

# **Nevada Bureau of Mines and Geology**

## **Special Publication MI-1997**

# **The Nevada Mineral Industry 1997**

This report, nineteenth of an annual series, describes 1997 mineral, oil and gas, and geothermal activities and accomplishments in Nevada: production statistics, exploration and development including drilling for petroleum and geothermal resources, discoveries of orebodies, new mines opened, and expansion and other activities of existing mines. Statistics of known gold and silver deposits, and directories of mines and mills are included.

**Metals**

**Industrial  
Minerals**

**Oil and Gas**

**Geothermal**

**Exploration**

**Development**

**Mining**

**Processing**

Mackay School of Mines

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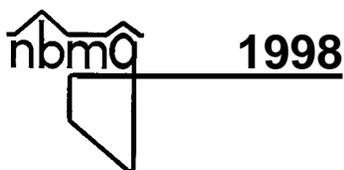
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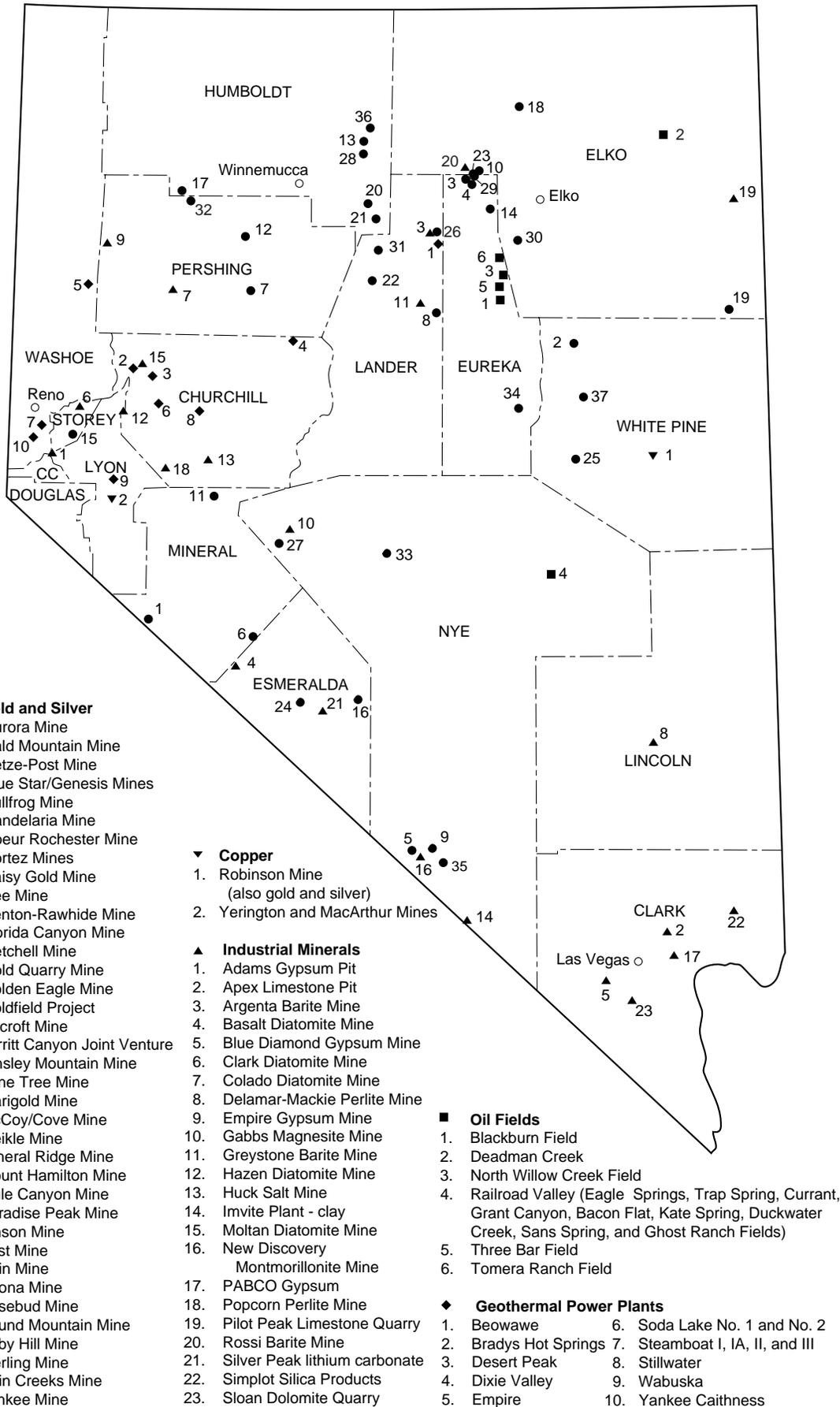
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**The Nevada Mineral Industry  
1997**

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Major mines, oil fields, and geothermal plants, 1997.

# Overview

by Jonathan G. Price

Mineral and energy production in Nevada in 1997, valued at \$3.3 billion, reached the second highest annual level. Lower gold prices were the cause of the drop in value from \$3.4 billion in 1996. The quantity of gold production, however, rose to a record high of 7.8 million troy ounces (243 metric tons). Contributions to the Nevada and U.S. economy are significant in terms of jobs, commerce, taxes, improvements to the infrastructure, and lowering of the U.S. trade deficit. Nevada ranks first in the nation in production of gold, silver, mercury, and barite, which are sold on both national and international markets. Construction of new homes, casinos, other businesses, schools, and roads continues the strong demand for local sources of sand, gravel, crushed stone, gypsum, and cement.

Nevada ranked second in the United States in terms of nonfuel (excluding oil, gas, coal, and geothermal) mineral production in 1997. Arizona, which is a world leader in copper production, produced more, and California, boosted by large demands for construction raw materials, was the third largest nonfuel mineral producer in 1997.

This report highlights activities through 1997 in metals, industrial minerals, geothermal energy, and petroleum. Numerous graphs and charts are incorporated for rapid inspection of trends in production and price.

Through a survey conducted early in 1997, the Nevada Division of Minerals collected data for Nevada Bureau of Mines and Geology Special Publication P-9, *Major Mines of Nevada 1997*. This publication includes, in handbook form, location maps, names and telephone numbers of operators, numbers of employees, and preliminary, non-proprietary production figures for most mines in Nevada. The full contents of this 28-page publication are available for free on the World Wide Web ([www.nbmng.unr.edu/mm97/mm97.htm](http://www.nbmng.unr.edu/mm97/mm97.htm)). The data from this survey are used, along with information from other sources, in this publication and will be used to update, revise, and check preliminary statistics collected and released by the U.S. Geological Survey.

The section on **Metals** and the table of **Major Precious-Metal Deposits** provide details on new deposit discoveries, new mine openings, mine closures, additions to reserves, and mine expansions. As has been the case in recent years, gold has been the leading commodity produced in Nevada. Production of gold was valued at over \$2.5 billion and came from 37 major mining operations. The Carlin Trend in northeastern Nevada accounted for 51% of the total production. Twelve additional mining operations, not on the Carlin Trend, each produced over 100,000 ounces of gold from mostly multimillion-ounce deposits.

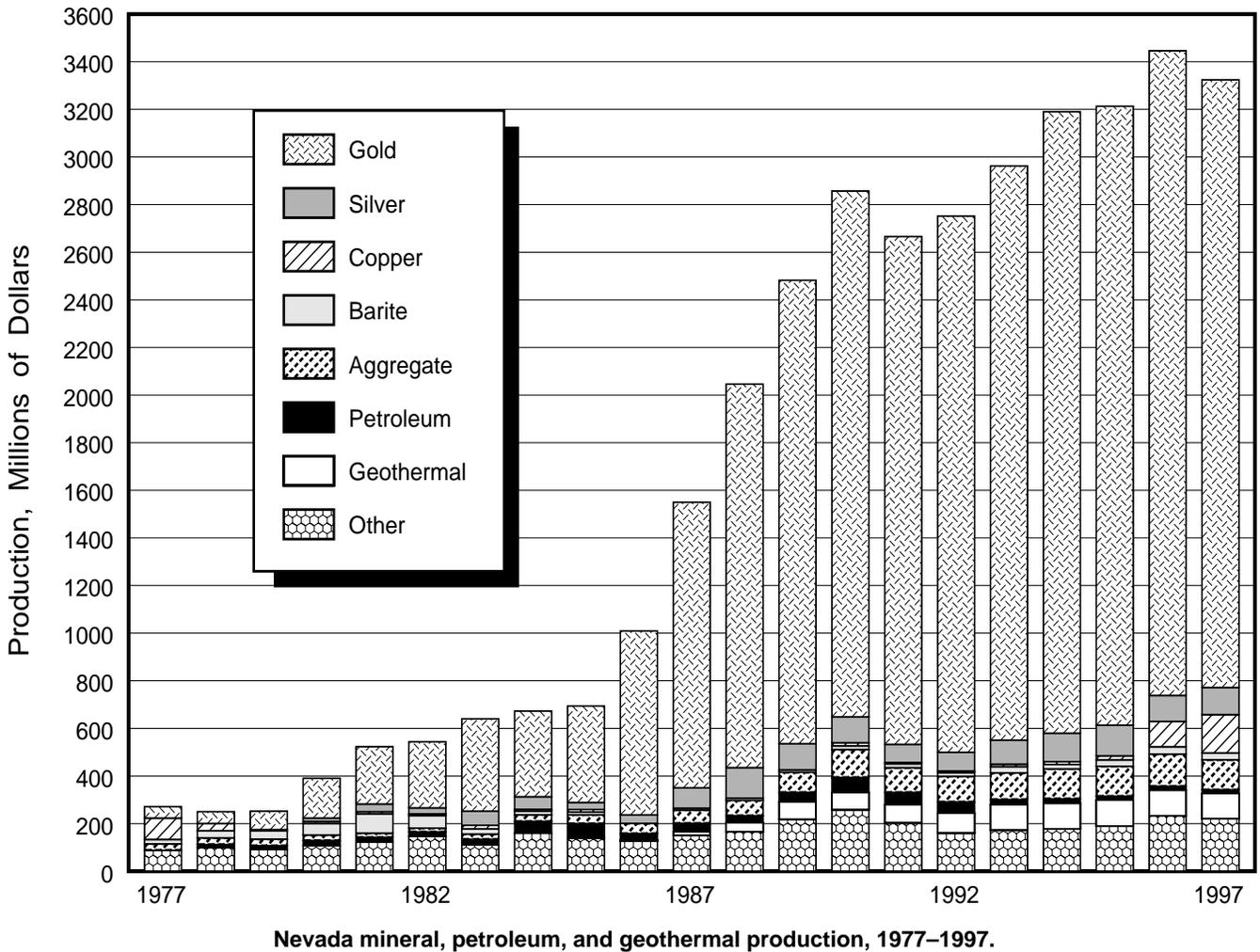
## MINERAL, PETROLEUM, AND GEOTHERMAL POWER PRODUCTION IN NEVADA<sup>1</sup>

Minerals	1996		1997 preliminary		% change from 1996 to 1997	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value
Barite (thousand short tons)	603	\$30,200	586	\$29,300	-3	-3
Copper (thousand pounds)	99,000	107,000	148,600	160,500	50	50
Geothermal energy (thousand megawatt-hours)	1,360	108,700	1,348	107,000	-1	-2
Gold (thousand troy ounces)	6,944	2,708,000	7,828	2,544,000	13	-6
Petroleum (thousand 42-gallon barrels)	1,100	15,900	1,000	15,000	-9	-6
Sand, gravel, crushed stone (thousand short tons)	30,000	135,000	28,000	126,000	-7	-7
Silver (thousand troy ounces)	20,531	108,800	24,645	113,900	20	5
Other minerals <sup>2</sup>	—	232,000	—	220,000	—	-5
Total	—	3,445,600	—	3,315,700	—	-4

<sup>1</sup>Production as measured by mine shipments, sales, or marketable production (including consumption by producers); compiled by the Nevada Division of Minerals and the Nevada Bureau of Mines and Geology.

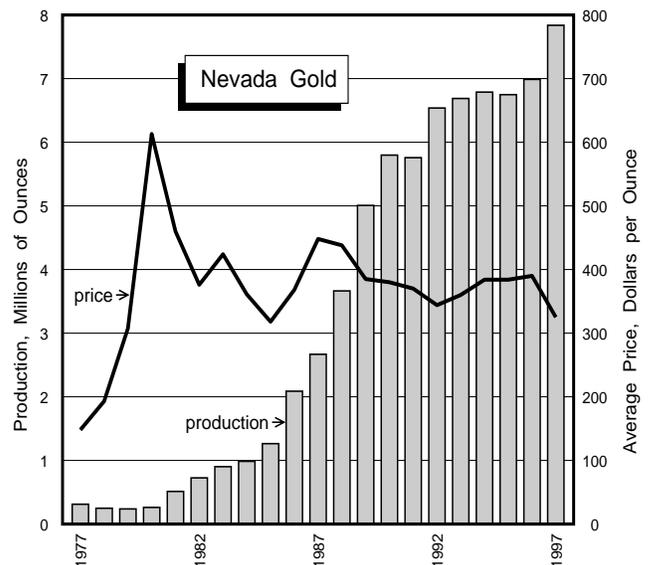
<sup>2</sup>Production data for cement, clay, diatomite, building stone, gypsum, lime, lithium carbonate, magnesite, mercury, perlite, salt, and silica sand are combined. See text for details of some of these commodities.

Products milled or processed in Nevada but mined from deposits in California are not included. Specifically, colemanite from a mill in Amargosa Valley in Nye County and zeolite from the Ash Meadows plant in Nye County are excluded from these totals.



Barrick's Betze-Post Mine in Eureka County, which produced 1.6 million ounces, is the largest gold mine in the United States. Nearby in Elko County, Barrick's Meikle Mine had the highest production among underground gold mines in the United States. Five new mines came into production in 1997: Placer Dome's Pipeline and South Pipeline deposits in Crescent Valley in Lander County (part of the Cortez Mines complex), Homestake's Ruby Hill Mine near Eureka, Newmont's Mule Canyon Mine near Argenta in Lander County, Newmont's and Hecla's Rosebud property in Pershing County, and Mineral Ridge Resources' Mineral Ridge Mine in Esmeralda County. The Mineral Ridge Mine halted mining later in the year due to low gold prices.

Nevada is a major force in the national and international gold markets, accounting for approximately 70% of U.S. production and 10% of world production. These numbers are calculated using statistics reported for areas outside Nevada by Gold Fields Mineral Services (M. Stewart, P. Klapwijk, H. Le Roux, and P. Walker, 1998, *Gold 1998*: Gold Fields Mineral Services, London, 63 p.). Using statistics collected by the U.S. Geological Survey for areas outside Nevada, which are somewhat less than those reported by Gold Fields Mineral Services,



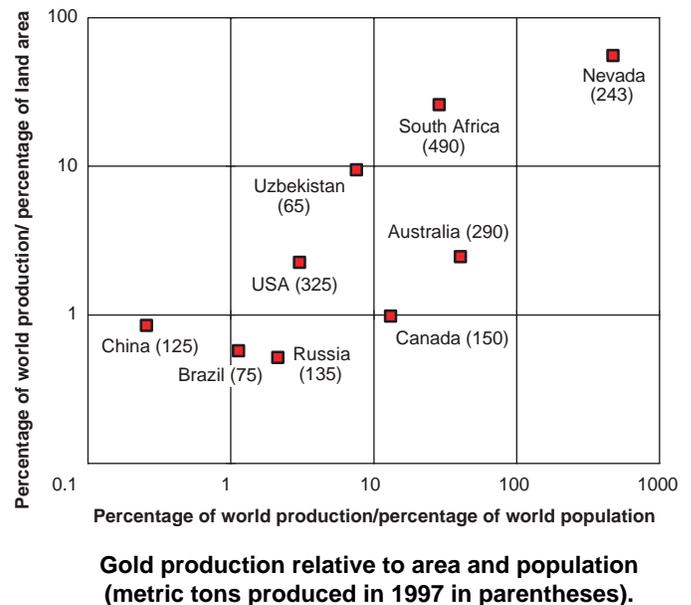
**1997 world production (in metric tons) of selected mineral commodities\***

	<b>Gold (t)</b>	<b>Silver (t)</b>	<b>Copper (thousand t)</b>	<b>Barite (thousand t)</b>	<b>Gypsum (thousand t)</b>	<b>Industrial sand (thousand t)</b>	<b>Land area</b>	<b>Population</b>
WORLD	2,300	15,300	11,300	4,600	100,000	115,000	100%	100%
USA	325	1,600	1,920	700	17,000	28,300	6.25%	4.67%
Nevada	243	770	67	532	1,576	581	0.19%	0.02%
Arizona	—	—	1,230	—	—	—	0.20%	0.07%
Austria	—	—	—	—	—	6,750	0.06%	0.14%
Australia	290	1,100	520	—	2,000	—	5.12%	0.31%
Brazil	75	—	—	—	—	2,700	5.68%	2.89%
Canada	150	1,200	660	—	8,300	—	6.65%	0.50%
Chile	—	—	3,380	—	—	—	0.50%	0.24%
China	125	—	440	1,500	9,000	—	6.38%	21.20%
France	—	—	—	—	5,000	6,800	0.38%	1.09%
Germany	—	—	—	—	—	7,000	0.24%	1.48%
India	—	—	—	550	—	—	2.19%	15.83%
Indonesia	—	—	525	—	—	—	1.27%	3.59%
Iran	—	—	—	—	8,300	—	1.10%	1.04%
Italy	—	—	—	—	—	3,000	0.20%	1.08%
Japan	—	—	—	—	5,300	3,500	0.25%	2.32%
Kazakstan	—	—	—	270	—	—	1.81%	0.31%
Mexico	—	2,500	—	260	5,300	—	1.32%	1.66%
Morocco	—	—	—	270	—	—	0.30%	0.49%
Netherlands	—	—	—	—	—	24,000	0.03%	0.28%
Paraguay	—	—	—	—	—	7,000	0.27%	0.09%
Peru	—	2,000	580	—	—	—	0.86%	0.41%
Poland	—	—	420	—	—	—	0.21%	0.72%
Russia	135	—	520	—	—	—	11.39%	2.77%
South Africa	490	—	—	—	—	—	0.82%	0.74%
Spain	—	—	—	—	8,000	2,700	0.34%	0.74%
Thailand	—	—	—	—	8,600	—	0.34%	1.03%
United Kingdom	—	—	—	—	2,000	—	0.16%	1.07%
Uzbekistan	65	—	—	—	—	—	0.30%	0.37%
TOTAL represented	72%	55%	79%	77%	79%	80%	54%	67%

\* Production data in metric tons for all areas except Nevada are from the U.S. Geological Survey (Mineral Commodity Summaries, 1998, 197 p.); data on areas and 1990 populations are from The World Almanac and Book of Facts, 1992, Pharos Books, New York, 960 p.

the numbers would be 75% and 11%, respectively. Nevada's production makes the United States a net exporter of gold and helps offset the trade deficit, which has averaged approximately \$10 billion per month in recent years. The United States is the second leading gold producer in the world, behind only South Africa. Nevada's 1997 production alone exceeded that of all countries except South Africa and Australia.

Nevada is clearly one of the most productive and enriched areas in the world for gold. One way of measuring the relative production of different states or countries is to calculate the percentage of world production divided by the percentage of world land area occupied by that state or country. A figure of 1.0 would mean that the state produced an average amount of gold for its land area and would imply, assuming that current annual production is a measure of resource endowment, that the state was not enriched relative to the rest of the world. A number greater than one would indicate higher



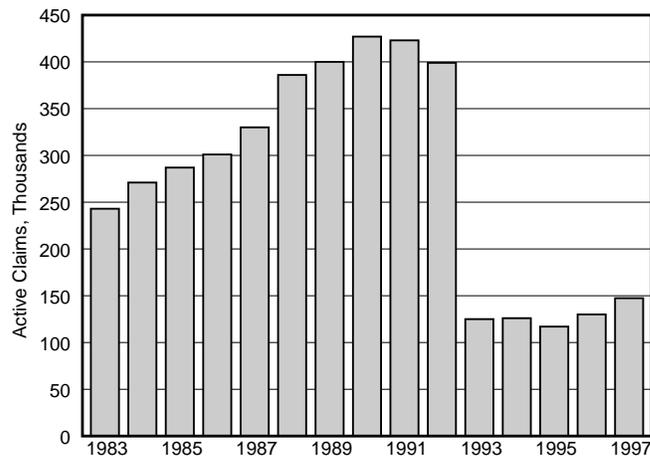
than average production relative to land area. Another way of measuring relative production is to calculate the percentage of world production divided by the percentage of world population. A figure of greater than one would mean that the state produced more than the average world production on a per capita basis. Nevada's gold production, either per unit area or per capita, was substantially higher in 1997 than that of major producing countries, including South Africa, Australia, Canada, Russia, China, Brazil, and Uzbekistan. Such high relative production is one of the reasons why Nevada continues to be an excellent place for gold exploration. It should be noted, however, that if only the most productive regions of South Africa, Australia, Canada, or other countries were compared, other provinces or states may surpass Nevada in this type of analysis. Nonetheless, Nevada is highly productive in terms of gold by nearly any measure.

Exploration, including grass roots activity, work in known mining districts, and development of extensions to known deposits, added to the Nevada resource base in 1997. New mineable deposits continue to be discovered. Exploration activities are summarized in the section on **Metals**. In 1997, companies explored in or near at least 106 of Nevada's 526 mining districts.

Exploration for near-surface deposits that can be mined from open pits is becoming increasingly difficult, because exploration in Nevada for these types of deposits has been vigorous for nearly 20 years. Nonetheless, targets continue to be identified below the cover of alluvium and volcanic rocks that are younger than the ore deposits. In some areas, exciting discoveries of high-grade deposits are being made at depths requiring underground mining. These are commonly along veins or faults within districts with previous near-surface production. Underground mining continues to increase, with 1.57 million ounces of gold coming from these operations in 1997. Two new underground mines, Getchell Gold Corporation's Turquoise Ridge Mine and Midas Joint Venture's Ken Snyder Mine, are expected to begin production in 1998.

At the end of 1997 the published gold resources in Nevada, including mineable reserves and perhaps some subeconomic resources, totaled about 117 million ounces of gold, enough to sustain gold production at current levels for about 15 to 20 years, assuming stable prices. The term "reserve" has special meaning with regard to U.S. securities laws. To be called a reserve, the deposit must be able to be mined profitably. With relatively low gold prices, some of the reserves of previous years have been downgraded to subeconomic resources. When prices rise or when new technologies allow mining and gold processing costs to be lower, subeconomic resources can become reserves.

As measured by the numbers of active claims on public lands, grass-roots exploration activity has remained fairly steady in the last five years, after dropping precipitously in 1993, when a new claim-holding fee was imposed by the federal government.

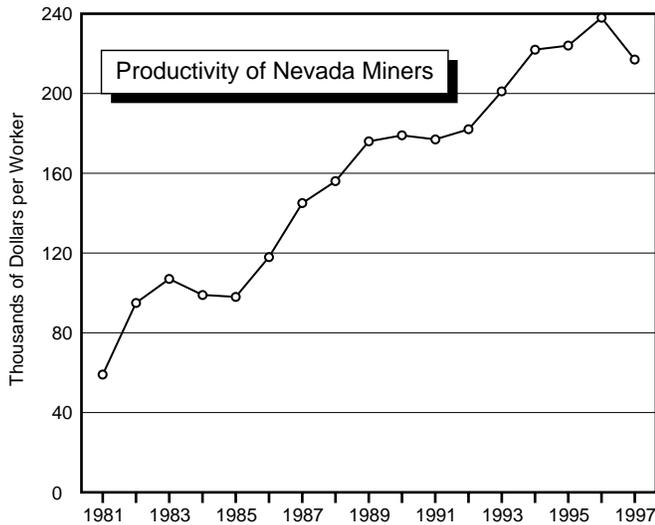


**Number of active claims in Nevada.**

The Nevada Division of Minerals recently completed its fourth annual survey of companies active in exploration in Nevada (D. Driesner, 1998, *Exploration Summary, 1998*: Nevada Department of Business and Industry, Division of Minerals, Carson City). The 51 companies that responded to the questionnaire plan to spend a total of \$94 million on exploration in Nevada in 1998, down 32% from actual expenditures of \$139 million in 1997. These companies employed 309 geologists in Nevada in 1997, but expect the number to drop to 228 in 1998. The decrease in exploration in Nevada in 1998, which is the direct result of low gold prices, is comparable to cutbacks in worldwide and U.S. exploration as a whole. The 51 companies reported a 29% decrease in expected worldwide exploration (with projected 1998 expenditures of \$767 million, down from \$1.083 billion in 1997) and a 40% decrease in expected U.S. exploration (with projected 1998 expenditures of \$136 million, down from \$226 million in 1997).

The companies answered questions regarding the factors influencing their exploration activities in the United States; chief among these are, in order of importance to the companies who are spending more than \$1 million each on Nevada exploration, existence of favorable geology (continually a major attraction for Nevada), commodity prices (which was less of a concern last year), uncertainty in permitting timeframes, corporate demands, actual length of permitting timeframes, uncertainty over mining law reform, announcements of new discoveries, changes in foreign mining laws, wilderness study areas, land exchanges, mining claim holding fees, and mergers.

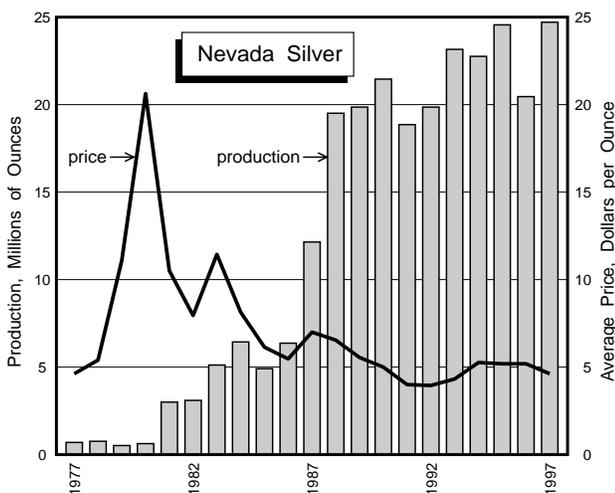
Productivity of Nevada mining operations is exceptionally high. Measured simply by the value of the commodities produced divided by the number of employees, productivity of Nevada miners is outstanding. On the average, each person in the nonfuel mineral industry in Nevada produced approximately \$217,000 in mined products in 1997. Depressed gold prices lowered the overall productivity from the peak of \$238,000 per person in 1996.



**Total value of mined product per worker in Nevada (exclusive of petroleum and geothermal energy)**

Approximately 14,800 workers were employed directly in the Nevada mining industry in 1997. The Nevada Division of Minerals (see Nevada Bureau of Mines and Geology Special Publication P-9) estimates that the 1997 direct payroll alone from the mining industry in Nevada was approximately \$734 million. The Division of Minerals further estimates, using U.S. Department of Commerce multipliers, that there are 48,000 additional jobs created in Nevada to provide goods and services needed by the mining industry and its workers.

Challenges that face the precious metal mines in Nevada include economic, safety, and environmental concerns, including fluctuating metal prices; hazards of underground mining; regulatory changes; treating refractory (iron sulfide and/or carbon-bearing) ores; dewatering mines; ultimate chemical compositions of pit lakes; and treatment and disposal of large volumes of water, some of which may contain potentially toxic elements that need to be removed or may be too warm to introduce directly into streams. Through research on new technologies and engineering approaches, industry is responding well to these challenges.



Thanks in part to Nevada's record level of silver production in 1997, 24.6 million troy ounces (766 metric tons), the U.S. ranks third, behind Mexico and Peru but well above Canada and Australia, in world silver production. Much of this silver was a by-product of gold mining. With a ratio of value (average price of gold to average price of silver) of 70:1 in 1997, only those deposits with more than 70 times as much silver as gold can be considered primary silver deposits. Two such deposits operated in Nevada in 1997—the Coeur Rochester Mine in Pershing County (with a silver to gold production ratio of 74:1 and total silver production of 6.7 million ounces) and the Kinross-Candelaria Mine in

**ANNUAL TAX ON NET PROCEEDS OF MINERALS**

Year	Annual net proceeds <sup>1</sup> (thousands)	Annual tax (thousands)
1982	\$159,999	\$1,800
1983	245,688	4,152
1984	184,987	3,222
1985	198,263	3,527
1986	374,664	6,091
1987	627,330	12,084
1988	798,253	13,568
1989	748,052	36,238
1990	887,035	42,737
1991	706,250	33,678
1992	694,457	33,128
1993	734,399	35,150
1994	994,416	48,205
1995	786,843	37,568
1996	613,167	29,198
1997	632,503	30,059

<sup>1</sup>Net proceeds are gross income minus direct costs incurred at the mine site. Source: Nevada Department of Taxation.

**OTHER REVENUE TO THE STATE OF NEVADA FROM THE MINERAL INDUSTRY**

Fiscal year <sup>1</sup>	Mining claim fee <sup>2</sup> (thousands)	Oil production fee <sup>3</sup> (thousands)
1984	\$158	\$52
1985	160	129
1986	160	155
1987	175	146
1988	337	158
1989	402	161
1990	408	178
1991	386	202
1992	351	156
1993	333	159
1994	420	81
1995	395	78
1996	370	58
1997	425	51

<sup>1</sup>July 1 through June 30.

<sup>2</sup>The state receives a fee of \$2.50 for each new claim and each assessment report.

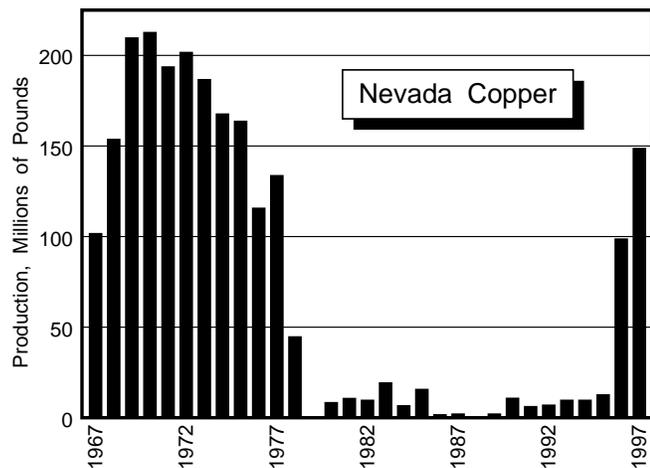
<sup>3</sup>\$.05 per barrel of oil produced; does not include drill permit fee or net proceeds tax.

Source: Nevada Division of Minerals.

Mineral County (with a silver to gold production ratio of 296:1 and total silver production of 2.9 million ounces). The largest silver producer in the United States, Echo Bay's McCoy-Cove Mine complex in Lander County, is primarily a co-product gold and silver mine; it yielded 11 million ounces of silver from ore with an average silver to gold ratio of 59:1. These three operations produced 83% of Nevada's silver in 1997.

At the end of the year the published silver resources in Nevada, including mineable reserves and perhaps some subeconomic resources, totaled approximately 230 million ounces. Nevada's production in 1997 accounted for 48% of the U.S. total and 5% of the world total. Depending on price, Nevada is likely to retain the present-day distinction of its nickname, the "Silver State."

Copper production increased dramatically from 1996 to 1997, as BHP Copper produced at nearly full, planned capacity at its Robinson property near Ely in White Pine County. This mine produced 138 million pounds of copper plus 71,000 ounces of by-product gold and 314,000 ounces of by-product silver in 1997. Arimetco, Inc. curtailed mining at its MacArthur project near Yerington in Lyon County due to low copper prices. Nevada's copper production, the highest annual level since 1975, represented 4% of total U.S. production in 1997.

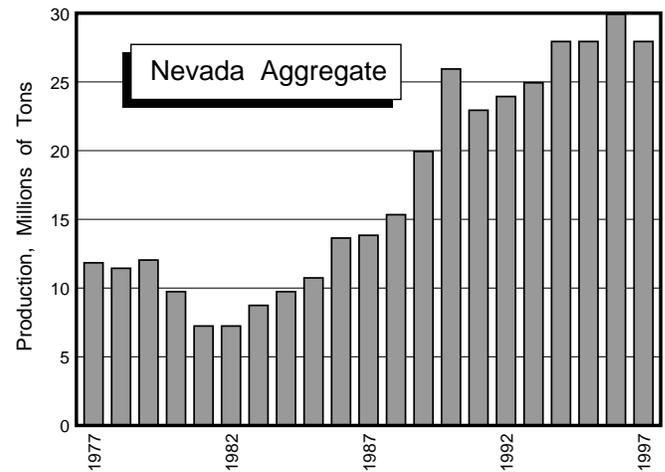


Reclamation of mined lands is regulated by the Nevada Division of Environmental Protection (NDEP) and, if on public lands, by either the Bureau of Land Management or the U.S. Forest Service. The mining industry is required to reclaim lands that are disturbed at mines and exploration sites after mining ceases and if the explored land does not have a mineable deposit. In 1997, NDEP reported that 2.2 square miles of land were unreclaimed at active mining operations and exploration projects. To put this amount of land in context, it is 0.002% of the total land area of Nevada. In contrast, according to mileages and average lane widths of interstate, U.S., state, and county highways in Nevada, as reported by the Nevada Department of Transportation and estimated from the Nevada Bureau of Mines and Geology's

geographic information system, the amount of land that is paved by highways in Nevada is approximately 57 square miles, more than 25 times that disturbed by current mining activity. The paved highway figure does not include paved streets in cities or paved parking lots.

The section on **Industrial Minerals** covers developments during 1997 and gives details on important commodities produced from Nevada, such as aggregate, barite, building stone, cement, clays, diatomite, dolomite, gypsum, lime, limestone, lithium, magnesia, perlite, salt, and silica. In terms of dollar value, the most significant industrial mineral commodity is aggregate (sand, gravel, and crushed stone), with a value of \$126 million, third in mineral value behind gold and copper in 1997. Aggregate production remains high as a result of Nevada's expanding population with its demands for construction materials for homes, schools, and streets and as a result of building resort hotels, other businesses, airports, and highways.

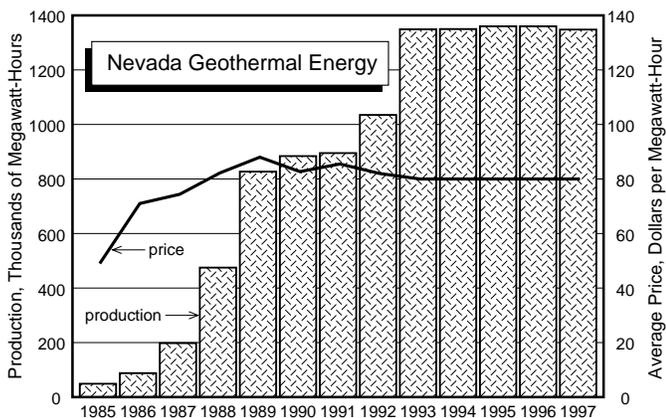
Demand for construction raw materials is likely to remain strong owing to Nevada's booming population. The U.S. Census Bureau estimated Nevada's population in 1997 to have been 1,677,000 and projected the population to rise to 1,871,000 in 2000, up from 1,202,000 in 1990. The Nevada State Demographer estimated the 1997 population to have been 1.78 million and projected populations of 2.0 million in 2000 and 2.8 million in 2010.



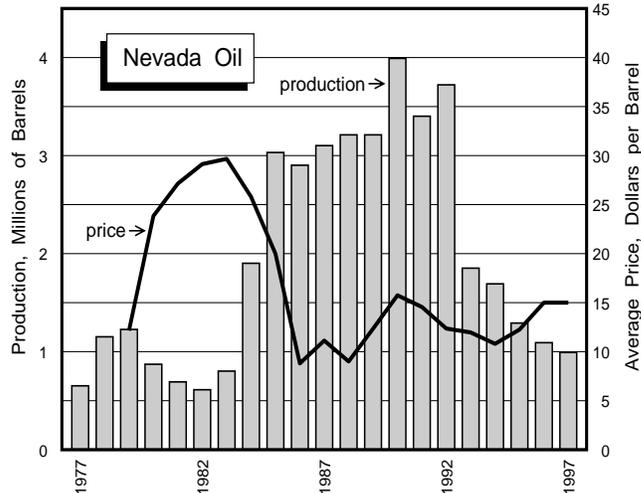
The table on 1997 world production of selected mineral commodities demonstrates that Nevada is particularly enriched in barite and gypsum. These two commodities illustrate the wide difference in markets for industrial minerals. Barite, which is used primarily as a well-drilling additive to prevent blowouts in drilling for oil and gas, is traded chiefly on international markets. Mineable barite deposits are relatively rare. Nevada barite accounted for 76% of the U.S. total production and 12% of the total world production in 1997. Gypsum, which is used primarily in the manufacture of wallboard or sheetrock, is a relatively common mineral and rarely is transported long distances. Nevada's deposits, which feed wallboard plants near the mines to meet not only demands in Nevada but also in neighboring states,

accounted for 9% of total U.S. production and 2% of total world production in 1997.

Developments in the geothermal industry are covered in the section on **Geothermal Energy**. Electric power production in 1997 was slightly less than the historic high reached the previous year. Fourteen power plants (operating at ten sites) sold \$107 million in electricity, far surpassing the value of petroleum production. Additionally, geothermal energy is used at numerous places in Nevada for space heating, warm water, recreation, and dehydrating vegetables. Relatively low prices for natural gas, coal, and petroleum have discouraged development of known geothermal resources and exploration for new resources.



Developments in the Nevada petroleum industry are covered in the section on **Oil and Gas**. Oil is produced primarily in two areas—Railroad Valley in Nye County and Pine Valley in Eureka County. A third area, northeast of Wells in Elko County, had minor production in 1997. Total annual oil production from Nevada (valued at \$15 million in 1997) accounted for 0.04% of U.S. production. Oil production declined for the fifth consecutive year. The largest producing fields in 1997 were Trap Spring (289 thousand barrels), Grant Canyon (144 thousand barrels), and Ghost Ranch (113 thousand barrels) in Railroad Valley and Blackburn (151 thousand barrels) in Pine Valley. Minor gas production from the Kate Spring Field is used to fuel equipment used in oil production.



Exploration for oil in Nevada is encouraged by the cumulative production from the two premier fields in Railroad Valley, Grant Canyon and Trap Spring (20 million and 12 million barrels, respectively). Oil exploration and development activity in Nevada was down slightly in terms of numbers of wells spudded (14 in 1997 versus 15 in 1996). Of the 13 wells completed in 1997, four were producers. Historically, few exploration wells have been drilled in the state (less than 1,000 wells, or fewer than one well per 111 square miles or 286 square kilometers). With so much area unexplored, even discounting areas underlain by granitic intrusions and high-grade metamorphic rocks, the potential for finding more multimillion-barrel fields remains high.

Additional information about the Nevada mineral industry and the U.S. gold industry, including the contents of selected publications, is readily available on line through the World Wide Web from the Nevada Bureau of Mines and Geology ([www.nbmj.unr.edu/](http://www.nbmj.unr.edu/)) and the Nevada Division of Minerals ([www.state.nv.us/b&i/minerals/](http://www.state.nv.us/b&i/minerals/)). Useful national and international data on nonfuel minerals can be obtained from the U.S. Geological Survey (<http://minerals.er.usgs.gov/minerals/>), and the U.S. Energy Information Administration ([www.eia.doe.gov/index.html](http://www.eia.doe.gov/index.html)) provides data on oil and gas, geothermal, and other energy sources.

# Metals

*by Joseph V. Tingley and Daphne D. LaPointe*

The information in this section was compiled from news releases in The Mining Record (DMR), Skillings Mining Review (SMR), Mining Engineering (ME), International California Mining Journal (ICMJ), The Northern Miner (NM), Society of Economic Geologists Newsletter (SEG), Rocky Mountain Pay Dirt (RMPD), and Reno Gazette-Journal (RGJ). Information was also extracted from various company annual reports and news releases on file at the Nevada Bureau of Mines and Geology, from the Nevada Division of Minerals monthly newsletter, and from the Nevada Mining Association monthly newsletter.

Nevada produced 7.83 million oz (troy ounces) of gold and 24.6 million oz of silver in 1997. Nevada broke its own record for gold production, set in 1996. Silver production also set a new record for the state, breaking the previous record set in 1995 by more than 43,000 oz. Nevada maintained its place as the leading gold and silver producing state in the United States with 32 mines reporting gold production and 26 mines reporting silver production during 1997.

For the third year, Barrick Gold's Betze-Post Mine was the largest individual Nevada gold producing mines with 1,605,836 oz while Newmont Gold reported a combined production of 1,819,115 oz of gold from its Carlin Trend mines. Barrick Gold's Meikle Mine claimed title for the second consecutive year as the largest underground gold mine in production in North America with production of 574,308 oz. Newmont Mining Corp. completed its \$2.1 billion merger with Santa Fe Pacific Gold Corp. in May 1997, adding the Lone Tree Complex, the Twin Creeks Mine, and half-interest in the Rosebud Mine to the Newmont portfolio of operations. With the acquisition of these mines, Newmont moved into place as the largest gold producing company in Nevada with over 2.7 million oz of production in 1997. Other major gold producers in 1997 included Smoky Valley Common Operation's Round Mountain Mine, 484,430 oz; Placer Dome's Cortez Gold Mines (including Pipeline), 407,973 oz; Independence Mining Co.'s Jerritt Canyon Mine, 312,015 oz; Barrick Gold's Bullfrog Mine, 206,571 oz; Echo Bay Minerals, 187,000 oz from its McCoy/Cove operation; Getchell Gold's Getchell Mine, 177,321 oz; and the Florida Canyon Mine of Florida Canyon Mining Co., 163,321 oz.

Three mines contributed most of Nevada's silver production in 1997: Echo Bay's McCoy/Cove operation produced 11 million oz, Coeur d'Alene Mines' Rochester Mine produced 6.7 million oz, and Kinross Gold's Candelaria Mine produced 2.9 million oz. Other major silver producers were Kennecott Rawhide Mining Co.'s Denton Rawhide Mine with 1.1 million oz, the Hycroft Mine of Hycroft Resources & Development with 479,920 oz, and Smoky Valley Common Operation's Round Mountain Mine with 356,085 oz. Nevada's newest major silver producer, Hecla's Rosebud Mine, produced 337,167 oz.

Nevada's 1997 copper production increased more than 50% over the previous year to 148.6 million pounds. The increase was due to increased production from the Robinson Mine in White Pine County, from which BHP Copper North America shipped concentrates containing 138 million pounds of copper to the BHP smelter at San Manuel, Arizona in 1997. Copper production by Arimetco International Inc. from their Yerington operations in Lyon County totaled slightly over 10.5 million pounds.

Nevada gold mines that came into production in 1997 included Placer Dome's Pipeline Mine (part of the Cortez Mines complex) in Lander County, Homestake's Ruby Hill Mine near Eureka, Hecla's Rosebud Mine in Pershing County, and Cornucopia's Mineral Ridge Mine at Silver Peak. Alta Gold's Griffon Mine in White Pine County is scheduled to pour its first gold in early 1998. All of Nevada's mines suffered to some extent due to lower metal prices during 1997. The Mineral Ridge Mine temporarily closed before the year ended and Arimetco ceased mining at its Yerington copper operations in late November. The Candelaria, Sterling, and Mt. Hamilton Mines also closed during the year.

## EXPLORATION

As in previous years, 1997 exploration activity in Nevada was focused in a broad band across the central and northern parts of the state. Heavy concentrations of activity were reported along the Battle Mountain-Eureka, Getchell, and Carlin trends and in specific districts, such as Gold Circle (Midas) and Eureka where major discoveries have been made. The map shows the locations of Nevada mining districts in which exploration activity was reported during 1997.

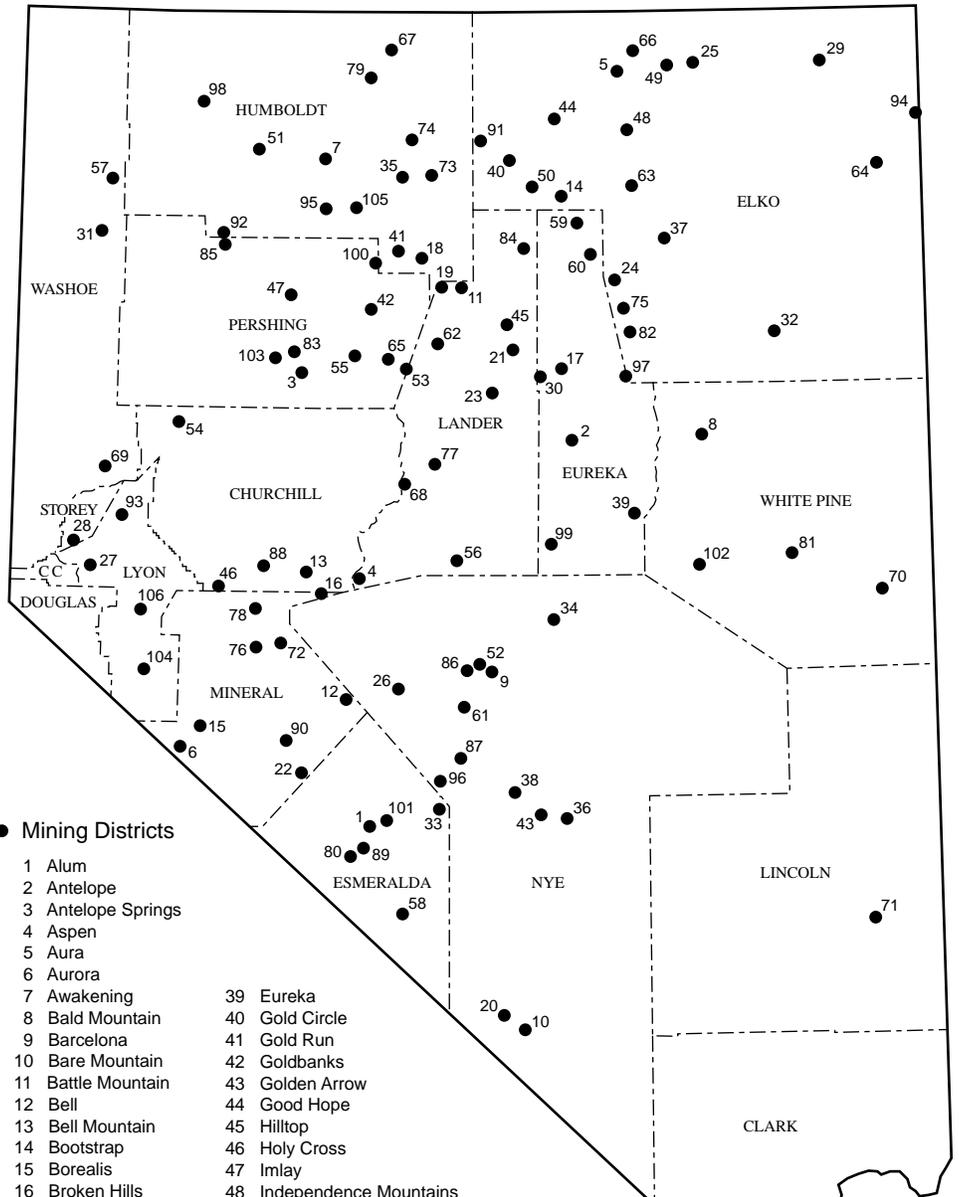
## CHURCHILL COUNTY

### Bell Mountain district

Ecu Gold Mining Co. Inc. announced completion of a first phase diamond drilling program on the Bell Mountain property. Known reserves at Bell Mountain are about 110,000 oz of gold equivalent (Ecu Gold Mining Co. Inc. press release, 1/10/97).

### Holy Cross district

Silver Trend Mining Co. assigned the lease on the Pyramid Mine to Breckenridge Minerals Inc. of Toronto, who planned a 1997-98 exploration program consisting



● Mining Districts

- |                     |                           |                        |                        |
|---------------------|---------------------------|------------------------|------------------------|
| 1 Alum              | 39 Eureka                 | 71 Pennsylvania        | 93 Talapoosa           |
| 2 Antelope          | 40 Gold Circle            | 72 Poinsettia          | 94 Tecoma              |
| 3 Antelope Springs  | 41 Gold Run               | 73 Potosi              | 95 Ten Mile            |
| 4 Aspen             | 42 Goldbanks              | 74 Poverty Peak        | 96 Tonopah             |
| 5 Aura              | 43 Golden Arrow           | 75 Railroad            | 97 Union               |
| 6 Aurora            | 44 Good Hope              | 76 Rand                | 98 Varyville           |
| 7 Awakening         | 45 Hilltop                | 77 Ravenswood          | 99 Wallace Canyon Area |
| 8 Bald Mountain     | 46 Holy Cross             | 78 Rawhide             | 100 Washiki            |
| 9 Barcelona         | 47 Imlay                  | 79 Rebel Creek         | 101 Weepah             |
| 10 Bare Mountain    | 48 Independence Mountains | 80 Red Mountain        | 102 White Pine         |
| 11 Battle Mountain  | 49 Island Mountain        | 81 Robinson            | 103 Willard            |
| 12 Bell             | 50 Ivanhoe                | 82 Robinson Mountain   | 104 Wilson             |
| 13 Bell Mountain    | 51 Jackson Mountains      | 83 Rochester           | 105 Winnemucca         |
| 14 Bootstrap        | 52 Jefferson Canyon       | 84 Rock Creek Area     | 106 Yerington          |
| 15 Borealis         | 53 Jersey                 | 85 Rosebud             |                        |
| 16 Broken Hills     | 54 Jessup                 | 86 Round Mountain      |                        |
| 17 Buckhorn         | 55 Kennedy                | 87 Rye Patch           |                        |
| 18 Buffalo Mountain | 56 Kingston               | 88 Sand Springs        |                        |
| 19 Buffalo Valley   | 57 Leadville              | 89 Silver Peak         |                        |
| 20 Bullfrog         | 58 Lida                   | 90 Silver Star         |                        |
| 21 Bullion          | 59 Lynn                   | 91 Snowstorm Mountains |                        |
| 22 Candelaria       | 60 Maggie Creek           | 92 Sulphur             |                        |
| 23 Carico Lake      | 61 Manhattan              |                        |                        |
| 24 Carlin           | 62 McCoy                  |                        |                        |
| 25 Charleston       | 63 Merrimac               |                        |                        |
| 26 Cloverdale       | 64 Montello               |                        |                        |
| 27 Como             | 65 Mount Tobin            |                        |                        |
| 28 Comstock         | 66 Mountain City          |                        |                        |
| 30 Cortez           | 67 National               |                        |                        |
| 31 Deephole         | 68 New Pass               |                        |                        |
| 32 Delker           | 69 Olinghouse             |                        |                        |
| 33 Divide           | 70 Osceola                |                        |                        |

Nevada mining districts with reported 1997 precious metals exploration activity

of an I.P. survey, geologic mapping and geochemical sampling, and a drill program of resultant targets. Interest was renewed in the property in 1996 after miners doing development work on the 185-foot level intersected a vein averaging 9 opt (troy ounces per short ton) of silver and 0.09 opt of gold across a 12-foot face (Silver Trend Mining Co. press release, 4/30/97).

#### **Jessup district**

Echo Bay Exploration completed a third round of drilling on its Jessup gold property, a joint venture with Americomm Resources Corp. In addition to further delineating an area of known shallow gold mineralization associated with silicification and argillic alteration, 1997 drilling identified a new resource area nearby (DMR, 2/26/97, 9/3/97, 12/10/97).

#### **New Pass district**

White Knight Gold (U.S.) Inc. and Quest U.S.A. Resources Inc. are pursuing a mining venture on Quest's New Pass property where previous work has indicated a resource of 3.1 million tons of gold ore grading 0.055 opt. Previous drilling at New Pass identified gold-bearing jasperoid bodies formed in limestone along a north-south volcanic/limestone contact. Gold mineralization is erratically distributed throughout the jasperoid and is locally present in the volcanic rocks. Three exploration targets were identified that require additional testing, including deep potential for Carlin-style high-grade gold mineralization (NM, 9/15/97, Quest International, 9/4/97).

#### **Sand Springs district**

Miranda Industries Inc. completed detailed geologic mapping, soil geochemistry, and ground magnetometer surveys on its Sand Springs property, east of the town of Fallon, where previous drilling identified gold and copper mineralization associated with a skarn zone. The focus of new exploration will be a zone of skarn and marbled limestone extending beyond the earlier drilled area (Miranda Industries Inc. press release, 1/15/98).

### **ELKO COUNTY**

#### **Aura district**

Atlas Corp. turned its Doby George property over to Western Exploration and Development Ltd. for \$1.6 million. Extensive drilling by the previous operators of Doby George proved up a reserve of 250,000 oz of gold with an additional drill-indicated resource of 500,000 oz of gold. In the same district, Crown Resources Corp. continued exploration on its Maggie Summit Project where 24 exploration holes were planned (DMR, 1/29/97; Aquaterre press release, 1/29/97).

#### **Bootstrap district**

Barrick Gold Inc. secured an agreement to explore the deeper potential of the Dee gold property owned by Rayrock Yellowknife Resources. Rayrock plans to cease mining of the Dee pit in early 1998, but leaching operations on the property will continue for about 3 more years (DMR, 2/26/97, 10/29/97; NM, 9/1/97, 11/10/97).

In the south part of the Bootstrap district, at the Ren property, drilling results indicate potential for deep, higher-grade mineralization where structures intersect the favorable Popovich Formation. The Ren Venture (50% Romarco Minerals Inc., 50% Uranerz USA Inc.) entered into an exploration agreement with Homestake Mining. Plans for the next drill program at Ren are under way and will focus on a detailed study of the structural controls (Romarco Minerals Inc. press release, 8/20/97; NM, 9/8/97).

A joint venture between Minorca Resources Inc. and Trio Gold completed 10,865 feet of percussion drilling on the West Flower zone of the Rodeo Creek property. Additional drilling is planned to follow up on encouraging drill results (Trio Gold press release, 11/19/97).

#### **Carlin district**

High Desert Mineral Resources completed geologic mapping and geophysical survey work on several properties along the Carlin Trend including the Bell Creek property and the Evans Mine area. The Bell Creek property consists of 1,200 acres contiguous to the Meikle Mine to the north, and the Evans Mine property covers 180 acres one mile east of Newmont's Emigrant Springs property.

High Desert also completed limited trench sampling at the Bob Creek gold property, which covers 640 acres two miles south of Carlin (Elko Daily Free Press, 11/22/97). Newmont Gold Co. has filed a Plan of Operation with the BLM to begin open pit mining at the Emigrant deposit in the Piñon Range. Ore from the new operation will be transported to the existing processing facility at Newmont's Rain Mine (BLM Plan of Operations Notice, 5/30/97).

#### **Charleston district**

Notices were filed by Neil and Associates, Inc. to drill the Badger Creek-Union Gulch area, and the St. Elmo project site, both in the Charleston district (Humboldt-Toiyabe National Forest Plan of Operation Notice, 4/2/97).

#### **Contact district**

Golden Phoenix Minerals is investigating the copper, gold, and silver potential of properties in the Contact district. Previous drilling at Contact by Phelps Dodge encountered high-grade intercepts of 10% copper, silver values as high as 12.8 opt and gold values as high as 0.15 opt on properties which have a reported resource of 500 million to 1 billion pounds of copper. Mineralization on the Contact properties occurs both in high-grade copper-silver-gold fissure veins and in porphyry-style copper-

molybdenum-silver-gold deposits (Golden Phoenix Minerals, Inc press release, 2/6/98).

### **Delker district**

The McNew Project area in the Delker district is one of several properties along the Bald Mountain-Spruce Mountain structural lineament which are being evaluated by Golden Phoenix Minerals Inc. Assays on samples collected by Golden Phoenix confirmed high-grade gold values reported by previous lessors from the mineralized project area. Along the same trend, Golden Phoenix also has the Exxon (Cu-Au) property (Delker district) and Medicine Man (Ag-Pb-Zn) area in the nearby Mud Springs district (Golden Phoenix Minerals, Inc. press release, 1/14/98).

### **Elko district**

Royaledge Resources Inc. completed an eight-hole drilling program on the South Fork property east of the town of Elko. The drilling was done to test possible extension of gold mineralization discovered in 1996 and to explore for new ore. Nearly all drill holes intersected gold mineralization and demonstrated persistence of gold mineralization in altered siltstone and marble units adjacent to a dike and along fault structures. Additional drilling is being considered (DMR, 5/14/97, 11/26/97).

### **Gold Circle district**

There was a high level of activity in 1997 in the Gold Circle district, surrounding the town of Midas, due mainly to the new Ken Snyder discovery of Euro and Franco Nevada Mining Corporations in the heart of the old district. Exploration and definition drilling continued on the high-grade Ken Snyder deposit, now estimated to contain 2.25 million oz of gold and 25.3 million oz of silver. The focus has been on resource and reserve delineation in the area of the Ken Snyder Mine, with other identified Midas property target areas scheduled for drilling during the 1998 and 1999 field seasons. Excavation of the main decline at Ken Snyder was begun on May 1, 1997 and the mine is scheduled to begin production by May 1999. Expected mine yield is 250,000 oz of gold equivalent annually. Drilling in 1997 boosted reserves to 2.17 million tons ore grading 1.04 opt gold and 11.65 opt silver (DMR, 6/25/97; NM, 7/7/97, 10/13/97). The Ken Snyder resource has been extended significantly to the north and to the south where it has been linked to the Sleeping Beauty discovery. In addition, a new parallel structure, the Snow White vein, has been discovered to the east of Sleeping Beauty (DMR, 12/3/97).

On adjacent ground, drilling by Romarco Minerals Inc. on the Belnap claims of their Midas project encountered two new high-grade gold-silver veins: Footwall No. 2 and Hangingwall No. 1. The discovery resulted from an 11-hole exploration program which focused on two previously known, high-grade gold-silver

veins: the Gold Crown and Footwall No. 1. Infill drilling on the Gold Crown vein intersected high-grade mineralization over a 1,700-foot strike length. Additional drilling on Romarco's Dixie claims hit several high-grade gold zones within lower-grade halos hosted in altered Tertiary volcanics (NM, 9/8/97, 10/13/97, 10/27/97; Romarco Minerals Inc. press release, 1/29/98).

On the eastern side of the district, Royaledge Resources Inc. acquired the Frazer Creek gold property and initiated core drilling at the Eastern Star. Initial results indicated several significant gold intercepts (DMR, 11/26/97).

Blue Desert Mining Inc. secured an agreement to develop Golden Glacier Resources Inc.'s South Midas property, located about 6 miles southwest of the Ken Snyder Mine. Drilling by previous owners on the property confirmed the presence of high-grade gold mineralization in steeply dipping north-northeast trending quartz and quartz-carbonate veins (Blue Desert Mining Inc. press release, 11/19/97).

### **Good Hope district**

Altair Gold Explorations Inc. acquired an option on the Wildhorse claims where previous exploration efforts detected anomalous gold, arsenic, and mercury in a sinter in Tertiary volcanic rocks (Altair Gold press release, 2/3/97).

### **Independence Mountains district**

Underground mining continued at the West Generator and Murray Mines of the Jerritt Canyon Joint Venture (70% Independence Mining Co., 30% Meridian Gold). Independence reported that 1997 exploration on the Jerritt Canyon property had encountered more gold at the Coulee and Burns Basin Extension targets (NM, 6/2/97: ME, 11/97). The former contains a resource of 1.9 million tons grading 0.27 opt gold. At the Burns Basin target, pre-stripping is underway for a fourth quarter startup. At the Dash open pit, which entered production last year, Minorco is evaluating the possibility of following the mineralization underground.

In the Jerritt Canyon Mine area, Independence reported plans to conduct exploration drilling in the Mahala and Jim Creek drainages of its Mahala Creek Exploration Project, and in the Stump and Sheep Creek drainages on its South California Mountain Project.

Independence also conducted exploration in 1997 on its Smith Creek Project in the vicinity of Burns Creek and Schmidt Creek, and on the Cow Canyon project. Elsewhere in the district, Romarco Minerals drilled its Gance Creek property (Humboldt-Toiyabe National Forest Decision Notices, 12/18/96, 1/29/97, 3/20/97, 12/12/97; NM, 10/27/97).

### **Island Mountain district**

Quest International entered into a joint venture on Aur Resources' Coleman Canyon gold project located 60

miles north of Elko. Previous exploration on the property conducted by Westmont Gold Inc. encountered significant gold mineralization with gold grades ranging as high as 0.187 opt. The gold mineralization is associated both with regional structural intersections and with an intrusive contact with Permian siltstone and limestone (Quest International, 1997).

#### **Ivanhoe district**

Core drilling at the Ivanhoe property of Great Basin Gold Ltd. and Cornucopia Resources Ltd. intersected a northwest-trending structural system hosting epithermal, multistage quartz veins containing visible gold and silver mineralization. The structure is in upper plate Valmy Formation rocks, and is believed to be a feeder system for the overlying 3-million-ounce gold resource of the Hollister deposit. Great Basin Gold plans to pursue exploration of the Valmy targets (Great Basin Gold Ltd., Cornucopia Resources Ltd. press release, 8/14/97; DMR, 9/3/97; Great Basin Gold Ltd. press release, 2/10/98).

Also in the Ivanhoe district, Athlone Resources Ltd. conducted an enzyme leach soil geochemical survey and geophysical surveys on the Daw claims. This work defined an area of silicification and mineralization in the southern part of the property that will be further explored. In the same district, Athlone also staked the Lin claims to cover favorable volcanic host rocks within an area of known mercury mineralization. Athlone's target at both the Daw and Lin claims is high grade, structurally controlled gold mineralization in silicified volcanic rocks (Athlone Resources Ltd. press release, 10/9/97).

#### **Lynn district**

Barrick Gold's Meikle Mine completed a second record year as the most productive underground gold mine in North America with 1997 production of 574,308 oz of gold. Barrick announced a revision of its mining plans for the low-cost Meikle Mine which will increase its annual production rate to 650,000 oz, to partially offset lost production from the anticipated 1999 closure of Barrick's Pinson, Bullfrog, and other mines (NM, 9/15/97, 10/20/97).

#### **Merrimac district**

White Knight Resources acquired a 76-claim property to add to its Lone Mountain gold project, boosting its land holding in the district to 11,500 acres. White Knight continued mapping and sampling work on the project in 1997 (NM, 7/7/97).

In the same district, Independence Mining Co. negotiated an agreement with Royal Gold whereby Independence can either transfer all of its interest or convey a 2% net smelter return royalty on any production from its Lone Mountain property (49 claims), in exchange for the opportunity to explore the Buckhorn South project in Eureka County.

#### **Montello district**

Lexam Explorations Inc. drilled eight holes on the Lewis Spring prospect, located 10 miles west of the town of Montello, to test jasperoids containing highly anomalous values of mercury, arsenic, and antimony, together with weak gold values. One hole intercepted 40 feet of 0.13 opt gold (Lexam website, 1998; Lexam oral commun., 1998).

#### **Mountain City district**

Cordex Exploration Co. planned to drill 10 exploration holes on its Mountain City Project in 1997 (Humboldt-Toiyabe National Forest Plan of Operation Notice, 3/3/97).

#### **Railroad district**

Several companies reported activity in the northern Piñon Range south of the town of Carlin.

Exploration Mirador Inc. began drilling on the 38-square-mile Railroad property located adjacent to and south of Newmont's Rain Mine. Exploration focused on the POD deposit, which hosts the majority of the presently known reserves. Exploration Brex apparently also maintains an interest in the POD deposit. The Railroad project includes Mirador's 41% interest in Royal Standard's 100,000-oz Dark Star gold deposit.

At the POD deposit, 1997 drilling confirmed the presence of 1.5 million tons of near-surface ore grading 0.085 oz opt gold. Drilling in 1997 also resulted in the discovery of the Elliot High Ranch (EHR) gold zone, 6 miles southeast of the POD deposit and immediately north of the Darkstar deposit; and the LT zone located about 6 miles southwest of the POD deposit. Drilling on the extension of the Bunker Hill Zone intercepted polymetallic mineralization (gold, copper, zinc) in an intensely altered zone at shallow depths. All of these zones will be targeted for further drilling to expand the boundaries of the mineralized areas. Late in the year, Mirador announced that it had entered into a joint venture agreement with Kinross Gold Corp. U.S.A. for the exploration, development and operation of the Railroad project (DMR, 10/8/97; 10/15/97; 11/26/97; Exploration Mirador press release, 5/21/97, 9/29/97, 11/25/97; NM, 10/13/97, 10/27/97; Exploration Brex Inc. press releases, 6/25/97, 8/5/97).

In the same district, International Calneva Gold Corp. explored the 71-claim ARF project located about 15 miles from the town of Carlin. One target focused on jasperoids containing vein barite along steeply dipping structures similar to those found at the Rain Mine and the South Bullion deposit. A second geological target on the ARF ground includes possible gold-bearing Tertiary rhyolite dikes. Calneva also explored altered and mineralized zones on the LM claims of its Pine Mountain property located approximately 10 miles south-southeast of Carlin (International Calneva Gold press release, 1997).

Nevada Pacific Gold Ltd. reached an agreement with Kennecott Exploration to acquire the Woodruff Creek property located 4 miles northwest of the Rain Mine (Elko Daily Free Press, 12/20/97).

## **Robinson Mountain district**

Quest International Resources Corp. entered into a joint venture agreement with Barrick Gold Corp. on Quest's Pony Creek property. Previous drilling on the property delineated a geologic resource of more than a million tons grading 0.057 opt gold. Gold mineralization occurs at the base of an altered rhyolite intrusion and along high-angle faults cutting the rhyolite (Quest International press releases, 9/4/97, 1/13/98). Elsewhere in the district, Cameco Corp., working with joint venture partner Royal Standard Minerals, completed 11,425 feet of drilling on the Cord Ranch property (Crown Resources Corp. Third Quarter Report 1997, 11/13/97). In the same district, International Calneva Gold Corp. explored the ARF-2 (Section 2) property located about 5 miles south of the Rain Mine and adjacent to Calneva's Pine Mountain property and to its ARF property. The ARF-2 property hosts numerous barite-rich jasperoid outcrops that are locally copper stained and contain anomalous gold and base metals (International Calneva Gold press release, 2/24/97).

## **Snowstorm Mountains district**

Three companies reported activity in the Snowstorm Mountains district in 1997. Romarco Minerals, in a joint venture with Crown Resources, completed a 10-hole drilling program on its Snowstorm property, where low-grade gold mineralization was encountered in three holes along a northwest structure. Deeper follow-up drilling is planned for 1998 to test the hypothesis that earlier drilling may have intersected the upper portion of an epithermal vein system (NM, 10/27/97; Romarco Minerals Inc. press release, 1/29/98; Crown Resources Corp. press release, 11/13/97). On an adjacent claim block staked in 1996, Blue Desert Mining continued exploration on its Snowstorm property (Blue Desert Mining Inc. press release, 1997; DMR, 10/22/97). Also in the Snowstorm Mountains, Oro Nevada Resources Inc. completed one hole on the Knolls target to test a Controlled Source Audio Magnetotelluric (CSAMT) resistivity high. Although favorable host rocks were encountered, the drilling did not encounter significant gold mineralization (DMR, 10/29/97).

## **Tecoma district**

On the eastern border of Elko County, Lexam Explorations Inc. has been active on two properties in the Tecoma district: the State Line prospect and the newly discovered East Canyon prospect, both near the Nevada-Utah state line. The State Line prospect includes the highly mineralized rocks of the Jackson Mine area and extends east to the Nevada-Utah state line. Widespread low gold values throughout the prospect area are associated with jasperoids in the Grandeur and Trapper Creek formations. At the East Canyon prospect, north of the State Line prospect, gold values occur in quartz-sulfide veins associated with a marble skarn (Lexam web page press release, oral commun., 3/2/98).

## **ESMERALDA COUNTY**

### **Alum district**

Two targets were drill-tested in 1997 by Camnor Resources Ltd. on its Alum property, a hot spring epithermal gold prospect southwest of Tonopah. Geologic mapping, geochemical sampling, and a geophysical survey had previously outlined a northeast trending zone of silicification and alteration. Three reverse circulation drill holes intersected extensive zones of anomalous silver, gold, mercury, arsenic, and molybdenum in altered rocks, but no economic grades were found (Camnor Resources Ltd. press release, 2/16/98).

### **Divide district**

Work by Prism and Eastfield Resources on the Hill of Gold property outlined a gold resource of 1.6 million tons grading 0.026 opt. A number of targets remain to be tested on this property as well as extension and in-fill drilling. Prism is earning a 50% interest in the Hill of Gold property and has approximately \$900,000 left to spend by July 1999 to complete the earn-in (Eastfield Resources press release, 1997).

### **Lida district**

Southwest of Goldfield, Cascade Metals Inc. completed preliminary mapping and sampling on the contiguous Florida-Wisconsin, Mozart, and Texas projects in the Lida district and added 120 new lode claims to the property. At the Florida-Wisconsin Project, mineralization is hosted by parallel, east-trending quartz vein/shear zones. The Mozart Project contains a high-grade zone of silver, copper, antimony and zinc values. The Texas Project contains a large potential oxide gold and copper porphyry system with anomalous silver, gold, copper, lead, zinc, and arsenic. Based on encouraging gold-silver assays from Cascade's first round of sampling the property, the company is proceeding in 1998 with further exploration including detailed mapping, sampling, and geophysics (Cascade Metals Inc. press releases, 11/27/97, 2/24/98).

### **Red Mountain district**

Nevada Camnor Resources Ltd. explored the Argentite property, composed of 17 claims located 19 miles west of Silver Peak. Camnor reported that six reverse-circulation holes drilled in 1997 on the Adit zone of the property encountered significant gold mineralization. Earlier work on the Argentite property identified three zones of gold mineralization: Adit, Baseline and Westridge. All zones are silica capped and occur within argillized and silicified volcanic rocks. Mineralization is associated with quartz stockwork, quartz veins, and fracture linings. and each zone also contains highly anomalous gold pathfinder elements. Mapping and sampling have demonstrated that the Adit Zone structure

can be traced on surface for more than 2,500 feet. Surface sampling of the Baseline and Westridge zones, north of and subparallel to the Adit Zone, returned values of 0.01 to 0.10 opt gold. The Argentite property is under option to Twin Star Minerals Ltd. whereby Twin Star may earn a 49% interest by spending \$1,000,000 on exploration expenditures by October 1999 (Camnor Resources Ltd. press releases, 11/5/97, 1/8/98; DMR, 1/28/98).

### **Silver Peak district**

In June 1997, Cornucopia Resources Ltd. poured its first gold at the new Mineral Ridge Mine in the Silver Peak district but, in November, the company announced the temporary suspension of mining operations due to depressed metal prices. Although annual production of 50,000 oz was anticipated, production at the time of the suspension totaled 10,400 oz, due to a slower leach rate than anticipated. Leach operations will continue during the shutdown period on stockpiled ore, with gold production proceeding at an estimated rate of 3,000 oz per month (Cornucopia Resources Ltd. press release, 6/26/97; DMR, 7/2/97; NM, 7/7/97, 9/1/97, 11/30/97).

### **Tonopah district**

Eastfield Resources explored the Three Hills property, located in the Esmeralda County portion of the Tonopah district, for both high-grade vein and bulk tonnage potential. The property contains an estimated gold resource of 6.3 million tons grading 0.023 opt. Eastfield executed Phase I of a drilling program to delineate high grade vein mineralization in the vicinity of the historic Keystone, Monarch-Pittsburgh and 76 mines, where several holes encountered anomalous gold and trace elements in altered rock. Phase I drill data and newly completed surface mapping will guide the next phase of the drilling program. Several surface targets on the property remain to be drill tested (Eastfield Resources press release, 1997).

### **Weepah district**

Dia Met Minerals Ltd., in conjunction with Goldtex Resources Ltd., commenced Air-Track drilling on its Weepah property in August of 1997 (Goldtex Resources Ltd. press release, 8/13/97).

## **EUREKA COUNTY**

### **Antelope district**

Barrick Gold Exploration Inc. completed the purchase from Atlas Corp. of more than 90% of Atlas' Gold Bar properties with an option to acquire the balance within 2 years. The Gold Bar claim block covers about 100 square miles in the Antelope district and contains the Gold Bar mill (Atlas Corp. press release, 6/10/97; DMR, 6/25/97).

Also in the Antelope district, Globex Mining Enterprises Inc. announced that it acquired Gold Capital Corp. and, as a result, a 60% interest in and management of the Tonkin Springs Mine (DMR, 7/13/97, Globex Mining press release, 9/2/97). In the north part of the district, White Knight and Chapleau Resources continued drilling on the Indian Ranch property, confirming mineralization in an area of previous drilling on the 310-claim prospect (DMR, 9/24/97). Romarco Minerals acquired the Red Hill property in the northern Simpson Park Range, where anomalous arsenic, antimony, and gold values were obtained in a sampling program in hydrothermally altered sedimentary rocks. Romarco will explore the property for Carlin-type, sediment-hosted gold (Romarco Minerals press release, 8/20/97).

### **Buckhorn district**

Royal Gold, Inc. drilled 32 reverse circulation holes in its Buckhorn South property, resulting in the discovery of additional gold mineralization. Drilling outlined a generally north-striking zone of mineralization 1,400 feet long and 600 feet wide in Tertiary basalt and underlying fanglomerate in the south-central portion of the property (Royal Gold Inc. press release, 5/22/97). Later in the year, Independence Mining Co. optioned the Buckhorn South project from Royal Gold in return for an interest in two of Independence's properties. The Buckhorn South hosts a known resource of 110,000 contained oz of gold (DMR, 6/4/97, 10/8/97).

### **Cortez district**

On the Hand-Me-Down target, Dean Ranch property, Crescent Valley, exploration drilling by Oro Nevada Resources Inc on a resistivity anomaly identified a sizable gold-bearing epithermal system. Anomalous gold mineralization was encountered under gravel cover in 15 of the total 37 RC and core holes drilled to date. More drilling is planned on selected targets on the Dean Ranch (DMR, 6/25/97, 7/13/97; Oro Nevada Resources Inc., 12/3/97).

### **Eureka district**

Homestake Mining Co.'s new Ruby Hill Mine poured its first gold on November 6, 1997 and is now processing 3,500 tons of ore per day (DMR, 12/3/97; Homestake Mining Co. press releases, 11/10/97, 2/19/98). Homestake is continuing exploration in the immediate area and a deep drilling program is planned to further define the zone of high-grade sulfide mineralization discovered last year some 1,500 feet below the West Archimedes open pit (DMR, 6/4/97; NM, 11/23/97).

Elsewhere in the district, Alta Gold acquired the Lookout Mountain property, south of Eureka, from Echo Bay Mines. The 4,500 acre property comprises six different deposits extending over a 2-mile strike-length

(NM, 2/2/98). Echo Bay Mines retained the Ratto Canyon property, north of Alta's acquisition, and stepped up exploration after drill results indicated a previously unexplored mineralized area (Echo Bay Mines web page). Uranex and Cambior have completed significant amounts of drilling on the New York Canyon and Hoosac property of High Desert Mineral Resources Inc., located 2 miles south of the town of Eureka (Elko Daily Free Press, 11/22/97).

European American Resources announced encouraging drill results from its Prospect Mountain property located just outside Eureka. The objective of the first phase of drilling was to delineate the extent of a mineralized horizon lying above the main ore horizon in the Wabash ore zone. Drilling encountered high-grade intercepts in excess of one opt gold in this upper zone, prompting additional drilling in 1998 (European American Resources press release, 1/30/98)

### **Lynn district**

In the Lynn district on the northern border of Eureka County, exploration and development activity continued at a high pace. Barrick Gold Corp.'s Betze-Post Mine maintained its place as the top producing gold mine in the state with 1997 production of 1,605,836 oz of gold. Goldstrike has produced over 10 million oz of gold to date and has current reserves of 29.7 million oz, the single largest gold reserve in the U.S. (Barrick Gold Corp. Fourth Quarter 1997 Report, 2/10/98; DMR, 4/23/97). Of this Betze-Post (Eureka County) contains 23.6 million oz and the adjacent Meikle Mine (Elko County) contains 6.1 million oz. An additional 11.6 million oz of gold in mineralized material also have been identified on the property. Barrick allocated a \$10 million exploration budget for the property in 1997, concentrated on the Screamer, North Betze, and West Betze areas (DMR, 4/23/97).

Newmont Gold continued underground operations at five Carlin Trend mines: Carlin East, Carlin Main, Carlin West, Deep Star, and Rain. Newmont also intercepted high-grade gold values below 6,000 feet in a deep drilling program south of its Post deposit in the northern part of the district. The holes tested the lower-plate rocks below the Roberts Mountains thrust, and are considered to be the deepest holes ever drilled in the Carlin Trend (ME, 8/97).

Newmont-Barrick-High Desert Mineral Resources Joint Venture will be preparing an EIS on the Leeville Project. Proposed operations will consist of an underground mine and surface support facilities to develop the West Leeville, Four Corners, and Turf deposits. The depth of the deposits ranges between 1,000 feet and 2,500 feet. Current projected mine life is 18 years (BLM Plan of Operations Notice, 7/30/97). The Joint Venture also explored the Micron and Golden Boy prospects. Two holes were drilled to depths of 2,415 feet and 2,000 feet; lower plate rocks were encountered at depths of 1,450 and 1,660 feet respectively (Elko Daily Free Press, 11/22/97).

### **Maggie Creek district**

To the south, in the Maggie Creek district, Newmont Gold Co. announced plans to expand the Gold Quarry open pit to extend the mine's life through the year 2013. The expansion will include mining of 110 million tons of refractory and oxide gold ore, mainly from a southeast expansion of the pit (Elko Daily Free Press, 6/21/97).

In the same district, Silver Eagle Resources drilled the Section 8 anomaly of its High Dollar property. The initial hole was planned to explore stratigraphic units to a depth of 3,000 feet (DMR, 2/26/97). Altaur Gold Explorations Inc. has negotiated an option with Silver Eagle to earn a 51% interest in the High Dollar property (Altaur Gold press release). Exploration Brex continued to explore its 50%-owned Section 12 property through an exploration program which included geophysical work, shallow drilling, and two deep holes (NM, 6/2/97).

### **Union district**

Romarco Minerals Inc staked 83 mining claims covering the historic Union mining district in the northern Sulphur Springs Range near the Elko-Eureka county line. Romarco's target in the Union project is structurally and stratigraphically controlled disseminated gold mineralization in lower plate rocks (Romarco Minerals Inc. press release, 8/20/97).

### **Wallace Canyon area**

In the far southwest corner of Eureka County, Red Dome Mining Co. reported plans to drill two holes on their Wall Project located in the Wallace Canyon area of the northern Monitor Range about 30 miles southeast of Austin (Humboldt-Toiyabe National Forest Plan of Operation Notice, 6/6/97).

## **HUMBOLDT COUNTY**

### **Awakening district**

North of Winnemucca in the Awakening district, X-Cal Resources recently extended its option to purchase Amax Gold's portion of the Sleeper Gold property and planned to resume drilling of the West Wood, Bedrock, Casino, and Ready Line targets late in the year. Placer Dome had previously optioned the project but lost its right to participate when talks reached a stalemate. The 1997 drilling program expanded the potentially mineralized area at Sleeper to include the pediment west of the mine site (DMR, 4/23/97, 6/4/97, 7/13/97, 8/27/97, 9/24/97; NM, 7/21/97, 9/1/97, 9/29/97).

Pallaum Minerals acquired the Hill property about 5 miles southeast of the Sleeper deposit and 2 miles south of the Jumbo Mine. Earlier geologic mapping, geochemical sampling, and drilling on the property encountered gold mineralization in quartz veins and stockworks in quartzite (Pallaum Minerals press release, 4/16/97).

### **Battle Mountain district**

Rayrock Yellowknife Resources Gold Inc. increased tonnage milled as well as reserves at the Marigold Mine in the Humboldt County portion of the Battle Mountain district. Production reported in 1997 was 73,640 oz of gold (NM, 9/1/97; Homestake Mining Co. press release, 2/19/98).

### **Buffalo Mountain district**

Drilling by Uranerz in the Buffalo Mountain district has almost doubled the gold resource at the Converse gold property. A 25-hole drill program on the property outlined 43 million tons grading 0.02 opt gold in the main area of mineralization. An additional 7.1 million tons at the same grade has been delineated in an open extension of the zone to the north. Uranerz is exploring the property as part of a joint-venture with Romarco Minerals and Newmont Gold. Infill drilling is planned in order to verify preliminary resource estimates (NM, 8/11/97). In the same area, Pallaum Minerals acquired an option to acquire the Buff property, located on the northwest flank of Buffalo Mountain about 5 miles west of the Lone Tree and Marigold gold mines. Earlier mapping, sampling, and drilling on the property identified anomalous gold associated with hornfelsed and locally silicified sediments near a contact with intrusive rocks (Pallaum Minerals press release, 4/16/97).

### **Dutch Flat district**

In the Hot Spring Range west of Getchell, Oro Nevada Resources Inc. tested geophysical and geochemical anomalies with a ten-hole drilling program at Sodarisi Canyon. Several structural zones were found to carry anomalous arsenic, antimony, mercury, and up to 0.037 opt gold over short intervals (DMR, 10/29/97).

### **Gold Run district**

Altair Gold announced that it has an option to purchase the Adelaide Crown gold property, an advanced stage, fully permitted project with a proven reserve of 25,000 oz of gold and a drill-inferred resource of about 200,000 oz. Altair plans to confirm the in-ground resource and increase its land holdings in the area before making a production decision (Altair Gold press release, 3/6/97). In the same district, White Knight Resources secured an agreement with North Mining to explore the Rock Creek Ranch property, located between the Adelaide Crown Mine and Kramer Hill (DMR, 3/4/98).

### **Jackson Mountains**

Gerle Gold Inc. and Meridian Gold Inc. entered into an agreement whereby Meridian will explore the Happy Creek property. Exploration efforts will focus on epithermal gold-silver targets on the 72-claim property (Gerle Gold Ltd. press release, 10/27/97).

### **National district**

In the northeast part of the county, Royaledge Resources Inc. has acquired the 52 claims of the Buckskin property, National district, and has designed a reverse-circulation drilling program to test for the presence of high-grade gold mineralization. The property contains an estimated resource of 50,221 oz of gold and 466,243 oz of silver in the Bell vein, which was a producer in the early 1900s (DMR, 11/26/97). Gold Valley Resources also reported plans to drill eight exploration holes in its Buckskin Mountain property in the same district (Humboldt-Toiyabe National Forest Plan of Operation Notice, 7/17/97).

### **Potosi district**

Exploration activity at the Turquoise Ridge and Getchell underground deposits at Getchell Gold Corp.'s Getchell Mine added a net 1.6 million contained oz of proven and probable reserves in 1997. Total proven and probable gold reserves at year end for the Getchell properties were 6.2 million contained oz with an additional 6.6 million oz inferred resource. This includes proven and probable underground reserves of 6.1 million contained oz with an average grade of 0.379 opt. Part of the increased resource base of the Getchell underground mine resulted from 1997 drilling in the North Getchell zone which delineated 500,000 oz of gold contained in 1 million tons grading 0.5 opt.

Development of the underground workings at Turquoise Ridge advanced in 1997 with the sinking of the production shaft to the 1250 level (total depth of 1,810 feet should be reached by July 1998), the ventilation shaft to the 1710 level, and 4,900 feet of development drifting on several levels. At the Bud Hill zone, 2,000 feet south of the main shaft of the Turquoise Ridge deposit, Getchell established a preliminary resource of 1.3 million tons grading 0.38 opt, equivalent to 490,000 contained oz based on 1997 drilling results. Drilling continued on the Section 13 property located west of and adjacent to Newmont's Twin Creeks deposits. Getchell's 1998 plans were to continue exploration in all of these areas as well as on new targets along the Getchell structure, including Summer Camp and Hansen Creek (DMR, 5/14/97, 9/3/97; NM, 8/11/97, 9/29/97; Getchell Gold press releases, 2/17/98, 9/30/97; ME,8/97).

Early in 1997, Homestake Mining Co. and Barrick Gold Corp. purchased the interests in the Pinson property not already owned by them, to increase their ownership of the property to 50% each, with Homestake as the manager. Deep exploration potential was the reason for the purchase. By the end of the year, Barrick Gold Corp. announced that production was expected to wind down at Pinson by mid-year 1999 unless current exploration on the property succeeds in identifying new reserves. Reported 1997 production from the Pinson Mine was 51,600 oz of gold (DMR, 2/26/97; Homestake Mining Co. press release, 2/19/98; Humboldt Sun, 9/15/97; NM, 9/1/97, 9/15/97).

At Anderson Canyon, west of the Getchell Mine, Oro Nevada Resources Inc. completed nine drill holes in the North Anderson target. Anomalous gold values as well as significant mercury, antimony, and bismuth anomalies were encountered in all nine holes, none of which penetrated lower plate rocks. More drilling is planned on a deep-seated lower plate target (DMR, 10/29/97).

#### **Poverty Peak district**

A seven-hole drilling program by Oro Nevada Resources Inc. on its Poverty North geophysical target encountered negligible gold values (DMR, 10/29/97).

#### **Rebel Creek district**

Oro Nevada Resources Inc reported anomalous gold mineralization and significant mercury and antimony in quartz-pyrite zones drilled on their Orovada target in the Rebel Creek district in the Santa Rosa Range. Additional drilling is planned on other target anomalies (DMR, 10/29/97).

#### **Sulphur district**

Despite record 1997 production of 117,379 oz of gold, Vista Gold Corp. announced temporary suspension of mining activities at its Hycroft Mine in western Humboldt County, due to depressed gold prices. Ore mining was to cease by May 1998, although gold recovery and processing will continue from inventoried ore while the mine equipment and facilities are maintained on standby pending a rebound in gold prices (DMR, 7/23/97; Vista Gold Corp. press release, 1/12/98).

#### **Ten Mile district**

Early in 1997, Blue Desert Mining Inc. commenced a reverse circulation drilling project at the Golden Sage property west of Winnemucca where previous drilling had outlined a 500,000-oz gold resource located along the range front faults at the base of Blue Mountain. Difficult drilling conditions led to the suspension of drilling after only seven holes were completed, some of which fell short of their target depth. Drilling intersected pervasively altered volcanic rocks containing anomalous amounts of antimony, arsenic and mercury, indicator elements for epithermal gold deposits (Blue Desert Mining Inc. press release, 5/14/97; DMR, 3/12/97).

#### **Varyville district**

In 1997, Mustang Gold Corp. conducted geological mapping, sampling, and ground geophysics which identified four distinct targets on its Pearl Canyon property in the Varyville district. A first-phase 27-hole reverse circulation drill program completed on one of these targets, the Roberts Polymetallic Zone, intersected significant amounts of copper and silver over a 1,000-foot strike length. Mustang plans additional drilling on the

property to further define mineralization along the remaining 8,000-foot strike length of the zone as well as to test other targets (Mustang Gold Corp. press release, 1/7/98).

#### **Washiki district**

In the Washiki district 15 miles south of Winnemucca, Quest International planned 3,000 feet of reverse circulation drilling on its Jasperoid gold property. The drilling will test surface showings of rock yielding gold values of 0.09 opt (DMR, 5/21/97).

#### **Winnemucca district**

Anvil Resources announced delay of a two-phase drilling program scheduled for its gold property located just north of the town of Winnemucca, while it seeks additional funding or a joint venture partner. Extensive earlier exploration on the property has proven 130,000 to 140,000 oz of gold in the main stockwork zone with several other potential zones targeted for drill testing (Anvil Resources Ltd. press release, 6/3/97).

In the same area, Pallaum Minerals announced signing of an option to acquire the W property, located on Winnemucca Mountain, where earlier drilling identified disseminated gold in silicified sediments and in quartz/carbonate veining (Pallaum Minerals press release, 4/16/97).

### **LANDER COUNTY**

#### **Aspen district**

Fairmile Gold Corp. acquired the 2,500-acre Highland Gold property located in the Aspen district in the southwest corner of the county. Fairmile planned a program of detailed geologic mapping and sampling for the project area, where closely spaced quartz veins cut highly altered volcanic rocks (DMR, 9/17/97).

#### **Battle Mountain district**

Battle Mountain Gold Co. increased total estimated proven and probable gold reserves at the Phoenix property to 2,505,000 oz. Additional drilling is planned for the Fortitude, Midas, and Phoenix deposits in 1998 in an effort to further expand the reserves (Battle Mountain Gold press release, 2/6/98). Battle Mountain Gold Co. projected that the Reona Mine would run out of ore by January 1998, although the heap-leach and processing facility will continue to operate past that time (Elko Daily Free Press, 9/9/97).

High Desert Mineral Resources Inc., with partner Battle Mountain Gold, completed a mapping and sampling program on the Copper Basin property and, with partner Barrick Gold Corp., completed mapping, rock-chip and soil sampling on the ICBM property located 8 miles west-southwest of Battle Mountain (Elko Daily Free Press, 11/22/97).

International Calneva Gold Corp. completed a 13-hole drilling program on its Battle Mountain property located immediately south and east of the Trenton Canyon Mine, and Oro Nevada Resources mapped and sampled the DeWitt property, located between Battle Mountain and Buffalo Valley (International Calneva press release, 7/8/97; DMR, 11/26/97).

In the southwest part of the district, Consolidated North Coast Industries Ltd. plans to explore the Wilson Independence property near Copper Canyon where prior exploration has indicated a resource of over 800,000 oz of gold (DMR, 12/17/97; Consolidated North Coast Industries Ltd. press release, 12/9/97).

Exploration work by Cascade Metals Inc. identified 3 coincident soil and geophysical anomalies on its Iris Gold property located on the northeast flank of Battle Mountain about a mile north of Copper Basin. The company planned a second phase of geophysical surveys to target reverse circulation drill holes to test the anomalies (Cascade Metals Inc. press releases, 11/27/97, 1/28/98).

### **Buffalo Valley district**

In the Buffalo Valley district, west of Battle Mountain, Fairmile Gold Corp. reported that this season's drilling at its Buffalo Valley Project increased the total gold resource to 600,106 oz (DMR, 4/2/97, 4/23/97, 6/4/97; Fairmile Gold Corp. 1997 year-end report, 11/1/97; Fairmile Gold press release, 11/20/97). Echo Bay Mines Ltd. formed a strategic alliance with Fairmile in April 1997, and 66 holes of the 1997 program were drilled under that arrangement.

### **Bullion district**

Placer Dome Inc. announced the successful commissioning of the new gold processing facilities for the Pipeline deposit at the 60%-owned Cortez Joint Venture (Kennecott Minerals Co. owns 40%). The plant poured its first gold doré on March 6, 1997, processing lower-grade ore from the Crescent pit until the higher-grade Pipeline pit came onstream in mid-year. The facility is expected to process more than 8,400 tons of ore and produce 2,000 oz of gold per day over a projected mine life of 15 years (DMR, 3/26/97; Battle Mountain Bugle, 3/11/97; Humboldt Sun, 7/11/97; NM, 11/23/97; Placer Dome press releases, 3/6/97, 4/23/97, 7/22/97, 2/18/98). Cortez Joint Venture also began the permitting process for the South Pipeline gold deposit, 500 feet south of Pipeline. The mine is projected to operate for 17 years, with proven and probable reserves estimated at 2.85 million oz of recoverable gold. Royal Gold holds a 20% net profits royalty in the South Pipeline Project. A 1997 drilling program by Cortez expanded the extent of known gold mineralization in the deposit in the southern extension, southeastern margin, northwest Crescent pit, eastern margin, and saddle areas of the South Pipeline property (DMR, 6/4/97; Royal Gold Inc. press release, 12/22/97).

By year's end, the Cortez Joint Venture had also completed an extensive drilling program on the west side of the jointly held portion of the Robertson property in Crescent Valley (Cortez Joint Venture 61%, Coral Gold 39%). Drilling focused on intersections of high-angle faults with the projection of the Pipeline fault corridor north onto the Robertson property. Although ore-grade gold values were not intercepted, the program located gold bearing structures and favorable stratigraphy to guide the 1998 drill program (Coral Gold news release, 2/10/98).

Another company actively exploring in the Bullion district in 1997 was Pallaum Minerals, which drilled the Bullion Mountain property, which is jointly owned (40%) by Cabo Exploration Ventures, Inc. The 10-hole RC-drilling program verified strongly anomalous gold values in the southeastern portion of the property reported by earlier workers on the property (Pallaum Minerals press release, 4/7/97). Pallaum also completed a seismic survey on the CVP property, located 1.5 miles southeast of Pipeline, and planned to drill the property later in the year (Pallaum Minerals press release, 5/23/97).

High Desert Mineral Resources Inc., with partners Euro-Nevada and Summex Mines, carried out geologic mapping, sampling, and an airborne geophysical survey on the Mill Creek and Horse Mountain property, followed by drilling of one 3,000-foot hole that returned values of up to 560 ppb (0.016 opt) gold in upper plate rocks (Elko Daily Free Press, 11/22/97; Summex Mines Ltd. press release, 2/4/98). High Desert, with partner Royal Gold, drilled two holes on the Ferris and Cooks Creeks property, where airborne surveys had earlier been completed. Anomalous mineralization was encountered in both holes (Elko Daily Free Press, 11/22/97).

### **Carico Lake district**

Pallaum Minerals took an option to acquire a 100% interest in the RM property, located in the Carico Lake Valley about 14 miles southwest of Placer Dome's Pipeline gold deposits. Exploration over the past ten years on the property consisted of geological mapping, geochemical sampling, and drilling which defined a resource of 100,000 tons grading 0.026 opt gold. In the same area, Pallaum entered into an agreement to acquire a 100% interest in the Stone Cabin Canyon property, which covers two epithermal gold mineralization target areas. Past exploration activities outlined anomalous concentrations of gold, arsenic, mercury, and antimony associated with fault zones on the property (NM, 10/20/97; Pallaum Minerals press releases, 1/30/97, 4/16/97).

### **Hilltop district**

First International Metals Corp. completed IP and magnetometer surveys on the JDN claim group and is now planning a drilling program for the area (First International Metals Corp. press release, 10/30/97).

## **Kingston district**

Verdstone Gold Corp. and Stirrup Creek Gold Ltd. announced plans to sell some waste dumps at the Victorine Mine to New Concept Mining Inc to be milled at NCM'S established heap leaching operations at Manhattan. Proceeds from the sale will be used to finance drilling of up to 40 holes to test extensions to the existing mine reserves of 123,000 oz. of gold identified by Stirrup in a 31-hole drill program in 1992 (Verdstone Gold Corp. press release, 2/4/97; Humboldt-Toiyabe National Forest Plan of Operation Notice, 6/12/97).

## **McCoy district**

Exploration drilling at Echo Bay's McCoy/Cove in the McCoy district south of Battle Mountain hit additional gold mineralization just outside the southeastern edge of the Cove open pit. The mineralization is relatively shallow; if proved up as reserves, it could extend the life of the mine by one or more years (DMR, 9/3/97).

## **Ravenswood district**

Camnor Resources, Inc., drill tested two geophysical and geochemical anomalies on the Raven property north of Austin. Although all holes hit significant silicification, no economic gold values were found (Camnor press release, 10/21/97; DMR, 10/22/97).

In the southern part of the district, Digger Resources and Fischer-Watt Gold Co. are exploring the Tempo claims. Digger commenced a phase-one drill program consisting of approximately 3,000 feet of core drilling in 10 to 15 holes centered in an area of gold mineralization associated with strongly altered host rocks (Digger Resources Inc. press release, 9/30/97).

## **Rock Creek area**

At Rock Creek on the southeast flank of the Sheep Creek Range northeast of Battle Mountain, Altaur Gold has optioned a 60% interest in the Rock Creek gold property from Brancote U.S. Inc. Previous exploration on the property outlined a small gold resource of approximately 800,000 tons grading 0.045 opt in a zone of brecciated quartz at the south end of the claims. Current exploration is focused on possible deeper-seated gold mineralization indicated by opaline alteration with strongly anomalous mercury on the northern part of the claim block (Altaur Gold press release, 3/6/97).

## **LINCOLN COUNTY**

### **Pennsylvania district**

Based on assay results from a 1997 sampling program, Royal Standard Minerals, Inc. planned an infill diamond-drilling program to prove up and expand the reserve base of the Jumbo zone on its Caliente property. The mile-long gold-bearing sheeted quartz vein-breccia system has been

partially developed by the Jumbo pit. Previous exploration identified a resource of 700,000 tons grading 0.039 opt gold in the central area of the system. The former heap-leach pile contains about 50,000 tons of 0.03 opt gold and 0.80 opt silver which may also be classified as reserves. Deep exploration and evaluation of several gold skarn targets on the property are also planned (DMR, 1/29/97).

## **LYON COUNTY**

### **Como district**

In mid-year, Adamas Resources Corp. announced acquisition of a 100% interest in the Hydra-Hercules gold-silver project located at the northern end of the Pine Nut Mountains. Past exploration work on the property by numerous companies included sampling and drilling which delineated at least ten shallow en echelon zones of epithermal gold-silver mineralization. A geological resource amenable to open-pit mining methods was estimated by earlier operators to contain between 170,000 and 213,000 oz of gold and over 1.5 million oz of silver (DMR, 4/6/97; Adamas Resources Corp. press releases, 5/20/97, 11/4/97, 12/16/97, 2/2/98).

### **Talapoosa district**

Miramar Mining suspended development of the Talapoosa project due in part to depressed gold prices and in part to the need for additional metallurgical testing (DMR, 2/26/97).

### **Wilson district**

In the Wilson district, in the southern part of the county, several closed adits south of the old camp of Pine Grove were opened in preparation for exploration (Humboldt-Toiyabe National Forest Plan of Operation Notice, 5/2/97). South of Pine Grove, in the Rockland area, Inmet Mining (US) has an approved mining plan for drilling and exploration road building.

### **Yerington district**

In November 1997, Arimetco International Inc. announced that the MacArthur Mine would be shut down for up to 6 months due to declining copper prices (Reno Gazette-Journal, 12/1/97).

## **MINERAL COUNTY**

### **Aurora district**

During the third quarter of 1997, Nevada Consolidated Goldfields, operator of the Aurora Mine, bought the adjoining Aurora property from Electra Gold Limited, thus acquiring sole ownership of the Aurora mining district, including the Humboldt pit (DMR, 5/28/97; Consolidated Nevada Goldfields Corp., 1997 Annual Report).

In the western part of the district, near the Nevada-California state line, Echo Bay Mines has been sampling and evaluating several areas at Bald Peak for gold mineralization potential, and hopes to identify targets to drill in 1998 (Echo Bay Mines web page).

#### **Bell district**

Exploration and development are planned for the Mina Gold project, owned and operated by Mina Gold Mine, Inc., a subsidiary of the SF Lewis Trust. Previous owners reported a geologic resource of 1.77 million tons averaging 0.055 opt gold on the property. Golden Phoenix Minerals Inc. is in the process of extending a purchase option on this and other properties after which exploration and development will proceed (Elko Daily Free Press, 1/25/98).

#### **Borealis district**

In November, Golden Phoenix Minerals announced that it had acquired sole ownership of the Borealis Mine project. Cambior Exploration USA Inc. is earning a 70% interest in the project through planned exploration and development expenditures of \$7 million over the next seven years. Cambior is seeking additional oxide and sulfide reserves on the property, which produced more than 600,000 oz of gold in the 1980s. Cambior's exploration and development drilling program will include continued work on the Graben-Freedom Flats sulfide resource, reported to contain an estimated 205,000 oz of gold. Cambior plans to commence their exploration and pre-development drilling program in early 1998 (NM, 11/10/97; Cambior Exploration USA Inc. press release, 1/22/98).

#### **Broken Hills**

Altair Gold Explorations Inc. took an option from Brancote U.S. Inc. to acquire a 75% interest in the Bell Flat group of prospects which straddle the Mineral-Churchill county line in the Broken Hills area. Exploration work will concentrate on three bulk-mineable gold targets: Bell Flat, GA, and North Kaiser prospects. At the Bell Flat prospect, gold-bearing outcrops of silicified siltstone are exposed in a window of Triassic sedimentary rocks. The GA prospect consists of a gold-bearing, siliceous sinter in volcanic rocks. The North Kaiser prospects contain multiple zones of anomalous gold in silicified volcanics (Altair Gold press release, 2/3/97).

#### **Candelaria district**

Kinross Gold Corp.'s Candelaria Mine, located near Hawthorne, produced 2.9 million oz of silver and 9,955 oz of gold in 1997. Active mining ceased on the property in the second quarter but residual leaching operations are expected to continue to the year 2000 (NM, 11/17/97; Kinross Gold Corp. press release, 2/5/98).

#### **Poinsettia district**

Camnor Resources Ltd. secured an option to acquire a 100% interest in the Poinsettia property from Hot Spring Gold Corp. (Camnor press release, 10/21/97).

#### **Rand district**

Pallaum Minerals reported drill results on its 700-acre claim Copper Mountain copper property, located on the northeast flank of Pilot Peak. Drilled reserves were reported to be more than 36 million pounds of copper in 2,985,000 short tons averaging 0.61% copper, plus a lower grade resource of 1,360,000 tons averaging 0.17% copper. The oxide copper ore is hosted by Permian siliceous sedimentary rocks (Pallaum Minerals press release, 5/23/97).

#### **Rawhide district**

Kennecott Exploration reported that exploration activities are proceeding in areas adjacent to the Denton-Rawhide Mine. Reserves at the mine stand at about 447,000 oz of gold and 3.9 million oz of silver to be produced over the next five years (Kennecott press release; Kinross Gold Corp. press release, 2/5/98; NM, 11/17/97).

Newhawk Gold Mines Ltd. has acquired the Winchester property, located about 9 miles from the Rawhide Mine. Newhawk obtained promising copper and gold assays from preliminary grab samples on the property and plans to begin a Phase 1 exploration program (Newhawk Gold Mines Ltd. press release, 8/20/97).

#### **Silver Star district**

Cimarron Minerals Inc. completed a small trenching program and an I.P. survey over the Maryann Basin and Mega anomaly portions of the Sunset Claim property, west of the town of Mina. Pallaum Minerals planned a program of reverse circulation drilling on these and other gold targets centered in and around the Maryann Basin. Earlier work in the district had outlined an estimated 60,000 oz of gold resource in several zones between old Sunset and Kernick Mines (Pallaum Minerals press release, 4/25/97).

Also west of Mina, Miranda Industries Inc. completed the first phase of drilling on its Gold Cross project. Geophysical and geochemical surveys conducted in 1996 identified four gold-mineralized targets on the property. Seven RC holes encountered no economic mineralization, but did cut thick intercepts of anomalous gold values in two of the target areas (Miranda Industries Inc. press release, 8/28/97).

### **NYE COUNTY**

#### **Barcelona district**

Royal Standard Metals Inc. completed a first round of geological mapping and trenching on its Antone Canyon

gold property in the Barcelona district. This work identified a second silicified high-grade gold-bearing structure subparallel to one identified by earlier drilling. An extensive diamond drilling program is planned to test for continuation of the structures to the southwest under thicker alluvial cover (DMR, 11/26/97, 12/3/97; Humboldt-Toiyabe National Forest Plan of Operation Notice, 12/2/97). Prochnau-Sutherland Co. filed a plan of operations with U.S. Forest Service for a drilling project on its Corcoran Canyon project, northeast of the central Barcelona district, (Humboldt-Toiyabe National Forest Plan of Operation Notice, 3/17/97).

#### **Bare Mountain district**

Inter-Rock Gold Inc. reported increased mineable reserves at the Daisy Mine, now standing at 17.3 million tons grading 0.024 opt gold. The revised figures incorporate both additional oxide ore outlined by drilling early in 1997, and sulfide gold mineralization now classifiable as reserves due to successful testing of the company's bio-oxidation program for sulfidic ore (DMR, 5/14/97, 6/25/97; NM, 7/14/97, 9/1/97). In the southern part of the district, underground mining operations were placed on standby at Cathedral Gold's Sterling Mine due to low levels of mineable ore reserves and the low gold price. Gold recovery operations and processing of stockpiled ore will, however, continue through 1998 (DMR, 4/16/97; Cathedral Gold press release, 4/9/98).

#### **Bullfrog district**

The main pit at the Bullfrog Mine and a satellite pit have been mined out, and limited reserves remain in a second satellite pit. With no new reserves added to the inventory, Barrick plans to close the mine in 1999 (NM, 9/15/97).

JABA Inc., of Tucson, Arizona announced plans for core drilling on its Providence claims, located adjacent to Barrick Bullfrog's Montgomery Shoshone pit. JABA also planned drilling on its Tram Ridge prospect, which lies along trend from Cordex's Secret Pass and Mother Lode deposits in the Bare Mountain district (JABA press release, 4/2/96).

#### **Cloverdale district**

Miranda Industries Inc. announced that anomalous gold and silver values were encountered in the first phase of drilling at its Secret Basin project, a volcanic-hosted, epithermal vein/stockwork prospect. Miranda found the results to be of sufficient interest to stake additional claims and now has 80 claims in the area (Miranda Industries Inc. press release, 11/11/97).

#### **Dobbin Summit district**

A 12-hole exploration project was planned by the Amain Corp. on its FJ project, located about 30 miles northeast of the town of Belmont (Humboldt-Toiyabe National Forest Plan of Operation Notice, 3/5/97).

#### **Eden district**

Dia Met Minerals Ltd. reported that drill permitting was approved for its Eden property. Exploration on the project is proceeding under an agreement between Dia Met and Goldtex Resources Ltd. (Goldtex Resources Ltd. press release, 8/13/97).

#### **Ellendale district**

Golconda Resources Ltd. planned a 25-hole drill program at the South and Central zones of its South Monitor project, located west of the Ellendale District. Previous drilling at the South zone outlined a geological resource of 14 million tons with an average grade of 0.026 opt gold and 0.12 opt silver containing about 375,000 oz of gold and 1.7 million oz of silver (DMR, 9/3/97).

In August, Dia Met Minerals Ltd. in a joint venture with Goldtex Resources commenced a drilling project on its Ellendale property (Goldtex Resources Ltd. press release, 8/13/97).

#### **Golden Arrow district**

Tombstone Explorations Co acquired the Golden Arrow project from Kennecott Explorations and commenced RC drilling late in the year. The property consists of 16 patented and 419 unpatented claims covering the Gold Coin, Confidence, and Hidden Hill deposits. Previous operators estimated a resource from two zones at Golden Arrow at 12.4 million tons at 0.039 opt gold. Drilling in 1997 focused on the Hidden Hill deposit and expanded its estimated geologic resource to 3.9 million tons containing 0.034 opt gold. (DMR, 6/4/97, 9/3/97, 9/17/97).

#### **Jefferson Canyon district**

Prochnau-Sutherland Co. planned to drill 9 holes at the Jefferson Canyon Project (Humboldt-Toiyabe National Forest Plan of Operation Notice, 3/17/97).

#### **Manhattan district**

In May 1997, Nevada Manhattan Mining Inc. delivered the first gold ore from the Nevada Manhattan property to New Concept Mining's nearby mill for processing, and by June 1, they had mined about 2,000 tons of underground and surface ore, averaging upwards of 0.10 opt gold. On the adjacent Gold Wedge property, drilling by New Concept Mining, Inc. discovered a large new high-grade gold zone. By the end of the year, Royal Gold, Inc. had announced a three-year exploration and lease purchase option agreement with New Concept Mining, Inc. and Nevada Manhattan Mining, Inc. on the Manhattan properties. The transaction with New Concept Mining (a subsidiary of American Technologies Group Inc.) gives Royal Gold the right to explore for gold mineralization on four separate parcels of land covered by 3 patented and 115 unpatented mining claims. The New Concept property contains proven and probable reserves of 1.7 million tons grading 0.13 opt gold, and a total resource of 5.3 million

tons at an average grade of 0.19 opt gold, mostly from underground sources. The transaction with Nevada Manhattan Mining gives Royal Gold the right to explore for surface mineralization on 28 patented and 65 unpatented mining claims while Nevada Manhattan continues exploration for underground targets. Nevada Manhattan will retain a 4% net smelter returns royalty and will continue underground development of its White Caps Mine (DMR, 3/5/97, 5/7/97; NM, 6/2/97; Royal Gold, Inc. press release, 12/17/97; Nevada Manhattan Mining Co. press release, 12/17/97).

### **Round Mountain district**

The Round Mountain Mine of Echo Bay Minerals and Homestake Mining Co. has adopted a new, optimized open-pit plan that will eliminate the mining of lower-grade, higher-cost sulfide material but will reduce the mine's current ore reserves by approximately 1.2 million oz of gold. This revision will result in a remaining projected mine life of 10 years. At year's end, reserves stood at 401,324,000 tons proven and probable ore grading 0.018 opt gold plus 142,224,000 tons mineralized material grading 0.016 opt gold. An infill drill program focused on developing additional reserves from pit material that is currently categorized as other mineralization. The North Feeder exploration program is testing a deep target to the north and several other exploration sites have been identified (DMR, 8/6/97, 9/3/97; Homestake press release, 2/19/98).

### **Rye Patch district**

Tombstone Explorations acquired the Midway property from Kennecott Explorations. Kennecott completed 132 reverse-circulation and four diamond drill holes on the property, identifying a preliminary resource of 270,000 oz of gold (DMR, 6/4/97).

## **PERSHING COUNTY**

### **Antelope Springs district**

Altair Gold Explorations Inc. acquired 100% interest in the Holly property, which includes the Hollywood Mine, mined for antimony in the 1950s. The property is a sediment-hosted disseminated gold prospect with two zones of surface ore-grade gold values and a strong gold-antimony mineralized structural zone (Altair Gold press release, 4/3/97).

### **Goldbanks district**

Falling gold prices prompted Kinross Goldbanks Mining Co. to delay startup of their Grass Valley Goldbanks Mine until the spring of 1999. Proven and probable mineable reserves in the Main Zone and the KW Zone of the property were 1,525,000 oz of gold with an additional 3,039,00 oz of gold resource. Drilling in 1997 on the west

flank of the Main Zone intercepted high-grade gold values; additional drilling was underway to determine the extent of the mineralized zone in this area (Lovelock Review Miner, 1/22/98; DMR, 4/30/97; Kinross Gold Corp. Third Quarter Report 1997, 11/6/97).

In the same district, Newhawk Gold Mines Ltd. reported the completion of the first phase of an exploration program on the Table Mountain prospect. A 6,000-foot reverse circulation drilling program was planned to test structural targets covered by soil-geochemical gold anomalies (DMR, 1/22/97).

Pallaum Minerals strengthened its land position on the LHS property located south of Winnemucca across Grass Valley from Kinross' Goldbanks deposit. Pallaum began a program of soil sampling, magnetic surveying, and geological mapping on the property to identify targets for a planned 5,000-foot drilling program. Rock geochemistry indicates that gold mineralization is related to a series of north-northeast-trending faults cutting hydrothermally altered siliciclastic sediments (Pallaum press release, 3/7/97).

High Desert Mineral Resources Inc., together with partner Barrick, is exploring the Wildhorse, Rye, RRT property, which includes 301 lode claims located 10 miles south of the Kinross Goldbanks property. Geologic mapping and geochemical analysis data were completed to define drill targets (Elko Daily Free Press, 11/22/97).

### **Imlay district**

Development and exploration drilling in 1997 in the Radio Tower East, Jasperoid Hill, Cone, and Headwaters areas of the Florida Canyon property added reserves and additional mineralized material to the property's resource estimates. Florida Canyon has proven and probable reserves of 45.5 million tons grading 0.024 opt gold along with 122.8 million tons mineralized material grading 0.022 opt gold (DMR, 9/3/97).

### **Jersey district**

Altair Gold Inc., together with joint venture partner Brancote U.S. Inc., has the option of earning a 75% interest in the Jersey prospect, located southwest of the McCoy/Cove Mine, near the Lander County line. Anomalous gold values occur in a jasperoid breccia at the range front that extends under shallow gravel cover to the west (Altair Gold press release, 2/3/97).

### **Kennedy district**

Oro Nevada Resources Inc. completed the first phase of its drilling program on the Kennedy property. Precious metal mineralization was found to be more widely disseminated than previously indicated by surface sampling and mapping, and the company does not plan any further drilling at this time (DMR, 10/22/97, 11/5/97, 1/21/98).

## **Mount Tobin district**

In the southern Tobin Range, Dia Met Minerals Ltd. completed reverse circulation drilling on the Mt. Tobin property, co-owned with Goldtux Resources Ltd. (Goldtux Resources Ltd. press release, 8/13/97).

## **Rochester district**

The Coeur Rochester Mine produced a record total of 6,701,283 oz of silver and 90,351 oz of gold in 1997. Mine reserves are 74,216,000 oz of silver and 603,000 oz of gold (Coeur d'Alene Mines Corp. 1997 annual report).

## **Rosebud district**

The Rosebud Mine began producing gold in April 1997. The deposit currently contains a total reserve of nearly 500,000 oz of gold and about 3.4 million oz of silver. The underground mine project is a 50-50 joint venture between Hecla Mining Co. and Newmont Gold Corp. Ore is transported to Newmont's Twin Creeks mill for processing. Once full production is reached, the mine is expected to yield about 100,000 oz of gold annually. The core Rosebud deposit is still open to the north and at depth; and a surface and underground exploration drilling program is planned to expand reserves (Hecla Mining Co. press release, 4/23/97, 2/5/98; DMR, 4/30/97; Lovelock Review Miner, 5/27/97; DMR, 9/3/97).

## **Willard district**

In the Willard district, northeast of Lovelock, Easton Minerals elected to proceed with the second year of an exploration agreement on the Colorado gold-silver property after obtaining encouraging results from the first phase of drilling. Previous work on the project by owner Santa Fe Pacific Gold Corp. indicated an oxide gold resource of 15 million tons grading 0.022 opt (DMR, 2/19/97, 4/23/97).

## **STOREY COUNTY**

### **Comstock district**

BMR Gold Corp. completed a drill program at its 100% owned Comstock Mine in the southern part of the district. The program was designed to expand the Billy The Kid orebody to the east and test continuity of mineralization between the defined orebody and the old Hartford pit to the north-northwest. Seven of 12 reverse-circulation holes intersected ore grade intercepts that will add to proven and probable resources. At present, the Comstock Mine contains 84,701 proven and probable equivalent oz of gold (BMR Gold Corp. press releases, 7/16/97, 2/4/98).

## **WASHOE COUNTY**

### **Deephole district**

Canyon Resources Corp. sold its Mountain View property near Gerlach for \$3 million to Mountain View Gold, Inc. The Mountain View property contains a resource of 19.5 million tons of 0.027 opt gold lying beneath 100 to 600 feet of gravel to the west of the Granite Mountains. Canyon and Homestake Mining Co. drilled a total of 186 holes while evaluating the Mountain View discovery and searching for other mineralized areas on the property (DMR, 7/23/97).

### **Leadville district**

RoyalEdge Resources Inc. completed a 10-hole drilling program on its Hog Ranch property, a joint venture with Cameco U.S. Inc. Two small gold resources identified on the property by the previous operator contain approximately 76,600 oz of gold. The company considers the potential for discovery of additional gold resources on the property to be high (DMR, 11/26/97).

### **Olinghouse district**

Alta Gold Co. increased its land position adjacent to its Olinghouse Mine more than 50% by staking 140 additional mining claims in an area that previously had been withdrawn by the federal government. Geochemical work on the new holdings defined 10 drill targets, two of which are defined by large soil geochemical anomalies. In September, the BLM issued a Draft Environmental Impact Statement (DEIS) for the company's proposed plan of operations for the Olinghouse Mine, with a final EIS expected in early 1998. Alta announced that as soon as the BLM Record of Decision is issued, site development, construction, and mining will begin, with gold production at a rate of at least 100,000 oz per year over a period of at least 5 years. The Olinghouse deposit contains more than 662,000 oz of mineable gold reserves (Alta Gold Co. press release, 9/9/97; DMR, 5/14/97, 9/10/97; Elko Daily Free Press, 5/3/97; 12/27/97).

## **WHITE PINE COUNTY**

### **Bald Mountain district**

Placer Dome, Inc. reported end-of-the-year proven and probable reserves at the Bald Mountain Mine as 921,000 oz of gold, with an additional resource of "other mineralized material" containing 817,000 oz. Estimated remaining mine life is 7.5 years (Placer Dome press release, 2/18/98).

**Osceola district**

Alta Gold has an agreement with Osceola Gold Mining Co. to develop gold properties covering 1,800 acres in the Osceola district in the Snake Range. Initial drilling by Alta is concentrated on the area surrounding the old Gilded Age Mine (DMR, 4/2/97).

**Robinson district**

BHP Copper's Robinson Mine, in the Robinson district near Ely, completed its first full year of production in 1997 with an output of 138 million pounds of copper, 71,000 oz of gold, and 314,000 oz of silver. The property has 287 million tons of mineable reserves and a projected mine life of 17 years (DMR, 7/30/97; ME, 12/97).

**White Pine district**

Alta Gold Co. received final permitting for its Griffon Mine. Site development began in July 1997 followed by the commencement of mining in September from two shallow

orebodies. The first gold was poured in early January 1998. Alta's 1997 exploration program expanded Griffon's proven and probable gold reserves by more than 40% to nearly 100,000 oz of gold, thus extending Griffon's expected mine life by at least one year. Alta expects 1998 production from Griffon to be approximately 40,000 oz of gold (Elko Daily Free Press, 5/10/97; DMR, 6/4/97, 7/23/97; Alta Gold Co. press release, 1/14/98).

Also in the White Pine district, Rea Gold ceased mining the Seligman deposit at its Mt. Hamilton Mine in mid year with a total production of 12,500 oz of gold and 36,000 oz of silver. These figures are revised from earlier figures reported in NBMG Special Publication P-9. Also in 1997, Rea began a 30-hole, 13,000-foot in-fill drilling program on the Centennial orebody, which currently hosts 7.72 million tons grading 0.035 opt gold. Drilling was designed to verify geological structure, gold grades, and metallurgical recovery rates of the deposit (DMR, 2/26/97; NM, 6/2/97).

# Major Precious-Metal Deposits

by Joseph V. Tingley and Harold F. Bonham, Jr.

The information in this compilation was obtained from the Nevada Division of Minerals and from published reports, articles in mining newsletters, and company annual reports and press releases. Locations of most of these deposits are shown on NBMG Map 91, and most active mines are shown on page 2 of this publication. opt = troy ounces per short ton.

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>CHURCHILL COUNTY</b>				
<b>Bell Mountain (Bell Mountain district)</b>	1989: reserves—30,000 oz Au, 125,000 oz Ag 1997: 2.5 million tons, 0.059 opt Au equiv. oz	1997: exploration	rhyolitic tuff	Miocene
<b>Buffalo Valley gold property (Eastgate district)</b>	1996: 96,000 oz Au			
<b>Dixie Comstock (Dixie Valley district)</b>	1991: 2.4 million tons, 0.049 opt Au 1995: 100,000 oz Au	1989: development 1990–93: exploration	Tertiary rhyolite	Miocene?
<b>Fondaway Canyon (Shady Run district)</b>	1988: 400,000 tons, 0.06 opt Au 1990: 400,000 tons, 0.06 opt Au	1989: 1,065 oz Au, 87 oz Ag 1990: 12,000 oz Au 1993: idle	Triassic slate and phyllite	Cretaceous
<b>New Pass property (New Pass district)</b>	1994: 3.4 million tons, 0.042 opt Au 1997: 3.1 million tons, 0.055 opt Au		Permian greenstone	Mesozoic?

## CLARK COUNTY

<b>Crescent property (Crescent district)</b>	1992: 390,000 tons, 0.05 opt Au; 3.3 million tons, 0.022 opt Au			
<b>Keystone (Goodsprings district)</b>	1990: <i>estimated geologic resource</i> 64 million tons, 0.05 opt Au 1992: 110,000 tons, 0.11 opt Au	1990: ~1,000 oz Au 1993: idle	lower Paleozoic carbonate rocks	Triassic

## ELKO COUNTY

<b>Big Springs (Independence Mountains district)</b>	1989: 1.55 million tons, 0.172 opt Au	1987–88: ~106,000 oz Au 1989–92: 274,000 oz Au, 48,000 oz Ag 1993: 52,752 oz Au 1994: 28,315 oz Au, 2,597 oz Ag 1995: 1,780 oz Au, 280 oz Ag	Mississippian to Permian overlap assemblage clastic and carbonate rocks	Cretaceous or Tertiary
<b>Bootstrap/Capstone (Bootstrap district)</b>	1989: <i>geologic resource</i> —25.1 million tons, 0.039 opt Au 1990: 18.3 million tons, 0.044 opt Au 1994: 169,000 oz Au, <i>geologic resource</i> — 1 million oz Au	1988–90: see "Newmont Gold Production" on page 41	dacitic dikes, Paleozoic siltstone and laminated limestone/chert	~37 Ma
<b>Bootstrap/Capstone/ Tara (Bootstrap district)</b>	1996: 20.2 million tons, 0.046 opt Au proven and probable reserves; 1 million tons, 0.086 opt Au mineralized material	1996: 19,800 oz Au		
<b>Cobb Creek (Mountain City district)</b>	1988: <i>geologic resource</i> —3.2 million tons, 0.045 opt Au			
<b>Cord Ranch (Robinson Mountain district)</b>	1991: 3.5 million tons, 0.037 opt Au 1992: 6.0 million tons, 0.03 opt Au 1994: 350,000 oz Au in 3 deposits			

continued

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>ELKO COUNTY (continued)</b>				
<b>Dee</b> (Bootstrap district)	1990: 4.5 million tons, 0.059 opt Au 1992: 5.2 million tons, 0.049 opt Au 1994: <i>geologic resource</i> —958,000 oz Au 1995: 550,000 oz Au 1996: 579,000 oz Au 1997: 400,000 oz Au	1987–88: ~97,000 oz Au 1989–92: 135,000 oz Au, 142,000 oz Ag 1993: 25,860 oz Au 1994: 24,219 oz Au 1995: 45,000 oz Au 1996: 45,070 oz Au, 50,322 oz Ag 1997: 35,000 oz Au	Vinini Formation Devonian carbonates, dacitic dikes	Cretaceous or Tertiary
<b>Deep Star</b> (Lynn district)	1996: 1.4 million tons, 0.8765 opt Au proven and probable reserves	1995: 2,800 oz Au; 1996: 93,400 oz Au		
<b>Doby George</b> (Aura district)	1995: 3.7 million tons, 0.060 opt Au 1997: 250,000 oz Au			
<b>Gnome</b> (Carlin district)	1988: 2.7 million tons, 0.048 opt Au		Paleozoic sedimentary rocks	Cretaceous or early Tertiary
<b>Jerritt Canyon</b> (includes Saval Canyon and Burns Basin) (Independence Mountains district)	1989: 21.6 million tons, 0.143 opt Au mill ore; 6.5 million tons, 0.043 opt Au leachable 1990: new discovery south of current mine has a <i>geologic resource</i> of 3.2 million tons, 0.284 opt Au 1991: <i>geologic resource</i> —4.7 million oz Au 1997: 2.1 million tons, 0.269 opt Au	1981–90: ~2.6 million oz Au 1991–94: 1,380,000 oz Au, 25,000 oz Ag 1995: 328,000 oz Au 1996: 309,477 oz Au 1997: 312,015 oz Au	Hanson Creek and Roberts Mountains Formations	~40 Ma
<b>Ken Snyder Mine</b> (Gold Circle district)	1995: 13 million tons, 0.16 opt Au, 2.7 opt Ag, announced resource, proven Au reserve <500,000 oz 1996: 1.1 million tons, 1.324 opt Au, 14.95 opt Ag 1997: 2.17 million tons, 1.04 opt Au, 11.65 opt Ag		Tertiary volcanic rocks	15.3 Ma
<b>Kinsley Mountain</b> (Kinsley district)	1988: 2.1 million tons, 0.048 opt Au 1993: 2.6 million tons, 0.047 opt Au 1994: 3.5 million tons, 0.044 opt Au 1995: 3.5 million tons, 0.045 opt Au 1996: 3.4 million tons, 0.032 opt Au	1993: evaluation 1995: 44,040 oz Au, 8,050 oz Ag 1996: 44,553 oz Au, 10,930 oz Ag 1997: 38,472 oz Au, 5,472 oz Ag	upper Paleozoic carbonate rocks	Oligocene?
<b>Meikle</b> (Lynn district)	1992: <i>geologic resource</i> —7.9 million tons, 0.613 opt Au 1993: <i>geologic resource</i> —6.6 million oz Au 1996: 8.5 million tons, 0.716 opt Au proven and probable; 1.4 million tons, 0.717 opt Au mineralized material	1996: 78,442 oz Au 1997: 574,308 oz Au, 194,030 Ag	Popovich and Roberts Mountains Formations	Eocene
<b>Piñon (South Bullion and Dark Star)</b> (Robinson Mountain district)	1996: 38.3 million tons, 0.026 opt Au <i>geologic mineral inventory</i>			
<b>Pony Creek</b> (Carlin district)	1994: <i>geologic resource</i> —1.1 million tons, 0.057 opt Au			
<b>Railroad Property</b> (POD zone) (Railroad district)	1997: 1.5 million tons, 0.085 opt Au drill indicated resource			
<b>Rain Emigrant Springs</b> (Carlin district)	1989: 30.3 million tons, 0.021 opt Au 1995: 169,000 oz Au 1996: 16 million tons, 0.028 opt Au proven and probable reserves; 10.4 million tons, 0.021 opt Au mineralized material	1994: 79,000 oz Au 1995: 32,100 oz Au 1996: 48,900 oz Au	Webb Formation	36–37 Ma
<b>SMZ</b> (Carlin district)	1989: <i>geologic resource</i> —1.6 million tons, 0.019 opt Au			
<b>Trout Creek</b> (Carlin district)	1988: 1.5 million tons, 0.04 opt Au	1988: exploration	lower Paleozoic rocks	Cretaceous or Tertiary
<b>Tuscarora</b> (Dexter) (Tuscarora district)	1987: 2 million tons, 0.039 opt Au, 1.9 opt Ag 1988: 1.8 million tons, 0.037 opt Au, 0.74 opt Ag	1896–1902: 29,940 oz Au, 28,543 oz Ag 1987–89: 33,000 oz Au, 143,000 oz Ag 1990: 1,163 oz Au, 41,865 oz Ag 1992–93: idle	Eocene rhyolitic ignimbrite and andesite	39 Ma

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>ELKO COUNTY (continued)</b>				
<b>Winters Creek (Independence Mountains district)</b>	1986: 1.4 million tons, 0.146 opt Au		lower Paleozoic carbonate rocks	Cretaceous or Tertiary
<b>Wright Window (Independence Mountains district)</b>	1986: 1.3 million tons, 0.095 opt Au	1992: 3,500 oz Au	lower Paleozoic carbonate rocks	Cretaceous or Tertiary
<b>ESMERALDA COUNTY</b>				
<b>Boss (Gilbert district)</b>	1987: 500,000 tons, 0.07 opt Au 1990: <i>reserves</i> —637,500 tons, 0.023 opt Au <i>geologic resource</i> —31,000 oz Au 1996: <i>see</i> Castle		Ordovician sedimentary rocks	Miocene?
<b>Castle (includes Boss) (Gilbert district)</b>	1996: 3.7 million tons, 0.03 opt Au		Palmetto Formation	
<b>Gemfield</b>	1996: 9.5 million tons, 0.04 opt Au		Oligocene Sandstorm Rhyolite	21 Ma?
<b>Goldfield Project (Goldfield district)</b>	1983: 1.75 million tons, 0.087 opt Au 1991: 1.2 million tons, 0.05 opt Au 1993: 2.3 million tons, 0.073 opt Au 1994: 3.48 million tons, 0.071 opt Au	1903–45: 4.19 million oz Au, 1.45 million oz Ag 1989: 1,987 oz Au, 200 oz Ag 1993: 11,350 oz Au 1995: 9,850 oz Au 1996: 3,810 oz Au, 1,349 oz Ag 1997: 1,376 oz Au, 435 oz Ag	andesite, rhyodacite, rhyolite	21 Ma
<b>Hasbrouck (Divide district)</b>	1986: 12.9 million tons, 0.0291 opt Au, 0.59 opt Ag	1986–92: exploration 1993: idle	Siebert Formation tuff and volcanoclastic rocks	16 Ma
<b>Hill of Gold deposit (Divide district)</b>	1988: 500,000 tons, 0.04 opt Au, 0.40 opt Ag 1995: <i>geologic resource</i> —100,000 oz Au, including reserves of 20,000 oz at 0.036 opt Au 1996: 1.6 million tons, 0.026 opt Au	1991–93: idle	Miocene silicic tuff	16 Ma
<b>Mary-Drinkwater (Silver Peak district)</b>	1991: 531,300 tons, 0.124 opt Au	1991: 25,000 oz Au, 8,000 oz Ag	Wyman Formation	Mesozoic?
<b>Mineral Ridge (Silver Peak district)</b>	1995: 5.2 million tons, 0.068 opt Au proven and probable reserves (includes Mary-Drinkwater)	1997: 13,793 oz Au, 7,907 oz Ag	Wyman Formation	Mesozoic?
<b>Tip Top (Fish Lake Valley district)</b>	1997: 109,000 tons, 0.103 opt Au, 0.88 opt Ag indicated resource	1997: exploration	Tertiary quartz latite	
<b>Three Hills (Tonopah district)</b>	1996: 3.2 million tons, 0.036 opt Au 1997: 6.3 million tons, 0.023 opt Au		Miocene Siebert Formation and Oddie Rhyolite	
<b>Weepah (Weepah district)</b>	1986: 200,000 tons, 0.1 opt Au, 0.4 opt Ag	1986–87: 58,000 oz Au 1988–90: idle	Wyman Formation	Cretaceous
<b>EUREKA COUNTY</b>				
<b>Afgan (Antelope district)</b>	1996: 80,000 oz Au drill indicated resource		Webb Formation	

*continued*

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>EUREKA COUNTY (continued)</b>				
<b>Betze, Post (Lynn district)</b>	1988: 128.4 million tons, 0.095 opt Au 1990: <i>geologic resource</i> —18.4 million oz Au 1992: 112.1 million tons, 0.180 opt Au, <i>geologic resource</i> —21 million oz Au 1993: <i>geologic resource</i> —29.1 million oz Au 1994: <i>reserves</i> —29.6 million oz Au 1995: 23 million oz Au 1996: 122.7 million tons, 0.192 opt Au proven and probable reserves: 55.8 million tons, 0.189 opt Au mineralized material	1980–88: 440,000 oz Au 1989: 207,264 oz Au, 15,500 oz Ag 1990: 352,880 oz Au, 20,112 oz Ag 1991: 546,146 oz Au, 22,000 oz Ag 1992: 1,108,218 oz Au, 34,735 oz Ag 1993: 1,439,929 oz Au 1994: 1,849,503 oz Au, 107,330 oz Ag 1995: 2,031,883 oz Au, 68,217 oz Ag 1996: 1,934,966 oz Au, 73,140 oz Ag 1997: 1,605,836 oz Au, 65,716 oz Ag	Ordovician to Devonian chert, shale, siltstone, and impure carbonates; in part, Vinini Formation	Cretaceous or early Tertiary
<b>Blue Star (Lynn district)</b>	1989: <i>geologic resource</i> —22.2 million tons, 0.030 opt Au	1974–84: intermittent 1988–97: <i>see</i> "Newmont Gold Production" on page 41	lower Paleozoic sandy siltstone and carbonate rocks, granodiorite	Cretaceous or early Tertiary
<b>Bobcat (Lynn district)</b>	1988: <i>geologic resource</i> —17.7 million tons, 0.029 opt Au		lower Paleozoic rocks	Cretaceous or Eocene
<b>Buckhorn/ Buckhorn South property (Buckhorn district)</b>	1990: 700,000 tons, 0.05 opt Au; <i>geologic resource</i> —200,350 oz Au 1991: 409,000 tons, 0.062 opt Au 1992: open-pit ore mined out 1993: <i>geologic resource</i> —1.1 million tons, 0.11 opt Au 1996: 2 million tons, 0.056 opt Au 1997: 24 million tons, 0.046 opt Au	1988–91: 97,922 oz Au, 376,487 oz Ag 1992: 7,700 oz Au, 28,800 oz Ag 1993: 3,800 oz Au, 4,600 oz Ag	basaltic andesite, sinter, silicified sedimentary rocks	14.6 Ma
<b>Bullion Monarch (Lynn district)</b>	1987: 1 million tons, 0.10 opt Au		lower Paleozoic sedimentary rocks	Tertiary or Mesozoic
<b>Carlin/Pete/ Lantern (Lynn district)</b>	1995: 14.8 million tons, 0.031 opt Au 1996: 13.7 million tons, 0.046 opt Au proven and probable reserves; 14.7 million tons, 0.046 opt Au mineralized material	1994: 27,700 oz Au 1995: 9,300 oz Au 1996: 31,700 oz Au	Roberts Mountains Formation	Cretaceous or early Tertiary
<b>Genesis (Lynn district)</b>	1989: <i>geologic resource</i> —35.8 million tons, 0.044 opt Au 1990: 32 million tons, 0.047 opt Au (includes Blue Star)	1986: production commenced 1988–93: <i>see</i> "Newmont Gold Production" on page 41	Ordovician-Devonian limestone, argillite chert	Cretaceous or early Tertiary
<b>Genesis/North Star/ Sold (Lynn district)</b>	1996: 22.7 million tons, 0.034 opt Au proven and probable reserves; 11 million tons, 0.050 opt Au mineralized material	1994: 417,200 oz Au 1995: 267,400 oz Au 1996: 245 oz Au	Ordovician-Devonian limestone, argillite chert	Cretaceous or early Tertiary
<b>Gold Bar (Antelope district)</b>	1988: 2.75 million tons, 0.10 opt Au 1989: <i>geologic resource</i> —1.45 million oz Au 1990: mined out in December 1994: 240,000 oz Au 1995: 190,000 oz Au	1987–88: 91,000 oz Au 1989: 66,000 oz Au 1990: 81,263 oz Au 1991: 80,727 oz Au, 3,000 oz Ag 1992: 80,000 oz Au 1993: 55,080 oz Au 1994: 20,000 oz Au	Devonian Nevada Formation	Eocene?
<b>Gold Canyon (Antelope district)</b>	1992: <i>reserves</i> —86,500 oz Au, <i>geologic resource</i> —131,000 oz Au 1993: 770,000 tons, 0.080 opt Au			
<b>Gold Pick (Antelope district)</b>	1988: 10 million tons, 0.06 opt Au 1990: 9.7 million tons, 0.057 opt Au includes Gold Ridge and Goldstone 1991: 4.5 million tons, 0.055 opt Au 1992: <i>geologic resource</i> —329,700 oz Au, includes eastern deposit 1993: 1.4 million tons, 0.079 opt Au		Paleozoic sedimentary rocks	Eocene?
<b>Gold Quarry (Maggie Creek district)</b>	1987: 197.8 million tons, 0.042 opt Au 1988: <i>geologic resource</i> —503 million tons, 0.04 opt Au 1990: 212.6 million tons, 0.042 opt Au, <i>geologic resource</i> —534.3 million tons, 0.037 opt Au 1991: <i>reserves</i> —9.3 million oz Au	1985 170,000 oz Au 1988–93: <i>see</i> "Newmont Gold Production" on page 41	Ordovician to Devonian chert, shale, siltstone, and impure carbonates; in part, Vinini Formation	Cretaceous or early Tertiary

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>EUREKA COUNTY (continued)</b>				
<b>Gold Quarry/Mac/Tusc (Maggie Creek district)</b>	1996: 174.8 million tons, 0.046 opt Au proven and probable reserves; 51.9 million tons, 0.058 opt Au mineralized material	1994: 967,700 oz Au; 1995: 1,094,000 oz Au; 1996: 916,300 oz Au		
<b>Gold Ridge (Antelope district)</b>	1988: 4 million tons, 0.06 opt Au 1990: <i>see</i> Gold Pick 1991: 2.9 million tons, 0.04 opt Au 1992: 1.4 million tons, 0.038 opt Au 1993: 426,000 tons, 0.059 opt Au		Paleozoic sedimentary rocks	Eocene?
<b>Goldstone (Antelope district)</b>	1988: 1.7 million tons, 0.08 opt Au 1990: <i>see</i> Gold Pick 1991: 845,000 tons, 0.063 opt Au 1992: 878,000 tons, 0.061 opt Au 1993: 130,928 tons, 0.104 opt Au		Paleozoic sedimentary rocks	Eocene?
<b>Horse Canyon (Cortez district)</b>	1984: 3.94 million tons, 0.055 opt Au 1988: included in Cortez Joint Venture figures	1984: 40,000 oz Au 1988–93: included with Cortez Joint Venture	Vinini Formation, Wenban Limestone	34 Ma?
<b>Maggie Creek (Maggie Creek district)</b>	1988: <i>geologic resource</i> —303,000 tons, 0.092 opt Au	1984: 1,250,000 tons 1986: intermittent production 1988: no production reported	Ordovician to Devonian siltstone, chert, sandstone, impure limestone	Cretaceous or early Tertiary
<b>North Star (Lynn district)</b>	1989: <i>geologic resource</i> —6.9 million tons, 0.052 opt Au 1990: 3.9 million tons, 0.052 opt Au	1988: 4,250 oz Au	lower Paleozoic sedimentary rocks	Cretaceous or early Tertiary
<b>Post/Goldbug (Lynn district)</b>	1996: 25.6 million tons, 0.190 opt Au proven and probable reserves; 43.6 million tons, 0.079 opt Au mineralized material			
<b>Ratto Canyon (Eureka district)</b>	1984: ~200,000 oz Au	1995: idle	Dunderberg Shale, Hamburg Dolomite	Oligocene
<b>Rock Creek (Eureka-Lander Co. line)</b>	1997: 800,000 tons, 0.045 opt Au	1997: exploration	Tertiary latite tuff	
<b>Ruby Hill (Eureka district)</b>	1994: <i>geologic resource</i> —20 million tons, 0.08 opt Au 1995: 7.62 million tons, 0.099 opt Au 1997: 7.028 million tons, 0.098 opt Au proven and probable, plus 7.173 million tons, 0.073 opt Au mineralized material	1997: 16,600 oz Au, 250 oz Ag	Goodwin Limestone	Cretaceous?
<b>Tonkin Springs (Antelope district)</b>	1987: <i>oxide</i> —1.5 million tons, 0.05 opt Au; <i>sulfide</i> —2.5 million tons, 0.09 opt Au 1991: 9 million tons, 0.05 opt Au 1995: <i>proven and probable reserves</i> —956,000 oz Au 1996: 9.8 million tons, 0.056 opt Au	1987: ~9,700 oz Au 1988: 565 oz Au 1989: 1,753 oz Au, 1,402 oz Ag 1990: 2,068 oz Au, 470 oz Ag 1992: idle, exploration, metallurgical testing	Vinini Formation, dacitic dikes	Oligocene?
<b>Turf (Lynn district)</b>	1996: 2.5 million tons, 0.367 opt Au mineralized material			
<b>Tusc (Maggie Creek district)</b>	1988: <i>geologic resource</i> —15.8 million tons, 0.059 opt Au 1990: 13.3 million tons, 0.062 opt Au	1995: in production	lower Paleozoic sedimentary rocks	Cretaceous or early Tertiary
<b>West Leeville (Newmont) (Lynn district)</b>	1996: 2 million tons, 0.377 opt Au proven and probable reserves; 581,000 tons 0.354 opt Au mineralized material	1995: 99,800 oz Au 1996: 173,000 oz Au		
<b>West Leeville (Newmont-Barrick) (Lynn district)</b>	1996: 7.1 million tons, 0.425 opt Au proven and probable reserves; 500,000 tons 0.328 opt Au mineralized material			
<b>Zeke (Buckhorn district)</b>	1989: 2 million tons, 0.056 opt Au, 0.224 opt Ag			

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>HUMBOLDT COUNTY</b>				
<b>Adelaide Crown (Gold Run district)</b>	1989: <i>south pit</i> —585,000 tons, 1.313 opt Ag, 0.043 opt Au; <i>additional area</i> - 165,000 tons, 0.015 opt Au, 1.10 opt Ag	1990: 3,068 oz Au, 37,537 oz Ag 1991: 1,849 oz Au, 15,937 oz Ag 1992: idle	Preble Formation	Tertiary
<b>Ashdown (Vicksburg district)</b>	1988: 1 million tons, 0.11 opt Au 1992: 1.1 million tons, 0.12 opt Au		Mesozoic granite	Mesozoic
<b>Buckskin (National district)</b>	1997: 50,221 oz Au, 466,243 oz Ag estimated resource		Miocene rhyolite flows and flow breccias	15 Ma
<b>Chimney Creek (Potosi district)</b>	1988: <i>proven, probable</i> —26.9 million tons, 0.068 opt Au; <i>inferred in south pit</i> —2.1 million oz Au 1989: <i>geologic resource</i> —4.6 million oz Au 1993: <i>see</i> Twin Creeks	1987–88: 300,000 oz Au 1989: 222,556 oz Au, 55,953 oz Ag 1990: 220,000 oz Au 1991: 228,065 oz Au, 100,000 oz Ag 1992: 247,969 oz Au, 113,463 oz Ag 1993: <i>see</i> Twin Creeks	upper Paleozoic sedimentary rocks	41.9 Ma
<b>Getchell (Potosi district)</b>	1989: 8.1 million tons, 0.154 opt Au mill grade and 1.43 million tons, 0.049 opt Au heap-leach ore; <i>additional geologic resource</i> - 5.7 million tons, 0.092 opt Au sulfide and 2.6 million tons, 0.055 opt Au oxide 1991: 6.5 million tons, 0.192 opt Au sulfide and 1.8 million tons, 0.039 opt Au oxide. 1992: <i>sulfide</i> —7.0 million tons, 0.194 opt Au; <i>oxide</i> —2.5 million tons, 0.031 opt Au 1993: <i>geologic resource</i> —1.3 million oz Au 1994: <i>reserves</i> —1.59 million oz Au 1995: <i>resource</i> —6.2 million tons, 0.354 opt Au, <i>reserves</i> —1.25 million oz Au (Turquoise Ridge only) 1996: 15 million tons, 0.304 opt Au (underground and surface, includes Turquoise Ridge) 1997: 6.2 million oz Au, proven and probable reserves	1938–50, 1962-67: 788,875 oz Au 1987–88: ~35,000 oz Au 1989: 120,730 oz Au, 9,407 oz Ag 1990: 172,029 oz Au 1991: 200,958 oz Au 1992: 230,600 oz Au, 78,700 oz Ag 1993: 210,000 oz Au, 51,000 oz Ag 1994: 230,000 oz Au, 57,000 oz Ag 1995: 120,000 oz Au, 72,000 oz Ag 1996: 171,286 oz Au 1997: 177,231 oz Au	Comus and Preble Formations, granodiorite dikes, granodiorite	90 Ma?
<b>Hycroft (formerly Crofoot/Lewis) (Sulphur district)</b>	1988: 25 million tons, 0.025 opt Au 1990: 12 million tons, 0.020 opt Au 1991: 13.9 million tons, 0.019 opt Au 1992: 29.8 million tons, 0.024 opt Au, <i>geologic resource</i> —45 million tons, 0.021 opt Au 1993: 29.8 million tons, 0.024 opt Au 1994: <i>geologic resource</i> —56.7 million tons, 0.018 opt Au 1994: <i>geologic resource</i> —58.1 million tons, 0.019 opt Au 1995: 66.5 million tons, 0.019 opt Au 1997: 25.2 million tons, 0.02 opt Au, estimated proven and probable	1988: 75,800 oz Au 1989: 82,000 oz Au, 123,000 oz Ag 1990: 92,000 oz Au, 110,000 oz Ag 1991: 94,340 oz Au, 151,553 oz Ag 1992: 100,000 oz Au, 280,000 oz Ag 1993: 86,516 oz Au, 310,559 oz Ag 1994: 94,500 oz Au, 297,000 oz Ag 1995: 101,128 oz Au, 417,823 oz Ag 1996: 89,381 oz Au, 321,315 oz Ag 1997: 117,379 oz Au, 479,920 oz Ag	Camel conglomerate, rhyolite dikes	1–2 Ma
<b>Lone Tree (Buffalo Mountain district)</b>	1990: 5.4 million tons oxide mill ore, 0.159 opt Au, 5.7 million tons heap-leach ore, 0.025 opt Au and 1.2 million oz Au in sulfide ore 1991: <i>reserves</i> —1 million oz Au 1992: 3.14 million oz Au 1993: 3.8 million oz Au 1994: 4 million oz Au	1991: 36,424 oz Au 1992: 128,000 oz Au 1993: 155,000 oz Au 1994: 226,911 oz Au 1995: 240,000 oz Au, 11,000 oz Ag 1996: 205,738 oz Au 1997: 331,082 oz Au	Havallah Formation and dacite porphyry	38 Ma
<b>Marigold (Battle Mountain district)</b>	1990: 4.3 million tons, 0.105 opt Au mill ore, 7.6 million tons, 0.026 opt Au heap-leach ore 1992: 10 million tons, 0.055 opt Au 1996: 648,000 oz Au	1989: 16,000 oz Au, 484 oz Ag 1990: 60,750 oz Au, 1,600 oz Ag 1991: 65,469 oz Au, 2,000 oz Ag 1992: 90,000 oz Au, 4,000 oz Ag 1993: 90,000 oz Au, 1,700 oz Ag 1994: 84,895 oz Au 1995: 59,800 oz Au 1996: 73,500 oz Au 1997: 73,640 oz Au	Paleozoic chert, argillite, and carbonate rocks	early Oligocene
<b>North Stonehouse (Buffalo Mountain district)</b>	1991: 2.5 million tons, 0.103 oz Au mill ore		Havallah Formation and porphyry dikes	39 Ma

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>HUMBOLDT COUNTY (continued)</b>				
<b>Pinson (includes Mag pit) (Potosi district)</b>	1989: 480,000 oz Au 1992: 4.98 million tons, 0.064 opt Au 1996: 2.6 million tons, 0.072 opt Au	1980: 56,000 oz Au 1986–88: 189,864 oz Au 1989: 72,489 oz Au (includes Preble) 1990: 56,382 oz Au 1991: 55,640 oz Au 1992: 50,340 oz Au, 5,730 oz Ag 1993: 50,870 oz Au, 3,470 oz Ag 1994: 44,000 oz Au, 3,500 oz Ag 1995: 44,854 oz Au 1996: 42,431 oz Au, 2,850 oz Ag 1997: 51,600 oz Au, 4,500 oz Ag	Comus Formation	90 Ma?
<b>Preble (Potosi district)</b>	1989: 15,110 oz Au 1992: idle, mined out	1985: 17,000 oz Au 1987: 28,000 oz Au 1988: 18,828 oz Au 1989: included with Pinson 1990: 1,161 oz Au	Preble Formation	90 Ma?
<b>Rabbit Creek (Potosi district)</b>	1989: 4.1 million oz Au; additional geologic resource—1 million Au in refractory material 1990: reserves—2.5 million oz Au; geologic resource—5.1 million oz Au 1992: reserves—3.26 million oz Au 1993: see Twin Creeks	1990: 25,000 oz Au 1991: 115,500 oz Au 1992: 156,000 oz Au 1993: see Twin Creeks	Ordovician	Eocene?
<b>Sleeper (Awakening district)</b>	1989: 1,975,000 oz Au 1990: 44.1 million tons, 0.038 opt Au, 0.152 opt Ag 1991: 1.7 million oz Au, 6.7 million oz Ag 1993: 751,000 oz Au 1997: 2.27 million oz Au measured, indicated, inferred geologic resource	1986: 128,000 oz Au, 94,000 oz Ag 1987: 158,696 oz Au 1988: 230,410 oz Au 1989: 256,000 oz Au, 339,650 oz Ag 1990: 250,131 oz Au, 391,886 oz Ag 1991: 183,346 oz Au, 289,463 oz Ag 1992: 132,383 oz Au, 285,011 oz Ag 1993: 100,020 oz Au, 254,690 oz Ag 1994: 106,912 oz Au, 142,597 oz Ag 1995: 82,062 oz Au, 98,694 oz Ag 1996: 38,200 oz Au, 36,800 oz Ag 1997: exploration	Miocene "latite" flows and dikes, silicic ash-flow tuff, Triassic slate and phyllite	16.1 Ma
<b>Trenton Canyon (Buffalo Valley district)</b>	1994: oxide resource—14.6 million tons, 0.035 opt Au, (517,000 oz Au) 1996: 20 million tons, 0.029 opt Au (590,000 oz Au)		Vinini Formation	
<b>Trout Creek (Battle Mountain district)</b>	1989: 50,000 oz Au			
<b>Twin Creeks (Chimney and Rabbit Creeks) (Potosi district)</b>	1993: 5.7 million oz Au 1994: geologic resource—8.5 million oz Au 1996: 10.5 million oz Au	1993: 482,600 oz Au, 206,200 oz Ag 1994: 501,897 oz Au, 244,710 oz Ag 1995: 451,285 oz Au, 265,462 oz Ag 1996: 459,083 oz Au, 137,914 oz Ag 1997: 572,150 oz Au, 210,493 oz Ag	Paleozoic	Eocene?
<b>LANDER COUNTY</b>				
<b>Austin Gold Venture (Birch Creek district)</b>	1989: mined out	1986–88: 141,000 oz Au 1989: 50,000 oz Au	Antelope Valley Limestone	Cretaceous or Tertiary
<b>Battle Mountain Complex (Battle Mountain district)</b>	1992: 500,000 oz Au 1993: geologic resource—900,000 oz Au 1995: resource (overall Battle Mountain complex)—60.2 million tons, 0.036 opt Au, including reserves—46.6 million tons, 0.040 opt Au 1996: 52.9 million tons, 0.038 opt Au	1994: 12,000 oz Au, 15,000 oz Ag 1995: 74,958 oz Au, 206,807 oz Ag 1996: 73,100 oz Au, 201,460 oz Ag 1997: 77,896 oz Au, 129,147 oz Ag		Eocene
<b>Buffalo Valley Gold Project (Buffalo Valley district)</b>	1988: 1.5 million tons, 0.05 opt Au 1991: idle 1994: 4.8 million tons, 0.07 opt Au 1995: 511,000 oz Au 1996: 301,000 oz Au 1997: 600,106 oz Au resource; 100,797 oz Au, other mineralized material	1988: 9,238 oz Au 1989: 14,660 oz Au 1990: 15,770 oz Au 1997: exploration		Eocene?

continued

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>LANDER COUNTY (continued)</b>				
<b>Cortez Joint Venture (Bullion district)</b> CJV includes original Cortez Mine, Pipeline, and South Pipeline	1987: 4.8 million tons, 0.105 opt Au 1988: 5.4 million tons, 0.093 opt Au 1992: <i>reserves</i> —3.1 million tons, 0.05 opt Au, 0.4 opt Ag 1997: 107.7 million tons, 0.089 opt Au proven and probable; 156.5 million tons, 0.046 opt Au mineralized material	1942–84: 2.4 million tons, 0.13 oz Au/ton; 2 million tons, 0.041 opt Au leached. Little Gold Acres: 800,000 tons, 0.124 opt Au 1988: 42,322 oz Au (includes Horse Canyon) 1989: 39,993 oz Au, 12,234 oz Ag (includes Horse Canyon) 1990: 53,945 oz Au, 10,150 oz Ag 1991: 53,500 oz Au, 6,600 oz Ag 1992: 75,000 oz Au 1993: 66,850 oz Au 1996: 160,782 oz Au, 6,800 oz Ag 1997: 406,551 oz Au, 10,868 oz Ag	Roberts Mountains Formation, Wenban Limestone, Valmy Formation, quartz porphyry dikes	92.8–94 Ma and 36 Ma
<b>Crescent Pit (Bullion district)</b>	1994: 1.97 million tons mill grade, 0.125 opt Au, 2.2 million tons heap-leach, 0.029 opt Au 1997: included in Cortez Joint Venture			
<b>Crescent Valley (Bullion district)</b>	1994: <i>placer reserve</i> —8 million cu yd, 0.031 oz Au/cu yd 1995: <i>placer resource</i> —6 million cu yd, 0.03 oz Au/cu yd			
<b>Dean (Lewis district)</b>	1995: <i>proven reserve</i> —11,000 oz Au <i>possible to probable resource</i> —240,000 oz Au			
<b>Elder Creek Project/Shoshone (Lewis district)</b>	1989: 91,500 oz Au 1990: 1.5 million tons, 0.041 opt Au	1990: 17,400 oz Au 1991: 2,702 oz Au	Valmy Formation	Cretaceous or Eocene
<b>Fire Creek (northeast of Bullion district)</b>	1982: 350,000 tons, 0.06 opt Au	1983–84: 767 oz Au	basaltic andesite	Miocene
<b>Fortitude Extension (Battle Mountain district)</b>	1992: 500,000 oz Au 1993: <i>geologic resource</i> —900,000 oz Au 1996: <i>see</i> Battle Mountain Complex			
<b>Hilltop (Hilltop district)</b>	1984: 10.5 million tons, 0.073 opt Au 1989: 10 million tons, 0.049 opt Au		Valmy Formation	Oligocene?
<b>Klondike property</b>	1989: 100,000 oz Au equivalent			
<b>McCoy/Cove (McCoy district)</b>	1989: <i>proven and probable reserves</i> - 2.9 million oz Au, 128 million oz Ag <i>geologic resource</i> —3.5 million oz Au, 1.50 million oz Ag 1990: <i>reserves</i> —58.7 million tons, 0.045 opt Au, 2.32 opt Ag 1993: <i>reserves</i> —63.3 million tons, 0.037 opt Au, 1.66 opt Ag, <i>geologic resource</i> —2.43 million oz Au, 107 million oz Ag	1986: 50,000 oz Au 1987: 200,000 oz Au, 5 million oz Ag 1988: 100,000 oz Au, 700,000 oz Ag 1989: 214,566 oz Au, 2.26 million oz Ag 1990: 255,044 oz Au, 1.98 million oz Ag 1991: 284,327 oz Au, 5.62 million oz Ag 1992: 301,512 oz Au, 7.92 million oz Ag 1993: 395,610 oz Au, 12.45 million oz Ag 1994: 359,360 oz Au, 10.44 million oz Ag 1995: 310,016 oz Au, 11.91 million oz Ag 1996: 271,731 oz Au, 7.10 million oz Ag 1997: 187,000 oz Au, 11.00 million oz Ag	Panther Canyon Formation (conglomerate, sandstone), Augusta Mountain Formation (limestone), granodiorite	39.5 Ma
<b>Mud Springs (Bald Mtn. Zone) (Bullion district)</b>	1993: <i>geologic resource</i> —42,000 oz Au			
<b>Mule Canyon (Argenta district)</b>	1992: 8.5 million tons, 0.136 opt Au 1995: <i>reserves</i> —oxide 4.222 million tons, 0.058 opt Au; sulfide 5.780 million tons, 0.145 opt Au 1996: 9 million tons, 0.112 opt Au	1992: exploration 1996: 6,743 oz Au	basalt and basaltic andesite	15–16 Ma

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>LANDER COUNTY (continued)</b>				
<b>Pipeline (Bullion district)</b>	1991: <i>geologic resource</i> —11.3 million tons, 0.237 opt Au 1993: 35.3 million tons, 0.120 opt Au 1994: <i>reserves</i> —21.2 million tons, 0.145 oz Au/ton; <i>plus other resources</i> —8.3 million tons, 0.035 opt Au 1995: 4.3 million oz Au 1996: 136.7 million tons, 8.7 million oz Au measured resource, includes South Pipeline 1997: included in Cortez Joint Venture		Roberts Mountains Formation	Cretaceous or early Tertiary
<b>Robertson (Bullion district)</b>	1988: 11 million tons, 0.04 opt Au 1993: <i>geologic resource</i> —20 million tons, 0.036 opt Au 1996: <i>geologic resource</i> —1 million oz Au	1989: 3,700 oz Au	Valmy Formation	early Oligocene
<b>Slaven Canyon property (Bateman Canyon district)</b>	1994: 50,000 oz Au			
<b>South Pipeline (Bullion district)</b>	1992: 9 million tons, 0.082 opt Au 1993: <i>geologic resource</i> —31.4 million tons, 0.106 opt Au 1994: <i>geologic resource</i> —76.5 million tons, 0.048 opt Au 1996: <i>see</i> Pipeline 1997: included in Cortez Joint Venture	1995: 111,215 oz Au, 6,804 oz Ag	Roberts Mountains Formation	Cretaceous or early Tertiary
<b>Surprise (Battle Mountain district)</b>	1987: 225,000 oz Au 1988-91: production and reserve included in Fortitude figures 1994: mined out	1987: 2,000 oz Au	skarn	37 Ma
<b>Toiyabe</b>	1988: 813,400 tons, 0.066 opt Au	1988: 32,000 oz Au, 10,300 oz Ag 1990: 11,700 oz Au, 9,100 oz Ag 1991: 8,780 oz Au, 6,025 oz Ag	lower Paleozoic calcareous siltstone	Eocene?
<b>Victorine (Kingston district)</b>	1992: 915,000 tons, 0.304 opt Au 1995: <i>proven and probable reserves</i> —256,000 tons, 0.36 opt Au, plus <i>additional geologic resource</i> —31,160 oz Au			
<b>LINCOLN COUNTY</b>				
<b>Atlanta gold property (Atlanta district)</b>	1980: 1.1 million tons, 0.08 opt Au, 1.6 opt Ag 1996: 300,000 oz Au, 3 million oz Ag	1980: 88,000 oz Au, 1,710,000 oz Ag 1987-89: idle 1990-93: idle	Pogonip Group, Ely Springs and Laketown Dolomites, Oligocene silicic tuff, dacite dikes	early Miocene
<b>Caliente property (Pennsylvania district)</b>	1997: <i>geologic reserves</i> —50,000 tons, 0.03 opt Au, 0.80 opt Ag; <i>geologic resource</i> —700,000 tons, 0.039 opt Au			
<b>Easter and Delamar Project (Delamar district)</b>	1994: <i>geologic resource</i> —3.36 million tons, 0.069 opt Au 1995: 1.5 million tons, 0.069 opt Au	1994: exploration	Cambrian quartzite	Miocene
<b>LYON COUNTY</b>				
<b>Fire Angel (Como district)</b>	1989: 5,600 oz Au, <i>geologic resource</i> —148,500 oz Au			
<b>Hydra-Hercules (Como district)</b>	1997: 259,329 oz Au, 1,956,511 oz Ag	1997: exploration	Tertiary andesite	
<b>Pine Grove (Pine Grove district)</b>	1994: 2.5 million tons, 0.061 opt Au			

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**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>LYON COUNTY (continued)</b>				
<b>South Comstock Joint Venture (Silver City district)</b>	1994: 3 million tons, 0.05 opt Au 1995: 100,000 oz Au			
<b>Talapoosa (Talapoosa district)</b>	1988: 2.5 million tons, 0.041 opt Au, 0.53 opt Ag <i>oxide</i> 14.9 million tons, 0.03 opt Au, 0.49 opt Ag <i>sulfide</i> 1989: <i>additional resources delineated</i> - 2.7 million tons, 0.054 opt Au, 0.654 opt Ag 1991: <i>geologic resource</i> - 19.6 million tons, 0.045 opt Au, 0.61 opt Ag 1992: <i>geologic resource</i> —18 million tons, 0.044 opt Au, 0.61 opt Ag 1994: <i>geologic resource</i> —50 million tons, 0.026 opt Au, 0.35 opt Ag 1995: <i>geologic resource</i> —45 million tons, 0.025 opt Au and 0.33 opt Ag, including <i>proven and probable reserves</i> of 29.9 million tons, 0.026 opt Au and 0.4 opt Ag		Kate Peak Formation	Miocene
<b>MINERAL COUNTY</b>				
<b>Aurora Mine (Aurora district)</b>	1989: 347,000 tons, 0.253 opt Au 1990: 433,000 tons, 0.21 opt Au 1992: 493,000 tons, 0.15 opt Au 1993: 537,400 tons, 0.123 opt Au, <i>geologic resource</i> —100,000 oz Au 1994: 316,000 tons, 0.120 opt Au 1995: 1.54 million tons, 0.055 opt Au 1996: 900,000 tons, 0.1 opt Au	1989: 12,683 oz Au, 16,400 oz Au 1990: 12,973 oz Au, 18,162 oz Ag 1991: 15,000 oz Au 1992: 15,000 oz Au, 35,000 oz Ag 1993: 8,600 oz Au, 17,200 oz Ag 1995: 15,000 oz Au, 35,000 oz Ag 1996: 10,374 oz Au 1997: 13,284 oz Au, 37,327 oz Ag	andesite, rhyolite	10 Ma
<b>Aurora Partnership (Aurora district)</b>	1983: 1.5 million tons, 0.129 opt Au, 0.3 opt Ag 1990: 816,880 tons, 0.103 opt Au 1992: 790,000 tons, 0.13 opt Au <i>geologic resource</i> —267,640 oz Au 1994: 1.5 million tons, 0.1 opt Au (underground) 1995: 230,000 tons, 0.208 opt Au (in portion of Humboldt vein system)	1930's: 100,000 oz Au 1983: 10,000 oz Au 1988: 10,302 oz Au 1989: 27,825 oz Au, 26,000 oz Ag 1991: 36,000 oz Au, 68,000 oz Ag 1992: 39,100 oz Au, 79,200 oz Ag 1993: 30,120 oz Au, 59,880 oz Ag 1994: 30,000 oz Au, 57,000 oz Ag 1995: 15,048 oz Au, 39,853 oz Ag 1996: 7,528 oz Au, 15,000 oz Ag	andesite, rhyolite	10 Ma
<b>Borealis (Borealis district)</b>	1988: 1.792 million tons, 0.046 oz Au/ton 1991: known reserves mined out 1997: 960,000 tons, 0.24 opt Au sulfide resource	1981–84: 170,000 oz Au 1986–88: 116,256 oz Au 1989: 89,060 oz Au, 37,032 oz Ag 1990: 18,435 oz Au, 15,396 oz Ag, production ceased 1992: exploration 1997: exploration	rhyolite flow dome, andesite flows, breccias, volcaniclastic rocks	5 Ma
<b>Candelaria Mine (Candelaria district)</b>	1988: 24 million tons, 1.267 opt Ag, 0.011 opt Au 1992: mine idle, heap-leaching continuing 1993: <i>geologic resource</i> —20,000 oz Au, 5.8 million oz Ag 1994: <i>surface-mineable reserve</i> —15 million oz Ag, 42,000 oz Au <i>underground reserve</i> —45 million oz Ag, 46,000 oz Au 1995: <i>geologic resource</i> —44 million oz Ag, 45,000 oz Au, including reserves of 6.663 million tons, 0.005 opt Au and 1.68 opt Ag 1996: 1.4 million tons, 1.76 opt Ag and 0.005 opt Au proven ore; 10.8 million tons, 4.21 opt Ag and 0.0045 opt Au drill indicated resources	1982: 1.7 million oz Ag, 9,000 oz Au 1987: total production was 10 million oz Ag as of June 1987 1988: 3.8 million oz Ag, 11,000 oz Au 1989: 4.36 million oz Ag, 13,800 oz Au 1990: 4.89 million oz Ag, 11,796 oz Au 1991: 1.68 million oz Ag, 2,870 oz Au 1992: 1.06 million oz Ag, 2,431 oz Au 1993: 904,810 oz Ag, 1,810 oz Au 1994: 3.19 million oz Ag, 12,800 oz Au 1995: 2.87 million oz Ag, 10,720 oz Au 1996: 3.86 million oz Ag, 15,030 oz Au 1997: 2.95 million oz Ag, 9,955 oz Au	Candelaria Formation serpentinite, granitic dikes	Cretaceous

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>MINERAL COUNTY (continued)</b>				
<b>Denton-Rawhide (Rawhide district)</b>	1989: <i>reserves</i> —29.4 million tons, 0.040 oz Au and 0.368 opt Ag; <i>geologic resource</i> —59.3 million tons, 0.0274 opt Au, 0.298 opt Ag 1991: 29.4 million tons, 0.040 opt Au, 0.368 opt Ag; <i>geologic resource</i> —59.3 million tons, 0.0274 oz Au and 0.298 opt Ag 1992: <i>geologic resource</i> —54 million tons, 0.026 opt Au with 29.4 million tons, 0.04 opt Au, 0.39 opt Ag and 29.9 million tons, 0.015 opt Au, 0.23 opt Ag 1993: 1.3 million oz Au, 15 million oz Ag 1995: 470,000 oz Au, 6 million oz Ag 1996: 535,000 oz Au, 7.3 million oz Ag proven ore 1997: 447,000 oz Au, 3.9 million oz Ag	1990: 39,000 oz Au, 170,000 oz Ag 1991: 76,000 oz Au, 500,000 oz Ag 1992: 92,000 oz Au, 804,000 oz Ag 1993: 105,000 oz Au, 1 million oz Ag 1994: 118,000 oz Au, 952,000 oz Ag 1995: 117,000 oz Au, 960,000 oz Ag 1996: 126,000 oz Au, 1,073,000 oz Ag 1997: 120,000 oz Au, 1,131,000 oz Ag	rhyolite plugs, flows, tuffs, breccias	16 Ma
<b>Mina Gold (Bell district)</b>	1997: 1.77 million tons, 0.055 opt Au geologic resource	1997: exploration	Tertiary feldspar porphyry	
<b>Mindora (Garfield district)</b>	1988: 1.0 million tons, 0.037 opt Au and 1.78 opt Ag	1988: exploration		
<b>Santa Fe (Santa Fe district)</b>	1990: 6.8 million tons, 0.035 opt Au and 0.241 opt Ag	1989: 60,000 oz Au, 150,000 oz Ag 1990: 64,336 oz Au, 177,244 oz Ag 1991: 67,102 oz Au, 149,168 oz Ag 1992: 61,000 oz Au, 100,000 oz Ag 1993: 54,030 oz Au, 64,950 oz Ag 1994: 22,361 oz Au, 28,267 oz Ag 1995: 16,670 oz Au, 41,000 oz Ag	Luning Formation	Miocene
<b>NYE COUNTY</b>				
<b>Baxter Springs (Manhattan district)</b>	1988: 1 million tons, 0.050 opt Au 1990: <i>geologic resource</i> —5 million tons 0.050 opt Au			
<b>Bruner property, Duluth zone (Bruner district)</b>	1992: <i>geologic resource</i> —15 million tons, 0.026 opt Au	1993: exploration	Tertiary volcanic rocks	Miocene
<b>Bullfrog (Bullfrog district)</b>	1989: 18.6 million tons, 0.097 opt Au 1992: 8.8 million tons, 0.14 opt Au plus an additional <i>geologic resource</i> —1.8 million tons, 0.102 opt Au 1996: 10.2 million tons, 0.062 opt Au proven and probable reserves; 3.7 million tons, 0.040 opt Au mineralized material	1989: 50,011 oz Au, 40,905 oz Ag 1990: 220,000 oz Au, 229,000 oz Ag 1991: 205,000 oz Au, 189,000 oz Ag 1992: 323,800 oz Au, 313,000 oz Ag 1993: 340,000 oz Au, 400,000 oz Ag 1994: 301,000 oz Au, 410,000 oz Ag 1995: 177,631 oz Au, 413,587 oz Ag 1996: 205,348 oz Au, 288,700 oz Ag 1997: 206,571 oz Au, 351,348 oz Ag	rhyolitic ash-flow tuff	9.5 Ma
<b>Daisy (Bare Mountain district)</b>	1993: 4.7 million tons, 0.024 opt Au <i>geologic resource</i> —430,000 oz Au 1994: <i>geologic resource</i> —18 million tons, 425,000 oz Au 1995: 12 million tons, 0.018 opt Au, <i>geologic resource</i> —51.1 million tons, 0.026 opt Au (includes five orebodies listed below) 1997: 17.3 million tons, 0.024 opt Au mineable reserves	1997: 32,000 oz Au		
<b>Gold Bar (Bullfrog district)</b>	1987: 1.23 million tons Au ore 1993: idle		silicic volcanic rocks	Miocene
<b>Golden Arrow (Golden Arrow district)</b>	1997: 12.4 million tons, 0.039 opt Au resource	1997: exploration	Tertiary rhyolite tuff	
<b>Longstreet property (Longstreet district)</b>	1989: 4 million tons, 0.024 opt Au, <i>geologic resource</i> —9.6 million tons, 0.024 opt Au		rhyolitic volcanic rocks	Oligocene
<b>Manhattan property (Manhattan district)</b>	1989: <i>geologic resource</i> —100,000 tons, 0.50 opt Au 1996: <i>geologic resource</i> —161,000 oz Au 1997: 1.7 million tons, 0.13 opt Au proven and probable	1997: exploration		

*continued*

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>NYE COUNTY (continued)</b>				
<b>Midway (Rye Patch district)</b>	1997: 270,000 oz Au preliminary resource	1997: exploration	Ordovician Palmetto Formation	
<b>Montgomery Shoshone (Bullfrog district)</b>	1988: 3.1 million tons, 0.072 opt Au, 0.240 opt Ag		rhyolitic ash-flow tuff	9.5 Ma
<b>Nevada Mercury</b>	1994: <i>geologic resource</i> —50,000 oz Au			
<b>Northumberland (Northumberland district)</b>	1988: 12 million tons, 0.06 opt Au	1939–42: 327,000 oz Au 1981–84: 950,000 tons/year 1988: 29,667 oz Au, 130,394 oz Ag 1990-93: idle	Roberts Mountains and Hanson Creek Formations, granodiorite, tonalite, quartz porphyry dikes	85 Ma
<b>Paradise Peak/ Ketchup Flats pit (Fairplay district)</b>	1989: 5.22 million tons, 0.09 opt Au, 3.62 opt Ag, mill ore; 11.52 million tons, 0.036 opt Au, 0.445 opt Ag, leachable 1991: ~ 2 year mine life 1992: <i>reserves</i> —197,000 oz Au, 4.3 million oz Ag 1993: mining ceased, remaining resource refractory sulfides, heap-leaching continued 1996: 5 million tons, 0.022 opt Au, 0.2 opt Ag (Ketchup Flats pit)	1986–88: 560,000 oz Au, 8.5 million oz Ag 1989: 228,000 oz Au, 5.17 million oz Ag 1990: 198,800 oz Au, 5.42 million oz Ag 1991: 182,000 oz Au, 2.26 million oz Ag 1992: 251,000 oz Au, 1.85 million oz Ag 1993: 156,000 oz Au, 795,000 oz Ag 1994: 39,084 oz Au, 130,086 oz Ag	rhyolite and andesite flows, ash-flow and air-fall tuffs	Miocene
<b>Round Mountain (Smoky Valley) (Round Mountain district)</b>	1989: <i>geologic resource</i> —271 million tons, 0.032 opt Au 1990: 256.8 million tons, 0.033 opt Au 1993: 151.2 million tons, 0.024 opt Au, <i>geologic resource</i> —3,876,000 oz Au 1995: 10 million oz Au 1996: 9 million oz Au 1997: 401.3 million tons, 0.018 opt Au proven and probable plus 142.2 million tons, 0.016 opt Au mineralized material	1977–84: 313,480 oz Au, 160,419 oz Ag 1984: 70,000 oz Au 1987: 190,600 oz Au 1988: 233,700 oz Au 1989: 386,227 oz Au, 211,297 oz Ag 1990: 483,192 oz Au, 236,600 oz Ag (includes Manhattan) 1991: 339,000 oz Au, 260,000 oz Ag 1992: 370,600 oz Au, 316,700 oz Ag 1993: 370,000 oz Au, 300,000 oz Ag 1994: 423,000 oz Au, 268,000 oz Ag 1995: 344,437 oz Au, 250,529 oz Ag 1996: 410,977 oz Au, 345,258 oz Ag 1997: 480,430 oz Au, 356,085 oz Ag	rhyolite ignimbrite	26 Ma
<b>Sterling (Bare Mountain district)</b>	1989: 469,000 tons, 0.21 opt Au 1990: 519,000 tons, 0.209 opt Au 1992: 403,000 tons, 0.24 opt Au <i>geologic resource</i> —765,000 tons, 0.178 opt Au 1995: 483,000 tons, 0.19 opt Au 1996: 129,000 tons, 0.245 opt Au	1983–88: 75,900 oz Au 1990: 12,626 oz Au 1991: 12,215 oz Au 1995: 14,000 oz Au 1996: 14,000 oz Au 1997: 4,841 oz Au	Wood Canyon and Bonanza King Formations	14 Ma
<b>South Monitor (west of Ellendale district)</b>	1996: 250,000 oz Au 1997: 14 million tons, 0.026 opt Au, 0.12 opt Ag		Tertiary volcanic rock	
<b>Sullivan (Fairplay district)</b>	1987: 10.2 million tons, 0.039 opt Au, 0.086 opt Ag and 0.37% Cu 1988: <i>proven</i> —10.8 million tons, <i>probable</i> - 2.7 million tons, 0.025 opt Au 1995: <i>proven and possible</i> —17 million tons of 0.34% Cu, 0.0255 opt Au, + 8.5 million tons of 0.32% Cu		Mesozoic granodiorite and metavolcanic rocks	Mesozoic
<b>PERSHING COUNTY</b>				
<b>Bunce (Velvet district)</b>	1989: <i>geologic reserve</i> - 600,000 tons, 0.04 opt Au 1990: 500,000 tons, 0.04 opt Au		rhyolite	
<b>Colado Gold (Willard district)</b>	1997: 15 million tons, 0.022 opt Au resource	1997: exploration		

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>PERSHING COUNTY (continued)</b>				
<b>Florida Canyon (Imlay district)</b>	1988: 37 million tons, 0.023 opt Au 1991: 48.3 million tons, 0.018 opt Au 1995: <i>reserves</i> —72.4 million tons, 0.019 opt Au, <i>additional geologic resource</i> —8 million tons, 0.061 opt Au, sulfide 1997: <i>reserves</i> — 45.5 million tons, 0.024 opt Au proven and probable mineralized material, 122.8 million tons, 0.022 opt Au	1987–88: 109,300 oz Au 1989: 81,484 oz Au, 24,721 oz Ag 1990: 83,200 oz Au, 19,300 oz Ag 1991: 80,586 oz Au, 20,951 oz Ag 1992: 89,954 oz Au, 37,775 oz Ag 1993: 109,190 oz Au, 37,550 oz Ag 1994: 92,000 oz Au, 25,000 oz Ag 1995: 111,157 oz Au, 62,624 oz Ag 1996: 183,176 oz Au, 104,684 oz Ag 1997: 163,321 oz Au, 146,568 oz Ag	Grass Valley Formation	Cretaceous or Tertiary
<b>Goldbanks Project (Goldbanks district)</b>	1994: 900,000 oz Au 1995: <i>reserves</i> —45.6 million tons, 0.019 opt Au, 0.044 opt Ag, <i>plus geologic resource</i> —60 million tons, 0.017 opt Au, 0.071 opt Ag 1996: 80.8 million tons, 0.019 opt Au proven and probable reserves; 7.4 million tons, 0.014 opt Au possible reserves; 106.8 million tons, 0.028 opt Au drill indicated resources			
<b>Relief Canyon (Antelope Springs district)</b>	1988: ~ 1.3 million tons, 0.03 opt Au 1991: mined out 1994: 1.5 million tons, 0.035 opt Au 1996: 8.6 million tons, 0.022 opt Au	1984: 24,500 oz Au 1987–88: 82,000 oz Au 1989: 30,266 oz Au, 32,835 oz Ag 1990: 4,000 oz Au, 6,400 oz Ag	Natchez Pass Limestone, Grass Valley Formation	Cretaceous?
<b>Rochester (Rochester district)</b>	1989: <i>geologic resource</i> —94.5 million tons, 0.012 opt Au, 1.40 opt Ag 1993: 75 million tons, 1.32 opt Ag, 0.0113 opt Au 1996: <i>reserves</i> —81 million oz Au, 696,000 oz Au 1997: 74.2 million oz Au, 603,000 oz Au	1986–88: 122,400 oz Au, 13 million oz Ag 1989: 76,032 oz Au, 4.63 million oz Ag 1990: 59,000 oz Au, 4.8 million oz Ag 1991: 61,000 oz Au, 5.8 million oz Ag 1992: 57,000 oz Au, 5.6 million oz Ag 1993: 66,412 oz Au, 5.9 million oz Ag 1994: 56,000 oz Au, 5.9 million oz Ag 1995: 59,226 oz Au, 6.5 million oz Ag 1996: 74,293 oz Au, 6.3 million oz Ag 1997: 90,351 oz Au, 6.7 million oz Ag	Koipato Group, Weaver Rhyolite	Late Cretaceous
<b>Rosebud Project (Rosebud district)</b>	1992: 570,000 oz Au (0.362 opt), 5.5 million oz Ag (5.5 opt) 1994: 512,000 oz Au 1995: 1.6 million tons, 0.36 opt Au, 2.3 opt Ag 1996: 1.2 million tons, 0.45 opt Au, 2.75 opt Ag 1997: 500,000 oz Au, 3.4 million oz Ag	1997: 93,948 oz Au, 337,167 oz Ag	Tertiary volcanic rocks	Miocene
<b>Tag-Wildcat (Farrel district)</b>	1989: <i>geologic resource</i> —1.5 million tons, 0.043 opt Au; <i>reserves</i> —416,000 tons, 0.076 opt Au	1989: exploration	Tertiary volcanic rocks	Miocene
<b>STOREY COUNTY</b>				
<b>Comstock heap leach project (Comstock district)</b>	1992: 475,000 tons, 0.072 opt Au, 0.60 opt Ag 1993: <i>geologic resource</i> —3.2 million tons, 0.05 opt Au, 0.5 opt Ag 1996: 100,000 oz Au, 1.2 million oz Ag			
<b>Flowery (Golden Eagle) (Comstock district)</b>	1989: 1 million tons, 0.037 opt Au 1990: 6.3 million tons, 0.043 opt Au <i>geologic resource</i> —1.16 million oz Au 1991: <i>geologic resource</i> —29.3 million tons, 0.04 opt Au 1993: 362,000 tons, 0.064 opt Au, 0.97 opt Ag, <i>geologic resource</i> —88,128 oz Au and 1 million oz Ag	1988: 836 oz Au, 9,473 oz Ag 1990: 6,000 oz Au, 70,000 oz Ag 1992: 2,253 oz Au, 34,572 oz Ag 1993: 2,200 oz Au, 30,000 oz Ag 1994: 5,000 oz Au, 41,000 oz Ag 1995: 5,300 oz Au, 58,000 oz Ag 1996: 2,080 oz Au, 31,500 oz Ag 1997: 116 oz Au, 629 oz Ag	Alta Formation	12 Ma
<b>Oliver Hills (Comstock district)</b>	1990: 3.37 million tons, 0.054 opt Au, 1.2 opt Ag 1991: <i>geologic resource</i> —8.5 million tons, 0.060 opt Au, 0.60 opt Ag 1993: 4 million tons, 0.05 opt Au, 0.5 opt Ag, <i>geologic resource</i> —225,000 oz Au and 2.25 million oz Ag	1991: 573 oz Au, 6,947 oz Ag		

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>WASHOE COUNTY</b>				
<b>Mountain View Gold Project (Deephole district)</b>	1995: 19.5 million tons, 0.027 opt Au		rhyolite	Miocene
<b>Olinghouse (Olinghouse district)</b>	1994: <i>geologic resource</i> —500,000 opt Au, 0.057 opt Au 1995: <i>geologic resource</i> —775,000 oz Au, <i>proven and probable reserves</i> —9,655,000 tons, 0.036 opt Au		Miocene andesite	Miocene
<b>WHITE PINE COUNTY</b>				
<b>Alligator Ridge (Bald Mountain district)</b>	1989: 1 million tons, 0.064 opt Au 1990: 624,000 tons, 0.059 opt Au, <i>geologic resource</i> —2.1 million tons, 0.043 opt Au 1992: 11.5 million tons, 0.046 opt Au; <i>geologic resource</i> —661,888 oz Au, includes Casino/Winrock	1981–88: 560,000 oz Au, 70,000 oz Ag 1989: 54,057 oz Au, 10,188 oz Ag 1990: 18,000 oz Au, 4,000 oz Ag 1991: 17,000 oz Au 1992: 10,450 oz Au 1993: <i>see</i> Bald Mountain 1994: 40,000 oz Au 1995: idle 1996: <i>see</i> Bald Mountain	Pilot Shale	Mesozoic or early Tertiary
<b>Bald Mountain (Top) (Bald Mountain district)</b>	1989: 6.7 million tons, 0.069 opt Au 1990: 8.7 million tons, 0.062 opt Au 1992: <i>geologic resource</i> —600,000 oz Au 1996: 30 million tons, 0.033 opt Au proven and probable reserves; 21 million tons, 0.05 opt Au other resources 1997: 921,000 oz Au	1986: 50,000 oz Au 1988: 48,619 oz Au 1989: 55,112 oz Au 1990: 60,000 oz Au, 5,000 oz Ag 1991: 55,000 oz Au, 12,000 oz Ag 1992: 81,500 oz Au, 33,600 oz Ag 1993: 90,610 oz Au, 26,145 oz Ag (includes Alligator Ridge and Yankee Projects) 1994: 80,000 oz Au 1995: 114,200 oz Au, 11,800 oz Ag 1996: 107,708 oz Au, 50,660 oz Ag (includes Alligator Ridge) 1997: 113,500 oz Au, 61,416 oz Ag	quartz porphyry, Cambrian shale and limestone	Jurassic?
<b>Bellview (White Pine district)</b>	1988: 277,000 tons, 0.04 opt Au, <i>geologic resource</i> —1 million tons, 0.036 opt Au			
<b>Casino/Winrock (Bald Mountain district)</b>	1989: <b>Casino</b> - 804,000 tons, 0.054 opt Au; <b>Winrock</b> 1.3 million tons, 0.037 opt Au 1990: <b>Winrock</b> - 993,000 tons, 39,000 oz Au 1992: <i>see</i> Alligator Ridge	1990: 7,000 oz Au 1991: 20,000 oz Au 1992: 19,800 oz Au	late Paleozoic sedimentary rocks	Eocene
<b>Easy Junior (Nighthawk Ridge) (White Pine district)</b>	1989: 5.68 million tons, 0.031 opt Au 1991: 137,000 oz Au	1990: 11,500 oz Au, 900 oz Ag 1997: 510 oz Au, 76 oz Ag	Devonian and Mississippian rocks	Eocene
<b>Golden Butte (Cherry Creek district)</b>	1989: 4.23 million tons, 0.031 opt Au	1989: 12,187 oz Au, 1,448 oz Ag 1990: 22,362 oz Au, 7,700 oz Ag 1991: 8,970 oz Au, 7,763 oz Ag	Chainman Shale	Cretaceous or Eocene
<b>Griffon (White Pine district)</b>	1993: <i>geologic resource</i> —60,000 oz Au 1994: <i>geologic resource</i> —50,454 oz Au, 0.039 opt Au 1995: <i>proven and probable reserves</i> —2,737,000 tons, 0.025 opt Au 1997: 100,000 oz Au		upper Joana Limestone	
<b>Horseshoe (Bald Mountain district)</b>	1991: 1.5 million tons, 0.039 opt Au		Pilot Shale and intrusive quartz porphyry	36–38 Ma
<b>Illipah (Illipah district)</b>	1988: mined out	1987: ~25,000 oz Au/year 1988: 25,324 oz Au, mining ended 1989: 3,874 oz Au, heap-leached 1996: exploration	Paleozoic sedimentary rocks	Eocene?

**MAJOR PRECIOUS METAL DEPOSITS (continued)**

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
<b>WHITE PINE COUNTY (continued)</b>				
<b>Little Bald Mtn. (Bald Mountain district)</b>	1989: 200,000 tons, 0.13 opt Au; <i>geologic resource</i> —260,000 tons, 0.127 opt Au 1993: 140,000 tons, 0.13 opt Au, <i>geologic resource</i> —21,800 oz Au	1985–88: 21,700 oz Au 1989: 5,500 oz Au, 1,500 oz Ag	Antelope Valley Formation	35–38 Ma
<b>Mt. Hamilton (White Pine district)</b>	1988: 7.7 million tons, 0.05 opt Au, 0.5 opt Ag 1994: <i>reserve</i> —9.04 million tons, 0.052 opt Au, 0.38 opt Ag 1996: 10.8 million tons, 0.038 opt Au, 0.24 opt Ag 1997: 7.72 million tons, 0.035 opt Au	1988: preproduction 1993: idle 1995: 52,000 oz Au, 100,000 oz Ag 1996: 35,000 oz Au, 71,500 oz Ag 1997: 12,500 oz Au, 36,000 oz Ag (data revised after NBMG Special Publication P-9 was published)	Dunderberg Shale	Cretaceous
<b>Pan (White Pine district)</b>	1989: 241,000 oz Au			
<b>Robinson (Robinson district)</b>	1989: 46.0 million tons, 0.019 opt Au; <i>geologic resource</i> —1 million oz Au 1991: <i>geologic resource</i> —200 million tons, 0.012 opt Au 1992: 1.2 million oz Au, <i>geologic resource</i> —2.21 million oz Au 1994: <i>geologic resource</i> —252 million tons, 0.553% Cu, 0.0102 opt Au	1986: 48,000 oz Au, 96,000 oz Ag 1987: 50,207 oz Au 1988: 38,750 oz Au 1989: 78,828 oz Au, 66,340 oz Ag 1990: 75,000 oz Au, 55,000 oz Ag 1991: 21,674 oz Au 1992: 35,581 oz Au, 55,000 oz Ag 1993: 13,432 oz Au 1996: 39,000 oz Au, 170,000 oz Ag, and 84 million pounds of Cu 1997: 71,000 oz Au, 314,000 oz Ag and 138 million pounds of Cu	Rib Hill Sandstone Riepe Spring Limestone Intrusions	Cretaceous
<b>Taylor (Taylor district)</b>	1980: 10 million tons, 3 opt Ag	1980: 1,200 tons/day 1995: idle	Guilmette and Joana Limestones, rhyolite dikes	Eocene or Oligocene
<b>White Pine (White Pine district)</b>	1989: 63,000 oz Au, 0.04 opt Au	1989: 20,654 oz Au	Pilot Shale	Oligocene?
<b>Yankee (Bald Mountain district)</b>	1992: 683,000 oz Au	1990: ~15,000 oz Au 1992: 10,800 oz Au 1993: <i>see</i> Bald Mountain	Pilot Shale	36–38 Ma?

**Newmont Gold Production**

Production data for individual mines owned by Newmont Gold Co. are not available in some cases, particularly during 1988–1993. Total production of Newmont operations in Nevada by years is as follows:

<u>Year</u>	<u>Gold (oz)</u>	<u>Silver (oz)</u>
1988	895,500	NA
1989	1,467,800	117,400
1990	1,676,000	NA
1991	1,575,700	NA
1992	1,588,000	98,000
1993	1,666,400	175,000
1994	1,554,000	158,000
1995	1,634,500	188,000
1996	1,700,000	322,000
1997	1,819,000	118,000

# Industrial Minerals

by Stephen B. Castor

The estimated total value of industrial minerals produced in Nevada in 1997 is about \$370 million, a decrease of about 7% from 1996. In order of estimated dollar value the most important Nevada industrial minerals produced in 1997 were aggregate, lime, diatomite, barite, cement, gypsum, lithium, clay, silica, and magnesia. Data used for these estimates, and data reported for individual commodities below, were obtained from the Nevada Division of Minerals or directly from companies that produced industrial minerals.

**Aggregate (Sand, Gravel, and Crushed Stone)** In 1997, construction aggregate production in Nevada had an estimated total value of \$126 million and was ranked third among the state's mined commodities behind gold and silver. For 1997, statewide aggregate production is estimated at 28 million tons, 7% below production in 1996. Aggregate produced from sand and gravel deposits accounted for about 75% of aggregate production statewide, with crushed stone and lightweight aggregate making up the balance. Aggregate produced in the Las Vegas area, which accounted for about 19 million tons, decreased about 9% from 1996, while production in the Reno-Sparks-Carson City area, estimated at 5 million tons, was about the same as in 1996.

Companies in the Las Vegas area that produced more than a million tons of aggregate in 1997, ranked in approximate order of tonnage produced, were Nevada Ready Mix Corp., Bonanza Materials, Inc., WMK Transit Mix, Inc., Wells Cargo, Inc., Lopke Granite Products, Blue Diamond Materials Co., and Las Vegas Paving Corp. Las Vegas area community pits, which are administered by the U.S. Bureau of Land Management, provided about 1.3 million tons in 1997. As in the past six years, the most important source of aggregate in the Las Vegas region in 1997 was alluvial sand and gravel deposits in the Lone Mountain area northwest of Las Vegas. While significant production still comes from the Spring Mountain Road area in the urbanized area of Las Vegas, it is likely that future production will come increasingly from more distant sources. In 1997, common aggregate was hauled into Las Vegas from pits as far as 50 miles away in Lincoln County, and volcanic cinder was hauled 80 miles from Nye County.

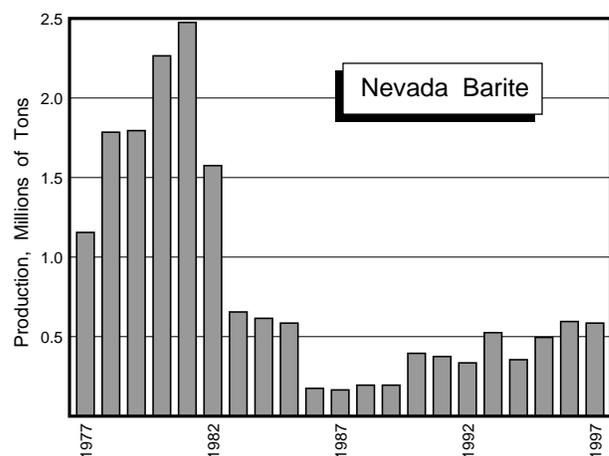
In 1997, crushed stone and lightweight aggregate accounted for nearly 20% of aggregate used in the Las Vegas metropolitan area. Major crushed stone producers in the Las Vegas area were Frehner Construction Co., Lopke Granite Products, and Southern Nevada Lightweight.

In the Reno-Sparks-Carson City area, only Granite Construction Co. produced more than a million tons of aggregate in 1997. Companies that produced 500,000 or more tons in 1997 included Rocky Ridge Inc. and Rilite Aggregate Co. Crushed rock continued to be an important source of aggregate in this area; crushed rock operations of Granite Construction and Rocky Ridge Inc. and lightweight rhyolite aggregate from All-Lite Aggregate Co., Rilite Aggregate Co., and Naturalite Aggregate Corp. accounted for about 50% of the aggregate used in 1997 in the Reno-Sparks-Carson City area.

**Barite** In 1997, barite shipments from Nevada were about 586,000 tons, 3% percent less than in 1996. M.I. Drilling Fluids Co. was the largest Nevada barite producer in 1997, shipping nearly 350,000 tons of barite that included high-grade crude ore from the Greystone Mine and ground and bagged barite from its Battle Mountain plant, both in Lander County. The company reportedly purchased the Mountain Springs barite deposit, also located in Lander County, during 1997.

Baroid Drilling Fluids Inc. shipped barite from the Dunphy mill in Eureka County and the Rossi Mine in Elko County in 1997. Milpark Inc. produced barite at its Argenta property near Battle Mountain, Lander County.

Standard Industrial Minerals did not mine barite in 1997 from its P and S Mine in Nye County but operated from a stockpile of selectively mined barite from this property at its processing plant in Bishop, California. The company makes finely ground (-400 mesh) white paint-grade barite with brightness of about 80, which is sold for use in paint and as a filler.



**Borate** American Borate Co. increased production of borate minerals mined underground in Death Valley, California, in 1997. The ore is processed at the Lathrop Wells mill in Nye County, but because the ore is from out of state, this production is not included in the estimate of total value of Nevada minerals.

**Building Stone** Nevada Neanderthal Stone, which quarries and cuts several varieties of Tertiary tuff near Beatty in Nye County, continued to produce floor tile, columns, and other stone products in 1997. However, since the implementation of NAFTA, this small family-owned enterprise has faced intense price competition from stone cutters in Mexico and sales are down. Las Vegas Rock produced building and landscape rock from Cretaceous Aztec Sandstone at Goodsprings, Clark County.

**Cement** The Nevada Cement Co., a subsidiary of Centex Construction Products, Inc., with a plant at Fernley in Lyon County, is the only significant cement manufacturer in Nevada. It was erroneously reported to be the only cement producer in the state in NBMG Special Publications MI-1995 and MI-1996 (see below). Portland cement has been produced at the Fernley plant since 1964. Raw materials for the cement include limestone quarried a few miles south of Fernley, along with clay, iron ore, and gypsum mined elsewhere in northern Nevada.

Since 1995, the Royal Cement Co. has been producing minor amounts of cement for sale into the Las Vegas market at a plant near Logandale in Clark County. Prior to 1993, the Logandale plant was owned by Las Vegas Cement. Limestone for the cement was mined locally, alumina and silica were obtained from ash from a local power plant, additional silica was obtained from Utah, and iron ore was obtained from California. Estimated production is reported to have been about 50,000 tons of cement per year from 1995 through 1997 when the plant ceased operation.

Patent applications for a cement plant near Apex in Clark County are presently in review by the U.S. Bureau of Land Management.

**Clay** Clay production in Nevada in 1997 was the highest since 1991. The largest Nevada clay producer is Mud Camp Mining Co., which is controlled by a privately owned industrial mineral company in California. The company's Nevada operation consists of several open-pit mines and a processing plant in Amargosa Valley, Nye County. Clay minerals mined in Amargosa Valley include sepiolite, montmorillonite, and saponite. The operation was acquired from IMV Division of Floridin Co., a subsidiary of RTZ PLC, in 1997.

American Colloid Co. mined relatively minor amounts of clay in Nevada in 1997. The company ships clay from deposits of montmorillonite in Pershing County and hectorite in Humboldt County to a plant in South Dakota. Vanderbilt Minerals Co. did no mining in 1997 but shipped

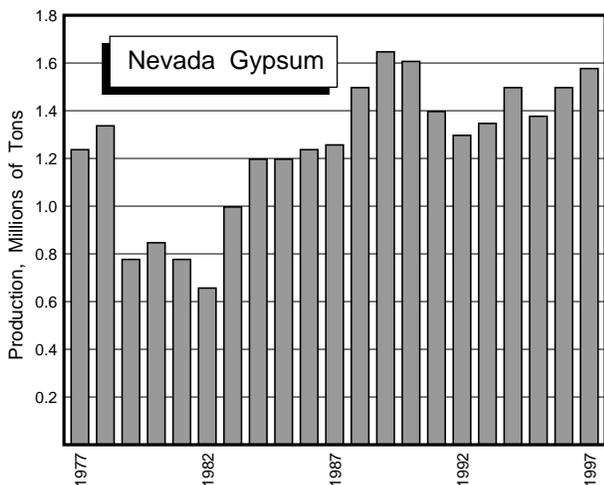
clay from several Nevada clay deposits from its crushing plant near Beatty in Nye County. The Art Wilson Co. sold a small amount of montmorillonite in 1997 for use in fish and shrimp food from the Jupiter Mine in Lyon County. Halloysite clay that is mined from a deposit in Washoe County by the Art Wilson Co. is not reported as clay in NBMG mineral production figures because it is included in portland cement produced by the Nevada Cement Co. in Fernley.

Exploration for clay in Nevada in 1997 included evaluation by Specialty Clay Corp. (formerly Nevada Clay Co.) of a bentonite deposit near Salt Wells in Churchill County about 15 miles east of Fallon. The clay is Namontmorillonite that is said to compare favorably with Wyoming bentonite.

**Diatomite** Eagle-Picher Minerals, Inc., a division of Eagle-Picher Industries, Inc., produces most of Nevada's diatomite at three different operations. The company processes diatomaceous earth filtration products at its Colado plant in Pershing County from diatomite mined northwest of Lovelock, diatomite that is mainly used in fillers and absorbents at its Clark plant and mine in Storey County, and diatomite used in insulation from a pit near Hazen in Lyon County.

Moltan Co. of Memphis, Tennessee, is the second largest diatomite miner in Nevada, producing cat litter, oil absorbent, and soil conditioner from diatomite mined in Churchill County northeast of Fernley. Other companies that produced diatomite in Nevada in 1997 were Grefco Inc. at its Basalt operation in Esmeralda and Mineral Counties, and CR Minerals at Hazen in Lyon County.

**Gypsum** In 1997, gypsum production in Nevada increased about 5% over 1996 to about 1.58 million tons. Most of this gypsum is used to make wallboard at plants in Nevada. The Blue Diamond operation of James Hardie Gypsum, which is just southwest of Las Vegas in Clark County, was the largest producer at about 560,000 tons. Most of the Blue Diamond gypsum was used to make about 475,000 million square feet of wallboard, and the rest was sold as plaster or to cement plants. USG Corp., which mines gypsum in northern Pershing County, was the second largest producer in the state at nearly 500,000 tons. USG processes gypsum into wallboard and plaster at Empire in Washoe County. Although PABCO Gypsum in Clark County east of Las Vegas mined 550,000 tons of ore in 1996, actual gypsum production was approximately 400,000 tons because the ore must be beneficiated to produce a gypsum concentrate. PABCO processes most of this gypsum into wallboard. The Art Wilson Co. of Carson City shipped about 130,000 tons of gypsum from the Adams Mine in Lyon County for use in cement and agricultural markets. Georgia Pacific Corp. performed little or no mining in Nevada but purchased gypsum from a mine in Utah for use in its wallboard plant northeast of Las Vegas.



**Lime, Limestone, and Dolomite** In 1997, lime production in Nevada continued at record levels, increasing 9% over 1996. Two companies produced approximately equal amounts of lime from carbonate rock mined in Nevada. Chemical Lime Co. makes high-calcium lime at Apex northeast of Las Vegas and dolomitic lime at a plant in Henderson. For raw materials, the company mines limestone adjacent to the Apex plant and dolomite at Sloan, south of Las Vegas. The high-calcium lime is sold to gold mine processing, paper manufacturing, and environmental markets; the dolomitic lime is mostly used in construction. The Continental Lime, Inc. Pilot Peak high-calcium lime operation near Wendover in Elko County, mainly sells lime to Nevada gold mining operations for use in pH control.

In addition to lime, Chemical Lime Co. produces non-calcined dolomite and limestone for glass flux and other uses. Min-Ad, Inc. and Nutritional Additives Corp., both located near Winnemucca, produce ground dolomite for agricultural use. Min-Ad's production, about 59,000 tons in 1997, has increased steadily over the past eight years.

**Lithium** Cyprus Foote Mineral Co., a division of Cyprus-Amax Minerals, produces lithium carbonate and lithium hydroxide compounds from brine at a plant at Silver Peak, Esmeralda County. The brine is pumped from below the

surface and evaporated in ponds on the adjacent Clayton Valley playa. Lithium carbonate has been produced from this brine since 1965. The company, which also has a lithium brine operation in Chile, is currently the largest lithium producer in the world. In recent years company earnings from lithium sales have been strong. However, it is believed that new lithium brine operations in Chile and Argentina will cause price reductions of as much as 50% and the Nevada operation may be adversely affected.

**Magnesia** Annual production of magnesia from magnesite at Gabbs, Nye County, by Premier Services Corp. was approximately the same in 1997 as in 1996. In late 1997, the New York-based Alpine Group Inc. signed a letter of intent to purchase the refractories division of Premier's parent company, American Premier Inc.; the effect of this purchase on the Gabbs operation is not known.

**Perlite** In 1997, Eagle-Picher Minerals Inc. produced expanded perlite at the Colado diatomaceous earth facility in Pershing County from perlite that is mined in Churchill County. In addition, the Wilkin Mining and Trucking Co. mined perlite from the Mackie Mine in Lincoln County.

**Salt** The Huck Salt Co. of Fallon produced nearly 16,000 tons of salt in 1997. The salt, mined from Fourmile Flat in Churchill County, is mainly used for deicing roads in Nevada.

**Silica** The Simplot Silica Products plant at Overton in Clark County shipped about 640,000 tons of silica sand in 1997, a 2% decrease from 1996. The sand is mined from a large deposit of friable sandstone, washed in the pit, and transported via a slurry pipeline to the plant where it is screened and bagged.

**Zeolites** American Resource Corp., which processed clinoptilolite at a small plant in the Ash Meadows area of Nye County, was put up for sale after its parent company, Rea Gold, filed for bankruptcy. The clinoptilolite was mined from a nearby deposit in California. A new zeolite processing plant was reportedly set up by KMI at Sandy Valley in Nye County to process California clinoptilolite, possibly mined from the same deposit.

# Geothermal Energy

by David A. Davis

Fourteen geothermal well permits were issued during 1997 by the Nevada Division of Minerals: four industrial producers, nine observation wells, and one domestic well. A total of 20,402 feet was drilled during 1997.

During 1997 in Nevada, there were 74 noncompetitive federal geothermal leases covering 108,983 acres, and 47 competitive federal geothermal leases covering 47,546 acres. This is a decrease of 44,394 noncompetitive lease acres and a decrease of 3,705 competitive lease acres from 1996 totals. The annual rental fee paid for these leases was \$171,750, down 6.6% from 1996. Total gross electrical production from geothermal resources on public lands was 1,243,000 megawatt-hours (MWh), down 1.3% from 1996. Net production was approximately 998,000 MWh, down 5% from 1996. Production royalties on that amount equaled \$4,958,000, about 1.2% higher than in 1996. Gross

electrical sales from federal lands totaled \$102,190,000, about 2.7% lower than in 1996. By regulation, half of all rental fees and royalties are returned to the state, and in 1997 the total amount of those fees returned to the state was \$2,564,875, up 1% from 1996 (R. Hoops, personal commun., 1998, Bureau of Land Management).

Total Nevada gross geothermal electrical production from both federal and fee lands in 1997 was 1,648,652 MWh, down about 1.2% from 1996. Total net production in 1997 was 1,347,435 MWh, down 0.8% from 1996. The sales value of the net production in 1997 estimated at \$80.00 per MWh was \$107,812,400. Gross production capacity (as rated by the manufacturer) from the currently developed geothermal resources at the fourteen existing geothermal power plants in Nevada is 236.8 MW (Nevada Division of Minerals, 1998). Nevada is second only to California (2,660 MW, according to the California

NEVADA GEOTHERMAL POWER PLANTS 1997

Plant name (year on line)	Production capacity' (MW)	1997 Production (MWh)		Location	Operator
		Gross	Net (sales)		
Beowawe (1985)	16.6	132,642	106,640	S13,T31N,R47E	Oxbow/Beowawe Geothermal Power Co. HC 66, Unit 1, Box 16 Beowawe, NV 89821
Bradys Hot Springs (1992)	21.1	175,632	135,384	S12,T22N,R26E	Brady Power Partners P.O. Box 649 Fernley, NV 89408
Desert Peak (1985)	11.0	69,893	61,464	S21,T22N,R27E	Western States Geothermal Co. P.O. Box 2627 Sparks, NV 89432-2627
Dixie Valley (1988)	62.0	528,050	473,813	S7,T24N,R37E S33,T25N,R37E	Oxbow Geothermal Corp. 5250 South Virginia St. Suite 304 Reno, NV 89502
Empire (1987)	4.8	22,298	18,628	S21,T29N,R23E	San Emidio Resources P.O. Box 40 Empire, NV 89405
Soda Lake No. 1 (1987) and Soda Lake No. 2 (1991)	26.1	126,251	94,294	S33,T20N,R28E	Constellation Power 5500 Soda Lake Road Fallon, NV 89406
Steamboat I, I-A (1986) and Steamboat II, III (1992)	58.6	408,500	308,033	S29,T18N,R20E	S.B. Geo, Inc. P.O. Box 18199 1010 Power Plant Dr. Reno, NV 89511
Stillwater (1989)	21.0	106,078	71,159	S1,T19N,R30E S6,T19N,R31E	Constellation Power 5500 Soda Lake Road Fallon, NV 89406
Wabuska (1984)	1.2	4,404	4,404	S15,16,T15N, R25E	Tad's 10 Julian Lane Yerington, NV 89447
Yankee Caithness (1988)	14.4	82,013	73,616	S5,6,T17N,R20E	Yankee Caithness J.V.L.P. P.O. Box 18160 Reno, NV 89511
TOTAL	236.8	1,655,761	1,347,435		

1. Production capacity according to equipment name plate.  
Sources: Plant operators, Nevada Division of Minerals, and NBMG files.

Department of Conservation at [www.consrv.ca.gov/dog/geo.html](http://www.consrv.ca.gov/dog/geo.html)) in total installed geothermal generating capacity. According to the Energy Information Agency (Electric Power Monthly, March 1998), the net production of electricity in Nevada in 1997 was 22,870,000 MWh, up 7.1% from 1996. Geothermal energy provided 5.9% of the total in 1997, down from 6.4% in 1996.

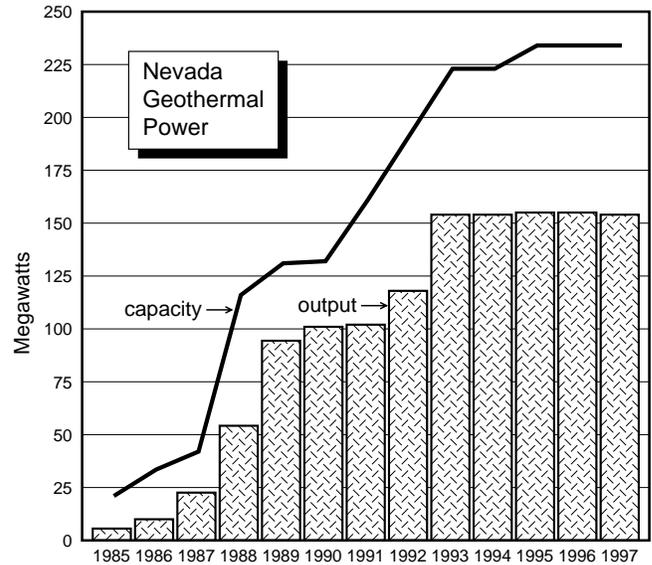
**Wabuska**

After being off-line throughout 1996, Tad's went back into production on May 1, 1997 and remained on line for the rest of the year.

**Reno**

The Reno Energy Geothermal District (REGD) Heating Project received approval from the Nevada Public Utilities Commission and a Special Use Permit from the Washoe County Planning Commission in 1997, according to U. S. Energy Systems, Inc., which holds a 50% interest in the project. The project is expected to be completed in mid-1999. The REGD will be one of the largest district heating facilities in the U.S. and one of the largest geothermal district heating operations in the world. The water will be used for heating, hot water supply, industrial process heat, and chilled water production, and will initially service 40,000,000 square feet in the South Meadows Business Park and Damonte Ranch Development. The REGD will use excess heat from two geothermal electric plants owned by U.S. Energy Systems and from two others owned by Steamboat Development Corp., also an equity owner in the project. To assure continuing sufficient

geothermal heat supplies, U.S. Energy Systems is also involved in acquiring 120 additional acres of geothermal fields adjacent to the proposed facility. When the project is in full service, the difference in pollution levels compared to those of a fossil fuel-fired facility will be equivalent to the removal of 40,000 cars from the streets of Reno (GRC Bulletin, 1997, v. 26, no. 11, p. 277).



**Rated capacity and average net output of Nevada geothermal plants, 1985–1997. Average net output is annual sales in megawatt-hours divided by the number of hours in a year (8,760). No commercial geothermal power was produced in Nevada before 1985.**

# Oil and Gas

by David A. Davis

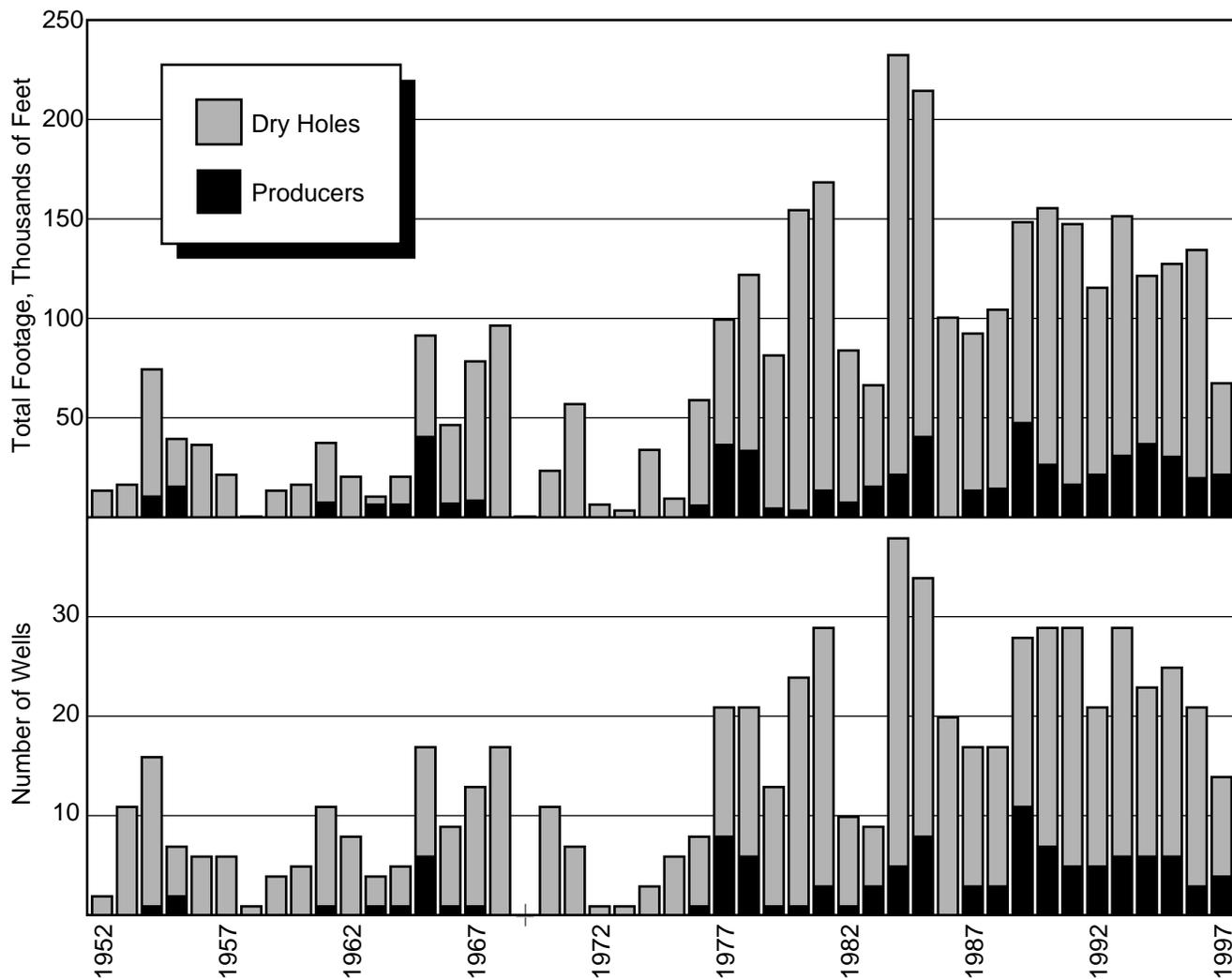
## Production

In 1997, Nevada produced oil from 13 fields in Nye, Eureka, and Elko Counties. Of the 97 wells listed as producers in 1997, four were new producers, nine were shut in for 6 to 12 months, and 18, of which one was plugged and abandoned, were shut in for the entire year. The net oil production in 1997 was 980,200 barrels, which is 0.042% of the total U. S. production. The sales volume was estimated at \$15 million according to the Nevada Division of Minerals. The 7.5% decline in oil production from 1996 to 1997 is due to an overall drop of 18.5% in production in eight fields that was only partially offset by production increases in four fields and the return of one field to production.

Nevada's highest volume producer was Grant Canyon No. 9, which averaged 344 barrels of oil and 446 barrels of water per day during 1997. Nevada's second highest volume producer was Blackburn Unit No. 19, which averaged 237 barrels of oil and 982 barrels of water per day.

Oil production from the Grant Canyon Field decreased 14% while water production increased 18%. Two of Grant Canyon's four producers remained shut in throughout 1997, and production declined at the other two.

Oil production from the Trap Spring Field decreased 6% while water production increased 6%. Of Trap Spring's 42 wells listed as producers, seven were shut in throughout 1997, two were shut in for 6 to 12 months, and three were shut in for 1 to 6 months. Production



increased at 14 and decreased at 21 of the 35 of the wells that produced in 1997 in the Trap Spring Field.

Oil production from the Blackburn Field decreased 37% while water production decreased only 1%. Production from its six older wells decreased; a new producer came on line in November but did not appreciably offset the decrease.

Oil production from the Eagle Springs Field decreased 20% while water production decreased 16%. Of Eagle Springs' 20 wells listed as producers, two were shut in throughout 1997, five were shut in for 6 to 12 months, and two were shut in for 1 to 6 months. Of the 18 wells actually producing, two had production increases, but 16 had production decreases.

Oil production from the Bacon Flat Field decreased 22% while water production decreased 6%. Only one of its three producing wells was in operation during 1997.

Oil production from the Kate Spring Field decreased 13% while water production decreased 9%. Production decreased at five wells. Western General kept a sixth well shut in throughout 1997, and shut in one of the others for the second half of the year. A total of 9.4 million cubic feet of gas was produced from the Kate Spring Field in

1997, a decrease of 13% from 1996. The gas is used to operate production and related equipment at the lease sites of Makoil, Inc. and Western General, Inc.

The Ghost Ranch Field gained two new producers during 1997, and oil production increased 231% while water production increased almost 3,500%.

Oil production from the Sans Spring Field increased 161% while water production decreased 15%. Of Sans Spring's two older producing wells, one remained shut in throughout 1997, and the production of the other decreased but this decrease was offset by a new producer coming on line in May.

Oil production from the Tomera Ranch Field increased 70% while water production increased 113%. One of Tomera Ranch's two producing wells was in operation for the entire year in 1997, up from 6 months in 1996. The other well remained shut in and was plugged and abandoned in June.

Oil production from the North Willow Creek Field decreased 59% while water production decreased 81%. Of North Willow Creek's three wells, one remained shut in throughout 1997, while another produced only during January and February. The only producing well in the

#### OIL WELL DRILLING ACTIVITY IN NEVADA IN 1997

Company	Well	Permit No.	Location	Permit	Spud date	Completion date	Depth (feet)	Status (31 Dec 97)
<b>ESMERALDA COUNTY</b>								
Marshall Oil Co.	Federal Jake No. 1	807	NW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> S7 T2N R39E	Sep 97	Oct 97	Dec 97	8,928	P & A
<b>EUREKA COUNTY</b>								
Foreland Corp.	Pine Creek No. 1-7	787	NE <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> S7 T28N R52E	Jul 96	Jul 96	Dec 97	9,708	P & A
Petroleum Corp. of Nevada	Blackburn No. 21	802	NE <sup>1</sup> / <sub>4</sub> SE <sup>1</sup> / <sub>4</sub> S7 T27N R52E	Jul 97	Aug 97	Sep 97	6,826	Producer
<b>LINCOLN COUNTY</b>								
Falcon Energy, LLC	Hamlin Wash No. 18-1	795	SE <sup>1</sup> / <sub>4</sub> S18 T8N R70E	Nov 96	May 97	Jun 97	3,990	P & A
Falcon/Kriac Energy, Inc.	Hamlin Wash No. 18-1R	805	SE <sup>1</sup> / <sub>4</sub> SE <sup>1</sup> / <sub>4</sub> S18 T8N R70E	Aug 97	Aug 97	Sep 97	W	TA
Falcon/Kriac Energy, Inc.	Kriac No. 3	810	SE <sup>1</sup> / <sub>4</sub> SE <sup>1</sup> / <sub>4</sub> SE <sup>1</sup> / <sub>4</sub> S18 T8N R70E	Dec 97				Not drilled
<b>NYE COUNTY</b>								
Big West Oil and Gas, Inc.	Sans Spring No. 5-14A	792	SW <sup>1</sup> / <sub>4</sub> NW <sup>1</sup> / <sub>4</sub> S14 T7N R56E	Oct 96	Apr 97	May 97	5,671	Producer
Eagle Springs Production, LLC	Ghost Ranch Federal No. 38-35	793	SW <sup>1</sup> / <sub>4</sub> SE <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> S35 T9N R57E	Oct 96	Jan 97	Jan 97	4,582	Producer
Makoil, Inc.	Radio No. 6-22	796	SE <sup>1</sup> / <sub>4</sub> NW <sup>1</sup> / <sub>4</sub> S6 T9N R57E	Nov 96				Not Drilled
McFarland Energy, Inc.	Pancake Mesa No. 1	797	NW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> S14 T5N R54E	Jan 97	Feb 97	Mar 97	5,615	P & A
Makoil, Inc.	Ghost Ranch No. 2-21	798	NE <sup>1</sup> / <sub>4</sub> NW <sup>1</sup> / <sub>4</sub> S2 T8N R57E	Jan 97				Not Drilled
Eagle Springs Production, LLC	Ghost Ranch No. 47-35	799	NE <sup>1</sup> / <sub>4</sub> SE <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> S35 T9N R57E	Feb 97	Mar 97	Mar 97	4,696	Producer
Makoil, Inc.	Ghost Ranch No. 2-21X	800	NE <sup>1</sup> / <sub>4</sub> NW <sup>1</sup> / <sub>4</sub> S2 T8N R57E	May 97	Jul 97	Aug 97	4,542	Shut in
Trio Petroleum, Inc.	Federal No. 16X-20	801	SW <sup>1</sup> / <sub>4</sub> NW <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> S20 T7N R57E	May 97	May 97	May 97	5,298	P & A
Trio Petroleum, Inc.	Federal No. 16X-20 (Re-drill)	803	SW <sup>1</sup> / <sub>4</sub> NW <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> S20 T7N R57E	Jul 97	Jul 97	Aug 97	5,498	P & A
Makoil, Inc.	Trap Spring No. 27-32X	804	SW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> S27 T9N R56E	Aug 97				Not Drilled
Frontier Exploration Co.	Mega Springs Federal No. 7	806	NE <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> S7 T8N R56E	Sep 97	Oct 97	Oct 97	2,935	P & A
MKJ Xploration, Inc.	Trough Springs Canyon Federal No. 25-7	808	SW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> S25 T6N R61E	Nov 97	Dec 97	Jan 98	W	Drilling
<b>WHITE PINE</b>								
Paleozoic Prospects, Inc.	PPI Bugs No. 1	809	NE <sup>1</sup> / <sub>4</sub> NW <sup>1</sup> / <sub>4</sub> S33 T22N R59E	Nov 97	Nov 97		W	Suspended
W: Withheld in accordance with company requests and Nevada regulations. P&A: Plugged and abandoned. TA: Temporarily abandoned. Drilling: Drilling not finished in 1997.								

Duckwater Field was operated only from August through November and oil production decreased 61% and water production decreased 73%. The Currant Field's only well was shut in the first half of 1997 and produced oil without water the second half. The single oil well in the Deadman Creek Field produced 109 barrels of oil in May 1997 and then was shut in for the rest of the year. Both of the producers in the Three Bar Field remained shut in throughout 1997.

According to the Nevada Division of Minerals, the average net wellhead price for Nevada crude oil in 1997 was about \$15 per barrel. Most Nevada oil is used to make such products as No. 1 and No. 2 diesel fuel, kerosene, stove oil, and asphalt. Nevada crude oil is transported by tank trucks to several refineries: the Petro Source Refining Corp. 8,000 barrel-per-day capacity refinery and asphalt storage plant near Currant in Railroad Valley, the Petro Source Refining Partners' asphalt storage facility and refinery (used only a few days per month for refining) at Tonopah, and the Crysen Refining refinery at Woods Cross, Utah (presently refining only Pine Valley crude oil).

## New Producers

Four new wells were put into production in 1997. These were Big West Oil and Gas, Inc. Sans Spring No. 5-14A, and Eagle Springs Production, LLC Ghost Ranch Nos. 38-35 and 47-35 in Railroad Valley, and Petroleum Corporation of Nevada Blackburn No. 21 in Pine Valley.

In the Blackburn Field, Petroleum Corporation of Nevada, Blackburn Unit No. 21 was drilled to a depth of

6,826 feet. The casing was perforated between 6,676 and 6,725 feet and between 6,816 and 6,821 feet. Production began November 12, 1997 with 2,710 barrels of free-flowing fluid containing 97.6% water and averaged about 32 barrels of oil and 1,144 barrels of water per day through November and December. Blackburn Unit No. 21 has two shows. According to well reports on file at the Nevada Bureau of Mines and Geology, the first show between 6,686 and 6,695 feet and the upper part of the second show between 6,720 and 6,725 feet are in sandstone and are fair and consist of brown stained sucrosic patches with very weak spotty to patchy greenish yellow fluorescence and a fast, weakly streaming bluish white cuts. The middle of the second show is in shale between 6,725 and 6,823 feet and is poor with no to weak, spotty yellow fluorescence and a fast, non-streaming, milky bluish-white cut. These shows are in the Devonian Chainman Shale. The lower part of the second show is in Devonian dolomite between 6,823 and 6,838 feet and is good with rainbow show in the mud in the shaker with weak greenish yellow fluorescence and a fast, moderately to strongly streaming, bluish-yellow cut. Also, 2 to 7 units of gas containing C1 through C4 were reported between 6,766 and 6,832 feet.

In the Ghost Ranch Field, Eagle Springs Production, LLC Ghost Ranch Federal No. 38-35 was drilled to a depth of 4,582 feet. The casing was perforated at four intervals between 4,352 and 4,496 feet. Production began February 18, 1997 with 498 barrels of fluid containing 40% water the first 24 hours and averaged about 195 barrels of 16.7 to 17.4° gravity oil and 185 barrels of water

### FEDERAL OIL AND GAS LEASES IN EFFECT IN FISCAL YEARS 1996 AND 1997<sup>1</sup>

County	NUMBER OF LEASES						ACREAGE					
	Competitive		Noncompetitive		Simultaneous <sup>2</sup>		Competitive		Noncompetitive		Simultaneous <sup>2</sup>	
	FY96	FY97	FY96	FY97	FY96	FY97	FY96	FY97	FY96	FY97	FY96	FY97
Carson City	0	0	0	0	0	0	0	0	0	0	0	0
Churchill	0	0	0	0	2	2	0	0	0	0	5,278	5,278
Clark	0	0	2	1	2	2	0	0	1,262	640	5,761	5,761
Douglas	0	0	0	0	0	0	0	0	0	0	0	0
Elko	23	29	55	61	15	5	34,703	45,923	92,238	107,641	38,385	10,435
Esmeralda	0	0	11	22	0	0	0	0	26,312	47,810	0	0
Eureka	33	46	108	86	47	13	45,165	66,239	179,959	136,847	144,414	14,358
Humboldt	0	0	0	0	0	0	0	0	0	0	0	0
Lander	0	0	3	2	0	0	0	0	5,953	3,874	0	0
Lincoln	42	24	224	157	17	4	71,602	42,530	486,498	284,919	73,968	17,805
Lyon	0	0	0	0	0	0	0	0	0	0	0	0
Mineral	0	0	2	2	0	0	0	0	12,441	12,441	0	0
Nye	274	294	285	275	135	28	229,916	247,202	499,458	509,332	151,142	13,137
Pershing	20	18	15	10	0	0	40,519	38,604	27,941	18,794	0	0
Storey	0	0	0	0	0	0	0	0	0	0	0	0
Washoe	0	0	0	0	0	0	0	0	0	0	0	0
White Pine	79	70	170	134	68	6	119,360	104,393	324,555	234,831	163,199	22,331
TOTAL	471	481	875	750	286	60	541,265	544,891	1,656,618	1,357,129	582,148	89,106

<sup>1</sup>Data from the U.S. Bureau of Land Management

FY96 = Oct. 1995-Sept. 1996; FY97 = Oct. 1996-Sept. 1997

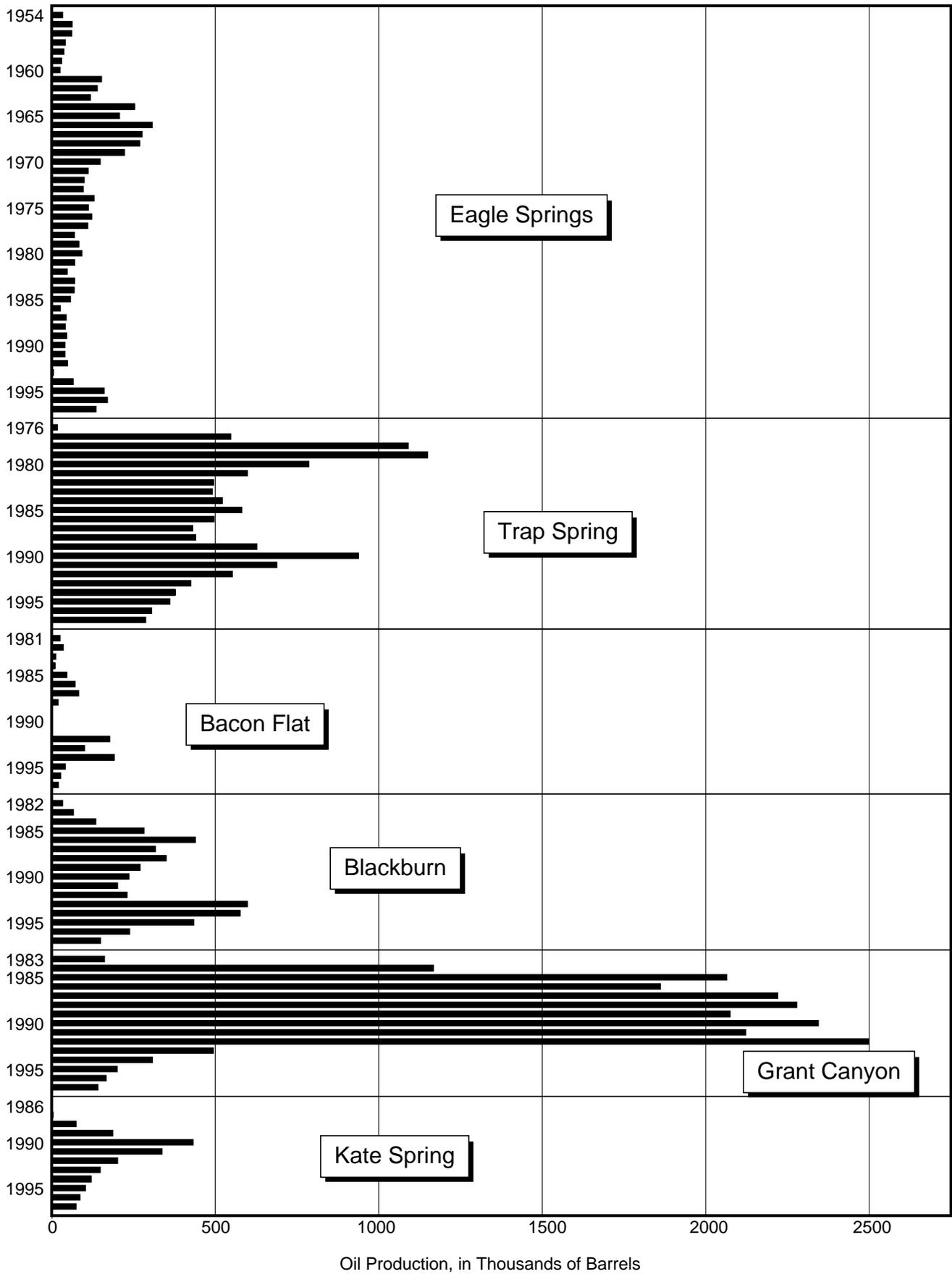
<sup>2</sup>These are the remaining leases that were issued under the simultaneous leasing program that was terminated by the December 22, 1987 amendment to the 1920 Mineral Leasing Act.

<b>PRODUCTION OF NEVADA'S OIL FIELDS (barrels)</b>									
<i>Compiled from Producer's Reports filed with the Nevada Division of Minerals</i>									
<b>Field (year discovered)</b>	<b>Thru 1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>TOTAL</b>
Eagle Springs (1954)	3,987,201	42,043	49,767	7,075	66,565	162,296	171,638	137,278	4,623,863
Trap Spring (1976)	9,235,632	690,257	554,410	427,150	378,955	362,985	306,858	288,686	12,244,933
Currant (1979)	641	0	0	0	0	278	0	202	1,121
Bacon Flat (1981)	314,660	0	178,845	102,030	192,601	43,057	28,891	22,465	882,549
Blackburn (1982)	2,143,744	203,023	231,719	599,857	576,853	435,975	239,934	151,151	4,582,256
Grant Canyon (1983)	14,184,526	2,124,021	2,499,831	495,934	308,709	202,129	168,163	143,707	20,127,020
Kate Spring (1986)	705,497	339,310	203,274	150,309	122,436	104,574	87,789	76,280	1,789,469
Tomera Ranch 1987)	9,083	3,067	2,295	2,140	1,970	1,405	387	659	21,006
N. Willow Creek (1988)	16,662	2,365	4,491	3,928	3,736	6,419	3,619	1,478	42,698
Three Bar (1990)	3,601	17,684	362	1,961	229	0	0	0	23,837
Duckwater Creek (1990)	3,095	4,190	2,764	2,256	1,269	655	433	168	14,830
Sans Spring (1993)				69,478	44,279	22,174	17,228	45,001	198,160
Ghost Ranch (1996)							34,166	113,016	147,182
Deadman Creek (1996)								109	109
<b>TOTAL</b>	<b>30,604,342</b>	<b>3,425,960</b>	<b>3,727,758</b>	<b>1,862,118</b>	<b>1,697,602</b>	<b>1,341,947</b>	<b>1,059,106</b>	<b>980,200</b>	<b>44,699,033</b>
Change from previous year		-15%	9%	-50%	-9%	-21%	-21%	-7%	

per day through the rest of the year free-flowing. Ghost Ranch No. 38-35 has nine oil shows of which the first eight make up the production zone. All are in dolomite of the Devonian Guilmette Formation. Shows 1 through 8 are between 4,341 and 4,502 feet, range from 5 and 20 feet thick, and contain oil ranging from dark-brown stains on fracture surfaces to free oil. The ninth show is a series of small shows between 4,502 and 4,570 feet that consist of spotty dark-brown stains with a dull golden fluorescence and a good streaming cut.

Also in the Ghost Ranch Field, Eagle Springs Production, LLC Ghost Ranch Federal No. 47-35 was drilled to a depth of 4,696 feet. The casing was perforated at four intervals between 4,495 and 4,623 feet. Production began 8 June 1997 with 190 barrels of fluid containing 21% water the first 24 hours and averaged about 72 barrels of 16.7 to 17.4° gravity oil and about 190 barrels of water per day through the rest of the year using a pump. Ghost Ranch No. 47-35 has six oil shows, all in limestone and dolomite of the Devonian Guilmette Formation. The

<b>Production of Water from Nevada's Oil Fields (barrels)</b>					
	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>Total since 1993</b>
Eagle Springs	160,982	331,999	432,300	364,900	1,290,181
Trap Spring	3,066,458	3,079,669	2,870,437	3,046,366	12,062,930
Currant	0	0	0	0	0
Bacon Flat	341	127,111	107,164	100,708	335,324
Blackburn	2,035,611	2,041,599	1,788,791	1,777,941	7,643,942
Grant Canyon	153,794	260,390	284,006	335,603	1,033,974
Kate Spring	467,059	514,034	580,219	529,503	2,090,815
Tomera Ranch	27,676	36,645	15,013	31,948	111,282
North Willow Creek	871	923	727	135	2,656
Three Bar	5,958	0	0	0	5,958
Duckwater Creek	23,336	12,592	6,787	1,853	44,568
Sans Spring	252,190	263,659	273,928	233,046	1,022,823
Ghost Ranch			2,775	99,945	102,720
Deadman Creek				0	0
<b>Total</b>	<b>6,033,454</b>	<b>6,668,621</b>	<b>6,362,147</b>	<b>6,362,946</b>	
Change from previous year		10.5%	-4.5%	2.5%	



first five shows, which make up the production zone, are between 4,484 and 4,654 feet, range from 5 and 35 feet thick, and contain oil ranging from dark-brown stains to free oil. The small sixth show is noted on the lithologic log at TD.

In the Sans Spring Field, Big West Oil and Gas, Inc. Sans Spring No. 5-14A was drilled to a depth of 5,671 feet. The casing was perforated between 5,644 and 5,670 feet in welded tuffs of the Tertiary Garrett Ranch Volcanics. Production began on May 8, 1997 with 267 barrels of oil with no water the first 24 hours and averaged about 207 barrels of oil and about 550 barrels of water per day throughout the rest of the year using a pump. Sans Spring No. 5-14A has three oil shows. The first show is in conglomerate of the Garrett Ranch Volcanics between 5,436 and 5,444 feet and consisted of medium and dark brown even and spotty oil stains with an even medium golden fluorescence and a good streaming cut. The second show between 5,638 and 5,648 feet and the third show between 5,655 and 5,664 feet are in welded tuff of the Garrett Ranch Volcanics and consist of medium to dark brown stains with a dull golden fluorescence and fair to good streaming cut.

## Exploration

Fourteen wells were spudded for oil and gas in 1997, down from fifteen spudded in 1996. One well spudded in 1996 was completed in 1997. Drilling was completed on 13 wells totaling 68,289 feet during 1997. At year-end, one well was temporarily abandoned, drilling suspended at one, and one was being drilled. The peak drilling rig count reached five between July through October but varied between two and three the rest of the year. At 9,708 feet, Foreland's dry hole Pine Creek No. 1-7 was the deepest well drilled in Nevada in 1997.

Significant oil shows were reported for three wells in Nye County. Frontier Exploration Co. reported its Mega Springs Federal No. 7 contained two shows. The first one is between 1,440 and 1,450 feet and consists of live oil cutting out of carbonaceous shale with a bright fluorescence and streaming cut when trichloroethane was applied. The second one is between 2,290 and 2,310 feet and consists of areas with no visible stain but has a dull gold fluorescence with a slow, weak cloudy cut. The first cut is located in black, carbonaceous, locally coally shale of the Chainman Shale. The second show is in dark-gray to brown cryptocrystalline limestone of the Joana Limestone.

Trio Petroleum, Inc., reported its Federal No. 16X-20 contained two shows. The first one is between 4,840 and 4,880 feet and consists of a trace to fair show with multiple faint oil blooms and mineral fluorescence with

no cut. The second show between 4,892 and 4,896 feet contains trace spotty black to brown-black surface stain with dull to very dull gold fluorescence with very fine yellow cut. Federal No. 16X-20 was redrilled, but the intervals 5,340 and 2,590 feet, and 5,400 and 5,410 feet only showed trace dark oil stain with no cut. The original shows are located in conglomerate within the alluvium. The shows in the redrill are located in limestone and sandstone of the Devonian Guilmette Formation.

In the Ghost Ranch Field, Makoil, Inc., reported its Ghost Ranch No. 2-21X had a show between 4,235 and 4,543 feet, ranging from brown to black oil stains to free oil in rock with vuggy porosity ranging between 20% and 50%. This show is in the Pennsylvanian Ely Limestone except for the lower 75 feet, which is in the Devonian Guilmette Formation. The casing was perforated at four intervals between 4,352 and 4,496 feet, and the well was completed as a producer. The well flowed 80 barrels of almost all water on September 11, 1997, but no oil was sold and the well was shut in.

## Transfers

No transfers occurred in 1997.

## U.S. Oil Production and Consumption

According to the Energy Information Agency (EIA) of the Department of Energy ([www.eia.doe.gov](http://www.eia.doe.gov)), petroleum imports accounted for 55.5% of U. S. consumption in 1997, which surpasses the previous annual peak of 53.6% set in 1996. Domestic crude oil dropped to its lowest level since 1954, and dependence on imports reached a new high. U. S. crude oil production averaged about 6,411,000 barrels per day in 1997, 0.83% less than in 1996. Petroleum consumption increased by 3.1%. Oil provided about 40.1% of the nation's total energy supply in 1997, according to EIA. This percentage has hovered near 40% since 1991. Coal consumption increased 2.5% in 1997 and was over 1 billion short tons for the first time. Natural gas consumption dropped 0.28%, the first drop in consumption since 1990. Natural gas use for production of electricity rose 8.7% in 1997, however electrical production consumes only about 15% of the total natural gas consumption. This and a 1.8% rise in commercial use (16% of total consumption) were offset by a 4.5% drop in residential use (25% of total consumption) and a 1.2% drop in industrial use (44% of total consumption). The drop in natural gas consumption was likely due to high prices in late 1996 and early 1997. Although dropping 33% throughout 1997, natural gas prices still averaged 10% higher than in 1996, while oil prices dropped 6.6%.

<b>NEVADA OIL PRODUCERS</b>			
<b>Company</b>	<b>Field</b>	<b>Contact</b>	<b>Address and phone number</b>
Big West Oil and Gas, Inc.	Bacon Flat Sans Spring	J. Phillips Adams	333 West Center Street North Salt Lake, UT 84054 (801) 296-7700
Eagle Springs Production, LLC	Deadman Creek Eagle Springs Ghost Ranch	Bruce C. Decker	2561 South 1560 West No. 200 Woods Cross, UT 84087 (801) 298-9866, Fax: (801) 298-9889
Foreland Corp.	North Willow Creek Tomera Ranch	Bruce C. Decker	2561 South 1560 West No. 200 Woods Cross, UT 84087 (801) 298-9866, Fax: (801) 298-9889
Frontier Exploration Co.	Trap Spring	Andy Pierce	3006 Highland Drive, No. 206 Salt Lake City, UT 84106 (801) 486-5555
Makoil, Inc.	Currant Duckwater Creek Grant Canyon Kate Spring Trap Spring	Eugene Kozlowski	66555 W. Sahara Avenue, No. B-200 Las Vegas, NV 89102-0844 (714) 939-7560
Petroleum Corporation of Nevada	Blackburn	Ken Chattin	P.O. Box 1447 Elko, NV 89801 (702) 753-6810
Trail Mountain, Inc.	Three Bar		105 South 4th Street Artesia, NM 88210 (505) 748-1471
Western General	Kate Spring	Rick Taylor	3419 Via Lido, No. 212 Newport Beach, CA 92663 (714) 548-5325, Fax: same
<i>Source: Nevada Division of Minerals (<a href="http://www.state.nv.us/b&amp;i/minerals/ogprdlst">www.state.nv.us/b&amp;i/minerals/ogprdlst</a>)</i>			

# Directory of Mining and Milling Operations

Compiled from information supplied by the Nevada Division of Minerals, Nevada Division of Mine Inspection, and U.S. Mine Safety and Health Administration. Sand and gravel operations with less than 300,000 tons annual production are not listed.

CIL = carbon-in-leach, CIP = carbon-in-pulp, HL = heap leach, ML = mill, OP = open-pit mine, OS = other surface, PL = placer, UG = underground mine.

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
<b>CHURCHILL COUNTY</b>							
<b>Huck Salt</b>	Huck Salt Co.	S12,T16N,R31E	salt	OS	solar evaporation	5	John R. Huckaby, Owner 5033 Austin Highway Fallon, NV 89406 702-423-2055
<b>Moltan Mine and Plant</b>	Moltan Co.	S28,29,32,33, T23N,R27E	diatomaceous earth	OP,ML	drying crushing screening	52	Craig Paisley, Plant Manager P.O. Box 860 Fernley, NV 89408-0860 702-423-6668 Fax: 423-6411
<b>Popcorn Perlite Mine</b>	Eagle-Picher Minerals, Inc.	S24,T16N,R28E S19,T16N,R29E	perlite	OP		1	Myron S. Burdette, Operations Manager P.O. Box 10480 Reno, NV 89510 702-343-1818 Fax: 343-1821
<b>CLARK COUNTY</b>							
<b>Apex Quarry and Plant</b>	Chemical Lime Co.	S14,22,23,26,27,34,35 T18S,R63E	lime	OP,ML	crushing calcining hydrating	60	Bryan Nielson, Operations Manager P.O. Box 3609 North Las Vegas, NV 89036 702-643-7702 Fax: 643-9517
<b>Blue Diamond Mine and Mill</b>	James Hardie Gypsum, Inc.	S20,29-31, T21S,R59E; S5-8,T22S,R59E S24-26,T21S,R58E	gypsum	OP,ML	grinding calcining	128	Gary Gottula, Plant Manager HCR 89033, Box 2900 Las Vegas, NV 89124 702-875-4111 Fax: 875-4213
<b>Bonanza Materials Pit and Plant</b>	Bonanza Materials, Inc.	S9,16,T22S,R62E	sand gravel	OP,ML	multiple bench crushing screening	40	Dan Stewart, President 565 Lalif Road Henderson, NV 89015 702-565-1313
<b>Buffalo Road Pit and Mill</b>	W.M.K. Transit Mix, Inc.	S21,T21S,R60E	sand gravel	OP,ML	single bench crushing screening	18	Peter Mahoney 6075 S. Eastern Avenue, Suite 11 Las Vegas, NV 89119 702-798-3900
<b>El Dorado Pit</b>	Lopke Granite Products	S11,T23S,R63E	crushed stone	OP	single bench crushing screening	20	Ray Huntington, President 4905 Portraits Place Las Vegas, NV 89129 702-293-2083
<b>Georgia-Pacific Quarry and Wallboard Plant</b>	Georgia-Pacific Corp.	S10,11,14,16,22, T16S,R66E S34,T18S,R63E	gypsum	OP,ML	crushing, calcining	47	Bob Shajary, Plant Manager P.O. Box 30006 North Las Vegas, NV 89030 702-643-8100 Fax: 643-2049
<b>Gornowich Plant</b>	Gornowich Sand & Gravel, Inc.	S15,22,T23S, R63E	sand gravel	OP	single bench screening	8	Robert S. Martinez, President 3450 S. Procyon Avenue Las Vegas, NV 89102 702-876-2777
<b>Henderson Plant</b>	Chemical Lime Co.	S18,T22S,R63E	dolomitic lime	ML	calcining	43	Dave Johnson, President P.O. Box 127 Henderson, NV 89015 702-565-8991
<b>Hollywood Pit and Henderson Mill</b>	Nevada Ready Mix Corp.	S32,T21S,R63E; S11,T21S,R62E	sand gravel	OP,ML	single bench crushing screening	24	Richard Thornton General Manager-Vice President P.O. Box 42755 Las Vegas, NV 89104 702-457-1115
<b>Jones Pit</b>	Blue Diamond Materials	S26,T22S,R60E	sand gravel	OP	single bench crushing screening	17	Bruce Nelson 89 Glen Carran Circle Sparks, NV 89431 702-263-2150
<b>Las Vegas Cement Plant</b>	Las Vegas Cement, Inc.	S10,T15S,R67E	cement	ML	construction	13	Aldo Dinardo, Owner and President P.O. Box 380 Logandale, NV 89021

**DIRECTORY OF MINING AND MILLING OPERATIONS (continued)**

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
<b>CLARK COUNTY (continued)</b>							
<b>Lone Mountain Community Pit</b>	Quality Sand and Gravel	S1,T20S,R59E	sand gravel	OS	single bench	2	Gary Vosburg, President P.O. Box 15476 Las Vegas, NV 89114 702-644-3668
<b>Lone Mountain Mendenhall Pit</b>	Las Vegas Paving Corp.	S35,T19S,R59E	sand gravel	OP	single bench	7	Robert Mendenhall, Owner 4420 S. Decatur Boulevard Las Vegas, NV 89103 702-378-6102
<b>Lone Mountain Nevada Ready Mix Pit</b>	Nevada Ready Mix Corp.	S36,T19S,R59E	sand gravel	OP,ML	single bench crushing screening	32	Darrel Thornton, President P.O. Box 42755 Las Vegas, NV 89104 702-457-1115
<b>Lone Mountain Stocks Pit</b>	Southern Nevada Paving	S3,4,T20S,R59E; S34,35,T19S,R59E	sand gravel	OP	single bench	35	Floyd Meldrum, President 3555 Polaris Avenue Las Vegas, NV 89102 702-876-5226
<b>Money Pit</b>	Southern Nevada Liteweight	S9,16,T25S,R61E	lightweight aggregate	OP	crushing screening	12	Spencer Apple 4675 Wynn Road Las Vegas, NV 89103
<b>PABCO Gypsum Pit and Plant</b>	Pacific Coast Building Products, Inc.	S7,T20S,R64E	gypsum	OP	single bench wash plant	83	Emil Kapilovich, Manufacturing Mgr. 1973 N. Nellis Boulevard #328 Las Vegas, NV 89115 702-643-1016 Fax: 643-6249
<b>Salt Lake Highway Pit</b>	American Sand and Gravel	S25,T19S,R62E	sand gravel	OP	single bench	6	Art Melonas, Owner 5004 Stanley Avenue Las Vegas, NV 89115 702-452-1900
<b>Simplot Silica Products Pit and Mill</b>	Simplot Industries	S30,T16S,R68E	silica sand	OP,ML	flotation drying screening	44	Jack Olsen, Manager P.O. Box 308 Overton, NV 89040 702-397-2667 Fax: 397-2798
<b>Sloan Quarry</b>	Chemical Lime Co.	S12,13,T23S,R60E S18,T23S,R61E	dolomite	OP	crushing	7	Bryan Nielson, Regional Operations Manager HCR 37, Box 2300 Las Vegas, NV 89124 702-361-6901 Fax: 361-7890
<b>Sloan rock pit</b>	Frehner Construction Co.	S13,T23S,R60E	sand gravel	OS,ML	single bench crushing screening	11	Donald G. Groch, Vice President/ General Manager 124 West Brooks Avenue North Las Vegas, NV 89030 702-649-6250
<b>Spring Mountain Pit and Mill</b>	Wells Cargo, Inc.	S15,T21S,R60E	sand gravel	OS,ML	multiple bench crushing screening	8	Howard Wells, General Manager P.O. Box 81170 Las Vegas, NV 89180 702-873-7440

**ELKO COUNTY**

<b>Dee Gold Mine</b>	Rayrock Mines, Inc.	S33,34,T37N,R49E; S3,4,T36N,R49E	gold silver	OP,ML	milling HL	37	Dave Cook, General Manager P.O. Box 160 Valmy, NV 89438 702-738-6440 Fax: 635-2455
<b>Dunphy Mill</b>	Baroid Drilling Fluids, Inc.	S26,T33N,R48E	barite	ML	crushing grinding	46	Paul J. Mills, Production Manager P.O. Box 340 Battle Mountain, NV 89820 702-468-0515 Fax: 468-2060
<b>Jerritt Canyon Joint Venture</b>	Independence Mining Co.	T39-41N,R52-54E	gold silver	OP,ML, UG	CIP, CIL HL	551	Ben Guenther Senior Vice President HC31, Box 78 Elko, NV 89801 702-758-9221 Fax: 758-9231
<b>Kinsley Mountain Mine</b>	Alta Gold Co.	S4,5,6,T26N,R68E	gold	OP	HL	97	Joe Pescio, General Manager 778 S. Pioche Highway Ely, NV 89301 702-289-3007 Fax: 289-4138

*continued*

**DIRECTORY OF MINING AND MILLING OPERATIONS (continued)**

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
<b>ELKO COUNTY (continued)</b>							
<b>Meikle Mine</b>	Barrick Goldstrike Mines, Inc.	S13,T36N,R50E	gold	UG	CIL cyanide autoclaving	286	Donald R. PrahI P.O. Box 29 Elko, NV 89803 702-778-8196 Fax: 738-6543
<b>Pilot Peak Lime Plant</b>	Continental Lime, Inc.	S14,15,22,23,26, T34N,R68E	lime	OP,ML	multiple bench roasting grinding rotary kiln	57	Jack Elliott, Plant Manager P.O. Box 2520 Wendover, NV 89883 702-478-5463 Fax: 478-5149
<b>Rossi Mine</b>	Baroid Drilling Fluids, Inc.	S14-16,21-23, 26-28,34-35; S15,21,22, T37N,R49E	barite	OP	multiple bench crushing	47	Paul J. Mills P.O. Box 340 Battle Mountain, NV 89820 702-468-0515 Fax: 468-2060
<b>ESMERALDA COUNTY</b>							
<b>Basalt Mine and Mill</b>	Grefco Minerals, Inc.	S29-32,T2N,R34E	diatomaceous earth	OP,ML	grinding	4	Robert A. Poelvoorde, Plant Manager P.O. Box 288 Mina, NV 89422 Dicalite Toll Station #1 Fax: 619-872-6006
<b>Blanco Mine</b>	Vanderbilt Minerals Corp.	S22,T1N,R37E	clay	OP	grinding bagging	6	Jerry W. Lease 2320 Viking Road Las Vegas, NV 89109 702-732-3174
<b>Goldfield Operation</b>	American Resource Corp.	S35,T2S,R42E	gold	OP	HL	10	Conrad Henshaw, Vice President P.O. Box 160 Goldfield, NV 89013 702-485-3218 Fax: 485-3268
<b>Mineral Ridge Mine</b>	Mineral Ridge Resources, Inc.	S1,2,6,7,11,12,31, 35,36,T1-2S, R38-39E	gold silver	OP	HL	48	Thomas R. Rinaldi, General Manager P.O. Box 67 Silver Peak, NV 89047 702-937-2266 Fax: 937-2201
<b>Silver Peak Operations</b>	Cyprus Foote Mineral Co.	S22,T2S,R39E	lithium carbonate	OS	solar evaporation precipitation	82	C.B. Loundagin, Vice President P.O. Box 98 Silver Peak, NV 89047 702-937-2222 Fax: 937-2250
<b>EUREKA COUNTY</b>							
<b>Betze-Post Mine</b>	Barrick Goldstrike Mines, Inc.	S12,20,29,30, T36N,R50E; S23-26,T36N,R49E	gold silver	OP,ML	CIL cyanide milling	1,723	Donald R. PrahI, Vice President P.O. Box 29 Elko, NV 89803 702-778-8196 Fax: 738-6543
<b>Gold Bar Mine</b>	Atlas Gold Mining, Inc.	S26,27,T22N,R49E	gold	OP,ML, HL	CIL,CIP	7	Don Canepa P.O. Box 282 Eureka, NV 89316 702-237-5621
<b>Newmont Gold Operations</b>	Newmont Gold Co.	T31-36N, R49-53E	gold silver mercury	OP,ML, UG	bioleaching HL roasting	2,271	Tom Enos, General Manager P.O. Box 669 Carlin, NV 89822-0669 702-778-4000 Fax: 778-4754
<b>Ruby Hill Mine</b>	Homestake Mining Co.	S9-11,14,15 T19N,R53E	gold silver	OP,ML	HL	95	Bruce H. Thieking P.O. Box 676 Eureka, NV 89316 702-237-6060 Fax: 237-5408
<b>HUMBOLDT COUNTY</b>							
<b>Bonanza Opal Mine</b>	Lloyd H. Olds	S13,T45N,R25E	precious opal	OP	single bench	3	Lloyd H. Olds P.O. Box 13 Denio, NV 89404
<b>Crofoot/Lewis Mine (Hycroft)</b>	Hycroft Resources & Development, Inc.	S35,T35N,R29E; S19,T35N,R30E	gold silver	OP	crushing HL	215	Hank Lesinski, General Manager P.O. Box 3030 Winnemucca, NV 89446 702-623-5260 Fax: 625-0215
<b>Disaster Peak Clay Mine</b>	American Colloid Co.	S26,T47N,R34E	hectorite	OP	single bench		Pete Maul 1500 West Shure Drive Arlington Heights, IL 60004 847-392-4600 Fax: 506-6199

**DIRECTORY OF MINING AND MILLING OPERATIONS (continued)**

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
<b>HUMBOLDT COUNTY (continued)</b>							
<b>Getchell Mine</b>	Getchell Gold Corp.	S33,T39N,R42E	gold silver	UG	milling	493	R. David Russell, VP/COO P.O. Box 220 Golconda, NV 89414 702-635-5001
<b>Kelley Mine</b>	C. George Hewitt	S30,T45N,R26E	precious opal	OP		1	C. George Hewitt, Owner P.O. Box 33 Denio, NV 89404
<b>Lone Tree Mine</b>	Newmont Gold Co.	S1,11,13,15,23, T34N,R42E	gold silver	OP,ML	HL oxide milling flotation	548	Ali Soltani, General Manager P.O. Box 388 Valmy, NV 89438 702-635-9000 Fax: 635-0111
<b>Marigold Mine</b>	Rayrock Mines, Inc.	S8,9,18-20, T33N,R43E	gold	OP,ML	HL	107	Virgil Larios, General Superintendent P.O. Box 160 Valmy, NV 89438 702-623-0818 Fax: 635-2455
<b>MIN-AD Mine and Mill</b>	MIN-AD, Inc.	S25,T36N,R37E; S28,T35N,R38E	dolomite	OP	grinding air separation screening	13	Charles Evans, Superintendent 4210 W. Jungo Road Winnemucca, NV 89445 702-623-5944 Fax: 623-9028
<b>Pinson Mine</b>	Pinson Mining Co.	S28,29,32,33, T38N,R42E	gold silver	OP,ML	HL, CIL	91	Ken A. Kluksdahl, General Manager P.O. Box 2280 Winnemucca, NV 89445 702-623-5036 Fax: 623-5030
<b>Sexton Mill</b>	Nutritional Additives Corp.	S20,T36N,R38E	dolomite	ML	crushing screening	6	W. Glen Sexton, CFO 1230 Bridge Street Winnemucca, NV 89445
<b>Twin Creeks Mine</b>	Newmont Gold Co.	S3-10,15-22,27-32 T39N,R43E	gold silver	OP	HL milling	850	Trent Tempel, General Manager P.O. Box 69 Golconda, NV 89414 702-635-9400 Fax: 635-4596
<b>LANDER COUNTY</b>							
<b>Argenta Mine and Mill</b>	Baker Hughes INTEQ	S14,T32N,R46E; S6,18,19,T32N,R47E	barite	OP	gravity grinding	20	Keith S. Olson, Manager P.O. Box 277 Battle Mountain, NV 89820 702-635-5441
<b>Battle Mountain Complex (Fortitude)</b>	Battle Mountain Gold Co.	S22,27,33,34, T31N,R43E	gold silver	OP	HL	40	Brian Anderson, General Mine Mgr. P.O. Box 1627 Battle Mountain, NV 89820 702-635-2465 Fax: 635-8677
<b>Battle Mountain Grinding Plant</b>	M-I Drilling Fluids LLC	S18,T32N,R45E	barite	ML	gravity grinding	26	Garry Thielen, Operations Manager P.O. Box 370 Battle Mountain, NV 89820 702-635-5135 Fax: 635-2191
<b>Cortez Gold Mines</b>	Placer Dome U.S., Inc.	S33,34, T27N,R47E	gold silver	OP,ML	HL CIL	466	Art Walsh, Mine Manager HC66-50 Beowawe, NV 89821 702-468-4400 Fax: 468-4496
<b>Dean Mine</b>	St. George Metals, Inc.	S36,T30N,R45E	gold silver	UG,OP	exploration development	29	Frank Varseveld, President 1140 Chukar Lane Battle Mountain, NV 89820 702-635-2208
<b>Greystone Mine</b>	M-I Drilling Fluids LLC	S35,T28N,R45E	barite	OP	gravity	52	Garry Thielen, Operations Manager P.O. Box 370 Battle Mountain, NV 89820 702-635-5135 Fax: 635-2191
<b>McCoy/Cove Mine</b>	Echo Bay Minerals Co.	S2-11,T28N,R42E; S36,T29N,R42E	gold silver	OP,ML	HL milling	450	Rick Baker, General Manager P.O. Box 1658 Battle Mountain, NV 89820 702-635-5500 Fax: 635-5098
<b>Mule Canyon Mine</b>	Newmont Gold Co.	T31/32N,R47E	gold	OP			Ali Soltani, General Manager P.O. Box 388 Valmy, NV 89438 702-635-9000 Fax: 635-0111

**DIRECTORY OF MINING AND MILLING OPERATIONS (continued)**

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
<b>LINCOLN COUNTY</b>							
<b>Delamar-Mackie Perlite Mine and Caliente Plant</b>	Wilkin Mining & Trucking Co.	S34,T4S,R62E (mine); S5,T4S,R67E (plant)	perlite	UG,ML	room pillar crushing expansion	10	Dennis Sonnenberg, President P.O. Box 829 Panaca, NV 89042 702-728-4463 Fax: 728-4456
<b>LYON COUNTY</b>							
<b>Adams Claim</b>	Art Wilson Co.	S25,T16N,R20E	gypsum/ anhydrite	OP,ML	crushing	7	Art Wilson, President P.O. Box 1160 Carson City, NV 89702 702-882-0700 Fax: 882-0790
<b>Dayton Pit</b>	Granite Construction Co.	S25,T16N,R21E	sand gravel	OP	crushing screening	5	Jim Roberts, Branch Manager P.O. Box 2087 Sparks, NV 89432 702-358-8792
<b>Hazen Pit</b>	Eagle-Picher Minerals, Inc.	S6,9,T19N,R26E	diatomite	OP	crushing drying calcining	2	Myron Burdette, Operations Manager P.O. Box 10408 Reno, NV 89510 702-343-1818 Fax: 343-1821
<b>Nevada Cement Mine and Plant</b>	Nevada Cement Co.	S3-6,9,T19N,R25E S36,T40N,R24E; S31-33,T20N,R25E S2,3,10,11, T20N,R25E	limestone cement	OP,ML	rotary kiln	139	Allan Steagall, President P.O. Box 840 Fernley, NV 89408 702-575-2281 Fax: 575-4387
<b>Section 8 Mine and Fernley Mill</b>	CR Minerals Corp.	S8,17,T19N,R26E S11,T20N,R24E	diatomaceous earth	OP,ML	grinding drying milling	17	Chris Harris, Manager of Operations P.O. Box 858 Fernley, NV 89408 702-575-2536 Fax: 575-4857
<b>Yerington and MacArthur Mines</b>	Arimetco Inc.	S8,9,16,17,20,21, T13N,R25E S19,30,T14N,R25E	copper	OP	HL solvent extraction electrowinning	97	H.R. Snipes, President 102 Burch Drive Yerington, NV 89447 702-463-3125 Fax: 463-3127
<b>MINERAL COUNTY</b>							
<b>Aurora Mine</b>	Nevada Goldfields, Inc.	S8,17,18, T5N,R28E	gold silver	OP,UG, ML	crushing grinding CIL	36	F.E. "Bill" Dubois III, General Mgr. P.O. Box 3070 Hawthorne, NV 89415 702-945-3368 Fax: 945-3360
<b>Candelaria Mine</b>	Kinross Candelaria Mining Co.	S32-34,T4N,R35E;	silver gold	OP	HL Merrill-Crowe	22	James M. Gillis, Project Manager P.O. Box 1240 Hawthorne, NV 89415 702-573-2471 Fax: 573-2520
<b>Denton-Rawhide Mine</b>	Kennecott Rawhide Mining Co.	S4,5,8,16,17, T13N,R32E	silver gold	OP	HL	190	D.H. Batchelor, General Manager P.O. Box 2070 Fallon, NV 89407 702-945-1015 Fax: 945-1213
<b>NYE COUNTY</b>							
<b>Ash Meadows Plant</b>	American Resource Corp.	S25,T18S,R50E	zeolite	ML	screening drying bagging	4	Dave Lewis State Route 15 P.O. Box 7006 Amargosa Valley, NV 89020 702-372-5524
<b>Bullfrog Mine</b>	Barrick Gold Corp.	S3,10,14,15,16,24, 26,27,T12S,R46E	gold silver	OP,UG	milling	305	David McClure, General Manager P.O. Box 519 Beatty, NV 89003 702-553-2900 Fax: 553-2963
<b>Cinder Cone Pit</b>	Cind-R-Lite Co.	S36,T14S,R48E; S1,T15S,R48E	cinder	OP	gravity	2	H.D. Allen, President 3333 Cinder Lane Las Vegas, NV 89103 702-876-1775
<b>Crown Mine/Ione Placer/ Primary Mill</b>	Ione Gold Mining Co.	S28,34, T13N,R39E	gold silver	ML,OP	screening washing	15	Hugh Marshall, President Route 1, Box 29A Austin (Ione), NV 89310 702-964-2003

**DIRECTORY OF MINING AND MILLING OPERATIONS (continued)**

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
<b>NYE COUNTY (continued)</b>							
<b>Daisy Gold Mine</b>	Rayrock Mines, Inc.	S11-15,22,23, T12S,R47E; S7,8,18, T12S,R48E	gold	OP	HL	64	Glenn Holley, General Manager P.O. Box 190 Beatty, NV 89003 702-553-2234 Fax: 553-2295
<b>Gabbs Mine and Mill</b>	Premier Services Corp.	S23,25-27,34-36, T12N,R36E	magnesite	OP,ML	calcining gravity grinding packaging	96	Don Pressey, General Manager P.O. Box 177 Gabbs, NV 89409 702-285-2601 Fax: 285-4021
<b>Invite Plant and Pits</b>	IMV Nevada	S28,29,T17S,R49E; S6,21,T17S,R51E	clay minerals	OP	screening grinding drying	35	Glenn Kennedy, Plant Manager Route Box 549 Amargosa Valley, NV 89020 702-372-5341 Fax: 372-5640
<b>Lathrop Mill</b>	American Borate Co.	S36,T17S,R49E	calcium borate	ML	flotation calcination	9	Darrel Cypert, Vice President Star Route 15 Box 610 Amargosa Valley, NV 89020 702-372-5339
<b>Nevada Neanderthal Plant</b>	Nevada Neanderthal Stone	S10,T11S,R47E	dimension stone	ML	stone cutting	6	Dave Spicer, President P.O. Box 897 Beatty, NV 89003 702-553-2454
<b>New Discovery Mine and Mill</b>	Vanderbilt Minerals Corp.	S13,14,T12S,R46E; S18,19,T12S,R47E	clay	UG,ML	grinding bagging	8	Jerry W. Lease, VP General Manager 2320 Viking Road Las Vegas, NV 89109 702-732-3174 Fax: 731-3621
<b>Round Mountain Mine</b>	Echo Bay Mines Homestake Bargold	S19,20,29,30, T10N,R44E	gold silver	OP,ML	HL	697	Steve Mueller, General Manager P.O. Box 480 Round Mountain, NV 89045 702-377-2366 Fax: 377-3240
<b>Sterling Mine</b>	Cathedral Gold US Corp.	S13,T13S,R48E	gold	UG,ML	HL	36	Chuck Stevens, Mine Manager P.O. Box 549 Beatty, NV 89003 702-222-4844 Fax: 372-1720

**PERSHING COUNTY**

<b>Buff Mine</b>	Vanderbilt Minerals Corp.	S2,T27N,R32E	clay	OP	grinding bagging	6	Jerry W. Lease 2320 Viking Road Las Vegas, NV 89109 702-732-3174
<b>Coeur Rochester Mine</b>	Coeur D'Alene Mines Corp.	S9,10,11,15,16, 21,22,27,28, T28N,R34E	silver gold	OP	HL Merrill-Crowe	288	Edgar Smith, Vice President P.O. Box 1057 Lovelock, NV 89419 702-273-7995 Fax: 273-7423
<b>Colado Mine and Plant</b>	Eagle-Picher Minerals, Inc.	S6,7,16,18,21,25, T28N,R29E; S33,T28N,R32E	diatomite perlite	OP,ML	drying classification grinding calcining	114	José Ontiveros, Operations Manager 150 Coal Canyon Road Lovelock, NV 89419 702-273-2636 Fax: 273-7553
<b>Empire Quarry</b>	United States Gypsum Co.	S31,T31N,R24E	gypsum	OP	crushing calcining	10	Michael L. Christopher, Mine Manager P.O. Box 130 Empire, NV 89405 702-557-2341
<b>Florida Canyon Mine</b>	Florida Canyon Mining, Inc.	S2-4,9-11,14-16, 37-39,T31N,R33E	gold silver	OP	HL	301	Doug Stewart, General Manager P.O. Box 330 Imlay, NV 89418 702-538-7300 Fax: 538-7324
<b>Rosebud Mine</b>	Hecla Mining Co.	S13,24,T34N,R29E S18,19,T34N,R30E	gold silver	UG		102	Ronald W. Clayton, General Manager P.O. Box 2610 Winnemucca, NV 89446 702-623-6912 Fax: 623-6967
<b>Section 8 Mine</b>	American Colloid Co.	S8,T27N,R33E	clay	OP	single bench		Pete Maul 1500 West Shure Drive Arlington Heights, IL 60004 847-392-4600 Fax: 506-6199
<b>Sexton Mine and Mill</b>	Nutritional Additives Corp.	S5,8,T34N,R38E	dolomite	OP	grinding	6	Donald Sexton, Co-owner 415 Wellington Street Winnemucca, NV 89445 702-623-3328

**DIRECTORY OF MINING AND MILLING OPERATIONS (continued)**

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
<b>STOREY COUNTY</b>							
<b>Clark Mine and Mill</b>	Eagle-Picher Minerals, Inc.	S27,33,34, T20N,R23E; S35,T20N,R22E	diatomite	OP,ML	grinding drying	67	Myron S. Burdette, Operations Manager P.O. Box 10408 Reno, NV 89510 702-343-1818 Fax: 343-1821
<b>Golden Eagle Mine and Mill</b>	American Eagle Resources, Inc.	S23,24,26, T17N,R21E	gold silver	OP	HL	7	Bob Spengler, Manager of Operations P.O. Box 859 Virginia City, NV 89440 702-246-0761 Fax: 246-3117
<b>Lower Naturalite Pit and Plant</b>	Naturalite Aggregate Corp.	S16,T17N,R22E	lightweight aggregate	OS,ML	multiple bench crushing screening	6	Fritz Anthes, General Manager 2600 Boeing Way Carson City, NV 89701
<b>Patrick Pit</b>	Granite Construction	S6,T19N,R22E	sand gravel	OP	single bench	11	Jim Roberts, Branch Manager P.O. Box 2087 Sparks, NV 89432 702-358-8792
<b>WASHOE COUNTY</b>							
<b>Bella Vista Pit</b>	A&K Earth Movers Inc.	S3,T18N,R20E	rock gravel	OP	single bench screening		Michael A. Hiatt, Vice President P.O. Box 1059 Fallon, NV 89407 702-423-8898
<b>Clay Mine</b>	Art Wilson Co., contractor for Nevada Cement Co.	S13,T27N,R19E	clay	OP	single bench	5	Art Wilson, Operator P.O. Box 1160 Carson City, NV 89702 702-246-0282
<b>Empire Mill</b>	United States Gypsum Co.	S11,13,T31N,R23E	gypsum	ML	grinding calcining	129	Kenneth A. Samuelson, Plant Manager P.O. Box 130 Empire, NV 89405 702-557-2341
<b>Lockwood Quarry</b>	Granite Construction Co.	S17,T19N,R21E	aggregate	OP	single bench crushing screening	7	Jim Roberts, Branch Manager P.O. Box 2087 Sparks, NV 89432 702-358-8792
<b>102 Ranch Pit</b>	Lost Dutchman Construction Co.	S36,T20N,R22E	sand gravel	OS,ML	crushing screening	5	Jerry Helms P.O. Drawer 608 Sparks, NV 89432 702-356-5515
<b>Paiute Pit</b>	Paiute Pit Aggregates, Inc.	S22,27,34, T21N,R24E	sand gravel	OP	single bench	7	Alex Karlshoet, Owner P.O. Box 159 Wadsworth, NV 89442
<b>Rilite Aggregate Pit</b>	Rilite Aggregate Co.	S23,T18N,R20E	aggregate	OP	grinding crushing	8	Bruno Benna P.O. Box 11767 Reno, NV 89511 702-853-1463
<b>Sha-Neva Pits</b>	Sha-Neva Inc.	S24,T21N,R19E; S17,T19N,R21E	aggregate	OP	screening	6	Pat Shane, President 10655 Sha-Neva Rd. Truckee, CA 96161 530-587-3525
<b>Sky Ranch Pit</b>	Rocky Ridge, Inc.	S15,T21N,R20E	sand gravel	OS,ML	multiple bench crushing screening	15	Pat Shane, President 10655 Sha-Neva Rd. Truckee, CA 96161 530-587-3525
<b>WHITE PINE COUNTY</b>							
<b>Bald Mountain Mine (Includes Alligator Ridge, Yankee Projects)</b>	Placer Dome U.S. Inc.	T24N,R57E	gold	OP	HL	183	Douglas Bailey, Mine Manager P.O. Box 2706 Elko, NV 89803 702-744-4227 Fax: 744-4216
<b>Mt. Hamilton Mine</b>	Rea Gold Corp.	S5-8,16,17,21 T16N,R57E	gold silver	OP	HL	146	Todd Fayram P.O. Box 150476 East Ely, NV 89315
<b>Robinson Mine</b>	BHP Copper North America	S7-18,T16N,R62E	copper gold silver	OP,ML	milling	440	Lee Browne, Vice President P.O. Box 382 Ruth, NV 89319 702-289-7000 Fax: 289-7009

For additional information on Nevada's mineral resources and mineral industries see the following NBMG publications:

### **Statewide Commodity Bulletins**

Antimony (B61)	Oil and gas (B104)
Barite (B98)	Radioactive minerals (B81)
Fluorspar (B93)	Talcose minerals (B84)
Gypsum (B103)	Thermal waters (B91)
Iron (B53)	Tungsten (B105)
Mercury (B41)	Zeolites (B79)
Montmorillonite, bentonite, and fuller's earth (B96)	

### **County Mineral Resource Bulletins**

Carson City (B75)	Eureka (B64)	Nye (B77, B99B)
Churchill (B83)	Humboldt (B59)	Pershing (B89)
Clark (B62)	Lander (B88)	Storey (B70)
Douglas (B75)	Lincoln (B73)	Washoe (B70)
Elko (B106)	Lyon (B75)	White Pine (B85)
Esmeralda (B78)	Mineral (B58)	

### **Special Publications**

- Oil and gas wells drilled in Nevada since 1986 (L-8)
- Geothermal wells drilled since 1979 (L-5)
- Nevada mining and you (SP8)
- Nevada ore and concentrate buyers, custom mills, and smelters available to mine operators (L-7)
- Major mines of Nevada 1997 (P-9)
- Outline of Nevada mining history (SP15)
- Mining districts of Nevada (R47)

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- petroleum and geothermal exploration and production
- mining district records and maps
- mineral resources and reserves
- mineral resource assessments
- core and cuttings library
- mining claim data
- wilderness study area reports
- general geologic studies
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