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By
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This report is preliminary and has not been edited or reviewed for conformity with U. S. Geological Survey standards and nomenclature.

June 1955

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UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

URANIUM OCCURRENCES AT THE MOONLIGHT MINE AND GRANITE POINT CLAIMS, HUMBOLDT COUNTY, NEVADA*

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*This report concerns work done on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission.

URANIUM OCCURRENCES AT THE MOONLIGHT MINE AND GRANITE POINT CLAIMS, HUMBOLDT COUNTY, NEVADA

By A. O. Taylor and John F. Powers

ABSTRACT

The Moonlight mine and Granite Point claims are on the western flank of the Double H Mountains between the Kings River and Quinn River valleys in northern Humboldt County, Nev.

Uranium minerals at the Moonlight mine occur in a vein in intensely altered Tertiary volcanic rocks. The known uranium mineralization is spotty and erratic, but ore-grade material is present in the vein. Samples of the vein taken along its outcrop and in the mine shaft contain from less than 0.02 percent to 0.40 percent U_3O_8. The uranium minerals change from autunite at the surface to torbernite, "gummite(?)" and pitchblende below the 90-foot level of the shaft.

The Granite Point claims are two miles north of the Moonlight mine at the base of a rhyolite cliff. Radioactivity traverses made along the base and slope of the rhyolite cliff indicate that a large part of the rhyolite is abnormally radioactive. Radioactivity ranges from 0.013 to 0.3 mr/hr and averaged 0.10 mr/hr. in the vicinity of the claims. A sample taken at the base of the rhyolite cliff, at the point of highest radioactivity contains 0.02 percent U_3O_8.

INTRODUCTION

The Moonlight and Granite Point properties are on the west side of the Double H Mountains and 3 miles east and about 500 feet above Kings River valley (fig. 1). The Moonlight mine property is in sections 9 and 16, T. 45 N., R. 34 E., Mt. Diablo Base and Meridian, Humboldt County, Nev. The Granite Point claims adjoin the Moonlight mine property on the south, but mine workings of the properties are about two miles apart. The area can be reached from U. S. Highway 95 at Orovada by driving west 24 miles over Thacker Pass on a well-traveled, graded and graveled road, thence 8 to 10 miles north over a dirt road which is in fair condition, thence east two miles over mine access roads. The area is accessible during all but the severest winter months when heavy snowfalls temporarily may close Thacker Pass.

A preliminary examination of the Moonlight mine and the Granite Point claims was made in June 1954 for the Defense Minerals Exploration Administration to evaluate the uranium occurrences for an exploration loan. G. G. Gentry, Engineer of the U. S. Bureau of Mines, accompanied the writers and sampled the Moonlight mine during this examination.

In addition to the preliminary examination, more information was obtained during subsequent visits to the area in the fall of 1954. B. J. Sharp and Milon Papulak, geologists for the U. S. Atomic Energy Commission, accompanied the writers on a brief examination of both properties in October 1954. F. J. Williams and H. J. Davis of the Atomic Energy Commission prepared a plane-table map and a sample map of the Moonlight mine and the immediate surrounding area which were used in compiling parts of figure 2. The work described in this report was done by the U. S. Geological Survey on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission.

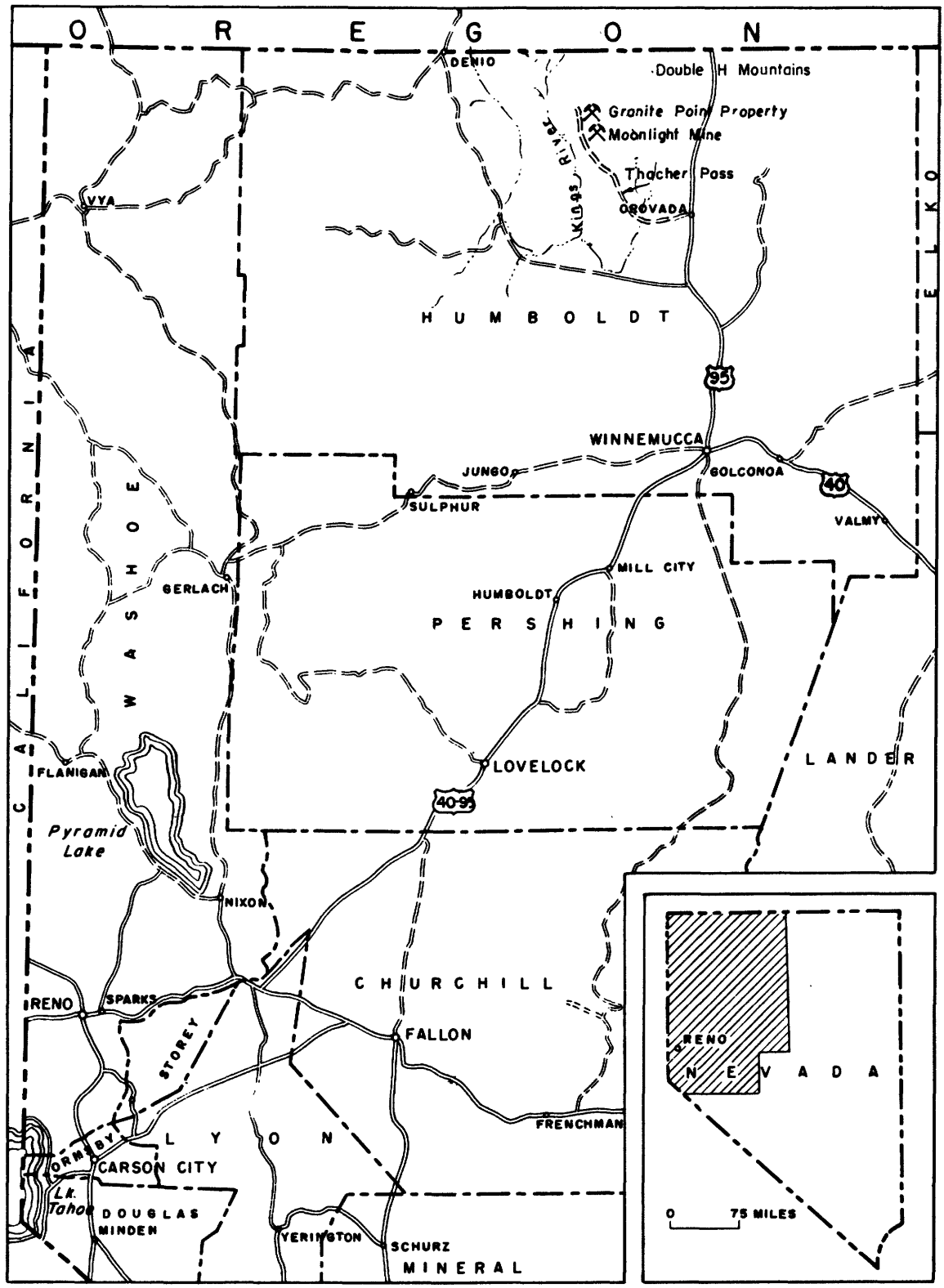

FIGURE 1.-INDEX MAP OF NORTHWEST NEVADA

10 0 10 20 MILES

GENERAL GEOLOGIC FEATURES

The occurrences of uranium examined are on the western slope of a tilted and moderately dissected north-south fault-block range. The range, locally referred to as the Double H Mountains, is bounded on the west by the Kings River Valley and on the east by the Quinn River Valley. The Double H Mountains are composed mainly of Tertiary volcanic rocks consisting of thick lenticular rhyolite flows, rhyolitic andesitic pyroclastic material, and latite and basalt flows. The volcanic rocks rest unconformably on an older quartz monzonite stock which crops out east of the Granite Point property and is exposed in the lower workings of the Moonlight mine.

The generalized sequence of volcanic rock, beginning at the base, is a massive basalt (locally absent at the Moonlight mine), andesitic pyroclastic material and rhyolite flows, pyroclastic rocks of intermediate to acidic composition interbedded with flows of hornblende andesite or latite, and a series of cliff forming rhyolite flows that cap the range in the area. The volcanic rocks are estimated to be between 1,500 and 2,000 feet thick.

The regional strike of the rocks is northerly with dips of 5 to 15 degrees to the east. Locally, dips as much as 60 degrees to the east were observed.

MOONLIGHT MINE

History and development

Uranium was first discovered on the Moonlight property in 1952 by Jess Nachiondo and others of Winnemucca, Nev. The property was originally a gold prospect but gold was never produced. Fluorescent autunite was found when Mr. Nachiondo and partners inspected the property for scheelite using an ultra-violet lamp. R. S. Palmer and James Dutton of Denver, Colo., obtained a lease on the Moonlight property and exposed parts of the mineralized zone by bulldozer cuts and short drifts. They subsequently assigned their lease to Jack M. Anderson of Denver, Colo., who, in turn, assigned the lease to Platora Uranium Corporation.

Platora Uranium Corporation had sunk a 60-degree inclined shaft to a depth of 200 feet by September 1954. Shipments of ore before June 1, 1954,were made from above the 90-foot level of the shaft.

Geology

The rocks exposed in the immediate vicinity of the Moonlight mine (fig. 2) are intensely altered and silicified rhyolitic and latitic tuffs and flows. Three mappable rock units have been distinguished. The first is an acidic or intermediate ash tuff. It is a light-colored incoherent rock composed of sericite and unidentified alteration products, but it may originally have been lithic and crystal tuff of intermediate to acidic composition. The second is a rhyolite

tuff which is light-colored on fresh surfaces but weathers brown from the oxidation of pyrite. The rock is intensely silicified and more or less brecciated, causing it to weather to vertical cliffs and craggy points. This rock is the host for the uranium minerals at the Moonlight mine. The third rock unit is a rhyolite porphyry consisting of quartz, orthoclase or adularia, and abundant disseminated pyrite in a highly altered fine-grained groundmass. Although this rock has the appearance of a rhyolite, it is possible that it was originally a more mafic rock, altered by addition of silica, for it grades upward into overlying flows of andesite or latite. It is everywhere intensely altered, but outlines of phenocrysts of feldspar are preserved giving the rock its porphyritic appearance. Oxidation of part of the pyrite causes the rock to weather brown.

The rock is locally abnormally radioactive above the main incline shaft giving readings of from 0.40 mr/hr to 1.5 mr/hr.

Small bodies of diabase(?), suspected to be intrusive, were observed underground but were not mapped and do not appear in the cross section.

Quartz monzonite was noted only in the mine workings about 170 feet down the incline shaft. The rock is equigranular and contains about equal amounts of plagioclase and orthoclase with lesser amounts of quartz and augite. The rock is moderately altered and contains scattered amounts of pyrite. The quartz monzonite appears to be older than the surrounding volcanic rocks and probably is related to the quartz monzonite that crops out in the vicinity of the Granite Point claims.

The structure in the Moonlight mine and the directly surrounding area is shown on section A-A', figure 2. The rhyolite tuff is shown as dipping into the hill, but there is little actual information about the attitude of rock units or their contacts. Flow banding in the rhyolite rocks is contorted and swirled and hence unreliable as an indicator of attitudes. Similarly, contacts between bedrock units are exposed over such small distances that they cannot be projected with any certainty.

The major structure in the area (fig. 2) is a north-trending normal fault, exposed at the Moonlight mine, and referred to as the Moonlight fault. The fault dips from 45 to 54 degrees east near the surface, but the dip steepens to 60 degrees east in most of the main inclined shaft. The fault is exposed for a distance of 280 feet on the surface where it separates brecciated rhyolite tuff in the hanging wall from altered tuff in the footwall. At a depth of 175 feet in the shaft, quartz monzonite appears in the footwall, and from this point downward, the Moonlight fault separates quartz monzonite from brecciated rhyolite tuff (Section A-A', fig. 2). At most places in the shaft, the fault is a smooth plane overlain on the hanging wall by a zone of breccia that grades into unbroken rock away from the plane of movement. Fault gouge is well developed only where the quartz monzonite is adjacent to the fault.

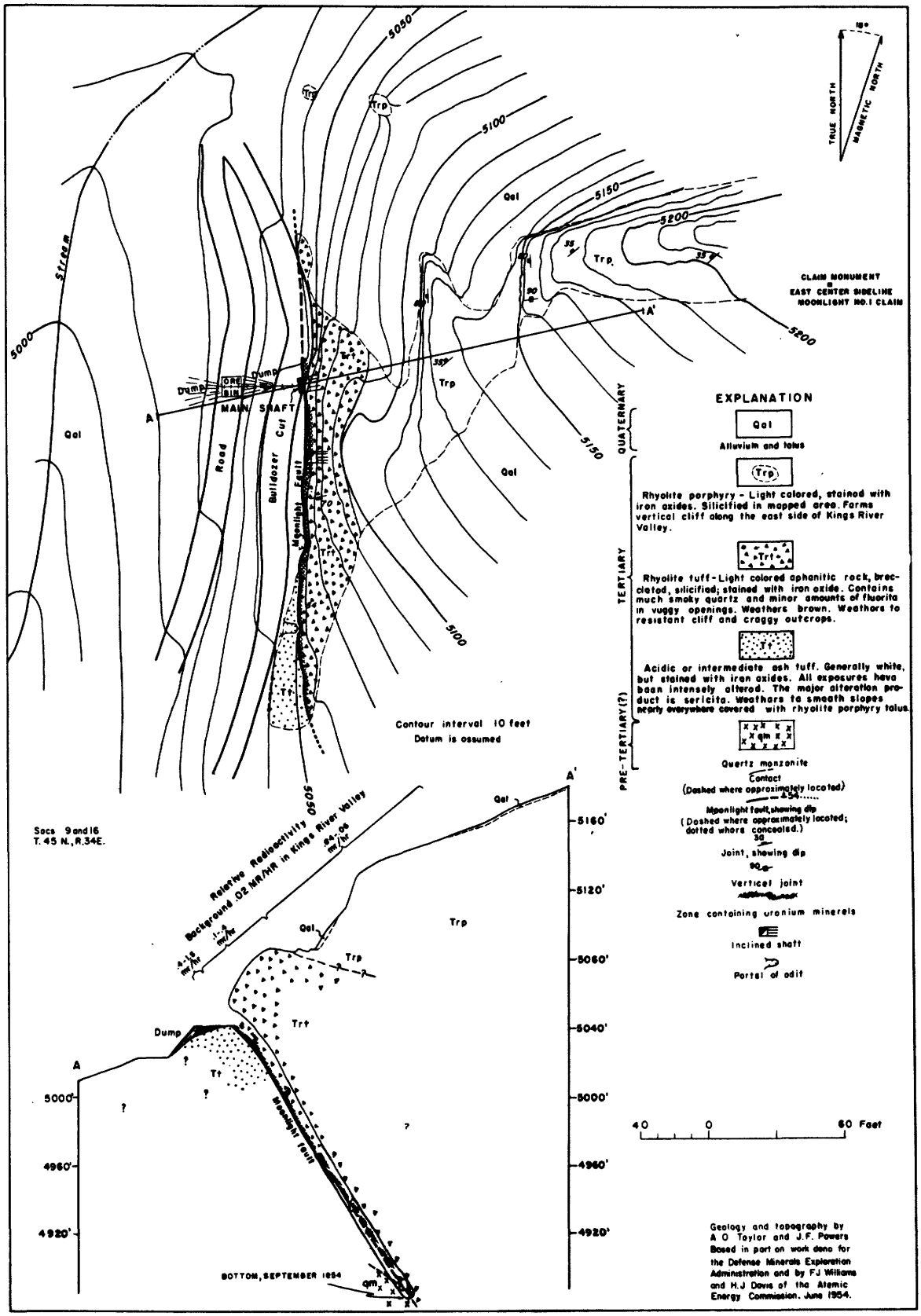

FIGURE 2.-GEOLOGIC MAP AND CROSS SECTION OF THE MOONLIGHT MINE, HUMBOLDT COUNTY, NEVADA

Mineralogy

The ore minerals in the vein are autunite, torbernite, orange and yellow non-fluorescent uranium minerals collectively termed "gummite", and uraninite(?). The common gangue minerals are pyrite, fluorite, smoky quartz, iron oxides, and clays. The owners reported that carnotite had been identified in the ore but no carnotite was observed in the specimens collected.

Autunite is most abundant near the surface but decreases in concentration down the dip of the vein until it is almost absent at a depth of 96 feet. Torbernite and "gummite" appear as the autunite disappears. Between 80 and 120 feet on the main inclined shaft, traces of "gummite" occur as halos and coatings around small black cores presumed to be uraninite. At greater depth the only uranium mineral is probably uraninite. Similarly, hydrated iron oxides which are abundant at the surface, grade to pyrite with depth; thus, it seems clear that the mine workings pass downward from the oxidized to the unoxidized zone and that primary uranium minerals are exposed below a depth of 90 feet in the inclined shaft.

The uranium minerals, pyrite, fluorite, and smoky quartz were introduced after intense brecciation and silicification, perhaps during a period of minor movement along the Moonlight fault that reopened it to mineralizing fluids.

Character and origin of deposit

In the Moonlight mine uranium minerals occur in the brecciated zone that forms the hanging wall of the Moonlight fault. Individual ore shoots are irregular in shape and vary from four feet to a few inches in width and from a few inches to several feet in length. No definite trend for the distribution of ore-grade material along the fault is evident nor could any spatial controls of the ore shoots be recognized. Samples of the vein taken along its outcrop and in the mine workings contain from less than 0.02 percent to 0.4 percent U_3O_8. Adjacent to the vein the rhyolite is estimated to contain from 0.01 to 0.04 percent equivalent U_3O_8.

The samples available (from the surface to a depth of 90 feet in the shaft) represent both primary and secondary ore. In general, analyses for uranium in the samples from the oxidized part of the ore zone are about the same as from the unoxidiaed part, suggesting that the conversion of uraninite to hydrated uranium oxides and to calcium and copper uranium phosphates has taken place practically in situ, with only a relatively slight migration along cracks and fractures of the rock. Geiger counter readings taken at intervals below 90 feet in the shaft indicate that the grade and distribution of uranium is about the same as in the upper part of the vein. At the contact of the quartz monzonite a significant increase in radioactivity was noted and the grade of the ore may increase at this point.

The mineral assemblages indicates that the deposit was formed under epithermal conditions of low temperature and pressure after brecciation and silicification of the rock. The solutions probably originated from a deep-seated source and ascended along the fault.

Conclusions

Uranium minerals at the Moonlight mine occur along an eastward-dipping fault that displaces intensely altered Tertiary volcanic rocks. The principal uranium mineral at the surface is autunite, but this mineral gives way at depth to torbernite, "gummite"(?) and pitchblende(?). The uranium minerals are accompanied by fluorite, pyrite, and smoky quartz. Known uranium mineralization is erratic but some ore-grade material is present in the vein along the hanging wall of the Moonlight fault. The deposit is thought to have been formed under epithermal conditions after brecciation and silicification of the rock. Material of ore grade probably can be obtained by selective mining of the higher grade zones.

GRANITE POINT CLAIMS

Location, history and development

The Granite Point claims adjoin the Moonlight property on the north and are in secs. 4 and 5, T. 45 N., R. 34 E., Humboldt County, Nev. The Granite Point claims were located shortly after the initial discovery of uranium in the Moonlight mine. The claims were subsequently leased by the Nevada Rosegold Placers, Inc.

Exploration by trenching began in the spring of 1954. At the time the property was first visited in June 1954, several thousand feet of bulldozer trenching had been completed. In September 1954, the company drilled six diamond drill holes spaced about 350 feet apart in an east-west line on the slope below the rhyolite cliffs. The holes are all inclined to the east, and average about 200 feet in depth.

Geology

The Granite Point property, like the Moonlight mine, is in an area of volcanic rock that consists of basalt and rhyolite, pyroclastics and flows that rest unconformably on quartz monzonite. Small dikes of diabase cut the quartz monzonite, the basalt, and the latitic rocks. The oldest rock in the volcanic sequence is a 200-foot flow of fine-grained dark basalt that weathers into low outcrops. Overlying the basalt is about 800 feet of latitic pyroclastic and flow rock. The pyroclastic material consists of fine-grained tuffs, and latite or andesite breccia interbedded with latite or andesite porphyry flows. Much of this unit is covered by the talus from the overlying rhyolite flows. Individual flows of the rhyolite are as much as 150 feet thick and weather into steep cliffs and bluffs. The rock is buff colored on fresh fracture and brown on weathered surface. On most of the exposures examined the flow banding was irregular but generally dips to the east. Under the rhyolite cliff, and exposed in three places by bulldozer stripping, is a soft, green, intensely altered diabase intrusive rock containing abundant stellate clusters of labradorite crystals. The intrusive bodies are believed to be small discontinuous dikes, because outcrops are not continuous along strike.

A talus mantle covers rocks below the rhyolite cliffs at the Granite Point claims to a depth of ten to twenty feet concealing the bedrock geology. It seems likely that silicification of the older volcanic rocks would have caused them to crop out through the talus mantle. No such outcrops were found on the Granite Point claims.

Radioactivity

The rhyolite is the most radioactive rock exposed. Radioactivity measurements taken at the base of the rhyolite cliff show that the rock has a background count of three to four times that commonly found in rhyolites in the Basin and Range province, and about seven to eight times the average reading of the underlying diabase and basalt. Background radioactivity in the area is 0.035 mr/hr whereas the average reading for the rhyolite is 0.10 mr/hr. Radioactivity measurements of the diabase is between 0.013 mr/hr and 0.03 mr/hr. The radioactivity of the rhyolite talus that mantles much of the Granite Point claims ranges from 0.03 mr/hr to 0.04 mr/hr.

The highest reading obtained from the rhyolites was 0.30 mr/hr.; however, the area with this radioactivity is very limited. A sample collected at this place contains 0.02 percent uranium.

Conclusions

Radioactivity at the Granite Point claims was checked at numerous points along the rhyolite cliff and in the cuts where the underlying latitic pyroclastic and flow rocks are exposed. The radioactivity of the rhyolite ranges from 0.013 mr/hr to 0.30 mr/hr. and averages 0.10 mr/hr. The radioactivity of other rocks exposed is lower. A sample taken at the base of the rhyolite cliff where the highest radioactivity was noticed contains 0.02 percent U_3O_8. Uranium in this rhyolite is abnormal, roughly three times the amount commonly found in other rhyolites. No uranium minerals or structure mineralized with uranium minerals were found on the property.

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