Notes on the Antelope Mining District, Nevada

By F. C. Schrader.*

The Antelope district is in Nye county, south-central Nevada, about 30 miles east-southeast of Goldfield, the nearest supply point, on the Las Vegas & Tonopah railroad, with which it is connected by a good wagon and automobile road, and 25 miles from Ralston siding.

Gold was first discovered here in 1903 by the Bailey brothers, of Cactus Spring, on the Antelope ground, which they still hold and develop, about a mile southwest of the main spring. In 1906 the Jordan brothers made locations about the same distance to the south, including the ground of the recent strike, and they too have annually done considerably more than the required development work. The strike of high-grade ore which recently attracted attention to the district and gave the camp its present impetus was made by Jordan & Reilly on the Antelope View ground early in November, 1911, and soon afterwards there were 150 men in camp prospecting and making locations. By the close of the year a $15,000 5-day option had been taken on the Antelope View claim by George Wingfield of the Goldfield Con. Mines Co., who prosecuted the work of sinking a shaft continuously with good results, but as he wished a brief extension of time, which it is said the owners would grant only at a very large price, he relinquished the option.

Topography.—The relief of the region is characteristic of the Great Basin province, which comprises nearly all of Nevada and portions of adjacent states. The dominant features of this province are parallel north-south minor mountain ranges—the "desert ranges"—separated by detritus-filled valleys.

The area here treated lies mainly on the easterly slope of the range, and extends from 6000 to 7000 ft. in elevation. The topography is in part rough but not rugged. The principal features are several north-south monoclinal or hog-back ridges, of which East ridge and Jordan ridge, situated diagonally to the axis of the range, are examples, and their intervening small valleys or open gulches.

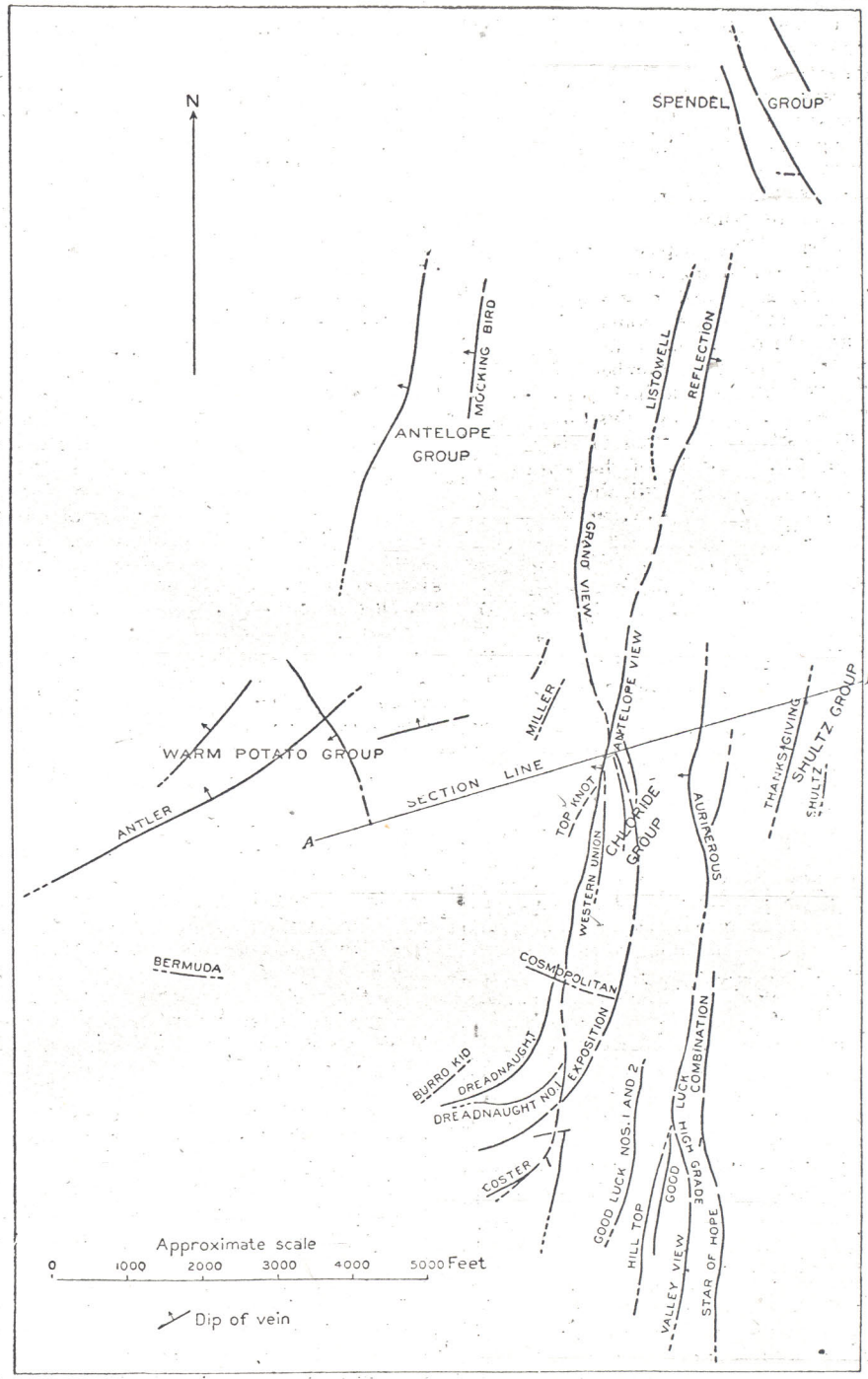
Geology.—Most of the older rocks in the desert ranges are faulted Paleozoic and Mesozoic sediments cut by many intrusive dikes and bodies of porphyry and buried by lavas. According to Ball, the succession of formations exposed in the Cactus range from the base up is as follows: Pogonip limestone, Eureka quartzite, Silver conglomerate, granite, diorite, porphyry, hornblende-biotite latite, earlier biotite andesite, augite andesite, rhyolite tuffs (?), later rhyolite (?), and alluvium.

The range, however, is composed of predominantly Tertiary volcanic rocks, and the covering or country rock is almost wholly rhyolite, regarded as of early Tertiary age. This rock contains the ore deposits of the camp. The rhyolite forms almost all of the higher part of the range, occupying a belt 5½ miles wide. On the south, in the latitude of Wellington, it is abruptly terminated by a large area of early Quaternary and late Tertiary flows of basalt and basic andesite, small bodies of which also flank the rhyolite in other parts of the range.

Locally capping the rhyolite unconformably as flows and likewise intruding it are andesite and dacite, which occur also in the northwestern part of the district and near by form the upper part of Antelope peak. They too are referred to as early or middle Miocene age.

In the western part of the district, where the rhyolite is bared by erosion, occurs a small area of quartzite, regarded by Ball as the Eureka quartzite of Ordovician age.

The rhyolite is a porphyritic lava or igneous rock with a glassy base and has about the same chemical composition as granite. It occurs mostly in heavy flows which have been domed and transversely



Sketch Showing Principal Veins of Antelope District, Nevada.

*Abstracted from Bulletin 530-J. U. S. Geological Survey.

faulted into the series of monoclinal ridges above described.

The flows dip mainly 20°-60° E., and the fault scarps formed by their broken upturned edges face to the west. The flows are crosscut by a prominent system of sheeting which dips 30°-60° W., about parallel with the fault planes. This sheeting is probably contemporaneous in origin with the faults and was induced by the same forces. It is important in that its fissures and cracks contain or are associated with the mineral deposits. Locally, as in Jordan ridge, the cracks contain also many small nonworkable veins or ledges and stringers of quartz. The rocks, in places at least, as best shown in East ridge, are also thinly sliced by a close vertical sheeting amounting almost to cleavage, and in places dikes or bodies of younger but similar rhyolite seem to be intruded along the faults.

Ore Deposits.—The deposits of the camp are veins containing ores of silver and gold. They are found in or associated with veins and fissures contained in the rhyolite which has been described. The veins are about 20 in number. The relative position of the principal veins is shown in the accompanying illustration. They occur mostly at elevations of about 6500 ft. The general strike of the veins is N. 12° E., about parallel with the principal jointing system, but some of them depart from this direction, both to the east and especially to the west. The dip is about 40° W., into the range, but varies from 30° to 60°. Of the steeper dips the Chloride vein is an example. In several places the dip was observed to flatten in depth, and the tendency to flatten seems to be general. The veins are fairly persistent, several having a known extent of 2000 ft. or more, while for some a much greater length is claimed. Branching and intersection seem to be common.

The veins are exposed principally in the southern and northern parts of the district. If present through the considerable stretch of intervening ground, they are mostly covered by alluvial wash and debris from the mountains.

The veins vary from 1 to 20 ft. or more in width, 8 ft. being perhaps a fair average. As for the most part they weather evenly with the country rock, the croppings are generally not prominent. However, there are some good-looking croppings, consisting chiefly of iron and manganese stained quartz and silicified rhyolite, in the southern part of the district on the Chloride and Auriferous groups, in the western part on the Antelope group, and to the north on the Reflection and Listowell claims.

The Auriferous croppings have considerable gossan that pans well in gold. Quartz samples from the Exposition shaft show hematite with specularite and some pyrolusite, and quartz ore from the Chloride shaft, near the southwest corner of the Antelope View, contains considerable chrysocolla.

The gangue is quartz and faulted, crushed, and altered rhyolite. The rhyolite is in part silicified, in part completely kaolinized to a white chalk-like mass of so-called talc, and in part affected by all stages of alteration between these extremes. The chalk-like material is largely kaolin, with some alunite. The portions most resembling talc in the hand specimen are found under the microscope to consist principally of sericite, a filmy white or colorless mica derived by alteration from the orthoclase. Even the portion of the gangue which at first appears to be normal vein quartz is found on examination to be mainly altered and silicified rhyolite replaced by quartz. Some of it has a finely honeycombed or porous texture, which seems in part due to cavities of disseminated pyrite, dissolved out of the rhyolite. The quartz is also drusy, with small, very irregular cavities, containing acute solid angles and jagged walls studded with pyramidal quartz crystals and filmed with hyalite. Adularia is sparingly associated with the quartz as a gangue mineral.

In the northwestern part of the district, on the Antelope group, was observed some platy quartz, pseudomorphic after calcite or other spar, indicating that the present gangue has in part replaced an earlier gangue mineral, but this phase of replacement seems to be very subordinate.

In general, much of the gangue is more or less heavily stained with iron and manganese, and, as shown by slickensides and displacements, there has also been considerable postvein movement.

The valuable ore minerals are chiefly the silver chloride, cerargyrite or horn silver, and the sulphide, argentite. They occur mainly in the form of dark-green or gray-green specks, bodies, and films widely distributed through the gangue, and with them and the iron oxide is associated the gold. Some of the bodies are cuboidal and apparently fill casts of dissolved pyrite crystals. The film form is best developed on slickensides in the chalky kaolinized masses.

About four-fifths of the valuable content of the ore is in silver and one-fifth in gold. In places occur bodies several inches in diameter of yellowish and gray-green horn silver that are very rich. Macroscopic free gold is not common, especially in the main vein, but in a cellular quartz specimen collected at about 60 ft. down the hill slope from the Antelope View mine the pocket lens shows the dark silver ore bodies to be peppered with small beads and specks of gold. The light color of much of this gold denotes that it is in alloy with native silver.

Associated with the ore in many places is considerable iron oxide, mostly limonite, which so permeates and stains large bodies several feet in diameter that the mass resembles partly decomposed iron ore. Much of the ore of this type, as well as of the porous honeycombed siliceous ore, pans well in gold.

In places the ore minerals, by metasomatic replacement, impregnate to a considerable degree the surrounding altered wall rock, which is locally kaolinized or silicified for distances of 60 ft. or more back from the vein. In contracted parts of fissures and in small fissures and point cracks showing little or no distinct vein the ores appear along the plans of division.

Uranium has not yet been put to many practical uses.

Bituminous and Oil Shales Canada.

The Canadian government, through geological survey, has paid considerable attention to the examination and test of the bituminous and oil shales which abound in great thickness in eastern Canada, particularly in the New Brunswick Nova Scotia and the Gaspé regions. It may be readily asserted that in these deposits—considering the richness of some of the shales, their large extent, especially in the province of New Brunswick, their general accessibility and the facility with which they can be worked—Canada possesses a source of mineral wealth the great value of which, if properly developed, can scarcely be overestimated.

It is noteworthy in this connection that the Dominion of Canada (so far as present known) is by no means well supplied with oil fields such as exist in the United States. These shales, therefore, might prove an important substitute for petroleum, as was the case in New Zealand and Scotland, where the shale distilling industry has for a long period been profitably carried on.

Apart from the distillation of illuminating oil a remarkable number of valuable products, such as ammonia, kerosene, paraffin and the like, are obtained in the process of distillation. Bituminous and oil shales also exist in parts of the United States, particularly in the Book Cliffs region of Colorado, and only await some enterprising companies to take hold of them. It might be said that they would not be able to compete with the present petroleum market, but there will come a time when our petroleum and gas pools will be exhausted and people may be glad to have recourse to the distillation of shales, which at present are totally neglected. Apart from competition with petroleum, the by-products are to be considered from a manufacture and market point of view.

The shales vary in character. They are often a thin-bedded, brownish or greenish gray, sometimes quite flexible and elastic, sometimes rich in fish remains, and are known locally as paper shales; but the shales vary to massive beds of black or brownish-black, tough rock occurring as interstratified beds in the formation as a whole. While the greater part of these shales are bituminous, the black massive beds, ranging in thickness from 3 to 7 ft., are, on the whole, much richer in ammonia gas and oil than the great mass of the thinner beds.

The Albert mines comprise the important oil-shale area of New Brunswick. They belong to the Permian formation underlying the Lower Carboniferous. The basal part of this formation is represented by reddish-brown and dull-green conglomerates with interbedded shaley beds.

Analyses of these shales show 35 to 40 gals. of crude oil per ton and 30 to 40 lbs. of ammonia per ton.

A blown-out shot is a shot that has blown out the tamping without breaking the coal or rock in which the charge is placed.