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GEM MINING  
A NEW OREGON INDUSTRY

by  
H. C. Dake\*

Introduction

For more than 50 years Oregon has been a producer of high-grade gem quality agate, but it is only during the past decade that production has reached a notable amount. Prior to World War I, more than 90 percent of agates and similar semi-precious gems sold in America were produced in Germany from rough, imported material. During World War I, this enormous industry was temporarily lost to Germany, but recovery of the world market was rapidly made after the close of hostilities. During this time the agate cutting industry in Oregon expanded widely, but for various reasons the local cutters could not compete and did not have the production facilities to hold the market.

Beginning in 1933, with the organization of the Oregon Agate and Mineral Society of Portland, considerable publicity has been given to the gem minerals of Oregon and the possibilities of developing a new industry in the State. Functioning regularly and continuously since 1933, this organization has been instrumental in building a new Oregon industry. Prior to 1933 little attention was given to the gem deposits of Oregon, but with wide local publicity, hundreds of people became interested in collecting and cutting gems as a hobby; but a substantial number of people, also, went into the business commercially.

By 1937 the value of the gems mined and finished in Oregon amounted to approximately \$250,000 annually. This included both rough materials produced in the State and shipped to various cutting centers, and stones finished by local cutters.

Industry expands

At the outbreak of the war in Europe, in 1939, imports of finished gems were cut off. This created a wide demand for finished gems produced by domestic lapidaries. It is a notable fact that in times of wide prosperity the demand for all types of gems, including both precious and semi-precious stones, increases markedly. Oregon was already geared for production, with dozens of commercial shops and hundreds of home cutters scattered throughout the state ready to meet this demand from the jewelry manufacturing industry. To date there is practically no importation of semi-precious gems from Germany or other European cutting centers; hence the domestic cutters continue to supply the demand. It is unlikely that the Germans can ever recover their former world-wide market. It is reported that they have no stocks of rough materials to process.

Million dollar industry

It is estimated that, at the present time, the annual production of rough and cut gems in Oregon amounts to approximately one million dollars. One large commercial cutting establishment alone produces more than \$100,000 a year in finished stones and finished gem

\*Publisher, The Mineralogist, Portland, Oregon.

specimens which are shipped to markets throughout the United States and Canada. Probably there are now over 50 commercial cutting shops in Oregon and over 500 home gem cutters mainly engaged in the work as a hobby.

#### Thunder eggs

In addition to the agates mined in Oregon other gem materials enter into the picture. Some 15 years ago peculiar, spherical masses of silicified rhyolite were discovered in central Oregon at a number of localities. These spherical masses are often filled with colorful, high-grade, gem quality agate, and are in wide demand for use as a gem cutting material and as polished specimens. The rough masses are generally sectioned in the middle with a diamond saw, and the exposed surfaces polished. These specimens are popularly known as "thunder eggs" from an old Indian legend which gives an account of their genesis.

During the past 15 years thunder eggs have been collected in central and eastern Oregon by the tens of thousands. The early collectors merely gathered them up by the truck load from the surface where they had been exposed through weathering. Most of the best deposits are located in Wasco and Jefferson counties, but in recent years deposits have also been discovered and mined in Harney, Crook, and Deschutes counties.

In size the thunder eggs range from quite small up to several feet in diameter, but the average and most popular sizes are about 5 to 6 inches in diameter. The finished polished half brings anywhere from \$1.00 to upwards of \$20.00 each, all depending on quality of the individual specimen. They have found their way into practically every museum and private collection in the United States. Notable quantities have also been utilized for gem cutting.

In places, after the surface deposits of thunder eggs were depleted, hand mining was employed to win the material covered by surface debris. Recently more extensive mining operations have been carried on in central and eastern Oregon.

#### The rhyolite rocks

Practically all the quartz gem deposits of Oregon are directly associated with the high silica rhyolite rocks - rarely if ever are they found associated with the dark-colored basaltic rocks. This fact is well known to gem hunters. Invariably thunder eggs are found associated with or near veins or seams of rhyolitic perlite (a variety of obsidian), and often the eggs are found embedded within perlite. Only a very small portion of the rhyolite rock areas in Oregon have been explored. In recent years a number of discoveries of thunder eggs have been made in the rhyolite rocks some 22 miles east of Burns in Harney County. This locality produces exceptionally large and colorful specimens.

On the Friday Ranch in central Oregon a considerable amount of mining has been done, and this famous locality has produced no less than \$150,000 in quartz gems during the past 15 years - more than the property recently brought in a sale.

During the past 10 years the Friday Ranch has attracted thousands of gem miners from nearly every part of the country. Luck appears to have played an important part in the winning of quartz gems at this locality, but it has been no uncommon occurrence for a party of energetic diggers to expose a rich pocket in a few days and leave with \$1,000 or more of high-grade gem material.

#### Plume agate

In addition to the thunder eggs mined on the Friday Ranch property, the locality is also noted for its high-grade plume or flower agate. This material is probably equal in quality to the best gem agate found anywhere in the world. The agate occurs in veins or seams from a few inches to several feet below the surface, and tends to segregate into pockets. High-grade plume agate in the rough brings as high as \$50.00 a pound, and individual stones (finished) bring \$5.00 or more each.

A considerable area was originally dug by hand labor, but this has proved wasteful as many areas were missed or covered with debris. In recent years the greater part of the production has been won by sinking shafts and drifting, and by using bulldozers which are most useful where the gem deposits are reasonably near the surface.

#### Antelope Valley

The gem deposits of Antelope were known for at least 50 years before the discovery of gems elsewhere in central Oregon. This region has produced great quantities of quartz and gem minerals, and continues to produce them, but underground mining methods are now indicated. Antelope has been notable for its production of high-grade iris agate, jasp-agate, and enormous quartz crystal-lined geodes. Geodes from Antelope have found their way into numerous large museums and private collections of the country.

#### Crook County

Crook County and the high desert regions east of Bend in Deschutes County have been productive of gem materials. Most of the material so far gathered in this great area has been on the surface. One of the most valuable single masses of agate ever found in Oregon was recently mined in Crook County near Post. This mass of gem agate weighed 186 pounds and was sold to a Portland gem cutting firm for \$1,000, or more than \$5.00 per pound in the rough. This pocket was discovered as an outcrop and in addition to the single large mass, produced numerous smaller masses; to date a total of more than \$8,000 has been mined from the pocket. The discovery was made by a Bend, Oregon, gem prospector.

#### Harney and Malheur counties

Harney and Malheur counties cover some 20,000 square miles, with an average population of less than one person per square mile, with most of them concentrated in a few small cities. A large part of these counties is covered with rhyolite rocks, and it is expected that important discoveries will be made in this little known region.

#### Beach deposits

The Oregon beach gem deposits have been known for many years and have served as an important tourist attraction. There are dozens of large and small gem cutting establishments along the Oregon coast that cater largely to the wants of tourists. While the beach deposits have yielded some superb gem materials, the production has not been nearly as great as from the central and eastern parts of the state. At times some exceedingly valuable single agates have been found in the beach gem-bearing gravels. Several years ago, near Yachats, a number of small but valuable agates were found. The largest was a nearly spherical mass some 5 inches in diameter and, when cut into polished sections, sold for more than \$300. The beach deposits also yield valuable specimens of rare silicified corals, fossil worm-bored woods, water-filled (enhydros) agates, jaspers, and carnelians. All of these items find a ready market among tourists and collectors.

#### High prices

Owing to the wide demand for all types of semi-precious gems, prices have risen correspondingly. Where some years ago it was not especially profitable to prospect for or mine gems in Oregon, it is now attracting many persons and forming the principal occupation of many of them. Rough gem materials of all types, if of good quality, find a ready market locally or at other gem cutting centers, at record prices.

Along with the development of the gem cutting industry in Oregon, a minor industry of lapidary machinery manufacturing has also developed locally. The gems of the state are so widely known and distributed that the accompanying publicity has served to make Oregon a center of supply for much of the country for lapidary machinery and supplies of various kinds. A number of manufacturing firms in Oregon distribute their products throughout the world.

Other gems

While the quartz family comprises the greater part of the gem production of the state, there are a number of other gems produced. The peculiar variety of garnet, known as grossularite, has often been termed Oregon jade. This gem material closely resembles jade in hardness, specific gravity, and is even found in practically all the colors of jade, including green, mutton fat yellow, brown, white, pink, and black. The layman finds difficulty in distinguishing this material from true jade.

The pleasing pink rhodonite found on Evans and Cave creeks in southwestern Oregon, finds minor use as a gem material. This material could doubtless be utilized more widely, but little attention has been devoted to the deposits or rhodonite possibilities in the gem markets.

Great deposits of green serpentine rock occur at several regions in Oregon, notably in southwestern Oregon and on the John Day River near Canyon City. While this material finds little value as a gem stone, it does have possibilities as a material for the manufacture of ornaments like book ends, paper weights, ash trays, and various other desk ornaments.

The obsidian rock of central Oregon has been widely used as a gem material, especially the iridescent variety. Ordinarily obsidian is opaque and worthless as a gem material, but the gem variety found at Glass Buttes, some 50 miles east of Bend, has been sold widely throughout the country. This material has not been exploited to any great extent.

A considerable amount of agatized and opalized (petrified) wood has been produced in Oregon. Little of this material is used for gem cutting, but it is widely sold as specimen material, especially in the form of intact tree and limb sections. The region east of Bend is noted for its agate tree casts which were formed where the original wood was engulfed by lava and destroyed, but leaving a cast within the lava, the cavity of which was subsequently filled with agate.

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#### NEW UNIT TRIPLES CEMENT OUTPUT\*

Oregon Portland Cement Company, through its president, F. E. McCaslin, this week announced completion of its new cement manufacturing unit at its plant at Oswego, Oregon. Ground was broken about eleven months ago, and the construction of this new unit involved the superimposing of an entirely new cement plant upon the former facilities. The plant has cost about \$1½ million.

The former plant produced about 1,150 barrels of finished Portland cement per day, while combined capacity of the new unit is in excess of 3 thousand barrels per day.

The new construction has included the following items of machinery and equipment:

- A new rotary kiln
- A Cottrell electric precipitator
- A new Hammermill crusher
- An additional new raw grinding mill
- Two new slurry basins, 36 feet in diameter by 30 feet in height
- An additional new finish grinding mill

The increases materially add to the company payroll, and make the plant one of the most modern cement manufacturing units in the country, McCaslin stated.

The entire construction program has been under the supervision of David H. Leche, vice-president and general superintendent of the Oregon Portland Cement Company.

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\*From Commerce published by Portland Chamber of Commerce.

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## CONTROLLED GASIFICATION OF UNDERGROUND COAL

A valuable and interesting article on gasification of coal in place appears in the Quarterly Report of the Interstate Oil Compact Commission, April 1947, State Capitol Building, Oklahoma City, Oklahoma. The article is entitled, "An Experiment in the Underground Gasification of Coal at the Gorgas Mine of Alabama Power Company" by Milton H. Fies, Consulting Engineer and Manager Coal Operations, Alabama Power Company, Birmingham, Alabama. Following is a brief abstract:

The experiment was planned by the Alabama Power Company in September of last year and the company secured the aid of the Federal Bureau of Mines in carrying out the project. The company furnished the site together with supplies and labor necessary for the construction and maintenance of the project, and the Bureau provided technical assistance together with labor, equipment, and laboratory staff.

At the outset a study of the history of previous experiments, largely by the Russians, was undertaken. Also a review was made of the data acquired by members of the staff of the Bureau of Mines who had visited Europe, but not Russia, immediately after V-E day. The data available was not detailed enough to permit planning any definite procedure. Sir William Siemens had suggested the underground gasification of coal as early as 1868. Russian literature dates from 1934 but is indefinite in its descriptions.

The first step in conversion of natural gas to gasoline by the Fischer-Tropsch process is to change methane ( $\text{CH}_4$ ) to carbon monoxide and hydrogen. Underground gasification can yield carbon monoxide and hydrogen, if coal is burned under control with admission of air or steam, and if proper engineering control is exercised.

It is estimated that liquids and gaseous fuels make up only 1.2 percent of the mineral-fuel reserves of the United States and coal and lignite account for 98.8 percent of the total. Therefore the domestic reserves of coal and lignite must form the backbone of our future fuel needs. If these solid fuels can be converted economically into gaseous fuels without removing the coal from the ground, a gigantic contribution to humanity would be made.

The author mentions the application that could be made of this method of obtaining gas to the gas turbine. This machine is being rapidly developed. A high temperature gas drawn from the mine would make very low cost power if used in the gas turbine located at the mine mouth. It is stated that the largest gas turbine unit now in operation is rated at 10,000 kilowatts. The largest on order is for 27,000 kilowatts. There is talk of closed-cycle units as large as 100,000 kilowatts.

The actual combustion of such mine gas under boilers as a source of energy was one of the underlying reasons for trying out the experiment.

The experiment demonstrated that combustion was maintained, and that, varying the direction of the air, some control could be exercised over the position of the flame. It is stated that although much was learned regarding the roof conditions resulting from burning coal, such conditions may not be predicted in advance of other experimental work. Under the conditions of this one experiment, the heat content of the gas during the air blast operations was held to a range of 50 to 100 B.t.u. However, gas having a heating value of 150 B.t.u. was produced and the gas analysis corresponded to that which would be produced at 1250° F. at equilibrium conditions with a limited supply of only 200 cubic feet per minute of oxygen and 291 B.t.u. (calculated air free) when steam only was used.

It is emphasized that results obtained may be interpreted only in the light of the conditions of this particular experiment. A vast amount of experimental work is required before commercial projects for underground gasification of coal may be undertaken.

The experiment was studied by two representatives of the British Government who stated that experiments in underground gasification would be undertaken in England. Information which the Bureau of Mines has from Belgium is that work there is proceeding on a large scale both in new and old mines. The supposition is that in Russia a great expansion of subterranean gasification is planned or is under way.

A paper describing the Alabama experiment is being prepared for a joint meeting of the Coal Division of the American Institute of Mining and Metallurgical Engineers and the Fuels Division of the American Society of Mechanical Engineers to be held in Cincinnati in October.

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# HISTORY OF ASSESSMENT LEGISLATION IS GIVEN\*

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The requirements for annual labor on mining claims have varied greatly in recent years. Because of this a brief review of the several acts of Congress on the subject might be of interest to prospectors and miners, and assist them in determining what lands are open for location.

The legislation which expires July 1, 1947, as a result of President Truman's proclamation of January 1, 1947, is the act which was passed by Congress in May of 1943. This measure suspended all assessment work for the war period and to July 1 following cessation of hostilities as determined by presidential proclamation or concurrent legislation of the Congress. However, the requirement was made that claim owners must file with the county recorder of the county in which the claims are situated a notice of intention to hold their claims without performance of the \$100 annual labor requirement on each claim.

A year previously, in May of 1942, Congress had suspended assessment requirements for a period of two years - from July 1, 1941, to July 1, 1943. That act also required the filing of notices of intention to hold, and limited the number of claims to which the exemption applied. In other words, exemption could be taken by an individual on only six lode claims, and by an association, corporation, or partnership on 12 lode claims. No limitation was placed on the number of placer claims as all assessment work was suspended on placers.

In addition to the above wartime measures, special legislation was passed which waived assessment work requirements for members of the armed forces, as well as on all claims located in defense areas, bombing ranges, etc.

Assessment work was required for the three fiscal years ending July 1, 1939, 1940, and 1941, following moratoriums which had been granted during the depression years.

The first of these was the act of Congress which suspended the assessment work on all claims for the assessment year ended July 1, 1932. For the next three years the exemption applied only to claim owners who were exempt from the payment of a federal income tax. It also was subject to the filing and recording of a notice of intention to hold the claims without assessment work.

For the fiscal year 1934-35, a further limitation was placed on the assessment moratorium in that the suspension applied to only six lode claims or 120 acres of placer ground held by an individual, or 12 lode claims or 240 acres of placer ground held by a partnership, association, or corporation. The same provisions regarding non-payment of a federal income tax and the necessity for filing and recording notices of intention to hold were included. These same limitations were included in the acts of Congress which suspended the annual labor requirements for the fiscal years 1935-1936, 1936-1937, 1937-1938.

Thus, during the last 16 years, some type of moratorium has been in effect except for the three fiscal years starting July 1, 1938, and ending July 1, 1941. A blanket moratorium was in effect for one year - 1931-1932; only those who were exempt from the payment of a federal income tax were relieved of the annual expenditure requirements (subject to filing of notices of intention to hold) for the fiscal years 1932-1933, and 1933-1934; starting with the fiscal year 1934-35, the exemption was limited to six lode claims or 120 acres of placer ground held by an individual, or 12 lode claims or 240 acres of placer ground held by a partnership, association, or corporation; and for 1941-42 and 1942-43, assessment work

\*From Pay Dirt for June 20, 1947, published by Arizona Small Mine Operators Association.

was suspended on all placer claims and on six lode claims for an individual or 12 lode claims for a partnership, association, or corporation, but owners were required to file their notices of intention to hold.

During the war years 1943-1947, the limitations as to number of claims and payment of federal income taxes were waived, and it was only required that notices of intention to hold be filed with the county recorder of the county in which the claims are situated.

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#### MERCURY AND CHROMITE

Although there appears to be a general apathy to mineral industry problems in this country, Oregon should be vitally interested in anything affecting the supplies and markets of these two essential mineral raw materials. During the last war when foreign supplies of both were cut off, representatives of Governmental agencies in large numbers spread out over western states in order to urge and promote the production of the vitally needed mercury and chromite. Producers and potential producers, laboring under the many handicaps of wartime labor and material shortages, did a magnificent job in providing these needed minerals. After the war emergency passed and domestic supplies were not urgently needed, the efforts of the producers were conveniently forgotten in Washington. Very soon domestic users turned to foreign sources with both passive and active support of Governmental officials, and imports became the mainstay of domestic consumption. Figures on chromite and mercury brought into this country, just released by the U.S. Bureau of Mines, show strikingly the peacetime handicaps of producers or would-be producers of mercury and chromite in this country.

In 1946 domestic production of primary mercury was 25,348 flasks. General imports totaled 23,062 flasks. Consumption was 31,200 flasks. Principal foreign sources were Italy, Mexico, and Spain although, in the first quarter of 1947, over 3000 flasks were imported from Japan.

As far as chromite is concerned, 1946 domestic production amounted to 3,920 tons as compared to imports of 754,308 tons. In the first quarter of 1947 there was no domestic production. Imports for this quarter amounted to 188,247 tons.

In another war emergency, there would be the same crying need for mercury and chromite, but there would not be time to open domestic mines and put them into condition to produce. If our mines are to save us again, they must be kept in a healthy condition; that condition can be realized only if they are allowed to operate profitably.

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#### NOTICE OF HEARING

The Legislative Mining Interim Committee, as set up by Senate Joint Resolution No. 18 to study surface mining operations in relation to agricultural land, will hold public hearings in eastern Oregon as follows: at John Day, September 8; at Sumpter, September 9; and at Baker, September 10.

Members of the Interim Committee are Senators Austin Dunn, Paul Patterson, and Rex Ellis, Chairman, and Representatives John Dickson, E. W. Kimberling, and Marie Wilcox.

A hearing was held at Grants Pass by the committee on May 24.

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#### SMELTER NEEDS SILICEOUS ORES

The Tacoma Smelter needs to increase its supply of siliceous ores. Anyone who can ship quartz or other highly siliceous ore containing low gold or copper values may receive a favorable smelting contract. Correspondence should be addressed to D. A. Summerville, Tacoma Smelter, Tacoma, Washington.

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## GOLD

During the past two or three weeks considerable publicity has been given in press reports concerning the so-called "free market" for "gold in its natural state."

It is difficult, however, to understand how a higher price than that paid by the U.S. Mint may be obtained by gold producers in this country. Possibly there is a very limited open market in which people with foreign connections would purchase gold here and ship it abroad to persons who would sell in open or "black" markets. Such shipments would have to be sub rosa, as a license is required from the Treasury in order to ship gold out of the country. In this regard the Treasury has licensed and presumably will continue to license domestic smelters to ship gold abroad equivalent in amount to that received in the form of concentrates from Canadian producers and for the account of these producers. Such gold may be sold in foreign open markets at a price in excess of the \$35 an ounce paid by the U.S. Mint.

The Engineering and Mining Journal "Metal and Mineral Markets," July 17, 1947, states that "free market" gold values have varied considerably, but little gold above \$43 an ounce has changed hands in dollar transactions. As reported in the Portland Oregonian of July 19, the Associated Press stated that gold sold abroad above the official U.S. price of \$35 an ounce, and that the U.S. Treasury and Federal Reserve Board had appealed to individuals and businesses to assist in stopping active speculative markets abroad in gold. The report also stated that Secretary of the Treasury Snyder had said that officials had not discussed the offer made by the American Smelting and Refining Company to buy Canadian gold concentrates, refine them here, and export the gold content at a price above \$35 an ounce.

As reported by the News Letter of the Mining Association of Montana for July 1947, the Wall Street Journal, Toronto bureau, published the following item on June 17:

"The open market for gold is substantially above \$35 an ounce. Directors of McIntyre Porcupine Mines Ltd. believe the open market price indicates a trend that cannot long be ignored, Balmer Neilly, president, told stockholders at the annual meeting.

" 'Today's official price of gold represents the judgment of a few men, while the higher prices prevailing abroad mirror the price that men are willing to pay,' he said.

"J. P. Bickell, chairman of the board, discussed the storing of the company's gold production. ... Mr. Bickell disclosed that the company replaced its short-term low yield bonds by gold in storage to the extent of \$5,887,000. He also revealed that the return to parity of the Canadian dollar meant a reduction in excess of \$1 million in the value of American securities held by the company."

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## CLEARING HOUSE

CH-95: For sale - Huckleberry Mine (gold) located on Ash Creek 5 miles south of Riddle, Douglas County, Oregon, in sec. 7, T. 31 S., R. 5 W. Access to the mine is by means of a road and trail, 3 miles and 2 miles long respectively. The property comprises 7 patented lode claims. Record of production is approximately \$6,500. The property is owned by E. B. Hart, Riddle, and Frank Fahy, Bandon. Anyone interested should contact Mr. Hart.

CH-96: For sale - Roberts Mine located two miles southwest of Greenhorn, Grant County, Oregon, in sec. 21, T. 10 S., R. 35 E. The property is 20 miles from Sumpter. There are four unpatented claims containing 600 feet of tunnels partly caved. The production record shows that over \$10,000 in gold has been produced. Very high-grade values have been found. Assay records show samples assaying from \$25 to \$80 at the old price of gold. Anyone interested should see or write Mr. Frank Roberts, Yamhill, Oregon.

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State of Oregon

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