

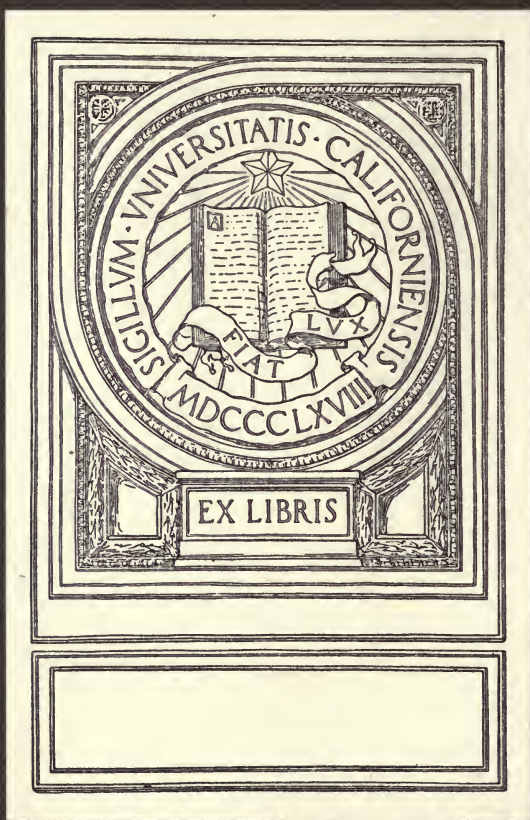
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# DIRECTORS' REPORT

OF THE

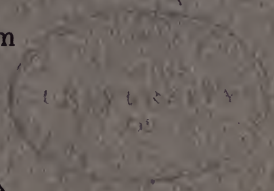
## Oregon (State) Bureau of Mines

TO THE

UNIV. OF CALIFORNIA

Twenty-seventh Regular Assembly  
Oregon Legislature

For the Biennium  
1911-1912



SALEM, OREGON  
WILLIS B. DUNIWAY, STATE PRINTER  
1913



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TO VINU  
AIRPORT

LETTER OF TRANSMITTAL

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OFFICE OF THE BUREAU OF MINES,  
Corvallis, Oregon, Jan. 1, 1913.

*To the Honorable Oswald West, Governor of Oregon, and to  
the Honorable Members of the Oregon Legislature:*

SIRS:—

I have the honor to submit herewith for your consideration the biennial report of the Oregon State Bureau of Mines for the years 1911 and 1912. The report refers to the organization, field work, and other activities of the Bureau, together with what the Director believes to be the present needs of the Bureau.

I have the honor to be

Your obedient servant,

HENRY M. PARKS,

*Director.*





# REPORT

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At the Twenty-Sixth (1911) Regular Session of the Oregon Legislature, House Bill No. 207 was passed creating the State Bureau of Mines, a copy of which law will be found appended to this report.

The Director believes that the action of the Legislature in limiting the appropriation to a nominal amount at the beginning was a wise one. When large appropriations are made at once for work of a new character much money is often wasted in the haste to be doing before the proper field of endeavor has been carefully and thoughtfully limited. Although the purpose and field of the State Bureau of Mines was quite well defined in the minds of those in charge of the Bureau, yet the experience of the past two years has taught them many things; we can now say with confidence that the Legislature used excellent judgment in keeping the appropriation for the first biennium to a small sum to insure a proper organization, a careful study of the field and scope the Bureau should occupy, and a true conception of the right way to have this information reach all those who might use it to advantage in the upbuilding of our State. Because of this the money spent in the field was largely for the purpose of getting acquainted with our economic needs and carrying out what we conceived to be the intent of the Legislature. This the Director feels has now been accomplished within the given time.

We found that the objects and duties of the Bureau as defined by the present law were all important divisions of the work, but upon careful investigation of the needs of the State from an economic standpoint, it would seem advisable that the Bureau hasten its work along certain special lines.

## NEED FOR CLAY INVESTIGATION.

Among the important geological products of the State which should be rapidly developed, the ceramic industry is one which in our opinion should receive State attention. In the modern sense of the word this term is now generally applied to the technology of the earthy and nonmetallic minerals and hence embraces the so-called silicate industries which

deal with the manufacture of all kinds of clay products, glass, cement, lime, plaster, etc. The great economic significance of these industries consist in the fact that their raw materials are practically inexhaustible, having little intrinsic value except when made up into ceramic products. The use of the clays, limestone, sandstone, etc., does not diminish the natural resources of the State but increases the wealth of the people. Owing to the replacement of lumber by other structural materials the manufacture of these materials is increasing at a rapid rate. The annual output of the clay products in Oregon is valued in round numbers at \$1,000,000. We estimate the value of these products, domestic and imported into the State from other states and countries at \$5,000,000 annually. The natural result of such a condition between supply and demand is that the State of Oregon is paying an exorbitant price for such structural materials. A very large factor in this exorbitant price is transportation from other states and countries. Pressed brick, for example, of the quality used in the Multnomah Hotel in Portland costs \$16 per thousand in the Middle States as compared with \$27 per thousand in Oregon. The same proportional difference in wholesale price will be found in all the clay products such as common brick, dry pressed brick, drain tile, sewer pipe, terra cotta, sanitary ware, etc. Oregon has an abundance of surface clays suitable for the manufacture of common brick, dry pressed brick, drain tile, building and paving brick, sewer pipe, etc., and with a little systematic search we have no doubt that materials could be found in a number of localities in the State for the manufacture of the highest grade front brick, fire brick, enameled brick, glazed ware, stoneware for household, technical and chemical use, electrical insulators, sanitary ware and high grade architectural terra-cotta, floor tiles, etc. Nearly all of these last named products are shipped into the State from long distances making the cost of the same more than double what they are in Eastern States. Thus it will be seen that almost every individual in the State is paying a tax ranging from 20 to 50 per cent of the cost of such products, the consumption of which we have already shown to be \$5,000,000 annually.

It might appear from the foregoing statements that we were implying that the clay manufacturer is realizing great profits from his sales. This we do not believe. But rather that under the present adverse conditions the expenses of manufacturing are so high that even with the high prices obtained the manufacturer is struggling to make a profit. Each separate plant, whether small or large, must make its own investigations of

the clay banks in any locality, at best quite fragmentary and incomplete even with those companies having considerable means. How much more true is this with those possessing insufficient funds to properly inaugurate an enterprise. A choice of poor materials together with improper methods of preparing and burning often cause a rejection of over half the product of a kiln. A piecemeal addition to the plant without the proper planning of the mechanical handling increases the manual labor required, the largest cost factor in the industry. All of these increased costs together with the fixed expenses in connection with the industry must, of course, be paid by the consumer. If the manufacturer could, however, co-operate with the Bureau in the investigation of his deposits and increase the efficiency of his plant the result would be not only a material reduction in the price of the commodity but greater profits to the manufacturer due to increased sales because certain fixed expenses must be met whether the sales are large or small. A pleasing result which would follow these improved conditions would soon manifest itself in our towns and cities by a more permanent class of building.

Dr. Withycombe, Director of the Experiment Station of the Oregon Agricultural College, is authority for the statement that there are 4,000,000 acres of land in Western Oregon which if properly drained with tile, would produce double the crop that they now produce. This will cost about \$20 per acre but will be returned to the owner in increased crops within five years, adding by this means alone to the agricultural production of the valley more than twenty-five millions every year. This will never be done in the Willamette Valley if the drain tile has to be imported. In order to accomplish it the tile must be manufactured in every locality. Oregon could encourage this thriving condition in no better way than to make a careful investigation of the clays in the Willamette Valley and determine the locality of the deposits best suited for the manufacture of the different clay products.

#### INFORMATION WANTED CONCERNING OREGON'S CEMENT MATERIALS.

The cement situation in the State presents even a more appalling condition. It is a well known fact that Oregon has never manufactured a barrel of Portland cement. We have not been able to get very accurate estimates of the amount of Portland cement consumed in the State of Oregon but it is accurately estimated that in 1910 there were 1,500,000 barrels of Portland cement shipped into the City of Portland alone. The

wholesale price in this city averaged about \$2.00 per barrel during that year. The average wholesale price during the same year in the United States was 84 cents. The average price on the Pacific Coast was \$1.40. There are at the present time eleven large cement mills on the Pacific Coast, eight in California and three in Washington. No one will deny the fact that these manufactories were established largely under the influence of the efficient Bureau of Mines of California and the State Geological Survey of Washington. Note that the average price at the mills on the Pacific Coast is \$1.40 as compared with 84 cents, the average price in the United States. This points conclusively to the fact that the Portland cement mills on the Pacific Coast are not supplying the local demand but are getting middle state prices plus freight transportation. Note also that Oregon's wholesale price ranges from \$2.00 per barrel in Portland to \$3.90 in the eastern part of the State. Thus we are paying Washington and California prices plus an additional transportation tax.

Portland cement is a commodity weighing 380 pounds to the barrel and cannot be shipped any great distance from the manufacturing point as was the case in the earlier days of the industry. We refuse to admit that "Mother Nature" has so discriminated against the State of Oregon as to place all of the cement materials on the Pacific Coast in California and Washington. Without doubt Oregon has a number of localities in which good cement materials can be found. No detailed investigation has been made to determine the extent and nature of these deposits. Let us suppose that Oregon is able to investigate her cement materials within the next five years and should be the means of inducing capital to locate three or four large producing cement plants in the State and thus reduce the wholesale price to the present average on the Pacific Coast, it would save to the State \$900,000 annually on our present consumption. As you will see later in this report we are going to ask for an annual appropriation, for carrying on the entire work of the Bureau of Mines, of \$25,000 annually. This will be less than three per cent of the amount which will have been saved to the consumer on the one item of cement.

With the exceedingly cheap fuel oil which can be had now from California the manufacture of these ceramic products should be very materially stimulated on the Pacific Coast, within the next few years, and there is no good reason why the cost of production of these products should be materially different from that of the middle west states.

There is no good reason why Oregon should not produce all of the lime which she uses. The production in the State in 1910

was only 6,742 tons. We have not available the accurate statistics as to consumption in the same year but without question it was very many times this figure of production. Note also that the average price received at the lime kilns in Oregon is \$9.65 per ton as compared with an average price at the lime kilns in the United States of \$3.99. The price of lime in Oregon in 1910 was higher than any other state except Wyoming where the price was \$12.47, that state producing only 143 tons.

#### BUILDING STONE AND ROAD MATERIALS.

The building stone industry in Oregon is one that has been sadly neglected. The State has without question unlimited resources along this line but as long as the State refuses to find out the extent and character of the same, just that long will our architects in all parts of the State specify foreign stone. Nearly all of the dimension and monumental stone used in the State is at the present time imported. A very large quantity of building stone is imported from as far east as Bedford, Indiana, thus evidently making the cost of the same enormous.

The Mining Department of the Oregon Agricultural College in 1910 made a hurried survey of the Willamette Valley to determine the location of important deposits of road material, the only work of this kind ever made in the State. This investigation should be continued throughout the State and include not only road materials but all kinds of building and structural materials. The Oregon Granite Company at Medford has developed a granite quarry in that section, the quality of which product is as good as the best and there is no doubt that a large number of other localities in the State have equally as good materials including granite, sandstone, limestone, etc. It is very probable that a good ornamental stone industry could be developed in Southern Oregon in the large serpentine deposits.

The coal production of the State is confined to a small area in Coos County. It is known that there are coal beds and good indications in a number of other sections of the State which if investigated in detail might be the means of extending the producing field to other areas.

When the structural geology of our State is as well worked out as it is in California it is quite possible that sufficient data may be available for finding petroleum and natural gas. It is a well known fact that the same stratigraphic conditions are found over large areas in Oregon that produce the oil and gas in Southern California, so that investigation along these lines might easily be a fruitful field.

It is the unanimous opinion of mining men all over the State that the fragmentary work which has been done by the United States Geological Survey in past years is of inestimable value in assisting the practical miner in determining the likely fields in which to prospect as well as aiding materially in the development of important mines. Such an economic geological survey should be continued all through the metal mining areas of the State at the earliest possible date.

In each metal mining locality there exists large quantities of comparatively low grade gold, silver and copper deposits which would add very materially to the wealth of the State if they were developed. We do not believe it to be a State's business to develop these deposits but rather to make a study of them in each district and find out the best methods of treatment for these low grade ores and make this information public property. The science of ore dressing and metallurgy has made such rapid strides in the past few years that the practical miner is quite unable to avail himself of this information, partly because he does not keep closely in touch with developments along these lines, and secondly because he usually lacks the scientific training which will enable him to grasp the situation.

#### OREGON'S MINERAL RESOURCES AT PANAMA EXPOSITION.

The State of Oregon will without doubt spend several hundred thousand dollars in displaying her resources at the San Francisco Exposition in 1915. It is to be hoped that the mineral industries of the State will not be slighted in this exhibit. If Oregon is going to do her mineral industries justice at this exposition it will mean that the work of preparing such an exhibit must be begun at an early date. The display of the agricultural products must necessarily be collected during the years 1914-15 but it will require much more time than that to get an intelligent display of mineral and geological material. This is true, first, because so few are available who are equipped to do this sort of work and secondly, because, a considerable amount of investigation must necessarily be done before such information is available. A mineral display at such an exposition is usually little more than a mineralogical curiosity. To be of real service to the State such an exhibit should be prepared showing not only the material but the extent of the deposit, the value of the deposit, the relation to transportation, and best methods of utilizing the same. An exhibit prepared in this way would certainly be unique and would be the means of attracting capital and thus assist materially in the development of our State's mineral resources.

It will be seen in the above discussion that we believe the Bureau should at once begin separate investigations along the lines of clays and cement materials, coal, oil and gas, fertilizers and the mineral salts of the south central portion of our State. At the same time work should be prosecuted as fast as it may be along the line of the precious and base metals of the State and the investigation of road making materials and building stone should be continued.

In addition to the requirements of the present law we believe that statistics of consumption of geologic products in the State to be of greater importance to the upbuilding of the State than statistics of production which we now collect. The first question that the prospective manufacturer asks is "Have you a market" and second "Have you the material." He is not interested in the question whether or not you have a deposit of the raw materials if there is no market after it has been manufactured. We have no means at the present time of securing this information. The director is already deluged with questions as to information on the market as well as the location, quantity and quality of raw materials.

The consumption in the State at the present time is more than four times its present production but by a moderate cheapening in the general average of prices of such such materials by home manufacture the consumption would be vastly increased. This home manufacture would make a saving to every individual, its great army of employees at good wages, would create the best kind of a market for agricultural and other products, thus creating a healthier tone throughout the entire commerce of the State.

The above as far as the general work of the Bureau is concerned we believe to be the field for investigation.

#### WHAT SHOULD BE THE IMPORTANT WORK OF THE BUREAU OF MINES?

Unfortunately it is the opinion of a considerable number of our citizens that a Bureau of Mines is simply a subsidiary and fractional part of a mining school, the main purpose of which is to provide a convenient medium whereby the public can send in all kinds of samples of material obtaining a considerable quantity of free assaying and chemical analyses. Manifestly this cannot be the main purpose of a Bureau of this kind in order to be of the greatest benefit to the mineral and geological industries of the State. The imperative need of our State is definite information with reference to our unde-

veloped geological and mineral resources. This can be obtained only by careful and continual field examinations, not by novices, nor by bone diggers, nor graduates fresh from mining and geological departments, but by men well versed in the fundamental sciences whose experiences in the actual field of endeavor has been so extensive that the public can have no reason whatever to doubt the accuracy and authenticity of any report they may make. The value of a determination depends very largely upon the manner of taking the sample. An accurate analysis is of little value with an inaccurately taken sample. Unless the sample represents some considerable amount of the deposit it has little meaning. This information can only be secured by careful field examination where the sample is taken by one who understands these things and can correctly interpret the conditions.

#### BULLETINS PUBLISHED.

The Department of Mining Engineering and Geology of the Oregon Agricultural College in the year 1910 made investigations of the road materials in the Willamette Valley and published a bulletin on the same in January, 1911. Seven quarries were located the first season as a result of its publication. The demand for the bulletin far exceeded our expectations and a second edition of the same seemed imperative. Since the Bureau of Mines had been given the responsibility for the investigation of all road materials the Bureau has assumed the expense of publishing a second edition of 3,000 copies.

In common with the practice of other states the State Bureau of Mines has made co-operative arrangements with the United States Geological Survey whereby the annual mineral statistics of the State are collected. It was deemed advisable since no such bulletin had heretofore been issued, notwithstanding the limited funds available, that the Bureau should publish a bulletin dealing with the discussion of each of the mineral products of importance in the State together with suggestions as to future possibilities. The bulletin containing this information is entitled "The Economic Mineral Resources of Oregon." The information contained therein was secured by means of field trips and from the information coming from the producers into this office under the terms of the contract with the United State Geological Survey. This information is later sent on to Washington.

The custom of the Federal Government and many State surveys is to make a thorough and exhaustive investigation



of a certain portion of their domain, either including all of their deposits or some certain deposit following which investigation is a more or less extended period when the investigator digests the information obtained in the field. Exhaustive and refined determinations of samples and material collected in the field are made, very high grade maps are engraved and tables computed. After a period of one or two or five years, sometimes longer, reports are published, long after the live interest of the public has died away. This we believe to be a wrong policy. We think that the field work of the Bureau should proceed upon an orderly plan along some certain line of investigation in a certain field and that as soon as a conclusion can be properly reached upon any part of the work the public should have this information promptly in as clear and simple a way with as few technical expressions as the subject will permit. To this end we would recommend that the Bureau keep the public informed through the press of the State of any new developments while an investigation is going on and that preliminary bulletins be issued at frequent intervals for distribution to the interested public.

A summary of the expenses of the Bureau for the biennial period 1911-1912 is as follows:

Printing expenses .....	\$ 931.64
Laboratory supplies and expenses.....	216.34
Traveling expenses .....	511.88
Office supplies and expenses .....	340.14
	\$2,000.00
Total.....	

Requisitions approved by the President of the Oregon Agricultural College with itemized statements of expenditures are on file in the business office of the College.

#### COLLEGE EQUIPMENT AVAILABLE FOR WORK OF BUREAU.

The law creating the Bureau in making the head of the Mining Department *ex officio* director of the Bureau simplified the work of organization, since that department had been performing this function for some time for the good of the State though seriously handicapped by having neither funds nor adequate quarters to carry on this work. The Bureau was fortunate at the time of its creation in that at the same session the appropriation was made for the Mines building. The President and Board of Regents of the College approved the

plans of the new Mines Building, which we now occupy, setting aside considerable floor space for the exclusive use of the Bureau of Mines for offices and its own laboratories. They even recommended paying largely for its equipment which the meager appropriation for the Bureau would not allow. The Bureau of Mines laboratory occupies one-quarter of the second floor of the Mines Building and is equipped with chemical desks, hoods, and filing cabinets and other useful furniture. This laboratory, also, has the use of the latest petrographic microscopes, used constantly in making petrographic analyses and classifying the different rocks and minerals sent to the Bureau. The laboratory has also all the necessary pulp balances, chemical balances and button balances and a great many other things which cannot be enumerated here. To it is piped the necessary gas and water and it is wired for electric hot plates, ovens, etc., all of which are furnished the Bureau free of charge. Besides this, the Bureau has free use of our large crushing, fine grinding and sampling room and various accessory apparatus and the power is furnished to the Bureau by the College without cost. The Bureau also utilizes the assay laboratory, a room 30 by 60 feet, with its expensive equipment including furnaces installed with the very best crude oil burners and compressed air system, together with pulp balances, flux balances and the most accurate gold balances obtainable such as are used in the government offices in Washington. A gas system, hoods, hot plates, and scores of smaller accessory equipment which are necessary for the work of the Bureau are here available.

The Bureau is also provided with seven hundred and fifty square feet of floor space for office use. These offices with all necessary furniture and a choice technical library which has been augmented from the College Library fund with some \$500 worth of new books the present biennium and which no doubt will continue to be added to from year to year as the needs may demand, without cost to the Bureau. In handling the large amount of correspondence the College has seen fit to do considerably more than its share in paying the salary of a stenographer and filing clerk. The College has also recognized the importance of the work by furnishing a stronger teaching staff in order to lighten the work of the head of the department to permit him to prosecute more efficiently the work of the Bureau.

The College authorities have also approved in the plan of the Mines building our recommendations for a large Ceramics laboratory which occupies one-half the basement floor of the

building. All necessary equipment for this laboratory to the amount of between \$5,000 and \$6,000 will probably be installed during the coming summer. This equipment will include the mechanical apparatus, such as tempering machines, molding and washing machinery, filter presses, grinders, pug and auger machines, for the preparation of clays for brick and terra-cotta manufacture and for testing Portland cement materials. The laboratory will also be equipped with up-draft kilns, down-draft kilns, Portland cement burning kilns, electric furnaces, glazing furnaces, dryers, fuel storage, dry presses, as well as all necessary cabinets, working desks, tables and sinks, optical pyrometers for very high temperatures, recording pyrometers, etc. This heavy requirement in fuel and power will be furnished by the College to all of which the Bureau has access without additional cost.

The College is also providing an ore testing laboratory in the Mines building which occupies the northwest quarter of the first floor. The equipment for this laboratory will also be installed along with the Ceramics equipment at an expenditure of about \$2,000. This laboratory will be used in connection with the crushing, fine grinding and sampling laboratory before mentioned, to determine by tests of some magnitude the most efficient method of treatment of a particular ore by any of the standard processes such as concentration, amalgamation, cyanidation, flotation, etc.

#### RECOMMENDATIONS.

To carry out the investigations as outlined and recommended above will require a considerable appropriation.

To make an investigation of the clays of the State will require, at least, one good reputable ceramist and assistant to aid him in the laboratory investigations. The salaries for the two men would be at least \$4,000 and about \$750 would be required for traveling expenses.

A man to search out the deposits suitable for building stone and cement materials would require \$2,500 for salary and \$750 traveling expenses.

A man should be placed in the field to investigate for coal, oil, gas and extent of deposits of fertilizers such as phosphates and potash and the saline salts with especial reference to the lake region of south central Oregon and to such other parts of the State as the probabilities would warrant. This would require about \$3,500 per year for salary and traveling expenses. The Bureau has reasons to believe that these would be fruitful fields for investigation.

There should be at least one good mining geologist and assistant placed in the eastern part of the State and the same in the western part of the State to investigate the precious and base metal mining resources. The salaries for these four men would be \$8,000 and traveling expenses \$2,000.

Laboratory chemist and metallurgist would require a salary of \$1,800; stenographer and assistant \$1,500; office and laboratory supplies would cost \$1,500. The cost of printing and postage would be at least \$7,500 and the traveling expenses of the Director \$1000, making a total estimated expense of \$34,800.

With the field force suggested above together with their necessary assistant the Bureau could prosecute the work with vigor and obtain results which would give satisfaction, not only to the people engaged in the industries, but to those utilizing the cheapened products and withal a source of great satisfaction to those law makers far sighted enough to enact such efficient state building legislation. The whole question resolves itself into one of business, pure and simple. Oregon has during her entire history neglected to find out the extent and variety of one of her basic industries. Can she afford to longer delay this important piece of State business? Can she afford *not* to do it?

I am informed that the mining men of the State through the Oregon Branch of the American Mining Congress have asked for an annual appropriation of \$25,000 to prosecute this work. In our opinion the request is conservative and really not enough under our present conditions to cover the entire geological industries and get the information, that we so much desire, with dispatch. This amount might, however, be sufficient to prosecute the work along the lines of the geologic industries already established but would probably not be enough to do very much work in encouraging the manufacture from those materials which do not represent an industry in our State.

We are highly gratified to note the interest that is being taken by these men of the State in promoting this cause and to know that so many people all over the State are realizing the importance of pushing this work.

The Director wishes to record his appreciation of the many courtesies and material aid rendered him by the producers and engineers of the State without which his labors of the first biennium would have availed but little. With their continued support which will, without doubt, be rendered in the future even more heartily than in the past and with sufficient

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means to permit the Bureau to prosecute the work with vigor we know that Oregon will soon cease to be a straggler in the rear guard of mineral producers and will take her proper place in the van. This is my profound conviction.

Respectfully submitted,

HENRY M. PARKS, *Director.*

## APPENDIX I.

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A BILL

For an Act to establish and create the Bureau to be known as the State Bureau of Mines, defining its objects, powers and duties; providing for the appointment of a director, defining his powers and duties; permitting co-operation with Federal and State Bureaus in furthering the objects of this Act, providing for the publication of the findings of the Bureau; providing for the collection of exhibits of the natural resources of the State; authorizing entrance upon private lands in the prosecution of work of the Bureau; and making provisions for the enforcement of this Act.

*Be it enacted by the People of the State of Oregon:*

*Be it enacted by the Legislative Assembly of the State of Oregon:*

Section 1. That there be, and is, hereby created and established a Bureau to be known as the State Bureau of Mines.

Section 2. That the said State Mining Bureau shall have for its objects and duties the following:

1. A study of the State mineral resources, with especial reference to their economic products, including coal, oil, gas, ores of the different metals, fertilizers, building stones, road making materials, clays, cement materials, sands, gravels, mineral and artesian waters.

2. A more detailed study of the road making materials of the State, with reference to their character, distribution and best methods of utilizing the same.

3. An investigation of the clays in the State, with reference to their adaptability for the manufacturing of brick, tile, pottery, etc., as well as testing of all the clay manufactured products.

4. An investigation of limestones, clays, slates of the State, to determine their fitness for use as cement materials.

5. An investigation of fuels of the State, including coal, oil, and gas, with reference to their character, distribution, and methods of utilizing the same.

6. A study of the different ores of the State, with especial reference to their conservation, concentration, and reduction.

7. The preparation of special reports, with necessary illustrations and maps, which shall contain both general and detailed descriptions of the mineral resources of the State.

Section 3. That the work of the said State Bureau of Mines shall be carried on by the Department of Mines of the Oregon State Agricultural College, the equipment and building of the said Department of Mines to be available for the work of said State Bureau of Mines as herein provided.

Section 4. That the Professor of Mining Engineering or head of the Department of Mines of said Oregon State Agricultural College shall be Director of the said State Bureau of Mines.

Section 5. That it shall be the duty of the Director of the State Bureau of Mines to organize and direct the work of the State Bureau of Mines in field and office, to determine the order, character, and publication, the reports of the Bureau, and to direct the preparation, printing and distribution of the same; to arrange for co-operative work with various Federal and State Scientific Bureaus, where such work shall redound to the interests of the State, and to perform such other work as may be necessary to carry out successfully and speedily the work of the survey; to procure and have charge of the necessary field and office supplies and equipment and supervise the acquisition, care of the distribution of the collections of the State Bureau of Mines, and to perform such other work as may be necessary to the successful conduct of the Bureau. He shall prepare a report to the Legislature before each regular meeting of the same, setting forth the progress and conditions of the Bureau, together with such other information as may seem necessary and useful.

Section 6. That the State Bureau of Mines is hereby authorized to enter into co-operation with any Federal or State Scientific Bureaus, for the prosecution at joint expense, of such work in the State, as shall be deemed of mutual interest and advantage, and under such conditions as said Bureau deems for the best interests of the people of the State.

Section 7. That in order to carry out the provisions of this Act, it shall be lawful for any person employed hereunder, to enter and cross all land within the State; provided, that in so doing no damage is done to private property.

Section 8. That for the purpose of carrying out this Act, the sum of one thousand dollars (\$1,000) or so much thereof as may be necessary, to be and is, hereby, appropriated annually, beginning January 1, 1911, out of any money in the State Treasury not otherwise appropriated.

Section 9. That the said appropriation shall be paid quarterly to the Treasurer of the Board of Regents of the said State Agricultural College at Corvallis, Oregon, and shall be used solely for the purpose of paying the current expenses incurred in carrying out the provisions of this Act including traveling expenses of those actually engaged in the work of the aforesaid Bureau, all necessary clerical and laboratory assistance, office supplies and expense of printing all reports of said Bureau.

APPENDIX II.

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*Agreement* for co-operation in statistical work between the United States Geological Survey and the Oregon State Bureau of Mines.

In order to avoid duplication of requests for statistical information of mine and quarry operations, and also in order that the State Director may be kept in touch with the mineral producers of the State, the following agreement between the State Director and the Director of the United States Geological Survey is made for the collection of the statistics of mineral production (with the exception of gold, silver, copper, lead, and zinc) in 1910.

As soon as possible after the first of December a numbered list of the mineral producers in the State of Oregon (duplicate of the list used by the Federal Survey) will be sent to the State Director, who will check with the data in his office and notify the Federal Survey of any additions or corrections. These corrections will be made on the list of the Federal Survey, properly numbered, and the State Director advised of the number.

The blanks for the collection of the statistics will be printed at the expense of the United States Geological Survey and stamped with the statement that the work is done in co-operation with the State Survey. The inquiries will be mailed from the United States Geological Survey, but will contain a franked envelope for the return of the reply to the State Director.

If the State Director finds any errors or omissions to correct, he will retain the original report and return a copy to the producer for the necessary correction, which correction when received by the State Director will be transferred to the original report. The latter will then be tabulated by him and forwarded immediately to the Federal Survey. The supply of blanks for securing these corrections will be furnished by the Federal Survey. If any additional corrections should be found necessary by the Division of Mineral Resources of the United States Geological Survey, they will be obtained by correspondence with the producers, and the State Director will be advised of any changes resulting therefrom.

The second and third requests for information will be prepared in the office of the Federal Survey in the same manner



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as the first requests. The fourth request will be sent by registered mail after all attempts to secure returns by ordinary mail have been exhausted. The Director of the State Bureau of Mines will undertake to secure the reports of delinquents by personal visits of himself or his assistants.

Before any publication of results is made, the totals for each subject will be submitted by the State Director to the Federal Survey for checking, and publication may be made by the State Survey as soon as the final figures are agreed upon. It is understood that in any preliminary or press notices thus issued by either the Federal or the State Survey credit for the co-operative plan will be given.

H. C. RIZER,

*Acting Director, United States Geological Survey.*

H. M. PARKS.

*Director Oregon State Bureau of Mines.*

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