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DEPARTMENT OF GEOLOGY & MINERAL INDUSTRIES
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* TO ALL EXCHANGE LIBRARIES *
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* Announcement is made of the release of Bulletin no. *
* 11, entitled "The Geology and Mineral Resources of *
* Lane County, Oregon"; by Warren D. Smith in colla- *
* boration with Lloyd Ruff. Copies of this bulletin *
* will be mailed from this office on March 6th, 1939. *
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NEW BULLETIN ANNOUNCED

Announcement is made of the publication of the following bulletin by the State Department of Geology and Mineral Industries:

> "The Geology and Mineral Resources of Lane County, Oregon"; by Warren D. Smith in collaboration with Lloyd Ruff; Oregon State Department of Geology & Mineral Industries, Bulletin no. 11, 65 pp., 27 figs., 1939."

Copies may be obtained from the Department's office, 329 S.W. Oak Street, Portland, upon receipt of 50¢, which is partially to cover the cost of printing and mailing.

Lane County covers an area from the coast to the summit of the Cascade Mts., and offers an unusually good cross-section of the geology of western Oregon. The rocks are entirely of Tertiary age and the sequence begins with Eocene on the coast through to Miocene, and later, rocks in the eastern portion. One of the rare occurrences of marine Miocene sediments is found in the extreme northwestern corner of the county.

Rocks of Eocene age are the Umpqua formation, consisting of shale, sandstone, and some conglomerate, occurring in the western half of the Blackbutte-Elkhead area; the Calapooya formation, consisting of tuffs, lava flows, congbmerates, and mud flows, occurring in the Calapooya Mts.; and the Tyee formation consisting of sandstone, calcareous tuff, conglomerate, thin coal partings, and shale, and occurring throughout much of the Coast Range. The Oligocene formations are represented by the Fisher formation, - terrestrial material such as tuffs, agglomerate, clays, sand and gravel, in the Coyote Creek region; the Eugene formation, consisting of sandstones, conglomerates, tuff, with felsic intrusions, occurring in and around

Eugene; and the Goshen Beds, near Goshen. The Miocene is represented by Heceta Head Beds, heavy conglomerates, tuff and conglomerate, basalt flows, agglomerate, and sandy shale, of marine origin; the Columbia River lava of the McKenzie and Willamette river drainages. Pliocene and Pleistocene are represented by the Cascade formation of andesitic lavas intruded by the Nimrod Granite. Pleistocene and Recent formations are mainly glacial and alluvium. The fossils of the county are described and pictured.

The physiography of the county, which is quite diversified, is well described. The divisions are: The Coastal area, the Coast Range, the Calapooya Mtn. section, the Willamette Valley, and the Cascade Mountain region. The Coastal area is characterized by wave-cut terraces and dune topography. The Coast Range features valley-in-valley erosion, accordant ridge tops, which have resulted from a peneplained area having been uplifted and tilted to the east. The Calapooya Mts. are in late maturity and have no definite stream pattern. The Willamette Valley, a most fertile farming area, is characterized by a broad flood-plain with braided or anastomosing stream channels, Yazoo type streams, and glacial erratics. The Cascade Mtn. region supplies Lane county with its most picturesque scenery, mineralization, water supply, and numerous other advantages.

The principal economic metals are quicksilver, gold and silver, copper, lead, zinc, and antimony, concentrated in the Calapooya Mts., and the Cascade region. Of the non-metallic resources, refractory clay, brick clay, sand and gravel are the principal deposits; others, of lesser importance, include coal, lime and calcite, mineral hot springs, and ground water.

The scenic resources are discussed in detail and pictured with excellent illustrations. Seven appendices tabulate a great deal of factual information that will be of value to those interested in the county.

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The Grants Pass Courier in its issue of February 28th notes that three new mining operations recently started in the Grants Pass mining district:

One of these is the C.R.C. Co., Inc., operating with a dragline shovel on the right fork of Foots creek in the area formerly dredged by the Rogue River Gold Co.

William von der Hellen is operating a dry land plant, using a power shovel and trucks, also on the right fork of Foots creek.

The Pleasant Creek Mining Corporation dredge, a standard bucket line type, is getting under way at a point on Pleasant creek.

It is stated the above three operations will move between five and six thousand yards each 24 hours, and use about 35 men on the regular crews, exclusive of workers clearing ground and incidental labor.

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Mervin Packard of Yreka, Calif., has purchased some placer ground in the town of Jacksonville and expects to move his plant up from California this spring.

J. H. Garner and Chas. Dallerup of the Crescent Oil Company, San Francisco, have purchased the Rippey and Dick Head ranches on the Upper Applegate. They expect to make a dragline set-up on these ranches this spring.

The Bull of the Woods lode mine, about 2 miles northeast of Gold Hill, has again been leased to J. A. Clement of Gold Hill. Mr. Clement has a five year lease and has just completed a new 100' shaft; he also has equipped the property with a compressor and 2-stamp mill. On his former lease he produced 112 oz. of gold during 1934-35.

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COAL TESTING

The Director of this Department, in Washington recently in connection with discussions of cooperative projects between the U. S. Geological Survey and the U. S. Bureau of Mines, and this Department, made a tentative arrangement whereby the Bureau of Mines will test bulk samples of the Coos Bay coals for their by-product possibilities. The samples for test purposes must be taken in a certain way, sealed in clean oil barrels to prevent escape of moisture, and shipped to the testing station at Pittsburgh, Penna. Normally, about 3,000 pounds of coal are required for the sampling tests. Under the arrangement made by the Director, all costs of the testing will be borne by the U. S. Bureau of Mines, with the exception of those in connection with the taking of the samples and their transportation to Pittsburgh. Because of the necessity of taking the samples according to the Bureau of Mines' standard method, it is not unlikely that Dr. H. F. Yancey, Supervising Engineer of the U. S. Bureau of Mines Non-metallics Station at Seattle, may be asked to supervise the sampling in question.

The socalled carbonizing properties of the coals are determined by the U. S. Bureau laboratory after careful analyses, both proximate and ultimate, are made. Analyses are made for moisture, volatile matter, fixed carbon, ash, hydrogen, nitrogen, oxygen, sulfur, heating value, softening temperature of the ash, etc. Samples are placed in an especially-designed retort and heated under conditions of careful control to certain temperatures, and the by-products collected and analyzed at the various stages. The following products are obtained from the samples tested: Coke (or briquet product), gas, tar, light oil, ammonia, and liquor. Calculations are then made and amount of the various products are expressed as per cent by weight of the coal and in yields per ton of the coal.

More of the details of the tests which have been made on eastern coals will be given in the next issue of the Ore.-Bin.

In the past year the testing service on coals offered by the U. S. Bureau of Mines, according to its Director, have been so popular and valuable that the test station is nearly one year behind schedule on account of the large number of samples already received from the eastern coal fields. Because of the critical nature of the situation in Coos Bay field and the need of the community, Director Nixon made a special request that samples from this Oregon field be given a priority. He was given to understand that this probably can be arranged.

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UNITED STATES GEOLOGICAL SURVEY TO CONTINUE WORK IN OREGON THIS SUMMER.

The Director of this Department received assurances in Washington recently that the U.S.G.S., which completed the areal geological work of the Medford quadrangle last fall, would continue this work by quadrangles westward, toward the coast, this following summer, unless it happens that the Oregon Legislature declines to approve a small segregation of funds to be allotted this Department for cooperation with the U. S. Geological Survey. Francis G. Wells, who was in charge of the U.S.G.S. surveying in the Medford district last summer, is prepared to come west in April or May and organize the field work this coming summer. He was able to cover part of the Grants Pass quadrangle last summer, and he expects to complete that area this coming season. Much of this area is mountainous, and the work will be somewhat more difficult, but according to the present plan it is expected the area can be completely finished in 1939. The following field season, that is to say during 1940, the Kerby quadrangle should be covered, and following that the fractional quadrangle west of the Kerby reaching to the coast in Curry county, - if topographic maps are available by then.

The U.S.G.S. was willing to grant a preference for the southern Oregon country in the light of the fact that it would cover important areas known to contain chromite, a strategic mineral.

On account of the plan to get this southern tier of quadrangles in the Grants Pass-Medford area mapped by the U.S.G.S., the State Department of Geology & Mineral Industries will stay out of the area in question, but plans tentatively to have a field party this summer mapping the areal geology of the country immediately to the north of the area covered and to be covered by the U.S.G.S. party.

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STRATEGIC MINERALS

During the recent discussion between the Director of this Department with the Director and various geologists of the United States Geological Survey in Washington, the fact was brought out that Oregon appears to be almost at the head of the list among the states of the nation as a potential producer of strategic minerals. These include principally, of course, chromite and quicksilver, but it was brought out that Oregon also has some known deposits of tungsten, antimony, nickel, and manganese. The Oregon State Department of Geology & Mineral Industries has been urged by the Federal agency to stress as much as possible the work on, and searches for, these strategic minerals, - particularly quicksilver.

The situation is complicated by the fact that a great deal of the state where quicksilver occurrences are known, is not covered by topographic maps. Furthermore, the principal chromite area in eastern Oregon, namely the serpentine belt in the Canyon City district, is not covered by topographic maps. Under the circumstances, we were in a position to request that the U. S. Geological Survey give preference in its priority plan for topographic mapping to the critical areas mentioned, and we are led to believe this will be done.

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TOPOGRAPHIC MAPPING IN OREGON

Last year a grant of some $80,000 of PWA funds, the bulk of it ear-marked for topographic work, was allocated to Oregon. Most of this is being used for aerial topographic mapping of the coastal area from about opposite Eugene north to the Columbia river, on account of the need of maps in that area for War Department use in connection with coast defense. Whether or not more funds will be available this coming year is not known, but since the funds were intended to be used in part in connection with the Federal government's study of strategic minerals, it is hoped that a substantial part of any further funds from this source may be utilized in covering a large part of certain Oregon areas now unmapped, where strategic minerals, particularly chromite and quicksilver, are known to exist.

To assure that critical areas in Oregon not mapped topographically may be covered in the next ten to fifteen years, it would be highly desirable if the State of Oregon through its Legislature would adopt a long-range program whereby the state would allocate a certain amount of funds, say not less than $10,000 each year, to be matched by the U. S. Geological Survey, to carry out this topographic mapping plan. We have assurances that the Federal agency will match our funds for this purpose. It goes without saying that the State Highway Commission, the State Engineer, and the Soil Department and various other state and county agencies, would be materially benefitted by such a program. Massachusetts began five years ago putting up $50,000 each year for cooperation with the U. S. G. S. in remapping that state. They are getting a splendid job of mapping of the state as a result. In going into details of the cost of topographic mapping, we find that by letting a contract of substantial size, as would be advisable in the case of central Oregon, the cost per square mile would be reduced to $20 or $25. Oregon could well afford to consider very seriously indeed a program which would contemplate topographic mapping of these critical areas.

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SUMPTER QUADRANGLE MAP

The areal mapping of the Sumpter quadrangle was started previous to 1910. In 1913-14 further work was done toward completion of the job. Since then, certain additional areas have been mapped and the total area covered, but the final map has not been issued because of the desire of the Survey to catch up tag-ends and make a letter-perfect job. The details which remain to be done pertain primarily to the south end of the quadrangle where the rocks are mainly Tertiary lavas, and where little is to be expected in the way of economic interest. After some discussion of the matter, the U. S. Geological Survey agreed to let the State Department of Geology & Mineral Industries issue within the next few months a geological map in colors of the northern two-thirds of the quadrangle which are of greatest interest to mining men and engineers. Since mining is particularly active in this area, it is our belief that the Department is well justified in carrying out this work for the benefit of mining people, rather than wait, possibly several years, for the completion of certain details which are of more interest academically than economically.

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BY-PRODUCT VANADIUM

Vanadium is a very useful metal in forming special iron and steel alloys, and the name vanadium steel has become a synonym for rugged strength in machine parts. Ores of the metal are mined in Peru, southwest Africa, the United States, and northern Rhodesia (in order of quantity of production in 1937). That vanadium is derived from another source than that of its ores is the interesting information given by the Vanadium Corporation of America. About 200,000 pounds yearly are recovered from smoke deposits of boilers and smoke-stacks of oil-burning steamships.

Nearly all crude oils contain traces of vanadium, but those of Venezuela and Mexico contain enough so that flue deposits have from 5 to 25 percent of the non-volatile vanadium oxide, making it profitable to recover the vanadium from such accumulations.

This is one of the many instances in which valuable by-products are recovered from flue gases, and illustrates also the wide variation of elements sometimes associated with natural hydro-carbons. Witness the reported presence of beryllium in some Russian coals. This case of vanadium by-product recovery represents a value of about $100,000.

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POWDER METALLURGY

An important development in the metallurgical arts which has received relatively little publicity is that of so-called powder metallurgy. Essentially this is the art of forming metallic objects by compacting finely divided component parts without melting.

Metal powders may be compressed in very hard steel, tapered dies to form briquets which, after annealing at subfusion temperatures, become homogeneous billets. Such briquets may then be used to make various desirable products which cannot be made so efficiently by the age-old method of fusing and moulding.

Some high lights of this important development in metallurgy are given by Dr. John Wulff in the December issue of Technology Review. Making usable metal briquets by compression is not a recent discovery, for the method was used early in the 19th century, but the development and industrial application of the art is of quite recent date.

Powders of metals used may be produced by a variety of methods, both chemical and mechanical. These powders, either of one metal or - after suitable mixing - two or more metals, are placed in suitable, tapered, very hard steel dies, and subjected to extremely high pressures, thus forming briquets or metal compacts. They are then given a heat treatment in controlled atmospheres or in a vacuum, usually at temperatures below the melting point of the briquet. The resulting metal compact is of greater density than the original mass and possesses a remarkable strength because of a welding or sintering action. It also possesses a uniformity of grain sometimes difficult to distinguish from

that of equivalent composition made by melting and casting.

Dies used to form the briquets must be made with special care and must be able to stand pressures up to 350 tons per square inch. Presses with a capacity of from five to one hundred tons are used and may be of hydraulic-, cam-, friction-, or knuckle-type. They compress the powder to as little as one-third or one-eighth of its original depth.

There are many important applications of this new development in metal fabrication. High melting point metals such as platinum, tungsten, molybdenum, and tantalum, used in electronics, are so treated. High-speed cutting tools are made by compressing very hard substances such as carbides, borides or even diamonds with more malleable materials such as cobalt. Electric contact and welding accessories having especial physical properties have been formed by compressing silver or copper with tungsten, graphite, molybdenum, titanium, and zirconium. So-called oilless bearings are made by compounding metal powder with a volatile salt which is expelled by annealing, leaving a certain porosity and at the same time retaining sufficient strength for the bearing. The pores soak up oil and form a reservoir for the lubricant. All these products can be produced in usable form only by the powder technique, and many other metallic articles can be made more efficiently by this method than by melting.

The Massachusetts Institute of Technology has established a laboratory for the study of powder metallurgy. Research will be carried on in related basic scientific problems such as cohesion, diffusion in metals and like phenomena as well as the more practical problems of the manipulation and manufacture of powders and the physical and chemical properties of metallic compacts.

The field of powder metallurgy is necessarily confined to certain fields because the high pressures involved limit the size of the dies which may be used; nevertheless there appears to be an ever-widening scope for its application. In certain instances it is the most economical method to use, but the matter of economy is not generally considered its most important feature. The outstanding quality in the development of this art is the ability to obtain certain sought-for characteristics in metals or combinations which may not be obtained by the usual standard methods.

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