

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1069 State Office Building
Portland 1, Oregon

BULLETIN No. 47

TENTH BIENNIAL REPORT
of the
**State Department of Geology
and Mineral Industries**

of the
STATE OF OREGON

July 1, 1954, to July 1, 1956

To His Excellency the Governor
and the
Forty-ninth Legislative Assembly



1956

STATE GOVERNING BOARD

MASON L. BINGHAM, CHAIRMAN	PORTLAND
NIEL R. ALLEN	GRANTS PASS
AUSTIN DUNN	BAKER

HOLLIS M. DOLE
DIRECTOR

TENTH BIENNIAL REPORT

STATE of OREGON

DEPARTMENT of GEOLOGY and MINERAL INDUSTRIES

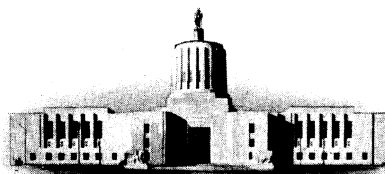
1954-1956



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GOVERNING BOARD
MASON L. BINGHAM, CHAIRMAN, PORTLAND
NIEL R. ALLEN, GRANTS PASS
AUSTIN DUNN, BAKER



FIELD OFFICES:
2033 FIRST STREET
BAKER
239 SOUTHEAST "H" STREET
GRANTS PASS

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1069 STATE OFFICE BUILDING
PORTLAND 1

To His Excellency
The Governor of the State of Oregon
and to
The Forty-ninth Legislative Assembly of the State of Oregon


Sirs:

We submit herewith the Tenth Biennial Report of the
Department of Geology and Mineral Industries, covering
activities of the Department for the period from July 1, 1954,
to and including June 30, 1956.

Respectfully,


Mason L. Bingham, Chairman


Niel R. Allen, Member


Austin Dunn, Member

Portland, Oregon
December 3, 1956

THE GOVERNING BOARD

The Department of Geology and Mineral Industries is administered by a Governing Board of three members. The statute creating the Department and establishing the Board states that the members shall be Oregon citizens, shall be appointed for terms of four years by the Governor subject to approval by the State Senate or the Senate Mining Board Interim Committee, and shall serve without compensation but be reimbursed for actual expenses incurred in the performance of official duties. Board meetings must be held at least four times a year. Meetings during the biennium were held as follows:

RESPONSIBILITIES OF THE BOARD (Chapter 516 ORS)
Have general charge and control of the Department.
Have possession, charge, and control of all publications, equipment, and property of the Department.
Select Director of the Department.
Cause to be published reports of investigations and surveys.
Cause to be published a biennial report of Department activities.
Administer and enforce Oil and Natural Gas Conservation Law (Chapter 520 ORS).
May make contracts with Federal and State agencies.
May receive gifts and legacies and make use of them.

1. Portland, August 21, 1954
2. Grants Pass, September 18, 1954
3. Portland, December 11, 1954
4. Grants Pass, March 7, 1955
5. Salem, April 11, 1955
6. Portland, June 6, 1955
7. Portland, July 9, 1955
8. Baker, September 25, 1955
9. Portland, December 12, 13, 14, 1955
10. Portland, March 16, 19, 1956
11. Portland, June 30, 1956

Chairman of the Board is chosen by the members, and the Director of the Department, who is selected by the Board, serves

as Secretary. Members of the Board and Governors appointing them since the beginning of the Department in 1937 are as follows:

<u>Member</u>	<u>Term</u>	<u>Governors appointing</u>
W. H. Strayer	1937-1946	Martin, Sprague, Snell
Albert Burch	1937-1943	Martin, Sprague
E. B. MacNaughton	1937-1943	Martin, Sprague
	1946-1949	Snell
S. H. Williston	1943-1947	Snell
Niel R. Allen*	1943-1960	Snell, Hall, McKay, Smith
H. E. Hendryx	1947-1953	Snell, McKay
Mason L. Bingham*	1949-1957	McKay, Patterson
Austin Dunn*	1953-1959	Patterson

*Present members of Board.

THE DEPARTMENT

The Department of Geology and Mineral Industries was established by the thirty-ninth Legislative Assembly with the Honorable Charles H. Martin as Governor. By July 1, 1937, a staff had been organized and operations were begun. Previous to this the State was without a separate mining or geology department except for the period 1911 to 1923 when a Bureau of Mines was operated in conjunction with the mining school at the State College.

DUTIES OF THE DEPARTMENT (Chapter 516, ORS)

Conduct geological and mineral resource studies.

Carry out economic studies pertaining to utilization of mineral raw materials.

Cooperate with Federal and other agencies in studies of value to the State.

Serve as a bureau of mineral and geological information, compile and keep up-to-date a mines catalog, prepare and publish reports of investigations, mineral statistics, etc.

Conduct a State geological survey.

Collect specimens and develop a museum of mineral and geological specimens, maps, and other objects representative of mineral industry activities.

Collect a mining and geological library.

Make qualitative mineral determinations.

Study minerals and ores as well as processes for improved ore treatment.

Make quantitative determinations of ores and minerals.

Make spectrographic analyses.

Administer act regulating drilling, prospecting for, production, and conservation of natural gas and oil (Chapter 520 ORS).

A head office of the Department is maintained at Portland and field offices are at Baker and Grants Pass. The assaying, chemical, and spectrographic laboratories and the accounting functions are centralized in the Portland office. Total staff, in addition to the Director, consists of eleven technical employees, four full-time and two part-time clerical employees, and three part-time student workers. This compares with a full-time staff of six technical employees and three clerical employees in 1937; and ten technical employees, three full-time and three part-time clerical employees, and two part-time student workers in 1946.

The past biennium has shown a marked increase in demands for Department services. This is due to several causes, the most important of which are: the intense search for uranium and other metals little known or understood a few years ago but now vital to defense and industry; the accelerated search for oil and gas within the State; the migration of industrial mineral suppliers to areas

closer to their expanding markets as the result of population increases; and the newly awakened interest of the layman in his surroundings. It is expected that these factors will continue to exert ever-increasing pressures on the Department in the coming years. If oil or gas is found in the State in commercial quantities, it is quite likely a sizable increase in the Department will become necessary in order to adequately administer Oregon's oil and gas conservation law.

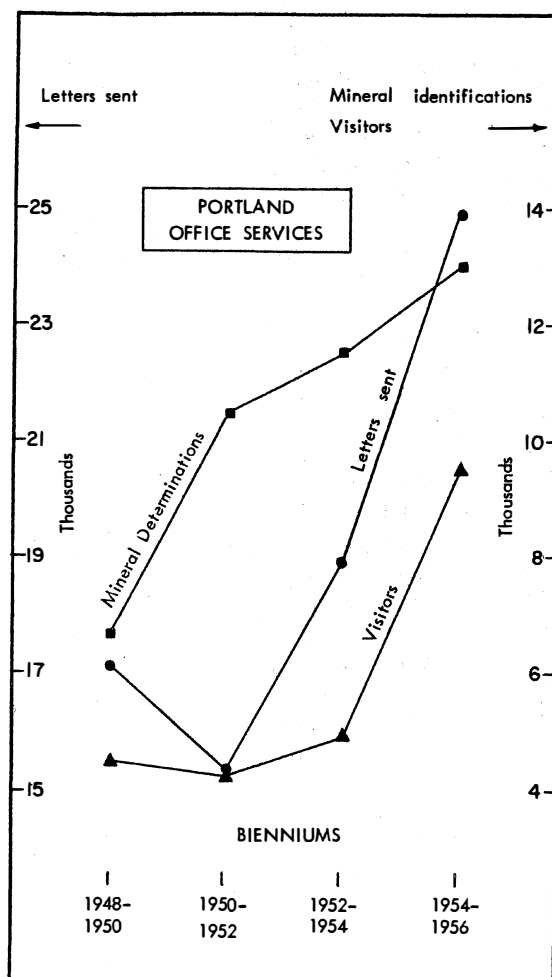
DEPARTMENT ACTIVITIES

Department activities are described on the following pages under Services, Research, Oil and Gas Administration, Cooperative Work, and Publications. Although these headings outline the work of the Department, it should be noted that separate divisions charged with these activities do not exist. Personnel of the Department must be expert in several or all of these technical activities.

SERVICES

A major responsibility of the Department is to provide information on the mineral potential and mineral industry of the State as well as to answer inquiries concerning a wide range of subjects relating to mineral occurrences and the geology of Oregon and other states. Although the largest number of inquiries comes from residents of the State, many are received from people living outside the State. Requests for information range from the school child

carrying out a class project to an industrial organization planning to establish in the Northwest. More and more are other State agencies, as well as County and City, relying on the Department for basic information concerning building sites, land evaluation, landslide problems, and economic planning. Research organizations retained for special studies find the Department an excellent source of information. Federal Government departments and bureaus frequently make use of the Department's services.



OFFICE SERVICES

The offices of the Department are a clearing house for information on mining, mineralogy, the mineral industry, and geology of the State. During the past two years the most frequent inquiries have dealt with uranium, mercury, and chromite prospecting, oil and gas investigations, and industrial mineral sources. The usual requests for information on mining regulations relating to location and assessment work were augmented by inquiries on changes in the basic federal mining laws and areas withdrawn from mineral entry. Many questions were asked concerning specific mines, mineral localities in the State, and publications.

Requests are received through all usual forms of office communication. Inquiries from office visitors deal largely with spot identification of rock and mineral samples but many are concerned with mineral economics on a conference level. Considerable time is devoted to informing uranium prospectors about geology, mining, and use of radiation detection instruments.

FIELD SERVICES

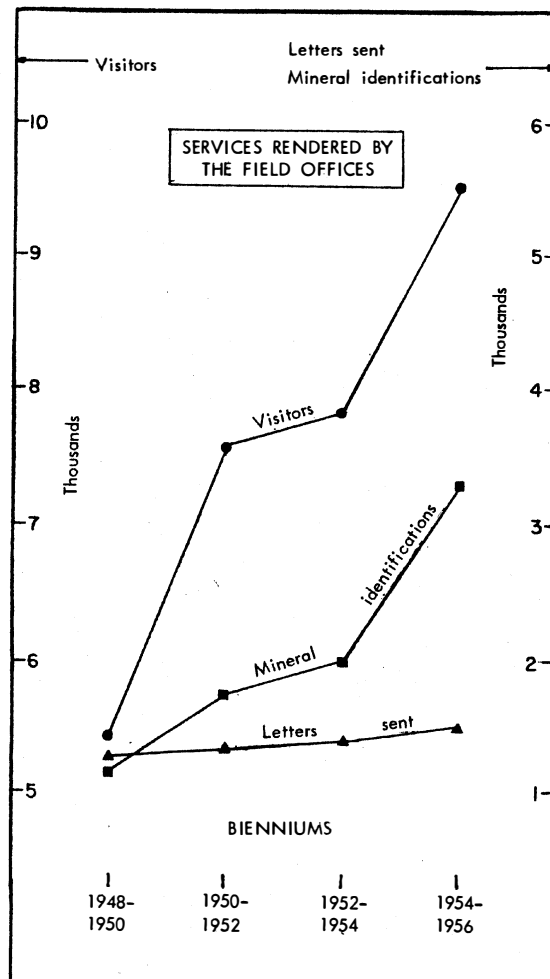
Encouragement and enlightenment of the prospector is the basic purpose of the field examination by the Department as prospectors find most mineral deposits that develop into mines. Requests for field examination are received not only for minerals but also for oil seeps, landslides, and other problems of a geological or mining nature. A primary reason for maintaining field offices is to enable the Department to give better, faster, and more economical field inspection coverage of the State to its citizens. The examinations are usually of a preliminary

nature but some are repeated to keep abreast of new developments. Great care is taken in order not to encroach upon the field of the consulting engineer or geologist. If a detailed examination is warranted, the staff member will recommend professional services.

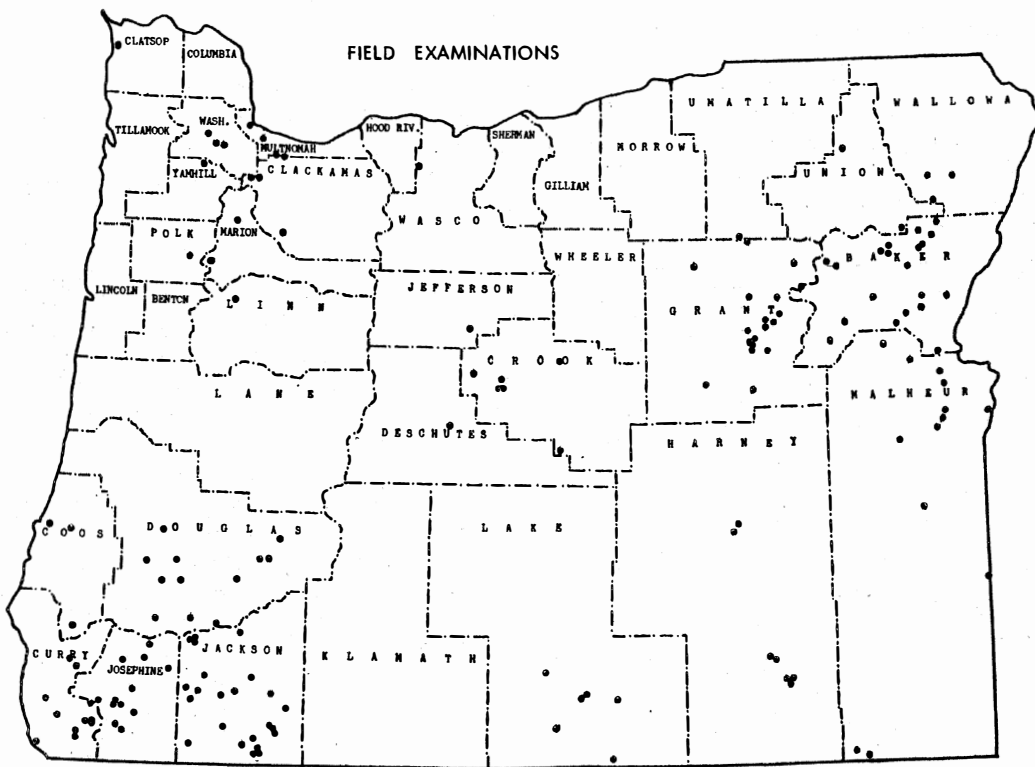
In addition to spot investigations, the Department conducts field trips for the benefit of oil geologists and shows areas under detailed Department investigation for their mineral possibilities to interested parties. A map showing where examinations have been made at the request of citizens is found on page 6.

LABORATORY SERVICES

A chemical and fire assaying laboratory, spectrographic laboratory, petrographic laboratory, micropaleontology laboratory, and crushing and grinding equipment are maintained at the Portland office. Services from all these laboratories except the spectrographic are free (ORS 516.040). The spectrographic laboratory was authorized by the 1941 Legislature (ORS 516.060). The authorizing act states that a "reasonable" charge in excess of the actual cost is to be made for determinations except for those made at the request of other State agencies for which the charge shall be at cost. The law



establishing all the other laboratories states that a person or group of persons may submit no more than two samples in a 30-day period. Such samples must be from an original prospect or property within the State, and the service is in return for information on the origin of the sample including the location from which it was obtained. This service may not be given to engineers in the sampling of properties for the purpose of evaluation nor to operating mines which are milling or shipping ore.

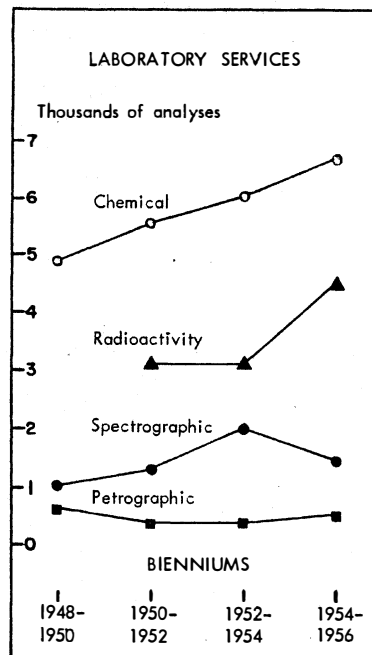


The spectrographic laboratory is used by commercial laboratories, basic metal industries, police departments, and health organizations, as well as the mining industry. The Department utilizes it by checking rocks and minerals for rare metals and assisting in rock and mineral identifications. The chemical laboratory is continually adding new equipment to keep pace with the search for the rare metals little known or looked for until recently. In the past two years expensive radiation detection instruments and chemical equipment necessary for uranium and thorium determinations have been acquired. The petrographic laboratory assists the prospector in identifying rocks and minerals and in determining what certain samples should be analyzed for. A limited amount of testing is done on clay samples to determine their suitability for the making of brick and tile. Local brick and tile plants cooperate with the Department in the performing of some of this test work. The micro-paleontology laboratory assists oil exploration organizations in the determining of microfossils used for stratigraphic dating.

MISCELLANEOUS SERVICES

The Department maintains a library and museum at the Portland office. Smaller libraries and displays of rocks and minerals of local interest are kept at the field offices. The library consists of publications by Federal and State geological surveys, publications of scientific and technical societies, a limited number of textbooks, maps, Department reports, and unpublished theses and reports concerned with Oregon's geology and mineral industry. Most material in the library can be taken out on a loan basis and facilities are available in the Department for library research. The librarian, a geologist, is on duty to assist visitors in use of the library and in obtaining publications through interlibrary loans. The museum has a collection of typical rocks, minerals, and fossils from Oregon.

The material is inadequately housed at present but is available for study. Use of both facilities is made by the Department, the interested public, engineers, research organizations, and mining and oil exploration organizations. As acquisitions to the library and museum increase, the limited space now available becomes more critical.



Great public interest in Oregon's geology and mineral industry and in geology and mining in general is shown by the number of requests made to the Department for talks and field trips. A list of the talks given in the biennium is shown on page 8. This service is one of the responsibilities of the regular staff members as there is no separate education or speakers bureau in the Department. A request for a projector and screen to show 35 mm colored photographic slides is in the budget for 1957-59 as use of this equipment will add more interest and better illustrate future lectures. A file of geologic and mineral industry photographs is continually being expanded. The Department welcomes the opportunity to appear before groups as it feels a better understanding of Oregon's mineral potential by the public is necessary if the State's resources are to be wisely used. The

Department also feels an educational responsibility, for a sign of an enlightened society is a better understanding of its surroundings.

An allied public service to the lectures and field trips is the preparation and distribution of mineral sets. Three sizes of sets are prepared, one of which is distributed on a loan basis and the other two are for sale. The loan set is a collection of 60 typical rocks and minerals from Oregon 1 inch by 2 inches by 1 inch in size put up in four boxes 9 by 10 inches. Ten sets are available and more are in preparation. The sets are sent to science classes of grade and high schools. A collection of 30 Oregon rocks and minerals 3/4 inch by 2 inches by 1 inch is assembled in boxes 9 by 10 inches for sale at \$1.50 per set plus postage. A small 6-mineral set in a box 3 by 6 inches is prepared for Boy Scouts and school children and sells for 25 cents. Included with all sets is a description of the material. The number of sets sold and the money received and distribution of the loan sets

is given on page 9. Material to be placed in the sets is collected by the staff members in the course of their duties, and a student worker is employed to assemble the sets.

A TYPICAL MONTH IN THE
PORTLAND LABORATORY
(June 1956)

Samples received	157
Chemical and fire analyses . .	341
Elements assayed for.	22
Spectrographic analyses . . .	71
Identifications	17*
Petrographic examinations . .	19
Radioactivity tests	125

*Does not include numerous specimens brought in by visitors for identification.

RESEARCH

Research is the basis for a large part of the information obtained by the Department. In order to prepare for future mineral development within the State it is essential that the mineral, both industrial and metallic, and oil and gas possibilities be continually examined. As the demand for new metals increases, a re-study of areas and properties previously examined becomes necessary. Because research precedes most new developments by several years, and sometimes by a great many years, it is difficult to immediately evaluate results. Most

research done in the Department is in the form of field studies. Assistance is given through the Department laboratories and library and sometimes from consultants hired by the Department.

GEOLOGICAL SURVEYS

Perhaps the most basic of all studies being conducted by the Department is the preparation of a State Geologic Map. This is a cooperative project with the U.S. Geological Survey. Reconnaissance mapping and compilation of existing mapping has been underway since 1953. The mapping will be completed on western Oregon from 121° longitude to the Pacific Ocean by the end of 1956 and a preliminary map will be issued in 1957. Work will then proceed into northeastern Oregon to be followed by mapping in the southeastern part of the State. Choice of regions to be geologically mapped has depended largely on the existence of present and anticipated topographic map coverage.

SERVICES GIVEN TO GROUPS

	<u>Schools</u>	<u>Service groups</u>	<u>Professional societies</u>	<u>Radio TV</u>	<u>Total</u>
Talks	21	34	8	3	66
Field trips	4	5	3	-	12
Office tours	10	3	-	-	13

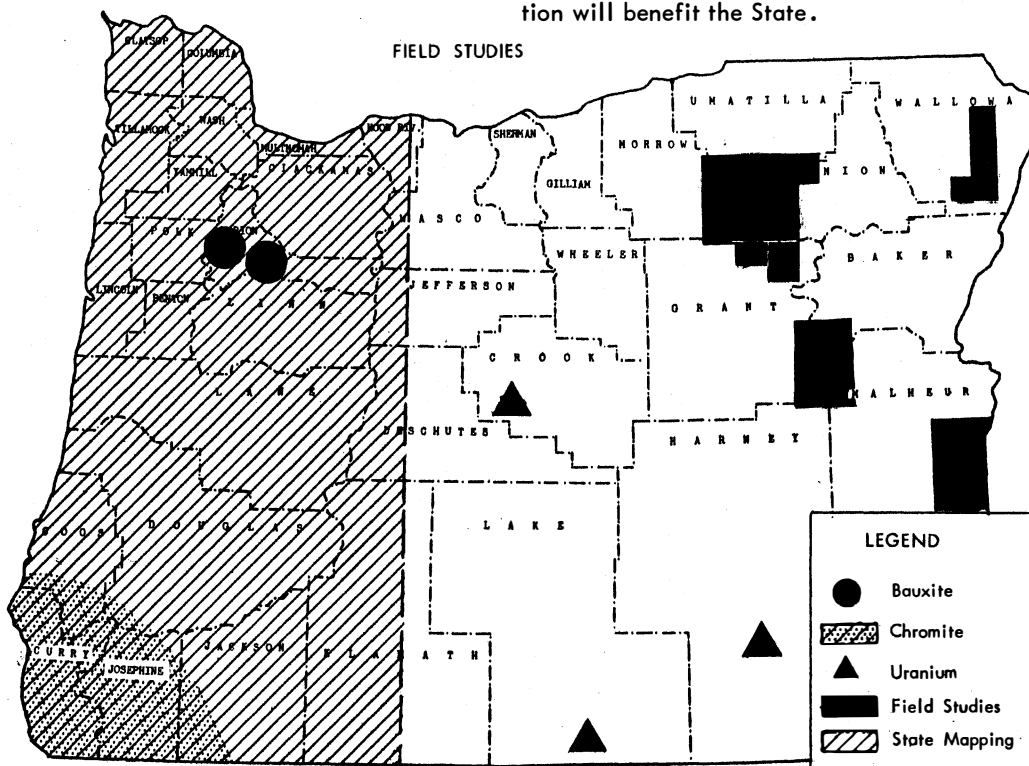
Certain areas that appear to have possible mineral significance or can furnish basic stratigraphic information from which reconnaissance mapping can be extended are examined in detail. Quadrangle mapping projects undertaken during the biennium were: Ironside Mountain in Grant, Baker, Malheur, Harney counties; Mitchell Butte in Malheur County; and Dale and Desolation Butte, chiefly in Grant County. Mapping in the Ironside Mountain and Mitchell Butte quadrangles will be finished in 1956 and the other quadrangles will probably be finished by 1960. Mineral studies in the biennium were made in the Salem Hills, Marion County, for bauxite; in southwestern Oregon on chromite; and in Lake, Crook, and Harney counties on uranium. Results of the bauxite work are in press and the chromite studies will be published in 1957. The uranium study, commenced in 1955, will not be ready for several years; however, progress reports are issued yearly. A map showing areas under study is on the opposite page.

FORAMINIFERAL STUDIES

Since 1944 the Department has been engaged in a continuing study of the microfossils of the marine Tertiary formations of western Oregon. The purpose of the study is to obtain basic data for stratigraphic correlations to aid in the exploration for oil and gas and to assist in the geologic mapping of western Oregon. Results have been published in seven papers incorporated into two volumes. A summary of the work to date is being readied for publishing and will be available in 1957. This work is continuing.

MISCELLANEOUS SERVICES	
Mineral Sets Sold During Biennium	
30-specimen sets	304
6-specimen sets	167
Special sets of 60 rocks and minerals were loaned to 53 schools during the Biennium.	
Letters From Students	
Requesting minerals.	571
Requesting geologic information	179
Asking about mineral resources	203

Staff personnel for study of other paleontological material are not available. For studies on material other than foraminifera, arrangements are made, as the occasion demands, with the State University and College, the U.S. Geological Survey, and other scientific organizations. Usually there is no charge made to the Department for this type of assistance. Material studied is generally limited to that collected in the course of Department field work and seldom of fossils submitted to the Department. Arrangements will be made to publish the results of research of paleontologists outside the Department if it is thought the publication will benefit the State.



OIL AND GAS ADMINISTRATION

Sixteen drilling permits for exploratory drilling in Oregon were issued by the Department's Governing Board between July 1, 1954, and June 30, 1956. No oil or gas in commercial quantities has as yet been discovered in Oregon, but of possible significance are shows of gas in Malheur County and minor shows of crude oil and gas from two tests in Douglas County. The accompanying tabulation shows the location and gives pertinent information on each well drilled during the last biennial period.

In 1953 the Oregon Legislature passed an oil and gas conservation law to be administered by the Governing Board of the State Department of Geology and Mineral Industries. The Board was directed to set up rules and regulations for the future guidance of oil and gas operators in the State. In June 1955 and again in March 1956 public hearings were held by the Board which resulted in amendments to the rules and regulations. Administrative Order No. G.M.I. 2 clarified certain sections of the regulations and increased the amount of the drilling bond from \$2,000 to \$4,000 for each well. Administrative Order No. G.M.I. 3 revised the well-plugging procedure and made abandonment of an unsuccessful exploratory well mandatory.

Oil and Gas Drilling Permits Issued Since Adoption of the Oil and Gas Act

Permit No.	Date Issued	Company	Lease Name and County	Location	Status
No number. (Drilling begun before oil and gas regulations were adopted.)	Sept. 4, 1952	Northwest Oils, Inc. Prineville, Oregon	Morrow Bros. No. 1 (Jefferson County)	700' N. of S. line, 900' E. of W. line, SW $\frac{1}{4}$ sec. 18, T. 12 S., R. 15 E.	Sporadic drilling since 1952. Suspended August 1955. Depth: 3000' \pm .
1	March 22, 1954	W. F. Kernin Roseburg, Oregon	D. Coon No. 1 (Douglas County)	900' S. of N. line, 900' W. of E. line, SE $\frac{1}{4}$ sec. 30, T. 28 S., R. 6 W.	Sporadic drilling.
2	March 26, 1954	R. A. Stamey Ontario, Oregon	G. B. Russell No. 1 (Malheur County)	330' S. of N. line, 330' E. of W. line, NW $\frac{1}{4}$ sec. 14, T. 19 S., R. 44 E.	Suspended October 1954. Depth: 4367'.
3	Sept. 2, 1954	H. K. Riddle Ontario, Oregon	Kiesel Estate No. 1 (Malheur County)	1260' N. of S. line, 1370' E. of W. line, SW $\frac{1}{4}$ sec. 8, T. 19 S., R. 47 E.	Suspended November 1954. Depth: 5137'.
4	October 4, 1954	Oil Developers, Inc. Roseburg, Oregon	Scott No. 1 (Douglas County)	SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 5, T. 27 S., R. 6 W.	Plugged and abandoned December 1954. Total depth: 3693'.
5	Nov. 15, 1954	El Paso Natural Gas Company. Salt Lake City, Utah	Federal No. 1 (Malheur County)	360' S. of N. line, 550' W. of E. line, NE $\frac{1}{4}$ sec. 5, T. 20 S., R. 44 E.	Plugged and abandoned January 1955. Total depth: 7470'.
6	February 16, 1955	C. A. Stone & Assoc. Lakeview, Oregon	W. A. Anderson No. 3 (Lake County)	2290' N. of S. line, 20' E. of W. line, SW $\frac{1}{4}$ sec. 20, T. 39 S., R. 19 E.	Suspended April 1955. Depth: 727'.
7	February 24, 1955	Oraco Oil and Gas Co. Payette, Idaho	Bolles No. 1 (Malheur County)	660' S. of N. line, 400' W. of E. line, NW $\frac{1}{4}$ sec. 15, T. 17 S., R. 47 E.	Suspended April 1955. Depth: 1966'.

Oil and Gas Drilling Permits Issued Since Adoption of the Oil and Gas Act

Permit No.	Date Issued	Company	Lease Name and County	Location	Status
8	March 29, 1955	Riddle Oil and Gas Producers Riddle, Oregon	Dayton No. 1 (Douglas County)	960' N. of S. line, 1040' E. of W. line, SW $\frac{1}{4}$ sec. 34, T. 30 S., R. 6 W.	Suspended April 1956. Depth: 1370'.
9	April 1, 1955	Standard Oil Co. of California Seattle, Washington	Haagland Unit No. 2 (Clatsop County)	311' N. and 499' E. of S $\frac{1}{4}$ corner sec. 11, T. 7 N., R. 10 W.	Plugged and abandoned June 1955. Total depth: 7101'.
10	June 6, 1955	R. N. Ranger Portland, Oregon	Eastern Oreg. Land Co. No. 1 (Malheur County)	660' N. of S. line, 1320' E. of W. line, SW $\frac{1}{4}$ sec. 15, T. 16 S., R. 44 E.	Abandoned February 1956. Superseded by Permit No. 13.
11	June 2, 1955	Sinclair Oil and Gas Company Portland, Oregon	Federal Mapleton No. 1 (Lane County)	1629' N. and 246' W. of SE corner sec. 12 T. 16 S., R. 10 W.	Plugged and abandoned February 1956. Total depth: 12,880'.
12	July 22, 1955	Oroco Oil and Gas Company Payette, Idaho	J. D. Lane No. 1 (Malheur County)	1320' N. of S. line, 2640' E. of W. line, SW $\frac{1}{4}$ sec. 16, T. 18 S., R. 47 E.	Abandoned June 1956. No drilling done.
13	July 26, 1955	Sinclair Oil and Gas Company Portland, Oregon	Eastern Oregon Land Co. No. 1 (Malheur County)	660' N. of S. line, 1980' E. of W. line, SW $\frac{1}{4}$ sec. 15, T. 16 S., R. 44 E.	Plugged and abandoned September 1955. Total depth: 4880'.
14	July 28, 1955	Standard Oil Company of California Seattle, Washington	Pexco No. 1 (Crook County)	3535' N. of S. line, 3006' E. of W. line, NE $\frac{1}{4}$ sec. 36, T. 20 S., R. 20 E.	Plugged and abandoned December 1955. Total depth: 7594'.
15	August 2, 1955	Uranium Oil and Gas Company Klamath Falls, Oregon	Ziedrich No. 1 (Douglas County)	1570' S. and 238' W. of N $\frac{1}{4}$ corner NW $\frac{1}{4}$ sec. 16, T. 29 S., R. 8 W.	Suspended November 1955. Depth: 4368'.
16	August 15, 1955	Oregon Explorations Hillsboro, Oregon	C. Wohler No. 1 (Washington County)	771.2' S. of N. line, 1650' W. of E. line, NE $\frac{1}{4}$ sec. 11, T. 1 S., R. 3 W.	Plugged and abandoned October 1955. Total depth: 727'.
17	October 24, 1955	Miriam Oil Company Dallas, Oregon	Elliott No. 1 (Polk County)	395' S. of N. line, 1390' E. of W. line, SW $\frac{1}{4}$ sec. 9, T. 8 S., R. 3 W.	Plugged and abandoned June 1956. Total depth: 1000' \pm .
18	April 30, 1956	Riddle Oil and Gas Producers Riddle, Oregon	Wollenberg No. 1 (Douglas County)	601' S. of N. line, 34.9' W. of E. line, NE $\frac{1}{4}$ sec. 28, T. 30 S., R. 6 W.	Intermittent drilling.

COOPERATIVE WORK

The Department, in its capacity as the State organization responsible for geological and mineral resource information and studies in Oregon, is called upon to cooperate with Federal bureaus and State, County, and City agencies in pursuing projects of mutual interest or in furnishing information as part of resource studies. When cooperating with Federal bureaus the Department usually takes the responsibility for completing an agreed-upon part of the work and the Federal bureaus furnish the technical and financial aid for their responsibility. Certain Department arrangements for cooperative work with State organizations include a charge to the requesting agency on an actual cost-to-Department basis while other cooperative work is considered a service of the Department and no charge is made. On major projects of several years' duration the Department has matched funds with counties - e.g., the Coos Bay coal project with Coos County in 1943 and 1944. In such arrangements the Department directs the work and furnishes the personnel and an agreement is reached on financial responsibility. Minor projects - e.g., geological surveys of limited extent or resource studies involving library research only - are usually considered a Department service and no charge is made. Cooperation with cities is generally of a limited nature and to date no charge has been made.

During the period covered by the biennium cooperative projects have been undertaken with the Federal Government as follows:

1. U.S. Geological Survey, Mineral Deposits Branch - preparation of the State Geologic Map; a resource study on titanium.
2. U.S. Geological Survey, Fuels Branch - preliminary mapping in the Coast Range; preparation of a summary on the coal resources of Oregon.
3. U.S. Bureau of Mines - compilation of statistics for various reports including the Minerals Yearbook; a three-way contract with the U.S. Bureau of Mines and the U.S. Bureau of Census for the collection of statistics; obtaining samples of Oregon bauxite for metallurgical research in the Bureau of Mines' laboratories.

Cooperative work in the 1954-1956 biennial period with the U.S. Geological Survey is shown on the opposite page.

Cooperative work in the 1954-1956 biennial period with State agencies is as follows:

1. Board of Control - maps and reports on three sites under consideration for the Portland mental institution and one site for the intermediate institution.
2. Land Board - maps, reports, and technical testimony on two areas in litigation.
3. Crime Detection Laboratory - spectrographic analysis and technical testimony.
4. Board of Health - petrographic analysis.
5. Exchange of information with several other agencies.

Except for work done in the spectrographic laboratory for police departments, the County and City cooperation during the biennium was limited to projects for which no charge was made. These projects were concerned principally with mineral resource studies and studies concerned with landslides.

PUBLICATIONS ISSUED COOPERATIVELY
WITH THE U.S. GEOLOGICAL SURVEY

MAPS

Oil and Gas Investigations Series

OM 150 "Geology of the west-central border area of the Willamette Valley, Oregon," by H. E. Vokes, D. A. Myers, and Linn Hoover, 1954.

OM 155 "Geology of the Sheridan and McMinnville quadrangles, Oregon," by E. M. Baldwin and others, 1955.

OM 162 "Geology of the Marys Peak and Alsea quadrangles, Oregon," by E. M. Baldwin, 1955.

Mineral Investigations Field Studies Series

MF 38 "Preliminary geologic map of southwestern Oregon," by F. G. Wells, 1955.

CIRCULARS

Circular 362 "Coal resources of Oregon," by R. S. Mason and M. I. Erwin, 1955.

DEPARTMENT PUBLICATIONS AND PUBLICATIONS IN PROGRESS

A complete list of Department publications is given at the end of this bulletin. The following publications have been issued during the biennium covered by this report.

BULLETIN 1 - (4th revision) - "Mining Laws of Oregon," 1954.

This publication presents information to the public on the various phases of Departmental activities as set up by the State Legislature; the laws concerning mining and mining claims, O&C Lands' mineral entries, mining claims on the public domain and within Mount Hood National Forest, and the essentials of assessment work. A section of the bulletin is devoted to Federal placer mining laws and regulations.

2,000 copies were issued at a cost of \$408.20.

BULLETIN 16 - (2d printing of 5th edition) - "Field Identification of Minerals for Oregon Prospectors and Collectors," compiled by Ray C. Treasher, former Geologist with the Department, and the staff, 1954.

The fifth edition of 1,091 copies was exhausted in 1954 making another printing necessary.

1,997 copies cost \$1,009.40.

BULLETIN 45 - Ninth Biennial Report of the Department for the period July 1, 1952, to July 1, 1954.

800 copies cost \$343.41.

SHORT PAPER 18 - "Radioactive Minerals the Prospector Should Know."

The search for uranium has resulted in a continuing demand for this publication since the first printing May 1949. It was necessary to reprint it three times during the 1954-1955 biennium. The original report was made by David J. White, formerly geologist with the Department. The third edition was completely rewritten by Max Schafer, geologist at the Grants Pass field office. This revision includes new prospecting techniques, description of new radiation detection instruments, and an outline of Public Law 585 which amends the mining laws to allow multiple use of the surface of mining claims.

Between May 1949 and August 1955, 7,681 copies were issued. Printings during the Biennium covered by this report were as follows:

First printing:	(December 1954)	-	555	copies	cost	\$	98.71
Second	"	(June 1955)	-	1,600	"	"	261.44
Third	"	(August 1955)	-	1,950	"	"	292.94
		Total	4,105	"	"	\$	653.09

MISCELLANEOUS PAPER 2 - (Second printing) - "Key to Oregon Mineral Deposits Map," by Ralph S. Mason, 1955. The first printing of 1,250 copies was depleted in 1955.

This pamphlet contains information regarding the properties shown on "Oregon Mineral Deposits Map" (1954).

1,045 copies cost \$144.16.

MISCELLANEOUS PAPER 4 - (Revised edition) - "Rules and Regulations for the Conservation of Oil and Natural Gas," 1955.

An Appendix (Chapter 520 ORS, Gas and Oil Wells; also Section 516.090 ORS) is included. This paper was published as a result of the new oil and natural gas law (Chapter 520 ORS) passed by the 1953 Oregon Legislature. The revised edition was published in 1955 as a pocket edition.

992 copies cost \$105.65.

MISCELLANEOUS PAPER 6 - "Oil and Gas Exploration in Oregon," compiled by R. E. Stewart, 1955.

Since World War II, activities in oil and gas investigations in Oregon have increased. Inquiries at Department offices have made it necessary to compile available records and references concerning oil and gas test wells, oil and gas indications, shallow stratigraphic drilling, and geophysical investigations throughout the State.

1,033 copies cost \$469.22.

THE ORE.-BIN - This small monthly periodical is prepared and multigraphed in the office of the Department. Monthly circulation is 1,450, of which 382 are sent free to legislators, Oregon libraries, educational institutions, and a restricted exchange list. A yearly subscription charge of 50 cents is made to cover cost of assembling and mailing. The principal value of such a publication is to present the mineral industry viewpoint on problems affecting the industry, and to provide pertinent information on Oregon mining and geology. The Ore.-Bin serves also for announcement of new publications, and publishes statistics on Oregon mineral production as soon as they are available. During the Biennium ending June 30, 1956, there were 39,147 copies printed by the Department.

URANIUM LAW - Review reprinted from Rocky Mountain Law Review, June 1955, University of Colorado.

"Discovery Requirements and Rights Prior to Discovery on Uranium Claims on the Colorado Plateau," by William G. Waldeck, Attorney-at-Law, Montrose, Colorado.

The Department reprinted a limited number as a public service. They were intended mainly for distribution to legal offices in the State of Oregon.

120 copies cost \$22.27.

MAPS PUBLISHED DURING BIENNIUM

OREGON MINERAL DEPOSITS, by Ralph S. Mason, (revised) 1954, 22 by 34 inches; 2000 cost \$200.

LANDFORMS OF OREGON, 17 by 22 inches; 1000 cost \$150.

INDEX TO GEOLOGIC MAPPING, 1954, 8½ by 11 inches, two colors; 1175 cost \$18.58.

INDEX TO TOPOGRAPHIC MAPPING, 1954, 8½ by 11 inches; 1420 cost \$16.69.

MINERAL LOCALITIES, 1952, 8½ by 11 inches, two colors; 2459 cost \$16.00.

SEMIPRECIOUS GEM STONE AREAS, 1955, 8½ by 11 inches, two colors, text on back; 1431 cost \$12.23.

REPRINTS from The Ore.-Bin:

Vol. 16, No. 6, June 1954:
"Reconnaissance Geology along U.S.
Highway 20 between Vale and Buchanan,
Malheur and Harney counties, Oregon."

300 copies cost \$20.18.

Vol. 16, No. 11, November
1954: "Uranium Prospecting."

1,200 copies cost \$54.82.

Vol. 9, No. 5, May 1947: "Department Spectrograph."

600 copies cost \$3.34.

Vol. 15, No. 10, October 1953: "The Nickel Mountain Project."

500 copies cost \$45.84.

Vol. 13, No. 4, February 1951: "Comments on the Geology and Mineral Resources of Douglas County, Oregon."

250 copies cost \$19.52.

Publications in progress during the biennium are as follows:

BULLETIN 46 - "Ferruginous Bauxite Deposits in the Salem Hills, Marion County, Oregon," by R. E. Corcoran and F. W. Libbey. In press. The bulletin gives a description of the geology of the area, the limit of the area found to be underlain by bauxite, and the results of the Department's drilling program. A large number of analyses of samples are listed. Reports by Professor E. E. Roedder and the U.S. Bureau of Mines laboratory on the geochemistry of the titanium found in the bauxite are included.

BULLETIN - "Fossil Localities in Western Oregon," by Margaret L. Steere. Ready for publication in 1957. The bulletin is intended primarily for the amateur paleontologist but the oil geologist will find it useful. Information for the bulletin is being compiled from literature and from field inspection. The text summarizes the geology of the fossiliferous areas in western Oregon, lists fossils for each area, and describes how to find the localities. Maps, illustrations of fossils, and bibliographies are included. A supplement to this bulletin, "Fossil Localities in Eastern Oregon," is in preparation.

BULLETIN - "Bibliography of the Geology and Mineral Resources of Oregon," by Margaret L. Steere. This is the third supplement of the original bibliography published by the State Planning Board in 1936. It will cover the five-year period 1951-1955. Information for the bulletin is maintained currently in card-file form and will be ready for publication in 1957.

BULLETIN - "Geology of the Mitchell Butte Quadrangle, Malheur County, Oregon," by R. E. Corcoran. Ready in 1958. The publication will include a geological map and description of the formations found within the area. The mapping was authorized to furnish basic geologic data for development of the area's mineral and oil and gas resources and to serve as a "bench mark" from which to extend reconnaissance geologic mapping in southeastern Oregon for the State Geologic Map.

BULLETIN - "Geology of the Ironside Mountain Quadrangle, Baker, Grant, and Malheur Counties, Oregon," by W. D. Lowry. Ready in 1957. Authorization for this publication was granted as part of the Department's policy to map areas having economic possibilities and to furnish geological information in critical areas. The map and description of geology will be of great help for the State Geologic Map in both the northeastern and southeastern Oregon segments. Dr. Lowry, a former staff member, is a professor at Virginia Polytechnic Institute, Blacksburg, Virginia, and was hired on a consultant basis for this mapping job.

BULLETIN 36 (3rd volume) - "Papers on Foraminifera from the Tertiary of Western Oregon," by R. E. Stewart. This is a continuation of the work on which Volumes 1 and 2 of Bulletin 36 have already been published. These studies are designed to set up a stratigraphic section of the Tertiary of western Oregon and will be extremely valuable for investigators in the field of geology, especially oil geologists.

BULLETIN - "Chromite Deposits of Southwestern Oregon," by Len Ramp. Ready in 1958. Mr. Ramp, Field Geologist at the Grants Pass Field Office, has devoted the past four years to this study. The project was authorized in order to obtain information on genesis and structural control of chromite deposits that may be helpful in prospecting. All known occurrences of chromite in southwestern Oregon will also be listed.

MISCELLANEOUS PAPER 6 - "Stratigraphic Implications of Some Cenozoic Foraminifera from Western Oregon," by R. E. Stewart. Ready in 1957. A reprint of three articles appearing in The Ore.-Bin giving a summary of foraminiferal studies to date.

GEOLOGIC MAP SERIES - "Geology of the Lebanon Quadrangle, Oregon," by Ira S. Allison and Wayne M. Felts. Ready in 1957. Dr. Allison is head of the Department of Geology at Oregon State College. Dr. Felts, now with the Texas Company, did the original work on the quadrangle as a Masters thesis under Professor Allison in 1936. The Lebanon quadrangle is a continuation of Allison's geologic mapping in the Willamette Valley. His mapping in the Albany quadrangle was published as Department Bulletin No. 37. "Geology of the Lebanon Quadrangle, Oregon," will appear as a colored geologic map with the text printed on the back.

GEOLOGIC MAP SERIES - "Geologic Map of the Bend Quadrangle and the Central High Cascades, Oregon," by Howel Williams. Ready in 1957. Dr. Howel Williams, professor of geology at the University of California, Berkeley, has given the Department his mapping in central Oregon for publishing. The publication will come out as a folio with the Bend quadrangle in color on a scale of 1:125,000 and parts or all of the Bend, Three Sisters, McKenzie Bridge, Waldo Lake, Maiden Peak, Newberry Crater, Chemult, Diamond Lake, and Crater Lake quadrangles in black and white on a scale of 1:250,000. The folio will include a limited text. The publication is intended primarily for the interested layman and tourist, but the geologist will also find it of great value.

STATE GEOLOGIC MAP - "Preliminary State Geologic Map of Western Oregon from 121° 30' West Longitude to the Pacific Ocean," a cooperative project between the Oregon Department of Geology and Mineral Industries and the U. S. Geological Survey. Ready in 1957. The map is on a scale of 1:500,000 and the preliminary edition will be in black and white. It is planned to issue the State Map in three segments: western, northeastern, and southeastern. Upon completion of the maps in black and white, necessary revisions will be made and a colored edition of all segments will be published. The maps are a compilation and correlation of existing mapping with reconnaissance mapping filling in the blank areas. This basic information publication is probably the most important of the State geological surveys and forms the framework for intelligent approach to future economic and geological studies of the Department and industry. Information going into the map embodies all the geological research done in the State to date.

PRESS RELEASES*

"Geology Department Director Retires" - October 15, 1954
"Area in Malheur County to be Geologically Mapped" - December 17, 1954
"Oil Land Leasing in Oregon Increases" - December 24, 1954
"Oil and Gas Publication Issued" - February 24, 1955
"Radioassayer Installed at Baker" - March 29, 1955
"Uranium Booklet Published" - June 16, 1955
"Dole Appointed Director" - July 15, 1955
"Oil and Gas Law Changes Proposed" - March 6, 1956
"Geologist Added to Staff" - June 15, 1956
"Board to Meet" - June 26, 1956

* Issued from July 1, 1954, to June 30, 1956,

PERSONNEL

GOVERNING BOARD

Mason L. Bingham, Chairman - Portland
Niel R. Allen - Grants Pass
Austin Dunn - Baker

The Governing Board, appointed by the Governor of the State, selects the Director of the Department who has charge of the work of the Department and who subscribes to the same oath of office as other State officers. The Director employs assistants with the approval of the Governing Board. Salary of the Director is set by the Governing Board within a range determined by the Legislature. Salaries and wages of Department employees are governed by the State Civil Service and Department of Finance regulations.

The law establishing the Department prohibits the Director or any member of the staff from holding or having an interest or dealing in any producing or prospective mineral property of any kind in this State, including oil and gas. It also prohibits the Director or staff from doing consulting work if the service is concerned with mining, geology, or any mineral industry in the State.

Fay W. Libbey, Director of the Department since July 1944, retired in November of 1954. The Board appointed Hollis M. Dole Director on July 1, 1955, after his serving as

DEPARTMENT PERSONNEL

Hollis M. Dole, Director
* Roger P. Ashley, Student worker
Howard C. Brooks, Geologist (Baker)
Raymond E. Corcoran, Geologist
* Howard J. Handewith, Jr., Draftsman
L. L. Hoagland, Assayer-chemist
Loris M. Killian, Secretary
* Grace E. Lewis, Stenographer (Baker)
Ralph S. Mason, Mining engineer
Thomas C. Matthews, Spectroscopist
Lillian F. Owen, Multigraph operator
Lenin Ramp, Geologist (Grants Pass)
* George H. Rice, Laboratory assistant
June A. Roberts, Secretary
Max Schafer, Geologist (Grants Pass)
Herbert G. Schlicker, Geologist
* Arline M. Sims, Stenographer (Grants Pass)
Margaret L. Steere, Geologist
R. E. Stewart, Geologist
Norman S. Wagner, Geologist (Baker)
R. P. Zobl, Accountant

Acting Director following Mr. Libbey's retirement. Howard Brooks, geologist, was added to the Baker field office staff as a geologist in June 1956. This was the only increase in the Department's staff during the biennium and was made upon authorization of the 1955 Legislature in order to more effectively meet the increased demand for services and geological work in eastern Oregon. Herbert Schlicker, geologist, was appointed in November 1955 to fill the vacancy left when Hollis Dole was appointed Director.

Department personnel as of July 1, 1956, are shown in the accompanying table. Unless otherwise noted, employees are stationed at the Portland office. Names preceded by an asterisk (*) are part-time employees.

Some temporary employees were hired during the period covered by this report for geological field work, drafting, and special work.

FINANCIAL STATEMENT

APPROPRIATIONS

The Department's activities are supported by money appropriated by the Legislature out of the State's general fund. Appropriations received by the Department are divided into accounts classified as follows: Salaries and Wages; Other Personal Service; Materials and Services; Capital Outlays; and Special Requests. Funds appropriated for use under one classification may not be used for expenditures in a different classification. All departmental expenditures are evidenced by warrants drawn on the State Treasurer and are audited by the office of the Secretary of State.

In addition to funds appropriated by the Legislature, the Department maintains a separate account with the State Treasurer called the Geology and Mineral Industries Account to which are credited receipts from the sale of publications, from gifts, and from oil and gas drilling permits. Allowable expenditures from this account are budgeted by the Legislature and approved by the State Budget Director. A statement showing receipts and expenditures of this account is given on page 24.

The following table gives biennial appropriations made by the last two Legislatures as well as funds requested for the 1957-59 biennium:

	<u>1953-1955</u>	<u>1955-1957</u>	<u>Requested 1957-1959</u>
Salaries and Wages	\$ 156,245.60	\$ 188,638.00	\$ 226,287.00
Other Personal Service	---	10,364.10	16,370.00
Materials and Services (Gen., Oper., & Maint.)	52,425.00	49,015.00	57,795.00
Capital Outlays	4,100.00	6,950.00	13,102.57
Special Requests	<u>13,500.00</u>	<u>13,500.00</u>	<u>15,000.00</u>
TOTAL	\$ 226,270.60	\$ 268,467.10	\$ 328,554.57

The increase in Salaries and Wages in the 1957-1959 budget request is the result of new wage scales set up by the State Civil Service Commission and the Budget Division of the Department of Finance and Administration. The Materials and Services increase reflects the increased demand for Department services and the increased cost of doing business. The bulk of the increase in Capital Outlays is for three new field vehicles to replace old units. The remainder of the increase in Capital Outlays is for laboratory instruments. The Board believed an increase in Special Requests was necessary in order to accelerate the State Geologic Map, the need for which is becoming greater each year as oil and gas investigations increase and the industrial mineral requirements of a growing population become greater.

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

Comparative Statements of Expenditures According to Bienniums

1951-1953

	<u>Expenditures</u>	<u>G&M Expenditures</u>	<u>Total Expenditures</u>
<u>Salaries and Wages</u>	<u>\$ 133,010.74</u>	<u>\$</u>	<u>\$ 133,010.74</u>
<u>General, Operating, & Maint.</u>	<u>49,410.16</u>	<u>1,142.53</u>	<u>50,552.69</u>
Office Supplies	1,219.50	22.76	1,242.26
Telephone and Telegraph	1,606.44	9.00	1,615.44
Postage, Freight, and Express	1,743.06		1,743.06
Printing	3,600.83	167.72	3,768.55
Rents	19,796.95	892.70	20,689.65
Premiums	212.50		212.50
Contribut.: Pub. Emp. Ret. Board	6,388.10		6,388.10
Soc. Security			
State Civil Service	401.03		401.03
State Ind. Acc.	399.80		399.80
Assessments: Restoration	201.19		201.19
Auditing	631.28		631.28
Private Car Mileage	239.97		239.97
Railroad Fares, etc.	1,086.28	6.00	1,092.28
Meals and Lodging	2,482.78	41.35	2,524.13
Motor Vehicles	2,615.73	3.00	2,618.73
Heat, Light, Water, Power	607.13		607.13
Laundry	116.32		116.32
Laboratory and Field	2,315.80		2,315.80
Library	393.61		393.61
Buildings and Fixtures	847.03		847.03
Photos and Blueprints	347.41		347.41
All other	421.63		421.63
Expense moving to State Off. Bldg.	1,735.79		1,735.79
Gas & oil well law administration			
<u>Capital Outlays:</u>	<u>3,100.00</u>	<u>195.42</u>	<u>3,295.42</u>
Office Furniture & Equipment	850.14	19.80	869.94
Motor Vehicles	1,300.51		1,300.51
Laboratory and Field	875.90	175.62	1,051.52
Library and Others	73.45		73.45
<u>Special Requests</u>	<u>9,534.59</u>		<u>9,534.59</u>
State Geological Survey	7,659.89		7,659.89
" " Mapping	1,874.70		1,874.70
 TOTAL Expenditures	 \$ 195,055.49	 \$ 1,337.95	 \$ 196,393.44

	1953-1955		1955-1957	1957-1959
<u>Expenditures</u>	<u>G&MI Expenditures</u>	<u>Total Expenditures</u>	<u>Estimated Expenditures</u>	<u>Funds Requested</u>
<u>\$ 152,253.33</u>	<u>\$</u>	<u>\$ 152,253.33</u>	<u>\$ 188,638.00</u>	<u>\$ 226,287.00</u>
52,301.11	2,085.49	54,386.60	59,379.10	74,165.00
1,106.08		1,106.08	1,600.00	1,900.00
1,908.32		1,908.32	1,850.00	2,100.00
2,099.61	68.88	2,168.49	2,100.00	2,300.00
2,294.36	1,358.20	3,652.56	3,200.00	5,900.00
21,784.80	380.00	22,164.80	22,625.00	22,745.00
405.26		405.26	400.00	400.00
5,196.82		5,196.82	5,857.00	10,500.00
2,444.57		2,444.57	3,034.00	3,690.00
452.71		452.71	600.00	680.00
461.13		461.13	873.10	1,500.00
156.74		156.74	340.00	300.00
588.17		588.17	700.00	700.00
729.76		729.76	800.00	800.00
851.69		851.69	1,700.00	1,950.00
2,525.92		2,525.92	3,300.00	5,000.00
3,890.71		3,890.71	3,650.00	5,500.00
686.18		686.18	900.00	900.00
114.11		114.11	125.00	125.00
2,476.07	25.16	2,501.23	2,425.00	3,600.00
483.02	225.00	708.02	625.00	700.00
265.90		265.90	950.00	1,250.00
245.48	28.25	273.73	375.00	875.00
737.77		737.77	850.00	250.00
---	---	---	---	---
<u>395.93</u>		<u>395.93</u>	<u>500.00</u>	<u>500.00</u>
3,912.45	427.98	4,340.43	6,950.00	13,102.57
335.57		335.57	1,750.00	2,468.25
1,955.20	188.85	2,144.05	1,200.00	5,800.00
801.44	232.17	1,033.61	3,750.00	4,229.32
820.24	6.96	827.20	250.00	605.00
9,409.28		9,409.28	13,500.00	15,000.00
5,998.67		5,998.67	13,500.00	15,000.00
3,410.61		3,410.61		
<u>\$ 217,876.17</u>	<u>\$ 2,513.47</u>	<u>\$ 220,389.64</u>	<u>\$ 268,467.10</u>	<u>\$ 328,554.57</u>

GEOLOGY AND MINERAL INDUSTRIES ACCOUNT
(Section 7, Chapter 179, Oregon Laws 1937)

For Period July 1, 1954, to July 1, 1956

Balance June 30, 1954 \$ 9,486.41

RECEIPTS:

Sale of publications	\$ 8,097.02	
Sale of mine reports, blueprints, and sundry sales	129.33	
Sale of mineral specimen collections	497.75	
Refunds from Geological Society of the Oregon Country for printing expense	167.69	
Public Employees Retirement Board refund for over- payment on contribution by R. S. Mason	47.77	
Refund from Insurance Company	22.11	
Commission from Conger Printing Company for sale of publications	37.50	
State Land Board, Salem, for report on Willamette River	56.64	
Witness fees of Thomas C. Matthews, Max Schafer, and Raymond E. Corcoran	19.08	
Oil and Gas Test Permit Fees	400.00	9,474.89
		18,961.30

DISBURSEMENTS:

<u>Material and Services:</u>		
Office Supplies	22.72	
Automotive	65.66	
Industrial and Laboratory	22.33	
Rents	240.00	
Telephone and Telegraph	258.38	
Railroad fares	25.17	
Postage	99.90	
Meals and Lodgings	83.25	
Printing	1,719.82	
Library	131.50	
 <u>Capital Outlays:</u>		
Office Equipment	674.00	
Automotive Equipment	188.85	
Laboratory and Field Equipment	152.10	
Library	6.96	3,690.64
		3,690.64

BALANCE June 30, 1956 \$ 15,270.66

OREGON'S MINERAL INDUSTRY

Oregon's mineral industry reached an all-time production record during the biennium, but it is likely this record will be surpassed in the years ahead. The upward trend was most noticeable in the industrial minerals, a good indicator of the economic condition of an area. Metals turned in mixed reports. Gold dropped to a new low, and chromite was off 20 percent as the anticipated termination of the stockpile program neared. Mercury more than doubled its 1954 value, and nickel and uranium, newcomers to Oregon's family of mineral products, made impressive developments.

Metal prices fluctuated considerably during the biennium, mostly in response to normal supply and demand, but partly, as in the case of mercury, to government "cloak and dagger" manipulations which left the mercury miner wondering what his future was to be.

Exploration for oil and gas was conducted at a record rate in 1955, but no significant showings were found. Sixteen permits to drill were issued by the Department during the biennium. One company drilled to a depth of 12,000 feet, a record for the Northwest. Although the first six months of 1956 saw little oil and gas exploratory drilling, there were indications that 1957 would see renewed activity on a substantial scale.

INDUSTRIAL MINERALS

Limestone and cement. A continuing strong demand for limestone in the Northwest kept Oregon's six quarries operating at full capacity throughout the biennium. Three quarries produced rock principally for the manufacture of cement, one for calcium carbide, one for paper mills and sugar refineries, and one wholly for agricultural use.

Oregon Portland Cement Company opened a new quarry on their property at Lime, Baker County, and announced additions to quarry facilities at Dallas, Polk County. The Chemical Lime Company of Baker purchased a plant site at Wingville on the Union Pacific Railroad 4 miles north of Baker in 1955 and started to construct a lime-burning plant on the site in 1956. Limestone will come from the company-owned quarry on Marble Creek about 8 miles from the plant. National Industrial Products Company shipped high-grade limestone from its quarry at Durkee, Baker County, at the rate of approximately 150,000 tons per year. The bulk of production went to sugar refineries in Idaho with some going to Northwest paper manufacturers. Ideal Cement Company operated its Marble Mountain quarry, Josephine County, at full capacity and trucked crushed limestone to its cement plant at Gold Hill, Jackson County. Formerly rock was transported over the C&OC and Southern Pacific railroads. Pacific Carbide and Alloys Company operated its quarry near Enterprise, Wallowa County, during all but the winter months. Most of the production went into the manufacture of calcium carbide at the Portland plant.

Total tonnage of agricultural limestone produced in the State in 1955, as reported to the State Agriculture Department, was 32,117 tons. Approximately 51,000 tons of limestone were spread on Oregon farms in 1955, however, with some lime coming from Washington and some recovered from carbide sludge.

Business was good-to-booming in cement. In addition to top-capacity production from the three plants located in the State, a considerable quantity of cement was imported from outside the area to meet the demand. In 1955 Oregon Portland Cement Company announced plans to enlarge the capacity of its Oswego plant by 50 percent and to double the capacity of its plant at Lime. Included in its \$6,000,000 expansion program started in 1947 are new kilns, additional storage space, and new machinery. Ideal Cement Company's Gold Hill plant operated at full capacity.

Demand for cement came from accelerated domestic and industrial construction. Added to this is the present and anticipated future construction of massive concrete dams for power and flood control.

New Oregon Mineral Products
Nickel
Uranium
Salines

Sand, gravel, and crushed stone. One of the best indices of business activity in an area is the production of sand and gravel. Used as a basic ingredient in the construction of all concrete structures, sand and gravel reflect promptly the trends in domestic and industrial growth. Construction of dams consumes large quantities of this commodity but the greatest single continuing use is in road and highway construction.

Although accurate statistics for the industry are difficult to obtain due largely to the transient nature of many small operations plus production by companies not normally regarded as stone producers, the overall picture was one of continued large-volume production. Dollar value of sand and gravel and crushed stone for Oregon in 1955 is estimated at slightly more than \$22,000,000 or almost two-thirds of the total of all mineral production for the State.

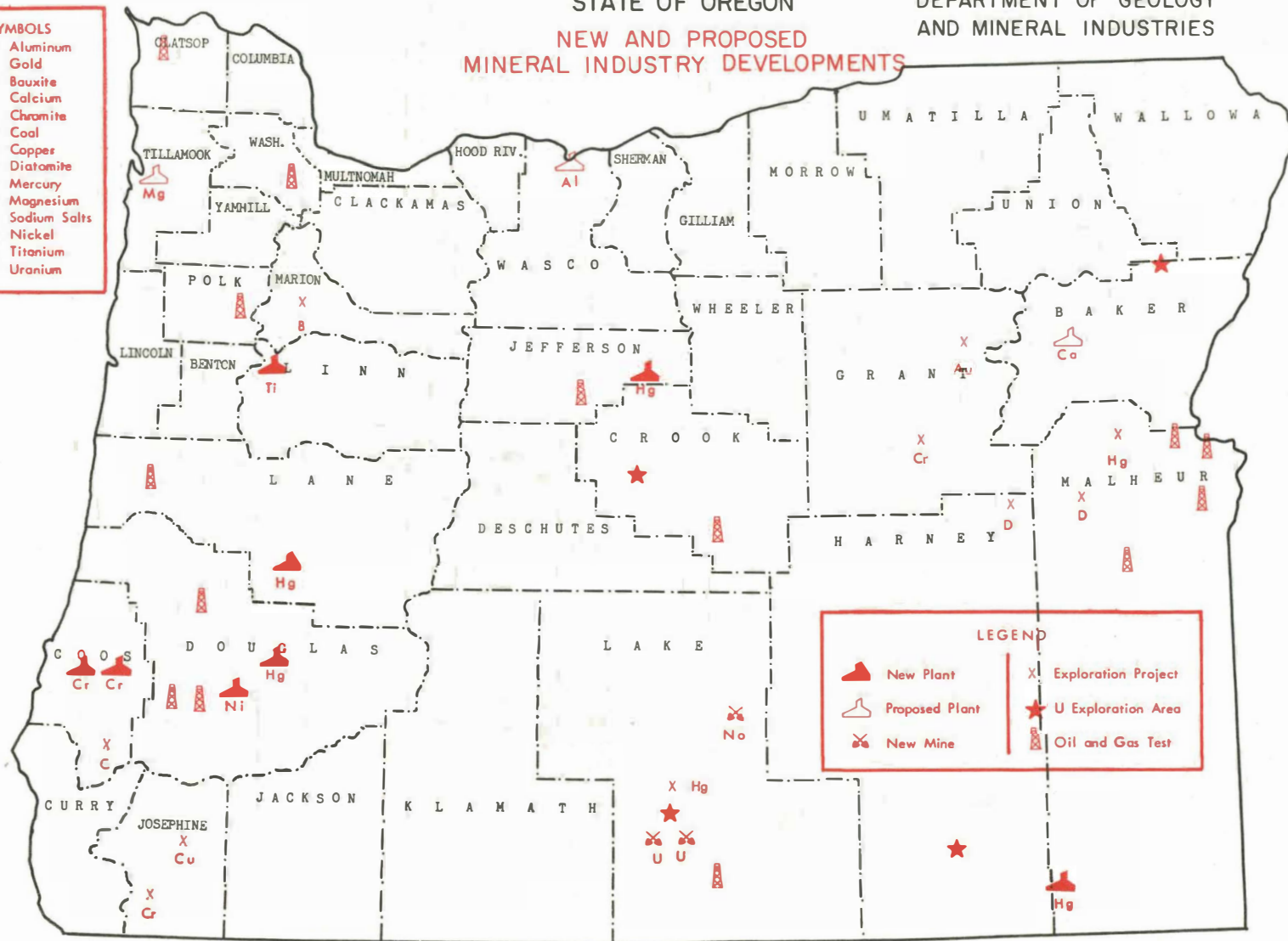
In the past it was common practice to use locally obtainable supplies in road construction. This picture is changing rapidly in Oregon with the advent of lightweight, large-capacity, high-speed haulage units. This practice points up the growing problem of obtaining suitable aggregate in sufficient quantity to meet the ever-increasing demand and stringent construction requirements. In western Oregon there is, in certain areas, a shortage of acceptable crushed stone and the supply is steadily decreasing. Movement of concrete and plaster sand from the Portland area to points as far away as Astoria has become regular practice.

Building stone. Demand for building stone saw a decided increase during the biennium with the bulk of the supply coming from out-of-state quarries. The trend toward "outdoor living" with stone-covered patios, barbecue pits, stone-veneered exterior and interior walls, and fireplaces fashioned from rough and surfaced stone appears to be gaining momentum. Five Oregon quarries were active during the biennium. Though none of them could be said to be large operations, most of them reported that business was good. Without exception all the quarries were producing some form of volcanic rock. Rocky Butte Quarry on the northeast side of Rocky Butte, Multnomah County, and Faoro and Sons Quarry near Carver, Clackamas County, sold rough and surfaced blocks of lava for retaining walls, fireplaces, and other uses. Rainbow Rock Quarry near Pine Grove, Wasco County, installed a wire quarry saw and circular resaw to prepare veneer and patio slabs of brightly colored volcanic tuff. Shipments from this quarry were made to Grants Pass, Portland, and Seattle. Pacific Cut Stone Company produced a banded, dark pink tuff from its quarry at Willowdale, northern Jefferson County. Most of the production was in the form of gang-sawed veneer stock which was shipped largely to Seattle with a small amount moving into the Portland area. Tuff Stone Company produced a light gray tuff from a quarry located just east of Sublimity, Marion County.

STATE OF OREGON
NEW AND PROPOSED
MINERAL INDUSTRY DEVELOPMENTS

DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES

SYMBOLS	
Al	= Aluminum
Au	= Gold
B	= Bauxite
Co	= Calcium
Cr	= Chromite
C	= Coal
Cu	= Coppers
D	= Diatomite
Hg	= Mercury
Mg	= Magnesium
Na	= Sodium Salts
Ni	= Nickel
Ti	= Titanium
U	= Uranium



LEGEND	
	New Plant
	Proposed Plant
	New Mine
	Exploration Project
	U Exploration Area
	Oil and Gas Test

Granite produced by the Northwestern Granite quarry at Haines, Baker County, is limited primarily to monumental stone. The quarry has operated for many years.

Large blocks of dark red scoria were produced from several pits in the Bend-Redmond area of central Oregon for use in garden walls and rock gardens.

Oregon's Mineral Industry at a Glance		
	1954	1955
Chromite	\$ 535,609	\$ 463,514
Clays	377,201	250,608
Copper	2,950	2,984
Gold	228,200	59,780
Lead	1,370	894
Mercury	129,287	306,610
Nickel	(see undistributed)	1,658,879
Pumice	177,515	(see undistributed)
Sand and Gravel	14,149,380	11,985,164
Silver	12,974	7,978
Stone	8,436,284	9,420,471
Undistributed	9,444,218	8,845,477
TOTAL	32,271,513	31,895,335

Expanded shale. Expanded-shale production continued in much the same manner as it has in former years. Smithwick Concrete Products obtained raw shale from a quarry near Vernonia, Columbia County, and railed it to Portland for expansion. Empire Building Materials quarried and furnaced shale at its operation near Sunset Tunnel in northwest Washington County and trucked the expanded material to its block plant in Portland. Expanded-shale aggregate, in addition to being used in modular precast units and monolithic construction, is finding a new field in the construction of prestressed structural members such as

roof and bridge trusses. The strength and comparative lightness of such units may bring them into competition with structural timbers and steel. One manufacturer shipped prefabricated bridge trusses to Alaska.

Pumice. Pumice producers (Williamson Cascade Pumice Company, Bend; Central Oregon Pumice Company, Bend; and Harney Concrete Tile Company, Burns) reported construction of additional plant facilities or the acquisition of more deposits during the biennium. Both Central Oregon and Williamson produced, besides pumice, an aggregate from volcanic cinders or scoria. The bulk of the pumice aggregate went into lightweight concrete blocks but considerable quantities were also sold for plaster sand, loose fill insulation, and sweeping compound. Shipments of abrasive-grade pumice by Williamson Cascade Pumice Company from a deposit located in Newberry Crater were about the same as in previous years. Harney Concrete opened a new pit near Burns, Harney County, of buff-colored, hard lump pumice which mixes well with mortar to form blocks and makes a pleasing color contrast with the more common white material.

All of the pumice producers exercise a great deal of control in the production of their various fractions. Block manufacturers find that they can rely upon a consistently high-quality product, and improvement in block-making techniques has resulted in the production of pumice blocks free from the defects which characterized blocks made 10 years ago. Pumice producers have found that a blend of pumice and volcanic cinders produces a mixture having special properties which are in demand for certain applications. After considerable experimentation with artificial drying of pit-run pumice, the operators have come to the conclusion that air and sun drying is cheaper and more efficient. This is accomplished by spreading the pumice over areas several acres in extent and stirring the surface occasionally with tractor-drawn equipment. In addition to the production of aggregate for concrete blocks, nursery starter or bedding material, a floor sweeping compound, and plaster sand are also produced.

Scoria and volcanic cinders. Large quantities of unconsolidated scoria and volcanic cinders are used annually for aggregate in highway construction in central and eastern Oregon where the mileage of "red roads" has been increasing rapidly. Lightness of material, which permits hauling greater yardage, plus excellent drainage and low frost damage characteristics, make this type of material exceptionally suitable for road aggregate. Local cinder cones, spotted across much of central and eastern Oregon, supply the bulk of this product which is easily quarried and crushed.

Scoria and cinders found increased use as concrete aggregate during the biennium. Two central Oregon operators reported substantial shipments from cinder cones in the Bend-Redmond area. Cinders are slightly heavier than pumice but much lighter than crushed basalt or river gravel and produce blocks having higher crushing strengths than pumice. Increasing quantities of scoria are used in blends with pumice for block construction, and some cinders are marketed in paper bags for red Bermuda-type roofs.

Diatomite. The Dicalite Division of Great Lakes Carbon Company operated steadily at its Lower Bridge site, Deschutes County, and is the sole producer of diatomite in the State. At Lower Bridge a thick deposit of diatomite is stripped with heavy equipment, windrowed for air drying, and then processed and bagged for shipment. The Company also did considerable exploration work on the diatomite near Drewsey, Harney County, where large-diameter holes were drilled for sampling and inspection. Numerous deposits of diatomite, some of them very large, occur throughout central and eastern Oregon. Those in the Harper-Westfall area of Malheur County have been investigated by several companies in the past year and leases have been taken.

Perlite. There was no production of crude perlite (a type of volcanic glass) in the State during the biennium. A considerable amount of diamond drilling was done at the Northwest Perlite Corporation's holdings north of Sheaville in eastern Malheur County.

Carbon dioxide. The Gas-Ice Corporation plant near Ashland continued to recover carbon dioxide from a group of drilled wells. A simple separator removes the gas from the water after which it is pressed into solid 80-pound cakes for shipment in cardboard containers as "dry ice." Portland Gas and Coke Company reclaims carbon dioxide at its Portland plant by scrubbing flue gases and distributes it in liquid form.

Salines. A. M. Matlock, Eugene, removed 100 tons of solid salines from "potholes" at the south end of Alkali Lake, eastern Lake County. The material, a residue formed by dessication of large Ice Age lakes, consists primarily of sodium carbonate. Considerable tonnages of dried salines have been concentrated in Alkali, Abert, and Summer lakes and numerous investigations of the deposits have been made in the past. The soda was marketed as an acid neutralizer, industrial soda, and a floor sweeping compound.

Silica. Bristol Silica Company, Rogue River, Jackson County, remained the State's sole producer of silica, a position the Company has maintained for nearly 20 years. A white, nearly chemically pure quartz deposit near the plant is mined, washed, crushed, and screened for shipment to manufacturers of ferrosilicon, refractories, and silicon carbide. Some of the product is used directly for poultry grit, roof granules, petrochemical tower packing, and acid hearth ramming material. Demand for silica in Oregon exceeded the supply, and considerable exploration work was done by Bristol for additional deposits.

Brick and tile. There was little change in Oregon's oldest mineral industry. Twenty kilns of varying sizes and mostly concentrated in the Willamette Valley produced fired clay brick, tile, and hollow tile. Reserves of suitable clays are large and readily accessible.

Limonite. Orr Engineering and Chemical Company produced limonite for pigments and activated limonite for use as a sulphur scrubber in petroleum gas plants. Limonite is obtained from a deposit near Scappoose, Columbia County, and trucked to the plant at Scappoose for fine grinding and calcining with caustic soda.

Coal. With the closing of the South Slough mine in Coos County last May, Oregon coal production dropped to a new low. Only one mine, the Mandrones Big Dipper near Wilhoit in Clackamas County, maintained any activity. Some exploration work was done at Eden Ridge in Coos County by Roy Rannells on several of the exposed seams. The Department inspected the Eden Ridge field in the early spring of 1956 and sampled several of the seams.

In August 1956 Pacific Power and Light Company announced that it was starting immediate exploration of the Eden Ridge coal field. Pacific indicated that it hoped to burn the coal on the spot to generate steam for a 100,000-kilowatt electric plant. Additional power would also be obtained by damming the South Fork of the Coquille. If the proposed project is carried through to completion it will mark the most important development in Oregon's coal industry in half a century.

PROCESSING PLANTS

Vermiculite. Vermiculite-Northwest, Inc., operated an exfoliation plant in Portland for processing raw vermiculite ore shipped in from Libby, Montana.

Calcium hydrate. Industrial Processing Company prepared powdered calcium hydrate from calcium carbide sludge at its Portland plant.

METALS

Nickel. Nickel mining and smelting, a newcomer to Oregon's metal industry, gave a substantial boost to the State's economy. The Hanna operation at Riddle, Douglas County, which began operation in July 1954, is the only nickel mine and smelter in the United States. Nickel is one of the most important alloying metals, and long ago the federal government labeled it a strategic and critical material for stockpiling. In 1954 the United States consumed 94,733 net tons of nickel of which only 2,645 tons were produced domestically. The Hanna production of 3,250 tons in 1955 amounts to 3.4 percent of the 1954 domestic requirements for the United States.

The open-pit mine on the top of Nickel Mountain, Douglas County, is operated by Hanna Coal and Ore Corporation which trams the ore $1\frac{1}{2}$ miles down the mountainside to the smelter operated by Hanna Nickel Smelting Company. Size of the whole operation is indicated by the 1955 production of 390,000 tons of ore and 15 million pounds of ferronickel which contained $6\frac{1}{2}$ million pounds of nickel. In addition, large quantities of ferrosilicon, for use in the ferronickel smelting process, were manufactured. Production during 1955 was obtained with two electric melting furnaces. Two additional furnaces were put in operation early in 1956.

Interest in other nickeliferous deposits in southwestern Oregon continued during the year and several localities were investigated.

Uranium. 1955 marked the end of Oregon's being a "have not" state for uranium. To John Roush and Don Tracy of Lakeview goes the honor of finding the first commercial body of uranium ore in the State. Their discovery in the summer of 1955 of the White King prospect northwest of Lakeview, Lake County, touched off a rush of prospectors to the area. The White King and its neighbor the Lucky Lass prospect, located by a group headed by Bob Adams, Jr., were taken over in the fall of 1955 by the Lakeview Mining Company. Three carloads of ore were shipped from the properties during the year to Salt Lake City, Utah, under an Atomic Energy Commission contract. Exploration and development are continuing. Numerous other occurrences of uranium were reported in the State during the summer and fall, and exploration work was started in some of the more promising areas. The wide distribution of rocks similar to those at the Lakeview deposits offers considerable hope that other commercial-grade ore bodies will be found.

CHROME MINES	CHROME MILLS
<u>Coos County</u> Mineral Sands	<u>Coos County</u> Mineral Sands Pacific Northwest Alloys
<u>Curry County</u> Fourth of July McCaleb Pearsoll Sourdough Uncle Sam	<u>Curry County</u> McCaleb Sourdough Wonder
<u>Douglas County</u> Black Boy	<u>Douglas County</u> Fitzpatrick Triple L
<u>Grant County</u> Gardner Ranch Haggard New Red Hill Ward	<u>Grant County</u> Comstock-Uranium & Tungsten Co. John Day Mining Co. Tri-County Milling Co.
<u>Josephine County</u> Black Otter Black Prince Chrome King Crown Chrome Deep Gorge Lucky L & R Nickel Ridge Oregon Chrome Sad Sack Sordy	<u>Jackson County</u> Ashland Mining Co. <u>Josephine County</u> Bowers Foster Gallaher Grants Pass Chrome McTimmonds Radcliffe Six Mile Waldo Milling Co.

Chromite. Oregon shipments of concentrates and lump chromite to the General Services Administration depot at Grants Pass declined from 6,665 short tons in 1954 to 5,341 tons in 1955. Value of production dropped from \$536,387 in 1954 to \$463,514 in 1955. The decline was attributed to the reluctance of operators to continue exploration for new deposits in the face of impending termination of the GSA ore-buying program in mid-1957. In July the Office of Defense Mobilization announced that the GSA stockpile program would be extended until June 30, 1959. Many producers feel that a minimum of 5 years is required to prospect, explore, develop, and mine an ore body of several thousand tons.

Chromite operations in the State were concentrated in two main areas: the John Day district of Grant County and southwestern Oregon (see list). In Grant County four mines were active and three mills shipped concentrates to the stockpile. Not all properties were steady producers, however. In southwestern Oregon activity was re-

ported in Coos, Curry, Douglas, Josephine, and Jackson counties where a total of twenty mines made shipments of lump ore and fourteen mills concentrated disseminated ore.

In Coos County, Pacific Northwest Alloys concentrated black sands accumulated during World War II for upgrading in the now defunct Defense Plant Corporation mill. Pacific used an electromagnetic and electrostatic circuit to obtain chromite, magnetite, garnet, zircon, and ilmenite concentrates. The chromite fraction was shipped to the company plant at Mead, Washington, for use in the manufacture of ferrochrome. This operation was abandoned and the plant dismantled when the stockpile was exhausted in the fall of 1956.

In the Whiskey Run area about 6 miles north of Bandon, Mineral Sands Company erected a black-sand treatment plant that is scheduled to go into operation late in 1956. The plant will use Humphreys spirals, electromagnets, roasting, and acid leaching to produce concentrates which will include a low-iron chrome product. Overburden stripping operations to obtain the ore to be treated have been carried on about a mile south of the plant. Approximately 60 feet of overburden must be removed to reach the black-sand horizon which will be dug with a "sandhog," a tractor-mounted continuous digger feeding directly on to a rubber belt that discharges into trucks.

The Department continued its detailed study of chromite deposits in southwestern Oregon and results will be published in 1957.

Bauxite. Announcement by the Department in 1954 of the distribution of high-iron bauxite in the Salem Hills area of Marion County resulted in exploration activity in 1955 by Aluminium Laboratories, Limited, Canada. Four drill crews using light power drills sampled the area during the summer and fall. Although no tonnage figures have been published, the Department estimated in the April 1955 issue of *The Ore-Review* that a total area of more than 1200 acres may be underlain with bauxitic laterite having an average thickness of about $14\frac{1}{2}$ feet with about $3\frac{1}{2}$ feet of overburden. Analysis of the ore sampled from 23 holes drilled by the Department showed an average of 35.40 percent Al_2O_3 , 6.67 percent SiO_2 , 30.60 percent Fe_2O_3 , and 6.56 percent TiO_2 . At the end of the biennium a detailed report on the Department's findings was in preparation.

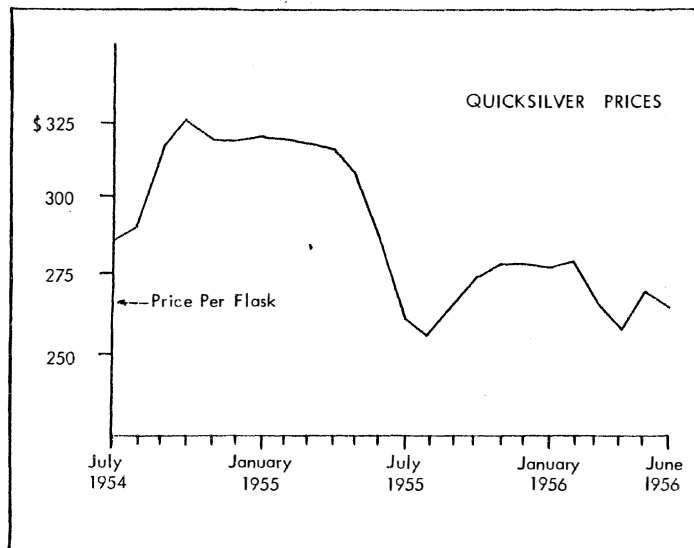
Gold, copper, silver, lead, and zinc. The Buffalo mine near Granite, Grant County, operated by the Boaz Mining Company of Seattle, contributed the bulk of Oregon's gold production. The Pyx mine in the Greenhorn district on the Grant-Baker county line operated by the Greenhorn Mountain Development Company was also active. No dredges operated during the biennium and only fourteen small seasonal hydraulic mines were run for a few months. Production of copper, lead, and silver was obtained largely as by-products from gold mining. Some copper was shipped from the Standard mine, Grant County, by Ray Summers. Fall Creek Mining Company leased the Fall Creek copper mine, Josephine County, from J. A. Phillips of the United Copper Gold Mines and commenced exploration work late in 1955. There was no zinc production.

Tungsten. Northwest Mining Company shipped low-grade tungsten ore from its property on Foothills Creek in Jackson County to the Laughlin Alloy Steel Company plant at Eagle Point. Mining was suspended in 1955 reportedly due to the low tungsten content of the ore.

In Grant County, Tony Brandenthaler explored a new scheelite deposit discovered by Lester E. Thornton near the head of Lemon Creek in the Morning mine district. No activity was reported at either the Bratcher or Mattern mines in Jackson County, both of which shipped ore a few years ago.

Magnesium. Plans to erect a plant near Tillamook, Tillamook County, to recover magnesium from sea water were announced in the press by Hatch Brothers Chemical Company, Tillamook.

Mercury. The wide fluctuations in the price of mercury during the biennium seemingly acted as a damper on operators to open new mines or reopen old ones. Production nevertheless rose to 1,056 flasks in 1955, highest since 1951. Value based on an average New York price per flask of \$290.05 was \$306,610. Only two mines ran continuously: the Bonanza east of Sutherlin, Douglas County, owned by the Bonanza Oil and Mine Corporation, and the Horse Heaven mine east of Ashwood, Jefferson County, owned by Cordero Mining Company.



The Horse Heaven mine plant was erected late in 1954 on the site of a former furnace destroyed by fire 10 years earlier. Ore broken underground at the time of the fire was furnaced as well as newly mined ore. At the Bonanza mine a 1953 DMEA loan was reactivated and exploration

and development were done principally on the 800 North level with some work on the 1000 and 1100 levels.

The Black Butte mine, Lane County, once an important producer but inactive for a number of years, was purchased by the Mercury and Chemical Corporation of New York in December 1955. Reopening of the mine and rehabilitation of the 100-ton mill proceeded immediately with production scheduled for late in 1956. In Douglas County the Buena Vista and Maud S mines carried on exploration and refurbished a 50-ton Gould furnace in preparation for operation late in 1956. About twenty men were employed under the supervision of B. A. Young, Roseburg. Shawano Development Company of New York announced in May 1955 that the Bretz mine, southern Malheur County, had been acquired and that a churn-drilling program would be conducted. In the summer of 1956 Shawano entered into a lease agreement with Arentz Comstock Mining Venture to construct a 100-ton mill and operate the property. The Hope Butte prospect near Vale, Malheur County, owned by B. E. and R. L. Jordan, was the scene of considerable exploration activity by H. K. Riddle, lessee, with the

aid of a DMEA contract. Winter Creek Mining Company furnaced ore from the Blue Ridge mine, Crook County, and from the McCammon mine in Coyote Hills, Lake County. Small production came from several mines in the Prineville area including the Maury Mountain, Mother Lode, and Towner mines. No activity was reported at the Roba quick-silver mine in Grant County where considerable exploration under a DMEA loan was carried on in 1953.

ELECTRO-PROCESS PLANTS

Reynolds Metals Company continued to operate its Troutdale smelter using alumina imported from Jamaica. Announcement was made in the press that construction on the long-delayed Harvey Aluminum plant at The Dalles would get underway in the near future. Capacity of the 65-million dollar plant will be an estimated 100,000,000 pounds of aluminum annually. The National Metallurgical Corporation electric furnace at Springfield produced aluminum-silicon alloy by direct reduction of aluminum-bearing clay from California and silicon metal by the reduction of silica obtained largely from the Bristol silica deposit. Electro Metallurgical Company produced ferrosilicon, ferromanganese, and calcium carbide in its Portland plant using silica, lime, and manganese obtained from deposits in Oregon and other sources. Pacific Carbide and Alloys used high-calcium limestone from its Enterprise quarry in Wallowa County and petroleum coke obtained from the Portland Gas and Coke Company to produce calcium carbide in its Portland plant. Zirconium and hafnium sponge and ingot metal production at the U.S. Bureau of Mines Northwest Electrodevelopment Laboratory at Albany was discontinued July 1, 1955.

OIL AND GAS EXPLORATION

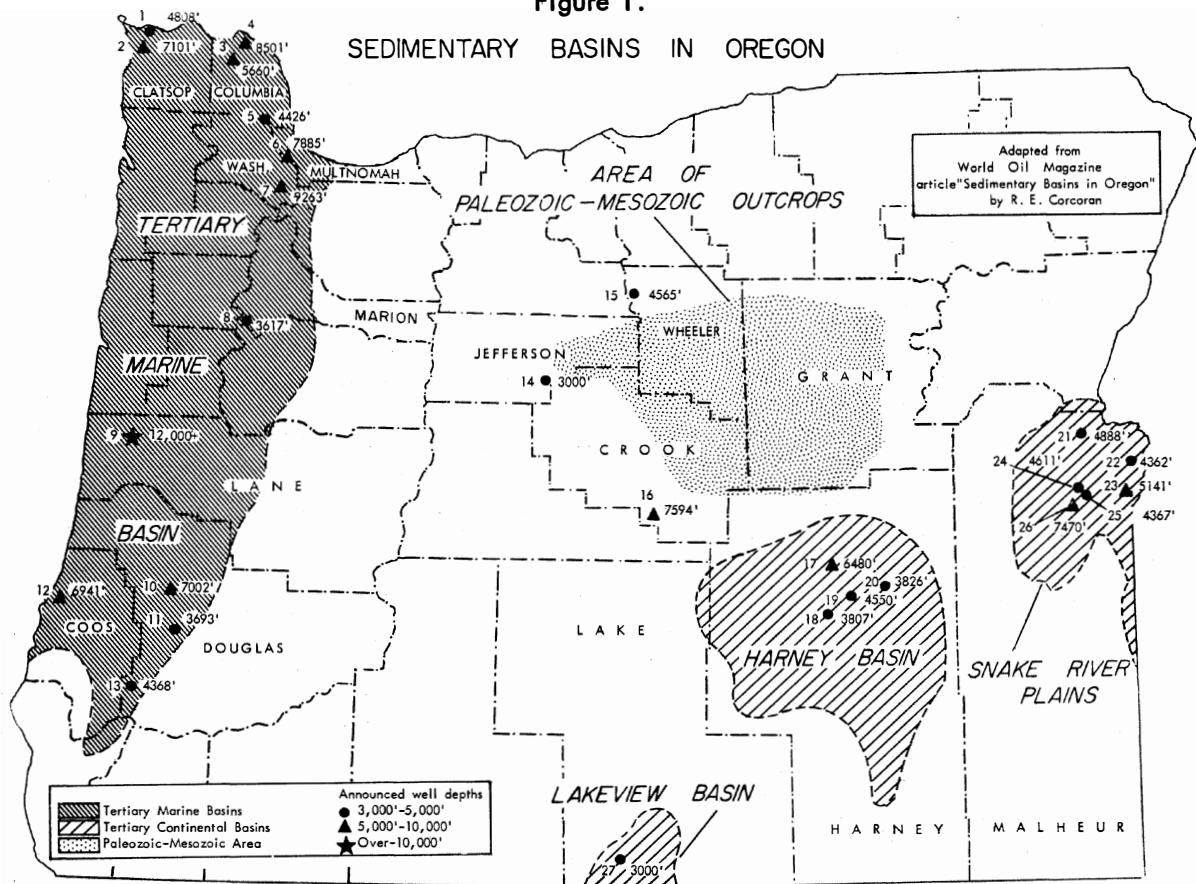
Explorational activity for oil and gas in the State has increased considerably in the past few years. At least ten major oil companies have been engaged in geological and geophysical work in Oregon as a part of their continuous search for commercial deposits of petroleum. The political unrest in the Middle East, probably the largest petroleum producing area in the world today, has given added impetus to the discovery of new domestic sources of supply.

The total amount of land leased in Oregon for oil and gas exploration is well over a million acres. A significant amount of this land belongs to the State or to counties within the State. In the case of most Federal lands, 37½ percent of the lease fee is returned to the State for distribution to the counties in which the leases were made. From July 1, 1954, through June 30, 1955, counties within the State received more than \$81,000 as their share of the money paid to the United States Government by companies for permits to investigate for oil, gas, and coal on Federal lands in Oregon.

Most of Oregon has been examined, at least on a reconnaissance basis, by numerous oil company geologists and independent drillers since the early 1900's. As petroleum and gas usually are found in regions or "basins" in which a relatively thick series of sedimentary

Figure 1.

SEDIMENTARY BASINS IN OREGON



WELLS PLOTTED ON FIGURE 1

1. Lower Columbia Oil and Gas Co., Brown No. 1, Clatsop County, NW¼ sec. 25, T. 8 N., R. 10 W.
2. Standard Oil Company of Calif. Hoagland Unit No. 2, Clatsop County, SW¼ sec. 11, T. 7 N., R. 10 W.
3. The Texas Company, Clatskanie No. 1, Columbia County, E¼ cor. sec. 36, T. 7 N., R. 4 W.
4. The Texas Company, Clark and Wilson No. 6-1, Columbia County, SE¼ sec. 19, T. 6 N., R. 4 W.
5. Lease Holding Syndicate, Dutch Canyon Well, Columbia County, NW¼ sec. 17, T. 3 N., R. 2 W.
6. Richfield Oil Company, Barber No. 1, Multnomah County, SE¼ sec. 23, T. 1 N., R. 1 W.
7. The Texas Company, Cooper Mountain No. 1, Washington County, E¼ cor. sec. 25, T. 1 S., R. 2 W.
8. Portland Gas and Coke Company, Weiderker No. 1, NW¼ sec. 24, T. 9 S., R. 4 W. Marion County.
9. Sinclair Oil and Gas Company, Federal Mapleton No. 1, Lane

- County, SE¼ sec. 12, T. 16 S., R. 10 W.
10. Union Oil Company of California, Liles No. 1, Douglas County, NE¼ sec. 27, T. 25 S., R. 7 W.
11. Oil Developers, Inc., Scott No. 1, Douglas County, SW¼ sec. 5, T. 27 S., R. 6 W.
12. Phillips Petroleum Company, Dobbys No. 1, Coos County, SW¼ sec. 28, T. 26 S., R. 13 W.
13. Uranium Oil and Gas Company, Ziedrich No. 1, Douglas County, NW¼ sec. 16, T. 29 S., R. 8 W.
14. Northwest Oils, Inc., Morrow Bros. No. 1, Jefferson County, SW¼ sec. 18, T. 12 S., R. 15 E.
15. Clarno Basin Oil Company, Burgess No. 2, Wheeler County, SE¼ sec. 34, T. 7 S., R. 19 E.
16. Standard Oil Company of Calif., Pexco No. 1, Crook County, SW¼ sec. 36, T. 20 S., R. 20 E.
17. United Company of Oregon, Inc., Weed and Potet No. 1, Harney County, NW¼ sec. 9, T. 23 S., R. 31 E.
18. Central Oregon Oil and Gas Co., SE¼ sec. 24, T. 25 S., R. 30 E., Harney County.

19. I. W. Love Drilling Company, H. C. Voglar No. 1, Harney County, SE¼ sec. 25, T. 24 S., R. 31 E.
20. United Company of Oregon, Inc., Fay No. 1, Harney County, SE¼ sec. 9, T. 24 S., R. 33 E.
21. Sinclair Oil and Gas Company, Eastern Oregon Land Company No. 1, Malheur County, SW¼ sec. 15, T. 16 S., R. 44 E.
22. Ontario Cooperative Gas and Oil Company, Malheur County, SE¼ sec. 9, T. 18 S., R. 47 E.
23. H. K. Riddle, Kiesel Estate No. 1, Malheur County, SW¼ sec. 8, T. 19 S., R. 47 E.
24. Idaho-Oregon Production Company, Recla No. 1, Malheur County, SE¼ sec. 9, T. 19 S., R. 44 E.
25. R. A. Stamey, Russell No. 1, Malheur County, NW¼ sec. 14, T. 19 S., R. 44 E.
26. El Paso Natural Gas Company, Federal No. 1, Malheur County, NE¼ sec. 5, T. 20 S., R. 44 E.
27. Tri-State Gas and Petroleum Company, Fisher No. 1, Lake County, SW¼ sec. 22, T. 40 S., R. 19 E.

rock has accumulated, the search for such deposits is concentrated in those areas where sedimentary basins are known to exist. The western part of the State has, over the years, received the greatest attention, but more recently central Oregon is being given a closer examination by oil company geologists. For an area the size of Oregon, however, exploratory drilling has been sparse. Although more than 200 holes have been drilled in the State, almost three-fourths of these are less than 3,000 feet deep and only 27 wells can be considered to have penetrated deep enough to yield some valid geologic data.

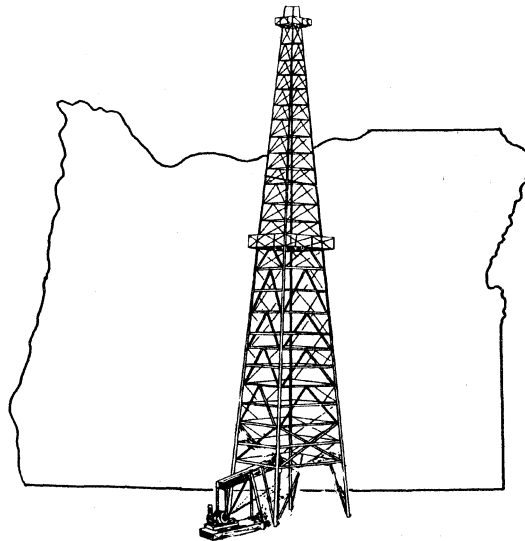
The Tertiary marine basin of western Oregon (see map opposite page 34) is made up of a thick section of marine sediments and volcanics of Eocene to Miocene age. The total thickness of this section is unknown, but probably has a maximum of 15,000 to 20,000 feet. Most of the test drilling in the State has been done in this area and includes eight of the eleven wells put down by the major oil companies. Several wells have reportedly encountered small quantities of gas, and at least two wells had a minor show of crude oil in some of the drill cuttings. The deepest test in the Northwest including Alaska, 12,880 feet, was recently abandoned by Sinclair Oil and Gas Company in this basin. More wells of similar depth will be necessary to test the area adequately.

The Snake River plains, which rank second in the amount of exploratory drilling, cover a large portion of southern Idaho and extend a short distance into eastern Oregon. The sediments consist of non-marine tuffaceous shales, sandstones, and conglomerates with intercalated lavas ranging in age from middle Miocene to middle or upper Pliocene. The total thickness of the section may be as much as 15,000 feet, but probably varies considerably within the plains area. This region was the center of drilling activity during the early 1900's when gas was encountered in wells drilled for water. Analysis of the gas, however, showed that it was probably marsh gas formed through decomposition of vegetable material buried in the sediments. Since 1953 four wells have been drilled in the Oregon portion of the Snake River plains and some gas was encountered in one or two of these. Whether or not the quantity of gas flow was sufficient to classify these wells as potential producers is questionable.

The Harney and Lakeview basins, although separate areas as shown on the map, are geologically similar to each other and also to the Snake River plains to the east. This similarity to the Snake River plains deposits was the cause of some drilling in the Harney basin during the early 1900's and later, to a lesser extent, in the Lakeview basin. The first wells were all shallow and although a few reportedly encountered pockets of gas, none was able to produce any appreciable quantities. In 1949 and 1950 three fairly deep holes were drilled in the Harney basin (3,826, 4,550, and 6,480 feet), but no oil or gas shows were reported in any of them. The great thickness of continental deposits and associated lavas in these areas of eastern and southeastern Oregon, where there are no definitely proven petroleum deposits, will continue to have a restraining influence on drilling activity.

Throughout much of central Oregon there is a large area of older marine sediments of Paleozoic-Mesozoic age. These deposits are exposed at the surface as erosional "windows" in the younger Tertiary formations and are difficult to trace any great distance. The boundary

of the Paleozoic-Mesozoic basin can be determined only approximately because of the widely separated outcrops and lack of published geologic mapping. It is believed that at least 6,000 to 8,000 square miles in central Oregon is underlain by these older essentially unmetamorphosed marine deposits, having a possible thickness of 15,000 to 20,000 feet. Although potentially of great promise as a petroleum province, this basin has remained virtually untouched by the exploratory drill. This is due largely to the complexity of the geology in the area and the lack of good surface exposures. In the past few years, however, several oil companies have had geological teams exploring these deposits in an effort to solve the structural and stratigraphic problems. The results of their work may determine whether or not Oregon will become the thirty-fourth petroleum producing State in this country.



STATUS OF TOPOGRAPHIC AND GEOLOGIC MAPPING IN OREGON

TOPOGRAPHIC MAPS

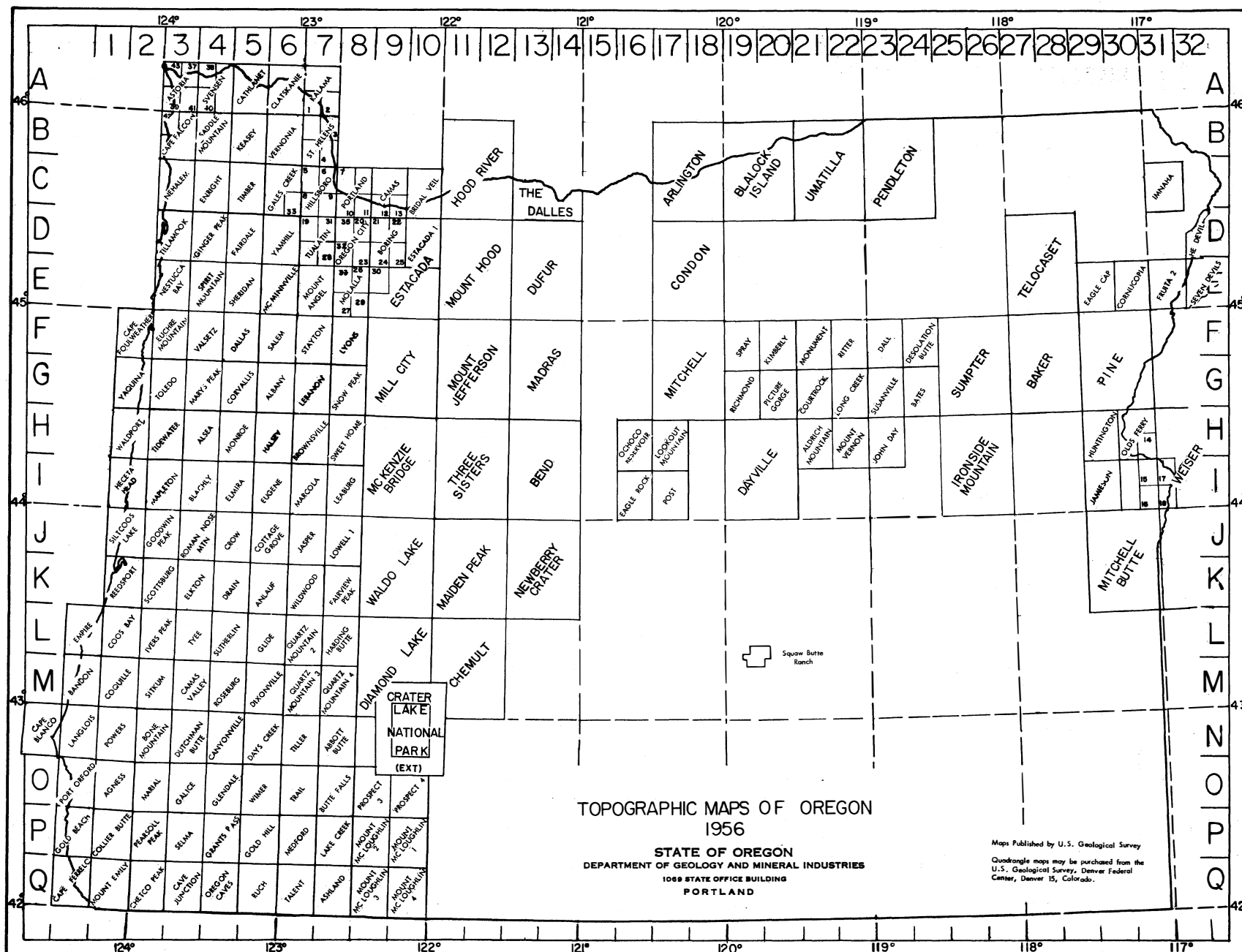
Less than half of the State is topographically mapped at the present time. The areas for which topographic map quadrangles are available are shown on an index map on the opposite page. An alphabetical list of the quadrangles appears on the following page. The first topographic maps published by the U.S. Geological Survey in Oregon covered one degree of latitude and longitude, embraced 3500 square miles, and were reproduced on a scale of 4 miles to the inch. Current mapping by the Federal Survey is being done on two scales, 15-minute quadrangles published with a scale of 1 mile to the inch, covering an area of approximately 200 square miles, and 7½-minute quadrangles with a scale of slightly more than 2½ inches to the mile and covering 50 square miles. At the present rate of mapping in Oregon, the U.S. Geological Survey estimates that all of the State will be covered in approximately 17 years. The task will not be complete then, since older maps will have become obsolete and will need either revision or complete remapping.

The Department maintains a complete file of all topographic quadrangles published for areas in Oregon. These are available for inspection by the public but are not for sale by the Department. Copies may be obtained locally from stationers and blue print firms, or directly from the U.S. Geological Survey, Denver Federal Center, Denver, Colorado. Copies of index maps showing the status of topographic mapping in the State are distributed free of charge by both the Federal Survey and the Department.

Modern topographic quadrangle maps contain a wealth of information that is useful to both the professional worker and the layman. In addition to providing an accurate base on which engineering planning and geologic mapping can be done, the maps serve the sportsman, the camper, the agate hunter, in fact everyone in need of a good map which shows all the streams, roads, trails, mountains, culture, elevations and configurations of the land surface, areas covered by forest, and sections, townships, and ranges.

GEOLOGIC MAPS

Following the topographic index map are two index maps showing the status of published geological mapping in the State. The information is divided to show mapping on scales greater than 1:125,000 and less than 1:125,000. The publications which contain the maps are listed on the page following the index map. Most of the publications and maps are in the library of the Department and are available for study at the Department's offices. Some of the material can be purchased from the organizations noted in the reference. Only the publications by the Department of Geology and Mineral Industries are for sale by the Department. The index maps are distributed at no charge. These index maps are revised each biennium in order to keep current a quick reference to the geological mapping of Oregon.



TOPOGRAPHIC MAPS OF OREGON— 1956

15-MINUTE QUADRANGLES (Scale 1:62,000)

Name	Location	Date
Abbott Butte	N-8	1947
Agness	O-2	1956
Albany	G-6	1944
Aldrich Mountain	H-21	1943
Alsea	H-4	1942 C
Anlauf	K-6	1939
Ashland	Q-8	A
Astoria	A-3	1939 C
Bandon	M-1	1944
Bates	G-24	1951
Blachly	I-4	1942
Bone Mountain	N-3	1956
Boring	D-9	1944
Bridal Veil	C-10	1942 C
Brownsville	H-7	1952
Butte Falls	O-8	A
Camas	C-9	1942
Camas Valley	M-4	A
Canyonville	N-5	1956
Cape Blanco	N--	1956
Cape Falcon	B-3	1940 C
Cape Ferrello	Q-1	1956
Cape Foulweather	F-2	1944
Cathlamet	A-5	1941
Cave Junction	Q-4	A
Chetco Peak	Q-3	A
Clastkanie	A-6	1942 C
Collier Butte	P-2	A
Coos Bay	L-2	1945
Coquille	M-2	1945
Cornucopia	E-30	B
Corvallis	G-5	1942 C
Cottage Grove	J-6	1921
Courtrock	G-21	1956
Crow	J-5	1945
Dale	F-23	1951
Dallas	F-5	1942 C
Days Creek	N-6	A
Desolation Butte	F-24	1953
Dixonville	M-6	1956
Drain	K-5	1956
Dutchman Butte	N-4	1948
Eagle Cap	E-29	B
Eagle Rock	I-16	1948
Elkton	K-4	A
Elmira	I-5	1942 C
Empire	L-1	1944
Enright	C-4	1941 C
Euchre Mountain	F-3	1943
Eugene	I-6	1949
Estacada 1	D-10	A
Fairdale	D-5	A 1942 C
Fairview Peak	K-8	A
Fruita 2	E-31	B
Gales Creek	C-6	A 1943 C
Galice	O-4	1948
Ginger Peak	D-4	A 1942 C
Glendale	O-5	A
Glide	L-6	A
Gold Beach	P-1	1956
Gold Hill	P-6	A
Goodwin Peak	J-3	1943
Grants Pass	P-5	A
Halsey	H-6	1941
Harding Butte	L-8	A
Heceta Head	I-2	1944
He Devil	D-32	1922
Hillsboro	C-7	1943
Huntington	H-29	1951
Imnaha	C-32	B
Ivers Peak	L-3	B
Jameson	I-29	1950
Jasper	J-7	B
John Day	H-23	1943
Kalama	A-7	1943 C
Keasey	B-5	1943 C
Kimberly	F-20	1953
Lake Creek	P-8	1955
Langlois	N-1	1956
Leaburg	I-8	1951
Lebanon	G-7	1944
Long Creek	G-22	1951
Lookout Mountain	H-17	1953
Lowell 1	J-8	A
Lyons	F-8	1951
Mapleton	I-3	1945
Marcola	I-7	1952
Marial	O-3	1956
Marys Peak	G-4	1942
McMinnville	E-6	1943
Medford	P-7	A

Name	Location	Date
Molalla	E-8	1943 C
Monroe	H-5	1942
Monument	F-21	1956
Mount Angel	E-7	1943
Mount Emily	Q-2	A
Mount McLoughlin 1	P-10	A
Mount McLoughlin 2	P-9	A
Mount McLoughlin 3	Q-9	A
Mount McLoughlin 4	Q-10	A
Mount Vernon	H-22	1943
Nehalem	C-3	1943 C
Nestucca Bay	E-3	A 1942 C
Ochoco Reservoir	H-16	1950
Olds Ferry	H-30	1956
Oregon Caves	Q-5	A
Oregon City	D-8	1945
Pearsall Peak	P-3	1956
Picture Gorge	G-20	1955
Portland	C-8	1940
Port Orford	O-1	A
Post	I-17	1951
Powers	N-2	A
Prospect 3	O-9	A
Prospect 4	O-10	A
Quartz Mountain 2	L-7	A
Quartz Mountain 3	M-7	A
Quartz Mountain 4	M-8	A
Reedsport	K-2	1942
Richmond	G-19	1956
Ritter	F-22	1952
Roman Nose Mountain	J-4	1945
Roseburg	M-5	A
Ruch	Q-6	A
Saddle Mountain	B-4	A 1943 C
Salem	F-6	1940
Scottsburg	K-3	B
Selma	P-4	1956
Seven Devils	E-32	1920
Sheridan	E-5	1942
Siltcoos Lake	J-2	1942
Sitkum	M-3	A
Snow Peak	G-8	1951
Spirit Mountain	E-4	A 1942 C
Spray	F-19	1955
Stayton	F-7	1944
St. Helens	B-7	A 1943 C
Sutherlin	L-5	A
Susanville	G-23	1951
Svensen	A-4	A 1940 C
Sweet Home	H-8	1951
Talent	Q-7	I
Tidewater	H-3	1945
Tillamook	D-3	A 1942 A
Tiller	N-7	1946
Timber	C-5	1941 C
Toledo	G-3	1946
Trail	O-7	1945
Tualatin	D-7	1943
Tyee	L-4	A
Valsetz	F-4	1942 C
Vernonia	B-6	1943 C
Waldport	H-2	1942
Wildwood	K-7	B
Wimer	O-6	A
Yamhill	D-6	1942 C
Yaquina	G-2	1946

SPECIAL MAPS

Crater Lake national park	N-10 1:62,000
Crater Lake and vicinity	O-11 1:62,000
Mt. Hood and vicinity	D-12 1:125,000
Squaw Butte Ranch (advance)	L-20 1:24,000
Klamath	Q-14 1:250,000

STATE DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES
1960 STATE OFFICE BUILDING
PORTLAND 1, OREGON

30-MINUTE QUADRANGLES (Scale 1:125,000)

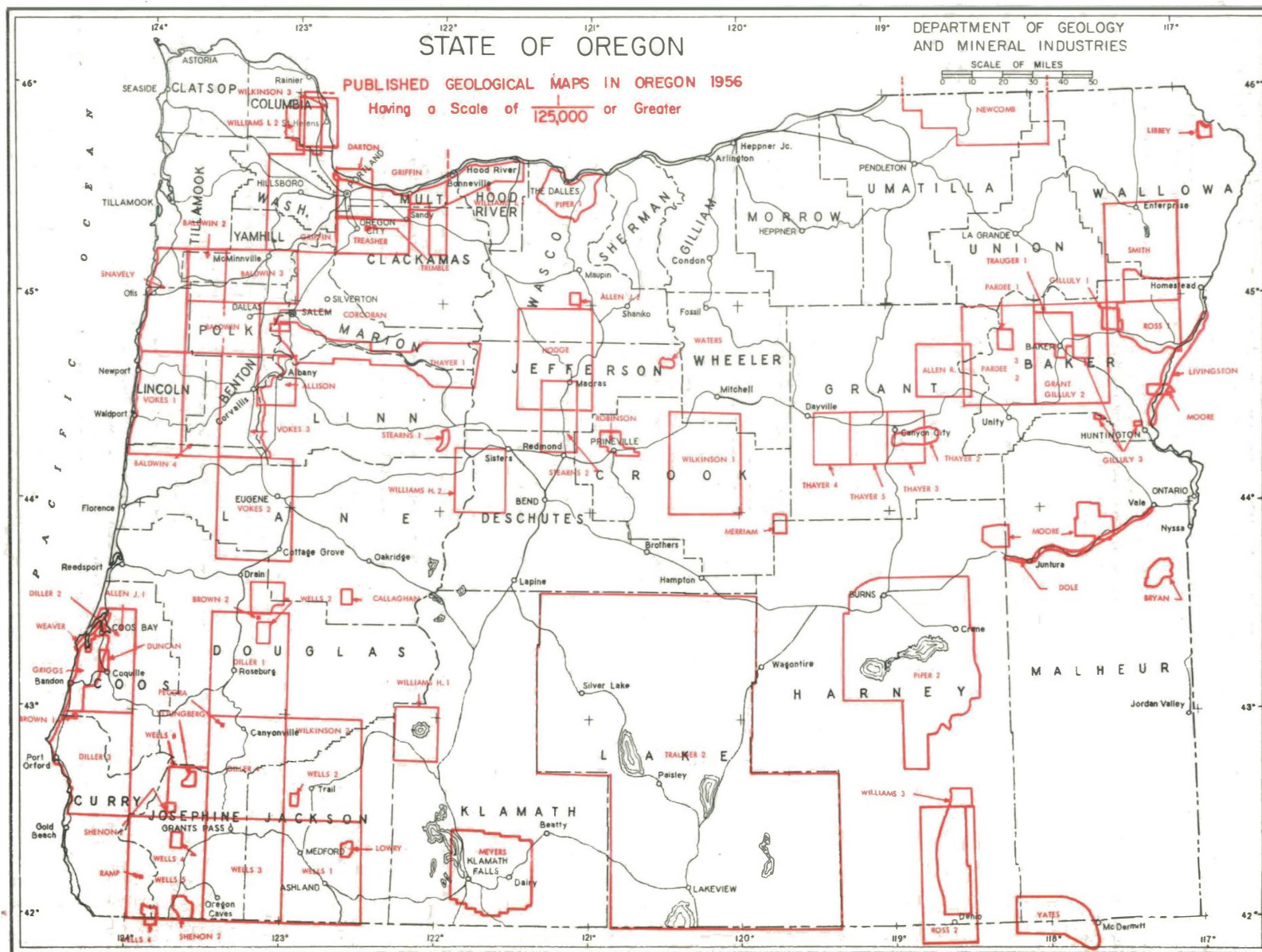
Name	Location	Date
Arlington	C-18	1941
Baker	G-28	1934
Bend	I-14	1940
Blalock Island	C-20	1944
Chemult	M-12	1941
Condon	E-18	1916
Dayville	I-20	1936
Diamond Lake	M-10	1926
Dufur	E-14	1945
Estacada	E-10	1938
Hood River	C-12	1940
Ironside Mountain	I-26	1908
Madras	G-14	1931
Maiden Peak	K-12	1944
McKenzie Bridge	I-10	1940
Mill City	G-10	1941
Mitchell	G-18	1926
Mitchell Butte	K-30	1921
Mt. Hood	E-12	1944
Mt. Jefferson	G-12	1938
Newberry Crater	K-14	1935
Pendleton	C-24	1935
Pine	G-30	1941
Sumpter	G-26	1939
Telocaset	E-28	1932
The Dalles	C-14	1941
Three Sisters	I-12	1941
Umatilla	C-22	1921
Waldo Lake	K-10	1944
Weiser	I-32	1916

7½-MINUTE QUADRANGLES (Scale 1:24,000)

Name	Location	Date
Rainier	1	1955
Kalama	2	1955
Deer Island	3	A
St. Helens	4	A
Dixie Mountain	5	A
Sauvie Island	6	A
Vancouver	7	A
Hillsboro	8	A
Linnton	9	A
Portland	10	A
Mt. Tabor	11	A
Fairview	12	A
Corbett	13	A
Olds Ferry	14	1956
Moores Hollow	15	1951
Malheur Butte	16	1951
Weiser South	17	1951
Payette	18	1951
Reedville	19	A
Portland S E	20	A
Damascus	21	A
Sandy	22	A
Oregon City	23	A
Redland	24	1956
Estacada	25	A
Molalla	26	A
Scotts Mills	27	1956
Sherwood	28	A
Wilhoit	29	A
Colton	30	A
Beaverton	31	A
Canby	32	A
Forest Grove	33	B
Barlow	34	A
Portland S W	35	A
Astoria	37	1949 C
Cathlamet Bay	38	1949 C
Gearhart	39	1949 C
Green Mountain	41	1949 C
Olney	42	1949 C
Tillamook Head	43	1949 C
Warrenton	44	1953 C

KEY TO SYMBOLS

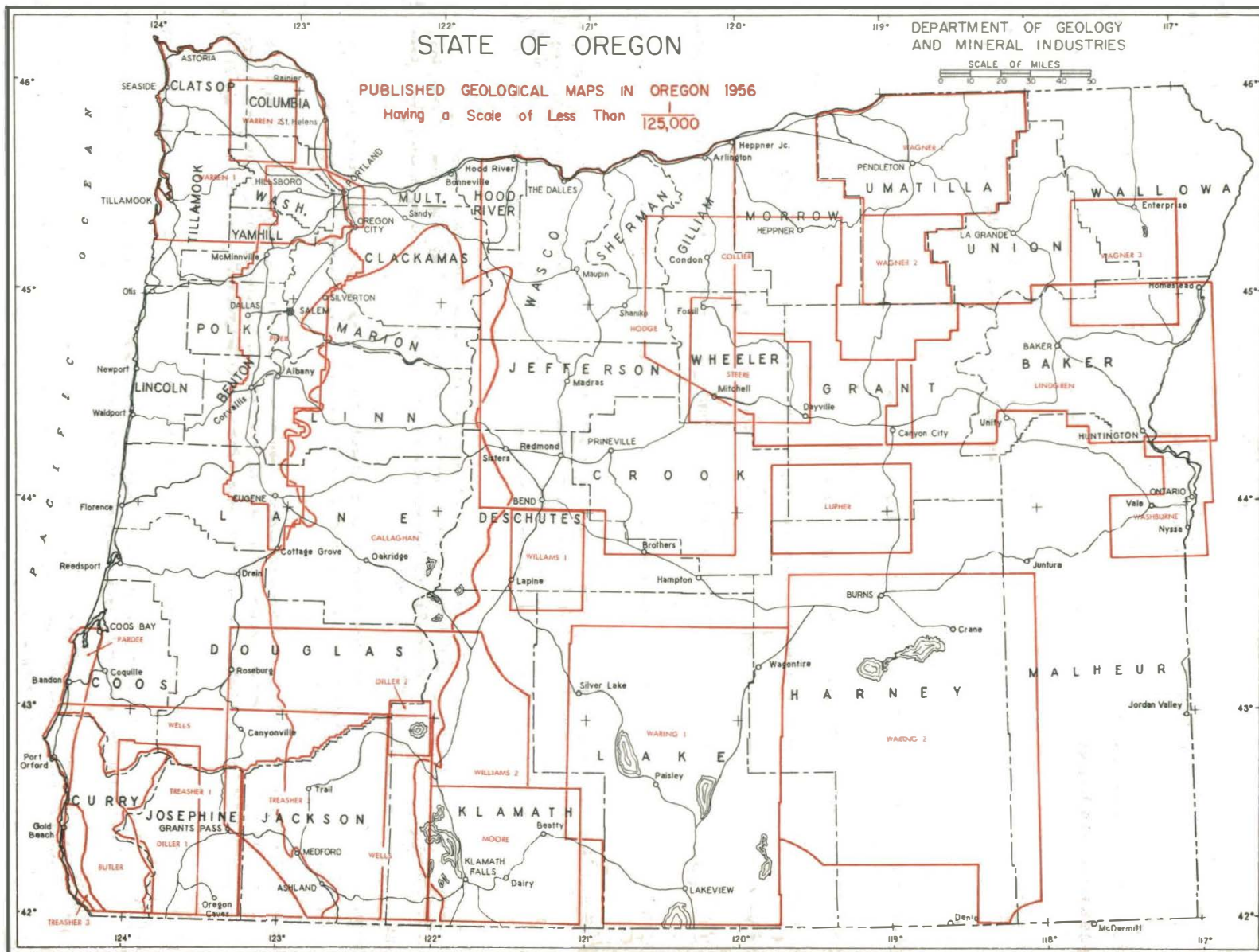
- A Map scheduled for publication 7-1-56 - 6-30-57
- B Map scheduled for publication 7-1-57 - 6-30-58
- C Map published by U.S. Army 29th engineers



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State of Oregon
Department of Geology and Mineral Industries, 1069 State Office Building, Portland 1, Oregon

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	<u>Price postpaid*</u>
1. Mining laws of Oregon, 4th revision, 1954. Contains Federal placer mining regulations	\$ 0.50
2. Progress report on Coos Bay coal field, 1938: F. W. Libbey	(out of print)
3. Geology of part of the Willowa Mountains, 1938: C. P. Ross	0.50
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13. First biennial report of the Department, 1937-38	(out of print)
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