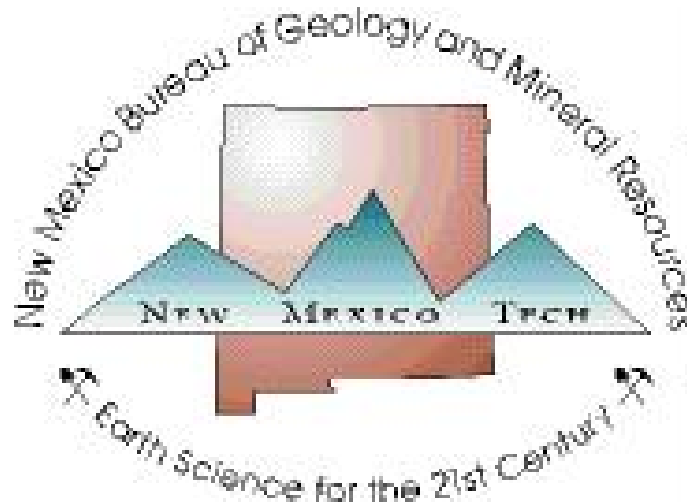


Copper Flat mine, Hillsboro, NM—2020



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New Mexico Tech

Copper Flat mine

- The Copper Flat mine is a proposed copper mine in the Hillsboro mining district in Sierra County and is being developed by the New Mexico Copper Corporation
- New Mexico Copper Corporation is a wholly-owned subsidiary of THEMAC Resources Group
(<http://themacresourcesgroup.com/about>)



Looking west at Copper Flat, Hillsboro district, Animas Mountains. Copper Flat forms the gap. The peaks are andesite. The Black Range forms the skyline.

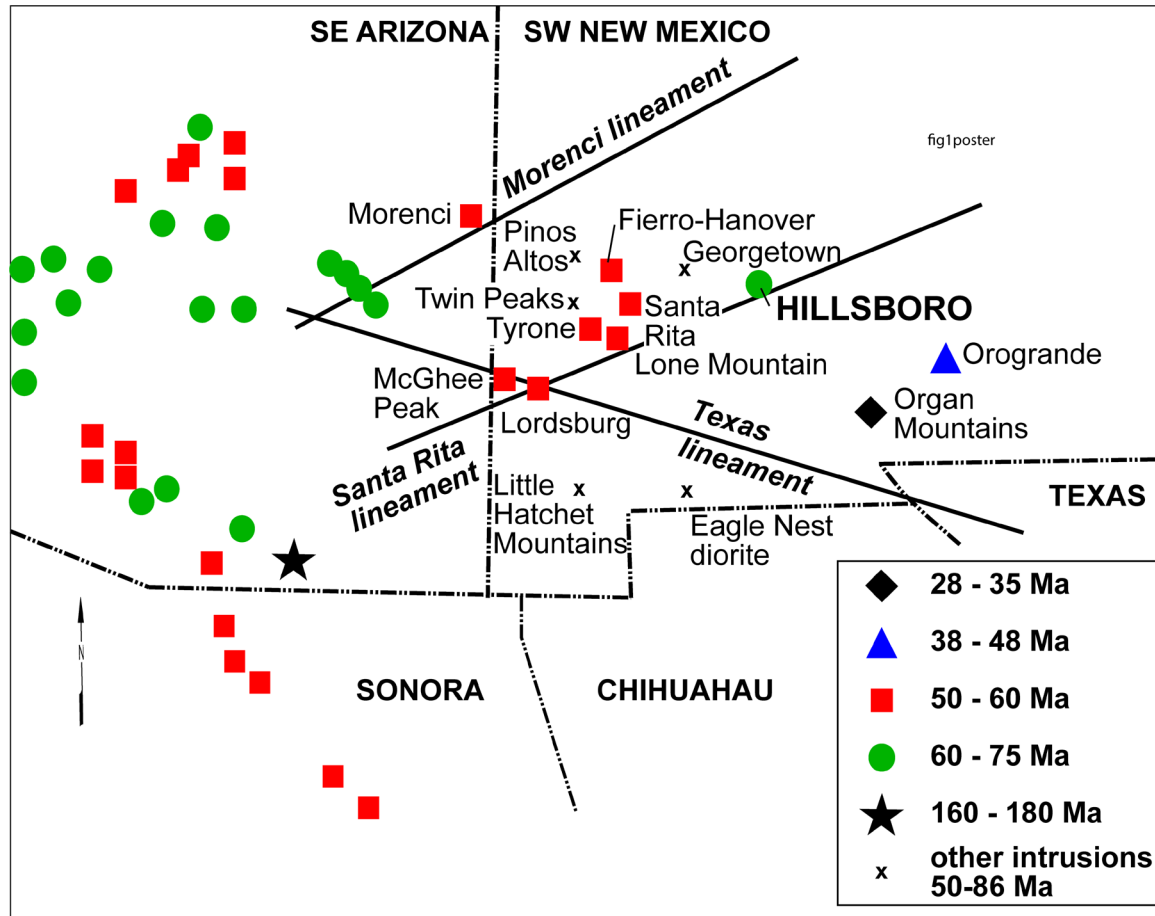
Importance of copper

- Copper is number 29 on the periodic table and is a nonferrous metal
- Copper is one of the most important metals because of its high ductility, malleability, thermal and electrical conductivity and resistance to corrosion
- Copper is easily alloyed to form brass (copper, zinc), bronze (copper, tin), and even copper-nickel
- It ranks third after iron and aluminum in terms of quantities consumed in the USA
- It is used in electrical applications, building construction, transportation equipment, consumer and general products, industrial machinery and equipment
- One of the most important uses of copper is to transmit electricity, for example from green technologies like solar and wind installations to your home and business

Copper Flat is a copper porphyry deposit

- Large (many millions of tons of ore), low-grade ($<0.8\%$ Cu) copper deposits of disseminated and stockwork veinlets of copper minerals that are associated with porphyritic intrusions
- Generally hosted by granitic rocks with chalcopyrite and other copper minerals disseminated throughout the fractured host rock
- Porphyritic refers to a specific texture of an igneous rock consisting of large-grained crystals such as feldspar or quartz dispersed in a fine-grained matrix or groundmass
- Generally mined by open pit
- Many copper porphyry deposits also include economic amounts of by-products such as molybdenum, silver, and gold
- Elements such as platinum, tellurium, indium, germanium, and gallium are recovered from the material remaining after smelting the ore concentrate

New Mexico is the eastern part of a large belt of copper porphyry deposits in southwestern United States and northern Mexico



History

- In 1892, the first copper smelter in the town of Hillsboro was developed
- Exploration in the 1950-1960s by Newmont Mining Company (Newmont) and Bear Creek Mining Company (Kennecott's former exploration subsidiary)
- Quintana Minerals produced for 3 months in 1982, but closed due to the low price of copper (\$0.70/lb)
- Alta Gold acquired the property in 1994 and drafted a EIS for the project in 1999, but went bankrupted due to financial difficulties at other mines

Copper Flat mine, Themax Resources

Planned production per year for ~15 yrs

50.76 mill lbs Cu

1.01 mill lbs Mo

12,750 oz Au

455,390 oz Ag

Start in 2020s?

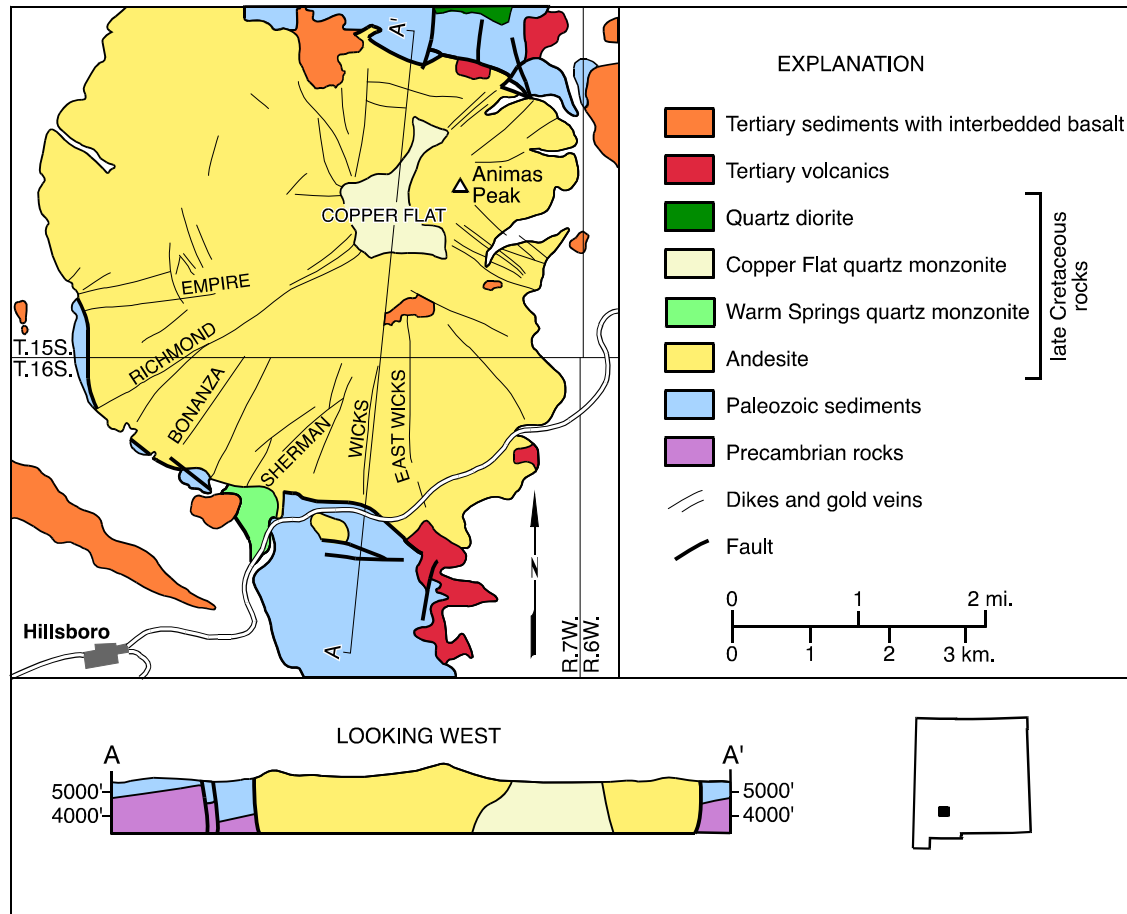
Pit lake (remaining from Quintana Minerals operation), looking east



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Monitoring wells are throughout the mine area to measure differences in water levels, chemistry, and water flow. Hydrologists use these data to model and predict the water flow and quality before, during, and after mining.

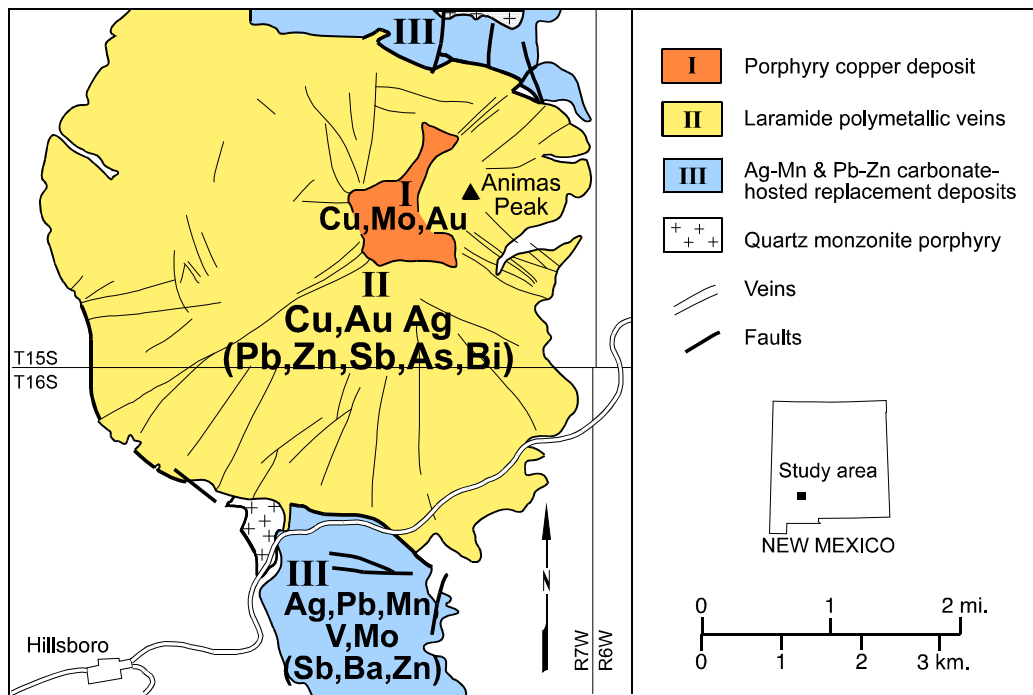


Geologic map of the Hillsboro district.

Copper Flat forms the center of the area (light yellow) surrounded by dikes and gold-silver-copper veins

Sequence of events in the Hillsboro mining district

GEOLOGIC EVENT	AGE	MINERALIZATION AND ALTERATION
Eruption of alkali basalt	4 Ma	None
Uplift of the Copper Flat volcanic/intrusive complex followed by erosion	21-22 Ma to present	Minor supergene enrichment of porphyry copper deposit, Placer gold deposits
Eruption of Sugarlump and Kneeling Nun Tuffs (Emory caldera)	35-34 Ma	None in the Hillsboro district
Burial? or possibly minor erosion?	75 Ma to 35 Ma	Minor supergene enrichment of porphyry copper deposit?
Formation of jasperoids	75-35 Ma	Followed by deposition of carbonate-hosted replacement Ag-Mn and Pb-Zn deposits
Latite and quartz latite dikes	75-70 Ma	Vein (Au, Ag, Cu) deposits, type 4, 5, and 6 alteration (Table 3)
Intrusion of quartz monzonite porphyry and formation of breccia pipe deposit	75 Ma	Porphyry copper deposits (Cu, Au, Ag, Mo), type 1, 2 and 3 alteration (Table 3), formation of skarn and marble in limestone
Eruption of andesite volcano	75 Ma	None, possible early deuteric alteration
Deposition of the Copper Flat porphyry copper and vein deposits and formation of jasperoids most likely overlapped in time. From McLemore et al. (1999, 2000b).		



DISTRICT ZONING

- I—porphyry-copper deposit forms the center of mineralization (Cu, Mo, Au)
- II—propagating outward radially from the Copper Flat quartz monzonite are Laramide Au-Ag-Cu veins (Pb, Zn, Sb, As, and Bi) hosted by many of the latite and quartz latite dikes
- III—carbonate-hosted replacement deposits in the southern and northern parts of the district, distal from the center (Ag, Pb, Mn, V, Mo Sb, Ba, Zn)

Acid seep provides
NM Tech students
opportunity to study
microbes associated
with forming acid



NMT student collecting acid seep material



Foundations of Quintana Minerals mill



Website:

[http://themacresourcesgroup.com/copper flat mine](http://themacresourcesgroup.com/copper_flat_mine)