

'79

NEVADA BUREAU OF MINES AND GEOLOGY
SPECIAL PUBLICATION MI-1979

prepared in cooperation with
Division of Mineral Resources
Department of Conservation and Natural Resources

THE NEVADA MINERAL INDUSTRY

1979

Metals
Industrial Minerals
Geothermal
Oil and Gas

Exploration
Development
Mining
Processing

by
Joyce Hall
Administrator
Division of Mineral Resources
Nevada Department of Conservation
and Natural Resources

and
John Schilling
Director
Nevada Bureau of Mines and Geology
University of Nevada•Reno

For more information contact:
Nevada Bureau of Mines and Geology
Email: [nbmg@unr.edu](mailto:nbmng@unr.edu)
Web: <http://www.nbmng.unr.edu/>



Phillips Petroleum Co. Campbell E No. 1 geothermal well, Churchill County. Flow test, October 1979. *Larry Garside photo.*



The State of Nevada
Executive Chamber
Carson City, Nevada 89710

Robert List
Governor

1979 was a year of excitement in Nevada's mineral industry. Several companies have announced plans to begin mining deposits of gold, silver, tungsten, molybdenum, and barite. The State's only oil refinery, located in Tonopah, has increased its capacity, and the deepest oil well in Nevada to date was spudded to test the potential of the Overthrust Belt in our State.


It is generally conceded that Nevada's rank as an important mineral producer is only in part due to its inherent mineral wealth. Cooperation among state and local governments, members of the public, and the mineral industry in developing a balanced approach to resource development also is responsible, to a great degree, for the interest shown in the State by explorationists. This policy will continue.

The mineral industry is one of high risks and huge capital expenditures. If funds are to be available for research and development, and plant and equipment investments, the essential protection of Nevada's environment must be accomplished in such a manner as to permit minimal expense.

Also of critical importance is the escalating rate of withdrawal of public land from exploration and development. It has been estimated, for example, that although approximately 50 percent of the nation's energy resources occur on the public domain, only 10 percent of our domestic production comes from those lands. The concept of multiple use of the public lands is one worthy of support.

We receive with great interest the news of each new mineral discovery and look forward to a healthy future for Nevada's mineral industry.

You have my warm, good wishes.


ROBERT LIST
GOVERNOR

This One



YOY1-8N9-E5TL

Digitized by Google

STATE OF NEVADA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF MINERAL RESOURCES

ROLAND D. WESTERGARD, *Director*
JOYCE HALL, *Administrator*

Capitol Complex
201 South Fall Street
Carson City, Nevada 89710

Address Reply to
Capitol Complex
Nye Bldg., 201 S. Fall Street
Carson City, Nevada 89710
Telephone (702) 885-4368

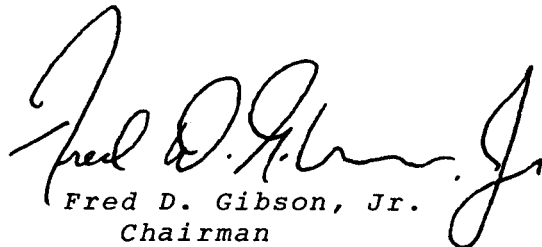
OIL, GAS AND MINING BOARD

History is replete with examples of man's dependence on minerals. Wars have resulted as governments sought new sources of raw materials and societies have declined as mineral supplies have become depleted.

Our present advanced state of technology tends to obscure, to some extent, our reliance on mineral commodities. Each year, however, domestic consumption of newly-mined minerals averages 40,000 pounds per person. The average American born today will require during his lifetime 1050 pounds of lead, 1750 pounds of copper, 91,000 pounds of iron and steel, and 1,337,000 pounds of building materials such as sand, gravel and cement.

Nevada's mineral wealth continues to contribute to the nation's economic well-being. In 1979, Nevada ranked first among the states in production value of barite, magnesite and mercury and was an important producer of gold, lithium and diatomite.

Exploration expenditures are at an all-time high and many significant discoveries have recently been made. We share in the excitement of the announcement of each new discovery and realize that the State's mineral potential has barely been tapped.


Fred D. Gibson, Jr.
Chairman

INTRODUCTION

This report is the first of an annual series. Its purpose is to discuss 1979 events in Nevada's mineral resource development.

This publication includes some of the current mineral exploration and development programs in Nevada, activities in the oil and gas industry, geothermal drilling, and most exciting, the many recent discoveries of ore bodies which have resulted in what Governor Robert List has called Nevada's third mining renaissance.

Mining is the State's primary basic industry; that is, like agriculture, it is one on which all other economic pursuits are reliant. Mining is second in economic importance only to Nevada's tourism and gaming industry.

In nine of the State's 17 counties in 1978, mining was responsible for 10% or more of total employment and at least 12% of total payroll. In six of those counties, mining's contribution to the local payroll was 21% or more.

MINERALS

Exploration

To find (explore or prospect for) a mine is a complex, time-consuming, expensive undertaking. Exploration in Nevada, whether by the weekend-pro prospector or highly-trained geologist, is at an all-time high in terms of the number of individuals and companies involved, money being spent in the search, and variety of minerals—both metals and industrial minerals—being sought. Exploration requires picking out geologically favorable areas to search, using all the geologic data available, adding to it with mapping and other studies to narrow down the search to a relatively small area (a "target"), then a more detailed examination including sampling and drilling to find the ore.

Increased exploration is due in part to the higher prices received for mineral commodities, especially gold, but also to the rapidly-increasing long-term demand.

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 described below.

METALS

ASARCO is continuing to explore in the Rochester mining district in Pershing County. Recent drilling included 125 holes during the 1979 field season and 1,950 ft of drilling during 1978. Probable ore has been estimated at 70 million tons with an average grade of 1.39 ounces of silver per ton and 0.0072 ounces of gold per ton. An additional 30 million tons of "possible" reserves have been delineated. (E & M J, Jan. 1980.)

A joint venture of Amselco Minerals Inc. and Occidental Minerals Corp. is exploring a gold deposit 80 miles northwest of Ely. The Alligator Ridge property lies at the south end of the Ruby Mountains in White Pine County. Drilling thus far has delineated five million tons of ore with an average grade of 0.11 ounces of gold per ton. The ore is contained in three near-surface deposits. Amselco is a wholly owned American subsidiary of Selection Trust Ltd. of London and is operator of the project. Oxy has a 50% interest in the venture. (Mining Record, Sept. 5, 1979.)

U.S. Bureau of Mines geologists working on a mineral resources inventory reported the presence of copper-bearing rocks in an altered area two miles long just east of Pyramid Lake, on the Pyramid Lake Indian Reservation. Mineral surveyor Jack Satkoski said the area "has significant potential and deserves further investigation." (U.S. Bureau of Mines press release.)

UV Industries has reportedly discovered 28 million tons of 0.15% molybdenite ore in the southern portion of the Paradise Range, Nye County. (E & M J, Feb. 1979.)

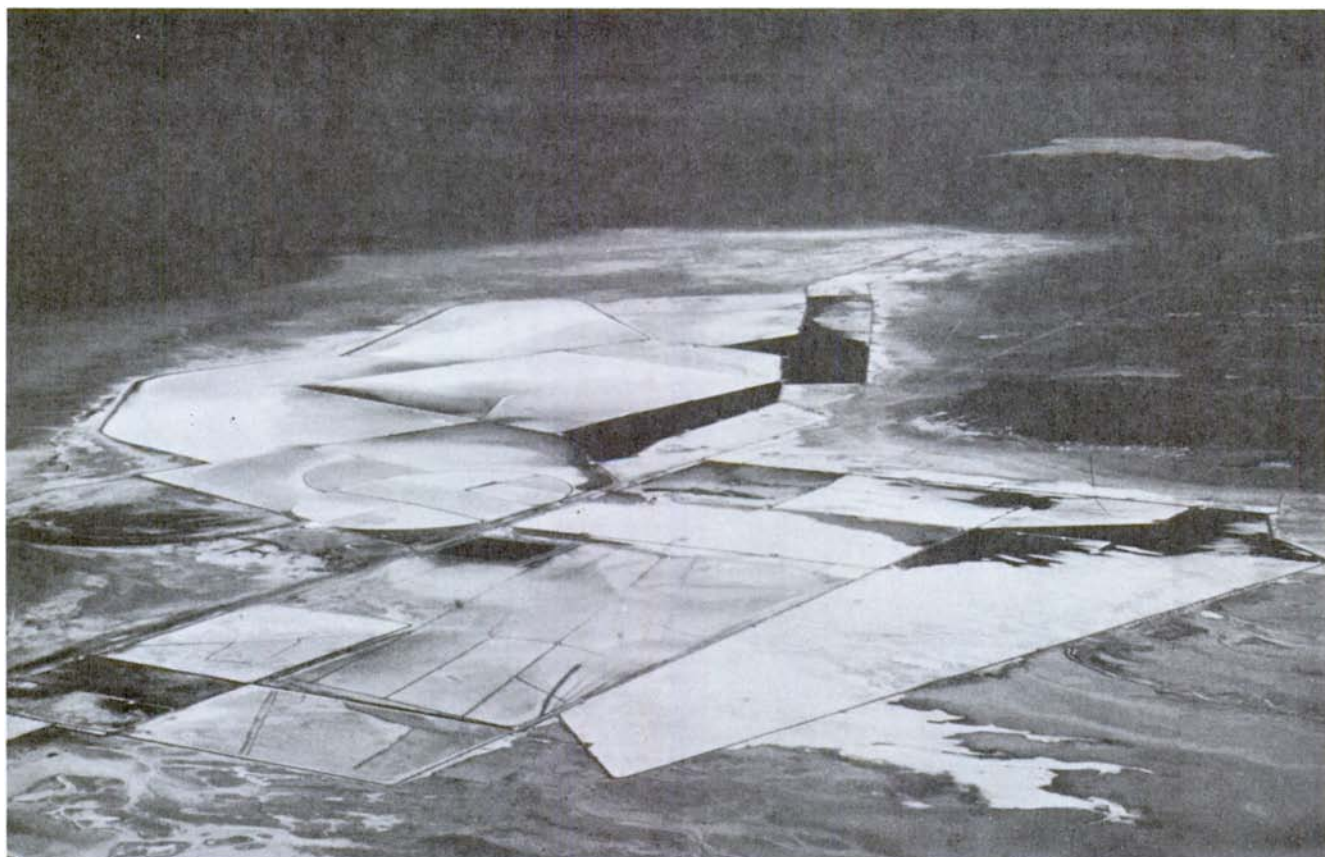
Freeport continues to search for more gold ore and reportedly (U.S. Bureau of Mines, Mineral Industry Survey, Nevada—1979) was evaluating 23 different gold anomalies covering 42 sq. mi. northeast of Tuscarora in Elko County.



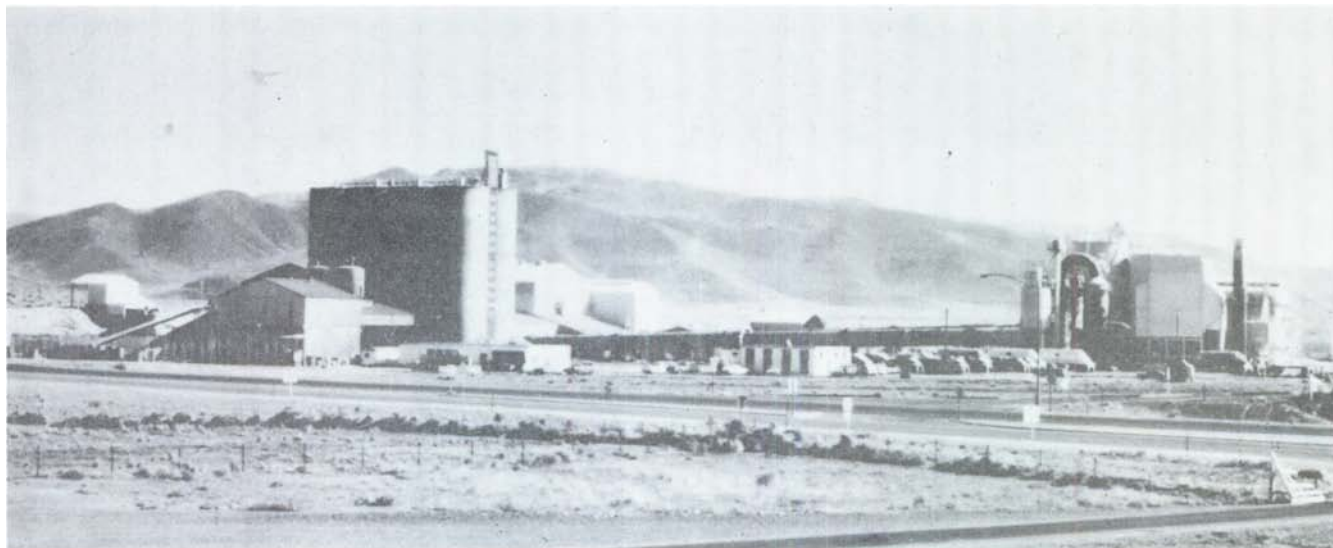
IMCO, Inc. barite grinding plant, Lander County. Keith Papke photo.



Newmont's Carlin gold mine, Eureka County. *Bill DuBois photo.*



Foote Minerals lithium operation, Silver Peak, Esmeralda County. Evaporating ponds. *Bill DuBois photo.*



Nevada Cement Co. plant, Fernley, Lyon County. Keith Papke photo.

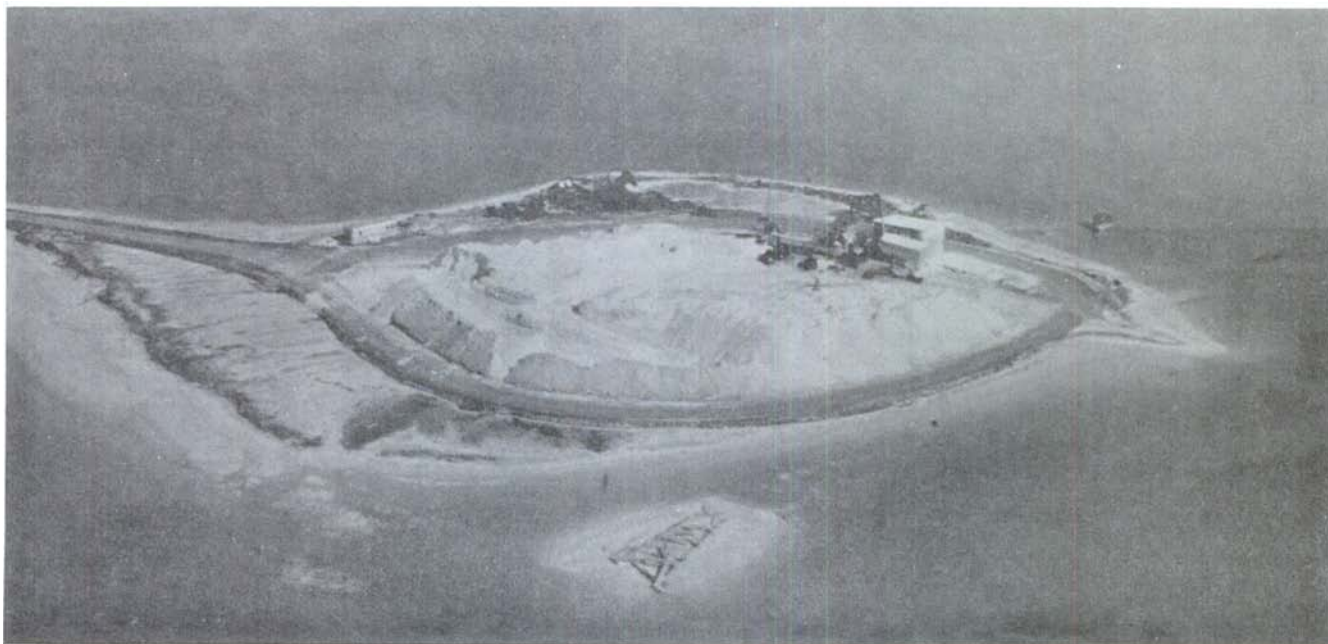
URANIUM

Ore reserves were announced at two uranium properties in Oregon along the north rim of the McDermitt caldera complex. These deposits are just north of the Oregon-Nevada boundary. Placer Amex, Inc. reports the Aurora deposit contains 17 million tons with a grade of 0.05% U_3O_8 and the Cordex Syndicate's adjacent Bretz property has announced 1.5 million tons of 0.075% and 3.5 million tons of 0.05% U_3O_8 (Northern Miner, May 31, 1979). Placer Amex is investigating a mill site in Oregon (Humboldt Sun, Aug. 23, 1979).

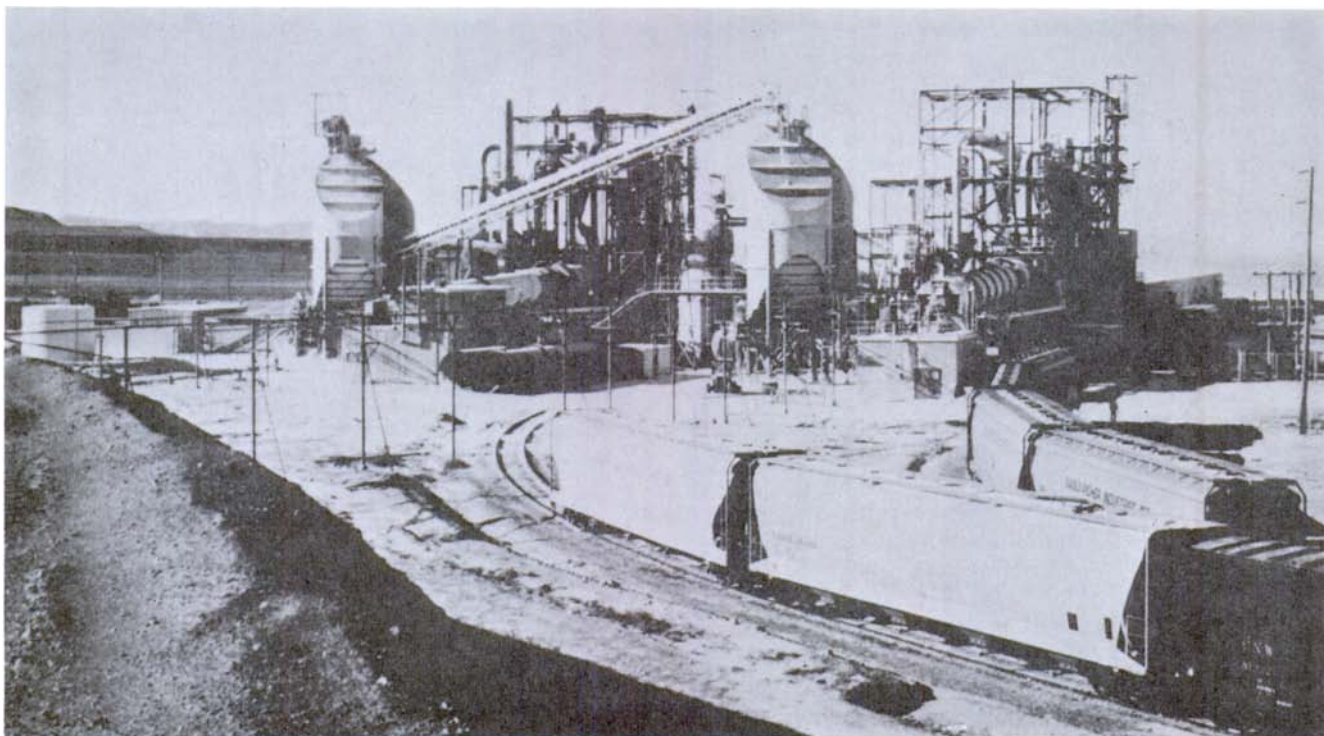
Chevron Resources has intensively explored a uranium prospect near the Moonlight Mine, 40 km southwest of the town of McDermitt along the west rim of the McDermitt

caldera complex. No reserves have been announced but Chevron has notified the Nevada Health Department that it might employ 180 to 250 miners in an underground uranium mine there (Humboldt Sun, Dec. 19, 1978). They have also applied to the Nevada Division of Water Resources for water rights for a uranium mill in adjacent Kings River Valley. (Pay Dirt, Feb. 1980.)

Joint venture partners of Shell Oil and the Minerals Exploration Division of the Energy Reserves Group, Inc. will conduct uranium exploration on their McDermitt prospect. The project encompasses 23,340 acres in Humboldt County and lies approximately five miles south of the Placer Amex discovery in Oregon. (Mining Congress Jour., Nov. 1979.)



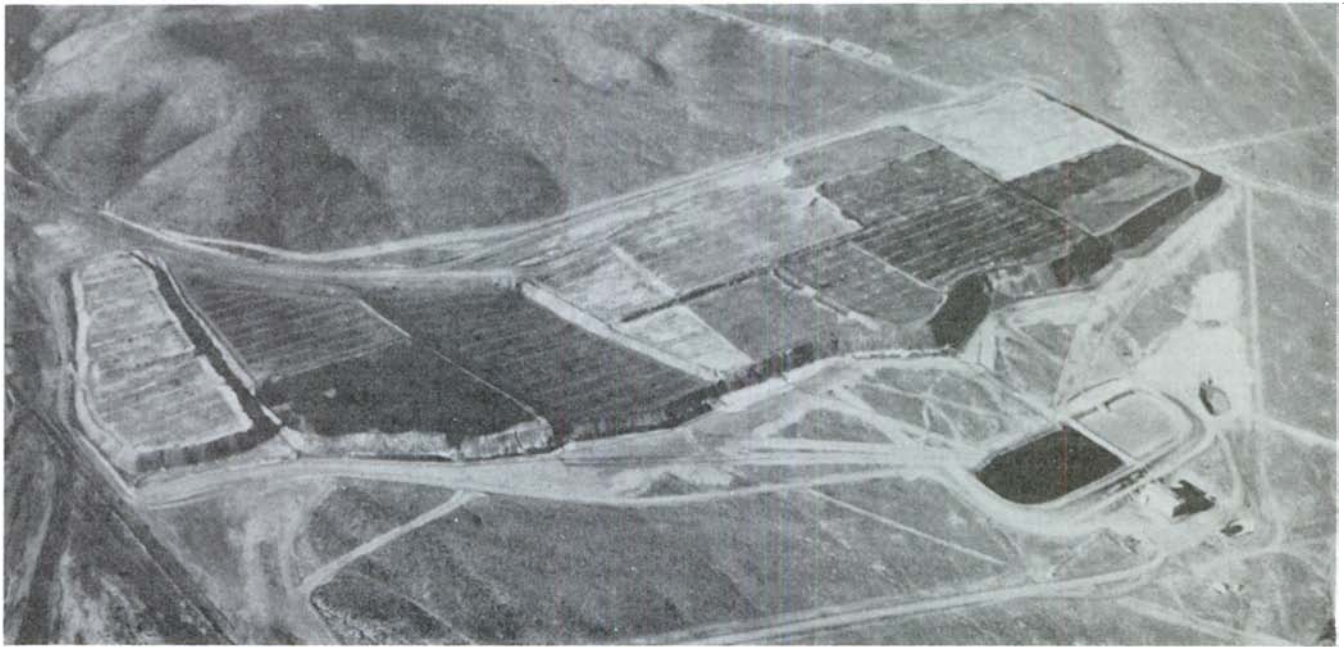
Huck salt operation, Churchill County. Bill DuBois photo.



Eagle-Picher Industries Colado diatomite processing plant, Pershing County. Keith Papke photo.



Flintkote Sloan dolomite mine and mill, Clark Co. Bill DuBois photo.



Cortez Gold Mines leach operation, Cortez, Lander County. *Bill DuBois photo.*

Development

Development is the second in the long, expensive, mine-finding process. Once mineralization is found, additional sampling, including drilling is needed to outline the ore. This is done in order to determine if the mineralization is rich enough and if there is a large enough tonnage to pay for the physical plant needed, and for the preparation of the mine itself, and still allow for a reasonable profit.

Development, like exploration, has increased markedly in Nevada in recent years. Some of the developing mines are listed here, and in the section entitled FUTURE MINES.

Utah International, a subsidiary of General Electric plans to reopen the Springer Tungsten Mine in northern Pershing County, 27 miles southwest of Winnemucca. The company plans to sink a 1,430-ft shaft and build an on-site concentrator and chemical plant. Production of 1,400 tons of ore per day is expected to commence in 1982. Annual production of 1.6 million pounds of ammonium para-tungstate is anticipated. Thirteen years of proven reserves have been developed and exploration of the deposit is continuing. (*Mining Engineering*, Nov. 1979.)

Candelaria Partners announced in October 1979, that its Candelaria Silver project in Mineral County has been approved for development and operation. Candelaria Partners is a limited partnership with Occidental Minerals the general partner and Congdon and Carey, the limited partner. The project has been in an exploration and evaluation status since 1976 when the partnership first started exploring in the district. Eight thousand tons of silver ore per day will be mined by open-pit methods and then heap-leached to recover silver values. The expected life of the mine is eight years. A precipitation plant and metal refinery

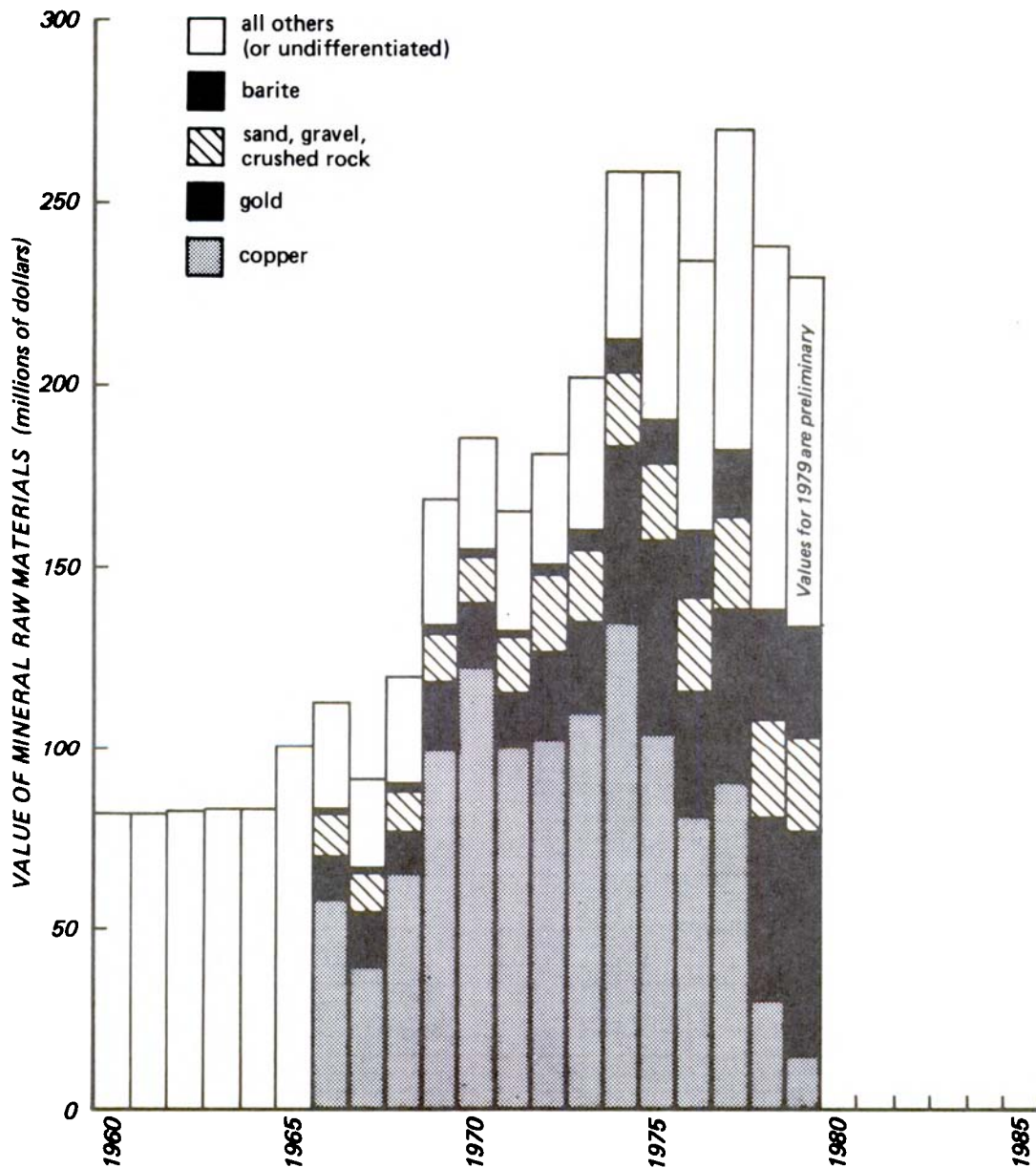
will be built at the site. The total cost of the project is estimated to be approximately \$25–30 million. Production is expected to commence in September 1980.

Silver King Mines Inc. began construction during September of a 1,200-ton per day mill at its Taylor silver mine in White Pine County. By mid-December, the foundation had been poured and the building was being erected. The ore will be mined by open-pit methods and is expected to be in operation by early 1981. The deposit contains reserves of more than six million tons of near-surface ore averaging 3.20 ounces of silver per ton. The expected mine life is 15 years.

Cyprus Mines Corp. has a long-term exploration and development program underway in the Northumberland mining district, northern Nye County. Exploration drilling has taken place over five seasons, and has resulted in the development of major gold-silver ore reserves in two distinct orebodies. Metallurgical testing began in 1977 when two heap-leach tests were washed away in a flash flood. Those tests were completed in 1978, and an additional field test was run in 1979. (*Geological Society of Nevada*, Jan. 1980 mtg.)

In December, Bethex Corp., a subsidiary of the Bethlehem Copper Corp., acquired an interest in the Buckhorn Mine, Eureka County. This gold-silver property has been known and mined intermittently since the turn of the century. A large rotary drilling program is underway to define and expand the known reserves. At the same time, engineering studies and exhaustive metallurgical testing of the ore are being carried out. The existing mill facilities have been put on a care and maintenance basis pending reactivation of the mine. (*Bethlehem Copper Corp.* 1979 Annual Report.)

Nevada Mineral Production



MINING

The estimated value of Nevada's mineral production for 1979 was more than \$246,000,000 (based on preliminary, nonfuel estimates by the U.S. Bureau of Mines, and an estimated price of \$22/bbl for oil). The value of mineral output remained roughly the same as in the previous year; increased production and/or value of a number

Nevada's role in U. S. mineral supply in 1979

Major commodity	Share of U. S. output, percent	Rank in Nation
Barite841
Diatomite	W2
Gold	W2
Lithium252
Magnesite	W1
Mercury	W1
Tungsten	W2

W Withheld; 1979 data not available.

State of Nevada's revenue from mineral industry

Source	1977	1978
Federal ¹	\$2,903,049	\$ 4,847,428
Net proceeds tax ²	1,842,283	2,000,000
Geothermal ³	451,984	240,000
In lieu of taxes	4,500,000	4,200,000
TOTAL	\$9,697,316	\$11,287,428

¹ royalties and rentals paid under Section 35 of the Mineral Leasing Act of 1920.

² on gross yield of mine less specified allowable deductions.

³ bonus bid payments from geothermal lease sales.

of mineral products was offset by the continuing decrease in copper production (U.S. Bureau of Mines Mineral Industry Survey, Nevada-1979).

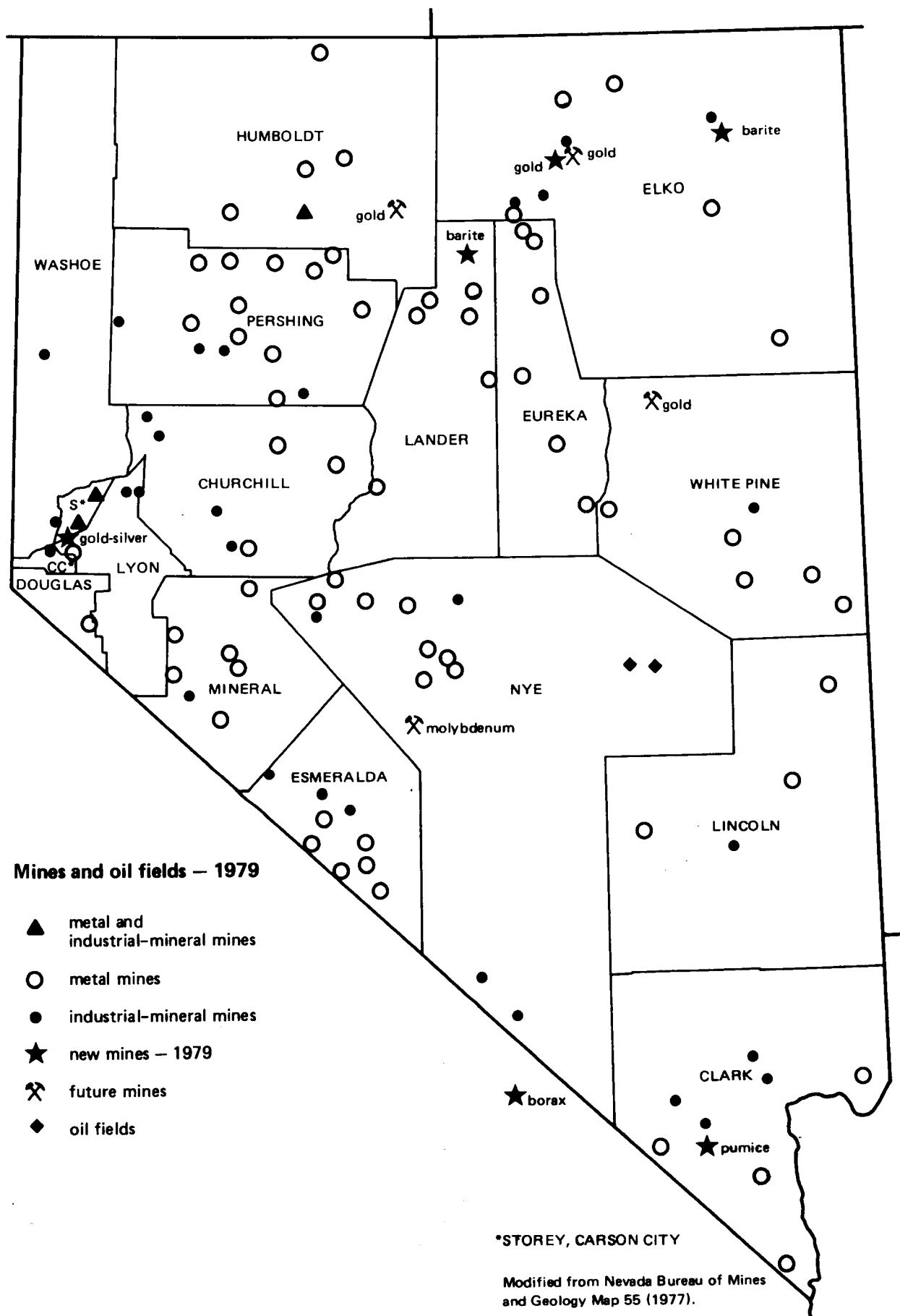
Mining in Nevada will expand markedly over the next few years. A number of new mines opened during the year and many others are being developed and are scheduled to open in future years.

Nevada's Mineral Production¹

Mineral	Quantity	1978	Quantity	1979 ^P
		Value (thousands)		Value (thousands)
Barite thousand short tons	1,788	\$ 30,034	1,652	\$ 28,572
Cement, Portland thousand short tons	431	22,163	W	W
Clays thousand short tons	51	514	W	W
Copper metric tons	20,453	29,986	W	W
Gem stones		1,000		1,000
Gold troy ounces	260,895	50,496	208,915	62,674
Gypsum thousand short tons	1,335	7,883	1,255	8,838
Lead metric tons	653	485	59	69
Mercury76-pound flasks	24,163	3,705	29,000	8,255
Molybdenum pounds	99,311	469	W	W
Perlite thousand short tons	6	75	6	83
Petroleum thousand 42-gallon barrels	1,269	13,000	1,230	14,600
Pumice thousand short tons	706	1,282	700	1,400
Sand and gravel thousand short tons	10,040	22,620	10,800	26,000
Silver thousand troy ounces	804	4,341	W	W
Stone, Crushed thousand short tons	1,426	5,488	1,434	4,983
Zinc metric tons	1,371	937	W	W
Combined value of diatomite, fluorspar, iron ore, lime, lithium compounds, magnesite, salt, talc, tungsten, and items indicated by symbol W		55,930		89,957
TOTAL		\$250,408		\$246,431

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 - 1979) except for petroleum.

^P Preliminary. W Withheld to avoid disclosing proprietary data; value included in "Combined value" figure.





Duval Corp. Copper Canyon Mine, Lander County. Bill Dubois photo.

Activities/Existing Mines

The Smoky Valley Mining Division of Copper Range Co. continues to mine its Round Mountain deposit in Nye County, approximately 50 miles north of Tonopah. Mining of the Smoky Valley gold ore commenced in the fall of 1976. Daily production is 5,500 tons per day of ore from the open pit mine. The ore is crushed and heap-leached and the precious metals are recovered by the carbon-absorption method. Annual recovery is 80,000 ounces of gold/silver Doré. The total cost of the project was \$20 million. The mine and mill employ 150 people with an approximate annual payroll of \$3.5 million.

Duval Corp. began production during 1979 of cathode copper from the new solvent extraction electrowinning plant at its Battle Mountain, Nevada project. The plant has an estimated capacity of 20 tons per day of cathode copper. The finished product contains 99.9% copper, as opposed to the 70% copper content of the product of the former mill and enables the company to produce copper from heap-leaching of dump material and low-grade ore. (Nevada Mining Association Bulletin.) A 111-day labor strike ended Jan. 20. (U.S. Bureau of Mines, Mineral Industry Survey, Nevada-1979; Feb. 1980.) The company also began mining a gold-silver orebody in the district. The deposit contains nearly six million tons of ore with an average grade of 0.092 ounces of gold per ton,

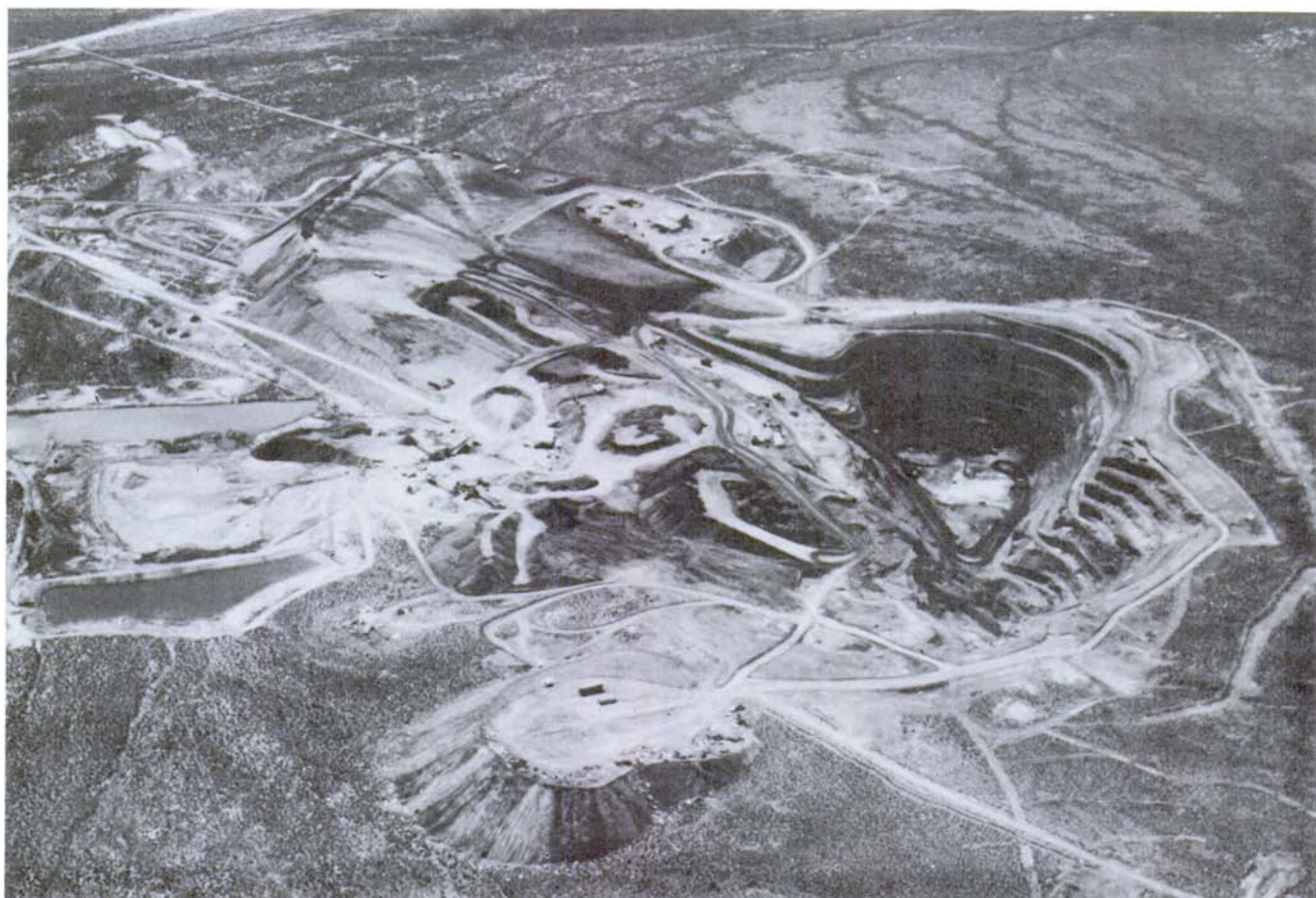
and 0.24 ounces of silver per ton. The metals are extracted by the cyanidation process.

During 1979 Placer Amex continued to re-leach old heaps at the Cortez gold project in Lander County. Production for the year has been estimated at 1,500 troy ounces. Plans for 1980 include a continued evaluation of the possibility of leaching waste dumps and tailings, as well as several small satellite deposits at the site.

Day Mines acquired the Victoria Mine near Currie in Elko County from Anaconda in the Spring of 1979. The property had previously operated from early 1975 until September 1977. Day Mines has announced reserves of 1.5 million tons averaging 2.1% Cu, 0.3 ounces of silver per ton. The mill will operate for six and two-thirds days per week at 1,000 tons per day and will probably be producing concentrates by the 2nd quarter of 1980. The mine and mill will employ approximately 90 people when in full operation.

Basic Inc. has announced a planned expansion of the capacity of its Gabbs plant. The expansion, with a price tag of \$5 million, will result in an additional 35,000 tons of magnesium oxide production annually. The plant modification, which will be completed in 1981, is in response to increased product demand by the animal feed, pulp, sugar and building materials industries.

Placer Amex's McDermitt operation in Humboldt County continues to produce mercury from its open pit



IMCO Services, Inc. Clipper barite mine, Lander County. Bill DuBois photo.

mine. The ore is milled by the froth-flotation process which is followed by concentrate furnacing. Mining commenced on June 1, 1975. The mine and milling operations employ 50 people and have an approximate annual payroll of \$750,000—\$1 million.

Dresser Industries is substantially increasing the capacity of the Greystone Barite Mine (E & M J, March 1980), 35 miles south of Battle Mountain, with additional jigs. The Greystone is the world's largest barite mine in terms of annual production.

NET PROCEEDS OF MINES, TAX REVENUE, MINING EMPLOYMENT AND PAYROLLS*
Statewide Totals

	Gross Yield	Net Proceeds	Tax Revenue	Average Monthly** Employment	Total Annual Payroll
1974	\$208,555,180	\$ 78,319,357	\$2,981,077	4275	\$51,228,084
1975	190,304,345	49,434,863	1,814,729	4399	58,263,937
1976	144,742,709	36,034,947	1,297,701	3694	53,557,900
1977	191,605,206	50,499,203	1,842,283	4337	56,068,061
1978	163,626,151	53,786,490	1,967,717	4205	***67,922,623
TOTAL		\$268,074,860	\$9,903,507		

* From NBMG Open-File Report 80—1, Feb. 1, 1980 (Information should be considered preliminary).

** Average monthly employment for those persons engaged in exploration, extraction and reduction in the Metallic and Nonmetallic Minerals Industry and the Oil and Gas Industry during 1978.

*** Represents a 21% increase over 1977.

NEW MINES

Milchem began mining (in July 1979) a small barite deposit six miles north of Battle Mountain in Lander County. Daily production is 1,500 tons of material averaging 4.20 specific gravity. Capacity of the jigging operation is 1,000 tons per day. Fourteen persons are employed at the Rim Rock project which is expected to be productive for approximately one year.

Houston Oil and Minerals began removal of overburden and mining and stockpiling gold-silver ore at its Comstock Operation in Gold Hill. Daily production at the Con-Imperial Pit is 10,000 tons per day; capacity of the cyanide mill is expected to be 1,000–1,500 tons per day. Total cost of the project which will employ 110 people at full operation is estimated at \$15 million. The annual payroll will be approximately \$1.5 million.

Tuscarora Associates, a joint venture of AgAu Exploration Limited and the Navajo Mineral Co. began a heap-leaching operation at Tuscarora, in Elko County. The project involves heap-leaching of silver and minor gold from the dumps in the district. A zinc dust precipitation process is used to recover silver and gold form solution. (Elko Daily Free Press, Nov. 21, 1979.)

Tri Delta Mining Co. commenced mining (during 1979) a deposit of a glassy pumiceous rhyolite tuff breccia. The material is a lightweight aggregate and is being used by the company as a raw material in its concrete masonry unit manufacturing facility in Las Vegas. The deposit

is on the west flank of the McCulloch Range 30 miles south of Las Vegas. The property is under lease from Rilite Aggregate. The material is a natural pozzolan and in some cases has saved in excess of 10% of the cement which would otherwise have been required. Current production is 400 tons per day and is expected to increase to more than 1,000 tons per day by the end of 1980.

American Borate Corp. is mining a ulexite and colemanite deposit which is located within the Death Valley National Monument. The Billie Mine, which has been under construction for two years, is located at the eastern border of the monument. It required five years for the firm to acquire the necessary permits to begin construction. Mine facilities have been built outside the monument boundary and a 1,500-ft drift was necessary to reach the deposit. The mine is expected to produce approximately 20 million tons of ore and has an expected life of 30 to 50 years. The mine is in California; the colemanite ore is processed at the company mill in Nevada, south of Lathrop Wells.

Chromalloy American has reportedly discovered five million tons of barite ore at several locations in the Snake Range in Elko County. Three properties began production during 1979, the most promising of which is the Snoose Creek deposit containing 300,000 tons of reserves. (E & M J, Jan. 1980.) Chromalloy American doubled the capacity at its Dry Creek jig plant north of Wells to process ore from these mines. (E & M J, March 1980.) A new barite grinding plant is planned at Wells. (Nevada State Jour., July 14, 1979.)

EMPLOYMENT PROJECTIONS—NEW MINES

County	Project	Production Commencement Date	No. Employees	Anticipated Annual Payroll
Elko	Freeport JERRITT CANYON	1981	200	\$6,000,000
Elko	Day Mines VICTORIA MINE	1980	90	\$1,800,000*
Eureka	Bethex BUCKHORN	1980	30	\$ 600,000*
Humboldt	Pinson Mining PINSON—PREBLE	1980	75	\$1,500,000
Lander	Milchem RIM ROCK	1979–1980	14	\$ 300,000
Mineral	Occidental Minerals CANDELARIA	1980	130	\$2,000,000
Nye	Cyprus NORTHUMBERLAND	unknown	50–60	\$1,100,000*
Pershing	Utah International SPRINGER	1982	125–140	\$2,600,000*
Storey	Houston Oil & Minerals COMSTOCK OPERATION	1980	110	\$1,500,000
White Pine	Silver King TAYLOR	1980	75	\$1,500,000*
Nye	Anaconda MOLY	1981	400	\$8,000,000*

* Estimate—based on \$20,000/employee

FUTURE MINES

Freeport/FMC expect to begin mining their Elko County gold deposit by July, 1981. The project is a joint venture owned 70% by Freeport Gold and 30% by FMC Corp. Freeport Gold is the project manager. The orebody contains estimated reserves of 11.9 million tons of ore which average 0.22 ounces of gold per ton. Daily production from the open pit mine is anticipated to be 12,000 tons. The expected capacity of the mill, which will employ the carbon in pulp recovery method, is 2,750 tons per day. The anticipated annual production is 180,000 ounces of gold. The estimated cost of the project, excluding exploration expenses, is \$115 million. At full production, the mine and mill are expected to employ 200 people at an annual payroll of \$6 million.

Amselco Minerals Inc. and Occidental Minerals Corp. have announced production plans for the Alligator Ridge gold deposit located 60 miles northwest of Ely in White Pine County. Production on a limited scale is expected to begin in late 1980. Full-scale production of 750,000 tons of ore per year is anticipated by early 1981. Total reserves have been estimated at 4.8 million tons with an average grade of 0.12 ounces per ton of gold. Ore will

be mined from three adjacent open pits and gold will be extracted by heap-leaching. The project is a 50-50 joint venture of Amselco, a wholly owned subsidiary of Selection Trust Limited of London and Occidental Minerals, a subsidiary of Occidental Petroleum Corp. (Nevada State Jour., Feb. 12, 1980.)

Pinson Mining Co. has begun a \$14 million development program at the Pinson gold property, 40 miles northeast of Winnemucca. A 272,000 tons per year (300,000-stpy) open-pit mine and conventional gold mill will begin production in 1980, with reserves sufficient for more than 10 years of operation. Total employment at the property will be 75 persons. (Mining Engineering, Jan. 1980.)

Anaconda Copper Co., a subsidiary of Atlantic Richfield, announced it will build a \$200 million molybdenum mine and mill at the Hall property, about 25 miles north of Tonopah. Construction will start immediately and be completed in 1981, at which time about 600 workers will be employed. When complete the operation will employ about 400 workers with an annual payroll of \$8 million. The deposit contains 150 million tons of ore and could produce up to 15 million pounds of molybdenum yearly (5% of the Free World's present production) for at least the next 20 years. (Anaconda press release, Dec. 1979.)



Smoky Valley Mining (Copper Range Co.) gold mine, Round Mountain, Nye County. Bill DuBois photo.

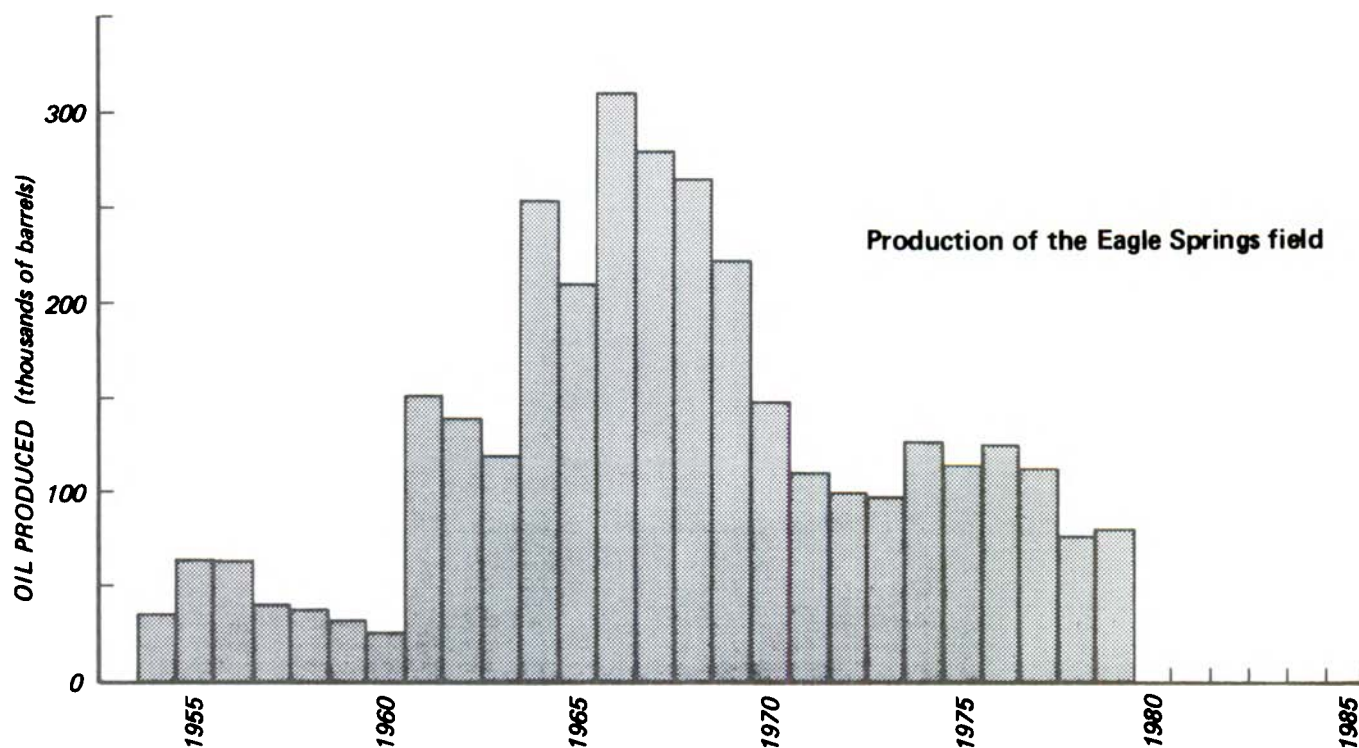
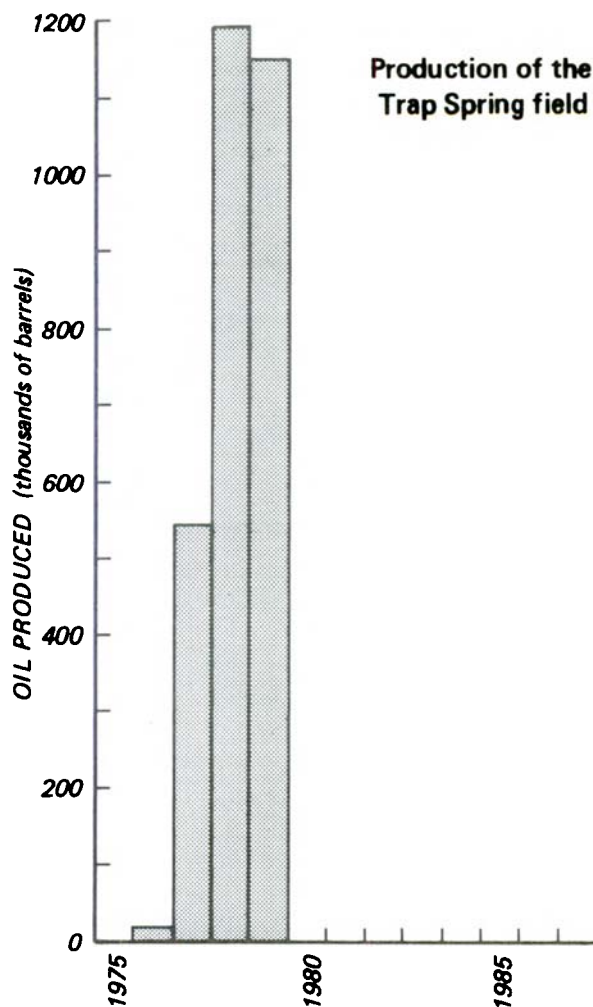
OIL AND GAS

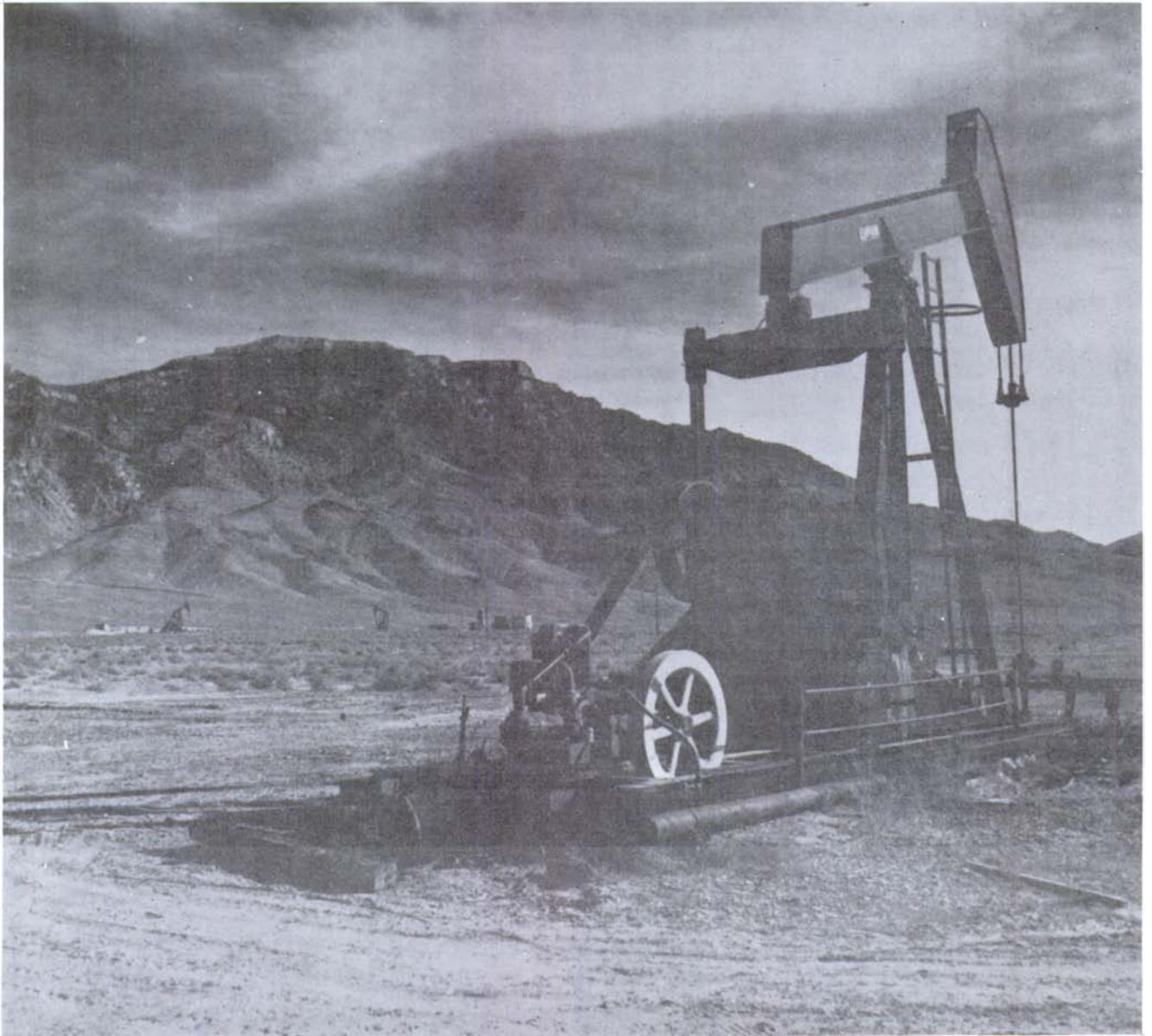
During 1979, 13 oil wells totaling 82,808 ft were drilled in Nevada. This compares to 21 and 121,417 ft respectively in 1978.

Perhaps the most significant development during 1979 was the commencement in September of the Mobil Oil Virgin River USA #1 well in Clark County. The proposed depth is 20,500 ft and by year-end it had reached a depth of greater than 12,000 ft. The deepest well drilled previously in Nevada was 13,832 ft and was drilled by A. Paul Sutherland in Nye County in 1971. The Mobil well is planned as a test of what is believed to represent a continuation of the Overthrust Belt which extends from Wyoming through Utah, and into Nevada and Arizona.

Supron Energy, U.S. Companies, Inc., and Sedco Energy have agreed to a joint program of petroleum exploration and development on about 570,000 acres of land in Nevada, Idaho and western Utah. The agreement will reportedly allow U.S. Companies and Sedco to earn a 50% interest in the properties by jointly providing approximately \$12 million for exploration and wildcat drilling. The program calls for drilling six wildcats in Railroad Valley in Nye County. Railroad Valley contains Nevada's oil fields. (Petroleum Information, Dec. 27, 1979.)

In early 1980 Wexpro Co. recovered 558 ft of low pour-point oil on a drillstem test below 9,398 ft in their 10-1 Jiggs well in S10,T29N,R55E, in Elko County. The oil apparently was recovered from a Tertiary volcanic section. Small shows of gas were recorded.

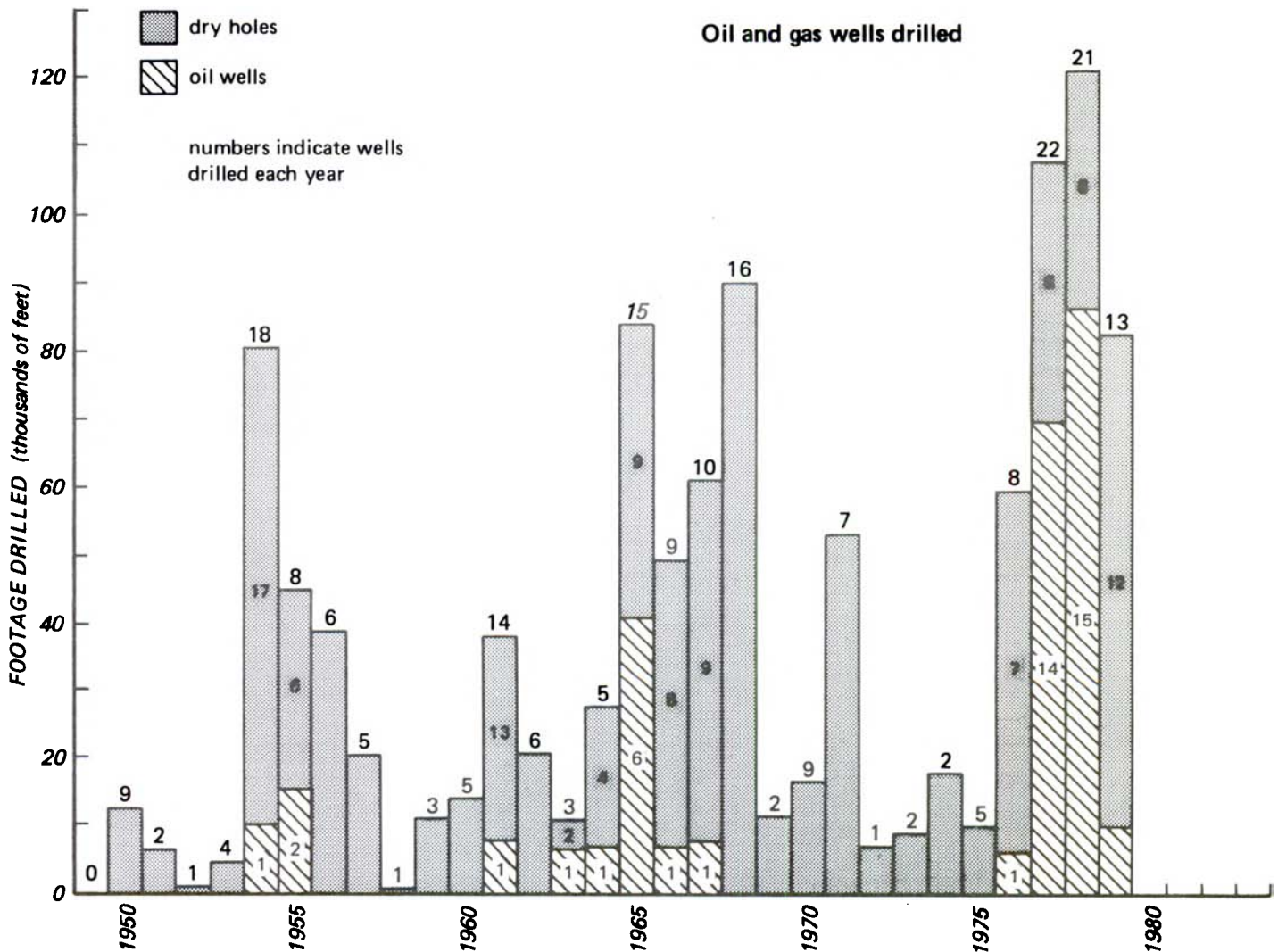


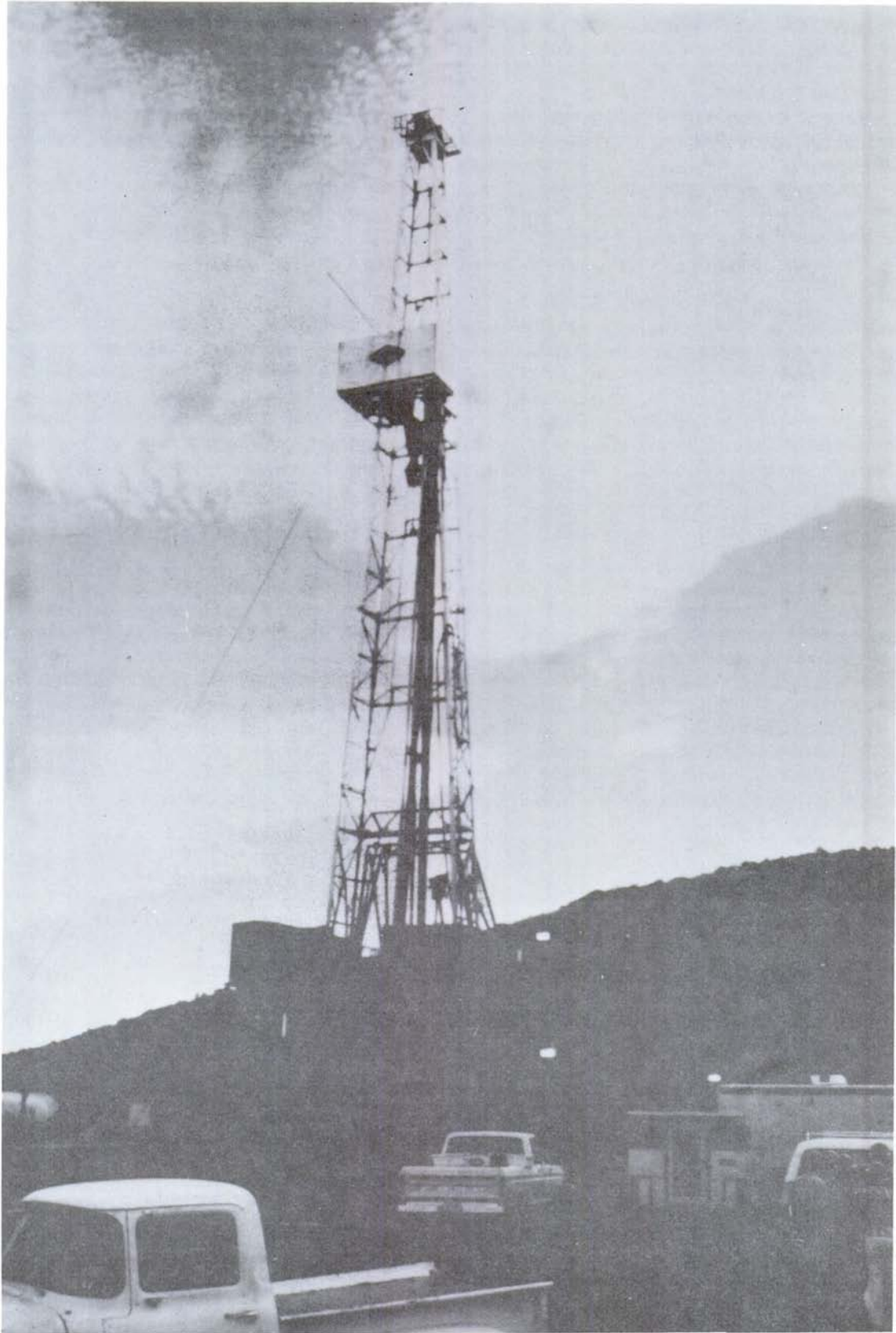


Eagle Springs oil field, Nye County. *A.S. Van Denburgh* photo.

Wells Drilled and Completed During 1979

Company	Well Name	Permit #	Total Depth	County
PAUL BOGDANICH	Munson Ranch 13-24	218	4650'	Nye
WEXPRO	Cord 24-1	246	11926'	Elko
DEPCO, INC.	Ventosa 42-13	255	6074'	Elko
AMINOIL	Southern Pacific Land Co. 1-23	259	7145'	Elko
PAUL BOGDANICH	Duckwater Creek 8-12	261	6910'	Nye
AMERADA HESS	Federal 1-20	262	5957'	White Pine
LOUISIANA LAND & EXPLORATION	USA-Steptoe Valley 1	267	6444'	White Pine
AMERICAN QUASAR	Adobe Federal 19-1	270	7706'	Lincoln
AMOCO PRODUCTION	Huntington Creek 1	266	7250'	Elko
AMOCO PRODUCTION	Bullwacker Springs	265	9200'	Nye
CONOCO, INC.	Conoco Federal 29	271	3145'	White Pine
MOBIL	Virgin River USA-1	260	1202'	Clark
HUMBOLDT ASSOCIATES	Ellison 1	268	986'	Humboldt
			78595'	





Phillips Petroleum Co. Steamboat Springs No. 1 geothermal well, Washoe County. *Larry Garside photo.*

GEOHERMAL ENERGY

by Larry J. Garside

Interest increased in Nevada's geothermal resources in 1979, partly as a result of rising fossil fuel costs. There was continued exploration for high temperature resources in several areas of the State, and a number of new homes, apartments, and businesses in the Reno area included geothermal heating systems or are considering them. Several million pounds of onions were dried at Brady's Hot Springs in 1979 using geothermal energy, and several areas of the State are considering alcohol-fuel plants utilizing geothermal energy.

Most of the geothermal exploration effort in the State was expended in the search for high-temperature ($>150^{\circ}\text{C}$) geothermal reservoirs to be utilized for electric power generation. This exploration effort was mainly carried out by major energy companies (see table). The total cost of exploration in Nevada may have been \$10–15 million in 1979. A considerable increase in exploratory drilling was also experienced (see bar graph). The drilling of small diameter temperature gradient holes was probably also up in 1979, although no statistics were available at the time of this printing.

The U.S. Bureau of Land Management has leased 1.3 million acres of public land (about 650 leases) for geothermal exploration since leasing began in 1974. There are 494 leases (covering 865,958 acres) still active.

Nevada Congressman James Santini introduced a bill in Congress that would increase the geothermal acreage

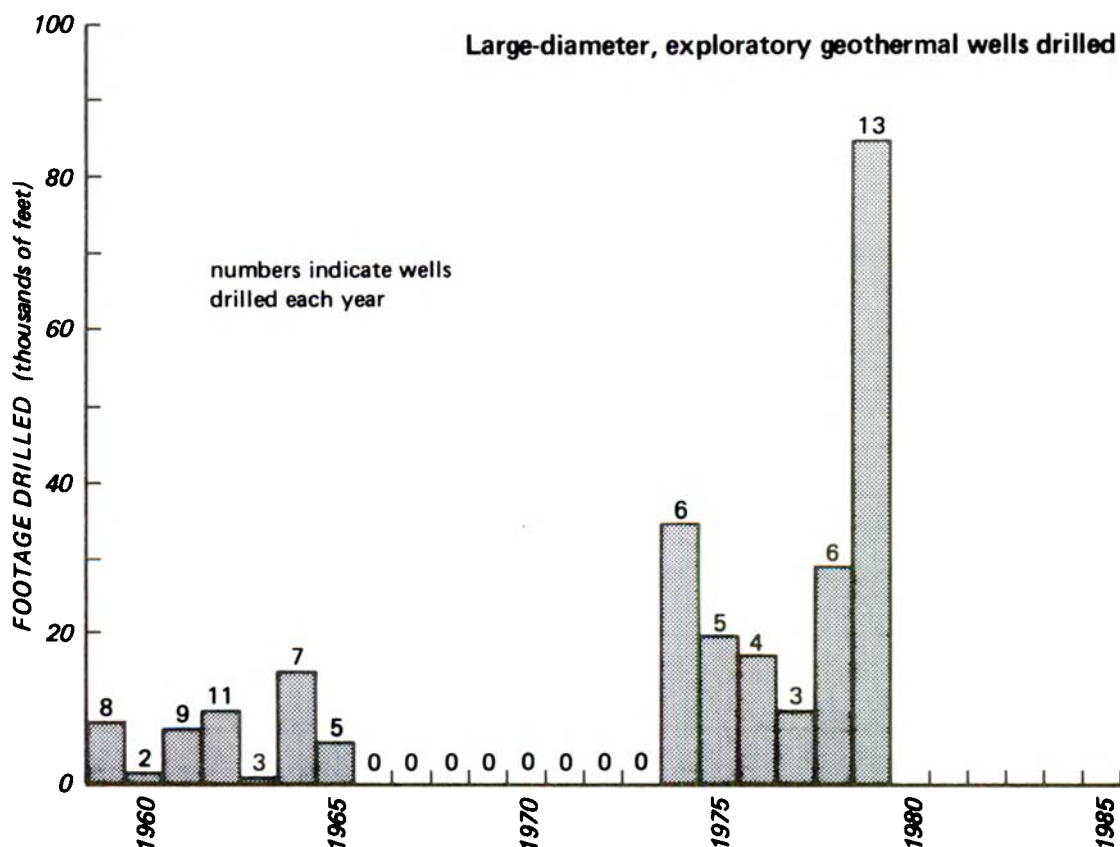
limitation for individual firms in any state from 20,480 to 51,200 acres of public land.

The Nevada Legislature passed AB 144 in 1979, which exempts nonproductive leases for geothermal exploration from property tax.

The U.S. Department of Energy has funded an Industry Coupled Program in an attempt to encourage the more-rapid development of geothermal resources. It includes cost sharing with industry for geothermal exploration, reservoir assessment and reservoir confirmation; and release to the public of data which aid in understanding of geothermal resources. Eight companies have contracts totaling approximately \$10 million for exploration work in northern Nevada. These projects will put existing data on a number of geothermal areas into the public record, and also will include numerous geologic studies, geophysical surveys, shallow and deep temperature gradient drill holes, and a number of deep exploratory wells. The Industry Coupled Program funds will continue to be expended in 1980.

Sierra Pacific Power Company along with four other western utilities, is considering several areas in Nevada for a 50-megawatt geothermal generating plant. Joining in the project will be Sacramento Municipal Utility District; Pacific Power and Light of Portland, Oregon; Portland General Electric; and the city of Eugene (Oregon) Water and Electric Board (Nevada Appeal, Dec. 16, 1979).

Sierra Pacific Power Company plans to purchase electricity from a five-megawatt geothermally-powered generating plant at Steamboat Hot Springs (Reno Magazine, March 1980). Phillips Petroleum drilled a 3,073-ft well



Large-Diameter Geothermal Wells Drilled in Nevada in 1979

CHURCHILL COUNTY

Dixie Valley

Thermal Power Co. Dixie Federal No. 45-14	S14,T23N,R35E	9022 ft.
Thermal Power Co. Dixie Federal No. 66-21	S24,T24N,R35E	9780 ft.
Sunoco Energy Development Co. S.W. Lamb No. 2	S18,T24N,R37E	8901 ft.
Sunoco Energy Development Co. S.W. Lamb No. 3	S18,T24N,R37E	9126 ft.

Desert Peak

Phillips Petroleum Co. Desert Peak B No. 23-1	S23,T22N,R27E	9641 ft.
---	---------------	----------

Stillwater

Union Oil Co. Debraga No. 2	S6,T19N,R31E	6946 ft.
-----------------------------	--------------	----------

ELKO COUNTY

Ruby Valley

Union Oil Co. Stonier No. 2	S11,T31N,R59E	3149 ft.
-----------------------------	---------------	----------

EUREKA COUNTY

Beowawe Geysers

Chevron USA, Inc. Beowawe No. 33-17	S17,T31N,R48E	1300 ft.
-------------------------------------	---------------	----------

PERSHING COUNTY

Humboldt

Phillips Petroleum Co. Campbell E No. 2	S15,T31N,R33E	8060 ft.
---	---------------	----------

WASHOE COUNTY

Gerlach

Sunoco Energy Dev. Co. Holland Livestock Ranch No. 1-2-ER	S2,T22N,R63E	5213 ft.
---	--------------	----------

Wards Hot Springs (Fly Ranch)

Sunoco Energy Dev. Co. Holland Livestock Ranch No. 1-2-FR	S2,T22N,R63E	5213 ft.
---	--------------	----------

Steamboat Hot Springs

Phillips Petroleum Co. Steamboat Springs No. 1	S5,T17N,R20E	3073 ft.
--	--------------	----------

WHITE PINE COUNTY

Monte Neva Hot Springs

W.H. Hunt Schellbourne No. 37-23	S23,T22N,R63E	4056 ft.
----------------------------------	---------------	----------

at Steamboat in 1979; flow tests appear favorable.

Four major geothermal exploratory wells were drilled in Dixie Valley in 1979, following the drilling of the Sunoco Energy Development Company discovery well in 1978. The 1979 wells were drilled to depths of 9,000 ft or more.

Phillips Petroleum drilled a step-out well at its Desert Peak geothermal field in 1979. Temperatures were promising, and tests indicate a communication with other wells in the field.

The Nevada Bureau of Mines and Geology published a report (Bulletin 91) describing Nevada's thermal waters (in springs, wells and mine workings). The Bureau also prepared a 1:500,000 scale map of the State's geothermal resources and their potential for direct utilization for the U.S. Department of Energy.

The annual meeting of the Geothermal Resources Council was held in Reno last September. Approximately 1,000 persons attended the meetings; field trips to several geothermal areas in Nevada and Utah were included.

The first vegetable dehydration plant to utilize geothermal energy in the United States was dedicated Nov. 3, 1978 at Brady's Hot Springs. Geothermal Food Processors, Inc. is the owner and operator of the plant. In 1979, Anderson Laboratories, Inc. of Bloomfield, Connecticut, purchased a 90% interest in Geothermal Food Processors.

The facility was built under a \$3.5 million U.S. Department of Energy Guaranteed Loan.

The facility is designed to utilize geothermal energy in the drying and desiccation of vegetables; it incorporates the most modern engineering concepts in bulk vegetable processing. Gilroy Foods and McCormack & Company cooperated in its design. Gilroy Foods intends to supply 25-30 million pounds of raw onions annually for dehydration by the facility. Geothermal Food Processors expects that the use of geothermal energy will reduce the cost of vegetable dehydration, over the long term, by 8-10% as compared with conventional energy sources.

Hydrothermal Energy Corporation was awarded a U.S. Department of Energy grant to retrofit a Reno apartment complex for geothermal space and water heating. Discussions with other condominium and apartment complexes in the Moana area are also underway.

The city of Reno drilled a geothermal test well at the Moana swimming pool, with the hope of using the well to heat water for the pool. The temperatures encountered appear promising.

Chilton Engineering was awarded a U.S. Department of Energy grant to demonstrate the applications of geothermal energy for space and water heating in three commercial buildings in Elko.

UNIVERSITY OF NEVADA SYSTEM

Board of Regents

Robert Cashell, *Chairman*

James L. Buchanan, II	Louis E. Lombardi, M.D.
Lilly Fong	John McBride
Chris Karamanos	John Tom Ross
Molly Knudtsen	June Whitley

Donald H. Baepler, *Chancellor*

UNIVERSITY OF NEVADA•RENO

Joseph N. Crowley, *President*

MACKAY SCHOOL OF MINES

Arthur Baker III, *Dean*

NEVADA BUREAU OF MINES AND GEOLOGY NEVADA MINING ANALYTICAL LABORATORY

John H. Schilling, *Director*
Keith G. Papke, *Assistant Director*

CLERICAL SERVICES

Helen Mossman, *Officer Manager*
Janet Amesbury, *Composer Operator/Secretary*
Patricia A. Chambers, *Composer Operator/Secretary*
* Louise Gibbs, *Accountant*

TECHNICAL SUPPORT

John Foss, *Laboratory Mechanic*
Norm L. Stevens, *Geology/Geophysics Assistant*

INFORMATION SERVICES

Arlene Kramer, *Sales Clerk/Secretary*
Susan L. Nichols, *Publication Manager/Cartographer*
Mati A. Stephens, *Assistant Editor*
Becky S. Weimer, *Geologic Information Specialist*

CHEMICAL LABORATORY

Patrick L. Beaulieu, *Chief Chemist*
Brenda Keller, *Chemical Assistant*
Tamela Wortman, *Chemical Assistant*

MINERALS ENGINEERING

* Frank W. Bowdish, *Extractive Metallurgist*
* James L. Hendrix, *Chemical Engineer*

BASIC GEOLOGY, GEOCHEMISTRY, & GEOPHYSICS

Harold F. Bonham, Jr., *Geologist*
* John W. Erwin, *Geophysicist*
* Liang-chi Hsu, *Geochemist*

MINERAL-RESOURCES GEOLOGY

Larry J. Garside, *Energy-Resources Geologist*
Richard B. Jones, *Metal-Resources Geologist*
Keith G. Papke, *Industrial Minerals Geologist*
Joseph V. Tingley, *Economic Geologist*

ENGINEERING & URBAN GEOLOGY

John W. Bell, *Engineering Geologist*

SPECIAL PROJECTS (GRANTS & CONTRACTS)

Dennis T. Trexler, *Research Associate/Geologist*
Tom Flynn, *Research Associate/Geologist*
Brian A. Koenig, *Research Associate/Geologist*

COOPERATIVE PROGRAMS

Geology and Mineral Resources
U.S. Geological Survey
Mineral Statistics
U.S. Bureau of Mines
Topographic and Orthophoto Mapping
U.S. Geological Survey
National Cartographic Information Center

*Part time

First edition, first printing, 1980: 1000 copies
Composed in IBM Univers type at the Nevada
Bureau of Mines and Geology
Printed by Central Office Services, University
of Nevada, Reno
Composition: Patricia A. Chambers

For sale by the Nevada Bureau of Mines and Geology, University of Nevada, Reno, Nevada, 89557. Price \$2.00.

For more information contact:
Nevada Bureau of Mines and Geology
Email: [nbmg@unr.edu](mailto:nbmng@unr.edu)
Web: <http://www.nbmng.unr.edu/>