Zeitschrift: Eclogae Geologicae Helvetiae

Herausgeber: Schweizerische Geologische Gesellschaft

Band: 58 (1965)

Heft: 1

Artikel: Magnetic profiles along mineralized fissure in the Quitman Mountains of West Texas, U.S.A.

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DOI: https://doi.org/10.5169/seals-163276

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Magnetic Profiles along Mineralized Fissure in the Quitman Mountains of West Texas, U. S. A.

by **Emil Ott**, San Angelo (Texas, U. S. A.)

With 1 text figure

Professor JOOS CADISCH, who is being honored with these papers by his friends and by his former students, did considerable work for a mining concern in the early 1930's. This paper shall bring back memories of this particular activity in his professional life as a practicing geologist.

This study shall demonstrate the usefulness of the magnetometer in exploration for ores.

The NW end of the Quitman Mountains in western Texas lies ten miles from the Mexican border, the Rio Grande river. Here a quartz-syenitic intrusive mass is exposed in the surface. Toward the SE it disappears under lower cretaceous sandstones and limestones. The contact is marked by a metamorphic belt which contains mineralizations of no commercial value.

To the NW lie the Malone Mountains where the only marine Jurassic limestones are exposed in the surface within the State of Texas. These marine sediments yield fossils abundantly and they relegate these rocks to the Sequanian and Kimmeridgian subdivisions of the Jurassic formation.

The entire region has been subjected to orogenic movements of the «Laramide Revolution» of post-cretaceous and pre-tertiary age. The laramide folding and thrusting period was accompanied by extensive intrusions of granitic-syenitic and dioritic magmas and extrusions of rhyolites and basalts. The Quitman Mountains' quartz-syenitic intrusion originated during the «Laramide Revolution».

This igneous massif is bisected by a transversal fault which strikes N80°E and is marked by a porphyry dike. Later pneumatolitic and hydrothermal activity mineralized parts of the porphyry.

The main mineral vein belongs to the lead-zinc-silver type with silver-bearing galena (PbS) and sphalerite (ZnS) the principal minerals. In the Bonanza mine on the east slope and the Alice Ray mine below the saddle in the Quitman Mountains on the west side these ores have been haphazardly mined from time to time. Accessory ores are of iron, copper, silver, nickel, uranium, tungsten, gold, molybdenum and manganese. Up to thirty ounces of silver per ton have been found in the galena. Some pyrites are gold-bearing.

The writer made six profiles across this main mineral vein (see Fig. 1). The first two profiles were run in the alluvium-filled valley east of the Bonanza mine and a number of secondary mineral veins were discovered.

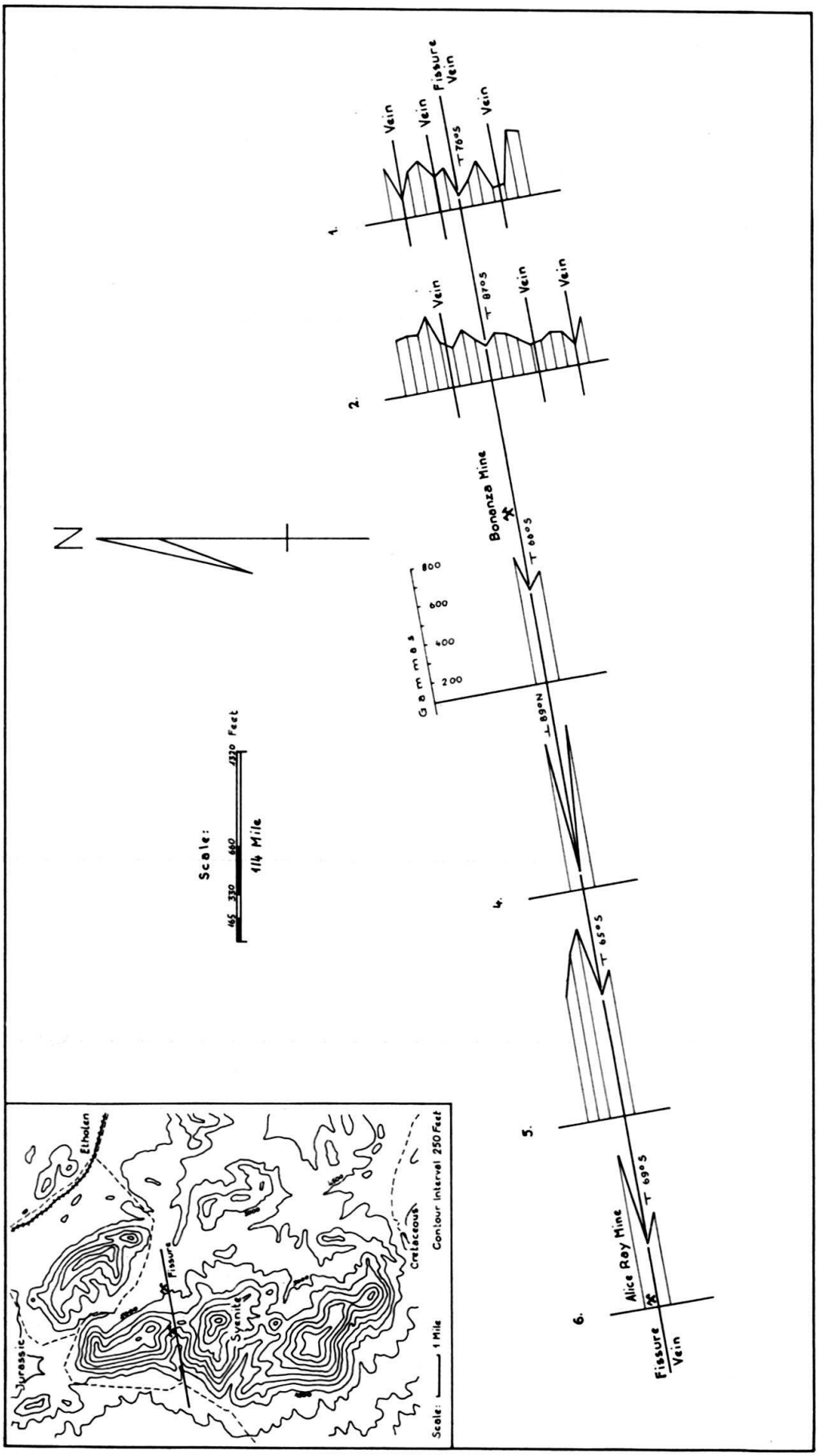

Fig. 1. Magnetic profiles along mineralized fissure in the Quitman Mountains of West Texas, U.S.A. Inset map: Quitman Mountains.

Used in this survey was an Askania type magnetometer measuring the vertical component of the magnetic intensity of the earth's magnetic field.

The magnetic susceptibility of minerals is very low; in fact some minerals are diamagnetic, having negative susceptibilities. The magnetic susceptibility of the surrounding igneous rocks is high: they are all paramagnetic.

The resulting contrast can be readily seen in the six attached profiles. This contrast is in direct proportion to the mineral mass in the veins. Stations were made 85 ft apart. The profiles allowed the correct determination of the dips of the sheeted mineral veins. Almost all dip to the south from 65.5 to 87 degrees, and in profile No. 4 the main mineral vein dips 89 degrees to the north – it is almost perpendicular in this spot.

The purpose of the magnetic work was to determine the course of the mineral veins, to discover additional veins where alluvium covered them, and the possible determination of the mineral mass and the dips of the sheeted mineral veins. The magnetic survey proved its usefulness.

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