is 26.5 million ounces of gold and 16.5 billion pounds of copper, making this the world's 3rd largest Cu-Au porphyry deposit. Mineralized system extends over 35 square mile area and includes other Cu–Au–Mo porphyry, Cu–Au skarn, and Au vein prospects (fig. C-1).

130 **Pogo**—Au hosted in a series (3 discovered to date) of sub-parallel and tabular, gently dipping, quartz vein zones hosted by Paleozoic gneisses intruded by Cretaceous felsic plutonic rocks. Au in the 3 ft to 60 ft thick quartz bodies has a strong correlation with Bi. A mining reserve for the Liese L1 and L2 zones is 7.7 million tons at an average grade of 0.47 oz/ton, for a total of 3.63 million oz at a 0.1 oz/ton cut-off grade. Other high-grade Au targets have been identified along an 8-mi-long trend southeast of the Liese zones (fig. C-3).

131 **Shotgun**—Quartz stockwork and breccia Au–Cu–As mineralization in a Late Cretaceous rhyolite (granite porphyry) stock. A preliminary, inferred Au resource of 980,000 oz (36.11 million tons at an average grade of 0.027 oz/ton Au) at a 0.016 oz/ton Au cut-off grade, with initial metallurgical tests indicating >90% Au recovery by cyanide leaching (fig. C-3).

132 **Illinois Creek**—Au–Ag–Cu–Pb–Zn–Bi–As-bearing, Fe–Mn oxide (gossan) shear zone crosscutting dolomitic quartzite localized near Cretaceous granitic pluton. Shear zone averaged 148 ft wide, with a drill-defined east-west strike length of 11,600 ft. Produced approximately 139,760 oz Au and 737,600 oz Ag from 1997 to 2003. Past ore grade of 0.076 oz/ton Au and 1.6 oz/ton Ag (figs. C-1, C-3).

133 **Calder Mine**—Seven recrystallized carbonate units exposed at the apex of a large regional antiform. Drilling has identified 13 million tons of chemically homogenous, high-brightness, high-whiteness marble with a purity of 98 to 99% calcium carbonate. Potential resource of 80 million tons of high-value calcium carbonate (fig. C-2).

134 **Vinasale Mountain**—Intrusion-hosted Au deposit. Au occurs as disseminated and veinlet mineralization, with arsenopyrite and pyrite in quartz-dolomite hydrothermal breccias, magmatic breccias, and zones of phyllic and silicic alteration hosted within a 69 Ma quartz monzonite stock. An inferred resource of 14.35 million tons grading 0.067 oz/ton Au, with an 0.03 oz/ton cut-off grade was identified by drilling in the Central zone (fig. C-3).

135 **Nixon Fork**—Au–Cu skarn deposits; Historic Nixon Fork mine produced 59,500 oz Au from Late Cretaceous skarns associated with quartz monzonite-Devonian limestone contact zones. Underground mining resumed in October 1995, with 133,900 oz of Au, 1,800 tons of Cu, and significant Ag produced through mine closure in 1999 (fig. C-3).

136 **Von Frank Mountain**—Au and very weak Cu 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 up to 429 ft wide with an average grade of 0.013 oz/ton Au. Higher-grade intercepts include 0.035 oz/ton Au up to 135 ft (fig. C-3).

137 **Donlin Creek**—Au mineralization associated with disseminated pyrite and arsenopyrite, sulfide veinlets, and quartz-carbonate-sulfide veinlets in sericite-altered Late Cretaceous to early Tertiary rhyodacitic porphyry dikes and sills. Au mineralization is structurally controlled, refractory, and occurs along a 4–mile long, 1–mile wide zone. Measured and indicated resource on April 2003 estimated at 11.1 million oz of Au grading 0.102 oz/ton Au and an inferred resource of 14.3 million oz Au grading 0.102 oz/ton Au at a 0.044 oz/ton Au cut-off grade. Considered the 25th largest gold resource in the world (fig. C-3).

138 **Kaiyah**—Au–Ag epithermal prospect in silicified Koyukuk sedimentary rocks adjacent to Poison Creek caldera. Polymetallic sulfides in quartz veins, with some veins over 100 feet thick, and silicification are associated with pervasive advanced argillic, and sericite alteration (fig. C-3).

139 **Shulin Lake**—Micro-and macro-diamonds occur in interbedded volcaniclastic and tuffaceous rocks containing olivine and pyroxene. Discovered by tracing diamond indicator minerals in placer gravels. Possibly lamproitic intrusions with up to 1-mile diameter circular aeromagnetic anomalies (fig. C-3).

140 **Canwell and Nikolai Complex**—Ni–Cu–PGE semi-massive to massive sulfide prospects hosted in mafic and ultramafic rocks of the Nikolai intrusive/extrusive complex. Five mafic-ultramafic intrusions in the central Alaska Range are comagmatic with the Nikolai flood basalts (fig. C-3).

141 **Duke Island**—Cu–Ni–PGE disseminated, semi-massive, and massive sulfides associated with 2 zoned, Ural-Alaska type ultramafic bodies (fig. C-3).

APPENDIX D

State and federal agencies and private interest groups involved in mineral development activities, 2003

(The *Alaska Miners Association Directory* lists technical and professional consultants and companies available for work in Alaska. The report is published annually and is free to AMA members. The cost for non members is $15 plus shipping and handling.)

STATE OF ALASKA AGENCIES

OFFICE OF THE GOVERNOR
International Trade
550 West 7th Avenue, Suite 1700
Anchorage, Alaska 99501
(907) 269-7450
(907) 269-7461 (fax)
email: Margy_Johnson@gov.state.ak.us

Function: Primary state office for promotion of exports. Maintains overseas offices to increase Alaska's visibility in key markets.

DEPARTMENT OF COMMERCE, COMMUNITY & ECONOMIC DEVELOPMENT
State Office Building, 9th Fl.
P.O. Box 110800 (mailing)
Juneau, AK 99811-0800
(907) 465-2500
(907) 465-5442 (fax)

Function: Promotes economic development in Alaska.

Office of Economic Development
State Office Building, 9th Fl.
P.O. Box 110809
Juneau, AK 99811-0801
(907) 465-5478
(907) 465-3767 (fax)

Office of Mineral Development
211 Cushman St.
Fairbanks, AK 99701-4639
(907) 451-2738
(907) 451-2742(fax)
email: rich_hughes@commerce.state.ak.us

Function: Primary state government advocacy agency for economic growth. Researches and publishes economic data on Alaska's mining industry. Attracts capital investment by advertising Alaska's resource potential. Provides research staff aid for the Alaska Minerals Commission. The Division also encourages the development of new markets for Alaska resources, increases the visibility of Alaska and its products in the international marketplace, and makes referrals and provides technical assistance to those interested in developing export markets for Alaska-produced or value-added goods and services.

Alaska Industrial Development & Export Authority (AIDEA)
813 W. Northern Lights Blvd.
Anchorage, AK 99503
(907) 269-3000
(907) 269-3044 (fax)
http://www.aidea.org

Function: AIDEA provides capital to finance economic growth throughout Alaska—from multi-million-dollar mining projects to small, family-owned businesses; from urban centers to small towns and rural villages. Regardless of project size, location, or business type, all AIDEA-financed projects must enhance the state's economy and provide or maintain jobs for Alaskans. AIDEA's financing assistance programs—the Credit Program and the Development Finance Program—have played an important role in Alaska's mineral development. The Credit Program includes the Loan Participation, Business and Export Assistance loan guarantee, and the Tax-Exempt Revenue Bond programs. AIDEA's Development Finance Program allows AIDEA to develop, own, and operate facilities within Alaska such as roads, ports, and utilities which are essential to the economic well-being of an area; are financially feasible; and are supported by the community in which they are located.

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
410 Willoughby Ave., Ste. 303
Juneau, AK 99801-1795
(907) 465-5009
(907) 465-5070(fax)
(907) 465-5040 TTY
(907) 465-5065 Commissioner's Office
(907) 465-5365 Public Information

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.

Department of Environmental Conservation
Anchorage Office
555 Cordova St.
Anchorage, AK 99501-2617
(907) 269-7500
(907) 269-7600 (fax)
(907) 269-7511 TYY
Permits/Compliance Assistance
1-800-510-2332 (inside Alaska only)
email: compass@envircon.state.ak.us

Department of Environmental Conservation
Fairbanks Office
610 University Ave.
Fairbanks, AK 99709-3643
(907) 451-2360
(907) 451-2187(fax)
(907) 451-2184 TTY
http://www.state.ak.us/dec

DEPARTMENT OF FISH AND GAME
1255 W. 8th St.
P.O. Box 25526 (mailing)
Juneau, AK 99802-5526
(907) 465-4100
(907) 465-4759
http://www.state.ak.us/adfg

DEPARTMENT OF NATURAL RESOURCES
Office of the Commissioner
400 Willoughby Ave., Ste. 500
Juneau, AK 99801-1724
(907) 465-2400
http://www.dnr.state.ak.us

Alaska Coastal Management Program
302 Gold St., Ste. 202

Juneau, AK 99801
(907) 465-3562
(907) 465-3075 (fax)

Function: Conducts coordinated State review of permits for mining projects within Alaska's Coastal Management Zone. Provides project design information to applicants 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
550 W. 7th Ave., Ste. 1660
Anchorage, AK 99501-3568
(907) 269-7470
(907) 269-3981 (fax)

Alaska Mental Health Trust Land Office
718 L St., Suite 200
Anchorage, AK 99501
(907) 269-8658
(907) 269-8905 (fax)
http://www.mhtrustland.org

Function: The Trust Land Office (TLO) manages the approximately 1 million acres of land that are included in the Alaska Mental Health Trust, which was created by Congress in 1956. Lands in the Trust are located throughout the state and are used to generate revenues to meet the expenses of mental health programs in Alaska. Management activities include all aspects of land use and resource development, including mineral and oil and gas leasing, exploration, and development; material sales (including gravel, sand, and rock); timber sales; surface leasing; land sales; and issuance of easements across Trust land.

Office of Habitat Management & Permitting
Headquarters & Juneau Area Office
400 Willoughby Ave., 4th Fl.
Juneau, AK 99801-1796
(907) 465-4105
(907) 465-2332 (fax)

Function: The Office of Habitat Management and Permitting fulfills specific statutory responsibilities for (1) protecting freshwater and anadromous fish habitat under the Anadromous Fish Act (AS 41.14.870) and (2) providing free passage of anadromous and resident fish in fresh waterbodies (AS 41.14.840). It requires prior written authorizations for any work affecting the free movement of fish, for any use or activity that may affect designated anadromous fish waters, and for any disturbance-producing or habitat-altering activity.

Operations Manager & Fairbanks Area Office
1300 College Rd.
Fairbanks, AK 99701-1551
(907) 459-7289
(907) 456-3091 (fax)

Anchorage Area Office
550 W. 7th Ave., Ste. 1420
Anchorage, AK 99501
(907) 269-8690
(907) 269-5673 (fax)

Kenai Area Office
514 Funny River Rd.
Soldotna, AK 99669-8255
(907) 260-4882 ext. 222
(907) 260-5992 (fax)

Mat-Su Area Office
1800 Glenn Highway, Ste. 12
Palmer, AK 99645-6736
(907) 761-3855
(907) 745-7369 (fax)

Petersburg Area Office
P.O. Box 667
Petersburg, AK 99833-0667
(907) 772-5224
(907) 772-9336 (fax)

Prince of Wales Area Office
P.O. Box 668
Craig, AK 99921-0668
(907) 826-2560
(907) 826-2562 (fax)

Division of Forestry
550 W. 7th Ave., Ste. 1450
Anchorage, AK 99501-3566
(907) 269-8463
http://www.dnr.state.ak.us/forestry

Function: Establishes guidelines to manage mining in state forests.

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

Coastal Region Office
400 Willoughby Ave., Ste. 300
Juneau, AK 99801
(907) 465-2494

Division of Geological & Geophysical Surveys
3354 College Rd.
Fairbanks, AK 99709-3707
(907) 451-5000
(907) 451-5050 (fax)
email: dggs@dnr.state.ak.us
http://wwwdggs.dnr.state.ak.us

Function: Conducts geological and geophysical surveys to determine the potential of Alaska 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 (AS 41.08.020). Publishes a variety of reports and maintains a web site 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 Geologic Materials Center storage facility at Eagle River.

Geologic Materials Center
P.O. Box 772805
Eagle River, AK 99577-2805
(907) 696-0079
(907) 696-0078 (fax)
John_Reeder@dnr.state.ak.us

Division of Mining, Land & Water
550 W. 7th Ave., Ste. 1070
Anchorage, AK 99501
(907) 269-8600

(907) 269-8904 (fax)
http://www.dnr.state.ak.us/mlw

A. Mining

Function: Principal agency for management of mining and reclamation on state land in Alaska. Maintains offices in Anchorage and Fairbanks. Issues property rights to leasable minerals; manages locatable mineral filings. Also issues millsite leases and 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 (ASMCRA), which includes permitting and inspection of coal mining activity and reclamation of abandoned mines.

B. Land

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

C. Water Management

Function: Manages water resources of the State; issues water-rights permits and certificates; responsible for safety of all dams in Alaska.

Mining Information:
Anchorage (907) 269-8642
Fairbanks (907) 451-2793

All other Land & Water Information:
Northern Regional Office
3700 Airport Way
Fairbanks, AK 99709-4699
(907) 451-2740
(907) 451-2751 (fax)

Southcentral Regional Office
550 W. 7th Ave., Ste. 900A
Anchorage, AK 99501
(907) 269-8503
(907) 269-8947 (fax)

Southeast Regional Office
400 Willoughby Ave., Ste. 400
Juneau, AK 99801-1724
(907) 465-3400
(907) 586-2954 (fax)
E-mail: sero@dnr.state.ak.us

Division of Parks and Outdoor Recreation
550 W. 7th Ave., Ste.1310
Anchorage, AK 99501-3565
(907) 269-8700

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. The Office of History and Archaeology reviews mining permit applications on all lands within the state for impacts to historic resources.

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

Southeast Regional Office
400 Willoughby Ave., 5th Fl.
Juneau, AK 99801-1724
(907) 465-4563

Office of History and Archaeology
550 W. 7th Ave., #1310
Anchorage, AK 99501-3565
(907) 269-8721
(907) 269-8908 (fax)
email: stefaniel@dnr.state.ak.us
http://www/parks/oha

DEPARTMENT OF PUBLIC SAFETY
450 Whittier St.
P.O. Box 111200 (mailing)
Juneau, AK 99811-1200
(907) 465-4322
http://www.dps.state.ak.us

Alaska Bureau of Wildlife Enforcement
5700 East Tudor Rd.
Anchorage, AK 99507-1225
(907) 269-5589

Function: Enforces state laws, in particular AS Title 16. Protects Alaska's fish and wildlife resources through enforcement of laws and regulations governing use of natural resources within Alaska. These laws are in Alaska Statutes 8, 16, 46, and Alaska Administrative Codes 5, 12, and 20.

DEPARTMENT OF REVENUE
State Office Bldg.
11th Fl., Entrance A
P.O. Box 110400 (mailing)
Juneau, AK 99811-0400
(907) 465-2300
http://www.revenue.state.ak.us

Tax Division
State Office Bldg., 11th Fl., Entrance B
P.O. Box 110420 (mailing)
Juneau, AK 99811-0420
(907) 465-2320
(907) 465-2375 (fax)
email: fish_excise@revenue.state.ak.us
http://www.tax.state.ak.us

Function: Issues licenses for sand and gravel operations. Administers mining-license tax 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 3½ years of operation. (Tax returns must be filed annually.)

UNIVERSITY OF ALASKA

College of Science, Engineering, and Mathematics
Department of Geology & Geophysics
P.O. Box 755780
Natural Sciences Building, Room 308
University of Alaska Fairbanks
Fairbanks, AK 99775-5780
(907) 474-7565
(907) 474-5163 (fax)
email: geology@www.uaf.edu
http://www.uaf.edu/geology

Function: Provides undergraduate and graduate education in geology and geophysics and conducts basic and applied research

in geologic sciences. For undergraduate studies, the department offers a B.A. program in Earth Science and a B.S. program in Geology (with emphasis options in general geology, economic geology, and petroleum geology). For graduate studies, the department offers M.S. and Ph.D. programs in Geology and Geophysics, with concentrations in: General geology; economic geology; petroleum geology; Quaternary geology; remote sensing; volcanology; solid-earth geophysics; and snow, ice, and permafrost geophysics.

College of Engineering and Mines
P.O. Box 755960
Duckering Building, Room 357
University of Alaska Fairbanks
Fairbanks, AK 99775-5960
(907) 474-7366
(907) 474-6994 (fax)
email: FYSME@uaf.edu
http://www.uaf.edu/sme

Function: Provides undergraduate and graduate education programs in geological engineering, mining engineering, mineral preparation engineering, and petroleum engineering. Through research programs conducts laboratory and field studies to promote mineral and energy development.

Mineral Industry Research Laboratory (MIRL)
College of Engineering and Mines
P.O. Box 757240
Duckering Building, Room 403
University of Alaska Fairbanks
Fairbanks, AK 99775-7240
(907) 474-6746
(907) 474-5400 (fax)

Function: Conducts applied and basic research in exploration, development, and utilization of Alaska's mineral and coal resources with emphasis on coal characterization, coal utilization, coal upgrading, 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.

Dept. of Mining and Geological Engineering
College of Engineering and Mines
P.O. Box 755800
Duckering Building, Room 301
University of Alaska Fairbanks
Fairbanks, AK 99775-5800
(907) 474-7388
(907) 474-6635 (fax)
email: FYSME@uaf.edu
http://www.uaf.edu/sme

Function: Teaching research and public service; support of the mineral industry.

Mining and Petroleum Training Service
Kenai Peninsula College/UAA
155 Smith Way, Ste. 101
University of Alaska Anchorage
Soldotna, AK 99669
(907) 262-2788
(907) 262-2812 (fax)
email: mapts@alaska.net
http://www.alaska.net/~mapts

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, and industrial hygiene. Professional safety education and consulting are available on demand.

FEDERAL AGENCIES

U.S. DEPARTMENT OF THE INTERIOR
Office of the Secretary
1689 C St., Ste. 100
Anchorage, AK 99501-5151
(907) 271-5485
(907) 271-4102

Function: Coordinates the Department of the Interior's policy and stewardship with DOI bureaus for the management of more than 200 million acres of public land in Alaska.

Bureau of Land Management
Alaska State Office
Division of Lands, Minerals, and Resources
222 West 7th Ave., Ste. 13
Anchorage, AK 99513-7599

Public Information Center (907) 271-5960
Northern Field Office (907) 474-2252
Public Information Center
http://www.ak.blm.gov/

Energy Branch (907) 271-5608
Solid Minerals Branch (907) 271-5608

Division Functions:

BLM is the surface manager of federal public lands (except national parks, wildlife refuges, national monuments, national forests, and military withdrawals). The Division is responsible for developing and coordinating statewide and regional program management policies and strategies related to federal onshore energy and non-energy leasable minerals, mineral assessments, and locatable minerals. It provides technical assistance and coordinates activities relating to ANILCA 1010 mineral assessments. The Division provides the basis for economic analysis relating to energy and mineral development in the state. It also provides leadership and technical assistance on abandoned mine lands inventories and impacts on public lands.

Energy Branch Functions:

The Branch is responsible for the federal onshore mineral leasing programs and functions; including oil and gas, geothermal resources, coal, and other energy and non-energy minerals. The Branch prepares and conducts oil and gas lease sales and is responsible for preparing pre- and post-lease sale fair market value evaluations for National Petroleum Reserve–Alaska leasing, and issuing leases; adjudicates oil and gas leases, transfers, and bonds; approves oil and gas industry operations for federal onshore oil and gas leases; protects federal lands from drainage of oil and gas resources, and inspects industry operations for compliance; and coordinates with other federal surface management agencies for the leasing and monitoring of minerals operations under their jurisdictions.

Solid Minerals Branch Functions:

The Branch maintains mining claim and mineral patent case files and electronic public minerals records related to those files. It adjudicates federal mining claim recordation filings, annual assessment affidavits, and timely payment of annual claim holding fees. It also adjudicates mineral survey and patent applications,

and serves contest complaints for all federal lands in Alaska. The Branch conducts mineral assessments that aid environmentally sound development of a viable mineral industry in Alaska. Emphasis is on field programs that identify the type, amount, and distribution of mineral deposits in Alaska. Field information is augmented by studies of economic feasibility, and economic and environmental effects of mineral development. Information is provided to 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.

Anchorage Field Office
6881 Abbott Loop Rd.
Anchorage, AK 99507-2599
(907) 267-1246
(907) 267-1267 (fax)

Glennallen Field Office
P.O. Box 147
Glennallen, AK 99588
(907) 822-3217
(907) 822-3120 (fax)
http://www.glennallen.ak.blm.gov

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

Nome Field Station
P.O. Box 925
Nome, AK 99762-0925
(907) 443-2177
(907) 443-3611 (fax)

Northern Field Office
1150 University Ave.
Fairbanks, AK 99709-3899
(907) 474-2200
(907) 474-2251 Public Room
(907) 474-2282 (fax)
1-800-437-7021

Tok Field Station
P.O. Box 309
Tok, AK 99780
(907) 883-5121
(907) 883-5123 (fax)

Juneau Office
John Rishel Mineral Information Center
100 Savikko Rd.
Mayflower Island
Douglas, AK 99824
(907) 364-1553
(907) 364-1574 (fax)
email: jalbrech@ak.blm.gov
http://juneau.ak.blm.gov

Function: As a part of the minerals branch, in addition to the assessments and studies described above, the Mineral information Center has a special library which contains 20,000 geologic and minerals publications, and provides a variety of information services; plus displays of Alaskan rocks, minerals, and mining artifacts.

U.S. Fish and Wildlife Service
Region 7 Office
1011 East Tudor Rd.
Anchorage, AK 99503
(907) 786-3542
http://www.r7.fws.gov/

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.

U.S. Fish and Wildlife Service
Fairbanks Fish and Wildlife Field Office
101 12th Ave.
Box No. 19
Fairbanks, AK 99701
(907) 456-0327
(907) 456-0208 (fax)

U.S. Fish and Wildlife Service
Juneau Fish and Wildlife Field Office
3000 Vintage Blvd., Ste. 201
Juneau, AK 99801-7100
(907) 586-7240
(907) 586- 7154 (fax)

U.S. Fish and Wildlife Service
Anchorage Fish and Wildlife Field Office
605 West 4th Ave., Rm. G-61
Anchorage, AK 99501
(907) 271-2888
(907) 271-2786 (fax)

U.S. Geological Survey
Alaska Science Center
Geological Science Office
4200 University Dr.
Anchorage, AK 99508-4667
(907) 786-7479

The mission of the USGS Alaska Science Center (ASC) is to provide scientific leadership and accurate, objective, and timely data, information, and research findings about the earth and its flora and fauna to Federal and State resource managers and policy makers, local government, and the public to support sound decision making regarding natural resources, natural hazards, and ecosystems in Alaska and circumpolar regions.

Geologic Discipline programs in the ASC are based on insightful monitoring, assessments, and research activities that address natural hazards, earth resources, and geologic processes. The Geologic Discipline provides comprehensive, high quality, and timely scientific information to decision makers at Federal, State, and local government levels, as well as the private sector. The Minerals Program investigates and reports on the occurrence, quality, quantity, and environmental characteristics of mineral resources in Alaska, the processes that create and modify them, models for assessing mineral endowment, and the potential impacts of mineral development.

U.S. Geological Survey
Alaska Science Center
Geographic Science Office
Earth Science Information Center

4230 University Dr., Suite 101
Anchorage, AK 99508-4664
(907) 786-7009

Function: Publishes and distributes all available topographic maps of Alaska, digital products, and aerial photography.

National Park Service
Alaska Regional Office
Physical Resources
240 W. 5th Ave.
Anchorage, AK 99501
(907) 257-2632
(907) 257-2448 (fax)

Function: Administers lands within the national park system in Alaska. Manages oil and gas operations and pre-existing valid 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
Physical Addres:
222 W. 8th Ave A-35
Anchorage, AK 99513
(907) 271-1250
(907) 271-1252 (fax)
email: bowen.ayers@dol.gov

Mailing Address:
Anchorage Federal Building
US Courthouse - Rm. A-35
222 West 7th Ave., Box 30
Anchorage, AK 99513
(907) 271-1250
(907) 271-1252 (fax)
email: bowen.ayers@dol.gov

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) 231-5458
(303) 231-5553 (fax)
http://www.msha.gov

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
Forest Service
Regional Office, R.L.M.
P.O. Box 21628
Juneau, AK 99802-1628
(907) 586-7869
(907) 586-7866 (fax)
email: jkato@fs.fed.us
http://www.fs.fed.us/
http://www.fs.fed.us/r10earth/

Function: With the Bureau of Land Management, provides joint administration of general mining laws on national forest system lands. 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., MS OW-130
Seattle, WA 98101
(206) 553-1200
(206) 553-1746 (NPDES permits)
http://www.epa.gov/r10earth/

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

Alaska Operations Office
222 West 7th Ave., Rm. 537
222 W. 7th Ave., Box 19 (mailing)
Anchorage, AK 99513-7588
(907) 271-5083

Alaska Operations Office
709 W 9th St., Rm. 223A
Box 20370 (mailing)
Juneau, AK 99802-0370
(907) 586-7619

U.S. DEPARTMENT OF THE ARMY
Corps of Engineers
Regulatory Branch
2204 3rd St.
P.O. Box 6898
Elmendorf Air Force Base, AK 99506-6898
(907) 753-2712
(907) 753-5567 (fax)
(800) 478-2712 (in Alaska only)
http://www.poa.usace.army.mil/reg

Function: Regulates structures or work in navigable waters of the U.S. and discharge of dredged or fill material into U.S. waters, including wetlands. Under Section 404 of the Clean Water Act, the Corps of Engineers issues dredge and fill permits for certain mining activities in waters of the United States. Examples of regulated mining activities include construction of berms, dikes, diversions, ponds, overburden stripping, stockpiling, and reclamation activities.

COOPERATIVE STATE–FEDERAL AGENCIES

Alaska Public Lands Information Center
250 Cushman St., Ste. 1A
Fairbanks, AK 99701
(907) 456-0527
(907) 456-0514 (fax)
(907) 456-0532 (TDD for hearing impaired)
http://www.nps.gov/aplic

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, Fish and Game, and Community and Economic Development.

BOARDS AND COMMISSIONS

Alaska Minerals Commission
Irene Anderson, Chair
c/o Bering Straits Native Corp.
P.O. Box 1008
Nome, AK 99762
(907) 443-5252
(907) 443-4317
(907) 443-2985 (fax)
email: irene@beringstraits.com

Function: The Minerals 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.

CHAMBERS OF COMMERCE

Alaska State Chamber of Commerce
217 Second St., Ste. 201
Juneau, AK 99801
(907) 586-2323
(907) 463-5515 (fax)
http://www.alaskachamber.com

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.

Anchorage Chamber of Commerce
441 West 5th Ave., Ste. 300
Anchorage, AK 99501
(907) 272-2401
email: info@anchoragechamber.org
http://www.anchoragechamber.org

Function: To be effective as a business leader by supporting and focusing its broad-based membership in their efforts to grow Anchorage into a premier American city.

Greater Fairbanks Chamber of Commerce
800 Cushman St., Suite 114
Fairbanks, AK 99701-4665
(907) 452-1105
(907) 456-6968(fax)
email: staff@fairbankschamber.org
http://www.fairbankschamber.org

Juneau Chamber of Commerce
3100 Channel Dr., Ste. 300
Juneau, AK 99801
(907) 463-3488
(907) 463-3489 (fax)
email: juneauchamber@gci.net
http://www.juneauchamber.org

PUBLIC INTEREST GROUPS AND ASSOCIATIONS

Alaska Miners Association Inc.
Statewide Office
3305 Arctic Blvd., Ste. 105
Anchorage, AK 99503
(907) 563-9229
(907) 563-9225 (fax)
email: ama@alaskaminers.org
http://www.alaskaminers.org

Denali Branch of AMA
P.O. Box 1000
Healy, AK 99743
(907) 683-2226
email: keith@usibelli.com

Fairbanks Branch of AMA
P.O. Box 73069
Fairbanks, AK 99707-3069
(907) 479-9450
email: paulcmpy@alaska.net

Juneau Branch of AMA
8832 Gail St.
Juneau AK 99801
(907) 789-8135
email: mike.satre@greenscreek.com

Kenai Branch of AMA
155 Smithway, #101
Soldotna, AK 99669-3503
(907) 262-2788
email: mapts@alaska.net

Nome Branch of AMA
P.O. Box 1008
Nome, AK 99762-1107
(907) 443-5252
email: irene@beringstraits.com

American Institute of Professional Geologists
1400 W. 122nd Ave., Ste. 250
Westminster, CO 80234
(303) 412-6205
(303) 253-9220 (fax)
email: aipg@aipg.org
http://www.aipg.org

Alaska Section
P.O. Box 242672
Anchorage, AK 99524-2672
(907) 336-5361

Earthjustice
325 Fourth St.
Juneau, AK 99801
(907) 586-2751
(907) 463-5891 (fax)
http://www.earthjustice.org

National Wildlife Federation
750 W. Second Ave., Ste. 200
Anchorage, AK 99501
(907) 339-3900
(907) 339-3980 (fax)

Northern Alaska Environmental Center
830 College Rd.
Fairbanks, AK 99701-1535
(907) 452-5021
(907) 452-3100 (fax)
email: info@northern.org
http://www.northern.org

Northwest Mining Association
10 North Post St., Ste. 220
Spokane, WA 99201
(509) 624-1158
(509) 623-1241 (fax)
email: nwma@nwma.org
http://www.nwma.org

Resource Development Council for Alaska, Inc.
121 W. Fireweed Ln., Ste. 250
Anchorage, AK 99503
(907) 276-0700
(907) 276-3887 (fax)
email: Resources@akrdc.org
http://www.akrdc.org

Society for Mining, Metallurgy, and Exploration Inc.
P.O. Box 277002
Littleton, CO 80127-7002
(303) 973-9550
(303) 973-3845 (fax)
email: sme@smenet.org
http://www.smenet.org

Southeast Alaska Conservation Council (SEACC)
419 6th St., Ste. 200
Juneau, AK 99801
(907) 586-6942
(907) 463-3312 (fax)
email: info@seacc.org
http://www.seacc.org

Trustees for Alaska
1026 W. 4th Ave., # 201
Anchorage, AK 99501-1980
(907) 276-4244
email: ecolaw@trustees.org
http://www.trustees.org

ORGANIZED MINING DISTRICTS

Circle Mining District
P.O. Box 30181
Central, AK 99730-0181
(907) 520-5419 (message)

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

Haines Mining District
P.O. Box 149
Haines, AK 99827
(907) 766-2821

Iditarod Mining District
John A. Miscovich
P.O. Box 39
Cooked Creek, AK 99575

Livengood-Tolovana Mining District
Rose Rybachek
P.O. Box 55698
North Pole, AK 99705
(907) 488-6453

Yentna Mining District
Carol Young
P.O. Box 211
Talkeetna, AK 99676
(907) 733-2351

MINERAL EDUCATION PROGRAMS

ALASKA MINERAL AND ENERGY RESOURCE EDUCATION FUND (AMEREF)
121 W. Fireweed Ln., Ste. 250
Anchorage, AK 99503
(907) 276-0700
(907) 276-3887 (fax)
email: resources@akrdc.org
http://www.ameref.org

Function: A 501(c)(3) educational non-profit whose mission is to provide Alaskan students with the knowledge and skills to make informed and objective decisions relating to mineral, energy, and forest resources.

Alaska Department of Education and Early Development
801 W. 10th St., Ste. 200
Juneau, AK 99801-1894
(907) 465-2826
(907) 465-3396 (fax)
email: Cynthia_Curran@eed.state.ak.us
http://www.eed.state.ak.us/tls/minerals/minerals.html

NATIVE REGIONAL CORPORATIONS

AHTNA INC.
Land & Resource Group
P.O. Box 649
Glennallen, AK 99588-0649
(907) 822-8132
(907) 822-3495 (fax)
http://www.ahtna-inc.com/

Anchorage Office
406 W. Fireweed, S uite 104
Anchorage, AK 99503
(907) 868-8235
(907) 868-8234 (fax)

THE ALEUT CORP.
4000 Old Seward Hwy., Ste. 300
Anchorage, AK 99503-6087
(907) 561-4300
(907) 563-4328 (fax)
email:aleut@alaska.net
http://www.aleutcorp.com

ARCTIC SLOPE REGIONAL CORP.
P.O. Box 129
Barrow, AK 99723-0129
(907) 852-8633
(907) 852-5733 (fax)
http://www.asrc.com/

Anchorage Office
3900 C St., Suite 801
Anchorage, AK 99503-5963
(907) 339-6000
(907) 339-6028 (fax)

BERING STRAITS NATIVE CORP.
Irene Anderson
Assistant Land Manager
P.O. Box 1008
Nome, AK 99762-1008
(907) 443-4317
(907) 443-2985 (fax)
email: irene@beringstraits.com
http://www.beringstraits.com/

Anchorage Office
Matt Ganley
10315 Main Tree Dr.
Anchorage, AK 99507
(907) 344-7121
(907) 344-0827 (fax)
email: matt@beringstraits.com

BRISTOL BAY NATIVE CORP.
800 Cordova St., Ste. 200
Anchorage, AK 99501-3717
(907) 278-3602
(907) 276-3924 (fax)
http://www.bbnc.net

CALISTA CORP.
301 Calista Court, Ste. A
Anchorage, AK 99518-3028
(907) 279-5516
(907) 272-5060 (fax)
http://www.calistacorp.com/

CHUGACH ALASKA CORP.
560 E. 34th Ave.
Anchorage, AK 99503-4196
(907) 563-8866
(907) 561-6961 (fax)
email: rrogers@chugach-ak.com
http://www.chugach-ak.com/

COOK INLET REGION INC.
and its subsidary North Pacific Mining Corporation
2525 C St., Suite 500
Anchorage, AK 99503
(907) 274-8638
(907) 263-5190 (fax)
email: kmcgee@ciri.com
http://www.ciri.com/

DOYON LTD.
1 Doyon Place, Ste. 300
Fairbanks, AK 99701-2941
(907) 459-2030
(907) 459-2062 (fax)
email: lands@doyon.com
http://www.doyon.com

KONIAG INC.
4300 B St., Ste. 407
Anchorage, AK 99503
(907) 561-2668
(907) 562-5258 (fax)
http://www.koniag.com/

NANA REGIONAL CORP.
P.O. Box 49
Kotzebue, AK 99752
(907) 442-3301
(907) 442-2866 (fax)
http://www.nana.com

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

SEALASKA CORP.
One Sealaska Plaza, Ste. 400
Juneau, AK 99801
(907) 586-1512
(907) 586-2304 (fax)
http://www.sealaska.com/

APPENDIX E
Alaska Mining Websites

Mining and Exploration Companies

Abacus Mining & Exploration Co.	http://www.amemining.com
Alaska Earth Sciences Inc.	http://www.aes.alaska.com
Anchorage Sand and Gravel Co. Inc.	http://www.anchsand.com
AngloGold Ltd.	http://www.anglogold.com
Avalon Development Corp.	http://www.avalonalaska.com
Bravo Venture Group Inc.	http://www.bravoventuregroup.com
Browns Hill Quarry	http://www.brownshill.com
CanAlaska Ventures Ltd.	http://www.canalaska.com
Century Mining Corp.	http://www.centurymining.com
Coeur d'Alene Mines Corp. (Coeur Alaska Inc.)	http://www.coeur.com
Continental Ridge Resources Inc. (now Nevada Geothermal Power Inc.)	http://www.nevadageothermal.com
Copper Ridge Explorations Inc.	http://www.copper-ridge.com
Engineer Mining Corp.	http://www.emcorp.yk.ca
Freegold Ventures Ltd.	http://www.freegoldventures.com
Full Metal Minerals Ltd.	http://www.fullmetalminerals.com
Geocom Resources Inc.	http://www.geocom-resources.com
Geoinformatics Exploration Inc	http://www.geoinformex.com
Geologix Exploration Inc.	http://www.geologix.ca
Golconda Resources Ltd.	http://www.golcondaresources.com
Grayd Resource Corp.	http://www.grayd.com
Hecla Mining Co.	http://www.hecla-mining.com
Inlet Resources Ltd.	http://www.inlet-resources.com
Kennecott Exploration Co.	http://www.kennecottexploration.com
Kennecott Minerals Co.	http://www.kennecottminerals.com
Kinross Gold Corp.	http://www.kinross.com
Liberty Star Gold Corp.	http://www.libertystargold.com
Linux Gold Corp.	http://www.linuxgoldcorp.com
Little Squaw Gold Mining Co.	http://www.littlesquawgold.com
Lonmin Plc	http://www.lonmin.com
Meridian Gold Inc.	http://www.meridiangold.com
Navigator Exploration Corp.	http://www.navigatorexploration.com
Nevada Star Resources Corp.	http://www.nevadastar.com
Northern Associates Inc.	http://www.alaskaexploration.com
Northern Dynasty Minerals Ltd.	http://www.northerndynastyminerals.com
NovaGold Resources Inc.	http://www.novagold.net
Pacific North West Capital Corp.	http://www.pfncapital.com
Placer Dome Inc.	http://www.placerdome.com
Quaterra Resources Inc.	http://www.manexresourcegroup.com/quaterra
Rimfire Minerals Corp.	http://www.rimfire.bc.ca
Rio Fortuna Exploration Corp.	http://www.manexresourcegroup.com/riofortuna
Rubicon Minerals Corp.	http://www.rubiconminerals.com
Santoy Resources Ltd.	http://www.santoy.ca
Shear Minerals Ltd.	http://www.shearminerals.com
Silverado Gold Mines Ltd.	http://www.silverado.com
Sisyphus Consulting	http://www.sisyphus-consulting.com
St. Andrew Goldfields Ltd.	http://www.standrewgoldfields.com
Teck Cominco Ltd.	http://www.teckcominco.com
Teryl Resources Corp.	http://www.terylresources.com
TNR Gold Corp.	http://www.tnrgoldcorp.com
Tri-Valley Corp.	http://www.tri-valleycorp.com
Usibelli Coal Mine Inc.	http://www.usibelli.com

Ventures Resource Corp.	http://www.venturesresource.com
Western Keltic Mines Inc.	http://www.keltic.com
Western Warrior Resources Inc.	http://www.westernwarrior.ca
WGM Inc.	http://www.wgm.com

Alaska Native Corporations

Ahtna Inc.	http://www.ahtna-inc.com
Aleut Corp.	http://www.aleutcorp.com
Arctic Slope Regional Corp.	http://www.asrc.com
Bering Straits Native Corp.	http://www.beringstraits.com
Bristol Bay Native Corp.	http://www.bbnc.net
Calista Corp.	http://www.calistacorp.com
Chugach Alaska Corp.	http://www.chugach-ak.com
Cook Inlet Region Inc.	http://www.ciri.com
Doyon Ltd.	http://www.doyon.com
Koniag Inc.	http://www.koniag.com
NANA Regional Corp.	http://www.nana.com
Sealaska Corp.	http://www.sealaska.com

General

Alaska Miners Association	http://www.alaskaminers.org
Alaska Resource Data Files	http://ardf.wr.usgs.gov
Alaska Division of Geological & Geophysical Surveys	http://www.dggs.dnr.state.ak.us
Alaska Division of Community & Business Development	http://www.dced.state.ak.us/dca

Alaska's Minerals Data and Information Rescue in Alaska (MDIRA) Project Websites

MDIRA Portal Home Page	http://akgeology.info
Alaska Geology Map Indexer	http://maps.akgeology.info
Alaska Mining Claims Information System	http://akmining.info
Alaska Resource Data Files	http://ardf.wr.usgs.gov
DGGS Publications On-Line	http://www.dggs.dnr.state.ak.us/pubs/pubs
Digital Index of Geological Information	http://imcg.wr.usgs.gov/digi.html
DNR Sites Related to Mining Applications and Forms	http://www.dnr.state.ak.us/mlw/forms
Guide to Alaska Geologic and Mineral Information	http://wwwdggs.dnr.state.ak.us/scan1/ic/text/IC44.PDF
Land Records Web Application	http://plats.landrecords.info/index.html
NURE Data	http://imcg.wr.usgs.gov/nuredata.html
On-Line Annual Payments	https://www.dnr.state.ak.us/cc_payment/LAS_Form.cfm
RASS, PLUTO Geochemistry Data	http://geopubs.wr.usgs.gov/open-file/of99-433
State Map Library	http://www.dnr.state.ak.us/lris/gis_maplib/maplib_start.cfm
State Recorder's Office Search	http://www.dnr.state.ak.us/ssd/recoff/search.cfm
State Uniform Commercial Code (UCC) Documents Search	http://www.dnr.state.ak.us/ssd/ucc/search.cfm

APPENDIX F
U.S. Customary Units/Metric Units Conversion Chart

To convert from:	To:	Multiply by:
Weight/Mass/Ore Content		
ounces (avoirdupois)	grams	28.350
ounces (troy)	grams	31.1035
pounds	kilograms	0.4536
short tons	metric tons	0.9072
grams	ounces (avoirdupois)	0.03527
	ounces (troy)	0.03215
kilograms	pounds	2.2046
metric tons	short tons	1.1023
parts per million (ppm)	parts per billion (ppb)	1,000
parts per million (ppm)	ounces per ton	0.0292
parts per million (ppm)	grams/metric tons (tonnes)	1.00
Length		
miles	kilometers	1.6093
yards	meters	0.9144
feet	meters	0.3048
	centimeters	30.48
	millimeters	304.80
inches	centimeters	2.54
	millimeters	25.4
kilometers	miles	0.6214
meters	yards	1.0936
	feet	3.2808
millimeters	feet	0.00328
	inches	0.03937
centimeters	inches	0.3937
Area		
square miles	square kilometers	2.590
acres	square meters	4,046.873
	hectares	0.4047
square yards	square meters	0.8361
square feet	square meters	0.0929
square inches	square centimeters	6.4516
	square millimeters	645.16
square kilometers	square miles	0.3861
square meters	acres	0.000247
	square feet	10.764
	square yards	1.196
hectares	acres	2.471
	square meters	10,000.00
square centimeters	square inches	0.155
square millimeters	square inches	0.00155
Volume		
cubic yards	cubic meters	0.7646
cubic feet	cubic meters	0.02832
cubic inches	cubic centimeter	16.3871
cubic meters	cubic yards	1.3079
	cubic feet	35.3145
cubic centimeters	cubic inches	0.06102
gallons (U.S.)	liters	3.7854
liters	gallons (U.S.)	0.2642
milliliters	ounces (fluid)	0.03381
ounces (fluid)	milliliters	29.5735

Temperature conversions:
From degrees Fahrenheit to degrees Celsius, subtract 32 and multiply by 5/9.
From degrees Celsius to degrees Fahrenheit, multiply by 9/5 and add 32.

SOURCE: *Minerals Today,* February 1993, U.S. Bureau of Mines.

APPENDIX G
Primary metals production in Alaska, 1880-2003

Year	Gold (oz)	Gold (m$)	Silver (oz)	Silver (t$)	Mercury (flask[b])	Mercury (t$)	Antimony (lb)	Antimony (t$)	Tin (lb)	Tin (t$)	Lead (tons)	Lead (t$)	Zinc (tons)	Zinc (t$)	Platinum (oz)	Platinum (t$)	Copper (lb)	Copper (m$)	Chromium (tons)	Chromium (t$)
1880-1899	1,153,889	23.85	496,101	329.0	--	--	--	--	--	--	250	17.0	--	--	--	--	--	--	--	--
1900	395,030	8.17	73,300	45.5	--	--	--	--	--	--	40	3.4	--	--	--	--	--	--	--	--
1901	335,369	6.93	47,900	28.6	--	--	--	--	--	--	40	3.4	--	--	--	--	250,000	0.04	--	--
1902	400,709	8.28	92,000	48.5	--	--	--	--	30,000	8.0	30	2.5	--	--	--	--	360,000	0.04	--	--
1903	420,069	8.68	143,600	77.8	--	--	--	--	50,000	14.0	30	2.5	--	--	--	--	1,200,000	0.16	--	--
1904	443,115	9.16	198,700	114.9	--	--	--	--	28,000	8.0	30	2.5	--	--	--	--	2,043,586	0.28	--	--
1905	756,101	15.63	132,174	80.2	--	--	--	--	12,000	4.0	30	2.6	--	--	--	--	4,805,236	0.75	--	--
1906	1,066,030	22.04	203,500	136.4	--	--	--	--	68,000	38.6	30	3.4	--	--	--	--	5,871,811	1.13	--	--
1907	936,043	19.35	149,784	98.8	--	--	--	--	44,000	16.8	30	3.2	--	--	--	--	6,308,786	1.26	--	--
1908	933,290	19.29	135,672	71.9	--	--	--	--	50,000	15.2	40	3.4	--	--	--	--	4,585,362	0.61	--	--
1909	987,417	20.41	147,950	76.9	--	--	--	--	22,000	7.6	69	5.9	--	--	--	--	4,124,705	0.54	--	--
1910	780,131	16.13	157,850	85.2	--	--	--	--	20,000	8.3	75	6.6	--	--	--	--	4,241,689	0.54	--	--
1911	815,276	16.85	460,231	243.9	--	--	--	--	122,000	52.8	51	4.5	--	--	--	--	27,267,778	3.40	--	--
1912	829,436	17.14	515,186	316.8	--	--	--	--	260,000	119.6	45	4.1	--	--	--	--	29,230,491	4.82	--	--
1913	755,947	15.63	362,563	218.9	--	--	--	--	100,000[c]	44.1[c]	6	0.6	--	--	--	--	21,659,958	3.35	--	--
1914	762,596	15.76	394,805	218.3	--	--	--	--	208,000	66.6	28	1.3	--	--	--	--	21,450,628	2.85	--	--
1915	807,966	16.70	1,071,782	543.3	--	--	520,000	W	204,000	78.8	437	41.1	--	--	--	--	86,509,312	15.14	--	--
1916	834,068	17.24	1,379,171	907.4	--	--	1,200,000	W	278,000	121.0	820	113.2	--	--	8	0.7	119,654,839	29.50	--	--
1917	709,049	14.66	1,239,150	1,020.6	--	--	500,000	W	200,000	123.3	852	146.6	--	--	53	5.5	88,793,400	24.40	1,100	W
1918	458,641	9.48	847,789	847.8	--	--	540,000	W	136,000	118.0	564	80.1	--	--	284	36.6	69,224,951	17.10	1,100	W
1919	455,984	9.42	629,708	705.3	--	--	--	--	112,000	73.4	687	72.1	--	--	569	73.7	47,220,771	8.80	--	--
1920	404,683	8.37	953,546	1,039.7	--	--	--	--	32,000	16.1	875	140.0	--	--	1,478	160.1	70,435,363	13.00	--	--
1921	390,558	8.07	761,085	761.1	45	1.5	--	--	8,000	2.4	759	68.3	--	--	40	2.7	57,011,597	7.40	--	--
1922	359,057	7.42	729,945	729.9	--	--	--	--	2,800	0.9	377	41.5	--	--	29	2.8	77,967,819	10.50	--	--
1923	289,539	5.98	814,649	668.1	--	--	--	--	3,800	1.6	410	57.4	--	--	--	--	85,920,645	12.60	--	--
1924	304,072	6.29	669,641	448.6	2	0.3	--	--	14,000	7.1	631	100.9	--	--	28	2.6	74,074,207	9.70	--	--
1925	307,679	6.36	698,259	482.4	44	3.6	W	W	28,600	15.4	789	140.6	--	--	10	1.2	73,055,298	10.30	--	--
1926	324,450	6.70	605,190	377.0	22	1.7	W	W	16,000	10.4	778	124.4	--	--	3,570	274.5	67,778,000	9.49	--	--
1927	286,720	5.97	350,430	215.0	--	--	--	--	53,400	34.0	1,008	127.0	--	--	--	--	55,343,000	7.25	--	--
1928	331,140	6.85	351,730	187.0	--	--	--	--	82,000	41.0	1,019	118.0	--	--	120	9.0	41,421,000	5.96	--	--
1929	375,438	7.76	472,900	252.0	4	0.5	--	--	77,200	35.0	1,315	166.0	--	--	475	32.0	40,570,000	7.13	--	--
1930	408,983	8.47	408,570	157.3	--	--	--	--	29,400	9.3	1,365	136.5	--	--	--	--	32,651,000	4.24	--	--
1931	459,000	9.51	352,000	102.0	15	1.2	--	--	8,200	2.0	1,660	126.0	--	--	393	14.0	22,614,000	1.88	--	--
1932	493,860	10.20	234,050	66.0	8	0.5	--	--	--	--	1,260	75.6	--	--	--	--	8,738,500	0.55	--	--
1933	469,286	9.70	154,700	55.0	--	--	--	--	5,800	2.3	1,157	85.6	--	--	605	18.6	29,000	0.02	--	--
1934	537,281	8.78	154,700	100.0	--	--	--	--	8,200[c]	4.3	839	62.1	--	--	2,555	85.6	121,000	0.06	--	--
1935	469,495	16.43	286,600	206.0	--	--	--	--	98,800	49.8	815	65.2	--	--	8,685	259.6	15,056,000	1.25	--	--
1936	540,580	18.92	484,306	375.0	--	--	--	--	226,000	105.0	941	86.6	--	--	5,654	241.9	39,267,000	3.72	--	--
1937	627,940	21.98	494,340	382.0	--	--	962,000	147.6	372,000[c]	202.3[c]	823	97.1	--	--	9,823	313.4	36,007,000	4.74	--	--
1938	662,000	23.17	479,853	310.0	8	0.6	444,000	54.8	210,000	89.1	994	91.5	--	--	41,000	2,460.0	29,760,000	2.98	--	--
1939	676,780	23.68	201,054	136.5	--	--	210,000	25.9	66,000	38.0	937	88.1	--	--	33,900	2,034.0	278,500	0.04	--	--
1940	755,900	26.45	191,679	136.3	156[c]	130.9	306,000	42.8	92,000	52.0	840	72.0	--	--	28,886	1,093.0	110,000	0.02	--	--
1941	692,314	24.23	199,700	142.0	W	W	774,000	87.3	93,600[c]	61.0[c]	742	58.0	--	--	22,630	813.0	144,000	0.02	--	--
1942	487,657	17.07	135,200	96.0	W	W	316,000	41.0	5,600	2.5	523	44.0	--	--	22,000	779.0	48,000	0.01	--	--
1943	99,583	3.49	31,700	22.0	786	153.4	368,000	33.3	2,000[c]	1.0[c]	200	22.0	--	--	27,900	1,020.0	54,000	0.01	5,564	186.3
1944	49,296	1.73	15,240	10.8	841	165.0	70,080	30.0	--	--	44	5.8	--	--	33,616	2,017.0	4,000	0.01	1,845	64.6
1945	68,117	2.38	9,983	6.2	275	180.0	W	W	--	--	11	1.8	--	--	22,949	1,377.0	10,000	0.01	--	--
1946	226,781	7.93	41,793	26.3	699	68.7	W	W	--	--	115	25.0	--	--	22,882	1,418.7	4,000	0.01	--	--
1947	279,988	9.79	66,150	46.3	127	10.6	52,000	16.1	2,000	2.2	255	76.5	226	0.15	13,512	1,351.2	24,000	0.06	--	--
1948	248,395	8.69	67,341	58.7	108	7.8	88,000	29.3	10,000	10.8	317	88.9	226	0.15	13,741	1,209.2	28,000	0.07	--	--
1949	229,416	8.03	36,056	32.4	102	7.9	88,000	31.3	114,000	100.8	49	11.2	226	0.15	17,169	1,545.2	7,700	0.02	--	--

APPENDIX G, *cont'd*

Year	Gold (oz)	Gold (m$)	Silver (oz)	Silver (t$)	Mercury (flask[b])	Mercury (t$)	Antimony (lb)	Antimony (t$)	Tin (lb)	Tin (t$)	Lead (tons)	Lead (t$)	Zinc (tons)	Zinc (t$)	Platinum (oz)	Platinum (t$)	Copper (lb)	Copper (m$)	Chromium (tons)	Chromium (t$)
1950	289,285	10.13	52,638	48.0	W	W	W	W	158,000	170.3	144	27.5	- -	- -	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	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
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	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
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	108.70	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	38,221	13,759.6	268,769	236,516.7	3	1.2	- -	- -	- -	- -
1994	182,100	70.29	1,968,000	10,391.0	- -	- -	- -	- -	- -	- -	36,447	25,512.9	329,003	296,102.7	5	2.1	- -	- -	- -	- -
1995	141,882	56.04	1,225,730	6,655.0	- -	- -	- -	- -	- -	- -	58,098	34,428.6	359,950	345,552.0	1	0.4	- -	- -	- -	- -
1996	161,565	62.62	3,676,000	19,078.0	- -	- -	- -	- -	- -	- -	70,086	52,284.0	366,780	361,646.0	2	0.8	780,000	0.80	- -	- -
1997	590,516	207.29	14,401,165	70,710.0	- -	- -	- -	- -	- -	- -	88,560	49,593.0	419,097	494,888.0	- -	- -	3,440,000	3.54	- -	- -
1998	594,191	174.62	14,856,000	82,154.0	- -	- -	- -	- -	- -	- -	102,887	49,386.0	549,348	505,400.0	- -	- -	3,800,000	2.85	- -	- -
1999	517,890	144.26	16,467,000	85,628.0	- -	- -	- -	- -	- -	- -	125,208	57,596.0	643,642	630,769.0	- -	- -	4,200,000	3.00	- -	- -
2000	546,000	152.39	18,226,615	90,404.0	- -	- -	- -	- -	- -	- -	123,224	51,754.0	669,112	682,494.0	- -	- -	2,800,000	2.30	- -	- -
2001	550,644	149.25	16,798,000	73,408.0	- -	- -	- -	- -	- -	- -	127,385	56,049.0	634,883	507,907.0	- -	- -	2,800,000	1.99	- -	- -
2002	562,094	174.28	17,858,183	82,326.0	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	3,200,000	2.27	- -	- -
2003	528,191	191.93	18,589,100	95.3	- -	- -	- -	- -	- -	- -	162,479	64,279.0	714,769	536,348.0	- -	- -	- -	- -	- -	- -
Other[c]	- -	- -	- -	- -	1,438	- -	- -	- -	- -	- -	- -	- -	- -	- -	71,946	17,091.9	- -	- -	- -	- -
TOTAL	**37,435,221**	**3,258.25**	**183,281,816**	**713,527.3**	**40,945**	**9,910.5**	**11,070,800**	**6,655.1**	**7,287,700**	**12,523.5**	**1,150,955**	**561,293.9**	**5,709,802**	**5,460,882.6**	**668,548[d]**	**65,815.7**	**1,398,813,932**	**244.78**	**39,051**	**3,426.7**

[a]From published and unpublished state and federal documents.
[b]76-lb flask.
[c]Not traceable by year.
[d]Crude platinum; total production of refined metal is about 575,000 oz.
W = Withheld.
- - = Not reported.
t$ = Thousand dollars.
m$ = Million dollars.

APPENDIX H

Production of industrial minerals, coal, and other commodities in Alaska, 1880-2003

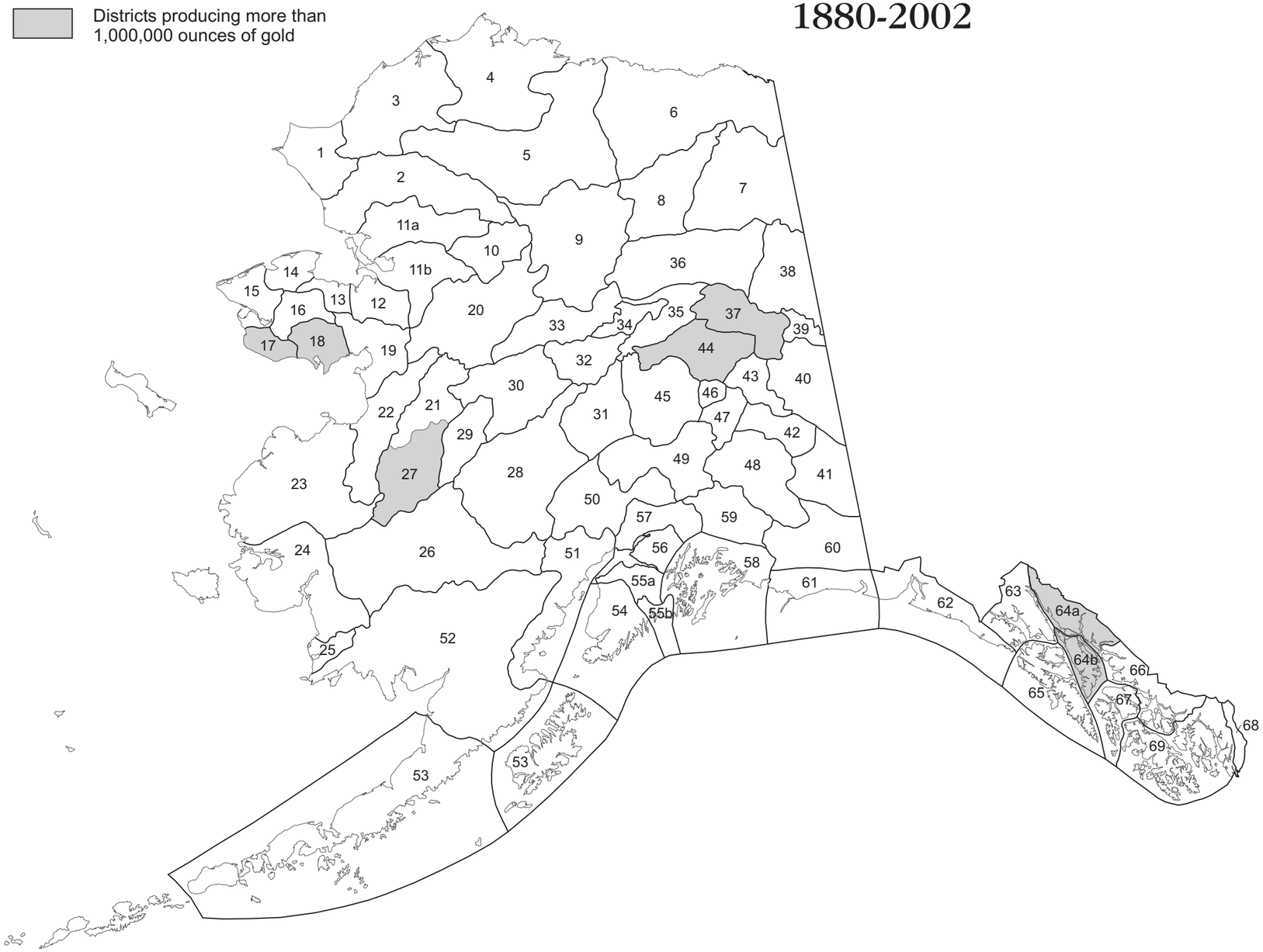
Year	Coal		Sand and gravel		Rock[a]		Barite		Other[b]
	s. tons	m$	s. tons	m$	s. tons	m$	s. tons	t$	$
1880-1899[c]	19,429	0.14	- -	- -	7,510	0.04	- -	- -	- -
1900	1,200[d]	0.02[d]	- -	- -	510	0.01	- -	- -	- -
1901	1,300[d]	0.02[d]	- -	- -	700	0.01	- -	- -	500
1902	2,212[d]	0.02[d]	- -	- -	800	0.01	- -	- -	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
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

Year	Coal		Sand and gravel		Rock[a]		Barite		Other[b]
	s. tons	m$	s. tons	m$	s. tons	m$	s. tons	t$	$
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
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
1994	1,490,000	36.75	13,518,321	40.95	3,843,953	27.04	- -	- -	459,500
1995	1,640,000	41.30	9,847,550	30.89	2,811,152	22.13	- -	- -	182,500
1996	1,481,000	38.00	9,890,463	32.20	3,000,045	23.56	- -	- -	200,000
1997	1,446,000	38.05	13,800,000	51.91	3,200,000	20.00	- -	- -	217,000
1998	1,339,000	35.23	12,363,450	57.28	1,636,200	14.04	- -	- -	215,000
1999	1,560,000	41.05	10,600,000	52.42	1,640,000	18.01	- -	- -	- -
2000	1,473,355	38.77	10,600,000	49.86	5,200,000	36.59	- -	- -	- -
2001	1,537,000	48.11	10,360,000	55.22	3,091,000	27.18	- -	- -	- -
2002	1,158,000	37.40	22,412,000	120.70	3,152,000	31.44	- -	- -	- -
2003	1,088,000	38.08	11,868,001	64.14	861,382	10.41	- -	- -	175,000
Other[d]	- -	- -	- -	- -	2,300,000[e]	W	79,000	W	- -
TOTAL[f]	**59,430,335**	**1,094.34**	**1,208,074,001**	**2,746.44**	**131,037,382**	**658.45**	**856,000**	**11,417**	**177,936,872**

[a]Building-stone production figures for 1880-1937 are for the southcentral and interior regions of Alaska only.
[b]Includes 2.4 million lb U_3O_8 (1955-71); 505,000 tons gypsum (1905-26); 286,000 lb WO_3 (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).
[c]Production not traceable by year.
[d]When 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.
[e]Marble quarried on Prince of Wales Island, southeastern Alaska (1900-41).
[f]Rounded to nearest 1,000 ton.
m$ = Million dollars.
t$ = Thousand dollars.
- - = Not reported.
W = Withheld.

	Mining districts[a]	Production (in refined troy ounces)		
		Total production	Placer	Lode
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	65,860	48,460	17,400
9.	Koyukuk-Nolan district	344,983	344,983	0
10.	Shungnak district	15,000	15,000	0
11.	Squirrel River district	40,600	40,600	0
12.	Fairhaven-Inmachuk district	348,089	348,089	0
13.	Candle district	253,720	253,720	0
14.	Serpentine district	4,220	4,220	0
15.	Port Clarence district	42,351	42,351	0
16.	Kougarok district	176,776	176,776	0
17.	Cape Nome district	4,988,928	4,988,928	0
18.	Council-Solomon district	1,046,513	1,019,513	27,000
19.	Koyuk district	84,132	84,132	0
20.	Koyukuk-Hughes district	258,344	258,344	0
21.	Kaiyah district	131,843	5,400	126,443
22.	Anvik district[b]	0	0	0
23.	Marshall district	124,506	124,506	0
24.	Bethel district	42,945	42,945	0
25.	Goodnews Bay district	29,700	29,700	0
26.	Aniak-Tuluksak district[c]	584,473	584,473	0
27.	Iditarod district	1,562,722	1,559,792	2,930
28.	McGrath-McKinley district	329,393	132,494	196,899
29.	Innoko-Tolstoi district	727,794	727,638	156
30.	Ruby-Poorman district	477,477	477,477	0
31.	Kantishna district	99,307	91,401	7,906
32.	Hot Springs district	577,956	577,956	0
33.	Gold Hill-Melozitna district[d]	12,089	12,089	0
34.	Ramparts district	196,699	196,699	0
35.	Tolovana-Livengood district	529,466	529,466	0
36.	Yukon Flats district	0	0	0
37.	Circle district	1,062,005	1,062,005	0
38.	Black district	0	0	0
39.	Eagle district	52,000	52,000	0
40.	Fortymile district	548,114	548,114	0
41.	Chisana-Nabesna district	144,500	78,000	66,500
42.	Tok district	280	280	0
43.	Goodpaster district	2,350	2,050	300
44.	Fairbanks district	10,762,951	8,174,987	2,587,964
45.	Bonnifield district	82,650	75,950	6,700
46.	Richardson district	120,940	118,640	2,300
47.	Delta River district	6,740	6,740	0
48.	Chistochina district	181,842	181,842	0
49.	Valdez Creek district	508,554	506,973	1,581
50.	Yentna-Cache Creek district	197,690	197,690	0
51.	Redoubt district	105	105	0
52.	Illiamna-Bristol Bay district	1,570	1,570	0
53.	Kodiak-Unga Island district	112,400	4,800	107,600
54.	Homer district	16	16	0
55.	Hope-Sunrise & Seward district	132,442	67,442	65,000
56.	Anchorage district[e]	0	0	0
57.	Willow Creek-Hatcher Pass district	666,175	57,175	609,000
58.	Prince William Sound district	137,715	15	137,700
59.	Nelchina district	14,115	14,115	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	81,440	81,440	0
64.	Juneau & Admiralty districts	8,449,521	80,000	8,369,521
65.	Chichagof district	770,000	0	770,000
66.	Petersburg-Sumdum 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	**37,396,760**	**24,224,860**	**13,171,900**
	Undistributed[g]	154,142		
	Total production (troy ounces)	**37,550,902**		

Total gold production in Alaska by mining district 1880-2002



[a]Mining 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 1970–2002. Entries of "0" generally mean no specific records are available.

[b]Included in Marshall district.

[c]Includes Georgetown and Donlin districts.

[d]Includes Tanana area.

[e]Placer gold included in Willow Creek–Hatcher Pass district.

[f]Includes lode production from Glacier Bay and placer production from Lituya Bay district.

[g]Production that cannot be credited to individual districts due to lack of specific records or for reasons of confidentiality.

Top. *Maintenance of the railroad right-of-way as an Alaska Railroad Corp. passenger train enters one of the many tunnels along the Nenana River between Healy and Denali Station. Photo by David Szumigala.*

Bottom Left. *Rainer Newberry, University of Alaska Fairbanks economic geology professor, and Jen Athey, DGGS minerals geologist, discuss lithology and local structure while mapping in the Livengood mining district. Rainer is holding a total field magnetic map of a portion of the Livengood mining district, one of the products of the DGGS Airborne Geophysical/Geological Mineral Inventory Project. DGGS geologists and its contractors view the geophysical maps as an essential tool for mapping in many areas of Alaska. Photo by David Szumigala.*

Bottom Right. *Constructing a drill platform in the rugged terrain of the Union Bay Alaskan-type ultramafic complex while exploring for platinum-group-element mineralization on this property near Ketchikan. Temsco Helicopters Inc. provided flight services and drill support, and Connors Drilling Inc. conducted core drilling. Photo provided by Chris Van Treeck.*