The Ore Bin

Volume 25, No. 8
August, 1963

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

• The Ore Bin •

Published Monthly By

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
Head Office: 1069 State Office Bldg., Portland 1, Oregon
Telephone: CApitol 6-2161, Ext. 488

Field Offices
2033 First Street, Baker
239 S. E. "H" Street, Grants Pass

Subscription rate 50 cents per year. Available back issues 5 cents each.

* *

Second class postage paid
at Portland, Oregon

* *

GOVERNING BOARD

Frank C. McColloch, Chairman, Portland
Fayette I. Bristol, Grants Pass
Harold Banta, Baker

STATE GEOLOGIST

Hollis M. Dole

GEOLOGISTS IN CHARGE OF FIELD OFFICES

Norman S. Wagner, Baker
Len Ramp, Grants Pass

* *

Permission is granted to reprint information contained herein. Any credit given the Oregon State Department of Geology and Mineral Industries for compiling this information will be appreciated.

The ORE BIN
Volume 25, No. 8
August, 1963

GROUND WATER IN THE ORCHARD SYNCLINE, WASCO COUNTY, OREGON*

By R. C. Newcomb

Abstract

Rocky Prairie anticline impedes the movement of ground water northward through the Columbia River Basalt from the large Ortley anticline. The damming of ground water causes artesian-pressure levels 400 feet higher in the Orchard syncline than in the down-gradient Mosier syncline. Under these conditions the water is a potential economical source for irrigation.

The importance of geologic structure in the occurrence of ground water, particularly for irrigation or other large-quantity uses, was brought out during field mapping of a type area of the Columbia River Basalt. The map of this area shows geologic structures that produce favorable situations for the economic use of ground water.

The Tertiary rocks consist of accordantly layered Columbia River Basalt, about 3,000 feet thick, and several hundred feet of sedimentary tuffaceous andesitic agglomerate, tuff, sandstone, and siltstone of the Dalles Formation which overlies the basalt in a nearly conformable manner (see geologic map, pages 140 and 141). Quaternary alluvial, colluvial, and glaciofluvial deposits and intracanyon lavas unconformably overlie the older rocks in places. One deposit of water-laid silt and fine sand, lakebeds in the valley of Mosier Creek, forms especially good orchard soil. The basalt affords 300 to 800 gpm (gallons per minute) of water to properly constructed wells (Newcomb, 1959), but the Dalles Formation in general transmits and yields little water.

The Rocky Prairie anticline and the parallel Orchard syncline are

---

→ Mr. Newcomb is Research Geologist, U.S. Geological Survey, Ground Water Branch, Portland, Oregon.
* Publication authorized by the Director of the U.S. Geological Survey.

subordinate folds in the Tertiary rocks along an overstressed segment of the large Mosier syncline, which is one of the broad northeastward-trending folds along the east side of the Cascade Range. Rocky Prairie anticline is only about a quarter of a mile wide, and the 40° to 60° dips near its axial plane are marked by local shearing and interflow gliding. This zone of sheared basalt curves across the lowest part of the Mosier Creek basin and terminates against higher parts of the monoclinal slopes of the basalt on the sides of the creek basin (see geologic map).

The mechanical destruction of the water-transmitting capacity of the basalt within this sharply folded anticline has created a partial barrier to ground water moving northwest, downdip from the large Ortley anticline. Such structural barriers influence ground-water movement in accordance with principles previously described (Newcomb, 1961, p. 5). Though the levels of ground water in the basalt north of the Rocky Prairie anticline are near the 72-foot altitude of the river, and though the anticlinal axis is notched to an altitude of about 270 feet by Mosier Creek gorge, ground water in the top several hundred feet of the basalt within the Orchard syncline rises in wells to an altitude of about 500 feet.

Some representative data from four irrigation wells tapping ground water in the basalt in the Orchard syncline are listed below.

Map No.	Owner	Altitude (feet)	Total depth (feet)	Basalt penetration (feet)	Yield (gpm) / Drawdown (feet)	Static water level (altitude, in feet, by barometer)
E1	D. Evans	455	620	470	350f / 25	480
B1	C. Root	675	431	160	180 / 2	520(?)
H2	A. Francois	685	401	180	200 / "no"	490
Q1	A. Beach	410	88	80	500f / 85	495

Yield:

gpm, gallons per minute.
f, flow when well first drilled.

Static water level: That recorded when well was drilled.

Assuming a basalt penetration of about 220 feet, the average for the wells listed above, additional wells that are similarly constructed and properly spaced should yield at least 200 gpm, with 50 feet of drawdown. This yield is near the average for similar wells in the basalt of other parts of the region (Newcomb, 1959, p. 14).

About 3,000 acre-feet of water is desired annually to irrigate 1,500 acres distributed in many plots on the low plateaus and terraces overlying the Orchard syncline in secs. 6, 7, 8, 17, and 18 of T. 2 N., R. 12 E., and secs. 1, 12, and 13 of T. 2 N., R. 11 E. The present wells would each supply about 100 acre-feet of water if pumped half time during the 200-day irrigation season. Thus, assuming that additional wells could each yield similar quantities of water, about 25 or 26 more wells would be needed to provide the required amount of water.

It is estimated that wells of 500-foot average depth and 12- to 8-inch diameter cased to basalt would cost about $7,000 each if constructed as a group. Pumps would cost about $3,000 each installed, and the total capital outlay for such a ground-water development would be about $300,000, or about $200 per acre. Also, other arrangements--such as a smaller number of wells, each of which would have greater capacity--could be used, and wells could be constructed and pumps installed to fit the needs of the individual farm units.

The probable longtime dependability of the ground water to sustain a withdrawal of as much as 3,000 acre-feet of water per year can be evaluated by induction from general information on two hydrologic factors: (1) the water-carrying capacity of the basalt and (2) the average annual recharge to the ground water.

The transmissibility of the basalt varies considerably from place to place, but the average, from recent tests on 400- to 600-foot-thick sections of the rock, may be at least 100,000 gallons per day per foot at a hydraulic gradient of 1 on 1. For this value of the coefficient of transmissibility and an estimated natural gradient of 5 feet per mile across a 4-mile arc around the south, southeast, and southwest hydraulic approaches to the Orchard syncline, about 2,100 acre-feet of water would pass into the pumping area each year. If it is assumed that increased pumping could steepen the hydraulic gradient to 20 feet per mile, nearly 9,000 acre-feet per year would be transmitted through such a basalt section along the 4-mile arc. Under these conditions the water-carrying capacity of the basalt section would be adequate to transmit the additional water required.

Because of the low permeability of the overlying Dalles Formation, natural recharge to the ground water in the basalt probably occurs largely where the porous layers of the basalt are at or near the surface on the slopes

of the Ortley anticline and where they crop out in Mosier Creek valley south of the Orchard syncline. The characteristics of natural recharge on the slopes of the Ortley anticline are now unknown. If increased ground-water pumpage in the Orchard syncline lowered ground-water levels where the aquifers crop out in Mosier Creek, additional recharge would be induced from the creek. If natural or induced recharge were deficient in the future, artificial recharge could be accomplished by injecting clean surface water into wells along Mosier Creek.

Besides the ground water directly below the lands to be irrigated, other sources of ground water occur in Mosier Creek valley upstream from the Orchard syncline. Fault displacements, such as those which follow the south side of the basalt exposed in the Ortley anticline and in a small anticline farther west, ordinarily form a barrier to the movement of ground water in the basalt. Such a barrier would result in ground water being reservoired with a relatively high water level on the downthrown side of the fault beneath Mosier Creek valley in about sec. 1, T. 1 N., R. 11 E. During the dry periods of the year, ground water adds about 1 cubic foot per second to the flow in this segment of Mosier Creek. Exploration may establish the availability of ground water in this area, from which it could be transported down Mosier Creek and diverted to these orchard tracts. Thus, geologic mapping indicates that additional water may be available in subsurface reservoirs farther upvalley as well as directly beneath the orchard tracts.

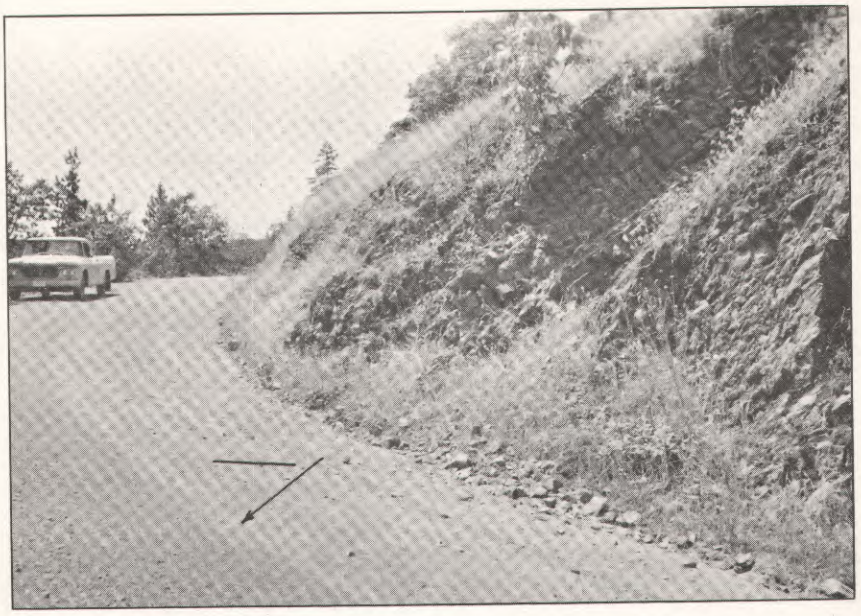
Conclusions

The barrier effect of the Rocky Prairie anticline provides a ground-water reservoir in the Columbia River Basalt in which the water level is about 400 feet higher than that in the downgradient Mosier syncline. Detection of this type of secondary tectonic structure is a good example of the immediate economic applicability of geologic mapping.

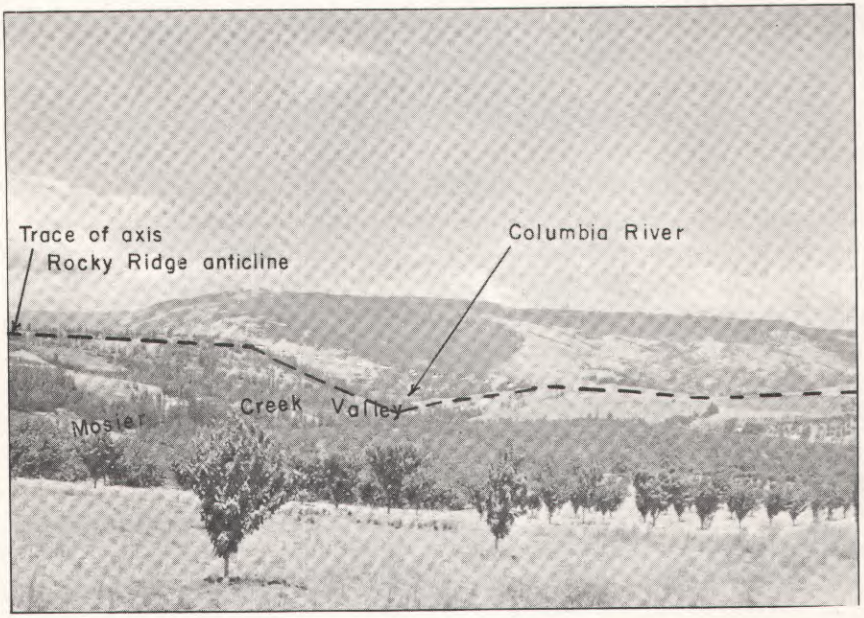
Ground-water characteristics of the basalt, as observed here and inferred from similar areas elsewhere, suggest the reservoir could provide the 3,000 acre-feet of applied irrigation water that would be needed annually on 1,500 acres of orchard and farm land situated over the Orchard syncline.

Alternate sources may occur in at least one other fault-impounded ground-water reservoir upstream from the Orchard syncline and may be usable by stream transport and rediversion.

[Note: The two photographs on the opposite page were added to Mr. Newcomb's paper by the State of Oregon Department of Geology and Mineral Industries.]



Southward (40°) inclined flows of the Columbia River Basalt exposed in bank of the Mosier-Rocky Prairie road just south of the anticlinal axis.



View north down lower part of valley of Mosier Creek, showing the trace of the Rocky Prairie anticline and many of the orchards that need irrigation.

References

Newcomb, R.C., 1959, Some preliminary notes on ground water in the Columbia River Basalt: Northwest Sci., v. 33, no. 1, p. 1-18.

_____ 1961, Storage of ground water behind subsurface dams in the Columbia River Basalt, Washington, Oregon, and Idaho: U.S. Geol. Survey Prof. Paper 383-A, 15 p.

* * * * *

GEOLOGY OF PORTLAND REGION PUBLISHED

The long-anticipated work of Donald E. Trimble on the geology of the Portland region has been issued by the U.S. Geological Survey. This is Bulletin 1119, "Geology of Portland, Oregon, and adjacent areas," an 119-page report and geologic map presenting basic data applicable to many fields. The bulletin is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price to be announced.

The report covers five 15-minute quadrangles (Hillsboro, Portland, Camas, Oregon City, and Boring). About 20 stratigraphic units are defined and their distribution shown on the geologic map. Volcanic rocks and basin-fill terrestrial deposits make up the bulk of these units.

The volcanic rocks include the lower Tertiary Skamania Volcanic Series; the middle Miocene Columbia River Basalt; the upper Miocene Rhododendron Formation; and the Pliocene-Pleistocene Boring Lava. A granodiorite stock has intruded the Skamania volcanic rocks in the northeast part of the map area. The only marine sedimentary rock exposed is the late Oligocene to early Miocene Scappoose Formation in the northwest part of the map area. Terrestrial sedimentary deposits include the early Pliocene Sandy River Mudstone (formerly the lower part of the Troutdale Formation); the Pliocene Troutdale Formation; a sequence of Pleistocene fluvial, lacustrine, and loessal deposits, some of which have been given formal names; and Recent landslide products, bog deposits, and alluvium. Fully treated are the cause and effect in the Portland area of the tremendous volume of flood waters from Lake Missoula in late Pleistocene time.

Special attention is given to laterization and formation of bauxite on the Columbia River Basalt and Rhododendron Formation. Economic resources are described, and engineering construction problems related to geology are discussed.

* * * * *

GOLD AND SILVER ASSAY OF A MANGANESE NODULE

By William E. Caldwell
Department of Chemistry, Oregon State University

The miner of gold from quartz-bearing veins knows that his gold assay is apt to be higher if manganese oxide minerals are also present. This association of gold and manganese minerals led to the thought that gold might be present in the manganese-containing nodules that are present on the floors of some seas. Articles disproving the earlier reported high values of gold in sea water are also in mind (Caldwell and McLeod, 1938; Jaenicke, 1935).

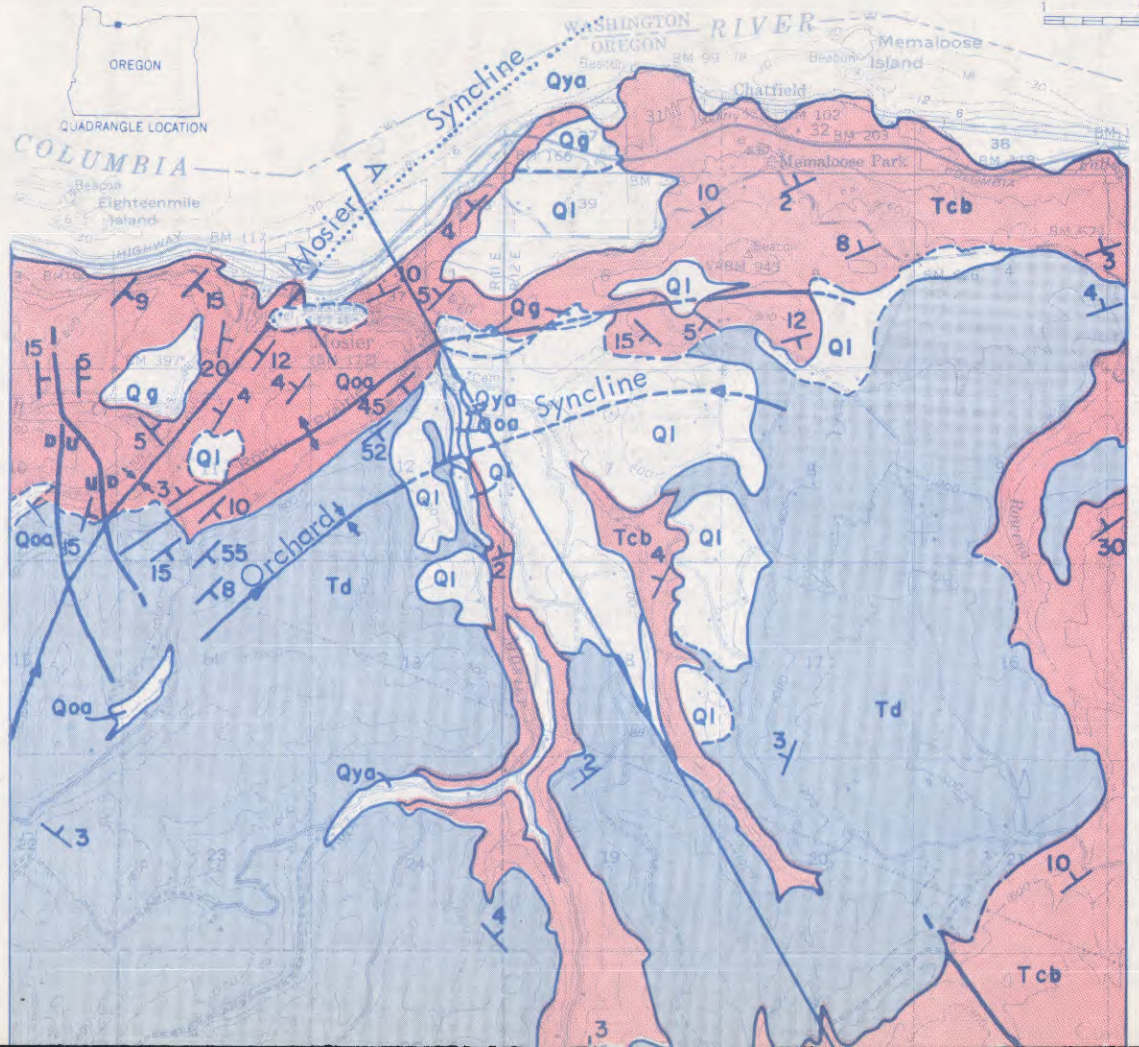
All lead from vein deposits has small amounts of codeposited gold in it. Thus, many investigators have reported gold from sea water that actually came from the lead used in assay analysis. Extensive repurification of lead by recrystallizations of lead tartrate gives an almost gold-free lead. Even the siliceous matter of assay crucibles may contain micro quantities of gold. When the assayer for gold in sea water, or in manganese nodules, obtains a minute speck of gold on analysis, he must conclude that the speck came from either his sample or his analytical materials--but he can report that there is no more than the speck amount of gold in the sample.

Forty liter samples of sea water from various sources have yielded an analysis no more than 0.01 mg of gold (which may have come from lead used in analysis or crucible). Thus, since 40 liters of sea water is about 40,000,000 mg, there is no more and almost certainly less than 1 part gold in 4,000,000,000 parts of sea water. In spite of this knowledge, it was desirable to analyze a manganese nodule.

A manganese nodule of approximately two pounds in weight was received from Scripps Institution of Oceanography, and had been collected by Prof. F. P. Shepard from a depth of 800 meters at latitude 22° 50' and longitude 109°15' Cabrilla Sea. Since the element nickel occurs in some of these nodules in considerable amount, the laboratory of Hanna Mining Co. at Riddle, Oregon, presents the following partial analysis of this nodule, by courtesy of Mr. E. E. Coleman.

Mn	18.8 percent	SiO_2	24.1 percent
Ni	0.27	Fe	16.1
Co	0.16	LOI	11.0

Four samples were prepared from part of the nodule and were treated in normal fire assay procedure. In each of the four analyses, a gold speck which weighed 0.02 mg or less was obtained and looked at with a lens. The conclusion must be that the gold came from analytical chemicals or



1 0 1 MILE

Qya
Alluvium, younger

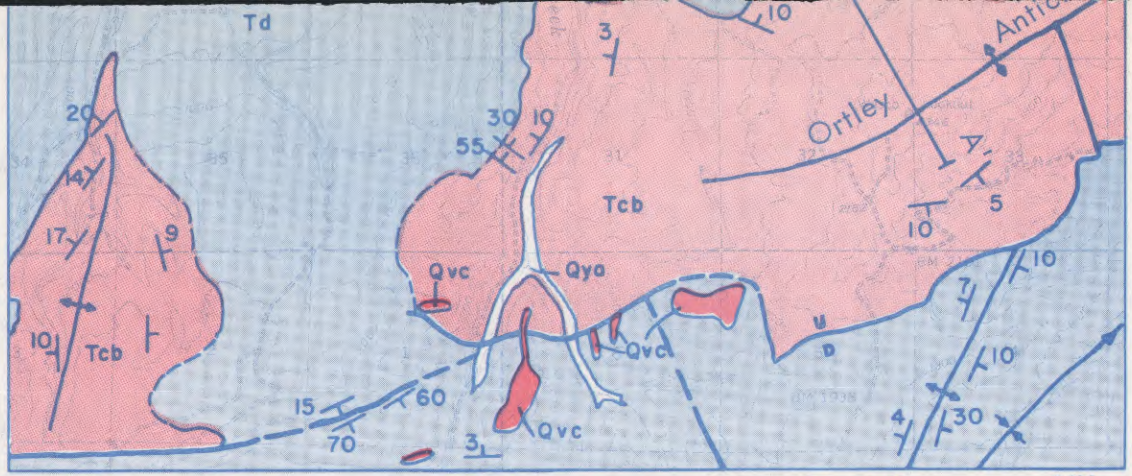
Qoa
Alluvium, older

Ql
Lake beds, glaciofluvial

Qg
Gravel, glaciofluvial

Qvc
Intracanyon lavas

QUATERNARY

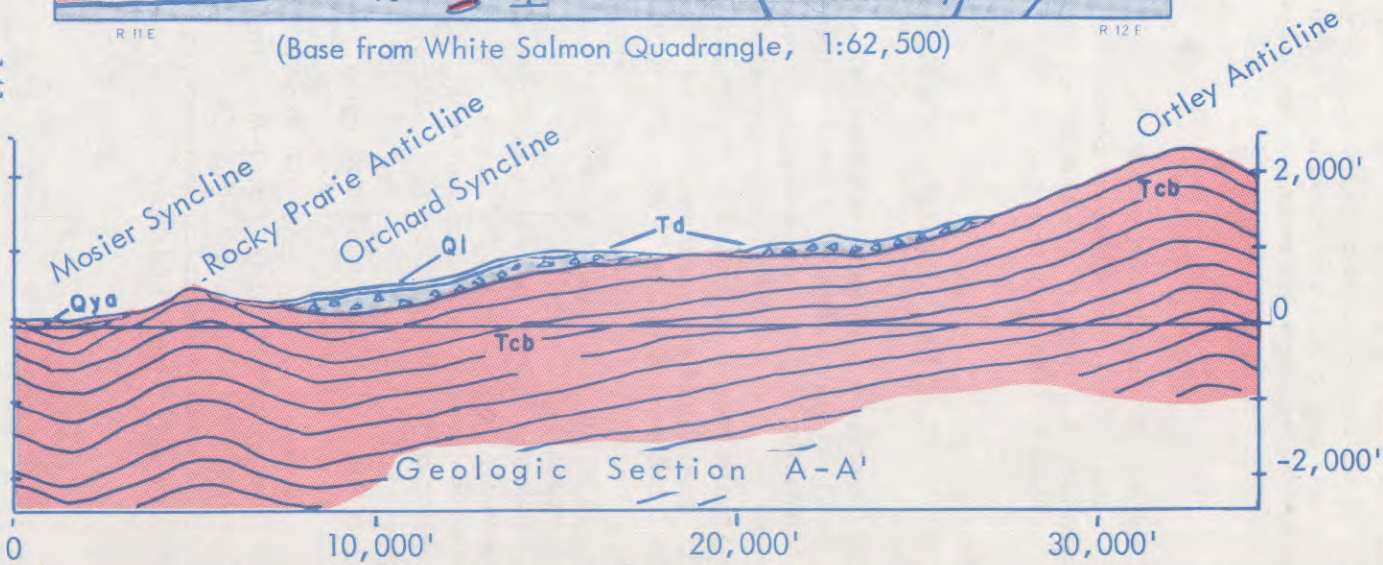


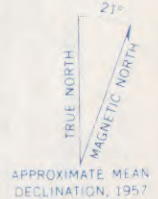
(Base from White Salmon Quadrangle, 1:62,500)

Td
Dalles
Formation

Tcb
Columbia
River
Basalt

TERTIARY





Geologic map and section of the lower part of the Mosier Creek valley, Wasco County, Oregon

crucibles, or that the nodule contains no more than the practically negligible amount of 0.02 mg from 29,166 mg sample. That would be in the order of 2 parts in 3 million, if present at all.

A difference was noted in the color of slag from that in the usual run of quartz gold ores. A dark purple indicated some oxidation of manganese in the cooling slag. The nodules retain their interest as selective residues of various metals, but not for gold or silver.

References

Caldwell, W. E., and McLeod, K. N., 1938, "The Gold Content in Sea Water: Jour. Chemical Education, v. 15, no. 11, Nov. 1938.

Jaenicke, J., 1935, "Haber's Studies on the Occurrence of Gold in Sea Water": Naturwissenschaften 23, 57.

* * * * *

INTERIOR CALLS FOR NOMINATIONS

The Department of Interior has called for nominations of areas for prospective oil and gas leasing on the outer continental shelf off the coasts of Oregon and Washington. Notice was given through an official news release by Under Secretary James K. Carr on August 9, 1963. This marks the first leasing by the Federal government of offshore lands in the Pacific Northwest.

By calling for nominations, the first formal step in leasing procedure, the Department of Interior is requesting oil firms to indicate areas of interest. This enables the Bureau of Land Management to select which areas are to be put up for bid. Carr said plans call for bids on specific tracts to be received by October 1, 1964.

Nominations are to be submitted to the Director, Bureau of Land Management, Washington 25, D.C., not later than November 1, 1963. Copies of nominations should also be sent to the Regional Oil and Gas Supervisor, Geological Survey, 1012 Bartlett Building, 215 West 7th Street, Los Angeles 14, California.

Maps of the Oregon and Washington leasing areas have been published and are available from the Manager, Pacific Outer Continental Shelf Office, Bureau of Land Management, Room 1130 Bartlett Building, 215 West 7th Street, Los Angeles 14, California. These maps are also obtainable at Bureau of Land Management offices in New Orleans, La., and Washington, D.C. A set of four maps has been prepared for Oregon and a set of two for Washington. Price is $1.00 per set.

* * * * *

OREGON MINERAL INDUSTRY HOLDS PRICE LINE

By Ralph S. Mason*

Despite steadily mounting prices in nearly every segment of the nation's economy, prices of minerals produced in Oregon during 1962 remained nearly constant, and even dropped a little in the case of stone and sand and gravel. The value of minerals produced in the state declined slightly from the figure for 1961, with a total of $52.5 million being reported by the U. S. Bureau of Mines (see Table 1). The number of workers employed in the state's mineral industries (mining, stone, clay and glass products, primary metals, industrial chemicals, and petroleum refining and related industries) increased fractionally and averaged 10,267 in 1962. More than 1,200 men were employed in mining activity during the year. Impact of the mineral industry on Oregon labor is shown clearly in Table 2.

The broad geographic base occupied by the state's mineral industry is indicated on the accompanying map, which lists individual county mineral production figures. All 36 of the state's counties reported mineral production, and 14 of them had greater income in 1962 than in the previous year. Mineral production is not only an excellent indicator of the economic well-being of a community but in itself provides a much needed bolster against seasonal dips in other aspects of the local economy.

Although not reflected in the value of minerals produced within the state, the economy benefited considerably from the exploration activities of minor and major petroleum companies. Both upland and offshore tests were conducted.

Skyrocketing silver prices on world markets spurred interest in an old silver producer, the Oregon King Mine near Ashwood in Jefferson County. Idle for a number of years, the Oregon King was reopened and an exploration program was undertaken. Interest in gold, on the other hand, remained quiet, with only 822 fine troy ounces of gold, the second lowest total in the history of the state, being produced. If melted and poured into a mold, the gold would make a 4-1/3-inch cube. It would be worth almost $29,000, however. A lower level cross-cut at the Buffalo Mine in eastern Grant County and a 1,660 foot exploration tunnel in the Bohemia

---

* Mining Engineer, Oregon State Dept. of Geology & Mineral Industries.

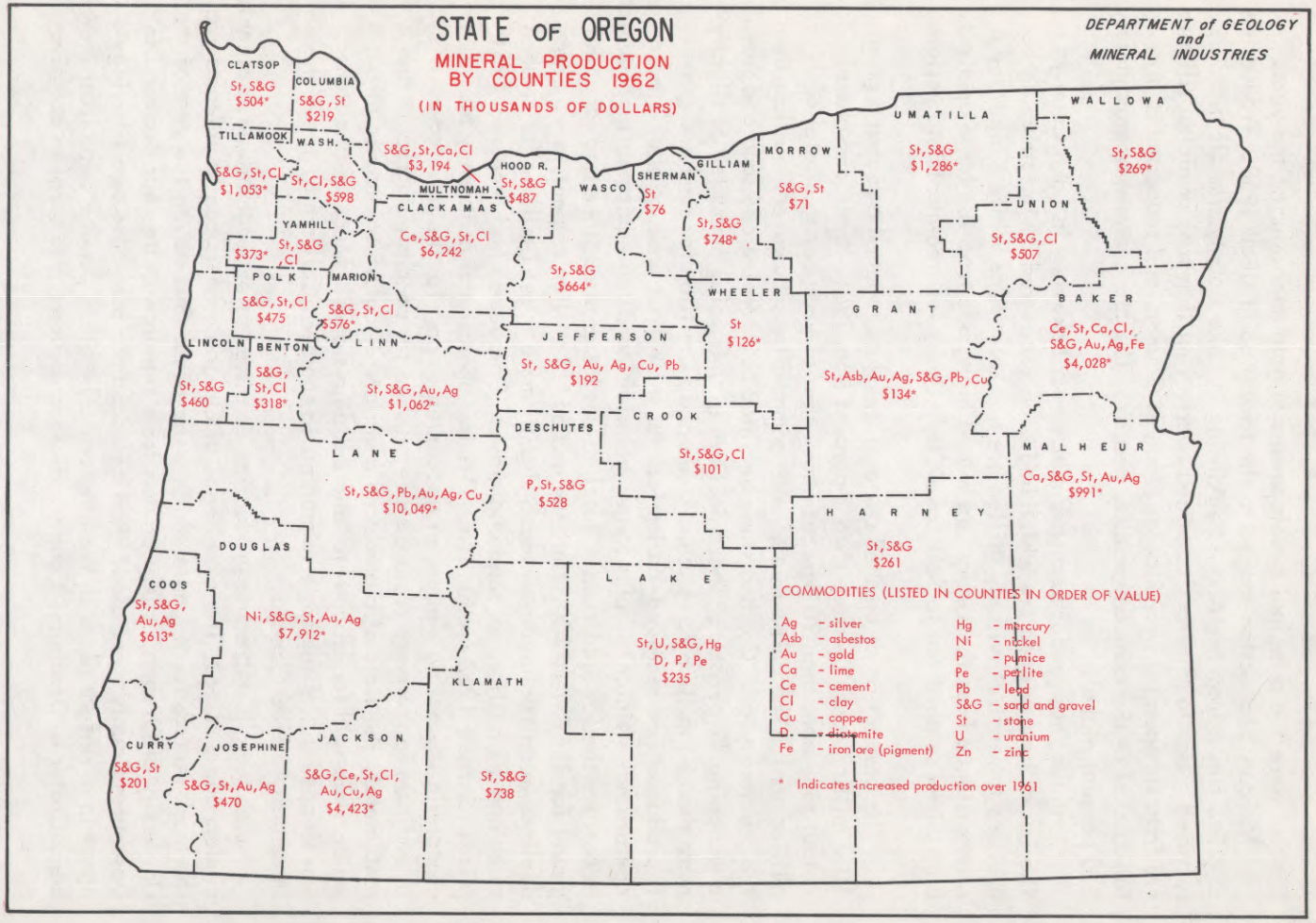
TABLE 1. Mineral Production in Oregon, 1961 - 1962 1/

Mineral		1961 Short tons (unless otherwise stated)	1961 Value (thousands)	1962 Short tons (unless otherwise stated)	1962 Value (thousands)	Note
Clays	thousand short tons	294	$ 357	249	$ 305	
Copper (recoverable content of ores, etc.)	short tons	2/	2/	2/	2/	1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers.)
Diatomite	short tons	2/	2/	50	2	
Gold (recoverable content of ores, etc.)	troy ounces	1,054	37	822	29	
Iron ore (pigment material)	long tons	829	2/	2/	2/	
Lime	thousand short tons	82	1,702	78	1,514	
Mercury	76-pound flasks	138	27	2/	2/	
Nickel (content of ore and concentrate)	short tons	12,860	2/	13,110	2/	
Perlite	short tons	- -	- -	3	3/	2/ Figure withheld to avoid disclosing individual company confidential data.
Pumice and volcanic cinder	thousand short tons	203	461	2/	2/	
Sand and gravel	thousand short tons	12,299	13,680	14,869	14,556	
Silver (recoverable content of ores, etc.)	troy ounces	2,022	2	6,047	7	
Stone	thousand short tons	4/17,455	4/21,202	18,258	20,977	
Uranium ore	short tons	2,160	66	2,722	112	3/ Less than $500.
Zinc (recoverable content of ores, etc.)	short tons	3	1	- -	- -	
Value of items that cannot be disclosed: Asbestos, cement, gem stones, lead, and values indicated by footnote 2/			15,557		14,956	4/ Revised figure.
Total			4/$53,092		$52,458	

TABLE 2. Oregon Mineral Industry Employment and Payrolls*

	1961 Employment	1961 Payrolls	1962 Employment	1962 Payrolls
1. Mining	1,112	$6,558,000	1,263	$7,272,000
2. Mineral manufacturing	2,674	16,216,000	2,820	17,589,000
3. Primary metals	5,532	36,662,000	5,405	36,521,000
4. Miscellaneous	821	5,274,000	779	5,153,000
	10,139	$64,710,000	10,267	$66,535,000

*Oregon State Employment Department figures.


STATE OF OREGON
MINERAL PRODUCTION
BY COUNTIES 1962
(IN THOUSANDS OF DOLLARS)
DEPARTMENT of GEOLOGY
and
MINERAL INDUSTRIES
CLATSOP
St, S&G $504*
COLUMBIA
S&G, St $219
TILLAMOOK
WASH.
S&G, St, Ca, Cl $3,194
S&G, St, Cl $1,053*
St, Cl, S&G $598
HOOD R.
MULTNOMAH
St, S&G $487
CLACKAMAS
WASCO
SHERMAN
St $76
GILLIAM
MORROW
S&G, St $71
St, S&G $748*
UMATILLA
St, S&G $1,286*
WALLOWA
St, S&G $269*
UNION
St, S&G, Cl $507
YAMHILL
St, S&G, Cl $373*
Ce, S&G, St, Cl $6,242
St, S&G $664*
POLK
MARION
S&G, St, Cl $475
S&G, St, Cl $576*
WHEELER
GRANT
BAKER
Ce, St, Ca, Cl, S&G, Au, Ag, Fe $4,028*
LINCOLN
BENTON
LINN
JEFFERSON
St $126*
St, S&G, Au, Ag, Cu, Pb $192
St, Asb, Au, Ag, S&G, Pb, Cu $134*
S&G, St, Cl $318*
St, S&G $460
St, S&G, Au, Ag $1,062*
CROOK
DESCHUTES
LANE
St, S&G, Cl $101
MALHEUR
Ca, S&G, St, Au, Ag $991*
P, St, S&G $528
St, S&G, Pb, Au, Ag, Cu $10,049*
HARNEY
St, S&G $261
DOUGLAS
LAKE
COOS
St, S&G, Au, Ag $613*
Ni, S&G, St, Au, Ag $7,912*
St, U, S&G, Hg D, P, Pe $235
KLAMATH
CURRY
JOSEPHINE
JACKSON
S&G, St $201
S&G, St, Au, Ag $470
S&G, Ce, St, Cl, Au, Cu, Ag $4,423*
St, S&G $738
COMMODITIES (LISTED IN COUNTIES IN ORDER OF VALUE)
Ag - silver
Asb - asbestos
Au - gold
Ca - lime
Ce - cement
Cl - clay
Cu - copper
D. - diatomite
Fe - iron ore (pigment)
Hg - mercury
Ni - nickel
P - pumice
Pe - perlite
Pb - lead
S&G - sand and gravel
St - stone
U - uranium
Zn - zinc
* Indicates increased production over 1961

District were the principal developments at gold mines during the year.

Mercury production sagged to the lowest point since 1950. Production of a few flasks from the Angel Peak Mine in Lake County was all that was reported. Hanna Mining Co. mined nearly 1 million tons of nickel silicate ore from its open pit near Riddle, Douglas County, and processed it into ferronickel at the company smelter nearby. The ore contains approximately 1.5 percent nickel.

Uranium was produced at two mines near Lakeview in Lake County. The Lucky Lass shipped ore which had been uncovered during stripping operations to reach previously drilled ore horizons. The White King Mine a short distance from the Lucky Lass mined highgrade from the large open pit. Both mines shipped ore to Salt Lake City, Utah, for treatment into yellow cake.

The production of crushed stone in the state reached a record high of 18.2 million tons, up more than 5 percent from 1961. Sand and gravel output rose more than 20 percent above that of last year to a total of 14.9 million tons. The unit value of both commodities, however, was less than the previous year. Crushed stone declined 5.3 percent and sand and gravel a whopping 12 percent. These declines in unit value amounted to slightly more than $1 million for crushed stone and $2 million for sand and gravel if producers had received 1961 prices for their 1962 production. Greater operational efficiency, plus larger materials handling equipment, accounted in part for the lowered costs. Total values for crushed stone and sand and gravel for 1962 were $20.9 million and $14.5 million respectively. These declines in unit value amounted to slightly more than $1 million for crushed stone and $2 million for sand and gravel if producers had received 1961 prices for their 1962 production. Greater operational efficiency plus larger materials handling equipment accounted in part for the lowered costs. In addition to the more prosaic stone crushed for concrete aggregate and road metal, the state also produced a variety of colorful volcanic tuffs which were sold for ornamental and building stones. Much of this stone was shipped out of the state to markets in southern California, to neighboring states, and to Canada.

Lightweight aggregate production consisted of expanded shale, volcanic cinders and pumice. The excellence of Oregon cinders can be inferred from the track records for the mile which were established during the year at the University of Oregon, where cinders from Tetherow Butte near Redmond in Deschutes County were used. Pumice edged out corn cobs as a filtering agent in a vinegar plant in Washington. The block pumice came from Newberry Crater in Deschutes County. The same quarry also supplies abrasive

grade lumps and large blocks for landscape architecture. Volcanic cinders and scoria found increased use as an aggregate in unit concrete masonry and lightweight monolithic concretes. Large quantities were also used in highway construction throughout central Oregon. Expanded shale, produced by two plants in Washington County, supplied aggregate for lightweight concretes and one producer furnished aggregate which was then ground to minus 325 mesh for a pozzolan replacement for portland cement used in the huge John Day Dam on the Columbia River.

Chrysotile asbestos was mined and processed near Mt. Vernon, Grant County, and shipped to southern California for finishing and marketing. The property has been worked intermittently for nearly 50 years.

The volume and value of semi-precious gems produced in Oregon appears to be growing steadily, although solid data is impossible to obtain. Quartz-family minerals occur widely across the state and are avidly sought by both amateur and professional collectors. Several communities have recognized the need for collecting areas and information about local gemstone deposits and have taken steps not only to provide maps and brochures but to make available collecting areas. Numerous private digging grounds have also been established and opened to the collectors.

* * * * *

NICKEL LATERITE REPORT AVAILABLE

The U. S. Bureau of Mines has issued Report of Investigations 6206, "Pine Flat and Diamond Flat Nickel-Bearing Laterite Deposits, Del Norte County, California," by W.T.Benson. The investigation, done in cooperation with the California-Oregon Power Co. (now Pacific Power & Light Co.), was prompted by the building of the nickel smelter at Riddle, Oregon, to treat ores on nearby Nickel Mountain. Report of Investigations 6206 points to the existence of a number of other deposits of nickel laterite that have developed on peridotite rock in the Klamath Mountains of Oregon and California. The Pine Flat and Diamond Flat deposits lie just south of the Oregon boundary. Sampling indicated that the deposits are comparatively small and of marginal or submarginal grade. Metallurgical tests conducted by the Bureau of Mines laboratory at Albany, Oregon, showed that the ore could be upgraded by reduction roasting and magnetic separation.

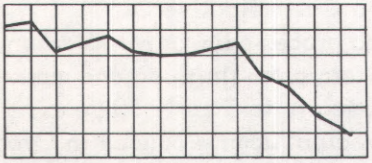
The report may be obtained free of charge from the Publications Distribution Section of the U. S. Bureau of Mines, 4800 Forbes Ave., Pittsburgh 13, Pa.

* * * * *

1963

PACIFIC NORTHWEST
METALS & MINERALS CONFERENCE

Portland, Oregon - April 24, 25, 26, 1963



U. S. GOLD STOCK

Proceedings of the:

SECOND GOLD AND MONEY SESSION

Available from the State of Oregon Department of Geology & Mineral Industries, 1069 State Office Building, Portland 1, Oregon.

Please make checks payable to H. M. Dole, Chairman, Second Gold and Money Session.

Price $1.50 postpaid.

Contents

- The Cost of Producing Gold
  Evan Just
- Gold -- The Only Alternative to Inflation
  Henry Hazlitt
- Chrysophiles and Chrysophobes or
  Should the Price of Gold be Raised or Lowered?
  William J. Busschau
- Gold Losses and the Domestic Economy or
  (Is There a Conflict between Economic Policies Good for the Domestic Economy and Those Good for the Dollar Internationally?)
  John Exter
- Gold and Gold Mining
  Donald H. McLaughlin
- Panel Discussion
  Donald H. McLaughlin, Moderator

AVAILABLE PUBLICATIONS

(Please include remittance with order. Postage free. A complete list of publications will be mailed upon request.)

BULLETINS

8. Feasibility of steel plant in lower Columbia River area, rev., 1940: R.M.Miller . 0.40
14. Oregon metal mines handbooks: by the staff
    - C. Vol. II, Section 1, Josephine County, 1952 (2d ed.) 1.25
    - D. Northwestern Oregon, 1951 . . . . . 1.25
26. Soil: Its origin, destruction, preservation, 1944: W.H. Twenhofel 0.45
27. Geology and coal resources of Coos Bay quadrangle, 1944: Allen & Baldwin . . 1.00
33. Bibliography (1st supplement) of geology and mineral resources of Oregon,. . . 1947: J. E. Allen 1.00
36. (1st vol.) Five papers on Western Oregon Tertiary foraminifera, 1947: Cushman, Stewart, and Stewart 1.00
    (2nd vol.) Two papers on Western Oregon and Washington Tertiary foraminifera, 1949: Cushman, Stewart, and Stewart; and one paper on mollusca and microfauna, Wildcat coast section, Humboldt County, Calif., 1949: Stewart and Stewart 1.25
37. Geology of the Albany quadrangle, Oregon, 1953: Ira S. Allison 0.75
40. Preliminary description, geology of the Kerby quadrangle, Oregon, 1949: Wells, Hotz, and Cater 0.85
41. Ground-water studies, Umatilla and Morrow Counties, 1949: Norman S. Wagner 1.25
44. Bibliography (2nd supplement) of geology and mineral resources of Oregon, 1953: M. L. Steere. 1.00
45. Ninth biennial report of the Department, 1952-54 . . . . . Free
46. Ferruginous bauxite deposits, Salem Hills, Marion County, Oregon, 1956: R. E. Corcoran and F. W. Libbey 1.25
49. Lode mines, central Granite Mining District, Grant County, Oregon, 1959: Geo. S. Koch, Jr. 1.00
51. Twelfth biennial report of the Department, 1958-60 . . . . . Free
52. Chromite in southwestern Oregon, 1961: Len Ramp 3.50
53. Bibliography (3rd supplement) of the geology and mineral resources of Oregon, 1962: M. L. Steere and L. F. Owen 1.50

GEOLOGIC MAPS

Prelim. geologic map of Sumpter quadrangle, 1941: J.T. Pardee and others . . . 0.40
Geologic map of the St. Helens quadrangle, 1945: Wilkinson, Lowry, & Baldwin . . 0.35
Geologic map of the Dallas quadrangle, Oregon, 1947: E. M. Baldwin 0.25
Geologic map of Kerby quadrangle, Oregon, 1948: Wells, Hotz, and Cater . . . 0.80
Geologic map of Albany quadrangle, Oregon, 1953: Ira S. Allison (also in Bull.37) . 0.50
Geologic map of Galice quadrangle, Oregon, 1953: F.G.Wells & G.W. Walker . 1.00
Geologic map of Lebanon quadrangle, Oregon, 1956: Allison and Felts 0.75
Geologic map of Bend quadrangle, and reconnaissance geologic map of central portion, High Cascade Mountains, Oregon, 1957: Howel Williams . . . 1.00
Geologic map of the Sparta quadrangle, Oregon, 1962: Harold J. Prostka 1.50
Geologic map, Mitchell Butte quadrangle, Oregon, 1962: R.E.Corcoran and others 1.50
Geologic map of Oregon west of 121st meridian (over the counter) 2.00
folded in envelope, $2.15; rolled in map tube $2.50 . . . . . .

(Continued on back cover)

Dr. John V. Byrne
Department of Oceanography
Oregon State University
Corvallis, Oregon 97331

State of Oregon
Department of Geology & Mineral Industries
1069 State Office Bldg., Portland 1, Oregon
POSTMASTER: Return Requested

The Ore Bin

Available Publications, Continued:

SHORT PAPERS

2. Industrial aluminum, a brief survey, 1940: Leslie L. Motz	0.10
13. Antimony in Oregon, 1944: Norman S. Wagner	0.25
17. Sodium salts of Lake County, Oregon, 1947: Ira S.Allison and Ralph S.Mason	0.15
18. Radioactive minerals the prospectors should know (2d rev.), 1955: White and Schafer	0.30
19. Brick and tile industry in Oregon, 1949: J.E. Allen and R.S. Mason	0.20
20. Glazes from Oregon volcanic glass, 1950: Charles W. F. Jacobs	0.20
21. Lightweight aggregate industry in Oregon, 1951: Ralph S. Mason	0.25
22. Prelim. report on tungsten in Oregon, 1951: H.D. Wolfe & D. J. White	0.35
23. Oregon King Mine, Jefferson County, 1962: F.W. Libbey and R.E.Corcoran	1.00

MISCELLANEOUS PAPERS

2. Key to Oregon mineral deposits map, 1951: Ralph S. Mason	0.15
3. Facts about fossils (reprints), 1953	0.35
4. Rules and regulations for conservation of oil and natural gas (rev.ed.), 1955	0.50
5. Oregon's gold placers (reprints), 1954	0.25
6. Oil and gas exploration in Oregon, 1954: R. E. Stewart	1.00
6. (Supplement) Oil and gas exploration in Oregon, 1960: V.C.Newton, Jr.	0.35
7. Bibliography of theses on Oregon geology, 1959: H.G. Schlicker	0.50
9. Petroleum exploration in Oregon (reprints): 1962	1.00

MISCELLANEOUS PUBLICATIONS

Oregon mineral deposits map (22 x 34 inches) rev., 1958	0.30
Oregon quicksilver localities map (22 x 34 inches) 1946	0.30
Oregon base map (22 x 34 inches)	0.25
Landforms of Oregon: a physiographic sketch (17 X 22 inches) 1941	0.25
Index to topographic mapping in Oregon, 1961	Free
Index to published geologic mapping in Oregon, 1960	Free
Geologic time chart for Oregon, 1961	Free