

MISSION, GOALS, AND PROGRAMS 1979-1985



STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
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DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
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MISSION, GOALS, AND PROGRAMS 1979-1985

A six-year plan for geologic investigation,
research, and regulation

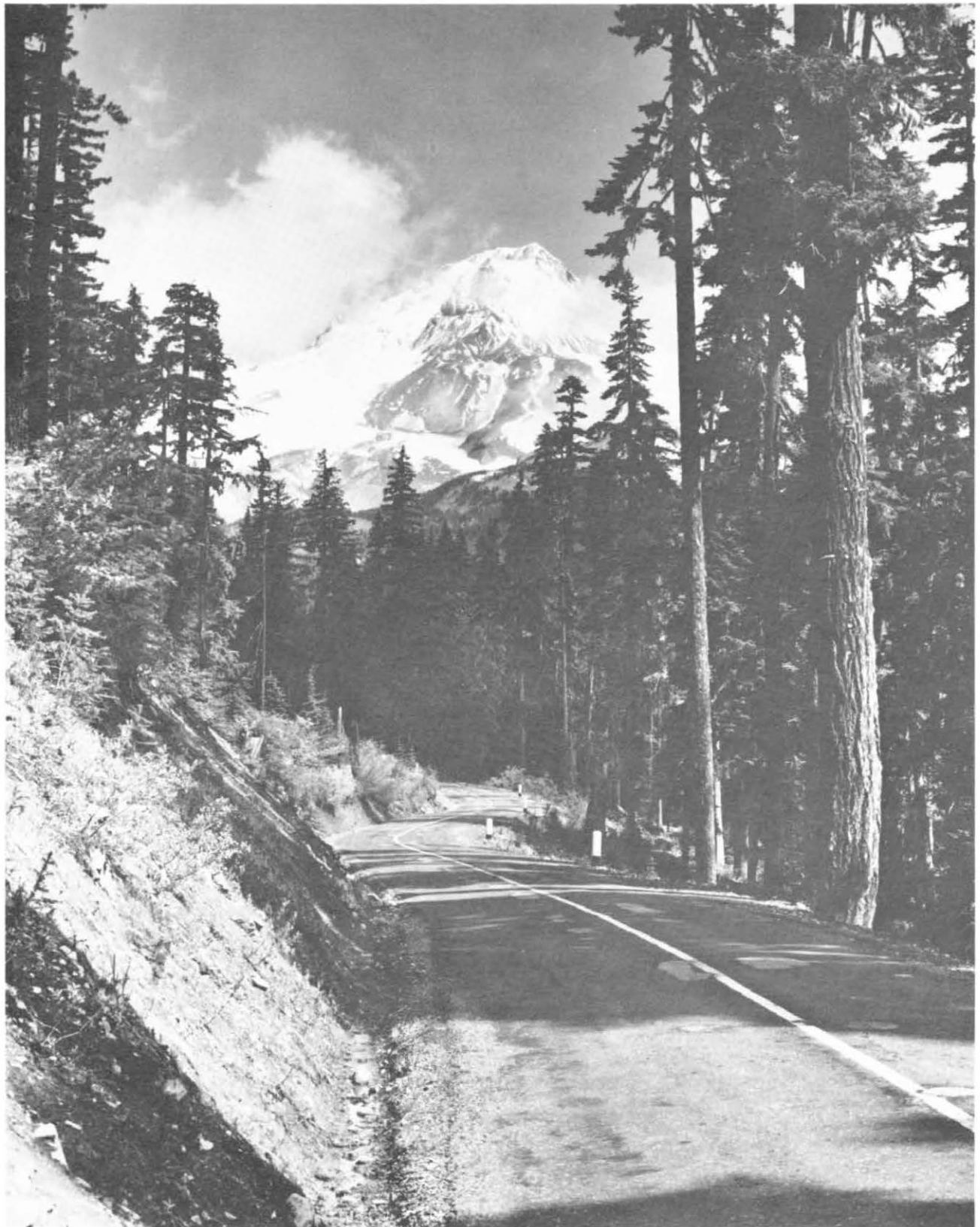


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Frontispiece: Mount Hood, northern end of the Oregon Cascade Mountains, viewed from the Mount Hood Loop Highway in the Mount Hood National Forest. This area is the site of a variety of natural resources including recreational, esthetic, forest products, and possibly geothermal energy. Mount Hood Volcano is currently being studied by the Oregon Department of Geology and Mineral Industries as part of a joint State-Federal geothermal energy research project. (Photo courtesy Oregon State Highway Division)

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ILLUSTRATIONS

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View of Elkhorn Ridge looking west from a point 15 miles northwest of Baker. This area has produced important amounts of gold from lode and placer mines and is currently being explored for deposits of copper and molybdenum. The valley in the foreground has untested potential for geothermal energy. (Photo courtesy Baker Democrat Herald)

Frontispiece

Mount Hood, viewed from Mount Hood Loop Highway in Mount Hood National Forest at the northern end of the Oregon Cascades

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SUMMARY

MISSION

The mission of the Oregon Department of Geology and Mineral Industries is to develop needed geologic information for the State and to disseminate that information to a diverse audience so that it can serve as a basis for sensible decision making. The Department also regulates selected activities of a technical and geologic nature.

STAFF AND PROGRAMS

To fulfill its mission, the Department maintains a professional staff of highly qualified geologists and support personnel and aggressively coordinates its activities with universities and local, State, and Federal natural resource agencies. Among Department programs are Geologic Mapping; Interpretive Geologic Mapping; Geologic Resource Assessment; Oil, Gas, and Geothermal Regulation; Technical Review and Publication; and Mined Land Reclamation.

INFORMATION DISSEMINATION

To effectively disseminate information to a diverse audience, the Department operates a systematic Technical Review and Publication Program and a Public Information Program. To promote meaningful interaction with other natural resource agencies in the State, the Department pursues a systematic Agency Assistance Program.

QUALITY OF WORK

The Department maintains a profile of high professionalism in the discipline and is proud of the esteem in which it is held throughout the State and the nation in both the public and private sectors. Requests for results of Department investigations come from within the State, around the nation, and, in some cases, foreign countries, as well.

GROWTH

With two exceptions, programs described here for the period 1979-85 can be accomplished without additional permanent staff, provided adequate and stable funding is available for effective planning and program management. The Oregon Rock Resource Assessment within the Interpretive Mapping and Resource Assessment Program contemplates some additional staff and facilities. The Mined Land Reclamation programs also require limited additional staff.

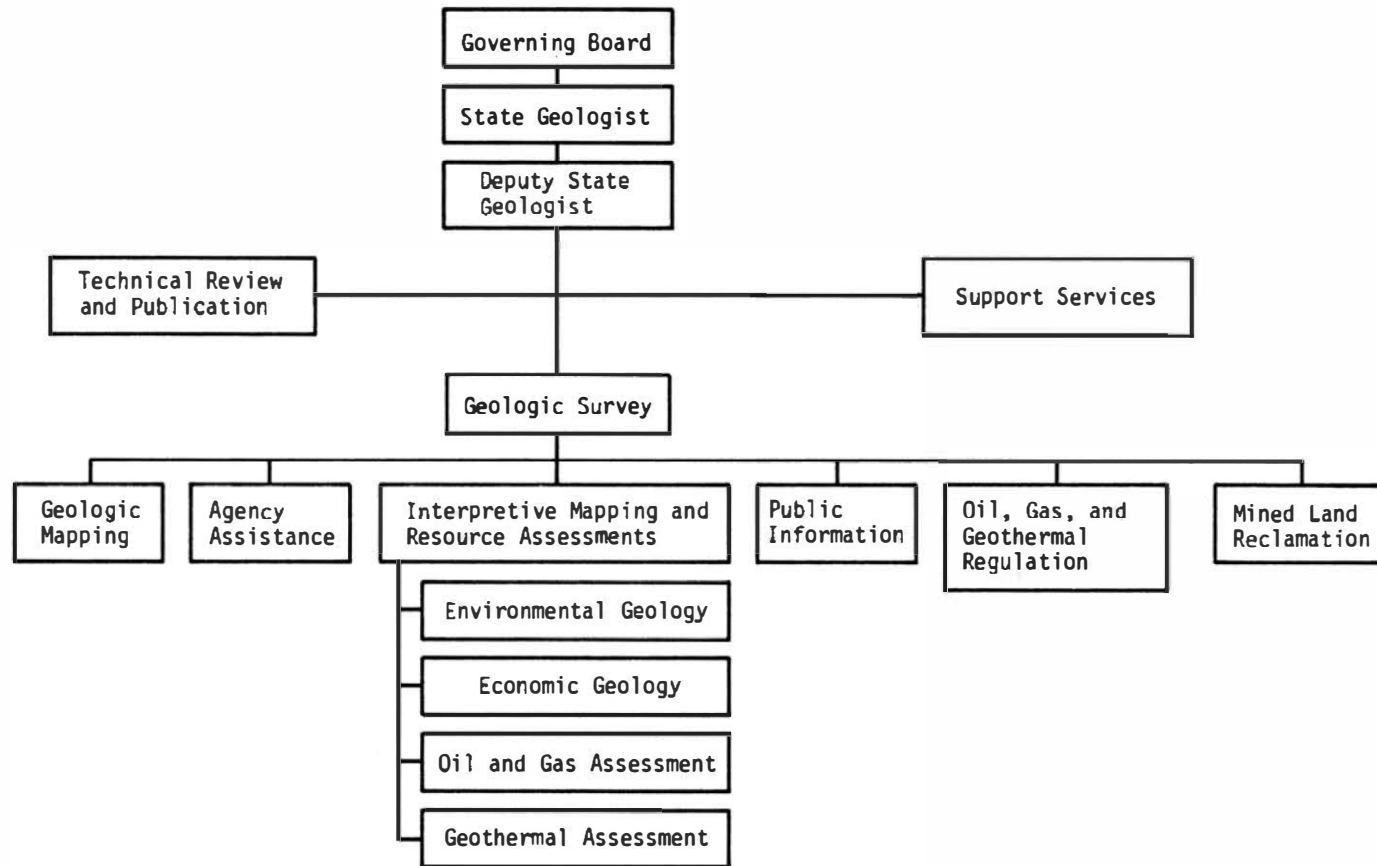


Figure 1. Functional organization chart of the Oregon Department of Geology and Mineral Industries.

INTRODUCTION

STATEMENT OF PURPOSE

Man interacts with the land directly or indirectly in most of his activities. This interaction necessitates a working knowledge of geology for natural resource policy formulation, decision making, and resource development and regulation. Proper and effective management, development, and regulation of the land resources of Oregon, as elsewhere, further necessitates continuing development of geologic information and its rational application in decision making and regulation.

The State of Oregon is experiencing rapid growth and redistribution of population at a time of increasing national and local demand for domestic sources of mineral and energy resources. At the same time, land use and resource planning are creating a demand for improved information on geologic processes and mineral resources. Because earth science information has been often neglected, geologic hazards have produced millions of dollars of damage and taken human life. Mineral resources have been lost because of incompatible uses, and costly resource conflicts have arisen between the public and private sectors. For these reasons, it is desirable for the Department to reaffirm its goals and develop viable programs that will provide earth science data to answer questions related to geologic hazards, subsurface resources, and the wise development of these resources.

Authority to function as the geologic survey center for the State is conferred on the Oregon Department of Geology and Mineral Industries in ORS 516. Authority to regulate subsurface resource development is conferred in ORS 517 for mined land reclamation, ORS 520 for oil and gas drilling, and ORS 522 for geothermal exploration. The Department is a storehouse and center for development of unbiased technical data related to the geology of Oregon. It is committed to maintaining its scientific objectivity, to directing its unique capabilities

toward needs in Oregon, and to maintaining technically competent regulatory capabilities.

The primary mission of the Department is to develop, store, and disseminate needed information about the geology of Oregon that can serve as a basis for effective and correct decision making in terms of safe resource development and land management at both the State and local levels. It is also the mission of the agency to integrate geologic expertise into regulatory activities of a geological nature so that development can be undertaken in an environmentally responsible manner. Other State agencies rely on the basic geologic survey function in our Agency Assistance Program in the successful, timely, and cost-effective execution of their duties.

NEEDS ADDRESSED

Major programs of the Department, as indicated on the accompanying organization chart (Figure 1), are designed to address Oregon's major geologic problems.

The Geologic Mapping Program addresses diverse needs for basic geologic maps. The Agency Assistance Program addresses the need for geologic information by a wide variety of State agencies and local government as they effectively discharge their duties. The Interpretive Mapping and Resource Assessment Program addresses the need for special maps of geologic hazards, mineral deposits, oil and gas, and geothermal resource assessments in land management, resource policy formulation, and resource development.

The Public Information and Technical Review and Publication Programs address the need for wide dissemination of geologic information as a basis for informed dialogue and wise decision making regarding the use of land and

its subsurface resources. The Oil, Gas, and Geothermal Regulation Program recognizes the need for geologic knowledge, expertise, and experience in the regulation of exploration activities. The Mined Land Reclamation Program addresses the needs for safety, environmental protection, and beneficial second uses of surface mines, gravel pits, and quarries, both during their long-term operation and in their eventual conversion to other uses. Geologic information is an integral part of the effective regulation of surface mining.

STAFF

Professional staff of the Department are selected and trained to effectively implement goals of various programs. They possess advanced degrees in various aspects of geology and engineering and have expertise and broad experience in engineering geology, environmental geology, resource geology, and geologic mapping of Oregon.

Within the Geologic Survey Division, the staff is organized in teams so that for each specialty at least two professionals have expertise and experience. This team capability enables the Department to schedule and conduct projects in an efficient and timely manner with the necessary technical-managerial expertise available.

The team concept allows for effective interpretation and project technical review, a very necessary element in the development of scientific and technical information and conclusions. Teamwork and professional interaction are fundamental to the geologic problem-solving capabilities of the Department.

FUNDING

The Department receives monies to operate from the General Fund, Federal sources, other sources, fees, and sales of publications. The Mined Land Reclamation Program is currently supported on the basis of fees charged to operators of surface mines and quarries. The precise order and degree to which specific objectives outlined herein are achieved is governed in part by the availability and nature of funds and specific contractual obligations. Many of the programs described herein represent long-term applied research efforts, and stable funding will be required to attain their goals.

GEOLOGIC MAPPING PROGRAM

NEED

The Department is charged with the responsibility of developing a geologic map base for Oregon that is adequate for use in solving diverse land-oriented problems of society both now and in the future. Geologic maps show the distribution of rock and surficial units and are invaluable tools in planning prudent use of land and water, in the search for mineral and energy resources, in the evaluation of geologic hazards, and in the assessment of environmental impacts. Geologic maps are prerequisites for the solution of major resource, environmental, and engineering problems in the State and can provide a valuable earth science data base for informed governmental decision making.

A specific geologic map for a given area represents the interpretation of the person or agency who prepared it. As technology, available data, and geologic concepts evolve, geologic maps are continually revised to better present the changing perceptions of the discipline and thereby better meet the needs of the State.

ORS 516.030, part 1, authorizes the Oregon Department of Geology and Mineral Industries to conduct on ongoing geologic survey for the State of Oregon.

MISSION AND GOALS

The goal of the Department is to initiate and conduct orderly basic geologic mapping at standard scales on a priority basis to meet the needs of the State. Ongoing mapping is conducted in those parts of the State lacking basic geologic maps, often as an integral part of interpretive mapping and resource assessment projects where the need is critical. On a priority basis, mapping is also conducted or encouraged in

areas for which multidisciplinary State needs are evident or anticipated. In addition, mapping by geologists from outside of the Department is encouraged through technical or other assistance, such as limited grant support to graduate students. Maps contributed by these other geologists are made available to the State on a select basis through the Department's Technical Review and Publication Program.

ACTIVITIES AND OBJECTIVES

The geologic mapping program during the period 1979-85 will be concentrated in areas of rapid population growth and in northwestern Oregon, where adequate detailed mapping is not available. The products of the Department's geologic mapping program over this six-year period will include a series of maps covering the Vancouver 1° x 2° Quadrangle (Figure 2a) and a final compilation of the entire quadrangle at a scale of 1:250,000 to be published as a multicolor map accompanied by a short text describing the geology and geologic history of the area. Individual larger scale maps will be issued as they are completed between 1980 and 1985.

During this same period, three critical 15-minute (1 in. = 1 mi) quadrangles outside of northwestern Oregon will also be mapped. These are the Eugene, Grants Pass, and La Grande Quadrangles, shown in Figure 2b. Each map will be published upon completion.

The agency plans to pursue the development of a lineament (linear features on the earth's surface) and structure (faults and joints) map package of Oregon using available Federal funds and in-state capabilities. The agency also plans to release in its Geologic Map Series several geologic quadrangle maps nearing completion for various areas of northeastern Oregon.

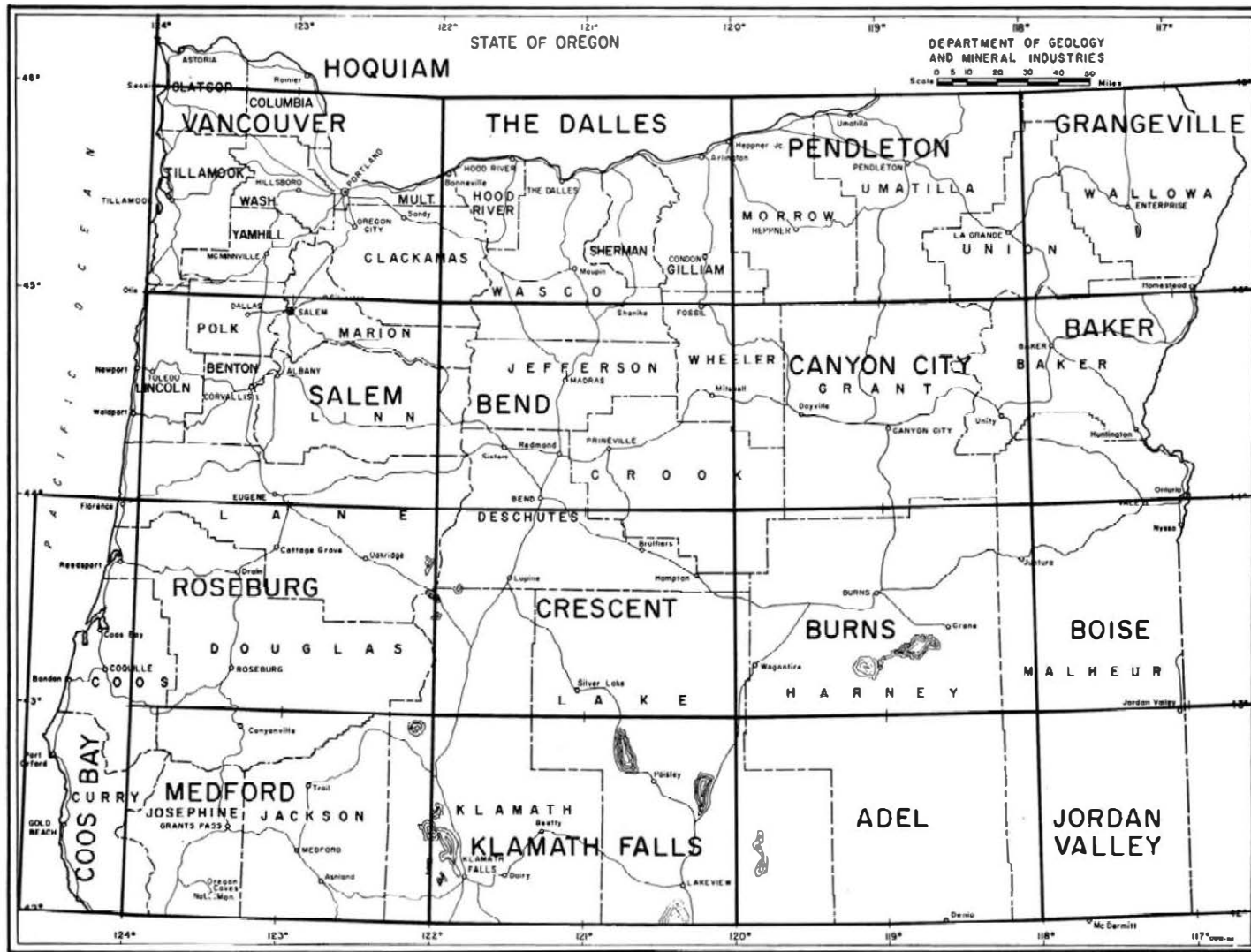


Figure 2a. Index map of 1° by 2° (AMS) sheets. Because 1° by 2° sheets cover large areas, they represent the most efficient format for compiling and publishing geologic maps, basic tools needed for follow-up investigations of mineral resources and geologic hazards.

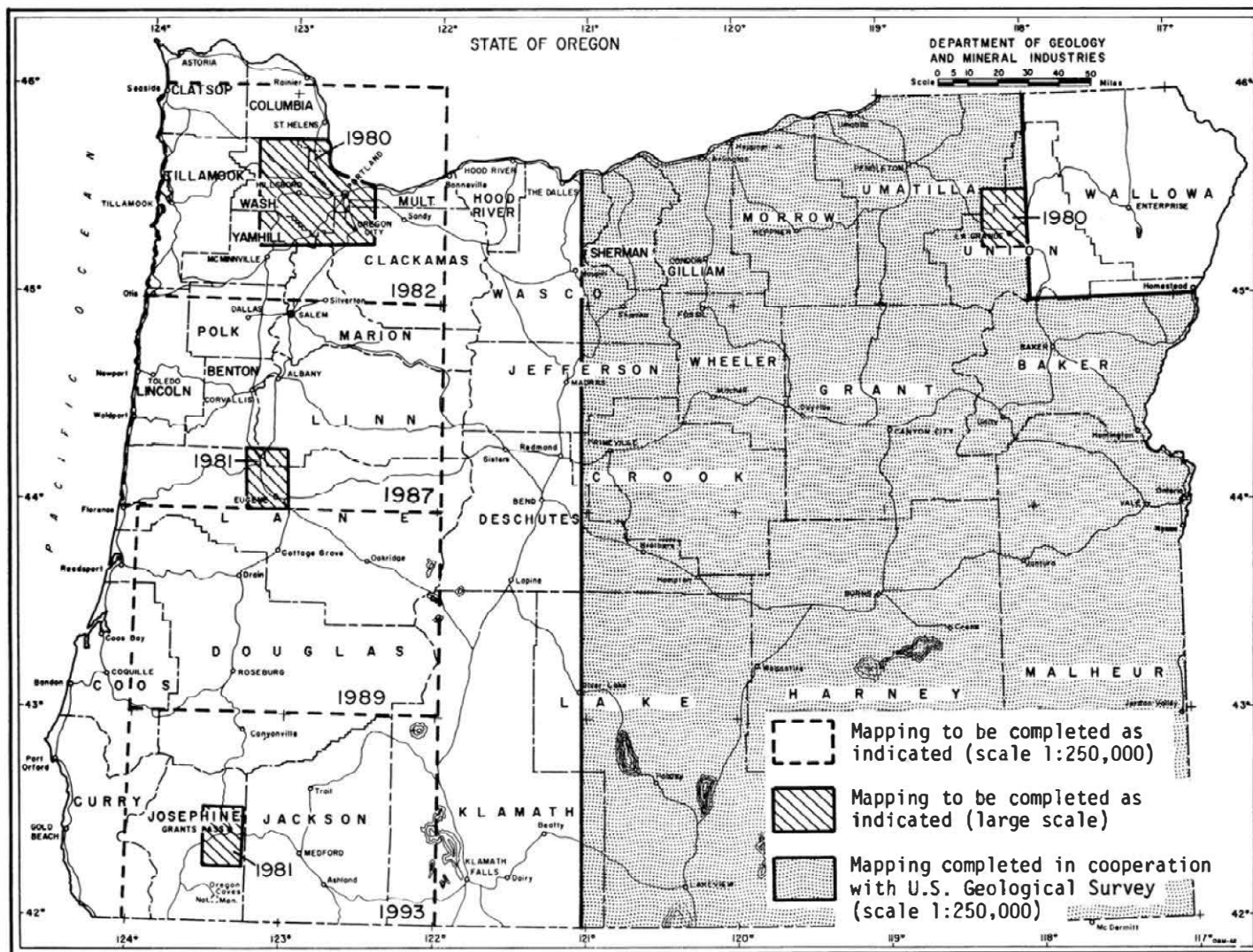


Figure 2b. Areas of planned geologic mapping.

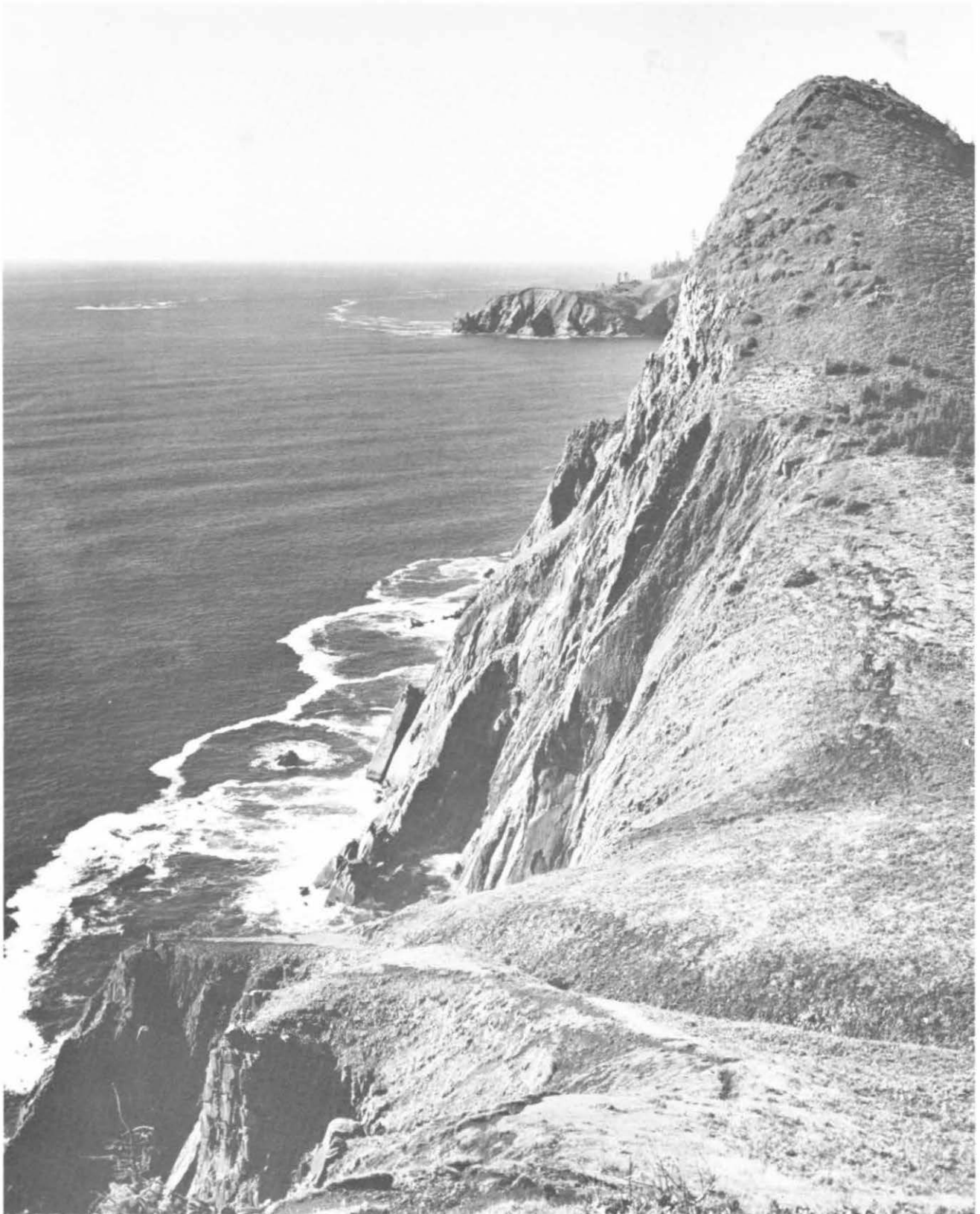


Figure 3. Neahkahmie Mountain on the north Oregon coast. This bold headland is formed of hard, erosion-resistant, igneous rock called gabbro and terminates in a high sea cliff whose angle is determined by joints that incline steeply seaward. These cliffs act as a bulwark against the waves of the Pacific Ocean. (Photo courtesy Oregon State Highway Division)

AGENCY ASSISTANCE PROGRAM

NEED

Many State agencies need accurate geologic information or advice of a technical nature which they cannot develop in-house, and they are directed by statute or administrative rule to obtain the information from the Oregon Department of Geology and Mineral Industries or from authoritative outside sources. The collection and dissemination of geologic information for these purposes constitute our Agency Assistance Program.

Authority to serve as the bureau for geologic information in the State is conferred upon the Oregon Department of Geology and Mineral Industries in ORS 516.030, part 1. In addition, the Department is widely recognized by State agencies as a center of geologic information.

The various topical research and regulatory programs outlined herein are designed to cover most of Oregon's major needs for earth-science data and regulation of subsurface resource extraction. In order to help other State agencies solve specific problems and efficiently complete their duties, it is desirable to make available to them the geologic and laboratory staff of the Department on a periodic and fully funded basis. The Agency Assistance Program represents a mechanism by which geologic expertise and information can be provided to various other State agencies in a timely manner. The statewide Agency Assistance Program, if adequately funded, will allow the Department to respond to these urgent State and local needs for geologic information.

MISSION AND GOALS

The Agency Assistance Program supplies geologic advice and information as provided for or implied in the statutes and/or administrative rules of the following State agencies: Economic Development, Land Conservation and Development, State Lands,

Transportation, Parks, Commerce, Environmental Quality, Energy, Forestry, Water Resources, and Soil and Water Conservation.

In addition, staff members serve on numerous State government committees and task forces needing geologic expertise and experience. Among these bodies formed by the various agencies, Legislative Resolution, or Executive Order are the Yoquina Head Advisory Committee, State Mapping Advisory Committee, Geothermal Waste Disposal Task Force, Oregon Continental Shelf Resource Committee, and Energy Facility Siting Task Force.

ACTIVITIES AND OBJECTIVES

The program for the period 1979-85 will involve continuation of cooperative agreements with agencies noted above and timely responses to future requests for assistance from State agencies concerned with the responsible management of Oregon's natural resources. The 1980 date for compliance with State planning requirements will require greatly increased workload for the Department due to requests for assistance from local governments.

- The objectives of the program are to
- Identify programs and personnel in State government in need of geological data to fulfill mandated objectives,
 - Coordinate responses and assistance to various people in any given agency, and
 - Develop ways of systematically meeting data needs of various programs in State agencies.

Memoranda of understanding may be needed to formalize working arrangements already in effect. Staff members are assigned to specific problems according to individual graphic and professional experience, field of specialization, and availability.



Figure 4. Nestucca Spit, with its varying shape and general instability, typifies Oregon coastal sand spits. This south-projecting sand spit has deflected the mouth of the Nestucca River southward about 3.5 miles. (Photo courtesy Oregon State Highway Division)

INTERPRETIVE MAPPING AND RESOURCE ASSESSMENT PROGRAM

NEED

Geologic information for specific purposes commonly must be derived from standard geologic maps through informed geologic interpretation. Thus, geologic hazards may be interpreted from basic geology maps. Also, mineral wealth or mineral potential of an area may be interpreted once the regional geology is understood. Interpretation linking basic geology data to specific State-related needs of other agencies or interests requires geologic expertise and experience which this Department is uniquely qualified to provide.

Authority to develop interpretive geologic information on a regional basis is conferred upon the State of Oregon Department of Geology and Mineral Industries by ORS 516.030, parts 1, 2, 3, and 4.

The agency's long-term mission within this program is to provide an atlas of statewide interpretative geologic maps in the fields of environmental, economic, oil and gas, and geothermal geology.

Emphasis on each of the activities varies in accordance with State needs and funding. For example, economic geology activities dominated Department programs during and shortly following World War II. Recently, environmental geology studies have become important and have therefore been emphasized. In all cases, success of the interpretive mapping and assessment activities proceeds directly from the Department's sound foundation of long-time geologic mapping experience in the State.

Specific projects generally necessitate the hiring of limited-duration field staff for a short period of time to perform the more routine data collection and mapping functions. Department staff geologists commonly serve as project managers supervising a variety of subordinate personnel.

ENVIRONMENTAL GEOLOGY

Need

Geologic processes impact land use, structures, water quality, and other natural resources. As Oregon's population increases, the need to understand geologic hazards such as earthquakes, volcanism, and landslides grows in importance. The program outlined below will provide basic data on potential hazards for priority areas over the period 1979-85. These hazards constitute continued and growing threats to Oregonians in terms of safety, health, and welfare. Losses are measured in terms of millions of dollars and several lives annually. The need for geologic hazard information is articulated in ORS 215 and ORS 197 and is clearly statewide in scope.

Authority to investigate geologic hazards is implicitly conferred upon the Oregon Department of Geology and Mineral Industries in ORS 516.030. Investigations are conducted, where possible, with joint funds provided by other State agencies, Federal agencies, or, to a limited extent, local government.

Accurate cost-benefit analyses for the activities proposed here are not possible. Because of their dispersed and variable nature, losses due to geologic hazards cannot be documented accurately. Furthermore, indirect impacts are difficult to quantify, and the record of losses is incomplete. It is clear, however, that benefits from geologic hazards investigations outweigh costs by factors of 10:1 or even 100:1 and are cumulative through the years. Furthermore, documents generated by geologic hazards investigations are used by many other State agencies to increase their efficiency.

Department involvement in data development and, possibly, in decision-making is almost certain to increase because of two trends: first,



Figure 5. Deep bedrock slide which destroyed 20 acres at Cascade Head is the result of coastal erosion and a unique distribution of geologic units with varying engineering properties. Geologic investigations are needed to outline areas of potential future hazard.

the greater demands of a growing population with expanding needs for recreational areas, energy, minerals, and forest products; second, the increase of potential geologic hazards induced by increasingly intensive land use and development.

Mission and goals

Goals of this activity are to provide pertinent geologic hazard information to Oregon jurisdictions on a regionalized and priority basis and to develop and provide geologic process information for use by resource management agencies in the State of Oregon.

Between 1979 and 1985, attention will be focused on areas experiencing rapid population growth, areas of above-average seismic activity, and regions with a high incidence of landslides and other potential geologic hazards. The major thrust of the Department's efforts will be in the Willamette Valley, including the Portland metropolitan area, and at individual sites elsewhere, including proposed thermal power plant sites. During the six-year planning period, the Department will complete hazard studies in the Vancouver, Salem, Roseburg, and Medford 1° x 2° Quadrangles (Figures 2a and 6). Some of this region has previously been studied, and the remainder will be completed. Specific potential hazards such as identified fault zones will be studied on a priority basis.

The adoption of a fully funded, scheduled, region-by-region format will allow this activity to progress efficiently toward the stated goals within the indicated time frame with no increase of permanent staff.

Activities and objectives

The Department of Geology and Mineral Industries proposes to conduct the statewide geologic hazard inventory on this orderly, scheduled, region-by-region basis, and to publish the results in a form usable by State and local jurisdictions needing the information. This objective will take 10 years to complete. It does not constitute a new activity but merely represents a restructuring and an acceleration of an existing activity.

Within a region, specific areas of investigation, topics of investigation, levels of inquiry, and areas of emphasis will vary depending on recognized needs. Types of reports and formats will vary accordingly and may include bulletins, miscellaneous papers, map atlases, maps, and informal reports.

The first proposed area of investigation, the rapidly developing western half of the northern Willamette Valley, will take two years to complete. Following the north Willamette Valley, in an order which will be determined after consultation with appropriate agencies and jurisdictions, will come investigations of

- Northwestern Oregon,
- Southwestern Oregon,
- Central Oregon,
- Northeastern Oregon, and
- Southeastern Oregon.

These areas correspond to major physiographic provinces in Oregon and will be scheduled on a priority basis in terms of land use, needs, hazards, and population. Excluded are areas for which studies will have been completed by July 1, 1979.

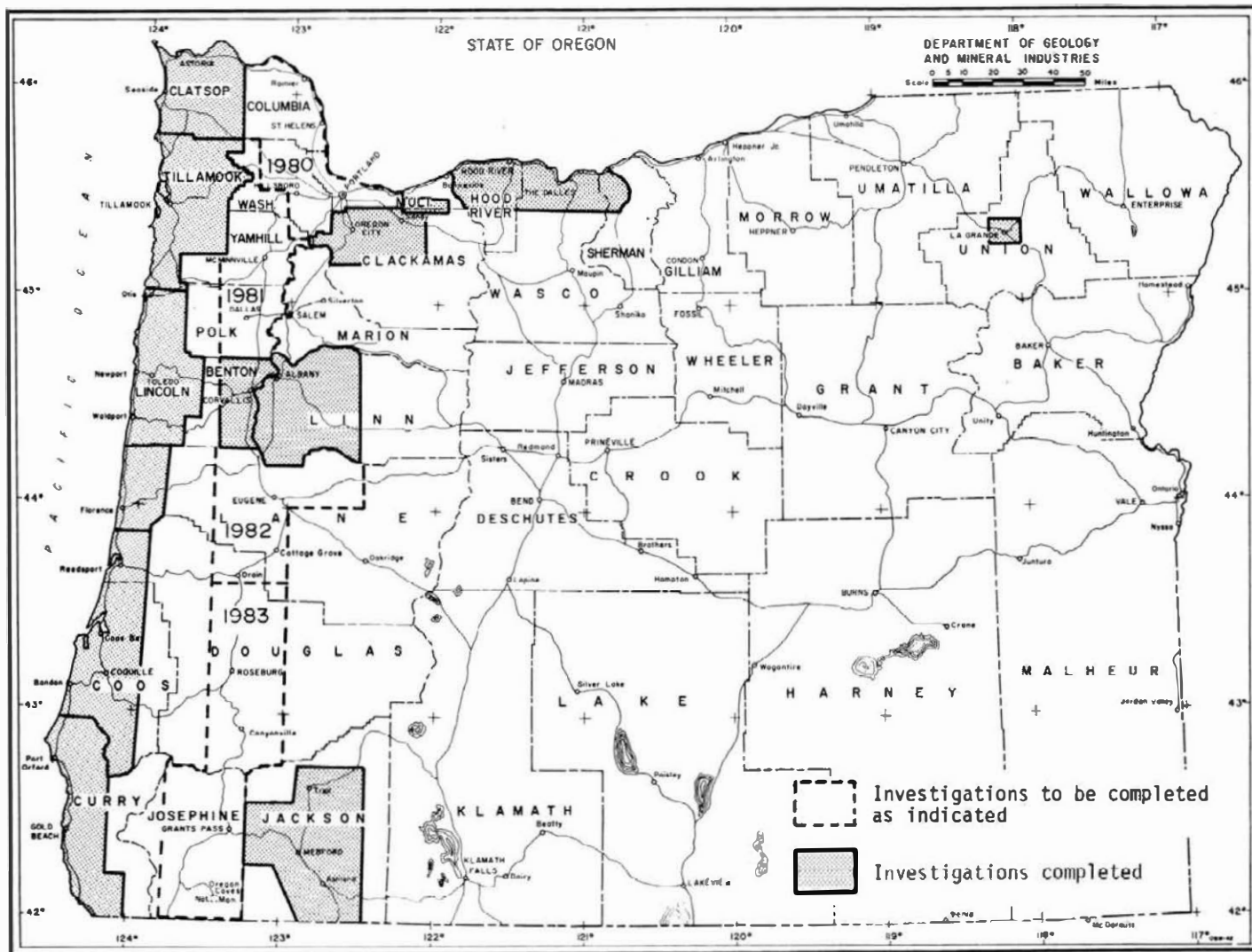


Figure 6. Areas of planned geologic hazard investigations.

In addition to these broad areas, smaller selected areas of rapid population growth in southwestern and northeastern Oregon will be studied in an attempt to anticipate problem areas prior to undertaking construction. Topical investigations, such as the geology of State parks, are also contemplated, provided outside funding and cooperation can be developed.

Successful completion of the Environmental Geology Program will require close coordination with Federal agencies, including the Army Corps of Engineers, Soil Conservation Service, U.S. Forest Service, and U.S. Geological Survey, as well as several State agencies, such as Departments of Energy, Water Resources, Land Conservation and Development, and Emergency Services.

The Department of Geology has a demonstrated capability to conduct these studies. Ongoing communication with other agencies on the Federal, State, and local levels assures efficient use of resources and a minimum of duplication in areas of common concern.

ECONOMIC GEOLOGY

Need

Updated general inventory information on the economic mineral deposits of Oregon is needed to achieve realistic land use planning; to guide policy formulation on the national, State, and local levels; to allow rational conservation practices; to promote equitable decision making regarding land resources at the State level; and to guide more intensive investigating activities of industry. The need, articulated in ORS 215, ORS 197, and a variety of other statutes, is clearly a statewide concern.

Authority to survey and inventory the metallic and nonmetallic mineral resources of

Oregon is conferred upon the Oregon Department of Geology and Mineral Industries in ORS 516.030. The Department recognizes the economic and social importance to the State and nation of identifying the State's mineral resources in advance of need, thereby insuring that they will be available when required.

In past years, the Department has investigated various metallic commodities including gold, silver, mercury, nickel, and chromite, on a statewide or regional basis. Studies of mineral construction materials, including sand and gravel and stone, have been conducted on a county basis. Future assessments should employ the latest concepts of ore genesis coupled with regional geological, geochemical, and geophysical data and should be directed toward the study of mineral resource areas of potential economic or strategic benefit to the State and nation. Future assessments should also be directed toward providing the unique data needed by planning bodies and resource managers.

Mission and goals

Goals of this activity are to

- Develop and disseminate current general inventory information on the mineral resources of the State for use by industry, local government, State government, and the general public;
- Identify high-priority mineral potential areas for specific consideration in long-range planning and policy formulation;
- Convey needed mineral information to other State agencies and local jurisdictions;
- Enter into cooperative laboratory agreements with private laboratories and geology departments at various universities in the State to expand capabilities and reduce potential duplication;
- Integrate laboratory activities with Department geologic investigations;



Figure 7. Nickel Mountain, site of the only active nickel mine in the United States, located near town of Riddle in Douglas County. The mine and smelter located in right background provide stable year-round employment for 580 individuals and annually produce ferronickel with a value of approximately \$50 million.

- Effectively use geologic expertise and experience in the accurate interpretation of the distribution of the State's mineral wealth;
- Develop meaningful chemical and physical data in the laboratory to serve as part of the data base for economic geology activity;
- Use data on metallic mineral deposits to predict possible sources of natural pollution;
- Develop data on minerals in the State for use in pollution control.

Activities and objectives

The following activity is designed to provide basic data on the potential of metallic and non-metallic mineral deposits in areas where competing land usage is likely to make planning particularly difficult because of the probable occurrence of minerals whose long-range potential has only recently been recognized.

The Department plans to study two critical areas in the State where conflicts between mineral production and other forms of land use are likely to occur (Figure 8). The first area is in the Western Cascades in the east quarter of the Solem 1° x 2° Quadrangle and the second is in the Blue Mountains in the east quarter of the Canyon City 1° x 2° Quadrangle. In both areas, deposits of copper, molybdenum, gold, and silver ore included in lands currently classified as roadless. Some of the alternative classifications for roadless areas offered in Federal land use guidelines discourage mining, so careful geologic mapping and evaluation of mineral potential are indispensable prerequisites to wise planning.

During the 1979-85 period, the two areas will be mapped geologically, and mineral deposits will be investigated by study of the hydro-thermal alteration assemblages; by geochemical

sampling and analysis of soils, stream sediments, and rocks; and by compilation of available industry data. The information will be assembled in a series of published reports and maps for use by government, industry, and the public.

Nonmetallic mineral investigation will consist of a statewide inventory of aggregates including sand and gravel and crushed stone, provided funding can be obtained. Sand and gravel and crushed stone, which constituted a \$76 million industry in 1977, represent 65 percent of Oregon's mineral industry. The initial study areas will be the Vancouver and Salem 1° x 2° Quadrangles, where population growth, land use planning, and depletion of existing mining sites have combined to limit future opportunities for extraction of these necessary mineral commodities. The sequence for completion of the various regions is shown in Figure 9.

OIL AND GAS ASSESSMENT

Need

Updating and completion of general inventory information on the oil and gas potential of the State is needed to achieve realistic land use planning; to guide policy formulation on the national, State, and local levels; to allow rational conservation practices when development begins; to promote equitable decision making regarding the resources of the State; to allow for effective regulation of the resource; and to guide more intensive investigations by industry. The need is referred to in ORS 215, ORS 520, ORS 197, and several other statutes. It is clearly a statewide concern.

Authority to investigate the oil and gas resources of Oregon in survey and inventory fashion is implicitly conferred upon the Oregon Department of Geology and Mineral Industries in ORS 516.030.

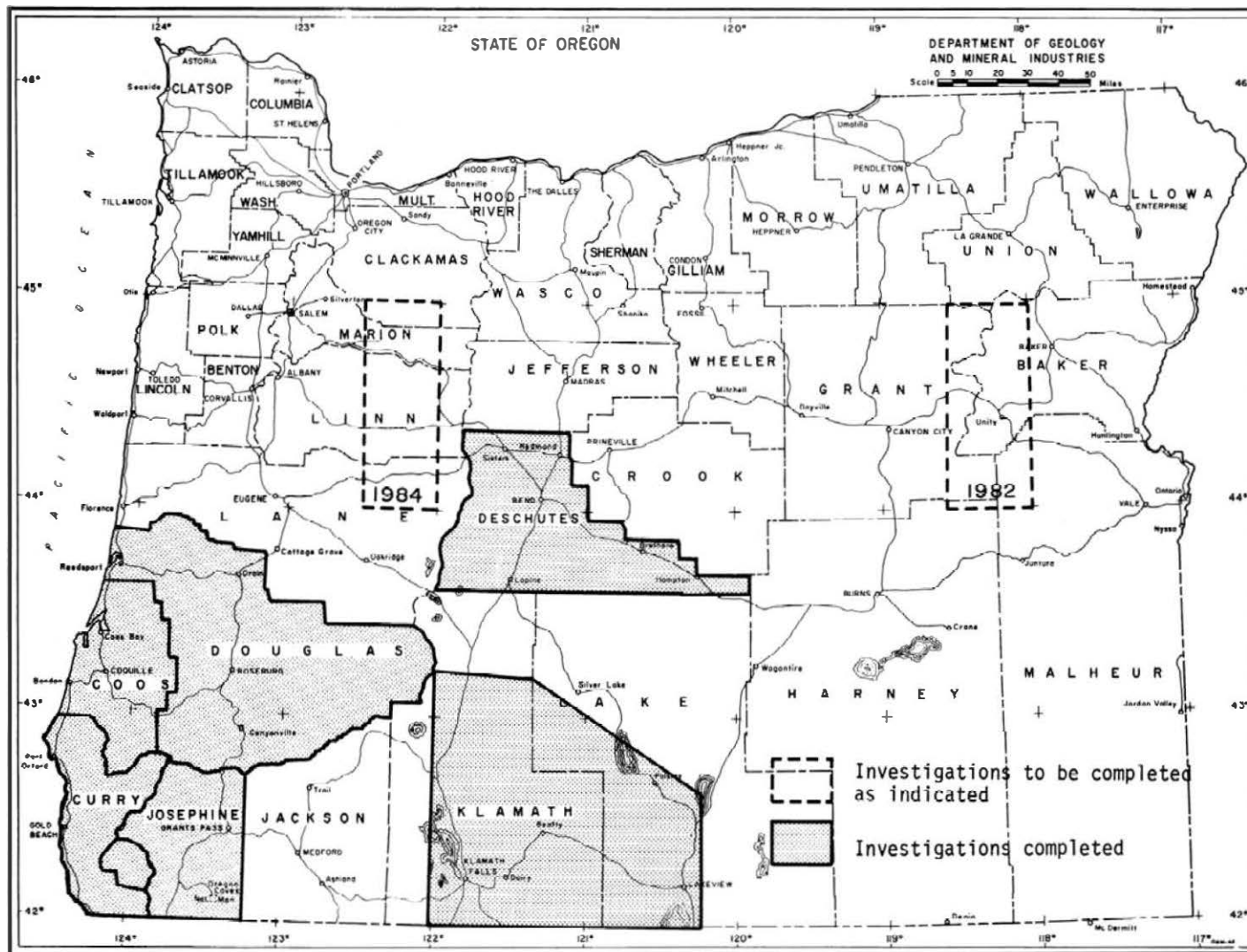


Figure 8. Areas of planned metallic mineral resource assessments. Oregon mines have produced important quantities of several metals including chromium, nickel, mercury, gold, silver, copper, and uranium. Future in-state production of many of these commodities can be expected as the nation increasingly turns to domestic sources of raw materials. Assessment of these subsurface resources is vital to good land use planning.

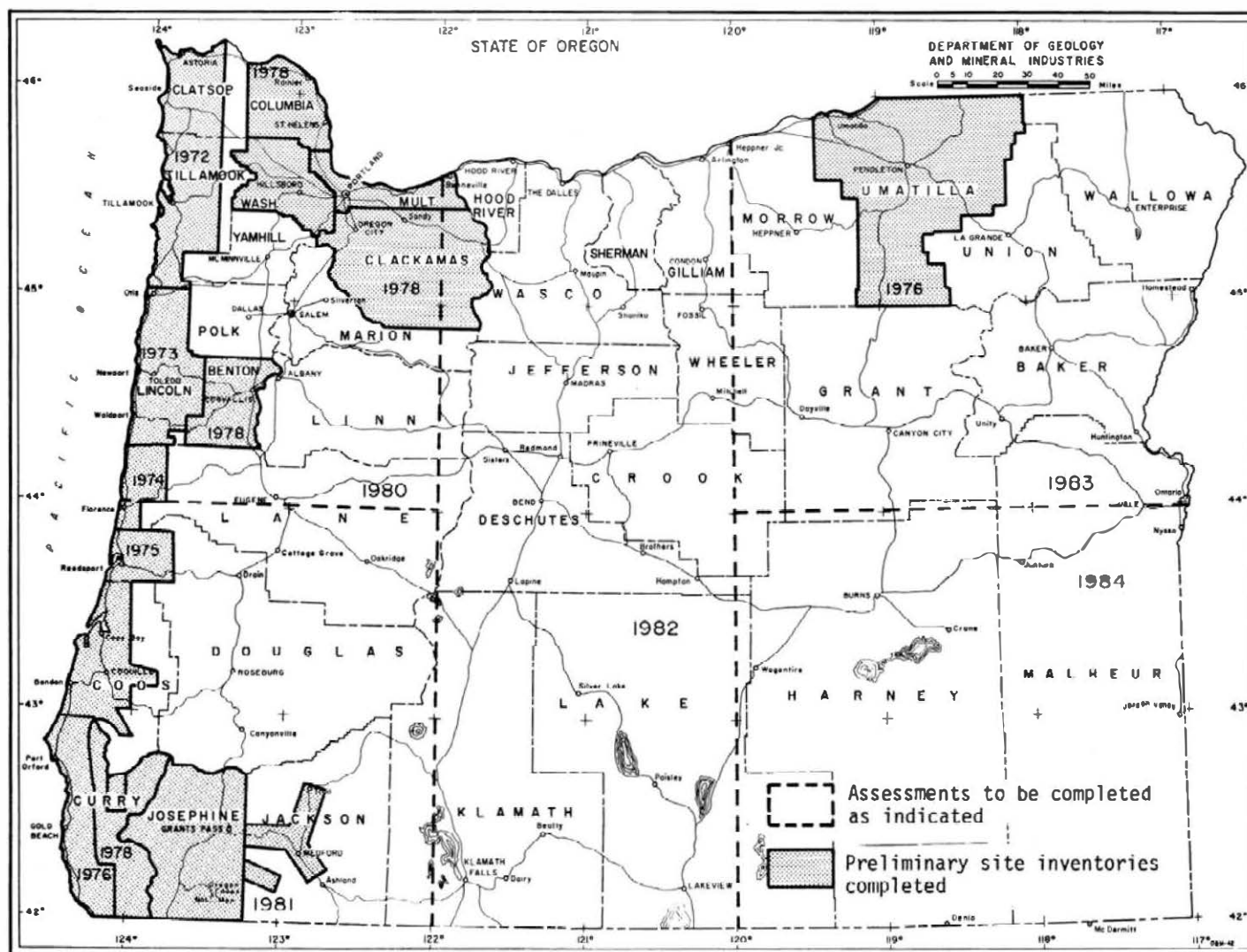


Figure 9. Areas of planned rock resource assessments. In 1976, production of rock materials (sand and gravel and crushed stone) had a value of \$76 million and represented two-thirds of Oregon's total mineral industry. Each Oregonian consumes an average of 15 tons of rock materials annually.



Figure 10. Marble Creek Summit on Elkhorn Ridge in northeastern Oregon is underlain by enigmatic limestone deposits, the origin of which is only now coming to light after decades of geologic investigation. The quarry in left center produced chemical grade limestone for the Chemical Lime Company plant in Baker, Baker County.

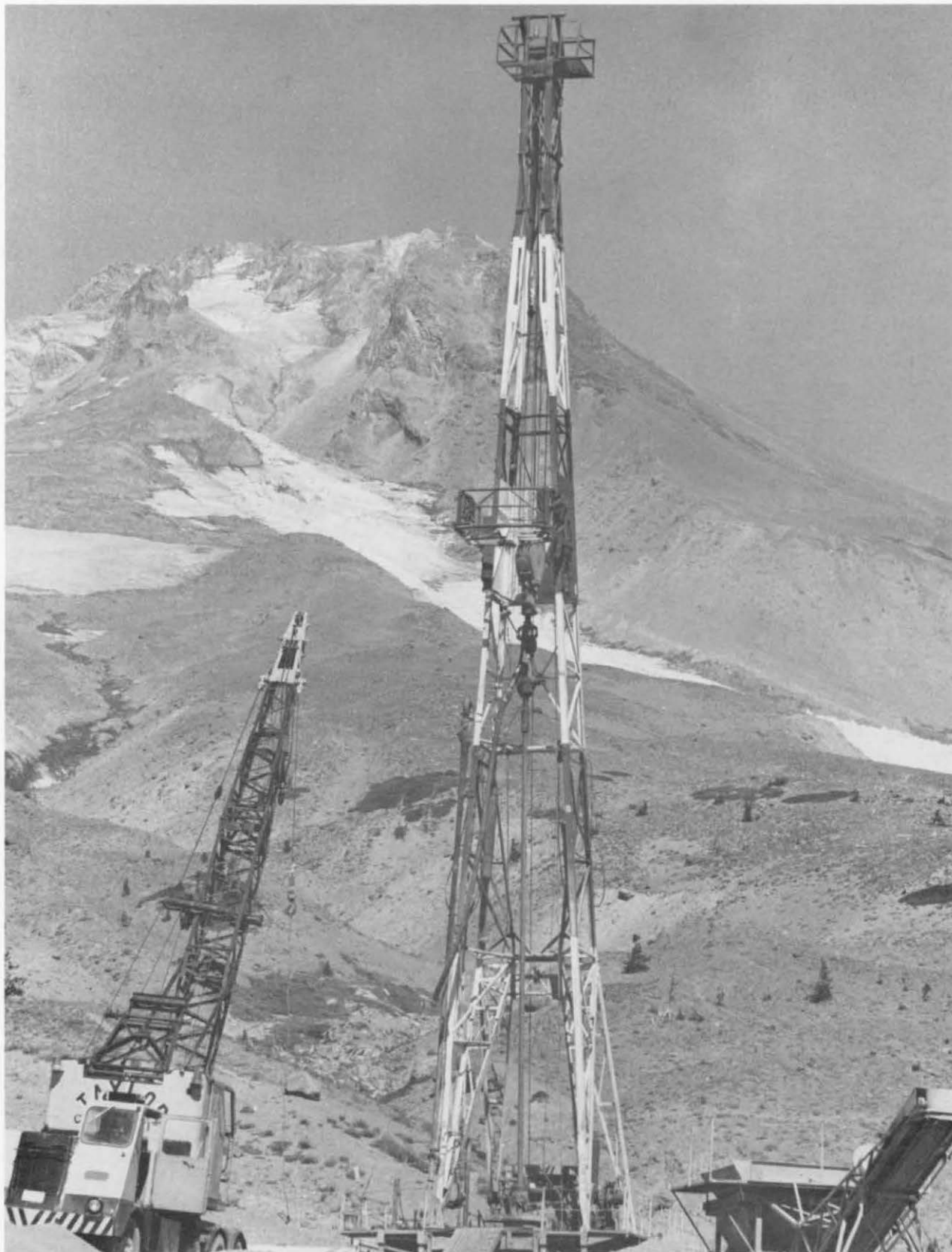


Figure 11. Geothermal exploration at Mount Hood. Exploration for oil, gas, and geothermal resources in Oregon involves deep-well technology and geologic expertise and experience. (Photo courtesy Oregon Journal, Roger Jensen, photographer)

Figure 12. Areas of planned reconnaissance oil and gas resource assessments. Possible renewed leasing of Federal offshore lands for petroleum and natural gas exploration and development in the period 1980-90 could have a substantial impact on Oregon's economy and environment.

Mission and goals

Goals of this activity are to

- Contribute to the State's energy independence by disseminating general inventory information on the State's oil and gas potential to a broad spectrum of industry, government organizations, and individuals;
- Identify high-priority oil and gas potential areas through geologic interpretation of data available to the public;
- Collect, store, and interpret data developed by private groups so that it is available to all Oregonians;
- Develop needed oil and gas information for various State agencies and local jurisdictions in understandable form for their use in effectively discharging their duties;
- Maintain in-house expertise on oil and gas to guide and assist effective and positive regulation and conservation of oil and gas;
- Attract more intensive and specialized research by non-Department personnel by providing a receptive environment for the interchange of new concepts and technical ideas and information.

Activities and objectives

The Department of Geology and Mineral Industries has a continuing program for collecting and disseminating data on areas of the State deemed to have greatest potential for future petroleum and natural gas production. Areas that have been previously studied are outlined with solid lines in Figure 12, and completion dates of studies are indicated.

The Department plans to complete the on-shore part of the Coos Bay Quadrangle in 1980 and the west half of the Roseburg Quadrangle in

1982. In 1981, a study encompassing the Salem Quadrangle will be started. From 1982 to 1988, four regional assessments covering about 14,000 sq mi of west-central Oregon will be completed.

GEOHERMAL ASSESSMENT

Need

General inventory information on the State's geothermal potential is needed to promote energy independence for the State; to guide more intensive investigations by industry; to achieve realistic land use planning; to guide policy formulation on the national, State, and local level; to allow rational conservation practices; and to promote equitable decision making regarding the resources of the State. The need is referred to in ORS 215, 522, 197, and a variety of other statutes and is clearly statewide in scope.

Authority to investigate the State's geothermal potential is implicitly conferred upon the Department in ORS 516.030, in previous budgets of the Department, and in other legislative actions including legislative joint resolutions. Involvement in the geologic investigation of geothermal potential by the Department spans a period of greater than 12 years and has resulted in numerous jointly funded studies with various Federal government agencies.

Mission and goals

The Department's interests in the geothermal resource are restricted primarily to statewide resource assessment proceeding directly from the geologic survey functions of the agency. Many other agencies with missions involving ground water, surface water, environmental

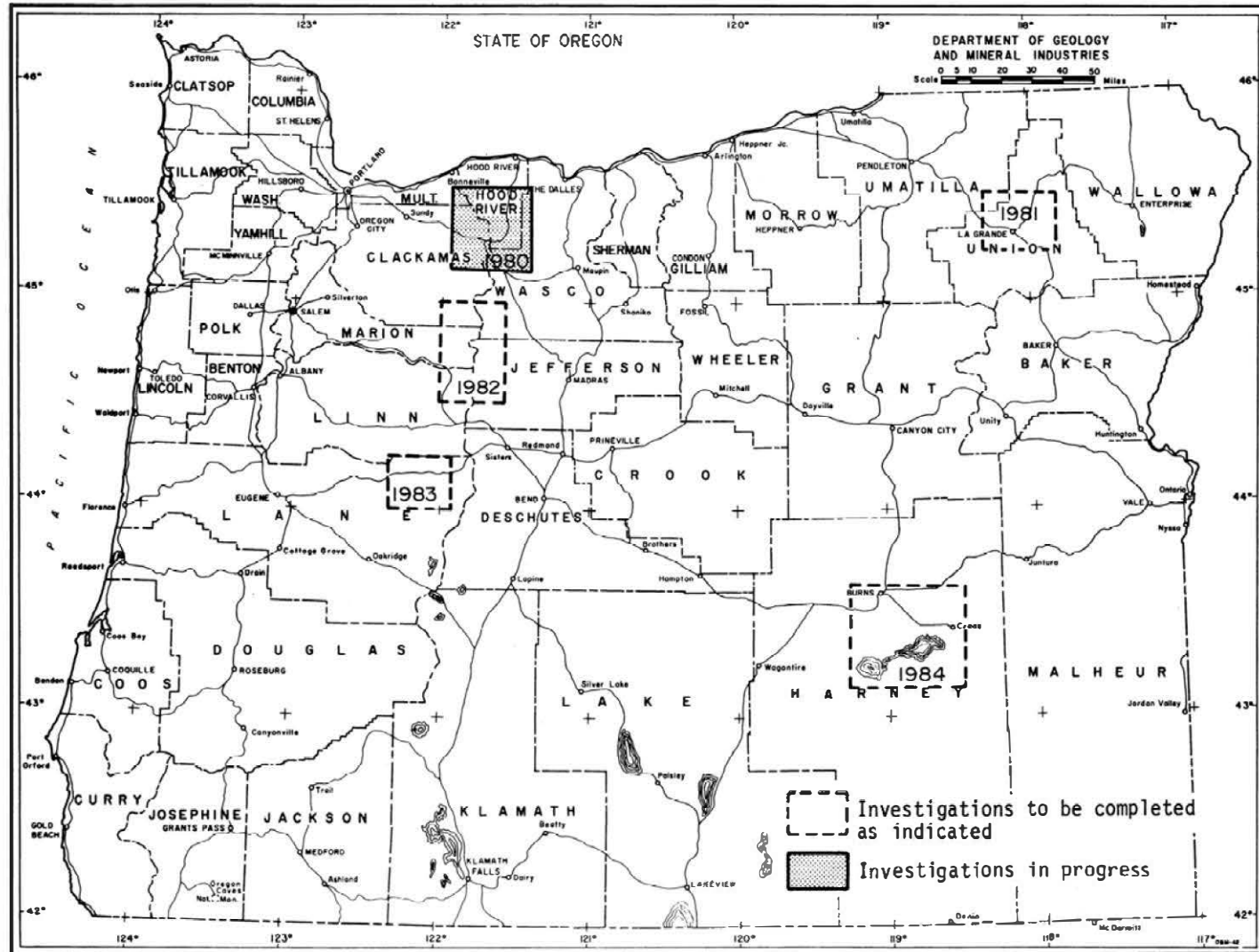


Figure 13. Areas of planned comprehensive geothermal assessments. Geothermal energy is one of Oregon's most promising sources of indigenous energy.

protection, and energy conservation are also interested to some extent in geothermal energy. Geothermal assessment goals of the Department of Geology and Mineral Industries include

- Development and dissemination of general inventory information on the geothermal energy resource potential of the State for use by industry, local jurisdictions, and State government;
- Identification and assessment of high potential areas for special consideration by industry and for long-range planning and policy formulation by government;
- Development of needed information to facilitate more intensive and specialized investigations by industry and others and promotion of these investigations by providing a technically well-informed and positive environment for the exchange of ideas;
- Maintenance of geothermal expertise to guide and assist effective and positive regulation of geothermal resources;
- Maximization of the development of geothermal data for resource assessment by linking geothermal investigations to the Department's on-going geologic survey and mapping activities.

Activities and objectives

The past activities of the Department and other agencies and individuals have resulted in a statewide perspective of geothermal resource

occurrences. The proposed program for the period 1979-85 is designed to focus efforts on those areas which have greatest promise for geothermal resource occurrence and which are closest to energy consumption centers. Figure 13 shows the areas proposed for more detailed assessment, with emphasis to be placed on potential areas for direct utilization.

The 1979-85 program will be concentrated in the Cascade Range and Basin and Range geologic provinces. In the Cascades, attention will be directed to the various hot spring areas on the west side of the Range. In eastern Oregon, efforts will be concentrated in the vicinity of Burns and La Grande.

In each of these areas, geologic mapping will be supplemented with geochemical sampling of hot springs, temperature gradient drilling, and geophysical studies in order to define the depth, lateral extent, fluid quality, and geologic controls of the geothermal reservoir.

The resulting data will help local jurisdictions determine the viability of this potentially important alternative energy resource. The information will also be of critical importance to energy planners charged with understanding long-term supply factors and to environmental agencies that need to consider natural sources of chemical pollutants.



Figure 14. Publications such as these issued by the Department between July 1977 and July 1978 are designed to summarize results of Department investigations and efficiently disseminate needed scientific information to the public.

TECHNICAL REVIEW AND PUBLICATION PROGRAM

NEED

Consistent and reliable geologic information is needed by State and local government, industry, the public, and various natural resource specialists and managers. Consistency and reliability are assured only through a review process by specialists in which various geologic perspectives and additional geologic experience and expertise are applied to geologic data and interpretations in their final stages of preparation. Because publications represent the most efficient manner to make voluminous data widely available, effective dissemination via publications over a period of time is needed to assure that the information is used to the greatest extent possible in meeting the needs of the State.

Authority to publish information on the geology of the State, its mineral resources (metallic and nonmetallic), and all other investigations of the Department is conferred upon the Oregon Department of Geology and Mineral Industries in ORS 516.100.

MISSION AND GOALS

The purpose of the technical review and publications function is to develop and disseminate accurate geologic information in consistent, clear, and understandable form to interested persons and agencies over an appropriate time period in a cost-effective manner. Specific goals of publication are to

- Reduce the cost of professional staff time in public service functions by providing information in printed form;
- Allow more widespread dissemination of geologic information in usable form to diverse and widely dispersed interests in need of information;

- Promote the exchange of information with other agencies, both within the State and nationwide, that develop information useful to the Department.
- Attract contributions from Oregon geologists who donate results of their investigations to the State in exchange for the opportunity to present their ideas in print. These contributions add to the Department's geologic survey data base and contribute to the effectiveness of other programs.

ACTIVITIES AND PROGRAMS

Publications by the Department are designed to efficiently make a wide variety of maps and reports available to a diverse public. Types of Department publications include Bulletins, Special Papers, Short Papers, Geologic Map Series, Open-File Reports, and the monthly ORE BIN magazine.

In order to accomplish the stated goals, the following programs are proposed:

- Publicize and systematically number open-file reports and maps so that their existence is made known to the public.
- Combine blackline (uncolored) geologic maps with colored geologic maps in the Geologic Map Series.
- Publish a revised and updated short paper on geologic map coverage, including thesis maps, in the State.
- Publish results of geologic investigations discussed under other program descriptions. The audience and the nature of an investigation determine whether or not a report is published and, if published, the series or format to be adopted in publication.

PUBLIC INFORMATION PROGRAM

NEED

To have meaningful public input and effective citizen involvement in natural and resource decision making at the State and local levels, it is imperative that the public have ready access to accurate information on a variety of land factors including such geologic considerations as mineral potential, geothermal potential, and earthquake hazards.

In addition to the technical review and publication program described, some types of information can be made available only through a variety of specialized and interrelated sources including an earth science library, a rock laboratory, a museum, and a network of public information desks.

The authority to disseminate the information and to serve as a State bureau of geologic information is conferred upon the Oregon Department of Geology and Mineral Industries in ORS 516.030, parts 4 and 7 (servicing inquiries), part 5 (museum), part 6 (library), and ORS 516.045 (assay).

MISSION AND GOALS

The mission of this program is to disseminate a variety of needed geologic information to the public in the most effective and economical way possible. Specifically, this involves the following goals:

- Respond to verbal and written requests for information by the legislature, the public, local jurisdictions, planning commissions, special study groups, Federal agencies, and industry;
- Maintain a staff geologic library for Oregon which is accessible to the public

and organized in a manner useful for both research and general reference;

- Maintain a museum of geologic specimens for public education, instruction, and research;
- Maintain close contact with the various regions of the State in order to understand local needs and to respond to requests for information;
- Provide referee assays and other rock analytical services for the State.

ACTIVITIES AND OBJECTIVES

During the period 1979-85, the Department will continue to provide information on a wide variety of geologic topics to the citizenry of Oregon by maintaining and improving collections of maps and publications at each of its offices throughout the State, by giving timely answers to geoscience questions from the public, and by upgrading laboratory and museum facilities.

At the Department's main office, a special effort will be made to offer more reference volumes and to expand the library storage area as new space becomes available. Special effort will also be made to implement a self-help publication sales system to assure continuing service without increased staffing in the business office. The field office libraries in Baker and Grants Pass will be systematically cataloged, and the Department's collection of university theses will be expanded.

The centralized laboratory in the main office will be upgraded, and joint programs will be implemented with the geology departments at various universities in the State to share expensive modern instrumental analytical equipment so as to avoid duplication.



Figure 15. Crump Geyser in south-central Oregon is a geothermal manifestation. Systematic geothermal assessments must also investigate less obvious phenomena such as heat flow through the earth's crust and regional geologic features. Development of high-temperature geothermal energy in deep wells requires careful engineering and regulation to conserve the resource and protect the natural environment.

OIL, GAS, AND GEOTHERMAL REGULATION

NEED

To protect the safety, health, and welfare of Oregonians; to safeguard the air, water, and other natural resources of the State; and to encourage conservation of oil, natural gas, and geothermal resources, it is necessary that exploration and production of these resources be properly regulated. Because geology plays such a significant part in the formation of the resource, the design and operation of wells, and the efficient recovery of the resource, geologic expertise should be an integral part of the regulatory procedure.

Authority to regulate drilling for oil, gas, and geothermal exploration and production is conferred upon the State of Oregon Department of Geology and Mineral Industries in ORS 520 and ORS 522. Staff expertise in deep-well technology and staff experience in the geology of the State are needed for the complex decision making of this activity.

MISSION AND GOALS

It is the mission of the Oil, Gas, and Geothermal Regulatory Program to regulate the exploration for these commodities efficiently so that the environment and other resources are effectively protected, as provided by law, in a manner which does not unnecessarily hinder exploration for these resources. Close association of regulatory personnel with staff geologists provides a mix of expertise and information that benefits the regulatory and research programs of the Department.

ACTIVITIES AND OBJECTIVES

At present, staff drilling-regulation experts also have responsibility for research on potential mineral energy resources. The Department plans to continue this practice so that the requisite experience can be most efficiently applied to Department research and regulatory functions.

In addition to preparing permits, regulatory personnel also will be required to contribute their expertise to continuing improvement of Oregon's laws and regulations regarding oil, gas, and geothermal drilling.

The level of regulatory activity is largely dependent upon industrial petroleum, natural gas, and geothermal energy exploration. At this time, the amount of exploration cannot be accurately forecast for the next six years, and Department personnel needs could increase markedly at any time if a major resource discovery occurs or if offshore petroleum exploration resumes on either State or Federal lands.

The functions of the regulatory program include not only issuance of permits and handling of bonds but also repeated field inspections to active drilling sites to insure safe compliance with the laws and regulations. After each drill hole is completed or abandoned, a further inspection is required to guarantee that the site has been restored in an environmentally acceptable manner prior to release of bonds.



Figure 16. Yaquina Head on the central Oregon coast typifies the issues facing Oregon as it pursues land use planning objectives in regions of multiple resource values and diverse special interests. (Photo courtesy Oregon State Highway Division)

MINED LAND RECLAMATION

NEED

Proper reclamation of surface-mined lands is necessary to prevent development of undesirable land, water, and air conditions detrimental to the safety, health, welfare, and property rights of the general public. Reclamation calls for substantial expertise in mining techniques, geology, and revegetation; specialized interagency cooperation is also required. It is essential that the current usefulness, future productivity, and scenic values of all land, air, and water resources affected by surface-mining operations be protected and reclaimed. Oregon's interests in air, water, and scenic resources require a positive regulation program closely coordinated with statutory directives of other agencies and aimed primarily at beneficial second use.

Authority to regulate the reclamation of surface-mined lands is conferred upon the Oregon Department of Geology and Mineral Industries in ORS 517.750 to 517.990.

The reclamation of mined land in a manner suitable to Oregon's highly varied geology and climate requires the generation of regionalized reclamation concepts. Much of the available research on mined land reclamation was conducted in the eastern and central United States and is not directly applicable to most parts of Oregon. Investigations are needed to meet the Department's statutory authority to provide knowledgeable advice to State and local agency heads.

Inadequate mine abandonment and reclamation practices in past years have left several dangerous, unsightly, or polluting abandoned mines in Oregon. The Department should be assigned the responsibility and wherewithal to properly reclaim such mines where corporate, agency, or individual responsibility for the unsatisfactory conditions cannot be determined or assigned.

MISSION AND GOALS

The goal of the Mined Land Reclamation Program is to assure beneficial second use of surface-mined lands that is consistent with the interests of State and local governments, realistic in terms of the limitations and potential uses of the land, and equitable in terms of industry needs. Positive regulation meets the needs of society and addresses the complex issues associated with long-term land and resource management activities. To realize this overall goal, several inter-related functions are necessary:

- Issuance of permits;
- Inventory of affected lands, including lands abandoned prior to the effective date of ORS 517;
- Research into reclamation techniques;
- Agency assistance; and
- Public information.

ACTIVITIES AND OBJECTIVES

Permits

Meaningful regulation of surface-mined lands requires systematic issuance of permits. Authority to issue permits for the operation of mined lands coming under the Mined Land Reclamation Act is conferred upon the Department in ORS 517.775.

The goal of the permit-granting function of the Mined Land Reclamation Division is to issue, in a timely manner, permits that are consistent with legislation and that protect the environment and provide for a realistic second beneficial use for mined lands.

Specific activities in the permitting process are

- Solicitation and integration of comments from other natural resource agencies on the contents of the proposed reclamation plans in a one-stop permit system overseen by the Mined Land Reclamation Division;
- Coordination of State regulations with local zoning laws and ordinances prior to permit issuance;
- Proper review of all permit requests in terms of geologic conditions prevailing at the permit site;
- Issuance of full operating permits to operators meeting with objectives of the act and coming fully under the provisions of the Mined Land Reclamation Act;
- Issuance of limited exemptions to operators meeting the objectives of the act and coming partially under the provisions of the Mined Land Reclamation Act;
- Maintenance of a file of total exemptions insofar as is practical, thus to more fully meet the intent of the act and promote more effective management of permitting activities;
- Establishment of a systematic data bank of operations; and
- Periodic field inspection of both permitted and exempt operations to insure compliance.

Inventory and research

Effective regulation of surface-mined lands in Oregon necessitates the development of a data base and in-house technical expertise in reclamation practices related to Oregon's physical environment.

Authority to conduct or to cause to be conducted investigations, research, experiments, and demonstrations related to the technical aspects of Mined Land Reclamation is conferred upon the Department in ORS 517.840, part 1. The legislation also enables the Division to collect needed information.

Maintenance of a surface-mined land inventory is implicit in the legislative mandates to issue permits, to inspect permit areas, and to take action on delinquent or abandoned operations.

The goal of the inventory function is to acquire and develop a working data base on surface-mined lands from which to efficiently regulate mined land reclamation in the least costly manner possible. The goal of the research function is to develop a working understanding of practical and optimal reclamation practices. To accomplish these goals, it will be necessary to

- Accumulate all available data on past and present surface mining operations in the State from all sources including the Geologic Survey Division of the Oregon Department of Geology;
- Accumulate available information on technology of surface-mined land reclamation to guide technical decision making in the granting or modification of permits;
- Develop regional inventories in mapped form of pit and quarry operations;
- Increase the use of remote sensing imagery in mined land reclamation by participation in Oregon demonstration projects with outside funding.



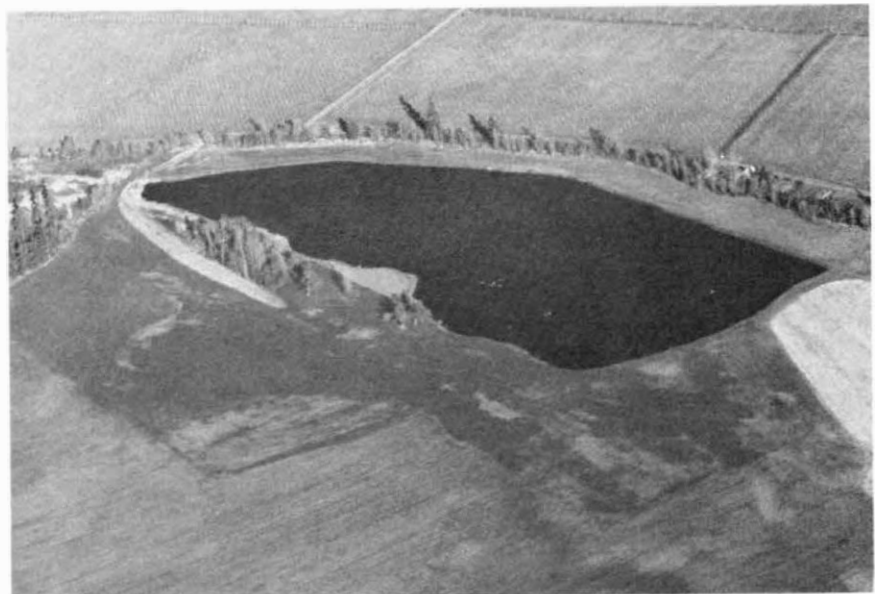
Figure 17. A case history of mined land reclamation.

Left: Brushy swamp land and marsh overlying economic rock material deposits in the mid-Willamette Valley, prior to mining.

Below: Mining of resource. Excavation is being conducted with approved reclamation plan including storage of topsoil for later use and provision for beneficial subsequent use of site.



Right: Reclaimed gravel site includes lake with graded beach and economically shaped agricultural plots. Assessed valuation of land in photo at right is more than double that of land shown in top photo as it appeared three years earlier.



The primary benefit of the research function is to improve the efficiency of the permit granting activity of the Mined Land Reclamation Division and to assist in planning for the reclamation of abandoned sites. Specific activities are

- Accumulation of information on the reclamation practices of other states;
- Accumulation of information on the physical limitations found in Oregon;
- Development of general information on acceptable reclamation practices in various physical settings in Oregon, including settings unique to the State.

Agency assistance and public information

The reclamation of surface mined lands is a complex interdisciplinary function necessitating input from a variety of sources and requiring constructive interchange of ideas between the Mined Land Reclamation Division, other State and local agencies, and the public regarding a variety of issues including environmental protection, operating standards, geologic hazards, and land use planning.

Authority to interact with other agencies and the public in an administrative and information capacity is implicit in the mandates to coordinate with local jurisdictions (ORS 517.780), to cooperate with private and governmental agencies (ORS 517.760, part 2b), to implement a workable permitting system, and to coordinate with LCDC (ORS 197), and is imposed on the Division by continued requests for information from government and public persons.

Authority to disseminate information is conferred upon the Division in ORS 517.850, part 1.

The goal of the agency and public information activity is to service the needs and requests for information by government and the general public in the most efficient manner possible. To accomplish this goal, it is necessary to

- Handle requests that legitimately come under the provisions of the act;
- Refer requests for information to other agencies and persons where appropriate;
- Route all requests for general resource data to the Public Information Program of the Geologic Survey Division.