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REPORT ON BETTY O'NEAL TUNGSTEN PROBEECT

By Oscar H. Hershey,
San Francisco, Calif.
October 4, 1928.

Mr. Charles H. Segerstrom, President,
Nevada-Massachusetts Company, Inc.,
Sonora, California.

Dear Sir:

During the last two days Mr. Heizer and I have been on a trip to investigate the geology of the Betty O'Neal tungsten prospect in Nye County, Nevada, about 35 miles by road from the railroad at Luning.

A thick series of blue-gray and brown limestone that normally dip westward 20° to 30° has been intruded by a rather fine-grained granite, near whichthe limestone has been much disturbed and marbleized, that is, largely recrystallized to a white marble. It is in this disturbed and altered zone that the scheelite-bearing vein occurs. It is basedupon a dike of fine-grained granite rock 2 to 4 feet wide that was injected into a steep fissure cutting the marble in an eastward direction. This dike is probably an arm of the granite that outcrops extensively in a southwest direction. After the dike was intruded much of it was greisenized. By that I mean that hot vapors ascended in it, developed many small flakes of white mica and deposited small prisms of tourmaline and a reddish brown bladed mineral that may be hubnerite. The bordering limestone to widths of 6 inches to 2 feet was largely altered to a greasy mineral that may be brucite, a hydrous magnesium oxide. In the closing stages of the process white quartz was locally deposited in seams and pockets, and small pockets of white to pale brown scheelite were formed in the greisen and in places in the brucite. Besides small grains that are not easily seen, the scheelite in places forms pure bodies upto 30 inches in length and in working the deposit doubtless much couldbe sorted out and shipped crude if desired.

In a second stage of mineralization portions of the vein received pyrite in cubes and a silver-bearing mineral. By oxidation the latter has made a gray stain and where this is present silver assays may be secured. Some black-spotted rock may have a silver-rich secondary sulphide. Mr. Alex Ranson who accompanied us says that a sample of thismaterial may be in a concentratable form and give the vein possibilities as a silver prospect.

At the prospect the vein has a course N75°E and has a tendency to dip northward 85°, It has been intruded by a dike of white, fine-grained rock that Mr. Heizer says was identified at the University of Nevada as a quartz-monzonite. This averages about 20 feet

in width and has a course northwest and dip southwest of 45° to 50°. Similar dikes occur east and west from the one at the prospect. They tend to follow the bedding of the limestone. Certain dark greenish gray lamprophyre dikes have northward courses and dip westward. They cut the greisen vein and the quartz-monzonite dikes.

Small seams of fault gouge material occur along the walls of the greisen and at the contacts between the dikes and limestone. One of these post-mineral faults that accompanies the vein has displaced the quartz-monzonite dike, throwing it westward 35 feet on the north side of the vein, as measured on the tunnel level. Between the greisenized dike, the brucite borders, the intrusive quartz-monzonite dike andthe post-mineral fault movements, the prospect seems rather complicated geologically.

At the surface I see a series of cuts and shallow shafts exposing scheelite-bearing vein matter at frequent intervals for a distance of 260 feet and width of 2 to 8 feet. At the east end the vein seems to pinch out abruptly about where the marble gives place to blue-gray limestone. There may be 70 feet more of scheelite-bearing greisen toward the west under a dump to a quartz-monzonite dike, along which the vein seems to be displaced northward 10 or 15 feet. Thence it runs west several hundred feet to the top of a ridge and down the west slope. The greisen core and the brucite borders are traceable by flat, occasional outcrops and one cut, but this portion of the vein is not known to be scheelite-bearing. Limonite float suggests considerable sulphide mineralization. Finally a cut is reached in which in place of greisen there is a dike several feet wide that dips south 80°. It has gouges on the walls and traces of brucite. The dike in a much iron-stained condition is traceable westward to near a fault under a large basic dike. Beyond that to near the granite there are tracesof mineralized zone that may represent the vein. But it may be said that west of a point several hundred feet west from the prospect the dike escaped greisenization and has no possibilities of scheelite, though it may carry more or less silver.

Tunnel No. 1, driven at a shallow depth, has been a disappointment, so I will analyze it in some detail. In thefirst place it did not begin on the greisen vein but 13 feet north of it, on a post-mineral fault, whose gouge dips north 70° to 75°. The rock under the gouge is partly brucite, with quartz seams and bunnhes, gray stains due to a silver mineral but no visible scheelite. Near the raise, 60 feet in, the tunnel reaches the greisen vein and for about 40 feet there is scheelite in a narrow band of gray greisen under the strike fault. This is cut off at survey station No. 4 by the quartz-monzonite dike. Thence for 35 feet the tunnel runs southeast along the hanging-wall of the dike, a small gouge that ~~dips~~ dips southwest 45° to 50°. This is the dike in its normal position south of the line of the vein and there is no reason to expect scheelite beyond station 4. A crosscut goes through the dike and exposes the footwall with a small gouge that dips southwestward 45°. Then a crosscut runs north 10 feet and exposes a light-colored dike 6 feet wide that has been driven upon 15 feet in an east diredtion.

This seems to be directly under the vein at the surface, judging from a Brunton survey made by Mr. Heizer. The problem arises whether this dike is a portion of the original dike that escaped greisenization or it is an arm of the later quartz-monzonite that was intruded along the vein. If the map is very nearly accurate there is a strong probability that the vein lies north of this dike. Therefore, I advised Mr. Heizer to continue the crosscut north beyond the dike a round or two. If it cuts the vein, then the situation will be as follows: The alteration of the dike was due to hot vapors that came from a great depth, from the central reservoir of the magma, and presumably the greisenization will not only extend deep along the dike, but probably become more intense with depth. In other words, the ore may extend deep, and may increase in length and richness. It should be developed by tunneling. However, the whole deposit may rake westward 45° or 50°, hence, the plan of tunneling for say point E as suggested by Mr. Heizer seems to me unsafe, because of the danger of passing east of the deposit and not even finding a vein to drive upon. A better site may be secured at a point about 650 feet N. 35° W. from survey stationNo. 1 at the mouth of the cut that leads to Tunnel No. 1. If the vein is vertical a tunnel driven about 670 feet S. 35° E. toward station No. 1 should cut the vein about 375 feet deep. Perhaps thisinvolves more tunneling than you want to do. By going up the slope on the same line a tunnel 400 feet long will give a depth of about 220 feet. That will be safer to reach the vein if it rakes westward. The quartz-monzonite dike will have passed west of the ore-shoot and will not make the trouble that it does in No. 1 tunnel.

But if the proposed crosscut in No. 1 tunnel shows only hard marble north of the dike in the most easterly drift, then I would drive east on that dike in the hope of finding it greisenized and ore-bearing. It will then become a question whether theunaltered dike is merely a short section that escaped greisenization, perhaps a sort of pocket with ore passing around it, or whether it means that the entire dike becomes unaltered at a shallow depth. Because of this uncertanty it will be well not to attempt any deep development, such as the tunnel proposed, and it will be advisable to trace the ore down by easy stages, either a winze or short tunnels.

You can see that much depends upon the little crosscut proposed on the No. 1tunnel level, north from station No. 7. I will be much surprised if the crosscut does not yield vein, for it seems unnatural for the greisenization to be shallow. If the vein is found in that crosscut I would advise against any further shallow work, but would say by all means proceed to runthe 400-foot level tunnel proposed, if not the lower one, in the expectation of getting a shoot of fair grade ore several hundred feet long, throwing in the rich bunches to sweeten the low-grade ore.

Respectfully submitted,

OSCAR H. HERSHEY.