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RED BLUFF

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

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.

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, SW¼ sec. 27, T. 24 N., R. 19 E.
Divide claims, SW¼ sec. 26, T. 24 N., R. 19 E.
Jeanne K claims, sec. T. 23 N., R. 18 E.

Type B deposits:

Lowary claims, SE¼SE¼ sec. 36, T. 24 N., R. 20 E.
Red Bluff mine, NW¼ sec. 1, T. 23 N., R. 20 E.

Deposits at the Go Getter-Put 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.

The Lowary and Red Bluff deposits are vein or fracture controlled deposits. At the Lowary cut light gray lithoidal tuff, probably slightly welded, overlies a gray friable crystal tuff. Uranium is associated with a nearly vertical silicified zone of fracturing in the lithoidal tuff which strikes about N. 30° E. and steeply dipping subsidiary fractures that strike N. 30° W. About 200 tons of ore were shipped in 1957.

The Red Bluff deposit, in the same general setting, consists of mineralized rock adjacent to a normal fault that strikes about N. 20° E., dips 55° W. and cuts welded felsic tuff. Rocks adjoining the fault and fractures branching into the footwall are radioactive and exhibit yellow secondary uranium minerals. The deposit is explored by several open cuts and a crosscut adit and drift. The adit is about 75 feet long and the connecting drift extends more than 100 feet along the strike of the fault. More rock has been moved here than at the Lowary, but only one shipment of about 60 tons of ore containing about 0.6 percent U_3O_8 has come to the writer's attention.

Other deposits

The deposit at the River Road claim, SW¼ sec. 3, T. 7 N., R. 27 E., Lyon County, consists of mineralized gouge and breccia along a westerly trending normal fault which dips S. and drops water-laid tuff and tuffaceous sedimentary rocks in the hanging wall against coarse-grained granitic rock in the footwall. The deposit is explored by an open cut about 100 feet long, a shaft about 15 feet deep near the south end of the cut, and a crosscut 40 feet long from the bottom of the shaft. Although the structure is persistent, brecciated rock and gouge adjoining the fault are only locally radioactive. Megascopically visible uranium minerals are sparse. About 40 tons of ore containing 0.14 percent U_3O_8 were mined and shipped in 1957.

At the Carol R mine in sec. 31, T. 8 N., R. 32 E., Mineral County, a limonite-stained layer along bedding of gray devitrified tuff which dips 65° NNW is radioactive and microfractures in tuff for about a foot under the layer are sparsely coated with yellow and green secondary minerals of uranium. The radioactive beds are about 60 feet stratigraphically above a coarse-grained granitic rock. Along a concealed contact they also adjoin a flow-banded partly glassy felsic rock which also appears to overlie the granitic rock. Other than the lack of carbonaceous material the deposit resembles Type A deposits in Elko and Washoe Counties. Geologists of the Atomic Energy Commission (written communication, Oct. 1959) report carnotite in gouge in fractures in overlying basalt.

Fine-grained water-laid beds in the Siebert tuff of Spur are all locally mineralized with uranium at places from 1.5 to 2.5 miles west of Tonopah and about 1 mile south of U. S. Highway 95.

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THE DISCOVERY AND GEOLOGY OF THE NIGHTHAWK RIDGE DEPOSIT AT EASY JUNIOR, WHITE PINE COUNTY, NEVADA

John R. Carden
Echo Bay Exploration
Reno, Nevada

Updated by:
M.E. (Gene) Larson
Alta Gold Company
Ely, Nevada

The Nighthawk Ridge deposit at Easy Junior is a sediment-hosted disseminated gold deposit located at the northern end of the Railroad Valley approximately 30 miles southeast of Eureka, Nevada. The orebody lies at the southeastern end of the Cortez gold trend in T.15N., R.55E., Section 9, Mt. Diablo Base and Meridian.

At least six companies explored the property between 1979 and 1986 before Echo Bay (then Tenneco) discovered the deposit, through an extensive rock-chip and soil sampling program. The 39th hole intercepted 320 feet of 0.066 opt Au. Surface projection of the orebody measures approximately 500 feet by 2,000 feet. As of February 1989, the minable reserve of the Nighthawk Ridge deposit is estimated at over 200,000 ounces of gold. The deposit is currently being developed through a 60-40 joint venture (Alta Bay Joint Venture) with Alta Gold Company being the operator.

The stratigraphy of the property is composed of a series of Upper Devonian through Mississippian carbonate and siliclastic-shale sequences deposited east of the Antler orogenic high. Gold mineralization is primarily hosted in the Chainman Shale and Joana Limestone which are deformed by northeast-striking anticlinal folding and repeated by reverse faulting (Figure 1) related to the Antler orogeny. Some normal faulting is also evident.

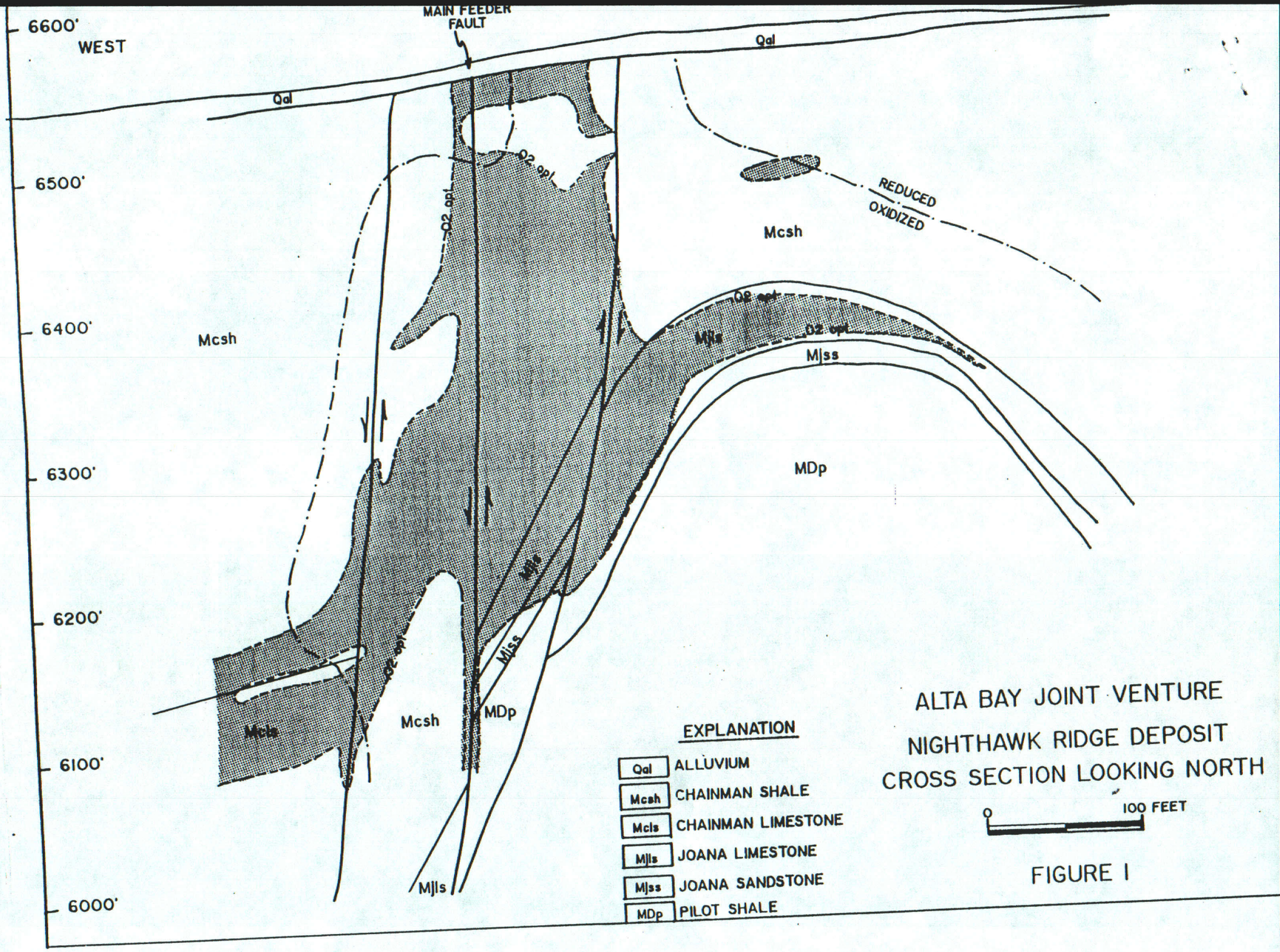
Compressional faults were reactivated by Basin and Range extensional activity at which time auriferous hydrothermal fluids were introduced. Gold mineralization is thickest where the northeast striking feeder fault is offset in a left-lateral en echelon fashion. En echelon faulting was responsible for structurally disrupting the rock and imparting secondary porosity and permeability characteristics to an otherwise tight shale. The Joana Limestone acted as a porous medium and disseminated gold mineralization mimics the anticlinal fold pattern. Tertiary intrusive or volcanic rocks have not been found anywhere within the vicinity of the Nighthawk Ridge deposit.

Surface expression of the deposit is concealed by a thin veneer of Quaternary gravel. Mineralization and alteration are confined to several small outcrops (40 x 50 feet) exposed by a minor arroyo incising the gravel. The discovery outcrop is a maroon to pale gray liesegang banded silicified Chainman mudstone containing barite with admixed clay and silica on fractures. Limonite is late in the paragenetic sequence, occurring on fractures that cut the liesegang bands. The average elemental content of 32 rock-chip samples collected from the discovery outcrop is 518 ppb gold, 850 ppb mercury, 470 ppm arsenic, and 12.3 ppm thallium. Silver is not important in the system.

Supergene weathering has altered the characteristically black shale to a slightly bleached-tan or buff color at the surface to a depth of approximately 60 feet. However, extreme oxidation and silicification is increasingly present near the main feeder fault, which acted as a hydrothermal conduit. The interface between the oxidized and unoxidized rock is usually razor sharp. Alteration more-or-less conforms to the anticlinal fold of the Joana Limestone east of the feeder fault and forms a core zone that crops out near the northeast striking feeder (Figure 1). Over 50% of the deposit is oxidized; the remainder is a reduced silty limestone of the lower Chainman.

Silicification is the primary form of alteration within the deposit. Silicification and liesegang banding occur concomitantly in the Chainman Shale. Hematite is thought to be transported and related to the hydrothermal destruction of diagenetic pyrite within the rock. The Joana Limestone and associated bioclastic debris have undergone ubiquitous jasperization. The jasperoid is characterized by glassy-translucent silica replacement of the original calcium carbonate fabric and commonly displays recurring brecciation. Iron oxides associated with the jasperization process are strongly limonitic particularly near the upper contact of the Joana Limestone and grade downward to hematitic.

Argillization accounts for less than 25% of the alteration within the orebody and is confined to portions of the Chainman Shale. It is caused by the hydrothermal degradation and destruction of diagenetic clay and detrital feldspar and the formation of secondary phyllosilicates.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Mjls JOANA LIMESTONE
Mjss JOANA SANDSTONE
MDp PILOT SHALE
ALTA BAY JOINT VENTURE
NIGHTHAWK RIDGE DEPOSIT
CROSS SECTION LOOKING NORTH
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FIGURE I