

STATE OF WASHINGTON

REPORT

OF THE

Supervisor of Geology

Department of Conservation and
Development

From October 1, 1922, to September 30, 1924



D. A. SCOTT, Director
SOLON SHEDD, Supervisor

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LETTER OF TRANSMITTAL.

Honorable D. A. Scott, Department of Conservation and Development,
Olympia, Washington.

Sir: I have the honor to submit herewith my biennial report. This covers the two years beginning October 1, 1922, and ending September 30, 1924, and gives in brief the most important things that have been accomplished by the Division during that time. Recommendations are also included as to some of the various lines of work to be undertaken, and appropriations needed, for the next two years.

Very respectfully,

S. SHEDD,
Supervisor, Division of Geology.

College Station, Pullman, Washington, November 1, 1924.

BIENNIAL REPORT OF THE SUPERVISOR OF THE DIVISION OF GEOLOGY.

ADMINISTRATION.

Scope of Report. This report covers the work of the Division of Geology from October 1, 1922, to September 30, 1924. The results of the work of the Division are issued in the form of bulletins, maps, and publications of various kinds. These are distributed to the leading libraries throughout the country generally, and to geologists, engineers, investigators, and especially to people in the State of Washington who are interested in them. These reports cover both the economic and scientific phases of the various problems treated.

Organization. The code passed by the legislature of 1921 makes the Division of Geology a part of the Department of Conservation and Development and provides for a supervisor of the division and such assistants as may from time to time be needed. The supervisor is Dr. Solon Shedd, who is head of the Department of Geology at the State College of Washington, and whose post office address is College Station, Pullman, Washington. In addition to the Supervisor, Professor Olaf P. Jenkins of the Department of Geology of the State College of Washington, Cedric E. Denman, and Ray C. Treasher, graduate students in the Department of Geology, and Virgil Barnes, a senior student in the department, have been employed part time in field work and in the preparation of reports. During practically the entire biennium, Miss Bernice M. McDermid has acted as secretary.

Office Work. The office work of the Division of Geology has grown to such proportions that it requires a considerable part of one person's time to attend to it properly. Many requests for information along various lines are constantly being received. One of the very common requests is for information in regard to the possible occurrence of gas and oil in various parts of Washington. Information is constantly being sought in regard to the mineral resources of different localities and in some cases it takes considerable time to find the information desired. Prospective settlers are very anxious to have accurate information regarding the climatic and soil conditions of those regions in which they may expect to make their homes. There is a very constant and growing demand for a geological map of Washington, and letters are being received almost daily asking for a geological map of some particular area or of the whole state. Many letters are being received from persons who have bought stock in mines, asking about the property or the company and these have to be answered and this all takes time. Manufacturers, before coming to Washington to embark in any new enterprise, are desirous of knowing, not only the character and variety of raw minerals that may be available for manufacturing purposes, but also the nature of the power and fuel supply.

The work of the Division of Geology is carried on at a minimum expense, as a large part of the work, especially the office work, is done by men who do not receive pay from the funds appropriated for the work of

this division. Expenses, in addition to a salary, have been paid to men doing field work, while they were in the field, but nothing has been paid for the preparation of the reports. I mention these things to show that the work of the Division of Geology is carried on at a very small expense.

Publications. Since September 30, 1922, the following publications have been issued and distributed:

Bulletin No. 28—"Geological Investigation of the Coal Fields of Western Whatcom County, Washington," by Olaf P. Jenkins.

Bulletin No. 29—"Geological Investigation of the Coal Fields of Skagit County, Washington," by Olaf P. Jenkins.

Bulletin No. 30—"Mineral Resources of Washington, With Statistics for 1922," by Solon Shedd, with an Article on Coal and Coke, by George Watkin Evans.

Of the above bulletins, number 28 is the only one for which the work was not all done during this biennium. The field work for this bulletin was done, and the report was under way at the close of the preceding biennium. In addition to the above, the field work has been completed for two other reports, No. 31, Lead Deposits of Pend Oreille and Stevens Counties, and No. 32, The Geology and Resources of the Pasco and Prosser Quadrangles, and the manuscripts for these reports are well advanced toward completion.

GEOLOGICAL SURVEYS.

State Surveys. Geological surveys have been organized in nearly all the states of the Union and funds appropriated for their support. In some cases, especially in some of the older states, these surveys have been active continuously for a long period of years. While the plan of supervision and organization varies somewhat in the different states, yet in most cases there is a geological survey board, consisting of three or five persons, that has supervision of and directs the work. This board usually appoints a geologist to have direct charge of the geological work in the state.

TOPOGRAPHICAL SURVEYS.

Topographic Maps. A map is a conventional picture of some part of the surface of the earth as it would appear if looked at from directly above. The map is intended to represent more or less completely the various features of the area represented. There are two general classes of maps as follows: (1) Those that show position or location and are designated as general geographic maps, and (2) those that show in addition to geographic features, topographic features as well, and are known as topographic maps. The map may show only the boundaries of a certain piece of property and would consist simply of a series of lines forming a closed figure with lengths and directions determined. In short, it would be simply a conventional outline of the property in question.

The topographic map is one that shows not only the location of places, but also the relief of the surface, steepness and height of hills, courses of streams, roads, railroads and things of this general character. It is intended to represent the surface features of a given land area, and the elevation of all points above some common datum, usually sea level. In the making of surveys for such maps, permanent marks, known as "bench marks," are

established at various places over the area, and the exact elevation above sea level of these points given. These serve as datum points for surveys that may be carried on later.

The topographic map is made with such accuracy and in great enough detail so that it is of value for many purposes. By studying these maps, persons who may be interested in knowing conditions in certain parts of the State may determine whether the particular locality would be suited to agriculture or not. These maps are very valuable in locating roads, railroads, reservoir sites and laying out irrigation ditches. With a good topographic map the most feasible location for these may be selected without spending a large amount of money for preliminary surveys as is usually done for improvements of this kind. These maps show the positions of streams and lakes and by a study of the maps the possibility of using these for water power or for irrigation purposes may be determined.

The areas covered by these maps are bounded by parallels and meridians and the completed maps are called "quadrangles." Each quadrangle is designated by the name of the most important place or topographic feature included within the quadrangle. The scale most commonly used in the construction of these maps is approximately two miles to the inch. In special cases, however, other scales are used. On a scale of two miles to the inch, each quadrangle represents an area of about eight hundred square miles.

During the period covered by this report (October 1, 1922, to September 30, 1924) topographic work has been carried on in cooperation with the U. S. Geological Survey, the State paying one-half of the expenses of the field work and the Federal Survey paying the other half. Under this agreement, work was carried on during the summers of 1923 and 1924. In addition to the cooperative topographic work, the U. S. Geological Survey was doing topographic work during the summer of 1924 in the area south of the Rainier National Park in what will probably be known as the Mount Rainier quadrangle.

During the summer of 1923 the work in topographic mapping was all done within the Columbia Basin Irrigation Project. The maps completed are the Wheeler, Schrag, and Washtucna quadrangles. Each of these cover an area one-fourth of a degree in length and breadth, or about 17 miles long and 12 miles wide and includes an area of approximately 200 square miles. These all have a contour interval of 25 feet and will be published on a scale of about one mile to the inch. The three quadrangles just mentioned above were chosen on account of the fact that the area covered by them is practically all within the Columbia Basin Irrigation Project and with the hope that they may be an aid in furthering this project.

During the field season of 1924, cooperative topographic mapping has been in progress, the area selected to be mapped being bounded by parallels 48° and $48^{\circ}30'$ and meridians $117^{\circ}30'$ and 118° . This area is in Stevens County, contains about 800 square miles, and will be known as the Chewelah quadrangle. This map will be published on a scale of about two miles to the inch and with a contour interval of 100 feet. The field work was completed on the northern half of the area during the summer of 1924. This area was selected for mapping on account of the mining interests in this part of the State.

In addition to the cooperative topographic work being carried on, some independent topographic mapping, as already mentioned, was being done by the U. S. Geological Survey in the territory south of Mount Rainier. The area included in the Rainier National Park is in the northern part of the quadrangle bounded by parallels $46^{\circ}30'$ and 47° and meridians $121^{\circ}31'$ and 122° . The Park has been mapped topographically and the work being done the past summer was on the southern part of this quadrangle. The map covering the park is published on a scale of about one mile to the inch and has a contour interval of 100 feet. The south half will be published on a scale of about two miles to the inch and a contour interval of 100 feet.

Copies of all engraved topographic maps may be purchased from the U. S. Geological Survey, Washington, D. C. The price charged for these maps, except in the case of special maps, is ten cents, or six cents each in lots of one hundred or more.

GEOLOGICAL INVESTIGATIONS.

Mineral Resources of Washington. For a number of years past, the State Geological Survey has cooperated with the U. S. Geological Survey in the matter of collecting statistics of the mineral production of Washington, and when the State Geological Survey was changed to the Division of Geology, this agreement was still continued. It is of great importance to Washington that statistics of the mineral production and resources be known on account of the bearing this will have upon the establishing of certain enterprises within the State.

The statistics for the table which follows and which shows the mineral production of Washington from 1916 to 1923, inclusive, are taken from Mineral Resources of the United States, published annually by the U. S. Geological Survey:

MINERAL PRODUCTION OF WASHINGTON FROM 1916 TO 1923 INCLUSIVE.

| PRODUCTS | 1916 | | 1917 | |
|---|-----------|--------------|-----------|--------------|
| | Quantity | Value | Quantity | Value |
| Antimony ore.....short tons | (a) | (a) | | |
| Briquets, fuel.....short tons | (a b) | (a b) | (a b) | (a b) |
| Cement.....barrels | 1,575,919 | \$2,447,779 | 1,403,191 | \$2,367,045 |
| Chromite.....long tons | | | (a) | (a) |
| Clay products..... | | (c)1,589,574 | | 1,533,039 |
| Clay, raw.....short tons | 1,840 | (b)6,251 | 1,613 | (b)9,248 |
| Coal.....short tons | 3,068,588 | 6,907,428 | 4,009,902 | 10,727,362 |
| Coke.....short tons | (a b) | (a b) | (a b) | (a b) |
| Copper.....pounds | 2,646,022 | 650,675 | 2,199,518 | 600,468 |
| Diatomaceous earth..... | | 10,700 | 1,995 | 18,910 |
| Ferroalloys.....long tons | | | (a b) | (a b) |
| Fluorspar.....short tons | | | (a) | (a) |
| Gems and precious stones..... | | | | |
|fine ounces (troy) | | 850 | | (a) |
| Gold.....fine ounces (troy) | 27,944 | 577,655 | 23,816 | 492,324 |
| Iron ore.....long tons | | | | |
| Iron, pig.....long tons | | | 2,361 | (a b) |
| Lead.....short tons | 2,700 | 372,550 | 4,895 | 841,913 |
| Lime.....short tons | 26,895 | 166,653 | 23,328 | 156,553 |
| Magnesite.....short tons | 715 | 5,362 | 105,175 | 783,188 |
| Manganese ore.....long tons | (a) | (a) | | |
| Manganiferous ore.....long tons | (a) | (a) | | |
| Mineral waters.....gallons sold | 151,528 | 9,476 | 155,265 | 7,265 |
| Molybdenum.....pounds | | | (a) | (a) |
| Natural gas.....M cubic feet | | | | |
| Platinum and allied metals..... | | | | |
|fine ounces (troy) | (a) | (a) | (a) | (a) |
| Potash (K ₂ O).....short tons | (a) | (a) | | |
| Quicksilver.....flasks | (a) | (a) | | |
| Sand and gravel.....short tons | 1,401,237 | 387,337 | 895,120 | 199,565 |
| Sand-lime brick..... | | | | (a) |
| Silica (quartz).....short tons | (a) | (a) | | |
| Silver.....fine ounces (troy) | 335,121 | 220,510 | 282,320 | 232,632 |
| Stone..... | | 903,635 | | 454,594 |
| Strontium.....short tons | (a) | (a) | (a) | (a) |
| Tungsten ore (60 per cent concen- trates).....short tons | 11 | 15,230 | 10 | 13,500 |
| Zinc.....short tons | 847 | 226,960 | 508 | 121,948 |
| Miscellaneous (d)..... | | 1,046,792 | | 1,809,700 |
| Total value, eliminating duplications.. | | \$14,521,014 | | \$18,576,052 |

(a) Value included under "Miscellaneous."

(b) Value not included in total value.

(c) Exclusive of pottery, value for which is included under "Miscellaneous."

(d) 1917—Fuel briquets, chromite, coke, ferroalloys, gems and precious stones, pig iron, molybdenum, platinum and allied metals, sand-lime brick, and strontium ore.

**MINERAL PRODUCTION OF WASHINGTON FROM 1916 TO 1923
INCLUSIVE—Continued.**

| PRODUCTS | 1918 | | 1919 | |
|--|-----------|--------------|-----------|--------------|
| | Quantity | Value | Quantity | Value |
| Asbestos | | | (a) | (a) |
| Briquets, fuel | (a b) | (a b) | (a b) | (a b) |
| Cement | 1,116,754 | \$2,114,730 | 1,402,616 | \$2,868,599 |
| Chromite | (a) | (a) | | |
| Clay products | | (c)1,274,708 | | 1,764,264 |
| Clay, raw | 3,435 | (b)17,637 | 20,518 | (b)21,964 |
| Coal | 4,082,212 | 14,132,869 | 2,990,447 | 10,691,222 |
| Coke | 123,788 | (b)1,196,685 | 62,546 | 531,160 |
| Copper | 1,922,406 | 474,834 | 1,676,576 | 311,843 |
| Diatomaceous earth | (a) | (a) | 974 | 14,821 |
| Ferroalloys | (a b) | (a b) | (a b) | (a b) |
| Fluorspar | (a) | (a) | | |
| Gems and precious stones | | (a) | | (a) |
| Gold | 14,738 | 304,658 | 12,232 | 252,802 |
| Iron ore | (a) | (a) | 2,750 | (a) |
| Iron, pig | 15,780 | (a b) | (a b) | (a b) |
| Lead | 2,636 | 374,299 | 1,073 | 113,746 |
| Lime | 22,118 | 226,104 | 19,534 | 232,723 |
| Magnesite | 147,528 | 1,050,790 | 106,206 | 743,442 |
| Mineral waters | (a) | (a) | (a) | (a) |
| Platinum | 10 | 1,075 | | |
| Potash (K ₂ O) | (a) | (a) | (a) | (a) |
| Sand and gravel | 908,102 | 332,141 | 1,231,814 | 536,132 |
| Sand-lime brick | | (a) | | |
| Silver | 310,093 | 310,093 | 259,384 | 290,510 |
| Stone | | 365,098 | 261,310 | 423,653 |
| Talc | | | (a) | (a) |
| Tungsten ore (60 per cent concen- trates) | 1 | 800 | | |
| Zinc | 19 | 3,537 | | |
| Miscellaneous (d) | | 1,360,720 | | 493,007 |
| Total value, eliminating duplications.. | | \$20,999,691 | | \$18,267,938 |

(a) Value included under "Miscellaneous."

(b) Value not included in total value for State.

(c) Exclusion of pottery, value for which is included under "Miscellaneous."

(d) 1918—Fuel briquets, chromite, pottery, diatomaceous earth, ferroalloys, fluorspar, gems and precious stones, iron ore, pig iron, mineral waters, natural gas, potash, and sand-lime brick.

**MINERAL PRODUCTION OF WASHINGTON FROM 1916 TO 1923
INCLUSIVE—Continued.**

| PRODUCTS | 1920 | | 1921 | |
|---|-----------|--------------|-----------|--------------|
| | Quantity | Value | Quantity | Value |
| Briquets, fuel.....short tons | (a b) | (a b) | (a b) | (a b) |
| Cement.....barrels | 1,806,025 | \$4,006,227 | 1,612,891 | \$4,080,785 |
| Clay products..... | | 2,923,687 | | (c)1,496,741 |
| Clay, raw.....short tons | 1,319 | (b)10,377 | 439 | (b)5,153 |
| Coal.....short tons | 3,757,093 | 14,560,000 | 2,428,722 | 9,787,200 |
| Coke.....short tons | 59,395 | (b)627,451 | 27,260 | (b)194,510 |
| Copper.....pounds | 1,983,134 | 364,807 | 251,544 | 32,449 |
| Diatomaceous earth.....short tons | 953 | 12,083 | (a) | (a) |
| Ferroalloys.....long tons | (a b) | (a b) | (a b) | (a b) |
| Gems and precious stones..... | | | | (a) |
| Gold.....troy ounces | 5,847 | 120,860 | 6,216 | 128,486 |
| Iron ore.....long tons | 2,500 | (a) | | |
| Lead.....short tons | 2,894 | 462,980 | 72 | 6,460 |
| Lime.....short tons | 31,083 | 324,042 | 17,710 | 209,761 |
| Magnesite.....short tons | 221,985 | 1,064,888 | | |
| Mineral waters.....gallons sold | (a) | (a) | (a) | (a) |
| Platinum.....troy ounces | 8 | 888 | | |
| Sand and gravel.....short tons | 1,976,969 | 1,016,926 | 1,481,574 | 881,842 |
| Sand-lime brick.....thousands | (a) | (a) | | |
| Silica (quartz).....short tons | 199,678 | 217,649 | (a) | (a) |
| Silver.....troy ounces | 712,680 | 821,842 | 142,450 | 142,450 |
| Stone.....short tons | | | 542,490 | 780,364 |
| Zinc.....short tons | 213 | 34,546 | 225 | 22,468 |
| Miscellaneous.....short tons | | 528,765 | | 159,088 |
| Total value, eliminating duplications.. | | \$26,677,191 | | \$17,605,878 |

(a) Value included under "Miscellaneous."

(b) Value not included in total value for State.

(c) Figures obtained through cooperation with Bureau of the Census.

**MINERAL PRODUCTION OF WASHINGTON FROM 1916 TO 1923
INCLUSIVE—Continued.**

| PRODUCTS | 1922 | | 1923 (Subject to Revision) | |
|---|------------|--------------|----------------------------|--------------|
| | Quantity | Value | Quantity | Value |
| Briquets, fuel.....short tons | (a b) | (a b) | (a b) | (a b) |
| Cement.....barrels | 1,951,414 | \$4,684,624 | 2,111,479 | \$4,988,022 |
| Clay products..... | | (c)1,982,759 | | (c) |
| Clay, raw.....short tons | 6,136 | (b)14,745 | 10,491 | (b)29,040 |
| Coal.....short tons | 2,581,165 | 10,279,000 | 2,926,392 | 10,894,000 |
| Coke.....short tons | 31,674 | (b)285,881 | 69,068 | (b)684,512 |
| Copper.....pounds | 317,208 | 42,822 | 871,999 | 128,184 |
| Diatomaceous earth.....short tons | (a) | (a) | 645 | 3,030 |
| Ferroalloys.....long tons | | | | |
| Gems and precious stones..... | | | | |
| Gold.....troy ounces | 9,044 | 186,965 | 16,547 | 342,067 |
| Lead.....short tons | 691 | 75,966 | 1,453 | 205,454 |
| Lime.....short tons | 25,447 | 355,412 | 25,895 | 359,510 |
| Magnesite.....short tons | (a) | (a) | 73,900 | 165,100 |
| Magnesium sulphate, natural.....pounds | (d) | (d) | (a) | (a) |
| Mineral waters.....gallons sold | (a) | (a) | 124,273 | 11,883 |
| Platinum.....troy ounces | 3 | 306 | | |
| Pulpstones.....short tons | | | (a) | (a) |
| Sand and gravel.....short tons | 1,802,121 | 844,252 | 3,789,109 | 1,363,006 |
| Silica (quartz).....short tons | | | 460 | 8,120 |
| Silver.....troy ounces | 205,046 | 205,046 | 227,187 | 186,233 |
| Stone.....short tons | (e)647,160 | (e)837,175 | 673,880 | 953,831 |
| Zinc.....short tons | 614 | 70,009 | 1,512 | 206,668 |
| Miscellaneous (f).....short tons | | 519,165 | | 740,354 |
| Total value, eliminating duplications.. | | \$19,725,303 | | \$22,175,000 |

(a) Value included under "Miscellaneous."

(b) Value not included in total value for State.

(c) Figures obtained through cooperation with Bureau of the Census. Figures for 1923 not yet available, first estimate included in State total.

(d) No date available.

(e) Exclusive of sandstone, value for which is included under "Miscellaneous."

(f) Includes minerals indicated by "a" and "e" above.

The Supervisor of the Division of Geology spent a part of the summer of 1923 in visiting the important metal mining districts of Washington, studying the condition of the industry and collecting data for a report on the mineral resources of Washington. The latter part of the summer was spent in mapping the geology of the Prosser quadrangle. Mr. Clyde E. Carr was assistant on this work.

From the middle of September, 1923, to July, 1924, much time was spent in preparing a report on the mineral resources of Washington. This was completed about the first of July and has been published as Bulletin No. 30, The Mineral Resources of Washington, with Statistics for 1922. This bulletin deals with both metallic and non-metallic minerals, giving statistics, distribution, and uses of the most important minerals.

Geology and Resources of the Pasco and Prosser Quadrangles. The summer of 1924 was spent by the writer in finishing the work on the Prosser quadrangle and mapping and studying the geology of the Pasco quadrangle. Mr. Ray C. Treasher was field assistant on this work. As a result of this field work, a report is being prepared on the area covered by these quadrangles, and will be published as a bulletin of the Division of Geology.

Geological Investigation of the Coal Fields of Skagit County. Professor Olaf P. Jenkins was in the field during the summer of 1923, making a study of the coal fields of Skagit County. Assisting him in this work, was Mr. Cedric E. Denman, a graduate student of the State College of Washington. After completing the field work on this area, a report was prepared and has been published as a bulletin of the Division of Geology.

This bulletin discusses the general geologic features of western Skagit County and the various coal areas in the county. Suggestions are also made with regard to future prospecting for coal in that part of Washington.

Lead Deposits of Pend Oreille and Stevens Counties. In the summer of 1924, Professor Jenkins, assisted by Mr. Virgil Barnes, made a study in the field of the lead deposits of Pend Oreille and Stevens counties. A very large amount of material for laboratory study was also collected and work on this material is being carried on at the present time. A report including the results of both the field work and laboratory study is being prepared and will be ready for publication in a short time.

RECOMMENDATIONS—GEOLOGICAL WORK.

Mineral Industries. For the coming biennium, there are a number of things that should be done. A study should be made of the lead and silver deposits of Ferry and Okanogan counties. A thorough study should be made of the copper deposits of Stevens County. These studies should be made in order to help in the development of the mining industry, this being an important industry in the northeastern part of the state. Any information bearing upon the occurrence, distribution, and production of various minerals in different parts of the state is always in great demand. From time to time, reports containing this information should be issued and distributed.

Underground Water Resources. The question of underground water supply is a very important one in many parts of this state, and some study might be made of this question to very great profit. Requests are being

received every few days for information in regard to the water resources of various parts of the state, especially in regard to artesian water, and in many cases, it is not possible to be of much assistance without going into the field and making an examination of the locality.

Soil Surveys. In the past, soil surveys have been made of a large part of western Washington, as well as smaller parts of eastern Washington. These surveys are of interest and value to the agriculturists, commercial bodies, prospective settlers, assessors, and many others, and there has been a constant demand for these reports. This work has all been carried on in cooperation with the U. S. Bureau of Soils. There are other parts of the state where soil surveys would be of great benefit and some work should be done along this line.

Geological Map. Large numbers of requests are being received for a geological map of Washington, and such a map should be published just as soon as possible. A good base map is now available and the geology of the state should be shown on this map and published at as early a date as possible. Many states have prepared and published such maps and they are proving of very great value.

Topographic Work. Topographic maps are absolutely essential before the accurate detailed geological study of a region can be undertaken, and work carried on satisfactorily. Topographic mapping was begun this last summer in northeastern Washington, and this should be continued. This is the part of the state where a considerable amount of metal mining is being done and on account of this, it is the part of the state where a thorough study should be made of the geology, including the origin, distribution, and extent of the ore bodies. In order to do this, we should have topographic maps of the district. This work should be done to help develop the mining industry of the state.

APPROPRIATIONS RECOMMENDED.

Geological Work. For the past four years, the amount of money appropriated for geological work has been very small and as a result, the amount of work done has not been very great. From 1909 to 1921, each succeeding legislature appropriated \$20,000 for geological surveys; and I would very earnestly recommend that at least this amount be appropriated for the coming biennium. Even this is much less than most states are spending for geological work.

Topographic Work. Each succeeding legislature since 1909 until 1923, made an appropriation of from \$30,000 to \$35,000 for topographic and hydrometric surveys and about \$20,000 of this has been used for topographic work. This has been conditioned on a similar sum being expended in the state by the U. S. Geological Survey. This means that for the \$20,000 of the state funds expended, \$40,000 worth of work is done.

A bill has been introduced into Congress which provides for the completion of the topographic mapping of the United States within 20 years. This bill has been favorably reported by the House Committee to the House for passage, and it will be one of the first measures brought before the House of Representatives when it convenes the first of December. This bill authorizes and contemplates cooperation in this work with such states or

civic subdivisions as may be able to contribute funds to expedite the completion of the mapping within their borders.

The indications are favorable for the passage of this bill, and I feel that we should be in a position to take advantage of it as soon as it does pass. I therefore recommend that an appropriation of at least \$20,000 be made for topographic work for the coming biennium (conditioned upon the U. S. Geological Survey expending a similar sum in Washington.)

The following plate shows the areas in the state that are covered by topographic maps:

Topographic Maps of the Following Quadrangles Have Been Completed.

| | |
|---------------------------------|--------------------|
| 1. Arlington | 36. Portland |
| 2. Beverly | 37. Priest Rapids |
| 3. Blaine | 38. Prosser |
| 4. Blalock Island | 39. Pullman |
| 5. Chehalis | 40. Pysht |
| 6. Chelan | 41. Quincy |
| 7. Chewelah | 42. Red Rock |
| 8. Chiwaukum | 43. Republic |
| 9. Chopaka | 44. Samish Lake |
| 10. Colocum Pass | 45. Schrag |
| 11. Ccnell | 46. Scootney Lake |
| 12. Corfu | 47. Skykomish |
| 13. Coyote Rapids | 48. Snohomish |
| 14. Crescent Lake | 49. Snoqualmie |
| 15. Ellensburg | 50. Spokane |
| 16. Glacier Peak | 51. Stehekin |
| 17. Hanford | 52. Stilaguamish |
| 18. Hillsbôro | 53. Sultan |
| 19. Malaga | 54. Sumas |
| 20. Methow | 55. Tacoma |
| 21. Moses Lake | 56. Umatilla |
| 22. Mount Adams | 57. Van Zandt |
| 23. Mount Aix | 58. Walla Walla |
| 24. Mount Baker District | 59. Wallula |
| 25. Mount Hood | 60. Washtucna |
| 26. Mount Rainier National Park | 61. Wenatchee |
| 27. Mount Stuart | 62. Wheeler |
| 28. Mount Vernon | 63. Wickersham |
| 29. Oakesdale | 64. Winchester |
| 30. Okanogan | 65. Zillah |
| 31. Osoyoos | 66. Cedar Lake |
| 32. Othello | 67. Hoquiam |
| 33. Pasco | 68. Mt. St. Helens |
| 34. Port Angeles | 69. Ocosta |
| 35. Port Crescent | |

FINANCIAL STATEMENT.

GEOLOGICAL DIVISION GENERAL FUND.

| | | |
|--|-------------|-------------|
| Appropriation | | \$10,000 00 |
| Per Diem Supervisor and Assistants | \$3,731 38 | |
| Travel and Subsistence | 1,363 32 | |
| Automobile Expense | 719 47 | |
| Office Supplies | 92 53 | |
| Telegraph and Telephone | 8 51 | |
| Postage | 50 87 | |
| Stationery and Printing | 1,184 99 | |
| Miscellaneous Expense | 42 04 | |
| Balance September 30, 1924..... | 2,806 89 | |
| Total | \$10,000 00 | \$10,000 00 |

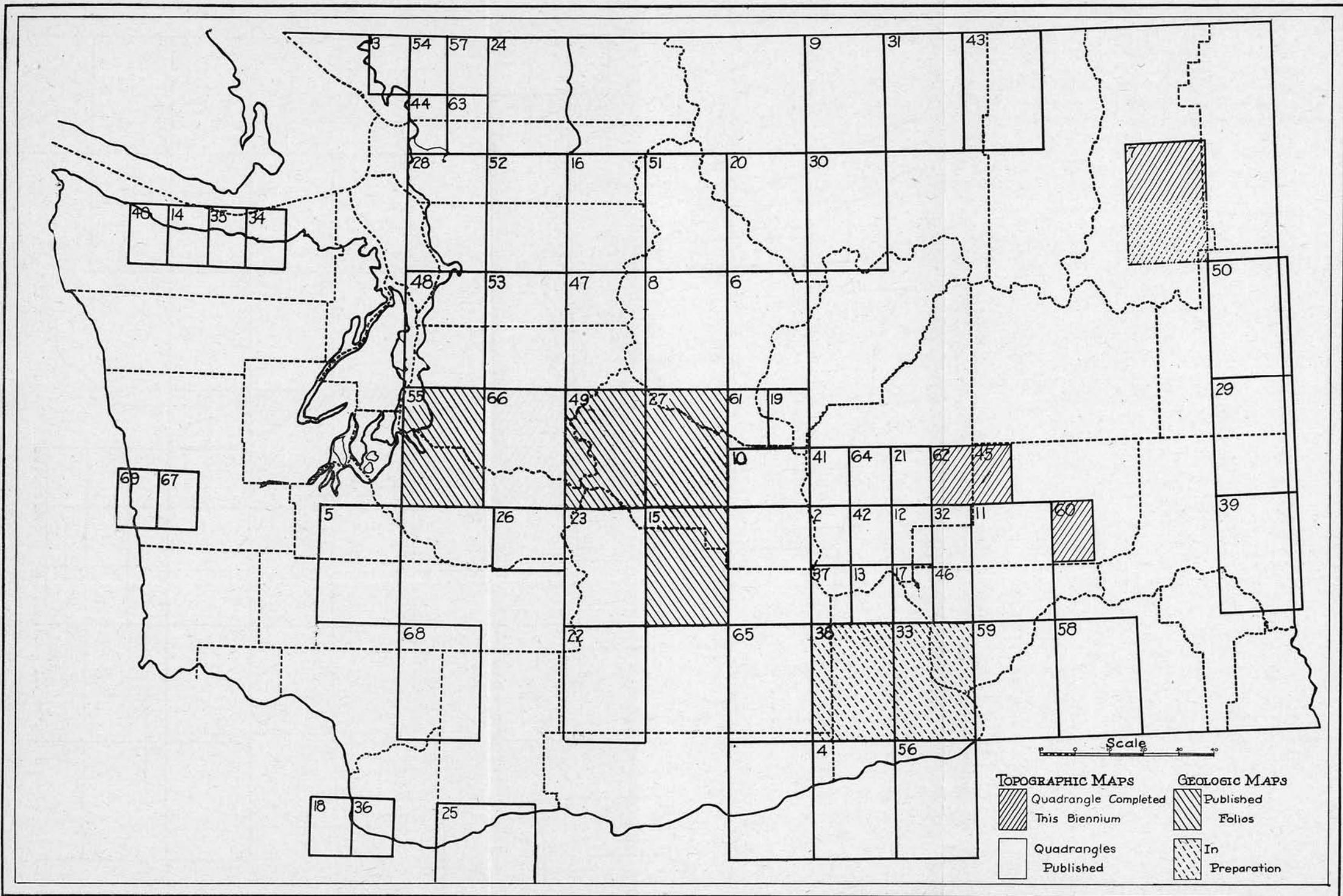


Plate I. Outline map of Washington showing the areas in the State covered by topographic maps. The numbers correspond to the numbered list of maps on page 35.