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A Memorandum on the Gardnerville, Nevada, Tungsten Mine

Introduction. The Gardnerville tungsten mine, owned by the Rare Metals Corporation, is about twelve miles from Gardnerville, Nevada, and nine and a half miles from the main highway, US 395, which runs south from Reno. Mr. Ott Heizer of the Rare Metals Corporation permitted use of the corporation's map of the mine. Three days were spent bringing the map up to date and plotting the geology on the four hundred level, the three hundred level, and most of the two hundred level. A plane table and a Brunton compass with an alidade attachment were used in mapping on a scale of forty feet to the inch. It was urgent to map at least the lower levels, as work at the mine will stop soon, and water threatens to prevent a later investigation of those levels. The one hundred level was not examined, and details of the geology in the northern part of the two hundred level were omitted. There is no danger, according to Mr. Heizer, that water will reach these levels. Areal mapping also was postponed until the later investigation. Mr. A. Ransome in charge of operations, and Mr. W. Maus were obligingly helpful at the mine.

The mine is in interbedded dolomite, hornfels, and spotted schist which trend northwest, from N40W to N60W, and dip about 55° south. This metamorphosed sedimentary sequence is cut by usually minor zones of shearing and brecciation, most of which trend within a few degrees of north. Some beds tend to thin rapidly,

as shown by the ore bed at the southern end of the 200 level where within seventy-five feet its thickness decreases from about six feet to one foot. Tungsten ore occurs in only one bed, and decreases in value with depth, from a reported three to four per cent on the surface to a small fraction of one per cent on the four hundred level.

Petrography and Stratigraphy. The best stratigraphic section is exposed on the lowest level. The cross-cut from the shaft to the scheelite-bearing bed starts in a light colored, spotted schist. A gouge two to three inches thick separates this from about three feet of hornfels which lies with a normal contact on a light colored dolomite. The three foot bed of dolomite contains layers and lenses of light brown garnet, and quartz. Next down the section, a ten foot bed of hornfels contains a band about one and a half feet thick of silicate rock. Within the following fifty feet of dolomite two faults, probably of minor importance, may have changed the true thickness of the bed, as the same bed of dolomite farther north on the two hundred level is only twenty-five feet thick. A strip of hornfels in the dolomite between the faults dips twenty degrees more steeply than the usual dip of fifty-five degrees. Some of the dolomite is fine-grained and dark gray, some light-colored, and the rest light colored and coarse-grained. Irregular bands and lenses of light brown garnet are common in the lighter dolomite, especially in the coarse-grained parts. No distinction of the various degrees of alteration was made in mapping, as no scheelite was noted in any type. The next bed is eight feet of

spotted schist, in some of which the spotting and schistosity are quite obscure so that it looks like hornfels or argillite. About two feet from the base of the schist a lens of dolomite with light colored silicate minerals is about a foot thick. It does not appear in other exposures of the same schist. Directly under this the six foot bed of silicated dolomite locally contains molybdenite, notable powellite, and scattered grains of scheelite. On higher levels this bed carries scheelite ore. The base of the known section is rather light gray, spotted schist. On the next level it is exposed for a stratigraphic distance of twenty-two feet. The body of the rock appears to be sericite, with spots commonly a sixteenth^{of an} inch in diameter consisting of fine-grained aggregates of a greenish gray mineral and much less sericite. The schist at other places seems to grade into spotted and unspotted hornfels, of microscopic, hard, silicate minerals.

The section is essentially the same at other places as far as it is exposed. The lack of any igneous rock is conspicuous.

Mineralogy: The ore mineral is scheelite, which frequently occurs with powellite, especially on the lower levels. On the four hundred level powellite was found in considerable quantity independently of scheelite. Finely granular molybdenite is common. In some places it is associated with pyrite and occasionally with moderately coarse sphalerite. All of these minerals are in altered dolomite beds. Pyrite was found in all varieties of rock. Light brown garnet is the commonest silicate in dolomite, which carries also quartz and probably epidote. No microscopic determinations have been made. The carbonate mineral notably is dolomite rather

than calcite.

Ore Body. The ore is restricted to one bed of silicated dolomite about six feet thick. The best ore observed underground was two or three feet thick, mostly in the middle or lower part of the bed for about 120 feet along the southern drift of the two hundred level. The ore is said to run one and one half per cent. The ore body was cut off by a fault. The workings continued along the second dolomite bed, which is nearly barren.

Structure. The structure is a homocline of hornfels, schist, and dolomite, cut by faults. The beds strike N40-60W and commonly dip 55S, although the dip may be as low as 45° and as high as 75°. The usual range is from 50° to 60°.

The most important fault is exposed along the southeastern drift on the two hundred level. It is about N30W58S, nearly parallel to bedding at the southern limit of exposure where the beds strike nearer north than usual, and cuts across bedding at the northern limit of exposure where the beds resume their more usual attitude. The amount and direction of displacement are not known. In the northern drift on the same level another fault, N5E30W, displaced the ore bed horizontally about 15 feet. The faults in line with it on lower levels show no appreciable horizontal displacement except on the four hundred level where a zone of faulting approximately in line dips steeply southeast, and ends the same dolomite bed. On the intermediate, three hundred level, the corresponding bed seems to end lenticularly, without shearing in that direction. Other shear zones are inconsequential

as they were not seen where they should reappear, even on the same levels.

Estimate of Remaining Work. Twenty-two claims were reported to have been staked in the district, making a strip about two miles long and one third mile wide.

Mr. W. E. Maus has a hundred foot stope about two third^{of a} mile from the mine, and a shaft twenty feet deep approximately one and one half miles from the mine. According to Mr. Maus there is a good showing of ore. Thirteen of the claims are his.

The others are claimed by the Rare Metals Corporation. It owns also an excellent mill there, which could start running at once. The corporation, however, after the recent development work on the three and four hundred levels, does not consider the scheelite worth mining and milling at present.

Judging by the poor exposures and the amount of the district covered by an old alluvium, an areal map of the entire strip of claims would not be justified. However an areal map around the main mine, covering an area 720 feet by 960 feet on a scale of forty feet to the inch, and perhaps small maps around the other workings, would seem worthwhile.

No geologic mapping has been done on the one hundred level or down the second shaft to the two hundred level, and it has not been finished on the two hundred level. The areal and mine mapping could be done probably in not less than one week nor more than two weeks by two men.

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J. F. McAllister

Add to paragraph on Ore Body:

At the surface the ore was reported to run three or four per cent. On the three hundred level only small pockets of scheelite were observed, and even less on the four hundred level.

Twenty specimens were collected.