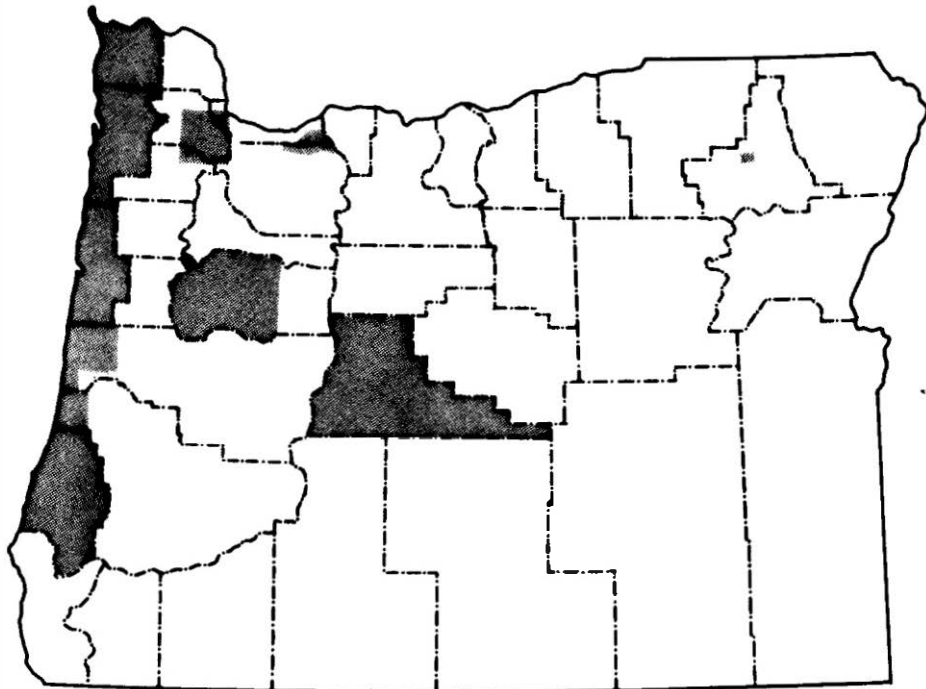


NINETEENTH  
BIENNIAL REPORT  
of the STATE of OREGON  
DEPARTMENT of GEOLOGY  
and MINERAL INDUSTRIES 1972-1974



Engineering Geology Studies

STATE OF OREGON  
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES  
1069 State Office Building  
Portland, Oregon 97201

BULLETIN 86

NINETEENTH BIENNIAL REPORT OF THE STATE OF OREGON  
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

1972 - 1974



1974

STATE GOVERNING BOARD  
R. W. deWeese, Portland, Chairman  
William E. Miller, Bend  
H. Lyle Van Gordon, Grants Pass

STATE GEOLOGIST  
R. E. Corcoran



### Margin of the Continent

Detailed geologic studies of the Oregon coastal zone were continued during the biennium by the Department. The geologic hazards peculiar to the Coast have been inventoried in a series of studies for coastal counties.

The problems of mined land reclamation in highly scenic areas such as this were also studied.



## DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

1069 STATE OFFICE BLDG. • PORTLAND, OREGON • 97201 • Phone (503) 229-5580

TOM McCALL  
GOVERNOR

STATE GEOLOGIST  
RAYMOND E. CORCORAN

### GOVERNING BOARD

R. W. deWEESE  
Chairman  
Portland

WILLIAM E. MILLER  
Bend

H. LYLE VAN GORDON  
Grants Pass

• • •

### FIELD OFFICES

2033 First Street  
Baker 97814

521 N.E. "E" Street  
P.O. Box 417  
Grants Pass 97526

3523 S. Pacific Blvd.  
P.O. Box 1028  
Albany 97321

To His Excellency, The Governor  
of the State of Oregon  
and to  
The Fifty-eighth Legislative Assembly  
of the State of Oregon

Sirs:

We submit herewith the Nineteenth Biennial Report of  
the State Geologist, covering activities of the Department of Geology  
and Mineral Industries for the period from July 1, 1972 to and  
including June 30, 1974.

Respectfully,

R. W. deWeese, Chairman of the  
Board

William E. Miller

H. Lyle Van Gordon, Member

Portland, Oregon  
December 17, 1974

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## BRIEF HISTORY OF THE DEPARTMENT

- 1872 First State Geologist, Dr. Thomas Condon, appointed by Legislature.
- 1911 Legislature creates Bureau of Mines of Oregon, located at Oregon Agricultural College.
- 1913 Legislature renames Bureau the Oregon Bureau of Mines and Geology and expands its responsibilities.
- 1923 Bureau incorporated into School of Mines at Corvallis.
- 1925 Legislature creates Oregon Mining Survey but without office or staff.
- 1929 Legislature creates State Mining Board with no office or staff.
- 1937 Legislature creates State Department of Geology and Mineral Industries, with offices in Portland, Baker, and Grants Pass.
- 1941 Legislature creates Spectrographic Laboratory, with installation in the Portland office of the Department.
- 1943 Department consolidates all analytical laboratories and assay services in the Portland office of the Department.
- 1953 Legislature adopts Oil and Gas Conservation Act (ORS 520.005) and assigns regulatory responsibilities to the Department.
- 1965 Legislature passes an act (ORS 517.410) requiring agencies to consult with Department before issuing leases for mining or for oil and gas exploration.
- 1971 Legislature passes the Geothermal Resources Act (ORS 522.101) assigning regulatory authority to the Department.
- 1971 Legislature passes Mined Land Reclamation Act (ORS 517.750) and assigns enforcement responsibility to the Department.

## FUNCTIONS OF THE DEPARTMENT

The Department is a geological services facility for the citizens of Oregon, state and local governments, schools, and industry.

## MISSION AND OBJECTIVES

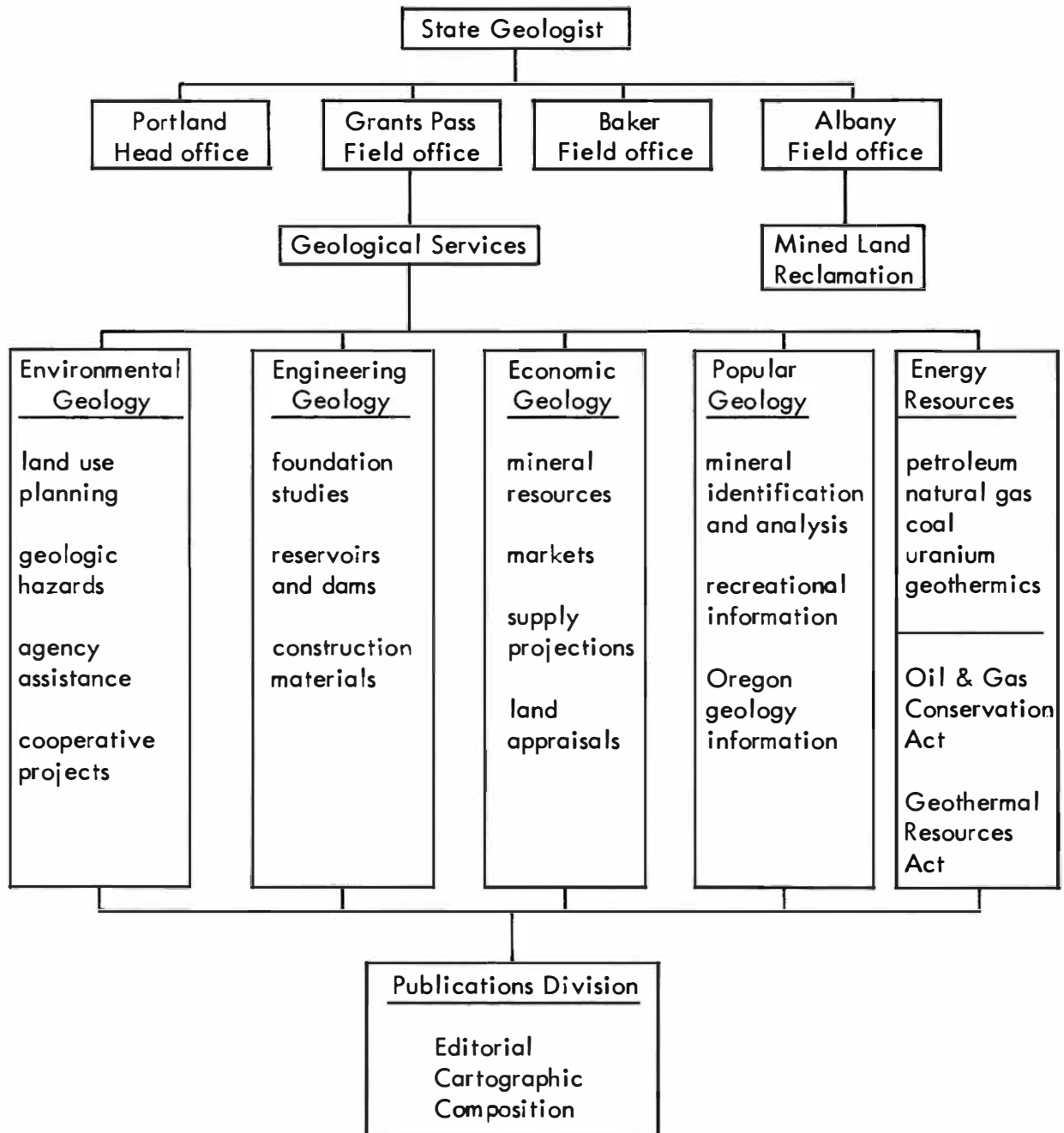
The objective of the Department is to identify and to assist in meeting the geologic and mineral-resource needs of Oregon in order to provide for the safety, economy and enjoyment of the people of the State in relation to their geologic environment.

In operational terms, the Department's mission is to collect, develop, interpret, and disseminate geologic information and to encourage the understanding and application of geologic knowledge in appropriate human enterprises in Oregon.

The Department pursues these objectives on a priority basis, in cooperation with other public agencies and the private sector. Department staff is available to provide information and advice on the wise use and management of the earth's crust, including its terrain, geologic hazards, and mineral resources.

In providing these services, it is the further objective of the Department to establish and maintain the highest standard of excellence among state geological surveys.

## ORGANIZATION CHART





# COMPARATIVE STATEMENT OF EXPENDITURES

	1971-73 Total Expenditures	1973-75 Estimated Expenditures	1975-77 Funds Requested
<u>Geological Services</u>			
Personal services	\$612,256	\$674,079	\$706,709
Services and supplies			
In-state, regional travel	43,933	38,174	45,809
Out-of-state travel	4,101	3,750	3,300
Office expenses	18,127	22,497	26,920
Fiscal control	3,093	3,600	4,003
Publications	28,081	33,200	42,500
Professional services	10,246	26,000	8,000
Insurance	1,344	1,308	1,232
Employee recruitment and improvement	1,381	4,076	2,750
Housing expenses	39,043	44,107	71,610
Department and project supplies and expenses	62,670	120,975	132,050
Other services and supplies	1,088	782	584
	<u>\$213,107</u>	<u>\$298,469</u>	<u>\$338,758</u>
Capital outlay			
Office furniture and fixtures	1,074	2,360	2,637
Motor vehicles	2,200	2,800	3,200
Laboratory and technical	7,347	5,290	1,709
Library	600	1,800	2,100
	<u>11,221</u>	<u>12,250</u>	<u>9,646</u>
Capital improvement			5,000
Total	\$836,584	\$984,798	\$1,060,113
<u>Mined land reclamation division</u>			
Personal services	\$	\$98,913	\$206,502
Services and supplies			
In-state, regional travel	2,181	15,091	70,435
Out-of-state travel		250	900
Office expenses	133	8,072	10,100
Publicity, publications	170	800	1,200
Professional services	12,500	14,517	4,000
Employee recruitment and improvement		3,278	750
Housing expenses	301	4,865	6,200
	<u>\$ 15,285</u>	<u>\$ 46,873</u>	<u>\$ 93,585</u>
Capital outlay		1,987	3,440
Total	\$ 15,285	\$147,773	\$303,527
GRAND TOTAL	<u>\$851,869</u>	<u>\$1,132,571</u>	<u>\$1,363,640</u>
<u>Source of funding</u>			
General funds	\$606,948	\$716,509	\$782,357
Other funds	116,931	248,672	414,283
Federal funds	127,990	167,390	167,000
GRAND TOTAL	<u>\$851,869</u>	<u>\$1,132,571</u>	<u>\$1,363,640</u>

## THE APPROPRIATION - - -

1973 - 1975 Fiscal Biennium	
Personal Services	\$674,079
Services and Supplies	298,469
Capital Outlays	<u>12,250</u>
 Total	 \$984,798

## - - - AND SOME OF THE THINGS IT PAID FOR During the 1972-1974 Reporting Period

91,100 Copies of The ORE BIN	108 Field investigations
5,990 Square miles mapped geologically	66 Geothermal gradients logged
5,672 Mineral identifications	50 Mined Land Reclamation Act applications processed
2,864 Chemical analyses	49 Field trips for groups
2,478 Geochemical analyses	21 Television and radio appearances
2,005 Spectrographic analyses	20 Geothermal gradient wells drilled
208 Petrographic examinations	20 Oil and Gas Act inspections
200 Radiometric determinations	15 Major publications issued
175 Talks	12 Office tours
64 Cooperative projects with other agencies	6 Exhibits judged
22 Fossil identifications	4 Court appearances as expert witness

## PLUS

Thousands of requests for miscellaneous geological information from more than 21,000 visitors to the Department's three offices. Also, large numbers of phone calls and letters. More than 64,000 pieces of mail (exclusive of bulk mail) were handled.

## ACTIVITIES OF THE DEPARTMENT

A steady change in emphasis  
in response to new demands

The Department of Geology and Mineral Industries is a service-oriented agency which provides a wide variety of geologic information to state agencies, local governments, industry, and the public generally.

The Department has steadily shifted the emphasis of its various activities over the years to supply the services and information requested.

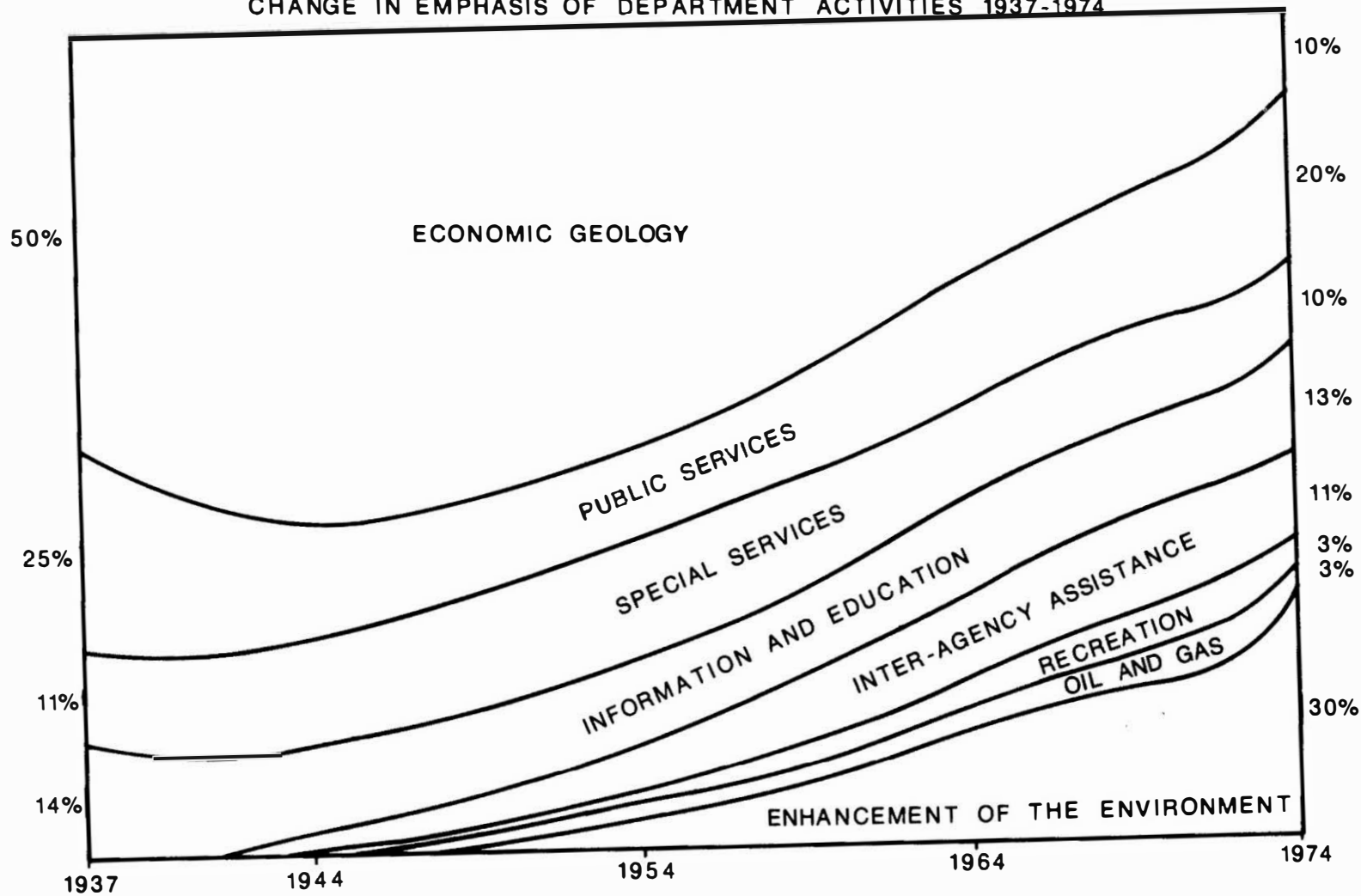
Currently the Department is spending almost half of its entire effort in land-use studies and geologic-hazards assessments for various counties, in regional and siting studies for state agencies, and in energy resource and conservation activities.

Public services, information, and education continue to increase in importance, requiring about one-third of the Department's funds currently.

Economic geology studies have steadily declined since World War II, when the search for strategic minerals required 55 percent of Department time and money, contrasted with 10 percent at the present time.

The change in the Department's activities over the years is shown on the graph on the opposite page.

CHANGE IN EMPHASIS OF DEPARTMENT ACTIVITIES 1937-1974



## PUBLICATIONS

The end-products of the Department's major efforts are publications on Oregon geology

The Department issued 15 publications during the biennium.

Major publications contained the results of intensive geologic mapping and land-use studies made for various counties. These studies are tailored specifically to the requirements of the cooperating county, and the text and maps are prepared for use by readers not formally trained in geology.

Several counties contracted for mineral resource studies which were published, together with a basic multi-color geologic map of the county.

Two publications contained highly technical information on the foraminiferal assemblages found in oil test wells. The information is valuable in the continuing search for petroleum in the state.

The Department issues The ORE BIN, a monthly periodical containing articles on popular geology, mineralogy, and mining legislation, and technical reports not suitable for publication as bulletins. The ORE BIN is distributed widely to subscribers, libraries, and universities.

One of the most popular of the Department's recent publications is the ERTS-1 imagery map of Oregon. The map shows what Oregon looks like from 560 miles up and contains a wealth of information not shown on other maps.

## PUBLICATIONS ISSUED DURING THE BIENNIUM

Publication	General Public	Of interest to:			Indus- try	Schools Univ.
		Local Gov't	State Agencies			
1. Geology and Mineral Resources of Douglas County	x	x	x	x	x	
2. Eighteenth Biennial Report of Department			x			
3. Geologic Field Trips in N. Oregon and Southern Washington	x					x
4. Bibliography of the Geology and Mineral Resources of Oregon (5th)	x	x	x	x	x	
5. Environmental Geology of Inland Tillamook and Clatsop Counties	x	x	x	x	x	
6. Geology and Mineral Resources of Coos County	x	x	x	x	x	
7. Environmental Geology of Lincoln County	x	x	x	x	x	
8. Geologic Hazards of the Bull Run Watershed		x	x			x
9. Environmental Geology of Western Linn County	x	x	x	x	x	
10. Environmental Geology of Coastal Lane County	x	x	x	x	x	
11. Prelim. Ident. of Foraminifera from Gen. Petroleum Well, Douglas Co.					x	x
12. Prelim. Ident. of Foraminifera from E. M. Warren Well, Coos Co.					x	x
13. Mosaic of Oregon from ERTS-1 Imagery	x	x	x	x	x	
14. Geologic Hazards Inventory of Oregon Coastal Zone	x	x	x	x	x	
15. The ORE BIN (monthly periodical)	x	x	x	x	x	

## PUBLICATIONS UNDER WAY DURING THE BIENNIUM

1. Eocene stratigraphy of Southwest Oregon					x	x
2. Environmental Geology of Western Coos and Douglas Counties	x	x	x	x	x	
3. Geology of the west half of Baker AMS Map Sheet	x	x	x	x	x	
4. Geology and Mineral Resources of Deschutes County	x	x	x	x	x	
5. Geology and Mineral Resources of Illinois R. Drainage Basin	x	x	x	x	x	
6. Geology and Mineral Resources of the Chetco Drainage	x	x	x	x	x	
7. Geology of Quadrangles (each a separate map with text) Comas Valley, Halfway, Ivers Peak, Huntington, Mineral, Olds Ferry, Sitkum, Tyee	x	x	x	x	x	
8. Geology of part of the Snake River Canyon	x	x	x	x	x	
9. Oregon Fossil Localities	x					x
10. Proceedings of the Forum on Energy Resources	x				x	x
11. Nickel in Southwest Oregon		x	x	x		
12. Geothermal Resources of the Western Cascades	x	x	x	x	x	
13. Proc. of Int'l Congress on Geothermal Energy for Indus., Agr., etc.	x	x	x	x	x	
14. Sand and Gravel Resources of Josephine County		x	x	x		
15. Underground Storage - Natural Gas in Clatsop and Columbia Cos.		x	x	x		
16. Bibliography of Geol. and Mineral Resources of Oregon (6th Sup.)	x	x	x	x	x	
17. Economic potential of the Coos Bay Coal Field	x	x	x	x	x	

## THE SEARCH FOR ENERGY - 1. OIL AND GAS

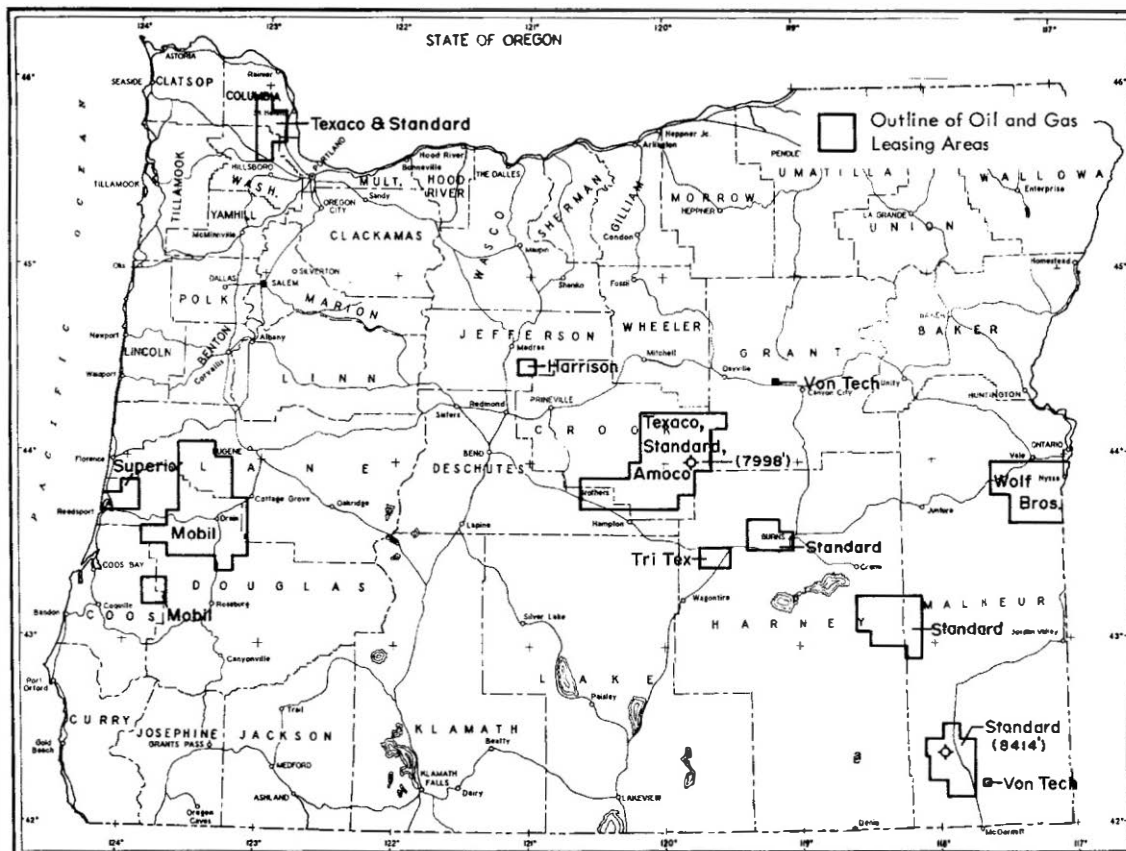
None found in Oregon -- yet.  
Federal leases delayed pending  
environmental impact statement.

The Department is charged with the administration and enforcement of the Oil and Gas Conservation Act (ORS 520) and has been concerned with the safe and efficient drilling for oil and gas for many years.

The Department issued only one onshore drilling permit for oil and gas during the biennium. Activity was curtailed because of a moratorium on Federal leases imposed by the Secretary of the Interior in November 1971 and continued through the biennium.

Offshore exploration for oil and gas was confined to sporadic geophysical work in both state and federally owned lands. New exploration techniques were used which required no explosives. Sparker and gas-exploder type equipment, coupled with computer processing of the resulting seismic responses, gave better results and virtually eliminated problems associated with earlier work.

The status of both onshore and offshore exploration activity is summarized on the opposite page. Areas covered by the onshore leases are shown on index map below.



Oil and Gas Onshore Land Status During the Biennium

<u>Company</u>	<u>Acreage</u>	<u>County</u>	<u>Status</u>
AMOCO Production Co.	71,000	Crook	Federal land, pending approval
Mobil Oil Co.	200,000	Lane, Coos and Douglas	Federal land, pending approval
Marvin and Melvin Wolf	146,265	Malheur	Federal land, pending approval
Texaco	175,179	Crook	Federal land, in effect
Standard Oil Co.	182,500	Crook, Harney, Malheur, Columbia, and Washington	Federal land, in effect
Tri-Tex Corp.	20,000	Harney	Private lands
Harrison	5,000	Jefferson	Federal land, pending approval
Von Tech	5,000	Grant and Malheur	Federal land, pending approval
Total	<u>804,944</u>		

The above tabulation does not include some non-federal leases. Total acreage under lease in the state was nearly 900,000 acres.

Oil and Gas Drilling Permit

Standard Oil Co. Blue Mtn. Unit no. 1 API no. 36-045-00022 SW $\frac{1}{4}$ sec. 34, T. 37 S., R. 41 E. Malheur County	8414' T.D.	Abandoned as an oil and gas prospect, August 6, 1973.
--	------------	---

Offshore Exploration Permits

<u>Company</u>	<u>Type Survey</u>	<u>State Lands</u>	<u>Federal Lands</u>
Digicon, Inc., Houston, Texas	Air gun	April-June 1974	April-June 1974
Gulf Oil Co.	Geophysical	1974-76	--
Standard Oil Co.	Geophysical	1973-75	--
Texaco, Inc.	Geophysical	1974-75	November 1974



## THE SEARCH FOR ENERGY - II. GEOTHERMAL RESOURCES

Deep well technology and geothermics  
will tap heat from the earth

The Department has been active in the search for and development of geothermal energy for 16 years. Numerous areas in Oregon have a potential for geothermal development because of a higher than average rate of temperature increase with depth.

The 1971 Legislature enacted ORS 522, the Geothermal Resources Act, with administrative and enforcement responsibility in this Department. Conservation of geothermal energy requires a thorough knowledge of deep well technology, subsurface geology, volcanism, and crustal plate tectonics.

During the biennium, a total of 1,500,000 acres of Federal land was leased for geothermal prospecting. Over 600,000 acres of non-federal land is under lease. State lands may be leased in 1975 if acceptable environmental impact statements are prepared.

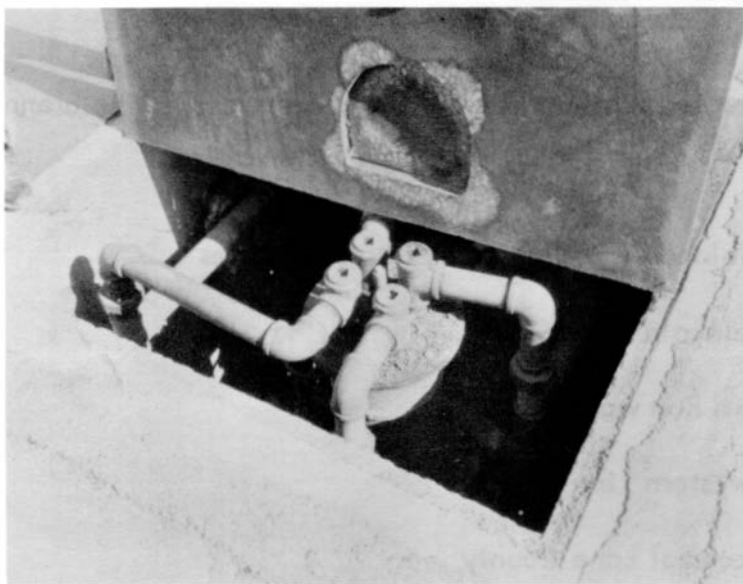
The Department has made numerous temperature-gradient measurements in existing wells and also in shallow test wells drilled by the Department. Two deep test holes have been drilled by private companies and plans have been announced for the drilling of others early in 1975.

The space-heating potential of geothermal energy was the theme of an international conference co-sponsored by the Department and held in Klamath Falls in 1974.

The status of industry activity is tabulated on the opposite page.

## Status of Geothermal Exploration

Gulf Oil Co. Favell-Utley no. 1-ST	<u>County</u> Lake	Plugged and abandoned Nov. 15, 1973. 5440' T.D.
Gulf Oil Co. Meadow Lake no. 1-ST	Klamath	Location made. Drilling postponed
Magma Energy, Inc. Butler no. 1	Malheur	Application filed on Sept. 7, 1973
Magma Energy, Inc. La Grande no. 1	Union	Application filed July 8, 1974 Drilled to T.D. 2730'
Magma Energy, Inc. La Grande no. 2	Union	Application filed on July 8, 1974
Magma Energy, Inc. Vale no. 1	Malheur	Application filed on July 8, 1974
Magma Energy, Inc. Vale no. 2	Union	Application filed on July 8, 1974
Gulf Research and Development Co. Geophysical program	Lake	Filed application to drill approximately 40 shallow geophysical holes in 1974



Picture at left shows the simple piping used to harness geothermal energy for domestic space heating in Klamath Falls. Geothermal energy developed for the generation of electric power would require vastly more complicated drilling techniques, controls and distribution systems than those needed for space heating.

## ENGINEERING AND ENVIRONMENTAL GEOLOGIC STUDIES

Our concern with the earth must  
be more than just skin deep.

During the biennium the Department became increasingly involved in the following:

- Geologic criteria for evaluating nuclear plant sites

- Geologic criteria for evaluating thermal plant sites

- Geologic criteria for disposal sites for solid, liquid, and radioactive wastes

- Detailed studies of proposed nuclear, thermal, and waste disposal sites

- Geologic hazards studies of special areas for counties

- Development of pre-disaster plans aimed at minimizing effects of geologic  
catastrophes

- Identification of areas having a potential for renewed volcanism or earthquake  
activity

- Preparation of reports on coastal areas subject to unusual geologic processes  
peculiar to the coastal environment

Engineering and environmental studies published by the Department during the biennium  
included:

- Environmental geology of inland Tillamook and Clatsop Counties

- Environmental geology of Lincoln County

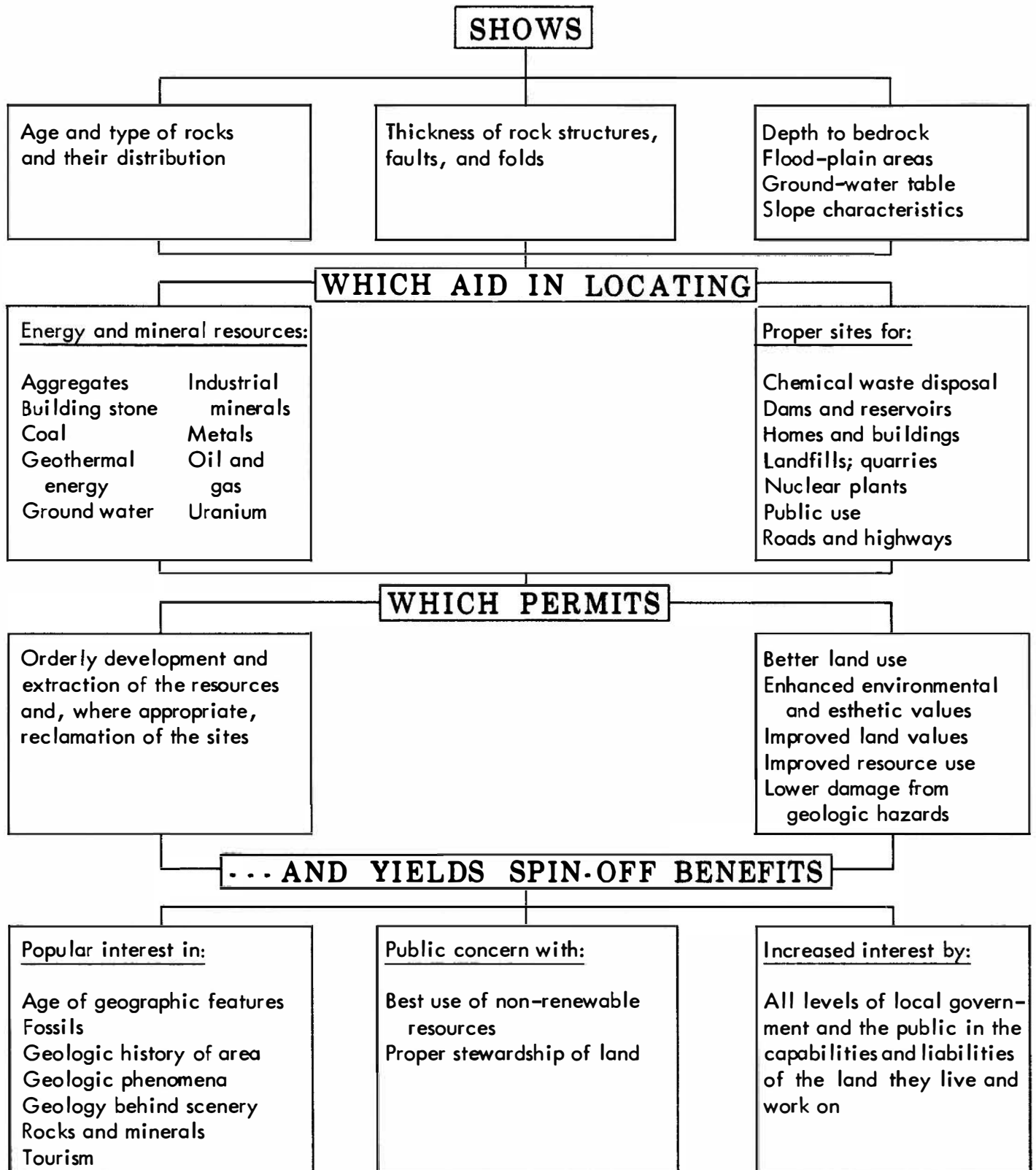
- Geologic hazards of the Bull Run watershed

- Environmental geology of western Linn County

- Environmental geology of coastal Lane County

- Geologic hazards inventory of the Oregon coastal zone

# AN ENGINEERING GEOLOGY STUDY



## ENGINEERING GEOLOGY APPLIED

A good homesite is  
hard to come by.

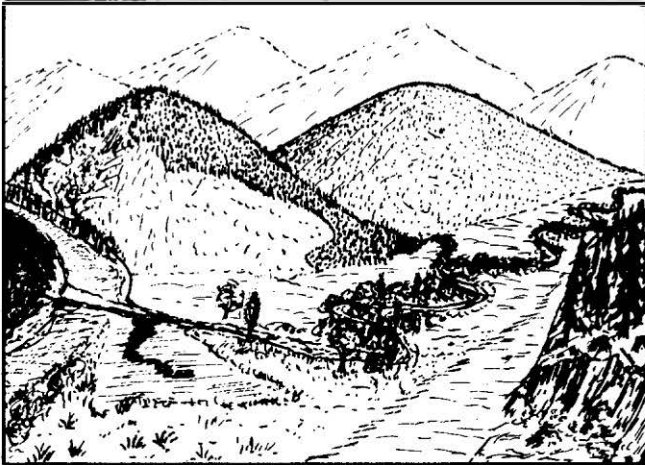
Engineering geology can provide the guidelines for selection of sites for many types of structures, including private homes. Good homesites are becoming increasingly scarce. Early residents built on the choice spots, and industrial developments have engulfed many others or reduced their suitability for home building. A thorough understanding of the geologic nature of a prospective homesite can have a profound impact on the economics of the final selection.

The original dollar cost of a homesite without geologic hazards may be more than a site with shortcomings; however, the cheaper site may require more expensive construction or increased maintenance, and should there be slope failure, subsidence, or landsliding, the homeowner will face possible loss of both house and lot.

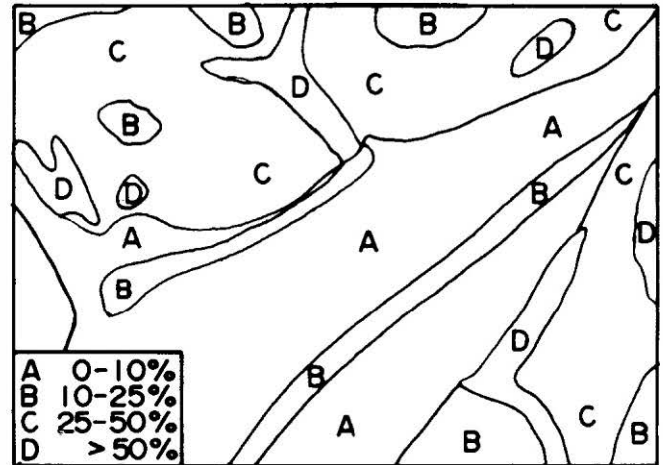
Some of the points to be considered in picking a new homesite are shown on the opposite page. Sites with minor flaws can often be upgraded within economic limits, and consultation with an engineering geologist is suggested for owners of such sites. The average home builder can, however, choose a good site on his own if he has adequate engineering geology maps and reports for his area.

The Department has completed engineering and environmental geologic studies for large parts of Clatsop, Coos, Douglas, Lane, Lincoln, Linn, and Tillamook Counties. The work will be continued in additional counties during the coming biennium.

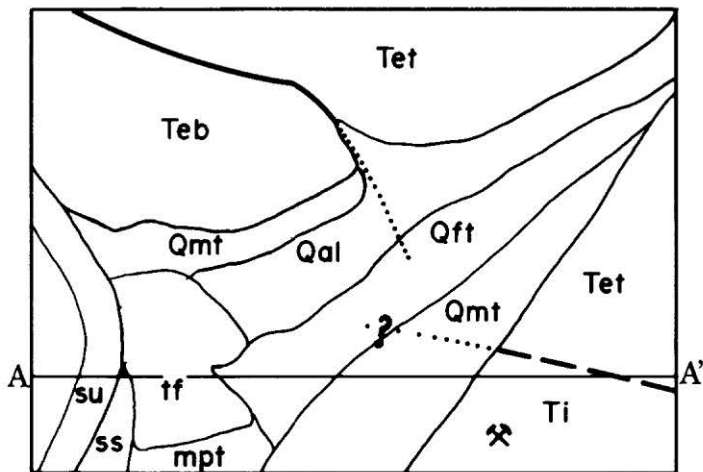
Sketch of Area



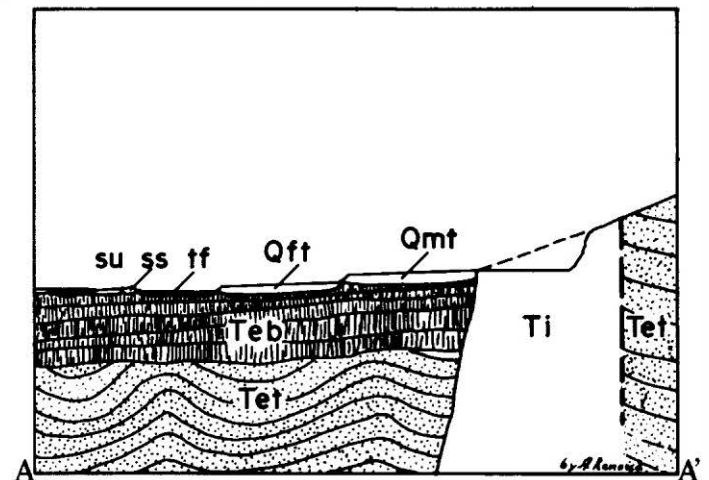
Slope Map



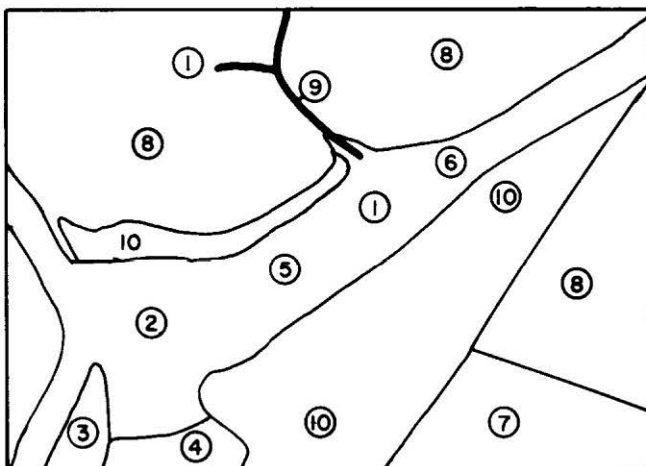
Areal Geology Map



Geologic Cross Section



Geologic Hazards Map & Explanation



- ① Fault, uncertain activity
- ② Ocean and stream flooding
- ③ Beach erosion and deposition
- ④ Compressible soils
- ⑤ High water table
- ⑥ Channel change and stream bank erosion
- ⑦ High excavation costs, resource value
- ⑧ Landslides and steep slopes
- ⑨ Flash flood channel, alluvial fan
- ⑩ No adverse conditions. Good building site

GEOLOGIC FACTORS IN THE SELECTION OF A GOOD BUILDING SITE

## THE MINED LAND RECLAMATION ACT

There are nearly 10,000 surface mining sites in the State. Only 1% of them come under the full provisions of the Act.

The Department was assigned the responsibility for administering and enforcing the Mined Land Reclamation Act (ORS 517) by the 1971 Legislature.

A canvass indicates that there are about 10,000 surface mining sites in the State varying widely in size, level of activity, and the need for and complexity of reclamation. Approximately 1,050 sites should require some measure of compliance, but fully two-thirds of these are exempt from the provisions of the Act for one reason or another. Of the remaining 300 sites, all but 100 will be exempt under the "grandfather" provisions.

It is anticipated that all 100 of the operations subject to the Act will have been issued Operating Permits by June 30, 1975.

Reclamation plans approved have included such diverse projects as conversion to fish farms, recreation vehicle parks, housing developments, plant sites, shopping centers, and roadside rest areas. Some sites will be returned to agricultural land or reforested.

The pictures on pages ii and 19 illustrate some of the complex problems involved in reclamation plans for a typical open pit. The approved plan is the product of cooperative efforts between the operator, county planning commission, various State natural resource agencies, and the Department.



The reclamation of open pits seeks the best ultimate use after mining has been completed and involves such considerations as steep banks, stagnant water, visual esthetics, deep pools, and high walls along property lines.



## SERVICES TO THE PUBLIC

The Department provides a variety of unique analytical and identification services for the public.

The Department analyses the mineral and metal content of rocks and ore samples submitted to it. To provide these services, the Department performs fire assay on gold and silver samples and operates both a wet chemical inorganic laboratory for quantitative analysis and a spectrographic laboratory for the rapid detection of metals in economic amounts and of trace elements. Facilities are also available for the determination of radioactivity in ores and for fluorescent mineral identification. A charge is made for these services.

The Department also identifies rocks, minerals, and fossils brought in by the general public. Generally there is no charge for this service, done with minimum equipment.

Although the Department has no public relations person on its staff, requests for speakers, guides, and trip leaders are serviced by regular staff members. The growing demand for this type of service by the public cannot always be met, however, and the Department, reluctantly, has to turn down more and more requests.

Various information sheets and small maps have been prepared by the Department to help meet the demand for information on popular geology.

At its three offices, the Department maintains displays of rocks, minerals, and fossils found principally in Oregon. Reference collections of additional specimens are also available for study.



What happened here?

Even a rudimentary knowledge of geologic processes enhances the enjoyment of Oregon's scenery, which is largely geologic in origin.

#### Publications on Popular Geology Issued by the Department

##### Articles in The ORE BIN:

Coastal Landforms -  
 Coos County, southern  
 Coos Bay to Sea Lion Point  
 Florence to Yachats  
 Yachats to Newport  
 Newport to Lincoln City  
 Roads End to Tillamook Bay  
 Tillamook to Columbia River

##### Bulletins:

Geologic field trips in northern Oregon  
 and southern Washington  
 Gold and silver in Oregon  
 Lava tubes in the Bend area [caves]  
 Lunar geological field conference  
 guidebook  
 Mineral and water resources of Oregon

## ECONOMIC GEOLOGY

Estimated value of Oregon's minerals and metals production, \$700 million annually.

Oregon's metallurgical industry produces iron and steel, aluminum, ferro-alloys, elemental silicon, reactive metals, calcium carbide, cement, lime, and ferro-nickel.

Oregon produced 34,200,000 tons of aggregate in 1973 valued at \$53,200,000 in the pit. Production was reported from every county and most communities. Concern by local governments over future supplies of aggregate and the impact of the extractive operation has resulted in several sand and gravel studies by the Department. On the basis of present available knowledge, there will soon be shortages of aggregate in local areas in western Oregon, with exhaustion of minable reserves in the Willamette Valley by about the year 2000.

The Department assists industry in the orderly search for mineral deposits in many ways. A comprehensive library of reference materials on Oregon geology and mineralogy, plus numerous unpublished studies and reports on known mines, is constantly used by industry. Professional staff members bring a total of more than 200 years experience on all phases of Oregon geology to bear upon the many economic problems posed.

Economic studies underway by the Department include a survey for nickel resources in southwestern Oregon, geothermal studies, and sand and gravel inventories in several counties. Proposed studies include offshore minerals on state-owned land, and mineral reserves in on-shore state lands.

# SOME OF OREGON'S MINERALS AT A GLANCE

<u>Mineral</u>	<u>1972</u>	<u>1973</u>
Clays	\$ 238,000	\$ 278,000
Gem stones	793,000	793,000
Lime	2,129,000	2,577,000
Nickel	W*	W
Pumice, volcanic cinder	W	1,191,000
Sand and gravel	34,981,000	35,631,000
Silver	4,000	--
Stone	18,380,000	17,654,000
Value of items that cannot be disclosed: cement, gold, talc, tungsten, and values indicated by symbol "W"	<u>19,991,000</u>	<u>25,107,000</u>
TOTAL	\$76,516,000	\$83,231,000

\*W - Withheld

## BY COMPARISON - - -

<u>State</u>	<u>1972 Value</u>	<u>Value per capita</u>	<u>Rank per capita</u>
California	\$ 1,851,365,000	\$ 93	25
Wyoming	746,743,000	2,249	1
Nevada	181,702,000	372	11
Washington	109,806,000	32	38
Idaho	106,206,000	149	17
Oregon	76,516,000	37	36
U.S. Total	32,217,000,000	159	