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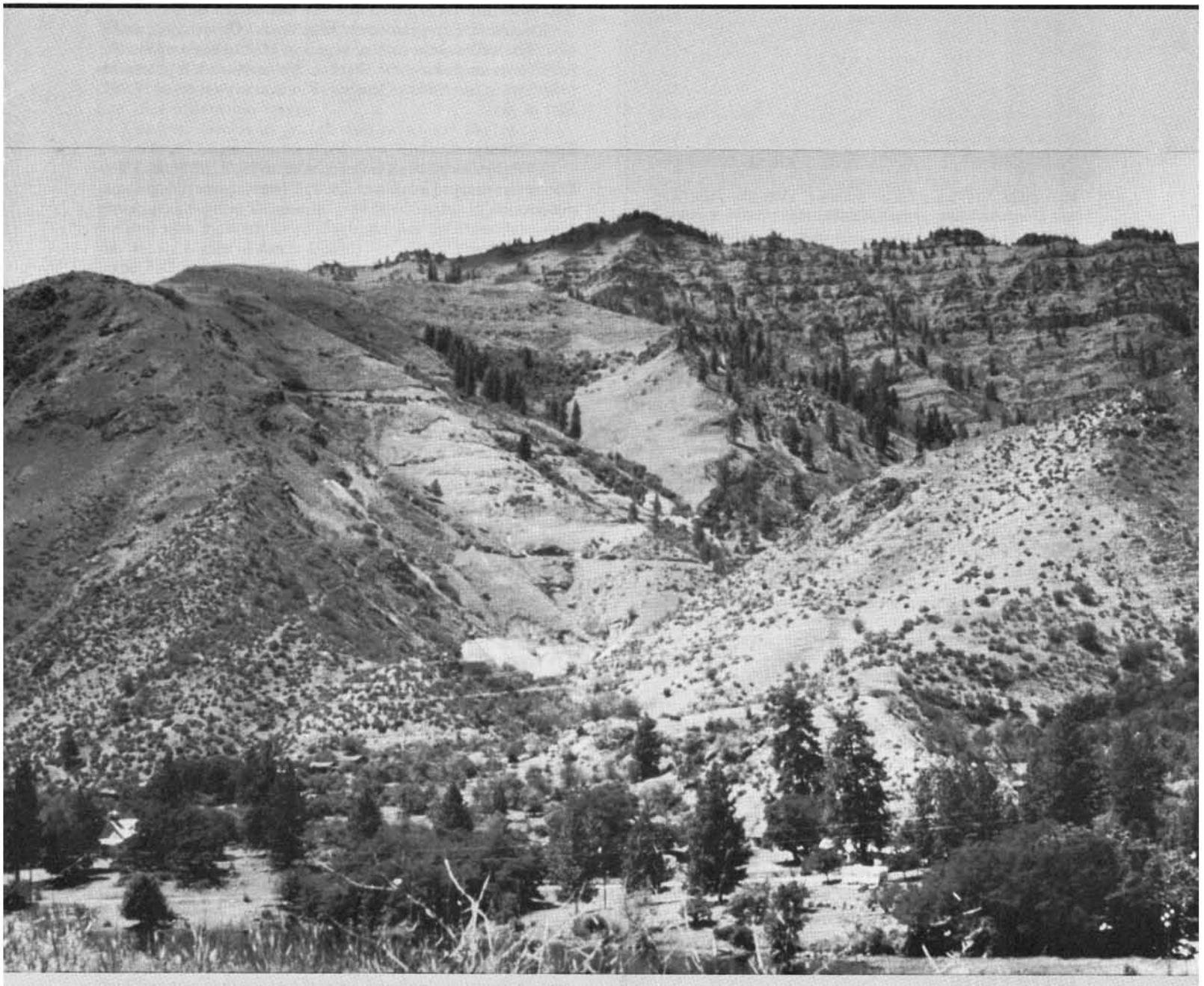

THIS MONTH:

ANNUAL SUMMARY: MINERAL INDUSTRY
IN OREGON 1984

OREGON GEOLOGY

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Oregon Geology is designed to reach a wide spectrum of readers interested in the geology and mineral industry of Oregon. Manuscript contributions are invited on both technical and general-interest subjects relating to Oregon geology. Two copies of the manuscript should be submitted, typed double-spaced throughout (including references) and on one side of the paper only. Graphic illustrations should be camera-ready; photographs should be black-and-white glossies. All figures should be clearly marked, and all figure captions should be typed together on a separate sheet of paper.

The style to be followed is generally that of U.S. Geological Survey publications (see the USGS manual *Suggestions to Authors*, 6th ed., 1978). The bibliography should be limited to "References Cited." Authors are responsible for the accuracy of their bibliographic references. Names of reviewers should be included in the "Acknowledgments."

Authors will receive 20 complimentary copies of the issue containing their contribution. Manuscripts, news, notices, and meeting announcements should be sent to Beverly F. Vogt, Publications Manager, at the Portland office of DOGAMI.

COVER PHOTO

Iron Dyke Mine area. view is to the west across the Snake River. Dumps near the center of the photo are from the pre-1928 period of mining. Main adit portal is out of view at lower left. Related article, annual summary on Oregon's mineral industry in 1984, begins on next page.

OIL AND GAS NEWS

Columbia County — Mist Gas Field

Arco has become the second operator with production at Mist with only its first well. The Columbia County 44-21, spudded on January 23 and completed February 10, flowed at over 1.8 million cfd. The well was drilled in section 21, T. 6 N., R. 5 W., to a depth of 4,500 ft. The company is drilling its second well in section 16, 1 mi north of the completed well.

Reichhold Energy recently abandoned Crown Zellerbach 42-1. The well was the only producer at Mist to be completed in the Crown sand above the Clark and Wilson sand. It produced from December 1981 to October 1984, making a total of 19,987 Mcf of gas.

Lane County

Ty R. Settles drilled Cindy I in section 23, T. 16 S., R. 5 W., during February to a depth of 1,600 ft. The well was plugged and abandoned.

Marion County

Oregon Natural Gas Development Corporation DeShazer 13-22, mentioned last month, was drilled to a depth of 2,511 ft before being plugged and abandoned. The company has two more permits in the area.

Recent permits

Permit no.	Operator, well, API number	Location	Status, proposed total depth (ft)
289	Reichhold Energy Crown Zellerbach 34-26 009-00139	SE¼ sec. 26 T. 5 N., R. 4 W Columbia County	Location; 5,500.
290	Reichhold Energy Columbia County 23-35 009-00140	SW¼ sec. 35 T. 7 N., R. 5 W Columbia County	Application; 2,800
291	Hutchins and Marrs Discovery I 019-00031	NW¼ sec. 17 T. 30 S., R. 9 W Douglas County	Application; 6,000

□

In memoriam: Ernest Howard Lund, 1915-1985

Ernest Howard Lund, retired professor of geology at the University of Oregon, died February 16 at his home in Astoria, Oregon. He was a native of Glenwood, Washington, and received his early education in Oregon. After graduate studies in Minnesota and a period of teaching at the University of Florida, Lund returned to Oregon to join the faculty of the Department of Geology at the University of Oregon in Eugene. He remained there for 20 years until his retirement in 1977.

At Eugene, Lund was chairman of the University's General Science Program for several years and the University's representative to the Malheur Environmental Field Station in eastern Oregon. He conducted annual field trips to the Malheur area to study geology and natural history that received high praise from both student and faculty participants.

Lund's research, particularly in his later years at the University, focused on the geology and landforms of the Oregon coast. His numerous publications on coastal geology, many of them printed in the *Ore Bin*, are still standard reference works for anyone studying the geology of the Oregon coast.

Ernest Lund will be remembered by his many friends for his good humor, his high personal and academic standards, and his honesty and loyalty. He will be greatly missed.

— Ewart M. Baldwin

Mineral industry in Oregon, 1984

by Howard C. Brooks, Len Ramp, Mark L. Ferns, and Jerry J. Gray, Oregon Department of Geology and Mineral Industries

INTRODUCTION

The annual value of Oregon's mineral production in recent years is shown in the accompanying figure and graph. The high of $172 million in 1980 was followed by a sharp decline in 1982 to $120 million. This drop was due to a decrease in demand for construction materials and a related slump in metals prices that led to a shutdown of the Hanna Nickel Mine at Riddle in April 1982. The nickel mine reopened in November 1983, and the effects of the reopening and the increasing demand for construction materials are shown by the increases in the 1983 and 1984 production values.

Cement, sand and gravel, and stone are the principal products of Oregon's mineral industry. Nickel from the Hanna operation is the only metal that has been produced in significant quantity for many years. The total value of base and precious metals produced in Oregon in 1984 is estimated at about $1.5 million, with most of the production from the Iron Dyke and Bay Horse Mines in Baker County.

MINING ACTIVITY

Metals

A number of small gold placers were active in Baker and Grant Counties in northeastern Oregon and Josephine and Douglas Counties in southwestern Oregon. Few produced more than 50 oz of gold, and most probably produced less than 10 oz. The most productive placer operations in eastern Oregon were on Pine Creek (4)* near Hereford and on Clarks Creek (5) near Bridgeport, both in Baker County. Numerous small placer operations continued to be active in Josephine County, including several on Josephine Creek (20) and its tributaries, Canyon Creek and Fiddler Gulch. Sucker Creek (21) continued to be worked in several places. There were also operations on Democrat Gulch (22) and Althouse Creek (23). The semi-cemented outwash gravels of Democrat Gulch (22) near Holland were worked by shafts and drift mining along bed rock. There were also several placer operations in the Galice area (17) and along Galice Creek, Rocky Gulch, Taylor Creek, and the Old Channel Mine (18). In Douglas County, some placer activity continued along Cow Creek (16) and its tributaries. One operation on Coffee Creek (15) northwest of Tiller has been active for four years.

*All mine numbers in this section refer to "Active Mines" on the location map and in Table 1.

OREGON'S MINERAL PRODUCTION
MILLIONS OF DOLLARS

	ROCK MATERIALS SAND & GRAVEL, STONE	OTHER MINERALS & METALS CEMENT, NICKEL, PUMICE, ETC.	NATURAL GAS	TOTAL
1984	87	42	8	137
1983	82	41	10	133
1982	73	37	10	120
1981	85	65	13	163
1980	95	65	12	172
1979	111	54	+	165
1978	84	44	0	128
1977	74	35	0	109
1976	77	35	0	112
1975	73	33	0	106
1974	75	29	0	104
1973	55	26	0	81
1972	54	22	0	76
1971	56	22	0	78
1970	48	20	0	68

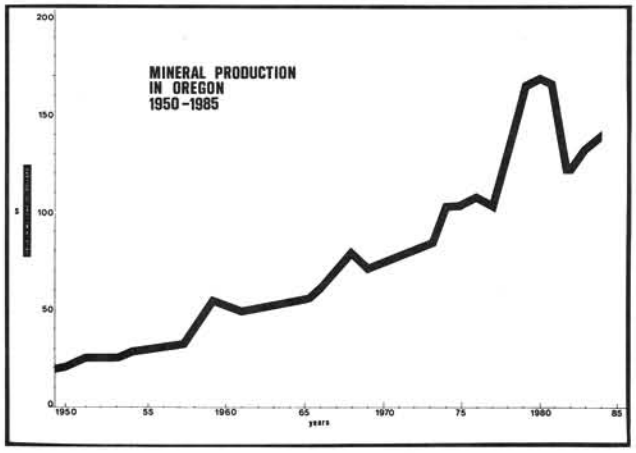
Summary of mineral production in Oregon for the last 15 years. Data for 1984 derived from U.S. Bureau of Mines annual preliminary Mineral Industry Survey *and Oregon Department of Geology and Mineral Industries natural gas production statistics.*

Cherokee Mining Company's placer operation on Elk Creek in Baker County.

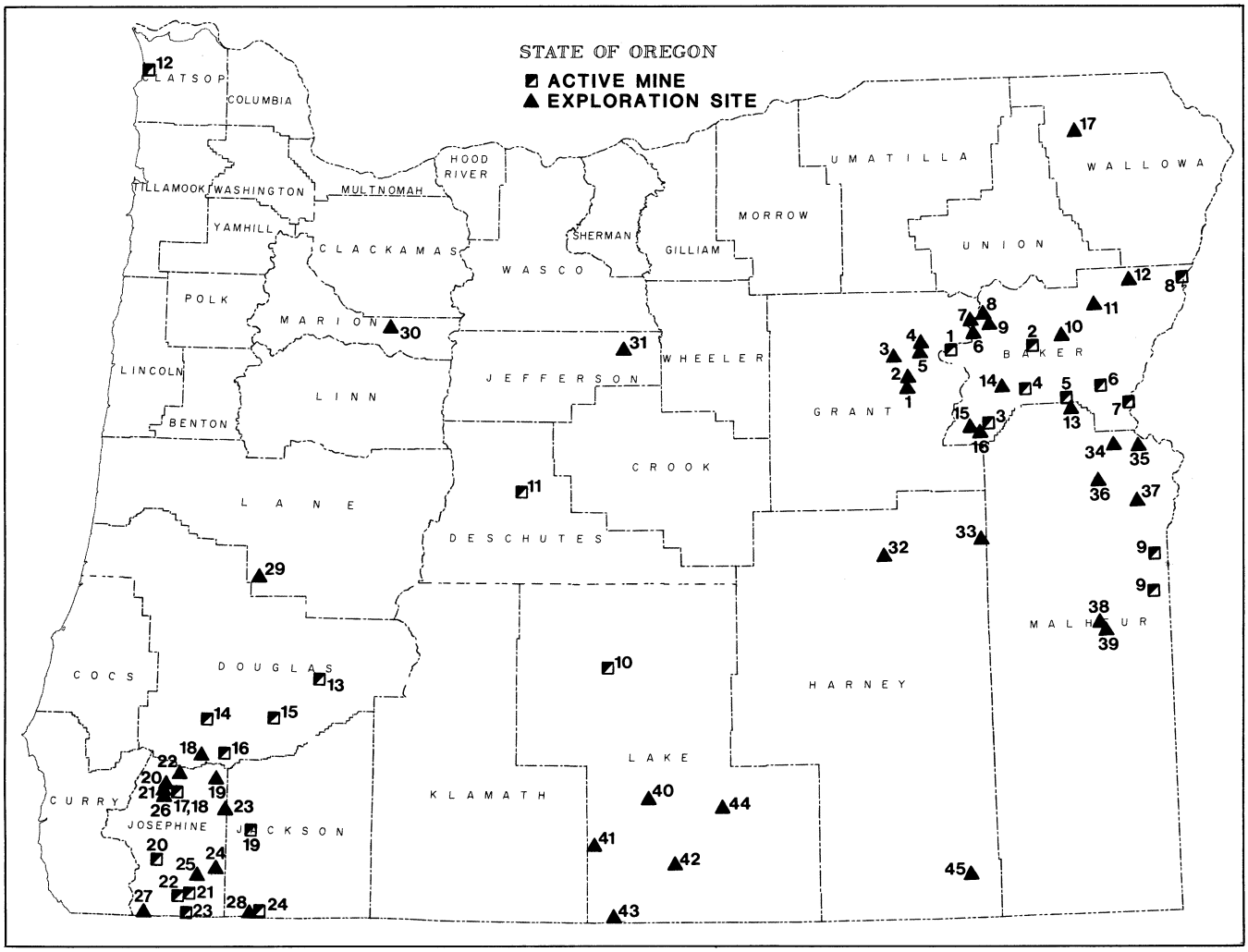
Lode gold and silver and base metal production was mainly from the Iron Dyke (8), Bay Horse (7), and Thomason Mines (3) in Baker County and the Pyx Mine (1) in Grant County, all of which were operated only part of the year.

The Iron Dyke and Bay Horse Mines were each operated by Silver King Mines, Inc., for about six months during 1984. The ore was trucked to Silver King's mill at the company's Copper Cliff Mine near Cuprum, Idaho. Both mines were closed near the end of August, and the mill was closed after treatment of the ore was completed.

The Iron Dyke is an old mine that produced 7,000 tons of copper, 35,000 oz of gold, and 256,000 oz of silver prior to 1928. Texas Gulf acquired the property in 1976 and conducted an extensive diamond drilling program. In 1979, Silver King acquired one-third interest in the property and began operation of the mine; in 1983, they bought out Texas Gulf. The mine was operated from the fall of 1979 until December 19, 1981. It was closed from then until March 1984 due to low gold prices. According to company reports, 1984 production was about 6,000 tons averaging 0.26 oz of gold, 1.4 oz of silver, and 2.3 percent copper. Reserves are about 20,000 tons averaging 0.3 oz of gold and 3 percent copper. No exploration or development occurred at the Iron Dyke in 1984. Mineralization is of volcanogenic origin and is associated with volcanic mudflow deposits of Permian age in the Seven Devils Group.



Mineral production in Oregon between 1950 and 1984.



EXPLANATION

ACTIVE MINES (half-filled square)

1. Pyx (Au, Ag)
2. Elk Creek placers (Au, Ag)
3. Thomason Mine (Au, Ag)
4. Pine Creek placers (Au, Ag)
5. Clarks Creek placers (Au, Ag)
6. Ash Grove Cement West (cement, limestone)
7. Bay Horse Mine (Ag)
8. Iron Dyke Mine (Au, Ag, Cu)
9. Teague Mineral Products (bentonite, zeolite)
10. Oil-Dri West (diatomite)
11. Cascade Pumice, Central Oregon Pumice (pumice)
12. Clatsop Peat (peat)
13. Quartz Mountain Silica (silica)
14. Nickel Mountain Mine (nickel)
15. Coffee Creek placers (Au)
16. Cow Creek placers (Au)
17. Galice Creek, Rocky Gulch placers (Au)
18. Old Channel placer (Au)
19. Bristol Silica (silica, limestone)
20. Josephine Creek, Canyon Creek, Fiddler Gulch placers (Au, Pt)
21. Sucker Creek placers (Au, Ag)
22. Democrat Gulch (Au, Ag)
23. Althouse Creek placers (Au, Ag)
24. Steatite of Southern Oregon (soapstone)

EXPLORATION SITES AND AREAS (solid triangle)

1. Cougar Ridge area (Au, Ag)
2. Dixie Meadows Mine (Au, Ag)
3. Susanville area (Au, Ag)
4. Sunrise Butte area (Au, Ag)
5. Tempest Mine (Ag)
6. Bald Mountain-Ibex Mines (Au, Ag)
7. Elk Heaven (Au, Ag)
8. Meadow Lake area (Au, Ag)
9. North Pole-Columbia Lode (Au, Ag)
10. Friday Mine (Au, Ag)
11. Keating area (Au, Ag, Cu)
12. Cornucopia Mine (Au, Ag)
13. Sunday Hill Mine (Au, Ag)
14. Hereford area (Au, Ag)
15. Record Mine (Au, Ag, Cu)
16. Grouse Springs area (Cu, Mo)
17. Grande Ronde lignite field (lignite)
18. McCullough Creek area (Au, Ag, Cu, Zn)
19. Greenback Mine (Au, Ag)
20. Almeda Mine (Au, Ag)
21. Yankee silver prospect (Ag)
22. Big Yank Lode (Goff Mine) (Au, Ag, Cu, Pb, Zn)
23. Ida Mine (Au, Ag)
24. Jones Marble (marble)
25. Babcock prospect (Au, Ag, Cu, Co)
26. Sugar Pine Mine (Au, Ag)
27. Turner Albright (Au, Ag, Cu, Co)
28. Squaw Creek area (Blue Ledge) (Au, Ag, Cu)
29. Hobart Butte (clay, Au, Ag)
30. North Santiam district (Au, Ag, Cu, Pb, Zn)
31. Rejax (Au, Ag)
32. Idol City (Au, Ag)
33. Eagle Picher (diatomite)
34. Birch Creek (Au)
35. Lackey prospect (Au)
36. Hope Butte (Au)
37. Vale Butte (Au)
38. Quartz Mountain (Au)
39. Red Butte (Au)
40. Tucker Hill area (perlite)
41. Quartz Mountain area (Au)
42. Salt Creek area (Au)
43. Dry Creek area (Au)
44. Coyote Hills area (Au)
45. Flagstaff Butte area (Au)

Mining and mineral exploration in Oregon in 1984 (excluding sand and gravel and stone). Active mines are keyed to Table 1; exploration sites are keyed to Table 2.

Silver King's work at the Bay Horse Mine began in 1984 under a lease agreement naming Silver King and Western Lands and Resources as partners and Silver King as the operator. The property is owned by Ibex Minerals, Inc., who acquired the property in 1977. Development of the mine began about 1891. The main period of production was from 1920 to 1925, when about 145,500 oz of silver was produced from 4,895 tons of ore that was shipped to smelters at Tacoma, Washington, and Kellogg, Idaho. Mineralization is in silicified felsic volcanic rocks of the Huntington Formation of Late Triassic age. Silver-bearing tennantite is the main ore mineral. The 1984 production was about 6,000 tons averaging 12 oz of silver per ton. Company personnel report that reserves averaging about 15 oz of silver total about 20,000 tons and that chances are excellent that reserves can be expanded significantly. About 1,000 ft of underground work and 15,000 ft of drilling were done at Bay Horse in 1984.

The Pyx Mine, which is owned by Myron Woodley of Sumpter, was discovered prior to 1900. Early-day production was small. Woodley began operating the mine in 1980 and has produced a small amount of gold annually since that time. The mine, which is worked only in summer months, employs four people. The gold occurs in a narrow vein in silicic argillite and chert. Vein minerals are quartz and pyrite, and much of the gold is free. The ore is trucked to Sumpter and treated in a small gravity and amalgamation mill.

The Thomason Mine is owned by Art Cheatham of Ontario. He and two partners have been operating the mine during summer and fall months for the past six or seven years. Ore is treated in a one-ton-per-hour mill on the property. The ore occurs along a fracture zone in serpentinized ultramafic rocks. The serpentinite is hydrothermally altered and contains small amounts of quartz, carbonate, talc, pyrite, chalcopyrite, molybdenite, and free gold. The gold typically coats fractures in the altered serpentinite. Some nice specimen material has also been found. There is little or no gold in the sulfide minerals.

The Hanna nickel mine and smelter at Nickel Mountain (14) near Riddle in Douglas County was reopened last December after an 18-month shutdown and has been operating all year on a part-time basis. The smelter is using electrical power during prescribed off-peak demand periods at a special contract rate. In spite of operating with a favorable labor contract, the company is experiencing some monetary operating loss because the price of nickel has not firmed up as expected. Some of the loss is being reduced or eliminated temporarily by selecting higher grade ore for smelter feed. The high-grade ore, which is about 2 percent nickel, occurs in limited quantities, however, and cannot be produced for a very long period. Various methods of upgrading mine-run ore, including installation of a wet screening process, are being considered. In 1984, 1,872,159 tons of ore was screened and processed, and 17,628,033 lb of nickel was produced in the form of ferronickel. Ore trammed to the smelter averaged 1.20 percent nickel.

Nonmetals

The limestone quarry and cement plant near Durkee (6) in Baker County produced about 450,000 tons of cement in 1984. Oregon Portland Cement Company began operating the Durkee quarry in 1959, and until 1981 the quarry produced limestone for Oregon Portland's cement plants at Lime and Lake Oswego. In 1980, a new plant was built at the Durkee site, and the clinker-producing facilities at Lime and Lake Oswego were phased out. The plant at Lime is now used only for bagging, and the Lake Oswego plant is used as a distribution facility. Oregon Portland was taken over by Ash Grove Cement Company in late 1983, and in July 1984 the name was changed to Ash Grove Cement West, Inc. The plant at Durkee has an annual capacity of 500,000 tons of cement and employs about 100 people year-round. Company management has indicated that orders for cement that have already been received will require near-capacity production through 1985. The company ships about 200,000 tons of crushed limestone annually to three Amalgamated Sugar Company sugar manufacturing plants in Idaho and one at Nyssa, Oregon. Oregon Portland Cement Company was organized in 1915 and began producing cement in 1916 at the Lake Oswego plant. Production at Lime began in 1923.

Jettystone is loaded at the quarry of Kiewit Pacific Company near Mapleton in Lane County. The stone will be used in extending jetties at the mouth of the Siuslaw River.

At Adrian, Oregon Teague Minerals (9) continued to produce bentonitic clay and zeolite for various uses. Bentonite production has been at the rate of about 25,000 tons per year. About 10,000 tons of zeolite were produced in 1984. The drying, grinding, and bagging plant is at Adrian. The bentonite is mined near the head of Sucker Creek, and the zeolite is from deposits near Rome.

Teague reports the development in 1984 of a new bentonite deposit that is suitable for use in oil-well drilling mud. A total of 600 core holes were drilled, and 30,000 tons of overburden were stripped. Drilling in the pit area was on 25-ft centers, and the core was sampled every 2 ft. The new bentonite bed is 20 to 25 ft thick and dips 19°.

Oil Dri West (10) continued to produce diatomite at its quarry and plant in Christmas Valley. Most of the product is used for cat litter and as an oil aborbent. Some is used an an anticaking additive in animal feeds and as a carrier for hazardous wastes. Mining, processing, packaging, shipping, and marketing of the diatomite are handled by Oil Dri. Between 30 and 35 people are employed year-round. Retailing is done through food and drug chains in 11 western states and in western Canada. The product is sold primarily in bags of sizes ranging from 5 to 50 lb each.

Quartz Mountain Silica Mine (13) in eastern Douglas County supplied high-grade silica rock for use in the production of ferrosilicon at the Hanna Nickel Company smelter. The ferrosilicon is used in the reduction of nickel ore to ferronickel. About 7,300 tons of new silica rock was mined from Quartz Mountain during the year, and material was also drawn from a stockpile of previously mined silica.

Bristol Silica and Limestone Company's mine (19) near Gold Hill produced about 24,000 tons of silica rock, limestone, dolomite, and shale during 1984. Limestone is mined from the Baxter quarry on Kane Creek. Most of the silica rock is marketed at the Dow Corning metallurgical plant in Springfield.

Steatite of Southern Oregon's (24) rate of production of

Quartz Mountain silica mine, Douglas County. View is to the east.

block soapstone for carving was slightly lower than in previous years. The mine is located on Elliott Ridge southeast of the new Applegate Reservoir. The soapstone is marketed on a worldwide basis.

Clatsop Peat Company (12) was formed to mine and market peat from a deposit 1½ mi northeast of Gearhart. The area is wetland unsuited for farming, and the peat deposit is 5 to 12 ft thick. Approximately 8 acres of cleared, nearly flat land is available for mining. Excavation will be done with floating equipment.

Pumice production was continued in the Bend area by two companies: Central Oregon Pumice and Cascade Pumice (11).

Table 1. *Active mines in Oregon, 1984*

Map no.	Name	Location	Commodity	Comments
1.	Pyx	Sec.1 T. 10 S., R. 35 E. Grant County	Au, Ag	Myron Woodley and partners continued small gold production. Ore is trucked to a small gravity and amalgamation mill in Sumpter.
2.	Elk Creek placers	T. 10 S., R. 39 E. Baker County	Au, Ag	Minor activity by several small operators.
3.	Thomason Mine	Sec. 6 T. 14 S., R. 37 E. Baker County	Au, Ag	Art Cheatham and partners. Small seasonal operation. Small gravity mill.
4.	Pine Creek placers	T. 12 S., R. 39 E. Baker County	Au, Ag	Several small operators.
5.	Clarks Creek placers	Tps. 12, 13 S., R. 41 E. Baker County	Au, Ag	Several small operators
6.	Ash Grove Cement West	Sec. 11 T. 12 S., R. 43 E. Baker County	Cement and limestone	Continued cement production at rate of 450,000 tons per year. Shipped 200,000 tons of limestone to sugar factories.
7.	Bay Horse Mine	Sec. 9 T. 13 S., R. 45 E. Baker County	Ag	Silver King Mines, Inc. 6,000 tons of ore mined and treated at Silver King mill at Cuprum, Idaho, averaged 12 oz of silver per ton.
8.	Iron Dyke Mine	Sec. 21 T. 6 S., R. 48 E. Baker County	Au, Ag, Cu	Silver King Mines, Inc. 6,000 tons of ore mined and treated at Silver King mill at Cuprum, Idaho, averaged 0.26 oz of gold and 1.4 oz of silver per ton and 2.3 percent copper.
9.	Teague Mineral Products	Sec. 29 T. 23 S., R. 46 E. Malheur County	Bentonite and zeolite	Continued production. 25,000 tons of bentonite and 10,000 tons of zeolite.
10.	Oil-Dri West	T. 27 S., R. 17 E. Lake County	Diatomite	Continued production. Diatomite used mainly for pet litter and oil absorbent.
11.	Cascade Pumice, Central Oregon Pumice	Bend area Deschutes County	Pumice	Continued production.
12.	Clatsop Peat	T. 6 N., R. 10 W. Clatsop County	Peat	Clatsop Peat Company formed to mine and market peat from deposit near Gearhart.
13.	Quartz Mountain Silica	Sec. 2 T. 28 S., R. 1 E. Douglas County	Silica	Production of 7,300 tons in 1984 for use in Hanna Nickel smelting operation.
14.	Nickel Mountain Mine	Sec. 17 T. 30 S., R. 6 W. Douglas County	Nickel	Hanna Nickel Company mine and smelter reopened in November 1983 and produced about 8,814 tons of nickel in 1984.
15.	Coffee Creek placer	Sec. 7 T. 30 S., R. 2 W. Douglas County	Au	One small operation.
16.	Cow Creek placers	T. 32 S., Rs. 5,7 W. Douglas County	Au	Minor activity.
17.	Galice Creek and Rocky Gulch placers	Secs. 25, 36 T. 34 S., R. 8 W. Secs. 2, 10, 16 T. 35 S., R. 8 W. Josephine County	Au	Several small operations.
18.	Old Channel placer	Sec. 35 T. 34 S., R. 8 W. Josephine County	Au	Continued production of placer gold from ripped-up bed rock. Four small operators.
19.	Bristol Silica	Sec. 30 T. 36 S., R. 3 W. Jackson County	Silica and limestone	Produced 24,000 tons of silica, limestone, dolomite, and shale in 1984.
20.	Josephine Creek, Canyon Creek, and Fiddler Gulch placers	Secs. 30, 36 T. 38 S., Rs. 8,9 W. Sec. 2, 11 T 39 S., R. 3 W. Josephine County	Au, Pt	Several small operations.
21.	Sucker Creek placers	Sec. 1 T. 40 S., R. 7 W. Josephine County	Au, Ag	Several small intermittent operators. Production down from recent years.
22.	Democrat Gulch	Sec. 2 T. 40 S., R. 7 W. Josephine County	Au, Ag	Semi-cemented gravels worked by shafts and drifts along bed rock
23.	Althouse Creek placers	Secs. 11, 12 T. 41 S., R. 7 W. Josephine County	Au, Ag	Several small operators
24.	Steatite of Southern Oregon	Secs. 10, 11 T. 41 S., R. 3 W. Jackson County	Soapstone	Continued production of carving-grade soapstone.

EXPLORATION AND DEVELOPMENT ACTIVITY

Metals

Most metallic mineral exploration projects in 1984 were for gold and silver. Exploration efforts were concentrated in the northeastern and southwestern parts of the state, where most of Oregon's productive precious metal mines have been located. Several major companies, however, continued to explore parts of southeastern Oregon for epithermal gold deposits.

American Copper and Nickel Company, Inc., continued exploration programs in three areas: the Susanville district (3)**, the Sunrise Butte area (4), and the Bald Mountain-Ibex Mines area (6).

The Susanville district is a small area in the western part of the Blue Mountains gold belt. Gold output of the district was mainly from placers. Lode production has been about $500,000, mostly from the old Badger Mine between 1899 and 1905. Country rocks of the district are schist, quartzite, green-stone, serpentinite, and gabbro of pre-Jurassic age. Late Jurassic quartz diorite is exposed in the northern and eastern parts of the district. Felsic dikes related to the quartz diorite are common in the mineralized areas. Most of the veins occur in schists and fill fissures paralleling the schistosity. Some of the veins are in serpentinite or along contacts between serpentinite and schist. Badger Mine worked two veins that were about 6 ft apart and that varied in width from 1 to 20 ft. Development includes a 900-ft shaft. American Copper and Nickel Company, Inc., began an exploration program in the district in 1980. Target areas include parts of the old Badger, Bull of the Woods, and Gem Mines. The work includes the rehabilitation of some underground workings, surface trenching, and drilling. Roughly 6,000 ft of diamond drilling was done last summer.

Sunrise Butte is in the western part of the Greenhorn district. Old mines in the vicinity include the Ben Harrison, Morris, and Tiger. Country rocks include quartz diorite of the Sunrise Butte Stock and a mélange of serpentinite, argillite, gabbro, and greenstone that predates the stock. Work by American Copper and Nickel Company, Inc., includes surface sampling, mapping, geophysics, and drilling. About 2,000 ft of drilling was done in 1984. Gold mineralization is associated with altered zones in quartz diorite of the Sunrise Butte stock.

The Bald Mountain and Ibex Mines are adjoining properties in the Cracker Creek mining district about 5 mi northwest of Sumpter. They are old properties that produced small amounts of gold at various times in the past. They were acquired by Nerco Minerals Company in mid-1980. Ibex Mining Company was formed as the operating company. During 1981 through 1983, 3,200 ft of old workings were reopened, and 54,000 ft of exploration diamond drilling and 2,000 ft of new underground work were done. In 1984, American Copper and Nickel Company, Inc., joined the venture and became the operating partner. About 12,681 ft of surface drilling (33 holes) was done last summer. An underground exploration program is being considered for 1985. Total cost of exploration by Nerco Minerals Company and American Copper and Nickel Company, Inc., exceeds $5 million.

**All site numbers in this section refer to "Exploration Sites and Areas" on the location map and Table 2.

Reverse circulation drilling on American Copper and Nickel Company property in the Sunrise Butte area of Grant County.

The Bald Mountain-Ibex vein is in hornfelsed argillite and chert near the margin of the Bald Mountain Batholith. It is traceable for about 3 mi and varies from 5 to 25 ft in width. It dips 60° to 80° and is composed of irregular bands and lenses of silicified argillite and chert breccia, quartz, and fault gouge. The gold is largely free in some locations and about 30 percent free in other places. Associated minerals are pyrite, arsenopyrite, tetrahedrite, pyrargyrite, and native silver. The gold to silver ratio averages about 1:10.

There was no activity at the North Pole-Columbia Lode (9) in 1984. The lode crosses Cracker Creek at Bourne, 6 mi north of Sumpter. It is a mineralized fracture zone in argillite and chert that ranges from 10 to 300 ft wide and that is traceable for 4½ mi. Five separate but adjoining mines — the North Pole, E and E, Tabor Fraction, Columbia, and Golconda — are in the 2-mi-long productive portion of the lode. The main periods of operation of all these mines were between 1894 and 1916. Total production was about $8 million. Since 1916 there have been a number of largely unsuccessful attempts to bring one or another of the mines back into production.

Four of the mines are covered by patented claims that are owned jointly by the Jevne family of Minneapolis and Boise Cascade Corporation. The property has been leased to Brooks Minerals of Lakewood, Colorado, since 1980. During 1980-1982, considerable work was done on the old E and E and North Pole segments of the lode under a joint venture agreement between Brooks and Amax Exploration, Inc. The work included mapping; rehabilitation of old workings; driving of new drifts, crosscuts, and raises; and surface and underground diamond drilling. A new crosscut adit was started with the intention of cutting the lode about 400 ft below any of the old adit levels. Because of company financial difficulties, Amax dropped out in the fall of 1982. Since that time Brooks has been looking for another joint venture partner.

M and S Associates did some exploration and development work at the Friday and Hidden Treasure Mines (10) in the Virtue gold mining district about 8 mi east of Baker. The two mines are about a quarter of a mile apart and on the same vein. Work accomplished by M and S includes some large dozer cuts and the construction of a small vat-type cyanidation plant. There has been no production. Some mineralized rock was stockpiled for treatment in the cyanide plant. Gold mineralization occurs along a fault zone in Permian or Triassic gabbro and diorite. Previous production from these mines has been small. The Hidden Treasure produced about $24,000 in gold during 1933-1938. Early development includes a 200-ft shaft at the Friday Mine and a 138-ft shaft at the Hidden Treasure Mine.

The Cornucopia Mine (12) remained inactive in 1984 as it was in 1983. The mine produced about $10 million in gold prior to World War II. The property, consisting of about 1,000 acres of patented mining claims, was leased by UNC Resources, Inc., in 1981. It was later purchased by UNC for about 900,000 shares of UNC stock. UNC reopened some of the lower level workings in 1981-1982 and planned an extensive exploration program to evaluate the downward extension of the Union-Companion vein. Because of company financial difficulties, work was terminated in late 1982, and no exploration work has been done since that time. Two employees have remained on the property.

The Sunday Hill Mine (13) in the northern part of the Mormon Basin mining district was acquired by Capri Resources Ltd. of Vancouver, B.C., in 1983. Seven diamond drill holes were drilled in 1984. Additional work is planned. Country rocks are foliated sedimentary rocks of the Burnt River Schist and

quartz diorite that intrudes the schist. The workings expose several veins consisting chiefly of quartz and gouge. Most of the existing development was done in the 1920's. Total production has been about $100,000, mostly in gold.

Manville Corporation continues to hold its Grouse Spring (16) copper-molybdenum property southwest of Unity. About 200 claims are included. In 1978-1979, some work was done by joint venture partners. Subsequently, Manville has done sufficient drilling and other types of exploration work each year to maintain assessment work. The claims cover the surface extent of a mineralized zone that is about 8 mi long and 1 mi wide. Host rocks are sedimentary rocks of the Jurassic Weatherby Formation and quartz diorite of Eocene age. The mineralized rocks have been silicified and impregnated with pyrite. Copper-molybdenum mineralization has been found locally.

In 1984, Manville Corporation acquired the old Record gold mine (15) at the northwest end of its Grouse Spring property. The Record Mine produced about $100,000 in gold prior to World War II from narrow quartz veins along the contact between quartz diorite and serpentinite. Work of reevaluating the old property has been started and will be continued in 1985.

Exploration in the Keating area (11) includes work by Ron Willden and J.L. Carroll in the vicinity of the old Mother Lode Mine which produced about 1 million lb of copper and 8,000 oz of gold in the late 1930's. Some drilling was done in 1983 and 1984.

Work continued in the McCullough Creek area (18), a gold deposit of volcanogenic origin near Glendale in southern Douglas County. Exploration was started there by Exxon in 1978. Boise Cascade joint-ventured the project in 1984. Some diamond drilling, soil geochemistry, and geophysical work have been done. Mineralization is in felsic volcanic rocks of the Rogue Formation. Boise Cascade also did some exploration work at the old Gold Note Mine situated on the Josephine-Jackson County line.

Mega Gold Resources Ltd. continued its evaluation of the Greenback gold mine (19) near the head of Tom East Creek 1½ mi north of the old settlement of Placer. The deposit was discovered in 1897. Production, which occurred primarily between 1898 and 1912, totals about $3.5 million. The country rock is greenstone. The main vein averages 20 in. in width and terminates in a fault to the west and against serpentinite to the east. Its length is more than 500 ft. The principal vein filling is quartz with calcite, pyrite, and arsenopyrite. Gold was 75-percent free milling. Geologic mapping of the area by Mega indicates 18 parallel quartz veins in a 4,500-ft-long band of greenstone.

Blue Diamond Energy Resources and Comanche Petroleum dropped their option on the Almeda Mine (20) near Galice on the Rogue River but have maintained a group of claims on the north extension of the Almeda (Big Yank) mineralized zone.

Exploration of the Yankee silver prospect (21) near Galice by Condaka Metals was completed in 1983, and the property was returned to owner George Reynolds.

Amselco obtained an exploration permit from Josephine County on 640 acres of county land adjacent to the Goff Mine in northern Josephine County along an extension of the Big Yank (22) volcanogenic sulfide mineralized zone. A drilling program is planned for early in 1985.

Score Resources ended its exploration activity at the Ida Mine (23), which is located a short distance northeast of Grants Pass, without finding sufficient reserves of gold ore.

Meridian is exploring the Babcock copper prospect (25) east of Kerby in Josephine County. This volcanogenic massive sulfide deposit has been looked at by a number of companies in recent years.

Wesley Pieren and associates are doing development work at the old Sugar Pine (26) gold mine west of Galice, where about 3,000 ft of old workings explore small quartz veins in Briggs Creek amphibolite. Work thus far has been opening old adits, sampling, and starting a new lower tunnel.

Ray Rock Mines, Inc., is continuing exploration at the Turner Albright (27) in the Waldo area in southern Josephine County. The prospect was discovered in the late 1800's. A little gold was produced from shallow workings in early days. In recent years, a lot of exploration work has been done including work by Barretta in 1980-1981 and by Noranda in 1982 and 1983. Noranda reported reserves of 3.3 million tons of rock averaging 0.114 oz per ton of gold, 0.443 oz per ton of silver, 1.46 percent copper, 3.32 percent zinc, and 0.055 percent cobalt.

Ray Rock acquired the property in 1983 and has reportedly increased slightly the reserves reported by Noranda. The Turner-Albright is a massive sulfide deposit in the Josephine Ophiolite. Surface manifestations of the deposit are two discontinuous areas of gossan, one 80 by 900 ft and the other 20 by 300 ft. Sulfides include pyrite, chalcopyrite, and sphalerite.

Freeport and Little Longlac Minerals are exploring the Blue Ledge mineralized zone in northern California and its extension into the southern Jackson County Squaw Creek drainage (28).

Exploration continued in the vicinity of the old Axehandle and Red Jacket mercury mines, now called the Rejax prospect (31), in Jefferson County. Ocelot Industries Ltd. has been prospecting epithermal gold occurrences in the area for several years. They were joined by Meridian Land and Mineral Company in 1984. Some reverse circulation drilling was done during the 1984 field season. The mercury and gold mineralization are related to low-temperature hydrothermal alteration of andesites and associated rocks of the Clarno Formation of Eocene age. Total mercury output has been about 150 flasks.

Much of the prospecting in southeast Oregon for the past several years has been for epithermal gold deposits. Most of the deposits in the northern part of Malheur County, including Birch Creek (34), Lackey (35), Hope Butte (36), Vale Butte (37), Quartz Mountain (38), and Red Butte (39), are in light-colored tuffs and tuffaceous sedimentary rocks of Miocene age. Extensive zones of silicification are common features of the deposits. Several of the deposits contain small amounts of cinnabar. Some of the prospects are associated with hot-spring sinter deposits, and some contain large calcite veins.

Major mining companies that have been active in this area in the recent past are Manville, Freeport, Homestake, and Meridian Minerals. Birch Creek, Vale Butte, and Red Butte are owned by Manville. Some drilling was done at Birch Creek and at Vale Butte by Meridian Land and Mineral Company in 1984.

The epithermal gold deposits in southern Lake County are associated with rhyolitic flows, breccias, tuffs, and shallow intrusives of Miocene age. Locally the rocks have been subjected to silicic and argillic alteration. Anaconda continued prospect drilling in the Quartz Mountain area (41) in 1984. Drilling began in 1983 and will be continued in 1985. Anaconda land holdings in the area total about 5 sq mi. For many years, the Quartz Mountain district has been known to contain small mercury deposits of the opalite type.

Noranda continued a surface diamond drill program in the Idol City area (32) north of Burns. The exploration target is a zone of gold-silver mineralization hosted in Miocene volcanic rocks. The area had previously been worked by small-scale placer mines and is one of the few areas in northeast Oregon where gold placers have been derived from mineralized Tertiary volcanic rocks.

Nonmetals

In January, Eagle Picher Industries, Inc., announced plans to invest $13 million in a diatomite mine and treatment facilities in Malheur and Harney Counties. The plant site is 7 mi west of

Table 2. *Exploration sites and areas in Oregon, 1984*

Map no.	Name	Location	Commodity	Comments
1.	Cougar Ridge area	Sec. 12 T. 12 S., R. 33 E. Grant County	Au, Ag	Continued surface exploration by Cougar Ridge Mining Company.
2.	Dixie Meadows Mine	Sec. 23 T. 11 S., R. 33 E. Grant County	Au, Ag	Some drilling by Big Turtle Mines, Inc.
3.	Susanville area	T. 10 S., R. 33 E. Grant County	Au, Ag	Continued exploration by American Copper and Nickel.
4.	Sunrise Butte area	T. 10 S., R. 34 E. Grant County	Au, Ag, Mo	Continued exploration by American Copper and Nickel.
5.	Tempest Mine	Sec. 10 T. 9 S., R. 34 E. Grant County	Ag	Continued development by Keith and Terry Lyons. Small portable mill constructed.
6.	Bald Mountain-Ibex Mines	Sec. 4 T. 9 S., R. 36 E. Baker, Grant Counties	Au, Ag	American Copper and Nickel joint-ventured with Nerco and did about 12,681 ft of diamond drilling.
7.	Elk Haven	Sec. 16 T. 8 S., R. 36 E. Baker, Grant Counties	Au, Ag	Small amount of exploration by G and A Industries.
8.	Meadow Lake area	T. 8 S., R. 37 E. Baker, Grant Counties	Au, Ag	Small amount of drilling by Manville Corp.
9.	North Pole — Columbia Lode	Sec. 32 T. 8 S., R. 37 E. Baker County	Au, Ag	No activity. Brooks Minerals, Inc., continues looking for joint-venture partner.
10.	Friday Mine	Sec. 11 T. 9 S., R. 41 E. Baker County	Au, Ag	Surface trenching, sampling, and stockpiling by M and S Associates. Small cyanide plant installed.
11.	Keating area	T. 7 S., R. 43 E. Baker County	Au, Ag, Cu	Some drilling near the old Mother Lode Mine by Ron Willden and J.L. Carroll.
12.	Cornucopia Mine	Secs. 27, 28 T. 6 S., R. 45 E. Baker County	Au, Ag	No activity. Two people employed by UNC to maintain workings reopened in 1981-1982.
13.	Sunday Hill Mine	Sec. 17 T. 13 S., R. 42 E. Malheur County	Au, Ag	Some mapping, sampling, and diamond drilling done by Capri Resources Ltd.
14.	Hereford area	T. 12 S., R. 38 E. Baker County	Au, Ag	Amax exploration program completed, and property returned to owners in 1983.
15.	Record Mine	Sec. 1 T. 14 S., R. 36 E. Baker County	Au, Ag, Cu	Property held by Manville Corp. Exploration continued.
16.	Grouse Springs area	Secs. 24, 25 T. 14 S., R. 36 E. Baker County	Cu, Mo	Small amount of drilling by Manville Corp.
17.	Grande Ronde lignite field	Northern Wallowa County	Lignite	Continued exploration of lignite field by Boise Cascade and Utah International.
18.	McCullough Creek area	Secs. 30, 31 T. 32 S., R. 6 W. Douglas County	Au, Ag, Cu, Zn	Continued exploration by Boise Cascade under joint venture with Exxon.
19.	Greenback Mine	Secs. 32, 33, 5 Tps. 33, 34 S., R. 5 W. Josephine County	Au, Ag	Continued exploration by Mega Gold Resources Ltd.
20.	Almeda Mine	Sec. 13 T. 34 S., R. 8 W. Josephine County	Au, Ag	Blue Diamond and Comanche dropped their option on the Almeda Mine but maintain a group of claims on the north extension of the Almeda zone.
21.	Yankee Silver prospect	Secs. 25, 26 T. 34 S., R. 8 W. Josephine County	Ag	Condaka Metals terminated its exploration program in 1983 and returned the property to its owner George Reynolds.
22.	Big Yank Lode	Secs. 20, 29 T. 33 S., R. 7 W. Josephine County	Au, Ag, Cu, Pb, Zn	Amselco obtained a permit to explore county land adjacent to the Goff Mine along the Big Yank Lode. Some drilling is planned.
23.	Ida Mine	Sec. 26 T. 35 S., R. 5 W. Josephine County	Au, Ag	Score Resources terminated its exploration work.
24.	Jones Marble	Sec. 31 T. 38 S., R. 5 W. Josephine County	Marble	Genstar Stone Products Company began evaluating the marble for use in paper manufacturing. Some drilling was done.
25.	Babcock prospect	Secs. 5, 8 T. 39 S., R. 6 W. Josephine County	Au, Ag, Cu, Co	Exploration by Meridian Minerals. This prospect has been investigated by several companies in recent years.

Table 2. *Exploration sites and areas in Oregon, 1984 — continued*

Map no.	Name	Location	Commodity	Comments
26.	Sugar Pine Mine	Sec. 3 T. 35 S., R. 8 W. Josephine County	Au, Ag	Some development work was done by Wes Pieren and associates.
27.	Turner Albright	Secs. 15, 16 T. 41 S., R. 9 W. Josephine County	Au, Ag, Cu, Co	Drilling continued by Ray Rock.
28.	Squaw Creek area	Secs. 5, 6, 7, 8 T. 41 S., R. 3 W. Jackson County	Au, Ag, Cu	Freeport and Little Longlac Minerals explored the Blue Ledge mineralized zone extending from northern California into the Squaw Creek area in southern Jackson County, Oregon.
29.	Hobart Butte	Sec. 31 T. 22 S., R. 3 W. Lane County	Clay, Au, Ag	Some drilling was done for refractory clay by C.I. Resources and for precious metals by Rexcon, Inc.
30.	North Santiam district	Sec. 27 T. 8 S., R. 5 E. Marion County	Au, Ag, Cu, Pb, Zn	George Atiyeh produced a small amount of mill concentrates from cleanup of underground workings at the Ruth Mine.
31.	Rejax	SE part of T. 9 S., R. 17 E. Jefferson County	Au, Ag	Meridian Land and Minerals joint-ventured with Ocelot Industries Ltd. and continued exploration of the Red Jacket and Axehandle Mines area. Some drilling was done.
32.	Idol City	Sec. 4 T. 21 S., R. 32 E. Harney County	Au, Ag	Noranda continued diamond drilling.
33.	Eagle Picher	Tps. 19, 25 S., Rs. 35, 36, 37 E. Malheur, Harney Counties	Diatomite	Announced plans to mine diatomite near Drewsey. Treatment plant will be built 7 mi west of Vale at cost estimated at $13 million.
34.	Birch Creek	Sec. 21 T. 15 S., R. 44 E. Malheur County	Au	Meridian joint-ventured with Manville Corp. and continued exploration. Some drilling was done.
35.	Lackey prospect	Secs. 22, 27 T. 15 S., R. 45 E. Malheur County	Au	Continued exploration by Freeport.
36.	Hope Butte	Sec. 21 T. 17 S., R. 43 E. Malheur County	Au	Assessment work maintained.
37.	Vale Butte	Secs. 28, 29 T. 18 S., R. 45 E. Malheur County	Au	Meridian joint-ventured with Manville Corp. and continued exploration. Some drilling was done.
38.	Quartz Mountain	Sec. 5 T. 25 S., R. 43 E. Malheur County	Au	Assesment work maintained.
39.	Red Butte	Secs. 26, 27, 34, 35 T. 25 S., R. 43 E. Malheur County	Au	Meridian joint-ventured with Manville Corp. Some surface sampling was done.
40.	Tucker Hill area	Sec. 35 T. 34 S., R. 19 E. Lake County	Perlite	Assessment work maintained by Houston International.
41.	Quartz Mountain area	T. 37 S., R. 16 E. Lake County	Au	Continued exploration by Anaconda.
42.	Salt Creek area	T. 38 S., R. 21 E. Lake County	Au	Freeport exploration ended in 1983.
43.	Dry Creek area	T. 41 S., R. 18 E. Lake County	Au	Continued exploration by U.S. Steel.
44.	Coyote Hills area	T. 35 S., R. 23 E. Lake County	Au	Reconnaissance work by Cominco and U.S. Minerals.
45.	Flagstaff Butte area	T. 39 S., R. 37 E. Malheur County	Au	Large block of claims located by Anaconda.

Vale. The mine site is in Otis Basin near Drewsey (33). Production is expected to be about 120,000 yd of diatomite per year. More than 3,000 acres is potentially mineable by open-pit methods. Diatomite reserves are sufficient to run the plant for 40 years or more. The operation will employ 30 to 35 people. Construction of the plant began this fall and is expected to be completed in mid-1986.

Exploration of the lignite deposits in northern Wallowa County continued. Exploration of the deposits was started by Utah International in the Paradise area in 1979. In mid-1982, Utah International joined with Boise Cascade Corporation to explore for lignite in a 44,000-acre block of Boise Cascade timber land approximately 18 mi north of Wallowa (17). Drilling during the 1983 and 1984 field seasons indicates that lignite underlies most of that land. The drill program included approximately 37 rotary holes and 10 core drill holes. The lignite forms two widely distributed beds near the base of the Grouse Creek sedimentary interbed in the upper part of the Columbia River Basalt Group. Only the upper lignite bed is of economic interest at present. It has an average thickness of 15.9 ft. Boise Cascade has estimated mineable reserves of 140 million tons on its land. This estimate includes only the portion of the upper lignite bed that is covered by less than 150 ft of sediment. A report on the Washington portion of the lignite field was published in 1984 by the Washington Division of Geology and Earth Resources.

Genstar Stone Products Company optioned the Jones Marble deposit (24) west of Williams in Josephine County to test the quality and quantity of white marble for possible use in making paper. They have been conducting a drilling program. □

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