OREGON GEOLOGY

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THIS MONTH:
ANNUAL SUMMARIES: MINERAL INDUSTRY AND MINED LAND RECLAMATION IN OREGON, 1983

OREGON GEOLOGY

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COVER PHOTO

Winner of the annual Outstanding Mined Land Reclamation Project award for 1983, the operations and maintenance headquarters of Multnomah County in Portland. Foreground and background of the photo show evidence of (respectively) past and ongoing mining activity. See annual report on mined land reclamation in Oregon in 1983 on page 33. (State Highway Division photo)

OIL AND GAS NEWS

Mist Gas Field

Reichhold Energy Corporation has drilled and abandoned Crown Zellerbach 23-26, located in sec. 26, T. 6 N., R. 4 W. The well was drilled to a total depth of 4,382 ft and was plugged on January 18, 1984.

Preparation is under way to build locations for and spud two offset wells to the most recent pool discovery, Columbia County 23-22. The two new locations (table below) will be located one-half mile east and one-half mile south of the new producer. Meanwhile, construction has begun on the pipeline to well 23-22.

Public hearing

On January 17, 1984, a public hearing was held in St. Helens to discuss the application for permit 255, Reichhold Energy Corporation, Columbia County 13-34A. This is a proposed well for a spacing unit in the Mist Gas Field for which there is already a producing well. An exception to the spacing rule would need to be granted by the Governing Board of DOGAMI to allow a second well in the spacing unit. The unit is the SW¼ sec. 34, T. 7 N., R. 5 W. The testimony has been given to the Board for a decision.

DOGAMI Board meets

The Governing Board of DOGAMI met February 27, 1984, in Roseburg, Oregon. The only oil and gas agenda item was the decision on an exception to the spacing unit rule (see item above). We will print the results in the next issue of *Oregon Geology*.

Other agenda items included discussion of the policy on offshore mineral development, water planning, non-metallic minerals assessment, and legislative proposals for the 1985 legislature.

Recent permits

Permit no.	Operator, well, API number	Location	Status, proposed total depth (ft)
256	Reichhold Energy Corp. Columbia County 43-22 009-00124	SE¼ sec. 22 T. 6 N., R. 5 W. Columbia County	Application; 4,000.
257	Reichhold Energy Corp. Columbia County 21-27 009-00125	NW¼ sec. 27 T. 6 N., R. 5 W. Columbia County	Application; 4,000. □

Information for contributors to *Oregon Geology*

Readers are invited to submit manuscripts on Oregon geology and other related subjects. 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 or any related questions should be addressed to Beverly F. Vogt, Publications Manager, at the Portland office of DOGAMI. □

CONTENTS

Mineral industry in Oregon, 1983

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

INTRODUCTION

Oregon's mineral industry saw a slow recovery in industrial minerals (primarily cement, stone, and sand and gravel) production in 1983. No formal canvass of precious-metal producers was made, but field observations indicate that gold and silver production remained low. The reopening of the Hanna Mining Company's nickel mine and smelter at Riddle on a part-time basis in November indicated a strengthening minerals industry at year's end.

METALS

The Hanna Mining Company nickel plant (14*) at Riddle was reopened on November 7 after an 18-month closure due to high power costs and low nickel prices. An off-peak power rate agreement with the Bonneville Power Administration has allowed for continued part-time operation of the plant.

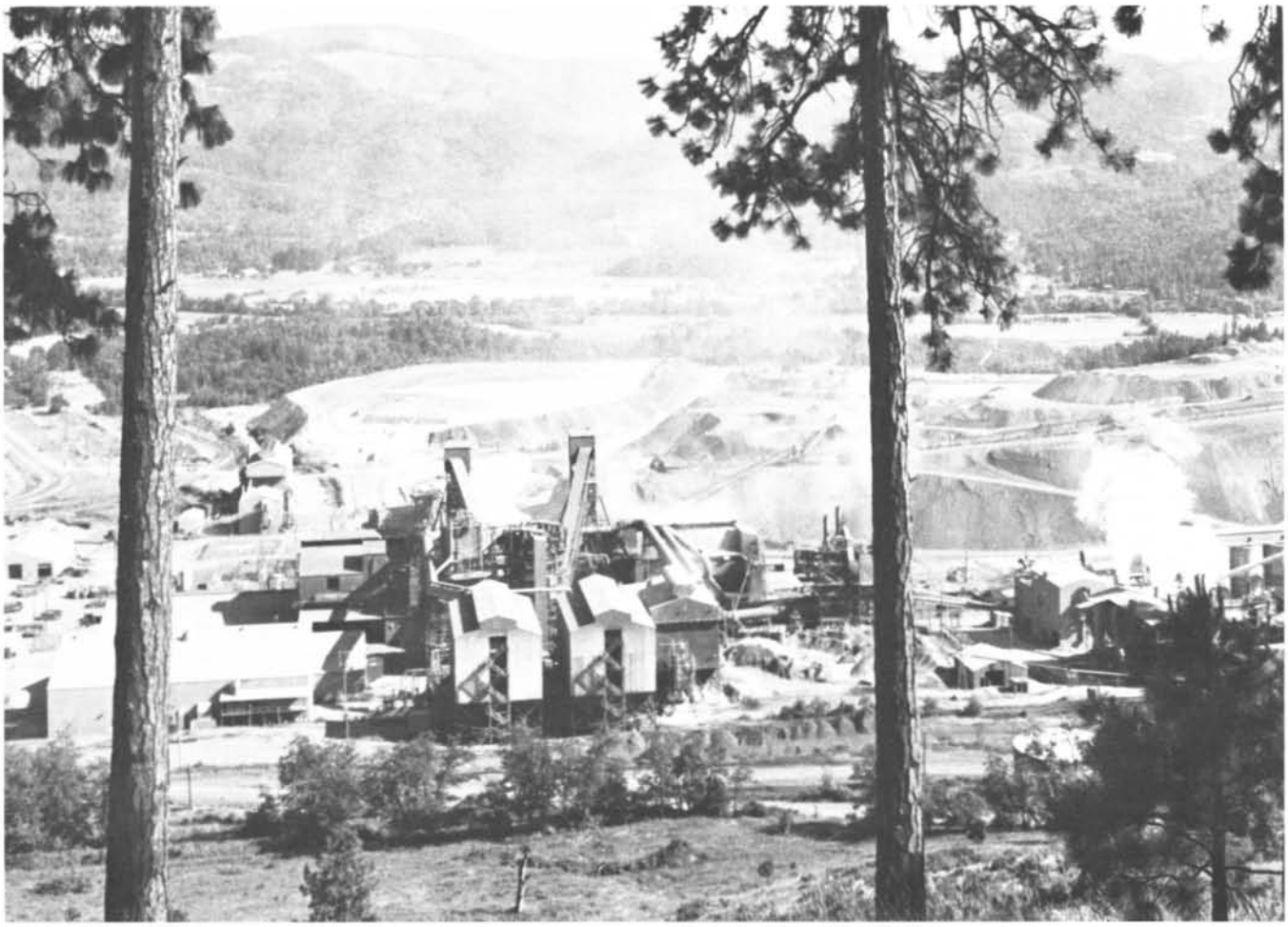
Smaller placer mines continued to supply most of the gold produced in the state. Small operations on Sucker Creek (19), Josephine Creek (18), Coffee Creek (13), and in the Galice Creek area (15) in southwestern Oregon and on Burnt River (3), Pine Creek (6), Elk Creek (4), and Clarks Creek (7) in northeastern Oregon were among the most productive.

Several small lode gold and silver mines were intermittently worked during the spring and summer of 1983. The Pyx Mine (2) in Grant County and the Thomason Mine (5) in Baker County continued small-scale operations from 1982. The Sunny Valley Mining and Development Company shipped a small amount of ore from the Greenback Mine (16) to the smelter at Tacoma, Washington. The property is now being evaluated by Mega Gold Resources, Inc. The Lyons Brothers of John Day produced a small amount of silver ore from the old Tempest Mine (1) in Grant County. The mine has been operating on a small scale since 1980. Cash Industries produced an undisclosed amount of silver ore from the old Bay Horse Mine (9) on the Snake River early in the summer of 1983. This property is a noted past producer of silver (over 150,000 oz) and is now being drilled by Silver King Mines, Inc.

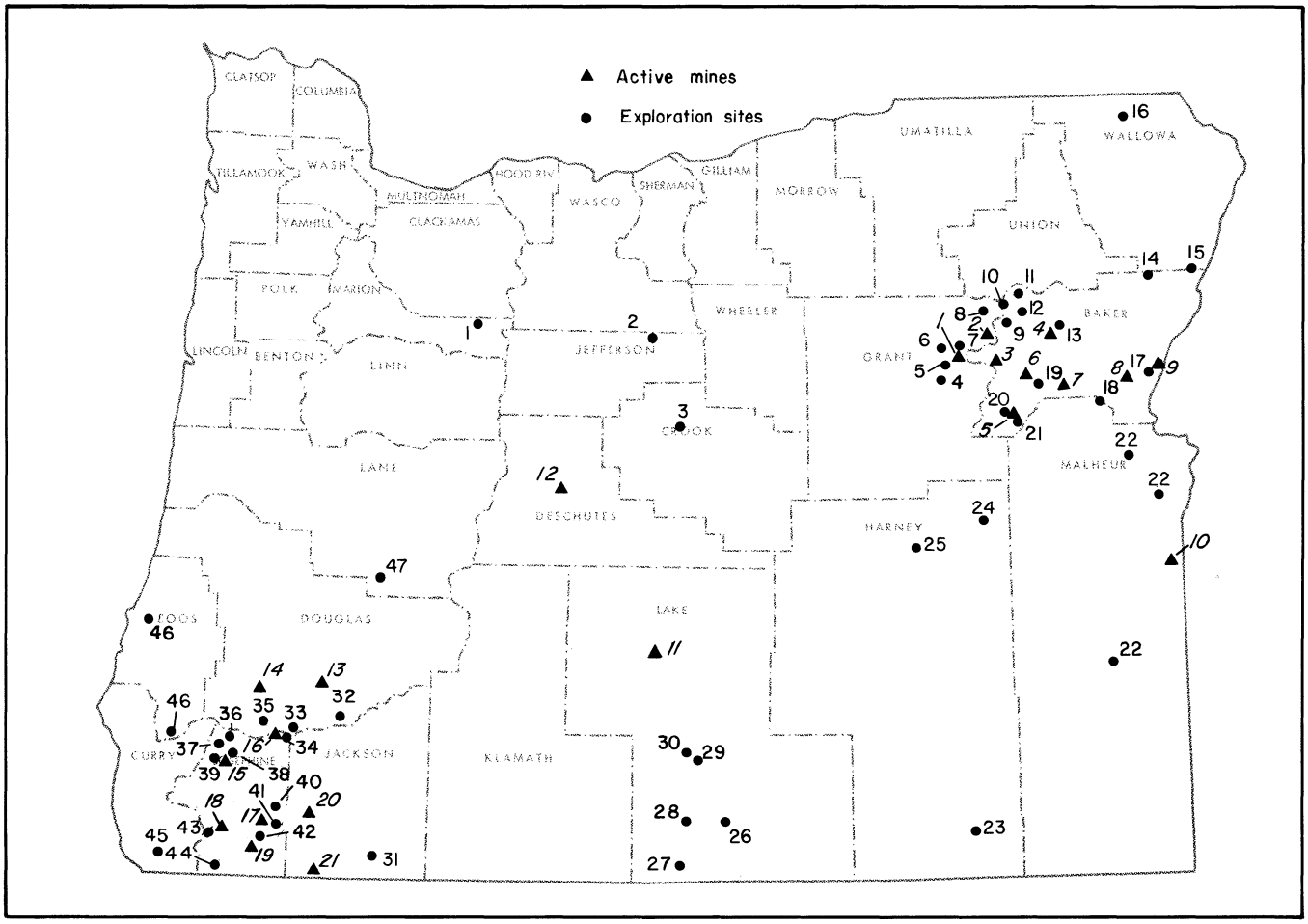
NONMETALS

Block soapstone production at Steatite of Southern Oregon (21) continued at a steady pace. This operation supplies markets as far away as New York and Alaska with carving-grade soapstone. The Oregon Portland Cement plant (8) at Durkee operated at an

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



Hanna Mining Company nickel smelter plant at Riddle in Douglas County, Oregon. Slag piles in background. Ore is mined at Nickel Mountain, a few miles from the plant. This operation is the nation's only domestic mine source of nickel.



EXPLANATION

ACTIVE MINES

1. Tempest Mine (Ag)
2. Pyx Mine (Au)
3. North Fork Burnt River placers (Au)
4. Elk Creek placers (Au)
5. Thomason Mine (Au)
6. Pine Creek placers (Au)
7. Clarks Creek placers (Au)
8. Oregon Portland Cement (limestone)
9. Bay Horse Mine (Ag)
10. Adrian (bentonite-zeolite)
11. Christmas Valley Diatomite
12. Bend area pumice mines
13. Coffee Creek placers (Au)
14. Nickel Mountain Mine (Ni)
15. Galice Creek area placers (Au)
16. Greenback Mine (Au)
17. Red Rose Mine (Au)
18. Josephine Creek placers (Au)
19. Sucker Creek placers (Au)
20. Bristol Silica (dolomite)
21. Steatite of S. Oregon (soapstone)

EXPLORATION SITES AND AREAS

1. North Santiam area (Au, Ag, Cu, Zn)
2. Oregon King, Axehandle Mines area (Au, Ag)
3. Gold Hill area (Au, Hg)
4. Cougar Ridge area (Au)
5. Dixie Meadows Mine (Au)
6. Susanville area (Au, Hg)
7. Vinegar Hill-Sunrise Butte area (Au, Ag, Mo)
8. Buffalo Mine (Au, Ag)
9. Bald Mountain, Ibex Mines (Au, Ag)
10. Cable Cove area (Au, Ag)
11. Meadow Lakes area (Cu, Mo, Ag)
12. North Pole-Columbia lode (Au, Ag)
13. Gray Eagle Mine (Au)
14. Cornucopia Mine (Au, Ag)
15. Iron Dyke Mine (Au, Cu, Ag)
16. Flora coal deposits
17. Bay Horse Mine (Ag)
18. Sunday Hill Mine (Au)
19. Hereford area (Au)
20. Record Mine (Au)
21. Grouse Springs area (Cu, Mo)
22. Vale-Weiser area (Au)
23. Fields area (Au)
24. Eagle Picher claims (diatomite)
25. Idol City area (Au)
26. Quartz Mountain area (Au)
27. Dry Creek-Fitzwater Point area (Au, Hg)
28. Salt Creek area (Au)
29. Tucker Hills area (metallic and nonmetallic)
30. Paisley area (Au, Cu)
31. Barron Mine (Au, Ag)
32. Rowley Mine (Cu, Ag, Zn)
33. Martha Mine (Au)
34. Greenback Mine (Au)
35. McCullough Creek area (Au, Ag, Cu, Zn)
36. North Fork Silver Creek area (Au)
37. Yankee Silver Mine (Au, Ag)
38. Almeda Mine (Au, Ag, barite)
39. Brass Ledge Mine (Cu, Ag, Au)
40. Iron Hat prospect (Au)
41. Ida Mine (Au, Cu)
42. Babcock Mine (Au, Ag, Cu, Co)
43. Lightning Gulch area (Au, Ag)
44. Turner-Albright Mine (Au, Ag, Cu, Co)
45. Mount Emily area (Au)
46. Coos County coal deposits
47. Bohemia district (Au, Ag, Cu, Zn)

Mining and mineral exploration in Oregon, 1983 (excluding sand and gravel and stone). Active mines are keyed to Table 1; exploration sites are keyed to Table 2.

increased rate in 1983 following a merger with the Ash Grove Cement Company of Overland Park, Kansas. Bentonite and zeolite continued to be produced at the Teague Minerals Products plant (10) near Adrian.

OREGON'S MINERAL PRODUCTION
MILLIONS OF DOLLARS

	ROCK MATERIALS SAND, GRAVEL, STONE	OTHER MINERALS & METALS CEMENT, NICKEL, PUMICE, ETC.	NATURAL GAS	TOTAL
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

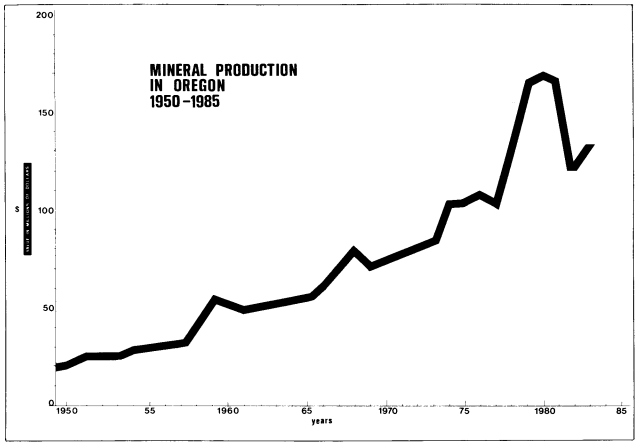
Summary of mineral production in Oregon for the last 14 years. Data for 1983 derived from U.S. Bureau of Mines annual preliminary Mineral Industry Survey *and Oregon Department of Geology and Mineral Industries natural gas production statistics.*

Table 1. *Active mines in Oregon, 1983*

Map no.	Name	Location	Comments
1.	Tempest Mine	Sec. 10 T. 9 S., R. 34 E. Grant County	Lyons Brothers continued small production of silver ore.
2.	Pyx Mine	Sec. 1 T. 10 S., R. 35 E. Grant County	Continued small production by Myron Woodley and partners.
3.	North Fork Burnt River placers	T. 10 S., Rs. 35, 35½ E. Baker County	Several small seasonal operators. Max Buckner operation.
4.	Elk Creek placers	T. 10 S., R. 39 E. Baker County	Several small seasonal operators.
5.	Thomason Mine	Sec. 6 T. 14 S., R. 37 E. Baker County	Small seasonal operation by Art Cheatham and partners.
6.	Pine Creek placers	T. 12 S., R. 39 E. Baker County	Several small seasonal operators.
7.	Clarks Creek placers	Tps. 12, 13 S., R. 41 E. Baker County	Several small seasonal operators.
8.	Oregon Portland Cement	Sec. 11 T. 12 S., R. 43 E. Baker County	Continued production.
9.	Bay Horse Mine	Sec. 9 T. 13 S., R. 45 E. Baker County	Small production of silver ore by Case Minerals (see text).
10.	Adrian (bentonite-zeolite)	Sec. 29 T. 23 S., R. 46 E. Malheur County	Continued production.
11.	Christmas Valley Diatomite	T. 27 S., R. 17 E. Lake County	Continued production for pet litter and floor sweep.
12.	Bend area pumice	Bend area Deschutes County	Continued production.
13.	Coffee Creek placers	Sec. 7 T. 30 S., R. 2 W. Douglas County	Seasonal operation by Bill Smith.
14.	Nickel Mountain Mine	Sec. 17 T. 30 S., R. 6 W. Douglas County	Mine and smelter reopened on a limited basis in November.

Table 1. *Active mines in Oregon, 1983 – Continued*

Map no.	Name	Location	Comments
15.	Galice Creek area placers	T. 34 S., R. 8 W. Josephine County	Small seasonal operations on Galice Creek and on the old channel.
16.	Greenback Mine	Secs. 32, 33, 5 Tps. 33, 34 S., R. 5 W. Josephine County	Small smelter shipment to Tacoma (see text).
17.	Red Rose Mine	Secs. 19, 20 T. 38 S., R. 5 W. Josephine County	Some ore milled from dump by owner Dave Vallandigham.
18.	Josephine Creek placers	Secs. 30, 36 T. 38 S., Rs. 8, 9 W. Josephine County	Doodlebug dredge operation and other small operators.
19.	Sucker Creek placers	T. 40 S., Rs. 6, 7 W. Josephine County	Small seasonal operations.
20.	Bristol Silica	Sec. 30 T. 36 S., R. 3 W. Jackson County	Reportedly shipped about 1,000 tons of silica rock.
21.	Steatite of Southern Oregon	Secs. 10, 11 T. 41 S., R. 3 W. Jackson County	Continued production of carving-grade soapstone.



Mineral production in Oregon between 1950 and 1983.

EXPLORATION AND DEVELOPMENT

Coal: Coal exploration continued at 1982's pace. Utah International continued to evaluate the lignite deposit (16**) in the Flora-Promise area with a shallow drilling program. The drilling program was set up to determine both the extent of the coal field and the hydrologic characters of the adjoining aquifers. Some 44,000 acres of Boise Cascade lands in this area are currently under a lease option to Utah International.

The Coos County coal fields (46) also continue to be the subject of exploration activity. Shell Oil conducted a small drilling program on lands whose mineral rights are held by the American Coal Company.

Nonmetals: Zeolite, clay, perlite, and diatomite were the principal nonmetallic exploration targets in 1983. Eagle Picher continued evaluation of diatomite deposits (24) near Harper and

** All site numbers in this section refer to "Exploration sites and areas" on location map and in Table 2.

Table 2. *Exploration sites and areas in Oregon, 1983*

Map no.	Site or area name	Location	Commodity	Comments
1.	North Santiam area	Sec. 27 T. 8 S., R. 5 E. Marion County	Au, Ag, Cu, Zn	Continued work in the vicinity of the Ruth Mine.
2.	Oregon King and Axehandle Mines area	T. 9 S., R. 17 E. Jefferson County	Au, Ag	Exploration program by Ocelot Mining Corporation.
3.	Gold Hill area	Tps. 13, 14 S., R. 19 E. Crook County	Au, Hg	Exploration program by Utah International.
4.	Cougar Ridge area	Sec. 12 T. 12 S., R. 33 E. Grant County	Au	Surface trenching and sampling of old workings by a local group (Cougar Ridge Mining Co., Inc.).
5.	Dixie Meadows Mine	Sec. 23 T. 11 S., R. 33 E. Grant County	Au	Property dropped by Western Nuclear and later acquired by Big Turtle Mines.
6.	Susanville area	T. 10 S., R. 33 E. Grant County	Au, Ag	Intensive surface drilling and sampling program by American Copper and Nickel.
7.	Vinegar Hill-Sunrise Butte area	T. 10 S., R. 34 E. Grant County	Au, Ag, Mo	Sampling and drilling program by American Copper and Nickel.
8.	Buffalo Mine	Sec. 14 T. 8 S., R. 35½ E. Grant County	Au, Ag	Property acquired by Great American Gold Corporation.
9.	Bald Mountain-Ibex Mines	Sec. 4 T. 9 S., R. 36 E. Baker and Grant Counties	Au, Ag	NERCO completed first phase of evaluating the Bald Mountain-Ibex vein with 54,000 ft of underground diamond drilling.
10.	Cable Cove area	T. 8 S., R. 36 E. Baker and Grant Counties	Au, Ag	Small-scale sampling program by local group.
11.	Meadow Lakes area	T. 8 S., R. 37 E. Baker and Grant Counties	Cu, Mo, Ag	Small drilling program by Manville.
12.	North Pole-Columbia lode	Sec. 32 T. 8 S., R. 37 E. Baker County	Au, Ag	Property held by Brooks Minerals, Inc.
13.	Gray Eagle Mine	Sec. 7 T. 9 S., R. 41 E. Baker County	Au	Small exploration program by Big Turtle Mines.
14.	Cornucopia Mine	Secs. 27, 28 T. 6 S., R. 45 E. Baker County	Au, Ag	Full ownership acquired by UNC Resources, Inc.
15.	Iron Dyke Mine	Sec. 21 T. 6 S., R. 48 E. Baker County	Au, Cu, Ag	Full ownership acquired by Silver King. Tentative plan to reopen in 1984.
16.	Flora coal deposits	Northern Wallowa County	Coal	Utah International conducted drilling and hydrologic study programs.
17.	Bay Horse Mine	Sec. 9 T. 13 S., R. 45 E. Baker County	Ag	Exploration program of drilling and sampling by Silver King Mines, Inc.
18.	Sunday Hill Mine	Sec. 17 T. 13 S., R. 42 E. Malheur County	Au	Sampling program by Capri Resources, Vancouver.
19.	Hereford area	T. 12 S., R. 38 E. Baker County	Au	Continued exploration programs by Amselco and AMAX.
20.	Record Mine	Sec. 1 T. 14 S., R. 36 E. Baker County	Au	Exploration program by Manville.
21.	Grouse Springs area	Secs. 24, 25 T. 14 S., R. 36 E. Baker County	Cu, Mo	Small drilling program by Manville.
22.	Vale-Weiser area	Northern and central Malheur County	Au	Sampling and drilling programs on epithermal gold prospects held by Manville and others.
23.	Fields area	Harney County	Au	Exploration programs by FMC and Inspiration Development.

Table 2. *Exploration sites and areas in Oregon, 1983—continued*

Map no.	*Site or area name*	*Location*	*Commodity*	*Comments*
24.	Eagle Picher claims	Malheur and Harney Counties	Diatomite	Exploration and development program.
25.	Idol City area	T. 21 S., R. 32 E. Harney County	Au	Sampling and drilling program by Noranda.
26.	Quartz Mountain area	T. 37 S., R. 16 E. Lake County	Au	Sampling and drilling program by Anaconda.
27.	Dry Creek-Fitzwater Point area	T. 41 S., R. 18 E. Lake County	Au, Hg	Continued exploration by U.S. Steel.
28.	Salt Creek area	T. 38 S., R. 21 E. Lake County	Au	Continued exploration by Freeport Minerals.
29.	Tucker Hills area	T. 34 S., R. 19 E. Lake County	Metallic and nonmetallic	Continued exploration by Houston International.
30.	Paisley area	T. 34 S., Rs. 18, 19 E. Lake County	Au, Cu	Continued exploration by Chevron.
31.	Barron Mine	Sec. 23 T. 39 S., R. 2 E. Jackson County	Au, Ag	Sampling and mapping program by Genex Resources, Vancouver.
32.	Rowley Mine	Sec. 4 T. 32 S., R. 2 W. Douglas County	Cu, Ag, Zn	Mapping and drilling program by Standard Metals.
33.	Martha Mine	Sec. 28 T. 33 S., R. 5 W. Josephine County	Au	Small exploration program by Jacksonville Mining Co.
34.	Greenback Mine	Secs. 32, 33, 5 Tps. 33, 34 S., R. 5 W. Josephine County	Au	Small production by Sunny Valley Mining and Development Co. early in 1983. Property now being evaluated by Mega Gold Resources Ltd.
35.	McCullough Creek area	Secs. 30, 31 T. 32 S., R. 6 W. Douglas County	Au, Ag, Cu, Zn	Continued exploration programs by Exxon and Boise Cascade.
36.	North Fork Silver Creek area	T. 35 S., R. 9 W. Josephine County	Au	Large number of claims held by Goldwin Resources.
37.	Yankee Silver Mine	Secs. 25, 26 T. 34 S., R. 8 W. Josephine County	Au, Ag	Property purchased by Condaka Metals, Inc., who are conducting a drilling and sampling program.
38.	Almeda Mine	Sec. 13 T. 34 S., R. 8 W. Josephine County	Au, Ag, barite	Geochemical sampling program by Blue Diamond Energy Resources and Comanche Petroleum.
39.	Brass Ledge Mine	Sec. 28 T. 34 S., R. 8 W. Josephine County	Cu, Ag, Au	Airborne E.M. program by Condaka Metals.
40.	Iron Hat prospect	Sec. 17 T. 37 S., R. 5 W. Josephine County	Au	Geochemical sampling, airborne E.M., and mapping programs by Condaka Metals.
41.	Ida Mine	Sec. 26 T. 35 S., R. 5 W. Josephine County	Au, Cu	Old workings reopened and sampled by SCORE Resources.
42.	Babcock Mine	Sec. 5 T. 39 S., R. 6 W. Josephine County	Au, Ag, Cu, Co	Airborne E.M. program by Condaka Metals.
43.	Lightning Gulch area	Tps. 38, 39 S., R. 9 W. Josephine County	Au, Ag	Airborne E.M. program by Condaka Metals.
44.	Turner-Albright Mine	Secs. 15, 16 T. 41 S., R. 9 W. Josephine County	Au, Ag, Cu, Co	Gray Rock attempting to extend ore reserves by drilling program.
45.	Mount Emily area	T. 40 S., R. 12 W. Curry County	Au	Small exploration program by Mount Emily Mining and Exploration Co. (Joe Montgomery and Associates) of Vancouver, B.C.
46.	Coos County coal deposits	Coos Bay and Eden Ridge coal fields	Coal	Small drilling program by Shell Oil.
47.	Bohemia district	T. 23 S., Rs. 1, 2 E. Lane County	Au, Ag, Cu, Zn	Underground work by Galactic Resources in early 1983 on the Champion.

announced plans in January 1984 to build a $13 million processing plant west of Vale. The plant is expected to provide full-time employment to 30 or 40 people in the production of filter-grade diatomite.

Metals: Acquisition, exploration, and evaluation of precious-metal deposits around the state continued at a strong pace in 1983. Development activity, however, has declined, in part due to falling metal prices. The principal exploration areas continue to be the newly recognized zones of Tertiary epithermal gold mineralization in Harney, Lake, and Malheur Counties and the old gold districts in Baker and Grant Counties, northeast Oregon, and in Douglas, Jackson, and Josephine Counties, southwest Oregon.

American Copper and Nickel continued its strong exploration program in Grant and Baker Counties, having just completed an extensive diamond drilling program on the Badger, Bull of the Woods, and Gem veins in the old Susanville district (6). NERCO, Inc., completed the initial phase of a Bald Mountain-Ibex evaluation program which saw over 50,000 ft of underground diamond drilling on the Bald Mountain-Ibex vein (9). NERCO announced a joint venture exploration program of the property with American Copper and Nickel in 1984. Current plans call for an above-ground diamond drilling program to be started on the Grand Trunk and Belle of Baker claims to the east of the main Bald Mountain workings.

UNC Resources, Inc., has acquired full ownership of the Cornucopia Mine (14) in eastern Baker County. Exploration and development of the property was at a low level in 1983.

Silver King Mines, Inc., acquired the two-thirds interest of Texasgulf, Inc., in the Iron Dyke Mine (15) on the Snake River, along with a 100 percent interest in the Red Ledge property in Idaho. Silver King had been in a joint venture partnership with Texasgulf on the Iron Dyke since 1978. The property had produced 36,000 tons of high-grade gold copper ore when last operated in 1980 and 1981. Silver King has also begun an exploration and evaluation program at the Bay Horse Mine (17), which is about 70 mi south of the Iron Dyke on the Snake River. Current plans call for the stockpiling of ore from both properties for shipment to the company's mill at Copper Cliffs, Idaho.

Volcanogenic sulfide deposits continued to be the focus of exploration activity in southwestern Oregon. Boise Cascade and Exxon are continuing to explore in the McCullough Creek area (35). Gray Rock is attempting to extend the ore reserves previously established by Noranda at the Turner-Albright Mine (44). Noranda had announced that their exploration program outlined over 3 million tons of gold copper ore at the Turner-Albright.

Active exploration of epithermal gold deposits in central and southeastern Oregon continued at a strong pace throughout 1983. Diamond-drill programs were under way at Idol City (25), Quartz Mountain (26), and in the Vale-Weiser area (22). Many of the prospects undergoing evaluation are new gold prospects discovered since 1978.

Low-level exploration of base-metal deposits continued despite depressed metal prices. Manville continued shallow diamond-drilling programs at Meadow Lakes (11) and Grouse Springs (21).

The Oregon Department of Geology and Mineral Industries released the results of several geochemical surveys during 1983. These included studies of 18 BLM wilderness areas in southeast Oregon (Open-File Report O-83-2) and of the western part of the Ochoco National Forest in central Oregon (Open-File Report O-83-4). The results of a similar survey in the Fall Creek district in western Oregon (Open-File Report O-83-5) were released in January 1984. Geologic maps of mineralized areas in Baker and Grant Counties released by the Department in 1983 included the Granite (GMS-25), Greenhorn (GMS-28), and Bates NE (GMS-29) quadrangles. Similar maps of the Bates NW and Bates SW quadrangles in Grant County and the Pearsoll Peak SE quadrangle in Josephine and Curry Counties are in progress. □

Scientists report on Mount St. Helens monitoring efforts

Monitoring efforts of Mount St. Helens by scientists of the U.S. Geological Survey (USGS) and the University of Washington geophysics program at the Cascades Volcano Observatory, Vancouver, Washington, were described in a series of eight articles in the September 30, 1983, issue of *Science Magazine*. Subjects ranged from earthquakes occurring beneath the volcano, ground measurements on the crater floor and lava dome, to daily gas emissions from the crater. Some highlights:

Fifteen eruptions have taken place in the horse-shoe-shaped crater of Mount St. Helens since the catastrophic events of May 18, 1980. Since late October 1980, the eruptions have been predominantly non-explosive dome-building events. Since early February 1983, the 750-ft-high lava dome in the middle of the crater has been growing continuously, extruding lava high on its northeast flank. This marks the longest dome-building eruption to date.

Information from six seismometers on the cone and 10 others in the surrounding area is radioed to the University of Washington in Seattle and analyzed and interpreted by seismologists. Seismic data provide information about the location, depth and frequency of earthquakes, times of degassing events for the dome, and rockfalls associated with dome growth. Each of the eruptions in 1981-82 was preceded by an increase in earthquake activity which was used to anticipate the time of the eruptions, particularly 1-2 days before an expected event.

Measurements inside the crater by USGS scientists using precise surveying equipment and simple tape measures show that the crater floor becomes deformed prior to an eruption, as magma rises upward from a deeper source. In late 1980, cracks often appeared on the crater floor before eruptions and extended outward from the dome like spokes of a wheel. Measurements show that the cracks widen with time, especially just before an eruption. Other parts of the crater floor often become slightly wrinkled several weeks before an eruption. A few of these wrinkles develop into features called thrust faults, sometimes growing from less than 1 ft high, to as high as 10-15 ft. The movement of the crater floor along these faults increases before eruptions, and by measuring the rate of movement scientists have been able to predict eruptions one to three weeks in advance.

Electronic tiltmeters specifically designed for use at Mount St. Helens are used to measure small changes in slope of the crater floor, much like a carpenter's level. These tiltmeters, installed within several hundred feet of the dome, show rapid changes hours to days before an eruption and send information by radio to the USGS Cascades Volcano Observatory in Vancouver.

Monitoring the shape of the dome is also used to anticipate eruptions one to three weeks in advance. Measurements between points on the dome and crater floor show that the dome grows or swells as magma moves upward into the dome before it is eventually erupted on the surface of the dome to form a new lobe. Repeated surveys to targets placed on the dome reveal movements that speed up as the eruption nears. Before the May 14, 1982, eruption, for example, a target placed on the west side of the dome was moving roughly 1 in. per day two weeks before the eruption; this movement increased to about 7 ft per day two days before the eruption. This increase in the rate of movement before the eruption is the key for predictions.

The lava-dome eruptions have each added a new flow of sticky viscous dacite magma to the composite lava dome. The major-element chemical composition of the dome has remained essentially constant at 62-63 percent SiO_2, suggesting that no new material has been added to the shallow magma system since the summer of 1980. An increase in the crystallinity of the dacite suggests that a deeper, gas-poor, crystal-rich layer is now being tapped rather than a gas-rich magma as during the explosive eruptions of 1980.

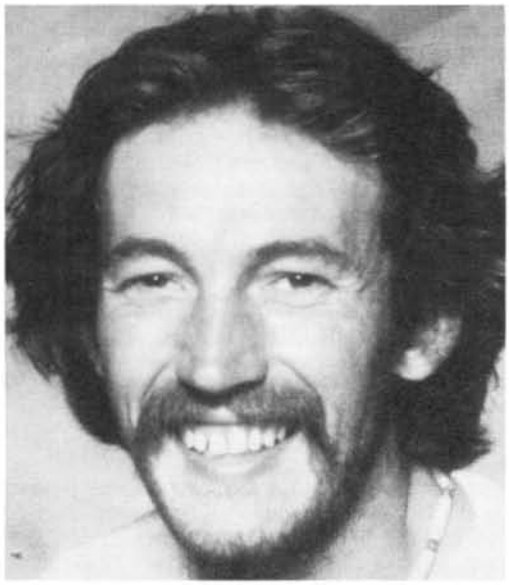
– USGS News Release

Surface mined land reclamation in Oregon, 1983

by Paul F. Lawson, Supervisor, Mined Land Reclamation Program, Albany Field Office, Oregon Department of Geology and Mineral Industries

In 1983, Oregon's Mined Land Reclamation Program (MLR) made progress in several areas. The most important single item is the reclamation of over 380 acres during the year. Other developments are detailed later in this report. In 1983, 785 field inspections were conducted, compared to 682 in 1982, 912 in 1981, and 681 in 1980. Also in 1983, 19 Surface Mining Permit sites (SMP's), 18 Limited Exempt sites (LE's), and 45 Total Exempt sites (TE's) were transferred from state to county jurisdiction under provisions of ORS 517.780.

After a five-month nationwide recruiting program, Frank Schnitzer was hired and began work in February. Frank is a soils scientist with an advanced degree. He has two years of comparable mining regulatory work in Wyoming in addition to other experience. He has had surface mined land reclamation experience with coal, uranium, bentonite, trona, and limestone operations as well as the more common minerals.



E. Frank Schnitzer

The unanimous choice of the selection committee for the 1983 Mined Land Reclamation Award was Multnomah County. After mining approximately 870,000 cubic yards of sand and gravel for local needs, the county used the site for a county landfill. After the landfill stabilized and was no longer chemically active, a portion was re-excavated to a stable base, and an exceptionally well planned and efficient building was completed for the county's Division of Operations and Maintenance (county shops). Other finalists in 1983 included Harold Knapp of Knapp Ranches, Port Orford, for pasture and recreation (organized rifle range); the Oregon State Highway Division, Department of Transportation, for water impoundment (public fishing and other public recreation, including flying of model seaplanes) and pasture; and Vernon Egge of Egge Sand and Gravel, Eugene, for areas reclaimed to wildlife management, agriculture, and a (permitted) solid-waste disposal site. More details and some photographs of these projects were published in the December 1983 issue of *Oregon Geology*.

The award program exists to provide recognition for outstanding performance and results in mined land reclamation and to encourage further sensible mined land reclamation, both mandatory and voluntary. While they cannot all be named, we do appreciate the efforts of the many additional operators who comply with the law and reclaim mined lands. Most reclaimed lands are worth at least as much as they were before mining. Some are substantially more valuable.

Regrettably, noncompliance also is a fact of life. The Department reclaimed one site, after it was legally declared abandoned, and the operator forfeited his security. It appears likely that the Department will reclaim at least three or four sites in 1984.

Several changes in law governing reclamation (ORS 517.750-517.955 and 990[4], [5], and [6]) were made by the 1983 Legislative Assembly. Authority was granted to increase new permit fees from $390 per year to a maximum of $415 and renewal fees from $290 per year to a maximum of $315. So far, the Department has not found it necessary to initiate a request to increase fees.

The Legislative Assembly, recognizing the added cost to the Department if it has to contract reclamation work, authorized a "per-site" bond of up to $2,000 on "aggregate" sites, in addition to the existing maximum bond of $500 per acre. This amount will meet the cost of moving equipment to and from the site, a cost that usually does not arise when the operator completes reclamation before leaving the site. The maximum bond of $500 per acre was unchanged. Other changes relative to "aggregate" sites were an increase in the authorized lien from $500 per acre to $2,000 per site plus $1,500 per acre (ORS 517.865). A provision was adopted authorizing the Department to accept a single bond covering two or more sites operated by a single company or owned by a single landowner.

The Legislature also directed the Department to conduct a study of the alternatives for recovering the costs of mined land reclamation. Authorization was given to appoint an advisory committee from mining industries, governmental agencies, and other interested persons. The results of the study, and any recommendations are to be reported by the Department to the Sixty-Third Legislative Assembly. The committee has been appointed and the study is under way.

Another series of amendments concerns ORS 517.750. Definitions were added for "processing," "surface impacts of underground mining," and "underground mining." The previously existing definition of surface mining was rewritten into two parts in an attempt to define more clearly what is and is not surface mining under this law. The Department will henceforth regulate the reclamation aspects of surface impacts of underground mining. Rules to implement these new provisions are being drafted for review, public hearings, and adoption.

Finally, amendments to ORS 517.780 were made. A terminal date was established for Subsection (2) which provides for a city or county to administer the mined land reclamation law. This amendment terminates such an option unless a city or county has a reclamation ordinance approved by the Department prior to July 1, 1984. An added provision directs the Department to review the implementation of county ordinances adopted pursuant to ORS 517.780(2). The Department may withdraw approval of such ordinances upon finding that implementation does not meet standards prescribed by the law and state rules.

An automatic data processing system of the personal computer class with word processing and database management software was

procured in the summer of 1983. The word processing capability is now very valuable in editing the large number of inspection reports, as well as many letters and other communications which must be produced. The data base is still being established with the insertion of data from approximately 2,300 site files. As the system develops it is expected that the administrative efficiency of the MLR program will be significantly enhanced, particularly the ability to identify monthly renewals and current delinquencies and to act on them promptly and efficiently.

Status of the Mined Land Reclamation Program

Total acreage reclaimed

1972 through Dec. 1980:	443
1972 through Dec. 1981:	805.75
1972 through Dec. 1982:	961.65
1972 through Dec. 1983:	1,344.15
(1983:	382.5)

Total acreage under security to guarantee reclamation

December 31, 1980:	2,173
December 31, 1981:	2,606
December 31, 1982:	3,105
December 31, 1983:	3,189

Uses to which acreage was reclaimed

	Agriculture	Forestry	Housing	Other*
1972 through 1980	251	6.5	37	148
During 1981	168	7	21	167.5
During 1982	105	14.5	0	36
During 1983	52.65	264	0	66
Total	576.65	292	58	417.5

* "Other" includes a wide variety of uses but contains a high percentage of various kinds of water impoundments, sites for wildlife management, industrial-commercial construction, and permanent stockpile sites.

Changes: New and closed sites, 1980-1983
(Permits issued for new sites, records closed, sites reclaimed, or activity legally terminated)

	Surface mining permit[1]		Limited exemption[2]		Total exemption[3]	
Year	New	Closed	New	Closed	New	Closed
1980	46	19	34	4	46	3
1981	84	32	50	7	51	26
1982	35	34	24	14	106	28
1983[4]	56	37	21	9	54	34

[1] Sites requiring a fee, reclamation, and security.

[2] Sites requiring a fee, but legally exempt from reclamation and security until horizontal expansion occurs—after July 1, 1972, or January 1, 1981 (different provisions). Expansion requires conversion to surface mining permit; expansion area **only** is then subject to reclamation and bonding.

[3] Sites legally exempt from fee, reclamation, and bonding—for various specific reasons, most commonly "access roads," size, and inactivity. (Surface mining permit category sites **cannot** go to total exemption status if the surface mining permit has been utilized.)

[4] During 1983 there were 49 other changes in status from one category to another.

Total number of sites under permit

As of	Surface mining permit	Limited exemption	Total exemption
December 31, 1980	348	333	571
December 31, 1981	399	338	587
December 31, 1982	400	287	648
December 31, 1983	405	254	602 □

Task force to study alternatives to MLR Program bonding system

The Governing Board of the Oregon Department of Geology and Mineral Industries (DOGAMI) has appointed a task force to conduct a study of all possible alternatives for guaranteeing recovery of costs of mined land reclamation in the state of Oregon. The study will deal specifically with bonding or other security systems assuring the availability of funds in the event DOGAMI must reclaim mined lands.

The task force, known as the Mined Land Reclamation Advisory Committee, was created in response to a charge established in amendments to Mined Land Reclamation legislation which the 62nd Oregon Legislative Assembly enacted. Included in the task force are representatives from the mining industry, government agencies, environmental groups, and bonding companies.

The eight committee members are Stan Biles, Assistant to the Director, Oregon Department of Environmental Quality; Kathleen Brophy, Surety Manager, Industrial Indemnity Company, Portland; Bruce Henderson, Oregon Environmental Council; Randall Hledick, Director of Land Use and Environmental Affairs, Wildish Sand and Gravel Company, Eugene; Howard Long, Manager, Fidelity and Surety Bond Department, North Pacific Insurance Company, Portland; William Lyons, Vice President for Planning and External Affairs, Northwest Energy Resources Company (NERCO), Portland; and John Beaulieu, Deputy State Geologist, and Donald Haagensen, Governing Board member, of DOGAMI.

The task force met for the first time on February 8, 1984. Activities of the anticipated four- to six-month study by the committee will include, but are not necessarily limited to, presentations by selected speakers and investigations of related mined land reclamation practices in other states. DOGAMI will report the results of the study and any recommendations to the 63rd Oregon Legislative Assembly. □

AEG to hold symposium on ore exploration

The Association of Exploration Geochemists (AEG) will hold a symposium on *Exploration for Ore Deposits of the North American Cordillera* on March 25-28, 1984, at the MGM Grand Hotel in Reno, Nevada.

The program will include technical sessions, a poster session and trade exhibit, and field trips both before and after the symposium. A full-day short course on the design of geochemical exploration programs will be offered on March 23 and 24. Keynote speaker will be R.W. Boyle of the Geological Survey of Canada.

For further information on registration, reservations, special travel services, and program details contact the Reno Symposium Executive Committee, P.O. Box 9777, University Station, Reno, Nevada 89507. Technical Program Chairman is J.W. Motter, phone (702) 323-3050. □

GSOC luncheon meetings announced

The **Geological Society of the Oregon Country** (GSOC) holds noon meetings in the Standard Plaza Building, 1100 SW Sixth Ave., Portland, OR, in Room A adjacent to the third-floor cafeteria. Upcoming meetings, topics, and speakers:

March 16—*Indian Ruins of the Southwest*, by Lloyd A. Wilcox, past president of GSOC, active member of the Archaeologic Society, participant in dig at the Calico Man site.

April 6—*Spring in the Mojave Desert*, by Donald Barr, naturalist.

April 20—*Statues of the Easter Islands*, by Esther Schwartz.

For additional information, contact Viola L. Oberson, Luncheon Program Chairwoman, phone (503) 282-3685. □

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