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UNPROSPECTED ZONE OF PYRITIC ALTERATION IN WEST-CENTRAL UTAH

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INTRODUCTION

Geologic studies by the U.S. Geological Survey in the Delta 2° quadrangle of west-central Utah have disclosed the presence of a large area of pyritized volcanic rocks that is similar to the zones of pyritized lavas that overlie concealed gold, silver, copper, lead, and zinc ore bodies in the East Tintic mining district, Utah (Lovering, 1949). This pyritized area is approximately 4,000 feet (1,219 m) long and 3,000 feet (914 m) wide and occurs in an area where relatively thin calc-alkaline volcanic rocks overlie faulted Cambrian limestone and quartzite. During the examination of the zone in October 1977 and May 1978, no evidence was observed that mining claims had been staked in the area or that any physical exploration, such as diamond drilling, had been carried out.

Although the pyritized zone is many miles distant from the nearest known productive ore bodies, it is located within the Tintic-Deep Creek mineral belt (Hilpert and Roberts, 1964, p. 30). In addition, spectrographic analyses of a limited number of samples indicate the presence of possibly anomalous traces of zinc, lead, arsenic, and other elements in the most brecciated and altered rocks. However, it is recognized that more intensive geochemical studies, along with other investigations, are

required before it can be assumed that either the hydrothermal alteration zone or the metal traces indicate the presence of concealed ore deposits at depth.

LOCATION

The pyritized area is in the north-central part of the Keg Mountains, which on some maps are shown as the McDowell Mountains, in west-central Utah. It is located in the northeastern part of the Keg Pass 7½-minute quadrangle, and is centered on the common corner of secs. 29, 30, 31, and 32, T. 11 S., R. 9 W. It is approximately 42 miles (68 km) airline west-southwest of Eureka, Utah, and 37 miles (60 km) airline north-northwest of Delta, Utah. Access by automobile is by the Flint Springs-Keg Springs road, which branches southward from the Pony Express road near the site of the Riverbed station, or from the Keg Pass-Keg Springs road which branches northward from the Jericho-Callao road south of the central part of the Keg Mountains. All of these roads are traversable by pickup trucks or even by high-clearance sedans in dry weather, but a four-wheel-drive vehicle is recommended in wet weather and for off-road use. The alteration zone may have escaped the notice of exploration geologists because it is largely concealed by the alluvium of several unnamed intermittent streams that drain northward from the area of Keg Pass.

GEOLOGY

As shown in figure 1, the rocks in the north-central part of the Keg Mountains consist of two closely related units of dark-brownish-gray Tertiary latite that were erupted over faulted beds of Lower Cambrian quartzite and Middle Cambrian limestone. Within a mile and a half (2.4 km) south-southwest of the pyritized area the lavas are intruded by a

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small plug of quartz monzonite porphyry that is part of a north-northeasterly trending group of monzonite and quartz monzonite plugs and dikes. The largest of these intrusions, a small stock about 2.5 miles (4 km) long and about a mile (1.6 km) wide crops out about 3 miles (4.8 km) south of the altered area. Potassium-argon dating techniques indicate that the igneous rocks are of early Oligocene age (D. A. Lindsey, oral commun., 1977). In nearby areas the dark latites and their intrusive counterparts are overlain by younger Oligocene rhyolite tuffs and breccias, and by Pliocene rhyolitic tuffs, flows, and ignimbrites related to the lavas of Topaz Mountain.

The structure of the north-central Keg Mountains is not well known. The Cambrian rocks have moderate dips and are cut by northeast- and northwest-trending normal faults. The fault of greatest interest in the area is inferred to separate Cambrian quartzite and limestone and to underlie the pyritized area. Its northwesterly strike may also account for the general northwesterly trend of the pyritic zone. In general the faults in the northern Keg Mountains all appear to have only small to moderate displacements, probably not exceeding 500 feet (152 m).

ALTERATION ZONE

The zone of pyritic alteration is largely exposed in a series of scattered hills and ridges separated by thin alluvial cover. Smaller exposures in the bottoms of the stream valleys partly confirm the general continuity of the altered rocks. In outcrop the pyritized lava ranges in color from nearly white to yellowish brown. Locally, patches of iron oxides stain the rocks brick red to rusty brown, but the more common colors of the outcrop are creamy yellow tones imparted by accumulations

of jarosite and ferric sulfate. In some areas the rocks are cut by many narrow veinlets of red-weathering iron oxide.

In the East Tintic mining district similar appearing zones of pyritic alteration have developed from rocks containing 1-3 percent iron sulfide. This iron sulfide was apparently derived from the sulfidization of indigenous magnetite (Lovering, 1949, p. 59) and is particularly abundant in and near biotite.

PRELIMINARY GEOCHEMICAL STUDIES

During the reconnaissance studies of the pyritized area 14 samples of the most intensely altered lava were collected for geochemical studies. Most of these samples consisted of highly iron-stained breccia from narrow fissures that appear to have been channelways for hydrothermal solutions. All samples were analyzed by spectrographic techniques and parts of the analyses are presented in Table 1. If it is assumed that the average background for zinc and lead in the pyritized lava is 30-50 ppm each, as it is in the East Tintic district (Almond and Morris, 1951, p. 623), then samples A, E, H, I, J, and L appear to contain anomalous, possibly introduced, quantities of these metals. Samples B1, F, and H also appear to contain anomalous amounts of arsenic, and samples C1, C2, E, H, I, and L may contain anomalous amounts of barium. Before any conclusions can be drawn concerning a geochemical anomaly in the pyritized area, however, many more geochemical samples should be collected and analyzed, and the background quantities of the metals in the fresh and altered rocks specifically determined.

Table 1

Partial Spectrographic Analyses

Sample Number

(Values in parts per million)

Element	A	B1	B2	C1	C2	D	E	F	G	H	I	J	K	L
Ag	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
As	7.	20.	15.	1.5	3.	10.	7.	50.	10.	70.	7.	15.	10.	N
Au	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	N
Ba	150.	500.	300.	1,500.	1,000.	500.	1,500.	700.	700.	1,000.	1,000.	700.	150.	1,000.
Bl	1.5	2.	3.	<1.	1.	1.	<1.	3.	1.	<1.	1.	<1.	<1.	N
Cd	1.	.7	1.	1.	.7	1.	1.	1.	.7	1.5	1.	1.	<.7	N
Cu	30.	10.	10.	15.	15.	7.	7.	7.	7.	15.	7.	5.	1.	20.
Mo	<2.	<2.	<2.	<2.	<2.	<2.	<2.	<2.	<2.	<2.	<2.	<2.	<2.	5.
Pb	15.	30.	7.	20.	7.	15.	20.	30.	15.	30.	15.	10.	7.	150.
Sb	<1.	<1.	<1.	<1.	<1.	1.5	<1.	5.	3.	5.	1.	1.	<.7	N
Te	<1.	1.	1.5	<1.	<1.	.7	1.	1.	.7	1.5	.7	.7	<1.	N
Zn	200.	50.	30.	50.	50.	30.	100.	30.	30.	100.	70.	100.	3.	150.

Analyst: Chris Heropoulos, Menlo Park, California. N = Not detected

RECOMMENDATIONS

In consideration of the cursory nature of the U.S. Geological Survey's examination of the Keg Mountains pyritic area, it is recommended that several types of detailed studies be undertaken before funds are spent on physical exploration. The most informative data will probably come from additional geochemical studies. Because of the dense, unbrecciated character of the lavas, these studies should be directed to the fillings of the many iron-stained fractures in the rocks. It is only by rising upward through such fractures that spent ore-depositing solutions could escape outward from the site of ore deposition.

Geophysical studies may also be warranted, although such studies have not proved to be especially successful in other districts where oxidized or partly oxidized sulfide ore bodies occur in highly broken and altered sedimentary rocks overlain by a moderately thick cover of pyritized lava. The geophysical techniques most applicable to evaluation of the character and significance of the Keg Mountain altered zone probably would be self-potential, electromagnetic, induced polarization, resistivity, and other electrical prospecting methods.

Diamond drilling may prove to be the only reliable way to evaluate the significance of the pyritized zone as a indicator of concealed ore deposits. If such drilling is ultimately carried out, the exploration geologist must be aware of the following:

1. The best chance for the existence of ore bodies is believed to be in the sedimentary rocks below the pyritized lavas.

2. The lavas are of unknown thickness, but are assumed to be only a few hundred feet (100-200 m) thick.

3. The alteration zone and any possible geochemical anomalies may not be vertically above ore, but possibly offset, up-rake from the principal area of ore deposition.

4. Because of the large size of the altered area, perhaps as many as 10 or more drill holes are indicated.

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