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SEARCHLIGHT AND ELDORADO DISTRICTS

INTRODUCTION

The Searchlight and Eldorado districts were visited early in February, 1906, partly in response to a petition from all of the principal mine owners or mine managers to the Secretary of the Interior asking for detailed geological work in the vicinity. The main object of the visit was to procure such general information as would enable future topographic and geological work to be laid out to the best advantage. In all about four days were spent looking over the Searchlight district and one in Eldorado Canyon. The following notes are necessarily fragmentary, but may be worth recording as a preliminary sketch of a region concerning which very little has been published and in which active development is now in progress.

SITUATION

Eldorado Canyon heads about 22 miles north of Searchlight and is 10 miles in length. It extends east and west, embouching on the Colorado River. There are no regular means of communication with the Eldorado Canyon district, which, however, is connected by a good road with Searchlight. A weekly mail service was formerly maintained between Chloride, the terminus of the Arizona and Utah Railroad, which connects with the Santa Fe system of Kingman, Ariz., but whether a stage was running over the route early in 1906 could not be ascertained.

No recent surveys have been made of this part of Nevada, and existing maps are all more or less obsolete and inaccurate. On most of them the town of Searchlight is either not shown or is only approximately located. The general positions of Searchlight and Eldorado Canyon are indicted, as nearly as can be determined, in the accompanying index map (fig. 1, p. 9) and the relations of the two districts to each other and to the Colorado River are shown in the sketch map forming Pl. IV.

HISTORY

Mining in Eldorado Canyon is said to date from about the year 1857 and the Techatticup (an Indian name, said to signify "plenty for all"), one of the principal mines, is reported to have been in intermittent operation since 1863. In 1885 the same mine was worked with 23 men, the ore being treated in a 15-stamp mill. The district bears evidence of having been extensively worked for many years past, large bodies of ore having been stoped from the Quaker City, Mocking Bird, Wall Street, and Techatticup mines. Latterly, however, the only work on this group, now under one ownership, has been confined to prospecting the Techatticup lode below the old stopes.

It is a little surprising that a district once alive with activity should have attracted so little outside notice. This, however, is partly accounted for by the overshadowing predominance of the Comstock, Eureka, Ely, and other districts noted in the early history of mining in Nevada, and by the isolation of Eldorado Canyon. The rich ore shipped from the canyon in early days was taken down the Colorado by boat to Needles, Yuma, or the Gulf of California.

PRODUCTION

The total output of the Eldorado district is not known and is difficult to estimate. It may be anywhere between $2,000,000 and $5,000,000. The Techatticup mine is said to have produced $1,700,000, but this estimate

could not be verified. The production of the Searchlight district to the end of 1905 probably lies between $1,750,000 and $2,000,000. Of the total sum the Quartette mine has produced approximately $1,250,000.

TOPOGRAPHY

The Eldorado and Searchlight districts both lie in a range of hills known as the Opal Mountains and locally marking the edge of the diversified plateau that in this region borders the valley of the Colorado on the west. The general altitude of this plateau as defined by its broad desert plains is from 2,000 to 3,000 feet above sea, or from 1,000 to 2,000 feet above the river. The town of Searchlight is approximately 2,200 feet above the Colorado, which here flows in a valley whose width varies from 10 to 15 miles, although very little of this is occupied by actual flood plain. At Searchlight the hills rise to a maximum height of about 1,000 feet above the alluvial plains and are not particularly rugged. At Eldorado Canyon the general slope from the plateau edge to the Colorado River is rather steep and deeply scored by erosion, so that contrasts in relief are more marked than at Searchlight.

GEOLOGY

In the very brief time spent in these districts only the most obvious and general relations of the rocks could be ascertained. The accompanying geological sketch map is merely a rough diagramatic representation of the apparent distribution of the rocks, and the contacts as sketched may be a mile or more from their actual positions. Such a sketch, valuless as to details, will, however, if its limitations are clearly understood, assist the reader in understanding the broad features of the geological structure.

The essentail facts of this structure are the existence of a north-south belt of quartz monzonite (locally known as granite), gneiss, and schist, which forms the main mass of the Opal Mountains and is flanked here and there by areas of Tertiary volcanic rocks. The schists and gneisses are the oldest rocks in the region and may be pre-Cambrian. They are much distrubed and are cut by the quartz monzonite as well as by dikes of aplite, pegmatite, and andesitec porphyries. Near Searchlight these older rocks are represented by biotitic gneiss forming part of the ridge that extends south of town and east of the Quartette mine. North of the town for a distance of 15 miles the Opal Mountains appear to consist mainly of quartz monzonite, with possibly some granite. At the Nob Hill camp, however, situated on the crest of the ridge, 4 or 5 miles south of Eldorado Canyon, the prevailing rocks are micaceous and hornblendic schists and are rounded hills of gneiss and schist, cut by irregular dikes of petmatite, aplite, fine-grained quartz monzonite, and various andesitic porphyries. These hills here mark the edge of the general upland, which descends in a rugged canyoned slope to the river. So far as could be seen in the foreground of the grand panorama spread out eastward from Nob Hill the schists and gneisses extend to the Colorado on the south side of Eldorado Canyon. The upper part of Eldorado Canyon, particularly the north side, is chiefly in quartz monzonite.

The "granite" in Eldorado Canyon and near Searchlight is uniformly a fine-grained gray rock, showing to the naked eye abundant biotite, some hornblende, and apparently considerable quantities of plagioclase as well as orthoclase. Titanite is noticeable accessory mineral. The quartz is very inconspicuous, and the general appearance of the rock suggests a fine-grained monzonite rather than a true granite.

This suggestion is corroborated by the microscopic study of thin

sections. These show that plagioclase and orthoclase are about equally abundant. Quartz is a more important constituent than would be supposed from a cursory examination, it filling many of the interstices between the partly idiomorphic feldspars. The principal dark constituent is biotite, which, however, is in most places accompanied by a little green hornblende and a colorless monoclinic pyroxene. Titanite, apatite, and magnetite are all fairly abundant accessory minerals. The plagioclase, although probably not all of the same composition, corresponds in general to andesine. An estimate of the volumetric proportions of the various minerals in a specimen from Eldorado Canyon afforded a basis for a calculation of the following approximate mineralogical composition of the rock by weight:

APPROXIMATE MINERALOGICAL COMPOSITION OF QUARTZ MONZONITE.

Andesine	34.7	Augite	2.3
Orthoclase	34.0	Titanite	.8
Quartz	12.6	Apatite	.5
Biotite	6.9		
Magnetite	4.4	Total	100.00
Hornblende	3.8		

The rock is thus, in all probability, a quartz monzonite, intermediate in composition between a true granite and a quartz diorite.

The quartz monzonite, like the gneiss and schist, is supposed to be a part of the old crystalline floor through which the Tertiary eruptive broke. Definite proof of this, however, was not obtained in the course of the present reconnaissance, and the possibility of its being a Tertiary intrusive mass is still open to consideration.

Bordering the quartz monzonite and schist belt on the east, near Searchlight, and lying between these rocks and the river, is a zone of volcanic rocks several miles in width. East of Searchlight the volcanic series is several hundred feet thick and consists of flows to hornblendic andesite, beds of andesitic breccia, and white and brown tuffaceous sandstones and some minor flows of basalt. The whole series of effusive lavas and tuffaceous beds dips to the west, the maximum dip observed being 55°. This general westerly dip is maintained close up to the quartz monzonite (fig.14), and it is difficult to avoid the conclusion that the contact is a fault. No definite fault plane, however, could be discovered in the brief time devoted to this area, and along the general line where the fault might be expected there are usually irregular intrusive bodies of a biotitic andesite porphyry, which, on account of its conspicuous white phenocrysts of feldspar, is locally known as "bird's-eye porphyry." It is possible that the volcanic rocks were poured out or deposited in a basin bounded on the west by the quartz monzonite and schist ridge of the Opal Mountains, but the high dip, the apparent steepness of the contact, and the presence of the intrusive andesite porphyry suggest that the quartz monzonite has been relatively upthrust by faulting and the intrusions of porphyry took place along the zone of dislocation.

On the west side of the quartz monzonite, near Searchlight, the relations of the rocks appear to be generally similar to those just described, although they are even less clearly shown. West of the monzonite and gneiss are low slopes of andesite passing westward beneath a cover of alluvium and traversed near the granite by numerous dikes of andesite porphyry. The same porphyry has also invaded the gneiss south of Searchlight in a multitude of nearly parallel dikes, in a way that will be more fully described in connection with the Quartette mine. Whether the hornblendic andesites west of Searchlight are flows of intrusive masses is a question that only detailed

study can satisfactorily answer. They are probably flows.

On the north side of Eldorado Canyon volcanic rocks occur in great thickness between the abandoned town of Nelson, about 7 miles from the river, and the mouth of the canyon. The lowest member of the series is a tremendous flow of purplish-red, oxidized basalt, fully 1,000 feet in thickness and viscular throughout. This rock forms picturesque cavernous cliffs just north of Nelson. It is overlain by a nearly equal thickness of tawney and buff rhyolite flow breccia. These flows seem to be entirely later than the mineralization in the upper part of the canyon and may be younger than the andesites near Searchlight. They evidently filled a valley in the older rocks, since the rhyolite between Nelson and the Techatticup mine (a mile or two east of the town site) rests directly upon an uneven surface of granite. These flows, unlike those east of Searchlight, dip toward the river.

MINES OF ELDORADO CANYON

DISTRIBUTION

With the Eldorado mines are here included those of Nob Hill, situated on the main ridge 4 or 5 miles south of the canyon proper. Here active prospecting is in progress on the Silver Legion, Combination, and other claims, most of which were worked many years ago and produced good ore near the surface. None of the workings at the time of visit were over 100 feet in depth.

In Eldorado Canyon all the mines are on the north side. The principal group is situated near the head of the canyon and probably about 8 miles from the river. Here are the Quaker City, Mocking Bird, and Honest Miner. The first two properties were extensively worked many years ago, and the Honest Miner is said to have been the claim on which gold was first found in the district. The Quaker City and Mocking Bird are now idle, but the Black Hawk Mining Company is prospecting the Rand, Honest Miner, and other claims in the vicinity. All these mines are in fine-grained quartz monzonite.

About a mile lower down the canyon is the Wall Street mine, now idle, but with huge open stopes testyfying to former activity. About 2 miles east of the Wall Street, or a mile east of Nelson, is the Buster mine, visible from the road down the canyon, and just over a ridge from the Buster, about half a mile northeast of it, is the Techatticup mine.

GENERAL CHARACTER OF THE DEPOSITS

The ores at Nob Hill occur in east-west fissures in gneiss and schist. The dip is in most cases to the south and ranges from 70° to 90°. The veins are rather narrow and show no gouge and no evidence of movement since the deposition of the ore. In the Silver Legion mine the maximum width of the old stopes is about 5 feet. Although small, some of the veins are very regular and persistent, the Silver Legion mine for example, being easily traceable over the surface for at least 5,000 feet. The sulphide ores, which in these veins are reached at 75 feet or less from the surface, consist of pyrite, galena, and sphalerite, in a gangue that is partly vein quartz and partly metasomatically altered gneiss or schist. The gold and silver present are probably inclosed in the sulphides, no native gold being visible. Most of the ore extracted in early days was oxidized, and contained free gold and horn silver. The Combination mine, 100 feet deep, is said to have produced about $150,000 from ore that was floated down the Colorado on flatboats.

The deposits near the head of Eldorado Canyon are notable for their diversity in dip. All are essentially mineralized fissure zones in quartz monzonite, but while some are almost horizontal and would ordinarily be called blankets, others are nearly vertical lodes. At the Quaker City there are two parallel, nearly horizontal veins about 100 feet apart, the upper one being exposed along the hillside for at least 1,200 feet. The average dip of these veins is 15°, in a direction a little east of north. They have been extensively stoped, in many places to a height of 7 feet, so that one can walk with ease over the smooth, slightly inclined floor of the great subteranean chamber thus formed. The ore consists of shattered quartz monzonite which has been cemented and partly replaced by calcite and quartz. Originally the deposit contained finely disseminated pyrite, but this is now oxidized and the material is a free-milling gold ore. In the Mocking Bird mine, about a quarter of a mile northeast of the Quaker City, the vein strikes N. 25° W. and dips northwest at an angle of 40°. It is in places 6 to 7 feet wide and resembles generally the Quaker City lodes. Quartz, however, is more abundant, and some parts of the vein are made up of solid white quartz inclosing fragments of quartz monzonite. This mine also contains large stopes, although development was apparently never pushed to any considerable depth.

Little could be ascertained concerning the value of the ore formerly extracted from these mines, but it is very improbably that ore worth less than $20 a ton could have been handled under the adverse conditions that must have prevailed when the mines in the canyon were most active.

On the Rand claim, near the Quaker City mine, a prospecting shaft is now being sunk and at the time of visit was 50 feet deep. The vein strikes N. 70° E. and dips north at an angle of 80°. The vein is tight, and consists of little bunches and veinlets of quartz, calcite, and pyrite in a somewhat pyritized quartz monzonite. The lode has produced some oxidized ore from old workings near the surface, but the value and dimensions of the sulphide ore bodies are yet to be determined. The Honest Miner claim, lying a short distance east of the Rand and Quaker City, is also being prospected. Here there are two nearly parallel northeast-southwest veins about 60 feet apart and dipping about 45° to the northwest. Some ore was formerly taken from the upper parts of these veins and treated in a 1-stamp mill with cyanide tanks improvised from barrels. The veins show the usual association of quartz and calcite with specks of limonite, and are in quartz monzonite.

The Wall Street mine lies a mile or two east of the Quaker City and Mocking Bird on an approximately east-west vein with a dip to the south ranging from 15° near the surface to 30° at a depth of 30 or 40 feet. A large body of ore extending from the surface down to the water level was stoped here in the early days of the camp. The distance from floor to back is in some places fully 20 feet. No timber was used, the back being supported by pillars of ore, and the open stope, resembling as it does a great natural cavern, is strikingly picturesque. The water level is apparently less than 100 feet below the surface. The ore, like that of the Quaker City and Mocking Bird is shattered quartz monzonite, with bunches and stringers of quartz and calcite.

The Buster lode, formerly worked in a small way through shafts, is about a mile east of Nelson. The vein strikes northeast-southwest

and has a steep northwest dip. The ore left on the dump shows quartz and calcite, with a little oxide of manganese and specks of malachite.

The Techatticup is one of the most extensively developed mines in the district. The vein strikes N. 80° E. and dips north at about 85°. It outcrops along the north slope of a steep ridge and is reached by an adit 180 feet in length and about 250 feet below the croppings of the lode. From this adit a drift several hundred feet in length has been run on the vein at one point a winze has been sunk to a depth of 300 feet. Operations are at present confined to this winze. Above the adit level are three or four old adits and extensive stopes, which are in many places open to the surface. East of the main adit the lode divides into two, the southern branch running nearly east and west and dipping north at 60°. Both veins have been stoped along the surface to widths varying from 3 to 5 feet.

The vein is a regular and well-defined zone of shattered quartz monzonite in which the fragments are held in a network of quartz and calcite stringers. There has been no movement along the fissure since the ore was deposited, so that the vein is closely adherent to its walls and is almost impervious to descending solutions. Consequently, the sulphides at the surface, consisting of pyrite, sphalerite, and chalcopyrite, are only partially oxidized. The sulphides are usually rather finely disseminated. As the surface ore is said to have been rich in silver, galena is probably present in parts of the vein, although none was seen at the time of visit. The proportion of calcite varies widely and is greatest in that part of the lode lying east of the adit.

The average value of the ore formerly stoped from the Techatticup mine is said to have been about $40 per ton. Unoxidized ore from the bottom of the 300-foot winze is reported to have about the same value, but detailed or reliable information regarding this property could not be obtained on the ground.

In conclusion, it may be said that one of the most striking features about the Eldorado Canyon district is the fact that the Quaker City, Mocking Bird, Wall Street, and Techatticup mines, after having produced large quantities of ore under conditions less advantageous than those now prevailing, should be idle, or, in the case of the Techatticup, be prospected in a somewhat desultory manner. Of course the best ore may have been extracted, but the impression carried away from a hasty examination, without measurements or assays, was that the development of these mines under a single management and by modern methods constitutes a problem that is well worthy of careful consideration.