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OREGON'S 1946 NONMETALLICS PRODUCTION

Nonmetallic mineral production in Oregon in 1946 was valued at $11,700,000, according to a canvass just completed by the State Department of Geology and Mineral Industries. This compares with a total of $8,718,000 in 1945 as reported by the U.S. Bureau of Mines. It is known that the totals for both years are low because many logging companies quarried rock for roads and kept no record of the amount produced.

Sand, gravel, and crushed rock combined in one classification are valued at $6,479,000. This classification is followed in order of value by portland cement, clay products, uncrushed road metal, coal, diatomite, limestone other than for portland cement, pumice, dimensional stone, quartz, and silica sand.

Sand and gravel pits, rock quarries and limestone quarries were very active throughout the year. The demand for construction materials was seemingly insatiable. Production of lightweight aggregate, mainly pumice, increased greatly. There were 325 sand and gravel pits and rock quarries, employing about 800 men, not including those operated by the State Highway Department. However, many of the individual quarries were not operated continuously.

The value of both portland cement and clay products represents an all-time high record for the state. Clay products in 1946 were made up essentially of building brick and tile. Nearly 29 million brick and 3 million tile were produced.

The table on the following page gives statistics of production. Certain industries are grouped under "miscellaneous" to avoid revealing the production of individual producers.

Oregon's Nonmetallics Mineral Production

1946

Classification	Number of operations	Number of men	Cubic yards and tons	Value $	Remarks
Sand and gravel	215	578	3,370,771 yds.	3,224,851	
Crushed rock	90	174	2,225,696 yds.	3,253,701	
Clay products	23	172	83,617 tons	914,645	Does not include potteries.
Unerushed road metal (shale, granite, cinders, loam)	20	27	292,318 yds.	153,832	
Coal	3	34	18,352 tons	87,172	Largest producer was Coast Fuel Corp., Coos Bay.
Limestone (other than for cement)	9	90	48,653 tons	53,439	Includes small output of shells. Includes men employed at all limestone quarries but not cement plants.
Pumice	12	13	31,329 yds.	47,905	Practically all for lightweight aggregate.
Cut stone, granite, basalt.	3	6	2,177 yds.	16,635	Includes flagstone.
Miscellaneous: portland cement, diatomite, quartz, silica sand.	7	326	---	3,946,761	Value estimated in part.
Totals	382	1,420	---	11,698,941	Nearly $10,000/man.

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ASSESSMENT WORK

An owner of an unpatented mining claim should file before July 1, 1947, in the office where his location notice is recorded, a statement of his desire to hold his mining claim.

Unless Congress takes further action to suspend annual assessment work, it will be necessary to do such work for the assessment year beginning July 1, 1947, and ending July 1, 1948.

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DEPARTMENT SPECTROGRAPH

by

T. C. Matthews*

The laboratories of the State Department of Geology and Mineral Industries are equipped to do complex spectrographic analyses in addition to chemical and petrographic analyses of rocks and minerals. The spectrograph is used independently or in conjunction with the other methods for more thorough and complete analysis of all contained elements. It is able quickly to determine the approximate quantities of the various elements present in a given substance, irrespective of the mode of combination.

The spectrograph has a great variety of applications in many fields of science and engineering. Some of these applications are as follows:

1. The detection of totally unsuspected elements present in a substance.

2. The detection at one operation of all the metallic elements and many of the nonmetallic elements present in the sample, with a semiquantitative estimate of each. This operation is carried out in a small fraction of the time required for chemical analyses.

3. The analysis of substances difficult to analyze chemically, such as refractories, enamels, glass, and slags.

4. The detection of impurities in metals and alloys, because the most effective range of the spectrograph is from 1 percent down to .001 percent and below.

5. The solution of cases in criminology or sabotage where it is necessary to identify substances or to detect the nature of minute quantities in order to determine their origin.

6. The analysis of road and construction materials by highway departments to detect undesirable elements or to determine the cause of flaws.

7. The rapid determination by agricultural and soils agencies of the metallic and nonmetallic elements contained in various soils.

8. The analysis of water to detect small amounts of various salts.

9. The detection of trace elements in rocks for purposes of correlation of types and determination of origin.

Certain types of analysis may be carried out more accurately by other than spectrographic means. Among these are the following:

1. Exact quantitative analysis of any substance, especially for elements making up more than 10 percent, is more accurate and sometimes faster by chemical means.

2. Assay of an ore for silver, gold, and platinum can be performed much more accurately by fire analysis, except that small amounts of platinum metals may be determined most accurately by a combination of fire assaying and spectrographic analysis.

3. Certain elements, such as hydrogen, fluorine, chlorine, bromine, iodine, oxygen, sulphur, phosphorus, and mercury, do not give satisfactory spectrum lines and must be analyzed by other methods.

To analyze a substance spectrographically it is crushed and ground in a mortar or ball mill to a fine powder. A pure metal or alloy is first dissolved in acid and then dried to a sulphate or other salt in order to change it to a powdered state. The sample should be thoroughly mixed and then quartered in accordance with standard practice, because the sample finally tested is quite small.

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*Spectroscopist, State Department of Geology and Mineral Industries.

All standard plates at the laboratory of the Department are made up on the basis of a 50-milligram sample, and this is the size ordinarily used. However, tests can be run on a sample as small as 5 or even 2 milligrams, but the accuracy of the analysis is decreased accordingly.

After the powdered sample is weighed out, it is mixed with graphite to promote even burning and then pressed into a tiny briquette. The briquette is placed in a drilled-out carbon electrode and burned in a direct current carbon arc. The 50-milligram sample is completely volatilized in the arc and its spectrum is photographed on a sensitized plate. When the plate is developed, the spectral lines characteristic of the sample may be compared with corresponding lines on standard plates made by burning 50-milligram samples of known chemical standards. To be sure that the lines may be compared with accuracy, an intricate procedure is closely followed using the Baird spectrograph, a Gaertner micro-densitometer, and a projection comparator.

Since each element has its own characteristic lines, and since the density and thickness of these lines depend on the percent of that element in the sample, it is possible by comparison to determine which elements are contained in the sample and their approximate percentages. In a qualitative analysis the elements present are usually reported, in percentages, within the power of ten; that is more than 10, 10 to 1, 1 to .1, .1 to .01, and so forth. For more exact analysis a quantitative procedure must be used. In this case sample and standard are photographed together on the same plate and comparable quantities read directly with the micro-densitometer.

Some types of analysis in which the Baird spectrograph at the State Department of Geology and Mineral Industries has proved valuable are the following:

1. Determination quickly whether or not an ore is worth further analysis for any element, or is waste rock.

2. Detection of rare minerals such as uranium and thorium.

3. Comparison of a number of kinds of wire in a criminology case to determine whether all samples were the same.

4. Analysis of a number of samples of aluminum alloy to determine whether all come up to specifications.

5. The determination of impurities in a filler for paper.

6. Analysis of various types of welding rod to find correct type for a special purpose.

7. Scientific research on problems of composition of cement, impurities in mercury, composition of a molybdenum ore, and determination of alkalies in feldspar.

The facilities of the spectrographic laboratory are available to all citizens of Oregon and others desiring such services. Samples of any type substance may be sent in for analysis or identification. The law which established the laboratory states that a charge must be made for work done according to a price schedule set up by the Governing Board of the Department. A discount is allowed to all citizens of the State for the analysis of samples of ore or mineral originating in the State of Oregon. A schedule of prices will be sent upon request to the Department.

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RESUMPTION OF WORK - BAKER COUNTY MINE

According to the Record-Courier, Baker, Oregon, May 1, 1947, work has been resumed at the McGee mine on East Eagle Creek, Baker County, by Chadwell and Sons after the winter shut-down. Repair work on the access tunnel has been completed. The ore carries both gold and copper.

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FROM NEWS LETTER, MINING ASSOCIATION OF MONTANA
Issues of April and May 1947

Gold and Silver

The Wall Street Journal carried the following news item from Amsterdam:

"The Netherlands Bank is calling in gold coins, gold and gold alloys, and foreign currency and silver.

"The calling in affects not only gold and currency offered to the bank under previous foreign exchange decrees, but also to those so far not offered. The gold and currencies must be sold to the bank before May 1, 1947.

"The calling in includes gold and currency deposited abroad."

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Public Lands

Congressman Barrett, of Wyoming, has introduced into Congress Bill H.R. 3022 "to promote the mining of coal, phosphate, sodium, potassium, oil, oil shale, gas, and sulphur on lands acquired by the United States." It is believed that this bill is really a substitute for H.R. 1684, previously introduced by Congressman Barrett. The provisions of H.R. 3022 provide for the extension of the mineral leasing laws to lands "acquired" or to be acquired under the provisions of the Act of March 11, 1911, which are not now subject to mineral leasing laws.

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METAL MARKETS

The domestic copper market has been very unsettled since the excise tax was suspended by Congressional action, according to the Engineering and Mining Journal, Metal and Mineral Markets, New York. During the second week of the month there were two prices for domestic copper. Some producers are selling the metal at 21½¢ Connecticut Valley while others are selling at 24¢ which represents the foreign price. The demand is so great that many buyers are willing to pay the higher price. It is thought that these prices will be equalized shortly and that there will be one selling price in this country. In the meantime the market is in a confused state. The high price for copper is apparently stimulating production. Domestic output for March was 74,340 tons compared with 68,327 tons in February and 70,415 tons in January, according to the U.S. Bureau of Mines. Production in the principal copper-producing states was up from 9 to 11 percent.

Market price for lead continues at 15¢ per pound, New York, and 14.8¢, St. Louis. There has been a sustained demand. The market price for zinc is unchanged at 10½¢ East St. Louis. Business is reported as spotty, that is, some producers report a good volume of business but others state that buying has slacked off.

It is reported that consumption of quicksilver has increased somewhat. The quoted price remains at $85-$87, New York. Western producers predict that domestic production cannot be maintained at the present price.

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CARBORUNDUM

Carborundum is the trade name for all the abrasives manufactured by the Carborundum Company which uses flint, emery, garnet, silicon carbide, aluminum oxide, and diamonds in its various products.

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LIGHTWEIGHT AGGREGATES FOR CONCRETE*

Professor Raymond E. Davis of the College of Civil Engineering at the University of California recently discussed the characteristics of various lightweight aggregates for concrete before a joint meeting of the National Sand and Gravel Association and the National Ready-Mixed Concrete Association.

Pumice is the only natural lightweight aggregate that has real possibilities at the present time, Davis declared, adding that all aggregates of igneous origin have high absorption and possess limited strength. The ideal concrete lightweight aggregate should have smooth surfaces to seal out absorption. In Florida pulverized fuller's earth is being nodulized with water and treated in rotary kilns in an attempt to produce an "ideal" aggregate which would require no final crushing. Pre-sized, oil-impregnated diatomaceous shale is being nodulized in California in kilns after dusting with material having a higher fusion point to prevent sticking. Another California product called Rocklite is being manufactured at Ventura from shale. The aggregate has low absorption, smooth surfaces, and although weighing about 110 pounds per cubic foot, has a compressive strength in excess of 6000 pounds per square inch.

Professor Davis stated that some 30 different interests are actively developing perlite aggregates which weigh less than 10 pounds per cubic foot. Although obsidian resembles perlite in composition, it makes an aggregate weighing about twice as much when expanded by heating.

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*Abstract of an article appearing in Rock Products, April 1947.

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THE "CHICO-PAN"

A new prospecting tool has been developed by Mr. A. O. Bartell of the Bartell Engineering Company, Box 6125, Portland, Oregon. The "Chico-Pan", as it is called, resembles a grocer's scoop combining in miniature the shape of a gold pan and a trowel. Specifications of the pan are: length 8 inches, width 4½ inches, depth 1½ inches; weight 6 ounces. The pan fits easily into the hip pocket for carrying. The "Chico-Pan" is formed from 20-gauge hardened stainless steel containing 18 percent chromium and 8 percent nickel. The pan is designed for use as a scoop for filling sample sacks; as a trowel to clean out "pockets", and as a gold pan.

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PLACER GOLD AMALGAMATION

In testing some placer ground in southwestern Oregon it was found that some of the metallics recovered from the gravel would not amalgamate. It was evident that at least a part of these metallics was platinum but Mr. Hollis Dole, field geologist for the Department who witnessed the clean-up, determined to find out if there were other metals present besides platinum. He sent a sample of the metallics to the Portland laboratory where it was determined that they were made up of 38 percent gold, 50 percent platinum, and 12 percent silver, plus other platinum metals such as palladium, iridium, osmium, rhodium, and ruthenium. Under the microscope some of the metallic particles had the color of platinum, whereas others were dark brown with a yellowish cast. These latter particles were separated out and both parts analyzed spectrographically. The platinum scales contained iron, iridium, and rhodium in the 10 - 1 percent range; copper, gold, osmium, ruthenium, and paladium in the 1.0 - 0.10 percent range; and magnesium, germanium, and nickel in the 0.01 - 0.001 percent range. The yellowish metallics were nearly all gold with iron in the 1.0 - 0.1 percent range, and lead and copper in the 0.01 - 0.001 percent range. The failure to amalgamate was undoubtedly due to the iron oxide coating on the outside of the metallic particles.

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