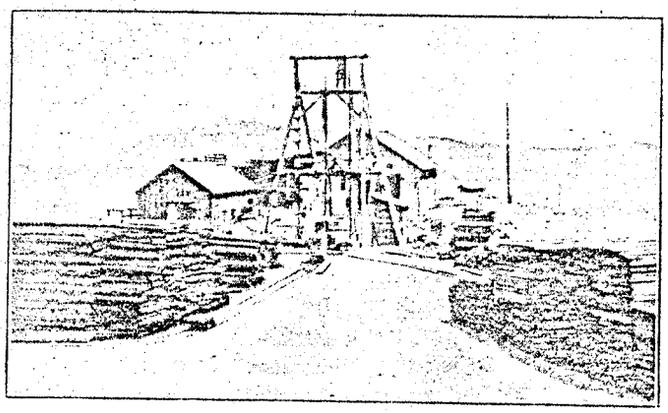
Divide Silver-Gold District of Nevada

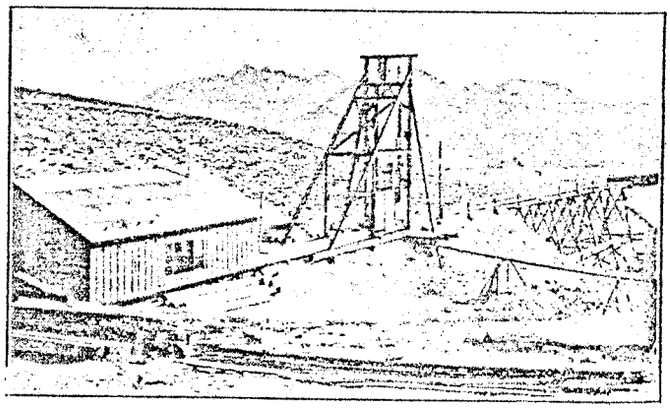
Two Proven Orebodies—Extensive Prospecting Work, Both on the Surface and Underground—Excellent Equipment a Feature, and Rapid Progress Being Made in Shaft Sinking and Drifting

BY GEORGE J. YOUNG

THE Divide district, south of Tonopah, Nevada, was fully described by Jay A. Carpenter in the "Journal" of May 17, 1919, and since that time considerable work has been done. Early in August I visited the district and had an opportunity of seeing some of the work. The labor difficulties which caused operations to be suspended from Aug. 17 to Oct. 5 are now adjusted, and the district will gradually resume a part at least of its former activity. At the time of my visit there were, according to various estimates, from 80 to 112 properties in operation. One well-informed man stated that there were 93 hoisting plants. New plants were, however, being installed every day, and it is difficult accurately to state the number of working properties. Estimates of the number of miners employed ranged from 700 to 1,000, with the smaller figure probably nearer the truth.



SHAFT OF TONOPAH DIVIDE MINING CO.



EXTENSION DIVIDE SHAFT. BUTLER MOUNTAIN IN BACKGROUND

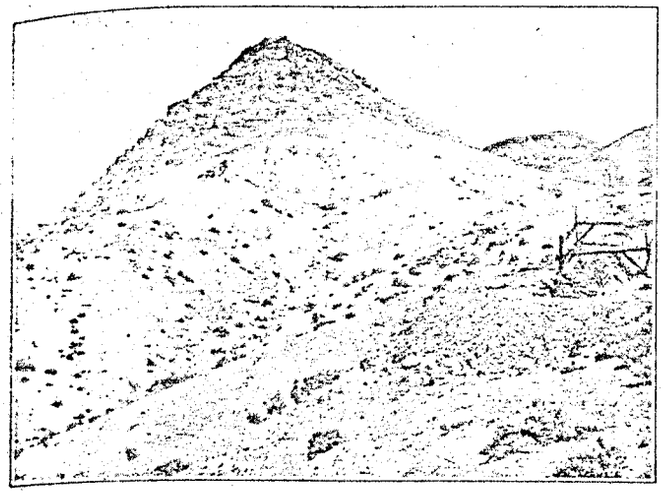
The Divide district is not a new district, for during the Tonopah excitement many prospects were opened up, but little or no ore was discovered, and the district was practically dead until H. C. Brougher discovered the orebody which was subsequently developed by the Tonopah Divide Mining Co. in 1918 and 1919. Since this discovery another discovery has been made in the area owned by the Extension Divide Mining Co. These two orebodies, the first of which has been developed, and the second of which is in process of development, were the important discoveries up to the time of my last visit. It is true that a number of minor ore occurrences have been reported from time to time, but there has not been sufficient development of such discoveries to demonstrate their importance as potential producers. Except for the two properties, therefore, the district must be considered to be in the prospecting state and all of the so-called properties to be prospects.

The term prospect covers a variety of conditions, and this is particularly true of the prospects of the Divide district. Obviously, the most important of these prospects are in line with the strikes of the two orebodies already discovered and in close proximity to the area containing them. The second group in order of importance consists of claims having definite surface indications of mineralization, such as limonite seams and kaolinized areas from which assays can be occasionally obtained. The third group gains some importance because of its proximity to dikes of rhyolite or other intrusions which are characteristic of the district, but the importance of which as a guide to the prospector must yet be demonstrated. The fourth and least important group consists of claims which have no particular surface indications and which are a greater or less distance from the center of the district which may be taken as the area of the Tonopah Divide Mining Co.

It is impracticable with the limited time at my disposal to group the various prospects in accordance with the foregoing scheme, but the interesting fact is that the map of the district shows about thirty square miles of mining claims, and on the border of the map there are listed over 300 groups of claims. On the San Francisco Stock Exchange there are listed seventy-three companies in the Divide district, the stocks of which are traded in to a greater or less extent. In my judgment the "area of expectation" is too large and the number of companies excessive. There is, however, no practical means of regulating or controlling such a situation, and a number of companies will inevitably fail to discover ore or a commercial orebody.

The district is important both on account of the two discoveries made and on account of its proximity to the Tonopah district. In the latter district important discoveries have been made by deep pros-

pecting. The ore-bearing veins, with the exception of the Mizpah and several other veins in the area owned by the Tonopah Mining Co., do not outcrop upon the surface, and consequently their discovery has been by chance or by clever underground prospecting. In the new district the first discovery was a chance one. The experience gained in the Tonopah district and in the first discovery in the Divide district served to establish the method of prospecting which was in vogue at the time of my visit. This



TYPICAL RHYOLITE DIKE IN DIVIDE DISTRICT

method is to sink a shaft 100, 200, or 300 ft. and then crosscut from the bottom either in a direction which surface indications favor or at right angles to a northwest and southeast line.

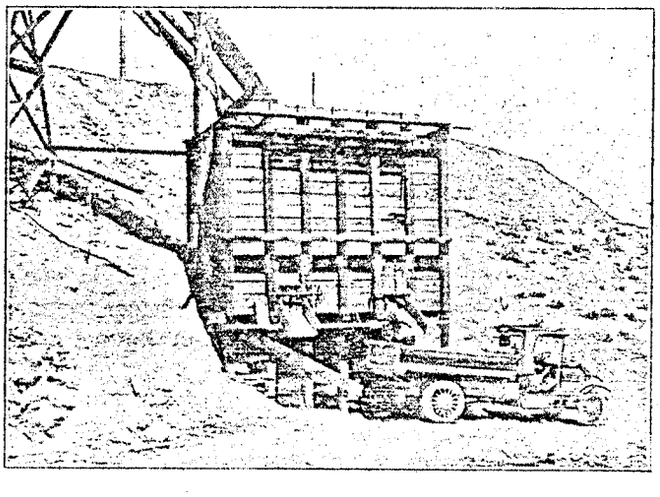
The more experienced engineers have gone over their ground carefully and have exhausted the possibilities of surface indications before deciding upon the sinking of a shaft, and if the decision is to sink a shaft, they select a site close to, or in, a mineralized area. Other shafts have been sunk without regard to anything other than the convenience of reaching the shaft side.

Surface trenching as a method of prospecting was just beginning to be used, and several companies were testing out the possibilities of their ground in this way. Over a relatively large proportion of the surface of the Divide district this method of prospecting should command the first attention of the company operating. Every system of fractures which reaches the surface in the vicinity of Gold Mountain is of importance, and, if a prospecting shaft is to be sunk, it, at least, should be put down in a fracture system if nothing better can be found. Hydrothermally altered zones are also important, as there are no prominent vein outcrops, and the ores, such as have been already discovered, are soft. Where they occur on the surface there is nothing to distinguish them from a great deal of material of a similar nature except by assaying or by the discovery of silver minerals in panning. Much useless expenditure of money can be avoided by systematically examining and trenching the surface under the direction of experienced mining engineers. Shaft sinking need only be undertaken where promising surface indications have been discovered. When more is known of the extent of the ore-bearing zone, prospecting shafts at greater distances from the present focus may be justified.

Correlation of New District with Tonopah

The correlation of the geology of the Divide district with that of Tonopah is a subject which should be given prompt attention by the U. S. Geological Survey. J. E. Spurr, in Professional Paper No. 42, gave an exhaustive account of the geology of the Tonopah district. His areal geological map terminates a short distance south of Butler Mountain on a line about four miles from Gold Mountain. In a subsequent account, appearing in "Economic Geology," Vol. 10, p. 713, Mr. Spurr reviews the geology of the district and brings it up to date. The close proximity to the Tonopah district, and the important production made by that district, make it especially desirable to determine the general geological conditions existing in the new district as well as detailed studies of structural conditions and the nature of the ore deposits already discovered. It ought not to be difficult to tie the work to the Tonopah area, for there is a similarity of conditions in the new district in the occurrences of intrusive rhyolites, the breccias, andesite and Siebert tuffs that indicates that there is a close relation, both in time and manner of formation, between the rocks of the two districts. Undoubtedly such an investigation, with a prompt publication of results, will be of value to the engineers and operators, and would be the means of more narrowly restricting the work of prospecting to favorable areas, with the resultant conservation of considerable capital.

The orebody of the Tonopah Divide Mining Co. is developed by a two-compartment shaft. Levels



AUTO TRUCK HAULING ORE IN DIVIDE DISTRICT

have been established at depths of 165, 265, 370, 475, and 580 ft. From each level a crosscut has been driven to the vein which lies approximately 140 ft. southwest of the shaft, and has a strike northwest and southeast, with a slight dip toward the northeast. Drifts have been driven on each level from the crosscuts along the orebody. Two raises have been driven between the 475 and the 370 levels from the southeast drift. Two raises have also been driven from the 370 to the 265 level, one raise has

been driven from the 265 to the 165, and one raise to the surface. Other raises have been started. According to the report of the company of July 1, 1919, the total footage of workings is about 4,500, and of this over half represents workings in the ore zone. The principal development lies on the southeast drifts. The oreshoot extends only a short distance from the main crosscuts in a northwesterly direction. The company report, above referred to, states that: "On the 580-ft. level the main crosscut has been driven across the vein, showing a width of 35 ft. and average values of $8 per ton. A drift has been started to the southeast along the vein." The distribution of assays on the 265-ft. level is shown by the following quotation, which is taken from the same report:

On the 265-ft. level the main crosscut shows the vein to be 27½ ft. wide, and assay results of sampling show the average value of the ore to be $14.35 per ton across the width of the vein. The drifts driven along the trend of the vein from the main crosscut on the 265-ft. level have attained a length of 145 ft. to the northwest and 360 ft. to the southeast. Crosscuts have been driven through the vein from these drifts at intervals, and have shown vein widths and assay values as follows:

50 ft.	northwest of	main crosscut	25 ft. of	$16.50 ore (a)
100 ft.	northwest of	main crosscut	30 ft. of	4.20 ore
50 ft.	southeast of	main crosscut	15 ft. of	12.40 ore
100 ft.	southeast of	main crosscut	30 ft. of	51.80 ore
150 ft.	southeast of	main crosscut	7 ft. of	16.80 ore
200 ft.	southeast of	main crosscut	15 ft. of	12.40 ore
250 ft.	southeast of	main crosscut	25 ft. of	48.20 ore

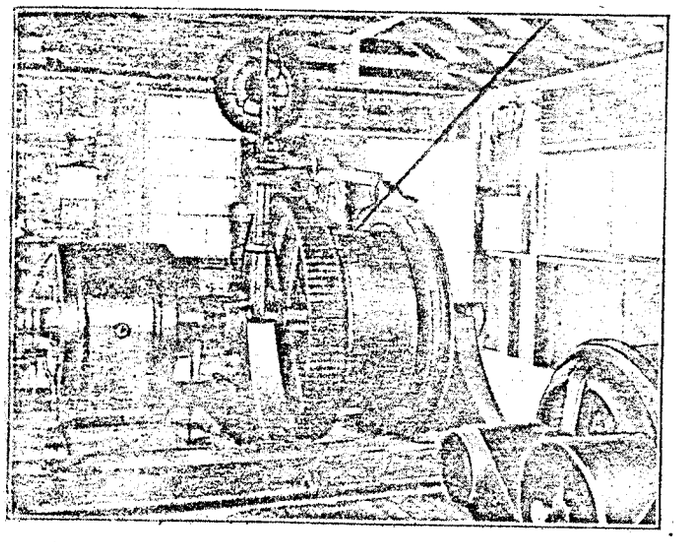
(a) Gold figured at $20 per oz., silver at $1 per oz., and the ratio gold to silver being 1 to 200.

The face of the northwest drift shows little value, and it is apparent that the oreshoot discontinues between the 50 and 100-ft. points.

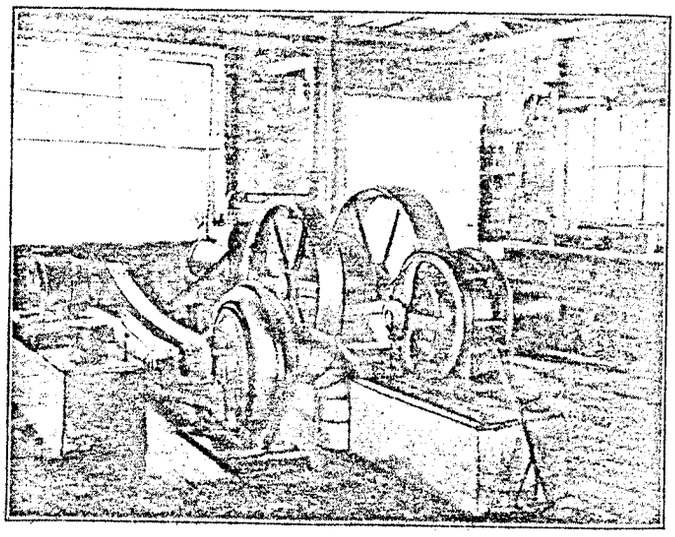
The oreshoot is not marked by well-defined walls, but follows a system of fairly well developed and persistent slips or fractures, which are followed in drifting. Crosscutting and assaying determine the limits of pay ore. On both the 265 and 370 levels there occur a remarkable series of transverse slip planes in the orebody, on which heavy gouges are found. These run in all directions, but are apparently confined between two main slips which follow the trend of the orebody. The ore is oxidized and contains silver in the form of chloride, cerargyerite. Certain interesting features of the ore and its treatment have already been pointed out by Jay A. Carpenter in the article to which reference has been made.

The Divide Extension has intersected an orebody in its No. 2 shaft. A width of 14 ft. on the 100-ft. level is claimed. The orebody has been opened along the strike for 35 ft. There is a distinct foot wall. The strike is 5 or 10 degrees east of north, and the dip 57 degrees to the northeast. The ore is of encouraging grade, and some exceedingly rich ore has been taken from recent sinking in the shaft.

The deepest shafts are the Tonopah Divide, 585 ft.; the Brougher Divide, 525 ft.; the Hasbrouck, 400 ft.; the Belcher Extension, 300 ft.; the Gold Zone, 500 ft.; the Rosetta Divide, 300 ft.; the Grimes Divide, 250 ft.; and the Silver Divide, 250 ft. There are a number of shafts which have reached the 100-ft. mark, and from this level crosscutting is being carried out in many instances.



HOIST AT GOLD ZONE DIVIDE MINE



COMPRESSOR AND FAN AT GOLD ZONE DIVIDE MINE

The usual shaft sunk is of the two-compartment type, both compartments being of the same size, either 4 x 4 or 4½ x 4½ ft. square. One compartment is used for hoisting and the other for a ladderway. In the event of ore being struck, the shaft can be used as a working shaft by the installation of pipes, hoisting counter-balance and power cables in the ladder compartment. This arrangement permits of an output of a maximum of 400 tons per day when properly handled. As the ground holds well, shaft sets are placed six feet apart and 2 in. lagging is used.

The usual equipment on the surface consists of a headframe, hoist and compressor building, protecting a single drum, gear-driven electric hoist and a belt-driven air compressor of a size sufficient to operate two hammer drills. Ventilation is secured by a No. 4 fan, belt, or direct-connected to a two or three horsepower motor and provided with by-pass arrangements so that it can be used either as an exhaust or blower. The fan and its accompanying motor are placed in a small wooden house close to the ladder compartment of the shaft. Ten-inch galvanized air-pipe is used. A blacksmith shop and timber shed complete the surface plant. An ordinary forge and shop equipment are used, power