PRELIMINARY REPORT ON URANIUM OCCURRENCE, SILVER KING CLAIMS, TOOELE COUNTY, UTAH

By

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March 1956

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PRELIMINARY REPORT ON URANIUM OCCURRENCE, SILVER KING CLAIMS, TOOELE COUNTY, UTAH

ABSTRACT

Uranium was discovered on the Silver King claims in the fall of 1953. The claims are on the west flank of the Sheeprock Mountains in the eastern part of the Erickson mining district, Tooele County, Utah. Uraninite occurs in north- to northwest-trending copper-nickel-silver bearing fissure veins near the margin of a granitic stock of probable late Tertiary age. Sedimentary rocks in contact with the granite are chiefly dolomite and quartzite of Middle and Upper Ordovician age.

Diamond drilling on this property did not disclose significant amounts of uranium; however, encouraging showings have been found by underground exploration by the owner.

INTRODUCTION

Four patented mining claims make up the Silver King group, and twenty contiguous unpatented mining claims comprise the Silver Lode group. Both groups are owned by Mr. Earl J. Clinger, 463 South State Street, Orem, Utah. The presence of radioactive material in the eastern part of the Erickson district was first brought to the attention of the Atomic Energy Commission by Mr. Clinger in September 1953. A preliminary examination of the property was made at that time.

Location

The Silver King claims are situated in Sec. 7, T. 10 S., R. 6 W., Salt Lake Base and Meridian, on the west flank of the Sheeprock Mountains in the eastern part of the Erickson mining district, Tooele County, Utah (fig. 1). The claims may be reached from Salt Lake City, Utah via U. S. Highway No. 40 west to Mills Junction, south on Highway No. 36 for 36 miles, west via dirt road over Lookout Pass for eight miles, south for seven miles and east for two miles to the claims.

The West Tintic mining district lies eight miles to the south on the southern end of the Sheeprock Mountains; the Blue Bells mining district is six miles to the southeast on the east side of the range. The Union Pacific railroad station Faust is situated 19 miles to the northeast of the claims.
Physiography

The topography is typical of the Basin and Range province, with isolated, nearly parallel mountain ranges and intervening valleys. The Sheeprock Mountains, made up of sedimentary, metamorphic and igneous rocks, form a narrow northwest-trending range that lies between the Simpson Mountains on the west and the West Tintic Mountains on the east. The highest summits of the range rise more than 7,000 feet above sea level. Steep ridges and broad V-shaped canyons are characteristic features of the mountain range. Bedrock in the vicinity of the granite stock is well-exposed.

Climate and Vegetation

The climate is typical of the western Utah desert. Summers are hot and dry; winters are mild to cold. Although the mean annual precipitation is less than six inches, heavy precipitation may occur during thunderstorms. Vegetation consists of sagebrush and scattered junipers on the ridges and lower slopes of the mountains and thick growths of scrub oak trees in canyons with running water.

Industry in the region is mainly agriculture, although a minor amount of manganese and lead mining was carried on during World War II.

Previous Reports

Butler, Loughlin, et al \(^1\) give a brief description of the Erickson mining district; otherwise, very little has been written concerning the district.

REGIONAL GEOLOGY

The lithologic units of the region are primarily sedimentary. The most extensive formation is dark to light brownish quartzite, shale, and conglomerate, probably of Precambrian age, that covers most of the southern part of the Sheeprock Mountains. Overlying this formation to the north is a succession of Paleozoic quartzite, shale, and limestone.

Igneous rocks include a prominent stock of granite in the north-central part of the range, and several smaller stocks of granite and monzonite at the southern end. Tertiary rhyolitic rocks are also present to the south.
Two types of faulting have been recognized in the Sheeprock Mountains, block faulting and thrust faulting. Block faulting, typical of the Basin and Range province, is evident on the west side of the mountains. The canyons on the west slope are distinctly hanging in character; they maintain gently graded bottoms throughout most of their courses, but near the base of the range the bottoms steepen abruptly and the creek beds follow a zigzag course between steep vertical walls.

G. F. Loughlin (1) states: "There are no indications of glaciation, and, as the base of the range is well above the highest level of Lake Bonneville, a lowering of water level cannot account for the hanging character. Quite possibly it is due to a renewal of faulting and uplift in recent times, since which the small creeks have been able to make only a beginning of down-cutting to the new base level".

It is believed that this faulting may be a continuation of the block faulting on the west side of the Stansbury Mountains further to the north.

The most prominent thrust fault in the Sheeprock Mountains is found in the West Tintic mining district about eight miles south of the Erickson district. Another thrust fault is present about a mile and a half to the east of the Silver King claims near the crest of the Sheeprock uplift.

**LOCAL GEOLOGY**

The portion of the Silver King claims described in this report lies along the western margin of the granitic stock in the north-central part of the range. The outcropping sedimentary rocks are quartzite and dolomite of Middle and Upper Ordovician age. The general strike of these rock units is northwest to west and dips are to the southwest. Igneous rocks in the area are represented by a granite stock of late Tertiary(?) age. The granite is well-weathered and highly fractured. A majority of these fractures are filled with specular hematite which has altered to hydrated iron oxides, giving the granite a rusty appearance.

Pegmatite and aplite(?) dikes are apparently related to the granite and several aplite dikes and numerous pegmatite dikes cut the granite stock to the south of this area.
Many fissure veins occur within the granite stock (plate I). They range from a few inches to about six feet in width, and extend over an area of more than 2,000 feet long and 1,000 feet wide. The general trend of the vein system is north to N. 35° W., with the veins dipping west. Surface exposures of these veins are characterized by gossan caps of weathered, residual iron and manganese vein material.

Sedimentary Rocks

Quartzite--The quartzite unit is a white to dark pink, fine- to coarse-grained rock. It is massive and resistant to weathering. Hydrothermal solutions which accompanied mineralization in the area, and which have altered the granite to some extent, have produced no visible change in the character of the quartzite. J. Powers (2) suggests that it is equivalent to the Swan Peak quartzite which is Middle Ordovician in age.

Dolomite--Light to dark gray dolomite crops out in the western part of the Silver King claims. It is fine-grained, massive, and fairly resistant to weathering. Some silicification of the dolomite may be the result of hydrothermal activity in the area. No fossils have been found in the dolomite in the area mapped; however, this unit has been correlated with the Fish Haven dolomite of Upper Ordovician age.

Igneous Rocks

Granite--The granite is generally a light colored, medium- to coarse-grained porphyritic rock. Plagioclase, quartz, perthite, biotite, and chlorite are the principal minerals recognized in hand specimens. Euhedral plagioclase crystals from one-fourth to one inch in length form most of the phenocrysts. However, some phenocrysts of smoky quartz are also present. The ground mass appears to contain both plagioclase and alkaline feldspars with quartz, biotite, and accessory minerals.

Structure

The major structural feature of the Silver King claims is a fault at the contact of the quartzite and granite. This fault structure trends N. 25° W., has an average dip of about 50° to the southwest, and is about 18 feet wide where exposed in the mine workings. The quartzite is well-brecciated and fragments range
from a fraction of an inch to a foot or larger in size. The granite is not brecciated, but shows intense clayey alteration in the fault zone. The fault is exposed approximately 42 feet from the portal of the Silver King No. 1 tunnel (fig. 6).

Mineralized fractures in granite mapped in the underground workings on the Silver King claims show a major directional trend from N. 11° W. to N. 40° W. The major fault also falls within this orientation. An analysis of fracture patterns in granite at the surface reveals two major trends. One set of apparently non-mineralized fractures strikes from N. 10° W to N. 25° W. and parallels the general trend of mineralized fractures observed in the underground workings. The other group is made up of mineralized fractures which range from N. 42° E. to about N. 80° E. The minerals of the northeast set of fractures were possibly deposited during a period of mineralization separate from that of the northwest set of mineralized fractures.

Inasmuch as the major structural trends are northwest, as indicated by statistical analysis of fracture patterns and by the general trend of the vein system, it appears that the veins in this area are related to the major system of block faults in evidence along the west side of the Sheeprock range.

URANIUM OCCURRENCE

Uranium minerals occur in veins in the granite stock. The veins have a general north to northwest strike and dip to the west. They range from a few inches to about six feet in width.

A sample of radioactive material taken from the Silver King No. 1 tunnel was analyzed by the U. S. Bureau of Mines in Salt Lake City. The laboratory report stated in part as follows:

"The sample submitted appeared to be an altered granite with pyrite veins and a black radioactive coating on one side. The sample contained quartz, albite, sericite, barite, pyrite, and minor amounts of siderite, opalite, biotite, and microcline. The radioactive mineral was identified as uraninite from polished sections and an x-ray powder diffraction pattern. The sericite is replacing the albite along cleavage planes and complete replacement has occurred in most of the sample. The pyrite is associated with secondary quartz veins which have been introduced along fractures in the sample and in some areas is associated with sericite. The uraninite is associated with the pyrite and also occurs as individual grains in some areas of the sample."
Mineralogy

Various sulphide and oxidized minerals have been found at the surface in fractures in granite on the Silver King claims. Uraninite has been identified, and there are other minerals present which are of direct interest because of their relationship to the uranium.

Specular Hematite--Colorful disk-like crystals of specularite with bright metallic luster occur in great abundance in many of the joints and fractures in the granite. Soft red earthy hematite is present in veins a few inches to about five feet in width in the Silver King No. 1 tunnel. The rusty appearance of the granite is considered to be primarily the result of weathering of the specularite.

Manganese Oxides--The principal vein mineral seen in this area is black manganese oxide. The manganese is intimately associated with iron oxide, and surface exposures of the veins are characterized by residual box-work structures of weathered manganese oxides and limonite. Much of the manganese occurs as thin, sooty coatings on the walls of the veins or as masses intermixed with the rock rubble in the veins. Massive black manganese oxide is found in several veins in the Silver King No. 1 tunnel. No unoxidized manganese minerals have been reported from the area.

Copper--Various copper minerals are present in the vein structures throughout the Silver King area. Chalcopyrite appears to be the most abundant copper sulphide, and minor amounts of bright green copper carbonates and copper silicates(?) also are present.

Pyrite--Very finely divided pyrite is disseminated throughout the granite mass. Pyrite is also associated with the vein structures of the area. Some of the rusty appearance of the granite may be due to the oxidation of small amounts of pyrite within the granite.

Silver--Although silver minerals have not been identified megascopically, assay results from samples taken show that silver is present in nearly all of the veins in this area.

Fluorite--Pale purple to dark purple fluorite occurs in several small stringers in the Silver King No. 1 tunnel. Fluorite crystals were observed also scattered throughout the granite in a section of drill core.

Chlorite--Pale green to yellowish green chlorite crystals occur in great abundance within the granite mass and as halos around mineralized fractures and fissures.
Quartz--Phenocrysts of rounded to sub-angular smoky quartz usually less than five mm. in diameter are present in great abundance in the granite.

CONDUCT OF PROJECT

The Atomic Energy Commission's project for the Silver King claims was set up in two parts, (1) bulldozing and (2) diamond drilling, and was formulated to obtain as much geologic information as possible.

Bulldozing was designed to expose the extremities of veins which crop out in the central area and to prepare diamond drill sites.

The diamond drilling project was planned to intersect most of the known veins in the area in at least one location. All holes were drilled nearly normal to the dip and strike of the veins. A limited project consisting of four holes was then undertaken to explore only the extremities of these veins.

Bulldozing

All bulldozer work was planned to conform with the topography of the area, and all veins were cut normal to their strike. Bulldozer cuts were spaced approximately 200 feet apart, nearly parallel to give maximum coverage (plate I). A total of 4,350 feet of bulldozer cuts were made, four diamond drill sites were cut, and 1,300 feet of new road was built. The bulldozer cuts on the flanks of the main ridge exposed the extensions of five veins. All cuts were mapped by Brunton compass and tape, and radiometric surveys of the cuts were made.

Diamond Drilling

Four holes were completed, ranging in depth from 165 feet to 367 feet, totaling 1,062 feet. The holes were all inclined with a dip of from minus 30° to minus 40° and were designed to intercept the veins at from 100 to 245 feet below the surface (figs. 2, 3, 4, and 5 and plates I, II, and III). All of the holes were collared and drilled to completion in granite. An average core recovery of 80 percent was obtained below the casing standpipe.

Each hole was probed with a Geiger counter and probing unit, and the cores recovered were logged geologically and radiometrically. A representative ten percent of the core was kept for future reference, and the remainder was given to the owner. No anomalous radioactivity was detected in any of the four holes.
SILVER KING CLAIMS
CROSS SECTION OF
Diamond Drill Hole SK-1
Section N45°E Looking N.W.
Elevation 6790'
Depth of hole 170' at -35°

NOTE: FeOx — MnOx Unidentified Iron and Manganese Oxides
SILVER KING CLAIMS
CROSS SECTION OF
Diamond Drill Hole SK-2
Section N49°E Looking N.W.
Elevation 6725
Depth of hole 367' at -30°
SILVER KING CLAIMS
CROSS SECTION OF
Diamond Drill Hole SK-3
Section S 72° E Looking N.E.
Elevation 6725'
Depth of hole 360' at -30°

SCALE IN FEET

0 50 100 200

Fig. 4
SILVER KING CLAIMS
CROSS SECTION OF
Diamond Drill Hole SK-4
Section S80°E Looking N.
Elevation 6710'
Depth of hole 165' at -40°

Fig. 5
Crosscutting

The Silver King No. 1 tunnel was driven to explore a series of nearly parallel metalliferous fissure veins at depth (fig. 2). The elevation at the portal of the adit is 6,630 feet.

The crosscut was advanced S. 72° E. for 420 feet and was then turned to N. 55° E. for 336 feet. It was started in quartzite but entered granite after penetrating a strong fault zone at 42 feet from the portal. Four veins have been cut by the adit. They range from a foot and a half to five feet in width, strike northwest and dip about 70° to the west. Minerals in the veins include manganese oxides, hematite, pyrite, and oxidized copper and silver minerals. The operators have drifted 62 feet along a strong southeast-trending fault, which shows spots of commercial-grade ore.

Radiometric surveys were conducted in the Silver King No. 1 tunnel and the Porcupine tunnel, and all areas of appreciable anomalous radioactivity were sampled (figs. 6 and 7). The analyses of these samples are shown in Table I.

CONCLUSIONS

Although diamond drilling carried out on the Silver King claims failed to reveal the presence of significant amounts of uranium, the underground operations have shown that uranium-bearing material of possible commercial significance exists in several northwest-trending veins and faults. The faults and veins may be related to the block faulting along the west side of the Sheeprock Mountains. That these veins served as channels for ascending hydrothermal solutions is evidenced by the alteration halos which surround them.

Abundant chlorite, pyrite, and silica are found in the altered areas. Uraninite appears to have been introduced along with pyrite and quartz as a late phase of mineralization. No secondary uranium minerals have been observed in any of the veins in the Silver King area, and it is assumed that some of the uranium in the oxidized material is associated with iron and manganese oxides.

The most effective way to explore these veins is by the continuation of underground operations.
Compressor house

Fault zone A

Brecciated quartzite and granite

Brecciated quartzite

5 Vet of Cu, FeOx, MnOx, CaF2

Coarse grained granite

Ven of Cu, FeOx, MnOx, CaF2

Fault gouge on hanging wall

Fault gouge on footwall

Note: All Scintillometer readings are in counts per second (C.P.S.)

Background counts 20 cps

All sample numbers are prefixed by "A"

See Table 1
PLAN & GEOLOGIC MAP of the 
PORCUPINE TUNNEL 
Tooele County, Utah

Note: All scintillator readings are in counts per second (C.P.S.)

Background count 70 cps.
All sample numbers are prefixed by "A" See Table I
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<th>( \text{Cu}_3\text{O}_8 )</th>
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20
BIBLIOGRAPHY


CROSS SECTION A-A'
SILVER KING CLAIMS
Looking North

NOTE:
- **VEIN**
- S.K. DDH
  (Silver King Diamond Drill Hole)
SILVER KING No.1 TUNNEL
Cross Sections B-B', C-C'
See Plate I
Looking Northwest

Scale in Feet

Plate III