by Len Ramp Jan 1958

Occurrences of Ultramafic Rocks in Southwestern Oregon

Peridotite, in large part altered to serpentine, has wide distribution in the Klamath mountains area of southwestern Oregon as shown on the accompanying map. Where outlines of the serpentine are indicated by dotted lines they have been mapped by reconnaissance only. Exposures of serpentine range from 7,340 feet elevation at Observation Peak in southern Jackson County to sea level on the coast in Curry County.

Early geologic mapping in the Klamath mountains was done by J. S. Diller of the U. S. Geological Survey about the turn of the century. F. G. Wells also of the U.S.G.S. was in charge of most of the other geologic mapping in the area.

Rocks of the Klamath mountains are all pre-Tertiary and range in age from the pre-Mesozoic "old schist" of undetermined age to upper Cretaceous Hornbrook formation. They are overlain by Tertiary marine sediments of the Coast Range and by Tertiary volcanics of the Western Cascades. Wells (1949) dates the ultramafic rocks as late Knoxville age since he found cobbles of peridotite in the Horsetown formation and Diller (1924) maps serpentine cutting the Knoxville formation in the Riddle quadrangle.

Wells (1950) suggests the possibility that there may be two ages of serpentine and that some may have been intruded during Triassic time. Most of the igneous intrusions in the Klamath mountains are late Jurassic or early Cretaceous age. The older ultramafic rocks are intruded by gabbros, diorites, and granitic type rocks.

Composition of the ultramafic rocks in the area is fairly uniform. The peridotites generally contain a large percentage of olivine. Pyroxenes, usually enstatite, and occasionally diallage or diopside are also common mineral constituents. Accessory minerals are magnetite and chromite. No feldspar has been found in the peridotites and they are uniformly low in alumina content. A few small areas of dunite (nearly pure olivine rock) and streaks of pyroxenite are not uncommon varieties of the peridotite which is normally a saxonite (olivine plus orthorhombic pyroxene). Considerable amphibole in the form of radiate clusters of anthophyllite and scattered needles of tremolite occurs in peridotite in the Red Mountain area south of Ashland.

Alteration of the peridotite, to serpentine is common and shows a high-

er degree of development in smaller bodies, along contacts of the larger intrusive bodies, and in zones of intense shearing.

Intrusion of the ultramafic rocks is somewhat localized in zones of major crustal weakness along contacts and faults. A few sill-like bodies of serpentine and peridotite show remarkable conformance to the bedding planes of the older intruded rocks. Highly sheared serpentine, sometimes referred to as "slickentite", has in places been squeezed upward into faults so that it appears to intrude younger rocks.

Nickel Exploration

Recent interest in areas of ultramafic rocks has been stimulated by the successful mining and smelting of nickel ore from Nickel Mountain near Riddle by the Hanna Coal and Ore Corporation and Hanna Nickel Smelting Company. Laterized areas in peridotite, i.e., areas of red soil development resulting in surface enrichment of nickel are the principal object of the nickel investigations.

A program of exploration by churn drills and bulldozer trenching on Woodcock Mountain and Eight Dollar Mounatin in the Illinois River district

was completed last summer by the Nickel Corporation of America. As a result they have proved up considerable tonnage of low-grade nickel-bearing red soil. The remaining problem is: can the material be processed commercially?

Large deposits of similar origin in Cuba which contain small amounts of cobalt in addition to nickel are to be treated by a sulphuric acid leach process.*

Exploration work is being done on Red Flat in Curry County by the Southwestern Engineering Company. Earlier exploration work was done by the Bureau of Mines (Hundhausen 1954).

Some of the criteria believed significant in investigating areas of ultramafic rocks for nickel enrichment are:

1. A thick cover of red soil.
2. Fairly flat areas such as flat-top mountains, bench areas, or gentle slopes.
3. Float of white to pale yellow or brown chalcedony boxwork.
4. Good cover of pine trees as compared to the usual lack of growth on serpentine and peridotite.

*E.&M.J. - vol. 158, no. 9 - Sept. 1957.

5. The presence of unserpentinized peridotite which weathers more readily than serpentine and is more likely to develop a thick soil cover. (The areas of nickel enrichment on Nickel Mountain are underlain by a fresh peridotite composed largely of fresh olivine.)

6. Lack of recent uplift and erosion. Much of the Klamath Mountains have undergone recent uplift and as a result most areas of laterite have suffered rapid erosion and only the roots of what may have been extensive deposits remain.

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