NEVADA BUREAU OF MINES & GEOLOGY
SPECIAL PUBLICATION MI-1992

THE NEVADA MINERAL INDUSTRY 1992

Metals
Industrial Minerals
Oil and Gas
Geothermal

Exploration
Development
Mining
Processing
Directories of Operations

For more information contact:
Nevada Bureau of Mines and Geology
Email: nbmg@unr.edu
Web: http://www.nbmg.unr.edu/

MACKAY SCHOOL OF MINES
UNIVERSITY OF NEVADA
RENO

Digitized by Google

UNIVERSITY AND COMMUNITY COLLEGE SYSTEM OF NEVADA
1993

Board of Regents
James Eardley, *Chairman*

Shelley Berkley
Jill Derby
Joseph M. Foley
Dorothy Gallagher
Madison Graves
Lonnie Hammargren
Daniel J. Klaich
Nancy Price
Carolyn M. Sparks
June Whitley

John A. Richardson, *Interim Chancellor*

UNIVERSITY OF NEVADA, RENO
Joseph N. Crowley, *President*

MACKAY SCHOOL OF MINES
James L. Hendrix, *Dean*

NEVADA BUREAU OF MINES AND GEOLOGY
Harold F. Bonham, Jr., *Acting Director/Acting State Geologist*
(Jonathan G. Price, Director/State Geologist, is on loan to the National Research Council.)

SCIENTIFIC RESEARCH STAFF
ECONOMIC GEOLOGY
Stephen B. Castor, *Research Geologist*
Liang-Chi Hsu, *Research Mineralogist*
Joseph V. Tingley, *Research Geologist*

ENGINEERING GEOLOGY
John W. Bell, *Research Engineering Geologist*
Craig M. dePolo, *Research Geologist*
Alan R. Ramelli, *Research Geologist*

ENVIRONMENTAL GEOLOGY
Paul J. Lechler, *Chief Chemist/Geochemist*
James G. Rigby, *Research Geologist*
Daphne D. LaPointe, *Research Geologist*

GEOLOGIC MAPPING
Larry J. Garside, *Research Geologist*
Christopher D. Henry, *Research Geologist*

HYDROGEOLOGY
Donald C. Helm, *Research Hydrogeologist*
Daw-long Jeng, *Graduate Research Assistant*
Jiang Li, *Graduate Research Assistant*
Zhuping Sheng, *Graduate Research Assistant*

RESEARCH SUPPORT STAFF
ANALYTICAL LABORATORY, GEOTECHNICAL SUPPORT, AND SAMPLE CURATION
Paul J. Lechler, *Chief Chemist/Geochemist*
David Davis, *Mineral Preparator/Shop Mechanic*
Mario Desilets, *Chemist and Quality Assurance Officer*
Bret Pecoraro, *Laboratory Assistant*
EARTH SCIENCE EDUCATION AND INFORMATION
Becky Weimer Purkey, *Geologic Information Specialist*
GEOGRAPHIC INFORMATION SYSTEMS AND DATABASES
Ron Hess, *Geologic Information Specialist*
Lindsay Christensen, *Geographic Information System Specialist*
Gary Johnson, *Geographic Information System Processor*

ADMINISTRATIVE AND PUBLICATION SUPPORT STAFF
ADMINISTRATIVE SUPPORT STAFF
Arlene Kramer, *Sales Manager*
Cheryl B. Richardson, *Management Assistant*
Phyllis Churchill, *Account Clerk (Mackay School of Mines)*
Terri M. Henley, *Management Assistant*
PUBLICATION AND SLIDE PREPARATION
Rayetta Buckley, *Composing Technician*
Richard Meeuwig, *Editor*
Mati A. Stephens, *Publication Technician*
Susan L. Tingley, *Publications Manager/Senior Cartographer*
Kris R. Pizarro, *Geologic Cartographer*
Janeen Walker, *Geologic Cartographer*

Manuscript reviewed by:
Fred V. Carrillo, *U.S. Bureau of Mines*
Russ Fields, *Nevada Department of Minerals*
Howard McCarthy, *U.S. Geological Survey*

Editor: Dick Meeuwig
Graphs: Dick Meeuwig
Typography: Rayetta Buckley and Terri Henley
At: Nevada Bureau of Mines and Geology
On: Macintosh, QuarkXPress

First edition, first printing, 1993: 600 copies
Printed by: A. Carlisle, 1080 Bible Way, Reno, NV
Stock, cover: Wausau Astrobright, Galaxy Gold, 65# Cover
Stock, text: Cascade White Offset, 60 lb.
Ink, cover: Pantone 469

Digitized by Google

NEVADA BUREAU OF MINES AND GEOLOGY
SPECIAL PUBLICATION MI-1992

THE NEVADA MINERAL INDUSTRY—1992

This report, fourteenth of an annual series, describes 1992 mineral and geothermal activities and accomplishments in Nevada: production statistics, exploration and development including drilling for petroleum and geothermal resources, discoveries of orebodies, new mines opened, and expansion and other activities of existing mines. Statistics of known gold and silver deposits, and directories of mines and mills are included.

CONTENTS

3 **SUMMARY** *by Harold F. Bonham, Jr.*

9 **METALS** *by Joseph V. Tingley*

18 **MAJOR PRECIOUS-METAL DEPOSITS** *by Harold F. Bonham, Jr. and Ronald H. Hess*

28 **INDUSTRIAL MINERALS** *by Stephen B. Castor*

33 **DIRECTORY OF MINING AND MILLING OPERATIONS** *by Lindsay Christensen and Stephen B. Castor*

43 **OIL AND GAS** *by Becky Weimer Purkey*

49 **GEOTHERMAL ENERGY** *by Ronald H. Hess*

nbmg 1993

For more information contact:
Nevada Bureau of Mines and Geology
Email: nbmg@unr.edu
Web: http://www.nbmg.unr.edu/

This One
1LEA-3HC-F4EC

● Precious Metals

1. Alligator Ridge mine
2. Aurora mine
3. Bald Mountain mine
4. Barrick Goldstrike mine
5. Big Springs operation
6. Blue Star/Genesis mines
7. Buckhorn mine
8. Bullfrog mine
9. Candelaria mine
10. Carlin mine
11. Casino/Winrock mine
12. Chimney Creek mine
13. Coeur Rochester mine
14. Cortez mine
15. Crofoot/Lewis mine
16. Dee mine
17. Denton-Rawhide mine
18. Florida Canyon mine
19. Fortitude complex
20. Getchell mine
21. Gold Acres mine
22. Gold Bar mine
23. Gold Quarry mine
24. Golden Eagle mine
25. Hollister mine
26. Jerritt Canyon joint venture
27. Lone Tree mine
28. Marigold mine
29. Mary Drinkwater mine
30. McCoy/Cove mine
31. Mother Lode mine
32. Paradise Peak mine
33. Pinson mine
34. Post mine
35. Rabbit Creek mine
36. Rain mine
37. Robinson district
38. Round Mountain mine
39. Santa Fe mine
40. Sleeper mine
41. Sterling mine
42. The Aurora Partnership
43. Toiyabe mine
44. Western Hog Ranch mine
45. Wind Mountain mine
46. Yankee mine

▼ Base Metals

1. Ward Mountain - zinc, lead, copper, silver
2. Yerington mine - copper

▲ Industrial Minerals

1. Adams gypsum pit
2. Apex limestone pit
3. Argenta barite mine
4. Basalt diatomite mine
5. Blue Diamond gypsum mine
6. Clark diatomite mine
7. Clipper barite mine
8. Colado diatomite mine
9. Empire gypsum mine
10. Gabbs magnesite mine
11. Hazen diatomite mine
12. Huck salt mine
13. IMV-Floridin - clay
14. Mackie perlite mine
15. Moltan diatomite mine
16. New Discovery montmorillonite mine
17. PABCO Gypsum
18. Pilot Peak limestone quarry
19. Rossi barite mine
20. Silver Peak lithium carbonate operation
21. Simplot Silica Products
22. Sloan dolomite quarry
23. Weiser gypsum quarry

■ Oil Fields

1. Blackburn field
2. North Willow Creek field
3. Railroad Valley (Eagle Springs, Trap Spring, Grant Canyon, Bacon Flat, Kate Spring, and Duckwater Creek fields)
4. Three Bar field
5. Tomera Ranch field

◆ Geothermal Power Plants

1. Beowawe
2. Bradys Hot Springs
3. Desert Peak
4. Dixie Valley
5. Empire
6. Soda Lake No.1 and No. 2
7. Steamboat I, IA, II, and III
8. Stillwater
9. Wabuska
10. Yankee Caithness

✱ Precious Opals

Royal Peacock, Rainbow Ridge, and Bonanza mines

Major mines, oil fields, and geothermal plants, 1992.

Summary

by Harold F. Bonham, Jr.

The mineral industry in 1992 continued to make a significant contribution to the economy of both Nevada and the nation. Nevada, as it has in the last several years, led the nation in the production of gold, silver, mercury, and barite, was second in lithium and diatomite, and was the only producer of mined magnesite. The total nonfuel mineral production of Nevada was only exceeded by Arizona and California.

This report highlights recent activities through 1992 in metals, industrial minerals, geothermal energy, and petroleum. Numerous graphs and charts are incorporated in this report for rapid inspection of data and trends.

Through a survey conducted in January 1993, the Nevada Department of Minerals collected data for Nevada Bureau of Mines and Geology Special Publication P-4, *Major Mines of Nevada 1992*. The publication includes, in handbook form, small-scale location maps, names and telephone numbers of operators, numbers of employees, and preliminary, non-proprietary production figures for most mines in Nevada. The data from the survey of mines are used, along with information from other sources, in the figures of this publication and will be used to update, revise, or check preliminary statistics collected and released by the U.S. Bureau of Mines.

The section on **Metals** and the table of **Major Precious-Metal Deposits** provide details on new deposit discoveries, new mine openings, additions or depletion of reserves, and mine expansions and closures. As has been the case for several years, gold continued to be Nevada's most valuable mineral commodity. Gold production in Nevada in 1992 set a new production record of over 6.5 million troy ounces with a total value in excess of $2.25 billion even though the price of gold continued to decline in 1992. Nevada produces about 60% of all gold produced in the United States and about 9% of all gold produced in the world. Nevada's gold production makes the United States the second leading gold

MINERAL, PETROLEUM, AND GEOTHERMAL POWER PRODUCTION IN NEVADA[1]

Minerals	1991		1992 preliminary		% change from 1991 to 1992	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value
Barite (thousand short tons)	385	$15,500	344	$14,670	-11	-5
Clays (thousand short tons)	50	13,000	40	10,000	-20	-13
Copper (thousand pounds)	6,108	6,474	7,000	7,280	15	12
Geothermal energy (thousand megawatt-hours)	895	76,500	1,035	85,000	16	11
Gold (thousand troy ounces)	5,766	2,133,420	6,546	2,251,824	13	5
Petroleum (thousand 42-gallon barrels)	3,411	51,862	3,725	46,004	9	-13
Sand, gravel, crushed stone (thousand short tons)	23,000	103,500	24,000	108,000	9	9
Silver (thousand troy ounces)	18,909	75,636	19,992	78,968	5	4
Other minerals[2]	—	189,989	—	150,000	—	-19
Total	—	2,665,881	—	2,751,746	—	3

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers); compiled by the Nevada Bureau of Mines and Geology, the Nevada Department of Minerals, and the U.S. Department of Interior, Bureau of Mines.
[2]Production data for cement, certain clays, diatomite, building stone, gemstones, gypsum, lime, lithium carbonate, magnesite, mercury, perlite, salt, and silica sand are combined. See text for details of some of the commodities.

Products milled or processed in Nevada but mined from deposits in California are not included. Specifically, 127,849 ounces of gold and 40,172 ounces of silver from the Buckskin Leach Plant in Douglas County, colemanite from a mill in Amargosa Valley in Nye County, and zeolite from the Ash Meadows plant in Nye County are excluded from these totals.

producer in the world. Published gold resources, including mineable reserves and perhaps subeconomic resources, totaled about 138 million ounces at the end of 1992, an increase of about 3 million ounces over the beginning of the year.

Grass-roots exploration for gold in Nevada, and in the western U. S., continued the decline that started in 1989, although exploration for concealed deposits as well as for deep mineralization in sediment-hosted gold districts increased during the year. Contributory factors include relatively low gold prices, increasingly restrictive federal and state regulations affecting mining, increased uncertainty concerning long term access to federal lands, and more favorable exploration and investment climates in many foreign countries, particularly in Latin America. The Gold Institute released a report in February 1993, entitled *The Search for Gold; U.S. Miners Look Abroad.* This report shows a decline in domestic exploration expenditures from $170 million in 1989 to $149 million in 1992 and an increase in exploration expenditures during the same period in Latin America from $14 million to $35 million. This trend will almost certainly accelerate in 1993 and beyond if, as appears very likely, major changes are made to the 1872 Mining Law, including federal royalties on mine production and increased restrictions on exploration of federal lands.

Newmont Gold Co. and American Barrick Resources Corp. announced an operating agreement for joint development of the Goldstrike mine. American Barrick also continued development of their Purple Vein deposit, now called the Meikle mine. The deposit contains announced reserves of 4.8 million ounces of gold and will be mined by underground methods. At year-end Santa Fe Pacific Minerals Corp. and

Hanson Natural Resources Co. had agreed in principal to exchange certain mineral assets. If finalized, Santa Fe will acquire most of Hansons Gold Fields Mining Co. assets including the Chimney Creek gold mine and the Mule Canyon deposit in Nevada. Placer Dome U.S. announced that the South Pipeline deposit, located ½ mile south of the Pipeline deposit, has an announced reserve of 9 million tons containing 0.082 ounces of gold per ton. Litigation over ownership of the Pipeline deposit between Placer Dome U.S. and Gold Fields Mining Co. continued in 1992, but litigation between Placer Dome U.S. and Royal Gold over the South Pipeline deposit was resolved. The discovery of several major gold deposits (such as Pipeline, Lone Tree-Stonehouse, and Rabbit Creek) under variable thicknesses of post-mineral cover during the last few years represents a significant new trend in exploration in Nevada. Since over half of the state is covered by rock units younger than virtually all of the known mineral deposits, these discoveries are an encouraging sign of the ability of mineral explorationists to explore for hidden or concealed deposits. This trend, and the discovery of very significant quantities of gold mineralization at depths of several hundred meters in several sediment-hosted gold districts, will undoubtedly result in most of the future gold discoveries in Nevada.

Arimetco Inc. produced copper at the Yerington mine in 1992 and Magma Copper Co. proceeded with plans to resume copper mining in the Robinson district in 1994. However, the Ward mine which had produced lead, zinc, copper, and silver in 1990 and 1991 was idle in 1992.

Nevada produces more silver than any other state in the Union. Although only one mine is currently being operated primarily for silver, most Nevada gold mining operations also produce silver. These mines produced 20 million troy ounces of silver worth $79 million in 1992.

Digitized by Google

The section on **Industrial Minerals** covers developments during 1992 and gives details on commodities such as aggregate, barite, borates, cement, clays, diatomite, dimension stone, gypsum, lime and dolomite, lithium, magnesium, perlite, salines, silica, and zeolites. The value of industrial minerals produced in Nevada during 1992 was about $285 million, a 5% decrease from 1991. Lower production of barite, silica, clay, gypsum, and lithium offset increases in production and value of aggregate, principally in the Las Vegas area, and other commodities such as cement, diatomite, and lime.

Both metal and industrial mineral producers are listed in the **Directory of Mining and Milling Operations.**

Developments in the Nevada petroleum industry are listed in the section on **Oil and Gas**. Production of oil was up slightly in Nevada in 1992 over 1991, but dollar value declined due to lower oil prices. No new fields were discovered in 1992, but five new producing wells were drilled in existing fields.

Developments in the Nevada geothermal industry are covered in the section on **Geothermal Energy**. 1992 was a banner year for the development of the geothermal power industry in Nevada. Geothermal power sales reached an all-time high and 45 megawatts of additional production capacity was brought on line. We expect that installed geothermal capacity in Nevada will surpass 200 megawatts in 1993.

Digitized by Google

NUMBER OF MINES AND EMPLOYEES IN NEVADA'S MINERAL INDUSTRY

(Data for 1978-1987 are from the State Mine Inspector's Reports; 1988-89 data were compiled from the Directory of Mining and Milling Operations in NBMG Special Publications MI-1988 and MI-1989; 1990 data are from NBMG Special Publication 11 and the State Mine Inspector's Report; 1991-1992 data are adapted from the State Mine Inspector's Report.)

NUMBER OF MINES BY WORK-FORCE SIZE

Year	Work-force size (employee/mine)				
	1-20	21-50	51-100	>100	Total
1978	306	18	9	9	342
1979	340	25	10	7	382
1980	392	30	11	17	450
1981	383	34	12	16	445
1982	312	22	8	14	356
1983	315	22	8	15	360
1984	325	24	12	18	379
1985	289	24	16	15	344
1986	250	26	14	21	311
1987	260	26	16	24	326
1988	155	25	22	33	235
1989	148	24	23	30	225
1990	226	31	21	36	314
1991	215	24	11	34	284
1992	245	21	13	35	314

1992

NUMBER OF EMPLOYEES BY WORK-FORCE SIZE

Year	Work-force size (employee/mine)				
	1-20	21-50	51-100	>100	Total
1978	1,544	609	626	2,205	4,984
1979	1,738	791	588	1,311	4,428
1980	2,139	1,037	799	4,195	8,170
1981	2,124	1,128	884	4,400	8,536
1982	1,640	716	533	2,632	5,521
1983	1,635	742	561	2,812	5,750
1984	1,437	767	887	3,127	6,218
1985	1,279	722	1,129	3,310	6,440
1986	1,315	848	921	5,171	8,255
1987	1,376	799	1,166	6,973	10,314
1988	941	832	1,483	9,441	12,697
1989	945	854	1,821	9,936	13,556
1990	1,243	1,019	1,314	11,643	15,219
1991	1,217	787	784	11,518	14,306
1992	1,245	719	891	11,534	14,389

1992

NUMBER OF EMPLOYEES BY COMMODITY

Year	Precious metals	Other metals	Industrial minerals	Sand & gravel	Total
1978	1,096	1,859	1,479	550	4,984
1979	1,503	833	1,604	488	4,428
1980	3,808	1,918	1,804	640	8,170
1981	4,263	2,018	1,760	495	8,536
1982	2,905	867	1,357	392	5,521
1983	3,616	598	1,104	432	5,750
1984	4,097	646	1,049	426	6,218
1985	4,595	256	1,046	543	6,440
1986	6,460	175	976	644	8,255
1987	8,636	160	901	617	10,314
1988	10,638	412	1,090	557	12,697
1989	11,088	510	1,448	510	13,556
1990	12,957	492	1,132	638	15,219
1991	12,123	344	975	864	14,306
1992	12,144	168	1,191	886	14,389

1992

NEW CLAIMS FILED WITH THE U.S. BUREAU OF LAND MANAGEMENT

State	1976-1990	1991	1992
Arizona	309,930	8,179	7,574
California	239,364	8,271	9,506
Colorado	286,640	2,041	2,153
Idaho	163,414	4,427	4,769
Montana	181,580	5,503	4,853
Nevada	618,985	21,624	36,357
New Mexico	159,195	2,931	3,024
Oregon/Washington	132,813	4,920	6,828
Utah	337,986	9,104	4,362
Wyoming	240,838	2,164	2,593

Claims filed in Nevada, 1980 through 1992.

The mining, petroleum, and geothermal industries pay taxes and fees directly and indirectly to the state of Nevada. The state government receives the state net proceeds of minerals tax and a percentage of the revenues from federal oil and gas and geothermal leases, mining claim fees, and oil production taxes. Additional mining-related revenues are derived by the state through reclamation and other permitting fees. In addition, substantial amounts of income accrue to the state government through sales taxes on equipment and supplies purchased by the mines, on travel and other expenditures by exploration crews, such as oil and gas and mineral drilling, and on purchases made by employees. The overall contribution of the extractive industries to the states economy is substantial, particularly in the rural counties.

In summary, Nevada's mineral industry remains healthy and productive, and will continue to do so, barring excessive environmental regulations or taxation by the federal government.

ANNUAL TAX ON NET PROCEEDS OF MINERALS

Year	Annual net proceeds[1] (thousands)	Annual tax (thousands)
1982	159,999	$1,800
1983	245,688	4,152
1984	184,987	3,222
1985	198,263	3,527
1986	374,664	6,091
1987	627,330	12,084
1988	798,253	13,568
1989	748,052	36,238
1990	887,035	42,737
1991	706,250	33,678
1992 (estimated)	694,457	33,128

[1]Net proceeds are gross income minus direct costs incurred at the 1mine site.
Source: Nevada Department of Taxation.

OTHER REVENUE TO THE STATE OF NEVADA FROM THE MINERAL INDUSTRY

Fiscal year[1]	Mining claim fee[2] (thousands)	Oil production tax[3] (thousands)
1984	158	$52
1985	160	129
1986	160	155
1987	175	146
1988	337	158
1989	402	161
1990	408	178
1991	386	202
1992	351	156

[1]July 1 through June 30.
[2]The State receives a fee of $1.25 for each new claim and each assessment report.
[3]Does not include drill permit fee: $.05 per barrel of oil produced.
Source: Nevada Department of Minerals.

Metals

by Joseph V. Tingley

The information in this section was compiled from news releases in The Mining Record (DMR), Skilling's Mining Review (SKL), Engineering and Mining Journal (EMJ), California Mining Journal (CMJ), Pay Dirt Rocky Mountain Edition (PD), The Nevada Miner (NM), Society of Economic Geologists Newsletter (SEG), U.S. Bureau of Mines Minerals Today (USBM), and from papers presented at professional meetings (SME preprints). Information was also extracted from various company annual reports and news releases on file at the Nevada Bureau of Mines and Geology.

Items of general interest and concern to Nevada's metal mining industry during 1992 centered on two major activities: corporate mergers, exchanges, and joint ventures; and changes in the 1872 Mining Law.

In July 1992, Homestake Mining Co. enhanced its position in Nevada's gold business by acquiring International Corona Corp. Corona holdings in Nevada now controlled by Homestake include the Santa Fe mine, Mineral County; interest in the Dee mine (44%), Elko County; the Marigold mine (33%), Humboldt County; and the Pinson mine (26%), Humboldt County.

Newmont Mining Co. and American Barrick Resources Corp. announced a joint venture agreement covering an area of mutual interest in the Goldstrike mine area, Lynn district, Eureka County, which will allow both companies to proceed with more efficient mining. Newmont, in separate agreements with Ivanhoe Gold Co. and Touchstone Resources, acquired 75% interest in the Hollister mine and surrounding property in the Ivanhoe district of Elko County.

Santa Fe Pacific Mining, Inc., in a property exchange with the Marigold Joint Venture, acquired the Stonehouse deposit in trade for Santa Fe's interest in the Marigold mine and some surrounding land in the northern Battle Mountain district, Humboldt County. Stonehouse is adjacent to Santa Fe's Lone Tree mine in the Buffalo Mountain district of Humboldt County. At year end, Santa Fe was finalizing an agreement with Hanson Natural Resources Co. for the exchange of mineral assets. When signed, Santa Fe will acquire certain Hanson Gold Fields Mining Co. gold assets and Hanson will acquire essentially all of Santa Fe's coal and quarry assets. Nevada gold properties to be acquired by Santa Fe are the Chimney Creek mine, Potosi district, Humboldt County, and the Mule Canyon deposit, Argenta district, Lander County.

In 1992, the General Mining Law of 1872 came under serious attack in Congress but, with the exception of a new $100 annual claim-holding fee, the law survived without substantial change. Mining law reform provisions were included in an appropriations bill passed by both houses and sent to the President for signature in early October as the 1992 session was nearing adjournment. In late September, however, a Senate-House conference committee removed most mining law changes from the bill. The bill, The Interior Department and Related Agencies Appropriations Act of 1993 (Public Law 102-381), was approved on Oct. 5, 1992 and established a mandatory annual rental fee of $100 for fiscal years 1993 and 1994 for each mining claim and site located and held under the General Mining Law of 1872. The Act suspends a Mining Law requirement for performance of a minimum of $100 of assessment work per claim per year. Instead, mining claimants must pay $100 per claim for each of the two assessment years established in the Appropriations Act (Sept. 1, 1992, through Sept. 1, 1993, and Sept. 1, 1993, through Sept. 1, 1994). For existing mining claims, located on or before Oct. 5, 1992, that are not otherwise exempt, both payments are due by August 31, 1993. The Congress made an exception to the rental requirement for "small miners" who have 10 or fewer claims and who meet certain criteria with respect to levels of production or exploration activity and unreclaimed surface disturbance. The rental fees will be deposited into the general treasury, and a portion will be returned to the BLM to fund the agency's mining law administration program. The new fee requirement is temporary unless renewed by Congress.

CLARK COUNTY

Crescent district

Yellowjack Resources Ltd. acquired three additional claim blocks at the Crescent property, located on the Nevada-California border west of Searchlight. Five gold-bearing targets were identified within the 597-claim property, and sampling indicated a broad distribution of gold. Values of sampling within a 900-foot-wide, 3-mile-long, shallow-dipping structure range from 0.066 to 2.70 oz of gold per ton, and are associated with high molybdenum values. Estimated reserves are 390,000 tons containing 0.05 oz of gold per ton and 3.3 million tons containing an estimated 0.022 oz of gold per ton. Geophysical exploration, trenching, and large-diameter diamond drilling are planned to confirm grades and the reserve estimates. (DMR, 7/29/92, 9/23/92, 10/1/92, 10/14/92, 11/25/92.)

Keystone pit, 1992. *J. V. Tingley photo.*

Goodsprings district

Durvada Resources Ltd. of Calgary, Alberta completed construction of a small recovery plant, removed 290,000 tons of waste, and produced 1,200 oz of gold from the Yellowhorse mine in the western part of the district. In May 1992, Durvada and Durga Resources Ltd., also of Calgary, announced an agreement to exchange Durvada shares for Durga shares and to delist Durvada. Durga Resources resumed mining at the Yellowhorse mine in November and announced that evaluation of the Keystone and Chiquita mines was underway. Estimated reserves at the Yellowhorse mine are 110,000 tons containing 0.11 oz of gold per ton. The company holds 7,000 acres of land in the Goodsprings district. (DMR, 5/16/92, 11/14/92.)

ELKO COUNTY

Bootstrap district

At the Dee gold mine, encouraging drill results have added two years to the mine life; the north and south extension areas were found to host shallow oxidized material that may overlie deeper sulfide bodies. (SEG, Jan. 1992.)

Carlin trend

FMC Gold Co. reached an agreement in principle with Tremont Corp. to purchase Tremont's 50% interest in the Humboldt joint venture, bringing FMC's interest to 100%. In 1992 the joint venture spent $2.2 million to evaluate deep potential of the Humboldt property, an 11-square-mile claim block located on the north end of the Carlin trend. Progressively encouraging results have been obtained at Humboldt over the past three years, and spending in 1993 is expected to exceed the 1992 amount. (DMR, 6/10/92; FMC Gold Co. 1992 annual report.)

Independence Mountains (Jerritt) district

At the Jerritt Canyon mine, operated by Independence Mining Co., Inc., a subsidiary of Minorco (USA), a record 38 million tons of material was moved and mill throughput was expanded to 8,171 tons per day, an increase of 3% above 1991. The average grade of mill ore declined to 0.117 oz of gold per ton, and average cash cost of gold production increased 5% to $230 per ounce. Exploration drilling during 1992 nearly replaced 1992 production with additional proven and probable reserves. (FMC Gold Co. 1992 annual report.)

Ivanhoe district

On March 18, 1992, Ivanhoe Gold Co., a subsidiary of Galactic Resources Ltd., entered into an agreement with Newmont Mining Corp. for the sale of Ivanhoe's 50% interest in the Ivanhoe property for $13.4 million; Touchstone Resources, a subsidiary of Cornucopia Resources Ltd., will sell another 25% interest to Newmont for $6.7 million. An agreement between Ivanhoe and Touchstone will then terminate, and ownership of the Ivanhoe mining venture will be 75% Newmont and 25% Touchstone. In March, the NSR royalties on all USX claims were acquired by Franco-Nevada and Euro-Nevada for $2.65 million.

Digitized by Google

Mining operations at Ivanhoe were shut down on May 22, 1992 but residual leaching will continue for several months; $1.6 million was budgeted for exploration during July through December 1992. (DMR, 4/1/92, 6/30/92, 9/16/92.)

Robinson Mountain district

Crown Resources conducted near-surface delineation drilling on its Cord Ranch gold deposit in the Piñon Range to test mineralized targets discovered in 1991. Reported reserves are 6 million tons containing 0.03 oz of gold per ton. (DMR, 2/19/92; SEG, July 1992.)

ESMERALDA COUNTY

Divide district

Corona Gold Inc. entered into an agreement with the Tonopah Divide Mining Co. to lease the Tonopah Divide mine. (SKL, 2/22/92.)

EUREKA COUNTY

Antelope district

During the fiscal year ending June 30, 1992, operations at Atlas Corp.'s Gold Bar project achieved a new production record of 81,832 oz of gold. Fiscal 1992 was the first full year of processing ores mined from the satellite deposits: Goldstone, Gold Ridge, and Gold Pick. During the year, mining was completed on the Gold Ridge South and Gold Pick West satellite deposits; preproduction work was initiated on the Gold Pick East deposit, with production scheduled for fiscal 1993. Atlas Corp. exercised an option to purchase 99 unpatented claims containing the Gold Canyon deposit from Phelps Dodge Mining Co. Drilling by Atlas on this new deposit, located about 5,000 feet north of Atlas' Gold Ridge deposit, defined a resource of 131,000 oz of gold—86,500 oz in proven and probable ore reserves averaging 0.094 oz per ton and 22,000 oz in possible ore reserves. The deposit is approximately 1,300 feet in diameter and gold mineralization occurs at surface. The estimated overall stripping ratio is 5.9:1. (DMR, 2/19/92, 3/13/92; Atlas Corp. 1992 annual report.)

Buckhorn district

Production of gold and silver from leaching continued on a reduced basis at Cominco American Resources' Buckhorn gold mine. Mining ceased at this property in 1991 and reclamation of open pits and access roads was essentially completed in 1992. Leaching is expected to continue through 1993 at a lower rate of gold production. (Cominco Resources International Ltd. 1992 annual report.)

Lynn district

At the Goldstrike mine, Newmont Gold Co. and American Barrick Resources Corp. signed an operating agreement for development of common areas. The agreement includes development of the Deep and Lower Post orebodies and sharing of Newmont's bioleach technology. The Betze pit will be expanded to encompass the Deep and Lower Post orebodies, the larger pit will be known as the Betze-Post pit. Both companies will share mining costs of the Deep and Lower Post deposits beyond the Betze pit perimeter. The Deep and Lower Post deposits are reported to contain 9 million oz of gold. Total reserves of the Goldstrike mine, including the Betze-Post deposits, were reported to be 21 millions oz of gold at year end. Goldstrike is targeted to produce 1.3 million oz of gold in 1993, 1.5 million oz in 1994, and 1.8 million oz in 1995. American Barrick plans to concentrate exploration on the north and west limits of the Betze deposit in the areas around the Screamer and Rodeo mineralization. (SKL, 12/12/92; EMJ, March 1992; American Barrick Resources Corp. 1992 annual report.)

American Barrick Resources Corp. announced development of the Meikle mine in the Purple Vein deposit. Reported reserves are 4.8 million oz of gold. This operation will be an underground mine and will be in full production at 400,000 oz per year by 1996 at an estimated cost of $125 per ounce. Estimated mine life is 11 years; capital cost is estimated at $180 million. Exploration drilling has identified an area to the south of the main Meikle orebody with significant potential for increasing mineable ore reserves in the upper levels of the mine. (EMJ, March 1992; American Barrick Resources Corp. 1992 annual report.)

Silver Eagle Resources leased its High Dollar property in the Carlin trend of Eureka County to Independence Mining Co. Inc. Minimum exploration obligations are $75,000 the first year, $125,000 the second year, and $250,000 each year thereafter. (SKL, 9/5/92.)

HUMBOLDT COUNTY

Awakening district

Amax Gold Inc reported that, as anticipated, production at its Sleeper mine declined about 20% in 1992. Sleeper is nearing the end of its production life, but the mine is expected to continue processing lower grade ore for three or four more years before final reclamation begins. (AMAX Inc. 1992 annual report.)

Battle Mountain district

Rayrock Yellowknife Resources Inc. entered into an agreement to purchase all of Placer Dome's ⅓ interest

in the Marigold Mining Co. for $17.5 million. This increases Rayrock Yellowknife's interest in the Marigold mine to 66 ⅔% and its participation in Cordex Exploration has increased to 100%. Marigold recently consolidated its holdings when, together with Corona Gold and Placer Dome, it exchanged interest in the adjacent Stonehouse and Lone Tree deposits and some nearby land for the 30% interest in Marigold held by Santa Fe Pacific Gold Corp. (SKL, 5/30/92; DMR, 7/15/92.)

Marigold mine, 1992. *S. B. Castor photo.*

Buffalo Mountain district

Santa Fe Pacific Mining, Inc. and Noranda Exploration have executed an exploration joint venture agreement covering over 46,000 acres of land controlled by Santa Fe and other lands controlled by Noranda. The lands encompass an area of 125 square miles located northwest of Battle Mountain, and include much of the area between the Rabbit Creek mine on the north, the Iron Point district on the west, and the Lone Tree mine on the south. (SKL, 1/25/92.)

At the Lone Tree mine, Santa Fe Pacific reported proven and probable reserves increased by 12% to 3.2 million oz of gold. Acquisition of the adjacent Stonehouse property from Marigold Mining Co. will allow Lone Tree and Stonehouse reserves to be mined and milled as a unit and is expected to enhance operational efficiency. (Santa Fe Pacific Resources Corp. 1992 annual report.)

Buffalo Valley district

Early in the year, a joint venture was announced between Horizon Gold Shares, Inc. and venture partners Santa Fe Pacific Mining Inc. and Battle Mountain Gold Co. The joint venture agreement calls for Santa Fe and Battle Mountain Gold to earn 80% of the proceeds from Horizons' Buffalo Valley property. Santa Fe and Battle Mountain Gold will expend $2.5 million on exploration and pay $750,000 to Horizon. (SEG, April 1992.)

Dutch Flat district

Miramar Mining Corp. purchased outright 104 unpatented claims comprising the Soda claims located in the Hot Springs Range, 15 miles northeast of Winnemucca. Previous exploration on this property has identified a number of high grade quartz veins in and around a northerly trending shear zone in the Harmony Formation near a small granodiorite stock. Anomalous gold values have been traced over approximately one mile of strike along the shear zone. Miramar will test drill three of the higher grade structures where they are associated with favorable Harmony Formation sedimentary rocks. (Miramar Mining Corp., news release 92-12, 8/12/92.)

National district

Cameco Corp. commenced diamond drilling on Queenstake's Buckskin property. Previous sampling and core drilling have outlined gold-bearing zones in the sinter cap area of the property. (MN, 7/1/92.)

Potosi district

FirstMiss Gold, Inc. reported at year end that proven and probable mineable gold reserves at its Getchell mine were 1.43 million oz, up 8% from last year. Proven and probable mineable sulfide reserves increased to 7.0 million tons at an average grade of 0.194 oz of gold per ton. Proven and probable mineable oxide reserves increased to 2.5 million tons at an average grade of 0.031 oz of gold per ton, and geologic reserves at year end increased to 26.5 million tons. Included in the proven and probable reserves are 1.5 million tons of mineable underground reserves at a grade of 0.315 oz of gold per ton. The mineable gold reserves have been identified in four different deposits on the Getchell property. Three of these deposits, the original Getchell deposit (which includes the Getchell pits and the Getchell underground reserves), the Hansen Creek deposit, and the mined-out Summer Camp deposit, are located on the main, north-trending Getchell fault system. The fourth deposit, Turquoise Ridge, is located 3,200 feet to the east on a northeast-trending fault system. Geologic resources are associated with mineable reserves in all four areas. (FirstMiss Gold, Inc. 1992 annual report.)

Drilling at Santa Fe Pacific Mining Inc.'s Rabbit Creek mine resulted in an increase of reserves of 12% during 1992, and are reported to be 3.3 million oz of gold. By combining Rabbit Creek with the

Digitized by Google

adjoining Chimney Creek mine, which was acquired from Hanson Natural Resources Co. early in 1993, Santa Fe expects to achieve operating efficiencies that will ultimately increase both annual production and recoverable reserves. (Santa Fe Pacific Resources Corp. 1992 annual report.)

Sulphur district

Granges Inc. reported that in addition to replacing the 6.2 million tons of ore mined in 1992 at the Crofoot/Lewis mine, exploration resulted in a substantial increase in ore reserves, extending mine life more than four years to 1998. Most of the reserves are on private land and would not be affected by the new production royalties proposed by the federal government. Total proven and probable reserves as of January 1, 1993 stand at 44.96 million tons grading 0.021 oz of gold per ton. This compares to total reserves for the mine on January 1, 1992 of approximately 14 million tons. Exploration in the Gap and Peninsula areas of the mine has largely been responsible for the increase in proven reserves. Drilling in the Brimstone deposit brought a significant portion of the probable reserves into the proven category. The Crofoot/Lewis mine is operated by Hycroft Resources and Development Corp., a 67%-owned subsidiary of Granges Inc. (DMR, 3/11/92, 12/30/92; CMJ, Oct. 1992; Hycroft Resources and Development Corp. newsletter, 11/18/92; Granges Inc. 1992 annual report)

Vicksburg district

North Lily Mining Co. announced acquisition of the Ashdown property from International Mahogany Corp. At the time of acquisition, 265 holes, totaling 68,855 feet, had been drilled on the property and, based on this drilling, reserves are estimated at 1.1 million tons containing 0.12 oz of gold per ton. The property also contains an estimated 20 million pounds of molybdenum. Ore reserves are within 200 feet of the surface and additional gold-bearing zones are known to occur below the 200-foot level and outside the current reserve boundary. Late in the year, a five-hole drilling program was completed to test continuity of ore as well as continuity of deeper gold-copper-molybdenum mineralization which underlies the existing gold reserve. (CMJ, June 1992, Oct. 1992; SKL, 10/1/92.)

LANDER COUNTY

Argenta district

Drilling at Hanson Natural Resources Co.'s Mule Canyon gold deposit has identified six discrete orebodies which contain gold reserves of 8.5 million tons at an average grade of 0.136 oz of gold per ton, totaling 1.15 million oz of gold. A test adit was driven into the West Zone orebody in the fall of 1991 to collect bulk samples for metallurgical and grade control purposes and this sampling demonstrated continuity of the high grade mineralization. Pre-feasibility metallurgical and engineering studies are in progress, and permitting for a gold mining operation at Mule Canyon is presently in the National Environmental Policy Act (NEPA) process. (SME, Preprint 93-271, Feb. 1993.)

Battle Mountain district

Battle Mountain Gold Co. reported that it is concluding feasibility studies for new heap-leach and mill-grade gold mineralization at its Fortitude mine. The Fortitude high-grade mineralization was expected to be depleted and milling operations were to cease early in 1993 but the new identified gold mineralization is expected to extend operations through the decade. Mineralization at the new Reona deposit is estimated to contain approximately 13.5 million tons of leach material at a grade of 0.028 oz of gold per ton. A 70% recovery factor is anticipated, for a total of 260,000 recoverable ounces. Assuming a favorable development decision, a $10 million heap-leach facility will be constructed and production of approximately 40,000 oz of gold per year is expected to begin in 1994. In addition, new low-grade millable gold mineralization containing approximately 500,000 oz of gold, named the Fortitude Extension, has been identified in and around the original Fortitude pit. If feasibility studies are favorable, Battle Mountain Gold will make about $27 million in modifications to the existing mill and would begin processing this material in 1995 to produce about 75,000 oz of gold per year. (Battle Mountain Gold Co. 1992 annual report.)

Bullion district

The Pipeline deposit of Placer Dome U.S., located east of the old Gold Acres mine in the southern part of this district, is now estimated to contain 11.3 million tons of ore with a grade of 0.237 oz of gold per ton, more than 2.6 million oz of gold. This is a minimum reserve based on drill results to date, and the deposit is open to the south. (CMJ, April 1992.)

Placer Dome and Royal Gold have announced that litigation between their wholly owned subsidiaries, Placer Dome U.S. and Royal Crescent Valley Inc., over the South Pipeline deposit has been resolved; agreement calls for creation of the South Pipeline project involving 4,000 acres in Crescent Valley, about ½ mile south of Placer Dome's Pipeline discovery. Placer Dome will remain the operator with $1.4 million minimum work commitment between the last quarter of 1992 and the end of 1994. Announced reserves at South Pipeline are 9.0 million tons containing 0.082 oz of gold per ton. During 1992, 123 drill holes with a total footage of 100,000 feet were drilled, and a substantial program of expansion and fill-in drilling will be conducted in 1993. This drilling confirmed that a significant mineralized system exists about 1,000 feet west of the South Pipeline deposit. (SKL, 10/10/92, 12/14/92; DMR, 9/30/92, 12/16/92, 2/10/93.)

Cathedral Gold Corp. has staked 1,900 acres of land at the Trendline property some 16 miles southeast of the Pipeline discovery. Geophysical surveys are planned. (DMR, 7/15/92.)

At the Robertson property, at Tenabo in the northern part of the Bullion district, Amax Gold, Inc. commenced a program to explore the 39 A zone and the Porphyry zone with about 12,000 feet of reverse circulation and diamond drilling. The 39A zone encompasses the Gold Pan and Gold Quartz areas where a small heap-leach operation had previously been established. (DMR, 11/4/92.)

In this same general area, Goldstack Resources signed a letter of intent with Sierra Gold to acquire the Bru-Lovie property; Newmont drilled wide-spaced holes on this property in 1989 and confirmed the presence of gold. Goldstack plans to test the Gold Quartz fault on this property by drilling. (DMR, 12/2/92.)

Kingston district

Verdstone Gold Corp. acquired an option to lease the Victorine mine located near the mouth of Kingston Canyon. The mine produced 73,000 oz of gold and 150,000 oz of silver between March 1987 and August 1989; reserves as of 1987 were more than 1 million tons of which 493,000 tons of 0.185 oz of gold per ton were mined and milled. By November 1992, Verdstone had completed 23 holes of a 24-hole drilling project and initial results on eight holes had been received. This drilling has indicated new reserves to the north and below known workings and anomalous values to the south. (DMR, 3/13/92, 7/8/92, 10/14/92, 11/11/92.)

Lewis district

The first doré bullion produced from St. George Metals, Inc.'s Dean mine was poured on August 12, 1992. Due to construction delays, crushing could not be done at the Battle Mountain pilot plant, and initial production of some 2,000 tons of ore from this property was delivered to Precious Metals, Inc.'s facilities at Kingston, Nevada for crushing and concentrating. The resulting concentrate was returned to St. George's Battle Mountain plant and processing was completed in its cyanide leaching circuit, Merrill Crow facility, and refinery. Underground production from the Dean's Pittsburg and Morning Star veins through the end of June 1992 averaged about 0.844 oz of gold per ton. During the last week of October 1992, the crushing system at the mine was completed and the entire plant became operational. Exploration activity on the property is focused on the development of the D-21 target in the Pittsburg vein where drill intercepts of 5 feet of 3.150 oz of gold per ton and 5 feet of 7.820 oz of gold per ton have been reported. (DMR, 6/10/92, 9/9/92; St. George Metals, Inc. newsletters, 1992-4, -5, -6, and -7.)

In the southern part of the district, in the area of Goat Canyon-Mill Creek on the west side of the Shoshone Range, Crown Resources Corp. announced that a first-phase drilling program was initiated in November at the 8,000 acre Monarch property, a 50-50 joint venture with Santa Fe Pacific Mining, Inc. (Crown Resources Corp. third quarter 1992 report.)

McCoy district

Echo Bay's Cove underground mine is expected to be closed by the end of 1992; underground mining at McCoy may continue into 1993. (DMR, 6/10/92, 7/26/92, 12/2/92.)

LINCOLN COUNTY

Eagle Valley district

Glamis Gold Ltd. completed nine reverse circulation drill holes on the Snowflake gold prospect, located near Buck Mountain on the Nevada-Utah border. While some good results were obtained, they were not sufficient to warrant further exploration, and Glamis terminated their option on the property. (Glamis Gold Ltd, First Quarter Report, 9/30/92.)

LYON COUNTY

Talapoosa district

Reserves at the Talapoosa property, a joint venture of Athena Gold and Pegasus Gold Corp., are 18 million tons containing 0.044 oz of gold and 0.61 oz of silver per ton. (SEG, Jan. 1992.)

Yerington district

Arimetco International Inc. acquired a 50% interest in the MacArthur property at a cost of $900,000 from Holcorp Mines Ltd. and development is expected to begin soon. Ore would be mined and leached to produce some 4,500 tons of copper per year; the property is estimated to contain reserves of 40,000 tons of copper. (SKL, 9/19/92.)

The Yerington mine, Arimetco's largest copper producer, was acquired in 1989 with reserves of about 284 million pounds of recoverable oxide copper. The mine is currently producing 37,000 pounds of cathode copper per day and is scheduled to reach design capacity of 65,000 pounds per day by the end of 1992. (PD, Sept. 1992.)

MINERAL COUNTY

Aurora district

The Aurora mine of Consolidated Nevada Goldfields Corp. produced 15,000 oz of gold in 1992. A 36,576-foot drilling program has defined additional reserves east of the Juniata pit, including the historic Chesco workings. As of June 30, 1992, total surface

and underground mineable reserves at the Aurora property were reported to be 493,000 tons containing 0.15 oz of gold per ton. (DMR, 5/27/92; Consolidated Nevada Goldfields Corp. 1992 annual report.)

Minerex Resources Ltd. reported reserves at The Aurora Partnership mine to be 790,000 tons of 0.13 oz of gold per ton. The increased reserves will allow production to continue into the third quarter of 1994, and leaching to continue through the third quarter of 1995. Additional ore will be obtained by pit expansions both easterly and westerly, on strike with the Humboldt vein. Geological resources outside the designed pit remain at 1.39 million tons at 0.10 oz of gold per ton, including a high-grade component of 100,000 tons with 0.32 oz of gold per ton. Minerex is 50.5% owned by Canada Tungsten Mining Corp. (2/26/92, 4/1/92, 5/20/92, 9/9/92.)

Rawhide district

Reserves at the Denton-Rawhide mine operated by Kennecott Rawhide Mining Co. are reported to be 29.4 million tons grading 0.04 oz of gold and 0.39 oz of silver per ton with dump leach material totaling an additional 29.9 million tons containing 0.015 oz of gold and 0.23 oz of silver per ton. Higher average grade and increased tonnage of gold ore processed at this property resulted in higher earnings from gold sales during the third quarter of 1992. Direct operating costs declined to $113 per oz of gold produced from a cost of $206 per oz for the same period of 1991. (SEG, Jan. 1992; CMJ, Dec. 1992.)

Santa Fe district

Mining of the principal deposit at Homestake's open pit Santa Fe mine was completed in 1992, and operations were shifted to another area of the property. (Homestake Mining Co. 1992 annual report.)

Kookaburra Gold Corp. announced it would commence a drill program in February on the Santa Fe South project and the Longshot Ridge copper oxide deposit to outline high grade ore for the first five years of production. This will be followed by extensive metallurgical testing to optimize the leaching method. Current plans call for annual ore production of 1.5 million tons which would produce 40,000 pounds of cathode copper daily or 14 million pounds a year. (Kookaburra Gold Corp., 1/6/92.)

NYE COUNTY

Bare Mountain district

The Sterling mine, operated by Cathedral Gold Corp., produced its 100,000th ounce of gold on March 20, 1992. Ore reserves of 765,000 tons containing 0.178 oz of gold per ton are the highest in the mine's history and are sufficient for at least four more years of production. During the third quarter, the Stirling mine produced 3,498 oz of gold compared with 2,786 oz during the same period of 1991. An 8,000-foot exploration drill program was completed on the mine property during the third quarter. Drilling was planned to test the potential for gold outside the area of current reserves. While successful in identifying a new area for potential additional reserves east of the mine, the program did not result in a major discovery. (CMJ, June 1992; DMR, 5/27/92, 9/16/92, 12/2/92, 12/30/92.)

Bruner district

Miramar Mining Corp. announced on October 14, 1992 that it had entered into an agreement in principle with Viceroy Resource Corp. and Channel Resources Ltd. on its wholly owned Bruner project. The Bruner claims cover an area about 10 miles long and 2 to 4 miles wide, containing several gold targets. Previous exploration by Newmont and others on this property had focused on Rawhide and Round Mountain style mineralization in Tertiary rhyolitic volcanic rocks. Almost 100 drill holes have been completed to date on the project and have identified a gold resource in the Duluth zone of 15 million tons grading 0.026 oz of gold per ton. In August and September, Miramar completed 20 drill holes, principally in the core of the Duluth zone to start upgrading the resource to a reserve. (Miramar Mining Corp., news releases 92-2, 2/20/92, and 92-14, 10/14/92.)

Fairplay district

Heap-leach production at FMC Gold Co.'s Paradise Peak mine contributed 96,000 gold equivalent ounces in 1992, about one-third of the mine's total gold equivalent production. Paradise Peak is entering its final year of production and at year-end 1992, reserves stood at 197,000 oz of gold and 4.3 million oz of silver. Mill-grade ore will be exhausted by mid-year 1993 and the remaining heap-leach reserves will be completely exhausted by year-end. (FMC Gold Co. 1992 annual report.)

Round Mountain district

At the Round Mountain mine, the average grade of ore processed during the third quarter this year was 0.0387 oz of gold per ton compared to 0.0290 oz of gold per ton a year ago. The higher average grade was partly offset by lower tonnage processed and lower recovery rates, reflecting the mining of more transition zone ore than a year ago; transition zone ore has a higher percentage of nonoxidized ore and higher clay content, which reduces recovery rates. A very narrow but high grade vein of coarse gold was encountered in the open pit at Round Mountain and about 30,000 tons of high grade and 10,000 tons of lower grade material were stockpiled. This material must be milled, as coarse gold is not amenable to heap leaching. Round Mountain began processing this material through a small pilot plant in September and, by the end of 1992, had recovered 52,000 oz of gold. (Echo Bay Mines Third Quarter 1992 report to shareholders; Homestake Mining Co. 1992 annual report.)

PERSHING COUNTY

Imlay district

Pegasus Gold Inc. reported that gold output at its Florida Canyon mine rose to 90,000 oz in 1992, an increase of 9,600 oz over 1991 and the highest level of production since its startup in 1987. Higher production was achieved despite the treatment of harder, more abrasive ore and a decline in the grade. Cash costs remained at the $282 per ounce level due to on-site process improvements and renegotiation of terms with the mine contractor. (Pegasus news release, 2/18/93.)

Rosebud district

LAC Minerals, in joint venture with Equinox Resources, has defined a substantial gold-silver resource in the Dozer Hill area of the Rosebud property. A total of 155,613 feet of drilling has been done in 235 holes in this area; 78 holes, totaling 54,173 feet, have been core drilled. Using a cutoff of 0.1 oz of gold per ton, the drill-indicated resource consists of 1.75 million tons containing 570,000 oz of gold with an average grade of 0.362 oz of gold per ton, and 5.5 million oz of silver with an average grade of 3.15 oz of silver per ton. Drill results have confirmed bonanza grades in what is known as the 900 zone, with intersections of 100 feet grading 1.09 oz of gold per ton. An underground exploration project, consisting of a 2,500-foot long decline, 2,600 feet of drifting, and some 60,000 feet of diamond core drilling from underground stations, is now proposed to further evaluate the deposit. (SME Preprint 93-175, Feb. 1993; SEG, July 1992.)

Sierra district

Mountain View Exploration of Reno purchased 20 patented claims that comprise the Twin Dome property and plans to conduct exploration on the property. Production from the Twin Dome mine since the late 1930s totals approximately 2,000 oz of gold mined from several small pits. Grades ranged from 0.5 to 0.75 oz of gold per ton. (DMR, 6/10/92.)

STOREY COUNTY

Comstock district

BMR Gold reported that open-pit-mineable reserves at its Comstock project are expected to exceed 3.2 million tons grading 0.05 oz of gold and 0.5 oz of silver per ton (approximately 160,000 oz of gold and 1.6 million oz of silver). In November, BMR entered into a financing and operations agreement with Rea Gold Corp. whereby Rea may earn a 50% undivided interest in the Comstock project by committing $2.5 million for preproduction/production stage activities. The first stage expenditure is being directed to complete drilling on extensions of the main deposit. This project is located in Storey and Lyon counties. (BMR Gold Corp. shareholder letter, 12/22/92.)

Miramar Mining Corp. announced that production has begun from the Lady Bryan pit at its new Golden Eagle mine (formerly known as the Flowery mine) near Virginia City. The new open pit and heap-leaching facility is scheduled to produce at least 20,000 oz of gold and 225,000 oz of silver per year from ore reserves delineated in 1991. (USBM, 1/12/92.)

Miramar is also conducting surface exploration on the Occidental claim group, which lies 2 to 3 miles southwest of the Golden Eagle mine. The claims encompass two mineralized structures, the Occidental and Bella Union lodes. (Miramar Mining Corp., news release 92-12, 8/12/92.)

WASHOE COUNTY

Leadville district

Gold production at the Hog Ranch mine of Western Mining Corp. (USA) increased by 23.7% in 1992. The nearby Bell Springs deposit was brought to full production and provided all of the plant feed for the second half of the year. Exploration of areas surrounding the mine was completed but no additional mineable ore was discovered. (Western Mining Corp. Holdings Ltd. 1992 annual report.)

San Emidio district

Mining activity stopped at Amax Gold, Inc.'s Wind Mountain mine in January 1992 and reclamation has begun at the mine site. The heap-leach pad will continue to be sprayed during the early stages of reclamation, however, and additional, low-cost gold will be recovered as long as it is efficient to do so. (DMR, 6/10/92; AMAX Inc. 1992 annual report.)

WHITE PINE COUNTY

Bald Mountain district

USMX, Inc. is currently evaluating significant deep and/or carbonaceous ore at its Alligator Ridge mine, especially in the Vantage Basin area. Total proven and probable oxide gold reserves at Alligator Ridge are 11.5 million tons at 0.046 oz per ton, and 3.3 million tons at 0.042 oz per ton. (DMR, 2/19/92; SEG, Jan. 1992.)

On June 24, 1992, USMX, Inc. poured the first gold at the Yankee mine, an open-pit, heap-leach, carbon-absorption operation 7 miles south of Alligator Ridge. Present plans call for mining, crushing, and leaching about 50,000 tons of ore per month. At a projected recovery of 75%, about 70,000 oz of gold are expected to be recovered from reserves of 2 million tons. A total of 10,540 oz of gold was produced in 1992, and production of 21,000 oz per year is projected for the next 3 years. Exploration drilling at

the Monitor deposit, part of the Yankee mine complex, has encountered gold mineralization in about 60% of the holes drilled. Boundaries of the deposit are not yet defined, but it is anticipated that the deposit will add one year to the life of the Yankee mine. (DMR, 2/19/92, 7/8/92, 9/9/92; SKL, 7/18/92.

Placer Dome U.S. reported current reserves at its Bald Mountain mine, located in the northern part of the district, to be 600,000 oz of gold. (DMR, 10/7/92.)

Robinson district

Magma Copper Co. is in the permitting and design phase of its Robinson copper-gold project located at the old copper-mining camp of Ruth, west of Ely. Construction is scheduled to begin during 1993, and mining is scheduled to start in 1994. Announced mineable reserves at the property are 201 million tons of ore containing 0.605% copper, 0.015% MoS_2, and 0.011 oz of gold per ton; geologic reserves are reported to be 564.6 million tons of ore containing 0.618% copper and 0.0092 oz of gold per ton. Ore will be mined by open-pit methods, solely by expanding previously mined pits; the stripping ratio will be 2.54:1. Plans call for the construction of a 35,000-ton-per-day mill to be located at the old townsite of Reipetown and concentrates will be delivered by rail or truck to the smelter at San Manuel, Arizona. Over its projected 16-year mining life, the new phase of copper mining is projected to yield approximately 2.5 billion pounds of copper and 1.2 million oz of gold. (DMR, 7/26/92; PD, August 1992; Seedorff and others, Northwest Mining Assoc. short course, Dec. 1992.)

Core drill in Top pit, Bald Mountain mine, 1992. *S. B. Castor photo.*

Reverse circulation drill rig, Robinson district, 1992. *S. B. Castor photo.*

Digitized by Google

Major Precious-Metal Deposits

by Harold F. Bonham, Jr., and Ronald H. Hess

The information in this compilation was obtained from the Nevada Department of Minerals and from published reports, articles in mining newsletters, and company annual reports and press releases. The Nevada Department of Minerals supplied most of the 1989-92 production data for the large mines. Locations of most of these deposits are shown on NBMG Map 91, and most active mines are shown on page 2 of this publication.

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
CHURCHILL COUNTY				
Bell Mountain	1989: *reserves*—30,000 oz Au, 125,000 oz Ag	no production	rhyolitic tuff	Miocene
Dixie Comstock	1991: 2.4 million tons, 0.049 oz Au/ton	1989: development	Tertiary rhyolite	Miocene?
Fondaway Canyon	1988: 400,000 tons, 0.06 oz Au/ton 1990: 400,000 tons, 0.06 oz Au/ton	1989: 1,065 oz Au, 87 oz Ag 1990: 12,000 oz Au	Triassic slate and phyllite	Cretaceous
CLARK COUNTY				
Crescent property	1992: 390,000 tons, 0.05 oz Au/ton; 3.3 million tons, 0.022 oz Au/ton			
Goodsprings (Keystone)	1990: *estimated geologic resource* 64 million tons, 0.05 oz Au/ton 1992: 110,000 tons, 0.11 oz Au/ton	1990: ~1,000 oz Au	lower Paleozoic carbonate rocks	Cretaceous
ELKO COUNTY				
Big Springs (Sammy Creek)	1989: 1.55 million tons, 0.172 oz Au/ton 1990: 73,224 oz Au, 3,060 oz Ag	1987-88: ~ 106,000 oz Au 1989: 60,376 oz Au, 4,416 oz Ag assemblage 1991: 69,539 oz Au, 3,327 oz Ag 1992: 71,035 oz Au, 600 oz Ag	Mississippian to Permian overlap clastic and carbonate rocks	Cretaceous or Tertiary
Bootstrap/ Capstone	1989: *geologic resource*—25.1 million tons, 0.039 oz Au/ton 1990: 18.3 million tons, 0.044 oz Au/ton	1988-90: NGO	dacitic dikes, Paleozoic siltstone and laminated limestone/chert	~37 Ma
Burns Basin	Reserves and production included in Jerritt Canyon figures		Roberts Mountains and Hanson Creek Formations	Cretaceous or Tertiary
Cobb Creek	1988: *geologic resource*—3.2 million tons 0.045 oz Au/ton			
Cord Ranch	1991: 3.5 million tons, 0.037 oz Au/ton 1992: 6.0 million tons, 0.03 oz Au/ton			
Dark Star	1991: 4.5 million tons, 0.022 oz Au/ton			
Dee	1990: 4.5 million tons, 0.059 oz Au/ton	1987-88: ~ 97,000 oz 1989: 44,500 oz Ag, 45,000 oz Ag 1990: 48,095 oz Au, 64,650 oz Ag 1991: 42,000 oz Au, 42,000 oz Ag 1992: 38,150 oz Au, 35,500 oz Ag	Vinini Formation Devonian carbonates, dacitic dikes	Cretaceous or Tertiary
Emigrant Springs	1989: 30.3 million tons, 0.021 oz Au/ton	exploration	lower Paleozoic sedimentary rocks	Cretaceous or early Tertiary
Hollister (Ivanhoe)	1989: *oxide*—18.4 million tons, 0.035 oz Au/ton; estimated mineral inventory 83.5 million tons, 0.034 oz Au/ton, with 52.8 million tons of oxide and 30.7 million tons of sulfide	1990: 6,000 oz Au 1991: 60,000 oz Au	rhyolitic tuff, flows, volcaniclastic rocks	Miocene
Jerritt Canyon (includes Saval Canyon)	1989: 21.6 million tons, 0.143 oz Au/ton mill ore; 6.5 million tons, 0.043 oz Au/ton leachable 1990: new discovery south of current mine has a geologic resource of 3.2 million tons, 0.284 oz Au/ton 1991: *geologic resource*—4.7 million oz Au	1981-89: ~2.3 million oz Au 1990: 323,000 oz Au 1991: 374,354 oz Au, 4,727 oz Ag 1992: 318,020 oz Au, 8,264 oz Ag	Hanson Creek and Roberts Mountains Formations	Cretaceous or Tertiary

NGO: Newmont Gold Operations (Bootstrap/Capstone, Blue Star, Genesis, and Gold Quarry mines) reported production of 895,500 oz Au in 1988, 1,467,800 oz Au and 117,400 oz Ag in 1989, 1,676,000 oz Au in 1990, 1,575,700 oz Au in 1991, and 1,588,000 oz Au and 98,000 oz Ag in 1992.

MAJOR PRECIOUS-METAL DEPOSITS (continued)

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
ELKO COUNTY (continued)				
Kinsley Mountain	1988: 2.1 million tons, 0.048 oz Au/ton	preproduction	upper Paleozoic carbonate rocks	Oligocene?
Meikle (Purple Vein)	1992: *geologic resource*—7.9 million tons, 0.613 oz Au/ton	underground development	Popovich and Roberts Mountains Formations	Oligocene?
Rain	1989: *geologic resource*—22.6 million tons, 0.052 oz Au/ton 1990: 9 million tons, 0.063 oz Au/ton	1988: 29,000 oz Au 1991: 135,400 oz Au	Webb Formation	36-37 Ma
SMZ	1989: *geologic resource*—1.6 million tons, 0.019 oz Au/ton			
Trout Creek	1988: 1.5 million tons, 0.04 Au/ton	1988: exploration	lower Paleozoic rocks	Cretaceous or Tertiary
Tuscarora (Dexter)	1987: 2 million tons, 0.039 oz Au and 1.9 oz Ag/ton 1988: 1.8 million tons, 0.037 oz Au/ton 0.74 oz Ag/ton	1896-1902: 29,940 oz Au, 28,543 oz Ag 1987-89: 33,000 oz Au, 143,000 oz Ag 1990: 1,163 oz Au, 41,865 oz Ag	Eocene rhyolitic ignimbrite and andesite	38 Ma
Winters Creek	1986: 1.4 million tons, 0.146 oz Au/ton	evaluation, exploration	lower Paleozoic carbonate rocks	Cretaceous or Tertiary
Wood Gulch	1988: 500,000 tons, 0.098 oz Au and 0.4 oz Ag/ton 1991: mined out	1989: 19,810 oz Au, 31,122 oz Ag 1990: 14,926 oz Au, 35,374 oz Ag	lower Paleozoic sedimentary rocks, andesite-dacite dikes and sills	Cretaceous or Tertiary
Wright Window	1986: 1.3 million tons, 0.095 oz Au/ton	1992: 3,500 oz Au	lower Paleozoic carbonate rocks	Cretaceous or Tertiary
ESMERALDA COUNTY				
Boss Mine	1987: 500,000 tons, 0.07 oz Au/ton	1989: W	Ordovician sedimentary rocks	Miocene?
Boss property	1990: *reserves*—637,500 tons, 0.023 oz Au/ton 1990: *geologic resource*—31,000 oz Au			
Divide	1988: 500,000 tons, 0.04 oz Au and 0.40 oz Ag/ton	evaluation	Miocene silicic tuff	16 Ma
Goldfield	1983: 1.75 million tons, 0.087 oz Au/ton 1991: 1.2 million tons, 0.05 oz Au/ton	1903-45: 4.19 million oz Au, 1.45 million oz Ag 1989: 1,987 oz Au, 200 oz Ag	andesite, rhyodacite, rhyolite	21 Ma
Hasbrouck	1986: 12.9 million tons, 0.0291 oz Au and 0.59 oz Ag/ton	exploration	Siebert Formation tuff and volcaniclastic rocks	16 Ma
Silver Peak	1991: 531,300 tons, 0.124 oz Au/ton	1991: 25,000 oz Au. 8,000 oz Ag	Wyman Formation	Mesozoic?
Top	1986: *geologic resource*—5.2 million tons, 0.093 oz Au/ton			
Weepah	1986: 200,000 tons, 0.1 oz Au and 0.4 oz Ag/ton	1986-87: 58,000 oz Au 1988-90: idle	Wyman Formation	Cretaceous
EUREKA COUNTY				
Blue Star	1989: *geologic resource*—22.2 million tons, 0.030 oz Au/ton 1990: 32 million tons, 0.047 oz Au/ton (includes Genesis)	1974-84: intermittent 1988-92: NGO	lower Paleozoic sandy siltstone and carbonate rocks, granodiorite	Cretaceous or early Tertiary
Bobcat	1988: *geologic resource*—17.7 million tons, 0.029 oz Au/ton		lower Paleozoic rocks	Cretaceous or Eocene

continued

NGO: Newmont Gold Operations (Bootstrap/Capstone, Blue Star, Genesis, and Gold Quarry mines) reported production of 895,500 oz Au in 1988, 1,467,800 oz Au and 117,400 oz Ag in 1989, 1,676,000 oz Au in 1990, 1,575,700 oz Au in 1991, and 1,588,000 oz Au and 98,000 oz Ag in 1992.
W: withheld

MAJOR PRECIOUS-METAL DEPOSITS (continued)

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
EUREKA COUNTY (continued)				
Buckhorn	1990: 700,000 tons, 0.05 oz Au/ton; *geologic resource*—200,350 oz Au 1991: 409,000 tons, 0.062 oz Au/ton 1992: mined out	1988-91: 97,922 oz Au, 376,487 oz Ag 1992: 7,700 oz Au, 28,800 oz Ag	basaltic andesite, sinter, silicified sedimentary rocks	14.6 Ma
Bullion Monarch	1987: 1 million tons, 0.10 oz Au/ton	exploration, evaluation	lower Paleozoic sedimentary rocks	Tertiary or Mesozoic
Carlin	1989: *geologic resource*—20.8 million tons, 0.029 Au/ton 1990: 1.4 million tons, 0.066 oz Au/ton	1965-84: 4.3 million oz Au 1988: 25,320 oz Au 1989: idle 1991: 35,500 oz Au	Roberts Mountains Formation	Cretaceous or early Tertiary
Genesis	1989: *geologic resource*—35.8 million tons, 0.044 oz Au/ton 1990: 32 million tons, 0.047 oz Au/ton (includes Blue Star)	1986: production commenced 1988-92: NGO	Ordovician-Devonian limestone, argillite chert	Cretaceous or early Tertiary
Gnome	1988: 2.7 million tons, 0.048 oz Au/ton	exploration	Paleozoic sedimentary rocks	Cretaceous or early Tertiary
Gold Bar	1988: 2.75 million tons, 0.10 oz Au/ton 1989: *geologic resource*—1.45 million oz Au 1990: mined out in December	1987-88: 91,000 oz Au 1989: 66,000 oz Au 1990: 81,263 oz Au 1991: 80,727 oz Au, 3,000 oz Ag 1992: 80,000 oz Au	Devonian Nevada Formation	Eocene?
Gold Canyon deposit	1992: *reserves*—86,500 oz Au, *geologic resource*—131,000 oz Au			
Gold Pick	1988: 10 million tons, 0.06 oz Au/ton 1990: 9.7 million tons, 0.057 oz Au/ton includes Gold Ridge and Goldstone 1991: 4.5 million tons, 0.055 oz Au/ton 1992: *geologic resource*—329,700 oz Au, includes eastern deposit	exploration	Paleozoic sedimentary rocks	Eocene?
Gold Quarry	1987: 197.8 million tons, 0.042 oz Au/ton 1988: *geologic resource*—503 million tons, 0.04 oz Au/ton 1990: 212.6 million tons, 0.042 oz Au/ton, *geologic resource*—534.3 million tons, 0.037 oz Au/ton 1991: *reserves*—9.3 million oz Au	1985 170,000 oz Au 1988-92: NGO	Ordovidian to Devonian chert, shale, siltstone, and impure carbonates; in part, Vinini Formation	Cretaceous or early Tertiary
Gold Ridge	1988: 4 million tons, 0.06 oz Au/ton 1990: *see* Gold Pick 1991: 2.9 million tons, 0.04 oz Au/ton 1992: 1.4 million tons, 0.038 oz Au/ton	exploration, evaluation	Paleozoic sedimentary rocks	Eocene?
Goldstone	1988: 1.7 million tons, 0.08 oz Au/ton 1990: *see* Gold Pick 1991: 845,000 tons, 0.063 oz Au/ton 1992: 878,000 tons, 0.061 oz Au/ton	exploration, evaluation	Paleozoic sedimentary rocks	Eocene?
Goldstrike (Betze, Post)	1988: 128.4 million tons, 0.095 oz Au/ton 1990: *geologic resource*—18.4 million oz Au 1992: 112.1 million tons, 0.180 oz Au/ton, *geologic resource*—21 million oz Au	1980-88: 440,000 oz Au 1989: 207,264 oz Au, 15,500 oz Ag 1990: 352,880 oz Au, 20,112 oz Ag 1991: 546,146 oz Au, 22,000 oz Ag 1992: 1,108,218 oz Au, 34,735 oz Ag	Ordovician to Devonian chert, shale, sltstone, and impure carbonates; in part, Vinini Formation	Cretaceous or early Tertiary
Horse Canyon	1984: 3.94 million tons, 0.055 oz Au/ton 1988: included in Gold Acres figures	1984: 40,000 oz Au 1988-92: included with Gold Acres	Vinini Formation, Wenban Limestone	34 Ma?
Lantern	1988: *geologic resource*—15.45 million tons, 0.028 oz Au/ton	exploration	lower Paleozoic sedimentary rocks	Cretaceous or early Tertiary
Maggie Creek	1988: *geologic resource*—303,000 tons, 0.092 oz Au/ton	1984: 1,250,000 tons 1986: intermittent production 1988: no production reported	Ordovician to Devonian siltstone, chert, sandstone, impure limestone	Cretaceous or early Tertiary
North Star	1989: *geologic resource*—6.9 million tons, 0.052 oz Au/ton 1990: 3.9 million tons, 0.052 oz Au/ton	1988: 4,250 oz Au	lower Paleozoic sedimentary rocks	Cretaceous or early Tertiary

NGO: Newmont Gold Operations (Bootstrap/Capstone, Blue Star, Genesis, and Gold Quarry mines) reported production of 895,500 oz Au in 1988, 1,467,800 oz Au and 117,400 oz Ag in 1989, 1,676,000 oz Au in 1990, 1,575,700 oz Au in 1991, and 1,588,000 oz Au and 98,000 oz Ag in 1992.

MAJOR PRECIOUS-METAL DEPOSITS (continued)

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
EUREKA COUNTY (continued)				
Pete	1988: *geologic resource*—15.7 million tons, 0.030 oz Au/ton 1989: 4.3 million tons, 0.036 oz Au/ton, *geologic resource*—15.8 million tons, 0.030 oz Au/ton	exploration	Roberts Mountains Formation	Cretaceous or early Tertiary
Post/Deep Post	Newmont Gold Co. holdings only- 1988: *geologic resource*—195 million tons, 0.062 oz Au/ton 1990: 40.1 million tons, 0.147 oz Au/ton 1992: 9 million oz Au	1988: 4,930 oz Au 1991: 177,500 oz Au	Vinini Formation, lower Paleozoic carbonate rocks	Cretaceous?
Project Glister		1989: 8,450 oz Au, 23,519 oz Ag		
Ratto Canyon	1984: ~200,000 oz Au	exploration	Dunderberg Shale, Hamburg Dolomite	Oligocene
Rock Creek	1988: 30,000 oz Au			
Tonkin Springs	1987: *oxide*—1.5 million tons, 0.05 oz Au/ton; *sulfide*—2.5 million tons, 0.09 oz Au/ton 1991: 9 million tons, 0.05 oz Au/ton	1987: ~ 9,700 oz Au 1988: 565 oz Au 1989: 1,753 oz Au, 1,402 oz Au 1990: 2,068 oz Au, 470 oz Ag 1992: idle, exploration, metallurgical testing	Vinini Formation, dacitic dikes	Oligocene?
Tusc	1988: *geologic resource*—15.8 million tons, 0.059 oz Au/ton 1990: 13.3 million tons, 0.062 oz Au/ton	exploration	lower Paleozoic sedimentary rocks	Cretaceous or early Tertiary
Windfall	1988: 3 million tons, 0.03 oz Au/ton	1908-16: 24,000 oz Au 1975-84: 90,000 oz Au 1988: 6,380 oz Au, 59 oz Ag	Hamburg Dolomite	Eocene or Oligocene
Zeke	1989: 2 million tons, 0.056 oz Au and 0.224 oz Ag/ton			
HUMBOLDT COUNTY				
Adelaide Crown	1989: *south pit*—585,000 tons, 1.313 oz Ag and 0.043 oz Au/ton; *additional area* - 165,000 tons, 0.015 oz Au and 1.10 oz Ag/ton	1990: 3,068 oz Au, 37,537 oz Ag 1991: 1,849 oz Au, 15,937 oz Ag 1992: idle	Preble Formation	Tertiary
Ashdown	1988: 1 million tons, 0.11 oz Au/ton 1992: 1.1 million tons, 0.12 oz Au/ton	exploration	Mesozoic granite	Mesozoic
Chimney Creek	1988: *proven, probable*—26.9 million tons, 0.068 oz Au/ton; *inferred in south pit*—2.1 million oz Au 1989: *geologic resource*—4.6 million oz Au	1987-88: 300,000 oz Au 19989: 222,556 oz Au, 55,953 oz Ag 1990: 220,000 oz Au 1991: 228,065 oz Au, 100,000 oz Ag 1992: 247,969 oz Au, 113,463 oz Ag	upper Paleozoic sedimentary rocks	~90 Ma
Crofoot/Lewis	1988: 25 million tons, 0.025 oz Au/ton 1990: 12 million tons, 0.020 oz Au/ton 1991: 13.9 million tons, 0.019 oz Au/ton 1992: 29.8 million tons, 0.024 oz Au/ton, *geologic resource*—45 million tons, 0.021 oz Au/ton	1988: 75,800 oz Au 1989: 82,000 oz Au, 123,000 oz Ag 1990: 92,000 oz Au, 110,000 oz Ag 1991: 94,340 oz Au, 151,553 oz Ag 1992: 100,000 oz Au, 280,000 oz Ag	Camel conglomerate, rhyolite dikes	1-2 Ma
Getchell	1989: 8.1 million tons, 0.154 oz Au/ton mill grade and 1.43 million tons, 0.049 Au/ton heap-leach ore; *additional geologic resource* - 5.7 million tons, 0.092 oz Au/ton sulfide and 2.6 million tons, 0.055 oz Au/ton oxide 1991: 6.5 million tons, 0.192 oz Au/ton sulfide and 1.8 million tons, 0.039 oz Au/ton oxide. 1992: *sulfide*—7.0 million tons, 0.194 oz Au/ton; *oxide*—2.5 million tons, 0.031 oz Au/ton	1938-50, 1962-67: 788,875 oz Au 1987-88: ~ 35,000 oz Au 1989: 120,730 oz Au, 9,407 oz Ag 1990: 172,029 oz Au 1991: 200,958 oz Au 1992: 230,600 oz Au, 78,700 oz Ag	Comus and Preble Formations, granodiorite dikes, granodiorite	90 Ma
Lewis	1984: 10 million tons, 0.04 oz Au/ton 1987: 9 million tons, 0.032 oz Au/ton	1984: 3,500 tons/day 1987: ~ 8,800 oz Au 1988-90: included in Crofoot/Lewis	Camel conglomerate, rhyolite dikes	1-2 Ma

continued

MAJOR PRECIOUS-METAL DEPOSITS (continued)

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
HUMBOLDT COUNTY (continued)				
Lone Tree	1990: 5.4 million tons oxide mill ore, 0.159 oz Au/ton, 5.7 million tons heap-leach ore, 0.025 oz Au/ton and 1.2 million oz Au in sulfide ore 1991: *reserves*—1 million oz Au 1992: 3.14 million oz Au	1991: 36,424 oz Au 1992: 128,000 oz Au	Havallah Formation and dacite porphyry	38 Ma
Marigold	1990: 4.3 million tons, 0.105 oz Au/ton mill ore, 7.6 million tons, 0.026 oz Au/ton heap-leach ore 1992: 10 million tons, 0.055 oz Au/ton	1989: 16,000 oz Au, 484 oz Ag 1990: 60,750 oz Au, 1,600 oz Ag 1991: 65,469 oz Au, 2,000 oz Ag 1992: 90,000 oz Au, 4,000 oz Ag	Paleozoic chert, argillite, and carbonate rocks	early Oligocene
North Stonehouse	1991: 2.5 million tons, 0.103 oz Au mill ore		Havallah Formation and porphyry dikes	39 Ma
Pinson	1989: 480,000 oz Au	1980: 56,000 oz Au 1986-88: 189,864 oz Au 1989: 72,489 oz Au (includes Preble) 1990: 56,382 oz Au 1991: 55,640 oz Au 1992: 50,340 oz Au, 5,730 oz Ag	Comus Formation	90 Ma
Preble	1989: 15,110 oz Au 1992: idle, mined out	1985: 17,000 oz Au 1987: 28,000 oz Au 1988: 18,828 oz Au 1989: included with Pinson 1990: 1,161 oz Au	Preble Formation	90 Ma?
Rabbit Creek	1989: 4.1 million oz Au; *additional geologic resource*—1 million Au in refractory material 1990: *reserves*—2.5 million oz Au; *geologic resource*—5.1 million oz Au 1992: *reserves*—3.26 million oz Au	1990: 25,000 oz Au 1991: 115,500 oz Au 1992: 156,000 oz Au	Valmy Formation	Cretaceous?
Sleeper	1989: 1,975,000 oz Au 1990: 44.1 million tons, 0.038 oz Au and 0.152 oz Ag/ton 1991: 1.7 million oz Au, 6.7 million oz Ag	1986: 128,000 oz Au, 94,000 oz Ag 1987: 158,696 oz Au 1988: 230,410 oz Au 1989: 256,000 oz Au, 339,650 oz Ag 1990: 250,131 oz Au, 391,886 oz Ag 1991: 183,346 oz Au, 289,463 oz Ag 1992: 132,383 oz Au, 285,011 oz Ag	Miocene "latite" flows and dikes, silicic ash-flow tuff, Triassic slate and phyllite	Miocene
Trout Creek	1989: 50,000 oz Au			
LANDER COUNTY				
Austin Gold Venture	1989: mined out	1986-88: 141,000 oz Au 1989: 50,000 oz Au	Antelope Valley Limestone	Cretaceous or Tertiary
Buffalo Valley	1988: 1.5 million tons, 0.05 oz Au/ton 1991: idle	1988: 9,238 oz Au 1989: 14,660 oz Au 1990: 15,770 oz Au 1991: W		Eocene?
Cortez	mined out	1968-82: 1.0 million oz Au	Roberts Mountains Formation	Cretaceous or early Tertiary
Elder Creek Project/ Shoshone	1989: 91,500 oz Au 1990: 1.5 million tons, 0.041 oz Au/ton	1990: 17,400 oz Au 1991: 2,702 oz Au	Valmy Formation	Cretaceous or Eocene
Fire Creek	1982: 350,000 tons, 0.06 oz Au/ton	1983-84: 767 oz Au	basaltic andesite	Miocene
Fortitude (Copper Canyon) (Battle Mtn.)	1989: *proven, probable*—6.7 million tons, 0.13 oz Au and 0.47 oz Ag/ton (includes Surprise and Labrador) 1992: *reserves*—3.1 million tons, 0.05 oz Au and 0.4 oz Ag/ton	1986: 259,000 oz Au, 902,000 oz Ag 1987: 255,000 oz Au 1988: 243,000 oz Au, 675,000 oz Ag 1989: 254,507 oz Au, 301,272 oz Ag 1990: 261,338 oz Au, 458,143 oz Ag (1988-90 production includes Surprise) 1991: 233,522 oz Au, 417,193 oz Ag 1992: 178,569 oz Au, 421 oz Ag	Battle Formation, Antler Peak Limestone, Pumpernickel Formation	37 Ma

W: withheld

MAJOR PRECIOUS-METAL DEPOSITS (continued)

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
LANDER COUNTY (continued)				
Fortitude Extension	1992: 500,000 oz Au			
Gold Acres and Little Gold Acres	1987: 4.8 million tons, 0.105 oz Au/ton 1988: 5.4 million tons, 0.093 oz Au/ton 1992: *reserves*—3.1 million tons, 0.05 oz Au and 0.4 oz Ag/ton	1942-84: 2.4 million tons, 0.13 oz Au/ton; 2 million tons, 0.041 oz Au/ton leached. *Little Gold Acres:* 800,000 tons, 0.124 oz Au/ton 1988: 42,322 oz Au (includes Horse Canyon) 1989: 39,993 oz Au, 12,234 oz Ag (includes Horse Canyon) 1990: 53,945 oz Au, 10,150 oz Ag 1991: 53,500 oz Au, 6,600 oz Ag 1992: 75,000 oz Au	Roberts Mountains Formation, Wenban Limestone, Valmy Formation, quartz porphyry dikes	92.8-94 Ma and 36 Ma
Hilltop	1984: 10.5 million tons, 0.073 oz Au/ton 1989: 10 million tons, 0.049 oz Au/ton	no production	Valmy Formation	Oligocene?
Klondike property	1989: 100,000 oz Au equivalent			
McCoy/Cove	1989: *proven and probable reserves* - 2.9 million oz Au, 128 million oz Ag *geologic resource*—3.5 million oz Au, 1.50 million oz Ag 1990: *reserves*—58.7 million tons, 0.045 oz Au, 2.32 oz Ag/ton	1986: 50,000 oz Au 1987: 200,000 oz Au, 5 million oz Ag 1988: 100,000 oz Au, 700,000 oz Ag 1989: 214,566 oz Au, 2.26 million oz Ag 1990: 255,044 oz Au, 1.98 million oz Ag 1991: 284,327 oz Au, 5.62 million oz Ag 1992: 301,512 oz Au, 7.92 million oz Ag	Panther Canyon Formation (conglomerate, sandstone), Augusta Mountain Formation (limestone), granodiorite	39.5 Ma
Mule Canyon	1992: 8.5 million tons, 0.136 oz Au/ton	1992: exploration	basalt and basaltic andesite	15-16 Ma
Pipeline	1991: *geologic resource*—11.3 million tons, 0.237 oz Au/ton		Roberts Mountains Formation	Cretaceous or early Tertiary
Reona project	1992: 360,000 oz Au, *geologic resource*—800,000 oz Au			
Robertson	1988: 11 million tons, 0.04 oz Au/ton	1989: 3,700 oz Au	Valmy Formation	early Oligocene
South Pipeline	1992: 9 million tons, 0.082 oz Au/ton		Roberts Mountains Formation	Cretaceous or early Tertiary
Surprise	1987: 225,000 oz Au 1988-91: production and reserve included in Fortitude figures	1987: 2,000 oz Au	skarn	37 Ma
Toiyabe	1988: 813,400 tons, 0.066 oz Au/ton	1988: 32,000 oz Au, 10,300 oz Ag 1990: 11,700 oz Au, 9,100 oz Ag 1991: 8,780 oz Au, 6,025 oz Ag	lower Paleozoic calcareous siltstone	Eocene?
Victorine (Kingston district)	1992: 915,000 tons, 0.304 oz Au/ton			
LINCOLN COUNTY				
Atlanta	1980: 1.1 million tons, 0.08 oz Au and 1.6 oz Ag/ton 1991: idle	1980: 88,000 oz Au, 1,710,000 oz Ag 1987-89: idle	Pogonip Group, Ely Springs and Laketown Dolomites, Oligocene silicic tuff, dacite dikes	early Miocene
Delamar	1988: 200,000 tons, 0.079 Au/ton	1988: exploration 1990: exploration	Cambrian quartzite	Miocene
LYON COUNTY				
Fire Angel	1989: 5,600 oz Au, *geologic resource*—148,500 oz Au			

continued

MAJOR PRECIOUS-METAL DEPOSITS (continued)

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
LYON COUNTY (continued)				
Talapoosa	1988: 2.5 million tons, 0.041 oz Au and 0.53 oz Ag/ton *oxide* 14.9 million tons, 0.03 oz Au and 0.49 oz Ag/ton *sulfide* 1989: *additional resources delineated* - 2.7 million tons, 0.054 oz Au and 0.654 oz Ag/ton 1991: *geologic resource* - 19.6 million tons, 0.045 oz Au and 0.61 oz Ag/ton 1992: *geologic resource*—18 million tons, 0.044 oz Au and 0.61 oz Ag/ton	preproduction	Kate Peak Formation	Miocene
MINERAL COUNTY				
Aurora	1989: 347,000 tons, 0.253 oz Au/ton 1990: 433,000 tons, 0.21 oz Au/ton 1992: 493,000 tons, 0.15 oz Au/ton	1989: 12,683 oz Au, 16,400 oz Au 1990: 12,973 oz Au, 18,162 oz Ag 1991: 15,000 oz Au 1992: 15,000 oz Au, 35,000 oz Ag	andesite, rhyolite	10 Ma
Aurora Partnership	1983: 1.5 million tons, 0.129 oz Au 0.3 oz Ag/ton 1990: 816,880 tons, 0.103 oz Au/ton 1992: 790,000 tons, 0.13 oz Au/ton *geologic resource*—267,640 oz Au	1930's: 100,000 oz Au 1983: 10,000 oz Au 1988: 10,302 oz Au 1989: 27,825 oz Au, 26,000 oz Ag 1991: 36,000 oz Au, 68,000 oz Ag 1992: 39,100 oz Au, 79,200 oz Ag	andesite, rhyolite	10 Ma
Borealis	1988: 1.792 million tons, 0.046 oz Au/ton 1991: known reserves mined out	1981-84: 170,000 oz Au 1986-88: 116,256 oz Au 1989: 89,060 oz Au, 37, 032 oz Ag 1990: 18,435 oz Au, 15,396 oz Ag, production ceased 1992: exploration	rhyolite flow dome, andesite flows, breccias, volcaniclastic rocks	5 Ma
Candelaria	1988: 24 million tons, 1.267 oz Ag and 0.011 oz Au/ton 1992: mine idle, heap-leaching continuing	1982: 1.7 million oz Ag, 9,000 oz Au 1987: total production was 10 million oz Ag as of June 1987 1988: 3.8 million oz Ag, 11,000 oz Au 1989: 4.36 million oz Ag, 13,800 oz Au 1990: 4.89 million oz Au, 11,796 oz Au, 1991: 1.68 million oz Ag, 2,870 oz Au 1992: 1.06 million oz Ag, 2,431 oz Au	Candelaria Formation serpentinite, granitic dikes	Cretaceous
Denton-Rawhide	1989: *reserves*—29.4 million tons, 0.040 oz Au and 0.368 oz Ag/ton; *geologic resource*—59.3 million tons, 0.0274 oz Au and 0.298 oz Ag/ton 1991: 29.4 million tons, 0.040 oz Au and 0.368 oz Ag/ton; *geologic resource*—59.3 million tons, 0.0274 oz Au and 0.298 oz Ag/ton 1992: *geologic resource*—54 million tons, 0.026 oz Au/ton with 29.4 million tons, 0.04 oz Au and 0.39 Ag/ton and 29.9 million tons, 0.015 oz Au/ton and 0.23 oz Ag/ton	1990: 39,000 oz Au, 170,000 oz Ag 1991: 76,000 oz Au, 500,000 oz Ag 1992: 92,000 oz Au, 804,000 oz Ag	rhyolite plugs, flows, tuffs, breccias	16 Ma
Mindora	1988: 1.0 million tons, 0.037 oz Au and 1.78 oz Ag/ton	1988: exploration		
Santa Fe	1990: 6.8 million tons, 0.035 oz Au and 0.241 oz Ag/ton	1989 60,000 oz Au, 150,000 oz Ag 1990: 64,336 oz Au, 177,244 oz Ag 1991: 67,102 oz Au, 149,168 oz Ag 1992: 61,000 oz Au, 100,000 oz Ag	Luning Formation	Miocene
NYE COUNTY				
Baxter Springs	1988: 1 million tons, 0.050 oz Au/ton 1990: *geologic resource*—5 million tons 0.050 oz Au/ton			
Bruner property, Duluth zone	1992: *geologic resource*—15 million tons, 0.026 oz Au/ton		Tertiary volcanic rocks	Miocene

MAJOR PRECIOUS-METAL DEPOSITS (continued)

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
NYE COUNTY (continued)				
Bullfrog	1989: 18.6 million tons, 0.097 oz Au/ton 1992: 8.8 million tons, 0.14 oz Au/ton plus an additional *geologic resource*—1.8 million tons, 0.102 Au/ton	1989: 50,011 oz Au, 40,905 oz Ag 1990: 220,000 oz Au, 229,000 oz Ag 1991: 205,000 oz Au, 189,000 oz Ag 1992: 323,800 oz Au, 313,000 oz Ag	rhyolitic ash-flow tuff	9.5 Ma
Cuervo (Sullivan)	1987: 10.2 milliom tons, 0.039 oz Au and 0.086 oz Ag/ton and 0.37% Cu 1988: *proven*—10.8 million tons, *probable* - 2.7 million tons, 0.025 oz Au/ton	1992: idle	Mesozoic granodiorite and metavolcanic rocks	Mesozoic
Gold Bar	1987: 1.23 million tons Au ore	1989-91: W	silicic volcanic rocks	Miocene
Ketchup Flat	1989: 300,000 oz Au, 3.1 million oz Ag	preproduction	Miocene volcanic rocks	Miocene
Longstreet property	1989: 4 million tons, 0.024 oz Au/ton, *geologic resource*—9.6 million tons, 0.024 oz Au/ton		rhyolitic volcanic rocks	Oligocene
Manhattan	1988: 22.4 million tons, 0.021 oz Au/ton 1989: 1.7 million tons, 0.017 oz Au/ton 1991: mined out 1992: idle	1905-59: 500,000 oz Au 1983: 26,000 - 27,000 oz Au 1986: 3,000 tons/day 1987: 24,855 oz Au 1988: 4,752 oz Au 1989: 32,389 oz Au, 17,611 oz Ag 1990: included with Round Mountain	Gold Hill Formation	16 Ma
Manhattan property	1989: *geologic resource*—100,000 tons, 0.50 oz Au/ton			
Montgomery Shoshone	1988: 3.1 million tons, 0.072 oz Au and 0.240 oz Ag/ton	1989: preproduction 1992: idle	rhyolitic ash-flow tuff	9.5 Ma
Mother Lode (includes Sunday Night Anomaly)	1989: *reserves, proven and probable* - 4.9 million tons, 0.054 oz Au/ton, of which 1.8 million tons, 0.048 oz Au/ton are in the Sunday Night Anomaly 1990: Sunday Night Anomaly *oxide reserves* - 927,372 tons, 0.047 oz Au/ton; *sulfide ore reserves*—65,217 tons, 0.042 oz Au/ton 1992: mined out	1989: 1,000 oz Au, 150 oz Ag 1990: 30,000 oz Au, 3,100 oz Ag 1991: W 1992: idle	lower Paleozoic rocks, Tertiary dacite porphyry	14 Ma
Northumberland	1988: 12 million tons, 0.06 oz Au/ton	1939-42: 327,000 oz Au 1981-84: 950,000 tons/year 1988: 29,667 oz Au, 130,394 oz Ag 1989: W 1990-91: idle	Roberts Mountains and Hanson Creek Formations, granodiorite, tonalite, quartz porphyry dikes	85 Ma
Paradise Peak	1989: 5.22 million tons, 0.09 oz Au and 3.62 oz Ag/ton, mill ore; 11.52 million tons, 0.036 oz Au and 0.445 oz Ag/ton, leachable 1991: ~ 2 year mine life 1992: *reserves*—197,000 oz Au, 43 million oz Ag	1986-88: 560,000 oz Au, 8.5 million oz Ag 1989: 228,000 oz Au, 5.17 million oz Ag 1990: 198,800 oz Au, 5.42 million oz Ag 1991: 182,000 oz Au, 2.26 million oz Ag 1992: 251,000 oz Au, 1.85 million oz Ag	rhyolite and andesite flows, ash-flow and air-fall tuffs	Miocene
Round Mountain (Smoky Valley)	1989: *geologic resource*—271 million tons, 0.032 oz Au/ton 1990: 256.8 million tons, 0.033 oz Au/ton	1977-84: 313,480 oz Au, 160,419 oz Ag 1984: 70,000 oz Au 1987: 190,600 oz Au 1988: 233,700 oz Au 1989: 386,227 oz Au, 211,297 oz Ag 1990: 483,192 oz Au, 236,600 oz Ag (includes Manhattan) 1991: 339,000 oz Au, 260,000 oz Ag 1992: 370,600 oz Au, 316,700 oz Ag	rhyolite ignimbrite	25 Ma
Sterling	1989: 469,000 tons, 0.21 oz Au/ton 1990: 519,000 tons, 0.209 oz Au/ton 1992: 403,000 tons, 0.24 oz Au/ton *geologic resource*—765,000 tons, 0.178 oz Au/ton	1983-88: 75,900 oz Au 1990: 12,626 oz Au 1991: 12,215 oz Au	Wood Canyon and Bonanza King Formations	14 Ma
Tellis claims	1988: 850,000 tons, 0.053 oz Au/ton			

continued

W: withheld

MAJOR PRECIOUS-METAL DEPOSITS (continued)

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
PERSHING COUNTY				
Bunce	1989: *geologic reserve* - 600,000 tons, 0.04 oz Au/ton 1990: 500,000 tons, 0.04 oz Au/ton	exploration	rhyolite	
Florida Canyon	1988: 37 million tons, 0.023 oz Au/ton 1991: 48.3 million tons, 0.018 oz Au/ton	1987-88: 109,300 oz Au 1989: 81,484 oz Au, 24,721 oz Ag 1990: 83,200 oz Au, 19,300 oz Ag 1991: 80,586 oz Au, 20,951 oz Ag 1992: 89,954 oz Au, 37,775 oz Ag	Grass Valley Formation	Cretaceous or Tertiary
Relief Canyon	1988: ~ 1.3 million tons, 0.03 oz Au/ton 1991: mined out	1984: 24,500 oz Au 1987-88: 82,000 oz Au 1989: 30,266 oz Au, 32,835 oz Ag 1990: 4,000 oz Au, 6,400 oz Ag	Natchez Pass Limestone, Grass Valley Formation	Cretaceous
Rochester	1989: *geologic resource*—94.5 million tons, 0.012 oz Au and 1.40 oz Ag/ton	1986-88: 122,400 oz Au, 13 million oz Ag 1989: 76,032 oz Au,4.63 million oz Ag 1990: 59,000 oz Au, 4.8 million oz Ag 1991: 61,000 oz Au, 5.8 million oz Ag 1992: 57,000 oz Au, 5.6 million oz Ag	Koipato Group, Weaver Rhyolite	Late Cretaceous
Rosebud project	1992: 570,000 oz Au (0.362 oz/ton), 5.5 million oz Ag (5.5 oz/ton)	underground	Tertiary volcanic rocks	Miocene
Standard	mined out	1932-51: 46,602 oz Au, 102,721 oz Ag	Natchez Pass Limestone, Grass Valley Formation	73 Ma
Tag-Wildcat	1989: *geologic resource*—1.5 million tons, 0.043 oz Au/ton 1989: 416,000 Ttons, 0.076 oz Au/ton	1989: exploration	Tertiary volcanic rocks	Miocene
Trinity	1988: 1 million tons, 5.25 oz Ag/ton 1991: mined out	1988: mining ended August 1988, heap-leaching continuing 1989: 718,714 oz Ag, 70 oz Au	rhyolite plugs	Miocene
Willard	1989: 3.61 million tons	1989: preproduction	Triassic siltstone	Cretaceous
STOREY COUNTY				
Flowery	1989: 1 million tons, 0.037 oz Au/ton 1990: 6.3 million tons, 0.043 oz Au/ton *geologic resource*—1.16 million oz Au 1991: *geologic resource*—29.3 million tons, 0.04 oz Au/ton	1988: 836 oz Au, 9,473 oz Ag 1990: 6,000 oz Au, 70,000 oz Ag 1991: W 1992: 2,253 oz Au, 34,572 oz Ag	Alta Formation	12 Ma
Oliver Hills	1990: 3.37 million tons, 0.054 oz Au/ton 1.2 oz Ag/ton 1991: *geologic resource*—8.5 million tons, 0.060 oz Au/ton and 0.60 oz Ag/ton	1991: 573 oz Au, 6,947 oz Ag		
WASHOE COUNTY				
Western Hog Ranch	1988: *reserves, proven and probable* - 5.5 million tons, 0.064 oz Au/ton; *geologic resource*—20.1 million tons, 0.029 oz Au/ton 1990: 1.1 million tons, 0.05 oz Au/ton	1986: 50,000 oz Au 1988: 30,000 oz Au 1989: 25,000 oz Au, 4,000 oz Ag 1990: 25,000 oz Au, 4,500 oz Ag 1991: 18,700 oz Au, 2,100 oz Ag 1992: 30,000 oz Au, 10,000 oz Ag	rhyolite, explosion breccia, sinter	15-16 Ma
Wind Mountain	1988: 15 million tons, 0.021 oz Au and 0.42 oz Ag/ton 1992: mined out	1989: 30,900 oz Au, 335,000 oz Ag 1990: W 1991: 91,000 oz Au, 405,000 oz Ag 1992: 54,690 oz Au, 297,403 oz Ag	Tertiary sedimentary rocks	late Tertiary or Quaternary
WHITE PINE COUNTY				
Alligator Ridge	1989: 1 million tons, 0.064 oz Au/ton 1990: 624,000 tons, 0.059 oz Au/ton, *geologic resource*—2.1 million tons 0.043 oz Au/ton 1992: 11.5 million tons, 0.046 oz Au/ton; *geologic resource*—661,888 oz Au, includes Casino/Winrock	1981-88: 560,000 oz Au, 70,000 oz Ag 1989: 54,057 oz Au, 10,188 oz Ag 1990: 18,000 oz Au, 4,000 oz Ag 1991: 17,000 oz Au 1992: 10,450 oz Au	Pilot Shale	Eocene

W: withheld

MAJOR PRECIOUS-METAL DEPOSITS (continued)

Deposit name	Reserves/resources	Production	Host rock	Mineralization age
WHITE PINE COUNTY (continued)				
Bald Mountain (Top)	1989: 6.7 million tons, 0.069 oz Au/ton 1990: 8.7 million tons, 0.062 Au/ton 1992: *geologic resource*—600,000 oz Au	1986: 50,000 oz Au 1988: 48,619 oz Au 1989: 55,112 oz Au 1990: 60,000 oz Au, 5,000 oz Ag 1991: 55,000 oz Au, 12,000 oz Ag 1992: 81,500 oz Au, 33,600 oz Ag	quartz porphyry, Cambrian shale and limestone	35-38 Ma
Bellview	1988: 277,000 tons, 0.040 oz Au/ton, *geologic resource*—1 million tons, 0.036 oz Au/ton			
Casino/ Winrock	1989: **Casino** - 804,000 tons, 0.054 oz Au/ton; **Winrock** 1.3 millon tons, 0.037 oz Au/ton 1990: **Winrock** - 993,000 tons, 39,000 oz Au 1992: *see* Alligator Ridge	1990: 7,000 oz Au 1991: 20,000 oz Au 1992: 19,800 oz Au	late Paleozoic sedimentary rocks	Eocene
Easy Junior (Nighthawk Ridge)	1989: 5.68 million tons, 0.031 oz Au/ton 1991: 137,000 oz Au	1990: 11,500 oz Au, 900 oz Ag	Devonian and Mississippian rocks	Eocene
Golden Butte	1989: 4.23 million tons, 0.031 oz Au/ton	1989: 12,187 oz Au, 1,448 oz Ag 1990: 22,362 oz Au, 7,700 oz Ag 1991: 8,970 oz Au, 7,763 oz Ag	Chainman Shale	Cretaceous or Eocene
Green Springs	1988: 1.25 million tons, 0.06 oz Au/ton *additional possible resource*—500,000 tons, 0.036 Au/ton 1992: mined out	1988: ~ 12,000 oz Au 1989: 30,000 oz Au, 5,000 oz Ag 1990: 16,000 oz Au, 4,000 oz Ag 1991: 5,000 oz Au	Paleozoic sedimentary rocks	Eocene?
Horseshoe	1991: 1.5 million tons, 0.039 oz Au/ton	exploration	Pilot Shale and intrusive quartz porphyry	36-38 Ma
Illipah	1988: mined out	1987: ~ 25,000 oz Au/year 1988: 25,324 oz Au, mining ended 1989: 3,874 oz Au, heap-leached	Paleozoic sedimentary rocks	Eocene?
Little Bald Mtn.	1989: 200,000 tons, 0.13 oz Au/ton; *geologic resource*—260,000 tons, 0.127 oz Au/ton	1985-88: 21,700 oz Au 1989: 5,500 oz Au, 1,500 oz Ag	Antelope Valley Formation	35-38 Ma
Mt. Hamilton	1988: 7.7 million tons, 0.05 oz Au and 0.5 oz Ag/ton	1988: preproduction	Dunderberg Shale	Cretaceous
Pan	1989: 241,000 oz Au			
Robinson	1989: 46.0 million tons, 0.019 oz/ton; *geologic resource*—1 million oz Au 1991: *geologic resource*—200 million tons 0.012 oz Au/ton 1992: 1.2 million oz Au, *geologic resource*—2.21 million oz Au	1986: 48,000 oz Au, 96,000 oz Ag 1987: 50,207 oz Au 1988: 38,750 oz Au 1989: 78,828 oz Au, 66,340 oz Ag 1990: 75,000 oz Au, 55,000 oz Ag 1991: 21,674 oz Au 1992: 35,581 oz Au, 55,000 oz Ag	Rib Hill Sandstone Riepe Spring Limestone	Cretaceous
Sunnyside	1988: 32,000 oz Au at 0.187 oz/ton gold equivalent			
Taylor	1980: 10 million tons, 3 oz Ag/ton	1980: 1,200 tons/day	Guilmette and Joana Limestones, rhyolite dikes	Eocene or Oligocene
White Pine	1989: 63,000 oz Au, 0.04 oz Au/ton	1989: 20,654 oz Au	Pilot Shale	Oligocene?
Yankee	1992: 683,000 oz Au	1990: ~15,000 oz Au 1992: 10,800 oz Au	Pilot Shale	36-38 Ma?

Industrial Minerals

by Stephen B. Castor

Industrial minerals produced in Nevada in 1992 had an estimated value of about $285 million, a decrease of about 5% from 1991. Decreases in production and dollar values of barite, clay, gypsum, lithium carbonate, and silica in 1992 overshadowed increases in aggregate, cement, diatomite, and lime. The most important Nevada industrial minerals produced in 1992, in order of estimated dollar value, were aggregate, diatomite, lime, cement, gypsum, lithium carbonate, barite, silica, clay, and magnesia. Data used for these estimates, and information reported for individual commodities below, were obtained from the Nevada Department of Minerals and from companies that produced industrial minerals.

AGGREGATE (SAND, GRAVEL, AND CRUSHED STONE). Nevada's aggregate production in 1992 is estimated at 24 million tons. Production in the Las Vegas area, which accounts for more than 60% of Nevada's aggregate production, increased slightly over that in 1991, while production in the Reno-Sparks-Carson City area was about the same as in 1991.

Large aggregate producers in the Las Vegas area in 1992, in approximate order of importance, were Nevada Ready Mix Corp., Las Vegas Paving Corp., Bonanza Materials, Inc., WMK Transit Mix, Inc., Wells Cargo, Inc., and Frehner Construction, Inc. Although residential building decreased in Las Vegas in 1992, aggregate consumption rose because the pace of commercial building increased with four major resort hotels under construction. Most of the production in the Las Vegas area was from alluvial deposits in the Lone Mountain, Henderson, Spring Mountain Road, and Nellis areas. Frehner Construction produced crushed rock from the Chemstar Lime Co. property at Sloan.

In the Reno-Sparks-Carson City area, large aggregate producers in 1992 were R. L. Helms Construction Co., Granite Construction Co., Rocky Ridge, Inc., Paiute Pit Aggregates, Inc., and Sha-Neva, Inc. Alluvial deposits continue to provide most of the area's production, but crushed rock aggregate operations are becoming increasingly important.

In 1992, production of rhyolite lightweight aggregate continued to account for a significant share of aggregate sold in the Reno-Sparks-Carson City area. All-lite Aggregate Co., a subsidiary of Sierra Stone, Inc., Rilite Aggregate Co., and Naturalite Aggregate Corp. together produced more than 800,000 tons. In the Las Vegas area, rhyolite produced by Southern Nevada Lightweight, Inc. and basalt scoria produced by Cind-R-Lite Co. accounted for a small share of the aggregate market.

BARITE. In 1992, Nevada barite production was 344,000 tons, a significant decrease from 1991. However, a larger share of barite shipped in 1992 was of higher value ground barite, so the total value of barite produced in Nevada was about the same. Foreign competition, particularly from China, India, and Mexico, and continued low levels of domestic oil drilling are the main factors that limit Nevada barite production.

Annual production of barite in Nevada, 1972-1992, Production figures are from the U. S. Bureau of Mines (1972-1987) and the Nevada Bureau of Mines and Geology (1988-1992).

Three major barite producers were active in Nevada in 1992. M.I. Drilling Fluids Co., Lander County, was the largest producer, mining at the Clipper and Greystone mines and shipping finished barite from its mill in Battle Mountain. In 1992 Baroid Drilling Fluids Inc. (formerly part of N L Industries, Inc.) continued production from the Rossi mine in Elko County and reopened the Dunphy mill in Eureka County which was formerly active between 1964 and 1984. In recent years the company relied mainly on imported barite from China and India, but long lead times for shipping and risks of receiving low quality ore led to the decision to revive domestic production. The Dunphy mill is said to have annual capacity of 100,000 tons. Milpark, Inc. produced barite from the Argenta mine and mill near Battle Mountain, Lander County. Between 1985 and 1992 Milpark also processed ore for N L Industries. Circle-A Construction, Inc. continued to produce small amounts from its Snoose Creek operation in Elko County.

BORATES. Newport Minerals Ventures produced colemanite at the old American Borate mill in Amargosa Valley in 1992. The plant treated ore from the Billie mine in nearby Death Valley, California. Because the ore was not originally mined in Nevada, borate is not included in the estimate of total value of Nevada industrial minerals.

Digitized by Google

BUILDING STONE. Nevada Neanderthal Stone quarries several varieties of Tertiary tuff in southern Nye County and operates a custom cutting shop near Beatty. Las Vegas Rock quarries Cretaceous Aztec Sandstone at Goodsprings, Clark County, and markets building and landscape rock in the Las Vegas area. Operation plans for mining Aztec Sandstone on claims west of Las Vegas were submitted to the Bureau of Land Management in 1992 by Stone of LaMadre General Partnership, and the agency is expected to make a decision regarding claim validity in 1993.

CEMENT. The Nevada Cement Co. plant at Fernley, about 30 miles east of Reno, produces portland cement at a rate of about 400,000 tons per year. The plant utilizes Tertiary limestone from a deposit located 7 miles southeast of the plant, halloysite clay from a deposit 50 miles northwest of the plant, iron ore from near Lovelock, and gypsum from Empire. Clinker is produced in two rotary kilns using coal from Utah as the primary fuel. The products, Type II (low alkali), Type III, Type 1P (pozzolonic), and plastic cement, are marketed in California (60%) and Nevada (40%).

CLAY. IMV Division of Floridin Co. mines sepiolite, montmorillonite, saponite, and hectorite from Tertiary lakebeds in the Amargosa Valley of Nevada and adjacent California, processes the clay at a plant in Nevada, and markets more than 20 different specialty and commodity products. About 30,000 tons of clay products were shipped in 1992, down from 42,000 tons in 1991 when large amounts of saponite went to landfill reclamation projects. However, the decrease in dollar value was not as pronounced as the drop in tonnage because high-value specialty clay products account for most of the operation's cash flow. During 1992, the company added a cat litter processing facility to the plant, and the first shipments of this new saponite-sepiolite product are anticipated in the spring of 1993.

Vanderbilt Minerals Co. produces montmorillonite used in pharmaceutical and cosmetic products from Nevada operations. The clay is mined at the New Discovery mine near Beatty in Nye County and from three other deposits in Nevada. It is crushed and blended at the Beatty site and shipped to Kentucky for further processing. American Colloid Co. mines clay from a montmorillonite deposit near Lovelock in Pershing County and from a hectorite deposit near Disaster Peak in Humboldt County. The montmorillonite is mostly used in ceramic, cosmetic, and laundry products, and the hectorite is mainly used in pharmaceutical and cosmetic products. The clay is processed in South Dakota.

Relatively large tonnages of halloysite from a deposit near Pyramid Lake in Washoe County are used by Nevada Cement Co. but not reported as clay in NBMG mineral production figures because they are

Kilns at Nevada Cement plant, Fernley. *Stanley Krukowski photo.*

Digitized by Google

Scanning electron microscope image of diatoms from Eagle-Picher diatomite. *J. J. Sjoberg photo.*

New belt conveyor system at James Hardie Gypsum. The conveyor transports ore more than 600 feet vertically and 3,000 feet laterally from the mine site to the plant. *Bill Rogers photo.*

Digitized by Google

included in cement. Montmorillonite was mined in 1992 from the Jupiter clay mine in Lyon County by Art Wilson Co. for pond liner material. J.M. Huber has been testing hectorite from northern Humboldt County at a pilot facility in Georgia, and Oil-Dri Corp. has been evaluating clay from the Smoke Creek Desert of Washoe County for use in absorbent products.

DIATOMITE. On the basis of total value, diatomite is the second most important industrial mineral mined in the state. Total annual production is about 200,000 tons. Diatomite filter aids are shipped worldwide, and Nevada ranks just behind California in total diatomite production. Eagle-Picher Industries, Inc. produces the bulk of Nevada's diatomite. Filtration grade diatomite is only produced at the company's Colada operation in Pershing County. The company produces absorbant and filler grade diatomite at its Clark operation in Storey County, and ships crude diatomite from a pit near Fernley in Lyon County. Although the company filed for Chapter 11 bankruptcy in 1991 due to asbestos litigation, production from the company's Nevada diatomite operations continued steadily throughout 1992.

Two other companies produced absorbant- and filler-grade diatomite in the Fernley area in 1992: Moltan Co., which markets cat litter regionally; and CR Minerals, which sells diatomite for insulation and absorbent manufacture. Grefco, Inc. mines filler and absorbent grade diatomite at Basalt in Mineral County.

FLUORSPAR. Until 1989, fluorspar had been mined more-or-less continuously in Nevada for 80 years, and the state produced an estimated 580,000 tons of fluorspar that was mainly used in metallurgical applications and in cement. J. Irving Crowell Jr. and Sons shipped about 150 tons of fluorspar from stockpile in 1992, but the company's Daisy mine near Beatty, which has had the largest total production in Nevada, remained inactive for the fourth straight year due to depressed markets. However, there was a flurry of interest in the commodity in 1992 because of potential future use of fluorine-containing substitutes for chlorinated fluorocarbon products in aerosols and refrigerants. The Verdstone Gold Corp. identified 460,000 tons of ore containing 30% fluorite in the Iowa Canyon district of Lander County. In addition, the company purchased the Baxter mine, which produced 182,000 tons of fluorspar between 1928 and 1957.

GYPSUM. Nevada gypsum production decreased for the third year in a row in 1992 due to weakness in the regional construction industry and lower wallboard prices. Four companies make wallboard in Nevada for sale into local and regional construction markets. In 1992, U.S. Gypsum Corp., mining in Pershing County, was the largest producer at about 400,000 tons. The gypsum is processed at a mill and wallboard plant at Empire in Washoe County. In late 1992 the company, which is the largest gypsum producer in the U.S., reached agreement with major creditors to enter Chapter 11 bankrupcy proceedings due mainly to inability to meet debt repayment costs. The company plans to file a reorganization plan in early 1993

Annual Nevada gypsum production, 1972-1992. Production figures are from the U.S. Bureau of Mines (1972-1986), Nevada Bureau of Mines and Geology data (1987 and 1988), and Nevada Department of Minerals data (1989-1992).

and to emerge from Chapter 11 in 1993. James Hardie Gypsum at Blue Diamond near Las Vegas was the second largest producer in the state at about 380,000 tons, followed by PABCO Gypsum and Georgia Pacific Corp., both also located near Las Vegas. In 1992, a new conveyor system for ore at the Blue Diamond operation replaced an aerial tram that had been in operation since 1924. Homestead Minerals, a subsidiary of the Art Wilson Co. mined gypsum and anhydrite near Carson City that was mainly sold to cement manufacturers and agricultural users.

LIME AND DOLOMITE. In 1992 lime production in Nevada increased by about 5% over 1991. Chemstar Lime Co. produced high-calcium lime at Apex just northeast of Las Vegas, but shelved work on a high-calcium lime quarry and plant near Winnemucca following start up of a new operation in southern Idaho. The Continental Lime, Inc. Pilot Peak high-calcium lime operation near Wendover in Elko County, which started production in 1989, continued to sell to northern Nevada gold mining operations.

Chemstar Lime Co. also produced dolomitic lime in Henderson from dolomite mined at Sloan, south of Las Vegas. In 1992 the company introduced "Leach-it," a gold ore processing product, and "Poz-o-cap," an environmental sealant. These new products contain lime and are manufactured at Henderson. Also in 1992 the company received a safety award for operating 10,000 days without an accident at Sloan. Min-Ad, Inc. and Nutritional Additives Corp., both located near Winnemucca, produced ground dolomite, mainly for agricultural use.

LITHIUM CARBONATE. Cyprus Foote Mineral Co. decreased lithium carbonate production at its lithium brine operation at Silver Peak in 1992. However the company announced higher earnings from production of the commodity, probably due to higher prices, lower operating costs, and production increases at the company's lithium brine operation in Chile.

Digitized by Google

MAGNESIA. In December 1991, Premier Services, Ltd., owner of the magnesite mine and magnesia plant at Gabbs, merged with American Minerals Corp. resulting in a name change to American Premier Corp. During the 1980s, production of refractory magnesia largely gave way to production of lower-priced caustic magnesia. In 1992, production of refractory magnesia was resumed, and the plant now produces some dead-burned refractory containing 93% MgO.

PERLITE. The Wilkin Mining and Trucking Co. ships crude and expanded perlite from Caliente in Lincoln County. The company operates the Mackie underground mine about 35 miles west of Caliente and has a small popping plant in Caliente.

SALT. In 1992, production from the family-owned Huck Salt Co. of Fallon decreased significantly from that in 1991. Sale of the operation was reported in late 1992.

SILICA. Simplot Silica Products produced 535,000 tons of silica sand in 1992 from its operation at Overton in Clark County, the third straight year of decline. This downturn is mostly due to declines in the regional foundry, construction, and automotive industries as well as competition from silica sand producers in California.

ZEOLITES. In 1992 American Resource Corp. processed clinoptilolite at a plant in Amargosa Valley, Nye County, that was formerly owned by East West Minerals, Inc. The mineral, which is mined from a nearby site in California, has uses in water and air purification, agricultural products, and absorbent products. In1992, the largest market was in commercial/industrial odor control. The company's mordenite operation at Eastgate in Churchill County remained idle in 1992.

Eagle-Picher Tunnel Hill diatomite pit near Lovelock. *S. B. Castor photo.*

Digitized by Google

Directory of Mining and Milling Operations

by Lindsay G. Christensen and Stephen B. Castor

Gold leach pad, Bald Mountain mine, reclaimed mine waste in background, 1992. *S. B. Castor photo.*

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

EX = exploration, HL = heap leach, ML = mill, OP = open-pit mine, OS = other surface, PL = placer, UG = underground mine.

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
CHURCHILL COUNTY							
Huck Salt	John Huckaby	S12,T16N,R31E	salt	OS	solar evaporation	3	John Huckaby and Sons 5033 Austin Highway Fallon, NV 89406
Moltan mine and plant	Moltan Co.	S28,29,32,33, T23N,R27E	diatomaceous earth	OP,ML	single bench crushing screening	42	W. M. Gurley P.O. Box 860 Fernley, NV 89408-0860
CLARK COUNTY							
American pit	American Sand and Gravel	S25,T19S,R62E	sand gravel	OP	single bench	6	Art Melonas, Owner 5004 Stanley Avenue Las Vegas, NV 89115

continued

Digitized by Google

DIRECTORY OF MINING AND MILLING OPERATIONS (continued)

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
CLARK COUNTY (continued)							
Apex mine and plant	Chemstar, Inc.	S23,26,T18S,R63E	lime	OP,ML	multiple bench calcining hydrating	46	Art Reber P.O. Box 3598 North Las Vegas, NV 89036
Blue Diamond mine and mill	James Hardie Gypsum, Inc.	S20,29-31,32, T21S,R59E; S5,T22S,R59E S24-26,T21S,R58E	gypsum	OP	grinding calcining	114	Dave Kessner, Works Manager HCR 89033, Box 2900 Las Vegas, NV 89124
Blue Sky #1	American Asphalt, Inc.	S1,T20S,R59E	sand gravel	OP,ML	single bench screening crushing	6	Dan Andress, President 3624 Goldfield Avenue North Las Vegas, NV 89030
Bonanza Materials pit and plant	Bonanza Materials, Inc.	S9,16,T22S,R62E	sand gravel	OP,ML	single bench crushing screening	40	Dan Stewart, President 565 Lalif Road Henderson, NV 89015
Buffalo Road pit and mill	W.M.K. Transit Mix, Inc.	S21,T21S,R60E	sand gravel	OP,ML	single bench crushing screening	18	Joe Winiger, President P.O. Box 14697 Las Vegas, NV 89114
Coyote mine and mill	Coyote Mines, Inc.	S22,23,T28S,R63E	gold	ML	gravity	3	Sanford A. Shuler, Jr., President P.O. Box 9 Searchlight, NV 89046
Durvada mine and mill	Durga Resources, Inc.	S27,T27S,R57E	gold silver	OP	multiple bench	14	Jasi Nikhanj, President P.O. Box 1184, HCR-31 Sandy Valley, NV 89019
Eldorado mine	Brookline Mining Co.	S2,T27S,R63E	precious metals	OP	single bench	8	C. Ray Kerby, Superintendent P.O. Box 61620 Las Vegas, NV 89160
Henderson plant	Chemstar, Inc.	S18,T22S,R63E	dolomitic lime	ML	calcining	43	Dave Johnson, President P.O. Box 127 Henderson, NV 89015
Hollywood pit and Henderson mill	Nevada Ready Mix Corp.	S32,T21S,R63E; S11,T21S,R62E	sand gravel	OP,ML	single bench crushing screening	24	Richard Thornton General Manager-Vice President P.O. Box 42755 Las Vegas, NV 89104
Las Vegas cement plant	Las Vegas Cement, Inc.	S10,T15S,R67E	cement	ML	construction	13	Aldo Dinardo, Owner and President P.O. Box 380 Logandale, NV 89021
Lone Mountain Community pit	Ron Williams Construction	S11,T20S,R59E	sand gravel	OP	single bench	8	Ron Williams, President 750 Fogg St. Las Vegas, NV 89110
Lone Mountain Mendenhall pit	Las Vegas Paving Corp.	S35,T19S,R59E	sand gravel	OP	single bench	7	Robert Mendenhall, Owner 1770 South Industrial Road Las Vegas, NV 89102
Lone Mountain Nevada Ready Mix pit	Nevada Ready Mix Corp.	S36,T19S,R59E	sand gravel	OP,ML	single bench crushing screening	32	Darrel Thornton, President P.O. Box 42755 Las Vegas, NV 89104
Lone Mountain Stocks pit	Southern Nevada Paving	S3,T20S,R59E	sand gravel	OP	single bench	35	Floyd Meldrum, President 3555 Polaris Avenue Las Vegas, NV 89102
Money pit	Southern Nevada Liteweight	S9,16,T25S,R61E	lightweight aggregate	OP	crushing screening	12	Spencer Apple 4675 Wynn Road Las Vegas, NV 89103
Nevada Gypsum pit	Nevada Gypsum, Inc.	S15,T21S,R63E	gypsum	OP,ML	drilling blasting crushing	4	Richard Thornton 928 S. Valley View Las Vegas, NV 89107
PABCO Gypsum-Apex pit and plant	Pacific Coast Building Products, Inc.	S7,8,17,18, T20S,R64E	gypsum	OP	single bench wash plant	75	Stanley L. Asbell 1973 N. Nellis Boulevard #328 Las Vegas, NV 89115
Rare Metals Corporation mill	Rare Metals Corp.	S33,T29S,R64E	gold	ML	cyanidation	8	Frank Snyder Sr., President P.O. Box 80 Searchlight, NV 89046
Salt Lake Highway pit	All Star Ready Mix, Inc.	S25,T19S,R62E	sand gravel	OP	single bench	12	Dennis Wadkins, President 4001 Losee Rd. North Las Vegas, NV 89030

DIRECTORY OF MINING AND MILLING OPERATIONS (continued)

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
CLARK COUNTY (continued)							
Simplot Silica Products pit and mill	Simplot Industries	S30,T16S,R68E	silica sand	OP,ML	flotation multiple bench drying screening	40	Jack Olsen, Manager P.O. Box 308 Overton, NV 89040
Sloan quarry and mill	Chemstar, Inc.	S13,T23S,R60E	dolomite	OP	crushing sizing	13	Glen House Star Route 70, Box 2300 Las Vegas, NV 89124
Sloan rock pit	Frehner Construction Co.	S13,T23S,R60E	sand gravel	OS,ML	single bench crushing screening	11	Donald G. Groch, Vice President/ General Manager 124 West Brooks Avenue North Las Vegas, NV 89030
Southwestern mine	Southwestern Minerals, Inc.	S30,T15S,R67E	gypsum	OP,ML	single bench crushing screening	5	George K. Broady, President 300 Crescent Court, Suite 1300 Dallas, TX 75201
Spring Mountain pit and mill	Wells Cargo, Inc.	S15,T21S,R60E	sand gravel	OS,ML	single bench crushing screening	8	Howard Wells, General Manager P.O. Box 14037 Las Vegas, NV 89114
Treasure Hawk mine and mill	Eddie Bounsall	S34,T19S,R70E	gold silver	OP,ML	single bench gravity concentration cyanidation	8	Eddie and Billy Bounsall, Owners P.O. Box 357 Logandale, NV 89021
Wallboard plant	Georgia-Pacific Corp.	S34,T18S,R63E	gypsum	ML	calcining	11	Jean Wassenberg, Manager P.O. Box 30006 North Las Vegas, NV 89030
Weiser Ridge quarry	Georgia-Pacific Corp.	S14,T16S,R66E	gypsum	OP	single bench crushing	65	Tim Cook P.O. Box 30006 North Las Vegas, NV 89030
DOUGLAS COUNTY							
Buckskin leach plant	Sonora Mining Corp.	S13,T13N,R23E	gold silver	HL	cyanide	28	George Newell P.O. Box 546 Yerington, NV 89447
ELKO COUNTY							
Big Four mine and mill	Phil Heater	S25,T44N,R52E	gold silver	OP,ML	single bench	1	Phil Heater, Owner P.O. Box 187 Mountain City, NV 89831
Big Ledge mine	Circle A Construction	S26,35, T42N,R61E	barite	OP	multiple bench	4	Tom G. Schmidt Superintendent Star Route Jackpot, NV 89825
Big Springs mine and mill	Independence Mining Co.	S1-3,11,12 T42N,R53E	gold silver	OP,HL	cyanide fluid-bed roasting	100	Bradley F. Selland Mountain City Star Route Elko, NV 89801
Dee mine	Rayrock Mines, Inc.	S34,T37N,R49E	gold silver	OP,HL, ML	cyanide	100	David S. Cook, General Shop Manager P.O. Box 1193 Elko, NV 89801
Hollister mine	Ivanhoe Gold Co.	S3,10,T37N,R48E	gold	OP	multiple bench heap leach	37	Samye N. Bruckner, Vice President and General Manager 623 Fairgrounds Road Winnemucca, NV 89445
Jerritt Canyon joint venture	Independence Mining Co.	S33,T41N,R53E	gold	OP,ML, HL	cyanide grinding fluid bed roasting	600	D. S. Barr Mountain City Star Route Elko, NV 89801
Pilot Peak lime plant	Continental Lime, Inc.	S14,T34N,R68E	lime	OP	multiple bench roasting grinding rotary kiln	24	Jack McGuirk, Division Manager P.O. Box 2520 Wendover, NV 89883
St. Elmo mine	St. Elmo Mining Corp.	S2,3,T44N,R56E	gold	UG		5	Allan G. Provost, President 1208 Quail Street Lakewood, CO 80215

continued

DIRECTORY OF MINING AND MILLING OPERATIONS (continued)

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
ELKO COUNTY (continued)							
Rossi mine	Baroid Drilling Fluids, Inc.	S15,21,22, T37N,R49E	barite gold	OP,ML	multiple bench crushing gravity concentration	8	Paul Mills P.O. Box 340 Battle Mountain, NV 89820
	John Davis Trucking Co., *contractor*	S15,21,22, T37N,R49E		OP	multiple bench		John N. Davis, Owner 165 West Front Street Battle Mountain, NV 89820
ESMERALDA COUNTY							
Basalt mine and mill	Grefco, Inc.	S29,T2N,R34E	diatomaceous earth	OP,ML	grinding	12	Robert A. Poelvoorde, Plant Manager P.O. Box 288 Mina, NV 89422
Blanco mine	Vanderbilt Minerals Corp.	S22,T1N,R37E	clay	OP	grinding bagging	6	Jerry W. Lease 2320 Viking Road Las Vegas, NV 89109
Cyprus Foote Minerals operations	Cyprus Minerals Co.	S22,T2S,R39E	lithium carbonate	OS	evaporation precipitation	70	Joel Christophersen General Delivery Silver Peak, NV 89047
Goldfield operation	American Resources Corp.	S35,35,T2S,R42E	gold	OP,HL	cyanide	65	John Webster P.O. Box 160 Goldfield, NV 89013
Red Rock mine	Ednuk Mining	S4,T1S,R36E	gold	UG	development	4	Robert L. Kunde, Owner 4780 Bottom Road Fallon, NV 89406
EUREKA COUNTY							
Barrick Goldstrike mine	American Barrick Resources Corp.	S12,20,29,30, T36N,R50E; S23-26,T36N,R49E	gold silver	OP,ML, HL	cyanide milling	1,703	Bob Smith, President P.O. Box 29 Elko, NV 89803
Buckhorn mine	Cominco American Resources Inc.	S30,31,T27N,R49E	gold silver	OP,HL	cyanide multiple bench Merrill Crowe	8	Warren R. Hood P.O. Box 847 Carlin, NV 89822
Gold Bar mine	Atlas Gold Mining, Inc.	S26,27,T22N,R49E	gold	OP,ML, HL	multiple bench crushing grinding cyanidation	220	Mike Doyle P.O. Box 282 Eureka, NV 89316
Newmont Gold operations	Newmont Gold Co.	T31-36N, R49-53E	gold silver	OP,ML, HL	carbon-in-leach carbon-in-pulp cyanide	2,470	Peter Phillips, CEO P.O. Box 669 Carlin, NV 89822-0669
HUMBOLDT COUNTY							
Bonanza opal mine	Lloyd H. Olds	S13,T45N,R25E	precious opal	OP	single bench	3	Lloyd H. Olds P.O. Box 13 Denio, NV 89404
Chimney Creek mine	Gold Fields Operating Co.	S5-8,T39N,R43E	gold silver	OP,ML, HL	grinding cyanide	319	Jim Arnold, Manager P.O. Box 69 Golconda, NV 89414
Crofoot/Lewis mine	Hycroft Resources & Development, Inc.	S24?,T35N,R29E; S19,20?, T35N,R30E	gold silver	OP,HL	crushing cyanide	213	David Beling, General Manager P.O. Box 3030 Winnemucca, NV 89446
Disaster Peak clay mine	American Colloid Co.	S26,T47N,R34E	hectorite	OP	single bench		I. Edgar Odom 1500 West Shore Drive Arlington Heights, IL 60004
Getchell mine	FirstMiss Gold, Inc.	S3,4,T38N,R42E; S33,T39N,R42E	gold silver	OP,ML, HL	multiple bench fluid-bed roasting cyanide	312	Cecil Alvarez, President P.O. Box 220 Golconda, NV 89414
Kelley mine	C. George Hewitt	S30,T45N,R26E	precious opal	OP		1	C. George Hewitt, Owner P.O. Box 33 Denio, NV 89404

DIRECTORY OF MINING AND MILLING OPERATIONS (continued)

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
HUMBOLDT COUNTY (continued)							
Lone Tree mine	Lone Tree Mining, Inc.	S11,T34N,R42E	gold	OP	multiple bench cyanide	185	Ken Pavlich, Project Manager P.O. Box 388 Valmy, NV 89438
Marigold mine	Rayrock Mines, Inc.	S8,9,17-19, T33N,R43E	gold silver	OP,ML, HL	grinding multiple bench cyanide	111	Jerry Harrington, General Manager P.O. Box 9 Valmy, NV 89438
MIN-AD mine and mill	MIN-AD, Inc.	S25,T36N,R37E; S28,T35N,R38E	dolomite	OP	grinding	18	Charles Evans, Mill Superintendent 4210 W. Jungo Road Winnemucca, NV 89445
Pinson mine	Rayrock Mines, Inc.	S28,29,32,33, T38N,R42E	gold	OP,ML, HL	cyanide grinding	125	K. M. Belingheri P.O. Box 129 Winnemucca, NV 89445
Rabbit Creek mine	Santa Fe Pacific Gold Corp.	S19,29,31, T39N,R43E	gold silver	OP,HL	carbon-in-leach multiple bench	360	Steve Lang, Project Manager P.O. Drawer 2220 Winnemucca, NV 89446
Rainbow Ridge opal mine	Rainbow Ridge Opal Mines, Inc.	S6,7,22,23, T45N,R26E	precious opal	OP,UG	multiple bench	1	G. Keith Hodson, Owner P.O. Box 97 Denio, NV 89404
Royal Peacock opal mine	Royal Peacock Opal Mines, Inc.	S19,20,T45N,R26E	precious opal	OP	hand digging	2	Walter Wilson 10 Virgin Valley Road P.O. Box 55 Denio, NV 89404
Sexton mill	Nutritional Additives Corp.	S20,T36N,R38E	dolomite	ML	crushing screening	3	Glen Sexton, General Manager P.O. Box 802 Winnemucca, NV 89445
Sleeper mine	Amax Gold Inc.	S16,17,20,21 T40N,R35E	gold silver	OP,ML, HL	multiple bench cyanide gravity grinding	221	David McIntosh, Interim General Manager 600 Sod House Road Winnemucca, NV 89445
LANDER COUNTY							
Argenta mine and mill	Milpark Drilling Fluids	S6,13,24,T32N,R46E	barite	OP	gravity grinding	20	Keith S. Olson P.O. Box 277 Battle Mountain, NV 89820
Battle Mountain grinding plant	M-I Drilling Fluids Co.	S18,T32N,R45E	barite	ML	gravity grinding	41	Garry Thielen P.O. Box 370 Battle Mountain, NV 89820
Buffalo Valley mine	Horizon Gold Corp.	S33,34,T32N,R42E	gold	OP,HL	cyanidation	2	John E. Watson, President P.O. Box 358 Valmy, NV 89438
Clipper mine	M-I Drilling Fluids Co.	S31,32,T28N,R46E	barite	ML	gravity concentration crushing	15	Gary Thielen, Operations Manager P.O. Box 370 Battle Mountain, NV 89820
Cortez Gold Mines	Placer Dome U.S., Inc.	S13,21,24, T27N,R47E; S36,T28N,R46E	gold silver	OP,ML, HL	cyanide grinding	202	A. L. Walsh HC66-50 Beowawe, NV 89821-9708
Dean mine	St. George Metals, Inc.	S36,T30N,R45E	gold silver	UG,OP	exploration development	19	Frank Varseveld, President 1140 Chukar Lane Battle Mountain, NV 89820
Fortitude complex/ Copper Canyon mine	Battle Mountain Gold Co.	S21,22,T31N,R43E; S28,T32N,R44E	gold silver	OP,HL	cyanide flotation gravity grinding	300	Danny Robertson, Manager P.O. Box 1627 Battle Mountain, NV 89820
McCoy/Cove mine	Echo Bay Minerals Co.	S1,2,11,T28N,R42E; S36,T28N,R43E	gold silver	OP,ML, UG,HL	cyanide grinding	529	John VanDeBukin, Manager P.O. Box 1658 Battle Mountain, NV 89820
112 Mile pit	Robert L. Helms Construction Co.	S23,T29N,R43E	sand gravel	OP	single bench crushing screening	6	Robert L. Helms, President 790 E. Lincoln Way Sparks, NV 89431

continued

DIRECTORY OF MINING AND MILLING OPERATIONS (continued)

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
LINCOLN COUNTY							
Meckie perlite mine	Wilkin Mining & Trucking Co.	S34,T4S,R62E (mine); S5,T4S,R67E (plant)	perlite	UG,ML	room pillar crushing expansion	7	Joseph D. Wilkin, Owner P.O. Box 472 Panaca, NV 89042
LYON COUNTY							
Adams pit	Art Wilson Co.	S25,T16N,R20E	gypsum/ anhydrite	OP,ML	grinding	45	Art Wilson, President P.O. Box 1160 Carson City, NV 89702
Copper Tek mine	Arimetco Inc.	S16,T13N,R25E	copper	OP,HL	leaching electrowinning	83	Rick Havenstrite, General Manager 102 Burch Drive Yerington, NV 89447
Dayton Sand & Gravel, Inc.	Dayton Sand & Gravel, Inc.	S23,T16N,R21E	sand and gravel gold	OP,ML	gravity crushing multiple bench screening	17	Robert O. Foster P.O. Box 193 Dayton, NV 89403
Hazen pit	Eagle-Picher Minerals, Inc.	S8,17,T19N,R26E	diatomite	OP	crushing drying calcining	2	Wes Lee, President P.O. Box 10480 Reno, NV 89510
Jupiter pit	Art Wilson Co.	S12,T16N,R24E	montmorillonite	OP	single bench		Art Wilson, President P.O. Box 1160 Carson City, NV 89702
Limestone mine	Nevada Cement Co.	S3-6,19,25, T19N,R25E; S31-33,T20N,R25E	limestone	OP	multiple bench	12	Alan Speagall, President P.O. Box 840 Fernley, NV 89408
Nevada Cement plant	Nevada Cement Co.	S2,3,10,11, T20N,R24E	cement	OP	rotary kiln	135	Alan Speagall, President P.O. Box 840 Fernley, NV 89408
Section 8 mine and Fernley mill	CR Minerals Corp.	S8,17,T19N,R26E S11,T20N,R24E	diatomaceous earth	OP,ML	grinding	10	Chris Harris, Superintendent P.O. Box 455 Fernley, NV 89408
MINERAL COUNTY							
Aurora mine	Nevada Goldfields, Inc.	S17,18,T5N,R28E	gold silver	OP,UG, ML	multiple bench	40	Rick Dye, Project Manager P.O. Box 3070 Hawthorne, NV 89415
Aurora Partnership	Minerex Resources, Ltd.	S17,T5N,R28E	gold silver	OP,HL	multiple bench cyanide	63	John C. Devitt P.O. Box 1628 Hawthorne, NV 89415
	Lost Dutchman Construction, Inc., *contractor*	S17,T5N,R28E		OP,ML	multiple bench crushing		Melvin Borden, General Manager P.O. Box 129 Hawthorne, NV 89415
Candelaria mine	NERCO Metals, Inc.	S32-34,T4N,R35E; S3-5,T3N,R35E	silver gold	OP,HL	cyanide	26	Dean Warner, Manager P.O. Box 1240 Hawthorne, NV 89415
Denton-Rawhide mine	Kennecott Rawhide Mining Co.	S4,5,8,16,17, T13N,R32E	gold silver	OP,HL	development	155	Dennis Kerstiens, General Manager P.O. Box 2070 Fallon, NV 89407
	Kiewit Mining Group, Inc., *contractor*	S3,10,15,18 T13N,R32E		OP			Steve Anderson, Project Manager P.O. Box 1647 Fallon, NV 89406
Nevada Minerals Processing	Nevada Minerals Processing	S7,T6N,R35E	gold silver	ML	testing	2	Annelle Hoyer, Owner 301 1st St. Mina, NV 89422
Prospectus mine and mill	Nevada Goldfields, Inc.	S18,T5N,R28E	gold	OP	multiple bench crushing	38	Nigel Bain, Project Manager P.O. Box 3070 Hawthorne, NV 89415
Santa Fe mine	Corona Gold Inc.	S6,T8N,R35E; S36,T9N,R34E; S31,T9N,R35E	gold silver	OP,HL	multiple bench cyanide	91	Gregory A. Lang, Resident Manager P.O. Box 3220 Hawthorne, NV 89415

DIRECTORY OF MINING AND MILLING OPERATIONS (continued)

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
NYE COUNTY							
Amargosa Valley plant and pits	IMV Div. of Floridin Co.	S15,29,T17S,R49E; S6,21,T17S,R51E	clay minerals	OP	grinding drying	53	Joseph Wujcik, Plant Manager Route Box 549 Amargosa Valley, NV 89020
Ash Meadows plant	American Resource Corp.	S25,T18S,R50E	zeolite	ML	screening drying bagging	4	Valerie Shelton State Route 15 P.O. Box 7006 Amargosa Valley, NV 89020
Bullfrog mine	LAC Minerals Ltd.	S15,T12S,R46E	gold silver	OP,HL	multiple bench cyanide grinding	168	Jack Bingham, Project Manager P.O. Box 519 Beatty, NV 89003
Cinder Cone pit	Cind-R-Lite Co.	S36,T14S,R48E; S1,T15S,R48E	cinder	OP	gravity	2	H.D. Allen, President 3333 Cinder Lane Las Vegas, NV 89103
Crown mine/lone placer	Marshall Earth Resources	S28,34, T13N,R39E	gold silver	ML,UG	screening washing	23	Hugh Marshall, President P.O. Box 888 Virginia City, NV 89440
Gabbs mine and mill	American Premier Corp.	S26,34,T12N,R36E	magnesite	OP,ML	calcining dead burning sizing separation	80	Don Pressey, Works Manager P.O. Box 177 Gabbs, NV 89409
Lathrop mill	Newport Mineral Ventures	S36,T17S,R49E	calcium borate	ML	flotation calcination	9	Jim Sparks, President Star Route 15 Box 610 Amargosa Valley, NV 89020
Manhattan mine and mill	Round Mountain Gold Corp.	S19,20,29,30, T8N,R44E	gold silver	OP,HL	gravity flotation cyanide, leach crush/grind	9	Andre Douchane, Project Manager P.O. Box 56 Manhattan, NV 89022
Manhattan Gold Project	Rannd Resources, Inc.	S21,T8N,R43E	gold	OP	single bench	10	Noel Tanner, President P.O. Box 85 Manhattan, NV 89022
Nevada Neanderthal plant	Nevada Neanderthal Stone	S10,T11S,R47E	dimension stone	ML	stone cutting	6	Dave Spicer, President P.O. Box 897 Beatty, NV 89003
New Discovery mine and mill	Vanderbilt Minerals Corp.	S13-24,T12S,R46E; S18,19,T12S,R47E	clay	UG,ML	grinding bagging	10	Jerry W. Lease 2320 Viking Road Las Vegas, NV 89109
Northumberland mine	Western States Minerals Corp.	S24,T13N,R45E	gold silver	OP,HL	cyanide	3	Britt Johnson, Project Manager HC65, Box 109 Austin, NV 89310
Paradise Peak mine	FMC Gold Co.	S7,12,13,24, T10N,R36E; S3-22,T10N,R35E	gold silver mercury	OP,ML, HL	grinding cyanide Merrill-Crowe retorting	256	Stephen R. Stine, General Manager P.O. Box 145 Gabbs, NV 89409
Round Mountain mine	Round Mountain Gold Corp.	S19,20,29,30, T10N,R44E; S12,24,25,36, T10N,R43E	gold silver	OP,HL, ML	cyanide	520	Andre J. Douchane P.O. Box 480 Round Mountain, NV 89045
Sterling mine	Saga Exploration Co.	S6,T13S,R48E	gold	UG,ML, HL	drifting cyanide	40	Greg Austin, President P.O. Box 6479 Reno, NV 89513
PERSHING COUNTY							
American Canyon mine	American Canyon Mining, Inc.	S14,T28N,R34E	gold	OP,ML	single bench gravity	4	Gunter Stromberger, President P.O. Box 1056 Lovelock, NV 89419
Buff mine	Vanderbilt Minerals Corp.	S2,T27N,R32E	clay	OP	grinding bagging	6	Jerry W. Lease 2320 Viking Road Las Vegas, NV 89109
Coeur Rochester mine	Coeur D'Alene Mines Corp.	S15,16,21,22, T28N,R34E	silver gold	OP,HL	cyanide	308	Robert Martinez, Vice President P.O. Box 1057 Lovelock, NV 89419

continued

DIRECTORY OF MINING AND MILLING OPERATIONS (continued)

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
PERSHING COUNTY (continued)							
Colado mine and plant	Eagle-Picher Minerals, Inc.	S7,T28N,R29E; S6,T27N,R32E	diatomite	OP,ML	crushing drying classification grinding calcining	139	Jack P. Richards Drawer A Lovelock, NV 89419
Dusty mine	Dusty Mining Co.	S24,T32N,R31E; S20,30,T32N,R32E	gold	OP	gravity flotation	3	L. Edward Speir P.O. Box 1149 Lovelock, NV 89419
Empire mine	United States Gypsum Co.	S31,T31N,R24E	gypsum	OP	multiple bench	124	Mike Jones, Human Resources Manager P.O. Box 130 Empire, NV 89405
Florida Canyon mine	Florida Canyon Mining, Inc.	S1-3,10-12,37,38, T31N,R33E	gold silver	OP,HL	cyanide	171	John Rice, Manager P.O. Box 330 Imlay, NV 89418
Nevada State pit	Frehner Construction Co., Inc.	S6,T25N,R30E	sand gravel	OS	crushing screening	7	Garth Frehner, Owner 124 West Brooks Avenue North Las Vegas, NV 89030
Relief Canyon plant	J. D. Welsh and Associates	S18,T27N,R34E	gold silver	OP,HL	cyanide	7	Elizabeth King, Project Manager P.O. Box 1537 Lovelock, NV 89419
Section 8 mine	American Colloid Co.	S8,T27N,R33E	clay	OP	single bench		I. Edgar Odom 1500 West Shore Drive Arlington Heights, IL 60004
Sexton mine and mill	Nutritional Additives Co.	S5,8,T34N,R38E	dolomite/ limestone	OP	grinding	4	W. Glen Sexton, General Manager 1230 S. Bridge Winnemucca, NV 89445
Willard project	Western States Minerals	S35,36,T28N,R32E	gold silver	OP,HL, ML	cyanide multiple bench	8	Larry Simpson, Project Manager P.O. Box K Lovelock, NV 89419
STOREY COUNTY							
All-Lite pit and plant	All-Lite Aggregate Inc.	S34,T19N,R21E	lightweight aggregate sand gravel	ML	multiple-bench crushing	16	Bill Poulter, Manager P.O. Box 10865 Reno, NV 89510
Clark mine and mill	Eagle-Picher Minerals, Inc.	S28,33,34, T20N,R23E; S35,T20N,R22E	diatomite	OP,ML	crushing drying calcining	62	Wes Lee, President P.O. Box 10480 Reno, NV 89510
Golden Eagle mine and mill	Miramar Mining Co. and American Eagle Resources, Inc.	S22,23,24,26,27, T17N,R22E	gold silver	OP,HL	cyanide	25	P.O. Box 859 Virginia City, NV 89440
Gooseberry mine and mill	Asamera Minerals (U.S.), Inc.	S25,T19N,R22E	silver gold	UG,ML, HL	flotation cyanide	4	Rick Karlson, Mine Manager 6121 Lakeside Drive Suite 130 Reno, NV 89511
Lower Naturalite pit and plant	Naturalite Aggregate Corp.	S16,T17N,R22E	lightweight aggregate	OS,ML	multiple bench crushing screening	6	Fritz Anthes, General Manager 2600 Boeing Way Carson City, NV 89701
Lucerne mine	Oliver Hill Mining Co., Inc.	S8,T16N,R21E	gold silver	OP	multiple bench	4	Scott Jolcover, President P.O. Box 1298 Carson City, NV 89702
Meri's Con Virginia #1	Marshall Earth Resources, Inc.	S29,T17N,R21E	gold silver	UG	drifting	4	Hugh R. Marshall, President 720 Willow Reno, NV 89502
Patrick pit	Granite Construction	S6,T19N,R22E	sand gravel	OP	single bench	11	Jim Roberts, Branch Manager P.O. Box 2087 Sparks, NV 89432
Sutro mine	Marshall Earth Resources, Inc.	S20,T17N,R21E	gold silver	UG	development	4	Hugh Marshall, President P.O. Box 888 Virginia City, NV 89440

DIRECTORY OF MINING AND MILLING OPERATIONS (continued)

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
WASHOE COUNTY							
Clay mine	Art Wilson Co., *contractor for* Nevada Cement Co.	S13,T27N,R19E	clay	OP	single bench	5	Art Wilson, Operator P.O. Box 1160 Carson City, NV 89702
Empire mill	United States Gypsum Co.	S11,13,T31N,R23E	gypsum	ML	grinding calcination	15	Mark Cubbage, Mines Superintendent P.O. Box 130 Empire, NV 89405
Mira Loma pit	Robert L. Helsm Construction Co.	S34,T19N,R20E	gravel	OP	crushing screening	9	Robert L. Helms, President P.O. Drawer 608 Sparks, NV 89432
Mira Loma extension	Granite Construction Co.	S2,T18N,R20E	sand gravel	OS	crushing screening	4	Jim Roberts, Branch Manager P.O. Box 2087 Sparks, NV 89432
102 Ranch pit	Robert L. Helms Construction Co.	S36,T20N,R22E	sand gravel	OS,ML	crushing screening	5	Robert L. Helms, President P.O. Drawer 608 Sparks, NV 89432
Paiute pit	Paiute Pit Aggregates, Inc.	S22,27,34, T21N,R24E	sand gravel	OP	single bench	7	Alex Karlshoet, Owner P.O. Box 159 Wadsworth, NV 89442
Rilite Aggregate	Rilite Aggregate Co.	S23,T18N,R20E	aggregate	OP	grinding crushing	8	Bruno Benna P.O. Box 11767 Reno, NV 89511
Sha-Neva pits	Sha-Neva Inc.	S24,T21N,R19E S17,T19N,R21E	aggregate	OP	screening	6	Pat Shane, President P.O. Drawer 669 Truckee, CA 95734
Sky Ranch pit	Rocky Ridge, Inc.	S15,T21N,R20E	sand gravel	OS,ML	multiple bench crushing screening	15	Pat Shane, President P.O. Box 2669 Truckee, CA 95737
Western Hog Ranch mine	Western Mining Corp. USA	S24,T38N,R22E	gold silver	OP,HL, ML	cyanide	63	C. A. Moore, Resident Manager P.O. Box 9 Gerlach, NV 89412
Wind Mountain mine	Amax Gold Inc.	S33,34,T30N,R23E	gold silver	OP,HL	cyanide	12	Barry Olson, General Manager P.O. Box 160 Empire, NV 89405
WHITE PINE COUNTY							
Alligator Ridge mine	USMX, Inc.	S22-26,35,36, T22N,R57E	gold silver mercury	OP,ML, HL	CIL circuit cyanide	34	Jim Kentopp P.O. Box 809 Ely, NV 89301
Bald Mountain mine	Placer Dome U.S., Inc.	S24,T24N,R56E; T24N,R57E	gold	OP,HL	multiple bench cyanide	147	D. G. Bailey P.O. Box 2706 Elko, NV 89801
	Pollocks Drilling, *contractor*	S16,17,18, T24N,R57E		EX	rotary drilling		Oren Pollock, Owner P.O. Box 1123 Ely, NV 89301
Casino mine	USMX, Inc.	S25,T24N,R58E	gold	OP	heap leach multiple bench	15	Jim Kentopp, Manager P.O. Box 809 Ely, NV 89301
	Lost Dutchman Construction Co., *contractor*	S35,T24N,R57-58E				36	Glenn Neely, Sr. Vice President 1475 Greg Street Sparks, NV 89431
Golden Butte mine	Alta Gold Co.	S2,3,T23N,R61E	gold silver	OP,HL	development cyanide multiple bench	6	Joseph A. Pescio, Mine Superintendent P.O. Box 400 S.R. 1, Cherry Creek, NV 89301
Green Springs mine	USMX, Inc.	S28,T15N,R57E	gold silver	OP,HL	multiple bench cyanide carbon absorption	3	Jim Kentopp P.O. Box 809 Ely, NV 89301

continued

DIRECTORY OF MINING AND MILLING OPERATIONS (continued)

Mine/plant name	Operator	Location	Commodity	Type	Process/ activity	Employees	Address
WHITE PINE COUNTY (continued)							
Little Bald Mountain mine	New Dynasty Mines (US), Inc.	S26,27,T24N,R57E	gold silver	OP,UG HL	cyanide	2	J.D. Simpson, President P.O. Box 342 Eureka, NV 89316
Nevada State pit	Las Vegas Paving Corp.	S29,T25N,R65E	sand gravel	OS,ML	single bench crushing screening	7	Robert Mendenhall, President 1770 Industrial Road Las Vegas, NV 89102
Osceola mine and mill	Robert Ostlund	S12,T14N,R67E	gold	OP,ML	single bench gravity concentration	3	Robert Ostlund, Owner Baker Stage Route Ely, NV 89301
Robinson project	Magma Copper Co.	S10,11,15 T16N,R62E	gold silver copper	OP,ML, HL	CIL mill cyanide	110	Dan Turk, Operations Manager P.O. Box 382 Ruth, NV 89319
White Pine gold mine	Western States Minerals Corp.	S1,T24N,R57E; S6,T24N,R58E; S36,T25N,R57E; S31,T25N,R58E	gold silver	OP,HL	cyanide carbon recovery	32	Gaylan Cropper P.O. Box 305 Ely, NV 89301
Yankee mine	USMX, Inc.	S25,T21N,R57E	gold	OP	development	37	Jim Kentopp P.O. Box 809 Ely, NV 89301

Oil and Gas

by Becky Weimer Purkey

Exploration

Twenty wells were spudded for oil and gas in 1992, down slightly from the 24 wells spudded in 1991. Two of the wells were re-entries and five new wells were put on production during the year. The new producers are **Foreland Corp. S.P. Land Co. No. 1-5R**, **Petroleum Corp. of Nevada Blackburn No. 18**, **Makoil, Inc. Munson Ranch No. 13-21X**, **Apache Corp. Grant Canyon No. 9**, and **Balcron Oil Bacon Flat No. 32-17**, all located in established fields. **Makoil, Inc. Munson Ranch No. 13-32** re-entry well drilled about 80 feet horizontally searching for better production, and now has the distinction of being Nevada's first horizontally drilled well (Kathy Loomis, Nevada Department of Minerals).

Drilling was completed on 21 holes totaling 105,836 feet during 1992. At year end drilling was in progress on one well, another well was shut in, and another was temporarily abandoned. An average of three to four drilling rigs were active in Nevada at any given time during 1992, with the rig count reaching five to seven from April through August, and decreasing to one from October through December.

Nevada currently produces oil and gas from 10 fields located in Nye and Eureka Counties. The

Number and total footage of Nevada oil wells completed as producers or plugged and abandoned, 1950–1992.

Digitized by Google

OIL WELL DRILLING ACTIVITY IN NEVADA IN 1992

Company	Well	Permit no.	Location	Spud date	Depth (feet)	Status (31 Dec 92)
EUREKA COUNTY						
E.P. Operating Co.	Stagecoach Fed. 17-2 No. 1	628	NW1/4 NE1/4 S17,T15N,R54E	Dec 91	7,700	P&A
Foreland Corp.	Foreland S.P. Land Co. No. 1-27 (re-entry)	633	SW1/4 NE1/4 SE1/4 S27,T29N,R52E	Nov 91	N/A	Producer
E.P. Operating Co.	Stagecoach Fed. 17-1 No. 1	643	NE1/4 NE1/4 NE1/4 S17,T15N,R54E	May 92	2,500	P&A
Foreland Corp.	S.P. Land Co. No. 1-5R	647	NE1/4 NE1/4 S5,T29N,R52E	May 92	1,933	Producer
Foreland Corp.	Papoose Canyon No. 1-15	649	SE1/4 NW1/4 S15,T29N,R52E	May 92	5,140	P&A
Trail Mountain, Inc.	Three Bar Unit Fed. No. 25-7D	655	SE1/4 SW1/4 NE1/4 S25,T28N,R51E	July 92	W	SI
Skippy Oil Operating, Inc.	Cortez No. 1-12	659	NW1/4 NW1/4 S12,T28N,R50E	Aug 92	10,532	P&A
Petroleum Corp. of Nevada	Blackburn Unit No. 18	660	NE1/4 SE1/4 S7,T27N,R52E	Sep 92	6,756	Producer
NYE COUNTY						
True Oil Co.	Bird Fed. No. 11-25	608	NW1/4 NW1/4 S25,T9N,R56E	Dec 90	9,000	P&A
Balcron Oil	Balcron Bacon Flat Fed No. 24-17	631	SE1/4 SW1/4 S17,T7N,R57E	Dec 91	5,435	P&A
Apache Corp.	Bacon Flat Fed. No. 42-20	636	SE1/4 NE1/4 S20,T7N,R57E	Mar 92	4,815	P&A
Makoil, Inc.	Munson Ranch No. 13-21X	640	NE1/4 NW1/4 S13,T9N,R56E	Apr 92	4,398	Producer
Apache Corp.	Grant Canyon No. 9	642	NW1/4 NW1/4 S21,T7N,R57E	Apr 92	3,620	Producer
Trail Mountain, Inc.	Quinn Canyon Fed. No. 1	650	C E1/2 NW1/4 S13,T7N,R57E	Sep 92	4,301	P&A
Skippy Oil Operating, Inc.	Wood Canyon Unit No. 1-30	651	SW1/4 NW1/4 S30,T9N,R54E	June 92	W	TA
CENEX	Federal No. 5-7	652	SW1/4 NW1/4 S7,T10N,R57E	June 92	4,989	P&A
Makoil, Inc.	Munson Ranch No. 13-32 (re-entry)	653	SW1/4 NE1/4 S13,T9N,R56E	Sep 92	N/A	Producer
Balcron Oil	Balcron Bacon Flat Fed. No. 23-17	657	NE1/4 SW1/4 S17,T7N,R57E	Jul 92	5,240	Producer
Skippy Oil Operating, Inc.	Squaw Hills No. 1-15	661	NE1/4 SE1/4 S15,T10N,R52E	Nov 92	W	Drilling
Apache Corp.	Kate Springs No. 11-2	663	NW1/4 NW1/4 S2,T8N,R57E	Oct 92	5,025	P&A
WHITE PINE COUNTY						
Marathon Oil Co.	Marathon-Anadarko Keno Unit No. 23-33	619	NW1/4 SE1/4 S23,T19N,R56E	Mar 92	7,300	P&A
Pioneer Oil and Gas	Yankee Mine Unit Fed. No. 27-23	644	SW1/4 NE1/4 SW1/4 S27,T21N,R57E	May 92	1,625	P&A
The Anschutz Corp.	Buck Mountain Unit No. 36-1	654	SE1/4 NE1/4 S36,T21N,R56E	Jun 92	7,816	P&A
Pioneer Oil and Gas	Yankee Mine Unit No. 27-23X	656	SW1/4 NE1/4 SW1/4 S27,T21N,R57E	May 92	6,700	P&A

W: Depth information withheld in accordance with company requests and Nevada regulations.
P&A: Plugged and abandoned.
SI: Shut in.
TA: Temporarily abandoned.
Drilling: Drilling not finished in 1992.

Currant field was permanently shut-in during 1983. The **Grant Canyon field** continued to account for 2 out of every 3 barrels of oil produced in Nevada in 1993. The **Trap Spring field** is the second highest producing area in the state.

Five unit agreements were approved and four development contracts were in effect with the Bureau of Land Management in Nevada during fiscal year 1992, compared with two unit agreements and four development contracts in fiscal 1991. There were 6,178,654 acres under 2,879 leases in fiscal year 1992, a decrease of 897,179 acres from fiscal 1991 (for more information on federal leases and development contracts see NBMG Special Publication MI-1988, p. 50-51.)

Secretary of the Interior Manual Lujan extended from February 29, 1992 to February 28, 1993, a ruling that reduces the rentals for onshore federal oil and gas leases to $1 per acre. The Secretary of the Interior could have terminated this extension before March 1993 depending on factors related to rental rates, such as the level of development of federal leases, economic conditions in the industry, oil prices or levels of imports. Any early termination would require a three-month notice to federal leaseholders (Petroleum Information, 2-13-92, p. 7).

Effective October 24, 1992, the primary term for all leases obtained through competitive bidding at Bureau of Land Management lease sales has been changed from 5 to 10 years. The change is pursuant to the provisions of Section 2509 of the Energy Policy Act of 1992. All BLM leases awarded at oral auctions will now have a 10-year primary term and will remain in effect as long as there is production in paying quantities on the lease (Petroleum Information, 10-30-92, p. 11).

The deepest well drilled in 1992 was the **Skippy Oil Operating, Inc. Cortez No. 1-12** well in Eureka County. It was drilled to a depth of 10,532 feet but no oil or gas shows were reported.

The second deepest well was **True Oil Co. Bird Fed. No. 11-25** well drilled to a depth of 9,000 feet in

Nye County. Oil shows were recorded in the valley fill above the volcanics from 4,660 to 4,760 feet, and especially from 4,744 to 4,758 feet. Several other nonproducers in Eureka, Nye, and White Pine Counties reported oil shows.

In Eureka County, **E.P. Operating Co.** reported oil shows and stains in the **Stagecoach 17-2 No. 1** well from 2,050 to 2,400 feet and from 2,650 to 2,750 feet in dolomite in the Upper Devonian Devils Gate Formation, from 3,850 to 3,880 feet in shale of Sentinel Mountain, from 4,130 to 4,170 feet in limestone in the Pilot Shale, and from 4,280 to 4,310 feet in the Pilot Shale.

Shows were recorded in several dry holes in Nye County. The **Apache Corp. Kate Springs No. 11-2** well had oil stains at 4,090 to 4,120 feet and from 4,730 to 5,025 feet (TD). Oil pops and globs were recorded in the drilling mud (not on the cuttings) from a depth of 4,390 to 4,570 feet. The top of the Devonian Guilmette(?) Formation was encountered at 4,738 feet. **Balcron Oil** recorded oil stains in dolomite and quartz sand in the Guilmette(?) Formation from 5,340 to 5,350 feet in the **Balcron Bacon Flat No. 24-17** well. Another **Balcron Oil** well, the **Balcron Bacon Flat No. 24-17**, had shows from 5,347 to 5,435 feet (TD) in dolomite in the Guilmette(?) Formation.

The **Apache Bacon Flat No. 42-20** well produced traces of oil from 2,260 to 2,670 feet, and from 3,050 to 3,900 feet in valley fill, and had oil shows from 4,750 to 4,830 feet in dolomite in the Devonian Guilmette Formation. The **Quinn Canyon** well drilled by **Trail Mountain, Inc.** produced oil shows at 3,500 (the Tertiary/Paleozoic unconformity), and again in Devonian dolomite at 4,120 feet.

The **Yankee Mine Unit No. 27-23X** drilled by **Pioneer Oil and Gas** in White Pine County yielded numerous shows from 1,900 to 4,562 feet in the Diamond Peak, Joana Limestone, Pilot Shale, and Guilmette formations (listed from near surface to TD).

New Producers

Petroleum Corp. of **Nevada Blackburn No. 18** is the new producer in the **Blackburn field** in Eureka County. Since November 1992, it has been producing 26.9 gravity oil with no water. The production zone is from 6,708 to 6,748 feet in the Mississippian Chainman Shale. The well produced 44,895 barrels of oil in 31 days in December.

A new producer in Eureka County's **Tomera Ranch field** is **Foreland Corp. S. P. Land Co. No. 1-5R** well, a wildcat which replaces the No. 1-5 well as Foreland's producer in that field. The new well came on line in July and during the month of December produced 175 barrels of 25 gravity oil and almost 2,000 barrels of water in 31 days. The production zone is from 1,630 to 1,660 and from 1,864 to 1,933 feet in the Tertiary Indian Well Formation.

Makoil, Inc. has added another producer to the **Trap Spring field** in Nye County with the **Munson Ranch No. 13-21X** well. Production began in May in a zone from 3,988 to 4,398 feet in Tertiary Garrett Ranch volcanics. The well was on production only 6 days in December yielding 328 barrels of 27 gravity oil and 45 barrels of water.

FEDERAL OIL AND GAS LEASES IN EFFECT IN FISCAL YEARS 1991 AND 1992[1]

County	NUMBER OF LEASES						ACREAGE					
	Competitive		Noncompetitive		Simultaneous[2]		Competitive		Noncompetitive		Simultaneous	
	FY91	FY92	FY91	FY92	FY91	FY92	FY91	FY92	FY91	FT92	FY91	FY92
Carson City	0	0	0	0	0	0	0	0	0	0	0	0
Churchill	0	0	11	3	1	2	0	0	22,102	5,085	508	5,278
Clark	0	0	16	12	14	9	0	0	13,530	10,683	17,806	10,913
Douglas	0	0	0	0	0	0	0	0	0	0	0	0
Elko	34	27	240	199	132	72	46,358	37,879	470,843	371,708	375,837	223,963
Esmeralda	0	0	0	0	0	0	0	0	0	0	0	0
Eureka	105	84	176	191	180	151	168,134	124,903	357,522	364,892	671,968	546,948
Humboldt	0	0	2	1	0	0	0	0	1,319	679	0	0
Lander	2	0	31	7	2	2	2,560	0	61,009	11,263	12,025	12,025
Lincoln	30	37	299	230	65	50	53,218	66,400	653,114	524,249	227,638	186,404
Lyon	0	0	0	0	0	0	0	0	0	0	0	0
Mineral	0	0	0	0	0	0	0	0	0	0	0	0
Nye	231	248	414	422	440	391	231,011	239,232	902,030	904,585	879,518	738,696
Pershing	0	0	6	5	0	0	0	0	8,686	8,046	0	0
Storey	0	0	0	0	0	0	0	0	0	0	0	0
Washoe	0	0	2	2	0	0	0	0	1,713	1,713	0	0
White Pine	166	161	290	316	316	257	248,524	243,511	642,106	746,290	1,006,756	793,309
TOTAL	568	557	1,487	1,388	1,150	934	749,805	711,925	3,133,974	2,949,193	3,192,056	2,517,536

[1]Data from the U.S. Bureau of Land Management FY90 = Oct. 1990-Sept. 1991; FY91 = Oct. 1991-Sept. 1992

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

PRODUCTION OF NEVADA'S OIL FIELDS[1] (barrels)

Field	Thru 1986	1987	1988	1989	1990	1991	1992	TOTAL
Eagle Springs (1954)[2]	3,809,048	45,821	43,451	47,272	41,609	42,043	46,729	4,075,973
Trap Spring (1976)	6,792,037	432,690	441,832	629,281	939,910	690,257	554,410	10,480,417
Currant (1979)	641	0	0	0	0	0	0	641
Bacon Flat (1981)	209,649	84,156	20,855	0	0	0	178,845	493,505
Blackburn (1982)	963,250	318,553	351,582	272,119	238,240	203,023	231,719	2,578,486
Grant Canyon (1983)	5,260,431	2,221,642	2,280,323	2,076,272	2,345,858	2,124,021	2,499,831	18,808,378
Kate Spring (1986)	1,521	5,494	75,725	188,408	434,349	339,310	203,274	1,248,08
Tomera Ranch (1987)	—	1,032	5,221	225	2,605	3,067	2,295	14,4450
N. Willow Creek (1988)	—	—	9,457	4,036	3,169	2,365	4,491	23,518
Three Bar (1990)	—	—	—	—	3,601	17,684	362	21,647
Duckwater Creek (1990)	—	—	—	—	3,095	4,190	2,764	10,049
TOTAL	17,036,577	3,109,388	3,288,446	3,217,613	4,012,436	3,425,960	3,724,720	37,751,140
Change from previous year		7%	4%	0%	25%	-15%	9%	

[1]Net production compiled from Producers' Reports filed with the Nevada Department of Minerals. Reported sales may vary slightly.
[2]Field discovery date.

Balcron Oil added a new producer to the **Bacon Flat field** with the **Balcron Bacon Flat No. 23-17** well. Production began in September from a zone 5,154 to 5,240 (TD) feet in dolomite in the Guilmette Formation. In December, the well produced 57,000 barrels of 28 gravity oil and no water in 31 days.

The **Grant Canyon No. 9**, Apache Corp.'s new producer in the **Grant Canyon field**, replaced the Grant Canyon No. 7 well as the most prolific free-flowing vertical onshore oil well in the conterminous United States. The No. 9 is producing almost a third more oil than the No. 7 well from two intervals (2,160 to 2,340 feet and from 3,591 to 3,610 feet) in Devonian rocks. The top of the Guilmette Formation is at 3,596 feet. First production was in April 1992. December production totaled 126,000 barrels of 26 gravity oil with no water in 31 days.

Oil and Gas Production

Nevada oil production increased by 9% in 1992 compared to the previous year. The total net oil produced in 1992 was 3,724,720 barrels from 10 fields, according to the Producer's Monthly Reports filed with the Nevada Department of Minerals. The Grant Canyon Nos. 7 and 9 wells accounted for over 67% of the state's annual 1992 production. The Grant Canyon field has contributed almost 50% of Nevada's total oil production, having produced nearly 19 million barrels of crude since the first production in September 1983.

A total of 29,543 thousand cubic feet (mcf) of gas was produced in 1992 and used to operate production and related equipment at the lease sites of Apache Corp. and Western General, Inc.

The average net wellhead price for Nevada crude in 1992 was $12.36 (John Snow, Bureau of Land Management, Nevada State Office). Nevada crude oil is transported by tank trucks to several refineries: the Petro Source Refining Corp's 8,000 barrel/day refinery and asphalt storage plant at Currant in Railroad Valley; the Petro Source Refining Partners' asphalt storage facility and refinery (used only a few days a month for refining) at Tonopah; the Petro Source Refinery in Salt Lake City, Utah; and Crysen Refining, Inc. at Woods Cross, Utah (presently refining only Pine Valley crude oil). Most Nevada oil is used to make diesel fuel, kerosene, stove oil, and asphalt.

Closures

Of the 72 wells capable of producing, 14 were shut-in for 6 months or more during 1992. Several operators continued to suspend production on their wells in various fields in Railroad Valley. Under a 1986 policy authorized by the Mineral Leasing Act of 1920, any oil and gas leaseholder with wells on federal land may opt to suspend production temporarily, rather than prematurely abandon the lease because of low domestic oil prices. This policy is meant to conserve domestic oil and gas reserves and provide for the collection of royalties and taxes on these leases in the future.

Apache Corp. suspended production on the **Bacon Flat No. 1** well all year.

In the Trap Spring field, **Makoil, Inc.** suspended production all year on the **Zuspann Nos. 24-1** and **24-3**, the **Britton 13-21**, and the **J.N. Fed. No. 1** wells. **J.R. Bacon Drilling** suspended production on the **Munson Ranch No. 13-46**, the **Munson Ranch No. 14-24** and the **No. 13-14** wells for 6 months or more during the year. **David M. Evans** suspended production on the **Trap Spring No. 12-13** all year.

In the Eagle Springs field, **Kanowa Petroleum, Inc.** suspended production on the **No. 62-35** well all year and **Draycutt Corp.** suspended production on the **No. 1-36** well from January through October.

Apache Corp. suspended production on the **Grant Canyon No. 3** well from July through December.

Production of Nevada's major oil fields; Tomera Ranch, North Willow Creek, Three Bar, and Duckwater Creek fields are not included.

J.R. Bacon suspended production on the **Tomera Ranch No. 33-1** well for 8 months in 1992 along with **Trail Mountain, Inc.** (formerly The Gary Williams Co.) which suspended production on the **No. 25-A** well for the same length of time.

U.S. Oil Production and Consumption

According to the American Petroleum Institute in its *Monthly Statistical Report* (January 1993) deliveries of petroleum products rose in 1992, the first time since 1988, but still didn't reach the historic peaks of the 1970s. Deliveries of petroleum products in the U.S. averaged 16,716,000 barrels a day in 1992, an increase of 1.6% from 1991 totals (Petroleum Information, 1-19-93, p. 2).

U.S. Petroleum demand is expected to increase another 1.9% in 1993, and an additional 1.2% in 1994. The leading factors in the increased demand are anticipated growth in transportation and heating fuels as well as growth in industrial output according to a report released in February 1993 by the Energy Information Administration (Petroleum Information, 2-18-93, p.1)

According to the study entitled *Entry and Exit in U.S. Petroleum Refining 1948-1992* by the American Petroleum Institute, the number of U.S. refineries and companies operating refineries has decreased by half over the past 45 years; however, over the same period, the operating capacity of domestic refineries increased substantially, from slightly less than 6 million barrels per day to nearly 15 million barrels per day (Petroleum Information, 3-19-93, p. 4).

A background paper prepared recently by the American Petroleum Institute's Policy Analysis Department underscores the shift by 18 leading U.S. oil companies in upstream expenditures (exploration, development and property acquisition) from the U.S. to international areas over the past 11 years (1981-1991). Domestic exploration expenditures have fallen by about 50% since the mid-1980s and in 1991 were the lowest of the entire 11-year period. Foreign exploration expenditures have increased 55% since 1987 (Petroleum Information, 3-24-93), p. 4).

In October, a report was released by the D.O.E. that should be cause for optimism about the future of the domestic oil industry. *An Assessment of the Oil Resources Bases of the U.S.*, commissioned by the D.O.E. and coordinated by the D.O.E.'s National Institute for Petroleum Energy Research and the Texas Bureau of Economic Geology, concluded that U.S. recoverable crude oil resources could range from 99 to 204 billion barrels at prices of $27 or less, compared with a current proven DOE reserve estimate of 24.7 billion barrels. The panel of experts coordinating this study concluded that much of the increase in reserves would likely come from new discoveries in the lower 48 states and Alaska, estimating that about 43 to 90 billion barrels could come from undiscovered resources, and another 31 to 89 billion barrels of oil could come from expanding the existing fields.

Geothermal Energy

by Ronald H. Hess

Forty geothermal well permits were issued by the Nevada Department of Minerals during 1992: they include 14 industrial class production wells, 4 domestic class, 21 observation or gradient wells, and 1 injection well. Thirty-six geothermal wells are reported to have been drilled during 1992 with a total footage drilled of approximately 59,000 feet. Seventeen of the wells drilled were production wells with a total footage drilled of approximately 29,000 feet.

During 1992 there were 156 noncompetitive and 53 competitive federal geothermal leases totaling 348,000 acres, a decrease of 5,397 acres from 1991. Federal leases generated $435,000 in rental fees, $217,500 of which was returned to the State of Nevada (State Office, U.S. Bureau of Land Management).

Geothermal energy production from federal lands in Nevada totaled 1.1 million megawatt-hours (MWh) gross in 1992; net production was 960,000 MWh; the sales value of this production is approximately $83,000,000. Federal production royalties generated $2,000,000 of which $1,000,000 was returned to the State. By regulation, half of all funds collected by the Bureau of Land Management from federal geothermal leases and production royalties are returned to the State. In 1992 geothermal lease returns ($217,000) and royalty returns ($1,000,000) to Nevada totaled $1,217,000 (Rich Hoops, State Office, U.S. Bureau of Land Management).

Industrial-class (power generating) wells drilled in Nevada, 1980–1992.

Rated capacity and average net output of Nevada geothermal plants, 19841992. Average net output is annual sales in megawatt-hours divided by the number of hours in a year (8,760).

Total Nevada geothermal electrical production from both federal and fee lands combined in 1992 was 1,219,700 MWh gross; net production was 1,034,800 MWh with an approximate sales value of $85,000,000. Production capacity from the currently developed geothermal resources at ten existing geothermal power plants in Nevada is 191.7 MW. These values represent an 11% increase in sales value of the power sold and an increase in installed power production capacity of 31% over 1991.

It was an exciting year for geothermal development in Nevada with 17 production wells drilled or reported completed and a total of 36 geothermal wells of all classes drilled in 1992. An additional 45.1 MW of geothermal capacity was brought on line and, as this publication goes to press, the construction of the Rye Patch geothermal plant is well under way. In 1993 we will see Nevada surpass 200 MW of installed geothermal power production capacity as its geothermal industry continues to develop and grow. Sierra Pacific Power Co. has three Executed Long Term contracts that should be coming on line during the next several years, totaling 41.3 MW. Plans are also being developed to add another 24 MW of production capacity at Steamboat Springs near Reno and an 80-MW geothermal power plant is proposed at the Fallon Naval Air Station.

The Bradys Hot Springs geothermal power plant came on line in July 1992. The plant is operated and maintained by Oxbow Power Services, Inc. The plant uses 5.4 million pounds of brine per hour produced from six of eight production wells. The production

Digitized by Google

DIRECTORY OF GEOTHERMAL POWER PLANTS

Plant name (year on line)	Production capacity[1] (MW)	1992 Production (MWh)		Location	Operator	Remarks
		Gross	Net (sales)			
Beowawe (1985)	16.0	138,196	104,415	S13,T31N,R47E	Oxbow/Beowawe Geothermal Power Co. P.O. Box 6 Beowawe, NV 89821	Production from three wells. Resource temperature 430°F.
Bradys Hot Springs (1992)	21.1	69,999	54,563	S12,T22N,R26E	Oxbow Power Services, Inc. P.O. Box 649 Fernley, NV 89408	Plant started operations on July 30, 1992. Resource temperature 342° to 360°F. Production zone 1,000 to 1,400 feet deep.
Desert Peak (1985)	8.7	85,364	76,906	S21,T22N,R27E	Western States Geothermal Co. P.O. Box 2627 Sparks, NV 89432-2627	Resource temperature 400°F. Well-head temperature 330°F.
Dixie Valley[2] (1988)	66.0	535,220	483,307	S7,T24N,R37E S33,T25N,R37E	Oxbow Geothermal Corp. 5250 South Virginia St. Suite 304 Reno, NV 89502	Estimated 30 to 60 year reservoir reserve with a 200+ MW production capacity. Now producing from six wells.
Empire (1987)	3.6	17,783	12,752	S21,T29N,R23E	OESI/AMOR II P.O. Box 1650 Fallon, NV 89407	Producing from a liquid-dominated geothermal source at 265° to 278°F.
Soda Lake No. 1 (1987) and Soda Lake No. 2 (1991)	16.6	107,315	84,419	S33,T20N,R28E	OESI/AMOR III P.O. Box 1650 Fallon, NV 89407	Producing from a liquid-dominated geothermal source at 320°F.
Steamboat I, I-A (1986) and Steamboat II, III (1992)	31.1	104,574	79,790	S29,T18N,R20E	S.B. Geo, Inc. P.O. Box 18087 Reno, NV 89511	Plants II and III came online in late 1992 with a gross capacity of 24 MW.
Stillwater (1989)	13.0	72,707	59,692	S1,T19N,R30E S6,T19N,R31E	OESI/AMOR IV P.O. Box 1650 Fallon, NV 89407	Producing from a liquid-dominated geothermal source at 310° to 340°F.
Wabuska (1984)	1.2	6,262	3,860	S15,16,T15N, R25E	Tad's 10 Julian Lane Yerington, NV 89447	Plant operates on geothermal fluids at 224°F from 350-foot depth.
Yankee Caithness (1988)	14.4	82,280	76,096	S5,6,T17N,R20E	Yankee Caithness J.V.L.P. P.O. Box 18160 Reno, NV 89511	Resource temperature 340°F.
TOTAL	191.7	1,219,700	1,035,800			

[1]Production capacity from currently developed geothermal resources.
[2]Gross output of the Dixie Valley plant occasionally exceeds 66 MW.
Sources: NBMG Special Publication MI-1991; Operators, 1992; and NBMG files.

View from S. B. Geo, Inc., office overlooking Steamboat Plants II and III with the Virginia Range in the background. *R. H. Hess photo.*

S. B. Geo, Inc., Steamboat Plant II, Unit 2. *R. H. Hess photo.*

Digitized by Google

NONDOMESTIC GEOTHERMAL WELLS REPORTED AS DRILLED OR COMPLETED IN NEVADA DURING 1992

Area	Company	Well name	Location	Type
Churchill County				
Bradys Hot Springs	Brady Power Partners	Exploration Well #17-31	SW1/4 SE1/4 S31,T23N,R27E	Injection
Bradys Hot Springs	Brady Power Partners	Exploration Well #18B-31	SW1/4 SW1/4 S31,T23N,R27E	Injection
Bradys Hot Springs	Brady Power Partners	Exploration Well #18D-31	SW1/4 SW1/4 S31,T23N,R27E	Injection
Bradys Hot Springs	Brady Power Partners	Exploration Well #68A-1	SW1/4 SE1/4 S1,T22N,R26E	Injection
Bradys Hot Springs	Brady Power Partners	Exploration Well #81A-1	NE1/4 NE1/4 S1,T22N,R26E	Injection
Bradys Hot Springs	Brady Power Partners	Exploration Well #81B-1	NE1/4 NE1/4 S1,T22N,R26E	Injection
Bradys Hot Springs	Brady Power Partners	Observation Well #18-31	SW1/4 SW1/4 S31,T23N,R26E	Observation
Bradys Hot Springs	Brady Power Partners	Observation Well #22-13	NW1/4 NW1/4 S31,T22N,R26E	Observation
Bradys Hot Springs	Brady Power Partners	Observation Well #26-12	NW1/4 SW1/4 S12,T22N,R26E	Observation
Bradys Hot Springs	Brady Power Partners	Observation Well #68B-1	SW1/4 SE1/4 S1,T22N,R26E	Observation
Bradys Hot Springs	Brady Power Partners	Observation Well #81-1	NE1/4 NE1/4 S1,T22N,R26E	Observation
Bradys Hot Springs	Brady Power Partners	Observation Well #81-11	NE1/4 NE1/4 S11,T22N,R26E	Observation
Bradys Hot Springs	Brady Power Partners	Production Well #46-1	SE1/4 NE1/4 S1,T22N,R26E	Production
Bradys Hot Springs	Brady Power Partners	Production Well #46A-1	SE1/4 SW1/4 S1,T22N,R26E	Production
Bradys Hot Springs	Brady Power Partners	Production Well #47A-1	SE1/4 SW1/4 S1,T22N,R26E	Production
Bradys Hot Springs	Brady Power Partners	Production Well #47C-1	SE1/4 SW1/4 S1,T22N,R26E	Production
Bradys Hot Springs	Brady Power Partners	Production Well #56-1	NW1/4 SE1/4 S1,T22N,R26E	Production
Bradys Hot Springs	Brady Power Partners	Production Well #56A-1	NW1/4 SE1/4 S1,T22N,R26E	Production
Bradys Hot Springs	Brady Power Partners	Production Well #56B-1	SW1/4 SE1/4 S1,T22N,R26E	Production
Esmeralda County				
Fish Lake Valley	Fish Lake Power Co.	FLP Well #1	NE1/4 NW1/4 S28,T1N,R36E	Temperature gradient
Fish Lake Valley	Fish Lake Power Co.	FLP Well #3	SE1/4 NW1/4 S32,T1N,R36E	Temperature gradient
Fish Lake Valley	Fish Lake Power Co.	FLP Well #4	SW1/4 NE1/4 S11,T1S,R35E	Temperature gradient
Pershing County				
Rye Patch	Rye Patch Limited Partnership	Production Well #62-28	NW1/4 SE1/4 S28,T31N,R33E	Production
Rye Patch	Rye Patch Limited Partnership	Production Well #68-21	SW1/4 SE1/4 S21,T31N,R35E	Production
Washoe County				
Steamboat	S.B. Geo, Inc.	Injection Well #35-28	NE1/4 SW1/4 S28,T18N,R20E	Injection
Steamboat	S.B. Geo, Inc.	Injection Well #46-28-2	NE1/4 SW1/4 S28,T18N,R20E	Injection
Steamboat	S.B. Geo, Inc.	Observation Well #36-28	NE1/4 SW1/4 S28,T18N,R20E	Observation
Steamboat	S.B. Geo, Inc.	Observation Well #37-28-1	SE1/4 SW1/4 S28,T18N,R20E	Production
Steamboat	S.B. Geo, Inc.	Observation Well #38-28	SE1/4 SW1/4 S28,T18N,R20E	Production
Steamboat	S.B. Geo, Inc.	Observation Well #38-28-2	SE1/4 SW1/4 S28,T18N,R20E	Production
Steamboat	S.B. Geo, Inc.	Observation Well #45-28	NE1/4 SW1/4 S28,T18N,R20E	Injection
Steamboat	S.B. Geo, Inc.	Observation Well #47-28	SE1/4 SW1/4 S28,T18N,R20E	Production
Steamboat	S.B. Geo, Inc.	Production Well #16-28	NE1/4 SW1/4 S28,T18N,R20E	Production
Steamboat	S.B. Geo, Inc.	Production Well #25-28-1	NE1/4 SW1/4 S28,T18N,R20E	Production
Steamboat	S.B. Geo, Inc.	Production Well #25-28-2	NE1/4 SW1/4 S28,T18N,R20E	Production
Steamboat	S.B. Geo, Inc.	Production Well #26-28	NE1/4 SW1/4 S28,T18N,R20E	Production

zone is 1,000 to 1,400 feet deep with a resource temperature between 342° and 360°F. The wells supply two high pressure turbines and one low pressure turbine in a two-stage system that produces 21.1 MW gross output. Geothermal fluids are injected into three of five available injection wells. (Geothermal Resources Council Bulletin August 1992 and Geothermal Hot Line December 1992, v. 21 no.1)

The Rye Patch Limited Partnership (OESI) is currently constructing a 12.5-MW binary generating plant at their site near Rye Patch Reservoir. They are continuing to drill production wells in order to develop sufficient geothermal resources for the plant. The Company has a signed purchase agreement with Sierra Pacific Power Co. with an anticipated plant online date of November 30, 1993.

San Emidio Resources continued their geothermal program in the San Emidio Desert near Gerlach. Early in 1991 San Emidio Resources signed a 5-MW 30-year geothermal power supply contract, effective 1992, and a 20-MW 30-year geothermal power supply contract, effective 1995, both with Sierra Pacific Power Co. (Geothermal Resources Council Bulletin, February 1991) The initial price to be paid for produced electricity under the long-term contracts is reported to be about 5 cents per kWh. At that time plans called for construction of a 6.5-MW binary plant to be on line by November 1992. Since then San Emidio Resources requested and was granted a suspension of the 5-MW project in order for Sierra Pacific Power Co. and San Emidio Resources to determine the feasibility of combining the 5- and 20-MW projects. (Public Service Commission of Nevada)

Construction has been completed on two 12-MW, air-cooled, binary geothermal power plants at Steamboat Springs. Steamboat II and III, operated by S.B. Geo, Inc., were brought on line in December 1992, adding 24 MW of production capacity to the S.B. Geo Steamboat facility which now has a gross production capacity of 31.1 MW. The new plants were constructed using environmentally safe technology that minimizes the overall impact of the facilities on the surrounding area. The geothermal fluid cycle is completely contained and the fluids are injected back into the ground after use. This particular type of operation is referred to as a closed binary cycle system. It is believed the existing resource will last more than 30 years and can support an additional 36 MW of production capacity. Based on this, plans are currently being studied to determine the feasibility of installing an additional 24-MW facility in the near future. (S.B. Geo, Inc.).

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

Statewide Commodity Bulletins

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

County Mineral Resource Bulletins

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

Special Publications

Oil and gas wells drilled in Nevada since 1986 (L-8)
Geothermal wells drilled since 1979 (L-5)
Nevada mining and you (SP8)
Nevada ore and concentrate buyers, custom mills, and smelters available to mine operators (L-7)
Major mines of Nevada 1992 (P-4)

NBMG maintains an open-file office with the following information available to the public:

NBMG, USGS, USBM, and DOE open-file reports on Nevada geology and mineral resources
petroleum and geothermal exploration and production
mining district records and maps
mineral resources and reserves
mineral resource assessments
core and cuttings library
mining claim data
wilderness study area reports
general geologic studies
indexes and ordering information for maps, air photos, and remote sensing imagery

Digitized by Google

The Nevada Bureau of Mines and Geology (NBMG) is a research and public service unit of the University of Nevada and is the state geological survey. NBMG is part of the Mackay School of Mines at the University of Nevada, Reno. NBMG scientists conduct research and publish reports on mineral resources, engineering geology, environmental geology, hydrogeology, and geologic mapping.

Current activities in geologic mapping and mineral resources include detailed geologic mapping and stratigraphic studies in Nevada, comparative studies of bulk-mineable precious-metal deposits, geochemical investigations of mining districts, metallic and industrial mineral resource assessments, igneous petrologic studies, hydrothermal experiments, and research on the origin of mineral deposits.

Engineering geology, environmental geology, and hydrogeology projects include investigations of earthquake hazards and related aspects of neotectonics, examination of geological issues involved in disposing nuclear and hazardous wastes, mapping of geomorphic features, radon hazard studies, studies of landslide hazards, geochemical characterization of natural environmental hazards, investigations of the fate of mercury from processing Comstock ores by amalgamation in late 1800s, and investigation of land subsidence, primarily in Las Vegas Valley.

Earth science education projects include writing guidebooks for laymen, teachers, and students; presenting lectures, short courses, and workshops; and assisting with science fairs, curriculum development, and conferences. Geologic and geographic information activities include creating and updating databases on mining districts, active mines and prospects, and geothermal and petroleum exploration and production; implementation and development of statewide geographic information systems and the digital maps needed for these systems; and maintenance of core and cuttings facilities, rock and mineral collections for research, aerial photographic imagery and maps, and extensive files on Nevada geology and resources.

NBMG cooperates with numerous state and federal agencies in conducting research and in providing geologic and resource information. Research results are published as NBMG bulletins, reports, maps, and special publications as well as in federal publications and scientific journals. In addition to addressing the needs for geologic information by conducting research, publishing reports and maps, and creating computer databases, staff members assist the public, industry, and government agencies by answering specific questions regarding Nevada geology and resources and by providing some chemical and mineralogical analyses.

Individuals interested in Nevada geology are encouraged to visit or write NBMG or call (702) 784-6691. NBMG offices are located in the west wing of the Scrugham Engineering-Mines Building on the University of Nevada, Reno campus. The Information and Publications Sales Offices are open from 10:00 a.m. until 2:00 p.m., but telephone requests and orders may be made from 8:00 a.m. until 5:00 p.m., Monday through Friday. When visiting NBMG by car please stop at the information booth just inside the Center Street entrance on the south end of campus. The attendant will issue you a temporary parking permit and give you directions to parking areas and the NBMG offices. Address mail to: Director/State Geologist, Nevada Bureau of Mines and Geology, Mail Stop 178, University of Nevada, Reno, NV 89557-0088. Our fax number is (702) 784-1709. A publication list will be sent upon request.

For more information contact:
Nevada Bureau of Mines and Geology
Email: nbmg@unr.edu
Web: http://www.nbmg.unr.edu/

Digitized by Google