ANNIE LAURIE PROSPECT
SANTA CRUZ COUNTY, ARIZONA
RMO 589

By
Robert J. Wright

ARIZONA GEOLOGICAL SURVEY
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January, 1951

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Plate 1 Map of Annie Laurie prospect

on file at fault

Introduction

The Annie Laurie uranium prospect, in the Oro Blanco district of southern Arizona, is located in the southwest quarter of Sect. 3, T23S, R11E. The nearest United States post office is Nogales, about 25 miles east, and the nearest settlement is Ruby, a nearly abandoned mining camp about 3 miles north. Access to the Ruby area is by gravel road from US highway 89 at Kinsley or Nogales. The Ruby quadrangle (1940) includes the area surrounding the prospect.

The prospect is owned by John H. Bright, Jr., 3914 South United States Avenue, Tucson, Arizona.

Examination of the property was made by the writer on June 12 and 24, Aug. 6-18, and Aug. 22-23, 1950. Microscopic identification of the ore minerals and rock types were made by LaMar Evans, U. S. Bureau of Mines, Tucson, Arizona.

History.

Mineralization in the Oro Blanco district has been widespread; prospects and mines are numerous. The dominant producer of the area is the Montana mine at Ruby, which from 1935 to 1939 was the largest single source of lead and zinc in the state /. Mining activities there were suspended

/ Minerals yearbook (1940), U. S. Bureau of Mines, p. 212.

in May 1940 as reserves became exhausted. Since 1940 there has been only scattered production from various small mines.

Radioactivity on the Annie Laurie prospect was first discovered during a Geiger counter reconnaissance of the area by John H. Bright, Jr., in the summer of 1949. The radioactive material was part of a calcareous travertine spring deposit near the floor of a tributary to California Gulch. A small amount of excavation by Bright revealed that the limestone underlying the spring deposit had only normal radioactivity. Bright then prospected the hill slope above and with the aid of a counter located an area of abnormally high radioactivity where he dug two small test pits, Pits A and B (Plate 1). Pit A reached a depth of about 6 feet and exposed pitchblende-bearing silicified flow rock. Pit B, somewhat more shallow, did not yield pitchblende.

Bright attempted to claim the deposit but learned that the discoveries were made on patented ground. The patented claim, called the Ruby, appears to have been originally located on the basis of sparse sulphide mineralization explored by the adit, now flooded, at location N5730, 4730E (Plate 1). The Ruby claim was purchased by Bright, who renamed it the Annie Laurie. A contiguous claim adjoining the Annie Laurie to the west was staked and is now held by location.

General Geology

The deposit lies within a series of volcanic and sedimentary rocks which is probably part of the Tertiary volcanic succession described by Darton [/]. California Gulch and its tributaries are floored by various

[/] Darton, N. H., A resume of Arizona geology: Univ. of Ariz. Bull. 119, 1915, p. 283.

sedimentary rocks including limestone, shale, and conglomerate. Resting upon these formations, which are nearly horizontal in attitude, is a porphyritic volcanic rock that underlies the neighboring hill crests and slopes. The flow rock contains phenocrysts of white feldspar and hornblende in a dark green groundmass. Thin sections reveal that the feldspar is andesine, the hornblende is largely altered to chlorite, and the rock also contains sporadic phenocrysts of orthoclase and magnetite. The rock is considered to be andesite porphyry and may be part of the andesite which is reported as having widespread distribution at the head of California Gulch /.

/ Fowler, George H., Montana Mine, Ruby (in Some Arizona Ore Deposits): Univ. of Ariz. Bull. 145, 1938, p. 120.

The immediate host for the Annie Laurie deposit is a strongly silicified, reddish porphyritic rock with large rounded quartz phenocrysts and smaller phenocrysts of pink feldspar. Veinlets of quartz criss-cross the rock in all directions. Under the microscope the pink feldspar proves to be orthoclase and the matrix appears to consist primarily of very fine-grained quartz.

The quartz porphyry underlies the area sampled (Plate 1). It is in contact with the sedimentary rocks which underlie the gully near the east edge of the claim. To the north and south the silicified rock is bordered by andesite. Investigation of the zone between the two rock types suggests that the contact is gradational for a short distance, but the relation

between the two rocks is not fully clear at the present writing. The quartz porphyry may be intensely silicified and feldspathized andesite which has undergone destruction of its dark minerals. On the other hand the rocks may represent separate flows.

Uranium Mineralization.

Only from Pit A can unweathered mineralized rock be obtained for study. Here the silicified rock is brecciated and recemented by veinlets of carbonate up to several inches wide. The veinlets contain minor fluorite, pyrite, sphalerite, galena, and chalcopyrite. Examination of the pit faces failed to reveal any controlling structural element, nor could the margins of the mineralized zone be determined.

The primary uranium-bearing mineral is pitchblende. It is largely confined to the host rock, within which pitchblende is found in lens-shaped zones with a length of several inches and a thickness of less than one inch. No pitchblende was observed within the carbonate veinlets. The pitchblende-rich zones are dark gray in color and are margined by a zone of red coloration similar to the hematitic stains in quartzite at the Sunshine mine /. However, the hematitic alteration is developed on a

/ Thurlow, Ernest E. and Wright, Robert J., Uraninite in the Coeur d'Alene district, Idaho: Econ. Geol. v. 45, 1950, p. 402.

much more limited scale at the Annie Laurie.

Under the microscope the pitchblende is seen to form small spherulitic bodies. The replacement of host rock by pitchblende has developed a texture similar to the texture of quartzite replaced by pitchblende at the

Sunshine mine. In Pit A, pitchblende is found within six feet of the ground surface. In comparison with most other pitchblende deposits of the western United States, this is an unusually shallow occurrence, pitchblende normally being quite soluble in slightly acid ground waters. The intimate distribution of pitchblende within the rhyolite and the intense silicification of the host rock both contribute to the relative resistance to weathering. The secondary minerals, formed within a few feet of the ground surface, include malachite, metatorbernite and several bright yellow uranium minerals, among which uranophane has been identified.

Grab samples collected by various individuals from Pit A have yielded uranium analyses up to 0.79% U_3O_8 , depending on the selectivity of the samples. Because of the irregularity of uranium mineralization, bulk sampling of the dump material would be required to provide a relatively accurate grade estimate.

Sampling and Radiometric Data

During the summer of 1950 American Smelting and Refining Company obtained an option on the prospect and plans were made to sink test pits for sampling purposes. It is difficult from surface exposures to outline the portion of the rhyolite which is mineralized because the rock is strongly silicified and the sulphide mineralization is not intense. For this reason it was decided to prepare a radiation survey of the area of interest in order to outline, for sampling purposes, the extent of possible uranium-bearing rock.

Radioactivity measurements were made with a Halross Scintillometer calibrated against a uranium standard. After preliminary experimentation it was decided to make the measurements with the counter suspended by its carrying strap from the operator's shoulder. Over most of the area, readings were taken at stations located 50 feet apart; but near Pits A and B the readings were made at 25 foot intervals. Primary control was established by alidade and tape, and most of the stations used for radioactivity measurements were located by pace and compass.

The results of the survey are plotted on Plate 1. The results indicate that the background radioactivity of the sedimentary rocks is about 70 to 80 counts per second. The silicified rock shows a greater variation in radioactivity with an average "background" of about 90 to 100 counts per second. Against these "background" readings are three anomalies of higher radioactivity. One, with individual readings up to 420 counts per second, is localized by the radioactive travertine. A second, with individual readings up to 1000 counts per second, is localized near Pits A and B. The radioactivity here is strengthened by the dump material, and hence the readings are not representative of the ground surface alone. A third anomaly, with readings up to 120 counts per second, is 200 feet south of Pits A and B.

Eight pits were located by American Smelting and Refining Company to test the two anomalies in silicified rock to test the areas of various radioactivity intensities in order to scout the possibility of extensive low-grade concentrations of uranium. Results of the sampling done are summarized in Table 1.

Table 1

SAMPLE DATA

<u>Location</u>	<u>Type of Sample</u>	<u>% U_3O_8</u>
Pit A	6' chip channel cut - south wall	tr.
	5' chip channel cut - west wall	0.63
	3' chip channel cut - north wall	tr.
	1' chip channel cut - west wall, gouge	0.006
	grab	0.40
Pit B	8' chip channel cut	0.013
Pit No. 1	7' chip channel cut	nil
	grab	tr.
	2 4' chip channel cut	nil
	grab	nil
	3 4' chip channel cut	nil
	grab	tr.
	4 5' chip channel cut	nil
	grab	tr.
	5 11' chip channel cut	nil
	grab	nil
	6 10' chip channel cut	nil
	7 grab	tr.
	8 grab	tr.

Conclusions.

The results of the analyses suggest that pitchblende-bearing rock is limited in extent. All samples that contain measurable amounts of uranium were taken from points with surface readings of more than 200 counts per second. However, the area enclosed by the 200 isorad is small; therefore, the tonnage of radioactive material must be small.

LEGEND

90 Radiation intensity. Figure represents relative radioactivity as measured in counts per second by Scintillometer. Survey point located by tape and compass.

Control point located by tape and open sight alidade.

Pit.

Approximate margin of highly silicified host rock.

Coordinate grid oriented with respect to true North assuming magnetic declination of 14° E.

RADIATION SURVEY OF ANNIE LAURIE PROSPECT SANTA CRUZ COUNTY, ARIZONA

SCALE
0 100 200