PRELIMINARY REPORT ON THE URANIUM OCCURRENCE OF THE SILVER LADY CLAIM, JAW BONE MINING DISTRICT, CROSS MOUNTAIN QUADRANGLE, KERN COUNTY, CALIFORNIA

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# PRELIMINARY REPORT ON THE URANIUM OCCURRENCE
OF THE SILVER LADY CLAIM, JAW BONE MINING DISTRICT,
CROSS MOUNTAIN QUADRANGLE, KERN COUNTY, CALIFORNIA

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Preliminary Report on the Uranium Occurrence of the Silver Lady Claim, Jaw Bone Mining District, Cross Mountain Quadrangle, Kern County, California

Abstract

An area of high anomalous radioactivity and visible uranium minerals is associated with a nearly vertical north 70° west trending shear zone. The shear zone is 50 feet wide and over 2,000 feet long, cutting Jurassic (?) granite and Pliocene (?) volcanics. Fragments of meta-torbernite covered granite are associated with molybdenite, molybdate, pyrite, quartz, sericite, and manganese oxide. The area is highly altered with a colorful oxidized zone of various shades of red and brown.

Introduction

Three unpatented claims make up the Silver Lady group. They are owned by Mr. and Mrs. Arthur J. DeLacy, 1508 South Bedford Street, Los Angeles 35, California.

The presence of radioactive material in the Jaw Bone area was first brought to the attention of the Atomic Energy Commission in a letter from Mr. DeLacy dated June 17, 1953. A preliminary examination was made by H. E. Nelson and D. C. Barrett on November 24, 1953. Surface mapping by means of alidade and plane table was undertaken during the latter part of January and the first part of February 1954 by H. E. Nelson and R. L. Hillier.

Location

Jaw Bone Canyon is located 20.5 miles north of Mojave, California (see Figure 1), a railroad junction for the Southern Pacific, Santa Fe, and Union Pacific railroads. Highway U. S. 6 and the Southern Pacific railroad cross the mouth of Jaw Bone Canyon and connect with Bishop, California, 155 miles to the north. The Randsburg mining district is 22 miles to the northeast. Los Angeles lies about 130...
miles to the south. The Los Angeles Water Aqueduct crosses the paved road 2.5 miles west of Highway U. S. 6 in Jaw Bone Canyon. At 2.3 miles west of the Aqueduct at Blue Point a "roofing granule" quarry is now in operation and a dirt Jeep road west of the quarry leads to the prospect. The Silver Lady claims are about one mile north of Blue Point in Section 10, Township 30 South, Range 36 East, Mt. Diablo Principal Meridian, Kern County, California (Plate II).

Physiography

The three principal topographic features in this area, in order from southwest to northeast, are the Tehachapi Mountains, Jaw Bone Canyon, and the El Paso Mountains.

The Tehachapi Mountains extend from the southwest, narrowing to a gap at Jaw Bone Canyon. The El Paso Mountains rise beyond the gap and extend to the northeast. The southeastern flank of the Tehachapi Mountains, bounded by the Garlock fault, trends north 40° east and rises abruptly from the Mojave Desert to the southeast. The range is made up of metamorphics, volcanics, and granitic rocks. Steep V-shaped canyons are characteristic. Rapid erosion has formed badland topography of which the Silver Lady claim area is an example in miniature. Resistant volcanic rocks form prominent ridges.

Climate

The climate of this area is typical of the Mojave Desert. The air is clear and dry the year round. Summers are very hot; winters are mild to cold. Although average annual precipitation is less than five inches, heavy downpours do come occasionally. High winds are part of the winter storms--from December to March. Electrical storms and local cloudbursts may take place any time from April through October. Industry is mainly quarrying and mining. Some alfalfa and cotton are raised in the Cantil Valley, where sufficient water is obtained from wells. Vegetation consists of scanty sagebrush characteristic of the Mojave Desert. Outcrop exposures are excellent throughout the area, which is almost devoid of soil and yields readily to erosion.
PREVIOUS REPORTS

Cross Mountain Quadrangle has not been mapped geologically. The area immediately to the east has been mapped and described by Dibblee (1) who shows the El Paso fault as a probable branch of the Garlock fault diverging from it in a westerly direction. Although Dibblee postulates that the El Paso fault dies out one and one-half miles west of Redrock, it is interesting to note that the upper two-thirds of Jaw Bone Canyon above Blue Point appears in a direct line with the westward projection of the fault. The Garlock fault appears to change direction rather sharply from a north 60° east strike northeasterly from the mouth of Jaw Bone Canyon as inferred by Dibblee in the Cantil Valley to south 40° west to the southwest.

Nolan (2) states that the Garlock fault is of major magnitude and probably of considerable antiquity. It extends eastward from the San Andreas rift for some 200 miles, the late Tertiary movement being dominantly horizontal, with the south side moving eastward for a distance of several miles, possibly as much as 25 miles. The Garlock fault was first recognized and named by Hess (3). Hulin (4) studied the fault and his description emphasizes its rift-character, nearly vertical dip, and branching habit. Hulin also considers the activity along the fault to have been in process for some time, possibly dating to the Jurassic.

Simpson (5) mapped and described the geology of the Elizabeth Lake quadrangle, which is 17 miles south of the Cross Mountain quadrangle. High upon the flank of the Tehachapi Mountains, seven miles northwest of the Garlock fault, he has mapped the Oak Creek fault which parallels the Garlock fault in this area. The Oak Creek fault is a system of two more or less parallel faults a quarter to a half-mile apart, separated by a strip of badly crushed schist and limestone. The fault plane is almost vertical. The throw is estimated to be 2,000 feet, while the lateral displacement is thought to be of great magnitude. Its course is a well-defined valley until it joins the Garlock fault a few miles north of Mojave.

Other published information includes Fairbanks (6), Smith (7), Hershey (8), Baker (9), and Hulin (10).
GENERAL GEOLOGY

The Jaw Bone mining district is located near the junction of the Basin-Range, Mojave Desert, and Sierra Nevada geomorphic provinces. The Garlock fault, a structure of great magnitude some five miles to the southeast, separates the shapeless erosional ranges of the Mojave Desert and the rugged Sierra Nevada mountains to the northwest. The Jaw Bone mining district is located in the southeast extremity of the Sierra Nevadas, with the granitic core of the range exposed a mile to the west. Tertiary volcanics are abundant in this area of transition. Exposures of the igneous rock mapped in the Silver Lady claim area are for the most part correlative with those mapped by Dibblee in his report on the Saltdale quadrangle.

Extrusives

The prominent ridge forming the southern boundary of Plate I is considered to be part of the Ricardo formation, member 2, Pliocene in age. The Ricardo formation was named by Merriam (11). It has been described as a series of continental and lacustrine sediments containing lava flows and tuff of Pliocene age. A thickness of some 7,000 feet has been described by Dibblee in his report on the Saltdale quadrangle, ten miles to the northeast in Last Chance Canyon.

Four members were recognized but not differentiated. These appear to be dipping to the south as a shell covering the underlying granite.

Basalt - dense to fine-grained, dark red to black, weathers dark brown, vesicules abundant. Outcrops on top of hill.

Andesite flow - red brown, brecciated, contains fragments of gray-white-green tuff, massive exposures, where in contact with granite is fused to surface.

Tuff breccia - gray-white-green, compact, contains small fragments of red to brown andesite. This appears to be the same as the material being quarried at Blue Point for sale as roofing granules.

Tuff - white, fine-grained, very small areas, spotty. Occurs at the bottom of the hill near the granite contact.
Intrusives

The low-lying central core shown on Plate I is considered to be Jurassic granite, while the sloping, rounded foothill to the northwest is mapped as granophyre. A mile to the west a considerable area of quartz monzonite is exposed.

Granite - Buff-weathering granite occupies the central core of this area. In hand specimen, the rock appears to be even-textured but it ranges from coarse- to fine-grained. Pinkish feldspar gives the rock a distinctive color. Small flakes of muscovite are common and biotite is present. All known anomalies occur in shear zones within the granite.

Granophyre - This unit weathers to well-rounded sloping, gray hills. Generally, it is a fine-textured assemblage of feldspars, quartz, biotite, and hornblende, though the percentage of these minerals present shows considerable variation. It resembles the granophyre exposed in Redrock Canyon, a few miles to the north, which is considered to be of Jurassic age.

Quartz monzonite - A mile to the west of the Silver Lady claim gray-white granitic rocks crop out that weather to gray-tan rounded hills. The rock is coarse-grained and even-textured, consisting mainly of quartz, feldspars, and biotite. It is correlated with the Jurassic quartz monzonite of the Rand Mountains.

Structure

Three tectonic units are worthy of consideration in the structural environment of the area. These are the Garlock fault, the El Paso fault, and the Silver Lady fault (Plate II). To attempt to relate the uranium occurrence along the Silver Lady fault to such a major structure as the Garlock fault may appear somewhat presumptuous. However, there are some spatial relationships that should be pointed out which indicate that this mineralized shear zone fits into the regional structural pattern.
PLATE I

(Appended, see Page 19)
Garlock Fault - The major tectonic feature of this region is the Garlock fault, which has a marked change in direction about five miles to the southeast of the Silver Lady area. This great fault, traceable for 200 miles, changes direction approximately 20° near the mouth of Jaw Bone Canyon. Projection of the Silver Lady fault to the southeast intersects the Garlock fault in the area of directional change.

El Paso Fault - This major split of the Garlock fault striking southwesterly gradually diverges from it on the northwest side. Such branching structures are not uncommon along the Garlock fault as the Oak Creek Canyon fault, 20 miles farther southwest, appears to be of the same type. The projection of the El Paso fault to the southwest conforms to the drainage pattern of Jaw Bone Creek southwest of Blue Point (see Plate II).

Silver Lady Fault - The Silver Lady fault as observed in the mapped area is a gray and reddish shear zone (see Figure 2), up to 70' feet in width, with a nearly vertical dip, trending south 70° east, and is over 2,000 feet in length. It is considered to be a part of the El Paso and Garlock fault systems. It is interesting to note that a major portion of the drainage of the surrounding area (see Plate II), including the northeast part of Jaw Bone Canyon, trends in the same direction as the Silver Lady fault. This section of the canyon follows the line of projection of the Silver Lady fault to the southeast and points to the major bend in the Garlock fault.

GEOLOGY OF THE URANIUM OCCURRENCE

Anomalous radioactivity is found at frequent intervals along the north side of the Silver Lady fault and in north trending shear zones splitting from the structure. One of these spur shears strikes south 80° east and dips 70° to the north. It has been exposed in places over a distance of about 200 feet. Altered granite lies to the north of this shear, while to the south it is in contact with highly altered fault breccia (Figure 2). The breccia, some pieces as large as three inches in diameter, is held together by a sericitized mass of pulverized rock. Both angular and rounded fragments of granite, andesite, tuff, and granophyre have been found in the breccia. An old shaft, 18 feet deep reportedly was sunk on the structure many years ago in a search for molybdenum. An abundance of silvery sericite-muscovite on the dump prompted the naming of the claim.
FIGURE 2
Silver Lady Fault Zone (center)
Granite on the left and altered volcanics to the right
"Silver Lady". Molybdenite is disseminated through the dump material.

Approximately 20 feet south of the exposure in the shaft a high of anomalous radioactivity was noted. This is at the contact of the granite and the main fault. The next spur shear to the east is the most colorful outcrop in the area. Hydrothermal alteration and oxidation resulted in pronounced coloration. Black manganese oxide is in striking contrast to the brighter colors. The granite in this vicinity is fractured with a network of iron oxide seams. Abundant solution cavities have weathered from the mass of granite giving it a honeycombed appearance. This area is approximately 400 feet east of the more radioactive portion of the Silver Lady fault zone but a small piece of the fault breccia contains more than one percent uranium as measured radiometrically. Sporadic radioactivity was noted over a distance of 1,500 feet with the most easterly anomaly lying beyond the boundary of Plate I a short distance to the north of the Silver Lady fault.

The northernmost anomalous radioactivity occurs at the head of the draw immediately north of the prominent ridge east of the section corner shown on Plate I. It is the farthest from the Silver Lady fault of any noted.

Minor northwest trending shears, some of which contain iron oxide, were observed. No abnormal radioactivity is associated with these shears at the outcrop.

Mineralogy

In the highly altered area with its colorful oxidized zone, probably indicative of pyrite alteration, sulphides have been found at the surface. From megascopic examination only one uranium mineral has been recognized--meta-torbernite.

Meta-torbernite - This hydrous copper uranium phosphate occurs disseminated in the sericitized material of the shear zone. Meta-torbernite is one of the most common of the secondary uranium minerals, resulting from the destruction of pitchblende in areas of granitic rocks and usually occurs as thin platy crystals with a distinctive green color.

Molybdenite - The sulphide of molybdenum--molybdenite--occurs disseminated throughout the highly sericitized shear zone. The dump
of the old prospect shaft shows many scales of molybdenite, about the size of the head of a match, in the sericitized material.

**Ferrimolybdite** - Hydrous ferric molybdate--ferrimolybdite--commonly formed by the alteration of molybdenite occurs in the fault zone. Individual pieces of granite breccia when broken may show this canary-yellow mineral near molybdenite. In one specimen exhibiting high radioactivity, Harold L. Gibbs of the U. S. Bureau of Mines laboratory, Salt Lake City, Utah, reported that the radioactivity is caused by uranium substituting for iron, in the ferrimolybdite (molybdite).

**Pyrite** - The colorful oxidized zone of red and tan colors is considered to be the result of alteration of pyrite. Very finely disseminated pyrite is present in the granite. Small stringers of iron oxide, forming lacing veinlets in some areas adjacent to the Silver Lady fault, appear to have formed from pyrite.

**Manganese Oxide** - On the east end of the principal uraniferous north split of the Silver Lady fault is a very highly altered zone of granite; the most easterly portion of which is marked by small masses of black manganese oxides, some of which are two feet in diameter. The manganese zone extends along the north side of the Silver Lady fault for nearly 200 feet. E. T. Schenk, U. S. Bureau of Mines, Boulder City, Nevada, states that these masses of manganese oxides are composed of rather fine cemented angular rock rubble, principally quartz with some feldspar. Much of it is coated with black manganese dioxide. The manganese dioxide occurs only as thin coatings or occasional small masses intermixed with fine rock rubble.

**Quartz** - The only vein quartz observed occurs as infrequent angular fragments in the fault breccia zone. The pieces found were smoky in color and approximately one-half inch in diameter.

**Garnet** - Cinnamon-brown crystals, identified by E. T. Schenk, U. S. Bureau of Mines, Boulder City, Nevada, as garnet, have been found in the fault breccia zone. The garnet is thought to be derived from metamorphism of impure calcareous rocks found in some members of the Ricardo formation.
Wolframite and Bismutite - Mr. Martin Engel of Cantil, California states that he has mined wolframite and has identified bismutite on the Silver Lady fault some 2,000 feet east of the Silver Lady prospect shaft.

CONCLUSIONS AND RECOMMENDATIONS

It is postulated that the Silver Lady fault zone is related to the El Paso and Garlock faults and that its position may be the result of a directional change in the Garlock fault. Jurassic intrusive monzonite and granite are found invading this area of structural weakness. The granitic area has been subjected to hydrothermal alteration along the Silver Lady fault. Manganese oxide, molybdenite, ferrimolybdate, pyrite, and meta-torbernite are found in the altered area. The uranium mineral—-meta-torbernite—-has been observed at intervals for 1,500 feet along the north side of the Silver Lady fault. A north split of this fault exhibits the highest radioactivity recorded. A channel sample 4.5 feet wide in the fault breccia assayed radio-metrically 0.07 percent and chemically 0.071 percent $UO_2$. Individual specimens of breccia have assayed as high as 31.10 percent $UO_2$.

Pitchblende presumably was introduced along the Silver Lady fault system with pyrite, molybdenite, and quartz. This vein material was later subjected to faulting and brecciation, and a considerable period of oxidation during which secondary minerals were formed, and near-surface leaching of uranium and other metals may have been important. There appears to be somewhat of a zonal arrangement of metals along the oxidized shear zone with uranium, molybdenum, iron, and manganese predominating successively from west to east. The outcrops are worthy of further exploration.

The most effective way to explore the shear zone would be by shaft sinking, drifting, and crosscutting. Drilling would be difficult because of the rugged terrain although it should be possible to prepare drilling sites by bulldozing. Core recovery would probably be poor in the mineralized area because of the brecciated and unconsolidated nature of the material. More detailed mapping would be advisable before starting an exploration program.
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