March 1949 Portland, Oregon

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
Head Office: 702 Woodlark Building, Portland 5, Oregon

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EXPLORATION OF NICKEL-BEARING LATERITE ON WOODCOCK MOUNTAIN, JOSEPHINE COUNTY, OREGON

By

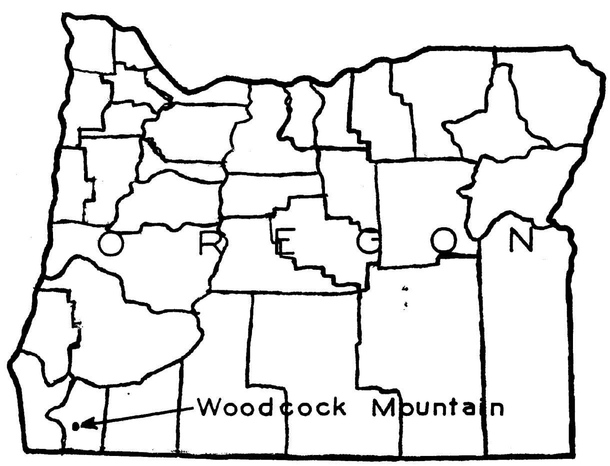
Ralph S. Mason*

Introduction

Following a preliminary reconnaissance and sampling of laterite on Woodcock Mountain in the summer of 1947, a drilling and mapping program was carried out by the department during July 1948. The work was a continuation of the department's investigation of nickel-bearing laterites begun in 1946. Progress reports of this work appeared in the March 1947 and the May 1948 issues of the Ore.-Bin.

Sampling and mapping in 1948 was done by the author assisted by Mr. Harold Wolfe, department field geologist stationed at Grants Pass, and Mr. Irving Jones.

Location of deposit



Woodcock Mountain is located in southwestern Josephine County about a mile west of the town of Cave Junction on U.S. Highway 199, 35 miles south of Grants Pass. The mountain covers parts of secs. 7, 18, 19, 30, and 31, T. 39 S., R. 8 W., and secs. 12, 13, 24, 25, and 36, T. 39 S., R. 9 W. It is roughly 4 miles long by 2 miles wide with its axis trending in a northerly direction. The area examined during 1948 was restricted to the summit of the south half of the mountain, an area measuring roughly 1700 by 7000 feet. The southern portion of the mountain is reached by driving about one mile on the graveled road leading west from U.S. Highway 199 just south of the Illinois River bridge about 2 miles south of Cave Junction. From an abandoned house at the end of the road, a dim trail can be followed up the southeast slope of the mountain.

The greater portion of the land covered by the area studied lies within the U.S. Forest Service boundary. Sec. 36, T. 39 S., R. 9 W., is state land and the W$\frac{1}{2}$ sec. 31, T. 39 S., R. 8 W., is Oregon and California Railroad revested land. The NW$\frac{1}{4}$ sec. 30, T. 39 S., R. 8 W., is public domain and the SW$\frac{1}{4}$ of the section is part county land and part privately owned.

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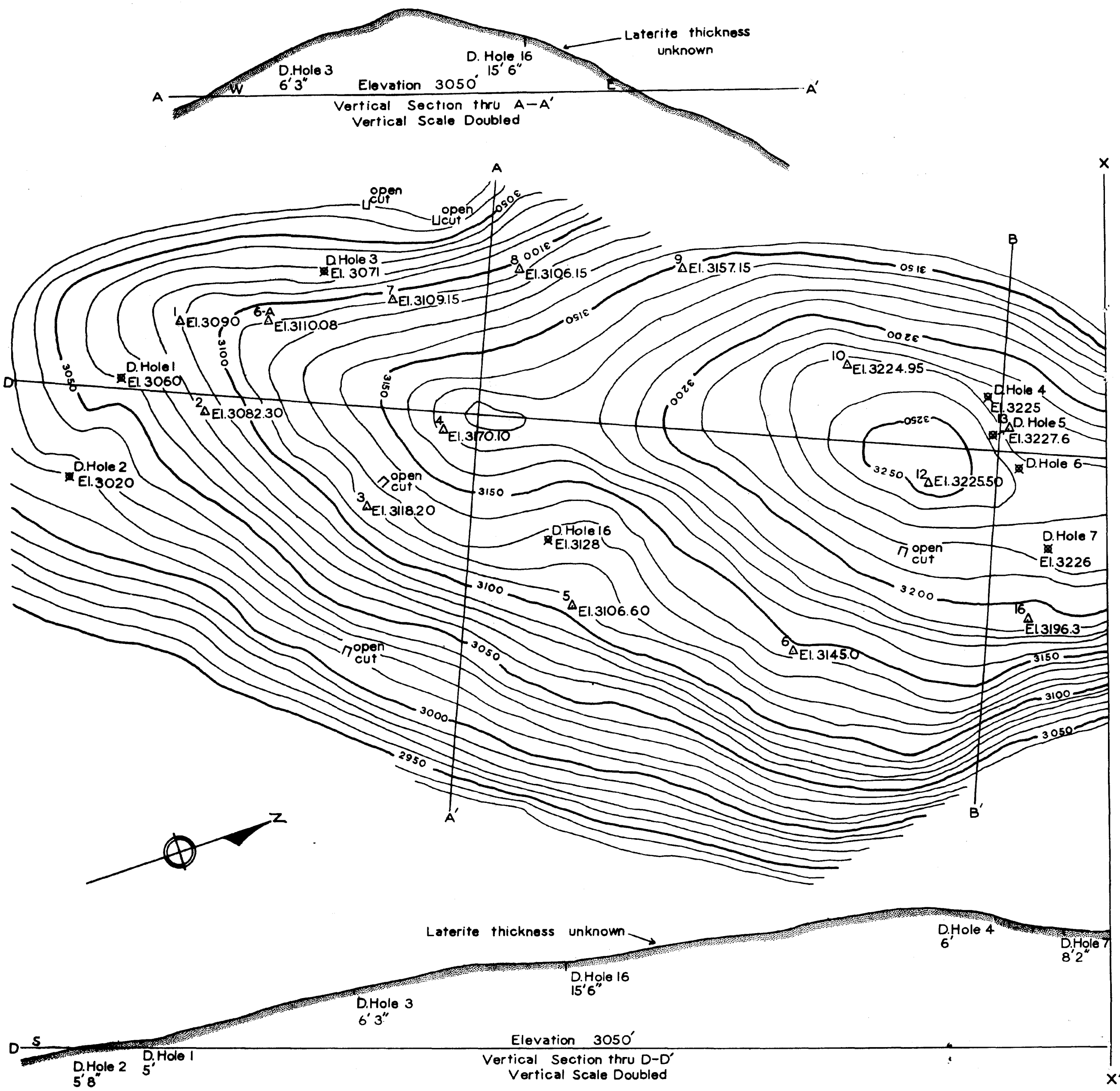
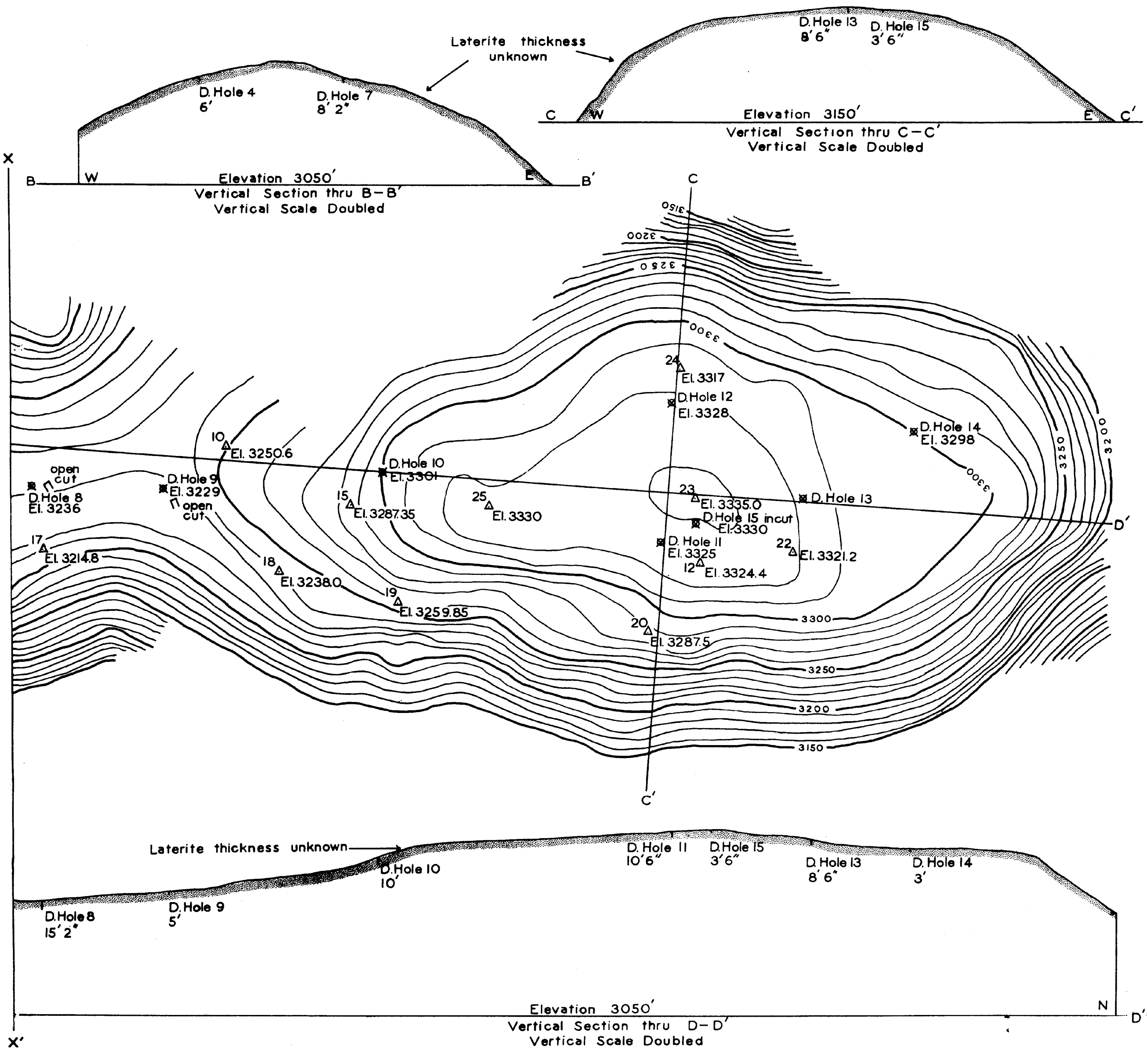
*Mining Engineer, Oregon Department of Geology and Mineral Industries.



AVERAGE ANALYSES OF AUGER HOLE SAMPLES

HOLE	%Ni	%Cr_2O_3	DEPTH	HOLE	%Ni	%Cr_2O_3	DEPTH
1	1.04	2.32	5'	9	0.63	1.06	5'
2	0.94	2.33	5' 8"	10	0.81	1.61	10'
3	0.78	1.65	6' 3"	11	0.59	1.27	10' 6"
4	1.41	3.74	6'	12	0.54	1.82	16'
5	0.90	2.01	6'	13	1.12	1.67	8' 6"
6	0.91	2.35	5'	14	0.75	2.10	3'
7	1.20	4.12	8' 2"	15	1.41	1.05	3' 6"
8	1.51	3.72	15' 2"	16	1.16	2.20	15' 6"



SUMMIT of the SOUTH HALF

of

WOODCOCK MOUNTAIN

TOPOGRAPHIC MAP AND SECTIONS

Josephine County, Oregon

Secs. 24,25 T. 39 S. R. 9 W.

Secs. 19,30 T. 39 S. R. 8 W.

Surveyed July, 1948

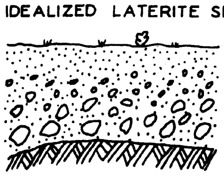
by the

STATE OF OREGON DEPARTMENT OF GEOLOGY & MINERAL INDUSTRIES

SCALE

0 200 400ft.

IDEALIZED LATERITE SECTION



⌘ Auger Holes Drilled by Dept.

⊓ Open Cuts

▲ Plane Table Stations

Elevation assumed

ANALYSES OF WOODCOCK MOUNTAIN NICKEL-BEARING LATERITE SAMPLES

Thickness of sample (feet)	Percent Ni	Percent Cr_2O_3
(Hole 1)		
0 - 1	1.02	2.23
1 - 2	1.18	2.51
2 - 3	1.39	2.27
3 - 4	1.04	2.64
4 - 5	0.57	1.93
	1.04*	2.32*
(Hole 2)		
0 - 1	0.85	2.80
1 - 2	0.91	2.79
2 - 3	1.08	2.79
3 - 4	1.02	2.08
4 - 5	0.88	1.90
5 - 5'8"	0.88	1.65
	0.94*	2.33*
(Hole 3)		
0 - 1	0.82	2.18
1 - 2	0.80	1.99
2 - 3	1.08	2.54
3 - 4	0.79	1.62
4 - 5	0.65	1.11
5 - 6	0.72	1.04
6 - 6'3"	0.59	1.10
	0.78*	1.65*
(Hole 4)		
0 - 1	0.92	3.47
1 - 2	1.53	3.74
2 - 3	1.63	3.80
3 - 4	1.40	3.32
4 - 5	1.58	4.39
5 - 6	(sample lost)	
	1.41*	3.74*
(Hole 5)		
0 - 1	0.93	3.61
1 - 2	0.99	3.27
2 - 3	0.95	2.60
3 - 4	0.93	2.52
4 - 5	1.21	2.37
5 - 6	1.40	2.14
6 - 7	0.78	0.94
7 - 8	0.68	1.28
8 - 9	0.71	0.75
9 - 10	0.71	1.08
10 - 11	0.64	0.65
11 - 12	0.91	2.94
	0.90*	2.01*
(Hole 6)		
0 - 1	0.75	2.94
1 - 2	0.98	2.89
2 - 3	0.83	1.42
3 - 4	0.95	2.41
4 - 5	1.05	2.09
	0.91*	2.35*
(Hole 7)		
0 - 1	0.97	4.60
1 - 2	1.15	3.99
2 - 3	1.12	3.96
3 - 4	0.99	3.73
4 - 5	1.21	4.85
5 - 6	1.13	3.44
6 - 7	1.40	4.13
7 - 8'2"	1.66	4.30
	1.20*	4.12*
(Hole 8)		
0 - 1	1.10	4.28
1 - 2	1.40	5.30
2 - 3	1.68	6.37
3 - 4	1.25	5.51
4 - 5	1.96	4.56
5 - 6	2.02	4.70
6 - 7	1.85	4.07
7 - 8	1.80	2.96
8 - 9	1.51	2.78
9 - 10	1.79	3.50
10 - 11	1.14	3.02
11 - 12	1.50	2.52
12 - 13	1.33	2.26
13 - 14	1.26	2.26
14 - 15'2"	1.02	1.69
	1.51*	3.72*
(Hole 9)		
0 - 1	0.58	1.87
1 - 2	0.62	1.08
2 - 3	0.67	0.86
3 - 4	0.64	0.62
4 - 5	0.65	0.85
	0.63*	1.06*
(Hole 10)		
0 - 1	0.85	2.62
1 - 2	0.82	3.22
2 - 3	0.93	1.81
3 - 4	0.84	1.59
4 - 5	0.88	1.27
5 - 6	0.69	1.33
6 - 7	0.61	1.15
7 - 8	0.90	1.08
8 - 9	0.80	1.02
9 - 10	0.71	1.01
	0.81*	1.61*
(Hole 11)		
0 - 1	0.46	1.56
1 - 2	0.59	1.84
2 - 3	0.57	2.03
3 - 4	0.61	1.91
4 - 5	0.75	1.89
5 - 6	0.73	1.33
6 - 7	0.60	0.82
7 - 8	0.61	0.73
8 - 9	0.67	0.68
9 - 10	0.52	0.58
10 - 10'6"	0.42	0.60
	0.59*	1.27*
(Hole 12)		
0 - 1	0.29	1.76
1 - 2	0.31	1.89
2 - 3	0.36	2.00
3 - 4	0.47	2.14
4 - 5	0.50	2.06
5 - 6	0.35	2.12
6 - 7	0.38	1.79
7 - 8	0.43	2.04
8 - 9	0.47	1.94
9 - 10	0.59	1.84
10 - 11	0.80	2.19
11 - 12	0.95	1.66
12 - 13	0.99	1.72
13 - 14	1.00	1.59
14 - 15	0.88	1.46
15 - 16	0.79	0.98
	0.54*	1.82*
(Hole 13)		
0 - 1	0.74	2.40
1 - 2	0.92	2.56
2 - 3	1.17	2.78
3 - 4	1.30	2.66
4 - 5	1.36	1.55
5 - 6	1.41	0.88
6 - 7	1.15	0.88
7 - 8	0.98	0.57
8 - 8'6"	1.03	0.71
	1.12*	1.67*
(Hole 14)		
0 - 1	0.77	2.26
1 - 2	0.76	2.29
2 - 3	0.72	1.75
	0.75*	2.10*
(Hole 15)		
1 - 2	1.47	1.02
2 - 3	1.45	1.26
3 - 3'6"	1.32	0.86
	1.41*	1.05*
(Hole 16)		
0 - 1	0.66	2.68
1 - 2	0.75	2.86
2 - 3	0.92	2.99
3 - 4	1.14	3.26
4 - 5	1.12	3.23
5 - 6	1.07	2.92
6 - 7	0.97	2.56
7 - 8	1.18	2.45
8 - 9	1.097	2.08
9 - 10	1.207	1.82
10 - 11	1.36	1.26
11 - 12	1.49	1.90
12 - 13	1.63	1.93
13 - 14	1.43	1.17
14 - 15	1.43	1.10
15 - 15'6"	1.23	0.99
	1.16*	2.20*

*Arithmetical average.

Geology

The surface of the mountain shows outcrops of rock and loose boulders in many places. The soil which supports a sparse growth of small pines and underbrush ranges in color from tawny yellow through brick red to maroon. Myriad, round grains or "shots" of magnetite, limonite, and rock are scattered over the surface. In some places the "shots" may completely cover the surface.

Numerous open cuts dot the crest and upper slopes of the mountain. Most of these are badly caved and were apparently dug for location cuts by locators about ten years ago. No signs of recent activity were observed.

Woodcock Mountain lies along the western edge of the Illinois River Valley, and just inside the eastern margin of a ten-mile wide belt of rocks of the peridotite clan which intruded Mesozoic rocks. Peridotite is usually composed largely of olivine and may have some minor amounts of other iron-magnesian minerals. There are several varieties of peridotite all of which are usually somewhat weathered. Miners and prospectors refer to these rocks as "serpentine." A small amount of nickel, about 0.1 to 0.3 percent, occurs in the olivine which, upon laterization, loses its magnesium, part of its silica, and some of its iron. Nickel is dissolved and is deposited irregularly below the surface either combined with iron hydroxide or as hydrous nickel silicates which are grouped under the name of garnierite.

An open cut, near Hole 8, exposed a thin vertical seam of garnierite which extended from just below the surface down to the floor of the cut 10 feet below the surface. This was the only garnierite found in the area mapped. As has been previously described, garnierite is found commonly in limonite-silica boxwork pattern on Nickel Mountain in Douglas County.*

Field work

Sixteen auger holes having a total footage of 129 feet were drilled by hand. Samples were taken at one-foot intervals the full length of each hole. A complete log of each hole was kept. Color, texture, moisture, ease of drilling, and magnetic qualities of the cuttings were recorded. A topographic map covering 27 acres was made on a scale of 200 feet to the inch with a 10-foot contour interval (see pp. 16 and 17).

Both 2-inch and 3-inch hand augers of the "Iwan" type were used, together with an inch and a half coal auger and 2-inch chisel bit. Much difficulty was experienced in drilling owing to great numbers of rocks in the laterite zone. All of the holes had to be abandoned short of the desired depth because of this condition. As would be expected the proportion of boulders in the laterite increased with depth. Although the thickness of the laterite zone was not determined, one hole (No. 12) apparently was spproaching the lower part of the zone when it was abandoned at 16 feet. At this depth the cuttings were bluish-green with varicolored spots, in contrast to the usual red or yellowish-brown of the upper zone.

Each sample was analyzed in the department laboratory for Ni (nickel) and Cr_2O_3 (chromium oxide). The results of these analyses are shown in the accompanying tabulation. A typical section of the laterite, as revealed by drilling, shows a gradual change from reddish or yellowish-brown earthy material near the surface to a darker brown, mottled, clayey zone which becomes olive drab, or blue gray with numerous varicolored spots at depth. Magnetic "shots" were found scattered through all horizons but there was no apparent pattern to their occurrence. Nickel content of the samples varied from 0.29 to 2.02 percent; the Cr_2O_3 content was from 0.58 to 6.37 percent. Generally speaking, samples containing the highest percentages of nickel likewise had the highest chromium oxide content. From a visual examination of the cuttings it is not possible to estimate what the amounts of either nickel or chromium oxide are.

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*Ore.-Bin, May 1948.

The sample containing the most nickel, 2.02 percent, from Hole 8 was gray-brown and earthy. This is almost identical in appearance to material containing only 0.61 percent nickel in Hole 10. Insufficient drilling has been done to show at what horizon, if any, the greatest concentration of nickel occurs. The erosion of the surface of the area studied, particularly the steeper slopes, is probably fairly rapid. Variations in the slope and subsurface conditions affect the thickness of the lateritic zone. The thickness of this zone in turn affects the concentration and location of the nickeliferous horizons. Slumping probably has occurred on the east slope especially near the north end. In Hole 4 the concentration of nickel was close to the surface while in Hole 16 a comparable amount was not encountered until a depth of more than 12 feet was reached. Hole 4 is located on a fairly steep hillside; Hole 16 was drilled in a small flat-lying area with high ground on two sides.

Accurate estimation of tonnage of reserves within the limits of the area is impossible for the following reasons:

(1) Insufficient number and shallowness of holes; (2) variation in thickness of laterite section; (3) variation in nickel content with depth and from hole to hole; (4) unknown volume of loose, unweathered rocks scattered throughout lateritic zone.

It is probable that the most satisfactory method of sampling the laterite section and estimating the quantity of boulders contained would be by sinking a sufficient number of pits through the laterite to bedrock on coordinates throughout the area.

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MERCURY IN THE FOURTH QUARTER OF 1948*
(Including summary for the entire year)

The serious drop in domestic production of mercury that had been threatening for many months took place in the fourth quarter of 1948, according to the Bureau of Mines, United States Department of the Interior. Production of 2,050 flasks in October-December 1948 was approximately one-half of the average for the first three quarters. Production for 1948 was the smallest since 1933 and in the fourth quarter was at an annual rate lower than in any year since 1926. Only two of the larger producers, the Mt. Jackson and Bonanza mines were in operation at the year end.

The world situation of oversupply in 1947 continued in 1948 and production in excess of needs, plus stocks already on hand, pressed for a market. The resultant extension of the fall in prices was to be expected. The average domestic price of $76.49 for 1948 was 9 percent below 1947 and amounted to only 39 percent of the 1942-43 average. The mark-up of $14 a flask in the cartel selling quotation for mercury after mid-December, brought the domestic price to $90+. Offerings at a wide range of quotations were reported as the year closed.

Imports of mercury in the fourth quarter rose substantially over those in July-September and the total for 1948 was more than 4 times as large as in 1947. Spain supplied 65 percent of the 1948 total, Italy 12 percent, Mexico 10 percent, and Japan 9 percent. Exports and re-exports again amounted to only a small fraction of imports.

Consumption of mercury was at a high rate in 1948, surpassing the relatively high peacetime level in 1947 by 28 percent. Chief reason for the sharp advance was the completion during the year of two new chlorine and caustic soda plants at Syracuse, N.Y., and Wyandotte, Michigan. Otherwise the use of mercury for agricultural purposes had the largest gain in 1948. The manufacture of pharmaceuticals and of antifouling paint also rose in 1948, whereas the new cell (included in electrical apparatus) failed to hold important 1947 gains although continuing to absorb a large quantity of mercury.

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*From U.S. Bureau of Mines <u>Mercury Report No. 89</u>.

Mine production. - California, as usual, was by far the largest producer in 1948 and supplied 78 percent of the United States total; it was followed by Oregon, Nevada, Idaho, and Alaska. Six mines produced 96 percent of the total for the United States as follows: New Idria, Mt. Jackson (including Great Eastern) and Reed, in San Benito, Sonoma, and Yolo Counties, respectively, in California; Hermes in Valley County, Idaho; Cordero in Humboldt County, Nevada; and Bonanza in Douglas County, Oregon. Of the six only Mt. Jackson and Bonanza were reported to be in operation at the end of the year.

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NEW GEOGRAPHIC NAMES

The U.S. Board on Geographic Names announces in its July-September 1948 Decision Lists the following new geographic names for Oregon:

Angell Peak: peak with an elevation of about 8,675 feet in the Blue Mountains in Whitman National Forest about 15 miles north of Sumpter, on the boundary between Grant and Baker Counties; named for Albert G. Angell, a member of the Forest Service from 1912 to 1941 and associated with the Whitman National Forest from 1912 to 1931; sec. 24, T. 7 S., R. 36 E., Willamette meridian, 44°56'30" N., 118°14'30" W.

Campbell Falls: falls in the South Umpqua River, about 5 miles down stream from South Umpqua Falls, Umpqua National Forest; named for Robert G. Campbell of the Forest Service who was stationed on the Umpqua National Forest from 1939 to 1943 and was killed in action on November 12, 1944, while serving as a lieutenant in the Air Corps; Douglas County; sec. 13, T. 29 S., R. 1 W., Willamette meridian, 43°03' N., 122°46' W.

Endicott Creek: stream about 2 miles long, heading in sec. 31, T. 6 N., R. 2 W., and flowing generally northeastward to Tide Creek; named for Lawson Edward Endicott; Columbia County; sec. 29, T. 6 N., R. 2 W., Willamette meridian, 45°58'10" N., 122°57'35" W.

Flatiron Point: rock bluff in Umpqua National Forest between the North Umpqua River and Fish Creek at their junction, rising about 1,000 feet above the rivers to an elevation of about 3,000 feet; the name is descriptive; Douglas County; sec. 28, T. 26 S., R. 3 E., Willamette meridian, 43°17' N., 122°28' W.

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ORE.-BIN INDEX

A 10-year index of the Ore.-Bin has been prepared and will be issued as a miscellaneous paper about April 1, 1949. It will be sent postpaid to anyone who requests it.

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HOUSE BILL NO. 427

House Bill No. 427 introduced in the Oregon Legislature by Representatives Van Dyke and Day is designed "to regulate the drilling, prospecting for, production and conservation of natural gas and oil; providing for oil and gas inspectors, the keeping of records, a charge to defray the costs and expenses of administering this act; providing a penalty for the violation of this act; and to repeal sections 108-701 to 108-711 inclusive, O.C.L.A."

This bill sets up rules and regulations for oil and gas test drilling and directs the State Department of Geology and Mineral Industries to supervise all water shut-offs of drilling wells, and the plugging of abandoned wells. It is specified that the Director of the Department of Geology and Mineral Industries shall appoint an oil and gas inspector to supervise certain of the drilling and producing operations which have to do with public welfare. The cost of such inspection and supervision must be borne by the Department who would in the case of commercial production of oil and gas, receive a small percentage of the value of production to offset the cost of carrying out the provisions of the act.

Sections 108-701 to 108-711 of the Oregon Code which are repealed provided for county oil and gas inspectors appointed by the county court or board of county commissioners. According to this law the county oil and gas inspectors were to be paid from receipts from sale of petroleum products produced in the county, and therefore in the absence of such receipts from the sale of petroleum products county oil and gas inspectors could not be paid, making the law inoperative.

House Bill No. 427 has been passed by the House, read twice in the Senate, and referred to the Senate Committee on Mining (March 28).

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ANNUAL ASSESSMENT WORK

At least three bills designed to exempt the owners of unpatented mining claims from annual work for the current assessment year have been introduced in the House of Representatives. Whether or not these bills will be passed is problematical. It seems unlikely that a decision will be reached or even that a prediction concerning their chances may be made much before June.

Members of the Oregon Congressional delegation will be glad to inform claim owners concerning the progress of this legislation.

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LIMESTONE SHIPPED IN SOUTHERN OREGON

According to Mr. Arnold Muck, the limestone Products Company is shipping limestone from Marble Mountain at Cheney Creek, near Wilderville, Josephine County. At present the company is hauling to Grants Pass by truck and shipping to Pacific Carbide and Alloys Company, Portland.

A railroad spur 3800 feet long is being constructed, and when finished limestone will be shipped by railroad from Wilderville to Grants Pass, thence over Southern Pacific to Portland. It is expected that the railroad spur will be finished in about sixty days.

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NEW MAP BY U.S. GEOLOGICAL SURVEY SHOWS OREGON COASTAL GEOLOGY

The U.S. Geological Survey has just issued a new map in its oil and gas series showing the geology of the Newport-Waldport area of western Oregon. The map was prepared in cooperation with the Oregon State Department of Geology and Mineral Industries by H. E. Vokes, Hans Norbisrath, and Parke D. Snavely, Jr., of the U.S. Geological Survey, and is called Preliminary Map 88 of the Oil and Gas Investigations series.

The map covers an area of 570 square miles and includes the Yaquina, Waldport, Toledo, and Tidewater quadrangles in Lincoln and Lane counties and is on a scale of 1:62,500, or approximately 1 inch = 1 mile. The several geological formations are in colors. The map shows topography and gives considerable information on stratigraphy and fossil localities. The price is 75 cents and the map may be obtained from the Director, U.S. Geological Survey, Washington 25, D.C.

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METAL MARKETS

As of March 24, the E&MJ Metal and Mineral Markets, New York, reported that unsettled price situation had affected demand for major nonferrous metals during the preceding week. The market price of zinc was reduced 1½ cents, making the price 16 cents, East St. Louis. Even though the price of lead has been reduced 3½ cents to 18 cents, New York, during the past three weeks, business was described as dull. Copper was steady at 23½ cents per ounce, Connecticut Valley. Platinum has been weak and the price was reduced to $72 an ounce troy, wholesale lots. The quicksilver market was quiet with spot metal available at $87-$90 per flask depending upon quantity. It is reported that the European quicksilver cartel is scheduled to meet in the near future, and the trade is speculating on whether the group will take any action to disturb the present selling price. Foreign silver was unchanged at 71½ cents an ounce. Ferro-manganese was advanced $12 per gross ton to $172 for 78 to 82 percent Mn grade. The advance was caused by higher cost of manganese ore.

According to the March News Letter of the Mining Association of Montana, the Anaconda Copper Mining Company on February 5, 1949, started to produce ferromanganese in electric furnaces at the Great Falls Reduction Works. The manganese ore used is produced at Butte, concentrated and calcined at Anaconda, and then smelted at Great Falls. Production is at the rate of about 1792 long tons of alloy per month from three furnaces.

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