CLAY TURQUOISE Hg DIATOMITE Li Au OIL Cu Ag Pb

NEVADA BUREAU OF MINES & GEOLOGY
SPECIAL PUBLICATION MI-1982

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THE NEVADA MINERAL INDUSTRY 1982

WO_3 MAGNESITE OPAL BARITE Ag Hg Zn BARITE DIATOMITE Au CRUSHED ROCK Mo Mo GRAVEL PERLITE Hg OIL CEMENT LIME Hg WO_3 Au Si GRAVEL Li SALT WO_3 Li Fe Au MAGNESITE TALC GYPSUM FLUORSPAR Au OIL SAND BARITE PUMICE

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NEVADA BUREAU OF MINES & GEOLOGY
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THE NEVADA MINERAL INDUSTRY—1982

(Prepared in cooperation with the United States Bureau of Mines)

Metals
Industrial Minerals
Geothermal
Oil and Gas

Exploration
Development
Mining
Processing

John Schilling
Director/State Geologist
Nevada Bureau of Mines and Geology

1983

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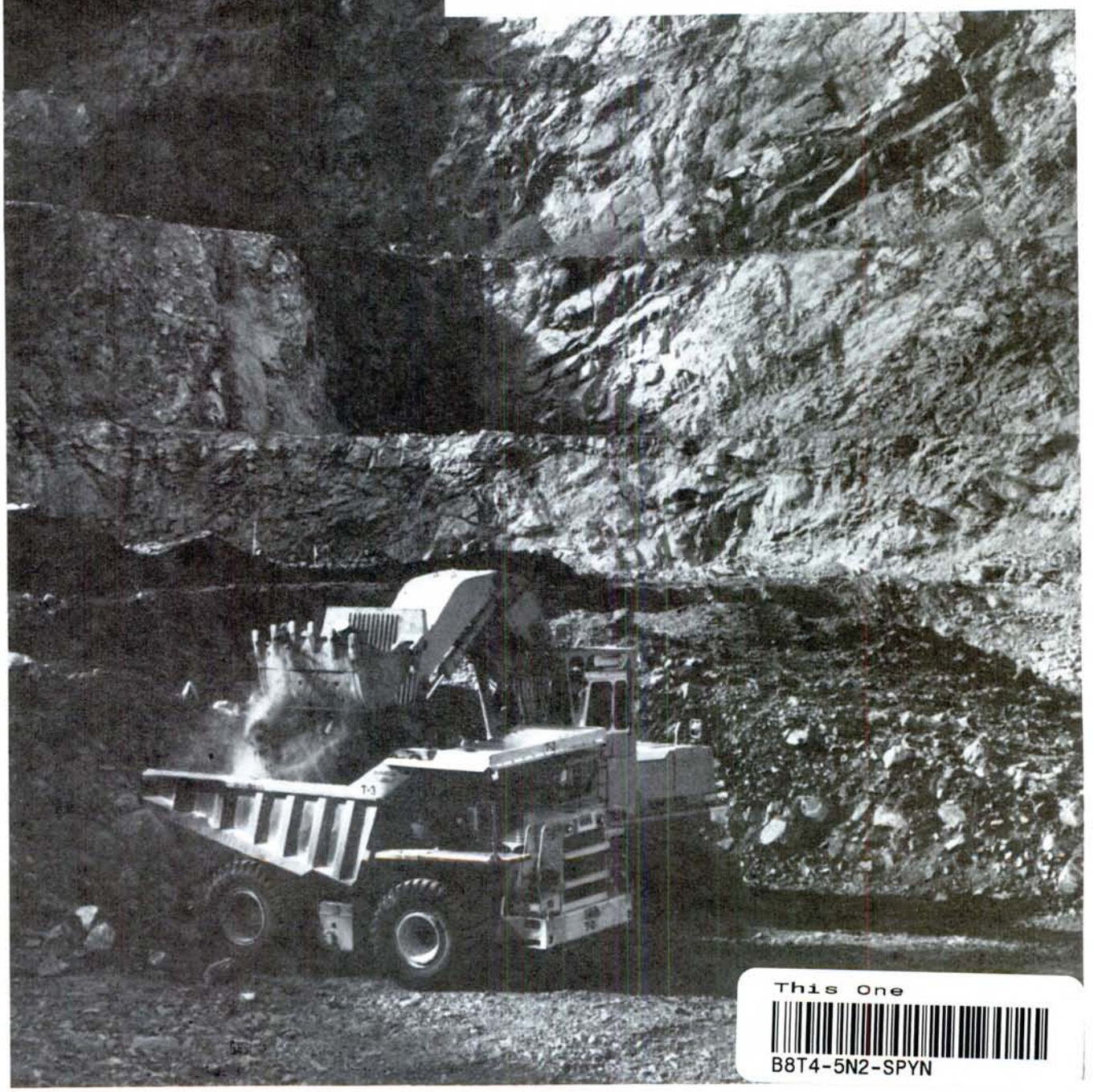

This One
B8T4-5N2-SPYN

Pinson open-pit gold mine. *Pinson Mining Co. photo.*

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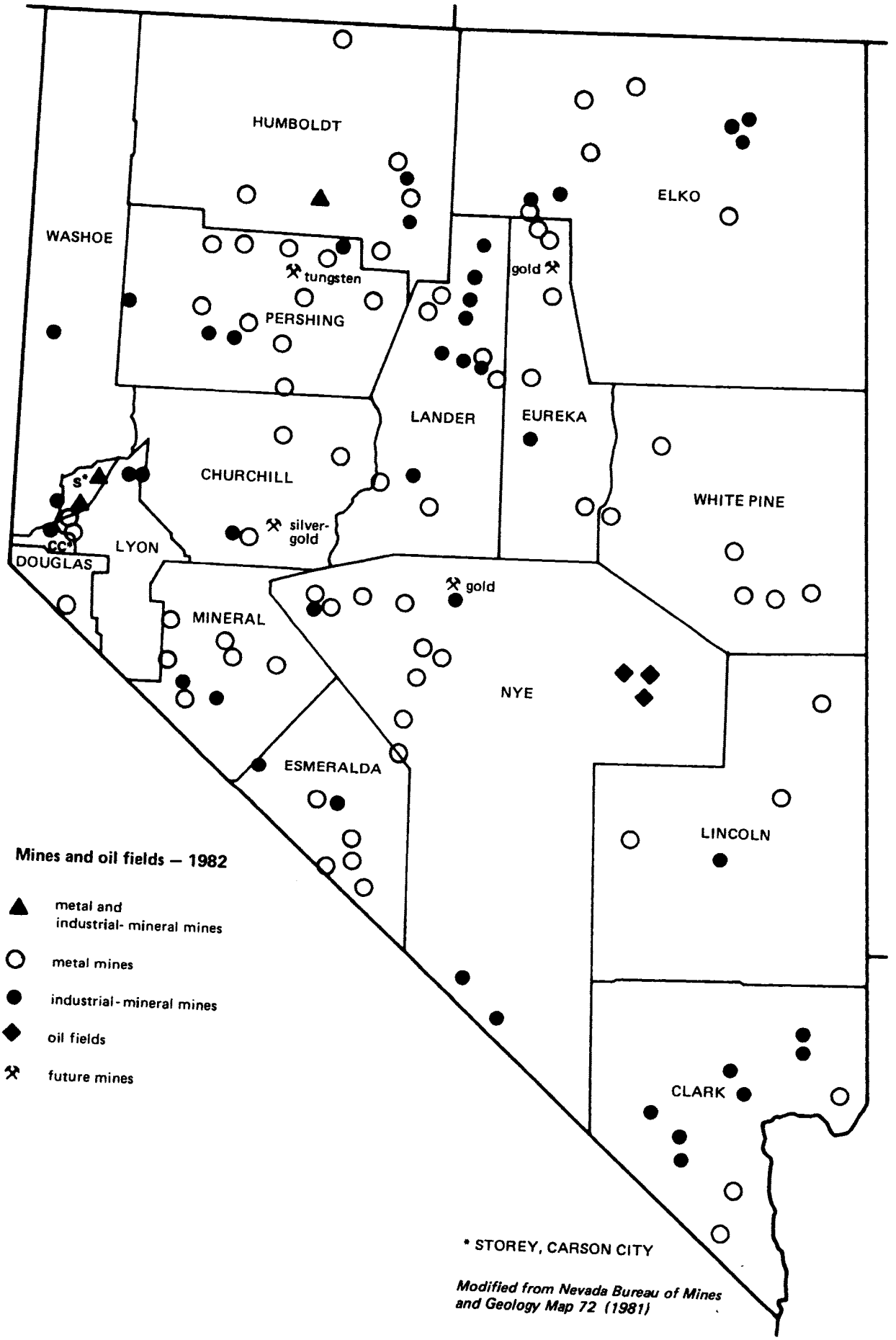

Modified from Nevada Bureau of Mines and Geology Map 72 (1981)

INTRODUCTION

This report is the fourth of an annual series. Its purpose is to discuss 1982 activities in Nevada's mineral-resource industry. It describes mineral exploration and development programs, discovery of orebodies, new mines opened, expansions and closings at existing mines, oil and gas drilling and production, and geothermal drilling and utilization. A directory of operating mines and a discussion of mining's economic impact on the State is also included.

MINERALS

EXPLORATION

To find (explore or prospect for) an ore deposit is a complex, time consuming, expensive undertaking. Exploration requires outlining geologically favorable areas, using all the geologic data available, adding mapping and other studies to narrow down the search to a relatively small area (a "target"), and following these steps by a more detailed examination including sampling and drilling to outline the ore.

Exploration in Nevada, whether by the weekend prospector or highly trained geologist, continued but at a much lower level than in 1981. Many companies closed their exploration offices and laid off their entire staffs; many others made deep cuts in their staffs and operating budgets. However, more exploration is underway in Nevada than other states, mainly because of the interest in and potential for finding gold. The U.S. Bureau of Land Management reported that more claims were recorded in Nevada in 1982 than in any other western state.

CLAIMS RECORDED BY BLM*

Year	New claims	Total active claims
1980	43,175	–
1981	49,284	–
1982	30,531	241,158

*U.S. Bureau of Land Management.

TOTAL CLAIMS FILED WITH BLM*

	1976–1982
Nevada	263,997
Utah	263,595
Wyoming	221,169
Colorado	197,404
Arizona	193,391
California	123,201
New Mexico	123,115
Oregon	55,778

*U.S. Bureau of Land Management.

Bethex, Brazos Metals, Conoco, Coastal Mining, Energex, Energy Resources (ERG), **Hecla, Inspiration, Moly Corp, Patino Mines, Phillips Mineral, Pathfinders, Seremin** (BGRM), **Tech Resources, T.R.V., Union Carbide,** and **Western Nuclear** were reported to have closed their Nevada exploration offices; others including **Anaconda, Gulf Minerals, Homestake, Noranda, Phelps Dodge,** and **Utah International** made cutbacks. These cuts have been so deep that future needs for minerals will be difficult to meet—in order to find enough new mines to satisfy this demand, more exploration is needed now. Nevada should continue to encourage exploration now, if mining is to be economically important in the years ahead.

Exploration, by its nature, is a rather secretive undertaking; for this reason much of what goes on is not public knowledge. Only a very few of the many exploration targets being examined in Nevada are mentioned below.

Metals

Utah International continued exploration for tungsten in the area around the Springer tungsten mine in Pershing County. Exploration activity continued after the mill and mine had been placed on standby late in the year.

Houston International Minerals Corp. continued exploratory drilling for gold in the Manhattan area of Nye County to offset dwindling reserves at their Manhattan Mine (Tonopah Times Bonanza, 28 Jan 82).

Conoco, Inc. closed its Reno exploration office and stopped exploration activities for copper at Pumpkin Hollow east of Yerington, Lyon County, and for gold at the Getchell Mine north of Golconda in eastern Humboldt County. All other exploration projects in Nevada were halted as well. Some 20 employees will be laid off. (Mason Valley News, Yerington, 23 Jul 82; Humboldt Sun, Winnemucca, 20 Jul 82). Conoco reportedly had located 1.4 million metric tons of new ore containing 0.22 oz gold/metric ton at Getchell by drilling (Mine Development Monthly, 19 Nov 82).

Veta Grande Companies, Inc. announced a program of geologic mapping, drilling, and underground exploration at the Mohawk Mine west of Silver Peak in Esmeralda County (Mining Record, Denver, 10 Feb 82).

Asarco has placed its Rochester property on hold due to cutbacks in its exploration program. Reserves are estimated at 80 million metric tons averaging 1.5 oz silver and 0.008 oz gold/metric ton. (Mine Development Monthly, 19 Nov 82).

Hecla continued gold-silver exploration at Cherry Creek in White Pine County. **Newmont** continued drilling for gold in the Railroad district in Elko County. **PanCana Resources** did exploratory drilling for gold in the Lynn district, Eureka County. **Westley Mines** drilled for gold and silver in the Santa Fe district, Mineral County. **Energex Minerals** reportedly did some drilling for gold and silver in the Eagle Valley district, Carson City "County," and at the Ashby prospect in the Pamlico district, Mineral County. **New Beginnings Resources** drilled for gold and silver in the Kingston district, Lander County.

Exxon's molybdenum prospect at Mt. Hope north of Eureka. *Ertec photo.*

Coeur d'Alene Mines Corp. opened an exploration office at Verdi. **Nev-Con** (Falconbridge), **Atlas Minerals**, and **Nicor Mineral Ventures** opened offices in Reno.

Industrial Minerals
by Keith G. Papke

Exploration for barite, which has dominated industrial mineral exploration in Nevada for the past decade, was at a much lower level in 1982; in terms of money expended or number of people employed, the 1982 figures were perhaps only one-half of those for 1980. The principal reason for this decline in exploration was softening of the market for barite because of sharply decreased domestic drilling for oil and gas and the increased imports of barite, mostly from Mainland China, Chile, and Morocco, at delivered prices well below those for Nevada material. Reserves of bedded barite in Nevada are large, but most of the reserves are held by several of the large barite producers. I estimate enough barite to support production for 45 years at the average mining rate for the past three years. The long-term outlook for Nevada barite continues to be good.

Exploration for other industrial minerals, always a rather secretive and solitary activity, remained at about the same level as in the past. Some increased interest was noted for materials used in insulation, such as diatomite and perlite for high-alumina refractory materials and for zeolites. Additionally, some increased exploration interest was noted in 1982 for swelling clays and silica.

DEVELOPMENT/FUTURE MINES

Metals

Exxon Minerals Co. continued plans to spend $600 million to develop its Mt. Hope molybdenum deposit north of Eureka in Eureka County. Production would begin in 1988 at the earliest. Mining would be by open-pit at a rate of 30,000 tons of ore per day. Mining is expected to last 30 years and require a work force of 550. (The Mining Record, 9 Feb 83).

Pinson Mining is developing a second mine, the Preble, 12 miles south of its Pinson open pit in southeastern Humboldt County. The mine is scheduled to start up in 1984 as a heap leaching operation; some higher grade ore will be trucked to the Pinson mill. Reserves are currently 1.3 million metric tons averaging 0.088 oz gold/metric ton. (Mine Development Monthly, 19 Nov 82).

Newmont Mining Corp. acquired all the property necessary for the development of its Gold Quarry deposit in northern Eureka County late in August. The purchase of land and mineral rights totaled $34.75 million. The deposit contains reserves of approximately 8 million oz gold. Newmont's Elko Land and Livestock Co. subsidiary bought the 223,000-acre T Lazy S Ranch, including mineral interests owned by the ranch. The ranch encompasses the company's Carlin, Bootstrap, Bluestar, and Maggie Creek Mines. Newmont's Carlin Gold Co. separately bought a 10% interest in the mineral rights to the Gold Quarry property and entered into a new long-term lease of the remaining rights. Production is planned at 120,000 oz gold/year starting in 1985 or 1986. (Mining Congress Journal, Nov 1982).

Carlin Gold Mining Co., a wholly-owned subsidiary of Newmont Mining Corp., announced a new find at Rain, some 20 miles southeast of the Maggie Creek Mine in Elko County. Intensive drilling and geologic assessment is still underway; blocked-out reserves are estimated to contain 8.3 million tons of ore averaging 0.083 oz of gold/ton, including 3.4 million tons averaging 0.147 oz/ton. (Newmont Mining Co. 1981 Annual Report).

Silver King Mines announced in May its acquisition of Gulf Oil's 51% interest in the Ward Mine south of Ely, White Pine County. Ore reserves are estimated

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at 17 million tons of silver-copper-zinc ore in limestone replacement bodies. Silver King plans to sink parallel, 4000-foot inclined shafts. (Mining Record, Denver, 30 Jun 82).

Duval Corp. has been developing its Fortitude gold deposit next to its Copper Canyon open-pit mine, 13 miles south of Battle Mountain in Lander County. Over 100 holes have been drilled and stripping was planned for 1982. Reserves were estimated at 14.5 million metric tons averaging 0.165 oz gold and 0.63 oz silver/metric ton. Ore would be mined by open-pit methods and processed at Duval's existing facilities; only minor modifications would be needed. Production is planned for late 1984. (1981 Report Duval Corp.)

AMAX, Inc. continued planning for the possible development of its molybdenum deposit at Buckingham, 7 miles south of Battle Mountain in Lander County. In March they applied for permits to drill a number of water wells sufficient to provide water for a 86,000 tons/day mill. No date has been set for starting the project. (Humboldt Sun, Winnemucca, 11 Mar 82).

American Pyramid Resources, Inc. announced discovery of a new mineralized zone on its Bell Mountain gold and silver property in Churchill County. The new discovery, known as the Sphinx Zone, is located as a cross structure to a 1-million-ton proven orebody and has a potential of 1.5 million–2 million tons of material minable by open-pit methods. Assays on the first crosscut were reported to average 0.14 oz gold and 3.3 oz silver. (Mining Congress Journal, Sep 82).

United Mining Corp. suspended underground development at the New Savage Mine which could have resulted in the first underground production from the Comstock Lode in 40 years. (Mine Development Monthly).

Cortez Gold Mines, a joint venture of Placer Amex Inc., Webb Resources Inc. (a wholly owned subsidiary of Standard Oil of Ohio), Bunker Hill Co., and Vernon F. Taylor, Jr., plans to begin production at its Horse Canyon gold deposit in mid-1983. The deposit is in Eureka County, 4 miles northeast of the Cortez mill. Reserves are estimated at 3.4 million short tons with a recoverable grade of 0.055 oz gold/ton. Mining is planned at 2000 tons of ore/day with an annual production of 40,000 oz gold. Open-pit methods will be used. Over $7 million will be spent to bring the mine into production. About 135 persons will be employed. (Elko Daily Free Press, 8 Nov 82).

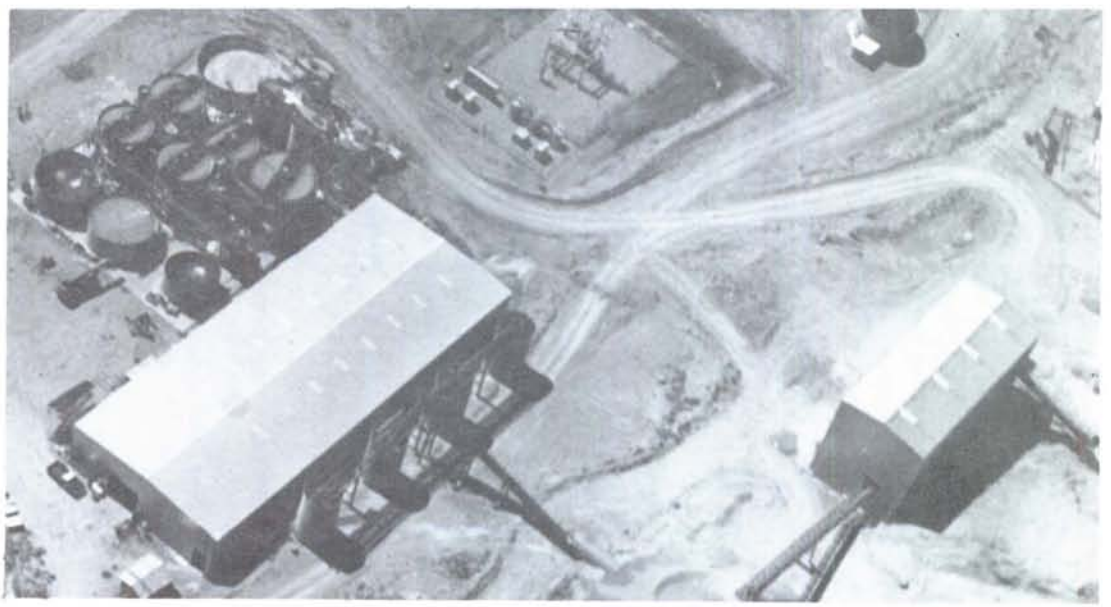
Cordex reportedly has reserves of 2.3 million metric tons averaging 0.11 oz gold/metric ton at its Boulder Creek property near the Bootstrap Mine in northern Eureka County. (Mine Development Monthly, 19 Nov 82).

Lacana is conducting metallurgical tests on the Relief Canyon deposit near Lovelock containing 4.5 million metric tons of ore averaging 0.066 oz gold/metric ton (Mine Development Monthly, 19 Nov 82).

Hecla and **Cyprus** dropped their joint venture option at the Ruby Hill Mine south of Eureka in Eureka County because of very serious water problems that would have resulted in high pumping costs. Reserves reportedly are 2.8 million metric tons averaging 0.176 oz gold and 6.23 oz silver/metric ton, as well as 3.7% lead and 8.3% zinc. (Mine Development Monthly, 19 Nov 82).

Smoky Valley Mining Co. announced that exploration during 1981 located an orebody adjacent to the present operation containing 8.4 million oz gold and 15 million oz silver. Production is planned to increase to 200,000 oz gold/year by 1984. (1981 Annual Report, Louisiana Land & Exploration Co.).

Placer Amex Inc. announced it would begin production of its Horse Canyon gold deposit 60 miles southwest of Elko in 1983. Reserves reportedly are over 3 million metric tons of ore averaging 0.061 oz gold/metric ton. Production is planned at 1800 metric tons of ore/day; annual gold production should average 40,000 oz gold/year. Development costs are expected to be about $7 million. (Mine Development Monthly, 19 Nov 82).



Silver King's silver mill at Taylor.
Ely Daily Times photo.

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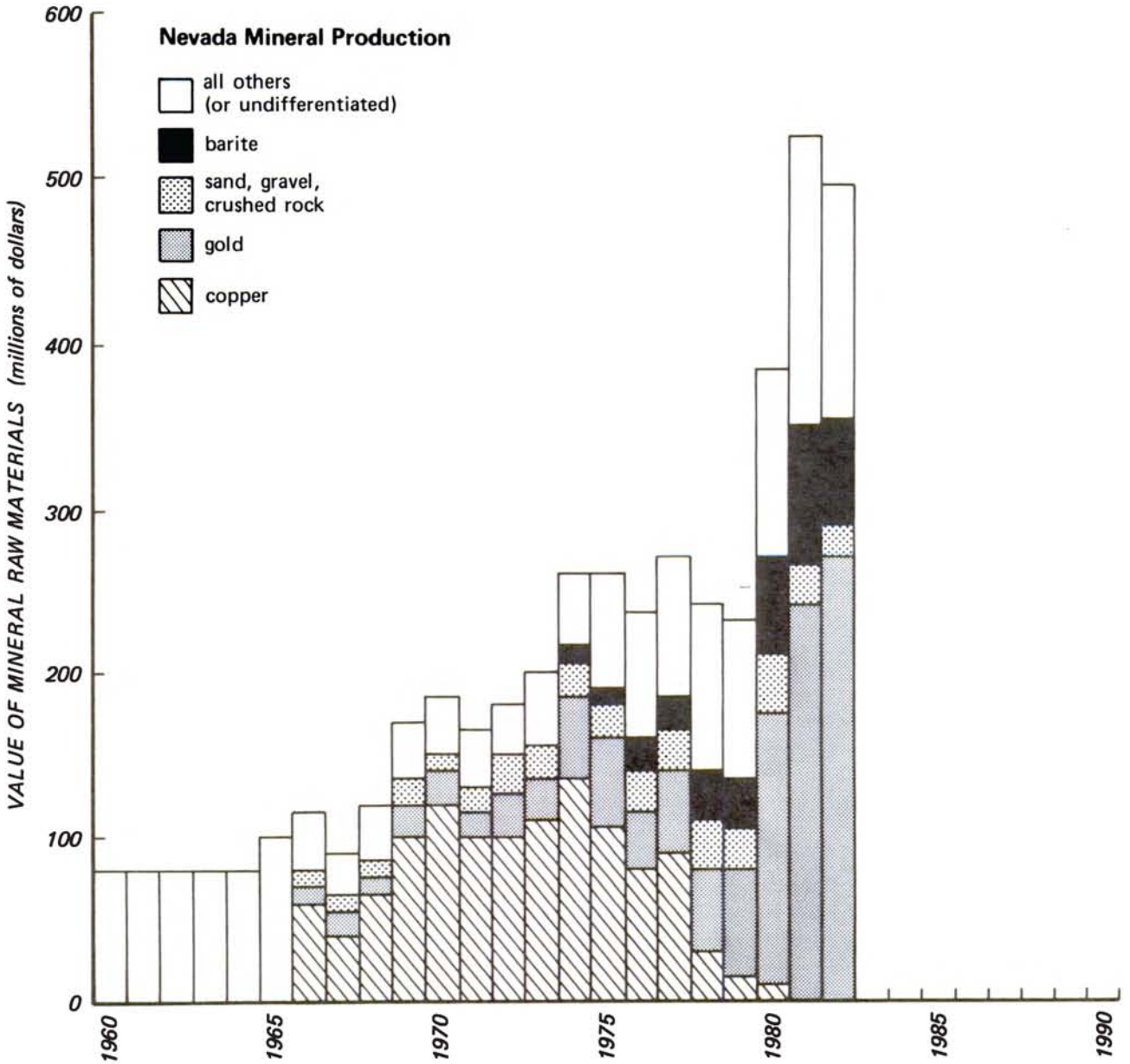

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MINING/PROCESSING

The estimated value of Nevada's mineral production for 1982 was more than $495 million (based on preliminary nonfuel estimates by the U.S. Bureau of Mines and an estimated price of $30/bbl for oil). Final figures are expected to exceed $500 million. Nevada ranked 14th among the states in nonfuel mineral production.

There were very few mine openings during 1982 in contrast to 1981, and there were many closings and reductions in both the work force and production.

Metals

New Mines

Sunshine Mining Co. began production at the Sixteen-To-One Mine and Mill near Silver Peak, Esmeralda County, in April. The mine had been closed for many years. Development costs totaled $22.8 million; about 70 persons will be employed. Ore reserves are estimated at 9.5 million oz silver and 36,700 oz gold. Extraction of the wide, low-grade argentite vein will be underground using rubber-tired haulage up inclined ramps. The newly built cyanide-leaching mill will process 500 tons/day seven days a week—over 1 million oz silver/year for over a decade. (Nevada State Journal, 12 May 82; Nevada Appeal, Carson City, 13 May 82).

Closings/Cutbacks

Titanium Metals Inc. laid off 100 workers at its Henderson titanium metal-producing plant at the end of March—10% of the plant's work force (Nevada State Journal, Reno, 4 Mar 82).

Houston International Minerals Corp. closed its Con-Imperial silver-gold pit at Gold Hill, near Virginia City, early in the year. The mill was closed and "mothballed" on June 30th, at which time 40 employees were laid off. (Elko Daily Free Press, 31 Jul 82).

Anaconda Minerals Co., a subsidiary of Atlantic Richfield Corp., discontinued molybdenum production at their Hall property 25 miles north of Tonopah in Nye County early in July. The closing was expected to last several months while modifications were made to the mill to increase efficiency. Mining activities continued and no manpower layoffs were planned. (Mining Congress Journal, Sep 82). However, in November Anaconda announced that the mill would be shut down and 130 of its 450-person work force laid off; the mill was expected to remain shut down through 1983. Waste-rock stripping and the "moly" leaching plant would continue to operate. (Tonopah Times-Bonanza, 25 Nov 82). The mine had been the only primary molybdenum producer currently in operation in the U.S. and had been

NEVADA'S ROLE IN U.S. MINERAL SUPPLY IN 1982

Commodity	Share of U.S. output (percent)	Rank in Nation
Barite	89	1
Diatomite	*35	2
Fluorspar	*1	3
Gemstones	15	2
Gold	49	1
Gypsum	7	7
Lithium	*40	2
Magnesite	*100	1
Mercury	*99	1
Silver	1	9
Tungsten	*15	3

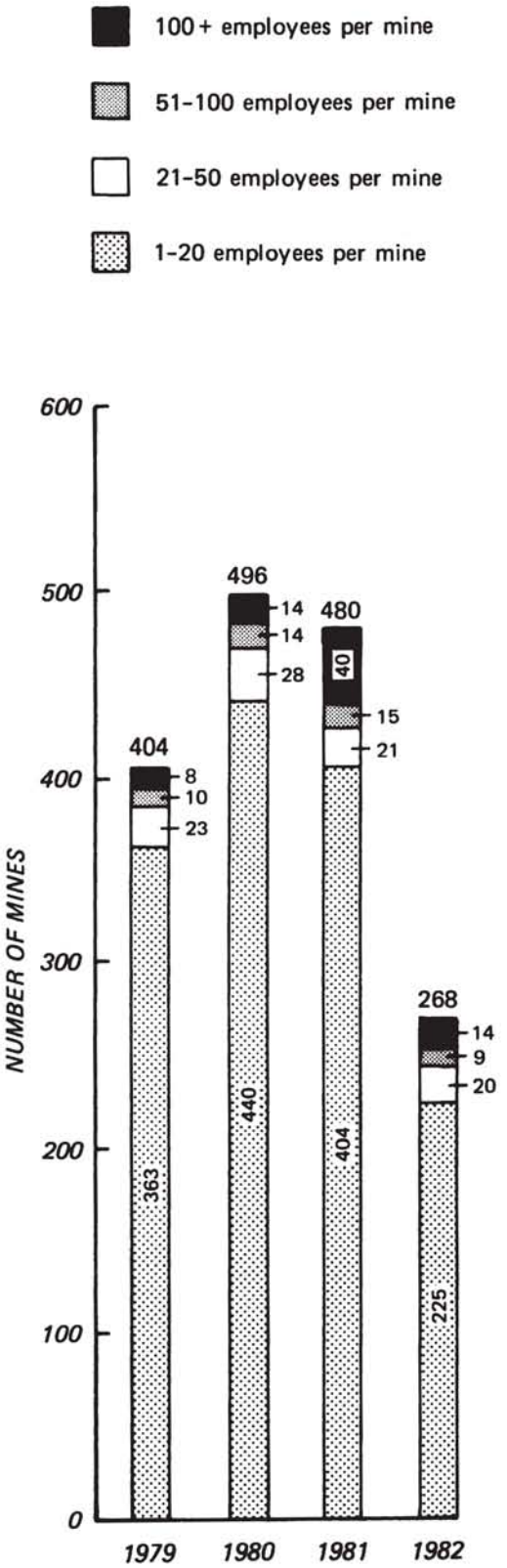
Data from U.S. Bureau of Mines.
*Estimated by Nevada Bureau of Mines and Geology.

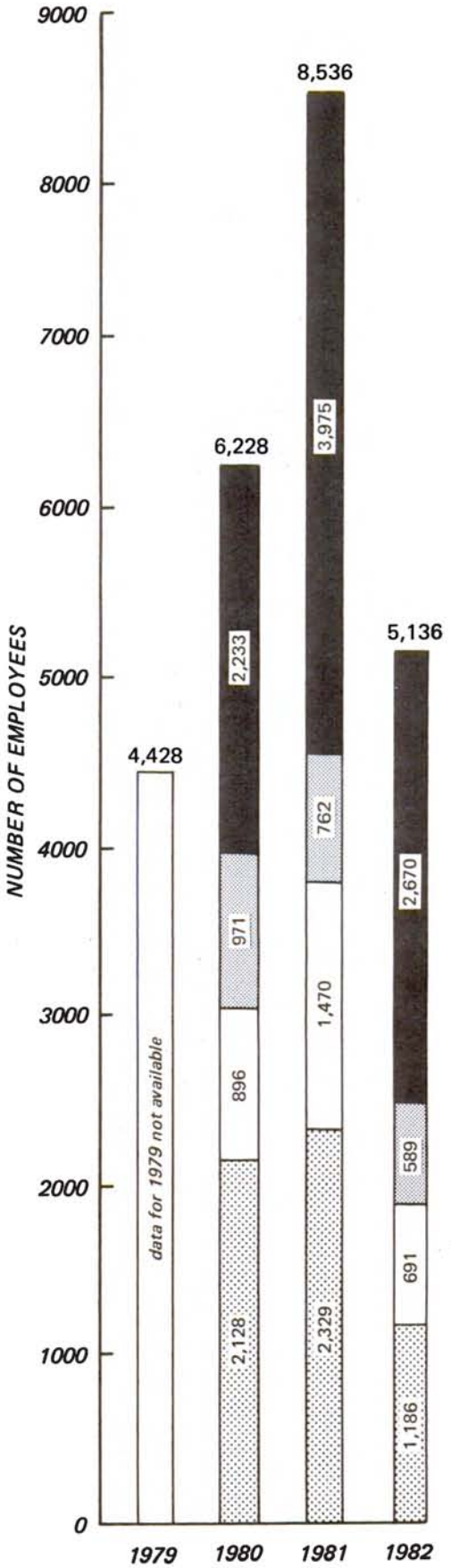
NEVADA'S MINERAL PRODUCTION[1]

Mineral	Unit	1981 Quantity	1981 Value (thousands)	1982[p] Quantity	1982[p] Value (thousands)
Barite	thousand short tons	2482	$79,716	1765	$56,158
Clays	thousand short tons	73	2948	110	4604
Gemstones			1000		1000
Gold	troy ounces	524,802	241,220	679,700	269,535
Gypsum	thousand short tons	778	6914	758	7073
Iron ore	thousand long tons	99	1490	W	W
Mercury	76-pound flasks	27,819	11,514	25,000	10,000
Petroleum	thousand 42-gallon barrels	699	18,900	597	17,900
Sand and gravel	thousand short tons	6000	12,800	7000	14,500
Silver	thousand troy ounces	3039	31,970	254	2032
Stone, crushed	thousand short tons	1343	5664	1240	3800
Combined value of cement, copper, diatomite, fluorspar, iron ore (1982), lead, lime, lithium compounds, magnesite, perlite, salt, sand (industrial), tungsten, and zinc			108,413		108,242
Total			$522,549		$494,844

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers), as compiled by U.S. Bureau of Mines (Mineral Industry Survey, Nevada—1982) except for petroleum.
[p]Preliminary.
W Withheld.

Number of Mines and Employees in Nevada's Mineral Industry





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VALUE OF NONFUEL PRODUCTION IN NEVADA, BY COUNTY*
(Thousands)

County	1978	1979	1980	[1]1981	Minerals produced in 1979, in order of value
Carson City	$252	W	$409		Stone, sand, and gravel
Churchill	W	$1903	W		Diatomite, sand and gravel, salt, gold, silver, tungsten, copper, lead, zinc
Clark	38,199	36,779	37,178		Sand and gravel, lime, gypsum, stone, silver, copper, gold, tungsten
Douglas	W	1488	W		Sand and gravel, silver, gold, stone
Elko	W	6427	17,098		Barite, copper, gold, silver, sand and gravel, tungsten, stone
Esmeralda	15,836	17,917	21,591		Lithium, diatomite, silver, gold, clays, talc, tungsten
Eureka	30,674	40,864	W		Gold, iron ore, silver, stone, barite, sand and gravel, lead, mercury, copper, zinc
Humboldt	4075	8526	12,089		Mercury, stone, sand and gravel, clays
Lander	30,423	49,082	87,335		Gold, barite, copper, silver, sand and gravel
Lincoln	8969	12,131	13,282		Tungsten, gold, lime, silver, sand and gravel, perlite, clays
Lyon	37,538	25,254	27,695		Cement, stone, sand and gravel, gypsum, diatomite, silver
Mineral	W	40	6468		Silver, gold, tungsten, sand and gravel
Nye	20,259	22,492	45,566		Gold, barite, magnesite, clays, sand and gravel, silver, fluorspar, stone
Pershing	14,295	17,731	18,495		Diatomite, gypsum, iron ore, sand and gravel, stone, perlite, gold, silver, clays
Storey	7924	12,389	21,043		Silver, gold, diatomite, sand and gravel
Washoe	W	4659	2793		Sand and gravel, stone, clays, silver, gold
White Pine	W	W	W		Sand and gravel, tungsten, stone
Undistributed[2]	28,965	2567	83,186		
Total[3]	$237,408	$260,249	$394,230		

*Data from U.S. Bureau of Mines.
W Withheld to avoid disclosing company proprietary data; included with "Undistributed."
[1]Not available.
[2]Includes some sand and gravel (1980) that cannot be assigned to specific counties, gemstones, and values indicated by symbol W.
[3]Data may not add to totals shown because of independent rounding.

World's largest (202,000-pound) grader working at Anaconda's mine near Tonopah. *Central Nevada Newspapers photo.*

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STATE OF NEVADA'S REVENUE FROM MINERAL INDUSTRY

Source	1977	1978	1979	1980	1981	1982
Federal[1]	$2,903,049	$4,847,428	$6,548,509	$7,718,102	$10,262,216	$12,595,501
Net proceeds tax[2] . .	1,842,283	1,967,717	1,976,912	3,243,145	1,912,754	–
Geothermal[3]	451,984	240,000	829,892	753,000	29,937	0
Total	$5,197,316	$7,055,145	$9,358,250	$11,714,247	$12,204,907	$12,595,501

[1]Royalties and rentals paid under Section 35 of the Mineral Leasing Act of 1920 (calendar year).
[2]On gross yield of mine less specified allowable deductions (fiscal year starting July 1).
[3]Bonus bid payments from geothermal leases sales.

producing in excess of 1 million pounds of molybdenum/month. Much of the depression in the moly market is caused by the greatly decreased demand for steel in which molybdenum is used as an alloy.

Utah International laid off 31 of its 190 employees at the Springer tungsten mine and mill near Mill City, Pershing County, on April 30, 1982, citing the need to "cut production" because of decreased demand (Humboldt Sun, Winnemucca, 29 Apr 82). Later in the year both the mine and mill were shut down, laying off 140 workers. The first layoffs were made October 29, with additional cuts through December. A small crew will remain to keep the mine on standby until economic conditions improve. The mine has been losing money because of the unusually low price of tungsten. (Nevada State Journal, Reno, 19 Oct 82).

Occidental Minerals Corp. early in the year announced that 40 employees have been laid off and 100 placed on a 32-hour work week at the Candelaria silver mine in Mineral County (Nevada Mining Association Bulletin, Mar-Apr 82). In June Occidental put the entire operation on standby (Nevada Appeal, Carson City, 29 Jul 82). Mining stopped June 3rd; leaching continued until all ore on the pads had been treated (Wallace, Idaho, Miner, 24 Jun 82).

Pinson's gold mill north of Golconda. *Pinson Mining Co. photo.*

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Houston International Minerals Corp. suspended operations at its Manhattan Mine at Manhattan in Nye County on Jan 31st, because of low gold prices and dwindling reserves. The mill was placed on standby. The operation employs 48 persons, and 31 were laid off; 12 more will be released later in the year. (Tonopah Times-Bonanza, 28 Jan 82).

Union Carbide has placed its Emerson tungsten mine in western Lincoln County on standby. Development work will continue in the mine; 32 of the 106 present workers will be retained for this effort. (Nevada Mining Association Bulletin, Mar-Apr 82).

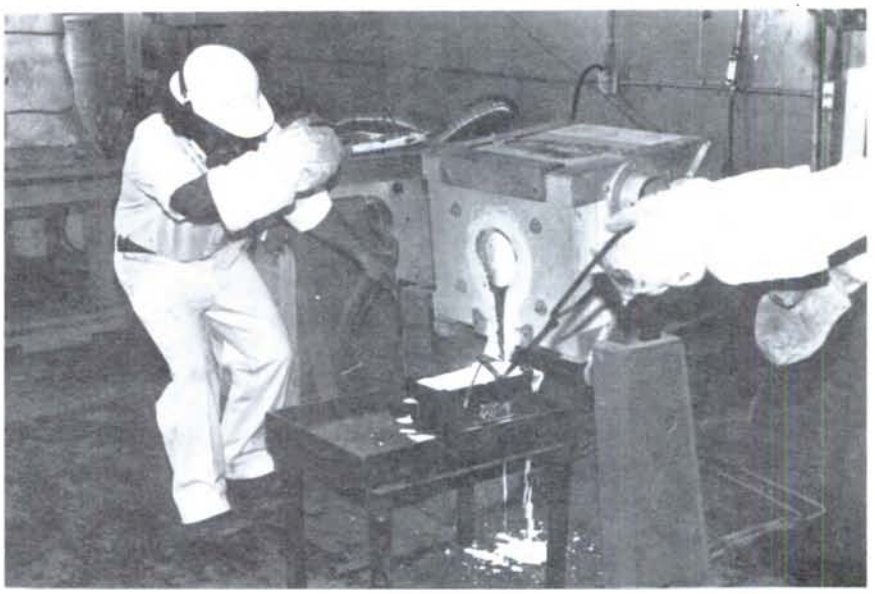
Western-Windfall Ltd. announced that the Windfall gold mine, near Eureka, Eureka County, had been placed on standby. Thirty-two employees were laid off. Leaching will continue. (Nevada Mining Association Bulletin, Mar-Apr 82).

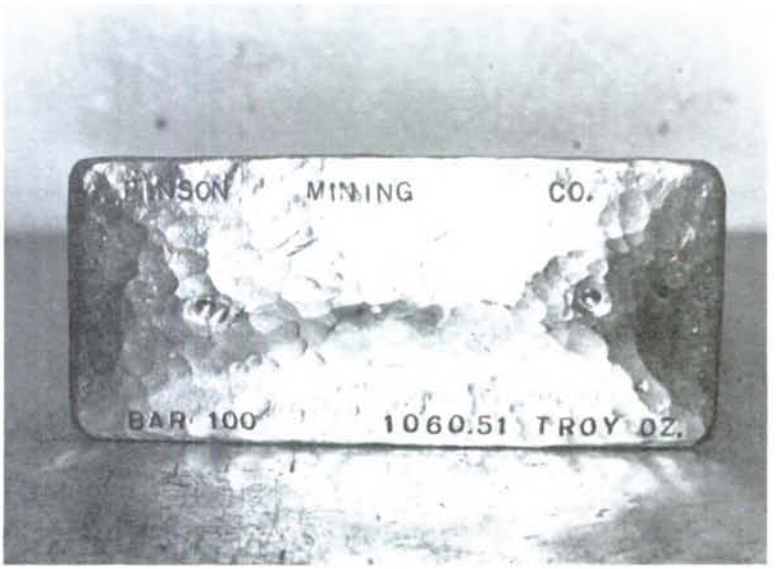
Kennecott Copper laid off 80 workers in November at its McGill plant while repairs were being made to the smelter. About 190 workers will remain. Repairs are expected to take 6–8 weeks. (Reno Evening Gazette, 5 Nov 82).

Smoky Valley Mining Co. laid off 33 employees in February citing that the stripping of waste had nearly been completed. About 200 employees remained; no further layoffs were planned. (Tonopah Times-Bonanza, 18 Feb 82).

Reopenings/Other Activities

Silver King Mines, Inc. resumed complete operations on 20 Sep 82 at the Taylor open-pit silver mine, 18 miles southeast of Ely in White Pine County. All the 75 employees laid off when the mine closed 21 Jun 82 have been called back to work. Over 1 million oz of silver were produced during the first year of continuous operation; at close-down the production rate was 90,000 oz silver/month. (Ely Daily Times, 21 Sep 82). Reserves are estimated at 10 million tons of ore containing 3 oz silver/ton (Ely Daily Times, 3 Sep 82).





Pouring the 100th 1000-ounce gold bar at the Pinson Mine. *Pinson Mining Co. photo.*

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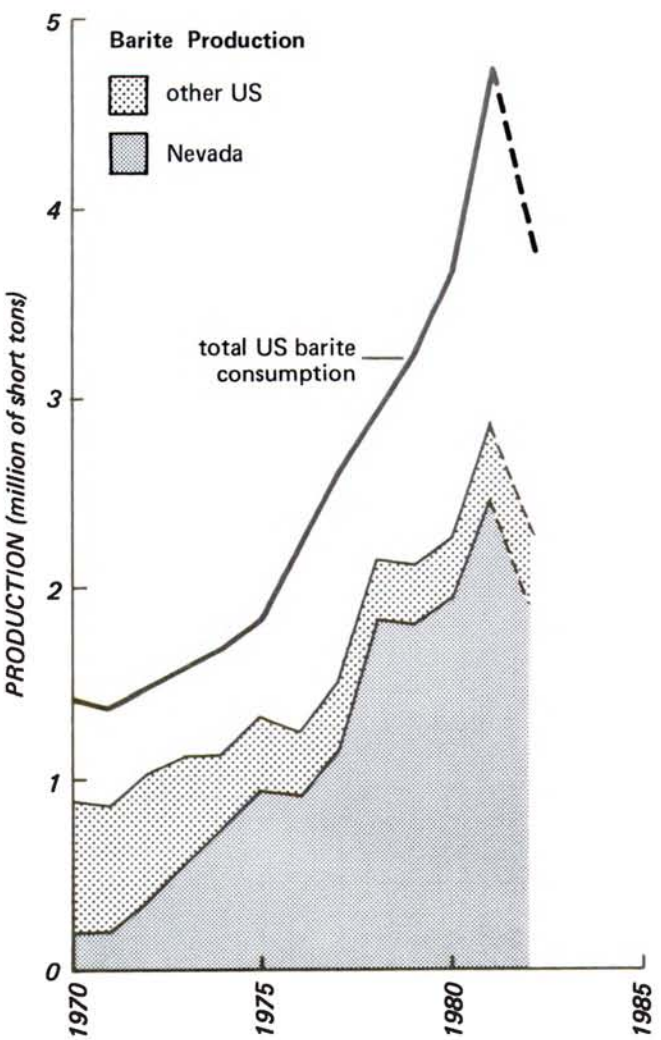
Asamera, Inc. purchased the underground Gooseberry Mine, located in Storey County, from **Scurry Rainbow** late in 1982. Scurry Rainbow had sunk a shaft to the 1450-ft level earlier in the year and confirmed the presence of ore at that level. From 1977 to 1981 the mine and mill had operated intermittently at a rate of 350 tons/day. Asamera plans to bring the mine back into production in 1983. (Guide to new mine development—United States, February 1983).

Industrial Minerals
by Keith G. Papke

Industrial-mineral production in 1982 had an estimated value of $166 million, down $30 million (15%) from the record high in 1981. This decrease was due mostly to decreased tonnage and value of barite production. Barite (value at $56 million), diatomite, cement, and lithium carbonate were the industrial-mineral commodities with the highest value produced in Nevada during the year. Additionally, Nevada produced the following: bentonite, sepiolite, and kaolinite clays; fluorspar; gem stones; gypsum; lightweight aggregate; limestone, lime, and dolomite; magnesite; perlite; pyritic soil additive; salt; sand and gravel; silica; and stone. Borate produced in Death Valley, California, was processed in Nevada.



Nevada is the principal domestic source of barite, producing 90% of the total 1982 U.S. production and 50% of the material consumed in the U.S. Revised data from the U.S. Bureau of Mines shows that Nevada barite production increased substantially from 1980 to 1981 to 2.48 million short tons. Because of a sharp decrease in the amount of domestic drilling done for oil and gas and a flood of cheap imported barite, however, the 1982 Nevada production was down considerably to an estimated 1.90 million short tons. All major producers continued to operate but generally at a decreased annual rate; some small producers who had been active in previous years during the "barite boom" were inactive in 1982. The largest producers, in alphabetical order, were **Dresser Industries, Inc., IMCO Services, Inc., Milchem, Inc.,** and **NL Industries, Inc.** Smaller producers included **All Minerals, Inc., Chromalloy American Corp., Eisenman Chemical Co.,** and **Old Soldier Minerals.** Nearly 95% of the domestic barite is used in drilling muds where it helps prevent costly and environmentally and physically dangerous oil or gas blowouts. A precedent-setting mining case was decided by the Nevada Supreme Court when the Court ruled that one mining company (**Eisenman Chemical Co.**) cannot use the State eminent domain law to condemn and extract ore reserves of another company (**NL Industries, Inc.**), in this case barite.

Commodities closely related to the construction industry, e.g., sand and gravel, gypsum, and cement, generally did poorly in 1982. Sand and gravel operations are mostly clustered near the large population centers—Las Vegas and Reno-Sparks. Most of the gypsum produced in the State is used in captive wallboard plants, two in Clark County and one in Washoe County. The **Nevada Cement Co.** plant at Fernley is the only cement producer in Nevada; construction has not started on the cement plant planned near Las Vegas. **C-E Basic's** magnesite operation at Gabbs—the only active magnesite mine in the U.S.—suffered from a poor market for their refractory products but did better with their magnesium-oxide products. **Simplot Silica Products** continued to operate at Overton, using its new slurry-transport, drying, and sizing systems. **Foote Minerals Co.** at Silver Peak produced at near capacity, reported to be 16 million pounds of lithium carbonate annually, aided by the temporary closure of Foote's other plant in North Carolina. The Silver Peak operation involves solar and chemical processing of lithium derived from brines pumped from a playa deposit. A lime plant operating at Caselton in Lincoln County changed hands and is now owned by **White Pine Minerals Co.** Three limestone, dolomite, or lime operations of **Gemstar Corp.** in Clark County also continued to produce as did the clay operations of **Industrial Minerals Ventures, Inc.** in southern Nye County. Three companies produced diatomite from Miocene-Pliocene, fresh-water lake deposits, making Nevada the second-largest diatomite-producing State.

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GEOTHERMAL ENERGY

by Larry J. Garside

EXPLORATION

Geothermal resource exploration in Nevada in 1982 was down considerably from 1981 levels. Total footage of the four large-diameter wells drilled (25,624 ft) is only about 30% of the 1981 level (see table and bar graph). The average well depth for these four wells was also about 2000 ft less than in 1981. The reduction in exploration reflects the depressed state of the economy and reductions in energy demands, fossil fuel prices, and Federal expenditures on geothermal energy. Federal and private-sector expanditures for geothermal exploration are expected to continue into 1983. Drilling costs for large-diameter geothermal wells are estimated to be as high as $200–$300 per foot, as geothermal wells in hard drilling regions are known to be approximately triple the cost (per unit depth) of petroleum wells.

Amax Exploration, Inc. drilled three temperature observation wells in the Fish Lake Valley area of northwestern Esmeralda County. Amax is the operator of the Federal lease unit; Amax and Magma Energy are the lessess. The wells ranged from 1300 to 2000 ft in depth.

The **Geotronics Corporation** of Austin, Texas, conducted a nonexclusive magnetotelluric survey in October 1982 in the Modoc Plateau of California and Nevada. The survey was designed to provide a better understanding of the subsurface lithologic units and to tie in with data already available from the Black Rock Desert area of northwestern Nevada (Geothermal Resources Council Bulletin, Nov 82).

The **U.S. Bureau of Land Management** issued 54 noncompetitive leases and eight competitive leases on Federal land in fiscal year 1982 (128,634 and 15,304 acres, respectively).

DEVELOPMENT

Phillips Petroleum Co. drilled two development wells in the Desert Peak geothermal area. Flow tests conducted in September on the Desert Peak No. 86-21 well suggest that it is capable of production. Information on the second well was not available at year end.

The **U.S. Department of Energy** sponsored a field test at Desert Peak, Nevada, of a method to inhibit the formation of calcite scale in liquid-dominated geothermal wells produced by flashing flow. The test, which was conducted on the Phillips Petroleum Co. B21-2 well, demonstrated that maintenance of the CO_2 partial pressure above a certain level (by recycling CO_2 from the well) will prevent the precipitation of calcite in the bore (Geothermal Resources Council Bulletin, Sep/Oct 82).

NORNEV Demonstration Geothermal Co., a consortium of electric utilities (Sierra Pacific Power Co., Sacramento Municipal Utility District, Eugene Water and Electric Board, and Pacific Power and Light) has put their plans on hold for a 10-megawatt binary geothermal power plant at Beowawe (Oregon Institute of Technology Geo-Heat Center Bulletin, Summer/Fall 82). The project is currently awaiting the outcome of two Federal government reviews (Energy Lines, Sierra Pacific Power Co. Newsletter, Winter 82).

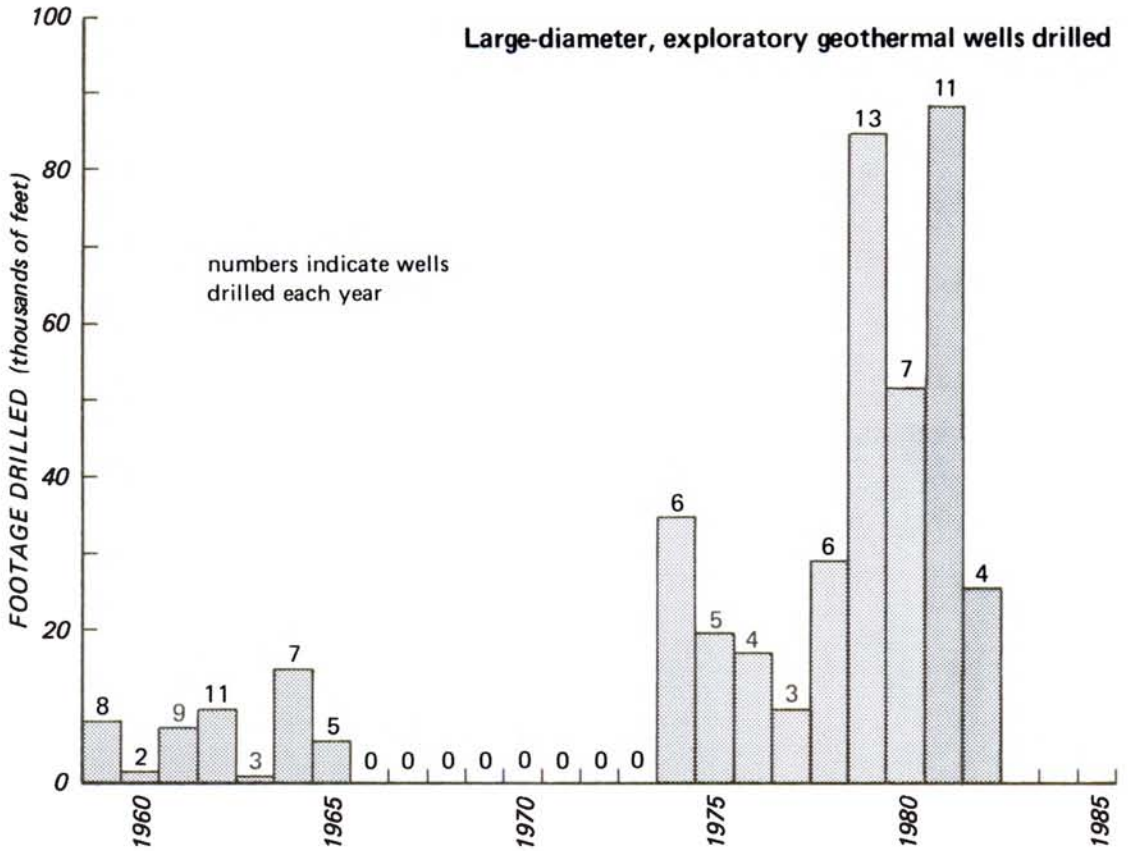
A geothermal well owned by the **El Capitan Hotel/Casino** in Hawthorne will probably not be used to heat the hotel and several public buildings. A study by Chilton Engineering of Elko has concluded that savings to Mineral County on utility bills would not repay the loan necessary to construct the system and retrofit the buildings. Marked changes in conventional energy costs or loan interest rates could change the economics of the project. When the well was drilled two years ago, its temperature (210°F) and capacity attracted numerous government agencies and private parties interested in the development of alternate energy sources (Mineral County Independent, 21 Jul 82).

Wally's Hot Springs Resort near Genoa operated under new ownership in late 1982. The newly developed facility has cottages and a cafe in addition to hot mineral baths, sauna, and swimming pool.

Warren Estates, a housing subdivision in southwest Reno, continued development of its geothermal heat distribution system in 1980. A hot water distribution firm, Nevada Geothermal Utility, was established by developer Frank R. Warren to distribute geothermal heat to people who buy lots and build homes in the subdivision. Water temperatures in a Nevada Geothermal Utility well are as high as 211°F at 800 feet. Lot prices begin at $63,000. The utility plans to charge $50 per month for heat for the first 3 years. After that, the energy charge would be one-half of the equivalent natural gas energy price that Sierra Pacific Power charges its Reno customers. The energy charge would also change in accord with the Consumer Price Index. Homeowners in the Warren Estates would be required to have their own heat exchangers to extract heat from the distribution system. Costs of these exchangers could be partly

LARGE-DIAMETER GEOTHERMAL WELLS DRILLED IN NEVADA IN 1982

Company name	Well name	Depth	Location	County
			Dixie Valley	
Rosewood Corp.	Eleven Mile Canyon No. 52-14	8246'	S14,T19N,R34E	Churchill
Rosewood Corp.	Pirouette Mountain No. 55-16	7379'	S16,T19N,R34E	Churchill
			Desert Peak	
Phillips Petroleum Corp.	Desert Peak 86-21	3269'	S21,T22N,R27E	Churchill
Phillips Petroleum Corp.	Desert Peak 22-22	6730'	S22,T22N,R27E	Churchill



FEDERAL GEOTHERMAL LEASES IN EFFECT BY COUNTY[1]

COUNTY	NUMBER OF LEASES				ACREAGE			
	Noncompetitive		Competitive		Noncompetitive		Competitive	
	FY81	FY82	FY81	FY82	FY81	FY82	FY81	FY82
Carson City	0	0	0	0	0	0	0	0
Churchill	161	175	29	37	448,263	278,191	54,618	66,521
Clark	0	0	0	0	0	0	0	0
Douglas	0	0	0	0	0	0	0	0
Elko	19	26	0	4	25,688	38,032	0	5143
Esmeralda	33	41	0	1	77,135	76,907	0	2547
Eureka	13	11	0	3	16,229	8850	0	6689
Humboldt	90	98	7	7	166,349	175,897	13,512	13,512
Lander	54	64	3	4	84,342	88,889	6328	4499
Lincoln	0	0	0	0	0	0	0	0
Lyon	6	7	4	4	4497	5287	5306	4462
Mineral	18	21	0	0	36,224	36,289	0	0
Nye	32	52	0	4	53,872	76,513	0	7395
Pershing	164	174	15	15	280,704	296,123	29,185	30,127
Storey	1	1	0	0	591	591	0	0
Washoe	19	18	11	11	19,281	16,947	18,255	16,738
White Pine	42	42	0	0	95,309	97,309	0	0
Total	652	730	69	90	1,308,554	1,195,825	127,204	157,633
	12.0% increase		30.4% increase		8.6% decrease		23.9% increase	

[1]Data from the U.S. Bureau of Land Management (FY = fiscal year, 1 Oct to 30 Sep).

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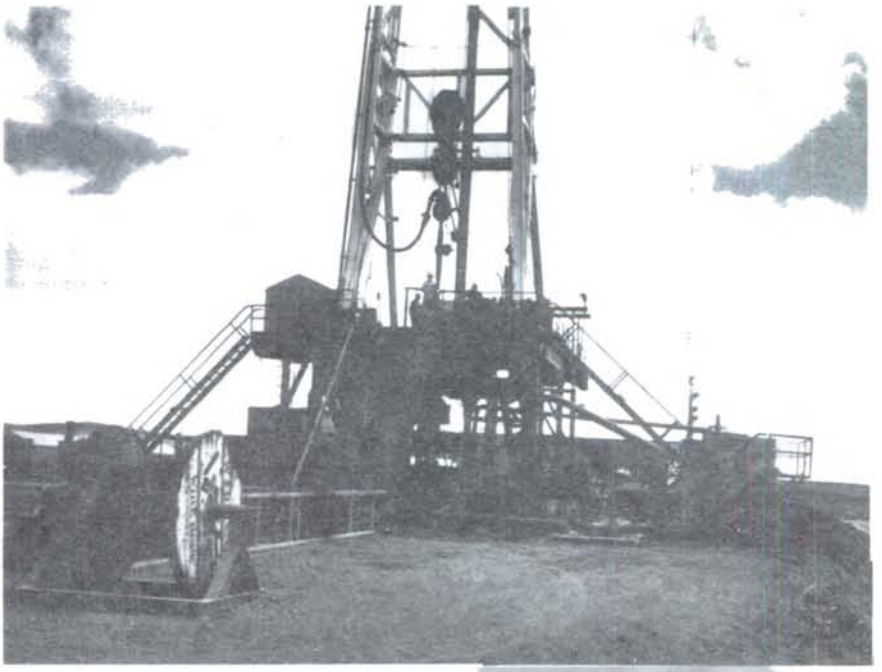
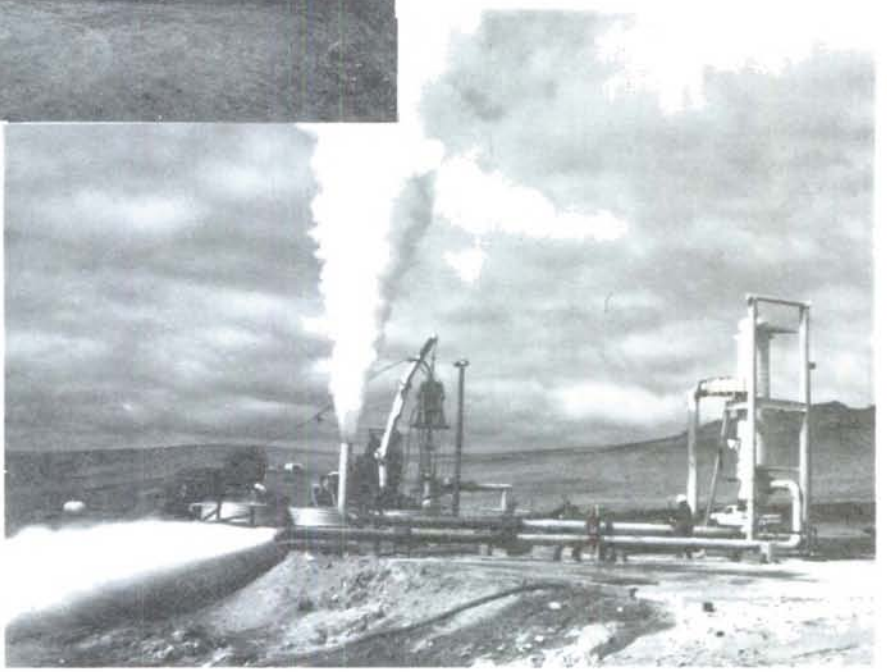


Phillips Petroleum Co. Desert Peak No. 22-22 well during drilling. *Larry Garside photo.*



Phillips Petroleum Co. Desert Peak No. 86-21 well during a flow test in September 1982. *Larry Garside photo.*

offset by Federal income-tax credits (Geothermal Hot Line, Jul 82).

Nevada Fish Growers, Inc. raised 16,000 catfish in May 1982 in waters issuing from Big Warm Spring on the Duckwater Indian Reservation in northeastern Nye County. The fish, which are raised in raceways, were 12–14 in. long in May. The spring system flows approximately 5000 gallons per minute of 90°F water. Fish will be sold on the fresh fish market (Dave Koch, oral commun., 1982).

The **Damonte Housing Project**, a proposed 6000-unit development near Steamboat Springs south of Reno may use geothermal water for a district space-heating system according to a plan by SEA Engineers/Planners (Geothermal Resources Council Bulletin, Jun 82). The project may begin street, water, and sewer construction by the early summer of 1983 (Nevada State Journal, 12 Dec 82).

Elko Heat Co. supplied geothermal water to its first customer, Vogue Laundry, in December of 1982. The 175°F geothermal fluid is piped from a well ¾ mile west of downtown Elko. The heat company will also supply geothermal water to the Stockman's Hotel and the Henderson Bank Building. A U.S. Department of Energy grant of $830,000 gave the project its start in 1978 (Nevada State Journal, 9 Dec 82). Total cost of the project was approximately $1.5 million (Oregon Institute of Technology, Geo-Heat Center Bulletin, Summer/Fall 82). The return water (at 100°–110°F) will be stored in a pond near West River Street and will be used to irrigate city parks (Elko Daily Free Press, 12 Oct 82). Elko Heat has a consumptive use permit from the Nevada Division of Water Resources. Production of water from the Elko Heat well and a pump test at Hot Hole just southwest of Elko have prompted complaints to the Division from other owners of geo-

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NORNEV Demonstration Geothermal Co. heat exchanger test unit. *Sierra Pacific Power Co. photo.*

thermal wells or springs in the area. Several owners report reduced flows or temperatures which may be related to recent drilling or pumping in the area (Elko Daily Free Press, 19, 31 Aug 82; 6 Oct 82).

The **City of Elko** drilled several test wells in Elko in 1982 in a search for geothermal waters that could be used for a sewage plant or to heat city buildings. A well drilled by the city near the Municipal Swimming Pool in November 1982 had temperatures over 125°F at 800 feet. Water from this well may be used for the swimming pool and to heat City Hall and the Convention Center (Elko Independent, 10 Nov 82).

The **City of Reno** is considering a proposal that would create a downtown geothermal heating district. Trans Energy Systems, Inc. of Bellevue, Washington, using Federal grant money, prepared a study of such a system for the Oregon Institute of Technology's Geo-Heat Center. The study found that for the first 20 years of such a system's operation, average heating costs would be 40%–50% of those of conventional natural gas. Seventy-five percent of downtown Reno's hotels and casinos could be heated economically with the system. If the system used hot water from Steamboat Springs, additional buildings along the pipeline could be connected to the system. A Steamboat Springs-based system would cost $55 million. If a source of hot water could be located within 5 miles of downtown, costs would be about $18 million (Nevada State Journal, 15 Feb 82). Current interest rates are not favorable for such a project. The City of Reno has received inquiries from companies who propose to develop and operate such a system on a franchise basis (Oregon Institute of Technology, Geo-Heat Center Bulletin, Summer/Fall, 1982).

The **Nevada Department of Energy** published a brochure in early 1982 titled "Geothermal Energy in Nevada." The report was written to familiarize public and private energy users and developers with the economic and social advantages of geothermal energy. Various sections of the report discuss the nature of Nevada's resources, resource applications, advantages of geothermal energy use, and Federal and State programs established to foster the development of geothermal energy.

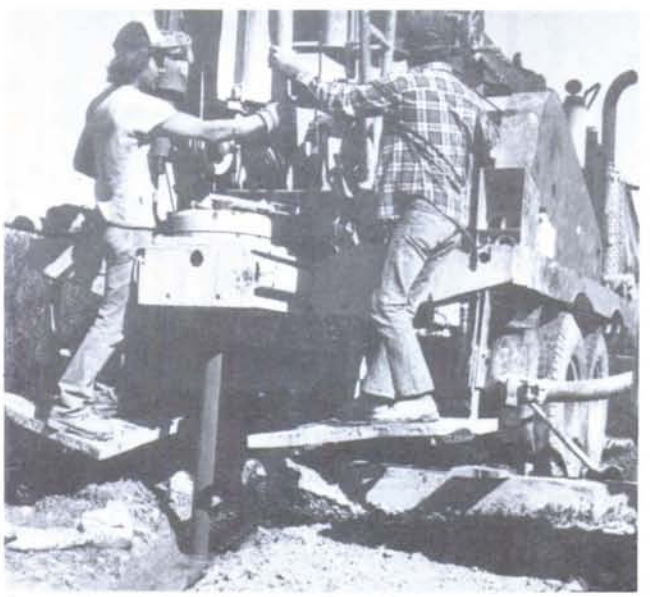
A geothermal greenhouse facility at **Stillwater** is producing hydroponically grown tomatoes. The tomatoes have been available in local markets in Fallon, which is 15 miles to the west. Several greenhouses are heated by passing the geothermal water through radiators located along the exterior walls. Swamp coolers are necessary at times for summer cooling.

A pilot plant to grow blue-green algae in geothermal water of **Wabuska** was put into operation in 1982. Wabuska, 10 miles north of Yerington, is also the site of a geothermal alcohol plant. Algae can be used for human or animal food or fertilizer. Several algae species are the most prolific when the nutrient-bearing waters are approximately 90°F.

Alexander Dawson, Inc. plans to develop a greenhouse and aquaculture site adjacent to the alcohol plant at Wabuska. Catfish and Malaysian prawns are presently being raised in aquaculture ponds (Geo-Heat Center Quarterly Bulletin, Oregon Institute of Technology, Summer/Fall 82).

A 350-ft geothermal production well was drilled in the Moana geothermal area of Reno for the **First Church of Religious Science**. The well is capable of yielding 60 gallons per minute (gpm) of 155°F water which will be used in conjunction with a 304-ft injection well capable of receiving 30 gpm of spent fluid. The geothermal water will provide the heat source for a planned 16,000 ft² church building (Geothermal Resources Council Bulletin, Jan 83).

The **Nevada Department of Energy** received a $280,000 grant for geothermal investigations in the State. Some of the money will be used to determine the extent of the Moana geothermal area and the impact of present use.



City of Elko geothermal well, during drilling near the city's sewage plant. *Elko Daily Free Press photo.*

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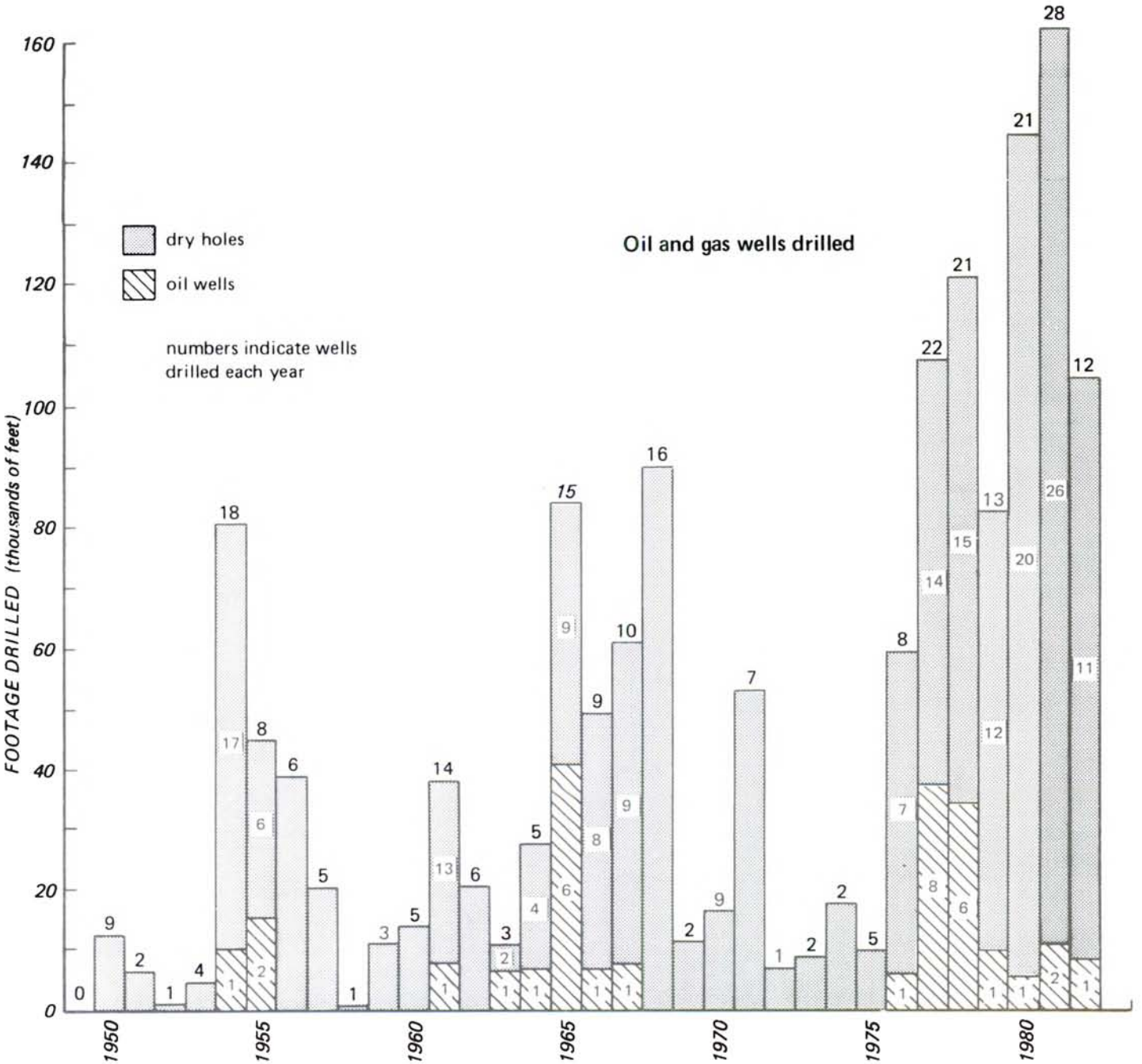
OIL AND GAS

by Larry J. Garside and
Becky S. Weimer-McMillion

EXPLORATION

During 1982, 12 wells totaling 103,260 ft were drilled in the search for oil and gas in Nevada, slightly more than a 35% decrease from 1981 (see bar graph). This statewide decrease was paralleled by a nationwide decrease of approximately 7%. However, the number of Federal oil and gas leases in effect in fiscal year 1982 (see table) increased by over 10%; the acreage held also increased a comparable amount. The average depth of wells drilled increased from 5736 to 8605 ft. Seven energy companies were involved in this exploration; Amoco Production Co. drilled over 30% of this footage in Eureka County. Fifteen permits to drill were issued during the year by the Nevada Division of Mineral Resources.

The **U.S. Bureau of Land Management** received a large number of oil and gas lease applications from energy companies for areas in northern Washoe County, Nevada, and adjacent Lassen County, California. Approximately 120 applications were filed for 890,000 acres of BLM land in northern Washoe County. These are 10-year noncompetitive leases, which cost $1 per acre per year. The lease activity is in an area which has very little subsurface information available. Surface exposures consist of Tertiary



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OIL AND GAS WELLS DRILLED AND COMPLETED DURING 1982

Company	Well	Permit no.	Total depth	County
Amoco Production Co.	Big Pole Creek No. 1	323	8300	Eureka
Amoco Production Co.[1]	Blackburn No. 3	324	7955	Eureka
Grace Petroleum Corp.	Arrow Canyon No. 1	329	17,110	Clark
Sun Oil Co.	Southern Pacific No. 1	330	14,000	Elko
Cities Service Co.	Federal BL No. 1	332	10,045	Elko
Amoco Production Co.	Blackburn No. 4	333	8100	Eureka
Amoco Production Co.	Blackburn No. 6	335	7651	Eureka
Sun Exploration & Production Co.	Southern Pacific No. 3-13	342	10,936	Elko
Buckhorn Petroleum Co.	Adobe Federal No. 16-1	343	3945	Nye
Jayhawk Exploration, Inc.	Federal-Indian Springs No. 1	344	5583	Clark
Buckhorn Petroleum Co.	Chuckwagon Federal No. 10-14	345	7000	Nye
Texaco, Inc.	Munson Ranch No. 11-23X	346	2635	Nye

[1]Producing well.

NEVADA'S OIL PRODUCTION[1]

Field (discovery data)	1981 year	1981 cumulative	1982 year	1982 cumulative
Eagle Springs (1954)	72,441	3,531,416	48,967	3,580,383
Trap Spring (1976)	599,907	4,197,192	495,907	4,693,099
Currant (1972)[2]	–	635	–	635
Bacon Flat (1981)	27,331	27,332	37,408	64,740
Blackburn (1982)	–	–	14,228	14,228
	699,679	7,756,575	596,510	8,353,085
			14.7% decrease	

[1]Production (in 42-gal. barrels) as reported by oil producers to the Nevada Division of Mineral Resources.

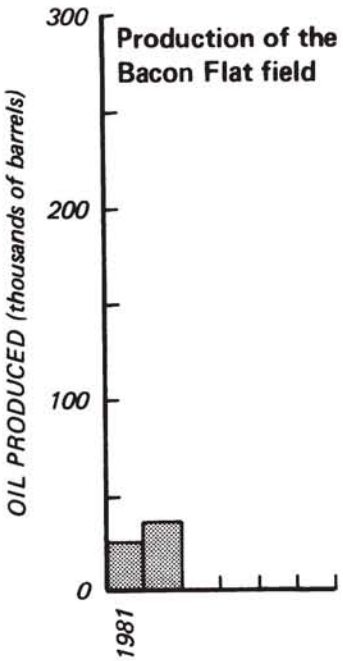
[2]The Currant Field produced 635 barrels of oil in 1980 from its single well before it was shut in. The cost of diluting the thick oil to produce it was too high to make production economically feasible.

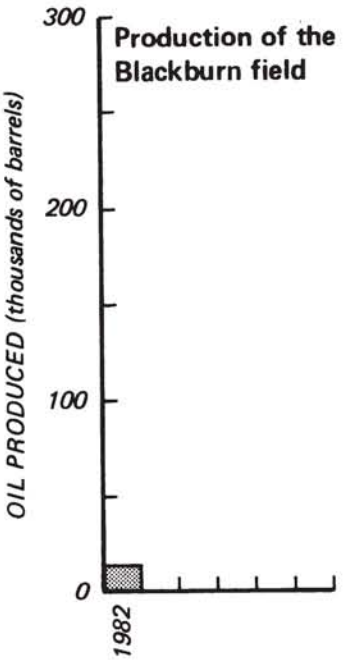
FEDERAL OIL AND GAS LEASES IN EFFECT BY COUNTY[1]

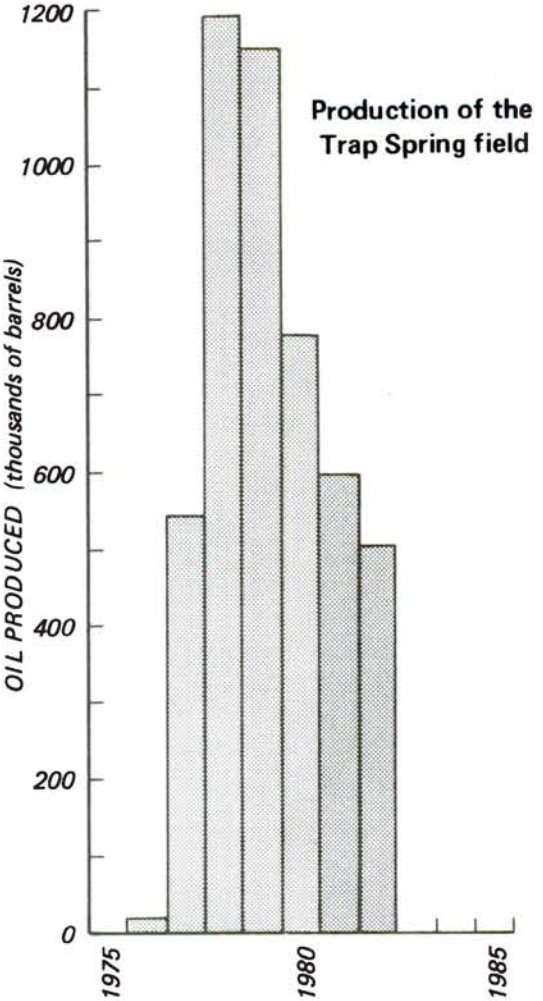
COUNTY	NUMBER OF LEASES Noncompetitive FY81	Noncompetitive FY82	Competitive FY81	Competitive FY82	Simultaneous drawing[2] FY82	ACREAGE Noncompetitive FY81	Noncompetitive FY82	Competitive FY81	Competitive FY82	Simultaneous drawing[2] FY82
Carson City	0	0	0	0	0	0	0	0	0	0
Churchill	436	460	0	0	4	913,339	976,109	0	0	6378
Clark	1328	1472	0	0	2	2,485,128	2,781,326	0	0	7989
Elko	1583	1849	0	0	10	3,496,384	4,822,687	0	0	21,986
Esmeralda	10	7	0	0	2	10,063	8263	0	0	1160
Eureka	642	688	0	0	13	1,136,547	1,338,098	0	0	57,835
Humboldt	164	295	0	0	0	632,871	1,299,211	0	0	0
Lander	268	305	0	0	0	537,041	695,803	0	0	0
Lincoln	1601	1661	0	0	1	3,793,885	3,991,842	0	0	1281
Lyon	7	7	0	0	0	12,353	12,353	0	0	0
Mineral	13	12	0	0	1	16,391	14,991	0	0	1400
Nye	2146	2138	2	2	14	2,564,978	2,891,671	400	400	22,648
Pershing	120	155	0	0	0	286,127	458,024	0	0	0
Washoe	1	95	0	0	0	1155	586,765	0	0	0
White Pine	1775	1989	0	0	19	1,444,761	363,499	0	0	60,862
Total	10,094	11,133	2	2	66	17,331,024	20,240,642	400	400	181,539
	10.3% increase					16.8% increase				

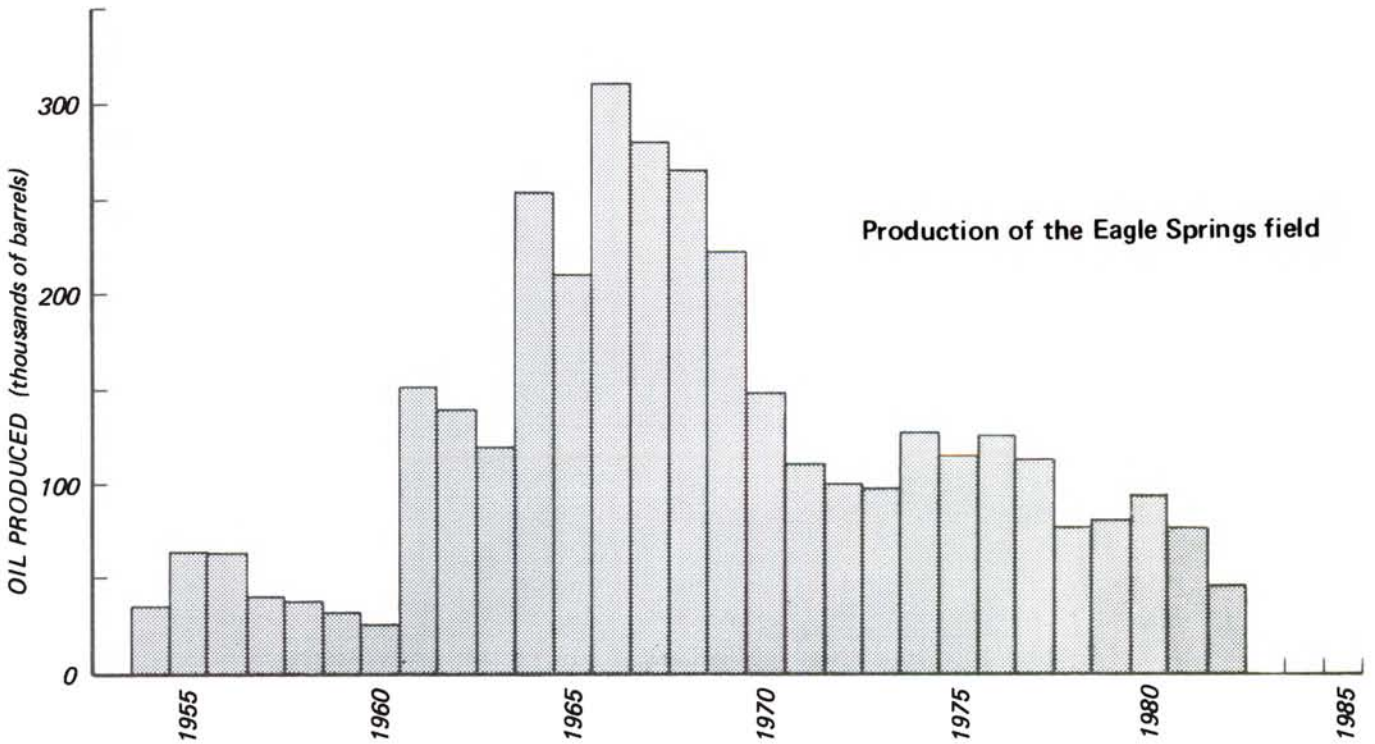
[1]From the U.S. Bureau of Land Management (FY = fiscal year, 1 Oct to 30 Sep).

[2]There are no figures for simultaneous drawings in FY81.









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volcanic rocks; possible marine Mesozoic rocks at depth may be the targets sought by any drilling.

Commodore Resources Corp. and partner **March Resources Ltd.** have reported that a total of 16 zones were scheduled to be tested in October 1982 at their Outlaw Federal No. 1 well in eastern White Pine County. Shows of gas were reported at 3000 ft in the Mississippian Chainman Shale and high molecular weight oil was encountered after five hours of swabbing from a zone that was perforated but not stimulated between 12,081 and 12,090 ft (Hotline Energy Reports, 9 Oct 82). The well was drilled on a farmout from Amoco Production Co. Commodore has a 49% working interest in the well and March has 30%. Other owners are not known. This test is the first well drilled on the Dearden Prospect, a seismically defined area covering 63,000 acres in White Pine County, Nevada, and adjacent Millard County, Utah (Oil and Gas Journal, 26 Jul 82). The Eagle Springs Field is 80 miles to the west of the wildcat, and the shut-in Anderson Junction Field in Utah is 40 miles east. The Commodore well was drilled to approximately 13,000 ft in 1982. The operators plan to redrill and deepen the well in the future.

Sun Oil Co. completed the Southern Pacific No. 1, a 14,000-ft wildcat, in 1982 northeast of Wells in Elko County. There were oil shows reported above 1000 ft in Tertiary sedimentary rocks. Sun completed another well, the Southern Pacific 3-13, 3 miles to the northeast in late December. Casing was run in this well, and Sun planned to perforate uphole (Munger Oilgram, 14 Jan 83). No further information was available at year end.

Cities Service Co. reported the recovery of 200 cc of oil and 180 cc of mud in a drill-stem test on their Federal BL No. 1 well in the Jiggs area of southwestern Elko County. The interval tested was 7580–7683 ft (Hotline Energy Reports, 27 Mar 82). The well was eventually drilled to a depth of 10,047 ft. A test of the interval between 7610 and 7683 ft produced gas to the surface in 4 minutes (Munger Oilgram, 26 Mar 82). This test is approximately 1¼ miles southeast of a marginal gas well drilled by Wexpro in 1980. The Wexpro well is reported to have flowed 93 Mcfd (thousand cubic feet per day) of gas from the Tertiary Elko Formation at 9060–9420 ft (Oil and Gas Journal, 26 Jul 82).

Grace Petroleum Corp. completed Nevada's second deepest well, the Arrow Canyon No. 1, in Clark County in late 1982. It is believed to be an "overthrust belt" test; no other information was available on the well at year end.

Field	County	Productive formation
Eagle Springs	Nye	Oligocene Garrett Ranch Group (volcanic rocks) and Sheep Pass Fm.
Trap Spring	Nye	Oligocene Garrett Ranch Group
Currant	Nye	Eocene Sheep Pass Fm.
Bacon Flat	Nye	Devonian Guilmette Fm.
Blackburn	Eureka	Paleozoic? rocks

NEW FIELDS DISCOVERED

Amoco Production Co. completed a new field discovery well, the Blackburn No. 3 (S8,T27N,R52E), in April 1982. The well is located in Pine Valley, approximately 45 miles southwest of Elko and 5 miles west of the Bruffey oil seep. Little information has been released concerning the well, but two pay zones were reportedly completed. The interval between 770 and 7199 ft was reported to be a favorable zone during drill-stem tests. It is rumored that the productive zone is in Paleozoic rocks, possibly Mississippian or Devonian dolomite. Production (flowing well) through December 1982 has been 14,228 barrels of oil. The API gravity ranges from 27° to 29.9°. The pour point of the oil is reported to be 30°F (Oil and Gas Journal, 28 Feb 83, p. 123).

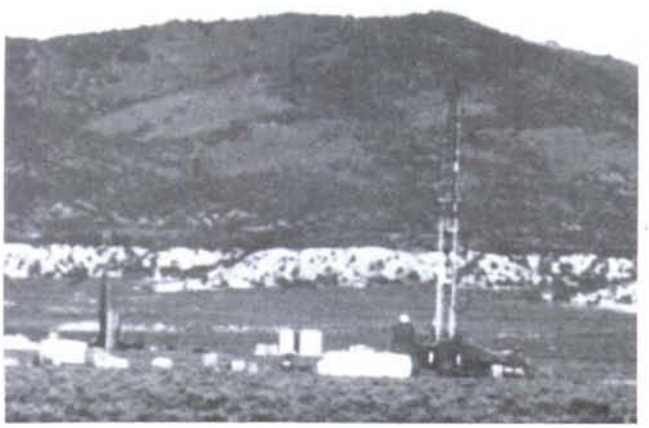
Working interest owners until payout are Amoco and Getty Oil Co., each with 50% interest. After payout, working interest owners will be Amoco, Getty, and North Central Oil Corp., each with one-third interest (Nevada Mining Association Bulletin, Mar-Apr 82).

Following the discovery, Amoco drilled two dry holes in the surrounding sections and has filed for permits to drill three additional wells in the area.

PRODUCTION

Nevada's oil production for the calendar year 1982 was 596,510 barrels (see table, bar graphs), a 14.7% decrease from 1981. Most of the oil produced in Nevada is transported by truck to Nevada Refining Co. in Tonopah. The refined products are marketed mainly in Utah and California.

The Bacon Flat field production of 37,408 barrels for 1982 was the first full-year production total for the field, which was discovered in June of 1981. Production of the oil involved associated production of a large volume of water, approximately 334,000 barrels. The royalty paid to the Federal government in fiscal year 1982 for oil produced in Nevada totaled $1,391,192 according to the U.S. Bureau of Land Management. Fifty percent of the royalty is returned to Nevada.



Amoco Production Co. well during drilling in the Blackburn field in 1982.
Harold Bonham photo.

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AN ANALYSIS OF THE ECONOMIC IMPACT OF THE MINING INDUSTRY ON NEVADA'S ECONOMY[1]

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The objective of this analysis is to bridge the historical and commercial development of mining in the State and, generally, to document the impacts that mining activities, broadly defined to include oil, gas, and geothermal exploration and production, have on the State's economy. Nevada's mining industry traditionally has been a prime mover in the State's economic, social, and political history. Indeed, before gaming and excepting the State's agricultural sector, the prospect of finding precious metals provided an impetus for people to come to Nevada, start businesses, create jobs, and contribute to the economic development of the State. While the legalization of gaming some 50 years ago fostered the growth of a tourist-oriented economy that has overshadowed the State's more traditional economic activities of mining and agriculture, mining has continued to play a significant role in determining the economic health of the State. This is particularly true in central, eastern, and northern Nevada, especially since the dramatic upswing in the value of mineral output which began in 1980, which has been heralded as the third renaissance of mining in Nevada.

Statewide mineral output and its estimated value are reported in table 1. The preliminary estimate of mineral production in 1982 is $484.8 million, up 5.9% over 1981, despite what many observers regarded as a slowdown of activity during the period associated with the recessionary national and State economy. However, it should be noted that the 1982 increase in production was the result of investment and start-up activity in the previous two years. Also, increases in 1982 production are modest compared to the 17.2% gain in production posted in 1981 and negligible in comparison to the 54.8% increase in output value in 1980 over 1979 (Hall and Schilling, 1980).

This large increase in the value of industry output in 1980 reflected increases in value rather than quantity of output, especially in regard to gold and silver prices, which increased substantially in that period. Generally, the industry's financial health is tied directly to national and international markets and trends and, at least in the short run, these indicators do not provide a basis for a favorable industry forecast.

Oil, barite, and gold, the State's top three mineral products in terms of value of output, faced price declines in early 1983. Price declines will adversely affect oil exploration and production, and reduced oil exploration will affect the barite industry, whose principle market is for drilling fluids. Consequently, the State's barite industry, already beset with increased foreign competition and high transportation costs to major markets, faces a significant decrease

[1]This research has been conducted by the Bureau of Business and Economic Research, College of Business Administration, University of Nevada Reno, under contract with the Nevada Mining Association.

TABLE 1. Nevada's mineral production.[1]

Mineral/Unit of measure		1980[2] Quantity	1980[2] Value[3]	1981[2] Quantity	1981[2] Value[3]	1982[2] Quantity	1982[2] Value[3]
Barite	thousand short tons	2268	$61,920	1988	$58,620	1765	$56,158
Clays	thousand short tons	83	2619	105	5021	110	4604
Gem stones		(4)	972	(4)	950	(4)	1000
Gold	troy ounces	250,618	153,699	417,200	194,500	679,700	269,535
Gypsum	thousand short tons	899	6273	826	8344	758	7073
Lead	metric tons	26	24	100	100	(5)	(5)
Mercury	76-pound flasks	3300	13,200	27,900	11,439	25,000	9750
Perlite	thousand short tons	5	77	5	107	(5)	(5)
Petroleum	thousand 42-gallon barrels	893	21,400	699	18,900	597	17,895
Sand and gravel	thousand short tons	7000	23,900	7000	20,000	7000	14,500
Silver	thousand troy ounces	167	3597	401	4410	254	2032
Stone, crushed	thousand short tons	1330	5000	1869	7633	1240	3800
Other minerals including cement, copper, diatomite, fluorspar, lime, iron, ore, lithium compounds, magnesite, molybdenum, pumice, salt, talc, tungsten, and zinc		(4)	98,132	(4)	127,976	(4)	98,492
Preliminary total			$390,813		$458,000		$484,839
Final total			$407,549		$503,649		(4)

[1]Production measured by mine shipments, sales, or marketable production (including consumption by producers), as compiled by the U.S. Bureau of Mines (U.S. Bureau of Mines, 1979–82) except for petroleum. Additional source: Schilling (1981) and Nevada Bureau of Mines and Geology staff assistance.

[2]Preliminary figures are used throughout for consistency of comparisons. Final totals are provided for years available.

[3]In thousands.

[4]Not applicable or not available.

[5]Included in "other minerals."

in demand. Hence, the predicted national and international economic recovery, based on oil prices, offers little optimism for the oil and barite industries of Nevada.

The significant price decline of gold, the State's major mineral commodity in terms of output, will adversely affect Nevada's mineral industry. The price of gold is notorious for its instability, but barring major international crises or inflationary policies by the Federal Reserve, gold prices will probably remain in the $400–$500 per ounce range in the near future.

The prospects of economic recovery in 1983 are perhaps most favorable for industrial minerals and construction materials such as sand, gravel, cement, and gypsum. However, even in these cases increased demand for Nevada's mineral output depends critically on factors such as the size of existing stockpiles and the pattern of nationwide economic recovery.

Despite the short-run market trends noted above, oil, gas, and geothermal resources in the State are as good an indicator of the State's potential mineral wealth as the more glamorous and traditional metals associated with the mining industry. Nevada's eastern border lies on the overthrust belt that extends from Wyoming to Arizona. Counties in the eastern part of the State have accounted for a majority of Federal oil and gas leases in effect in the State. These leases increased over 19% between 1979 and 1980 (Hall and Schilling, 1980, p. 23) and another 18% from 1980 to 1981 (Schilling, 1981, p. 28). Although the State is far from becoming a major gas and oil producer, both the number of leases and wells drilled, as well as the footage drilled, has increased dramatically since 1975. This exploratory drilling activity, costing an estimated $8 million in 1981 alone, indicates the industry's perceptions of Nevada's gas and oil potential.

A similar pattern exists with respect to geothermal exploration. Federal geothermal leases in effect increased by more than 26% between 1979 and 1980 (Hall and Schilling, 1980, p. 18) and by almost 18% from 1980 to 1981 (Schilling, 1981, p. 23). Geothermal energy may be significant in the future development of the State, as it not only provides a source of electrical power generating capacity and space-heating energy but also provides the potential for agricultural and aquacultural production. These potential uses could help diversify the State's industrial base and lower production costs for industries within the State.

In the following discussion we focus on four specific areas of concern with a summary of major findings. These areas are (1) "direct" and (2) "indirect" impacts on employment and payrolls, (3) mining's influence on economic development; and (4) taxes paid by the mining industry to State and local governments.

The basis for distinguishing direct from indirect impacts of mining on the State's economy is explained in detail in the Methodology section. The direct effects of the industry are payrolls and employment in the mining industry itself. Industry output figures presented above and in table 1 provide additional information on the industry's direct impact.

Indirect impacts are induced by the expenditure of incomes earned in the mining industry in other sectors of the local economy, such as expenditures by firms for equipment and supplies and by industry employees for consumer goods and services. First, an industry is considered part of the "export base" of the local economy to the extent that goods and services produced are consumed with incomes earned outside of the local economy. In the case of mining, virtually all of industry output is consumed outside of the State. The principle exceptions to the export of mining industry output are commodities such as sand, gravel, and cement, which are a fairly negligible percentage of the value of statewide output.

Second, the magnitude of the indirect impacts of an industry on the local economy is determined by the extent to which incomes earned in export base or basic industries are spent within the regional economy being considered (state or county). Export base incomes spent in the nonbasic sectors of the region's economy generate additional incomes, proxied here by employment and payrolls reported by the Nevada Employment Security Department and thus considered "covered" by industrial insurance, via a multiplier effect. Hence, incomes earned in the basic sectors of the State's economy induce additional incomes in the nonbasic sectors such as wholesale and retail trade, the financial sector, real estate, insurance, construction, local government, etc.

These direct and indirect impacts, along with industry effects on economic development and public sector revenues, are summarized below:

(1) The direct impacts of mining in the State's private sector are overshadowed by the gaming- and tourist-oriented economies of Reno/Sparks and Las Vegas. In 1981, for example, the mining industry accounted for only 2.8% of statewide covered payrolls and 1.9% of employment. Outside of the metropolitan gaming areas, however, mining is an extremely significant contributor to local economies.

As an indication of this direct impact outside of the State's major metropolitan areas, over the 13-year period since 1969, mineral, gas, and oil exploration, development, and production accounted for 73% of county payrolls (58% of employment) in Esmeralda County, 82% of county payrolls (78% of employment) in Eureka County, 72% of county payrolls (58% of employment) in Lander County, 30% of county payrolls (23% of employment) in Lincoln County, 37% of county payrolls (30% of employment) in Lyon County, 37% of county payrolls (25% of employment) in Pershing County, 40% of county payrolls (36% of employment) in Storey County, and 37% of county payrolls (28% of employment) in White Pine County (see tables 2 and 3). While the direct impact of mining is not large from a statewide perspec-

TABLE 2. Mining's share of nonagricultural payrolls, by county, 1969–81.

County	All years average	1981	Range % Low		Range % High	
Carson City	1.1%	0.9%	0.1%	(1980)	2.2%	(1969)
Churchill	1.7	5.8	0.4	(1972)	5.8	(1981)
Clark	0.2	0.3	0.11	(1971)	0.3	(1981)
Douglas	0.2	0.1	0	(1975)	0.4	(1969)
Elko	6.3	13.6	2.7	(1972)	13.6	(1981)
Esmeralda	73.3	58.8	70.6	(1975)	89.9	(1977)
Eureka	82.4	75.6	66	(1978)	95.2	(1977)
Humboldt	7.2	9.4	2.8	(1974)	20.7	(1969)
Lander	71.5	68.4	56.5	(1978)	81.1	(1973)
Lincoln	29.9	18.9	9.8	(1972)	44.6	(1975)
Lyon	37.0	20.7	8.5	(1979)	54.3	(1970)
Mineral	6.7	13.5	1.1	(1977)	13.5	(1981)
Nye	9.2	18.0	3.5	(1969)	18.0	(1981)
Pershing	37.0	52.4	26.8	(1978)	52.4	(1981)
Storey	39.9	44.5	20.6	(1976)	60.9	(1980)
Washoe	0.9	1.1	0.7	(1973)	1.3	(1980)
White Pine	36.5	20.0	9.5	(1979)	52.4	(1969)

TABLE 3. Mining's contribution to Nevada nonagricultural employment, by county, 1969–81.

County	Period average	1981	Range % Low		Range % High	
Carson City	0.7%	0.6%	0.1%	(1978)	1.5%	(1970)
Churchill	1.2	3.2	0.3	(1972)	3.2	(1981)
Clark	0.2	0.2	0.1	(1972)	0.2	(1981)
Douglas	0.1	0.1	0.0	(1972 & 1976)	0.2	(1969)
Elko	3.8	8.2	2.1	(1970)	8.2	(1981)
Esmeralda	57.9	43.4	43.1	(1978)	67.8	(1971)
Eureka	77.7	63.5	63.5	(1981)	88.9	(1977)
Humboldt	5.0	6.1	1.9	(1979)	15.5	(1969)
Lander	58.0	52.8	46.1	(1979)	66.3	(1974)
Lincoln	23.2	15.6	10.1	(1972)	33.4	(1974)
Lyon	29.5	12.4	5.1	(1979)	45.6	(1970)
Mineral	5.1	8.8	1.0	(1977)	8.8	(1981)
Nye	10.4	16.8	4.5	(1969)	16.8	(1981)
Pershing	24.9	34.6	17.5	(1978)	34.6	(1981)
Storey	35.5	43.1	20.9	(1978)	43.1	(1981)
Washoe	0.6	0.8	0.4	(1973)	0.9	(1980)
White Pine	28.0	15.5	7.4	(1979)	42.5	(1969)

tive, it is extremely important outside of Clark and Washoe Counties.

Another indicator of the nature of the industry's direct impact on local economies is suggested by the consistently larger fraction of county payrolls in mining than in other employment. This generally implies that earnings in the mining industry are larger than in other sectors. Estimated annual average per capita earnings in the industry reported by the State of Nevada Employment Security Research in late 1982 were $23,772. Among major industries surveyed, earnings in the mining industry are second only to construction trades, which showed estimated average earnings of $31,245 in the same period, and above average earnings in public utilities ($21,642), manufacturing ($16,885), and trade ($13,185). Hence, one direct impact of the industry is to bring relatively highly paid and highly skilled individuals into the State's workforce.

(2) The "indirect" or multiplied effects of the industry in the State's private sector are also important and are not only of concern to the rural portions of the State. Mining firms operating in rural areas of the State make purchases of supplies and equipment in the major metropolitan areas of the State, and employees of these firms spend a significant portion of their earnings in these commercial centers. Using the methodology described in the section on Methodology, statewide and county multipliers are derived. On a statewide basis, for the period 1969–81, the results presented in the Analysis and Discussion section show multipliers of 2.26 and 2.28 for employment and payrolls, respectively. These figures are interpreted to mean that for each job and payroll dollar generated in the export sector of the State's economy, an additional 1.26 jobs and an additional $1.28 in payrolls are generated by the spending of export-base incomes. County and mining industry specific multipliers are presented below in addition to these statewide, total export-base payroll, and employment multipliers.

(3) Another important aspect of the mining industry's effect on the State is its contribution to the economic development of the State. The estimation of county employment and payroll multipliers, discussed in the Analysis and Discussion and Methodology sections, provides an indirect means of estimating intercounty transfers of purchasing power, reflecting the extent to which incomes earned in one county are used to purchase goods and services in other counties. The estimation of county multipliers, supplemented with a small survey of mining employees' consumer behavior (also described in the Methodology section) assists in determining the extent of "spillover effects" between counties. These spillovers reflect the dependence of commercial centers on incomes generated outside their respective counties.

(4) Mining is an important element, if not the major part, of the tax base for most of the rural counties of Nevada. Statewide, the mining industry paid an estimated $26 million to State and local governments in taxes on minerals extracted, assessed values of land and improvements (ad valorem), and in sales and use taxes on purchases of equipment and supplies. This figure includes an approximate $3.5 million tax increase resulting from the 1981 "tax shift" program.

While these statewide figures show the overall contribution of the mining industry to the State's public sector, the industry's contributions to the public sectors of specific counties are much more significant. In 1981 and 1982, mining's share of assessed values was 18% in Elko County, 49% in Esmeralda County, 76% in Eureka County, 21% in Humboldt County, 85% in Lander County, 19% in Lincoln County, 30% in Mineral County, 35% in Nye County, 28% in Pershing County, 29% in Storey County, and 52% in White Pine County.

ANALYSIS AND DISCUSSION

Table 4 presents a summary of export-base multipliers derived using the methodology described above. As stated above, for the period 1969–81, our estimates show multipliers of 2.26 and 2.28 for employment and payrolls, respectively. Despite Nevada's general lack of economic diversification, these multipliers are comparable to those found in similar studies in other states. This comparability is most likely the result of the State's dependence on gaming, a highly export-oriented industry. A recent ten-state study showed employment multipliers of 2.14 in Arizona, 2.28 in Colorado, 1.76 in Idaho, 2.45 in Michigan and Minnesota, 2.18 in Missouri, 2.14 in Montana, 1.93 in New Mexico, 2.01 in Tennessee, and 2.20 in Utah (Mountain West Research, Inc., 1980, p. 7).

In comparison to that study, our results show that Nevada's multiplier is the highest in the intermountain region. However, since the areas of the State that are affected by the mining industry are generally great distances from the gaming-dominated local economies of Las Vegas and Reno/Sparks, these statewide multipliers may not apply at local levels. Therefore, in interpreting the results presented in table 4, the level of economic development and degree of diversification of specific local economies affected by mining are important to keep in mind. In general, the results show that the least-developed counties have the lowest multipliers. This is consistent with the interpretation of the multipliers offered above.

Table 4 presents detailed results of estimated employment and payroll multipliers by the two methods described in the Methodology section. The first method, reported in the first two columns of

TABLE 4. Employment and payroll multipliers, by county.

County	Model #1 (1969–81)		Model #2 (1976–81)			
			Employment		Payrolls	
	Employment	Payrolls	Mining	Other	Mining	Other
Carson City	2.65	2.78	(1)	(1)	(1)	(1)
Churchill	2.87	2.81	(1)	(1)	(1)	(1)
Clark	2.27	2.30	(1)	(1)	(1)	(1)
Douglas	1.71	1.73	(1)	(1)	(1)	(1)
Elko	2.14	2.14	1.36	2.02	0.63	2.58
Esmeralda	1.86	1.51	1.31	2.55	1.28	2.09
Eureka	1.68	1.38	0.65	5.08	1.39	2.08
Humboldt	2.88	3.19	2.95	1.27	1.92	1.64
Lander	1.42	1.43	1.00	3.53	1.09	3.04
Lincoln	2.02	1.78	1.70	2.08	1.96	2.40
Lyon	2.36	2.01	.83	1.96	0.52	1.89
Mineral	2.29	2.33	(1)	(1)	(1)	(1)
Nye	1.55	1.56	2.79	1.65	0.78	1.70
Pershing	1.69	1.44	1.13	2.36	1.22	2.46
Storey	0.99	1.84	1.36	2.11	0.75	2.81
Washoe	2.20	2.33	(1)	(1)	(1)	(1)
White Pine	0.54	1.87	0.96	1.10	0.79	2.28
All counties	2.26	2.28	1.47	2.25	1.96	2.12

[1]Omitted.

table 4, derives multipliers for the entire county export base. That is, there is no attempt to distinguish between export-base industries—mining, manufacturing, gaming, etc. The second method, shown in the last four columns, employs a distinction between mining and other export-base activities. This second method attempts to apportion changes in total employment and payrolls between mining and nonmining export activities.

In any set of statistical results, no particular significance should be attached to an individual number. Rather, it is the consistency and plausibility of the results taken as a whole that give empirical evidence its weight. In accordance with these principles, multiplier estimates for counties where mining is a relatively small proportion of employment and payrolls have been omitted from table 4 except where the result seems plausible. In the omitted cases, the effects of mining are generally overshadowed by the effects of developments in other export-base industries.

In certain counties whose multipliers are shown, especially those with multipliers less than one, specific events in the mining industry (such as shutdowns of operations in White Pine and Lyon Counties) have led to what must be interpreted as an underestimation of the multipliers. These particular statistics indicate that the analysis is sensitive to such events, but the results themselves should be regarded as serious underestimates since it is theoretically impossible for the multiplier to be less than one. While implausible, these results should be interpreted to mean that the contraction of the local nonexport-based economy occurs more slowly in response to a contraction in export-base payrolls and employment than to an expansion. More generally, an expansion in export-base employment and payrolls will have a larger short-term effect than a contraction. This is a short-run phenomenon that has been well documented in other studies (Barone, 1979).

The significance of the estimates refers to their statistical significance. Estimation of all of the multipliers on table 4 suffer from serial correlation problems which lead to upward bias in standard tests of statistical significance but not of the multipliers themselves (Kmenta, p. 274). Consequently, table 4 does not refer to this issue. As a practical matter, this statistical problem only indicates that the multipliers estimated should not, with a high level of statistical confidence, be used for short-run forecasts. The multipliers do, however, reflect the long-run average ratios of export-base employment and payrolls to total employment and payrolls.

In addition to these statistical considerations, the results shown in table 4 should be evaluated in light of two political/economic considerations. First, the regional commercial structure of the State economy should be contrasted with the county-based political structure of the data used to derive the multipliers. While Nevada has 17 counties, it has two major metropolitan areas in Las Vegas and Reno/Sparks, two secondary commercial centers in Winnemucca and Elko, and a number of smaller commercial centers such as Ely, Fallon, Fernley, Hawthorne, and Tonopah. The survey of mining operations described in the Methodology section suggests that these commercial centers and their geographic markets are the relevant regional units of analysis.

Second, and as a consequence of the poor fit between the economic and political structure of the data, the extent that nonmining sectors in various counties sell their output outside of their respective local economies will vary widely. For example, in Reno/Sparks/Carson City and Las Vegas, residents have a relatively low tendency to buy goods and services outside of their respective counties. If on the other extreme, all the incomes earned in a county were spent outside the county, its multiplier would equal one since no additional jobs (or payrolls) would be earned in the county. Hence, depending upon the degree of development of these commercial centers and their competitors, which amounts to the ability of the local economies to capture the payrolls generated in them and the surrounding counties, the percentage of output of various nonmining sectors that are export oriented will vary from the statewide averages.

These characteristics of the data and the structure of the State economy build systematic biases into the estimates shown on table 4 that are useful for examining the structure of the State's economy and the influence of the mining industry. As illustrated in table 4, a general pattern of below-average multipliers occurs in the sparsely developed counties, while above-average multipliers appear in the counties with major commercial centers.

Winnemucca and Elko are two secondary commercial centers that are identified by table 4 and our survey of mining operations as having substantially benefited from mining activity. For example, the counties surrounding Elko County—White Pine, Eureka, and Lander—all show small multipliers, while Elko County shows a relatively large multiplier (2.14) that reflects the role of the city of Elko as a regional commercial center. In spite of the fact that Elko County has a relatively small proportion of mining employment and payrolls, the County's economy receives a substantial boost from the mining-based economies of the surrounding counties.

A similar but more dramatic pattern appears in Humboldt County, which contains Winnemucca. The surrounding counties (Lander, Pershing, and Eureka) again show low multipliers and large mining sectors, while Humboldt County, like Elko County, contains a relatively small proportion of mining employment and payrolls and yet shows very large multipliers.

Humboldt County's multipliers are considerably larger than those for Elko County, because Elko faces significant competition from major commercial centers outside of Nevada from, principally, Twin Falls, Idaho, and Salt Lake City, Utah. However, Winnemucca's location puts it in competition with Elko to the east and Lovelock, Fallon, Fernley, and Reno/Sparks to the south and west. With the exception of Reno/Sparks, which is a significant distance,

TABLE 5. Net proceeds, by county, from 1972-73 to 1981-82.

County	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Carson City	—	—	$30	$439	—	—	—	—	$3780	—
Churchill	$100,497	$131,097	114,315	190,592	$274,600	$306,717	$362,627	$189,352	220,196	$336,403
Clark	2,488,509	2,514,796	2,119,586	2,500,140	2,988,621	3,503,561	3,543,547	4,235,065	2,294,780	2,119,527
Douglas	228	35,044	1567	10,651	900	860	5326	577	201,197	6942
Elko	387,761	387,898	1,547,430	2,775,983	2,973,576	3,762,935	2,238,344	4,764,073	6,007,608	11,199,440
Esmeralda	2,377,400	2,377,400	3,538,188	2,481,196	4,637,686	8,219,738	5,432,527	6,753,163	7,206,158	7,819,357
Eureka	10,978,304	10,978,304	19,336,281	25,277,193	15,069,783	19,886,569	18,410,060	24,454,769	49,953,775	44,437,068
Humboldt	196,449	175,349	293,146	254,368	631,652	1,368,417	367,320	5,996,259	6,998,583	22,987,308
Lander	9,769,102	9,869,438	19,213,682	10,380,648	5,197,334	5,270,545	8,004,237	9,125,313	10,934,406	27,382,278
Lincoln	31,289	31,289	119,332	264,102	362,711	338,252	761,522	792,080	3,308,624	1,236,160
Lyon	12,501,636	12,501,633	22,719,133	1,509,424	1,041,879	38,383	240,706	442,144	34,151	215,364
Mineral	233,374	233,374	247,080	202,371	6189	114,374	5983	368,766	383,361	3,844,500
Nye	1,105,665	1,414,535	2,174,319	2,676,005	1,802,325	6,114,448	12,727,607	18,154,629	34,660,845	21,626,160
Pershing	1,319,028	1,340,680	1,218,119	744,340	902,560	1,179,453	1,588,071	2,037,355	1,487,681	4,690,996
Storey	178,923	156,422	149,494	98,021	48,931	64,019	98,613	3,376,744	4,914,627	4,293,840
Washoe	1400	1400	900	1200	—	—	—	—	—	—
White Pine	15,692,844	15,596,776	5,526,755	68,190	96,200	330,932	—	—	531,174	12,543,236
Total	$57,362,409	$57,745,435	$78,319,357	$49,434,863	$36,034,947	$50,499,203	$53,786,490	$80,690,289	$129,140,946	$164,738,579

TABLE 6. Revenue from tax on net proceeds, by county, from 1973-74 to 1981-82.

County	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Carson City	—	$1	$17	—	—	—	—	$97	—
Churchill	$5244	4572	8247	$10,984	$11,902	$13,779	$4558	5571	$4032
Clark	80,578	77,970	102,171	109,345	128,185	129,647	96,836	56,639	36,025
Douglas	822	36	261	26	23	160	9	3337	91
Elko	12,612	47,037	88,662	91,118	114,958	68,269	73,479	103,330	117,335
Esmeralda	118,581	154,434	94,932	180,871	320,569	206,219	165,520	215,968	135,048
Eureka	410,589	676,352	879,649	518,447	680,121	629,624	479,443	1,067,262	332,389
Humboldt	7592	11,606	10,081	24,370	48,758	12,724	124,090	160,967	245,303
Lander	375,340	733,831	397,016	191,538	206,597	313,766	236,168	289,761	384,885
Lincoln	1089	4198	9257	12,640	11,864	27,423	16,720	78,745	15,678
Lyon	479,117	923,213	62,834	42,315	1644	10,143	13,375	1217	3371
Mineral	11,669	12,355	10,667	310	5719	299	13,441	14,299	49,978
Nye	63,432	90,295	120,821	80,414	257,848	498,220	600,862	1,029,427	336,857
Pershing	43,143	39,930	23,937	29,656	39,106	52,088	38,614	39,721	64,064
Storey	6676	6248	4272	2203	3075	4727	118,728	164,409	57,357
Washoe	58	35	134	—	—	—	—	—	—
White Pine	561,484	198,964	1171	3464	11,914	—	—	12,388	130,336
Total	$2,178,026	$2,981,077	$1,814,129	$1,297,701	$1,842,283	$1,967,094	$1,981,849	$3,243,145	$1,912,754

Winnemucca faces considerably less competition from major commercial areas.

Additional data from our survey of mining operations confirms this regional structure and suggests the existence of several other smaller regional commercial centers, including Fallon and Fernley between Winnemucca and the Reno/Sparks commercial centers and Hawthorne and Tonopah between Reno/Sparks and Las Vegas. In all these cases, mining has a small to modest direct impact that is measured by the proportions of payrolls and employment in the industry in the respective counties. However, the multipliers suggest that the indirect effects are more substantial.

As with Humboldt and Elko Counties, the multipliers in Churchill and Mineral Counties are fairly high. Only in Nye County are the multipliers substantially below the average, probably due to the fact that the mining-induced growth in Tonopah has occurred relatively late in the period we are examining and does not make a strong showing in the results. Also, much of Tonopah's recent growth has been related to Federal government activity on the Nevada Test Site and the proposed MX missile system. Tonopah faces significant commercial competition from Las Vegas to the south; from the commercial centers of Reno, Sparks, and Carson City to the north; and from Bishop, California, to the west.

TAXES PAID BY MINING FIRMS

The major taxes paid by mining firms in Nevada are taxes on net proceeds, property taxes on mine and mill improvements and equipment, and sales and use taxes on purchases of equipment and supplies. Other taxes related to mining are levied on oil and gas and geothermal leases and on patented mine claims.

Net Proceeds of Mines

The net proceeds tax is in lieu of an ad valorem tax on the mineral deposit. Rather than a tax on the assessed value of the deposit, it is a tax on the net earnings from the sale of the product of the mining operations. Mining firms provide information to the Nevada Department of Taxation, which determines the net proceeds of all mining operations in the State. However, tax rates are set by the county assessor at the ad valorem rate of other property in the same taxing jurisdiction, and the revenues are collected by county officials. Nevada Revised Statutes specify the items which may be deducted from gross proceeds to arrive at taxable net proceeds. These deductions are (a) the cost of extracting or mining the ore; (b) the cost of transporting the crude ore from mine to mill, smelter, or place of reduction; (c) the cost of maintaining the metals or minerals; (d) the cost of reducing or refining the crude ore; (e) the cost of insurance; (f) the cost of royalties; and (g) a depreciation allowance.

Table 5 shows the net proceeds, by county, for the period from fiscal year 1972–73 to 1981–82. Net proceeds were $53.1 million in 1973, increased to a peak of $78.3 million in 1975, and fluctuated until they stabilized at $53.8 million in 1979. Then net proceeds steadily increased to $164.7 million by 1982. There was a 50% increase between 1979 and 1980, a 60% increase between 1980 and 1981, and a 27% increase between 1981 and 1982.

Tax revenue generated by net proceeds has not followed the same pattern (table 6). Tax revenues were $1.96 million in 1979, $1.98 million in 1980, $3.2 million in 1981, and $1.91 million in 1982. This decrease was caused by the property tax rate reduction passed by the 1981 legislature. However, this reduction in the tax rate applied to net proceeds of mining firms and property was more than offset by the increase in the sales and use tax rates that was part of the same 1981 tax shift package. The net effect of the tax shift is discussed in greater detail below.

The effective statewide ad valorem tax rate has decreased from 3.66% in 1979 to 1.16% in 1982 (table 7). There are variations from county to county

TABLE 7. Tax revenue as percent of net proceeds, by county, from 1974–75 to 1981–82.[1]

County	1974–75	1975–76	1976–77	1977–78	1978–79	1979–80	1980–81	1981–82
Carson City	3.33%	3.87%	0	0	0	0	2.60%	0
Churchill	4.00	4.33	4.00%	3.88%	3.80%	2.41%	2.53	1.20%
Clark	3.68	4.09	3.66	3.66	3.66	2.29	2.47	1.70
Douglas	2.30	2.45	2.89	2.67	3.00	1.56	1.66	1.31
Elko	3.04	3.19	3.06	3.06	3.05	1.54	1.72	1.04
Esmeralda	4.36	3.83	3.90	3.90	3.80	2.45	3.00	1.73
Eureka	3.50	3.48	3.44	3.42	3.42	1.96	2.14	0.75
Humboldt	3.96	3.96	3.86	3.56	3.46	2.07	2.30	1.07
Lander	3.82	3.82	3.68	3.92	3.92	2.59	2.65	1.40
Lincoln	3.52	3.50	3.48	3.51	3.60	2.11	2.38	1.27
Lyon	4.06	4.16	4.06	4.28	4.21	3.02	3.57	1.56
Mineral	5.00	5.27	5.00	5.00	5.00	3.64	3.73	1.30
Nye	4.15	4.51	4.46	4.42	3.91	3.31	2.97	1.56
Pershing	3.28	3.21	3.28	3.32	3.28	1.90	2.67	1.36
Storey	4.18	4.36	4.50	4.80	4.79	3.52	3.34	1.34
Washoe	3.89	1.12	0	0	0	0	0	0
White Pine	3.60	1.71	3.60	3.60	0	0	2.33	1.04
Statewide	3.81%	3.67%	3.60%	3.65%	3.66%	2.46%	2.51%	1.16%

[1]Computed from tables 1 and 2.

but in every case it has decreased substantially. A proposed constitutional amendment, SJR21, has been passed for the second time by the 1983 session of the legislature and would allow the maximum rate to be set at 5% if approved by a vote of the general electorate in the next election. This would allow the revenues to increase from $1.9 million to $8.2 million for the 1982 tax year for a $6.3 million increase (table 8).

Of the tax revenue collected in 1982 on net proceeds, 55% was from the three rural counties of Eureka, Lander and Nye. Moreover, 98% of the revenue was collected in the nonmetropolitan counties other than Carson City, Clark, Douglas, and Washoe Counties.

Assessed Value of Mining Operations

In addition to the tax on net proceeds, mining firms pay a property tax on mine and mill improvements and equipment. Mining property is centrally appraised by the Nevada Department of Taxation and is subject to the local jurisdiction tax rate.

Assessed values have followed a pattern similar to net proceeds. From 1977-78 to 1980-81 annual growth exceeded 20%, and from 1980-81 to 1981-82 values grew by 46%. Elko, Lander, Nye, and White Pine Counties accounted for 75% of the assessed value. Nearly 95% of the assessed value of mining property was outside the metropolitan counties of Carson City, Clark, Douglas and Washoe Counties.

Although mining continues to contribute a large percentage of the property tax in most rural counties, tax revenues increased by 25% between 1978 and 1979, while assessed value increased by 253% (table 9). This discrepancy is due to the reduction in

TABLE 8. Tax revenues from net proceeds and potential revenues with maximum 5% tax rate, by county, 1981-82.[1]

County	Net proceeds 1981-82	Tax rate	Tax revenue 1981-82	Revenue on 5% rate	Difference
Carson City	0	0	0	0	0
Churchill	$336,403	1.20%	$4032	$16,820	$12,788
Clark	2,119,527	1.70	36,025	105,976	69,951
Douglas	6942	1.31	91	347	256
Elko	11,199,440	1.04	117,336	555,972	438,636
Esmeralda	7,819,357	1.73	135,048	390,968	255,920
Eureka	44,437,068	0.75	332,389	2,221,853	1,889,464
Humboldt	22,987,308	1.07	245,303	1,149,365	904,062
Lander	27,382,278	1.40	384,885	1,369,114	984,229
Lincoln	1,236,160	1.27	15,678	61,808	46,130
Lyon	215,364	1.56	3371	10,768	7397
Mineral	3,844,500	1.30	49,978	192,225	142,247
Nye	21,626,160	1.56	336,857	1,081,305	744,448
Pershing	4,690,996	1.36	64,065	234,550	170,485
Storey	4,293,840	1.34	57,357	214,692	157,335
Washoe	0	0	0	0	0
White Pine	12,543,236	1.04	130,337	627,162	496,825
Statewide	$164,738,579	–	$1,912,752	$8,232,925	$6,320,173

[1]Nevada Department of Taxation (unpub. data).

TABLE 9. Assessed values of mining improvements, equipment, and machinery tax revenues, by county, from 1978-79 to 1981-82.[1]

County	Assessed values 1978-79	Tax rate 1978-79	Tax revenue 1978-79	Assessed value 1981-82	Tax rate 1981-82	Tax revenue 1981-82
Carson City	$15,230	3.65%	$556	$17,060	1.18%	$201
Churchill	174,410	3.80	6627	444,340	1.20	5332
Clark	6,401,940	3.66	234,311	8,907,020	1.70	151,419
Douglas	78,220	3.00	2347	243,980	1.31	3196
Elko	1,551,825	3.05	47,330	27,189,190	1.04	356,178
Esmeralda	1,696,010	3.80	64,448	3,021,430	1.73	52,271
Eureka	4,938,500	3.42	168,897	10,818,880	0.75	81,142
Humboldt	2,227,190	3.46	77,060	5,842,660	1.07	62,516
Lander	9,802,370	3.92	384,253	20,556,950	1.40	287,797
Lincoln	4,138,830	3.60	148,998	5,874,390	1.27	74,605
Lyon	4,883,700	4.21	205,604	5,390,190	1.56	84,087
Mineral	316,510	5.00	15,826	8,489,460	1.30	110,363
Nye	10,223,610	3.91	399,743	50,494,960	1.56	787,721
Pershing	2,427,580	3.28	79,625	9,167,630	1.36	124,680
Storey	1,912,170	4.79	91,593	4,887,120	1.34	65,487
Washoe	1,186,320	3.90	46,266	1,836,270	1.31	24,055
White Pine	0	–	–	20,189,090	1.04	209,966
Statewide	$51,974,415	–	$1,973,484	$183,370,620	–	$2,481,016

[1]Nevada Department of Taxation (unpub. data).

tax rates in 1979 and again in 1981 for all property (not just mining). Again, it should be remembered that mining firms paid higher sales and use taxes on supplies and equipment purchases.

Contribution of Mining to Property Tax Base

Net proceeds and property taxes levied on mining property account for a substantial proportion of the total assessed values and property tax revenues in 11 of the 17 counties (tables 10, 11). In those 11 counties, mining contributes between 17% and 84% of the total assessed value of the county. Mining accounts for a similar percentage of property tax revenues in those same counties.

Other Mining-related Taxes

In addition to the ad valorem tax on net proceeds and improvements and equipment, taxes are levied on oil and gas leases and patented mine claims. The total assessed value of oil and gas leases was $25.9 million in 1982–83, compared to $17.9 million in 1980–81 (table 12).

The assessed value of patented mine claims increased from $4.9 million in 1980–81 to $6.9 million in 1982–83 (table 12). The value of oil and gas leases amounted to 1% or more of total valuation in Churchill, Eureka, Lander, Lincoln, Nye, and White Pine Counties. Valuation of patented mine claims amounted to 1% or more of total valuation

TABLE 10. Net proceeds and assessed value of mining improvement, machinery, and equipment as a percentage of total assessed value, by county, 1981–82.[1]

County	Net proceeds of mines	Assessed value of mining property	Net proceeds plus assessed value of mining property	Total assessed value by county	Mining's share of assessed value
Carson City	0	$17,060	$17,060	$321,392,786	([2])
Churchill	$336,403	444,340	780,743	93,656,071	0.8%
Clark	2,119,527	8,907,020	11,026,547	4,469,796,125	1.2
Douglas	6942	243,980	250,922	509,894,118	([2])
Elko	11,199,440	27,189,190	38,388,630	219,188,825	17.5
Esmeralda	7,819,357	3,021,430	10,840,787	21,973,182	49.3
Eureka	44,437,068	10,818,880	55,255,948	72,410,516	76.3
Humboldt	22,987,308	5,842,660	28,829,968	136,869,706	21.1
Lander	27,382,278	20,556,950	47,939,228	56,617,711	84.7
Lincoln	1,236,160	5,874,390	7,110,550	38,027,599	18.7
Lyon	215,364	5,390,190	5,605,554	147,196,994	3.8
Mineral	3,844,500	8,489,460	12,333,960	40,529,954	30.4
Nye	21,626,160	50,494,960	72,121,120	207,464,792	34.8
Pershing	4,690,996	9,167,630	13,858,626	50,349,364	27.5
Storey	4,293,840	4,887,120	9,180,960	31,661,224	29.0
Washoe	0	1,836,270	1,836,270	2,670,858,446	([2])
White Pine	12,543,236	20,189,090	32,732,326	63,071,123	51.9

[1]Nevada Department of Taxation (1982).
[2]Less than 0.1%.

TABLE 11. Tax revenue from net proceeds and mining assessed values as a percentage of total property revenue, by county, 1981–82.[1]

County	Tax revenue from net proceeds	Tax revenues from assessed value of mining property	Tax revenues from net proceeds and property tax	Total property tax revenue for local government[3]	Mining's share of property taxes
Carson City	0	$201	$201	$3,669,164	([2])
Churchill	$4032	5332	9364	1,194,129	0.8%
Clark	36,025	151,419	187,444	88,253,979	0.2
Douglas	91	3196	3287	8,094,136	([2])
Elko	117,336	356,178	473,514	2,838,087	16.7
Esmeralda	135,048	52,271	187,319	382,041	49.0
Eureka	332,389	81,142	413,531	545,082	75.9
Humboldt	245,303	62,516	307,819	1,578,843	19.5
Lander	384,885	287,797	672,682	797,134	84.4
Lincoln	15,678	74,605	90,283	522,853	17.3
Lyon	3371	84,087	87,458	2,275,263	3.8
Mineral	49,978	110,363	160,341	529,686	30.3
Nye	336,857	787,721	1,124,578	3,220,288	34.9
Pershing	64,065	124,680	188,744	711,862	26.5
Storey	57,357	65,487	122,844	422,931	29.0
Washoe	0	24,055	24,055	39,652,023	([2])
White Pine	130,337	209,966	340,303	713,666	47.7

[1]Nevada Department of Taxation (unpub. data).
[2]Does not include oil and gas leases on patented mine claims. See table 8.
[3]Includes cities, counties, school districts, and special districts.

TABLE 12. Assessed valuation of oil and gas leases, geothermal leases, and patented mine claims and percent of total valuation, by county, 1982–83.[1]

County	Oil and gas leases	Percent of total	Geothermal leases	Percent of total	Patented mine claims	Percent of total
Carson City	–	–	–	–	–	–
Churchill	$1,500,000	1.3%	–	–	$156,500	0.1%
Clark	4,840,724	0.1	–	–	2,238,085	0.04
Douglas	–	–	–	–	–	–
Elko	1,000,000	0.4	–	–	336,140	0.1
Esmeralda	2640	0.009	–	–	652,980	2.4
Eureka	1,500,000	2.1	–	–	247,068	0.3
Humboldt	–	–	–	–	133,731	0.1
Lander	758,500	1.1	–	–	219,468	0.3
Lincoln	6,705,363	11.7	–	–	383,916	0.7
Lyon	–	–	–	–	235,335	0.1
Mineral	31,513	0.02	–	–	252,145	0.2
Nye	4,152,065	1.6	–	–	622,410	0.2
Pershing	502,012	0.6	–	–	166,805	0.2
Storey	–	–	–	–	516,328	1.3
Washoe	–	–	–	–	210,720	0.006
White Pine	4,875,000	5.8	–	–	552,895	0.6
State total	$25,867,817				$6,924,526	

[1]Nevada Department of Taxation (1982).

only in Esmeralda and Storey Counties (Nevada Department of Taxation, 1982; this publication was not issued in 1981–82 due to the need to adjust to the 1981 tax shift program).

In addition to taxes paid by the mining industry, the State of Nevada received $10.9 million from the Bureau of Land Management in 1981 from mineral leases, compared to $7.2 million in payments in 1980 (Bureau of Land Management, 1981, p. 11; Whitney and Whitney, 1981, p. 83).

Sales and Use Tax

The Nevada Mining Association (unpub. data) surveyed the mining firms operating in Nevada in 1981–82. Of the questionnaires mailed, 32 firms responded. This number includes only operating firms, since exploration firms are discussed separately. These 32 firms had an annual total of 3991 employees and a total annual payroll of $110.7 million (table 13) in 1981–82. From other sources we estimated that there were approximately 7500 mining employees in Nevada during this period (Bureau of Business and Economic Research, 1982, p. 26). Thus, the Nevada Mining Association survey data underestimates the size of mining employment.

Of the 32 firms that responded, the average firm employed 125 workers at an annual wage of $27,000 per worker. Payrolls, even for the sample that responded, are underestimated because some firms contract for their mining production. Where possible, we adjusted to include these contract expenditures in payrolls. Expenditures in 1981–82 for services including contract services amounted to $45.9 million for the responding firms.

In addition to payrolls and employment, the firms were asked to report their equipment and supply purchases (table 14). The lack of response to the survey is especially critical since we used these data to determine the total sales and use tax paid on their

TABLE 13. Employees and payrolls for mining firms, by county, 1981–82.[1]

County	Number of firms	Employees	Payrolls
Carson	–	–	–
Churchill	1	115	$3,000,000
Clark	1	110	3,150,000
Douglas	–	–	–
Elko	6	713	18,540,500
Esmeralda	1	75	2,286,000
Eureka	[2]2	[2]103	[2]1,890,331
Humboldt	3	201	4,561,778
Lander	6	751	19,772,000
Lincoln	2	250	3,700,000
Lyon	–	–	–
Mineral	1	23	432,000
Nye	4	909	32,282,008
Pershing	[3]1	[3]116	[3]2,640,000
Storey	2	176	4,669,100
Washoe	–	–	–
White Pine	2	449	13,800,000
Statewide	32	3991	$110,723,717

[1]Nevada Mining Association (unpub. data).
[2]One firm has operations in Eureka and Elko Counties.
[3]Firm has operations in Pershing and Storey Counties.

purchases. The Department of Taxation maintains data on property and net proceeds taxes paid by mining firms. However, the department does not identify mining firm sales and use tax payments. Thus, one can determine the benefit to the mining industry of the reduction of property taxes in 1979 and 1981, but the extent to which the sales tax increase from 3.5% to 5.75% in 1981 offset the property tax reduction cannot be as precisely measured.

Nevertheless, these 32 firms reported $196.2 million of expenditures for equipment and supplies in 1981–82. These purchases were taxable at 5.75%, resulting in $11.3 million in sales and use taxes to State and local governments. Had they, instead, been subject to the former 3.5% rate they would have paid only $6.9 million in sales and use taxes.

TABLE 14. Purchases of equipment and supplies by mining firms, by county, 1981-82.[1]

County	Equipment purchased		Supplies purchased		Total purchases		Total
	In-state	Out of state	In-state	Out of state	In-state	Out of state	
Carson City	—	—	—	—	—	—	—
Churchill	$742,500	$742,500	$2,412,000	$603,000	$3,154,500	$1,345,500	$4,500,000
Clark	780,000	520,000	1,560,000	3,640,000	2,340,000	4,160,000	6,500,000
Douglas	—	—	—	—	—	—	—
Elko	3,938,400	3,864,600	14,930,200	8,816,800	18,868,600	12,681,400	31,550,000
Esmeralda	11,160	100,440	1,484,280	636,120	1,495,440	736,560	2,232,000
Eureka	194,214	1,440,061	3,503,608	805,956	3,695,822	2,246,017	5,941,839
Humboldt	1,192,507	144,821	5,258,328	1,493,869	6,451,835	1,638,690	8,090,525
Lander	4,907,000	1,708,000	27,552,750	18,632,250	32,459,750	20,340,250	52,800,000
Lincoln	320,000	320,000	1,568,000	992,000	1,888,000	1,312,000	3,200,000
Lyon	—	—	—	—	—	—	—
Mineral	60,000	60,000	648,000	432,000	708,000	492,000	1,200,000
Nye	1,676,175	8,201,854	10,222,412	39,963,823	11,898,587	48,165,677	60,064,264
Pershing	554,400	237,600	4,936,800	871,200	5,491,200	1,108,800	6,600,000
Storey	870,400	61,600	3,738,800	509,200	4,609,200	570,800	5,180,000
Washoe	—	—	—	—	—	—	—
White Pine	1,440,000	1,013,000	1,559,400	4,287,600	2,999,400	5,300,600	8,300,000
State total	$16,685,756	$18,414,476	$79,374,578	$81,683,818	$96,060,334	$100,098,294	$196,158,628

[1]Nevada Mining Association (unpub. data).

The additional sales and use tax collections, from the responding firms alone, amounted to $4.4 million.

In order to more completely determine the effect of the higher sales tax rate on mining we extrapolated from the base of the 32 firms which responded to the survey by the following method. These 32 firms account for 53% of the total employment reported by the mining industry. Therefore, if we assume that purchase of equipment and supplies are proportional to employment, we estimate that such expenditures would have been $368.7 million for the entire industry, compared to the $196.1 million reported by the 32 respondents. The $368.7 million in expenditures would have generated $21.2 million of sales and use tax revenue at 5.75%, compared to $12.9 million at the previous 3.5% rate. From this extrapolated data, mining firms paid $8.3 million in sales and in taxes as a result of the tax shift rather than $4.59 million reported by the 32 survey respondents (table 15).

The effect of the tax shift has two important implications. First, equipment purchases tend to be greatest at the start-up of an operation. The sales and use tax on equipment increases the start-up cost as opposed to the net proceeds tax, which is levied only when income is earned. This is one benefit of an income tax as compared to a sales tax.

Second, although we compiled the data by county, this gives no indication of the unit of local government that receives the revenue. If supplies and equipment are purchased in urban counties, as the multipliers computed in the previous section suggest, then much of the tax revenue will not remain in the county where the operation is located, but it will flow to the urban counties. The point at which the firm takes possession of the supplies or equipment determines which county will receive the tax revenue. If the firm takes possession of supplies in Reno or Las Vegas, then the revenue will remain in Washoe or Clark County, respectively. However, if the firm takes possession at the firm's site, then the county where the firm is located will receive the revenue. If the goods are purchased from an out-of-state vendor, the revenue is distributed equally to all 17 counties. The property tax and net proceeds tax revenue remains at the point of operation, and all of it is distributed to local governments. Only the 0.5% city-county relief tax remains in the county. The State general fund receives 2%; 1.75% goes to the supplemental city-county relief tax fund, and 1.5% goes to the county school funds.

TABLE 15. Effects of the 1981 tax shift on property taxes and sales taxes for mining firms.[1]
(Millions)

Tax base	1981-82 rates	1980-81 rates	Difference
Net proceeds revenues	$1.9	$4.1	$2.2
Assessed value of mining property	2.5	4.6	2.1
Other mining related property	.4	.8	.4
Total property tax reduction	—	—	4.8
Sales and use tax[2]	11.7	7.1	4.6
Sales and use tax[3]	21.2	12.9	8.3

[1]Effect of tax shift based on responding firms only; property tax decrease of $4.776 million and sales tax increase of $4.594 million for a net benefit to mining firms of $182 thousand. Effect of tax shift based on extrapolation from sample to total population of all mining firms; property tax decrease of $4.776 million and a sales tax increase of $8.3 million for a net tax increase of $3.5 million.

[2]For firms which responded to the survey including exploration firms.

[3]An extrapolation from the 32 production firms responding.

Exploration Firms

Twenty exploration firms in addition to the 32 production firms were sampled by the survey. We discuss them separately because they differ in so

many respects from the production firms. Three of the 20 firms reported no employment or payrolls in 1981, and two of those firms listed no expenditures for supplies or equipment in 1981. The other 17 firms reported 255 full-time employees and 14 part-time employees. However, from the survey comments it was obvious that at various times there were more temporary workers employed than the 14 listed. The annual payrolls amounted to $11.7 million, for an average salary of more than $40,000 per worker per year. The median firm had eight full-time employees. These 20 firms reported $3.2 million for personnel services while in the field and $23.6 million for all other services during 1981–82.

The average exploration firm reported spending $8.0 million for supplies and equipment (table 16) in 1981. Nearly 80% of these expenditures were made in Nevada. These expenditures for supplies and equipment contributed $459,892 in sales and use taxes at the 5.75% rate compared to $279,306 if they had been taxed at the 3.5% rate prior to the tax shift—a difference of $179,958.

TABLE 16. Purchases of equipment and supplies by exploration firms, 1981.[1]

	In-state	Out of state
Equipment	$3,957,657	$581,143
Supplies	2,428,049	1,031,274
Total	6,385,706	1,612,418
Grand total	$7,998,124	

[1]Nevada Mining Association (unpub. data).

Summary and Conclusions

Mining is an essential component of the tax base for most rural counties in Nevada. Local government revenues fluctuate with mining production in those counties; thus, government has a stake in the prosperity and stability of the mining industry.

However, mining does not only benefit the rural mining counties. From our survey data calculations, more than $100 million were spent for supplies and equipment by mining and exploration firms within the State. Equipment and supplies amounting to an additional $100 million were purchased from out-of-state firms. In addition to the expenditures for supplies and equipment, mining firms make considerable expenditures for services.

A prosperous and stable mining industry could provide the basis for attracting some out-of-state suppliers to Nevada. Such a move would increase the value of the multipliers discussed in the Analysis and Discussion section of this study.

The 1981 property tax reduction and sales tax increase both benefited and harmed the mining industry. If the effective property tax rate had been maintained at the 2.51% rate, as it was before the 1981 tax shift, the net proceeds revenues in 1981–82 would have been $4.134 million rather than $1.913 million. Net proceeds revenues were reduced by $2.221 million. There was a similar reduction in taxes on improvements, equipment, and other mining-related property of $2.555 million, for a total property tax reduction of $4.776 million due to the 1981 tax package.

These reductions were offset by an increase in sales and use tax payments of $4.594 million for the firms responding to the survey, a direct result of the sales tax rate increase from 3.5% to 5.75%. Based on our extrapolation, however, sales taxes paid by mining firms increased by $8.3 million, which more than offset the property tax reduction by approximately $3.5 million.

METHODOLOGY

For the purposes of this discussion Nevada's mining industry is defined broadly to include activities directed toward the discovery, extraction, and processing of metallic and nonmetallic minerals, natural gas, oil, and geothermal resources. This definition is adopted for consistency with the Nevada Employment Security Department reports (1969–1981) of industry payrolls and employment used in the analysis below. Statewide output and estimated dollar value of output, as reported by the Nevada Bureau of Mines and Geology (Hall and Schilling, 1979; Schilling and Hall, 1980; and Schilling, 1980) is shown on table 1.

First, the specific impacts identified and summarized above are described more generally in this discussion of research objectives and methodology as the impacts of the industry on the State's private sector. These impacts include both the direct effects of jobs and payrolls in the industry and the indirect, or induced, effects of the industry. The methodology for determining these indirect effects of the mining industry in the State are discussed below.

Second, we are concerned with the contributions of the mining industry to State and local government revenues. As with the private sector impacts, the industry's tax revenues can be broken down into direct and indirect components. These public sector impacts depend largely on the tax structure of the State and local governments involved and the magnitude of direct and indirect impacts in the private sector. These public sector impacts are described in the section on Taxes Paid by Mining Firms.

Finally, a third area of concern in this study is the impact of the industry on economic development in the State. This last area, of course, is closely linked with the first two and is discussed in the Analysis and Discussion section. However, in light of Nevada's special circumstances as a relatively underdeveloped area, the cyclical nature of the mining industry, and the high level of current interest in economic development and diversification in the State, this issue is addressed directly and independently in the section on Taxes Paid by Mining Firms.

The Export Base Sector and Export Base Multipliers

The most general model for estimating the indirect

effects of the mining industry in a regional economy involves estimating export-base multipliers. This approach reflects the hypothesis that regional growth and development are "export led" (North, 1955). That is, a regional economy grows around an export base that produces output consumed out of the region. This export base generates incomes within the region resulting in consumer demand in "residentiary" industries that produce for local consumption. Hence the hypothesis of "export led" growth is that expansion of the export sector (or export-base industries) leads directly to the expansion of an infrastructure of residentiary industries.

Theoretically, the relationship between the export-base and residentiary industries can be, and is most often, described in terms of input-output analysis that seeks to directly determine the relationship between different sectors of the local economy. While a standard approach to modeling a regional economy, input-output analysis has serious drawbacks when applied to undeveloped economies such as Nevada's. Specifically, since input-output analysis requires estimating the proportion of sales between local sectors, in an undeveloped economy such as Nevada's, these proportions will be extremely small, and relatively small errors in estimation can be magnified into extremely large errors in the estimation of multipliers. Consequently, we have chosen a more direct method based on the following theoretical model (Nourse, 1972, p. 155–180).

Let Y represent net regional income; E represent regional expenditures on consumption, investment, and government goods; M represent imports of goods and services into the regional economy; and let X represent exports. Given these definitions, the following is an accounting identify:

$$(1) \quad Y = E + X - M.$$

Theoretically, E and M depend on regional income, Y, while exports, X, are determined by factors outside of the model. In the case of mining, exports depend upon the existence of ore bodies within the region which are clearly exogenous to the economic model. Given this specification of the regional economy, it can be represented as the following system of equations:

$$(2) \quad E = a + bY;$$

$$(3) \quad M = c + eY;$$

$$(4) \quad X = \bar{x}.$$

This system reduces to:

$$(5) \quad Y = (a - c + \bar{x})/(1 - b + e),$$

which is a reduced form for the system (1)–(4), representing the regional economy. The system expresses regional income as a function of the parameters of equations (2)–(4). Our concern, of course, is with the relationship between regional income, Y, and the export base, $\bar{x}$. This relationship is expressed mathematically as:

$$(6) \quad dY/d\bar{x} = 1/(1 - b + e), \text{ or } dY = d\bar{x}/(1 - b + e),$$

which states that changes in net regional income, dY, will equal changes in the export base, $d\bar{x}$, multiplied by $1/(1 - b + e)$, which is the export-base multiplier. In the long run, when full adjustment to changes in the export base are made in the residentiary infrastructure, total income derived from production in the region should be proportional to income derived from the export base.

Because we have no direct data on regional (statewide or county by county) income, the model above needs to be modified for use with the employment and payroll data that are available. This modification is achieved by assuming that payrolls and employment are proportional to income which, in the short run, appears reasonable. Using this assumption the relationship between income and the proportion of income spent locally can be expressed in terms of the relationship between employment (or payrolls) in export vis-a-vis residentiary sectors of the local economy. The export-led growth model implies that employment and payrolls in residentiary industries will be proportionate to employment and payrolls in the export base. Let that proportional factor be k, and employment in the residentiary sector (Nr) can be expressed by (7) as a function of employment in the export base (Ne):

$$(7) \quad Nr = k\,Ne.$$

Similarly, let the factor of proportionality between residentiary and export sector payrolls be j, so that payrolls in the residentiary sector (Pr) can be expressed by (8) as a function of payrolls in the export base:

$$(8) \quad Pr = j\,Pe.$$

Given these definitions, total employment ($TN = Ne + Nr$) and payrolls ($TP = Pe + Pr$) can be represented by (9) and (10):

$$(9) \quad TN = (1 + k)\,Ne$$

$$(10) \quad TP = (1 + j)\,Pe.$$

These equations are simplified versions of the regression equations used to estimate $(1 + k)$ and $(1 + j)$ from the employment and payroll data.

The Analysis and Discussion section also presents a second set of multipliers that distinguish between mining employment (Nm) and payrolls (Pm) and other export base activities (No and Po). These multipliers provide separate estimates of mining's impact on the local economy, but it should be noted that they are plagued by estimation problems in certain counties. Generally, however, equations (11) and (12) represent the model employed to estimate mining-specific multipliers. In these equations, the coefficients of Nm and Pm, $(1 + r)$ and $(1 + p)$, respectively, represent the mining-specific multipliers.

$$(11) \quad TN = (1 + r)\,Nm + (1 + s)\,No$$

$$(12) \quad TP = (1 + p)\,Pm + (1 + q)\,Po$$

Theoretically, there should be no difference between the impacts of export-base incomes derived from different sectors unless they are dictated by the

characteristics of the industries in question. Characteristics of the mining industry that lead to the hypothesis that mining-specific multipliers, (1 + r) and (1 + p), will be less than the general multipliers (1 + k and 1 + j) are the general long-run instability of the industry; the relatively short productive life expectancy of any given orebody; a greater tendency for the industry to hire technicians, engineers, geologists, etc., from out of state for relatively short durations; and the relative lack of development in areas directly affected by mining.

Technically, employment and payroll multipliers are a ratio of total employment and payrolls to employment and payrolls in the export sector. The results presented in the Analysis and Discussion section are long-run weighed averages of the ratio of changes in county employment and payrolls to county export-base employment and payrolls. These multipliers estimate the magnitude of indirect, export-induced jobs and payrolls in the local infrastructure.

As a general rule, the more diversified an area's economy and the greater the tendency for incomes to be spent within the local area, the larger these multipliers will be. Conversely, the less developed a local economy, the greater the need to purchase goods and services outside the local economy, which reduces the size of the multipliers. Hence, multipliers measure the direct and indirect impacts of export-sector activities such as mining but are equally a measure of the capacity of the local economy to absorb the incomes generated in the export-base sector.

Survey of Selected Mining Operation's Employees

In an effort to supplement the findings regarding the geographic structure of regional commercial markets derived from the estimation of county multipliers, a small survey of selected mining operations was conducted. Operations selected were primarily in the central and north-central part of the State. This region, roughly speaking, is north of the Nevada Test Site, south and east of Winnemucca, and south and west of Elko. This region was selected for more in-depth investigation because of the lack of any clear-cut indication of where payroll dollars earned in this region would be spent.

A small number of interviews were made with personnel at mining sites in the area, but most of the data were collected from a mail survey. In both cases, and in interviews with local businessmen and civic leaders, two kinds of information were collected. Respondents were asked for payroll and employment data and there was a series of questions designed to indicate where payrolls earned at the site were spent. These latter questions concerned where employees lived, where those living in particular places were likely to shop for groceries, make major purchases, use banking and medical services, and go for entertainment.

In general, the survey was useful in supporting the spillover effects indicated by the employment and payroll multipliers. It was also useful in interpreting these multipliers as indicated in the Analysis and Discussion section. In particular, the survey identified regional commercial centers outside of the State such as Salt Lake City, Utah; Twin Falls, Idaho; and Bishop, California, that influenced the size of the multipliers.

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DIRECTORY OF NEVADA MINE OPERATIONS ACTIVE DURING 1982
(excluding sand and gravel)
by Keith G. Papke

Compiled in part from information supplied by the staff of the Division of Mine Inspection, Department of Industrial Relations. UG = underground mine; OP = open-pit mine; ML = mill; JV = joint venture. The primary mineral commodity produced, the method of processing, and the average number of workers employed during the year are listed to the right of each listing.

CARSON CITY

Heritage Mining Co. — gold & silver
Oristimba Placer (OP) — 3
S14,T15N,R20E
Ray Conner, Owner
No. 4 Kimberly Circle, Carson City, NV 89701

Sierra Rock and Sand, Inc. — volcanic cinder
Cinderlite Pit — 5
S21,T16N,R20E
Robert Frybarger, General Manager
P.O. Box 516, Carson City, NV 89701

CHURCHILL COUNTY

Armstrong, Edwin G. — gold & silver
Rainbow Mine (OP,ML) — 4
S12,T15N,R34E
Edwin G. Armstrong, Owner
1787 Roseman Drive, Fallon, NV 89406

Art Wilson Co. — magnetite (iron ore)
Iron Mine (OP) — 2
S16,T24N,R34E
Art Wilson, Owner
P.O. Box 1160, Carson City, NV 89701

Bernice Milling Co. — antimony
Vandenburg Group (UG) — 2
S24,T22N,R37E
Howard Turley, Owner
1221 Settlement Road, Dixie Valley, Fallon, NV 89406

Chalk Mountain Associates — silver
Chalk Mountain Mine (UG) — 1
S25,T17N,R34E
J. L. Green, General Manager
P.O. Box 3232, Reno, NV 89504

Cyprus Mines Corp., United Sierra Div. — diatomite
Section 17 Mine (OP) — 3
S17,T19N,R26E
Thomas Landels, Plant Manager
P.O. Box 455, Fernley, NV 89408

Ednuk Prospecting & Mining — gold & silver
Bell Mountain Mine (UG) — (development)
S10,T15N,R34E — 2
R. L. Kunde, Contractor
4780 Bottom Road, Fallon, NV 89406

Fisk & Robertson Mining — gold
Gold Hill Mine — (heap leach)
S6,T22N,R34E — 3
Richard Fisk, Owner
3995 Alcorn Road, Fallon, NV 89406

Huck Salt Co. — salt
Huck Plant — (solar evaporation)
S12,T16N,R31E — 2
Elmer & John Huckaby, Partners
895 Harrigan Road, Fallon, NV 89406

Red Star Gold, Inc. — gold
Red Star Gold Mine (OP) — 3
S33,T16N,R35E
Jack Caramilla, General Manager
100 Vassar Street, Reno, NV 89520

Ricanter Corp. — gold
Dixie Comstock Mine (OP,ML) — (cyanidation)
S14,T23N,R35E — 4
Gary Foster, Mine Superintendent
444 South 400 East, St. George, UT 84770

Stage Silver Mining & Smelting — silver
Clan Alpine Mine (UG) — 1
S19,T19N,R37E
Chuck Kinrade & Phil Martin, Partners
1000 Bath Street, Carson City, NV 89701

Standard Slag Co. — barite
Fallon Plant — (flotation)
S27,T19N,R28E — 4
Cliff McLaughlin, Plant Supervisor
P.O. Box 10477, Reno, NV 89510

Wheeler, Jess — gold & silver
Shamrock Mine (OP) — 1
S18,T16N,R35E
Wheeler Mill — (gravity concentration)
S28,T19N,R28E — 1
Jess Wheeler, Owner
P.O. Box 218, Fallon, NV 89406

Young, John — tungsten
John Young Mill — (gravity concentration)
S28,T19N,R28E — 1
John Young, Owner
4740 Alcorn Road, Fallon, NV 89406

CLARK COUNTY

Bounsall, Eddie — gold
Treasure Hawk Mine (OP,ML) — (gravity concentration)
S27,T19S,R70E — 2
Eddie Bounsall, Owner
P.O. Box 37, Logandale, NV 89021

Brook, Inc. — gold & silver
Techatticup Mine (ML) — (cyanidation)
S2,T26S,R64E — 6
John D. Manson, General Manager
1307 Darlene Way, No. A5, Boulder City, NV 89005

Continental Co. — gold & silver
Continental Heap Leach — (heap leach)
S34,T28S,R63E — 10
Virgil Barker, General Manager
P.O. Box 162, Searchlight, NV 89046

Crescent Mining, Ltd. gold & silver
Rest Mine (heap leach)
S31,T28S,R61E 6
Dudley Hardin, Manager
P.O. Box 296, Searchlight, NV 89046

District 32 Corp. gold & silver
M & M Santa Anna Mine (OP) (heap leach)
S22,T28S,R61E 5
Kirby P. Hunt, President
P.O. Box 177, Searchlight, NV 89046

DU-ZI Partners, Ltd. gold & silver
Rand Mine (heap leach)
S8,T26S,R64E 2
Andrew J. Zinkl, General Partner
557 California Street, Suite 134, Boulder City, NV 89005

Envirochem, Inc. copper, silver & nickel
Envirochem Mill (grinding, filtering)
S9,T13S,R71E 5
Bob Taylor, Superintendent
660 South 400 East, St. George, UT 84770

Genstar Building Materials Co. gypsum
Blue Diamond Mine & Plant (OP,ML) (crushing,
S32,T21S,R59E screening, calcining)
Fraser Gillan, Manager 18
Star Route 89031, Box 2900, Las Vegas, NV 89124

Genstar Cement & Lime Co. limestone
Apex Mine & Mill (OP,ML) (crushing, screening,
S26,T18S,R63E calcining)
Glenn House, Manager 34
P.O. Box 127, Henderson, NV 89015

Henderson Plant (ML) dolomite
S18,T22S,R63E (calcining)
Ken Coaker, Manager 49
P.O. Box 127, Henderson, NV 89015

Sloan Mine & Mill (OP,ML) dolomite
S13,T23S,R60E (crushing, screening)
Earl Gillian, Superintendent 14
Star Route, Box 2300, Las Vegas, NV 89031

Harrison, P. G., & James Harris gold & silver
Mockingbird Mill (gravity concentration)
S11,T26S,R64E 2
P. G. Harrison & James Harris, Owners
P.O. Box 9-B, Nelson, NV 89046

Helo Research & Development, Inc. gold & silver
Helo Plant (OP,ML) (gravity concentration,
S3,T15S,R66E cyanidation)
Jerry Henderson, President 10
P.O. Box 199, Moapa, NV 89025

Hydro-Chem, Inc. gold & silver
Chaquita Mill (heap leach)
S25,T24S,R57E 3
Corey Eddington, Vice President
7612 Blackbird, Las Vegas, NV 89128

H & H Developers, Inc. 6
Chaquita Mine Contractor (OP)
Rodger Hetland, Contractor
1571 Tenaya, Las Vegas, NV 89117

Intermountain Exploration Co. gold & silver
Eldorado Mine (heap leach)
S5,T26S,R64E 2
Richard Wyman, President
P.O. Box 6, Boulder City, NV 89005

Jetco Enterprises, Inc. gold & silver
Jetco Mill (tank leach)
S21,T30S,R65E 2
James E. Tinnell, President
3121 So. Maryland Pkwy., Bldg. 2, Suite 200,
Las Vegas, NV 89109

Nevada Oil & Mineral Corp. gold & silver
Quartette Mine (ML) (heap leach)
S4,T29S,R63E 2
John Roeder, President
P.O. Box 12931, Las Vegas, NV 89112

Pabco Gypsum gypsum
Las Vegas Plant (OP,ML) (calcining)
S5,T20S,R64E 28
Jim Mullins, Plant Manager
P.O. Box 43327, Las Vegas, NV 89104

Simplot Silica Products silica sand
No. 3 Pit (OP,ML) (screening, drying)
S30,T16S,R68E 50
W. J. Sandoval, Manager
P.O. Box 308, Overton, NV 89040

Tri-Delta Mining & Crushing lightweight aggregate
of Nevada, Inc. (crushing, screening)
Rilite Mine (OP,ML) 2
S9,T25S,R61E
James Richards, President
4675 Wynn Road, Las Vegas, NV 89103

DOUGLAS COUNTY

High Technology Recovery Systems, Inc. silver & gold
Veta Grande Mine (OP,ML) (gravity concentration,
S10,T11N,R21E flotation)
Clarence Sikkenga, Mine Manager 17
Route 2, Box 114, Gardnerville, NV 89410

Pacific Silver Corp. gold & silver
Buckskin Mine (UG) (development)
S13,T13N,R23E 12
K. L. Stoker, President
P.O. Box 486, Yerington, NV 89447

ELKO COUNTY

A. W. Arnold & Associates barite
Easy Miner Mine (OP,ML) (gravity concentration)
S12,T40N,R63E 9
Richard H. Clark, Manager of Nevada Operations
606 Commercial Street, Elko, NV 89801

Barite Mining, Inc. barite
Heavy Spar Mine (OP) 14
S10,T35N,R52E
E. R. Fegert, Mining Contractor
P.O. Box 2103, Elko, NV 89801

Lakes Mine (OP) 11
S1,T37N,R51E
Terral Young, Operations Manager
P.O. Box 1834, Elko, NV 89801

Burr, David copper
Silver Thread Mine (OP) 1
S4,T29N,R69E
David Burr, Owner
4546 South 1300 West, Taylorsville, UT 84107

Cagle, Henry tungsten
Montello Mill (flotation, gravity concentration)
S34,T40N,R69E 2
Montello, NV 89830

Carlin Gold Mining Co. gold
Bootstrap Mine (OP,ML) (heap leach)
S3,T36N,R50E 3
J. D. McBeth, Resident Manager
P.O. Box 979, Carlin, NV 89822

Chromalloy Mining & Minerals barite
Dry Creek Mill (gravity concentration)
S11,T42N,R63E 9
Bob Walish, Manager
P.O. Box 1003, Elko, NV 89801

Consolation Mine (OP) 7
S17,T42N,R62E

Loomis Mine (OP) 4
S21,T41N,R62E

Snoose Creek Mine (OP) 7
S4,T40N,R62E
John Ala, Mining Contractor
P.O. Box 487, Wells, NV 89835

Cordex Exploration Co. gold
Boulder Creek Mine (UG,ML) (heap leach)
S6,T37N,R50E 6
Charles W. Salsman, Project Engineer
P.O. Box 1193, Elko, NV 89801

Tee A. Chambers, Mining Contractor 4
P.O. Box 188, Mountain City, NV 89831

DeFaria, Joe lead & silver
Silver King Mine (UG) 2
S29,30,T45N,R53E
Joe DeFaria & Frank Hottal, Partners
P.O. Box 80, Mountain City, NV 89831

Freeport Gold Co. gold
Freeport Gold Mine (OP) 97
S34,35,T41N,R53E

Freeport Gold Mill (cyanidation)
S33,T41N,R54E 141
Joseph Farrell, President
P.O. Box 1132, Elko, NV 89801

Freeport Gold Mine contractors 35

Frontier Mining Co., Contractor tungsten
Wells Tungsten Mine (UG) 4
S31,T37N,R62E
Gary Lee, Partner
P.O. Box 604, Wells, NV 89835

Gold Creek Silver Mines, Inc. gold & silver
Diamond Jim Mine (UG) 3
S29,T45N,R56E
Stephen Carlquist, President
895 West 2600 South, Salt Lake City, UT 84119

Heater, Phil gold & silver
Big 4 Mine (OP,ML) (cyanidation)
S25,T44N,R52E 2
Phil Heater, Owner
P.O. Box 187, Mountain City, NV 89831

Mellen, Donald S. gold & silver
Sleeping Beauty Mine (OP) 3
S27,T39N,R46E
Donald S. Mellen, Operator
Midas, NV 89414

Moulton, Vern silver
Protection Leach Plant (heap leach)
S10,T45N,R53E 2
Vern Moulton, Owner
P.O. Box 77, Mountain City, NV 89831

Nevada Milling, Inc. tungsten
Wells Tungsten Mill (flotation)
S11,T36N,R62E 12
Sheldon Lee, Manager
P.O. Box 43, Wells, NV 89835

NL Industries Inc., Baroid Div. barite
Rossi Mine (OP,ML) (gravity concentration)
S15,T37N,R49E 15

Queen Lode Mine (OP) 10
S27,T37N,R49E
Tom Norris, Contractor
P.O. Box 231, Battle Mountain, NV 89820

Old Soldier Minerals barite
Stormy Creek Mine (OP,ML) (gravity concentration)
S27,T42N,R61E 25
GeoWest Services, Inc., Contractor
Jeff Long, General Manager
Suite 405, Henderson Bank Bldg., Elko, NV 89801

T & D Barite Milling, Contractor 10
Tom Leno & Dale Aslett, Partners
P.O. Box 162, Wells, NV 89835

Petro-Chem, Inc. barite
Fantastic Mine (OP,ML) (gravity concentration)
S14,T39N,R52E 8
Richard K. Mulvaney, Manager
P.O. Box 23, Crescent Valley, NV 89821

Pischel Mining Co., Inc. copper & molybdenum
Vivian Mine (UG) 2
S18,T45N,R64E
Harold Pischel, Contractor
P.O. Box 652, Lone Pine, CA 93545

San Rafael Exploration Co. gold & silver
Prunty Mine (UG) 3
S13,T44N,R57E
Louis Koncher, Lessee
P.O. Box 101, Elko, NV 89801

St. Elmo Gold & Silver, Inc. gold & silver
St. Elmo Mine (UG) 3
S3,T44N,R56E
Harvey R. Hatcher, President
P.O. Box 78, Mountain City, NV 89831

Tuscarora Associates silver
Tuscarora Associates Plant (heap leach)
S34,T40N,R51E 2
Earl Craig, Manager
P.O. Box 44, Tuscarora, NV 89834

Unichem Minerals, Inc. barite
Coyote Mine (OP) 12
S7,T36N,R51E
Max Riggs Construction, Contractor
Max Riggs, President
281 Adams Street, Elko, NV 89801

Valley Mining, Inc. gold
Ripsaw Mine (OP) 4
S21,T39N,R46E
Donald Clifford, President
1212 North Oakridge Drive, Centerville, UT 84014

ESMERALDA COUNTY

Apex 76 Deep Mines Co. gold & silver
Black Warrior Mine (OP) 4
S29,T1S,R39E
John F. Path, Jr., President/Owner
P.O. Box 170, Dayton, NV 89403

Blackhawk Mines Corp. gold & silver
Goldfield Tailings Project (heap leach)
S26,T2S,R42E 10
Russell E. Manley, President
P.O. Box 469, Tonopah, NV 89049

Candelaria Metals, Inc. gold & silver
Indian Queen Mine (UG) 9
S5,T1S,R33E
Paul Spor, General Manager
787 North Main Street, Bishop, CA 93514

Ebco Enterprises gold & silver
Falcon Exploration (ML) (crushing, screening)
S29,T1N,R42E 20
Cyrus Behain, General Manager
P.O. Box 847, Tonopah, NV 89049

Tonopah Divide Mine (OP) gold & silver
S26,T2N,R42E 10
Everett Berg, Owner
P.O. Box 847, Tonopah, NV 89049

Foote Mineral Co. lithium
Silver Peak Operation (solar evaporation and processing)
S22,T2S,R39E
Silver Peak, NV 89047

Parsons Construction Co., Contractor 7
Elton Parsons, Manager
Coaldale Junction via Tonopah, NV 89049

Grefco, Inc. diatomite
Dicalite Div. (OP,ML) (drying, classification)
S20,T2N,R34E 21
Robert Mannon, Plant Manager
P.O. Box 288, Mina, NV 89422

Hobble Creek Mining, Inc. gold & silver
Hobble Creek Mine (OP) (heap leach)
S21,T6S,R39E 3
Ronald James, Project Manager
P.O. Box 55, Dyer, NV 89010

KEMCO gold
Buster Mine (OP,ML) (cyanidation)
S24,T5S,R39E 3
Fernand Lemieux, President
P.O. Box 464, Goldfield, NV 89013

Kinkead Mining & Construction barite
Barium No. 1 and 2 Mine (OP) 2
S11,T2N,R34E
Dick Merritt, Owner
P.O. Box 32, Luning, NV 89420

Mammoth Canyon Resources gold & silver
Mammoth Canyon Mine (OP,ML) (gravity concentration)
Jim Back & Ernest Hathaway, Owners 6
General Delivery, Dyer, NV 89010

Matovich, Bill & Ray Dennison gold & silver
Penny Mine (OP,ML) (gravity concentration)
S26,T7S,R41E 2
Bill Matovich, Ray Dennison, & Raymond Kurr, Partners
P.O. Box 30J, Star Route, Gold Point, NV 89013

Mine Management, Inc. gold
Mohawk No. 2 Mine (UG) (development)
S1,T3S,R42E 2
Cooper Hayden, President
General Delivery, Goldfield, NV 89013

Minerals Management, Inc. gold & silver
Argentum Mill (cyanidation)
S5,T3N,R36E 6
L. T. Atkinson, President
P.O. Box 105, Dyer, NV 89010

Minerals Unlimited & barite
J & J Mining Co. (JV) 2
Barite No. 1 & 2 Mine (UG,OP)
S20,T3N,R35E
J. T. Desmond, President, J & J Mining Co.
Bill Morris, President, Minerals Unlimited
P.O. Box 12032, Reno, NV 89510

Modern Milling gold & silver
Modern Milling Mill (flotation)
S14,T2S,R38E 3
Albert E. Heflin, Jr., Owner
P.O. Box 2634, Silver Peak, NV 89047

Nevada Resources & Development gold & silver
Oremonte Mine (UG) 5
S1,T2S,R38E
Mark E. Gavard, President
P.O. Box 258, Mina, NV 89422

Sunshine Mining Co. gold & silver
16 to 1 Mine (UG,ML) (development)
S32,T2S,R38E 57
Allan Young, Project Manager
P.O. Box 97, Silver Peak, NV 89047

A.M.S. Inc. of Nevada, Contractor 10
Stan Canning, Superintendent
P.O. Box 2596, Silver Peak, NV 89047

Trafalgar Mines Partnership gold
Goldfield Mine (ML) (heap leach)
S35,T2S,R42E 18
Keith Jay, Operations Manager
P.O. Box 753, Goldfield, NV 89013

Transamerica Mining & Exploration gold & silver
Sarcobatus Mill (construction)
S5,T6S,R43E 5
Richard E. Howlett, President
P.O. Box 12331, Las Vegas, NV 89112

TW-MNR Associates silver
Tonopah West (ML) (cyanidation)
S10,T3N,R40E 27
David Hamilton, Project Manager
P.O. Box 404, Tonopah, NV 89049

Lurgi Corp., Contractor (construction)
Brian Hayden, Manager 3
P.O. Box 3069, Tonopah, NV 89049

Veta Grande Companies, Inc. silver
Mohawk Mine (UG) 1
S25,T2S,R37E
Dan Callaghan, Superintendent
P.O. Box 2707, Silver Peak, NV 89047

Wolff Milling & Mining gold
Cook Mill (gravity concentration)
S1,T7S,R41E 6
Vern Cook, Owner
Star Route, Box 30, Goldfield, NV 89013

EUREKA COUNTY

Barite Mining, Inc. barite
Lakes Mill (gravity concentration)
S3,T34N,R51E 13
Terral Young, Operations Manager
P.O. Box 1834, Elko, NV 89801

Carlin Gold Mining Co. gold
Blue Star Mine (OP) 2
S4,T35N,R50E

Carlin Mine (OP) 105
S14,T35N,R50E

Carlin Mill (cyanidation)
S14,T35N,R50E 92

Gold Quarry & Maggie Creek Mines (OP,ML) 51
S29,35,T34N,R51E
J. D. McBeth, Resident Manager
P.O. Box 979, Carlin, NV 89822

General Mineral Development Co. gold & silver
Eureka-Hamburg Mine (OP,ML) (cyanidation)
S22,T19N,R53E 8
Michael Galli, Vice President
P.O. Box 431, Eureka, NV 89316

H & H Construction barite
Queen Ann Mine (OP) 2
S12,T34N,R51E
Connell R. Henrie & Jemer Henrie, Lessees
165 West 5th Street, Richfield, UT 84701

IMCO Services, Inc. barite
Beowawe Loading Facility 2
S6,T31N,R49E
David Brown, General Manager
P.O. Box 861, Battle Mountain, NV 89820

Lloyd C. Evans Construction Co. gold
Bullion Monarch Mine (OP) 14
S10,T35N,R50E
Lloyd C. Evans, Contractor
P.O. Box 732, Winnemucca, NV 89445

Nevada Barth Corp. magnetite (iron ore)
Nevada Barth Mine (OP,ML) (crushing, screening)
S7,8,T31N,R51E 3
Charles Rowe, Manager
P.O. Box 425, Carlin, NV 89822

NL Industries, Inc., Baroid Div. barite
Dunphy Mill (flotation)
S26,T33N,R48E 46
Jim Kaiser, Superintendent
P.O. Box 414, Battle Mountain, NV 89820

TRV Exploration (Nevada), Inc. silver
Geddes Mine (heap leach)
S28,T18N,R53E 5
Robert G. Pate, Mine Manager
P.O. Box 442, Eureka, NV 89316

Unichem Minerals, Inc. barite
Coyote Mill (gravity concentration)
S3,T34N,R51E 4
Robert McDonald, Project Manager
P.O. Box 66, Carlin, NV 89822

Universal Gas (Montana), Inc. gold
Bullion Monarch Mine (OP,ML) (cyanidation)
S10,T35N,R50E 26
Joseph Mercier, President
1070 Silver Street, Elko, NV 89801

Western States Minerals Corp. gold
Gold Strike Mine (heap leach)
S31,T36N,R50E 11
A. B. Morrow, District Manager
P.O. Box 29, Elko, NV 89801

Western-Windfall, Ltd. gold
Windfall Mine (OP) (heap leach)
S2,T18N,R53E 30
R. D. Damele, Mine Manager
P.O. Box 326, Eureka, NV 89316

HUMBOLDT COUNTY

American Copper & Nickel Co. molybdenum
Ashdown Mine (UG) 11
S14,T45N,R29E
American Mine Services, Contractor
Stan Canning, Project Supervisor
General Delivery, Denio, NV 89404

Artillery Resources gold
B & M Placer Mine (OP,ML) (gravity concentration)
S7,T32N,R44E 7
Cornelius O'Leary, Manager
General Delivery, Battle Mountain, NV 89820

Aslett, Dale gold
Adelaide Placer Mine (gravity concentration)
S17,18,19,20,T34N,R40E 3
Dale Aslett, Owner
P.O. Box 105, Jackpot, NV 89805

B & C Mining, Inc. gold & silver
Davy Town Mill (gravity concentration)
S5,T39N,R36E 4
Dave Brewer, President
P.O. Box 3591, Sparks, NV 89431

Burl C. Lance, Inc. gold
Crofoot Claims (OP,ML) (gravity concentration)
S22,23,26,27,T35N,R30E 7
Burl C. Lance, President
P.O. Box 1925, Winnemucca, NV 89445

Conoco, Inc. gold
Getchell Project (ML) (cyanidation)
S33,T39N,R42E 15
Robert Cramer, Director of New Projects
P.O. Box 1068, Winnemucca, NV 89445

Eddie, Charles opal
Lorrie Lee Mine (OP) 2
S5,T45N,R26E
Charles Eddie, Owner
P.O. Box 1072, Sunland, CA 91040

Furies III Mining Corp. gold
Maryann Placer (OP,ML) (gravity concentration)
S25,T37N,R31E 3
Gary Ziebarth, President
P.O. Box 2024, Winnemucca, NV 89445

Hewitt, C. George opal
Cecilie Anne Mine (OP) 1
S8,9,T45N,R26E
Kelly Mine (OP) 1
S30,T45N,R26E
C. George Hewitt, Owner
c/o Virgin Valley Ranch, Denio, NV 89404

Hodson, G. Keith opal
Bonanza Mine (OP) 1
S13,T45N,R25E
Rainbow Ridge Mine (OP) 1
S34,T45N,R26E
G. Keith Hodson, Owner
General Delivery, Denio, NV 89404

K.W. Minerals Corp. bentonite
High Hopes Mine (OP) 2
S34,T37N,R36E
K. W. Snyder, Owner
P.O. Box 1007, Winnemucca, NV 89445

McDermitt Joint Venture mercury
McDermitt Mine (OP,ML) (flotation, distillation)
S33,T47N,R37E 56
Fran Schultz, Mine Manager
P.O. Box 497, McDermitt, NV 89421

Mead, Ray copper
Green Mining (OP,ML) (heap leach)
S17,T35N,R41E 2
Ray Mead, Owner
5075 East Kirkway, Winnemucca, NV 89445

Min-Ad, Inc. dolomite
Min-Ad Mill (crushing, screening)
S24,T36N,R37E 3
Charles J. Evans, Superintendent
4210 Jungo Road, Winnemucca, NV 89445

Dun Glen Mine (OP) 2
Little Red's Excavating, Contractor
Gerald Conklin, Owner
6990 Grass Valley Road, Winnemucca, NV 89445

Minerals Unlimited, Inc. barite
Golconda Mill (gravity concentration)
S28,T36N,R40E 4
John M. Torok, Vice President
390 Freeport Blvd., Suite 5, Sparks, NV 89431

Nutritional Additives Corp. dolomite
Sexton Mill (crushing, screening)
S20,T36N,R38E 5
Glen W. Sexton, General Manager
P.O. Box 802, Winnemucca, NV 89445

Pinson Mining Co. gold
Pinson Mine (OP,ML) (cyanidation)
S28,T38N,R42E 130
H. Dan Harper, General Manager
P.O. Box 192, Winnemucca, NV 89445

Snyder, K. W., & Pete Balison gold
Gold Button Mine (UG) 2
S5,T39N,R36E
K. W. Snyder & Pete Balison, Partners
P.O. Box 1007, Winnemucca, NV 89445

Thompson, Marlon H. gold
Gold Run Mine (OP) 3
S28,T34N,R40E
Marlon H. Thompson, Owner/Operator
745 West 6th Street, Winnemucca, NV 89445

True North, Inc. gold & silver
Marigold Mine (OP,ML) (cyanidation)
S18,T33N,R43E 2
Larie K. Richardson, Mine Manager
General Delivery, Valmy, NV 89438

Wilson, Harry opal
Royal Peacock No. 2 Mine (OP) 1
S25,T45N,R25E
Harry Wilson, Owner
P.O. Box 36, Denio, NV 89404

Wilson, Walt opal
Little Pebble Mine (OP) 1
S18,T45N,R25E
Walt Wilson, Owner
P.O. Box 36, Denio, NV 89404

LANDER COUNTY

A. W. Arnold & Associates barite
Rimrock Mill (gravity concentration)
S26,T33N,R45E 10
Richard Clark, Operations Manager
606 Commercial Street, Elko, NV 89801

Austin Resources, Inc. gold & silver
Argus Mill (gravity concentration)
S5,T19N,R44E 20
Hillside Shaft (UG) 3
S19,T19N,R44E
Slaughterhouse Mine (UG) 9
S32,T19N,R44E
Robert Hughes, President
P.O. Box 56, Austin, NV 89310

Boyette, Jim & Roy gold
Hilltop Placer Tunnel (UG) 4
S28,T30N,R45E
Jim & Roy Boyette, Partners
General Delivery, Battle Mountain, NV 89820

Brazos Metals, Inc. gold & silver
Klondike Mine (UG,ML) (flotation)
S27,T16N,R43E 14
Jim Patterson, President
Rt. 2, Box 5A, Austin, NV 89310

Cortez Gold Mines gold
Cortez Mine (OP,ML) (heap leach)
S13,T27N,R47E 104
Art Walsh, General Manager
Crescent Valley, NV 89821

Dresser Minerals, Inc. barite
Greystone Mine (OP,ML) (gravity concentration)
S26,T28N,R45E 126
Dresser Mill (crushing, screening)
S17,T32N,R45E 32
Garry Thielen, General Manager
P.O. Box 375, Battle Mountain, NV 89820

Duval Corp. gold
Copper Canyon Mine (OP) 171
S27,T31N,R43E
Copper Canyon Mill (cyanidation)
S27,T31N,R43E 219
Richard Sumin, Manager
P.O. Box 451, Battle Mountain, NV 89820

Edgar & Morgan Mining Co. barite
CBM Mine (OP) 10
S35,T28N,R45E
James D. Edgar, President
P.O. Box 899, Battle Mountain, NV 89820

Elquist Mining, Inc. barite
Slavin Canyon Mine (OP,ML) (gravity concentration)
S11,T30N,R46E 7
James Elquist & William Elquist, Partners
P.O. Box 488, Battle Mountain, NV 89820

FMC Corp. barite
Mountain Springs Mine (OP) 15
S8,9,T28N,R44E
R. Dale Taylor, Superintendent
P.O. Box 531, Battle Mountain, NV 89820

IMCO Services, Inc. barite
Mountain Springs Mill (gravity concentration, flotation)
S4,T28N,R44E 59
Battle Mountain Grinding Plant (grinding, classification)
S27,T32N,R45E 21
Ralph Gronning, General Manager
P.O. Box 861, Battle Mountain, NV 89820

M & B Mining & Milling, Inc. barite
Bradshaw Mine (OP,ML) (gravity concentration)
S7,T29N,R47E 1
Tenabo Placer Contractor (UG) gold
S16,T28N,R47E 4
Wayne Morris & Glen Bodam, Partners
P.O. Box 20, Crescent Valley, NV 89821

Major Barite Co. barite
Major Barite Mill (gravity concentration)
S8,T29N,R47E 6
John Uhalde, Superintendent
1975 Palisade Drive, Reno, NV 89509

Milchem, Inc. barite
Bateman Canyon Mill (gravity concentration)
S6,T30N,R46E 16
Argenta Mine (OP) 8
S19,T32N,R47E
Argenta Mill (gravity concentration)
S12,T32N,R46E 28
Carl Brown, Manager, Nevada Operations
P.O. Box 272, Battle Mountain, NV 89820

Monarch Milling silver
Bullion Monarch Mill (flotation)
S13,T19N,R43E 3
Robert Morris, General Manager
P.O. Box 176, Austin, NV 89310

Morris & Bodam Mining barite
Black Stone Mine (OP) 4
S4,T28,R46E
Wayne Morris & Glen Bodam, Partners
P.O. Box 20, Crescent Valley, NV 89821

New Pass Resources, Inc. gold & silver
Thomas W Mine (UG) 2
S9,T20N,R40E
New Pass Mill (heap leach)
S16,T20N,R40E 2
Donald Jung, General Manager
P.O. Box 69, Austin, NV 89310

Porter & Meissner Mining, Inc. barite
Rimrock Mine (OP) 8
S24,T33N,R45E
Duane H. Porter, President
P.O. Box 1072, Battle Mountain, NV 89820

Tom Norris Mining Co. barite
Allen Mine (OP) 3
S32,T21N,R42E
Tom Norris, Owner
P.O. Box 231, Battle Mountain, NV 89820

LINCOLN COUNTY

Delaperlite Partnership Lease perlite
Mackie Mine (UG) 2
S11,T5S,R62E
Joe Wilkin, Partner
P.O. Box 217, Pioche, NV 89043

Enoch Resources gold
Moapa Venture (cyanidation)
S23,T12S,R65E 4
Gregory Bradt, General Manager
1515 East Reno Avenue, Las Vegas, NV 89119

Freiberg Mining Corp. silver
Freiberg Mine (heap leach)
S20,T1N,R57E 9
Lynn Shirley, Manager
301 South 11th Street, Las Vegas, NV 89101

Hollingshead Mining Contracting gold & silver
Pioche Mill (flotation, gravity concentration)
S23,T1N,R67E 2
LaVar Hollingshead, Owner
Panaca, NV 89042

R.J. Dalton & Sons soil additive
Agricultural Minerals Mill (flotation)
S33,T1N,R67E 2
Richard Donohue, Superintendent
P.O. Box 131, Star Route, Pioche, NV 89043

Sierra Chemical Co. limestone
Sierra Chemical Mine (OP) 3
S25,T1S,R66E
Standard Slag Co., Mining Contractor

Sierra Chemical Mill lime
S29,T1N,R67E (calcining)
Kim Lee, Manager 17
P.O. Box 67, Pioche, NV 89043

Standard Slag Co. gold & silver
Atlanta Mine (OP,ML) (cyanidation)
S14,T7N,R68E 45
Ernie Charter, Manager
P.O. Box 97, Pioche, NV 89043

Union Carbide Corp. tungsten
Emerson Mine (UG,ML) 18
S36,T3S,R56E

Emerson Mill (flotation)
S36,T3S,R56E 38
Jerry Schierman, Manager
P.O. Box 307, Alamo, NV 89001

Wilkin Mining & Trucking Co. perlite
Caliente Mill (crushing, screening)
S7,T4S,R67E 3
Robert D. Wilkin, Owner
P.O. Box 217, Pioche, NV 89043

LYON COUNTY

Art Wilson Co. gypsum
Adams Claims (OP,ML) (crushing, screening)
S25,T16N,R20E 10
Art Wilson, Owner
P.O. Box 1160, Carson City, NV 89701

Au Harvesters International Ltd. gold
Korc Placer Mine (OP) 8
S26,T17N,R26E
Vincent P. Orlando, President
735 Cranford Avenue, Bronx, NY 10470

Cyprus Mines Corp., United Sierra Div. diatomite
Section 8 Mine (OP) 1
S8,T19N,R26E

Cyprus Mill (drying, classification)
S12,T20N,R24E 9
Thomas Landels, Plant Manager
P.O. Box 455, Fernley, NV 89408

Eagle-Picher Industries, Inc. diatomite
Hazen Pit (OP) 2
S9,T19N,R25E
M. M. Moezzi, Mine Manager
P.O. Box 959, Lovelock, NV 89419

G & S Constructors, Contractor gold
Bovie Lew Mine (OP) 3
S17,T13N,R24E
Greg Johnson & Sanford Johnson, Contractors
P.O. Box 335, Dayton, NV 89403

Gold Canyon Placers, Inc. gold & silver
Trio Claims (OP,ML) (cyanidation)
S23,T16N,R21E 2
Robert W. Craig & George W. Craig, Managers
P.O. Box 333, Dayton, NV 89403

Ida Mines, Inc. gold
Ida Mine (UG) 3
S9,T16N,R21E
Art Wilson, Vice President/Manager
P.O. Box 1160, Carson City, NV 89701

J & H Pine Mining Co. gold
Pine Grove Placer Mine (OP) 3
S32,T10N,R26E
John Winebarger, Partner
785 North Maddux Drive, Reno, NV 89512

Minor Mineral Co., Inc. montmorillonite
Wabuska Plant (screening)
S21,T15N,R25E 2
Bill Minor, President
P.O. Box 733, Yerington, NV 89447

Miss Quickly Mines, Inc. gold
Santiago-Haywood Mine (OP) 1
S17,T16N,R21E
Steve Russell, Geologist
P.O. Box 2407, Carson City, NV 89702

Nevada Cement Co. limestone
Limestone Mine (OP) 3
S4,T19N,R25E

Nevada Cement Plant cement
S10,T20N,R24E (crushing, screening, calcining)
David Dalton, President 125
P.O. Box 895, Fernley, NV 89408

Southern Mining, Inc. gold
Korc Placer Mine (OP,ML) (gravity concentration)
S26,T17N,R26E 6
Walter Leonpacher, President
P.O. Box 248, Silver Springs, NV 89429

Spring Valley Mining & Milling, Inc. gold
Dayton Properties (OP,ML) (gravity concentration)
S26,T16N,R21E 4
C. F. Heckman, Manager
P.O. Box 47, Gardnerville, NV 89410

Tuttle's Independent Contracting montmorillonite
Tuttle Mine (OP) 3
S20,T7N,R27E
James B. Tuttle, Owner
P.O. Box 956, Hawthorne, NV 89415

MINERAL COUNTY

Candelaria Metals, Inc. gold & silver
Potosi Mine (UG) (heap leach)
S5,6,T3N,R35E 17
Melvin G. Gordy, President
787 North Main Street, Bishop, CA 93514

Candelaria Partners — gold & silver
Candelaria Mine (OP) — (heap leach)
S5,T3N,R35E — 24
William Jacobs, Manager
P.O. Box 1246, Hawthorne, NV 89415

Canyon Milling, Inc. — gold
Pamlico Placer Plant (ML) — (gravity concentration)
S13,T8N,R31E — 2
Richard Carlstrom & Donald Carlstrom, Partners
832 Benita Place, Boulder City, NV 89005

C-E Basic — magnesite
Luning Mill — (screening)
S28,T8N,R34E — 8
Gary Judd, Works Manager
P.O. Box 177, Gabbs, NV 89409

Green Ranch Mining Co. — tungsten
Eagle Mine (UG) — 3
S9,T8N,R35E
Duane Moore, President
6155 Lakeside Drive, Reno, NV 89509

Houston International Minerals Corp. — gold & silver
Borealis Mine (OP,ML) — (heap leach)
S16,T6N,R29E — 39
Clyde Partin, Site Manager
P.O. Box 976, Hawthorne, NV 89415

W. E. Vining Co., Mining Contractor — 16
W. E. Vining, Contractor
P.O. Box 557, Virginia City, NV 89440

Ingle, Hugh C. — gold & silver
Aden Mill — (gravity concentration, flotation)
S8,T6N,R35E — 2

Mabel & Garfield Mines (OP,UG) — 2
S17,T7N,R33E
Hugh C. Ingle, Jr. & Hugh C. Ingle, Partners
1161 Highway 339, Yerington, NV 89447

Ingle, Hugh C., Jr. — gold
Ashby Mine (OP,ML) — (heap leach)
S27,T7N,R32E — 2
Hugh C. Ingle, Jr., Lessee
P.O. Box 2123, Hawthorne, NV 89415

Kinkead Mining and Construction — barite
Little Summit Mine (UG) — 2
S4,T3N,R34E

Kinkead Mill — (crushing, screening)
S15,T8N,R32E — 2
Dick Merritt, Owner
P.O. Box 32, Mina, NV 89420

Lovestedt, Claude B. — silver
Broken Hills Mine (OP) — 2
S26,T14N,R35E
Claude B. Lovestedt, Operator
P.O. Box 2710, Carson City, NV 89702

Mako Mining Corp. — gold & silver
Mako Mine (OP) — 3
S28,T11N,R30E
Roger Raudio, President
P.O. Box 751, Hawthorne, NV 89415

Merritt, Dick — barite
Bell Mine (UG) — 1
S22,T3N,R34E
Dick Merritt, Owner
P.O. Box 32, Luning, NV 89420

Minerals Management, Inc., Contractor — gold & silver
Moho Mine (UG) — 5
S26,T5N,R33E
L. T. Atkinson, President
P.O. Box 105, Dyer, NV 89010

Minerals Unlimited, Inc. — gold, silver & barite
Red Rock Mill — (flotation)
S9,T6N,R35E — 8
Kenneth W. Partridge, General Manager
P.O. Box 12032, Reno, NV 89510

Minerals Unlimited, Inc. & — barite
J & J Mining Co. (JV) — (screening)
Yates Mine (OP,ML) — 4
S17,T3N,R34E
William Morris, President, Minerals Unlimited, Inc.
J. T. Desmond, President, J & J Mining Co.
P.O. Box 12032, Reno, NV 89510

Monarch Mining Corp. — gold & silver
Stanmore Mine (OP) — 1
S22,T8N,R28E
Harry O. Nylene, President
P.O. Box HH, Yerington, NV 89447

Mt. Hope Mining Corp. — silver
Lucky Boy Mine (UG) — 3
S17,T7N,R30E
Hal Jensen, Manager
P.O. Box 501, Hawthorne, NV 89415

National Resources Development, Inc. — tungsten
Nevada Scheelite Mine (UG,ML) — (gravity
S1,12,T13N,R32E — concentration)
Paul Jones, Manager — 1
P.O. Box 1567, Fallon, NV 89406

Princeton Mining & Refining, Ltd. — gold
Gold Cliffs Mine (OP) — 5
S15,16,T5N,R33E
Tom Delany, President
2440 Eleventh Street, Sparks, NV 89431

Sodaville Research — gold & silver
Sodaville Research Facility (ML) — (flotation)
S29,T6N,R35E — 5
Jim Schaefer, Engineer
P.O. Box 451, Mina, NV 89422

Thorne Placers, Inc. — gold
Thorne Placer Mine (ML) — (screening)
S13,T7N,R31E — 4
J. Ellis George, President
P.O. Box 258, Issaquah, WA 98027

Tseng Mining Co. — gold & silver
Red Rock Mill — (flotation)
S9,T6N,R35E — 14
James R. Brown, General Manager
1785 West 6th Street, Reno, NV 89503

Valley Aggregate, Inc. gold
Neversweat Mine (OP,ML) (screening)
S13,T7N,R31E 5
Bernie Johnson, President
P.O. Box 11765, Spokane, WA 99211

Wilson, Jesse R. gold
Live Yankee Mine (UG) 1
S20,T5N,R28E
Jesse R. Wilson, Owner
P.O. Box 596, Sparks, NV 89431

NYE COUNTY

All Minerals, Inc. barite
Northumberland Mine (OP,ML) (gravity concentration)
S9,T12N,R46E 22
S. R. Mahoney, President
5510 South 300 West, Murray, UT 84107

American Borate Corp. colemanite
American Borate Mill (calcining, drying, flotation)
S36,T17S,R49E 98
Landon Lockhart, General Manager
Star Route 15, Box 610, Lathrop Wells, NV 89820

Anaconda Co. molybdenum
Nevada Moly Mine (OP,ML) (flotation)
S6,T5N,R42E 300
L. E. Wilkes, Project Manager
P.O. Box 1268, Tonopah, NV 89049

Auries Mining Development Co. gold & silver
Oasis Mine (OP) (heap leach)
S28,T12S,R47E 6
Reed A. Hatkoff, President
P.O. Box 278, Beatty, NV 89003

BML Mining Co. silver
Barcelona Mine (UG) 2
S36,T9N,R44E
Fred Masters, President/General Manager
P.O. Box 127, Manhattan, NV 89022

Bottom, Bob, & Gary Godfrey gold
Arlington Mine (OP) 3
S23,T8N,R43E
Bob Bottom & Gary Godfrey, Partners
P.O. Box 89, Tonopah, NV 89049

Bullfrog Enterprises gold & silver
Montgomery Shoshone Mine (screening)
S3,T12S,R46E 3
Robert B. Garcia, President
P.O. Box 397, Beatty, NV 89003

C-E Basic magnesite
Nevada Works Pit 35
S34,T12N,R36E
Nevada Works Plant (ML) (calcining, flotation,
S34,T12N,R36E heavy-media separation)
Gary Judd, Works Manager 182
P.O. Box 177, Gabbs, NV 89409

Cind-R-Lite Block Co. cinder
Cinder Cone Mine (OP) 2
S1,T15S,R48E
Ernest Selman, Superintendent
3333 Cinder Lane, Las Vegas, NV 89103

Crowell, J. Irving, Jr., & Son fluorspar
Crowell Mine (UG) 3
S23,T12S,R47E
Jack Crowell, Owner
P.O. Box 96, Beatty, NV 89003

Cyprus Mines Corp. gold & silver
Northumberland Mine (OP,ML) (heap leach)
S13,T13N,R45E;S31,T14N,R45E 110
Neil Prenn, Resident Manager
P.O. Box 8A, R.R. No. 2, Austin, NV 89310

D & K Exploration gold & silver
Sidewinder Mine (heap leach)
S16,T12S,R46E 2
Brent Kerr, Partner
P.O. Box 521, Beatty, NV 89003

GEO Drilling Fluids, Inc. barite
Jumbo Mine (OP) 12
S34,T3N,R47E
Roy A. Winder, Superintendent
1150 Lamoille Highway, Elko, NV 89801

Gila Mines Corp. gold & silver
Gila Mine (OP) (heap leach)
S24,T2N,R51½E 8
Oliver Smith, Superintendent
P.O. Box 210, Tonopah, NV 89049

Golden Reef Mining & Development gold & silver
Park Canyon Mine (UG) 5
S34,T14N,R42E
Verl Long & Steven Henline, Partners
889 East 200 South, Spanish Fork, UT 84660

Houston International Minerals Corp. gold
Manhattan Mine (OP,ML) (cyanidation, gravity
S20,T8N,R44E concentration, flotation)
Dan Martin, Project Manager 17
P.O. Box 56, Manhattan, NV 89022

Industrial Mineral Ventures, Inc. clay
Amargosa Mine (OP,ML) (crushing, screening)
S27,T17S,R49E 43
Forest Hansen, Resident Manager
RFD Box 549, Lathrop Wells, NV 89020

Manhattan Milling, Inc. gold & silver
Manhattan Mill (cyanidation)
S20,T8N,R44E 3
Anthony Selig, President
P.O. Box 64, Manhattan, NV 89022

Marshall Earth Resources, Inc. gold & silver
Catherine Mine (UG) 2
S1,T12N,R39E
Ione Placer (ML) gold
S28,T13N,R39E (screening)
4
Shamrock Tunnel No. 2 (UG) silver
S22,T13N,R39E 2
Sky Claims (ML) gold & silver
S34,T13N,R39E (construction)
Robert Miller, Superintendent 7
Rt. 1, Box 29A, Ione, NV 89310

N.S.E. & RoWeHo Mining Co. gold
N.S.E. & RoWeHo Mine (OP,ML) (gravity concentration)
S9,T6N,R56E 3
B. G. Hoffman, Tom Weber, & Jim Roper, Owners
P.O. Box 1051, Ely, NV 89301

Pacific Silver Corp. silver
Tybo Mine (UG) (rehabilitation)
S18,T6N,R50E 8
Art Schultz, Superintendent
Tybo, via Tonopah, NV 89049

Pauley, James gold
Nellie Gray Patent (UG) 2
S20,T8N,R44E
P.O. Box 111, Manhattan, NV 89022

R.A.W. Mining & Construction Co. gold
Free Gold Mine (OP) 2
S27,T7N,R40E
Ray Whisenant
P.O. Box 3999, Tonopah, NV 89049

R-J Mining Co. gold
Daisy Lane Placer (OP) (gravity concentration)
S15,T9N,R39E 5
Roy Jenkins, Owner
General Delivery, Tonopah, NV 89049

Saga Exploration Co. gold & silver
Sterling Mine (UG) (heap leach)
S14,T13S,R47½E 21
Greg Austin, President
P.O. Box 572, Beatty, NV 89003

S & KK Exploration gold & silver
S & KK Mine (UG) 2
S9,T12S,R46E
W. M. Kerr, President
P.O. Box 566, Beatty, NV 89003

Smoky Valley Mining Co. gold
Round Mountain Mine (OP,ML) (heap leach)
S19,T10N,R44E 219
Don L. Simpson, General Manager
P.O. Box 480, Round Mountain, NV 89045

Standard Slag Co. barite
P & S Mine (OP) 3
S14,T13N,R45E
Cliff McLaughlin, Resident Manager
P.O. Box 10477, Reno, NV 89510

Vanderbilt Minerals Co. bentonite
White Caps Mine (UG) 5
S19,T12S,R46E
Jerry Lease, Vice President/General Manager
P.O. Box 398, Beatty, NV 89003

White Mineral Resources, Inc. gold & silver
Bullfrog Mine (ML) (construction, heap leach)
S20,T12S,R46E 12
Arnold Buchanan, Vice President
P.O. Box 837, Beatty, NV 89003

Wilson, Robert E. gold
G & S Mine (OP,ML) (gravity construction)
S35,T13N,R42E 4
Robert E. Wilson, Owner
P.O. Box 10, Round Mountain, NV 89045

PERSHING COUNTY

Benickie, Michael gold
Saundra Lee & Phase II Mines (OP,ML) (gravity concentration)
S18,T32N,R32E 1
Michael Benickie, Owner/Operator
5444 Woods Drive, Sparks, NV 89431

Black Eagle Mining Co., Inc. gold
Black Eagle Mine (OP) 10
S15,T34N,R29E
John E. Wilson, Director
2001 Lakeside Drive, Reno, NV 89509

Circle A Construction gold
Little Jupiter Mine (UG) 7
S17,T33N,R37E
Marvin Aslett, President
Trails End Estates No. 21, Winnemucca, NV 89445

Cooney Mining Co. magnetite (iron ore)
Cooney Mine (OP,ML) (magnetic separation)
S29,T26N,R34E 7
John Cooney, President
P.O. Box 568, Lovelock, NV 89419

Coronado Oil & Minerals Co. silver
Oreana Mill (flotation, gravity concentration)
S36,T29N,R32E 4
Jess Darnell, Superintendent
Oreana Star Route, Lovelock, NV 89419

Dow James Minerals, Inc. (JV) gold
Dry Gulch Placer (OP,ML) (gravity concentration)
S35,T29N,R34E 4
Michael S. Hurd, Field Supervisor
P.O. Box 497, Lovelock, NV 89419

Dusty Mining Co. gold
Dusty Mine (OP) (heap leach)
S20,24,30,T32N,R32E 3
Larry Speir, President
P.O. Box 1149, Lovelock, NV 89419

Eagle-Picher Industries, Inc. diatomite
Colado Mine (OP) 19
S8,T28N,R29E
Colado Plant (ML) (calcining)
S6,T27N,R32E 109
V. J. Eisinger, Plant Manager
P.O. Drawer A, Lovelock, NV 89419

Ednuk Prospecting & Mining silver
Encanto Mine 3
S10,T29N,R33E
Robert Kunde, Contractor
4780 Bottom Road, Fallon, NV 89406

F.M. Wright Mining Co. gold
Wright Mill (flotation, gravity concentration)
S6,T28N,R33E 2
F. M. Wright, President
P.O. Box 643, Lovelock, NV 89419

G & S Mines gold
McCann Canyon Mine (OP,ML) (gravity concentration)
S19,T33N,R36E 2
Webb Shepherd, Partner
P.O. Box 1177, Winnemucca, NV 89445

H & M Minerals gold
Hardluck Mine (OP) 4
S4,T27N,R37E
Richard Harbin, Manager
P.O. Box 8372, Incline Village, NV 89450

Nevada Packard (JV) silver
Nevada Packard Mine (OP,ML) (cyanidation)
S28,29,32,33,T28N,R34E 7
Dale Scholz, Manager
P.O. Box 1007, Lovelock, NV 89419

Nev-Tex gold
Nev-Tex Mine No. 1 (OP,ML) (gravity concentration)
S28,T31N,R37E 16
Fred Molitor, Mine Engineer
P.O. Box 1529, Winnemucca, NV 89445

Nutritional Additives Corp. dolomite
Sexton Mine (OP) 2
S5,T34N,R38E
Glen W. Sexton, General Manager
P.O. Box 802, Winnemucca, NV 89445

Proquip, Inc. gold
Fortune Cookie Mine (OP) 4
S17,T33N,R36E
Bart Conn, President
P.O. Box 2012, Winnemucca, NV 89445

Rare Earth Products, Inc. gold
Spaulding Canyon Mine (OP,ML) (gravity concentration)
S28,T31N,R37E 6
Edward I. Stein, President
P.O. Box 2075, Winnemucca, NV 89445

Ro-Mac Gold, Ltd. gold
Willow Creek Mine (OP,ML) (gravity concentration)
S11,T31N,R36E 5
Ross Feraco, Vice President
c/o Kafoury-Armstrong & Co.
P.O. Box 2060, Winnemucca, NV 89445

Silver Bell Mining & Developing, Inc. antimony
Fencemaker Mine (UG) 3
S31,T26N,R37E
Walter Gertz, Mine Superintendent
P.O. Box 221, Lovelock, NV 89419

Trease Mining Co. gold
Imlay Canyon Mine (OP,ML) (gravity concentration)
S30,T32N,R34E 6
James Trease, Partner
2034 Golf Drive, Elko, NV 89801

U.S. Gypsum Co. gypsum
Empire Mine (OP) 4
S31,T31N,R24E

Lovelock plant (ML) perlite
S8,T27N,R32E (screening)
Roger Brown, Works Manager 2
Empire, NV 89405

Utah International, Inc. tungsten
Sutton No. 2 Mine (UG) (development)
S35,T34N,R34E 160
A. F. Metcalfe, Manager
P.O. Box 325, Imlay, NV 89418

Valley Mountain Mining, Inc. tungsten
Danner Mine (OP,UG) 4
S17,T34N,R34E
Linc Moore, Mining Chairman
P.O. Box 323, Imlay, NV 89418

Velvet Mining Co. gold & silver
Magmatic Gold Mine (OP,UG) 3
S6,T27N,R29E
Dave Bloyed, Manager
P.O. Box 1051, Lovelock, NV 89419

Warner Texas, Inc. gold
Willow Creek mine (OP,ML) (gravity concentration)
S11,T31N,R36E 6
O. V. Warner, President
P.O. Drawer 101, Lawton, OK 73502

STOREY COUNTY

Eagle-Picher Industries, Inc. diatomite
Clark Mine (OP) 8
S28,T20N,R23E
M. M. Moezzi, Mine Manager
P.O. Box 959, Lovelock, NV 89419

Clark Plant (ML) (drying, classification)
S35,T20N,R22E 30
C. A. Chadwell, General Works Manager
P.O. Box 1869, Reno, NV 89505

Glass Mountain Block lightweight aggregate
Lower Naturalite Pit (OP,ML) (crushing, screening)
S16,T17N,R22E 1
Richard Wideriksen, Vice President
355 Greg Street, Sparks, NV 89431

Houston International Minerals Corp. gold & silver
Consolidated Imperial Mine (OP) 10
S31,T17N,R21E
W. E. Vining Co., Contractor
P.O. Box 557, Virginia City, NV 89440

American Flat II Mine (OP,ML) (cyanidation)
S32,T17N,R21E 65
Ken Wright, Manager
P.O. Box B, Virginia City, NV 89440

United Mining Co. of Nevada, Inc. gold & silver
New Savage Mine (UG) (development)
S29,T17N,R21E 6
Earl Haldeman, General Manager
P.O. Box 320, Virginia City, NV 89440

Westcoast Oil & Gas Corp. gold & silver
Gooseberry Mine (UG,ML) (cyanidation)
S25,T19N,R22E 30
Doug Brown, General Manager
P.O. Box 2267, Sparks, NV 89431

WASHOE COUNTY

Art Wilson Co. clay
Clay Mine (OP) 3
S14,T27N,R19E
Art Wilson, Owner
P.O. Box 1160, Carson City, NV 89701

Ma-Gar Mining & Exploration gold
Sloppy Weather Mine (OP,ML) (electrostatic recovery)
S22,T21N,R22E 1
Thurman Overfelt, Owner
P.O. Box 3085, Carson City, NV 89701

McNicholes, Harry R. gold
Carmen Placer Mine (OP) 3
S33,T21N,R33E
Harry R. McNicholes, Owner/Operator
47 Silver Reef Drive, Reno, NV 89506

ORACO gold
Olinghouse Placer (OP) 4
S23,T21N,R23E
Ted V. Smith, President
555 Crummer Lane, Reno, NV 89511

Rilite Aggregate Co. lightweight aggregate
Rilite Pit (OP,ML) (crushing, screening)
S12,T18N,R20E 6
Bruno Benna, Owner
P.O. Box 11767, Reno, NV 89510

U.S. Gypsum Co. gypsum
Empire Mill (crushing, screening)
S11,T31N,R23E 6
Roger Brown, Works Manager
Empire, NV 89405

Wilcox, Jack gold
Babe Mine (UG,ML) (gravity concentration)
S29,T21N,R23E 1
Jack Wilcox, Manager
P.O. Box 1928, Grass Valley, CA 95945

WHITE PINE COUNTY

Amselco Minerals, Inc. gold
Alligator Ridge Mine (OP) (heap leach)
S2,T22N,R57E 156
Warren Stanford, General Manager
P.O. Box 149, Ely, NV 89301

Egan Milling Co., Inc. lead, zinc, gold, silver
Egan Mill (flotation, cyanidation)
S2,T16N,R63E 16
E. C. Erickson, President
P.O. Box 628, Ely, NV 89301

Hatch Rock Quarries building stone
Hatch Quarry (OP) 3
S15,T16N,R70E
Richard K. Hatch, Owner/Operator
No. 10 Hatch Rock Road, Gandy Route, Garrison, UT 84728

IBEX Mining Corp. silver
Taylor Shaft (UG) 16
S16,T14E,R65E
E. C. Erickson, President
P.O. Box 628, Ely, NV 89301

Kennecott Minerals Co. copper
Sunshine-Puritan Plant (precipitation)
S10,T16N,R62E 3
George Allen, General Manager
Ruth, NV 89319

Silver King Mines, Inc. silver
Taylor Mine (OP,ML) (cyanidation)
S16,T14N,R65E 65
K. L. Stoker, President
P.O. Box 324, East Ely, NV 89315

Anaconda's molybdenum mill (upper photo) **and mine north of Tonopah** (lower photo). *Ertec photo.*

Houston International's open-pit gold mine at Manhattan. *Ertec photo.*

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NBMG/NMAL offices are located in the Scrugham Engineering-Mines building on the University of Nevada Reno campus; office hours are 8:00–4:30, Monday through Friday.

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