

## DISSEMINATED DEPOSITS AT THE ESPERANZA COPPER MINE

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The Esperanza copper mine of the Duval Sulphur and Potash Company is located four miles southwest of the Twin Buttes mines. It is being prepared for operation to begin in the spring of 1959.

In contrast with some of the other recent discoveries of low-grade copper deposits south of Tucson, the Esperanza property is a typical porphyry copper deposit. The known ore is an enriched chalcocite blanket about 3,000 feet in diameter and 130 feet thick. A submarginal block of primary or hypogene protore lies in a restricted area below the blanket. The oxidized capping or overburden averages about 95 feet thick. In addition to the copper, there is enough molybdenum in the ore to increase its value significantly. The gold and silver content is low.

The ore body lies chiefly in three types of rocks -- a clastic series composed largely of graywacke, arkose and conglomerate-breccia, an intrusive andesite and a quartz monzonite porphyry.

There are two marked structural lineations in the area -- N. 30° to 40° W. and N. 50° to 70° E. -- of which the latter is the more prominent. The quartz monzonite masses in the ore trend N. 30° to 40° W. They are apophyses of a large mass of quartz monzonite which lies a few hundred feet north of the ore body. Several pre-ore faults, along some of which dikes have been intruded, also trend N. 30° to 40° W. The mine area is generally sliced up with pre-ore faults trending N. 50° to 70° E. A single prominent pre-ore fault strikes east-west and dips 25° to 30° south. This fault marks the north side of the ore body. Most of the ore is a breccia which looks like a rubble in the area now being stripped. Near the surface the breccia appears to have been incorporated in landslides.

Most of the host rock and much of the wall rock have been greatly altered. The most prominent secondary hypogene minerals are quartz, biotite, clay minerals, sericite(?), and chalcopyrite and pyrite. There is also minor chlorite and epidote. The most prominent supergene minerals are clay, goethite, jarosite and hematite, chalcocite, malachite, azurite, cuprite and turquoise.

The ore outline in depth, as developed by drilling, is marked roughly at the outcrop by a "geological" anomaly. Before drilling started the criteria used to outline this anomaly were largely the following: (1) Moderate to intense clay alteration; (2) megascopic sericite; (3) quartz veins; (4) copper staining; (5) moderate to strong brecciation; and (6) prominent goethite and minor jarosite and hematite. When drilled out, the ore outline slightly exceeded the limits drawn by the preliminary geologic work.

The quartz monzonite and quartz monzonite porphyry are characterized by biotite and oligoclase. Petrographic work revealed syenite and nepheline syenite in one drill hole.

\* Preliminary examination, geological anomaly and petrographic work.

\*\* Detailed mapping and trace-element studies.

\*\*\* Detailed mapping.