Garo Uranium Deposits, Park County, Colorado

Trace Elements Memorandum Report 222

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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Farnham, 3d

for W. H. Bradley
Chief Geologist

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UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

GARO URANIUM DEPOSITS,

PARK COUNTY, COLORADO

By

Garland B. Gott

June 1951

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Trace Elements Memorandum Report 222

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GARO URANIUM DEPOSITS
PARK COUNTY, COLORADO

by

Garland B. Gott

ABSTRACT

The uranium deposits, three-fourths of a mile south of Garo, Park County, Colo., were mined over 30 years ago for radium ore. The old workings are now abandoned and inaccessible. Forty tons of ore that contained 1.0 percent uranium are reported to have been mined from two light-gray sandstone beds that are stratigraphically about 100 feet apart. The minerals reported to occur in these sandstones are carnotite, malachite, azurite, calciovolborthite, and volborthite. The deposits are in close proximity to a radioactive cherty limestone which is one foot thick, that contains as much as 0.01 percent uranium. The uranium in the carnotite and the uranium in the chert may be genetically related.

Mr. W. H. Gaddis of Hartsel, Colo., has recently attempted to reopen some of the workings, but as of April 1951 this operation had not revealed any significant new data.

Future prospecting should be initiated in the two sandstone beds that have been mineralized. The chert can be used as a marker bed in correlating the sandstones from one exposure to another.

INTRODUCTION

The Garo uranium deposits are three-fourths of a mile south of Garo, Colo., in the NE 1/4 sec. 16, T. 11 S., R. 76 W. (fig. 1). The carnotite deposit was mined more than 30 years ago, and Riley _/ has

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_/ Riley, L. B. Report on SOM occurrences near Garo, Park County, Colorado: Union Mines Development Corporation, 1946.

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reported that at least one shipment of radium ore was made at that time. The old workings are now inaccessible. Carnotite and secondary copper minerals disseminated through sandstone fragments can still be found on the old dumps. The position of the abandoned shafts (fig. 1) suggests that there are two mineralized sandstone beds. A uraniferous chert bed closely overlies the lower of these sandstone beds.

The deposit is now under lease to Mr. W. H. Gaddis of Hartsel, Colo., who has started some small operations to reopen some of the old workings.

GENERAL GEOLOGY

The Garo uranium deposits are in South Park, Colo., an intermountain valley between the Mosquito Range on the west and the Front Range on the east. Faulted and steeply tilted Paleozoic, Mesozoic, and Tertiary sedimentary rocks make up a large part of the terrane between the two ranges. Broad valleys have been carved into these rocks, perhaps by the meltwater derived from the Pleistocene glaciers that may have been to the west and north. Large areas, particularly in the southern part of the park, are covered by Tertiary volcanic rocks.

The Maroon formation of Permian age underlies the area in the vicinity of the uranium deposits. This formation consists of maroon to bright-red sandstone, conglomerate, shale, and a few thin limestone beds. Several beds of sandstone, shale, and limestone crop out in places (fig. 1), but the rest of the formation is covered by residual soil. The whole series of beds strikes N. 40° to 50° W. and dips between 50° and 60° NE. Three northeast-trending faults were observed in the immediate vicinity of the known mineralized area. The westernmost fault has an apparent stratigraphic displacement of about 400 feet and the other two each have apparent displacements of 25 to 30 feet.

One bed of limestone, about 1 foot thick, is characterized by abundant radioactive chert. The chert constitutes as much as 95 percent of the bed; in this report, therefore, the limestone bed is referred to as the chert bed.

Along most of the outcrop of this bed the chert weathers as massive, hackly boulders. Characteristically, the chert is translucent, but locally it is opaque. Colors observed include gray, blue, black, yellowish-green, and red. The limestone in this bed is gray, and mottled red and gray, fine-grained to coarsely-crystalline.

Because of the resistance of the chert to weathering, a low ridge has formed along the strike of the bed. In three places, this chert bed and other limestone beds, along which strike ridges also have developed, were intersected by faults. The abrupt terminations of these ridges clearly show the strike of the faults.

URANIUM DEPOSITS

Carnotite Deposits

The carnotite deposits have been explored by five shafts between 12 and 30 feet deep and dozens of shallow prospect pits. Drifts are reported to have been driven in ore-bearing sandstone beds from two of the shafts. Riley / has reported that the deposits were first

/ Riley, L. B., op. cit.

prospected about 1917 and that two years later a 40-ton shipment of 1 percent U_3O_8 ore was made. During the prospecting of this deposit dozens of shallow pits were dug indiscriminately over the area, but most of these appear to have penetrated only the surface mantle. Bulldozer operations within the last five years have filled most of the deeper excavations. At present none of the mineralized rock can be seen in place, but carnotite- and copper carbonate-bearing sandstone fragments are scattered through an estimated 150 to 200 tons of dump material, near the shafts.

Judging from the position of the shafts, the mineralized sandstone fragments were mined from two light-gray, non-carbonaceous, micaceous sandstone beds in the Maroon formation. These beds are about 100 feet apart stratigraphically.

Riley _/ examined the dump material and identified carnotite,

_/ Riley, L. B., op. cit.

malachite, azurite, calciovolborthite, and volborthite. Inasmuch as several uranium analyses already have been made of specimens from the dump material, no additional sampling was done. The analytical data reported by Riley are reproduced in table 1.

Carnotite and dark vanadium minerals are disseminated in the sandstone samples obtained from the dumps. These specimens suggest that there was little or no fracture control during mineralization. They also suggest that there is no association between the uranium-vanadium minerals and carbonaceous material.

Table 1.--Sample and assay data for Garo uranium deposits, Park County, Colorado _/

Field Number	Office Number	U_3O_8 (percent)	Equivalent U_3O_8 (percent)	V_2O_5 (percent)	Copper (percent)	Notes
4023	3718	0.37	0.32	1.38	1.90	Grab sample of stock pile of upper or eastern horizon.
4024	3719	0.05	0.04	0.40	0.17	Grab sample of piled ore of lower or western horizon.
4025	3717	2.89	2.13	3.07	1.60	Grab sample of stockpile of upper or eastern horizon. Selected for high-grade carnotite.
4026	3714	0.35	0.33	1.31	8.40	Grab sample of stockpile of upper or eastern horizon. Darker sandstone with abundant copper minerals.
4027	3715	0.02	0.01	4.88	7.20	Grab sample of probable stock-pile of relatively high-grade green vanadium-copper ore associated with 30-ton dump on upper or eastern horizon.
4028	3716	0.42	0.42	1.51	0.80	Selected grab sample of largest workings on lower or western horizon. Carnotite, but minor copper. Probable richest material available in this horizon.

_/ Analyses from Riley, L. B., op. cit.

Although the analyses in table 1 are adequate proof of the presence of some commercial-grade ore, the size of the deposit will not be known until some preliminary exploration is carried out.

Chert bed

The uraniferous chert bed stratigraphically overlies the lower carnotite-bearing sandstone and is separated from it by about 5 feet of red shale, red sandy shale, and thin limestone beds.

The radioactivity of the chert ranges from 0.005 to 0.011 percent equivalent uranium. The uranium content is nearly the same as that indicated by the radiometric analyses, and small amounts of vanadium and copper are also present. The radiometric and chemical analyses of five chert samples are tabulated in table 2, and shown on figure 1.

Table 2.--Chemical and radiometric analyses of the chert _/

Serial Number	Field Number	Equivalent uranium (percent)	Uranium (percent)	Copper (percent)	Vanadium oxide (percent)
39552	GG-6	0.011	0.008	---	0.04
39553	GG-7	0.010	0.007	---	0.05
42714	GG-10	0.005	0.004	0.02	0.03
42715	GG-13	0.009	0.007	0.03	0.03
42716	GG-14	0.009	0.010	0.04	---

_/ Analyses by U. S. Geological Survey

ORIGIN

Inasmuch as the carnotite deposits are inaccessible, no definite evidence regarding their origin was obtained. The chert is probably of supergene origin, judging from the following relations:

1. Restriction of chert to one limestone bed.
2. Presence of chert in different amounts almost continuously along the outcrop of the bed.
3. Presence of chert nodules.

The possibility of hydrothermal origin, however, is not excluded.

The close proximity of the carnotite to the uraniferous chert deposits may indicate some genetic relationship. Little evidence is now available, but the following hypotheses should be considered:

(1) The uraniferous chert was leached near the surface and the uranium, vanadium, and copper migrated down dip and down slope in solution, and finally precipitated in the sandstones which are now mineralized. The comparatively insoluble chert may have served as a reservoir for the uranium and perhaps prevented the rapid dispersal of the uranium during weathering.

(2) The carnotite and secondary copper deposits were deposited from the same solutions as was the uraniferous chert.

(3) The uranium was leached from the carnotite deposits, or other nearby uraniferous deposits, by ground water and precipitated along with the secondary chert.

(4) The two types of deposits were formed independently and under different conditions.

SUGGESTIONS FOR PROSPECTING

Any prospecting that may be done in an attempt to extend the limits of the carnotite and copper deposits should be restricted initially to the two sandstone beds that are known to be mineralized. If a genetic relationship between the carnotite and the chert is considered likely on the basis of more evidence, the carnotite-bearing sandstones of the known deposit should be prospected wherever the radioactive chert is found.