GEOLOGICAL SURVEY CIRCULAR 319

RECONNAISSANCE FOR URANIUM IN THE LOST RIVER AREA SEWARD PENINSULA, ALASKA, 1951

This report concerns work done on behalf of the U. S. Atomic Energy Commission and is published with the permission of the Commission.

UNITED STATES DEPARTMENT OF THE INTERIOR
Douglas McKay, Secretary

GEOLOGICAL SURVEY
W. E. Wrather, Director

GEOLOGICAL SURVEY CIRCULAR 319

RECONNAISSANCE FOR URANIUM IN THE LOST RIVER AREA SEWARD PENINSULA, ALASKA, 1951

By Max G. White and Walter S. West

This report concerns work done on behalf of the U. S. Atomic Energy Commission and is published with the permission of the Commission.

Washington, D. C., 1953

Free on application to the Geological Survey, Washington 25, D. C.

RECONNAISSANCE FOR URANIUM IN THE LOST RIVER AREA SEWARD PENINSULA, ALASKA, 1951

By Max G. White and Walter S. West

CONTENTS

ILLUSTRATION

TABLE

ABSTRACT

Reconnaissance for uranium in the Lost River area, Seward Peninsula, Alaska, during the 1951 field season revealed the presence of minor amounts of radioactive material in mineralized parts of rhyolitic dikes and in a small iron-enriched zone in limestone. The dikes contain as much as 0.01 percent equivalent uranium locally and average 0.005 percent equivalent uranium. The radioactive material occurs as a secondary hematitic coating of the dike rock. The iron-enriched zone has an average content of about 0.06 percent equivalent uranium with the radioactive material occurring in limonite, hematite, goethite, and mimetite. The radioactivity of these minerals is due to the presence of uranium as an impurity.

No uranium deposits of economic importance were found.

INTRODUCTION

The Lost River area comprises the drainage basin of Lost River and Rapid River, the major tributary from the west. Lost River heads on the southwest slope of Brooks Mountain and drains into the Bering Sea about 30 miles southeast from Cape Prince of Wales and 80 miles northwest from Nome (fig. 1). Transportation to the area is chiefly by air. Small planes may land on three airstrips, one at the beach, one at the mouth of Cassiterite Creek, and one near the head of Lost River (fig. 1). Supplies may be landed at the beach by tug and barge.

The only mining operation in the area is at the Lost River mine on Cassiterite Creek where development work preparatory to mining tin and tungsten is being done by the United States Tin Corporation.

A number of studies have been made of the Lost River area by the Geological Survey (Collier, 1902, p. 13, 25, 38, 46; 1904a, p. 154-167; 1904b, p. 9-41; 1905, p. 120-127; Hess, 1906, p. 145-150; Knopf, 1908; Eakin, 1915, p. 81-89; Harrington, 1919, p. 353-361; and Steidtmann and Cathcart, 1922). However, no field investigations for radioactive materials had been made in this area by the Geological Survey before the present investigation.

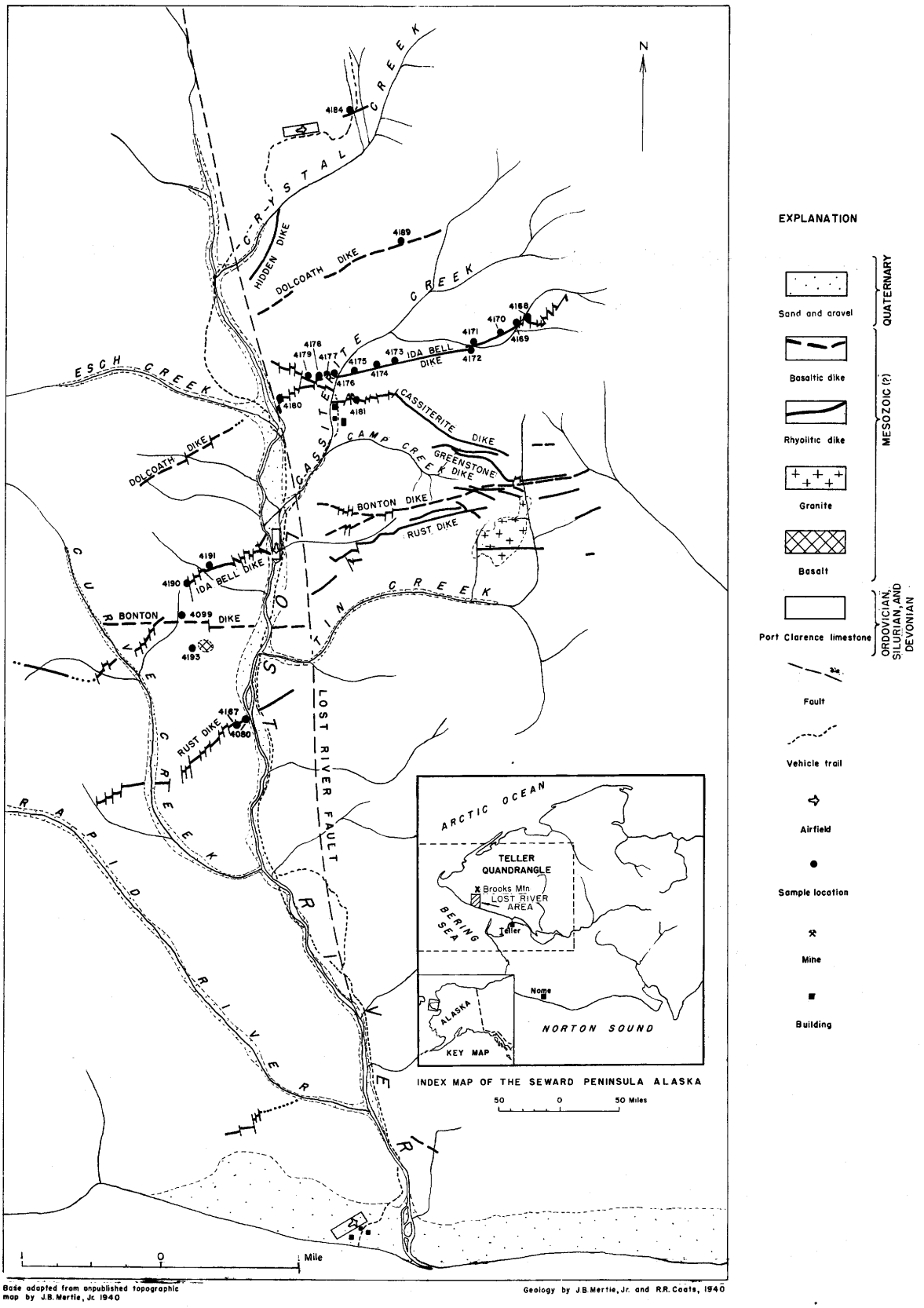

Figure 1.—Geologic map of Lost River area, Teller quadrangle, Seward Peninsula, Alaska.

Scanning of rock and ore specimens in the Survey collections for radioactivity revealed a few samples containing radioactive material (Wedow, White, and Moxham, 1951, p. 25). On the basis of these results and because the mineral assemblages of certain known mineral deposits suggested the presence of uranium, an investigation for radioactive materials in the Lost River area was made in conjunction with the investigation of zeunerite occurrences at Brooks Mountain, which are described in a separate report (West and White, 1952). The investigation was made during the latter part of July and in August 1951 by Max G. White and Walter S. West, geologists, and Fred Freitag, Arthur E. Nessett, and Eugene A. Hainze, field assistants. This work was done on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission.

GEOLOGY

The bedrock in the Lost River area is a white to light-gray and—in places—red limestone of Ordovician, Silurian, and Devonian age, called the Port Clarence limestone (Collier, 1902) which has been intruded by granite of Mesozoic(?) age and rhyolitic and basaltic dikes of an age slightly younger than the granite (fig. 1). The limestone is almost barren of any mineralization except adjacent to altered parts of the dikes. A light-gray medium-grained granite is exposed on Tin Creek, an east tributary to Lost River. A buried granite mass has been found in drill holes at the Lost River mine on Cassiterite Creek. The dikes, which were intruded shortly after the granite, trend northeast to east and range in width from 2½ to 35 feet, averaging about 5 feet.

The emplacement of the igneous rocks was followed by the injection of high temperature tin-tungsten-fluorine-bearing solutions that mineralized parts of the dikes and some of the granite. The center of this mineralization is on Cassiterite Creek. At this locality potentially commercial deposits of cassiterite, wolframite, and possibly fluorite have been found in a rhyolite dike and in part of the buried granite cupola. A wide variety of base metals have been found in minor or trace amounts in association with the cassiterite, wolframite, and fluorite.

RADIOACTIVITY INVESTIGATIONS

Radioactivity traverses were made on foot over most of the rocks of the area, in many prospect pits and tunnels, and through the accessible part of the U. S. Tin Corporation mine. The instruments used were 2- by 20-inch gamma tubes connected to standard portable survey meters mounted on packboards. Equivalent uranium determinations on selected samples representative of some of the mineralized source material in the area are given in table 1; the locations of these samples are shown on figure 1.

Field and laboratory radioactivity determinations and mineralogic studies show that minor amounts of radioactive material occur in hematitic coatings in the mineralized parts of the rhyolitic dikes and in an iron-enriched or replacement zone in limestone on the west side of Lost River, opposite the mouth of Tin Creek (sample 4193, fig. 1).

The dike rocks average about 0.005 percent equivalent uranium having a maximum of 0.01 percent equivalent uranium at one locality on Rust dike (sample 4080).

A series of samples were taken of the Ida Belle dike, a mineralized rhyolitic dike in the north-central part of the area, to obtain a pattern in a relationship between radioactivity and mineral content of the dike as it passes through the center of mineralization on Cassiterite Creek. No significant variation in radioactivity was found in the samples. The average value obtained is 0.005 percent equivalent uranium.

In the 3-foot wide iron-enriched zone or pocket in limestone on the west side of Lost River (sample 4193) a value of 0.06 percent equivalent uranium was obtained. The radioactivity is due to the presence of uranium in limonite, hematite, goethite, and mimetite. The source of the uranium was not found. It is possible that the uranium could have been deposited from solution in relatively cold circulating waters. The deposit could be traced no more than a few feet in any direction.

Table 1.—Equivalent uranium analyses of selected samples from the Lost River area, 1951

Sample no.	Location	Percent equivalent uranium	Sample no.	Location	Percent equivalent uranium
4080	Rust dike	0.01	4176	Ida Belle dike	0.005
4167	-----do	.006	4177	-----do	.005
4181	Cassiterite dike	.004	4178	-----do	.006
4190	Ida Belle dike	.005	4179	-----do	.005
4191	-----do	.003	4180	-----do	.006
4168	-----do	.005	4184	Crystal Creek, pegmatite dike.	.004
4169	-----do	.004			
4170	-----do	.005	4193	Iron-enriched deposit in limestone, on the west side of Lost River.	.06
4171	-----do	.006			
4172	-----do	.006			
4173	-----do	.005			
4174	-----do	.004	4189	Dolcoath tunnel	.004
4175	-----do	.005	4099	Bessie and Maple tunnel	.001

SUMMARY AND CONCLUSIONS

No uranium deposits of commercial importance were found in the Lost River area. Minor amounts of radioactivity were found in tin-tungsten-fluorine-bearing rhyolitic dikes and in an iron-enriched pocket in limestone. The dikes contain an average of 0.005 percent equivalent uranium, restricted to hematitic coatings in the fractured rock. The iron-enriched zone contains about 0.06 percent equivalent uranium, apparently as impurity in the iron minerals in the limestone; this is a very localized deposit.

Routine radioactivity tests will be made underground at the Lost River mine as exploration of the tin deposits exposes mineralized granite and dikes at depth to determine whether the radioactivity of these rocks increases with depth or whether other types of radioactive deposits are associated with the tin at depth.

LITERATURE CITED

Collier, A. J., 1902, A reconnaissance of the northwest portion of Seward Peninsula, Alaska: U. S. Geol. Survey Prof. Paper 2, 70 p.

_____1904a, Tin deposits of the York region, Alaska, in Emmons, S. F., and Hayes, C. W., Contributions to economic geology: U. S. Geol. Survey Bull. 225, p. 154-167.

Collier, A. J., 1904b, The tin deposits of the York region, Alaska: U. S. Geol. Survey Bull. 229, 61 p.

_____1905, Recent development of Alaskan tin deposits: U. S. Geol. Survey Bull. 259, p. 120-127.

Hess, F. L., 1906, The York tin region, in Brooks, A. H., and others, Report on progress of investigations of mineral resources of Alaska: U. S. Geol. Survey Bull. 284, p. 145-157.

Knopf, Adolph, 1908, Geology of the Seward Peninsula tin deposits, Alaska: U. S. Geol. Survey Bull. 358, 71 p.

Eakin, H. M., 1915, Tin mining in Alaska: U. S. Geol. Survey Bull. 622-B, p. 81-94.

Harrington, G. L., 1919, Tin mining in Seward Peninsula, Alaska: U. S. Geol. Survey Bull. 692-G, p. 353-361.

Steidtmann, Edward, and Cathcart, S. H., 1922, Geology of the York tin deposits, Alaska: U. S. Geol. Survey Bull. 733, 130 p.

West, W. S., and White, M. G., 1952, The occurrence of zeunerite at Brooks Mountain, Seward Peninsula, Alaska: U. S. Geol. Survey Circ. 214.

UNPUBLISHED REPORT

Wedow, Helmuth, White, M. G., and Moxham, R. M., 1951, Interim report on an appraisal of the uranium possibilities of Alaska: U. S. Geol. Survey Trace Elements Memo. Rept. 235. [In open files.]

INT.-DUP. SEC., WASH., D.C. 52403