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ASBESTOS DEPOSITS OF THE DAHL CREEK AREA, KOBUK RIVER DISTRICT, ALASKA

by

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INTRODUCTION

The asbestos deposits described in this report are near the head of Dahl Creek, a stream about 8 miles long, tributary to the Kobuk River near the village of Shungnak. Dahl Creek rises in the Cosmos Hills and in its lower 3 miles flows through the lowland adjoining the north bank of the Kobuk River. The Dahl Creek area is about 35 miles north of the Arctic Circle, about 150 miles east of Kotzebue, a village on Kotzebue Sound, and about 300 miles from Nome (see fig. 1).

The deposits are accessible more easily by airplane than by any other means. A landing field suitable for light planes has been constructed on a gravel bench east of Dahl Creek, just south of the point at which the creek leaves the hills. Freight, lightered from ocean-going ships to barges at Kotzebue, may be brought up the Kobuk River as far as Shungnak.

The examination upon which this report is based was made in August, 1943, in company with Harold E. Heide of the Bureau of Mines, and Eskil Anderson of the Territorial Department of Mines. The hospitality of Lewis Lloyd and Fred Johnson, local miners, is especially appreciated.

Chrysotile (serpentine asbestos) has long been known in the Dahl Creek area1/, but the deposits have been little explored and no asbestos has been produced. The chrysotile deposits were examined in 1931 by Irving McK. Reed2/ of the Territorial Department of Mines. The presence of tremolite asbestos in the Dahl Creek area was not recognized until specimens collected by the author were examined in the laboratory of the Geological Survey by Charles Milton.

1/ Smith, P. S., The Noatak-Kobuk region, Alaska: U. S. Geol. Survey Bull. 536, pp. 108 and 156, 1913.

2/ Stewart, B. D., Mining investigations and mine inspection in Alaska: Territorial Department of Mines report for biennium ending March 31, 1933, pp. 21-22, 1934.

GEOLOGY

The general geology of the upper part of Dahl Creek is shown in figure 2. The mapped geologic units are schist, limestone, and ultrabasic rock. The schist is principally mica schist, with subordinate amounts of graphitic mica schist and chlorite schist. The limestone, which apparently conformably overlies the schist is a thin-bedded, dark gray rock, which erodes to form massive cliffs. Both the schist and the limestone are probably of early Paleozoic age. The schist has been intruded by an irregular stock of ultra-basic igneous rock, with sill-like offshoots. The ultra-basic rock is generally massive, but locally schistose, gray-green to oil-green on fresh surfaces, and weathers brown where unaltered. It probably was originally peridotite with local pyroxenitic phases. None of the original minerals can now be recognized, and it was not possible in the course of this investigation to map separately the different phases, although such differentiation might be feasible in the course of more detailed work, and might have important economic implications.

The ultra-basic rock is altered principally to massive and schistose serpentine through which are disseminated many small grains of magnetite. The serpentine contains the deposits of chrysotile. Locally a large proportion of the ultra-basic rock is made up of veinlets of pale green chlorite, which enclose lenses of serpentine. No asbestos was seen in rock of this type. A third phase of the ultra-basic rock is made up of interlaced fibers of tremolite. This phase weathers to light-colored, hard, tough, platy to lenticular fragments. This tremolite rock is referred to as nephrite, because of its close resemblance to the nephrite variety of jade, which occurs in the Jade Hills, northwest of the Cosmos Hills. The nephrite is the host rock of the veins of tremolite asbestos. This nephrite is inferior in structure and color to material suitable for gem and ornamental stone.

ASBESTOS DEPOSITS

Both chrysotile and tremolite asbestos are present in the Dahl Creek area. The chrysotile is found only in the serpentine rock, the tremolite only in the nephrite.

Chrysotile

Two types of chrysotile are present--slip-fiber and cross-fiber. Slip-fiber chrysotile is formed in irregular faults which cut the serpentine. The chrysotile locally forms layers as much as 3 inches thick, made up of fibers as much as 10 inches long, which are oriented parallel to the dip of the fault. Cross-fiber chrysotile fills joints in serpentine. The fibers are normal to the walls of the vein, and extend from one wall to the other. The longest fibers seen are about 3/4 of an inch long. Veins of either type of chrysotile are present only locally in the serpentine, and nowhere comprise more than a small fraction of the total mass over minable widths.

Several seams of slip-fiber chrysotile are exposed in a prominent serpentine outcrop about 1,500 feet north of the mouth of Stockley Creek and about 1,000 fe east of Dahl Creek. The faults in which the chrysotile occurs generally strike

N. 30° to 40° W. and dip either between 10° and 28° NE or between 58° NE and vertical. The chrysotile seams locally are as much as 3 inches thick, but are generally less than 1/2 inch thick. Most of the chrysotile weathers dirty brown; where fresh it is light brown. Locally, the fibers are intergrown with magnesite, which cements the otherwise easily separated fibers of chrysotile. Some of the chrysotile, though weathered, is tenacious.

A few pieces of serpentine float containing irregular stringers as much as 1/2 inch thick of poor quality, cross-fiber chrysotile were found at an altitude of about 2,280 feet on the western peak of Asbestos Mountain.

Serpentine, which contains a few veinlets of slip-fiber chrysotile as much as 1 inch thick and traceable for a few feet, crops out at several places along the north side of the valley of the stream that enters Dahl Creek from the west, just south of the mouth of Stockley Creek.

A few short veinlets of cross-fiber chrysotile as much as 1/2 inch thick are exposed in a prominent outcrop of serpentine about 3/4 of a mile north of the mouth of Stockley Creek and 1,500 feet east of Dahl Creek.

Tremolite asbestos

Four small trenches have been dug through the talus, which contains much finely divided tremolite asbestos, on the northeast slope of Asbestos Mountains a few hundred feet north of the Dahl Creek divide at an altitude of about 2,450 feet. The trenches (see insert, fig. 2) are parallel to the slope of the hill and at right angles to the general trend of about N. 60° E of the elongate area of asbestos float, which is about 400 feet long. Each of the trenches cuts through a mat up to 6 inches thick, composed principally of finely divided, short, randomly oriented fibers of asbestos. The asbestos mat is apparently derived from a vein or veins of asbestos. Asbestos in place is exposed only in the most northeasterly of the trenches. In the upper end of this trench the asbestos is in a vein that ranges from 2 to 6 inches in thickness, trends about N 15° E., and dips 66° E. The vein material is made up of sub-parallel fibers of pale greenish tremolite asbestos, which extend obliquely down the dip of the vein. The longest unbroken fibers that could be dug from the vein were 1.8 feet long, but longer fibers may be present. The walls of the vein are composed of hard, gray-green nephrite, which has a pronounced platy structure, parallel to the vein; the edges of the plates show some tendency to shred into fine fibers of tremolite, somewhat resembling the material of the vein. Asbestos float above the vein indicates the existence of at least one other vein farther up the hill. The other trenches have not been extended far enough southward to cut any asbestos veins in place. The trend of the vein is at a considerable angle to the trend of the asbestos float, and it is inferred that the zone of asbestos contains several short veins, arranged en echelon.

Material somewhat similar to the asbestos float at the pits was noted on the west slope about 60 feet below the western summit of Asbestos Mountain.

RESERVES

No reserves of minable chrysotile in the Dahl Creek area are indicated.

The chrysotile seen in this area is of negligible value, compared to the tremolite asbestos, because of its scarcity and low quality. In general, however, the prices of the best grades of chrysotile and tremolite asbestos are comparable.

The scanty exposures make very difficult any estimate of the total quantity of tremolite asbestos in the area shown in the insert map on figure 2. Therefore, the estimate of indicated reserves may be considerably in error. Assuming, however, that veins will be found aggregating 400 feet in length, extending to a depth of 200 feet, and having an average width of 4 inches, about 2,300 tons of asbestos is indicated.

The price of tremolite asbestos such as that described in this report is subject to considerable fluctuation and is often a matter for bargaining between buyer and seller, so that no exact quotations can be offered. Asbestos of this type, free from contamination by wall rock or foreign material, was worth, in January 1944, about $500 a ton, in carload lots, delivered at an east-coast port.

SUGGESTIONS TO PROSPECTORS

Chrysotile is apparently not present in the Dahl Creek area in economic quantities.

The tremolite asbestos is confined, so far as is now known, to bodies of nephrite. The white tremolite asbestos in the float is conspicuous and easily recognized. Such float material is the best guide to prospecting.

The ultra-basic stock at the head of Dahl Creek has not been exhaustively prospected, and new discoveries may be made in it.

The presence of nephrite in the Jade Hills, 30 miles northwest of the Dahl Creek area suggests that some of the asbestos reported to occur in the Jade Hills may be of the tremolite variety, and may be worth investigation.

Tremolite asbestos may be distinguished from chrysotile in the Dahl Creek area by its pale green or white color, contrasted with the brown of the chrysotile, and also by its duller luster, poorer separability, and inferior tenacity.

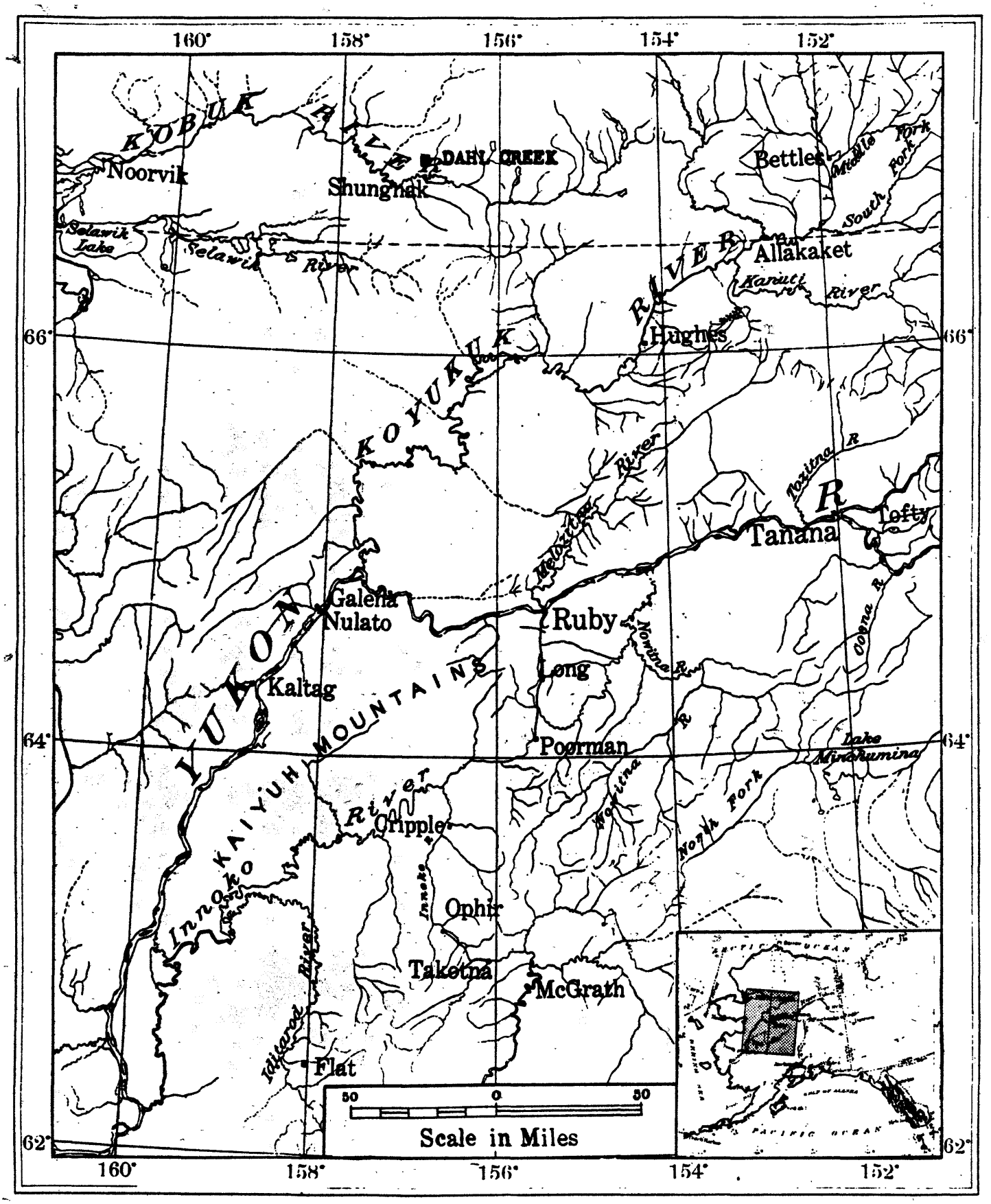

Figure 1

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Index map, showing location of Dahl Creek asbestos deposits