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Geology and Ore Deposits of Sierra County, New Mexico.  
Vanadium Deposits  
by

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### Location

The important deposits of vanadium-bearing ore in the Sierra Caballos are on the eastern slope of the Sierra Caballos and on the north side of Palomas Gap. The nearest station on the Albuquerque - El Paso line of the A. T. & S. F. R. R. is Cutter, 12 miles to the east, with which the mines are connected by a good desert road. Water at the mines is sufficient for domestic use only, but large wells have been drilled at Cutter and elsewhere along the railroad.

### History

Vanadium minerals were discovered in this area in 1909, altho the veins had been worked for lead for a number of years previously. As in many other districts, the original discoveries of lead were made by prospectors who tried to work the deposits on a small scale and intermittently. One by one, these small holdings were consolidated under the ownership of the Southwestern Lead & Coal Co., and much work was done during 1906 - 1908 on the Napoleon and Rosa Lee claims, where considerable low-grade galena ore was found. This company purchased the Dewey and White Swan claims from R. Widner in the fall of 1907 for \$3,000. Development work on these claims showed much low-grade lead ore, and in addition, much material on the upper levels containing brown hexagonal crystals that were taken for cerusite, lead carbonate. It was not until 1909 that these brown hexagonal crystals were determined to be vanadinite.

In that year A. B. Bement of Terre Haute, Ind., a stockholder in the company, took over the property and organized the Vanadium Mines Co. This company did extensive development work on the veins during 1910 - 1911, and experimented with a small mill that was originally designed for a lead concentrator, but the results were not highly successful. Water had to be pumped from wells 4 miles east. The crude vanadinite concentrate was shipped to Cutter, where a plant had been erected in which the concentrates were leached with sulphuric acid to obtain the vanadium sulphate in solution and the lead sulphate as a residue. The pregnant solution was evaporated to dryness and the residue calcined to obtain the vanadium oxides. Leaching was difficult, due to the formation of a coating of lead sulphate over the mineral grains, which protected the inside from further leaching. The plant operated only a short time and produced not more than a few hundred pounds of vanadium oxide before it was finally shut down. During the period of operation in the district much interest was manifested in the venture, and several articles on the geology and operating problems of the region appeared in the technical press.\*

The third and only other vein of importance is the Red Top, one end of which was originally owned by R. Widner and the other end by J. H. Hardin. This vein also was originally prospected for lead by means of a shaft and drifts. The Red Top vein is about  $3/4$  of a mile south of the Swan and Dewey veins and on the south side of Palomas Gap.

#### Property of the Vanadium Mines Co.

The holdings of the Vanadium Mines Co. include two veins. The vein on the north side of the Gap is known as the Dewey, and that on the south side the White Swan. Each vein is developed by a shaft about



400 feet deep, and by nearly 1,000 feet of lateral workings. On the Dewey vein the vein material has been removed for a width of 6 to 12 feet in open cuts and along a drift, and stoping has been done to a height of 30 feet above the drift. The vein is open textured and spongy, and the minerals are all oxidized. At other places in the vein near the surface, the vein matter is predominantly brecciated limestone, which is coated with a thin yellowish-green crust of mixed brown vanadinite and green cuprodescloizite. At the east end of the outcrop, well-developed crystals of vanadinite 1/8 inch or more in diameter have been mined. Many of these crystals are hollow.

The White Swan vein is similar to the Dewey, but it is vertical, and considerable wulfenite is mixed with the vanadinite. The gangue and ore minerals comprise all of those listed above as occurring in the district. The vanadinite is mostly brown crystals, which are so small as to give a velvety appearance to cavities lined with them. Under the binocular microscope, they appear as a glistening mass of crystals, radiating in all directions from the irregular surface of the cavities. Many of these cavities are evidently the result of the decomposition of galena. Great numbers of colorless or nearly colorless crystals of vanadinite may be seen under the microscope scattered thru the gangue and immediately adjacent wall rock, and some of the unpromising looking material is said to carry moderate amounts of vanadium.

#### Red Top Vein

About 3/4 of a mile south of the White Swan vein, R. Widner has located 4 claims on the Red Top vein, which from southwest to northeast are named the Gladys, Red Top, Red Top Annex, and Billiken claims.



Northeast of this group, J. H. Hardin has a claim called the Owl. The strike of the vein is parallel to the White Swan and the dip is  $60^{\circ}$  NW. This vein is about 4 feet wide. The vein material consists of brecciated limestone, much disintegrated and cemented with secondary calcite, and white and pink fluor spar. Some galena is scattered thru the ore. About a foot of the vein is very spongy and shows the effect of leaching by surface waters, and it is within this portion that crystals of vanadinite appear and occur. The vanadium content of these veins has been estimated at from 1 to 3 per cent, with the latter estimate probably much too high.