Oregon

COPY

GEOLOGICAL EVALUATION
BERRY NICKEL PROPERTY

Grant County, Oregon

INTRODUCTION

The following evaluation is based on comprehensive sampling and geological investigations completed by Melbye and Merwin during 3 different periods in 1957. Initial sampling and a preliminary evaluation was followed by a more thorough sampling job. This work indicated a favorable potential and complete geological-topographic plane table mapping was completed of the property in August, 1957.

LOCATION AND ACCESSIBILITY

The Berry nickel property is located in Sections 2, 3, and 34, T14&13S R32E, Grant County, Oregon and consists of 200 acres fee land with mineral rights on the Berry Ranch, owned by J. Boyd and Hazel B. Berry. (See property map, Plate No. 1). In addition at least 2 unpatented claims at the east end of the fee land are owned by Ronald C. Begg.

The property is reached by traveling east from John Day, Oregon on U. S. Highway 26 for 5.5 miles; then south on the Pine Creek road for 2.5 miles; thence right following the winding road for 1.5 miles to the road junction at Dean Creek, which is on the property. Accessibility is possible the year around for an ordinary automobile. Occasional snows, which do not stay on the ground all winter at this elevation, may temporarily hinder transportation.

HISTORY

There have been no past exploration efforts for nickel other than the surface geological study comprising the basis for this report. The presence of nickel was only recognized about 3 years prior to this work, and a thorough library search has disclosed no mention of any nickel in the John Day district.

A small amount of bulldozing has been done on a chrome occurrence in a small serpentine outcrop just east of the property line and at the east end of the limestone outcrop. Two short adits were driven in the west limestone ridge during early-day gold exploration by the Chinese.

GEOLOGY

Petrology

There are two principal and at least two subsidiary rock types exposed on the Berry property. Further study will be needed to establish the origin and classification of the minor types. The nickel is apparently confined to a fractured and altered limestone mass shown on Plate 2. Surrounding this mass and making an irregular or metamorphic contact with it is an extensive body of serpentine within which the limestone is apparently situated as a remnant.

A hard, dense, layered rock, mapped as a greenstone, was observed as scattered outcrops particularly along the southern and eastern borders of the mapped area. It is suggested that this rock either belongs to the Gabbro unit mapped by T. P. Thayer, U. S. G. S. Mineral Investigations Field Studies Map MF51, or it may be a phase of the serpentine.

In the southwestern quadrant of the mapped area several dikelike masses of light-colored igneous rock were observed. The relationship of these rocks to the encompassing serpentine and gabbros is obscured by soil cover, but they are now believed to be a facies of the serpentine.

The third minor rock type was mapped as one isolated outcrop located at 11,000N, 12,850E on Plate 2. A dark brown to pinkish cherty breccia possibly belonging to Thayer's Permian Metasedimentary series, was observed.

Limestone and serpentine comprise the bulk of the rocks exposed within the Berry property.

Limestone: The potentially commercial nickel deposits are believed to be concentrated within the Permian limestone shown on Plate 2. The lime varies in color from a light pink through brown to gray. On the main outcrop, which forms a sharp serrated hill with over 500 feet of relief, the surface of the limestone is coated with a light to dark brown limonitic stain, which causes the hill to stand out in sharp contrast to the surrounding green to black serpentine.

The limestone bedding has been nearly destroyed by the mountain-building and metamorphic forces. It is intensely fractured and mineralizing solutions have filled these fractures with quartz and calcite to such a degree that the rock exhibits a veined appearance. The limestone has been highly recrystallized and marbelized by metamorphism.

The limestone, where comparatively unaltered, is finely crystalline in texture and presents a grainy appearance on fresh surfaces. Nodules, believed to represent chert inclusions, are scattered throughout the mass.

The entire outcrop has been silicified, the degree varying but most intense adjacent to the two major suspected faults described under Structure.

The contact between the limestone and serpentine is somewhat gradational as evidenced by the banded outcrop at 11,900N, 12,950E.

Serpentine: Surrounding and in places encompassed by the limestone is a mass of intensely foliated and sheared Triassic serpentine. The color varies from black through green with an overall bluish cast. The serpentine mass is intricately sheared and slickensided.

Observed chrome deposits within the mapped area as well as throughout the John Day quadrangle occur within the serpentines.

It is probable that the serpentine was derived from alteration of gabbros, proxenites, or other ultra-basic rocks and that the somewhat lighter-colored serpentines near the suspected contact with the limestone resulted from metamorphism of the lime. It is interesting to note that at 12,030N, 14, 150E, a small plug, remnant, or window of chrome-bearing serpentine was mapped. Its relationship to the limestone at depth is not known but may represent a small lens of originally different material such as a basic dike.

Structure:

The Berry nickel property is located upon an intensely deformed, sinuous limestone mass which outcrops along the north base of the Strawberry range. Because of the fracturing and silicification, strikes and dips were apparent only after a careful survey of the entire mass, but in general the limestone dips from 45° - 80°N and describes a curved strike which near Dean Creek is N 65°E and at the eastern edge of the outcrop, N 30° - 45°W. This change in strike is due to a northeast plunging fold which strikes northeast. The outcrop to the west of Dean Creek is apparently overturned at its northern limit but within a few feet follows the north-dipping attitude of the main mass.

The outcrop shown on Plate 2, 13000N, 13500E, did not disclose any obvious dip or strike. It is possible that it represents the somewhat flat-dipping northward extension of the main outcrop. If this is true, the Permian limestone was tilted when Jurassic mountain-building formed the Strawberry Range to the south.

It will be noted that two major faults have considerably displaced the rocks. One is believed to follow the general strike of Dean Creek and the other strikes to the southwest near the extreme southeast corner of the mapped area. Subsuduary or minor faulting, as evidenced by the extremely numerous slickensided surfaces throughout the limestone and serpentine, was of such a nature as to be nearly impossible of representation. Most minor faulting confined itself to slippages along, or at slight angles, to the original bedding planes. Silicification and recrystallization of the lime accompanies faulting.

Mineralization:

The apple-green stain which is prominent and may be observed throughout the limestone outcrop, as well as in the float, was first believed to be copper mineralization. Numerous local prospectors had samples assayed but all showed only minor amounts. Approximately three years ago nickel was suspected and several samples were assayed, all of which gave significant results.

During the summer of 1956, a chip sample was taken by the writer across the limestone outcrop for a distance of approximately 400 feet, which assayed 1.49% Ni. Two other samples taken at this time ran approximately .20% Ni. Because of these results, a more detailed program was laid out to surface sample the limestone exposures. Locations sampled during this program are shown on Plate 4. Individual assays are listed below, and a copy of the assayer's return is included under Exhibit B.

SAMPLE NO.	% NICKEL
1A	0.17
2A	0.18
3A	0.14
4A	0.29
5A	0.23
6A	0.17
7A	0.12
8A	0.21
8	0.17
7	0.15
6	0.15
5	0.16
4	0.19
3	0.23
2	0.16
1	0.20
M	0.14
Z	0.19

A straight line average of the above results is 0.18% Ni. Exact footages of each sample were not measured so a weighted average was not made.

The apple-green oxide is probably annabergite or one of the numerous nickel oxides. However, the degree of green staining does not necessarily indicate the nickel percentage. Several selected specimens were analyzed which were more intensely mineralized with this green staining but did not run any higher than those with a low amount of stain or none at all. On the outcrop and in the talus, rudimentary limonite boxworks were observed which would indicate sulphide mineralization. In several hand specimens, small flecks of a bright sulphide were observed which may be millerite or one of the rarer nickel sulphides. No mineralogical determinations other

than megascopic have been made. As mentioned previously, there are abundant quarts and calcite veinlets throughout the limestone.

The limonite boxworks and the sparsity of observed sulphide minerals would indicate a high degree of surface oxidation and leaching, which in turn would suggest that a significant increase in nickel content is probable at depth. However, actual supergene enrichment should not be expected due to the limestone host rock. An increase from 0.2% Ni to an economic grade of about 1% is not an excessive amount to expect, since copper often increases from a trace at the surface to many percent in 50-100 feet.

ECONOMICS

Nickel is today one of the scarcest metals to be found in the United States and yet is one of the most strategic. The only economic deposit is the one at Riddle, Oregon being operated by the M. A. Hanna Company. This is a residual nickel-silicate type, derived from the weathering of ultra-basic rocks, which requires costly electric smelting. The Berry deposit, on the other hand, consists of oxides, probably derived from sulphides, and therefor can be concentrated by normal gravity and flotation processes. This type is also different from the productive Canadian deposits in that they are all in the ultra-basic igneous host rocks rather than limestone. In essence, little information or data is available upon which to evaluate its potentialities.

Because of the nickel scarcity in the United States, all the major mining companies are anxious to find new sources, and the U. S. government through the Office of Defense Mobilization and the General Services Administration encourages nickel output through offers of premium prices and fast tax amortizations. These factors are important because a small group must eventually sell or lease a large low-grade nickel property to a major company with the millions of dollars necessary to construct a mining and milling plant.

Present world market price is 75.5¢ per pound, f. o. b. Port Colbourne, Ontario, but premium prices offered by the U. S. government range up to $1.25 per pound.

CONCLUSIONS

1. The entire outcrop has been sampled at 100-foot intervals and showed unusually consistent nickel mineralization, averaging 0.18% Ni, with a few assays of over 1% having been obtained at various times.

2. The outcrop is highly oxidized and nickel, in the sulphide form, leaches nearly as readily as copper, thereby making a strong likelihood of increased grade below the oxidized zone. Similarly the accessory metals, cobalt and copper, should also increase in grade with depth.

3. The entire limestone mass is faulted and altered in the same manner thereby furnishing an adequate host rock for a large disseminated nickel ore body.

4. Low-cost open-pit mining would be feasible since the deposit comprises a prominent steep hill with 540 feet of relief.

5. World nickel economics are highly stable and favorable, and nickel is a scarce and strategic commodity in the United States.

RECOMMENDATIONS

1. Since all necessary sampling and geological mapping is completed, two drill holes, each to a depth of about 400 feet, should be completed. This will determine whether the surface nickel mineralization will increase sufficiently with depth to permit the presence of an economic nickel mineralization. These two holes will have to be drilled at an angle, and they should be cored all the way for maximum sample control.

3. If the two holes are unfavorable, the project can then be abandoned with no further expenditure of capital.

Respectfully submitted,

Charles E. Melbye
Geological Engineer

BERRY NICKEL PROPERTY

NAME | OLD NAMES

Nickel

PRINCIPAL ORE | MINOR MINERALS

T	R	S
13 S	32 E	34
14 S	32 E	2 - 3

PUBLISHED REFERENCES

Grant ..... COUNTY

CANYON ..... AREA

..... ELEVATION

Dean Creek ..... ROAD OR HIGHWAY

..... DISTANCE TO SHIPPING POINT

MISCELLANEOUS RECORDS

Malbye and Merwin Report - 1958

PRESENT LEGAL OWNER (S) **J. Boyd and Hazel Berry** ..... Address **John Day, Oregon**

Ronald Begg ..... **John Day, Oregon**

.....

.....

OPERATOR .....

Name of claims		Area	Pat.	Unpat.
Berry land	—	**deeded ranch**		
Begg #1	—	"	"	
Begg #2	—	"	"	

Name of claims	Area	Pat.	Unpat.

EQUIPMENT ON PROPERTY