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

By

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Trace Elements Investigations Report 220

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\*This report concerns work done on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission

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

By Max G. White and Walter S. West

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 portions 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 to Lost River from the west. Lost River heads on the southwest slope of Brooks Mountain and drains into the Bering Sea approximately 30 miles southeast of Cape Prince of Wales and 80 miles northwest of 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, pp. 13, 25, 38, 46, 1904, pp. 154-167, 1904, pp. 9-41, 1905, pp. 120-127 ; Hess, 1906, pp. 145-150 ; Knopf, 1908 ; Eakin, 1915, pp. 81-89 ; Harrington, 1919, pp. 353-361 ; and Steidtmann and Cathcart, 1922). However, no field investigations for radioactive materials had been made in this area by the Geological Survey prior to the present investigation.

Radiometric scanning of rock and ore specimens in the Survey collections 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 August 1951 by Max G. White and Walter S. West, geologists, and Fred Freitag, Arthur E. Nessel, 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 portions 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  $2\frac{1}{2}$  to 35 ft, averaging about 5 ft.

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 at least a portion 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. This locality is the site of the operations of the United States Tin Corporation.

#### RADIOACTIVITY INVESTIGATIONS

Radiometric traverses were made on foot over most of the rocks of the area, in the numerous prospect pits and tunnels, and through the accessible part of the U. S. Tin Corporation mine using 2- by 20-in. gamma tubes connected to standard portable survey meters mounted on pack-boards. Radiometric 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 plotted on figure 1.

Table 1.--Equivalent uranium analyses of selected samples from the Lost River area

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

Field and laboratory radiometric determinations and mineralogic studies show that minor amounts of radioactive material occur in hematitic coatings in the mineralized portions 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 with 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, in an attempt 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.

#### 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 radiometric tests will be made underground at the Lost River mine as exploration of the tin deposits exposes mineralized granite and dikes at depth in order 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.

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