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SUMMARY REPORT ON WASHINGTON MINERALS,
PRODUCTION AND RESOURCES

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SUMMARY REPORT ON WASHINGTON MINERALS

PRODUCTION AND RESOURCES

Minerals constitute one of Washington's most important resources. The annual production of the many aggregates and substances listed under that general term averaged \$19,132,000 during the period from 1923 to 1933. In 1932, Washington produced 0.56 per cent of the total value of United States mineral production and ranked twenty-seventh among the states. Idaho produced 0.41 per cent; Oregon 0.13 per cent; and California, with petroleum, natural gas, and a large gold output, produced 12.48 per cent.

The consistently large production from Washington is principally from nonmetallic minerals--those not used in producing metals. Their total yearly output, during the last eleven years, has been as high as \$23,051,144 (in 1929) and has averaged \$18,673,000 in value. They have contributed for many years from 85 to 95 per cent of the total value of mineral production.

Statistics for 1933¹ show a lower production than for any year since 1906. The decrease is not due to a drop in the production of any one mineral but rather to the general business stagnation; hence the figures still indicate the relative importance of the State's various mineral products if not the usual value of output. The total value of production was \$9,502,151, divided between \$8,991,886 for nonmetallics and \$510,265 for metallics. In order of importance, coal led the list, with a value of \$3,988,285, followed by Portland cement, stone, sand-gravel, and clay products. The value of magnesite production, concealed to avoid disclosing individual operations, is an important amount. Zinc led the metallics with a production of \$283,003, and gold came second with a value of \$111,620.

The year 1926 is often taken as a fair example to show normal business activity. A few of the more important resources and their value in that year are shown on the follow-

¹Use is made of figures on production supplied by the United States Geological Survey and Bureau of Mines and obtained through cooperation with the State Division of Geology. Statistics on coal are in part from the State Mines Inspector's Reports, and being on a slightly different basis, do not always coincide with the Bureau of Mines figures.

ing table:

Selected Mineral Production, 1926

Product, nonmetallic	Quantity	Value
Coal - - - - -	2,584,255	\$9,587,586
Cement - - - - -	2,247,633	4,832,410
Clay products - - - - -	- - - - -	2,604,995
Sand and gravel - - - - -	3,910,577	1,704,234
Stone - (a) - - - - -	461,577	979,482
Coke - (b) - - - - -	67,286	518,053
Lime - - - - -	23,783	298,014
Total nonmetallic production - - - - -	- - - - -	21,202,611
Product, metallic		
Copper - - - - - short tons	1,351,890	\$ 189,265
Gold - - - - - tray ounces	9,341	193,092
Iron ore - - - - - short tons	1,702	(c)
Mercury - - - - - flasks - - -	489	44,941
Manganese ore - - - - - short tons	3,162	(c)
Lead - - - - - do - - - - -	2,273	363,698
Zinc - - - - - do - - - - -	522	78,327
Total metallic production - - - - -	- - - - -	1,042,771
Total mineral production - - - - -	- - - - -	22,245,382

- a. Does not include "Marble."
 b. Not included in total to avoid duplication.
 c. Concealed.

Almost all of the mineral production of the State is basic material used in industry. Probably 90 per cent of the usual output is not limited by the quantity available, difficulties of mining, and processing costs, but by the amount the market will absorb. This production, then, is capable of being greatly expanded as markets improve. To mention several examples:

the production of coal, cement, clay products, lime, sand-gravel, and stone, accounting for 87 per cent of the 1933 total mineral production, can be expanded almost indefinitely so far as raw materials are concerned. Many other minerals and mineral substances are abundant in Washington but their production is negligible because of lack of present market; this applies to diatomite, pumicite, sodium sulphate, and other basic resources.

The metallic minerals happen to be the ones first thought of when mineral wealth is mentioned, although they are relatively unimportant in Washington. In the 80 years or more of mining here, the more available and readily recognized ore bodies have been discovered and their best ore extracted. Many have been exhausted, so that some mining districts, which were formerly important, have shown no activity for years. However, the great extent of the mineralized portion of the State and persistence of values in certain districts keeps production to approximately 10 per cent of the total mineral output.

The ores of the future will probably come from the same general regions that they have in the past--the northern row of counties. Estimates of future activity are difficult to make, but from many areas of promise a few examples may be given. An increase in the zinc output of the Metaline district may be expected. A steady output of gold from Republic, Mount Baker, and other areas will probably be maintained. The northern Cascade area will no doubt become increasingly important as a mineral producer; and, when made more accessible, the Spirit Lake-Mount St. Helens region may make notable additions to the metallic wealth of the State.

Among minerals which have had production and which should become more important are tungsten from Stevens and Okanogan counties, chromite from Whatcom, Skagit, and Okanogan counties, mercury from Lewis County, and probably from Yakima and Chelan counties, and arsenic from Snohomish and Lewis counties. Other ore bodies will be found, and large deposits of certain minerals now known may, at any time, be given new value by improved markets. The general ratio, however, between the ores and the nonmetals will probably be maintained.

The talc and soapstone resources of the State are valuable and are just getting into a good commercial position. That industry should expand and make a real contribution to State wealth. There is apparently more barite in the State than has been realized; it should find a market in the paint and paper industries. Natural gas within the last few years has added materially to the State's mineral output, and there are indications that it will become an important and valuable resource. Similar statements can be made of other less well known minerals.

As to the more prosaic nonmetallic resources, - those which have furnished so large a proportion in the past of the total mineral production: it has been estimated that there are coal reserves of over 63 billion tons. Limestone for cement and other uses is plentiful in western Washington and practically inexhaustible in the eastern part of the State. The commercial stones are also inexhaustible. Sand and gravel are abundant in many regions and underlie great areas in the more northern counties. Clays, for all products which have been important in the past, are available for any future production, and high alumina types suitable for more exacting needs are merely awaiting the demand for certain wares.

Changing economic conditions may redistribute values and give importance to new minerals. The bementite (manganese silicate) deposits of the Olympic Peninsula will be valuable when the metallurgical and marketing problems involved in their use have been solved. Manufacture in the Northwest of magnesium metal or alloys will give a new value to the already very important magnesite deposits of Stevens County and possibly to the abundant dolomite deposits of all the northeastern counties. The excellent high-alumina clays of the Spokane region may find their greatest value as ores of aluminum when cheap electric power is available and particularly if bauxite supplies become unavailable. In the meantime and without new discoveries or conditions, the mineral resources of Washington continue to contribute a very important amount to the total wealth of the State.

Nonmetallic resources with production¹ for 1933 by counties.

County	Resource	Value
Adams	diatomite, sand and gravel, stone - - -	-----
Asotin	coal, limestone, <u>sand and gravel</u> , stone	\$100
Benton	diatomite, <u>natural gas</u> , sand and gravel, <u>stone</u> - - - - -	92,879
Chelan	asbestos, clay, <u>clay products</u> , <u>coal</u> , graphite, lime, <u>limestone</u> , marble, mica, mineral waters, pumice, sand and gravel, silica, stone, talc and soapstone - - -	1,028
Clallam	clay, coal, limestone, mineral waters, petroleum, sand and gravel, <u>stone</u> - - -	2,685
Clark	clay, <u>clay products</u> , <u>sand and gravel</u> , <u>stone</u> - - - - -	84,426
Columbia	pumicite, sand and gravel, stone - - -	-----
Cowlitz	clay, <u>clay products</u> , <u>coal</u> , mineral pigments, mineral waters, peat, sand and gravel, <u>stone</u> - - - - -	27,949
Douglas	<u>clay</u> , <u>sand and gravel</u> , stone - - - - -	1,782
Ferry	asbestos, fluorite, garnet, limestone, marble, sand and gravel, <u>stone</u> , talc and soapstone - - - - -	17,037
Franklin	clay, pumicite, sand and gravel, stone	-----
Garfield	<u>sand and gravel</u> , <u>stone</u> - - - - -	10,770
Grant	clay, <u>diatomite</u> , mineral waters, pumi- cite, <u>sand and gravel</u> , sodium compounds, <u>stone</u> - - - - -	27,416
Grays Harbor	clay, limestone, mineral pigments, <u>sand</u> <u>and gravel</u> , molding sand, <u>stone</u> - - - -	65,492
Island	sand and gravel - - - - -	-----

Nonmetallic resources with production for 1933 by counties, cont.

County	Resource	Value
Jefferson	clay, limestone, petroleum, <u>sand and gravel</u> , <u>stone</u> - - - - -	23,869
King	<u>clay</u> , <u>clay products</u> , <u>coal</u> , diatomite, limestone, marble, mineral waters, peat, <u>Portland cement</u> , <u>sand and gravel</u> , molding sand, <u>stone</u> - - - - -	2,263,684
Kitsap	clay, mineral waters, sand and gravel, <u>stone</u> - - - - -	63,246
Kittitas	clay, <u>coal</u> , <u>diatomite</u> , fuller's earth, limestone, <u>sand and gravel</u> , molding sand, <u>stone</u> - - - - -	1,526,323
Klickitat	<u>carbon dioxide</u> , <u>mineral waters</u> , sand and gravel, <u>stone</u> - - - - -	83,553
Lewis	clay, <u>clay products</u> , <u>coal</u> , graphite, mineral waters, pumice, <u>sand and gravel</u> , <u>stone</u> - - - - -	208,877
Lincoln	limestone, sand and gravel, stone, talc and soapstone - - - - -	_____
Mason	clay, limestone, <u>sand and gravel</u> , stone	2,900
Okanogan	asbestos, clay, <u>clay products</u> , epsomite, fuller's earth, graphite, gypsum, limestone, marl, dolomite, marble, sand and gravel, sodium compounds, <u>stone</u> , talc and soapstone - - - - -	14,012
Pacific	clay, limestone, peat, sand and gravel, <u>stone</u> - - - - -	16,632
Pend Oreille	clay, feldspar, limestone, dolomite, marble, <u>Portland cement</u> , <u>sand and gravel</u> , serpentine, stone - - - - -	143,285

Nonmetallic resources with production for 1933 by counties, cont.

County	Resource	Value
Pierce	<u>abrasives</u> , clay, clay products, <u>coal</u> , diatomite, limestone, mineral pigments, mineral waters, garnet, peat, <u>sand and gravel</u> , molding sand, silica, <u>stone</u> , sulphur - - - - -	688,341
San Juan	feldspar, <u>lime</u> , <u>limestone</u> , marble, sand and gravel, <u>stone</u> - - - - -	100,660
Skagit	<u>abrasives</u> , asbestos, clay, <u>clay products</u> , <u>coal</u> , diatomite, graphite, limestone, marble, olivine, <u>Portland cement</u> , pumicite, <u>sand and gravel</u> , silica, slate, stone, strontium, <u>talc and soapstone</u> - - - - -	443,356
Skamania	<u>abrasives</u> , mineral waters, pumice, sand and gravel, <u>stone</u> - - - - -	44,649
Snohomish	clay, <u>clay products</u> , coal, graphite, limestone, marble, mineral waters, peat, <u>sand and gravel</u> , serpentine, stone, strontium - - - - -	10,000
Spokane	<u>clay</u> , <u>clay products</u> , feldspar, graphite, mica, mineral pigments, mineral waters, andalusite, sillimanite, <u>Portland cement</u> , <u>sand and gravel</u> , molding sand, silica, <u>stone</u> - - - - -	211,608
Stevens	asbestos, barite, brucite, <u>clay</u> , <u>clay products</u> , coal, dolomite, feldspar, fluorite, garnet, graphite, <u>lime</u> , <u>limestone</u> , <u>magnesite</u> , <u>marble</u> , marl, mica, mineral pigments, sand and gravel, serpentine, slate, <u>stone</u> , talc and soapstone - - - - -	861,912
Thurston	clay, <u>clay products</u> , <u>coal</u> , mineral pigments, mineral waters, sand and gravel, <u>stone</u> - - - - -	69,030

Nonmetallic resources with production for 1933 by counties, cont.

County	Resource	Value
Wahkiakum	clay, <u>sand and gravel</u> , <u>stone</u> - - - - -	3,729
Walla Walla	sand and gravel, <u>stone</u> - - - - -	69,034
Whatcom	asbestos, clay, <u>coal</u> , diatomite, graphite, lime, <u>limestone</u> , marble, mineral pigments, mineral waters, olivine, natural gas, peat, <u>Portland cement</u> , <u>sand and gravel</u> , molding sand, silica, stone, strontium - - - - -	610,044
Whitman	clay, clay products, gems, sand and gravel, <u>stone</u> - - - - -	93,186
Yakima	clay, <u>clay products</u> , diatomite, gypsum, mineral waters, alum, bentonite, pumicite, <u>sand and gravel</u> , <u>stone</u> , sulphur	37,684
Undistributed	sand and gravel (noncommercial production by State, counties, and railroads from many localities) - - - - -	542,773
Undistributed	clay products (principally from King and Spokane counties; some from other counties. See " <u>Clay products</u> ") - - -	537,935
	Total - - - - -	8,991,886

¹Resources which were produced in 1933 shown by underlines.

Washington nonmetallic mineral production, 1933.

Product	Quantity d	Value
Abrasives, pulpstones - - - - -		(a)
Briquets, fuel - - - - -		(b)
Cement - - - - - (barrels) - - - - -	669,953	1,406,901
Clay products - - - - -	- - - - -	537,935
Clay, raw - - - - -	6,101	7,913
Coal - - - - -	1,404,326	3,988,285
Coke, beehive - c - - - - -	379	2,903
Coke, byproduct - c - - - - -	31,817	141,267
Diatomite - - - - -	313	5,700
Lime - - - - -	17,214	170,281
Magnesite - - - - -	- - - - -	(a)
Natural gas - - - - - (M cubic feet)	108,004	80,799
Natural gas, carbon dioxide mfg. to "Dry ice." - - - - -	207	16,273
Sand and gravel - - - - -	2,278,097	873,111
Sand, molding - - c - - - - -	(b)	(b)
Stone - - - - - c - - - - -	1,395,690	1,174,041
Basalt - - - - -	1,123,200	782,262
Granite, crushed and dimension - Limestone, other than for lime and cement - - - - -	81,250	100,840
Marble (includes serpentine) - -	89,150	128,705
Miscellaneous stone - - - - -	1,020	11,718
Sandstone - - - - -	83,600	76,031
Miscellaneous products - - - - -	17,470	74,485
	- - - - -	730,647
Total value - - - - -		8,991,886

- a. Included under "Miscellaneous."
b. Concealed.
c. Not included in total value for State to avoid duplication.
d. Short tons except for "Cement" (barrels) and "Natural gas" (M cubic feet).

Washington metallic mineral production, 1933

Product	Quantity	Value
Copper - - - - -pounds - - - - -	5,781	\$ 370
Gold - ^a - - - troy ounces - - - - -	4,563	111,620
Iron ore - - - long tons - - - - -	1,631	(b)
Lead - - - - short tons - - - - -	840	62,176
Mercury - - - 76-pound flasks - - - -	(b)	(b)
Ores (crude), etc.		
Dry and siliceous (gold and silver)		
short tons - - - - -	5,275	(c)
Lead - - - - -short tons - - - - -	230	(c)
Lead-zinc - -do - - - - -	48,479	(c)
Silver - - - - - troy ounces - - - - -	18,520	6,482
Tungsten ore (60% concentrates)		
short tons - - - - -	43	(b)
Zinc - - - - - do - - - - -	3,369	283,003
Miscellaneous - - - - -		46,614
Total value - - - - -	- - - - -	510,265

- (a) Valued at average weighted price (\$25.56 per ounce).
(b) Included under "Miscellaneous."
(c) Not valued as ore; value of recoverable metal content included under metals.