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LOTUNITE

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Branch of Radioactive Materials
Building 25, Federal Center
Denver 25, Colorado

August 25, 1961

Mr. R. R. Coats
U. S. Geological Survey
345 Middlefield Road
Menlo Park, California

Dear Bob:

The memorandum accompanying this note is somewhat later in getting finished and dispatched than it should have been. It was written mainly to preserve a record of what was seen in a rather rapid tour and the tentative and somewhat nebulous ideas stemming from the observations.

Uranium deposits of the kind near Mountain City are sufficiently widespread to suggest that resources of uranium in deposits of this kind might be significant. At the present time, however, too little is known about the critical aspects of the relation of such deposits to their geologic setting and of events that have shaped or taken place in that setting to permit any reasonable definition of that potential.

Although the exploited or discovered deposits near Mountain City are relatively small, study of them would contribute to knowledge of the habits, distribution and relation of such deposits to their setting that would be very useful in helping to understand better the significance of this environment for uranium.

I think that gaining the kind of information that is needed to resolve some of the problems is beyond the scope of what investigations by the AEC are likely to accomplish, even though Bob Cohenour is aware of the problems. I hope that the charter for your project is liberal enough so that you can find an opportunity to help fit the uranium deposits and their possible provenance into the more comprehensive geologic picture that your work will develop.

I am sorry that our visit to the area could not have come at a time when you were there, but timing had to be accommodated in part to the schedule for Mr. Udas of the Indian Atomic Energy Commission.

Best wishes,

Art

Arthur P. Butler, Jr.

Enclosure

Copy to: Director's Reading File
Office of Economic Geology

Deposits belonging to type A that were examined are in northern Elko County, near Mountain City, in Washoe County, Nev., and Lassen County, Calif., about 25 miles north and north-northwest of Reno, respectively. The Carol R mine deposit, about 10 miles east of Hawthorne, Mineral County, may be of the same type.

Mountain City area, Elko County, Nev.

Deposits examined in the vicinity of Mountain City include:

Hot Spot No. 1, $N\frac{1}{2}NE\frac{1}{4}$ sec. 2, T. 45 N., R. 53 E., 0.45 mi. SW of Mountain City.

Race Track, Tag, Denis, and South Fork and Pixley. These are strung out along the valley of California Creek from the center W side sec. 31, to the $SW\frac{1}{4}NE\frac{1}{4}$ sec. 35, T. 44 N., R. 54 E. (unsurveyed).

Rimrock near common corner sec. 26, 27, 34, and 35, T. 46 N., R. 54 E.

Autunite $NE\frac{1}{4}$, $SE\frac{1}{4}$ sec. 30, T. 46 N., R. 54 E. (unsurveyed)

All deposits except the Autunite are generally similar. They are in a sequence of rocks of Tertiary and probably early Tertiary age which includes tuffaceous mudstone, vitric, crystal, and pumiceous tuff, lesser amounts of tuffaceous sandstone, and subordinate lenses of conglomerate and arkose. This sequence is overlain at least locally, and probably generally, by welded felsic tuff. Pebbles and cobbles in the conglomerate consist of differing proportions of older igneous and metamorphic rock and of volcanic rocks.

Thin seams and small pods of carbonaceous trash are irregularly present in the finer grained clastic rocks and are locally abundant.

The sedimentary rocks rest on an irregular surface developed on underlying medium- to coarse-grained granitoid rock. Local relief on this surface ranges from 5 to 30 feet in distances of 100 to 200 feet. The total relief on the surface beneath the sedimentary-volcanic sequence is doubtless much greater but requires district wide or quadrangle mapping to distinguish the effects of post-volcanic deformation from pre-volcanic erosion and determine the total original relief.

In part, as a result of the irregularity of the underlying surface, the thickness of the sedimentary part of the sequence is irregular. It is 3 to 10 feet thick in cuts at the Hot Spot claims west of Mountain City and at least 70 feet thick at the Denis pit 4 miles east of Mountain City.

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Although welded felsic tuff probably was once generally present in the area, it is absent in the immediate vicinity of many of the deposits probably as a result of post-volcanic erosion.

All the rocks have been displaced by post-volcanic deformation, and attitudes range from nearly flat to dips of 30 to 40 degrees. Local faults of a few feet to a few tens of feet displacement are exposed in some pits. On a larger scale Tertiary deformation may also be a result of faulting but the complete picture of the structure will only be established by mapping of R. R. Coats now in progress.

Uranium is concentrated in thin, less than 1 foot to 2 or 3 feet thick, irregular lenses and pods in tuffaceous mudstone and arkosic conglomerate. Some of the uranium is in rock containing carbonized plant remains. In the South Fork pit, rock relatively rich in carbon which rests directly on older granitic rock is locally very rich in uranium 0.5 to 1.0 percent U_3O_8 , whereas seams of carbon-rich rock a few feet above the unconformity are only slightly radioactive. Secondary minerals containing high-valent uranium are distributed on microfractures in tuff in some deposits, and at the Race Track mine some inconspicuous joints in granite and aplite are mineralized for 3 or 4 feet below the pre-volcanic surface. At most places mineralized rock rests directly on or is only a few feet above the old eroded surface of the granitic rock. At the Denis cut the mineralized beds are 30 or 40 feet above the base of the local section.

The deposits that have been explored or developed appear to consist of groups of masses of mineralized rock rich enough in uranium and close enough together to be mined by shallow open pits 5 to 20 feet deep. Exposures in the pits give the impression that mineralized rock as well as ore is erratically distributed even in the favorable zone. R. E. Cohenour, AEC, thinks that more richly mineralized rock is developed in local topographic and structural lows on the granite surface. Although this may be generally true, in the Pixley-South Fork pit richly mineralized rock is also present along portions of the side slope of such a hollow.

The Race Track workings have yielded at least 1,000 tons of ore containing between 0.1 and 0.2 percent U_3O_8 . The Rimrock and Pixley-South Fork pits have each been the source of 500 to 600 tons. Cohenour infers 10,000 tons of rock containing 0.1 percent or more U_3O_8 at the Hot Spot claims.

On the Autunite and October claims secondary uranium minerals occur along tight gently dipping fractures in granitic rock 10 or 12 feet from the portal of an adit driven in the granite and younger (?) quartz porphyry, and on joints in a cut 25 feet lower than the adit. The adit cut a non-radioactive pyrite- and molybdenum-bearing zone in quartz porphyry.

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The Hot Spot, Race Track, and Tag prospects fall within 100 feet of a straight line trending N. 72° W. The Autunite-October, Hawk and Pixley-South Fork deposits are almost as perfectly aligned in a direction of N. 80° W. and about 1 mile farther north. Whether these alignments are fortuitous or reflect some obscure structural control of distribution is uncertain. Five of the deposits are also situated well down in the valley of California Creek and the position of the deposits may be related in some manner to the form of the pre-volcanic surface.

the
Washoe County, Nevada, and Lassen County, California

Deposits visited in Washoe County, Nev., and in Lassen County, Calif., include the following:

Type A deposits:

Go Getter and Pup claims, SW $\frac{1}{4}$ sec. 27, T. 24 N., R. 19 E.
Divide claims, SW $\frac{1}{4}$ sec. 26, T. 24 N., R. 19 E.
Jeanne K claims, sec. T. 23 N., R. 18 E.

Type B deposits:

Lowary claims, SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 36, T. 24 N., R. 20 E.
Red Bluff mine, NW $\frac{1}{4}$ sec. 1, T. 23 N., R. 20 E.

Deposits at the Go Getter-Pup and Divide claims are generally similar in geologic surroundings and habit to those in the lower part of the volcanic sequence near Mountain City. They are, however, on or close to ridge and mountain crests rather than in the valleys. The deposit at the Divide claims is partly in a very coarse boulder conglomerate set in a matrix of consolidated vitric and crustal tuff which suggests deposition as a mud flow that incorporated hillside rubble. Radioactive material at both deposits is mainly in thin carbonaceous layers interbedded with tuff and 1 to 5 feet above the irregular contact with underlying granitic rock. At the Divide claims irregularly distributed pods of carbonized plant remains are also slightly radioactive, about 0.15 MR, or 3 to 4 times local background. No uranium minerals were noted.

The deposits are explored by shallow open cuts 15 to 20 feet wide and 100 to 120 feet long but have not been productive.

At the deposit on the Jeanne K claim the rock consists about two-thirds of arkose and about one-third tuff and conglomeratic tuffaceous mud flows. The arkosic rocks include some carbonaceous layers as much as 2 feet thick. The carbonaceous rock is radioactive, and exhibits local bloom of a secondary uranium mineral, possibly schroeckingerite. A few hundred tons of ore were shipped from the deposit.