The Tyrone district

Frank J. Kleinhampl, 1953, pp. 131-133

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Southwestern New Mexico, Kottlowski, F. E.; [ed.], New Mexico Geological Society 4th Annual Fall Field Conference Guidebook, 153 p.

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Mineralization

A period of mineralization probably accompanied or followed closely the intrusion of the large granodiorite porphyry stock. This mineralization was largely a part of the widespread hydrothermal alteration which was the final stage of the intrusion. The primary ore mineral chalcopyrite was precipitated from hot aqueous solutions, and due to the varying character and the broken nature of the host-rock both disseminated and vein deposits were formed.

Enrichment

Ore deposits of commercial grade were formed by secondary enrichment processes. Chalcocite, the principal ore mineral, occurs as truly disseminated blebs and also in small veinlets and stringers. The abundant pyrite it replaces may be merely coated with a thin film or be partly to almost completely destroyed. Other copper minerals occurring in minor quantities are native copper, cuprite, malachite, azurite and chrysocolla. Quartz, sericite, halloysite, and other clay minerals are common gangue constituents.

Alteration

Patterson and Kerr (1947, p. 1-3), Columbia University, who made a study of the alteration at Santa Rita divided granodiorite porphyry of the stock into four stages. They say, "... The granodiorite porphyry containing vitreous black biotite and glassy feldspar phenocrysts was designated Stage One of alteration. Stage Two was characterized by dull-gray-black chloritized biotite and altered feldspars. Stage Three included all granodiorite porphyry showing hydromica pseudomorphs after biotite. The final stage of alteration, Stage Four, showed no relicts of the original biotite and only widely scattered feldspar phenocrysts. The most highly altered granodiorite porphyry of Stage Four is essentially a quartz-sericite rock lacking phenocryst relicts ...". They state further, "... A striking correlation between the ore values and the alteration stages was evident. Generally, the highest ore values occurred in zones of Stage Three alteration. Stage Four was of secondary importance. Although Stage Two had not figured prominently in recent operations, assay values obtainable indicated poor production ...".

The Ore Body

The ore body is very roughly tabular, and is circular in plan. The largest segment by far is in the south and southwest parts of the stock and adjacent rock. The ore body was buried under oxidized capping ranging in thickness from nothing to four hundred feet. It is very irregular in thickness and in a few isolated places reaches a maximum thickness of six hundred feet. Chalcocite has been noted to a depth of approximately one thousand feet in prospect drill holes and in one instance, native copper and oxidized copper minerals have been identified at a depth of approximately twelve hundred feet.

THE TYRONE DISTRICT

Abstracted by
Frank J. Kleinhampl*

This information on the Tyrone district was taken from U. S. Geological Survey Professional Paper 122 (Paige, 1922).

The Tyrone district was discovered by Robert and John Metcalf about 1871. Previous to that, Indians mined turquoise from shallow pits. In 1904 the Phelps Dodge Corporation bought a third interest in the Burro Mountain Copper Company and later, in 1913, purchased most of the claims in the district. After extensive exploration and development, the Phelps Dodge Corporation began mining. Operations were continued during World War I and for a few years thereafter. Since about 1921, production has come mainly from leaching operations, which reached a peak during World War II. The Tyrone district lies 10 miles southwest of Silver City. Its principal settlement is the town of Tyrone, now nearly abandoned. Leopold, an abandoned town, lies about a mile southwest of Tyrone. The Continental Divide passes diagonally through the area from the southwest to the northeast corner.

All the dominant topographic features of the district are primarily the result of erosion of rocks of varying hardness under special topographic conditions in a semiarid climate. The Little Burro Mountains is a homoclinal fault block with a precipitous southwest-facing scarp and a gently sloping, partly gravel-covered northeastern slope. The Big Burro Mountains is an erosion remnant bordered by a rock-cut surface that merges into a gravel plain along its

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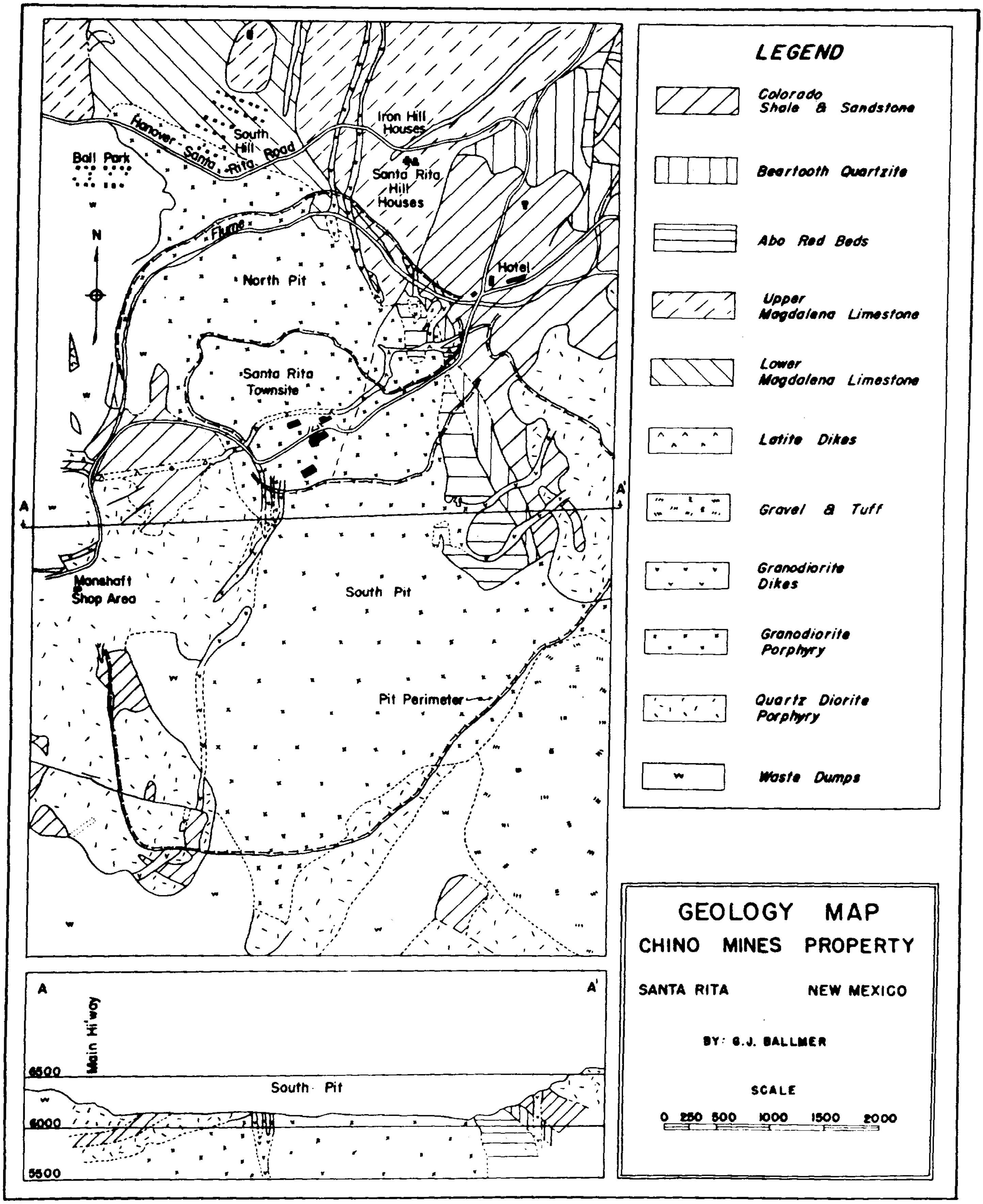

Iron Hill Houses
South Hill
Hanover - Santa - Rita Road
Ball Park
Santa Rita Hill Houses
Flume
N
North Pit
Hotel
Santa Rita Townsite
A
A'
Manshaft Shop Area
South Pit
Pit Perimeter
A
A'
Main Hi'way
6500
South Pit
6000
5500
LEGEND
Colorado Shale & Sandstone
Beartooth Quartzite
Abo Red Beds
Upper Magdalena Limestone
Lower Magdalena Limestone
Latite Dikes
Gravel & Tuff
Granodiorite Dikes
Granodiorite Porphyry
Quartz Diorite Porphyry
Waste Dumps
GEOLOGY MAP
CHINO MINES PROPERTY
SANTA RITA
NEW MEXICO
BY: G.J. BALLMER
SCALE
0 250 500 1000 1500 2000

outer border; this extensive gravel plain slopes gently away from the Big Burro Mountains to the northeast, east, and southeast. Within the planated area, there is a panlike depression formed by the erosion of unaltered quartz monzonite porphyry.

All of the igneous rocks of the Tyrone district are intrusives. The following types have been recognized: Precambrian granite, quartz monzonite porphyry, and quartz monzonite; aplitic dikes, some of which are allied to the granite and some to the quartz monzonite; rhyolite dikes; and quartz latite porphyry of unknown age.

Semiconsolidated sand and gravel, composed of material derived from the surrounding mountains, also occurs within the district, especially in the northeast part and along the northern border in Mangas Valley.

The structural relations of all the rocks of the Tyrone district are due mostly to intrusion, faulting, and fracturing.

A main stock of quartz monzonite porphyry intrudes Precambrian granite. The stock is roughly circular in outcrop and covers an area of about 15 square miles. The northern contact of the stock dips to the south, but the attitude of the other walls is not visible. Island-like masses of granite within the stock may or may not be roof pendants. Definite evidence of large-scale stoping has not been found.

A large northwest-trending fault, forming the southwestern scarp of the Little Burro Mountains, crosses the Tyrone district. East of this fault the Precambrian rocks and overlying Cretaceous sedimentary rocks of the Little Burro Mountains are tilted eastward. No evidence of overthrusting has been found in this region; all the major breaks are considered to be normal faults.

The sequence of intrusion, folding, faulting, fracturing, and mineralization occurred in Late Cretaceous time. Movement along the fault planes in the region have persisted to a late date, and evidence for post-Pleistocene movement along some faults exists.

The Tyrone district contains a wedge-shaped zone of intense fracturing with its apex 2 miles southwest of Leopold and its northeastern boundary along the gravel-igneous rock contact between Tyrone and New Mexico Highway 180. The change from extremely fractured rock to rock that is much less broken is very abrupt along the northwestern edge of the fracture area but is very gradual along the southeastern edge.

The position of the major zone of fracturing is independent of rock type. Fracturing is directly connected with faulting; in some places the movement took place along a great number of closely spaced fractures. An analysis of the fracture systems within the mines shows that the trends are not everywhere the same, but the greatest number of fractures dip to the east at moderately high angles.

The original constituents of the rocks in the fractured zones in the Tyrone district – the feldspars, biotite, and hornblende – have been partly or entirely replaced by sericite, quartz, and pyrite, with lesser amounts of chlorite, biotite, and chalcopyrite. Superimposed upon this primary alteration have been changes involving secondary enrichment of copper minerals. Fracturing was the necessary forerunner of all alteration, for the rocks that are not fractured show no appreciable alteration, and the intensity of alteration is a direct function of the intensity of fracturing. The degree of alteration is almost independent of rock type.

The principal copper deposits of the Tyrone district are chalcocite ore bodies in quartz monzonite porphyry and granite. The deposits exhibit all the characteristics of typical porphyry copper ore bodies. Only secondarily enriched bodies have proved minable in the past. The chalcocite is either disseminated regularly throughout large masses of fractured country rock or concentrated along exceptionally strong veins or shear zones. Valuable ore bodies of both types have been found. The deposits are clearly related to zones of intense fracturing and do not occur where such fracturing is lacking. The deposits of secondary copper have been impoverished in some places by renewed oxidation and natural leaching by ground water.

WHITE SIGNAL URANIUM DEPOSITS

by
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The White Signal district lies just south of the Burro Mountains, about 18 miles southwest of Silver

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