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193. GEOLOGY OF THE MOUNT WHEELER MINE AREA, WHITE PINE COUNTY, NEVADA

By Donald H. Whitebread and Donald E. Lee, Menlo Park, Calif.

Work done in cooperation with the Nevada Bureau of Mines

The occurrence of the beryllium minerals phenacite, bertrandite, and beryl at the Mount Wheeler mine in the Snake Range, White Pine County, Nev., has been described by Stager (1960). During the past year there have been additional discoveries of beryllium minerals and fluorite more than a mile north of the mine. This paper presents information on the areal geology, with particular emphasis on the limestone that is host to the beryllium minerals.

The area is underlain by the Prospect Mountain quartzite, Pioche shale, and Pole Canyon limestone, all of Cambrian age, which are folded into a broad anticline that plunges gently to the south; a quartz monzonite stock is exposed about three miles north of the Mount Wheeler mine (fig. 193.1).

The distribution and lithology of the Pioche shale are of particular interest because the known deposits of phenacite and bertrandite are in a limestone unit, locally known as the "Wheeler limestone," in the lower part of the Pioche. At the Mount Wheeler mine the beryllium is localized along quartz veinlets in the "Wheeler limestone" (Stager, 1960, p. 71). The deposit of phenacite, bertrandite, and beryl a mile north of the mine and several deposits of fluorite also are in this limestone.

The Pioche shale is chiefly yellowish brown to dark greenish gray, micaceous silty shale with minor limestone and quartzite in the lower part; fine-grained calcareous quartzite and interbeds and lenses of limestone make up the upper one-fourth of the formation. The Pioche is 450 feet thick on the north side of Pole Canyon and 330 feet thick on the south side of Dry Canyon; both sections are poorly exposed, and probably both are cut by faults. The contact between the Pioche shale and the underlying Prospect Mountain quartzite is gradational through a sequence of alternating quartzite and shale; the contact is mapped at the top of the uppermost light gray, resistant quartzite. Because of lateral variations in lithology, however, the contact may not be everywhere at the same horizon.

The "Wheeler limestone" unit of the Pioche shale is medium gray to dark bluish gray, thin- to thick-bedded limestone; some beds are bioclastic, and in places there are beds of sandy limestone. The limestone is commonly recrystallized, as at the portal of the Mount Wheeler mine, where it is light gray, coarsely crystalline marble. The limestone ranges in thickness from 8 feet to about 25 feet, and Stager (1960, p. 70) states that it is as much as 50 feet thick in the Mount Wheeler mine. Near the mine the "Wheeler limestone" is about 45 to 65 feet above the base of the Pioche, about 1 mile west of the mine it is 27 feet above the base, and in several places it is less than 20 feet above the base. An excellent exposure of the basal part of the Pioche on the crest of the range shows 11 feet of sandy limestone with irregularly interbedded shale about 10 feet above the base, and several beds and lenses of limestone and sandy limestone as much as 4 feet thick over an interval of 70 feet above the base. The variations described above raise the possibility that the "Wheeler limestone" as

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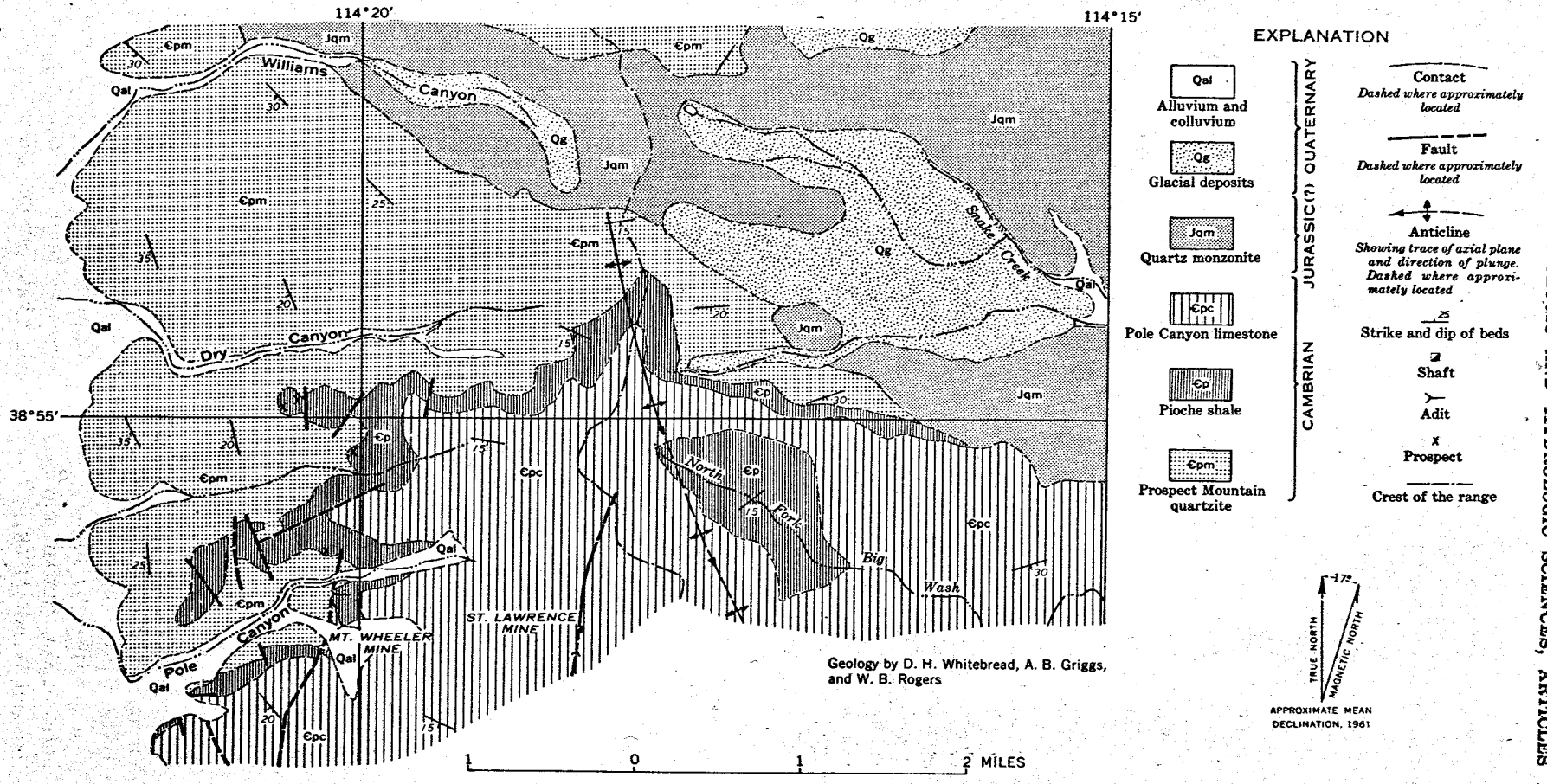

FIGURE 193.1.—Simplified geologic map of the area in the vicinity of the Mount Wheeler mine, Snake Range, White Pine County, Nev.

mapped may not be a continuous unit, but actually may consist of discrete lenses of limestone that may differ slightly in stratigraphic position, but that all occur within about a 70-foot zone above the base of the Pioche. A lateral change in the "Wheeler limestone" may be indicated along the adit of the Mount Wheeler mine, where Stager (1960, p. 70) reported that the limestone is almost completely silicified beyond 3,800 feet east of the portal. A thin section of one sample of this "silicified" rock shows it is fine-grained micaceous quartzite. The field relations have not been observed by the writers because poor ventilation prevented access to that part of the mine.

A possible source of the beryllium is the quartz monzonite stock, which is exposed as a westward-trending band 1 to 3 miles wide (fig. 193.1). On the west side of the range it intrudes the Prospect Mountain quartzite, but to the east it intrudes the Prospect Mountain, Pioche, and the lower part of the Pole Canyon formations. Cross sections based on surface maps indicate that the intrusive may extend to the south roughly concordant to the bedding in the overlying sedimentary rocks, and, if so, the intrusive may be on the order of 1,000 feet below the Mount Wheeler mine. No direct relation is apparent, however, between the mineralization of the limestone and the proximity of the intrusive. Throughout most of the area contact minerals are absent from the "Wheeler limestone"; but on the crest of the range, where the limestone is about 1,500 feet horizontally from the intrusive, light-green amphibole and light-green pyroxene are developed locally, and scheelite is disseminated in some beds. Quartz veinlets in recrystallized limestone probably will serve as the most useful guide to additional mineral deposits in the "Wheeler limestone." Prospecting in outcrop areas of this limestone is hindered, however, by the rubble that characteristically covers slopes underlain by the Pioche shale.

The search for beryllium minerals has been mainly confined to the "Wheeler limestone," but the possibility of beryllium minerals in other rocks should not be overlooked. Limestone apparently is the most favorable host rock for the beryllium minerals, as well as for the fluorite and scheelite. Perhaps the "Wheeler limestone" is a good host rock because, being the lowest limestone in the stratigraphic section, it would be the first to be encountered by ascending mineralizing solutions. Prospecting might be rewarding in younger limestones, particularly where the Wheeler is absent.

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194. TRITIUM-AGE OF GROUND WATER AT THE NEVADA TEST SITE, NYE COUNTY, NEVADA

By Alfred Clebsch, Jr., Washington, D.C.

Work done in cooperation with the U.S. Atomic Energy Commission

Estimates of the residence time of water in an aquifer are important to several problems in hydrology, particularly to questions concerning the movement of medium- and long-lived fission products in ground water. Methods of estimating the residence time by utilizing the natural distribution and radioactive decay rate of tritium, and increases in the tritium concentrations resulting from the testing of hydrogen bombs have been described by Libby (1953), Kaufman and Libby (1954), von Buttlar and Libby (1955), and von Buttlar and Wendt (1958).

Tritium in the ground water from the Nevada Test Site and vicinity suggests a much shorter residence time for water in perched aquifers than for water in the main aquifer. Analyses of water samples collected in 1958 and 1959 from a tunnel, a spring, and five wells (fig. 194.1) are reported in table 194.1. The samples from the tunnel and the spring are from perched aquifers.

In estimating the residence time for the water (underground or in the aquifer), an average pre-hydrogen bomb tritium concentration of greater than 8

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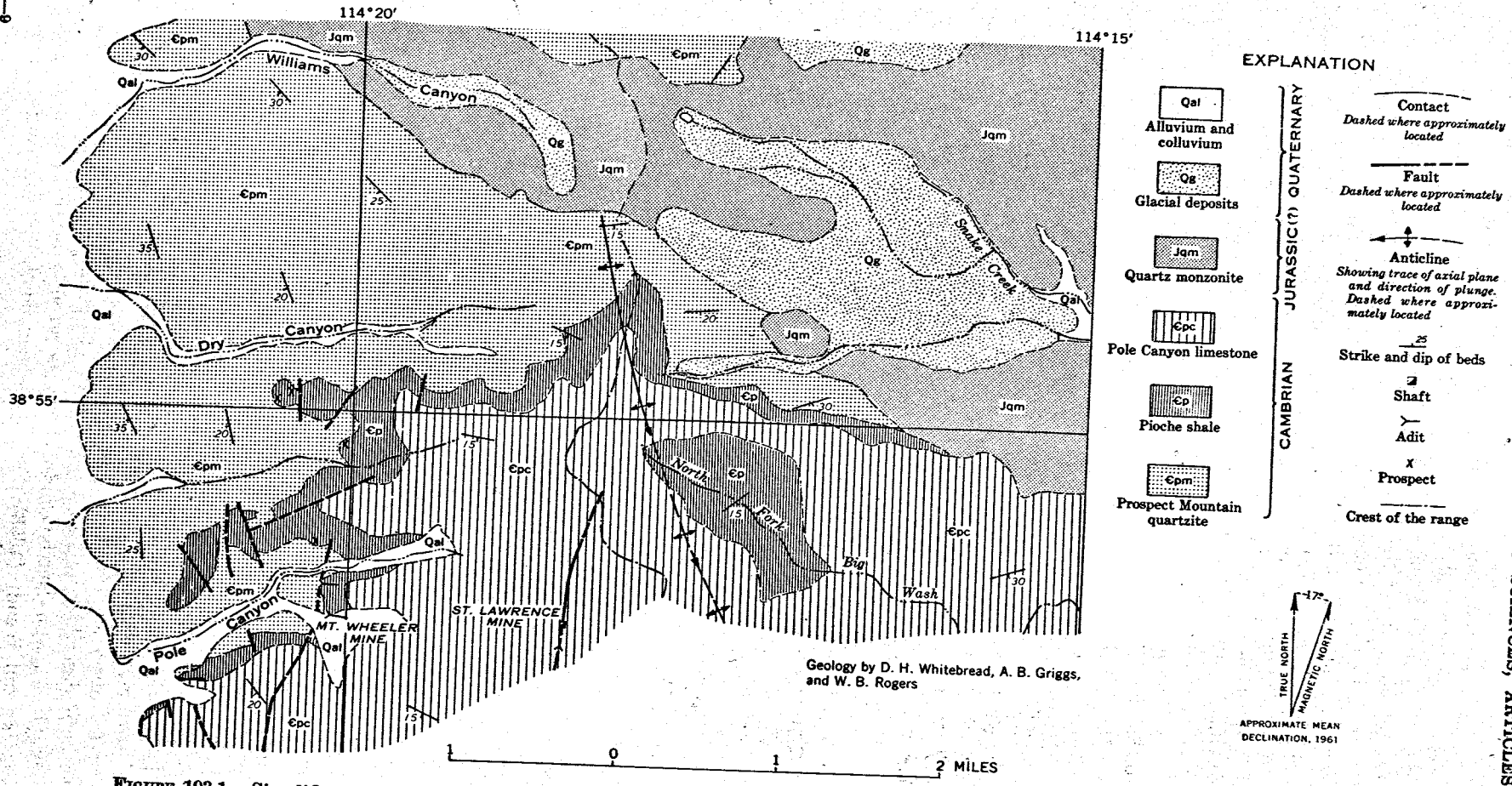


FIGURE 193.1.—Simplified geologic map of the area in the vicinity of the Mount Wheeler mine, Snake Range, White Pine County, Nev.

Lincoln Mining district (Lincoln Canyon and

Patented Claims

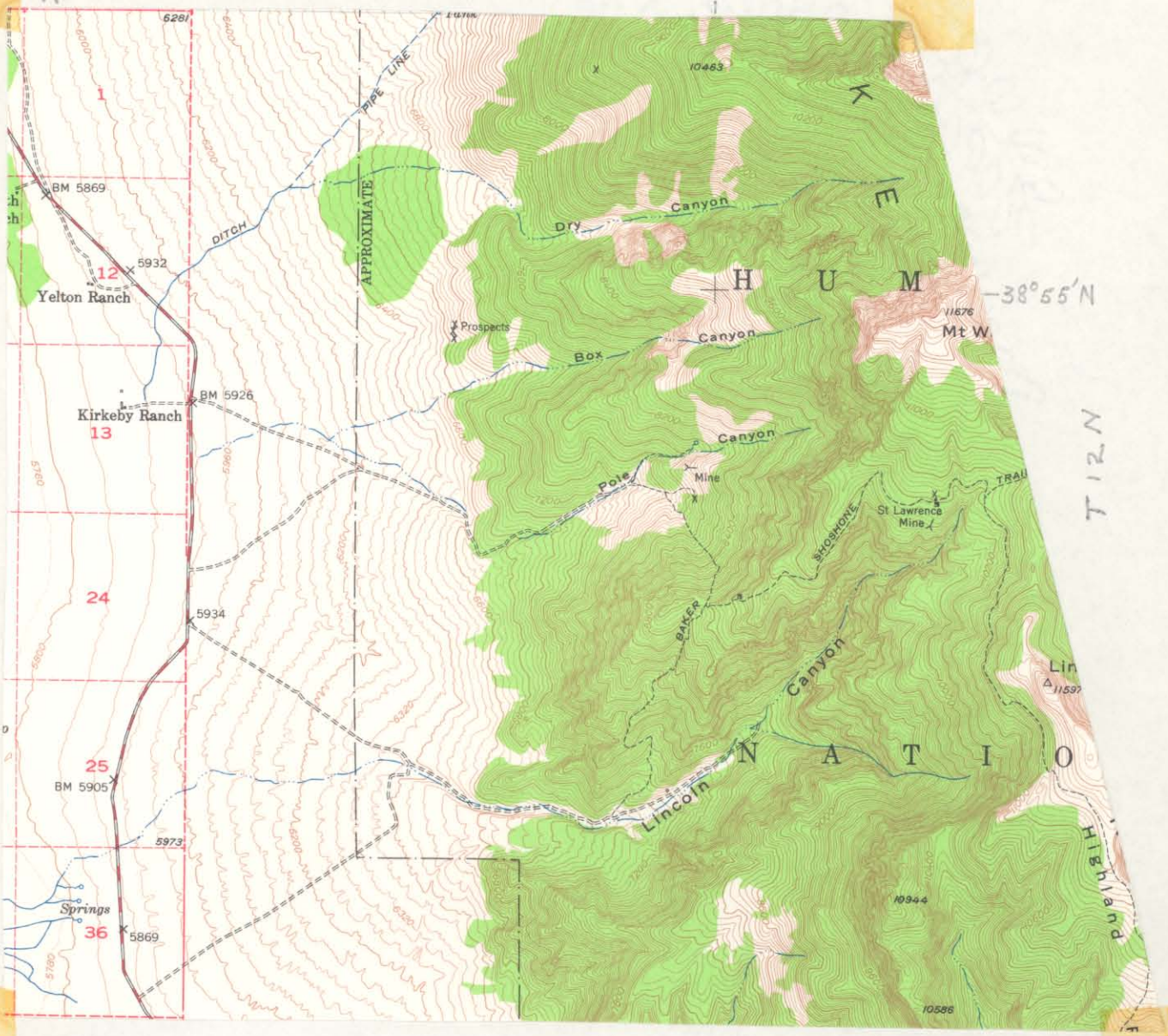
Camaan 2591-39 by Alfred Holm
Sheffield 2592-40 " "
Washington 2590-37 " "
Young America -3040-38 " "

Mt. Washington district

		B. P.
Black Oxide – St. Lawrence Mng. Co.	4289	82, 94
Cave 4289	" "	
Greenland 4289 (589024)	"	" "
Old Moon 4289	"	
Password " "	"	
Red Oxide " "	"	
Snowbird " "	"	

USBM Production Records - Mt. Washington

St. Lawrence	1911	22 Tons	411 Ag		33706 Pb
	1939	8	201		8039
	1948	37	249	6 oz	12063
	1949	8	54	10 oz	3028



Mount Washington district