THE ORE.-BIN

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INDEX TO ORE.-BIN, Volume 11, 1949

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STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
Head Office: 702 Woodlark Building, Portland 5, Oregon

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Regards
Fay W. Libbey

TEN YEARS OF THE ORE.-BIN

The first issue of the Ore.-Bin was dated January 10, 1939, a year and a half after the Department had been established. The purpose of the new publication was "to advise the public of the work of the Department, and of new and interesting developments in mining, metallurgy, and geology." The Ore.-Bin evolved from the press bulletins which had been issued monthly from November 1937 to December 1938. It is believed that Mr. R.C.Treasher, formerly department geologist, was mainly responsible for the name and cover design.

An article on the sink and float process, the perfection of which had just been announced, a graph and table showing Oregon's mineral production, and a short story on fissure eruptions near Bend were contained in the eight pages of vol.1, no.1.

At first copies were distributed free of charge. A rapidly growing circulation list necessitated a change in policy and after July 1940 a charge of 25¢ a year was made to help cover publication costs.

After ten years of uninterrupted publication, the growing circle of Ore.-Bin subscribers now includes those living in forty-two of the states, Hawaii, Alaska, Canada, South America, England, Netherlands, Japan, Africa, France, and Australia. Proof that the Ore.-Bin is read widely lies in the fact that many of its articles have been reprinted in technical magazines throughout the country. A mining company once requested extra copies of an issue containing an article on sampling to send to its exploration crew in New Caledonia. A quotation from the Ore.-Bin is contained in a book recently published and having wide circulation among people who see the need of maintaining a strong mineral industry in the United States.

Demand for back numbers of the Ore.-Bin is heavy. Despite the fact that seventy-five extra copies are printed each month, many of the issues are out of print. Circulation is now 807 copies.

All of the printing of the Ore.-Bin is done on a small multigraph machine in the Department except a few half-tone illustrations and photographs. These are sent out to be run by commercial printers. Illustrations are prepared for printing in several ways. Line drawings and maps are usually photographed and printed on zinc plates. Some line drawings are made directly on an aluminum plate with special pencils or ink, or traced with the aid of lithographic carbon paper.

In general the material appearing in the pages of the Ore.-Bin is written by the Department staff. A few articles are abstracted from other publications and some are written by persons outside of the Department who are well known in mining, geological, or metallurgical fields.

Probably there are few publications, even those of a similar nature, that are prepared under the same handicaps as the Ore.-Bin. There is rarely any surplus material to fall back upon. Usually the material which appears is prepared under pressure, as the Ore.-Bin is a side line of the principal activities of the Department. However, the editor believes that even if the Ore.-Bin is a bit rough at times, it serves its principal purpose.

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DEPARTMENT CHRONOLOGY
1937-1948

The Ore.-Bin is ten years old and at this milestone it seems appropriate for us to review the work of the Department since it was established in 1937. Much has been accomplished. The Department's early studies of Oregon's strategic minerals were especially timely and provided a shortcut for many of the Government's war-mineral investigations. The Department's discovery and exploration of high-iron bauxite is an accomplishment important to the State and to the Nation. Besides strictly economic studies, the Department has done a great deal of basic geology which has been freely used by geologists, engineers, and other investigators. But above all, the Department is especially glad that it has been able to give material assistance to prospectors, small mine operators, and many other persons who really needed council and advice and could obtain help nowhere else. Incidentally, during the ten-year interval, value of Oregon's mineral production has doubled in spite of the depressed condition of gold mining since World War II. The following chronology contains important events in the Department's life since its creation.

Editor

1937

The State Department of Geology and Mineral Industries was created by the 1937 Legislature in an act "defining its objectives, powers and duties; authorizing cooperation with Federal or other agencies; authorizing the governor to appoint a governing board and defining its powers and duties; authorizing the appointment of a director and defining his powers and duties and fixing his compensation; granting department authority to make grubstake loans to prospectors; granting department authority to accept funds from the Federal government; providing for the disposition of money received by such department; repealing chapter I, title LIII, Oregon Code 1935 Supplement, relating to state mining board; providing a savings clause; making an appropriation, and declaring an emergency."

The first Governing Board was composed of Senator W. H. Strayer, E. B. MacNaughton, and Albert Burch. They held organizational meetings after the act was signed, and elected Senator Strayer as Chairman of the Board. On June 8, Earl K. Nixon was selected as Director. Offices of the Department were opened in the Lewis Building at the corner of Fourth and Oak streets, Portland.

A great deal of the early administrative work of the Department was concerned with grubstake loans which had been provided for in the law establishing the Department. Loans were for $50.00 each to qualified prospectors. This grubstake section of the law became inoperative in 1939 when no appropriation for loans was made by the Legislature.

Because of the controversy between miners and fishermen over alleged detrimental effects of mining mud on fish life in the Rogue River, Dr. Henry B. Ward, prominent biologist of Chicago, was engaged and began to make a study of the subject.

Field offices including assay laboratories were established at Baker and Grants Pass.

Reconnaissance studies of mining operations in the Coos Bay coal field and manganese deposits in Jackson and Josephine counties were made.

A survey of refractory clay deposits by Ray C. Treasher and Hewitt Wilson in western Oregon was authorized and started.

Mining regulations of the State were assembled and issued as Bulletin No. 1.

1938

Dr. Ward's report on effects of mining mud on fish and fish life was published. It included a study of the effects of muddy water on young trout and fingerling salmon made by Dr. L. E. Griffin of Reed College. The report by Dr. Ward proved that mining mud was no different in its effect on fish and fish life than muddy water caused by floods, and that the inescapable fact is that the deterioration of fishing in the Rogue River is caused by the inroads of population and industry.

Bulletins on quicksilver in Oregon by C. N. Schuette and on refractory clay deposits by Hewitt Wilson and Ray C. Treasher were issued. These two bulletins became the basis for field studies by many investigators and were of great assistance in subsequent strategic-mineral studies.

Initial geological studies as a part of the State geological survey were made in the Wallowa Mountains by Department geologists and student assistants under the supervision of Dr. Warren D. Smith of the University of Oregon. Especial attention was directed at occurrence of strategic minerals, especially tungsten and molybdenum. This study was the basis of a bulletin and geologic map issued in 1941.

A bulletin on "Chromite Deposits in Oregon" by John Eliot Allen which contained chapters on chromite mining by H. F. Byram and on geophysics applied to chromite prospecting by F. W. Lee of the U.S. Bureau of Mines was published. This bulletin was used widely in studies of chromite by private and Government engineers during World War II.

A study of the oil and gas possibilities of the Clarno Basin was made and a short report issued as Bulletin No. 5.

A field canvass of Oregon nonmetallics producers was made by the Department to obtain value of production and to establish a list of producers.

1939

Oregon coal deposits were sampled by H. F. Yancey and M. R. Geer, of the Seattle station of the U.S. Bureau of Mines, and J. E. Morrison, Department mining engineer, under a cooperative arrangement. Results were published in 1940 as Department Bulletin No. 20.

The State geological survey under W. D. Wilkinson mapped the Round Mountain quadrangle in the Ochoco area. The geologic quadrangle map was issued in 1940.

At the request of Governor Sprague a study of the economic effects of dredging of farmland was made and a bulletin on the subject was published.

1940

The Department established a mining school during February at Burns and Bend in cooperation with the State Board of Vocational Education. J. E. Allen and L. L. Motz of the Baker office conducted the classes.

The Portland office was moved from the Lewis Building to the Woodlark Building.

Exploration work was begun by the Department on the chromite sands which occur in ancient elevated terraces of the southern Oregon coast, mainly between Bandon and Coos Bay. This project was carried out in cooperation with the U.S. Geological Survey and Oregon State College. A part of the funds was provided under a WPA grant negotiated by the Department. Sampling was done both with a standard drill and with an Empire core drill. This work formed the basis of subsequent exploration by several private companies who, after war was declared, were urged by Government agencies to set up plants for the production of chromite from these sands as a war measure. Planning by the Department under Earl K. Nixon in early chromite investigations was forward-looking and provided a great deal of valuable basic information needed by war agencies.

Because of war conditions in Europe, Oregon's mercury production more than trebled compared to 1939. Production in 1940 was 9,043 flasks valued at $1,599,436.

Value of nonmetallic mineral production was $5,750,000 according to a canvass made for the Department by C. P. Holdredge, consulting geologist

1941

A bill was passed by the Legislature authorizing the Department to purchase a spectrograph and establish a spectrographic laboratory.

A magnetometer survey was made in the Round Mountain area of the Ochoco Mountains by E. L. Stephenson of the U.S. Geological Survey in cooperation with the Department. This survey outlined certain fault structures favorable for occurrence of quicksilver ore bodies.

An exhaustive investigation of the reported occurrence of tin in the Juniper Ridge area west of Burns was made by the Department under the general charge of Dr. H. C. Harrison, Department spectroscopist. The evidence was conclusive that only microscopic amounts of tin occurred in this area.

In December the Governing Board acted to place activities of the Department on a war basis and gave directions that one hundred percent of these activities would be devoted to war-mineral work. State geological survey mapping was suspended.

A survey of zinc resources of the State was made designed to encourage establishment of an electrolytic zinc smelter in the lower Columbia River area.

1942

Mr. Earl K. Nixon was appointed Technical Consultant of the War Production Board. He was also appointed by Governor Sprague as Oregon Emergency Coordinator of Mines. A hearing on methods to encourage chrome production was held by the War Production Board at Grants Pass, and Mr. Nixon advocated establishing ore purchasing depots for the purchase by the Government of small lots of strategic minerals. These depots were established at Coquille, Grants Pass, and Seneca and were of great assistance in encouraging production of chromite.

The geologic map of the Portland area, together with a short paper containing the text on the geology of the area, both prepared by Ray C. Treasher, was published by the Department. This report has been in wide demand ever since.

Magnetometer work by E. L. Stephenson of the U.S. Geological Survey in cooperation with the Department was done on the chromite sand deposits in Coos and Curry counties.

A cooperative agreement among U. S. Department of Agriculture, Oregon Agricultural Experiment Station, and the Department initiated a project study of filbert soils. The Department's activities in this study consisted of spectrographic analyses of soil samples.

The Department gave assistance to Freeport Sulphur Company in starting an extensive exploration project on the nickel deposit located on Nickel Mountain, Douglas County.

Field laboratories at Baker and Grants Pass were closed and equipment moved to a central laboratory in the Portland office of the Department. This measure was taken by the Board because of shortage of assayers caused by the war.

Department geologists made a study of a vanadium-bearing black sand deposit at Horse Sign Butte, Curry County. The deposit was later explored by the U.S. Bureau of Mines.

All Oregon gold mining operations were closed down in October by the Government's ill-advised War Production Board Order L-208.

1943

The Department started an investigation of the geology and coal deposits of the Coos Bay coal field in cooperation with Coos County. This study lasted a year and resulted in Department Bulletin No. 27, "Geology and Coal Resources of the Coos Bay Quadrangle, Oregon" by John Eliot Allen and Ewart M. Baldwin, published in 1944.

Geologists of the Department made a study of nitrate occurrences in the Owyhee area and of optical calcite deposits, both in Malheur County. Results were negative. Although some clear calcite was found, it was hardly clear enough for optical purposes.

The first technical article to appear in print describing the Humphreys Spiral which was used for concentrating chromite from chromite sands located at the Lagoons north of Bandon was published in the October Ore.-Bin.

The Department began a study of the silica sand deposits located at Eugene. The study included a geological reconnaissance, sampling of the sands, behavior of the sands under working conditions in a Portland steel foundry, and securing experimental results under working conditions from the Naval Research Laboratory in Washington, D.C. Assistance was given the owners of the deposit in obtaining Government help in building a washing plant and in publicizing the qualities of the sand which were proved to be superior to those of other available sands for steel foundry use.

An economic study of availability and marketing of coal in the Portland area was made by the Department to assist the Government defense housing projects which at times had difficulty in obtaining fuel.

1944

The Department discovered extensive ferruginous bauxite deposits first in Washington County, later in Columbia County and in some other counties of northwestern Oregon. Auger-hole drilling was done in Washington County to explore some of the deposits, and reconnaissance work was done in the other counties. A report of the work in the form of a short paper was published. Alcoa Mining Company immediately showed an interest and started a geological study of the areas.

Earl K. Nixon resigned as director to accept a position as manager of western exploration for Freeport Sulphur Company effective May 1.

F. W. Libbey was appointed Director of the Department in July.

A long-range project designed to obtain information on the economic geology of the saline lake deposits of Lake County was started. Playas of Summer and Alkali lakes were sampled.

1945

A bulletin on ferruginous bauxite deposits of northwestern Oregon describing sampling results and studies of reconnaissance geology of the deposits was published by the Department. Alcoa Mining Company started an extensive program of exploration. Seven churn drills were put to work and a laboratory was established at Hillsboro.

A few Oregon gold dredges resumed operations when the Government's ban on gold mining was lifted on July 1. No lode mines reopened, mainly because of the high cost of repair work caused by the shut-down.

1946

The Department made a brief study of lightweight aggregates used in making building blocks, and published a short paper on the subject.

A study of nickel-bearing laterites of southwestern Oregon was started by a geological reconnaissance and auger-hole drilling at Red Flat in Curry County. Other laterite areas were to be studied in subsequent field seasons.

Sampling and study of the brines of Summer, Abert, and Alkali lakes were continued by Dr. I. S. Allison of Oregon State College and R. S. Mason of the Department. Results of the study were published as a short paper in 1947.

Senator W. H. Strayer, Chairman of the Board, died October 18, mourned by his associates in the Legislature and a host of other friends. Former member E. B. MacNaughton was appointed to the vacancy on the board.

Mapping of the St. Helens quadrangle, begun before World War II, was completed and a bulletin together with geologic map was published. Authors were W. D. Wilkinson of Oregon State College and W. D. Lowry and E. M. Baldwin of the Department staff.

1947

Field work on nickel-bearing laterites of southwestern Oregon was continued. Studies were made at Red Flat in Curry County, Nickel Mountain in Douglas County, and Woodcock Mountain in Josephine County.

In conjunction with meetings of the Legislative Interim Committee, the Oregon Mining Association, and the Oregon Section of the American Institute of Mining and Metallurgical Engineers, the Governing Board held a meeting on May 23 at Grants Pass. The Legislative Interim Committee held a hearing to gather evidence on alleged damage to farmland in southern Oregon by gold dredging. Both Mr. Niel Allen and Mr. H. E. Hendryx, as members of the Department Governing Board, spoke at this committee hearing.

A short paper on perlite in Oregon was published. This report gave results of a field study by John Eliot Allen, and has been widely used because of the great interest in this new building material.

As a result of a canvass by the Department staff, value of Oregon's nonmetallic mineral production in 1946 was estimated to be $11,700,000. This compares with $7,550,000 in 1941, the highest prewar year, and $15,300,000 in 1947.

The first volume of Bulletin No. 36 was published. This bulletin, which is designed in this and succeeding volumes to assist in setting up an authentic geologic column for the State, contains descriptions of foraminifera from certain type sections of western Oregon and Washington. Co-authors are J. A. Cushman of the U.S. Geological Survey, R. E. Stewart of the Department, and K. C. Stewart.

The Department cooperated in hearings of the Legislative Mining Interim Committee held in Baker and Sumpter at which evidence was gathered by the committee on dredging conditions in eastern Oregon.

A Department field party drilled auger holes in an area north of Vale, Malheur County, and sampled sodium chloride brine encountered in these holes. Results of the sampling were published in the Ore.-Bin for September.

A geological reconnaissance of a strip area extending from the Almeda mine near Galice, Josephine County, northeast to the Silver Peak mine, Douglas County, was made by H. M. Dole and E. M. Baldwin of the Department staff. A description of the reconnaissance with a geologic map was given in the December Ore.-Bin.

The Department lost three geologists because of higher salaries paid at colleges and in private industry.

1948

A ground-water reconnaissance was made by the Department in Umatilla and Morrow counties at the request of the county court of Umatilla County. This study resulted in a bulletin containing more than 200 water-well logs; the report will be published early in 1949.

The first technical article to appear in print describing the new throw-away rock bit, developed and patented by the Throwaway Bit Corporation, Portland, Oregon, was published in the April issue of the Ore.-Bin.

The Department entered into a cooperative arrangement with the Oregon Ceramic Studio under which arrangement a competent ceramist was employed half time beginning July 1.

Investigation of nickel-bearing laterite was continued by mapping, drilling, and sampling of the deposit on Woodcock Mountain in Josephine County.

High-silica bauxite was found in Clackamas County, and the Department did a small amount of drilling and sampling of an area near Springwater.

The department cooperated with the Oregon Section of the American Institute of Mining and Metallurgical Engineers and the Raw Materials Survey in promoting an industrial minerals conference which was held at Portland on May 8.

A reconnaissance of the Dutchman Butte quadrangle in Douglas County was made by Department geologists preparatory to mapping in 1949.

Legislation, sponsored by Congressman Ellsworth and Senator Cordon, designed to reopen Oregon and California Railroad revested lands and Coos Bay Wagon Road reconveyed lands to mineral entry and location under the United States mining laws was passed by Congress. This legislation contains a provision requiring registration of location and assessment papers with the District U.S. Land Office which provision is something entirely new in the general mining laws, and appears to be another obstacle to the encouragement of prospecting.

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LIME FIRM LAND SOLD

The Horsehead Lime Company properties at Williams were sold at sheriff's execution sale Friday to W. H. Leverette, former president, who last month obtained judgment against the company for sums totaling over $230,000. A bid of $95,000 was placed by G. W. Kellington of Medford, attorney for Leverette.

The properties, including some of the best quality limestone and marble in Southern Oregon, were operated by another company until the formation of the Horsehead Lime company by Leverette and his associates, Vernon Vaughn, W. H. Holloway and W. E. Coleman. During the period between 1933 and 1943, the operation employed up to 50 men full time.

Development of the plant by the Horsehead company included a substantial building program which would allow employment of nearly 100 men but the plant never went into operation after the buildings were completed.

Sales of equipment and personal property assets of the company were conducted previously and all bought by Leverette prior to purchase of the real property holdings Friday.

Kellington, of the firm of Roberts, Branchfield and Kellington, said he was unable to state what plans his client had for the operation of the lime plant.

From the Grants Pass Daily Courier, January 4, 1949.

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SCHOOL MINERAL COLLECTIONS

A visual educational program designed to provide information on Oregon rocks and minerals has been started by the State Department of Geology and Mineral Industries. For several years past, members of the Department staff have given frequent talks on minerals and rocks to students, teachers, and collectors. Now this work has been expanded to include distribution and circulation of small representative mineral collections. These come under three classifications. They are similar as far as kind and quality of container is concerned; the difference lies in size and number of specimens furnished.

In order to be as economical as possible and still have a reasonably substantial container, the specimens are put in stiff cardboard boxes 1 inch deep containing 1/8-inch thick wood partitions, egg crate style. The cardboard boxes, covers, and partitions were made in quantity on contract at a price of 11½¢ each for the 6 by 6 by 1 inches, and 17¢ for the 9 by 10 by 1 inches.

The boxes are furnished in two sizes, 6 by 6 inches and 9 by 10 inches. The smaller size has 16 divisions. The larger-sized box has 15 divisions, and two of these make up a set of 30 minerals and rocks. The first size is sold to students for 40 cents each. The other, planned for school teachers, is sold for $1.00. A third set of 60 specimens is packed in four 9 by 10-inch boxes. This set will be circulated among schools throughout the State with the schools paying the transportation cost. A pamphlet giving brief descriptions of the specimens accompany each set.

In the small student sets the sixteen specimens are:

diatomite	obsidian	asbestos	cinnabar
coal	basalt	bauxite	quartz (or gold ore)
limestone	schist	chalcopyrite	stibnite
pumice	galena	chromite	garnierite

The 30-specimen size sets, in addition to those of the first set consist of:

shale	volcanic tuff	molybdenite
sandstone (fossiliferous)	granite	barite
conglomerate	peridotite	talc
volcanic cinders	quartzite	feldspar
	magnetite	amphibole

The largest set besides specimens listed above includes:

travertine	rhyolite	saxonite	gneiss
fossiliferous sandstone or shale	andesite	gabbro	marble
	granite	diabase	serpentine
gypsum	diorite	slate	argillite
perlitic obsidian			

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PHILIP H. HOLDSWORTH

Mr. P. H. Holdsworth, mining engineer, died at his home in Seattle November 21, 1948. Mr. Holdsworth was prominent in Oregon mining for a number of years, first as superintendent of the Almeda mine and smelter near Galice early in the present century, and in the 30's as a leaser at the Almeda. He was greatly interested in geophysical work and made several investigations both in Oregon and Washington employing resistivity methods.

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KAISER GEOLOGIST TRANSFERRED

Louis C. Ball, formerly geologist for the Permanente Metals Corporation has been transferred to another Henry J. Kaiser Company subsidiary, the Standard Gypsum Company of California, with headquarters in the Kaiser Building, Oakland, California.

Mr. Ball has made several geological investigations in Oregon for the Permanente Company since termination of active service in the Navy in 1946.

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STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
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"REMARKS ON SILVER"*

By
R. D. Leisk
General Manager of Sunshine Mining Company

You will note on your programs that I am scheduled to talk on the subject of "Future of Silver." I thank the Chairman of the Program Committee for the compliment, but I must confess at the outset that I am not qualified to make the positive predictions that this title implies. Rather I will try in general terms to cover a little of the recent history of silver and outline its present situation as it appears from piecing together such statistics as are available.

Naturally the price of the metal is our primary concern in these times of rapidly rising costs and when we think about price we must look at supply and demand in the case of precious as well as of base metals. Generally speaking, the position of silver looks favorable - certainly it is much improved as compared to prewar years.

Over a long period of time the ratio of production, and this might also be referred to as the relative scarcity of silver to gold, was about 13 to 1. That is to say 13 ounces of silver were produced to each ounce of gold. In recent years, including prewar years, this ratio has declined until it now stands at 7 or 8 to 1. This means that new silver has steadily become scarcer in terms of new gold and that fact is distinctly in favor of the intrinsic value of silver. As against this is the fact that a considerable portion of the silver that has been produced in the world over the past several centuries is still in existence as silver metal in various forms such as jewelry, sterling ware, coins in circulation and hoarding, and as bar silver in the vaults of the United States Treasury and elsewhere. These constitute a secondary source of supply or reserve as distinguished from the primary supply or current production and this secondary supply will begin to appear in varying degrees whenever demand in excess of current production begins to force prices upward.

Over the five-year period from 1943 through 1947, inclusive, the consumption of silver in the United States, including that required by our Treasury Department for silver certificates and subsidiary coinage, was considerably more than the entire world production for the same period. This means that definite inroads have been made in the secondary supply just referred to.

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*From a talk delivered at the Annual Meeting of Montana Mining Association, Virginia City, Montana, July 30, 1948.

The world production of silver in 1947 has been estimated at about 150,000,000 ounces broken down approximately as follows:

Mexico	59,000,000 ozs.	
United States	38,000,000 ozs.	
South and Central America	21,000,000 ozs.	
Canada	12,000,000 ozs.	
North and South America	130,000,000 ozs.	
Rest of the World	20,000,000 ozs.	(Estimated)
Total	150,000,000 ozs.	

The estimate of production outside of North and South America is based upon the fact that the Americas normally account for 85 to 90 percent of the world production of silver.

Now let us look at consumption in the United States for 1947. We find that it was about as follows:

Sterling	55,000,000 ozs.
Plated Ware	9,000,000 ozs.
Nitrate (Photography)	17,000,000 ozs.
Electrical, Brazing, etc.	19,000,000 ozs.
Industrial Total	100,000,000 ozs.
*Treasury Silver Certificates	26,000,000 ozs.
Treasury Subsidiary Coinage	25,000,000 ozs.
Industrial Plus Monetary	151,000,000 ozs.

This indicates that United States uses were much more than the total production of all the Americas and were about equal to the entire world production.

However, the entire world production is not available for use in the United States as large amounts are consumed annually in other countries. A measure of these requirements is obtained by comparing the 1947 production outside the United States of 112,000,000 ounces with the 1947 net imports into the United States of 55,000,000 ounces, which indicates that 57,000,000 ounces of the world production found uses outside the United States. Some of it went into Mexican coinage at the rate of 2,000,000 ounces per month commencing in July, 1947.

Where then did the 151,000,000 ounces required for use in the United States in 1947 come from? Production within the United States of 38,000,000 ounces plus net imports of 55,000,000 ounces account for 93,000,000 ounces from which it appears that silver inventories in the United States, including those of the Treasury, declined some 58,000,000 ounces in 1947. Inasmuch as the Treasury absorbed all of the domestically mined silver in 1947, it follows that the industrial consumption of 100,000,000 ounces was made up of the net imports of 55,000,000 ounces and a decrease of 45,000,000 ounces in the domestic stocks available to industrial users. The above seems to indicate quite definitely that silver inventories have been going down and this, of course, strengthens the position of silver as a commodity.

Let us now look at the monetary side of silver. It is thought by many that the Treasury is under somewhat of a strain to absorb the annual domestic production. If so, it would coin no more than the current production less the seigniorage or free silver for which the producer is paid nothing.

It is interesting therefore to see what has actually happened. In the period from 1940 to June 1, 1948, the Treasury acquired from domestic producers 243,000,000 ounces of which 102,000,000 ounces were seigniorage and 141,000,000 ounces were paid for by issuance of silver certificates.

In the same period the Treasury used 505,000,000 ounces as backing for new silver certificates and 423,000,000 ounces for subsidiary coinage, namely, dimes, quarters, and half dollars - a total of 928,000,000 ounces of silver. In other words, the Treasury used up not

*On basis of 70 percent of U.S. production in 1947 required for backing for new silver certificates. Treasury figures for calendar year 1947 lower due to lag in deliveries of 1947 production to the mint.

only all of the 141,000,000 ounces it was required to use by law but also all of the 102,000,000 ounces of free silver received from the United States mines and in addition some 685,000,000 ounces that had to come from the Treasury stocks of unpledged silver. As of June 1, 1948, it was reported that the Treasury's stock of unpledged silver was down to about 182,000,000 ounces. Incidentally, the 102,000,000 ounces of seigniorage or free silver received from domestic producers brought the Treasury a profit of $132 million, a nice bit of help to United States taxpayers.

Perhaps a word or two of explanation of seigniorage or free silver is in order. One thousand ounces of silver are worth $1,290.00 to the Treasury when coined into silver dollars. If the Treasury paid the producer $1.29 an ounce for all of it, he would get $1,290.00 for his 1,000 ounces. However, he gets $1.29 per ounce for only part of it and the part of the 1,000 ounces for which he is paid nothing, but must deliver to the Treasury free, is called seigniorage or "free silver." The Treasury can coin this "free silver" into money and whenever it does so a profit is realized on the transaction by the Treasury. It is one of the best ways of "making money" I know of, but unfortunately the procedure is not available to the silver producer.

The variations in silver seigniorage over the past ten years have been as follows:

In 1936-1937 the Treasury paid the producer for 60 percent of his silver, and retained 40 percent as seigniorage. This meant in effect that for each 1,000 ounces of a coinage value of $1,290.00 the Treasury paid the producer $774.00 for 600 ounces by the simple process of converting the 600 ounces into 774 silver dollars. The Treasury retained the other 400 ounces of a coinage value of $516.00 as free silver.

On January 1, 1938, the Secretary of the Treasury arbitrarily increased the seigniorage to 50 percent which meant that the Treasury increased its margin on each 1,000 ounces from $516.00 to $645.00 at the expense of the domestic producer whose income was thereby cut from $774.00 to $645.00.

On July 1, 1939, Congress took away the Treasury's power to arbitrarily vary the seigniorage and directed it to reduce its seigniorage to 45 percent and to pay the domestic producer for 55 percent of his silver at the coinage value of $1.29 per ounce. This had the effect of dividing the $1,290.00 per 1,000 ounces in the ratio of $710.00 to the producer and $580.00 to the Treasury.

For seven years the seigniorage remained fixed at 45 percent with the producer's costs steadily rising, but finally on July 31, 1946, Congress again took action and reduced the seigniorage to 30 percent by directing the Treasury to pay the domestic producer for 70 percent of his silver at $1.29 per ounce. This divided the $1,290.00 per 1,000 ounces in the ratio of $905.00 to the producer and $385.00 to the Treasury.

There have been some interesting recent foreign developments with relation to silver. In China more and more consideration is being given to proposals to re-establish the silver yuan at a new arbitrary price giving it a position similar to that of the United States silver dollar, and last May the Economic Council of China issued an order making the old silver yuan exchangeable with United States dollars at four to one. This is an initial step in the direction of a return to a silver currency in China. Uncontrolled printing of paper money with nothing back of it has run the exchange rate on paper money against United States dollars to 5,000,000 to one and the need for a new currency with metal backing similar to our silver certificate is becoming more urgent daily. In April of this year the National Assembly urged the Chinese government to open negotiations with Great Britain and the United States for a loan of silver in order to restore China to a silver standard, and I would venture the opinion that no better use could be made of the 314,000,000 ounces of silver loaned by us during the war to Britain and India than to reloan this silver to China under proper safeguards as backing for a new Chinese currency.

Unfortunately there is no early prospect of the return of this silver metal to us from Britain and India. In the latter part of 1946 Britain enacted legislation designed to withdraw all silver coins from circulation by exchanging them for new coins made of a copper-

nickel alloy. The announced purpose of this was the need of repayment in kind of Britain's lend lease debt to the United States of 88,000,000 ounces of silver, and it was expected that by melting down Britain's silver coinage some 220,000,000 to 250,000,000 ounces of silver would be recovered.

However, the British people have developed a stubbornness toward this exchange which the authorities failed to take into account since the silver coins are being released very slowly and with much reluctance. Whereas the original plan called for complete withdrawals of all silver coins within five years from January, 1947, the fact remains that less than 10 percent of the quantity in circulation was recovered in the first eighteen months of the program and as yet not a single ounce of the lend lease silver has been returned. Apparently such silver as has been recovered from melting British coinage has been sold in the market to satisfy Britain's industrial demand of silver which is estimated at between 12,000,000 and 15,000,000 ounces per year.

This disinclination of Britons to exchange their good silver coins for copper-nickel ones of negligible intrinsic value was evidenced by the rapid disappearance of silver coin from circulation. Inasmuch as the silver coins apparently disappeared into hoarding instead of migrating to the Royal Mint where they would have been replaced by copper-nickel ones, the result was an acute shortage of coins for making change in business transactions. Many firms had to resort to postal money orders in lieu of small change and so much inconvenience and confusion resulted that in 1947 the Royal Mint found it expedient to restore to circulation some of the silver coin previously withdrawn for conversion into the debased currency. Thus it appears that a much longer period than originally contemplated will be required to complete the demonetization if indeed it is ever completed.

India received lend lease silver from the United States during the war in the amount of 226,000,000 ounces, the return of which was guaranteed by Great Britain. One of the last acts of the British Government for India prior to the effective date of the release of India from British rule was to enact legislation requiring substitution of copper-nickel coins for all silver rupee coins in the currency system of India and more recently the government of Pakistan has ordered the substitution of nickel coins for silver rupees.

In March of 1947 the Indian authorities banned the import of silver into India presumably to curb a profitable trade by Belgian brokers who bought dollars with Belgian francs, bought silver in New York with the dollars, and sold the silver in Bombay for sterling which was needed in Belgium for the purchase of goods and services from Britain.

The situation in India raises two interesting questions: (1) Will the people willingly exchange their silver rupees for nickel or copper-nickel rupees? And (2) Will the price of silver bullion in India and Pakistan reflect a decrease in the demand for silver for hoarding?

The experience in Britain in withdrawing silver coins together with the fact that the peoples of India have traditionally hoarded silver may give a clue to the answer to the first question and a look at the price of silver on the Bombay market over the past several years will help to answer the second question.

The price of silver on the Bombay market in terms of United States dollars has steadily risen since 1944 although the exchange rate of the rupee with the dollar has remained practically stable during that period. Bombay prices in United States equivalent have been as follows:

January, 1944	$ .91	January, 1947	$1.28
January, 1945	1.04	January, 1948	1.37
January, 1946	1.07	July, 1948	1.41

The problem of the domestic producer like that of the gold producer in the United States is one of being squeezed against a fixed price by the rising costs of labor, materials, and services. Since 1946 the return to the producer from silver delivered to the Treasury under the 30 percent seigniorage arrangement has been equivalent to 90.5c per ounce. During that period there have been very substantial increases in base metal prices.

The New York price on foreign and old domestic silver is currently about 75c per ounce, and until such time as the inroads of industrial consumption upon the supply cause this price to rise above 90.5c, the domestic producer will have to look for relief to a further reduction in the seigniorage claimed by the Treasury.

In closing let me emphasize that no taxes are levied by Congress to provide funds for the purchase of domestically produced silver. The producer is in effect paid with silver dollars coined from a portion of the silver delivered by him to the Treasury. At present his payment consists of 70 percent of the silver delivered by him and he can take it in silver dollars or in silver certificates which are exchangeable on demand for silver dollars. Over the years the seigniorage retained by the Treasury has been progressively reduced until it now stands at 30 percent. The silver producers feel that this policy of progressive reduction should be continued until seigniorage has been completely eliminated.

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OREGON METAL MINING IN 1948

According to preliminary estimates released by the U. S. Bureau of Mines, gold, silver, copper, and lead production in Oregon during 1948 decreased 22 percent compared to 1947. The value of the four metals was $547,137 in 1948, and $701,336 (including a small quantity of zinc) in 1947.

Production of gold in 1948 was 15,060 ounces valued at $527,110 compared with 18,978 ounces valued at $664,230 in 1947. Nearly all of this output came from placer gold produced by dredging. The two principal producers were Baker Dredging Company in Sumpter Valley and Porter & Company in the Clear Creek-Granite Creek area.

Gold and silver lode mining was at a near standstill. Only the Buffalo mine in eastern Grant County operated consistently, even if on a small scale. Other properties in a position to produce, such as the Oregon King mine in Jefferson County and the Champion mine in Lane County, were active only a small part of the year even though their ores contain a fair proportion of base metals (in addition to gold and silver) which commanded a high price throughout the year.

The Bureau of Mines does not include production of other metals with statistics for gold, silver, copper, lead, and zinc. In Oregon the Bonanza quicksilver mine in Douglas County produced throughout the year. Its output was small compared with its wartime production, but it was one of the two quicksilver mines in the United States which continued to operate at the end of the year. The Oregon Chrome mine in Josephine County was active during the first half of 1948 but was forced to close in July because of high costs and low market price.

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NEW ENGINEERING MAGAZINE

No. 1, Vol. 1 of The Trend in Engineering has just come off the press. This interesting magazine is published by the Engineering Experiment Station at the University of Washington and is designed to report progress in the Station's program of investigation and research. At present the plan is to issue the magazine quarterly, but the Director of the Station visualizes more frequent appearance in the future. The work of the Station is organized into nine divisions as follows:

Aeronautical Engineering
Chemical Engineering, Industrial Chemistry
Civil Engineering
Electrical Engineering
Forest products
Geology
Mechanical Engineering
Mining, Metallurgy, Ceramics
Physics Standards and Tests

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METAL MARKETS

The February issue of the E&MJ Metal and Mineral Markets, New York, reports that the price situation in major nonferrous metals remained about the same even though there was widespread unsettlement in other commodity markets.

The market situation in copper, although eased somewhat by resumption of work after the strike at Utah Copper, continues strong. Production of crude primary copper in January was 53,701 tons, compared with 54,635 in December.

The supply situation in lead appears to be improving. However, it is felt that consumers are reducing inventories in anticipation of an easier supply outlook for the metal.

Reports are that there is a ready market for all current production of zinc at firm prices. Some producers report that they have encountered somewhat more sales resistance in disposing of their output of slab zinc.

The foreign price of silver has increased 1½¢ per ounce. The quoted price of platinum decreased $3 an ounce, effective February 14.

Prices of important metals and mineral products are as follows:

Copper, 23½¢, Connecticut Valley points.
Lead, 21½¢ per pound, New York.
Zinc, 17½¢ per pound, East St. Louis.
Silver, 71½¢ per ounce
(Domestic silver, 90½¢ per ounce).
Mercury, $88-$91 per flask.
Tin, $1.02 per pound.
Platinum, $85-$88 per ounce.
Palladium, $24 per ounce.
Iridium, $105-$110 per ounce.
Osmium, $100 per ounce.
Aluminum ingots, 17¢ per pound.
Antimony, 38.5¢ per pound, Laredo.
Bismuth, $2 per pound in ton lots.
Cadmium, $2 per pound.
Indium, $2.25 per ounce, troy.
Nickel, 40¢ per pound, Port Colborne, Ontario.

Metallic ores

Antimony ore, per unit of antimony contained 50-55 percent, $5-$5.10.
Beryllium ore, per unit of BeO, 10-12 percent, $28-$30 f.o.b. mine.
Chrome ore, per long dry ton f.o.b. cars New York, Philadelphia, Baltimore, Charleston plus ocean freight differential for deliveries to Portland, Oregon, and Tacoma, Washington:
Indian and Rhodesian, 48 percent Cr_2O_3, 3 to 1 ratio, $38-$39.
South African (Transvaal), 48 percent Cr_2O_3, no ratio, $29-$30.
Turkish, 48 percent Cr_2O_3, 3 to 1 ratio, $40-$41.50.
Domestic, 48 percent, 3 to 1 ratio, $39 f.o.b. nearest shipping point.

Manganese ore, on long-term contracts involving large tonnages, prices a matter for private negotiation. Nearby business, basis 48 percent Mn, 78¢-80¢ per long ton unit c.i.f. U.S. ports.
Chemical grades, per ton, $55 in carloads.

Molybdenum ore, per lb. of contained MoS_2, 90 percent concentrate, 54¢ f.o.b. mines.
Titanium ore, per gross ton, ilmenite, 56-59 percent TiO_2, $18-$20 f.o.b. Atlantic seaboard; rutile, per pound 94 percent minimum concentrate, 6-8¢.
Tungsten ore, per short ton unit of WO_3, Chinese duty paid $24.50-$25; domestic scheelite delivered to buyer's plant, $28.50 carload lots.
Zircon ore, 65 percent ZrO_2, $45-$48 per ton c.i.f. Atlantic seaboard.

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STATE GEOLOGISTS MEETING

The annual meeting of the Association of American State Geologists was held in San Francisco February 11-12 inclusive. Dr. Walter B. Jones, State Geologist of Alabama, was elected President for 1949-1950 succeeding Captain Garland Peyton, Director of the Georgia Department of Mines, Mining, and Geology. The Society voted to separate the offices of Secretary-Treasurer and editor of the quarterly, thus distributing the work more equitably. Dr. Maurice M. Leighton, Chief of the Illinois Geological Survey, was elected editor of the quarterly. Dr. Edward L. Clark, State Geologist of Missouri, was re-elected Sec.-Treas.

On February 12 attending geologists were conducted on a field trip led by Dr. Olaf P. Jenkins, Chief of the California Division of Mines, and members of his staff. The party inspected Franciscan formations east and north of San Francisco Bay with especial attention to the Andreas rift zone in the Tomales Bay region.

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EXPLORATION OF NICKEL-BEARING LATERITE ON WOODCOCK MOUNTAIN, JOSEPHINE COUNTY, OREGON

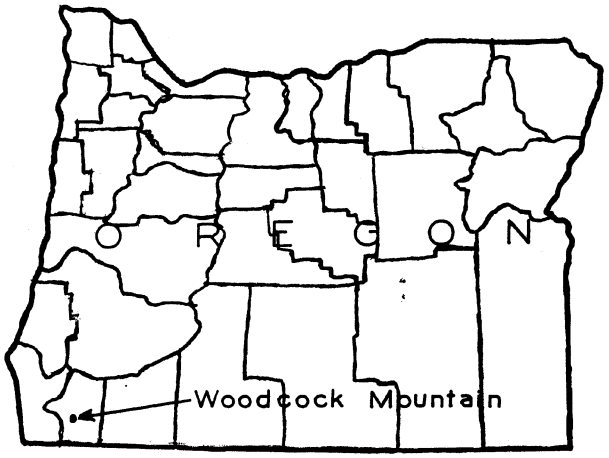
By
Ralph S. Mason*

Introduction

Following a preliminary reconnaissance and sampling of laterite on Woodcock Mountain in the summer of 1947, a drilling and mapping program was carried out by the department during July 1948. The work was a continuation of the department's investigation of nickel-bearing laterites begun in 1946. Progress reports of this work appeared in the March 1947 and the May 1948 issues of the Ore.-Bin.

Sampling and mapping in 1948 was done by the author assisted by Mr. Harold Wolfe, department field geologist stationed at Grants Pass, and Mr. Irving Jones.

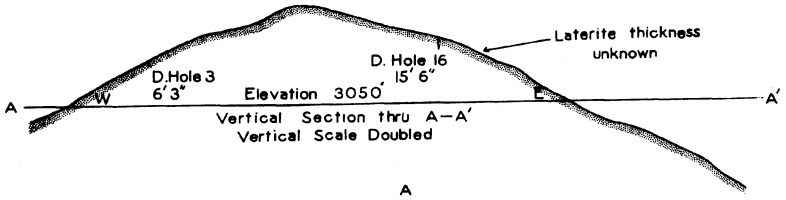
Location of deposit

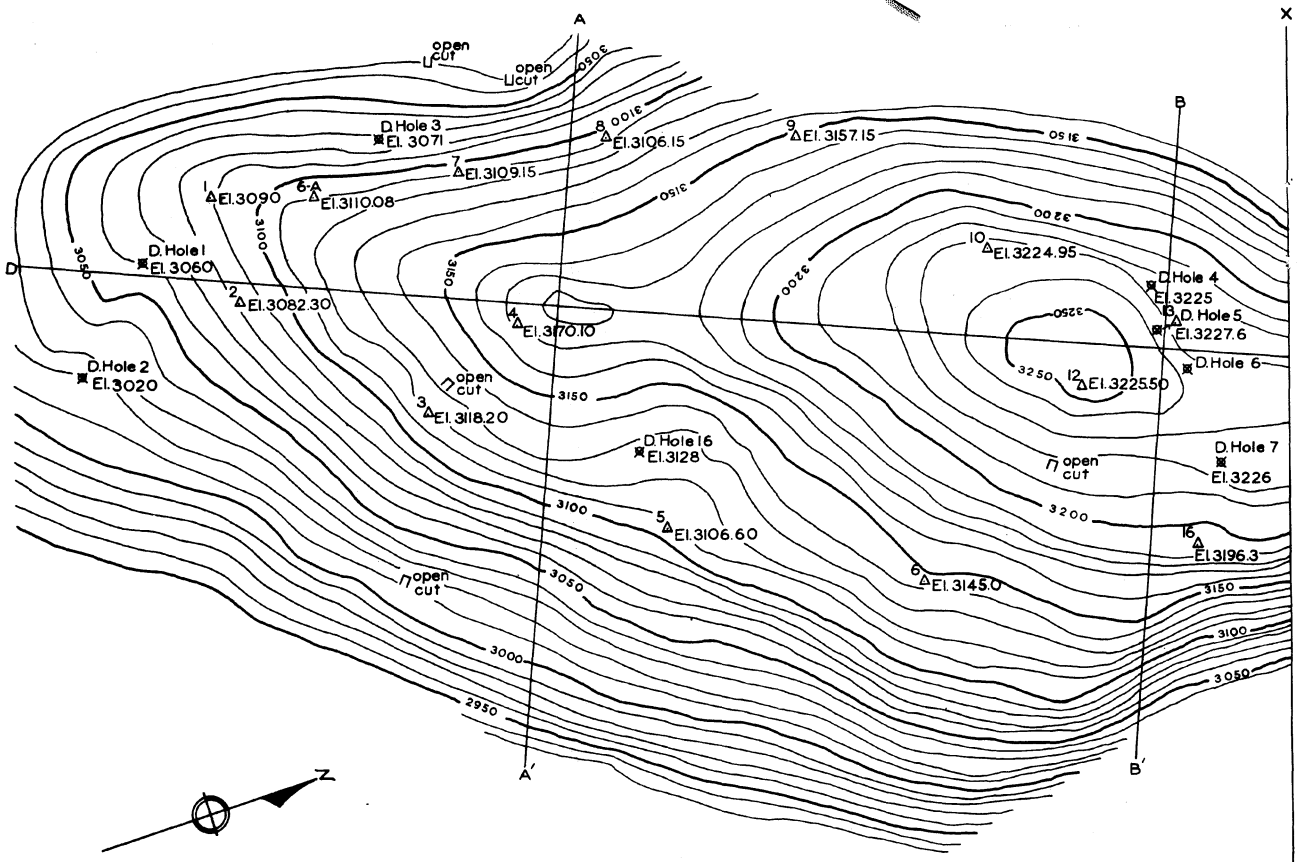


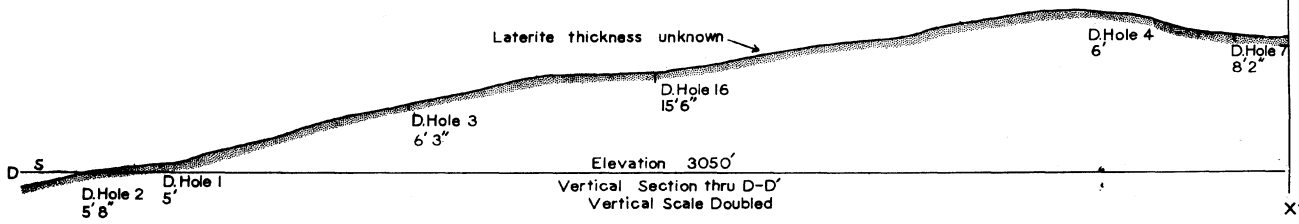
Woodcock Mountain is located in southwestern Josephine County about a mile west of the town of Cave Junction on U.S. Highway 199, 35 miles south of Grants Pass. The mountain covers parts of secs. 7, 18, 19, 30, and 31, T. 39 S., R. 8 W., and secs. 12, 13, 24, 25, and 36, T. 39 S., R. 9 W. It is roughly 4 miles long by 2 miles wide with its axis trending in a northerly direction. The area examined during 1948 was restricted to the summit of the south half of the mountain, an area measuring roughly 1700 by 7000 feet. The southern portion of the mountain is reached by driving about one mile on the graveled road leading west from U.S. Highway 199 just south of the Illinois River bridge about 2 miles south of Cave Junction. From an abandoned house at the end of the road, a dim trail can be followed up the southeast slope of the mountain.

The greater portion of the land covered by the area studied lies within the U.S. Forest Service boundary. Sec. 36, T. 39 S., R. 9 W., is state land and the W½ sec. 31, T. 39 S., R. 8 W., is Oregon and California Railroad revested land. The NW¼ sec. 30, T. 39 S., R. 8 W., is public domain and the SW¼ of the section is part county land and part privately owned.

*Mining Engineer, Oregon Department of Geology and Mineral Industries.

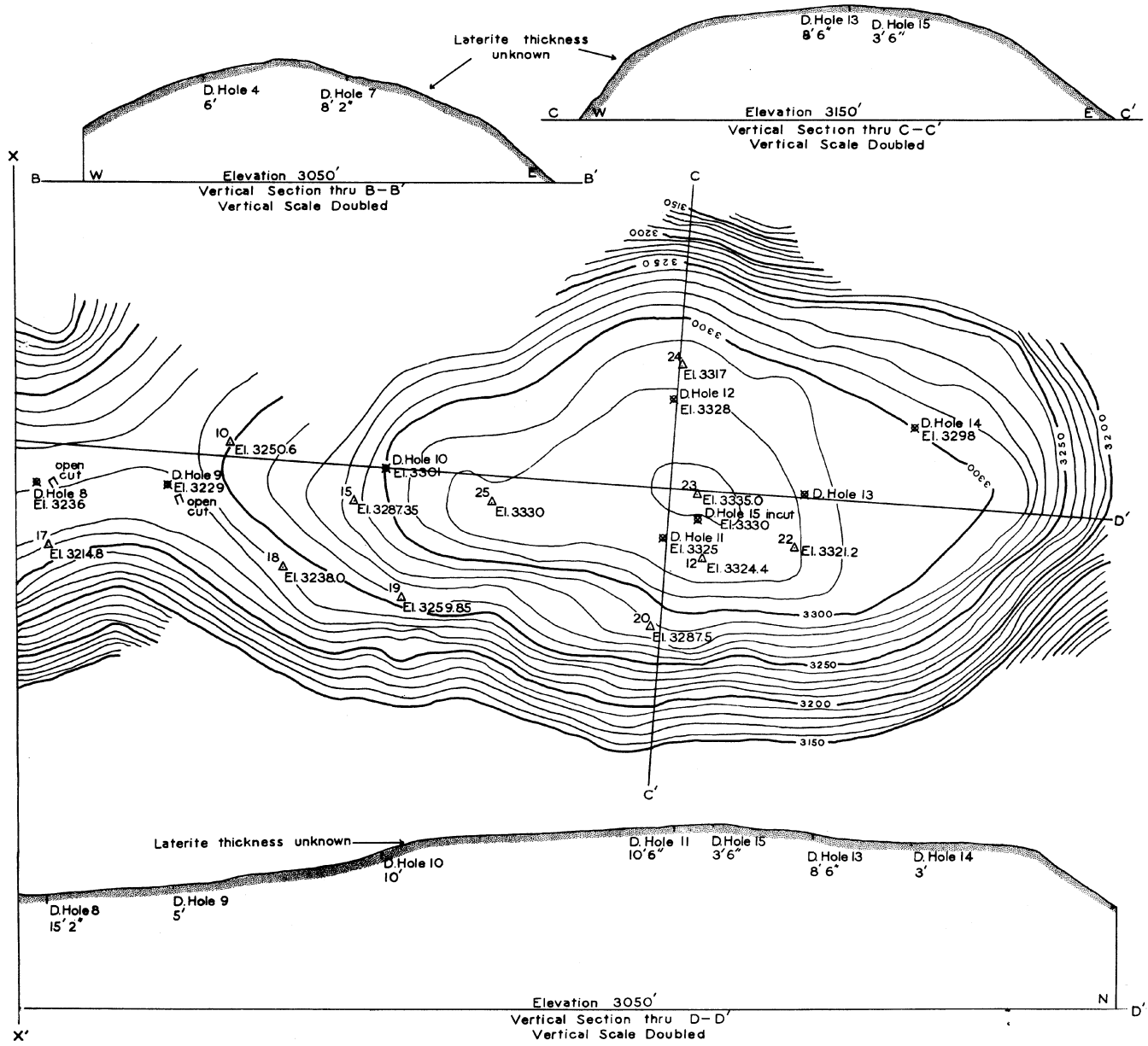




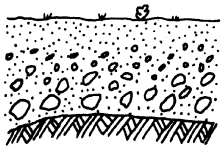


AVERAGE ANALYSES OF AUGER HOLE SAMPLES

HOLE	%Ni	%Cr_2O_3	DEPTH	HOLE	%Ni	%Cr_2O_3	DEPTH
1	1.04	2.32	5'	9	0.63	1.06	5'
2	0.94	2.33	5' 8"	10	0.81	1.61	10'
3	0.78	1.65	6' 3"	11	0.59	1.27	10' 6"
4	1.41	3.74	6'	12	0.54	1.82	16'
5	0.90	2.01	6'	13	1.12	1.67	8' 6"
6	0.91	2.35	5'	14	0.75	2.10	3'
7	1.20	4.12	8' 2"	15	1.41	1.05	3' 6"
8	1.51	3.72	15' 2"	16	1.16	2.20	15' 6"



IDEALIZED LATERITE SECTION



SCALE

0 200 400ft.

- Auger Holes Drilled by Dept.
- Open Cuts
- Plane Table Stations

Elevation assumed

SUMMIT of the SOUTH HALF of WOODCOCK MOUNTAIN

TOPOGRAPHIC MAP AND SECTIONS

Josephine County, Oregon

Secs. 24,25 T. 39 S. R. 9 W.
Secs. 19,30 T. 39 S. R. 8 W.

Surveyed July, 1948

by the

STATE OF OREGON DEPARTMENT OF GEOLOGY & MINERAL INDUSTRIES

ANALYSES OF WOODCOCK MOUNTAIN NICKEL-BEARING LATERITE SAMPLES

Thickness of sample (feet)	Percent Ni	Percent Cr_2O_3
(Hole 1)		
0 - 1	1.02	2.23
1 - 2	1.18	2.51
2 - 3	1.39	2.27
3 - 4	1.04	2.64
4 - 5	0.57	1.93
	1.04*	2.32*
(Hole 2)		
0 - 1	0.85	2.80
1 - 2	0.91	2.79
2 - 3	1.08	2.79
3 - 4	1.02	2.08
4 - 5	0.88	1.90
5 - 5'8"	0.88	1.65
	0.94*	2.33*
(Hole 3)		
0 - 1	0.82	2.18
1 - 2	0.80	1.99
2 - 3	1.08	2.54
3 - 4	0.79	1.62
4 - 5	0.65	1.11
5 - 6	0.72	1.04
6 - 6'3"	0.59	1.10
	0.78*	1.65*
(Hole 4)		
0 - 1	0.92	3.47
1 - 2	1.53	3.74
2 - 3	1.63	3.80
3 - 4	1.40	3.32
4 - 5	1.58	4.39
5 - 6	(sample lost)	
	1.41*	3.74*
(Hole 5)		
0 - 1	0.93	3.61
1 - 2	0.99	3.27
2 - 3	0.95	2.60
3 - 4	0.93	2.52
4 - 5	1.21	2.37
5 - 6	1.40	2.14
6 - 7	0.78	0.94
7 - 8	0.68	1.28
8 - 9	0.71	0.75
9 - 10	0.71	1.08
10 - 11	0.64	0.65
11 - 12	0.91	2.94
	0.90*	2.01*
(Hole 6)		
0 - 1	0.75	2.94
1 - 2	0.98	2.89
2 - 3	0.83	1.42
3 - 4	0.95	2.41
4 - 5	1.05	2.09
	0.91*	2.35*
(Hole 7)		
0 - 1	0.97	4.60
1 - 2	1.15	3.99
2 - 3	1.12	3.96
3 - 4	0.99	3.73
4 - 5	1.21	4.85
5 - 6	1.13	3.44
6 - 7	1.40	4.13
7 - 8'2"	1.66	4.30
	1.20*	4.12*
(Hole 8)		
0 - 1	1.10	4.28
1 - 2	1.40	5.30
2 - 3	1.68	6.37
3 - 4	1.25	5.51
4 - 5	1.96	4.56
5 - 6	2.02	4.70
6 - 7	1.85	4.07
7 - 8	1.80	2.96
8 - 9	1.51	2.78
9 - 10	1.79	3.50
10 - 11	1.14	3.02
11 - 12	1.50	2.52
12 - 13	1.33	2.26
13 - 14	1.26	2.26
14 - 15'2"	1.02	1.69
	1.51*	3.72*
(Hole 9)		
0 - 1	0.58	1.87
1 - 2	0.62	1.08
2 - 3	0.67	0.86
3 - 4	0.64	0.62
4 - 5	0.65	0.85
	0.63*	1.06*
(Hole 10)		
0 - 1	0.85	2.62
1 - 2	0.82	3.22
2 - 3	0.93	1.81
3 - 4	0.84	1.59
4 - 5	0.88	1.27
5 - 6	0.69	1.33
6 - 7	0.61	1.15
7 - 8	0.90	1.08
8 - 9	0.80	1.02
9 - 10	0.71	1.01
	0.81*	1.61*
(Hole 11)		
0 - 1	0.46	1.56
1 - 2	0.59	1.84
2 - 3	0.57	2.03
3 - 4	0.61	1.91
4 - 5	0.75	1.89
5 - 6	0.73	1.33
6 - 7	0.60	0.82
7 - 8	0.61	0.73
8 - 9	0.67	0.68
9 - 10	0.52	0.58
10 - 10'6"	0.42	0.60
	0.59*	1.27*
(Hole 12)		
0 - 1	0.29	1.76
1 - 2	0.31	1.89
2 - 3	0.36	2.00
3 - 4	0.47	2.14
4 - 5	0.50	2.06
5 - 6	0.35	2.12
6 - 7	0.38	1.79
7 - 8	0.43	2.04
8 - 9	0.47	1.94
9 - 10	0.59	1.84
10 - 11	0.80	2.19
11 - 12	0.95	1.66
12 - 13	0.99	1.72
13 - 14	1.00	1.59
14 - 15	0.88	1.46
15 - 16	0.79	0.98
	0.54*	1.82*
(Hole 13)		
0 - 1	0.74	2.40
1 - 2	0.92	2.56
2 - 3	1.17	2.78
3 - 4	1.30	2.66
4 - 5	1.36	1.55
5 - 6	1.41	0.88
6 - 7	1.15	0.88
7 - 8	0.98	0.57
8 - 8'6"	1.03	0.71
	1.12*	1.67*
(Hole 14)		
0 - 1	0.77	2.26
1 - 2	0.76	2.29
2 - 3	0.72	1.75
	0.75*	2.10*
(Hole 15)		
1 - 2	1.47	1.02
2 - 3	1.45	1.26
3 - 3'6"	1.32	0.86
	1.41*	1.05*
(Hole 16)		
0 - 1	0.66	2.68
1 - 2	0.75	2.86
2 - 3	0.92	2.99
3 - 4	1.14	3.26
4 - 5	1.12	3.23
5 - 6	1.07	2.92
6 - 7	0.97	2.56
7 - 8	1.18	2.45
8 - 9	1.097	2.08
9 - 10	1.207	1.82
10 - 11	1.36	1.26
11 - 12	1.49	1.90
12 - 13	1.63	1.93
13 - 14	1.43	1.17
14 - 15	1.43	1.10
15 - 15'6"	1.23	0.99
	1.16*	2.20*

*Arithmetical average.

Geology

The surface of the mountain shows outcrops of rock and loose boulders in many places. The soil which supports a sparse growth of small pines and underbrush ranges in color from tawny yellow through brick red to maroon. Myriad, round grains or "shots" of magnetite, limonite, and rock are scattered over the surface. In some places the "shots" may completely cover the surface.

Numerous open cuts dot the crest and upper slopes of the mountain. Most of these are badly caved and were apparently dug for location cuts by locators about ten years ago. No signs of recent activity were observed.

Woodcock Mountain lies along the western edge of the Illinois River Valley, and just inside the eastern margin of a ten-mile wide belt of rocks of the peridotite clan which intruded Mesozoic rocks. Peridotite is usually composed largely of olivine and may have some minor amounts of other iron-magnesian minerals. There are several varieties of peridotite all of which are usually somewhat weathered. Miners and prospectors refer to these rocks as "serpentine." A small amount of nickel, about 0.1 to 0.3 percent, occurs in the olivine which, upon laterization, loses its magnesium, part of its silica, and some of its iron. Nickel is dissolved and is deposited irregularly below the surface either combined with iron hydroxide or as hydrous nickel silicates which are grouped under the name of garnierite.

An open cut, near Hole 8, exposed a thin vertical seam of garnierite which extended from just below the surface down to the floor of the cut 10 feet below the surface. This was the only garnierite found in the area mapped. As has been previously described, garnierite is found commonly in limonite-silica boxwork pattern on Nickel Mountain in Douglas County.*

Field work

Sixteen auger holes having a total footage of 129 feet were drilled by hand. Samples were taken at one-foot intervals the full length of each hole. A complete log of each hole was kept. Color, texture, moisture, ease of drilling, and magnetic qualities of the cuttings were recorded. A topographic map covering 27 acres was made on a scale of 200 feet to the inch with a 10-foot contour interval (see pp. 16 and 17).

Both 2-inch and 3-inch hand augers of the "Iwan" type were used, together with an inch and a half coal auger and 2-inch chisel bit. Much difficulty was experienced in drilling owing to great numbers of rocks in the laterite zone. All of the holes had to be abandoned short of the desired depth because of this condition. As would be expected the proportion of boulders in the laterite increased with depth. Although the thickness of the laterite zone was not determined, one hole (No. 12) apparently was spproaching the lower part of the zone when it was abandoned at 16 feet. At this depth the cuttings were bluish-green with varicolored spots, in contrast to the usual red or yellowish-brown of the upper zone.

Each sample was analyzed in the department laboratory for Ni (nickel) and Cr_2O_3 (chromium oxide). The results of these analyses are shown in the accompanying tabulation. A typical section of the laterite, as revealed by drilling, shows a gradual change from reddish or yellowish-brown earthy material near the surface to a darker brown, mottled, clayey zone which becomes olive drab, or blue gray with numerous varicolored spots at depth. Magnetic "shots" were found scattered through all horizons but there was no apparent pattern to their occurrence. Nickel content of the samples varied from 0.29 to 2.02 percent; the Cr_2O_3 content was from 0.58 to 6.37 percent. Generally speaking, samples containing the highest percentages of nickel likewise had the highest chromium oxide content. From a visual examination of the cuttings it is not possible to estimate what the amounts of either nickel or chromium oxide are.

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* Ore.-Bin, May 1948.

The sample containing the most nickel, 2.02 percent, from Hole 8 was gray-brown and earthy. This is almost identical in appearance to material containing only 0.61 percent nickel in Hole 10. Insufficient drilling has been done to show at what horizon, if any, the greatest concentration of nickel occurs. The erosion of the surface of the area studied, particularly the steeper slopes, is probably fairly rapid. Variations in the slope and subsurface conditions affect the thickness of the lateritic zone. The thickness of this zone in turn affects the concentration and location of the nickeliferous horizons. Slumping probably has occurred on the east slope especially near the north end. In Hole 4 the concentration of nickel was close to the surface while in Hole 16 a comparable amount was not encountered until a depth of more than 12 feet was reached. Hole 4 is located on a fairly steep hillside; Hole 16 was drilled in a small flat-lying area with high ground on two sides.

Accurate estimation of tonnage of reserves within the limits of the area is impossible for the following reasons:

(1) Insufficient number and shallowness of holes; (2) variation in thickness of laterite section; (3) variation in nickel content with depth and from hole to hole; (4) unknown volume of loose, unweathered rocks scattered throughout lateritic zone.

It is probable that the most satisfactory method of sampling the laterite section and estimating the quantity of boulders contained would be by sinking a sufficient number of pits through the laterite to bedrock on coordinates throughout the area.

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MERCURY IN THE FOURTH QUARTER OF 1948*
(Including summary for the entire year)

The serious drop in domestic production of mercury that had been threatening for many months took place in the fourth quarter of 1948, according to the Bureau of Mines, United States Department of the Interior. Production of 2,050 flasks in October-December 1948 was approximately one-half of the average for the first three quarters. Production for 1948 was the smallest since 1933 and in the fourth quarter was at an annual rate lower than in any year since 1926. Only two of the larger producers, the Mt. Jackson and Bonanza mines were in operation at the year end.

The world situation of oversupply in 1947 continued in 1948 and production in excess of needs, plus stocks already on hand, pressed for a market. The resultant extension of the fall in prices was to be expected. The average domestic price of $76.49 for 1948 was 9 percent below 1947 and amounted to only 39 percent of the 1942-43 average. The mark-up of $14 a flask in the cartel selling quotation for mercury after mid-December, brought the domestic price to $90+. Offerings at a wide range of quotations were reported as the year closed.

Imports of mercury in the fourth quarter rose substantially over those in July-September and the total for 1948 was more than 4 times as large as in 1947. Spain supplied 65 percent of the 1948 total, Italy 12 percent, Mexico 10 percent, and Japan 9 percent. Exports and re-exports again amounted to only a small fraction of imports.

Consumption of mercury was at a high rate in 1948, surpassing the relatively high peacetime level in 1947 by 28 percent. Chief reason for the sharp advance was the completion during the year of two new chlorine and caustic soda plants at Syracuse, N.Y., and Wyandotte, Michigan. Otherwise the use of mercury for agricultural purposes had the largest gain in 1948. The manufacture of pharmaceuticals and of antifouling paint also rose in 1948, whereas the new cell (included in electrical apparatus) failed to hold important 1947 gains although continuing to absorb a large quantity of mercury.

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*From U.S. Bureau of Mines Mercury Report No. 89.

Mine production. - California, as usual, was by far the largest producer in 1948 and supplied 78 percent of the United States total; it was followed by Oregon, Nevada, Idaho, and Alaska. Six mines produced 96 percent of the total for the United States as follows: New Idria, Mt. Jackson (including Great Eastern) and Reed, in San Benito, Sonoma, and Yolo Counties, respectively, in California; Hermes in Valley County, Idaho; Cordero in Humboldt County, Nevada; and Bonanza in Douglas County, Oregon. Of the six only Mt. Jackson and Bonanza were reported to be in operation at the end of the year.

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NEW GEOGRAPHIC NAMES

The U.S. Board on Geographic Names announces in its July-September 1948 Decision Lists the following new geographic names for Oregon:

Angell Peak: peak with an elevation of about 8,675 feet in the Blue Mountains in Whitman National Forest about 15 miles north of Sumpter, on the boundary between Grant and Baker Counties; named for Albert G. Angell, a member of the Forest Service from 1912 to 1941 and associated with the Whitman National Forest from 1912 to 1931; sec. 24, T. 7 S., R. 36 E., Willamette meridian, 44°56'30" N., 118°14'30" W.

Campbell Falls: falls in the South Umpqua River, about 5 miles down stream from South Umpqua Falls, Umpqua National Forest; named for Robert G. Campbell of the Forest Service who was stationed on the Umpqua National Forest from 1939 to 1943 and was killed in action on November 12, 1944, while serving as a lieutenant in the Air Corps; Douglas County; sec. 13, T. 29 S., R. 1 W., Willamette meridian, 43°03' N., 122°46' W.

Endicott Creek: stream about 2 miles long, heading in sec. 31, T. 6 N., R. 2 W., and flowing generally northeastward to Tide Creek; named for Lawson Edward Endicott; Columbia County; sec. 29, T. 6 N., R. 2 W., Willamette meridian, 45°58'10" N., 122°57'35" W.

Flatiron Point: rock bluff in Umpqua National Forest between the North Umpqua River and Fish Creek at their junction, rising about 1,000 feet above the rivers to an elevation of about 3,000 feet; the name is descriptive; Douglas County; sec. 28, T. 26 S., R. 3 E., Willamette meridian, 43°17' N., 122°28' W.

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ORE.-BIN INDEX

A 10-year index of the Ore.-Bin has been prepared and will be issued as a miscellaneous paper about April 1, 1949. It will be sent postpaid to anyone who requests it.

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HOUSE BILL NO. 427

House Bill No. 427 introduced in the Oregon Legislature by Representatives Van Dyke and Day is designed "to regulate the drilling, prospecting for, production and conservation of natural gas and oil; providing for oil and gas inspectors, the keeping of records, a charge to defray the costs and expenses of administering this act; providing a penalty for the violation of this act; and to repeal sections 108-701 to 108-711 inclusive, O.C.L.A."

This bill sets up rules and regulations for oil and gas test drilling and directs the State Department of Geology and Mineral Industries to supervise all water shut-offs of drilling wells, and the plugging of abandoned wells. It is specified that the Director of the Department of Geology and Mineral Industries shall appoint an oil and gas inspector to supervise certain of the drilling and producing operations which have to do with public welfare. The cost of such inspection and supervision must be borne by the Department who would in the case of commercial production of oil and gas, receive a small percentage of the value of production to offset the cost of carrying out the provisions of the act.

Sections 108-701 to 108-711 of the Oregon Code which are repealed provided for county oil and gas inspectors appointed by the county court or board of county commissioners. According to this law the county oil and gas inspectors were to be paid from receipts from sale of petroleum products produced in the county, and therefore in the absence of such receipts from the sale of petroleum products county oil and gas inspectors could not be paid, making the law inoperative.

House Bill No. 427 has been passed by the House, read twice in the Senate, and referred to the Senate Committee on Mining (March 28).

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ANNUAL ASSESSMENT WORK

At least three bills designed to exempt the owners of unpatented mining claims from annual work for the current assessment year have been introduced in the House of Representatives. Whether or not these bills will be passed is problematical. It seems unlikely that a decision will be reached or even that a prediction concerning their chances may be made much before June.

Members of the Oregon Congressional delegation will be glad to inform claim owners concerning the progress of this legislation.

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LIMESTONE SHIPPED IN SOUTHERN OREGON

According to Mr. Arnold Muck, the limestone Products Company is shipping limestone from Marble Mountain at Cheney Creek, near Wilderville, Josephine County. At present the company is hauling to Grants Pass by truck and shipping to Pacific Carbide and Alloys Company, Portland.

A railroad spur 3800 feet long is being constructed, and when finished limestone will be shipped by railroad from Wilderville to Grants Pass, thence over Southern Pacific to Portland. It is expected that the railroad spur will be finished in about sixty days.

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NEW MAP BY U.S. GEOLOGICAL SURVEY SHOWS OREGON COASTAL GEOLOGY

The U.S. Geological Survey has just issued a new map in its oil and gas series showing the geology of the Newport-Waldport area of western Oregon. The map was prepared in cooperation with the Oregon State Department of Geology and Mineral Industries by H. E. Vokes, Hans Norbisrath, and Parke D. Snavely, Jr., of the U.S. Geological Survey, and is called Preliminary Map 88 of the Oil and Gas Investigations series.

The map covers an area of 570 square miles and includes the Yaquina, Waldport, Toledo, and Tidewater quadrangles in Lincoln and Lane counties and is on a scale of 1:62,500, or approximately 1 inch = 1 mile. The several geological formations are in colors. The map shows topography and gives considerable information on stratigraphy and fossil localities. The price is 75 cents and the map may be obtained from the Director, U.S. Geological Survey, Washington 25, D.C.

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METAL MARKETS

As of March 24, the E&MJ Metal and Mineral Markets, New York, reported that unsettled price situation had affected demand for major nonferrous metals during the preceding week. The market price of zinc was reduced 1½ cents, making the price 16 cents, East St. Louis. Even though the price of lead has been reduced 3½ cents to 18 cents, New York, during the past three weeks, business was described as dull. Copper was steady at 23½ cents per ounce, Connecticut Valley. Platinum has been weak and the price was reduced to $72 an ounce troy, wholesale lots. The quicksilver market was quiet with spot metal available at $87-$90 per flask depending upon quantity. It is reported that the European quicksilver cartel is scheduled to meet in the near future, and the trade is speculating on whether the group will take any action to disturb the present selling price. Foreign silver was unchanged at 71½ cents an ounce. Ferro-manganese was advanced $12 per gross ton to $172 for 78 to 82 percent Mn grade. The advance was caused by higher cost of manganese ore.

According to the March News Letter of the Mining Association of Montana, the Anaconda Copper Mining Company on February 5, 1949, started to produce ferromanganese in electric furnaces at the Great Falls Reduction Works. The manganese ore used is produced at Butte, concentrated and calcined at Anaconda, and then smelted at Great Falls. Production is at the rate of about 1792 long tons of alloy per month from three furnaces.

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QUICK-SETTING CEMENT FROM OREGON BAUXITE

Soon after the discovery of ferruginous bauxite in northwestern Oregon it was suggested by the Department that one possible use of the material was in making aluminous or quick-setting cements. Samples were submitted to cement companies for testing work along these lines. A few months ago Professor R. W. Moulton, Department of Chemical Engineering, University of Washington, informed the Department that early in 1948 a thesis had been written at the University of Washington giving results of testing work on northwest high-alumina clays and Oregon bauxite to indicate their possible application in making quick-setting cements. Subsequently Professor Moulton submitted a copy of the thesis with permission of the University and the authors to publish it. The essential parts of the thesis by Messrs. Arthur H. Every and George L. Hagen are reproduced herein. Some of the theoretical and experimental data have necessarily been condensed. It is believed that the thesis indicates a possible new use for Oregon bauxite.

Aluminous cement is made by only one manufacturer in the United States even though the product has found a wide use for special purposes. It would seem as if the peculiar properties of such cement would warrant a greatly expanded use if it were more readily available. An interesting feature of the testing work described by the thesis was the by-product of metallic iron. This feature especially warrants further research. The total amount of iron in Oregon bauxite may be reckoned in millions of tons. Titanium also is present in substantial amounts, and it would be desirable to find out how it acts in the cement-making process.

The Editor.

THE PRODUCTION OF ALUMINOUS CEMENT FROM NORTHWEST METERIALS*

By
Arthur H. Every and George L. Hagen

Status of Aluminous Cements

Physical properties of the cement

Aluminous cement, also variously called high-alumina, alumina, Lumnite, and Elektro-schmelz cement, and Ciment Fondu, is not a new product, but has been known for a number of years. It was first introduced in France early in this century.

It is in the uhique physical properties of concrete made from aluminous cement that the reason for its extensive use in Europe and specialized service in the United States is found. It is the only true very-rapid-hardening cement, and exhibits the strength within 24 hours which is reached by regular portland cement only after 28 days. Even the so-called high-early-strength portlands require 3 to 5 days to approach the aluminous 24-hour strength. The following table taken from data of Bates[1] gives a comparison between portland cement and aluminous cement as to strengths in pounds per square inch.

Table 1.

Strength of Portland and Aluminous Cements

	Portland psi**	Aluminous psi
1. Tensile - 1:3 mortar		
24 hours	122	372
28 days	383	425
2. Compressive - 1:3 mortar		
24 hours	475	5,615
28 days	2,650	5,835
3. Compressive - 1:2:4 concrete		
24 hours	---	2,880
28 days	2,410	2,845

The figures given in Table 1 are not to be considered as strictly representative of either cement, but were available values which Bates considered typical. It is interesting to note that the very marked superiority of aluminous cement is not so noticeable in the tensile strength. However, it has been found that the ratio of compressive to tensile strength in the latter is greater than in portlands, and for that reason, it is not practical to use the tensile test as a measure of the value of aluminous cements. This test is no longer specified by the United States Bureau of Standards for portland cement, either, for it is, of course, the compressive strength to which cements owe their constructional value.

Another important advantage of this cement over portlands, and actually the one which led to its development, is its resistance, unequalled by any other constructional cement, to chemical attack by sulfate and sea waters. Among its earliest uses was in railway tunnel construction in Southern France, where water containing considerable calcium sulfate had caused crumbling and cracking of the regular concrete work so seriously as to cause nearly complete collapse. However, after the installation of alumina concrete, this action was completely stopped, and this concrete is still good today. This concrete was also used in construction work on piers and piling at the Puget Sound Navy Yard at Bremerton, Washington, where sea water would be destructive to normal concrete.[2]

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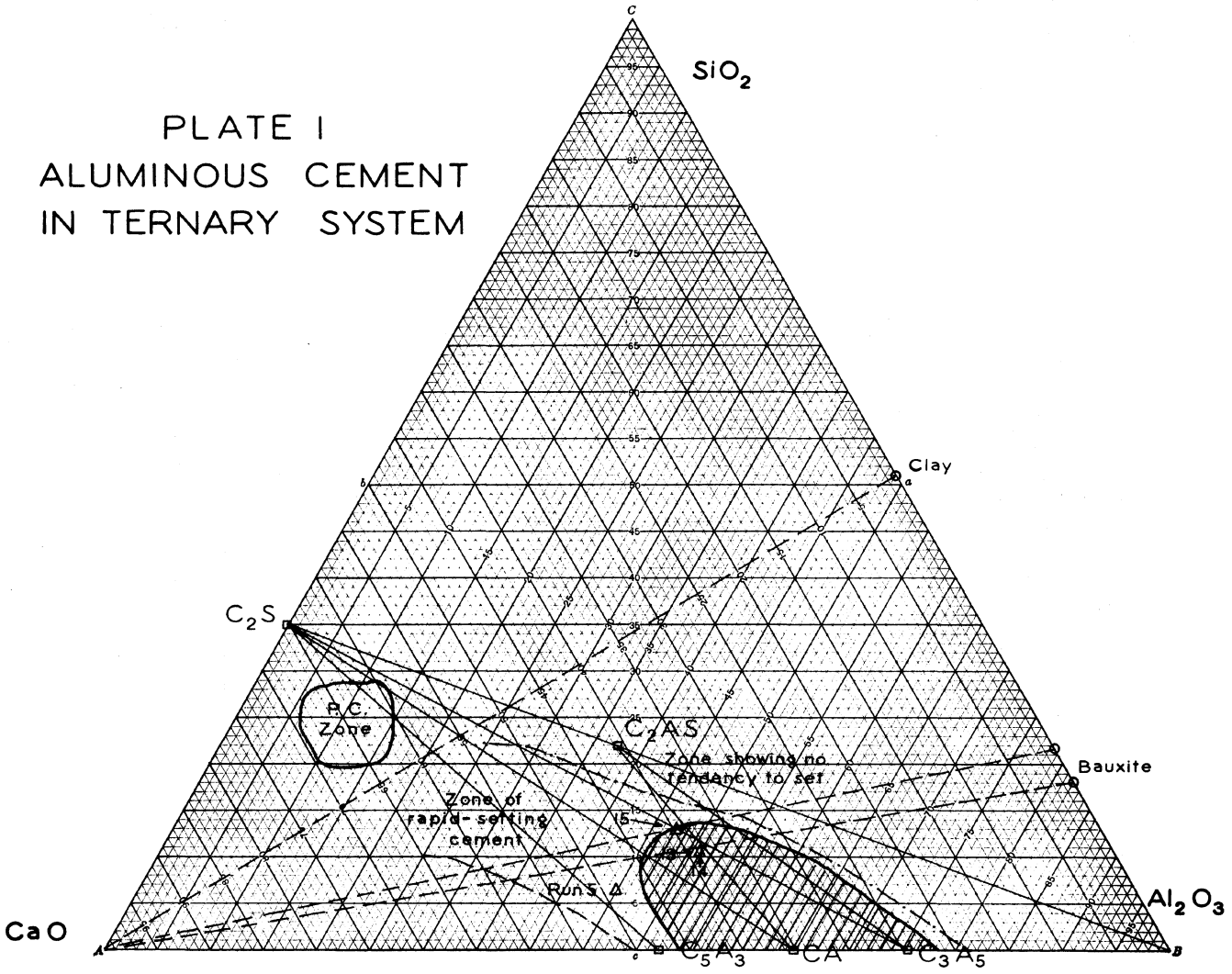
*Thesis submitted for the degree of Bachelor of Science in chemical engineering, University of Washington, 1948.

**Pounds per square inch.

[1]Bates, P.H., "High-alumina hydraulic cements": Ind. and Eng. Chem., vol.18, pp.554-559, 1926.

[2]Bates, P.H., Idem.

PLATE I
ALUMINOUS CEMENT
IN TERNARY SYSTEM



Because of its rapid hardening, the heat of hydration of alumina cement is more rapidly given off, allowing the concrete to be used at freezing temperatures which would normally damage portland concrete. Of course, this high heat has disadvantages, for higher temperatures, of approximately 145° F., hinder proper hardening and setting, and in addition, large masses of this concrete could not be poured because of the serious entrapment of too much heat. This latter difficulty has been overcome in some cases by constructing the main mass of a dam, pier, etc., of portland, then placing a relatively thin layer of aluminous cement about it, rendering the whole structure impervious to chemical attack. Aluminous concrete binds with portland concrete successfully.[3]

Other advantages claimed for the cement are: a favorable setting time, approximately the same as for portlands; absolute stability in volume; and stability in storage.

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[3] Lea, F. M., and Desch, C. H., The chemistry of cement and concrete, pp. 38-80, 290-320, London, Edward Arnold and Co., 1940.

Chemical properties of the cement

The chemical composition of this cement can be noted by a comparison with a typical portland cement.[4]

	Portland percent	Aluminous percent
SiO_2	22.0	5.0
Al_2O_3	6.5	42.0
Fe_2O_3	3.0	10.0
CaO	63.0	42.0

It can be seen that there is a large replacement of silica with alumina and subsequent lowering in the lime content. Thus the calcium silicates, principally tri- and di-calcium silicate, are replaced by calcium aluminates. These aluminates, as commonly written in the composite-oxide form, are calcium aluminate, $CaO \cdot Al_2O_3$ (abbreviated CA); tri-calcium penta-aluminate, $3CaO \cdot 5Al_2O_3$ (C_3A_5); penta-calcium tri-aluminate, $5CaO \cdot 3Al_2O_3$ (C_5A_3); and di-calcium aluminum silicate, $2CaO \cdot Al_2O_3 \cdot SiO_2$ (C_2AS). These compositions are located in Plate 1 (p.25) following the ternary diagram of the system. Because of the lack of clear information, iron has not been included, but is generally lumped with alumina in this diagram.[5] Tri-calcium aluminate, C_3A, gives a flash set on gauging with water and of course is avoided in the making of cement. C_5A_3 differs from the latter in showing no flash set, but nevertheless, the set occurs within 5-15 minutes, and owing to this rapidity, its actual value is doubtful. Both CA and C_3A_5 in the pure state rapidly attain high strengths and do not suffer from rapid setting. Bates[6] found final setting times of 2 and 8-16 hours respectively for these compounds. C_2AS seems to show no hydraulic properties. From these considerations, the notation of the alumina cement zone, shown in the diagram, seems valid.

The role of iron oxide in cement seems to be of minor importance, and the di-calcium ferrite formed does not contribute greatly to the strength.

The actual process of setting of aluminous cement is still a subject of some controversy, and the true mechanism is not completely agreed upon.[7]

Present manufacturing methods

In all present manufacturing processes, the raw materials are bauxite and lime or limestone. The method of manufacture is as yet far from standardized, and a variety of furnaces are in use. The most common production method is fusion in reverberatory open-hearth furnaces, arranged with a long vertical stack into which the bauxite and limestone are charged. It is fired with pulverized coal with a hot air blast. Fusion takes place at the point where the charge drops from the vertical stack into the furnace proper. The carbon dioxide and moisture are driven out the top, while the cement in the hearth is kept molten by heat radiated from the arch, and tapped out continuously from a tap hole. The temperature reached is about 1550-1600° C.

Electric furnaces have also been used at a number of plants in Europe. These are of the arc type, since the fused aluminates have too low a conductivity to allow the use of a resistance furnace.

All available references indicate that all commercial aluminous cements are completely fused, not merely clinkered as in the case of the usual portlands. Bates[8] states that alumina cements occur in a region where the temperature at which the compound is formed is considerably lower than in portland cement, and the compounds are also formed where slight changes in composition will require marked changes in the temperature needed to bring about

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[4]Bates, P. H., op. cit.

[5]Lea, F. M., and Desch, C. H., op. cit.

[6]Bates, P. H., op. cit.

[7]Lea, F. M., and Desch, C. H., op. cit.

[8]Bates, P. H., op. cit.

the desired reaction. Thus there is a narrow range where the mixture is a clinker of the desired composition, outside of which it is a mixture of unreacted raw material or a liquid. Some writers contend that complete fusion is absolutely necessary for good results. Hussey[9] states that complete fusion appears to have a very important bearing on other properties of the cement besides hydraulicity.

The rate of cooling is, according to Hussey,[10] an important variable in manufacture. Slow cooling is best, but the actual rates are based upon experience and are carefully guarded trade secrets.

The hard pigs of fused cement are crushed and ground to about the same size as portland cement, preferably within only 10 percent on a 150-mesh screen. The cement is very hard and causes considerable wear on the grinding equipment.

Raw Materials Used

The two principal raw materials used to make the cement were: (1) high-alumina clay obtained from Southwestern Washington deposits, and (2) ferruginous bauxite from deposits in Northwestern Oregon.

Castle-Rock clay

This was the first material tried and most of the work was done using it. This clay is of a group of transported and decomposed feldspars commonly called kaolin, or kaolinite, with the formula $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$. There are rather extensive deposits of these clays, varying somewhat as to composition, depth of overburden, etc., to be found in Southwestern Washington and Northwestern Oregon. The particular material that was used is known as Cowlitz or "Castle-Rock" clay, obtained from deposits near Castle Rock, Washington.

The analysis of this clay shows approximately this composition:

	Raw pct	Calcined pct
Al_2O_3	37.35	45.8
SiO_2	41.22	49.2
Fe_2O_3	4.13	5.0
Ignition loss	17.30	----

The material is located in Plate 1, the ternary phase diagram, on an iron oxide-free basis. It is immediately apparent from a glimpse of the tie-line that if only lime were added to this material the high-alumina zone located on the diagram would be missed, and no cement of the properties desired could be made, without the further addition of pure alumina, or chemical beneficiation. Such physical methods as flotation beneficiation would not solve the problem, for the silica impurity is tied up in molecular structure in the kaolin. An important factor, then, in the use of this raw material would be the ability to develop an economical enriching process. Since there has been considerable work done in an attempt to utilize these clays as a source of alumina production, the logical approach to this problem would seem to follow along these lines. However, the discouraging fact remains that if these would not be economically possible for the production of the relatively valuable aluminum, it is unlikely that they could be applied to this baser product. If, however, a process could be found that would give partial purification at a low cost, the answer might be found.

9Hussey, A. V., "The applications of aluminous cement and its influence on concrete construction": Chem. and Ind., 1936, pp. 1037-1045.

10Hussey, A. V., Idem.

Ferruginous bauxite

The other raw material, given the name ferruginous bauxite, is of laterite origin, located in sizeable deposits in Northwestern Oregon, especially Columbia County.[11] Although the compositions vary with location, two different samples used by these investigators show the following analyses, the first material (with the lower silica content) is of the classification known as "upper pisolitic fine," while the second is a typical mining mix."

	(1) pct	(2) pct
Al_2O_3	34.20	34.20
Fe_2O_3	33.99	34.00
TiO_2	6.43	6.40
SiO_2	6.62	9.50
Ignition loss	18.71	15.90

Both of these samples were obtained from Alcoa Mining Company which is conducting experiments as to the uses of this material as an aluminum source. The samples of this bauxite are located on the ternary diagram, on an iron- and titanium-free basis.

The economic study of these deposits has not been so thoroughly investigated by the authors as the kaolin clays, but it seems probable that the bauxite deposits would provide a satisfactory source from the standpoint of cost of mining, available supply, etc.[12] The deposits average about fifteen feet in depth, with an overburden of 1½ to 30 feet, with the former figure the more common, mostly of silt.[13]

Experimental Work

Castle-Rock clay

The first experiments were performed with Castle-Rock clay to which technical grade lime was added to make up the calcium oxide content of the cement, while technical grade of alumina was used to bring the composition down nearer to the desired area of cements.

Fusion was first attempted in a small induction furnace. But this furnace failed to get up to the necessary heat for complete fusion. The authors then used a single-phase arc furnace for which they built a special graphite crucible in order to fuse small-run batches of cement.* The results of the runs on the clay as well as those obtained later on the bauxite are tabulated in Table 2.

After a number of unsuccessful runs, it was decided that experimentation further with the clay as a raw material would be useless, because of the amount of pure alumina that had to be added. For instance, the makeup of Run no. 6 was: clay - 370 grams, pure alumina - 550 grams, and lime - 645 grams. It can be seen that very little use was made of the clay, and the alumina would naturally be too costly as a raw material. In addition, it is to be remembered that the silica and alumina are tied together in the clay in a molecular structure and it is very probable that more rigorous conditions would be required to break these bonds and make the cement molecules.

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[11] Kelly, J. V., "High alumina-iron laterite deposits, Columbia County, Oregon": U.S. Bur. Mines Rept. Inv. 4081, 1947.

[12] Libbey, F. W., Lowry, W. D., and Mason, R. S., "Ferruginous bauxite deposits in northwestern Oregon": Economic Geology, vol. 41, no.3, pp. 246-265, 1946.

[13] Kelly, J. V., op. cit.

* The original thesis fully describes the performance of the furnace and the behavior of the clay during experimentation.

Table 2.

Tabulation of Experimental Results

Run number	Raw material	Composition of feed				Strength psi		Comments
		Al_2O_3 pct	CaO pct	SiO_2 pct	Fe_2O_3* pct	24 hours	7 days	
1	Clay	40.0	40.0	10.0	10.0	----	----	Incomplete fusion
2	Clay	44.5	44.5	11.0	----	----	----	Incomplete fusion
3	Clay	44.5	49.0	6.5	----	----	----	Good fusion,hydraulic
4	Clay	46.7	40.8	10.4	2.1	----	----	Incomplete fusion,no hydraulic properties
5	Clay	44.0	49.0	6.5	0.6	----	----	Good fusion, flash set
6	Clay	47.0	43.0	10.0	----	1,949	3,592	Fusion, 2 hours
7	Pure components	47.0	39.0	8.0	6.0	1,320	1,870	Fusion, 3 hours, Fe_2Si formed
8	Clay	47.0	43.0	10.0	----	1,636	1,623	Incomplete fusion, 2 hours
9	Bauxite and clay	37.6	34.1	8.0	20.0	----	----	Easily fused, 2 hours
10	Bauxite and clay	45.0	37.0	8.0	10.0	244	1,640	Clinkered
11	Bauxite and clay	45.0	37.0	8.0	10.0	1,076	1,500	Nearly complete fusion, 2½ hours
12	Bauxite and clay	45.0	37.0	8.0	10.0	----	----	Electrode fused into charge, no results
13	Bauxite	25.0	40.0	5.0	30.0	4,350	6,100	Good fusion, Fe reduced, 1 hr., 45 mins.
14	Bauxite	25.0	40.0	5.0	30.0	3,030	6,060	Good fusion, 1 hr., 30 mins.
15	Bauxite	24.2	40.0	6.8	28.7	4,270	5,810	Good fusion, 1 hr., 30 mins., autoclave-0.08 pct expansion

*Includes TiO_2.

Ferruginous bauxite

Further experimentation, then, was conducted with the furnace and other equipment using the bauxite from the Oregon deposits. The first really indicative results were made on Run no. 13, which had the following analysis, both as predicted by the composition and amounts of raw materials added, and by actual determination, as previously described:

	Predicted pct	Actual pct
Al_2O_3	25.20	39.65
CaO	40.40	39.30
SiO_2	4.86	11.10
Fe_2O_3	29.70	9.95

The feed was 1000 grams calcined bauxite plus 675 grams CaO.

The strengths obtained with the compression cubes were:

	psi
24 hours	4,350
7 days	6,100

These strengths compare favorably with most commercial aluminous cements, and greatly surpass the strengths attained by portlands for these same periods of time.

It will be noticed that the iron content is considerably below that predicted, and that, comparatively, the alumina and silica contents are higher. The reason for this is the reduction of much of the iron. A single button of iron of 250 grams from a 1,675-gram charge was taken out, and there were other small pieces imbedded in the graphite crucible. The presence of so much iron oxide in the raw material was a problem because of its deleterious effect on the cement, and this reduction thus easily solved the problem of removal of much of it and gave very good strength characteristics to the product. The reduction took place of course on the bottom and sides of the graphite crucible. Because this cement showed promise, an autoclave expansion test, in which a pressure of steam of 295 psi is maintained for about three hours on the formed neat-cement mold, was conducted. This was to determine the expansion of the cement under severe conditions, and this sample showed only 0.08 percent expansion, which is well under the allowable value of 0.5 percent. Gillmore time-of-set tests were made, and they showed about 1 hour 15 minutes for initial and 5 hours 30 minutes final set. These values compare favorably with portland cements and are within the limits specified by the Bureau of Standards.

In order to determine roughly for certain if it was iron that was reduced and not such a substance as ferrosilicon, tests were made of the pig. These volumetric titrations showed about 98 percent iron, so it was definitely established that this was iron. No attempt was made to find a complete metallurgical analysis for such substances as arsenic, phosphorous, etc.

To determine the reproducibility of this cement, two more runs were made of the same starting composition. The strengths obtained with these products were:

	No. 14	No. 15
	psi	psi
24 hours	3,030	4,270
7 days	6,060	5,810

For Run no. 14, the 24-hour strength is lower than the earlier run, but the reason for this mainly lies in a faulty preparation of one set of cubes, for in tamping them, insufficient pressure was used, and there were air spaces, or honeycombs which definitely lowered the 24-hour strength. Not all of the cubes were in this condition, and on the 7-day test, only two of the three were counted because the third was honeycombed and showed much less strength. This would not, of course, be considered as a strictly reliable procedure, but for the comparative purposes of this work, it was believed to be justifiable. Run no. 15 also compared favorably with no. 13.

It is quite possible, of course, that these runs would not be strictly reproducible in commercial practice, for the reduction, being dependent upon the graphite of the crucible and electrode, would vary with the rate of feed, time of fusion, arc tension, current, and many other variables which were impossible to keep constant with the setup used. However, the fact that their characteristics were so similar indicated that they would probably be representative of the commercial product.

Conclusions

1. Castle-Rock clay is not suitable for the manufacture of aluminous cement because of its high silica content.

2. If Castle-Rock clay is used for cement, it would have to be beneficiated. It is doubtful if the cost of beneficiation would warrant its use in cement.

3. It is more advisable to utilize ferruginous bauxite from this same general locality.

4. Experimantal work indicates that despite its high iron content, a suitable mixture of the ferruginous bauxite and lime or limestone will produce a good aluminous cement.

5. The value of the iron formed in the process is uncertain since a complete metallurgical analysis was not performed. It is possible that a commercial grade of iron could be obtained.

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OLD MINE REACTIVATED

According to Mr. E. R. Waite of Waite Minerals, Inc., Grants Pass, the lower tunnel of the Cowboy copper property, Waldo Mining District, southern Josephine County, is being extended with the objective of cutting the ore exposed in the winze 200 feet above. Eight men, two shifts a day, are presently employed, Mr. Waite stated.

The Cowboy has a record of production estimated at $300,000, and although the property has been known since about 1900, most of the production was in the period 1928-1930. Values have been mainly copper and some gold.

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ADMINISTRATION BACKS SYNTHETIC FUEL BILL

John R. Steelman, assistant to the President and acting chairman of the National Security Resources Board, has written the House and Senate Interstate and Foreign Commerce Committees that he is in favor of legislations to accomplish the purposes of the Synthetic Fuels Bill. This bill includes $400,000 to reimburse the Alabama Power Co. for large-scale underground gasification experiments to determine whether coal in place can be burned and whether resulting gases are suitable for synthetic fuel purposes.

From Compact Comments published by Interstate Oil Compact Commission, Oklahoma City, Oklahoma, April 1, 1949.

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UNITED STATES GOLD AND SILVER MOVEMENTS IN FEBRUARY 1949

The monetary gold stock of the United States was increased during February by $18,429,000 to $24,289,635,000 at the end of the month as the combined result of earmarking operations, receipts from foreign countries, exports, domestic production, and other factors. Gold held under earmark at the Federal Reserve Banks increased during February by $22,200,758 to $3,802,549,285.

Gold exports in February totaled $4,499,082 and imports $25,978,267. Silver exports totaled $260,861 and imports $3,278,067. Principal gold exports were to Greece, $2,026,972 and Danzig $1,575,003. Principal imports were from Union of South Africa, $21,128,599. Principal exports of silver were to United Kingdom, $120,580 and principal imports from Mexico, $1,727,947.

From World Trade News published by Field Service, United States Department of Commerce, March 31, 1949.

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NEW MEMBER DEPARTMENT GOVERNING BOARD

Mr. Mason Bingham, Portland, has been appointed by Governor Douglas McKay as a member of the Governing Board of the State Department of Geology and Mineral Industries. Mr. Bingham succeeds Mr. E. B. MacNaughton who had expressed a desire to be relieved of his duties as a member of the Board at the expiration of his term on March 16. The State Senate confirmed Mr. Bingham's appointment on April 2. His appointment is for a 4-year term beginning April 4, 1949, and ending March 16, 1953.

Mr. Bingham has been prominent in Oregon business circles for many years. He is manager of the Lewis Investment Company, which owns the Benton Mine, the largest producing gold mine in southern Oregon until it shut down because of war conditions. He is chairman of the Multnomah County Tax Supervisory and Conservation Commission as well as being a director in the First National Bank and the M. & M. Woodworking Company.

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NEW BULLETIN WITH GEOLOGIC MAP ISSUED

The geology of the Kerby quadrangle, located in southwestern Josephine and southeastern Curry counties, is the subject of a bulletin including a colored geologic map, which has just been issued by the State Department of Geology and Mineral Industries. This bulletin was prepared and published as a cooperative project between the Department and the U. S. Geological Survey.

Authors of the bulletin are Dr. Francis G. Wells, who was in general charge of the field work, Preston E. Hotz, and Fred W. Cater, all geologists with the Survey.

The field work covering the bulletin and map started in 1940, suspended during the war period, resumed in 1945, and was finished in 1947. Besides the areal geology a total of 188 mines and prospects are shown on the map which covers an area of nearly 75 square miles. Much of this area is rough and inaccessible. Some of the towns and place names in the quadrangle were important in the early boom days nearly 100 years ago. Known deposits of copper, chromite, and gold are scattered throughout the quadrangle area.

The bulletin, Number 40, is entitled Preliminary Description of the Geology of the Kerby Quadrangle, Oregon, includes the geologic quadrangle map in the pocket, and may be obtained at the Portland office of the Department in the Woodlark Building, Portland, Oregon, or at the field offices in Baker and Grants Pass. Price postpaid is 85 cents.

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GOLD

According to an item in the "Mining World" of London, England, C. J. Turle, chairman of Hampton Gold Mining Areas, Ltd., is completing a special report on the world gold price in relation to the economic future of the English speaking nations. The report, when completed, will be sent to President Truman and U.S. Treasury officials. In the meanwhile, the group of gold producers, which Mr. Turle represents, has cabled President Truman recommending a high world gold price.

Congressman D. A. Reed (R-N.Y.) has introduced bill H. R. 3262 into Congress, to allow a free circulation of gold, redemption of paper money for gold, to establish and maintain a domestic gold coin standard, and for the repeal of the Gold Reserve Act of 1934. The bill does not call for any increase in price of gold or silver.

One of our prominent business magazines, in commenting on the sale of South African gold above $35.00 per ounce, states that the latter price is becoming "shaky," and the International Money Fund is badly worried about it. The magazine indicates the $35 price is too low.

* * * * *

According to reliable newspaper advices, gold is selling in Manila at $44.00 to $47.50 an ounce, and in 1948 the Mysore Mine in India sold its entire production at 21 pounds sterling an ounce, the equivalent of $84.00 in U. S. money.

From News Letter, published by Mining Association of Montana, Butte, April 1949.

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STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
Head Office: 702 Woodlark Building, Portland 5, Oregon

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TREASURY PROFITS ON SILVER

The following article by Edward L. Weikert, Jr., appeared in the Numismatic Scrapbook Magazine, Chicago, December 20, 1948, under the heading "Numismatic News from Washington." The editor of The Ore.-Bin was interested in the article for two reasons: first, it states facts, seemingly without bias, of the kind which the western mining industry finds it necessary to present continually to our lawmakers; and second, the article prompted the thought that our mining industry is probably missing a bet in not actively enlisting the support of numismatists in advocating to Congress a strong metallic backing for our currency, and in opposing legislation such as that sponsored by silverware manufacturers. A mailing list of numismatists should be a valuable addition to the active files of the American Mining Congress.

* * * * * * *

There is more misinformation about silver than any other subject in the United States. Much of it is deliberate and mischievously propagandized by selfish interests who profit by this misinformation. Probably the worst canard is that there is somewhere an unlimited amount of silver ready to flow into the United States Treasury once the price of silver is advanced, despite the fact that the annual reports printed by the United States Bureau of the Mint show that the total world production of silver since the discovery of America in 1492 up to the present time has been less than 18,000,000,000 ounces. Deducting losses and industrial uses, the amount available in the entire world for monetary purposes is probably less than 12,000,000,000 ounces.

Yet, when the Silver Purchase Act of 1934 was under discussion, opponents of silver gloomily prophesied that the unlimited purchase of silver at 45 cents per ounce would bankrupt the Treasury. The United States Treasury purchased all the silver offered at that price, but was able to buy only 3,000,000,000 ounces, because most of the silver in the world is already coined into money. This is particularly true in the Orient and the Middle East where silver is, and probably always will be, their money.

Incidentally, on the 3,000,000,000 ounces we were able to purchase, the United States Treasury made a net profit of 1½ billion dollars and would have made considerably more but for the fact that several hundred million ounces were lend-leased to foreign countries for monetary purposes, and other millions of ounces sold to jewelry manufacturers and industrial users at much below the monetized price.

Even on the relatively small amount of silver that will go into the minting of 5,000,000 fifty cent pieces commemorating the Booker T. Washington Birthplace Memorial, the net profit to the Treasury will be $1,619,394.00.

A saving of several million dollars to the taxpayers was also made on the silver money in circulation since it is only part of the $29,000,000,000 of money in circulation on which the American taxpayers pay no interest.

Neither silver nor gold are used extensively in industry; gold almost not at all, while the industrial use of silver does not exceed 15 percent of the production. Until recently, it was limited almost exclusively to jewelry, silverware, and plate silver. In hearings conducted by the Senate Appropriations Committee in 1946, it was proven that the retail prices of such articles bore little or no relation to the silver content; that the prices were from 5 to 25 times the value of the silver in them.

During the war, rather substantial quantities of silver were loaned by the Treasury to industrial plants, such as aluminum plants, to serve as bus bars in the transmission of high-voltage electricity. This was to release the copper bus bars for the making of shells and amunition, but since the end of the war, this silver has been returned to the Treasury. It is interesting to note that, during the war, this loaned silver served a dual purpose - as a part of the monetary reserves back of silver currency in circulation, and as a conductor of electricity in war plants. Since silver is imperishable, indestructible, and noncorrosive, the industrial use of it in no way impaired its value; and should the necessity arise, silver used as monetary reserves can be loaned again for such purposes.

Relatively small amounts of silver are used in electric appliances and in the making of moving-picture films. That is, the amount is very small compared to the cost of the commodities in which it is used. For example, thermostat controls for regrigerators and automobile heaters use about three cents worth of silver each unit, so the effect on the cost of a $200 refrigerator or a $2000.00 automobile is practically nil. Some silver is also used in medicine, but the amount is so small that the price is a matter of little consequence.

The largest manufacturer of the thermostats referred to above stated that he was not concerned whether the price of silver was $1.00 or $5.00 per ounce, since so little silver was required for each unit. He simply wanted to know that he could be sure to get it. This was during the temporary shortage of silver in this country in 1946. It may surprise many to learn that the Treasury sold 200,000 silver dollars to industrial users during that period to be melted down for their silver content. This is not illegal since the law against defacing money applies only when there is an intent to defraud the Government and, of course, there was no intent to defraud in this instance.

Since the price of the finished products bears little relation to the value of the silver in these products, the monetization of silver should help rather than hurt industrial users, as it would stabilize the price and insure a constant supply.

The necessity for monetized silver is just as great as the necessity for monetized gold, and no one would advocate a reduction in the price of gold for the benefit of manufacturers or fabricators of gold jewelry.

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EASTERN PERLITE FURNACE SUSPENDS

A perlite furnace at Grand Rapids, Michigan, which had operated for a year on perlite shipped from the Dant and Russell Lady Frances Mine, located at Frieda, on the Deschutes River, has shut down. The existing freight rate structure became too burdensome and the Grand Rapids Company will seek a supply elsewhere. This is a striking example of the importance of freight rates in the mineral industry, and more particularly in the nonmetallics field.

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THE JOHNSON ELEVATION METER

Automatic meters or measuring instruments are an integral part of our industrial machine. They furnish us with the means of control over speeded-up operations. It is difficult to imagine the laboriousness of operating without one when it has once proved its usefulness. When a proved new one appears it is welcomed as a saver of time and a means of substituting robot accuracy for the human equation. The Johnson Elevation Meter is such an instrument. It has been tested thoroughly. The U.S. Geological Survey has used it successfully to provide vertical control for topographic surveys. It has also been used to establish elevations for geophysical and geological surveys. The Sperry-Sun Well Surveying Company, Houston, Texas, operates this equipment on a service basis furnishing the instrument and operator.

A description of the operational technique follows:

The Johnson Elevation Meter equipment consists of a special three-wheeled trailer towed by an automobile. Continuous measurements of the change in elevation are made as the trailer moves along the road. Wherever it is required to establish an elevation at a given point on the road, the automobile is stopped, and the elevation is read from a counter similar to the ordinary mileage odometer. Elevations are easily transferred to nearby points off the road by means of a level rod and hand level provided for this purpose.

The Elevation Meter determines differences in elevation by integrating the instantaneous values of the path length (or velocity) and the sine of the inclination angle. The measurement of velocity is made by a device directly geared to the rear trailer wheel and which provides an electrical signal proportional to the velocity. A second device which furnishes an electrical signal proportional to the inclination angle is mounted mid-way between the front and rear wheels of the trailer. A special electronic integrator, which is carried in the towing vehicle, accomplishes the integration of velocity multiplied by the sine of the angle of inclination. The measured change in elevation is exhibited on a Veeder Root counter which reads directly in feet. Tenths of feet are read from an auxiliary electrical meter. The total distance traveled is also recovered from the integrator and compared with the reading of an odometer also directly geared to the rear wheel. The comparison of these two determinations of distance provides a means of checking instrument performance since they must agree to established limits. The speed at which the integrator operates will be realized when it is noted that the roadway is, in effect, divided into 500 parts per foot of travel.

Advantages of the Elevation Meter over standard methods are found in its greater speed of operation and also in a reduction in costs per mile traversed. The automobile may be driven at speeds as great as 25 miles per hour, and it is often possible to survey as much as 60 to 80 miles of traverse per day, depending on the accuracy required and the number of stations occupied.

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ASSESSMENT WORK

The House of Representatives has passed H.R. 1754, which extends the time for finishing annual assessment work for the current assessment year to October 1, 1949. The House has also passed H.R. 3754, which provides a temporary deferment for claimants by the Secretary of the Interior upon application by the claimant, where evidence is satisfactory that a mining claim or group of claims is surrounded by lands over which a right-of-way has been denied or is in litigation. Deferment may also be granted by the Secretary if other legal impediments exist which affect the right of the claimant to enter upon the surface of such claim or group, or to gain access to the boundaries thereof.

The Senate Committee on Interior and Insular Affairs is considering two bills, as follows: S.J. RES. 57, extending time for finishing the assessment work for the current assessment year to September 1, 1949; and S. 1141, suspending entirely the assessment work for the current assessment year.

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INDUSTRIAL MINERALS CONFERENCE

The third annual Northwest Industrial Minerals Conference, sponsored by the Columbia Section American Institute of Mining and Metallurgical Engineers in cooperation with the Oregon and North Pacific Sections, was held at the Davenport Hotel, Spokane, May 14, 1949. Oregon men who attended were: Frank McCaslin, David Charlton, James Jensen, Jack MacWilliams, George McBride, W. R. Reynolds, Willard Colegrove, Albert Lewis, A. O. Bartell, Leslie C. Richards, Hollis Dole, Ivan Bloch, and F. W. Libbey.

The papers, covering a broad industrial minerals field, were as follows:

Production of Manganese Oxides and Ammonium Sulphate, by Normas Ketzlatch, Chief Chemist, Manganese Products, Inc., Seattle, Washington.

Garnet and Kyanite Production at Fernwood, Idaho, by John Crandall, Manager, Idaho Garnet Abrasive Company, Fernwood, Idaho.

Corrosion Resistant Materials and Coatings in the Trail Chemical Operations, by E. A. G. Colls, Manager, Chemicals and Fertilizer Division, Consolidated Mining and Smelting Company of Canada, Limited, Trail, British Columbia.

Recent Improvements and Mechanization in Mining Practice of Washington Magnesite, by Howard A. Ziebell, Manager, Chewelah Plant, Northwest Magnesite Company, Chewelah, Washington.

Washington's Assets in the Field of Industrial Minerals, by Sheldon L. Glover, Supervisor, Division of Mines and Geology, Olympia, Washington.

Studies of the Effect of Freight Rates on Marketing of Northwest Industrial Minerals, by Leslie C. Richards, Mining Engineer, Baker, Oregon.

Ceramics, by Dr. Peter D. Johnson, Assistant Professor in Ceramic Engineering, University of Washington, Seattle, Washington.

Lehigh Portland Cement Company, Metaline Operations and Expansion, by Alfred W. Schaeffer, Manager, Metaline Plant, Lehigh Portland Cement Company, Metaline Falls, Washington.

Calcium Carbide for Pacific Northwest Industries, by James Jensen, Plant Engineer, Pacific Carbide and Alloys Company, Portland, Oregon.

Nonmetallic Minerals and Rocks in Montana of Value for Industrial Use, by Dr. Eugene S. Perry, Head, Department of Geology, Montana School of Mines, Butte, Montana.

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MOUNTAIN CITY COPPER COMPANY TAX CASE

The Wall Street Journal of May 11, 1949, reports a recent ruling of the tenth U. S. Circuit Court of Appeals that total receipts from sale of ore during a development period are subtracted from total expenditures and are taxable income only if they exceed total development costs. If the total expenditures exceed total receipts the balance is charged to capital account.

The decision resulted from a case involving the Mountain City Copper Company which started developing a mine in 1932 and completed development February 16, 1936. During the last of 1935 and early in 1936 the company received $288,525 from sales of ore. This amount was applied against the total development costs of $376,236 reducing that amount to $87,711.

The Commissioner of Internal Revenue had contended that receipts and expenditures should be computed on a monthly basis, and expenditures charged to capital account in those months when they exceeded receipts from ore sales. He maintained that for months in which receipts exceeded expenditures the excess represented taxable income.

However, the court ruled that the company could subtract the amount of sales from the total development costs to obtain the capital costs.

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SUPERIOR SETS NEW RECORD FOR DEEPEST WELL

Company holding the distinction of having drilled the world's two deepest wells has again set a drilling record. Superior Oil Co. of California has successfully carried its 1 Unit, SW NE SW 27-27n-103W, a Pacific Creek wildcat in Sublette county, Wyoming, to a depth of over 19,000 feet.

This depth compares with 51-11 Weller, which was drilled to a depth of 17,823 feet in 1947 in Caddo county, Oklahoma, and 1 Limoneira in Ventura county, California, which was abandoned last month at a depth of 18,743 feet.

The 1 Unit is being drilled with a new $1,000,000 rig which was displayed at the International Petroleum Exposition last year and which is termed "the world's largest rig, capable of drilling to 20,000 feet."

From Compact Comments, May 1, 1949, published by the Interstate Oil Compact Commission, Oklahoma City.

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UNITED STATES GOLD AND SILVER MOVEMENTS IN MARCH 1949

The monetary gold stock of the United States was increased during March by $24,181,000 to $24,313,816,000 at the end of the month as the combined result of ear-marking operations, receipts from foreign countries, exports, domestic production and other factors. Gold held under earmark at the Federal Reserve Banks increased during March by $16,724,660 to $3,819,-273,945.

Principal imports of gold were from the Union of South Africa, $21,341,042 out of a total of $24,878,731. Other principal imports were, in order of their magnitude, from Colombia, Nicaragua, Canada and Mexico. Imports of silver approximated six and one-half million dollars of which $3,793,557 was from Mexico and $974,000 from Canada.

From World Trade News published by U. S. Dept. of Commerce field service.

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NEW SMELTER USES ANTIMONY ORE

Morris P. Kirk & Sons, Inc., manufacture a variety of lead alloys, including antimonial lead, at the new smelting plant in northwest Portland. The company's main plant is in Los Angeles and there is another branch plant in Salt Lake City. Antimony ore for the plants is bought through the Los Angeles purchasing department at 2717 South Indiana Street. Mr. E. E. Gullette is purchasing agent. Specifications are: approximately 50 percent antimony containing no arsenic or silver. Crude ore ranging in size from about 6 inches to half an inch is required. Mr. James Miller is in charge of the Portland plant.

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STATE DEPARTMENT ISSUES URANIUM HANDBOOK

To answer the many questions asked about characteristics, occurrences, and geological habits of uranium ores, the State Department of Geology and Mineral Industries has just issued G.M.I. Short Paper No. 18, which is a small handbook titled "Radioactive Ores the Prospector Should Know." The author is David J. White, geologist with the Department.

The handbook describes the principal uranium and thorium minerals, their geological associations, and the equipment and methods used in testing for radioactivity. A page is devoted to an outline of the Atomic Energy Commission rules and prices, and a list of manufacturers of Geiger-Müller counters is also included.

The Short Paper may be obtained at the office of the Department in the Woodlark Building, Portland, and the field offices in Baker and Grants Pass. The price is 20 cents postpaid.

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DEPARTMENT ADMINISTRATOR OF NEW LAW REGULATING OIL WELL DRILLING

House Bill 427 passed by the last Legislature and signed by the Governor becomes effective July 16, 1949. This law requires the Department to supervise all oil-well test drilling and to set up regulations governing the various operations in such drilling in order to obtain records of value to the State and to insure against flooding of oil and gas formations by water. An outline of provisions in the bill requires that operators shall observe the following rules:

(1) An operator shall use such methods as are necessary for controlling and confining natural gas to prevent waste and to avoid danger to persons and property in the vicinity of the operations.

(2) No inflammable products from a well shall be permitted to run into any water used or usable for watering stock, and waste oil or oil refuse shall be burned at a safe place.

(3) Wells to be abandoned must be plugged in a manner approved by the State Department of Geology and Mineral Industries.

(4) Notices of commencement of drilling and completion of a hole must be filed with the Department. All records including drilling history of operations and a drilling log, as well as a casing record, must be filed with the Department.

(5) The Director of the Department shall appoint an oil and gas inspector who is given power to supervise operations according to regulations which may be prescribed by the Department. Water formations encountered in drilling must be shut off in a manner approved by the Department.

(6) The law requires operators to file under oath statements concerning production of oil and gas produced and marketed.

The Department is compiling forms to cover the various requirements set up in the law and these forms will be available at the Department offices in Portland, Baker, and Grants Pass prior to the date on which the law goes into effect. In general, these forms are patterned after those in use in California and New Mexico.

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STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
Head Office: 702 Woodlark Building, Portland 5, Oregon

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EARTHQUAKES

The recent earthquake in the Pacific Northwest which was heaviest in the Puget Sound area was the incentive for the accompanying article.

In perspective, it may be stated authoritatively that this earth is a very unstable vehicle for our ride through space. Our span of life is but a brief instant in geologic time, but during that instant there are thousands of earth shudders. Some of them are rough and kill people; others are so slight that they are detected only by instruments. Some parts of the earth's surface appear to be relatively secure and others are certainly subject to recurring shakes, some of which are serious and will continue to be serious, but always they are unpredictable as to time.

According to the Seismological Society of America bulletins for the year from March 27, 1948, to March 27, 1949, there was a total of 253 recorded earthquakes. One hundred ninety-five of these were in the whole Pacific area, of which 78 were in the United States part of the area. Three were recorded in Alaska (with 8 off the coast or in the Aleutians). None was recorded in British Columbia (2 were off the coast). One was recorded in Oregon (1 was off the coast). Of the total, 74 were recorded in California. Nine were centered in other western states (Montana, Nevada, Utah).

These figures indicate that Oregon is a fairly tranquil place from the standpoint of earthquakes but it would be unsafe to predict that tomorrow we shall not have one.

To return to our original thought regarding the instability of the earth, we like to have an excuse to quote from a certain part of The Ancient Volcanoes of Oregon by Howel Williams. The part we especially like reads: "The landscape is changing endlessly, and the face of the earth is always in motion, pulsating like a living thing."

These pulsations are poetic in this text; in reality they are often disastrous, even though they occupy but a moment of our brief existence in the geologic scheme.

The Editor

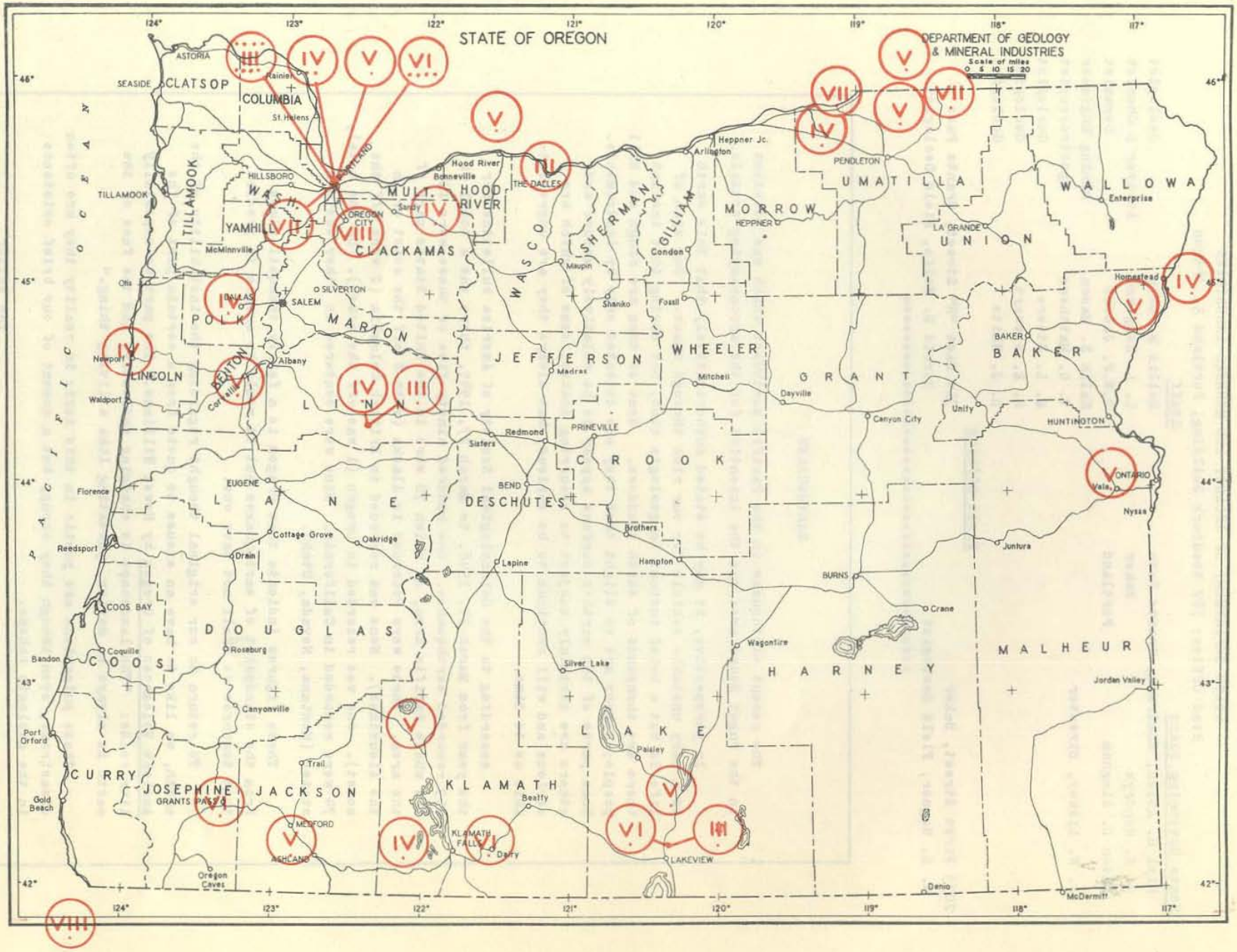

Fig. 1. Index map showing location of earthquakes in Oregon having an intensity of III or greater. Dots indicate number of shocks.

OREGON EARTHQUAKES

By
Ralph S. Mason*

Oregon has suffered but little damage from earthquake activity in the past century. The accompanying graph (fig. 2), which shows the occurrence in the State of all earthquakes with an intensity of III or greater (modified Mecalli intensity scale), shows that there has been only one earthquake having an intensity of VIII, and only three having an intensity of VII. On the Mecalli scale, an earthquake of intensity VIII is characterized by "slight damage to specially designed (brick) structures, with considerable damage to ordinary substantial buildings, accompanied by fall of chimneys, monuments, and walls." An earthquake of intensity VII does little damage to buildings of good design, although poorly built structures may suffer considerable damage. Earthquakes of intensity VI or less do little damage, and many people fail to even realize that an earthquake of an intensity III or IV has occurred.

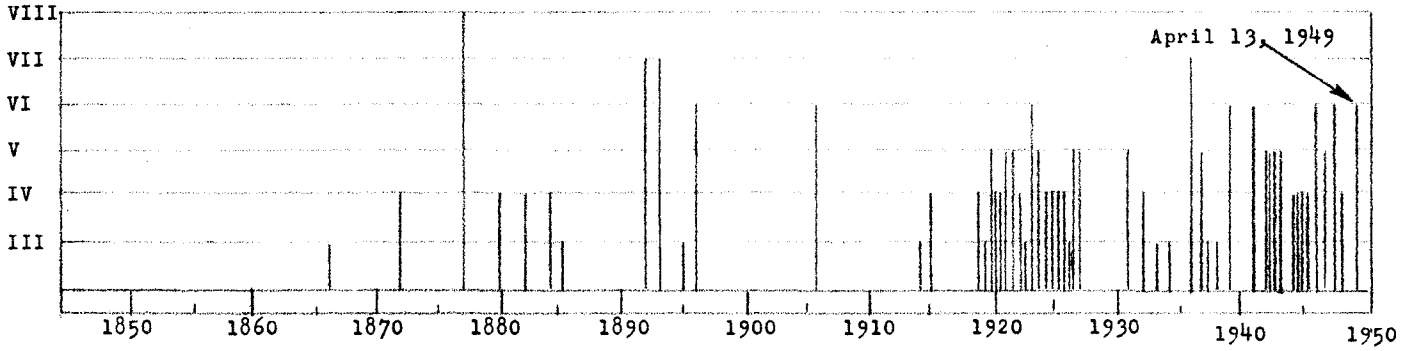

Fig. 2. Graph showing occurrence of earthquakes in Oregon having an intensity of III or greater from 1846 to 1949.

The greater number of earthquakes recorded since 1920, as shown on the graph, would seem to indicate at first glance that Oregon had experienced a great increase in seismic activity as compared to the 70-year record prior to that date. This would probably be an erroneous conclusion. During the early part of the period covered by the graph Oregon was sparsely settled and communication between settlements often long delayed. In sparsely settled areas the chances for a minor shock to go unobserved are relatively good, while in densely populated areas a shock of even low intensity is usually observed by enough people to verify its occurrence. The advent of the seismograph, a mechanical device which records even the faintest earth tremors, has resulted in a greater number of reported earthquakes in recent years.

The index map (fig. 1 opposite this page) of the State showing the location of earthquakes having intensity of III or greater bears out the fact that areas of reported earthquake activity coincide with the areas having the greatest density of population. It is extremely doubtful that the Portland area has had any more shocks than other areas in the State. The map shows, however, that there have been seventeen earth tremors in the Portland area as compared to a total of one or two for any other area in the State. It should be noted in connection with the plotting of the earthquakes shown on the index map that only those quakes which apparently originated within the boundaries of the State, or closely adjacent to it, were shown. Probably every part of the State has felt earth tremors, at one time or another, which originated at a considerable distance, perhaps many miles beyond the boundaries of the State.

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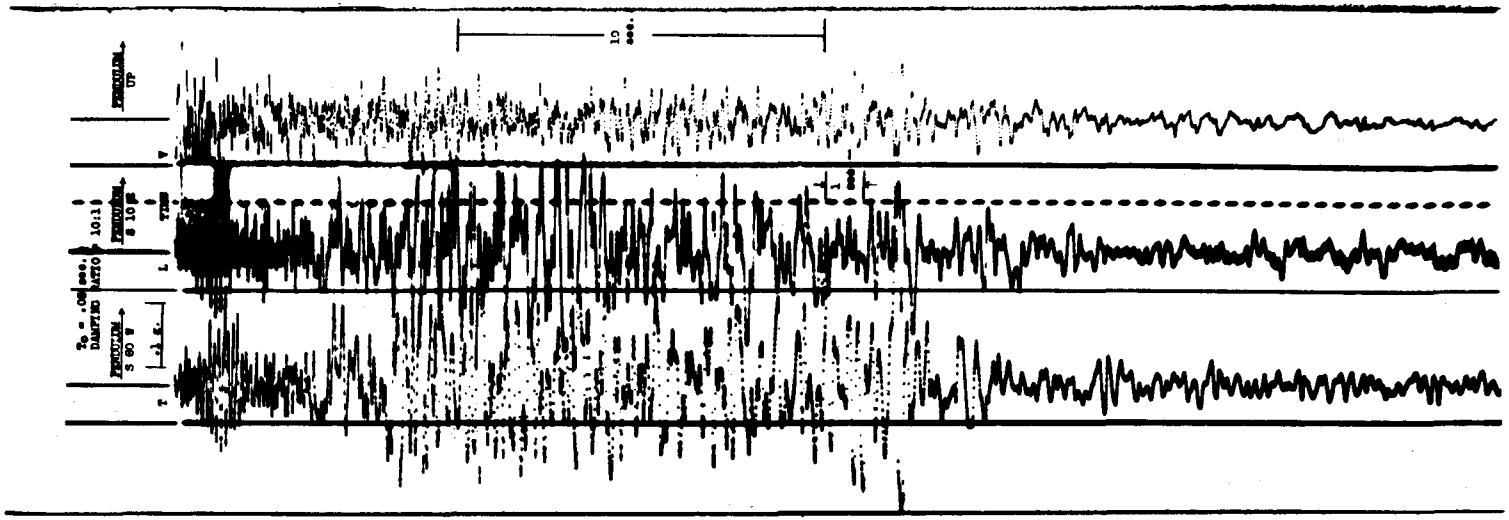
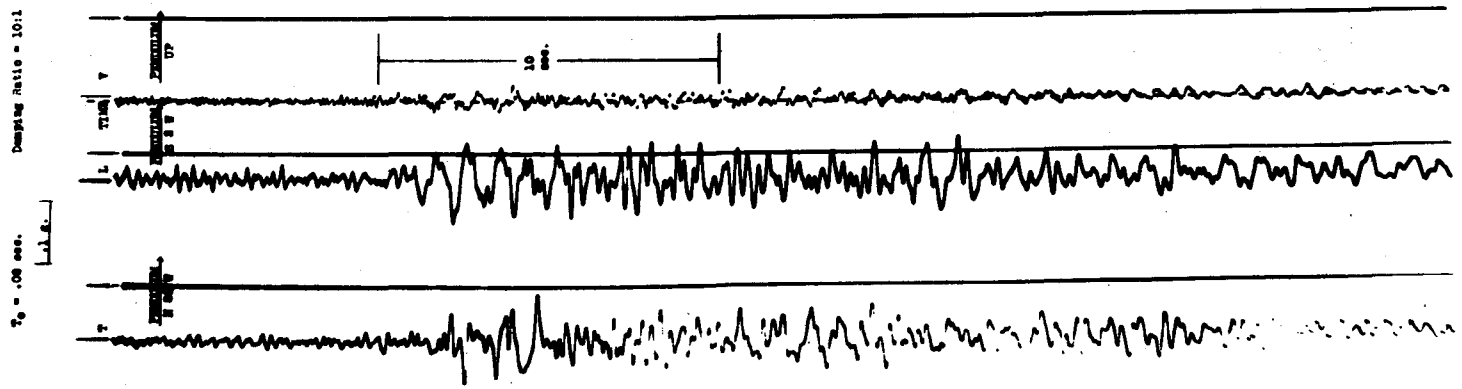
* Mining Engineer, Oregon Department of Geology and Mineral Industries.

OLYMPIA, WASHINGTON, ACCELEROGRAPH
EARTHQUAKE APRIL 13, 1949, 11:56 A.M., P.S.T.



SEATTLE, WASHINGTON, ACCELEROGRAPH
EARTHQUAKE APRIL 13, 1949, 11:56 A.M., P.S.T.



U.S.C. & G.S. SS-23
Seis. Field Survey

Fig. 3. Graphs of the April 13, 1949 earthquake recorded by U. S. Coast and Geodetic Survey accelerographs at Seattle and Olympia, Washington.

There has been little scientific interest taken in earthquakes in Oregon until quite recently. This has been doubtless due to the fact that the State has experienced such little earthquake disturbance. At the present time there is but one seismic recording station in the State, although a second station is currently being prepared. A description of the seismograph installed at Oregon State College appeared in the July 1948 Ore.-Bin. This instrument is to be replaced by one of improved design which will be housed in a more suitable structure located a short distance outside of Corvallis. The instrument currently at Corvallis is to be transferred to the Eastern Oregon College of Education at La Grande.

The recent quake which occurred April 13, 1949, although causing little damage in the Portland area, created considerable interest and concern among individuals, public agencies, engineering firms, power companies, and insurance firms. The State of Washington has inaugurated a special study of the earthquake, the epicenter of which was located by the U.S. Coast and Geodetic Survey between Olympia and Tacoma. Olympia suffered the greatest damage of the cities of the Puget Sound area. Minor damage to several of its substations in southern Washington was reported by Bonneville Power Administration. The Oregon Section, American Society of Civil Engineers, has undertaken a comprehensive study of earthquake resistant construction in buildings in Oregon. The study will include both the public safety and economic aspects of the problem.

As would be expected, local insurance firms were besieged by requests for earthquake insurance coverage immediately following the recent disturbance. One large international insurance firm made a comprehensive study of the earthquake activity in the State, together with a study of the subsurface conditions existing in the areas occupied by the principal cities in the State.

The graphs (fig. 3), representing the record made by the accelerographs operated by the U.S. Coast and Geodetic Survey at Seattle and Olympia, Washington, show the movements of the earth in three directions; the upper trace is a record of the vertical motion, the second and third show horizontal movement, the one trace being a record of motion at right angles to the other. In addition, of course, the graphs show the relative extent of greatest shock as well as a comparison of the intensity of movement between the Olympia and Seattle records.

Similar records recorded by other instruments in cities scattered throughout the world enable seismologists to locate accurately not only the geographical location of the origin of the quake but its depth below the surface as well. Further information regarding the two graphs reproduced herewith may be obtained from the U.S. Coast and Geodetic Survey, Seismological Field Survey, 214 Old Mint Building, San Francisco 3, California.

Oregon has been spared from destructive earthquakes, such as those which have been experienced in California, principally because the San Andreas rift which can be traced from the Mexican boundary northwards through San Francisco to a point just south of Eureka, California, passes out to sea, probably parallel to the Oregon coast some little distance from the shore line.

Undoubtedly Oregon experienced numerous severe earthquakes in the geologic past when fault scarps such as those now visible at Winter and Abert rims and Steens Mountain were formed. It is, of course, impossible to predict what the future holds for Oregon with respect to earthquake activity, but it is interesting to note that in California, seismologists estimate that four great shocks may be expected per century. These shocks will be generated by movement along either the San Andreas rift or the Owens Valley trough.* Just when the next slip will occur along the San Andreas fault line or at what point the movement will take place can not be determined. If the movement should occur along the portion of the fault which passes to the west of the State of Oregon, the resulting damage might be substantial. Careful measurements are being made along the California coast to determine the motion of the earth's surface on both sides of the San Andreas fault. The rate of movement at the present time continues at about the same rate that preceded the San Francisco quake in 1906.

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*From the bulletin of the Seismological Society of America: Vol. 34, No. 4, October 1944, "Frequency of earthquakes in California" by B. Gutenberg and C. F. Richter.

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ASSESSMENT EXEMPTED

Congressman Harris Ellsworth has wired the Department that on June 17 the President signed HR 1754 which extends the mining claim moratorium to cover the current assessment year ending July 1, 1949. Provision is made in the bill for crediting any labor performed or improvements made on any mining claim during the current assessment year against the labor or improvements required to be performed or made for the year ending on July 1, 1950.

In order to obtain the benefits of this act every claimant must file or cause to be filed in the office where the location notice or certificate is recorded, on or before 12 o'clock noon of August 1, 1949, a notice of his desire to hold his mining claim or claims under the act. Claimants on O&C Lands must file also with the Bureau of Land Management, Swan Island, Portland. **********

NEW URANIUM GUIDE

The U.S. Atomic Energy Commission and the U.S. Geological Survey have collaborated in publishing a pocket size handbook of 123 pages entitled "Prospecting for Uranium." The text contains descriptions of types of deposits, uranium minerals, various tests for radioactivity, methods of using the Geiger counter, and the laws and regulations governing the location of uranium claims and production of uranium ore. The handbook is available through the Superintendent of Documents, Washington 25, D.C. Price is 30 cents per copy.

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URANIUM SCHOOL

The Nevada State Uranium School has been established with Don C. Cameron, Director. The address of the school is State Capitol Building, Carson City, Nevada. Anyone interested in obtaining further information could write Mr. Marty Hess, care of the school.

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OREGON MINING NOTES

Mr. Bert Lowry, Medford, Oregon, has leased his antimony property to the Fasel and Scott Mines, also of Medford. The property is located in the Upper Applegate area, on Kanaka Gulch in southern Josephine County. Messrs. Fasel and Scott have recently cleared out some of the underground openings and are mining and sorting stibnite ore. Three men are employed.

* * * * *

The Buffalo Gold Dredging Company, 582 Market Street, San Francisco, has purchased the dredge and placer ground formerly owned by the Western Gold Dredging Company of San Francisco and John Day, Oregon. The dredge is a connected bucket type with buckets of about 6-cubic feet capacity. The present set-up is at Mount Vernon in the John Day Valley. The Western Gold Dredging Company operated the dredge until it was shut down by War Production Board Order L-208. Operations were resumed by the Buffalo Gold Dredging Company April 25, 1949, under the direction of Paul Clemmons, Superintendent. Thirteen men are employed.

* * * * *

The Calhoun and Howell dragline dredge located near Dale, Oregon, on the North Fork of the John Day River was obliged to suspend operations during May because of high water. Operations were conducted on the location during 1948 and were resumed after the winter shutdown in February 1949. It is planned to start up again in June.

* * * * *

A. L. Schneider and associates have begun open-pit exploration work on a gold lode property near Gold Hill, Oregon. The excavation work is by Stearns and Owens, Medford, Oregon. An estimated 100,000 cubic yards has been excavated in the operation which is also to include considerable diamond drilling and some underground development work.

* * * * *

The Opp gold mine in Josephine County, Oregon, has sold 2000 yards of dump rock at 15 cents a yard for road metal, and about 1000 tons of mill tailings at 50 cents a ton for paving and manufacture of hollow tile.

* * * * *

Baker County high grade stibnite ore from the Gray Eagle Mine was used in the initial run of the Morris P. Kirk & Son, Inc., smelter at Portland which started up June 1.

* * * * *

According to the Spokane Spokesman Review of June 17, 1949, Cornucopia Gold Mines has filed qualifications with the Federal Security and Exchange Commission under a plan to market 191,500 shares of stock without underwriter and at a price to be determined about June 20, when the offering is made. Carl Stoll, Spokane, is president of the company, Dale I. Hayes is vice-president, and John M. Baker is secretary-treasurer. The property is situated in the southern Wallowa Mountains in Baker County, and is located about 70 miles northeast of Baker. It has had a long history of development and production. The district was discovered in the late 1870's. Several mills were built down through the years. The greatest production was in the late 1930's. Although the record of early production of the Cornucopia veins is somewhat obscure, the value of their total production is believed to be about $15,000,000.

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CHANGES IN MINING LAWS ARE ASKED BY HOOVER COMMISSION

The Hoover Commission task force, after a 16-month study of the government's handling of natural resources, has proposed several changes in the United States mining and leasing laws. The commission's report states that the mining laws, which date back to 1872, and the mineral leasing law of 1920, while generally satisfactory and workable, need revision.

A special point was made of the fact that the present law does not cover concealed deposits because of its requirement of exposure of valuable minerals in order to establish a valid claim. It also noted the fact that there has been a steady decline in the number of mineral claims patented on public lands, the number dropping from 2,500 in 1905 to less than 100 in recent years.

The following changes in the laws pertaining to mining locations and patents were suggested:

1. Permit the staking of mineral claims on all vacant, unreserved and reserved public land, with certain exceptions such as the national parks and monuments, and other obvious reservations.

2. Recognize the validity of claims without the requirement of "discovery" of valuable minerals, so that ground without surface exposure or other positive evidence of ore or valuable mineral deposits may be held for sufficient time to complete exploration or to secure evidence indicative of its prospective value.

3. Eliminate reference to alleged structural forms of an ore body, such as are implied by the words "lode," "vein," "apex," or other geologic terms, and locate claims in rectangular areas conforming wherever possible to lines and corners of the public land surveys, and not to the assumed course of some geologic body.

4. Restrict underground rights to vertical planes through the boundary lines of the claim, thus eliminating the present provision of extralateral rights as far as new claims and patents based on them are concerned.

5. Cancel the rights of new unpatented mineral claims at the end of three years if evidence of potential value of ore for valuable mineral deposits that is acceptable for patenting, as subsequently defined, has not been obtained. At the same time, there should be the privilege of renewal of the rights, without patenting, for subsequent periods if work is in progress that is approved by the Geological Survey as suitable for testing the ground.

6. Give the Geological Survey the right to cancel new unpatented claims at any time, if it is requested to examine the ground by the agency administering the land, and if it finds prospective value of the ground too slight to warrant further expenditure of money or effort on its exploration.

7. Require that all claims be located with reference to fixed points and that they be surveyed prior to application for renewal; or that they be located by legal subdivisions wherever section corners and boundaries have been established.

8. Record a duplicate of location notice at the appropriate land office.

9. Grant patents upon establishment of the potential value of the ground for ore or mineral deposits, with the acceptance for this purpose of such evidence as proximity to known deposits of value, projection of ore bearing loci, extension of fracture or sheer zones with indications of mineralization, presence of gangue minerals or of rock alteration known elsewhere to be associated with ore, and of other evidence that meets with the approval of the Geological Survey.

10. Drop the requirement of assessment work for existing unpatented claims if the owner will accept the new rules and regulations governing claims that may be adopted in accordance with the recommendations in this report.

11. Recognize the presumptive right of the holder of a mineral claim to the surface but restrict surface uses, prior to patenting, to those necessary in connection with exploration activities. Grazing and cutting of timber should be in accordance with regulations of the Forest and Range Service and be limited to the needs of the proposed operation.

Changes in laws pertaining to leasing, as proposed by the task group, are

1. Provide for a prospecting period with liberal terms for exploration in leases covering areas where available data are not sufficient to reveal the extent, quality, minability and methods of processing essential to the determination of feasibility of established or new types of commercial operations.

2. Grant prospecting rights on areas of sufficient size and under provisions formulated by the Geological Survey that will encourage thorough and complete search for mineral deposits and that will justify the required expenditures.

3. Permit exploration for all minerals within the area covered by leases and provide for their orderly development, with exclusive rights granted to the prospector on a fractional part of the total area (or otherwise a minimum area), and a preference right for the remainder of the area or so much as may be in keeping with sound public policy and feasible of development with the financial resources available.

4. Remove all limits or restrictions on overriding royalties on oil or other leases on public lands and Indian lands.

Reprinted from Pay Dirt, the official publication of the Arizona Small Mine Operators Association, Phoenix, Arizona, May 20, 1949.

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OIL TEST DRILLERS ATTENTION

House Bill 427 passed by the 1949 Oregon Legislature requires that certain features of oil well test drilling in the State be supervised by the State Department of Geology and Mineral Industries. The law becomes effective July 16, 1949, and work in progress as well as new tests come under the law. Information concerning procedures may be obtained from the Department, 702 Woodlark Building, Portland.

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GENEVA STEEL COMPANY NEEDS MANGANESE ORE

Manganese ore is in demand by all steel companies, and the Geneva Steel Company, Geneva, Utah, is looking for a source of manganese ore in the Northwest. Any owner of manganese ore may obtain specifications and price quotations by writing Mr. S. G. Sargis, Supervisor Raw Materials, Geneva Steel Company, P.O. Box 269, Salt Lake City 8, Utah.

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STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

Head Office: 702 Woodlark Building, Portland 5, Oregon

State Governing Board

Niel R. Allen, Chairman, Grants Pass
H. E. Hendryx, Baker
Mason L. Bingham, Portland
F. W. Libbey, Director

Staff

Hollis M. Dole, Geologist
L. L. Hoagland, Assayer & Chemist
C. W. F. Jacobs, Ceramist
Ralph S. Mason, Mining Engineer
T. C. Matthews, Spectroscopist
M. L. Steere, Geologist
R. E. Stewart, Geologist
D. J. White, Geologist

Field Offices

2033 First Street, Baker
N. S. Wagner, Field Geologist

714 East "H" Street, Grants Pass
Harold D. Wolfe, Field Geologist

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PUBLIC AGENCIES CONNECTED WITH MINERAL RESOURCES

How do I go about patenting a mining claim? Who has supervision of State water rights? From whom can I lease State land? Where can I find out if I have good soil? Where can I obtain maps and geological reports? These are typical of the inquiries continually received by the Department. To answer these and other questions of this kind the accompanying list has been compiled.

FEDERAL

Agency	Address	Service and Information
Atomic Energy Commission	Raw Materials Division Grand Junction, Colorado or P.O. Box 30, Ansonia Station New York 23, New York	Information on and analysis of radioactive ores. Grants licences to sell and lets contracts to buy uranium-bearing ores. Commission has charge of all activities having to do with applications of radioactive materials.
Bonneville Power Administration (Interior Department)	729 N.E. Oregon Street Portland, Oregon	Power transmission to mining areas and metallurgical plants.
Bureau of Federal Supply (Treasury Department)	Chief, Purchase Division Strategic and Critical Materials Branch, 7th & D Streets Washington 25, D.C.	Purchasing agent for strategic and critical materials to be stockpiled.
Bureau of Land Management (Interior Department)	Administration Building Swan Island Portland 18, Oregon	Administers public land laws.

Agency	Address	Service and information
Bureau of Land Management (Interior Department	Oregon District Land Office Swan Island Postal Station Portland 18, Oregon	Maintains maps showing status of all Federal lands in State.
"	Oregon and California Railroad Revested Lands and Coos Bay Wagon Road Grant Lands Oregon District Land Office Swan Island Postal Station Portland 18, Oregon	Maintains file of mineral locations on O & C and Coos Bay Wagon Road Grant Lands.
"	Public Survey Office Swan Island Postal Station Portland 18, Oregon	Handles applications for mineral patents and mineral surveys. Maintains records of land patents.
U.S. Bureau of Mines (Interior Department)	S. M. Shelton, Chief Metallurgical Division Northwest Electro-Development Laboratory Albany, Oregon	Provides factual data, statistical and technical information on metallurgical problems.
"	S. H. Lorain, Chief Albany Branch, Mining Division Albany, Oregon	Investigations and exploration of mineral deposits.
"	Publications Distribution Section 4800 Forbes Street Pittsburgh 13, Pennsylvania	Distributes Bureau Reports of Investigations, Information Circulars, Periodical Reports, Mineral Resources.
Coast and Geodetic Survey (Commerce Department)	Panama Building AT 4742 534 S.W. 3rd Avenue Portland, Oregon	Sells planimetric maps of Portland area and hydrographic charts of navigable streams and coastline.
Corps of Engineers U.S. Army	Pittock Block Room 537 Portland, Oregon	Information on power resources. Sells U.S. Army Engineer topographic quadrangle maps. Information relating to navigable streams, dam sites, and harbor improvements.
Department of Commerce	520 S.W. Morrison Street (Pioneer Post Office) BR 8471, Ext. 151 Portland, Oregon	Have data on imports and exports; trade lists of offshore buyers and sellers.
Federal Works Agency Public Roads Administration	W. H. Lynch, Division Engineer P.O. Box 3900 Broadway-Oak Building Portland, Oregon	Constructs and supervises roads in public lands and national forests.
U.S. Forest Service (Agriculture Department)	Surveys and Maps Division Builders Exchange Building AT 8277 Portland, Oregon	U.S. Forest Service maps. Aerial photos.
U.S. Geological Survey (Interior Department)	Ground-Water Division, AT 6171 Main Post Office Building Broadway and Glisan Portland, Oregon	Water-well records and other information on ground water.

Agency	Address	Service and information
U.S. Geological Survey (Interior Department)	Surface-Water Division, AT 6171 Main Post Office Building Broadway and Glisan Portland, Oregon	Data on stream flow and run-off.
"	Director, U.S. Geological Survey Washington 25, D.C.	Sells U.S. Geol. Survey Circulars, geologic folios, topographic quadrangle maps. Information on maps, aerial photographic control surveys.
"	Denver Federal Center Denver, Colorado	Sells U.S. Geol. Survey topographic and geologic maps of areas west of Mississippi River.
U.S. Geological Survey Conservation Division	Water and Power Branch 619 Post Office Building P.O. Box 3485 Portland 8, Oregon (L. L. Bryan, Regional Engineer)	Classification and mapping of public lands for power sites and reservoirs. Maintains file of topographic maps of western United States.
"	Mining Branch Salt Lake City, Utah	Handles royalties and leases of certain mineral deposits on public lands.
U.S. Geological Survey Topographic Branch	C. A. Ecklund Division Engineer Pacific Division Sacramento, California	Information on status of topographic mapping in State.
"	Map Information Office Washington 25, D. C.	Information on maps, aerial photographs, and control surveys.
Soil Conservation Service (Agriculture Department)	Administration Building Swan Island Portland 18, Oregon	Information on soils and water, dam sites, and materials for constructing dams.
"	State Headquarters Benton Hotel Corvallis, Oregon	
Superintendent of Documents	Government Printing Office Washington 25, D.C.	Sells U.S. Bureau of Mines Bulletins and Technical Papers. U.S. Geol. Survey Annual Reports, Monographs, Professional Papers, Bulletins, Water-Supply Papers.

STATE

Corporation Commissioner (State of Oregon)	Maurice Hudson 518 State Office Building Salem, Oregon	Status of Oregon mining corporations.
Department of Geology and Mineral Industries	702 Woodlark Building 813 S.W. Alder Street Portland 5, Oregon BR 2276	Analysis and identification of rocks and minerals, clay testing, spectrographic analysis, information on mining and geology, examination of mineral deposits, makes field studies, publishes and sells reports and maps.

STATE

Agency	Address	Service and information
Department of Geology and Mineral Industries (cont.)	Field Office 2033 First Street Baker, Oregon	Information on geology and mineral deposits; field inspections of mining properties; preparation of reports. Department reports for sale.
"	Field Office 714 East "H" Street Grants Pass, Oregon	
Board of Engineering Examiners (State of Oregon)	Builders Exchange Building 3rd and Stark Streets Portland, Oregon AT 0053	Conducts examinations for registration of engineers and land surveyors. Maintains lists of registered engineers and surveyors.
Board of Health (State of Oregon)	1022 S.W. 11th Avenue Portland, Oregon AT 9233	Bacteriological tests on drinking water. Analysis of gases and fumes; chemical analysis of water.
Oregon State College Engineering and Geology Departments	Department of Geology Corvallis, Oregon	Engineering and geologic investigations. Soil studies.
State Engineer (State of Oregon)	Charles E. Stricklin 504 State Office Building Salem, Oregon	Information on surface and subsurface water rights.
State Forestry Department	N. S. Rogers, State Forester 2600 State Street Salem, Oregon	Administers laws relating to mineral deposits in State forests.
State Highway Department	State Office Building Salem, Oregon	Investigations of road construction materials.
State Land Board	E. T. Pierce, Clerk Capitol Building Salem, Oregon	Administers laws relating to mineral deposits on State lands.
University of Oregon Geology Departments	Department of Geology Eugene, Oregon	Geological investigations.

COUNTY

County Agricultural Agents (one in each county)	Usually located at county seat.	Analysis of soils for acidity, potash, and deficiencies.
County Assessor or County Surveyor	Offices in all county seats.	Information on ownership of county land.
County Recorder or County Clerk	Offices in all county seats.	Records filings such as location notices, miner's liens, proofs of labor, etc.

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PROSPECTORS BEWARE

Public Law 107 and Public Law 115, both of the 81st Congress, each contains identical provisions which read as follows:

> "Notwithstanding the provisions of any Act of Congress to the contrary, any person who hereafter prospects for, mines, or removes, by strip or open pit mining methods, any minerals from any land included in a stock raising or other homestead entry or patent, and who had been liable under such an existing Act only for damages caused thereby to the crops or improvements of the entryman or patentee, shall also be liable for any damage that may be caused to the value of the land for grazing by such prospecting for, mining, or removal of minerals. Nothing in this section shall be construed to impair any vested right in existence on the effective date of this section."

Although it does not appear at this writing that the results of this provision will be very serious, it is rather a pertinent commentary on the attitude toward mining of many people who make our laws. The intent is plain and that is to insure the homesteader against tangible damage to crops and an intangible loss of value of land for grazing purposes. This, in effect, tells the prospector or miner to work on this land at his peril even though the law setting up stock raising and homesteading reserves the mineral to the United States and allows prospecting and mining under certain definite restrictions. The viewpoint of the provision is to protect the rancher as against the miner. It is a sign of the times. The farmer must be protected at all costs. The miner who might provide minerals which would preserve the country in time of war has an additional obstacle placed in his path. How is the value of land for grazing purposes to be determined equitably in a case where grazing has not been practiced at the time of alleged damages to the land, but at some future time the homesteader might wish to use his land for grazing?

Congress intended that there should be no mistake about this provision becoming a part of our mining law since the provision was inserted in two different laws.

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GEOPHYSICAL SURVEY REPORT IN OPEN FILE

A preliminary report of a geophysical survey in the Ochoco quicksilver district, east of Prineville, Oregon, has been released according to an announcement made July 12, 1949, by Director W. E. Wrather of the Geological Survey.

The purpose of this study was to detect by the use of geophysical methods subsurface geologic structures favorable to the concentration and deposition of mercury minerals.

The geophysical survey, made under the cooperative auspices of the U.S. Geological Survey and the U.S. Bureau of Mines, covers a strip approximately one mile long in the southwestern part of the Johnson Creek fault area, and consists of a magnetic grid with traverse readings at 25-foot intervals across the fault zone. When correlated with the geology of the area, the geophysical data show a series of igneous dikes which apparently follow the zone of weakness of the Johnson Creek fault system.

Copies of the report and accompanying maps have been placed on open file in order to make this information immediately available to those interested. They may be examined at the U.S. Geological Survey offices, 1033 (Library), Federal Works Agency Building, and 5360 Interior Building, Washington, D.C., and at 203 Custom House, Baltimore, Maryland; at U.S. Bureau of Mines offices, 2258 Interior Building, Washington, D.C., and at Albany, Oregon; and at the State Department of Geology and Mineral Industries, Portland, Oregon.

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PLACER OPERATION SUSPENDS

The Rush Construction Company, Baker, Oregon, has suspended placer operations in Stices Gulch south of Baker. Operational difficulties reportedly caused suspension.

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TUNGSTEN DISCOVERY NEAR ASHLAND, OREGON

A promising discovery of scheelite, ore of tungsten, has been made on the Bratcher property 3 miles southwest of Ashland. Discovery of scheelite in samples taken by L. A. Bratcher was made by C. L. Hodges, Ashland agate and fluorescent mineral collector, through use of an ultraviolet lamp. An ore zone 4 to 12 feet in width is exposed by initial workings. The length and depth of the deposit are as yet undetermined. More than 100 tons of ore has been shipped to the Tulare County Tungsten Mines plant near Lindsey, California, for milling. Five men are employed at the Bratcher property.

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STANDARD MINE LEASED

Mr. Bert Hayes, John Day, Oregon has leased the old Standard Mine near Prairie City, Grant County, and is engaged in cleaning out the lower tunnel for inspection purposes. The Standard Mine is one of the old properties of the Quartzburg district. Over 40 years ago considerable underground work was done and a mill built. The principal ore was copper but the mine became best known because of cobalt in the ore.

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A.S. & R. HISTORY

"Metal Magic" is the title of a history of the American Smelting and Refining Company recently published.

Everybody in metal mining knows of the A.S. & R. as it is always called. A history of A.S. & R. is in large part a history of American mining, as the company was founded, expanded, and became powerful just as American mining, as we know it, blossomed out into the great industrial force of today. "Metal Magic" by Isaac F. Marcosson tells of the fabulous rise of the Guggenheim family and the founding and branching out of their empire over the mining world in the form of A. S. & R. One can comment accurately on "Metal Magic" not that truth is stranger than fiction but that truth is more interesting than most fiction.

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METAL MARKETS

According to E&MJ Metal and Mineral Markets, New York, July 21, 1949, metal prices have rebounded somewhat from their depressed condition early in July. Copper was the first to feel the strength of buying because of low inventories and both copper and lead reacted because of buying for the national stockpile. Zinc was the last metal to have an increase in price which occurred on July 18, raising the market price to 9½ cents East St. Louis. Copper is now 17 5/8 cents Connecticut Valley and lead is 14 cents New York. The most recent reports are that demand for all three metals continues good. (July 26 price of zinc raised to 10 cents.)

The market for quicksilver has continued to be dull and the price has remained unchanged at $78-80 per flask depending upon quantity. It has been reported that 1500 flasks of Japanese quicksilver has been offered to SCAP for $57.50 which, plus $19.00 duty and $2.50 transportation, would make the total $79.00. Report is that no interest was shown in the offer.

The New York quotation for foreign silver remains steady at 71½ cents per ounce. Reports are that requests for prompt delivery indicate low inventories.

Little or no interest has been shown in chrome and tungsten ores by consumers. Chrome ore consumers are believed to have considerable stocks on hand. Current antimony ore quotations have been somewhat lower at from $4.00 to $4.25 per unit of antimony in 50 to 55 percent ore.

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OREGON LIMONITE CLEANS B. C. GAS

According to the Raw Materials Survey News Letter issue of June-July 1949, James M. Orr, industrial minerals dealer of Portland has contracted to supply 1500 tons of limonite to be mined at Scappoose, Oregon, to a gas company in British Columbia. The limonite is used as a sulphur absorber in purifying the gas.

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Note: CLAIM OWNERS REMEMBER TO FILE "DESIRE TO HOLD" BEFORE AUGUST 1, 1949.

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COPPER TARIFF

In normal times domestic copper mines have a capacity in excess of domestic needs. Therefore, an import tax of 2 cents a pound has been maintained to equalize the competition of foreign copper producers who pay low wages and can dump copper in this country at a price below the cost of domestic production. Abnormal conditions after World War II were reflected in an apparently insatiable demand for copper which domestic producers alone could not fill. Congress encouraged copper imports to relieve the condition by passing, in 1947, a bill to suspend the import tax for a period of two years. When this period ended on March 31, 1949, the large demand still persisted and Congress passed a bill extending the act until June 30, 1950. Domestic producers without foreign production served notice that they would not oppose the act because of the continuing demand for copper, but they felt the tight supply condition was temporary and that the suspension should be of short duration only.

As is now history, buying of copper fell of sharply a short time after the law was passed. Demand declined to the lowest point in many years and the price fell from 23½ cents a pound to 16 cents. Although both demand and price have improved, production of domestic mines has been cut back because of large imports. Reportedly, Michigan mines have shut down and Arizona mines have either gone on a reduced work week or shut down. Employment conditions have become so serious that copper mining states have petitioned Congress through their congressmen to reconsider the action which provided for the second suspension of the import tax. The Ways and Means Committee of the House of Representatives is giving serious consideration to the matter.

There are very strong interests in this country who are opposed to any import tax on copper or any other raw material that goes into their manufactured products. They are equally partizan in favor of import tariffs on their own manufactured products. In addition certain powerful copper mining interests have foreign production and it is needless to point out where their interest in a copper tariff lies. Our State Department too is deeply interested in promoting imports of mineral raw materials into this country seemingly without concern over the effect on our own mining industry.

The matter of a copper tariff with especial attention to the present law suspending the import duty pinpoints again the diverse opinions of different factions in the mining industry - opinions which prevent the industry from acting as an organized whole. Therefore, efforts to obtain action in Washington to benefit or protect certain segments of the industry are opposed or diluted by other segments who have a selfish interest to promote or who are not directly concerned. Witness the L-208 miscarriage of justice, the disagreement over legislation to provide incentive payments to promote mineral production and development, lack of concerted efforts one way or another in mining law revision, and the like.

One element of the subject of import tariffs has been stated many times but to those who wish to preserve a strong domestic mining industry it bears repetition. Free trade means several things but to the miner it means ultimate equalizing of wages paid domestic and foreign miners; it means ultimate equalizing of the scale of living between domestic and foreign miners; but above all it means an anemic mining industry. Only the very low-cost producers could survive. There would be a reduction in development and exploration with the inevitable result of progressive depletion of mineral reserves. There would be the closing of many mines never to be reopened except under Government auspices in an emergency.

A long step in the direction of a weakened domestic mining industry will have been taken if suspension of the copper import tariff is retained.

F.W.L.

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HAYDITE PRODUCTION TO INCREASE

Investigations by the Department of bloating clays and shales in 1946 and 1947, both in the field and laboratory, are bearing fruit. Work on various lightweight aggregates has been carried on by the Department ever since the impact of postwar building began to make itself felt. Clays and shales from numerous localities were tested before the most favorable material was found. Keasy shale of upper Eocene or lower Oligocene age which covers a fairly large area in northwestern Washington County proved to have excellent expansion qualities. Directly as a result of this work the first haydite plant was built to use Keasy shale as suggested by the Department.

Northwest Aggregates is currently producing 150 yards of haydite per day at its recently enlarged plant near Sunset Tunnel on the Sunset Highway about 40 miles northwest of Portland. The shale is expanded at the quarry and the finished product is trucked to Portland where it is used by Empire Building Materials Company in concrete blocks and for monolithic purposes. Some of the aggregate is shipped to Eugene.

Smithwick Concrete Products Company, Portland, Oregon, has just announced that they are to build a $200,000 haydite plant. The haydite product is to be used as lightweight aggregate for concrete blocks and monolithic construction. The raw material will be obtained from a Keasy shale quarry located on the SP&S Railroad right of way about 12 miles south of Vernonia in Washington County. Smithwick is leasing the quarry site from the railroad. The raw shale will be hauled to the plant on Lombard Avenue by SP&S gondolas. The plant is expected to be completed within four months time and is to be built adjacent to the Company's block plant erected several years ago. Mr. Otto C. Frei, Vice-President and Assistant General Manager of the Company, will be in charge of the operation of the plant. In addition to the block and haydite plants in Portland the Company also operates a block plant at Eugene.

The new plant will produce material ranging in size from a quarter of an inch to one inch or larger for monolithic concrete structures, and from fines to three-eights inch for concrete blocks. Production is expected to be 300 cubic yards of haydite a day. Crushing strength of the aggregate when used in concrete blocks is in excess of 1000 pounds per square inch of gross area. Weight of the loose aggregate for monolithic purposes is in the neighborhood of 1000 pounds per cubic yard compared to about 2700 pounds for ordinary gravel.

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SUPERIOR WELL RECORD

A world's record depth of 20,521 feet was reached by Superior Oil Company in its Rock Springs, Wyoming, wildcat before the well was abandoned. (From Compact Comments published by the Interstate Oil Compact Commission August 1, 1949.)

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EXTENSION OF GRANTS PASS RAILROAD BELIEVED PROBABLE

The railroad from Grants Pass, Oregon, to Crescent City, California, stands a good chance of being completed within the next few years, it was announced on August 10 by Fay Bristol, President of the Oregon Mining Association.

The Oregon Mining Association is cooperating in the investigation now being made on the probable traffic that can be expected. So far the investigation of the project that Henry J. Kaiser wanted to build in 1937 has revealed the following:

Population of the area has increased almost three times during the past twelve years; production of lumber which greatly needs transportation is up approximately ten times; the harbor at Crescent City has been greatly improved and will be completed in the near future; and construction of the railroad will make it possible to mill the billions of feet of redwood timber near the source of supply. Redwood, to be made into good lumber must be air dried after it has been cut into rough timbers. These billions of feet of timber can be dried in the Illinois Valley and then shipped either by rail or returned to the harbor at Crescent City for boat shipment. The pine, fir, and cedar sawmills of the Illinois valley area would receive several dollars more per thousand through the saving in freight, and the United States would be much more secure as the railroad would tap the main U.S. source of high grade chrome ore. This important critical mineral supply would be greatly improved.

When the railroad was started in 1905 its main objective was the copper mines in the Illinois Valley. The main backer was wiped out in the San Francisco fire. In 1914 construction was again started and had reached Walters Creek when World War I stopped construction.

In 1937, Henry J. Kaiser, after making a very complete survey, applied for permission from the Interstate Commerce Commission to finish construction. This permission was held up by technicalities, and World War II was upon us.

Since then the railroad has been under lease to and operated by the Pacific Portland Cement Company. Traffic on the 14 miles of completed road has grown by leaps and bounds.

The survey so far has revealed a great need for immediate construction. For these reasons the Oregon Mining Association is cooperating in every way with the survey now being made.

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WAR MINERAL PRODUCTION INCENTIVE

S-2320, which provides incentive payments to producers of manganese, tungsten, quicksilver, and antimony, has been introduced in the Senate under the sponsorship of Senator Pat McCarran and thirty other senators from western states. Passage of the bill would be very important to Oregon, since quicksilver is one of the State's important mineral resources. Many domestic producers of these minerals have been obliged to close down since the war because of inability to compete with foreign producers who pay low wages and have been encouraged by our State Department to ship in their products at the expense of domestic producers.

The bill is rather unique in that it does not set up a new bureau or commission for its administration. It is unique also in that the method of help to domestic producers does not involve taking money out of the American taxpayer's pocket to foot the bill. Payments to domestic producers of the four strategic minerals would be made from tariff collections on imports of these minerals to each producer in the ratio that his production bears to the total domestic production of the mineral. In other words, if a quicksilver mine produced one quarter of the total domestic production, he would receive one quarter of the total tariff collected on foreign quicksilver.

Statistics of production and imports are available through the U.S. Bureau of Mines Statistical Division, and the Treasury collects tariff payments. Therefore, the method of making these incentive payments would be relatively simple. The bill sets ceilings above which payments could not go.

Senator McCarran states that this bill would increase production of very critical manganese from the present 10 percent to from 15 to 20 percent of domestic consumption. The life of present manganese operations would be greatly prolonged because of the increase in reserves due to higher prices received for the ore which would allow mining of lower grade material. The plan would mean a price to domestic producers of between $1.00 and $1.20 per unit as compared to about 80 cents per unit under present conditions.

The effect upon tungsten would be to raise the domestic production from the present 8 percent of the national requirements to approximately 35 percent. The price of tungsten to the producer would be about $34 per unit, an increase of about $10 per unit.

The effect upon quicksilver would be to increase the market price to about $115 a flask compared to about $76 a flask at present, and would stimulate production to take care of about one third of domestic requirements compared to less than one tenth at the present time.

The effect on antimony would be less helpful to domestic producers since the tariff on antimony was lowered from 2 cents to 1 cent per pound about a year ago. If the tariff were restored to 2 cents, the effect of the bill would be to increase domestic antimony production to from 25 to 30 percent of domestic requirements.

The bill would have automatic features in that if imports increased, there would be a tendency for the domestic market price to fall, but with increase of imports, higher payments would be made to domestic producers, which would tend to increase domestic production, and the need for stimulating such production would be lessened. With a fair price for their products, domestic operators would be encouraged to do exploration work which would result in increased domestic reserves -- a condition sorely needed. Senator McCarran stated that the total amount of tariff receipts which might be diverted would probably not exceed $5,900,000 a year. A precedent for incentive payments from tariff collections is provided in similar payments under the Agricultural Adjustment Act.

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OREGON'S BRICK AND TILE INDUSTRY

The brick and tile industry in Oregon, a million dollar a year business, is the subject of a report just issued by the State Department of Geology and Mineral Industries.

Brick making is the oldest commercial industry in the State and has expanded down through the years as population has increased. Brick plants build up where population is concentrated; therefore, the Willamette Valley has by far the largest number of brick and tile plants.

Production of brick and tile depends to a large extent on construction, but in normal times the brick and tile industry is remarkably stable. During World War II price ceilings forced some plants to shut down, but since the war the industry has prospered because of the activity in house construction.

The report, written by J. E. Allen and R. S. Mason, is issued as G.M.I. Short Paper No. 19. It contains 28 pages and several tables and graphs. It may be obtained at the Portland office of the Department at 702 Woodlark Building, or at the field offices located at Baker and Grants Pass. Price is 20 cents.

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NEW ALUMINUM CASTING WRINKLE

According to West Coast edition of Iron Age, August 9, 1949, a new wrinkle in aluminum casting pots has reportedly been developed by David Z. Murphy, Portland, Oregon, which is said to eliminate gas bubbles in castings. This melting pot has a partition down its center with a siphon about half way from the top, and aluminum metal is placed on one side for melting and the gas-free aluminum passes through the siphon to the other side of the pot, from which it is dipped for casting. The unit is in operation at the Murphy Knife Mfg. Company for its production of aluminum knife handles.

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OREGON LIMONITE SHIPPED

James M. Orr, Portland industrial minerals dealer, has started to ship limonite from Scappoose, Oregon, to British Columbia. The ore will be used to remove sulphur from manufactured gas. Orr has opened a power shovel pit in ore on the old Oregon Charcoal Iron property located about 2 miles northwest of Scappoose. He is also constructing a plant at Scappoose to dry and prepare the iron oxide to make it available to the trade for use as pigment, mineral additive for stock feeds, and the like.

* * * * *

Shipment of 700 tons of limonite from Scappoose, Oregon, has just been made to the C. K. Williams and Company plant at Emeryville, California. The material will be used as pigment the same as in previous years when the company mined the limonite. Mr. Orrin Peterson, Consulting Engineer for the company, supervised mining and shipping. The ore came from land owned by Columbia County.

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ORE.-BIN COSTS ADVANCE

Because of increase in postal rates and other costs it has been necessary to increase the subscription rate of the Ore.-Bin from 25 cents to 40 cents yearly. The new rate is already in effect.

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PUMICE PRODUCTION

The Department has just completed an investigation which included visits to nearly all operators currently engaged in the production of pumice. There are five active operations in the vicinity of Bend, one at Chemult, and one at Burns. In addition it is understood that two new operations are in the formative stage. While there are fewer producing operations today than there were in 1947, those currently active appear for the most part to be well established. Pumice aggregates are now being produced in sized and segregated shape, or as a blend under controlled conditions as compared to the crude screened product put out when the industry was in its infancy. A pumice plaster sand is now being produced by two of the operators. This puts the pumice industry into a new field, and reports are that the product is being very favorably accepted by the plaster trade because of the lightness in weight of pumice plaster and its relative hardness of finish.

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PROGRESS AT STANDARD MINE, GRANT COUNTY

Work in connection with reopening the lowest, or 1400, tunnel on the Standard Mine near Prairie City, Grant County, has progressed to a point somewhat beyond the halfway mark. This property was operated earlier in this century for its copper-cobalt ore, but the current work is being done largely on the strength of radioactive material found on the dump. Several large stopes have been traversed by the reopened section of the tunnel, but according to available maps the largest area of stoping is yet ahead of the present cave face. The stoping exposed to date has been so thorough that no ore remains to be sampled. Unless pillars are encountered in the workings yet to be reopened, it will be necessary to clean the floor of the tunnel and sink a series of shallow winzes to expose the vein for sampling purposes. As the Standard vein is understood to have been a strong, heavily mineralized vein never explored below the present tunnel level, the radioactivity noted in connection with the dump material is of more than ordinary interest.

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BAKER COUNTY MINE RESUMES

The East Eagle mine, owned by Rawleigh Chadwell in northeastern Baker County, Oregon, is again active after the winter's shut-down caused by deep snow. A new mountain road has been built in order to make accessible intermediate tunnel levels where ore has been encountered. Development work has uncovered copper ore, containing both sulphide and native copper, in addition to gold and silver.

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NEW QUICKSILVER FURNACE TESTED

The new Herschoff furnace at the Amity Quicksilver mine in the Ochoco Mountains near Prineville, Crook County, Oregon, was given a test run early this year. Some underground development work was also done. Although operations are currently inactive it is understood that the company plans to continue exploration work this summer.

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BOHEMIA DISTRICT ACTIVITY

The Champion mill, Bohemia district, Lane County, Oregon, is treating custom ore from the Musick mine dump in addition to ore from the Champion mine. A car of Champion concentrates has been shipped to Tacoma and a car of Musick concentrates will soon be shipped to Salt Lake City. Harold Barton of Eugene is leasing a part of the Helena mine and is mining heavy sulphide shipping ore.

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NEW OREGON SHIPPER

Mr. J. E. Hamlen and Mr. Ben Baker, both of Grants Pass, have been exploring the Hamlen copper prospect on Onion Mountain southwest of Grants Pass. A rail tram has been constructed to transport ore down the hill from the main tunnel to the truck road. Ore consists of massive chalcopyrite, bornite, and pyrite. Ore will be shipped to the Tacoma Smelter.

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SHELL FIELD OFFICE IN OREGON

The Shell Oil Company has opened a field office in Portland, Oregon, with Mr. H. J. Buddenhagen, geologist, in charge.

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CEMENT COMPANY INSTALLS COTTRELL AT OREGON PLANT

The Grants Pass Bulletin, July 28, 1949, announces that the Pacific Portland Cement Company plant at Gold Hill, Jackson County, Oregon, has contracted to install dust precipitating apparatus. This new equipment will eliminate dust which now escapes from the plant and will allow more economical operation of the plant.

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NEW DRAGLINE ON OLD HYDRAULIC MINE

R. F. Oliphant and G. C. Pepperdine are installing a dragline outfit with dry-land washing plant at the Esterly mine in the Takilma area, Josephine County. The Esterly is one of the oldest producers of gold and platinum in Southern Oregon. Total production has been in excess of $500,000. The property has been variously known as the Llano de Oro, Cameron placer, Logan placer, and Simmons placer.

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INTERIOR DEPARTMENT 100 YEARS OLD

March 3, 1949, marked the one hundredth anniversary of the Department of the Interior. Originally called the "Home Department," it was organized to deal with the internal problems of the Nation.

The Geological Survey is one of the older bureaus of the Department. Organized in 1879 to classify the public lands and to examine their geologic structure and mineral resources and products, the results of its systematic study are published in more than three thousand reports and seven thousand maps.

About 25 percent of the country is covered with modern topographic maps, and adequate geologic investigations have been completed for only about 10 percent of the country.

In Oregon a total of 38.5 percent or 96,981 square miles has been topographically mapped. During the last fiscal year the State of Oregon made the sum of $32,067 available for cooperative water studies with the U.S. Geological Survey. The total funds earmarked for cooperative work with the Survey by the various states and Hawaii amounted to $2,026,909. The Geological Survey was allotted $2,071,500 by the Interior Department as its share in the cooperative work.

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September 1949 Portland, Oregon

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MATERIALS FOR POZZOLAN: A REPORT FOR THE ENGINEERING GEOLOGIST*

(An abstract)

Introduction

Originally, pozzolan materials were the volcanic tuffs and ashes quarried, for use in mortars, in the vicinity of Pozzuoli, Italy, from whence came the name: pozzolan. Builders in the Roman times had discovered that these volcanic substances produced stronger and more durable mortars than did admixtures of ordinary sand. It was also found that, where volcanic tuffs and ashes were not available, ground tile, brick, and pottery served as satisfactory substitutes for pozzolan. In recent times, other natural or artificial substances have been used for this purpose.

Thus, today the term "pozzolan" covers a wide range of substances that can be defined as: "siliceous materials which, though not cementitious in themselves, contain constituents which at ordinary temperatures will combine with lime in the presence of water to form compounds that have a low solubility and possess cementing properties." Materials used for pozzalans may be divided into four groups: (1) volcanic tuffs, (2) siliceous sedimentary rocks, (3) burnt clays and shales, and (4) industrial by-products.

Properties of pozzolans

It has been known for some sixty years that several benefits can be derived by admixture of a suitable pozzolan with portland cement, particularly for use in hydraulic structures, the optimum proportion of pozzolan usually being between 10 and 30 percent by weight of the portland-pozzolan cement. The benefits derived are: (1) alkali-aggregate reaction can be greatly retarded or prevented; (2) resistance of concrete to attack by sulfate-carrying waters can be increased greatly; (3) heat generation in massive structures can be reduced; (4) savings in portland cement can be made; (5) cost of the cement constituent may be reduced; (6) tensile strength of concrete can be increased; (7) permeability of concrete can be reduced; and (8) properties of the mix before hardening, such as workability and tendency to segregation and water gain, can be improved. Concomitantly, certain adverse qualities may be introduced into the concrete. Water requirement usually will be increased, although the increase may be unnecessary if air entrainment is employed. Drying shrinkage usually will be increased; and compressive strength and freezing and thawing durability of normal mixes may be reduced.

The mechanism by which the pozzolan accomplishes these changes in the properties of concrete is not fully known. However, the pozzolanic action generally is believed to be in part physical and in part chemical. The physical effects relate particularly to the low

*From: Petrographic Laboratory Report No. Pet-90A, U.S. Bureau of Reclamation, Research and Geology Division, Branch of Design and Construction, Denver, Colorado, (April 4, 1949). Published by permission of the Bureau.

specific gravity of most pozzolans (ranging generally from 2.3 to 2.8, in contrast to about 3.1 for portland cement), as a result of which the pozzolan occupies a greater volume than the weight-equivalent of portland cement. Thus, if the cement-to-aggregate ratio by weight is held constant, use of a portland-pozzolan cement effectively increases the volume of cement in the concrete, with resulting tendency to increased workability, plasticity, and water requirement.

Chemically, pozzolans decrease susceptibility of the hydrated portland cement to dissolution or deterioration by reaction with the calcium hydroxide released by hydration of the portland cement. Reactive aluminous and siliceous compounds produced by calcination of clays are converted by this reaction with calcium hydroxide into comparatively stable substances, many of which are cementitious. Through destruction of the readily dissolved and decomposed calcium hydroxide, the concrete is rendered less susceptible to leaching or to decomposition by aggressive waters. Also, because the pozzolanic reactions proceed slowly, portland-pozzolan cement concretes harden slowly, and usually, but not always, increase progressively in strength and durability for long periods of time. Those pozzolans which inhibit or prevent cement-aggregate reaction in concrete do so by combination with the alkalies (Na_2O and K_2O) released by the hydrating portland cement. The alkalies thus retained by the pozzolan are unable to attack the aggregate.

Materials used as pozzolans

Materials which can be used as pozzolanic admixtures or replacements of portland cement include:

1. Volcanic tuffs and ashes, including pumicites, of rhyolitic and trachytic and possibly dacitic and andesitic types, particularly those which are hydrothermally altered.

2. Siliceous sedimentary rocks, especially opaline shales and cherts and diatomaceous earth.

3. Clays and shales to be calcined at temperatures in the range 900° F. to 1,800° F.

4. Industrial products, such as fly ash, blast furnace slag, and powdered brick.

1. Volcanic pozzolans

(a) Tuffs and ashes

The volcanic tuffs used as pozzolans occur as porous, consolidated or unconsolidated materials which commonly show evidences of chemical alteration by hydrothermal action subsequent to deposition. The rocks are alkaline or acidic types with SiO_2 content generally ranging from 46 to 72 percent. Volcanic pozzolans are commonly used without heat treatment, but investigations indicate that burning at low temperatures (up to 1,300° F.) is beneficial for some materials. Heating at temperatures higher than 1,850° F. usually greatly reduces activity.

The first large use in the United States of volcanic tuff for portland-pozzolan cement occurred in 1910-1912 when equal parts by volume of portland cement and a deeply altered rhyolite tuff were used in the construction of the Los Angeles Aqueduct for a reported saving of $700,000 over the cost of straight portland cement. The tuff used in this construction came from deposits at Monolith, Haiwee, and Fairmont, California. Samples obtained from the Monolith deposit are characterized by a fine-grained matrix of completely decomposed volcanic glass and fragmental rock and mineral particles. An estimated composition indicates the tuff to be about 80 percent zeolite (clinoptilolite, a silica-rich heulandite), 15 percent montmorillonite-type clay, and 5 percent quartz, orthoclase, plagioclase, and other minerals.

As determined by experience, as well as by laboratory investigation prior to construction of the Aqueduct, use of the portland-tuff cement increased tensile strength and decreased compressive strength of normal mixes, but increased compressive strength of lean mixes, slowed the rate of hardening so that forms had to be left in place about one-third longer, decreased perviousness, and reduced costs through economies in transportation and purchase.

(b) Pumicite

Pumicite, particularly the Fresno pumicite, has been used widely in concrete construction in California. In most ways this pumicite produces a portland-pozzolan cement similar to that produced by the tuff used for the Los Angeles Aqueduct, except that it is somewhat superior in strength development.

In laboratory tests on 21 rhyolite pumicites by the Bureau of Reclamation, calcination (at 1,400° F.) of the pumicites increased their pozzolanic activity, the improvement in strength development of portland cement-pumicite mortars being especially pronounced when the pumicite contained significant proportions of clay. Most of the clay in these pumicites tested are the kaolinite-type or montmorillonite-type, and were derived from decomposition of the glass shards in the pumicite, probably through the action of volcanic gases rather than by weathering.

2. Siliceous sedimentary pozzolans

(a) Opaline shales and cherts

Siliceous (opaline) shales and cherts, such as those occurring in the Monterey formation in western and southern California, have been used successfully as pozzolan, especially for a chemically resistant cement in marine construction, (as in portions of the San Francisco-Oakland Bay Bridge and in piers of the Golden Gate Bridge). Tests of concrete cylinders up to one year and of pavement cores up to two years indicate satisfactory strength for the concrete containing the high-silica cement; and laboratory and field tests of the cement indicate superior resistance to sulfate attack.

In the Monterey and Puente shales, used for marine construction in California, opal constitutes up to 50 percent and montmorillonite-type clay (beidellite) about 5 to 10 percent of the material.

(b) Diatomaceous earth

Diatomaceous earths have been tested repeatedly as possible sources of pozzolan in the United States. As a group, they are the most reactive with lime of all natural substances. Compressive strength is outstandingly high, both in lime mortar and in portland-pozzolan cement mortar and concrete. Tensile strength of portland-pozzolan mortar is considerably higher than that of equivalent portland cement mortar. Most important, resistance of the portland-pozzolan cement to attack by a 10-percent solution of sodium sulfate may be more than 6 times greater than that of straight high-lime portland cement. However, the one great deficiency of diatomaceous earth as a pozzolan is high water requirement for mixing and, hence, very high drying shrinkage of the concrete containing the portland-pozzolan cement; however, recent research suggests that the excessive water requirement may be controlled by use of wetting agents. By calcination at 1,450° F., the quality of diatomaceous earth pozzolan is considerably improved. Strength development, resistance to sodium sulfate solution, and grindability are increased, and water requirement and drying shrinkage are reduced.

3. Clays and shales (calcined)

Because of the widespread occurrence of suitable raw materials, burned clays and shales are more available than volcanic pozzolans or pozzolans produced from siliceous sedimentary rocks.

Suitable raw materials must be highly argillaceous, the activity usually increasing with clay content. The clays may be kaolinitic or montmorillonite-type, or rarer types such as paligorskite (attapulgite). The pozzolanic properties are induced by calcination to about 900° F., the optimum temperature of burning generally ranging from 1,300° F. to 1,475° F. By calcination at higher temperatures, the activity is reduced, and becomes very low after calcination above temperatures in the range 1,650° F. to 1,800° F., as the result of recrystallization with formation of more stable compounds. Consequently, powdered brick is a less effective pozzolan than that produced by burning the raw materials at medium temperatures.

Clays and shales used as pozzolans usually contain 50 to 65 percent SiO_2 and 17 to 38 percent Al_2O_3. Pozzolanic quality generally increases with increased alumina content of clay, suggesting that an aluminous compound produced by calcination in the range 950° F. to 1,650° F. plays a critical role in the pozzolanic reaction with lime. In this connection, it may be noted that burned bauxite forms an excellent pozzolan. Because of the critical influence of temperature of calcination on the properties of clays, production must be carefully controlled to obtain a uniform pozzolan.

The properties of mortar and concrete containing clay and shale pozzolans are widely variable, depending upon the composition and treatment of the pozzolan before use. Some clays and shales show satisfactory strength in lime mortar even without calcination, although calcination almost invariably will improve strength and resistance to sulfate attack and decrease water requirement.

Water requirement for portland-pozzolan cements containing calcined clay is considerably less than that of cements containing diatomaceous earth or shale, and commonly is less than that of cements containing volcanic pozzolans but is nevertheless more than that of straight portland cement. For this reason, drying shrinkage of mortar or concrete usually is increased by use of calcined clay with portland cement, but not so much as if volcanic or diatomaceous pozzolans are used. Heat of hydration of cement usually is reduced by use of calcined clay pozzolan. Durability in freezing and thawing, and wetting and drying, may not be affected by use of a calcined clay pozzolan with portland cement. Spent oil shales calcined after completion of distillation have yielded suitable pozzolanic materials.

Pozzolan for the portland-pozzolan cement was used in the construction of Bonneville spillway dam and fishways at Bonneville, Oregon. The pozzolan component, containing 68 percent SiO_2 and 3.5 percent CaO, was obtained by dredging from San Francisco Bay. The material was calcined at 1,650° F., and the cement was then prepared by intergrinding a modified portland cement clinker with the calcined material in proportions 3 to 1 by weight. The portland-pozzolan cement was significantly lower in cost than the standard portland cement used in construction of the Bonneville powerhouse and locks. After a comparison of the finished portland cement concrete in the powerhouse and the portland-pozzolan cement concrete in the fishway structures, it was concluded that the portland-pozzolan cement concrete showed no cracks or checks and no leakage, and that evidences of segregation were lacking, whereas the portland cement concrete is cracked, some of the cracks being of considerable width, and shows numerous sand streaks and signs of segregation.

4. Industrial products

Products of industrial processes, such as flue dust from power plants (fly ash), blast furnace slag, and powdered brick, have been used as sources of pozzolanic materials. However, they will not be discussed here because the geologist will be little concerned with location of such materials or with the determination of their properties.

Pozzolans and alkali-aggregate reaction

In recent years the discovery has been made that some rocks and minerals of aggregate react with alkalies released during hydration of portland cement and can cause rapid deterioration of concrete. Investigations in the field and laboratory proved the deterioration was effected by development of osmotic pressure in bodies of alkalic silica gel produced from the substance of the susceptible aggregate particles by attack of the alkalies.

Further investigations proved that some siliceous materials would reduce or virtually eliminate expansion of mortar due to alkali-aggregate reaction, if the siliceous materials were finely ground and added to the mix as a replacement of 10 or 20 percent of the portland cement.

At present, the pozzolans known to control alkali-aggregate reaction in concrete and mortar include:

1. Aluminous and siliceous amorphous substances, such as some opals and highly opaline rock types; certain rhyolitic volcanic glasses; diatomaceous earth; kaolinite calcined at 1,000° F. to 1,800° F.; some less common calcined clays, such as paligorskite; and some artificial siliceous glasses, such as Pyrex glass and silica fume, the latter being a by-product of magnesium production. Available data indicate that a material containing kaolinite as the only active ingredient will not pass the mortar test unless the raw material contains more than 75 percent by weight of kaolin, and is subjected to calcination at temperatures in the range of 1,000° F. to 1,800° F. Some fly ashes significantly reduce the expansion of mortars due to alkali-aggregate reaction, but others do not.

2. Many opals and opaline cherts yielding a partial X-ray, powder-diffraction pattern of beta-cristobalite.

3. Calcined (at about 1,400° F.) clays of montmorillonite-type (probably beidellite) commonly inseparably admixed with cristobalite, and which show contraction of the atomic lattice as a result of calcination at 800° F. or 1,000° F. Continued research may indicate the suitability of other clays of the montmorillonite or illite (hydromica) groups.

All of the materials which pass the mortar expansion test also meet the requirements of the test for compressive strength of lime mortar.

Because of the relatively few types of pozzolans which will satisfactorily control alkali-aggregate reaction, the search for pozzolans to be used at a specific project is simplified if alkali-aggregate reaction is not a problem. Thus, since the aggregate is not deleteriously reactive with cement alkalies, the fly ash selected for use as a pozzolan at Hungry Horse Dam, Montana, was not required to pass mortar expansion and chemical tests such as were devised for selection of a pozzolan for use at Davis Dam, Arizona-Nevada, where the concrete aggregate used caused a high expansion. In other instances, use of low-alkali cements may so reduce the possibility of alkali-aggregate reaction in concrete that a pozzolan exerting only moderate control over alkali-aggregate reaction can be used safely, even though the aggregates are deleteriously reactive. At Canyon Ferry Dam, specifications permit use of fly ash with low alkali cement, although the aggregates are known to contain reactive rock types. Consequently, because of the varied requirements, the geologist and project engineer should be aware of the reasons which justify use of a pozzolan in any given construction.

Conclusion

In the foregoing discussion the nature of pozzolans and their effect upon concrete have been stressed. However, in addition, economic factors may play a decisive role in selection of one satisfactory pozzolan or portland-pozzolan cement versus another, or in selection of a portland-pozzolan cement versus a portland cement, especially if technical factors, such as anticipated alkali-aggregate reaction or heat development in concrete, are not critical. Costs of purchase and transportation of the finished portland-pozzolan cement, or the purchase, excavation, haulage, processing, and blending of the pozzolan must enter into such cost analysis.

Current trends of thought anticipate that in a comparatively short time portland-pozzolan cement will displace use of straight portland cement in many situations. The accompanying demand for increased knowledge of the properties of pozzolan and for location of additional sources of materials presents a challenge to both the research laboratory and the engineering geologist.

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SOME MINERAL AND FOSSIL COLLECTORS THOUGHTLESS

The Department has received complaints that some mineral and fossil collectors are seemingly without feelings of responsibility when making excavations on highway rights of way and on private property. Instances have been cited of places where literally tons of rocks and clay have been picked down and left in highway ditches, blocking drainage. This type of collecting will tend to give all collectors a bad name and ultimately place obstacles in the way of geological field work. Shovels should be carried on field trips and when group trips are made an official inspector should be selected from the membership to see that ditches are cleaned and all litter taken care of.

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INVENTORY OF WASHINGTON NONMETALLICS

The Washington Division of Mines and Geology has recently published an inventory of Washington nonmetallic minerals as Bulletin 37. This bulletin, entitled "Inventory of Washington Minerals, Part I: Nonmetallic Minerals," is a 12 by 18-inch paper-bound, 113-page edition consisting of 30 maps and text. Each map shows the general distribution of a given nonmetallic resource in the State and also locates all known occurrences of that mineral in the State. The text opposite each map gives location, description, and value of every occurrence indicated on the map. The nonmetallic minerals are in alphabetical arrangement and the information is concise, complete, and easily readable.

Bulletin 37 is for sale by the Department of Conservation and Development, Olympia, Washington, for $1.00

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OREGON MARBLE QUARRY CHANGES HANDS

According to the Newsletter of the Raw Materials Survey, the Pacific Carbide and Alloys Company, Portland, has bought the property of Enterprise Lime Company from the Reconstruction Finance Corporation. The quarry and three kilns are located near Enterprise, Wallowa County. The limestone will be used in making calcium carbide at Portland.

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NEW BOOK ON NORTHWEST IRON ORE DEPOSITS

"A Review of the Iron Bearing Deposits in Washington, Oregon, and Idaho" is the title of a bound volume just issued by the Raw Materials Survey, Portland. The author is Carl Zapffe, Manager of the Northern Pacific Railway Company's iron ore properties and a well-known authority on the iron ore industry. Mr. Zapffe has first-hand knowledge of the iron ore deposits of the Northwest and has had long experience in following the development of various projects for studying these ores along with plans for putting the deposits into production. The book shows an admirable balance between the practical and the theoretical in evaluating possibilities of utilizing such deposits. The Raw Materials Survey has a limited number of these books for sale at $2.50.

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NEW GOLD CONCENTRATOR

Production of a compact, lightweight, portable gravity concentrator has been announced by the Northwest Machine Works, Portland, Oregon. The machine, invented by Mastin Taylor of Helena, Montana, has a rated capacity of ten tons of minus quarter-inch per hour. The current model consists of a trommel, hopper, and two concentrating bowls 12 inches in diameter arranged in series. The production model of the machine, which is to be available on or about October 1, will be equipped with two 16-inch bowls. This unit will have a capacity of about 25 tons per hour and will weigh 600 pounds. The machine is reportedly designed so that it can be dismantled into several small units for transportation by airplane or mule back.

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R.I.P.

The domestic mercury industry has about succumbed. Production of mercury in the second quarter of 1949 was at an annual rate smaller than in any year covered by the production record beginning with 1850 according to the U.S. Bureau of Mines in its Mercury Report No. 91. Primary production for the quarter amounted to 1,460 flasks or at an annual rate of 5,840 flasks. This compares with 51,929 flasks in 1943, the high point in domestic war production.

During the second quarter of 1949 the principal production came from the Bonanza mine, Douglas County, Oregon, and the Mt. Jackson (including the Great Eastern) mine, Sonoma County, California.

Imports during the quarter amounted to 29,492 flasks - a new high record for a 3-months' period. Italy, Mexico, Yugoslavia, Spain, and Japan supplied the metal imported, with Italy supplying 92 percent. Most of the imported metal was purchased by the Economic Cooperation Administration and was consigned to the national stockpile.

Domestic consumption was 7,600 flasks for the quarter. Although this figure is at a rate less than war and postwar rates, it compares favorably with the prewar rate of consumption.

The market price for the metal during the second quarter showed weakness and the average was $6 a flask less than in the first quarter. A recent quotation in the E&MJ Metal and Mineral Markets gave the price as $73-$74 a flask.

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EUGENE MEETING OF MINERALOGICAL SOCIETIES

The Northwest Federation of Mineralogical Societies held its 1949 convention in Eugene, Oregon, September 2, 3, and 4, under the sponsorship of the Eugene Mineral Association. Through the generous cooperation of the University of Oregon, exhibits and lectures were held in buildings on the campus. The principal speaker was Dr. Warren D. Smith, professor emeritus and former head of the University Department of Geology and Geography. Many fine exhibits were shown on the main floor of McArthur Court. At the annual banquet Mr. Phil Brogan of Bend, the well-known writer on Oregon geology, was master of ceremonies.

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PERCENTAGE DEPLETION ALLOWED PERLITE AND DIATOMITE

Section 9 of H.R. 5268 which amends certain provisions of the Internal Revenue Code provides for percentage depletion of deposits of perlite and diatomaceous earth. Depletion allowance for these two minerals has not heretofore been allowed in the code. It is proposed to allow percentage depletion with respect to perlite and diatomaceous earth only in the dry crude mineral form before grinding or any other preparation for any particular market. As with other minerals in the group, 15 percent of the gross income is allowed and the provision makes inapplicable to these two minerals allowance of depletion on the basis of discovery value. The Senate Committee on Finance has reported favorably on the amendments and has recommended passage of the bill.

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NORTHWEST NEEDS INDUSTRIAL CARBON

Industrial carbon, an essential material in the development of Northwest metallurgical industries, must be developed in large quantities or brought into the region economically if Northwest industrial expansion is to continue. This is the meat of a report just issued by the Department of the Interior Pacific Northwest Field Committee. The author is Ivan Bloch, consultant. Aluminum production in Washington and Oregon now requires about 160,000 tons of petroleum coke a year. Industrial consumption of coke and coke breezes is between 100,000 and 150,000 tons. Practically all of this carbon must now be shipped in. The report is entitled "Survey of Industrial Carbon Requirements of the Pacific Northwest" and is available at the Department of the Interior Pacific Northwest Field Committee, 506 Failing Building, Portland 4, Oregon.

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DOMESTIC PRODUCTION OF ROOFING GRANULES IN 1948

According to U.S. Bureau of Mines Mineral Market Report No. 1755 Revised, production of roofing granules in the United States during 1948 was 1,485,690 tons valued at $20,977,831, or an average per ton of $14.12. The production in the various classifications was as follows:

Classification	Short tons	Value	Average value per ton
Natural	448,150	$ 3,828,307	$ 8.54
Artificially colored	1,002,430	16,563,351	16.52
Brick	35,110	586,173	16.70

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MILL TAILINGS OWNERSHIP

Of considerable interest to mining men is the decision regarding ownership of mill tailings handed down in the Nevada Supreme Court recently. Briefly stated, mill tailings are personal property and are not subject to location as part of a mining claim. This holds true even for tailings from custom mills which treated ore belonging to one or more owners.

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EXPLORATION UNDERWAY AT TUNGSTEN PROPERTY

Surface exploration work is continuing at the Bratcher tungsten mine near Ashland, Oregon. Present work is planned to determine the lateral extent of the ore as well as to explore the immediate area for additional deposits. Initial shipment of 97 tons of ore to the Tulare County tungsten mines plant at Lindsey, California, yielded 109 units of tungsten trioxide.

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OREGON GOLD LODE PROPERTY INSTALLS MILL

Operations have begun at the Gold Plate mine near Galice, Josephine County. A four-stamp mill has been installed and milling is expected to begin in the near future. The mine is owned by W. W. Phillips and Charles Skeeters.

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URANIUM DISCOVERY

A potentially important discovery of uranium bearing ore in the Marysvale, Utah, district appears to contradict all the accepted theories concerning secondary uranium deposits.

Heretofore the theory has been that secondary uranium ores do not occur over large areas and that they are not highly disseminated through the formations. Ordinarily (in this country at least) they appear in small lenses in sandstone (such as the carnotite in Colorado and Utah) or in narrow veins in granite formations. Neither do soluble secondary uranium ores usually persist to a depth of more than a few feet at the most.

But in the Marysvale discovery all these generally accepted rules are contradicted. A sulphur colored ore, which appears to be autunite, is widely disseminated in an andesitic porphyry which is bounded on the north and south by rhyolite porphyry. It has been drilled to a depth of 135 feet along a 30° slope for a distance of 800 feet along the slope and is several hundred feet in width.

Autunite is a calcium-uranium-phosphate which in the pure state contains 60 percent uranium oxide. It fluoresces brightly, as does the Marysvale ore. Small samples of the discovery have shown a uranium content of 0.36 to 0.76, which is within the range of shipping quality. Its high solubility indicates an easy milling problem and the size of the deposits, which might be much greater than explorations to date have shown, suggest that it could be mined by low-cost open pit methods.

The property is being developed by the Bullion Monarch Mining Company.

(From West Coast Iron Age, September 13, 1949)

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October 1949 Portland, Oregon

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OREGON'S 1948 MINERAL PRODUCTION SHOWS BIG INCREASE

Total value of Oregon's mineral production in 1948 amounted to $24,980,000 according to a preliminary estimate of the U. S. Bureau of Mines. This is an increase of more than 55 percent over the value for 1947. The increase is especially remarkable since metallic mineral production was and still is at a very low ebb because of the severe decline in gold mining during and since the war. Value of metallic mineral production in 1948 was about $630,000. Thus the value of nonmetallics in 1948 was more than 97 percent of the total. This upsurge in nonmetallics production is directly due to the increase in construction activity since the war, reaching a high point in 1948. The value of Oregon's nonmetallics production has nearly tripled since 1945.

Nonmetallic minerals in general are low-priced products and must be consumed near the point of production so that production of nonmetallics usually depends on population. As population increases, demand for nonmetallics increases. To a certain extent the increase in Oregon's population is reflected in the large increase in production of nonmetallic minerals.

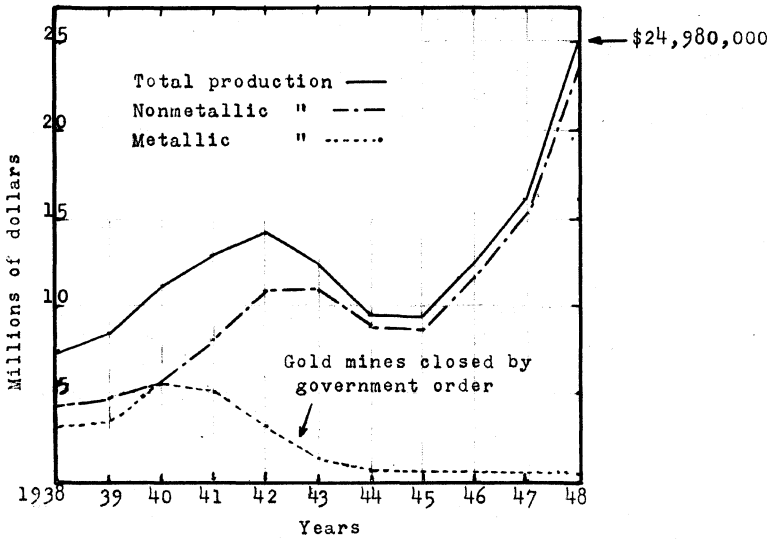
A break-down of mineral production as well as a graph showing production for the past 10 years follows:

Mineral Production of Oregon in 1948 1/

		Quantity	Value
Chromite	short tons	3,345	2/
Clay, raw	do ...	172,168	$ 128,586
Copper	do ...	2	868
Gold	troy ounces	14,611	511,385
Lead	short tons	7	2,506
Mercury	flasks	1,351	103,338
Pumice	short tons	106,277	307,274
Sand and gravel	do ...	8,384,755	10,628,889
Silver	troy ounces	13,596	12,305
Stone	short tons	3,682,420	5,733,658
Other: Cement, chromite, diatomite, heavy clay products, perlite, and quartz		----	7,551,000
Total			$24,980,000

1/ Preliminary.
2/ Value included with "Other."

Graph Showing Oregon's Mineral Production 1938 to 1948



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(Reprinted from CONTRIBUTIONS OF THE METEORITICAL SOCIETY, POPULAR ASTRONOMY, Vol. LVII, No. 2, February, 1949.)

THE MINERALOGY AND ORIGIN OF JOSEPHINITE*

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ABSTRACT

Josephinite is a naturally-occurring, terrestrial nickel-iron alloy, found along Josephine Creek, Josephine County, Oregon, and associated with stream gravels as water-worn pebbles, sometimes ellipsoidal in shape. A group of more than 75 specimens examined gave the following physical and chemical data: average sp. gr., 5.66; hardness, 4.5 to 5.0; streak, lead-gray; luster, metallic; fracture, hackly; malleable, sectile; strongly magnetic; opaque. The group of specimens examined ran as follows: largest dimension, 3.2 mm. to 31.4 mm. The chemical formula for josephinite is written usually as Fe_2Ni_5, altho josephinite contains also a little cobalt, phosphorus, and sulfur.

Josephinite is a naturally-occurring, terrestrial nickel-iron alloy, found associated with stream gravels along Josephine Creek, Josephine County, Oregon. It was first reported by W. H. Melville in The American Journal of Science, 43, 509, 1892. Josephinite is formed probably by the magmatic separation from peridotite magmas; these are later altered by hydration to form serpentine. Josephinite is found associated with chromite, magnetite, gold silver, and platinum, in stream gravels; because of its high specific gravity, it tends to collect at bedrock, together with the aforementioned minerals, where it may be recovered by sluicing. For many years mineralogists have assumed that josephinite was derived from the serpentine thru which Josephine Creek has cut its channel; actual samples have never previously been described, however, in which josephinite was found adhering to its serpentine matrix.

*(Altho this paper is, strictly speaking, on a mineralogical rather than a meteoritical subject, it is here included because of the similarity in chemical composition between josephinite and nickel-rich ataxites (cl. = D_1), and because josephinite itself has occasionally been suspected of being meteoritic in nature.-F.C.L.)

Paper published by permission of Mr. Russell A. Morley.

From this lack of evidence, the idea that josephinite might be of meteoritic origin was obtained. Some investigators have thought that perhaps blebs of molten metal, showered from a large meteorite, might have been responsible for its occurrence; others have reasoned that part of a large meteorite, perhaps the missing Port Orford, Curry County, Oregon, (C.N. = 1245,428), pallasite disintegrated, covering the area with thousands of small metallic fragments, later to be washed down and to be deposited in the Josephine gravels.

In the summer of 1948, I proposed to Dr. J. Hugh Pruett, astronomer of the University of Oregon, that I should make a study of josephinite and attempt to prove definitely whether it is of terrestrial origin. With the kind coöperation of a number of miners in the Kerby area, I was able to secure about 75 specimens of this mineral; in addition to studying these specimens, I made an extensive investigation of the Josephine Creek area, paying particular attention to the stream gravels. In the course of this work, I brought to light several fine specimens of josephinite with serpentine matrix adhering.

The accompanying data (in Table 1) resulted from a laboratory examination of this material. From these data it will be noted that my observations warrant the suggestion that a change should be made in the reported specific gravity and hardness of josephinite. The present reported specific gravity is 6.20, and the hardness, 5.0. A careful check of the specific gravity of the 15 specimens listed in Table 1 yields an average specific gravity of 5.66. The specific gravity ranges from 4.43 to 6.94. The lower specific gravities are due probably to oxidation products. The hardness ranges from 4.5 to 5.0.

TABLE 1. PHYSICAL PROPERTIES OF JOSEPHINITE

Specimen No.	Specific Gravity	Specimen No.	Specific Gravity
1	5.92	9	5.96
2	4.43	10	5.32
3	4.78	11	5.43
4	5.17	12	5.01
5	5.53	13	6.53
6	6.80	14	6.94
7	5.66	15	5.43
8	6.91		

Average sp. gr. of specimens 1 to 15 inclusive: 5.66; lowest sp. gr. observed: 4.43; highest sp. gr. observed: 6.94. Streak, lead-gray; luster, metallic; fracture, hackly; malleable, sectile; strongly magnetic; hardness, 4.5-5.0.

Josephinite is found occurring in stream gravels as water-worn pebbles, some of which are ellipsoidal in shape. A group of more than 75 specimens examined ran as follows: largest dimension, 3.2 mm. to 31.4 mm. The mineral has been reported as occurring more rarely in the form of much larger specimens.

TABLE 2. CHEMICAL PROPERTIES OF JOSEPHINITE

(The chemical formula is written usually as Fe_2Ni_5 or $FeNi_3$.)

$FeNi_3$: % of { Fe = 27.57, Ni = 72.43

Fe_2Ni_5: % of { Fe = 24.08, Ni = 75.92

	Analysis*
Fe	25.24 %
Ni	74.17
Co	0.46
Cu	Nil
P	0.04
S	0.09
SiO_2	Nil
Total	100 %

Josephinite is soluble in NHO_3; it gives a scarlet precipitate with dimethylglyoxime reagent after the removal of the iron by precipitation with NH_4OH.

* From F. S. Dana's System of Mineralogy, 7th Ed., 1, 117, 1944.

A BRILLIANT DISCOVERY

Titanium dioxide is a white powder used in making the best white paints, paper, plastics and even Milady's face powder. In recent years research has provided new and better varieties and the quest continues for still higher quality. It took a dramatic turn recently when scientists decided they could get better optical measurements if they had large crystals instead of the fine white powder. They produced the large crystals and were rewarded with a brilliant discovery; they had gems more brilliant than diamonds. The new "Titania" gems can be produced in clear crystals as well as blue and amber variations. Although more brilliant than the diamond, they are not so hard, therefore not so resistant to wear.

It may seem strange that such a large difference in physical properties is obtained simply by changing the particle size. However, this is a very important factor and considerable research has been done to determine the optimum size of the tiny particles of titanium dioxide so that they will have maximum whiteness. The best size for whiteness and opacity is about 1/125,000 of an inch across each particle. With the "Titania" gems the effort will be in the opposite direction; it will be desirable to have the crystals as large as possible.

Many materials show a similar change when produced in a large crystalline condition instead of very small crystals. We like our table salt as a fine white powder but the infrared spectroscopist uses it as a clear transparent crystalline plate like glass. He makes little containers with it to hold the organic liquids he examines with infrared radiation. Ordinary glass containers would not allow the radiation to pass through.

Usually we think of glass as a clear transparent material but if we grind it to a fine powder it is white like salt or titanium dioxide. But, if we replace the titanium dioxide in the white enamel with the powdered glass the enamel loses its whiteness completely. The physicist explains this by saying that titanium dioxide has a very high refractive index. This also explains its greater brilliance than the diamond; for titanium dioxide the refractive index is 2.70 and it is only 2.41 for the diamond. From high school physics we remember, probably, that the refractive index is a measure of the extent to which a material will refract or bend the light as it passes through it.

A few years ago the only type of titanium dioxide available had the crystal structure of anatase with an effective refractive index of 2.55. By rearrangement of the atoms in the crystal, the rutile structure was developed having a refractive index of 2.70 with a consequent increase in tinting strength and hiding power. No thought was given at that time to making gems more brilliant than the diamond, the object was to make white paints and enamels more opaque. It was highly successful in this respect as the paint manufacturer well knows and also the painter and householder when he applies the improved paint. The consumers of titanium dioxide will be glad to know that it is now more freely available, thanks to increased production facilities and improvements in processing.

(From "For Instance" No. 49, 1949, published by American Cyanamid Company, New York, N.Y.)

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PRODUCING TUFF BUILDING BLOCKS

Tuff Stone Company, Inc., of Portland is currently producing sawed blocks of volcanic tuff at a quarry located 6 miles northeast of Sublimity in Marion County, Oregon. William R. Singletary and Fred M. Franklin head the operation which is cutting 8 by 8 by 16-inch blocks from the quarry face. The rock has the formational name of Fern Ridge Tuffs.

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IT PAYS TO ADVERTISE

At the cost of a sign posted along the highway, one enterprising individual has succeeded in clearing his land of worthless boulders distributed in large numbers over his fields. The sign, which can be seen on U.S. Highway 30 several miles east of Pendleton, offers "petrified watermelons" free for the hauling away. The "melons" are actually rounded, elongate basalt boulders, but tourists have hauled away 500 tons of them, the owner reports.

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DO YOU OWN SOME GOLD?

In general, persons are required by law to have a government license in order to possess or deal in gold. Exceptions are given below as contained in the Gold Reserve Act of 1934 as amended to April 15, 1942.

Natural gold may be held, bought, sold, and transported within the United States without the necessity of obtaining a government license. Natural gold is defined by the Treasury as gold recovered from natural sources which has not been melted, smelted, or refined or otherwise treated by heating or by a chemical or electrical process. Thus the only gold which would come under the Treasury definition and which may be bought and sold in this country without any strings attached is metallic gold obtained from a natural source by mechanical means only - that is by such methods as sorting, washing, sluicing, screening, and tabling.

Gold obtained in the form of sponge, which results from retorting gold amalgamated with mercury, may be held and transported without a license by the person retorting the amalgam, provided that the person shall hold at any one time an amount not in excess of 200 troy ounces of fine gold. The person holding such gold may dispose of it only to the United States mint or to a person holding the proper government license.

Gold coin of value to coin collectors may be acquired, held, transported within the United States, or imported without the necessity of holding a license. However, such coin may not be exported without a license from the Director of the Mint. There is a special provision concerning quarter eagles ($2.50 pieces). These may form a part of a collection for historical, scientific, or numismatic purposes, except that such collections may not have more than four quarter eagles of the same date and design struck by the same mint.

A person engaged in an industry, profession, or art which requires gold for the legitimate conduct of such activities may import unmelted scrap gold and may acquire, hold, melt, and treat gold in any form without a license provided the aggregate amount of such gold does not exceed at any one time 35 troy ounces of fine gold. This gold must be used by the person possessing it in his actual business of fabricating or in his profession or art.

A person may hold at any one time not more than 35 troy ounces of fine gold in the form of unmelted scrap. He may furnish it only in such form to persons authorized by license or otherwise, to acquire unmelted scrap gold, or he may sell it in unmelted form to the United States. Such persons may acquire gold for these purposes only from:

(1) A person duly licensed by the government.
(2) A person authorized under the regulations to hold and dispose of gold without a license.
(3) A United States mint or assay office.

Persons as specified above may not sell or otherwise dispose of gold except as unmelted scrap gold, or fabricated gold, or in metals containing not more than 5 troy ounces per short ton, or gold in its natural state; provided that gold filings, clippings, and the like which result from the legitimate conduct of the work in which the person is engaged may be disposed of in the same form to licensed persons or to the United States.

No person may acquire, hold, transport, melt or treat, or import gold coin or gold derived by any person from gold coin or any gold which has been held in noncompliance with the Act of March 9, 1933, any executive orders or orders of the Secretary of the Treasury issued thereunder.

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EASTERN OREGON MINING NEWS

Andrew Murray and associates report plans to conduct a testing program next spring on potential dredge placer in the vicinity of Greenhorn, Grant County. This plan is the result of preliminary testing recently completed.

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Placer operations conducted throughout the past season by Anthony Brandenthaler on ground in the Virtue Flat area of Baker County, have proved successful. An average of four to five

men have been employed sluicing with water pumped from the old Virtue mine. Operations will be suspended this winter, but a larger capacity pump is to be installed for use during the coming season.

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Dredging operations by Porter & Company will be continued on the present Olive Creek set-up in Grant County for another season. Next season the dredge is to be moved to a property on Crane Creek also in Grant County.

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Kenneth Grabner and Ralph Leonhardy have just completed construction of a small mill at the Thomason mine near Unity, Baker County. This property was opened last year by Leonhardy and Vinson. An estimated 5000 tons of ore is reported to have been milled at that time in the mill at the nearby Bull Run mine. Vinson is no longer connected with the enterprise. Grabner is owner of the Grandview mine which is adjacent to the Thomason claims, and the present plans are eventually to work the Grandview property in conjunction with the Thomason operation.

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OREGON GEOLOGISTS CORNER GEOLOGY JOBS IN NEW MEXICO

John Eliot Allen, formerly geologist with the Oregon Department of Geology and Mineral Industries and later associate professor of geology, Pennsylvania State College, has accepted the position of head of the Department of Geology at the New Mexico School of Mines at Socorro.

Stewart Jones, Oregon State College graduate, who obtained his doctorate in geology at Columbia University, New York City, is assistant professor of geology at the New Mexico School of Mines.

J. Paul Fitzsimmons, formerly geologist with the Oregon Department of Geology and Mineral Industries and the U. S. Geological Survey, who obtained his doctorate at the University of Washington, is now assistant professor of geology at the University of New Mexico at Albuquerque.

Eugene Callaghan, University of Oregon graduate, formerly with the U.S. Geological Survey and later head of the Department of Geology at the University of Indiana, is now Director of the New Mexico Bureau of Mines and Mineral Resources, Socorro.

Philip F. McKinlay, Oregon State College graduate, is a geologist with the New Mexico Bureau of Mines and Mineral Resources.

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GOLD

At a recent press conference, Treasury Secretary Snyder again denied rumors that he will increase the price of gold or that the United States will return to the gold standard. His denial was issued after reporters had queried him about rumors as to a possible gold price change as the result of the devaluation of foreign currencies.

Prompted by the press conference questioning, the Treasury Department issued a formal statement concerning the legal authority to change the gold content of the dollar and the Treasury's price for gold. The statement declared: (1) only an Act of Congress can now alter the statutory gold content of the dollar; (2) the authority of the President to change the gold content of the dollar by executive proclamation expired June 30, 1943; (3) while the Secretary of the Treasury has authority to purchase and sell gold at such rates and upon such terms as he may consider most advantageous to the public interest, his authority in this respect is limited by United States obligations as a member of the Monetary Fund and the Bretton Woods agreement. The statement explained that no official of the United States can propose any change in the par value of the United States dollar to the Fund unless Congress authorizes such action by law.

(From American Mining Congress Bulletin Service, No. 32, October 10, 1949.)

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November 1949 Portland, Oregon

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HISTORICAL OUTLINE OF THE MINING LAWS

Introduction

The mining laws of European countries had an influence in the setting up of a system of mining laws in the United States. The laws governing mining operations in continental Europe were, as might be expected, based on crown ownership of mineral lands and governmental control. In England mining laws were liberally administered and individual enterprise and initiative were recognized by Parliament in giving statutory authorization to local rules and customs of miners in Cornwall, Devon, and Derbyshire. Spanish law was the rule in Mexico except for minor changes made in the setting up of the Republic of Mexico in 1821. Mines were the property of the government but title and possession could pass from one subject to another. Royalties were payable to the government. Discoverers of mines could acquire claims or "pertenencias," and rules were established by the government for locating, recording, and maintaining possessory rights. These Mexican laws and customs had a strong influence on rules set up in the organization of the first mining districts in California.

Early United States laws

When California became United States territory, Mexican mining laws then in force were abrogated. Therefore to prevent extreme chaos California miners lost no time in setting up their own rules and regulations to protect claim owners and to regulate the locating and recording of mining claims as well as to specify the amount of work required to maintain title. This unprecedented procedure was later formally approved by Congress and the Supreme Court of the United States even though in reality the miners were trespassers and took the law into their own hands, as was their custom in matters of criminal law.

The California gold rush focused attention on the need for a uniform mining code. The need became more acute after discovery of the fabulously rich Comstock lode at Virginia City, Nevada, with the attendant boom and confusion over the multitudinous mining locations.

During this early pioneer period from 1848 to 1866, mining laws were in a very unsettled condition. At first there were the loose local rules and customs. Later, states and territories set up regulations which were an outgrowth of the local rules. These regulations gave uniformity to the code within the state, but there were variations among the different states, especially in the size of mining claims. Discovery of valuable mineral preceding appropriation of the claim was generally recognized as was a work requirement for maintaining possessory rights. These were fundamental and were so considered by the courts in contests of property rights.

Lode Law of 1866

In this early unsettled period Congress recognized the need for formulating a definite mining code, but there were many divergent opinions as to the best policy and the proper machinery to implement that policy. Congressional action was delayed session after session but the pressure for action grew until the summer of 1866 when the so-called Lode Law of 1866 was passed.

There were several laws passed prior to 1866 which influenced the act of that year. The Department of the Interior was established by statute on March 3, 1849, and from then on this department had jurisdiction over public lands. In 1864 and 1865 laws were passed regulating sale of coal lands. On May 5, 1866, a law was passed which was concerned with the boundaries of Nevada and provided for maintenance of possessory rights in mining claims of a particular mining district in which local rules and regulations were declared valid, but this law expressly stated that fee title was not granted to mineral lands held by possessory title. The Sutro Tunnel Act was approved July 25, 1866. It granted rights of way and other privileges to Adolf Sutro and associates for the construction of an exploration and drainage tunnel to cut the Comstock Lode. This act also recognized mining regulations set up by the Nevada legislature. (The Sutro tunnel was finished too late to be of service and was probably unwarranted in any event. It was a financial failure to everybody concerned except Sutro.)

On the day following approval of the Sutro Tunnel Act, Congress passed the "Lode and Water Law of 1866." This was the first law which formulated a national policy under which title to mineral lands could be acquired. Later laws repealed or superseded most of the provisions of this act but it was important in establishing a means of acquiring title to mining claims under Federal law. It confirmed the rights acquired under local rules and established a definite policy that mineral lands of the public domain should be open to exploration and location. Even then Congress recognized the importance to the nation of encouraging mineral discovery and development.

As the name of the 1866 law indicates, it was concerned with lode claims. It made no provision for acquiring title to placers. The Comstock Lode was then much in the public eye and the spectacular boom in placer deposits was on the wane. Lode mining was gaining in importance and popularity even outside of the Comstock, and a national lode law became essential in order to avoid chaos among mining titles. Senator Stewart of Nevada, co-author of the act, was the principal force behind its passage. The law was built around the conception of a tabular vein deposit; the surface containing the lode was incidental. The law was unsatisfactory as a national mining law and was subject to many Land Office interpretations and court decisions. However, as stated above, it made a start on basic policy including the law of extralateral rights which permitted a claim owner to follow a vein beyond the claim's sidelines under certain conditions. This law was clarified by the act of 1872.

Placer Act

On July 9, 1870, Congress passed a placer law as a corollary to the Lode Act of 1866. The Placer Act defined a placer as "all forms of deposits excepting veins of quartz or other rock in place." This definition left certain types of mineral deposits, later to become important, in a "no man's land" requiring court decisions to place them in one camp or another. The act was important in placing entry, location, and patent of placer claims on the same footing as lode claims. It prescribed claim areas and methods of location.

Act of 1872

On May 10, 1872, Congress passed a new mining law known as the General Mining Act of 1872. It embraced in the one act provisions covering both lode and placer claims. These provisions form the basic mining laws of today. In its declaration of policy the act states

that "All mineral deposits in land belonging to the United States are hereby open to exploration and purchase and the lands in which they are found to occupation and purchase." Thus the policy was declared to be that both the deposits and the lands containing them were inseparable as far as original entry and patent were concerned. The entryman located a surface area containing a mineral deposit, not just a mineral deposit or lode as in the 1866 law.

The 1872 Act specified the maximum area embraced in lode claims (1500 feet long by 600 feet wide), a specification which was indefinite in the Act of 1866. In addition, the act fixed the amount of annual work, clarified rules for marking boundaries, recording and patenting, and provided for location of tunnel sites and mill sites.

Summary

The 1872 Act formed the framework of our mining laws but the whole fabric of these laws is made up, in addition, of subsequent legislation, both state and federal, court decisions, and administrative acts and rulings.[1/] Important among these acts and rulings are the following: granting certain sections of the public lands to states for the purpose of encouraging education and the maintenance of public schools; the Timber and Stone Act of 1878; the granting of lands to railroads to encourage construction; granting of townsite lands; homestead and townsite laws; Forest Reserve acts; formation of Indian reservations, national parks and national monuments; the leasing laws of 1917 and 1920; the Taylor Grazing Act of 1934; and the many administrative withdrawals of land for power sites and for the purpose of classification. Of importance to Oregon was the O and C Railroad Land Revestment Act which in 1916 returned railroad grant lands in Oregon to the federal government. In 1937 these lands were put under a sustained timber yield program, and later special mining regulations applicable to these lands were promulgated by the Bureau of Land Management, successor to the General Land Office.

In formulating the mining laws Congress recognized some basic facts regarding mineral lands of the public domain - namely, that it was essential to the public welfare for mineral deposits to be found and developed; that an incentive in the way of a reward for hardship and labor must be offered the prospector to make the search for minerals attractive; that this incentive should be commensurate with the risks involved; that the real prospector is, above all, an exponent of individualism and extreme optimism; that a minimum of governmental regulations should be set up; and that valuable mineral deposits are generally buried and may not be evaluated the same as timber land, agricultural land, and game resources.

Encouragement to the prospector was the keynote of the early statutes for it was recognized that the prospector provides an all-important link in the chain of finding, developing, and producing minerals - a link that cannot be formed by government, mine operators or investors. The building up of a great mining industry in the West, and a mineral production that contributed heavily to the winning of three wars bear witness to the wisdom of Congress in formulating the mining laws.

References

Lindley on Mines, by Curtis H. Lindley, 3rd ed., 1914, Bancroft-Whitney Company, San Francisco.

Mining Law in Recent Years, by William E. Colby, California Jour. of Mines and Geology, vol. 44, no. 3, July 1948.

United States Mining Laws, Circ. No. 430, Dept. of Interior, Gen. Land Office.

F. W. L.

1/ With a few minor exceptions the mining laws apply only to the public land states of the West comprising Arizona, California, Colorado, Idaho, Montana, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, Wyoming, and Alaska Territory.

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GALLIUM

Gallium - that rare metal with the unusual properties which, last spring, Alcoa announced it was deriving from bauxite - is in the news again. Almost simultaneously two separate branches of the U.S. Navy are reported to have been investigating potentialities of the metal as a treament for bone cancer and as a heat carrier for an atomic power plant.

According to a story that appeared in the Washington, D.C., Times Herald, the Chemical Society of Washington was told by Navy Commander Horace G. Dudley that a radioactive form of gallium had been used experimentally for bone tumor treatment at the Naval Medical Center, Bethesda, Maryland.

The Wall Street Journal, in a story by Ray Cromley, revealed that the Office of Naval Research and the Atomic Energy Commission were conducting experiments to determine what the metal can do in the way of helping make atom power practical for industrial plants, ships, planes, and rockets.

In its experiments with radioactive gallium, the Navy has injected the material into the blood streams of mice in which bone tumors were present. It emits electrons and high energy X-rays so violently that the hypodermic needle had to be guarded with a lead shield to protect the hands of laboratory workers from severe radiation burns. Within a few hours after its injection into the animals marked concentrations of gallium were found in the tumor mass. If present indications are upheld, said the Times Herald, radioactive gallium may prove to be the most valuable contribution yet made to bone cancer treatment by the new radioactive materials which have followed the atomic bomb and which are made in the government's uranium piles.

Office of Naval Research is looking into the possibilities of gallium along other lines, says the Wall Street Journal. In their efforts to create a practical stomic power plant, one of their chief problems has been how to collect the tremendous heat from an atomic pile and use it for production of power. Water heated to steam isn't usable because steam, as a collector of heat, is practical up to only about 600 degrees Fahrenheit. Scientists say atomic power plants will work most efficiently at temperatures of about 3,500 degrees.

It is here that gallium comes into the picture. Its physical properties are such that although it is solid at temperatures approaching the freezing point of water, it will become liquid at around 86 degrees Fahrenheit. But, it will not boil until above 2500° Fahrenheit. Thus, as a collector of heat from atomic piles it holds much promise for transferring this heat to a gas which would drive turbines to create electric energy. Stumbling block beyond this point is the search for a material to hold the gallium while it is at such high temperatures. Its chemical nature is such that it eats into most containers. The metal is now shipped in solid form in small rubber containers. The rubber is then stripped from around the solid contents to free it for use.

Discovered in 1875, gallium is not new. Up to now, however, its chief use has been in thermometers to measure high temperatures. More recently it has been used experimentally in making amalgams for filling teeth cavities.

Found in combination with most important metals and even with coal, gallium is so thinly spread in its natural state that it is economically produced only as a by-product of refining other metals. Gallium is now being produced at a cost comparable with some of the precious metals.

From The Alcoa News, Pittsburgh, Pa., issue of October 3, 1949.

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LIMESTONE SHIPPED TO PORTLAND CARBIDE PLANT

A 5-car shipment of limestone from its recently acquired marble quarry near Enterprise, Oregon, was received on October 25 by the Pacific Carbide and Alloys Company, Portland. Regular 5-car shipments will follow periodically. Pacific Carbide and Alloys Company bought the Enterprise quarry from the RFC. The stone, of high purity, is burned in kilns at the carbide plant in Portland.

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PERCENTAGE DEPLETION OF PERLITE AND DIATOMACEOUS EARTH FAILS

H.R. 5268 of the 81st Congress contained amendments to the Internal Revenue Code. Section 9 of the bill provided for percentage depletion for perlite and diatomaceous earth. The bill passed the House but the Senate amended the bill to include other materials besides perlite and diatomaceous earth which would come under the percentage depletion provision. These other materials were "tripoli, granite, marble, borax mines and deposits, sand, gravel, stone, calcium and magnesium carbonates, and all other nonmetallic clays and minerals." The conference committee failed to agree and eliminated the amendment with the understanding that the entire matter of percentage depletion will be considered early next year after full study and hearings. Therefore Public Law 378 which amends the Internal Revenue Code according to H.R. 5268 contains no reference to percentage depletion.

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MACE SMELTER PURCHASED FOR SOUTHERN OREGON MINES

According to the Illinois Valley News of October 13, 1949, Waite Minerals, Inc., which owns the Queen of Bronze and Cowboy mines near Takilma, Josephine County, Oregon, has purchased a Mace smelter to be erected at the Queen of Bronze mine. The report states that W. A. Richelsen, consulting engineer, Seattle, has been retained as consulting engineer for Waite Minerals, Inc. It is stated that the smelter will be operated as a customs smelter in addition to treating the ores produced by Waite Minerals, Inc.

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NEW MINERAL CLUB FORMED IN LA GRANDE

On October 24, Twenty-five residents of La Grande met at the home of Mr. and Mrs. Fletcher Milton and formed the Blue Mountain Gem Club. Weekly meetings will be held on Mondays. Mr. N. S. Wagner, field geologist for the State Department of Geology and Mineral Industries, gave a talk on geology of the State illustrating, with the aid of maps, geological phenomena in general, with specific examples representative of northeastern Oregon.

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DEPARTMENTAL ACTIVITIES

Harold Wolfe, field geologist stationed at Grants Pass, and David White, geologist from the Portland office, have been doing plane table work in the area above the old Ashland mine near Ashland, Jackson County, where scheelite, a tungsten mineral, was discovered last summer. When the topographic map of the area has been prepared, the geology will be mapped in an attempt to get a structural picture of the scheelite occurrence which may be of value as a guide to further prospecting. Results of the study will be published in a G. M. I. Short Paper.

Norman Wagner, field geologist stationed at Baker, and Ralph Mason, mining engineer of the Portland office, have examined clay deposits near Spray in Wheeler County and near Dayville in Grant County. The deposit near Spray contained white kaolinite and that near Dayville was a good grade bentonite. Both of the deposits proved to be of restricted size. Ceramic tests of samples were made by Charles Jacobs and chemical analyses by L. L. Hoagland, both of the Portland office.

Hollis Dole and Ralph Mason of the Portland office made an inspection, from a geological standpoint, of the Peninsula sewer tunnel now being driven by the City of Portland in the northern and northeastern sector of the city. Fine cooperation has been obtained by the Department from the engineering department of the city and from the contractor who is driving the tunnel. Petrological studies of the gravels penetrated will be made by the Department, and after the tunnel is finished, probably sometime next spring, a paper will be prepared on the geology of the area exposed by the tunnel. Maps and drill logs along the course of the tunnel have been provided by the city engineering department.

Hollis Dole is teaching an evening class in geology for the Vanport Extension Center of the Board of Higher Education at Vanport College, and together with David White is teaching classes one night a week at Lincoln High School in identification of rocks and minerals for the Portland Extension Center. Harold Wolfe is teaching a class on rocks and minerals organized by the Grants Pass Agate and Mineral Society.

During October members of the Department staff gave several talks to classes in Portland grade schools and to civic clubs.

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OREGON MEMBERS OF BOARD OF GOVERNORS, AMERICAN MINING CONGRESS

At the annual meeting of the Western Division of the American Mining Congress held in Spokane September 28, 1949, F. I. Bristol, F. W. Libbey, and S. H. Williston were elected to the Board of Governors as Oregon members.

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NEW MAP SHOWS GEOLOGY OF A COASTAL AREA IN NORTHWESTERN OREGON

The U.S. Geological Survey has published a new map of the area between Cape Kiwanda and Cape Foulweather along the northern coast of Oregon. It is part of a program to provide data on oil and gas possibilities of the northern Coast Range of Oregon, and was prepared in cooperation with the Oregon State Department of Geology and Mineral Industries.

The map, titled "Geology of the coastal area from Cape Kiwanda to Cape Foulweather, Oregon," by Parke D. Snavely, Jr., and H. E. Vokes, has been issued in one sheet as Preliminary Map 97 of the Oil and Gas Investigations series. Copies may be purchased from the Map Distribution Office, U.S. Geological Survey, Denver Federal Center, Denver, Colorado, at 50 cents each. The map will also be available for "over-the-counter" sale (but not by mail) at Room 1206 General Services Building, Washington,D.C., and at the Geological Survey field offices at 533 U.S. Post Office and Courthouse Building, Los Angeles, California; and at 234 Federal Building, Tulsa, Oklahoma.

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LOS ANGELES TRYING TO REGAIN ITS PLACE IN THE SUN

The West Coast edition of Iron Age, November 3, 1949, reports that 32 gray iron foundries in Los Angeles County must take active steps toward controlling coke ash particles. A county citation with a January 27, 1950, deadline for placing orders for smog-reducing equipment has been issued. The foundries are not the only plants contributing to the eye-smarting, sun-hiding industrial smog, however.

To determine what constitutes smog, the Stanford Research Institute and Los Angeles County developed new instruments which measure in sizes of one-tenth to 10 microns. They find in the Los Angeles area no one contaminant causes smog, but a combination of them does the damage.

In the air they find such contaminants as sulfur dioxide, ammonia, oxide of nitrogen, sulfur trioxide, aldehydes, filterable oil, soluble chlorides, carbon, ozone, hydrogen sulfide, fibers, pollen, tarry organic material, calcium, sodium, aluminum and silicon compounds, small amounts of magnesium, titanium, lead, iron, potassium and barium compounds and traces of compounds of copper, manganese, nickel, zinc, lithium, barium, strontium, silver, boron, vanadium, tin, chromium, zirconium, bismuth, and cobalt. These are the main contaminants. Industries contributing these contribute to smog.

The research group says it now knows that visibility is reduced by carbon and metal particles, responsible for 10 to 50 percent decrease in visibility; transparent light-scattering crystals, including aluminum oxides and silica, 10 to 30 percent; small water-soluble and oil soluble particles and oil droplets (effect small); substances capable of forming moisture droplets in the air, principal of which is sulfur trioxide, 5 to 20 percent; and large soluble crystals such as sulfates, nitrates, and chlorides, 0 to 80 percent. Particulate matter alone limits visibility, not gases which do not form particles.

Industry is far from being the only contributor as even sea salt spray and pollen as well as incinerators, auto exhausts, diesel burning and similar causes form a major part of the trouble.

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December 1949 Portland, Oregon

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OREGON'S PUMICE INDUSTRY
Progress Report for 1949

By
N. S. Wagner*

The present pumice industry is a postwar development. It was started in 1945 and first gave indication of assuming important proportions during 1946. An investigation of the then prevailing situation was made by the State Department of Geology and Mineral Industries and the results were summarized in the Ore.-Bin.** Subsequent development of the pumice industry in 1948 was again summarized in a report on the lightweight aggregate industry in Oregon (Wagner and Mason, 1949).

For those not familiar with the earlier articles just mentioned, and not otherwise acquainted with the pumice occurrences in Oregon, it can be stated that Oregon has extensive deposits. The most notable area includes parts of Klamath, Deschutes, and Lake counties in the southwestern portion of the central part of the State. For anyone interested in more detailed geological descriptions of the deposits, reference is here made to reports by Moore (1937) and Williams (1942).

Seven established operations were actively engaged in the production of pumice aggregate during 1949. Two of these produced 8,500 cubic yards in conjunction with company-owned block plants. One of these plants retails a limited amount of aggregate. The number of operations engaged in competitive commercial production is therefore six.

A comparison with preceding years is as follows: In 1946 there were also six established operations. As many as twelve are understood to have been active during 1947. A total of nine operations were engaged in full or part time production in 1948. This shows a considerable fluctuation for the 4-year period together with a progressive decrease in the number of operations from the peak year of 1947.

Production for 1948 totals 170,500 cubic yards. This figure is based on production statements given directly to the writer by the various operators. In most instances the individual production figures are understood to have originated from sales records. In only one operation is a production record known to be erroneous. Here the present owner had taken over the property during the year and was able to supply only figures for the aggregate he himself had produced, as records for the previous owner's production were not available. If an estimate of this unknown production were to be added, the yearly total given above would be boosted by several thousand yards.

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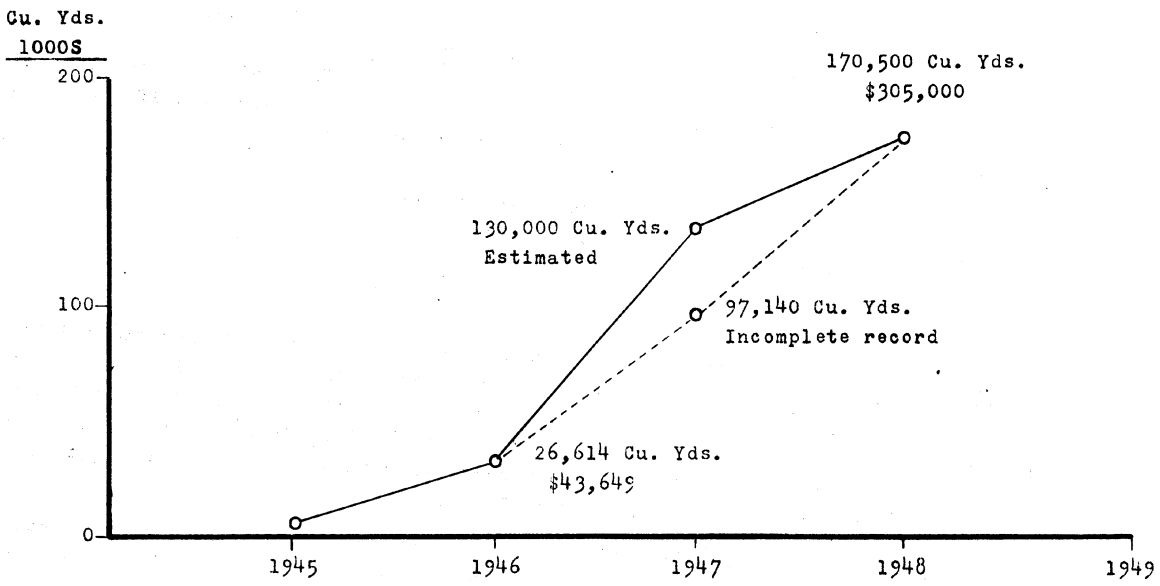
*Field geologist, State Department of Geology and Mineral Industries, Baker, Oregon.
**References at end of this report.

The value of the 1948 production amounted to about $305,000. This figure is subject to adjustment as the production figures were not in all instances sufficiently itemized by product grades to permit accurate calculations; nor was the author in possession of a full list of grade prices and the discounts offered by some producers for cash payments and quantity orders.

The accompanying graph shows increase in volume of production from 1945 to 1948, inclusive.



Individual production figures for the year 1947 were also obtained* by the writer directly from company representatives. For this year, however, the data gathered are known to be less complete than the 1948 record. Estimates of the missing figures on production (estimates believed for various reasons to be quite accurate) indicate that the actual 1947 production was in the neighborhood of 130,000 cubic yards. This is more than double the production given by the U.S. Bureau of Mines in their preliminary figures for the Mineral Production of Oregon in 1947. The Bureau gave the pumice production as 33,240 short tons valued at $111,380. Converted to cubic yards by using a weight of 1250 pounds per cubic yard, this tonnage figure equals 53,184 cubic yards. Although the U.S. Bureau of Mines figures available at this time represent preliminary figures, it is probable that the wide spread between the Bureau's figures and those obtained by the writer reflect the effectiveness of personal contact as compared to questionnaires. Even the incomplete 1947 production, as based on actual records collected, amounted to 97,140 cubic yards. Both the "estimated" and the "incomplete" totals are indicated on the graph. The production statistics for 1945-46 were gathered by the Department during an earlier investigation (Wagner, 1947).

A wide range of specially sized or blended aggregates is now available to the consumer. Common block aggregate can be obtained in sized and segregated condition and blended block aggregate is made under controlled conditions. This contrasts markedly with the state of affairs prevailing at the outset when only an unsegregated block aggregate was produced with little or no control exercised with respect to balance of proportions of fines. That the producers are now specification conscious stands as perhaps the most significant development at this time. This fact is important because it contributes to future stability of the industry. The ultimate popularity of pumice aggregate will depend upon the quality of products made with it, and therefore only by coordinated effort between the aggregate producers and those engaged in incorporating it into structures or structural units, can the

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*For the most part during the late 1949 investigation.

highest level of quality of product be attained. In this respect it is to be noted also that the popularity of block plants as quick money-making ventures has dwindled. Many of the plants which sprang up early in the game are now out of business. Those remaining generally represent operations under managements which recognize that the concrete products business is one of exacting requirements insofar as quality of product is concerned. Co-operation between aggregate producers and consumers is essential as each is handicapped by shortcomings of the other. It is fortunate that a measure of cooperation appears to exist. Reasearch on the many problems connected with the use of pumice as a lightweight aggregate is essential and it is encouraging to know that such studies are being conducted at Washington State College. Research on the use of pumicite as a pozzolanic material is being carried out at Oregon State College.

In addition to block aggregates several producers now offer a 3/4-inch minus aggregate for monolithic pours, and two producers are offering a pumice plaster sand. Entrance into the plaster sand field is new. Both of the operators had just embarked in this phase of production at the time of the writer's visit, and neither had at that time any appreciable backlog of production statistics. About all that can be said on the subject is that one of the operators advertises a product conforming to the A.S.T.M. standards. The plaster sand produced by this company is kiln dried and weighs approximately 28 pounds per cubic foot. It is sold sacked in sacks of $2\frac{1}{2}$- and 3-cubic foot sizes. The other producer offers a 3/32-mesh product weighing 1250 pounds per cubic yard and sold in bulk. Block aggregate prices prevailing during midsummer of 1949 ranged from $1.25 to $1.62 for blends to $1.80 for segregated sizes.

Plants are still rather simple and unpretentious in design. Crushing by commercial producers is done by rolls. In one plant where the operator owns his own pumice pit a Symons horizontal disc unit is used. Screening is done by means of shaker or vibratory screens at all plants except one where a rotary screen is employed. Segregation is controlled largely by manipulation of screen sizes and regulation of roll output. A substantial improvement in plant buildings is to be noted, particularly in the case of some of the larger operations. Present buildings are durable structures with storage bunkers and loading-out facilities.

Several of the producers have more than one working pit. In some places these pits are rather widely separated. This multiple pit operation is maintained both in deference to certain rail shipment considerations and to wintertime operating conditions. Freezing of the pumice constitutes a mining problem in the case of wet, poorly drained deposits, and substitute pits are therefore advisable in some places.

One operator digs with a shovel and believes that it furnishes a more uniform pit-run plant feed owing to the vertical shovel cuts across horizontal bedding and that less fractured and shattered material is created than is created by dozers. Less adverse wintertime mining conditions are claimed in favor of shovel-operation because stripping large areas of overburden ahead of mining operations is not required. All other producers employ dozers and carryalls or comparable materials handling equipment. A slackline set-up formerly used by one of the producers has been replaced by "cat" and carryall units.

Both rail and truck facilities are still employed for product shipment. All long-haul movements are by rail, and Oregon pumice is now regularly sent to surprisingly distant points. Vancouver, British Columbia, San Jose and Modesto, California, and several points in Montana represent some of the more distant areas served.

Labor is engaged on both a payroll and contract basis. The contracting system is rather extensively used for pit-to-plant hauling and also for mining in some operations. The number of men engaged on a contract basis is a variable factor, and the total number of men employed by the industry either directly or indirectly, is relatively small.

From a long range standpoint the importance of the industry to the community lies not so much in the number of men employed, but rather in its prospects of permanency. That pumice aggregate is becoming a widely accepted commodity is indicated most pointedly by the fact

that the decrease in the number of operations has been accompanied by a notable expansion of activity and a large increase in production. The net effect of the decrease in operations from a numerical standpoint therefore reflects a state of healthy stabilization and consolidation rather than a slump. Such a readjustment of operations is to be expected considering the newness of the industry and the fact that it had its inception during the period when the postwar demands for building materials were most acute and risk capital for investments of this type was relatively plentiful. Further consolidation of operations may yet be made as markets and distribution channels become more clearly defined and as the producers themselves become more firmly entrenched. While a leveling-off of production will certainly occur, and may even have occurred during the past year, for which production records are not yet available, it is believed that the market for pumice aggregates has become sufficiently established to insure continued operation of this new Oregon industry.

A list of producers (established and active in 1949) is as follows:

Central Oregon Pumice Company
William E. Miller
c/o Miller Lumber Company
Bend, Oregon

Chrystallite Aggregates
Wisby Brothers
P.O. Box 61
Chemult, Oregon

Deschutes Concrete Products Company
Chester T. Lackey
Redmond, Oregon

Harney Concrete Tile Company
Don Robbins
Burns, Oregon

Lloyd A. Williamson
114 Oregon Avenue
Bend, Oregon

Pumice Engineering Company
Merle Sleeper
P.O. Box 808
Bend, Oregon

Volcanic Materials
C. R. Badger
P.O. Box 302
Bend, Oregon

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1937 Nonmetallic mineral resources of eastern Oregon: U.S. Geol. Survey Bull. 875.

Wagner, N. S.
1947 The lightweight aggregate, pumice: Oregon Dept. Geology and Min. Industries Ore.-Bin, vol. 9, no. 4, pp. 29-34.

Wagner, N. S. and Mason, R. S.
1949 Lightweight aggregate industry in Oregon: Mining Engineering, Am. Inst. Mining and Met. Eng., New York, vol. 1, no. 11, pp. 385-87.

Williams, Howel
1942 The geology of Crater Lake National Park, Oregon: Carnegie Inst. Washington Pub. 540.

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NEW HYDRAULIC MINE

Spanish Gulch Mines, Inc., Sidney Zintner, President, has started hydraulicking operations in the old Spanish Gulch district of southeastern Wheeler County, Oregon. Five men are employed. Ground has been leased from Mr. Everett Waterman, Mitchell, Oregon.

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NORTHWEST EARTHQUAKES

The major earthquake of near disastrous proportions which shook the Northwest on April 13, 1949, at 11:55 a.m. was one of the strongest ever experienced in that area and was felt over an area of approximately 150,000 square miles. Major intensity in the Puget Sound area has been rated at VIII by the U.S. Coast and Geodetic Survey which issued a brief report on November 30, 1949. In the area of greatest intensity eight deaths were caused either directly or indirectly by the earthquake and at least sixty-five persons were seriously injured. Estimates of damage range from thirty to fifty millions of dollars; it was confined largely to areas of marshy, alluvial or filled land, and to older structures. In the State of Oregon an intensity of VII was felt in an area extending roughly from Astoria to Portland and eastward to Hood River County. The limit of the felt area in the State extended roughly from Pendleton through Bend and southwestward to Coquille.

The map on the succeeding page shows the pattern of the various intensities during this earthquake. The irregularity of outline of the different areas is partly due to variations in subsurface and surface conditions, and partly to the inability of human beings to evaluate an unexpected and disturbing experience equally. The cross-sections appearing below the map show graphically the uneveness of the transmission of earth tremors originating directly beneath the epicenter.

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An earthquake of rather severe intensity was felt over a wide area in the Pacific Northwest at 8:01 p.m., Pacific Standard Time, August 21, 1949. The center of the disturbance was located in the Queen Charlotte Islands. The shock was felt as far away as the Idaho line and Portland. The U.S. Coast and Geodetic Survey reports that maximum intensity in the State of Washington was VI on the modified Mercalli scale, which grades earth tremors into 12 degrees of intensity. In Seattle, power lines snapped and boats were torn from their moorings. In Tacoma water sloshed out of a swimming pool, and lakes in eastern Washington showed strong wave action.

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CARBORUNDUM PLANT STARTS UP

The new $2,000,000 plant at Vancouver, Washington, built by the Carborundum Company of America started operations on December 5, 1949. This plant will produce silicon carbide which has the trade name of Carborundum.

Silicon carbide is an important artificial abrasive used widely in industry. The product is made by fusing the raw materials coke, silica sand (or ground quartz), sawdust, and salt in an electric furnace. The Vancouver plant has 15 such furnaces. The coke, which is carbon, and the silica fuse together at a high temperature forming the compound silicon carbide. The sawdust is needed to make the furnace mixture porous so that gases may escape readily, and the salt is needed to combine with various impurities in the mixture to form chlorides which are eliminated by volatilization. The temperature required in the furnace is about 2200° C. or nearly 4000° F. The raw carbide will be crushed and processed to form the great variety of abrasive products used so widely in industry.

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METAL PRICES

The E&MJ Metal and Mineral Markets reports the following metal prices as of December 15, 1949: copper, 18½ cents per pound Connecticut Valley; lead, 12 cents New York; zinc, 9-3/4 cents East St. Louis; mercury, $71-73 per flask; tin, 78-3/4 cents; foreign silver, 73¼ cents an ounce troy; ingot aluminum, 17 cents per pound; antimony, bulk 32 cents per pound Laredo; nickel, 40 cents per pound cathodes f.o.b. Port Colborne, Ontario; platinum, $69-72 per troy ounce.

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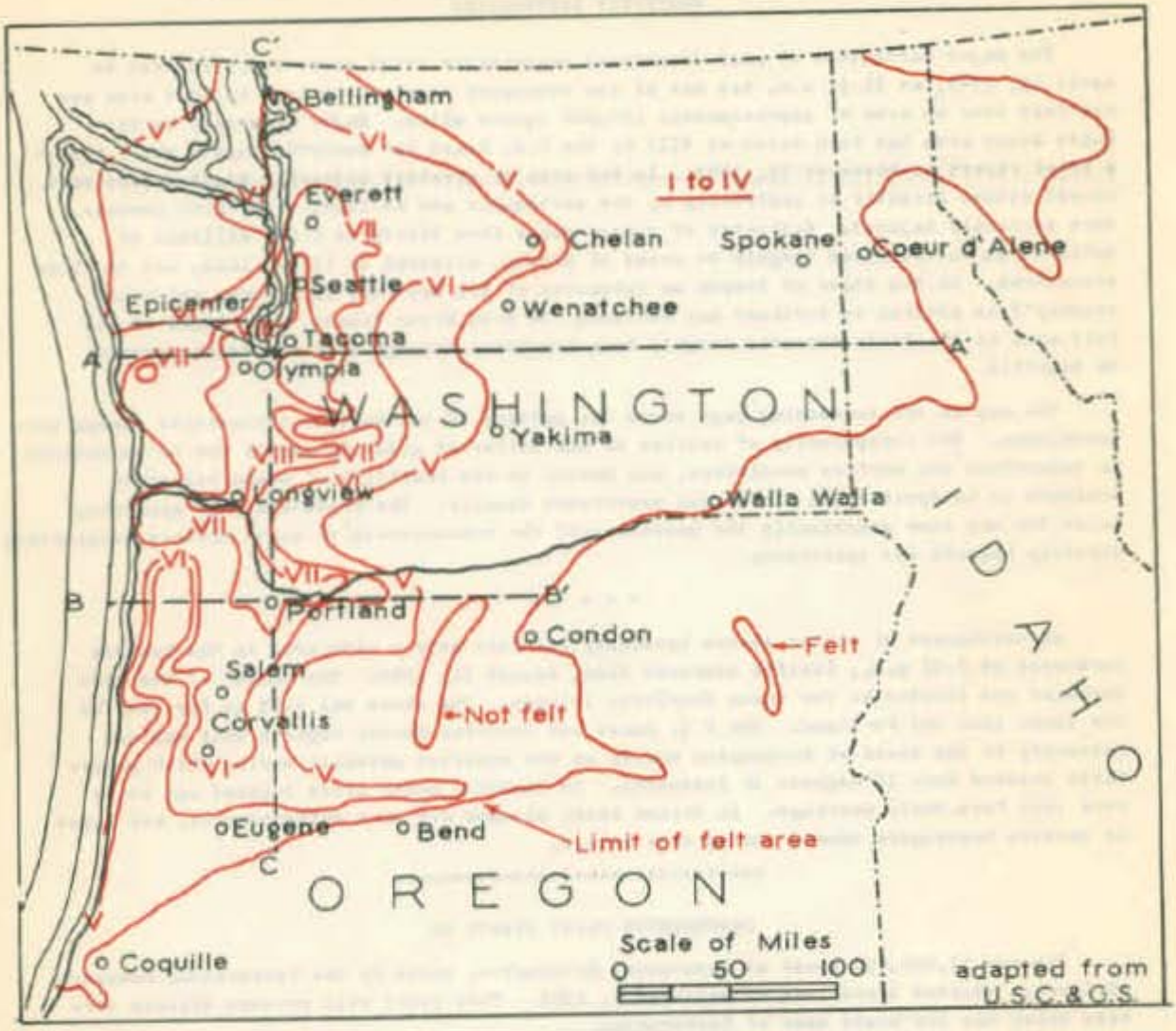
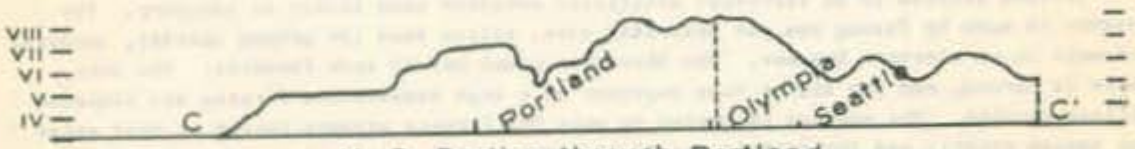
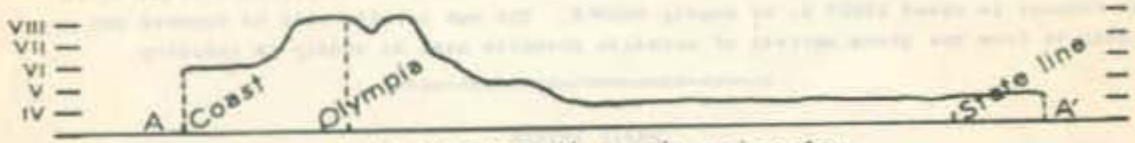
Isoseismal Map for Earthquake of 13 April 1949 at 11:55:41 PST.
Adapted from map prepared by U. S. Coast and Geodetic Survey.





N–S Section through Portland



E–W Section through epicenter

E–W Section through Portland