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JONES MARBLE DEPOSIT, JOSEPHINE COUNTY, OREGON

By Len Ramp*

Introduction

The economic geology of the Jones marble deposit is part of a larger study designed to gain more detailed information about the sedimentary portion of the extensive Upper (?) Triassic Applegate Group rocks (Figure 1) of southwestern Oregon. Detailed mapping in areas that contain limestone are thought to be the best possible sources for stratigraphic and structural evidence, and because nearby diorite intrusives may have been favorable host rocks for mineralization.

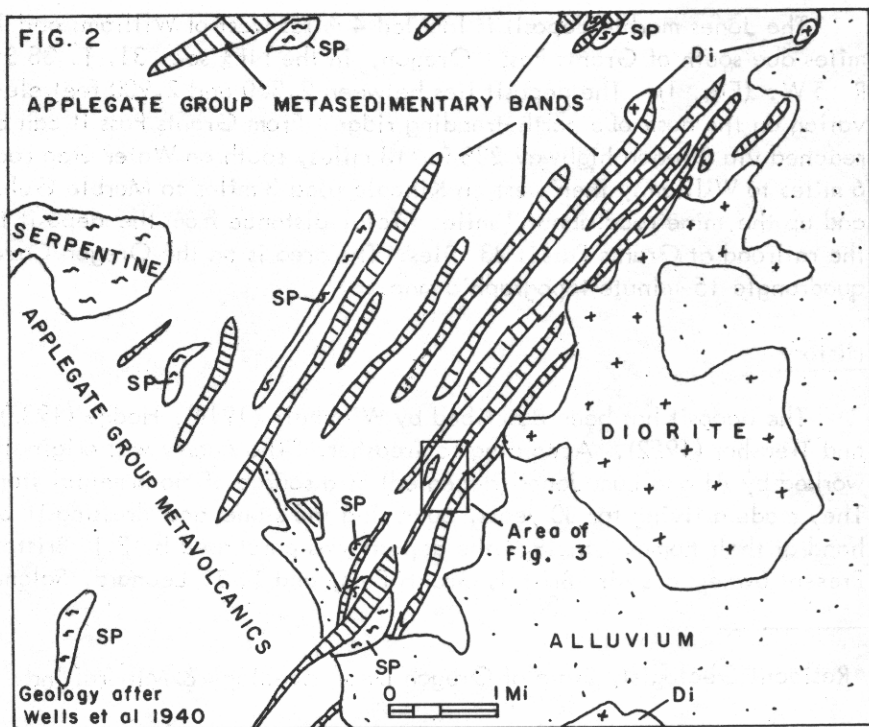
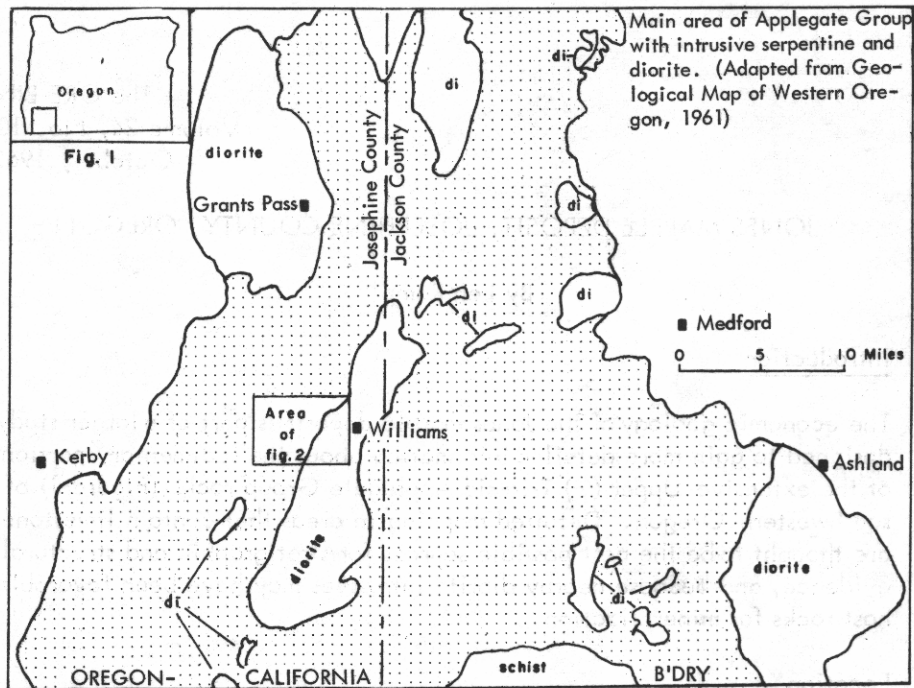
Location

The Jones marble deposit is located 4 miles west of Williams and 16 miles due south of Grants Pass, Oregon, in the NE $\frac{1}{4}$ sec. 31, T. 38 S., R. 5 W. (Fig. 1). The deposit lies between 2,300 and 2,900 feet elevation on the nose of a north-trending ridge. From Grants Pass it can be reached via Oregon highway 238 for 13 miles, south on Water Gap road 6 miles to Williams, then west on Kincaid road 3 miles to Marble Gulch and up the mine road about 1 mile. Total distance from the deposit to the railroad at Grants Pass is 23 miles. The area is on the Oregon Caves quadrangle 15-minute topographic map.

History

The deposit has been described by Winchell (1914), Hodge (1937), and Treasher (1952). According to Treasher, "The quarry was originally worked by Al and Lum Jones (deceased) as a source of monumental stone. They made a living for 30 years, quarrying the stone and dressing it by hand at their home." In 1934 the deposit was purchased by F.I. Bristol. Present owners are Mr. Bristol, Grants Pass, and T. T. Leonard, Salem.

*Resident Geologist, State of Oregon Dept. Geology & Mineral Ind.



Geologic Map of a Portion of the Grants Pass Quadrangle

The former reported that about 5,000 tons were ground and shipped for agricultural lime in 1939-40.

Geologic setting

The area is mountainous and covered by fairly dense forest. The marble stands in relief with very little soil cover and sparse vegetation. The deposit is a lenticular interbed in the highly deformed and metamorphosed rocks of the Applegate Group of Upper (?) Triassic age. In addition to marble, rock types of the Applegate Group in the area include argillite, quartzite, sandstone, schist, gneiss, and metamorphosed tuffs and lavas. The metavolcanic rocks are difficult to recognize and distinguish, owing to metamorphism. Wells and others (1940) mapped the greater portion of the Applegate Group as metavolcanics (Figure 2). The area mapped in this study (Figure 3) appears to be underlain largely by metamorphosed sediments.

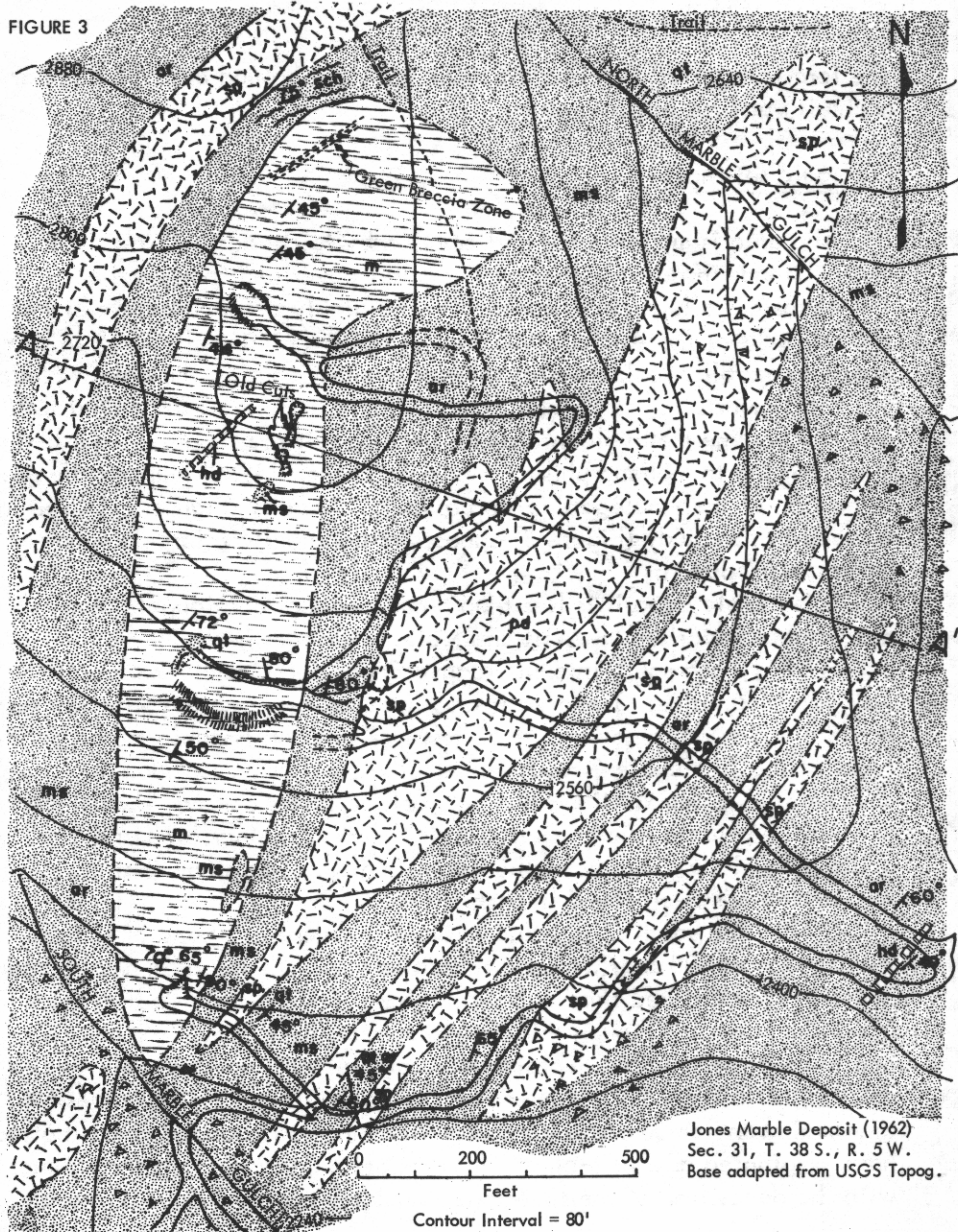
The marble deposit is less than a mile west of an elongate stock of diorite that underlies the Williams Valley, extends north across the Applegate Valley, and south into the rugged Sugarloaf-Grayback area of the Siskiyou Mountains. The area is also intruded by numerous sill-like serpentine bodies which appear to be more or less conformable to the deformed rocks of the Applegate Group. Later dikes of dioritic composition, probably related to the Williams diorite stock, are less common than the serpentine. Variable talcky alteration is found in the narrow serpentine bodies and along contacts of the larger bodies. Soapstone that is suitable for carving has been found in such areas.

Just to the south of the marble deposit, there is a band of limy quartzite as much as 400 feet wide. It contains numerous lenses and thin interbeds of recrystallized limestone which has similar texture to the Jones marble deposit. Although this limy quartzite layer has no surface connection with the marble deposit, it is parallel to it and may represent a folded limb of the same sedimentary horizon. The quartzite grades from a normal granular quartzite to a very fine-grained, banded chert that may have originated as a non-clastic precipitate more or less contemporaneous with the deposition of the limestone that later was converted to marble.

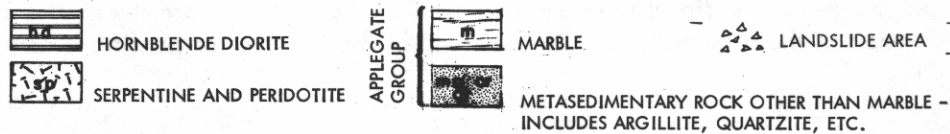
Structure

The layered rocks of the Applegate Group strike north to northeast and generally dip at high angles. Dips to the southeast are the most common in the area mapped. The attitude of the sill-like serpentine bodies

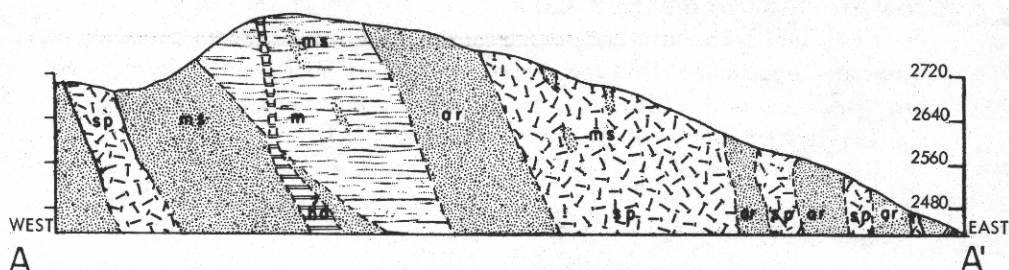
FIGURE 3



EXPLANATION



SECTION A-A' ACROSS MARBLE DEPOSIT



appears to be controlled by this predominant structural trend. This pattern is interpreted as a series of tight, isoclinal folds resulting in repeated exposures of a given horizon at various places across the section from west to east.

The marble deposit

The body of marble is lens shaped and is believed to be a squeezed segment of a former more extensive thin bed of limestone. The rock has been completely recrystallized to a granular white marble, with occasional gray streaks which give it a pleasing, variegated appearance. Individual calcite crystals in the marble range from 1/3 mm in diameter to 5 mm. The average diameter of the crystals is about 1 mm.

Important impurities in the deposit consist of occasional small lenses of quartzite and argillite and a hornblende diorite dike about 6 feet wide. Small streaks and knots of quartz occur at various places, usually aligned with the trend of the main body. A few sparse scatterings of pyrite also occur in the mass.

The lens or canoe-shaped body of marble is about 1,700 feet long and 300 feet wide, tapering rapidly at both ends. Residual layers, such as streaks of impurities or gray banding within the marble, dip from 45° SE to vertical. These layers appear to dip more steeply near the southern end than at the upper or northern end of the deposit. Also, dips observed near the western margin are generally less than those observed near the eastern margin. This implies a pinching of the deposit at depth as illustrated in cross-section A-A'.

A rough calculation of the available tonnage is based on the following rectangular average dimensions: length, 1,500 feet; width, 200 feet; and depth, 200 feet. Using a value of 12 cubic feet per ton, there are 5 million tons indicated in the deposit.

Marble from the deposit is of high purity. Winchell (1914) quotes an analysis of this marble by R.C. Wells (1910), which showed 99.14 per cent calcium carbonate and no magnesia. Analyses of 3 samples taken by a former department field engineer, E.A. Youngberg, in 1945 from eastern, western, and southern quarries on the Jones marble deposit all showed similar results. An average* of the analyses is listed below:

Silica (SiO_2)	0.71	Calcium carbonate (CaCO_3)	98.54
Iron (Fe_2O_3)	0.08	Magnesium carbonate (MgCO_3)	1.11
Alumina (Al_2O_3)	0.24	Phosphorus (P)	0.02

Possible utilization

The purity of the Jones marble deposit makes it acceptable for most uses. Stone for building purposes and monuments has already been produced in small amounts from this deposit. Possible use of the marble as rubblestone in walls in modern architecture offers a market for a limited yearly tonnage.

The Jones deposit has recently been considered as a possible source of lump lime for pulp and paper manufacturing. This use may be feasible, since there are pulp plants as close as Coos Bay and Springfield. Use of the powdered product as an opaque white filler in paint, paper, etc., may also be practicable.

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* * * * *

* Average of P-4113, P-4114, and P-4115. L. L. Hoagland, assayer-chemist, State of Oregon Dept. Geology and Mineral Industries.

TO HOARD GOLD IS NOW FASHIONABLE IN GERMANY*

Three ways to that type of expensive saving Reasons and background for hoarding

In the U.S.A. reserves of gold are diminishing, but at the same time those in Europe are increasing. In the Federal Republic of Western Germany gold is eagerly asked for at all bank counters. Its shine tempts and many believe in its steady value. The private purchase of gold, which increased lately, has no connection whatsoever with technical currency questions, because gold is with us just an article of merchandise. The gold which is freely traded in our country is mainly mined in the Union of South Africa. But also many other countries sell gold.

At the present time more gold than ever is purchased. In a Swiss financial paper the following note appears: "It is remarkable as to the reasoning of the German gold hoarders, whose attitudes and experiences find their reasons in experiences of times of war and turbulent after-years, that they, without any regard to the comparatively high price, buy gold coins."

Indeed, it had not happened for a long time that in the Federal Republic gold coins and gold bars were bought in such large quantities as during these last weeks. The small savers especially are eager buyers.

Gold purchases were usually only transacted in times of war. Nobody likes to part without good reason with stock and shares, or liquidate bank savings. It seems that there is an important motive for the present "escape into gold" in finding that during these last months there was plenty of talk about the diminishing purchasing power of the D-mark**; the calls of warning of our Finance Minister have, without doubt, caused more unrest among the population than was expected.

To "keep gold in a stocking" seems to be fashionable today. The gold purchaser has three possibilities: gold coins, gold medals, and gold bars. The latter is the simplest. Added to this, bars can be had, in general, at a cheaper quotation. The smallest bar (10 grams) costs 55 DM, the 1000-gram bar 4800 DM. The heavier the bar, the relatively cheaper the purchase price.

*Translation by Rudolph Zobl, Accountant, Oregon State Dept. Geology and Mineral Industries, of an article by Ernst Guenther Eack, economic contributor, Bonn, Germany, printed in Welt Am Sonntag, Frankfurt am Main, Sept. 9, 1962.

**Value of D-Mark as of Oct. 1, 1962, about 25 cents American.

It is getting more complicated as to coins. Like stamp collectors, numismatists try to grab rare specimens. Star among those is the 5-mark gold coin (fineness close to 2 grams). It costs about 200 to 220 DM. The one-dollar gold coin (approximately the same size) costs about 120 DM. In times of hardship and need it would realize at the most 10 DM for its value of fine gold contents.

The public in general keeps away from the purchase of such items for those reasons. Its interest is more concentrated in the Swiss, or French 20-franc coin, toward the English pound, or the Italian 20-lira coin. The fact that those and a number of other coins can be bought for approximately 35 to 70 DM explains the wish and desire of so many families to make the "piggy-bank" the hoarding place for gold coins.

Medals of gold (Erhard, Adenauer, Pope Pius, and many others struck in gold) are comparatively expensive. Because as mainly private firms or organizations strike those medals, the profit margin lies in the price of 45 DM for the Berlin gold medal 1958 (weight 7.9 grams) up to the 50-ducat Martin Luther (175 grams) for which 1,250 DM is being asked.

Maybe the hunger for gold finds its explanation in the fact that ownership of gold was prohibited in Germany before the last war. Maybe it's simply the nice and grand feeling of being able to go to the bank counter and exchange paper money for pure gold.

* * * * *

DRILLERS TO TRY AGAIN FOR STEAM ON CRUMP RANCH, ADEL

The Nevada Thermal Power Co., exploratory division of the Magma Power Co. of Los Angeles, plans to drill another exploratory well in the Adel fault zone east of Lakeview in southcentral Oregon. This company put down a hole on the Crump Ranch about 3 years ago in an attempt to encounter super-heated steam greater than 300° F. for possible use in electric power generation. Temperatures as high as 250° were recorded in this test, but were judged as not hot enough for efficient operation of a steam power plant.

Drilling of the well caused a continuously spouting geyser (see The ORE BIN, September, 1959) that sent a column of steam and hot water in the air from the 20-inch casing to a height of 150 to 200 feet. At the end of 9 months the geyser had stopped spouting, partly because of the partial plugging of the vent by vandals. Even today the rumble of boiling water can be heard at the pipe.

* * * * *

BATHYMETRY OF CRATER LAKE, OREGON

By

John V. Byrne*

Crater Lake, Oregon, is unquestionably the deepest lake in the United States (1,932 feet), and in North America is exceeded in depth only by Great Slave Lake in northern Canada (2,014 feet). Depth measurements were first made in Crater Lake in 1886, again in 1938-40, and most recently during the summer of 1959. The recent study, carried out in great detail by the United States Coast and Geodetic Survey, made use of echosounding methods and was made under the supervision of R. E. Williams. This survey (U.S.C. & G.S. Hydro Survey No. 8498) provided the basis for the accompanying bathymetric chart, which is controlled by soundings at more than 4,000 individual locations.

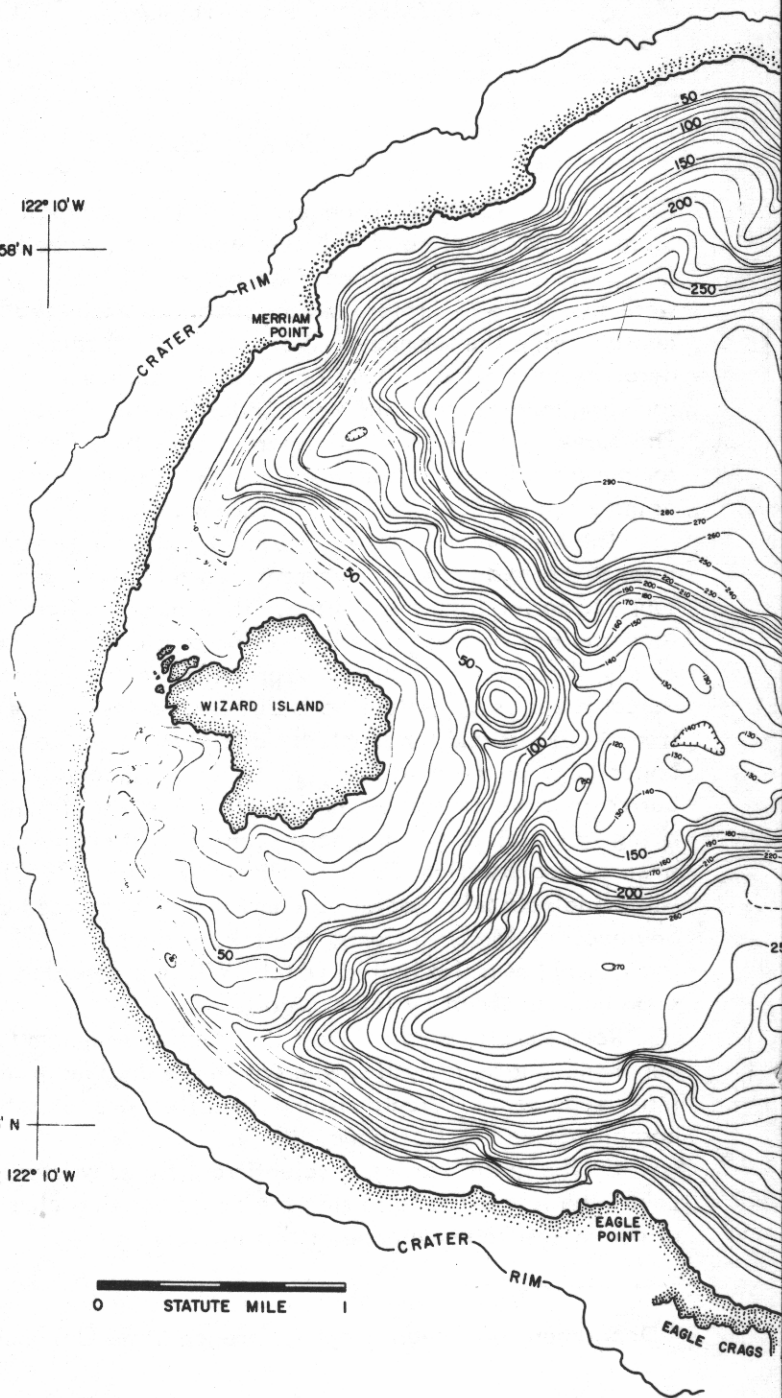
The use of a 10-fathom (60-foot) contour interval makes several features of geologic interest apparent. As the runoff and amount of sediment supplied to the lake are limited, little modification of the original surface can have taken place by erosion or deposition, and the bathymetric chart, therefore, essentially represents the configuration of the original volcanic surface. Attention is directed to the lobe extending eastward from Wizard Island, undoubtedly a lava flow; to the conical mound at the inner edge of the lava flow, probably a volcanic cone which has been buried to some extent by the lava flow; and to the almost perfect cone rising to 81 fathoms in the north-central part of the lake. This cone has been named Merriam Cone by Howel Williams (1961) in a short article which includes a less-detailed chart of the lake based on the same survey. Southeast of Merriam Cone, the lake is deepest, 322 fathoms (1,932 feet), and has a flat bottom which Williams considers to be a lava plain smoothed somewhat by later ashfalls.

Rock samples dredged from the flank of Merriam Cone consist of hypersthene-augite andesite, whereas those dredged from the mound at the inner edge of the Wizard Island lava flow are vitrophyric hypersthene-hornblende dacite (Williams, 1961).

Of the great number of scientific articles written concerning Crater Lake, the few listed following the accompanying chart provide a summary of our scientific knowledge of this interesting area.

* Department of Oceanography, Oregon State University.

122° 10' W
42° 56' N



42° 55' N
122° 10' W

0 STATUTE MILE 1



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* * * * *

CORRECTION

In the article "Geology of the Cape Blanco Area" (The ORE BIN, August, 1962) belemnoids were incorrectly reported as having become extinct at the end of the Cretaceous period, according to R. H. Dott, Jr., the author. A few aberrant forms actually have been reported from Eocene rocks. This would extend the possible range of the "Upper Cretaceous Rocks" near Blacklock Point into the early Tertiary. However, the author still considers these strata to be Cretaceous (but younger than the Myrtle group) on the basis of the meager Foraminifera and petrology of the sandstones. Furthermore, the first belemnoid found in them was a large, massive form unlike those reported from the Eocene.

* * * * *

NEW DRILLING PERMIT ISSUED IN OCTOBER

The department issued Drilling Permit No. 50 to John T. Miller, Ross Mitchell & Associates on October 5, 1962. The new hole is located on the Bliven Ranch 240 feet north of John T. Miller "Ray Adams No. 1," which was drilled last month and abandoned September 24. The proposed depth of the "Bliven well" was 400 feet. The coordinates were given as approximately 670 feet north and 860 feet east of the southeast corner of sec. 11, T. 8 S., R. 5 W., Polk County. Elevation at ground level is about 285 feet.

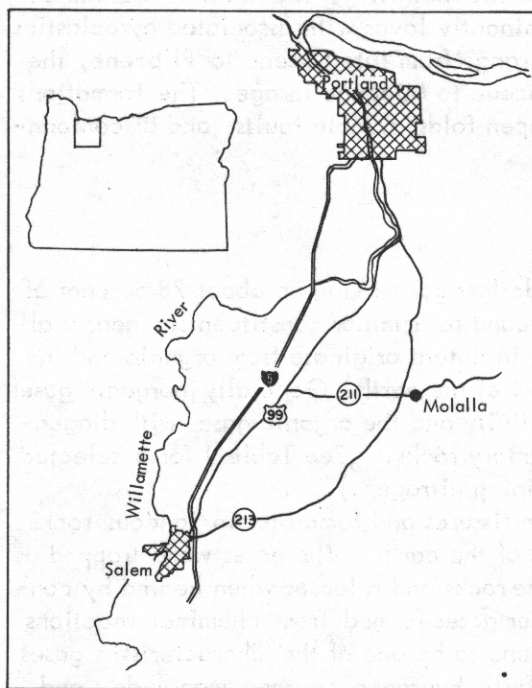
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NITROGEN WELL AT MOLALLA

By Vernon C. Newton*

A flow of nitrogen gas was struck by the Westerberg Drilling Co. in August, 1962, while the company was drilling for water on the Walter Moehne property, $3\frac{1}{2}$ miles east of the Town of Molalla in the NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 13, T. 5 S., R. 2 E., Clackamas County (see index map). The gas was encountered at 260 feet, and the flow increased after drilling into what appeared to be a fault zone. Gas continued to blow from the 6-inch casing during the remainder of the drilling and until the well was abandoned at a depth of 450 feet. No appreciable decrease could be noted after nearly 3 weeks of flowing through the uncapped casing. Carl Westerberg, the driller, reported he got headaches while working around the gas and he finally was forced to install a fan to blow the gas away from the working area.

INDEX MAP



Eugene Hampton, geologist with the U. S. Geological Survey, Ground Water Branch, Portland, accompanied the writer to the site August 28. The gas was found to be non-flammable and odorless. Although the pressure appeared to be low, the volume of gas issuing from the open 6-inch casing was impressive, and the hissing could be heard more than 50 feet from the well. A sample of the gas was taken for analysis to the U. S. Bureau of Mines laboratory at Albany. Measurements were made of the pressure 2 days later, on August 30, so that volume calculations could be made.

* Petroleum Engineer, Oregon Dept. Geology and Mineral Industries.

Westerberg capped the hole and left it unplugged until laboratory determinations could be made on the gas.

The log on the well, as compiled by the driller, is given below.

<u>Material</u>	<u>From</u>	<u>To</u>	<u>Material</u>	<u>From</u>	<u>To</u>
Top soil	0	1	Olive green formation, soft	251	253
Clay, tan	1	5	Rock, decomposed; blows	253	254
Rock, soft, gray	5	25	Rock, black; seems to be broken,		
Clay, tan	25	31	caves some, quartz in strata	254	269
Rock, shot to get casing by	31	33	Rock, black; cuttings coarse, some		
Clay, tan	33	35	quartz	269	310
Rock, shot to get casing by	35	37	Rock, drills fairly fast, green color as		
Clay, varicolored	37	223	claystone; also black cuttings	310	355
Gravel and blue clay; well blows in			Rock, hard; making 10' a day, caves		
gravel. No water	223	240	at 385 to 387. Will not hold water	355	415
Clay, blue	240	251	Rock, creviced at 435 to 437; will		
			not hold water, blows hard	415	452

Geology of the area

The Town of Molalla lies in the foothills of the Western Cascades. The rocks in this region are dominantly lavas with associated pyroclastics and waterlaid sediments which range from late Eocene to Pliocene, the bulk of the section being Oligocene to Miocene in age. The formations dip gently eastward and broad open folds, sizable faults, and disconformities are present.

Sources of nitrogen gas

Nitrogen is a colorless, odorless gas making up about 78 percent of the earth's atmosphere. It is found as a minor constituent in nearly all natural gases. Gases occurring in nature originate from organic and inorganic processes within the crust of the earth. Generally inorganic gases are associated with volcanic activity and the organic gases with diagenesis of organic matter in sedimentary rocks. (See Table 1 for a selected list of some natural gases containing nitrogen.)

Inorganic gases escape from fissures and fumaroles in igneous rocks at various places on the surface of the earth. The gases were trapped as occlusions within openings in the rocks and released when heated by contact with magmatic masses; other gases formed from chemical reactions within magmas. Nitrogen is found to be one of the characteristic gases in volcanic emanations, along with hydrogen, carbon monoxide, and carbon dioxide. Geochemists believe that the earth's atmosphere has been enriched with nitrogen during past geologic time by such volcanic eruptions. Nitrogen has been noted in the gaseous portions of comets and in the atmospheres of the stars, sun, and planets.

Table 1. Selected list of some natural gases containing nitrogen.

Organic Gases	N ₂						Remarks and References		
	CO ₂	CH ₄	CnH _{2n} *	O ₂	CO	H ₂			
Monongah Coal Mine									
West Virginia	77.77	0.16	1.59	--	20.48	0.0	--		U.S. Geol. Survey Bull. 389, p. 8
Darr Coal Mine									
Jacobs Creek, Pa.	77.00	2.31	6.01	0.31	14.09	0.28	--		Above reference, p. 9.
Shallow Well									
Bureau County, Ill.	85.83	0.10	13.97	--	0.05	0.05	--		U.S. Geol. Survey Mineral Resources of U.S.
Westbrook Field									
Mitchell County, Tex.	85-95	--	--	--	--	--	--		Leversen, p. 365. No petroleum associated.
McCamey Field									
West Texas	2.52	0.10	69.40	27.98	--	--	--		Univ. Texas Pub. 5716, p. 199.
Buena Vista Hills									
Kern County, Calif.	3.80	16.50	42.20	37.50	0.00	--	--		Rankama and Sahama, p. 362.
Oil Test									
Linn County, Oregon	50.4	0.50	48.0	1.10	--	--	--		Unpub. On file in Department. Low vol. flow.
<u>Inorganic Gases</u>									
Fumarole, Mt. Etna, Sicily	79.07	1.61	--	--	18.97	(0.35 H ₂ S)			Ley, p. 1062-63.
Mont Pelée, Martinique	54.94	15.38	5.46	--	13.67	8.12			Ley, p. 1062-63.
Well									
Harding County, N.M.	0.2	99.8	--	--	--	--	--		N.M. Bur. Mines Bull. 18.
Metal Mine									
Cripple Creek, Colo.	81.00	18.0	--	--	0.30	--	--		Ley, p. 1063.
<u>Gases - Origin Unknown</u>									
Well	N ₂	CO ₂	CH ₄	CnH _{2n} *	O ₂	He			
Las Animas County, Colo.	79.71	12.19	0.00	0.00	0.92	7.18			Above reference, p. 1062.
Well									
Emery County, Utah	61.02	31.70	0.00	5.70	0.27	1.31			Above reference, p. 1062.
Well									
Cowley County, Kansas	82.70	0.00	14.85	0.41	0.20	1.84			Above reference, p. 1062.
Boiling Spring									
Abano, Italy	74.23	10.73	12.00	--	--	1.51			Above reference, p. 1063.

* Other hydrocarbons.

Some of the nitrogen derived from volcanic activity is generated by distillation when intruded magma contacts organic material in the surrounding rocks or in meteoric waters. Enrichment of nitrogen also occurs through chemical reactions between gaseous vapors and wall rocks.

Experiments have suggested another source for nitrogen in rocks where helium is a minor constituent of natural gas. The effect of radiation on animal and vegetable proteins was studied by several researchers, who discovered that nitrogen was rapidly released when the material was exposed to radiation. The experiment suggested that contact between basement rocks containing radioactive minerals and sedimentary rock containing organic remains could produce large amounts of nitrogen, with helium a by-product of radioactive disintegration.

The natural gas used commercially for fuel is of organic origin, formed by decomposition of organic debris buried in sedimentary basins. Methane is the most common constituent of organic gases with heavier hydrocarbons, carbon dioxide, and nitrogen as minor components. These gases are the product of decomposition of organic matter in a reducing environment (chemical reaction without the presence of much oxygen). Coals and peats are formed from decomposition of land and marsh vegetation, while organisms in stagnant waters of inland lakes or marine embayments produce hydrocarbons in a process called putrefaction. This is a process of slow distillation aided by bacterial action. Fats and oils are changed into organic compounds and gases consisting mainly of methane and smaller amounts of other hydrocarbons, carbon dioxide, and nitrogen. Both carbon and nitrogen are enriched during the putrefaction process.

The source of the nitrogen in the Moehnke well is not definitely known, because of insufficient knowledge concerning the lithology and chemical composition of the rocks that underlie the Molalla area. Beds of sub-bituminous coal crop out on the surface about 6 miles south of Molalla and this horizon, or another at about the same stratigraphic position, could possibly occur below the Moehnke well. Partially decayed plant debris is also fairly common in some of the waterlaid tuffs in this vicinity, and it could be that the nitrogen evolved from these sediments during the putrefaction process. Because of the generally low porosity and permeability of most tuffaceous beds, the gas would be allowed to escape only where fracture zones in the rock extend to the surface or are encountered in well borings.

Volume calculations on the Moehnke well

Volume calculations were made on the Moehnke well in September,

1962. Measurements were made, using a choke nipple arrangement and a U-tube manometer filled with mercury. The general choke nipple gas flow formula used to estimate the rates is:

$$Q = \frac{CP}{\sqrt{GT}}$$

Q = rate in 1000 cu ft per day (24 hours)

C = orifice coefficient

P = backpressure (Psia)*

G = specific gravity of gas (0.90)

T = temperature absolute, degrees F

Choke Nipple Flow Measurements

(Shut-in press. = 16.87 psia)

<u>Choke Size</u>	<u>Coefficient</u>	<u>Pressure(psia)</u>	<u>Spec.Grav.</u>	<u>Temp.(°Fabs)</u>	<u>Est. Vol.</u>
1/4"	26.51	16.72	0.90	519.5	20 MCF/D**
5/16"	43.64	16.69	0.90	518.	33 MCF/D
3/8"	61.21	16.67	0.90	517.	47 MCF/D
1/2"	112.72	16.38	0.90	517.	85 MCF/D

The calculated absolute open flow potential of the well is roughly 200 MCF/D.

An estimate of the rate was also made using the side static pressure method. The rate was estimated to be about 150 MCF/D through a 1-inch pipe, but the value is questionable, because the side static method is inaccurate at low pressures.

The well was allowed to blow for 30 minutes through open-end 6-inch casing and then closed in. No appreciable drawdown in pressure could be detected. The driller, Carl Westerberg, reported that he could not detect any decrease in flow volume at the end of the 3-week period that the well was allowed to blow to air. The reservoir containing the gas must be an open fracture system to have such high permeability.

* Thousand cubic feet per day. **Pounds per square inch absolute.

Analysis of gas from the Moehnke well

<u>Sample No. 1*</u>	CO ₂	N ₂	CH ₄	CnH _{2n}	O ₂	CO	H ₂	He
Chemical analysis	0.1-	98.8	0.5-	0.0	0.1-	0.1-	0.1-	Not determined
<u>Sample No. 2**</u>								
Gas Chromatograph	1.0-	93.4	1.0-	0.0	- -	tr.	4.7	0.0

Selected References

- Chamberlin, R. T., 1909, Notes on explosive mine gases and dusts: U. S. Geol. Survey Bull. 383, 67p.
- Clarke, Frank W., 1924, The Data of geochemistry: U. S. Geol. Survey Bull. 770, 5th ed., 841p.
- Harper, Herbert Ewing, 1946, Preliminary report on the geology of the Molalla quadrangle, Oregon: Oregon State University master's thesis, 29p.
- Hill, B., 1914, Natural gas: in U. S. Geol. Survey, Mineral Resources of the United States, part II - nonmetals, p. 1411-1499.
- Howco Cementing Tables, 1956: Halliburton Oil Well Cementing Co., Duncan, Okla.
- Levorsen, A. I., 1954, Geology of petroleum: W. H. Freeman & Co., San Francisco, 703p.
- Ley, Henry A., ed., 1935, Geology of natural gas: Am. Assoc. Petroleum Geologists, Tulsa, Okla., 1227p.
- Peck, Dallas L., 1960, Geologic reconnaissance of the Western Cascades in Oregon north of latitude 43°: U. S. Geol. Survey Open File Rept., 232p.
- Railroad Commission of Texas, 1950, Back-pressure test for natural gas wells, State of Texas, 95p.
- Rankama, K., and Sahama, T.G., 1949, Geochemistry: University of Chicago Press, 912p.

* U. S. Bureau of Mines, Analytical Laboratory, Albany, Oregon, September 10, 1962.

** Humble Oil & Refining Co., "R. B. Perry No. 1", Borst & Giddens Logging Unit, Chehalis, Wash., October 5, 1962.

AEROMAGNETIC MAPS AND PROFILES IN OREGON

The index map of Western Oregon on page 172 shows the location of airborne magnetic surveys flown by the U. S. Geological Survey for which results are available to the public. The supplemental list of publications or open-file releases given below is keyed to the index map.

1. Total intensity aeromagnetic profiles of west-central Oregon (open-file report, 1957).
2. Preliminary interpretation of an aeromagnetic map of the Albany-Newport area, Oregon, by R. W. Bromery (open-file report, 1962).
3. Aeromagnetic map of the Kerby and part of the Grants Pass quadrangles, Josephine and Curry Counties, Oregon, by J. R. Balsley, R. W. Bromery, E. W. Remington, and others (GP 197, 1960, scale 1:96,000. 50 cents).
4. Geologic interpretation of the aeromagnetic map of the Lebanon quadrangle, Linn and Marion Counties, Oregon, by R. W. Bromery (GP 212, 1962, scale 1:62,500. 50 cents).

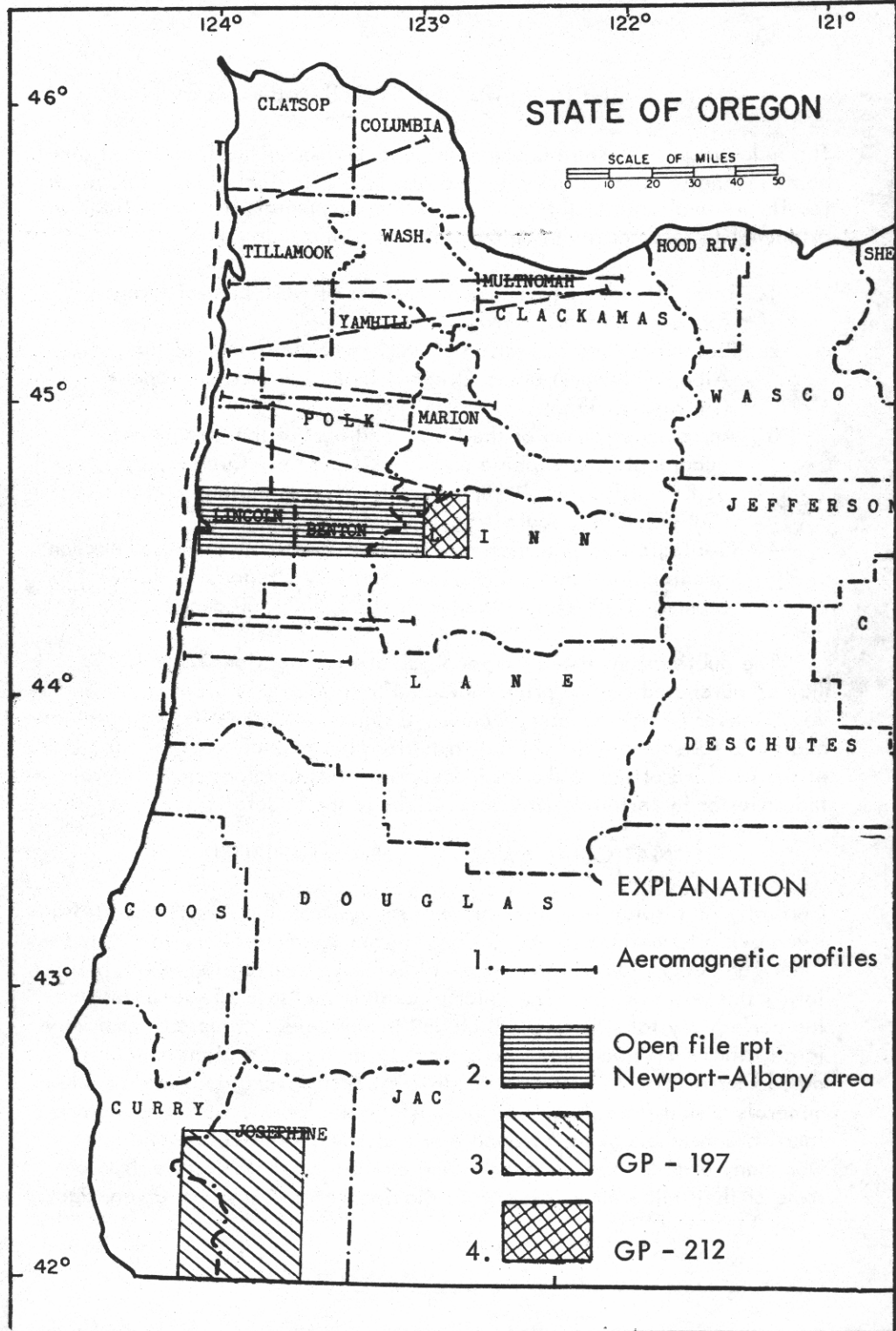
The publications listed as Geophysical Investigations Maps (GP), may be purchased for the price indicated from the U.S. Geological Survey, Denver Federal Center, Denver, Colorado. Open-file data are not available for sale or for public distribution, but may be examined or copied at the Portland office of the State Department of Geology and Mineral Industries or in certain West Coast offices of the Federal Survey.

* * * * *

NATIONAL AWARD MINERALS EXHIBITED

Currently on display in the department's museum is the Albert and Stella Keen exhibit, which won the national award for mineral crystals at the American Federation of Mineralogical Societies convention at Des Moines, Iowa, this past summer. The colorful exhibit includes 25 specimens having perfect crystal structure. Included in this select group are some very large stibnite crystals unique to a locality in Japan, a giant malachite pseudomorph after azurite from South West Africa, and a variety of other minerals from different parts of the world. The Keens, who live in Portland, are members of the Oregon Agate and Mineral Society and have won many awards for their outstanding exhibits. Another collection of some of their minerals was shown in the department's museum a year ago.

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Available Publications, Continued:

SHORT PAPERS

2. Industrial aluminum, a brief survey, 1940: Leslie L. Motz 0.10
4. Flotation of Oregon limestone, 1940: J.B. Clemmer & B.H. Clemmons 0.10
7. Geologic history of the Portland area, 1942: Ray C. Treasher 0.25
12. Prelim. report, high-alumina iron ores, Washington County, Oregon, 1944:
Libbey, Lowry, and Mason 0.15
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 & R.E. Corcoran . . . 1.00

MISCELLANEOUS PAPERS

1. Description of some Oregon rocks and minerals (to accompany school mineral
sets), 1950: Hollis M. Dole. 0.40
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
8. Well records of oil and gas exploration in Oregon, 1960: V.C. Newton, Jr. 0.25

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
- Landforms of Oregon: a physiographic sketch (17 x 22 inches) 1941 0.25
- Index to topographic mapping in Oregon, 1958 Free
- Index to published geologic mapping in Oregon, 1960 Free
- Geologic time chart for Oregon, 1961 Free

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

GEOLOGIC MAPS

Prelim. geologic map of Sumpter quadrangle, 1941: J.T. Pardee and others	0.40
Geologic map of the Portland area, 1942: Ray C. Treasher	0.25
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 the Valsetz 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 et al. (In press)	
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)