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Mineralized breccia pipes are roughly cylindrical, near vertical struc-

~~Bagdad Mine~~- Yavapai Cty
COPPER BASIN

PORPHYRY COPPER MINERALIZATION ASSOCIATED WITH THE CENTRAL ARIZONA GREENSTONE BELT

CENTRAL ARIZONA GEOLOGICAL SOCIETY FIELD SYMPOSIUM

FEBRUARY 23-24, 1985

FIELD GUIDE

DAY 2

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DAY 2

FIELD TRIP GUIDE

AFTER LEAVING THE MAIN GATE OF THE BAGDAD MINE, RETURN ALONG THE SAME ROUTE THAT YOU FOLLOWED TO KIRKLAND. CROSSING THE RAILROAD TRACKS, TURN RIGHT ON TO THE KIRKLAND-SKULL VALLEY ROAD AND PROCEED ON TO THE SKULL VALLEY CAFE. (FOR THE ROAD LOG FOR THE SECTION FROM KIRKLAND TO SKULL VALLEY, REFER TO THE ROAD LOG FROM PRESCOTT TO THE ZONIA MINE, DAY 1) TURN RIGHT PAST THE SKULL VALLEY CAFE AND CONTINUE ON TO THE COPPER BASIN MINE AREA.

MILEAGE: DESCRIPTION

0.00 Begin road log at the turnoff to the Copper Basin Rd.

0.20 Turn to the right on to Copper Basin Rd. This is at the end of the pavement and you will be turning right past the church.

0.70 Intersection of the Copper Basin Rd. and the Boston-Arizona Rd. Turn right and continue on the Copper Basin Rd.

0.90 On the right in the bottom of the wash is a borrow or gravel pit that is currently inactive but was an area of considerable past placering activity.

3.30 Contact with the overlying Quaternary pediment material and the underlying granite gneiss and schist.

4.80 Turnoff to the right for the Old Navy Mine, an early day Cu-Pb-Zn-Ag producer. The mineralizaion was associated with a NE striking vein

4.90 Road intersection, continue on the main road straight ahead. The left hand fork goes to the old Plymoth Mine, an old gold producer. Also off to the left and behind us are a series of volcanic necks of rhyolitic composition that are of probable Tertiary age.

5.60 Rim of Copper Basin.

5.80 Turn left off of main road on to side road.

6.00 Turn right. Off to the right is a molybdenum bearing breccia pipe. This is the Copper Hill area (STOP 1). The Copper Hill mine was originally operated in World War I and then reactivated in World War II for molybdenum production. The molybdenite mineralization is found throughout the area in association with quartz veins, veinlets and as disseminations in the fractured and altered older Precambrian units. The mineralization is associated with high silica-sericite alteration areas within the fractured units. Molybdenum mineralization in the general vicinity of the Copper Hill and Quartz Hill area averaged .2 to .3 % Mo with .7 to .9% Cu. Laramide Quartz diorite intrusives are also in this general vicinity. RETURN TO THE VEHICLES AND RETURN ALONG THE ROAD THAT WE CAME IN ON.

6.20 Turn left on to the road to go to the Copper Hill mine shaft area. On the right are outcrops of sediments or welded tuffs. These units are most likely of Tertiary age.

6.30 Copper Hill shaft (STOP 2). Stop here and examine the dump material; then proceed off the dump to examine the outcrops in the wash. Return to the vehicles and proceed to the left on to the main road.

6.50 Turnoff to the right goes to the old McNary Mine, an old high-grade gold producer. Mineralization was associated with veins.

6.70 View to the southeast of rhyolite plug on the south margin of the basin.

6.80 Contact between the Quartz Diorite and the Monzonite.

6.85 Exposures of altered, fractured and pyritic monzonite along the wash. (STOP 3) We are in the pyritic outer halo of the deposit and are outside the limit of economic mineralization below. The predominant alteration assemblage is quartz-sericite-clays. Return to the vehicles and continue along the main road. From this point on your will be traversing areas that have economic Cu-Mo mineralization in the subsurface. The mineralization starts at about 40 feet in sulfides. Thus, a very low stripping ratio. The orebody contains approximately 500 million tons of material, approximately 175 million tons are considered to be economic with 40 million tons of overburden that would have to be stripped.

7.00 Cross cattle guard and bear left on to the road to the Gabrina Hill Pipe and the Commercial Mine.

7.10 Road intersection, take the right hand fork.

7.30 STOP 4, Take a look at the contact relationship between the latite dikes and the monzonite. Return to the vehicles and continue along the base of the Commercial Mine dumps, noting the breccia material with associated oxide copper mineralization.

7.40 Road intersection, turn right and continue on to the right.

7.60 Road intersection with Copper Basin Road (STOP 5). Take a look at the stockwork fracturing and alteration of the monzonite in road cut. In the adjacent wash a recent field trip from Yavapai College recovered a 2 pennyweight gold nugget. Return along the route that we came in on to the last road intersection.

7.80 Take the LEFT FORK at the road intersection. Note the stockwork mineralization as you come out of the crrek on the right hand side.

8.00 Contact of the Monzonite and the earlier intrusives. (STOP 6) Note the mineralized veins along the contact. BRING YOUR GOLD PANS.

8.10 Road intersection, turn left here and continue down into creek bottom.

8.20 On the right hand side across the creek are some other breccia features that were part of the Gibbs claims that were purchased in the 1960's. We are now in the center of the ore shell.

8.30 Locked gate. Continue through the gate. notice copper mineralization on the left hand side.

8.40 Turn left on road up the hill. In this area the mineralization was consistent enough so that Phelps Dodge was able to drill the property on a 400 foot grid.

8.50 Off to the northeast are placer operations that are supposedly the second largest in the county. Contrary to popular belief the gold values encountered in the drilling were in the PPM range. The source of the gold mineralization is thought to be from the Precambrian granites and vein structures in the Sierra Prieta. As one continues along this road we are traversing the southeast flank of a breccia pipe that is barren of economic mineralization.

8.60 Left hand turn. Ahead is the Gabrina Hill area. Recent drilling operations encountered mineralization in the Quartz Monzonite.

8.80 Road intersection, take the left hand fork.

9.00 Aztec Area (STOP 7). Take a look at the exposed oxide copper bearing stream gravel mineralization. Copper Basin Wash must have been originally to this level to deposit these gravels. BE CAREFUL, THERE ARE A NUMBER OF OLD STOPES IN THIS AREA. Return to vehicles and the road intersection and return along the route we came in on. TAKE THE LEFT HAND FORK AT THE INTERSECTION.

10.1 Road intersection, take right hand branch and go up the hill to the collapsed stope area.

10.6 Collapsed Stope area (STOP 8) Note the degree of brecciation, alteration and mineralization. Cuprite crystals can be found in the vugs here. RETURN TO THE VEHICLES AND RETURN DOEN THE HILL TO THE ROAD INTERSECTION. TURN RIGHT AND CONTINUE PAST THE SURFACE WORKINGS TO THE MAIN COPPER BASIN ROAD AND THEN OUT TO SKULL VALLEY. END OF DAY 2. HAVE A SAFE TRIP HOME.

ABSTRACT

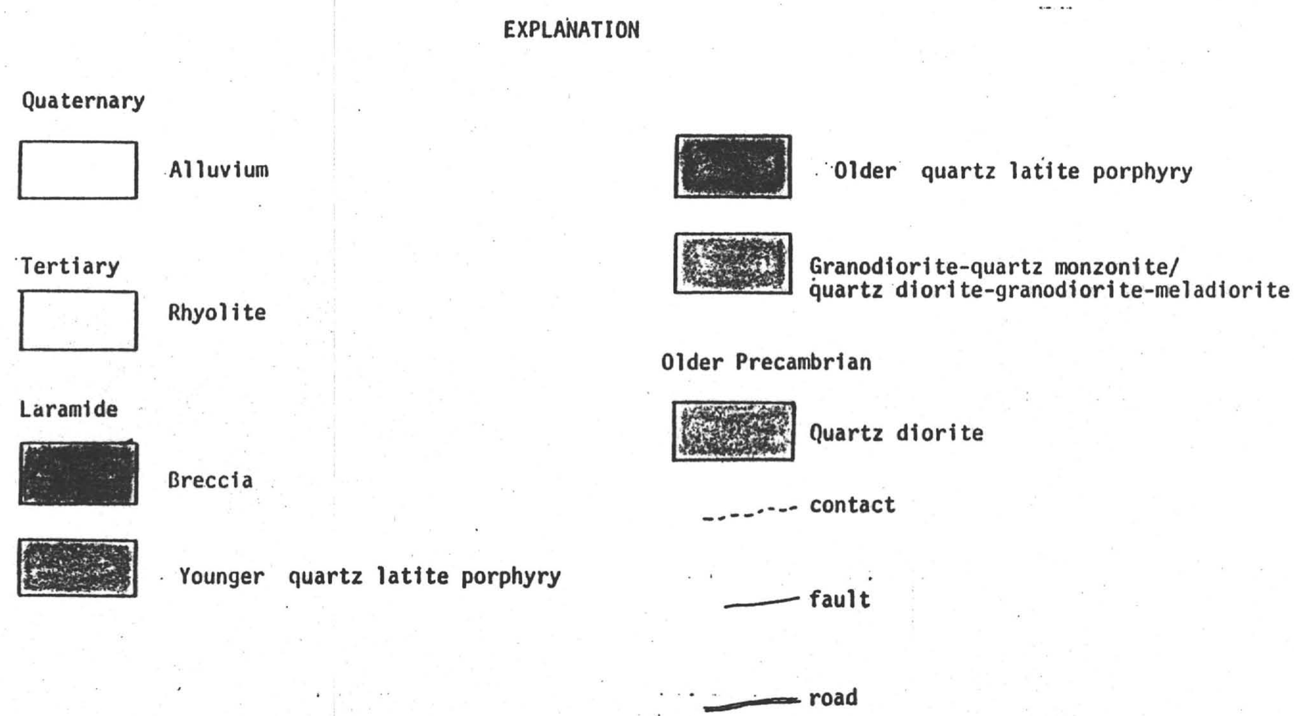
The Copper Basin porphyry copper deposit occurs in a multiple-phase stock of Laramide age emplaced in Precambrian wall rocks. In order of emplacement, the stock includes granodiorite-quartz diorite-meladiorite, granodiorite-quartz monzonite, older quartz latite porphyry, and younger quartz latite porphyry. K-Ar dating shows that these rocks were intruded from about 75 to 72 m.y. ago. Breccia, thought to be the result of collapse of a large vapor-filled chamber, forms a large part of the deposit.

Hydrothermal alteration and mineralization zoning is recognized as rough annular zones centered on the most abundantly fractured portion of the stock. The alteration zones from the center of the deposit outward are a poorly-developed core of phyllic alteration surrounded by a potassic zone which grades outward to a halo of propylitic alteration. The potassic zone is divided into secondary biotite and secondary orthoclase subzones. Sulfide mineralization zoning is characterized by the variability of pyrite and pyrite: chalcopyrite ratios. The sulfides occur as veinlets and disseminated grains and blebs.

Both the alteration and mineralization zoning are attributed to convective flow of saline hydrothermal fluids. These fluids were probably a combination of meteoric and magmatic solutions. The available fluid inclusion data suggests the fluids ranged between 200 and 500° C. The fluids circulated at hydrostatic pressures of

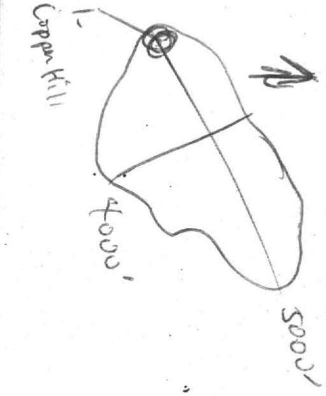
200 bars or less which are compatible with a maximum depth of 1.8 km. The hydrothermal fluids are believed to have boiled intermittantly.

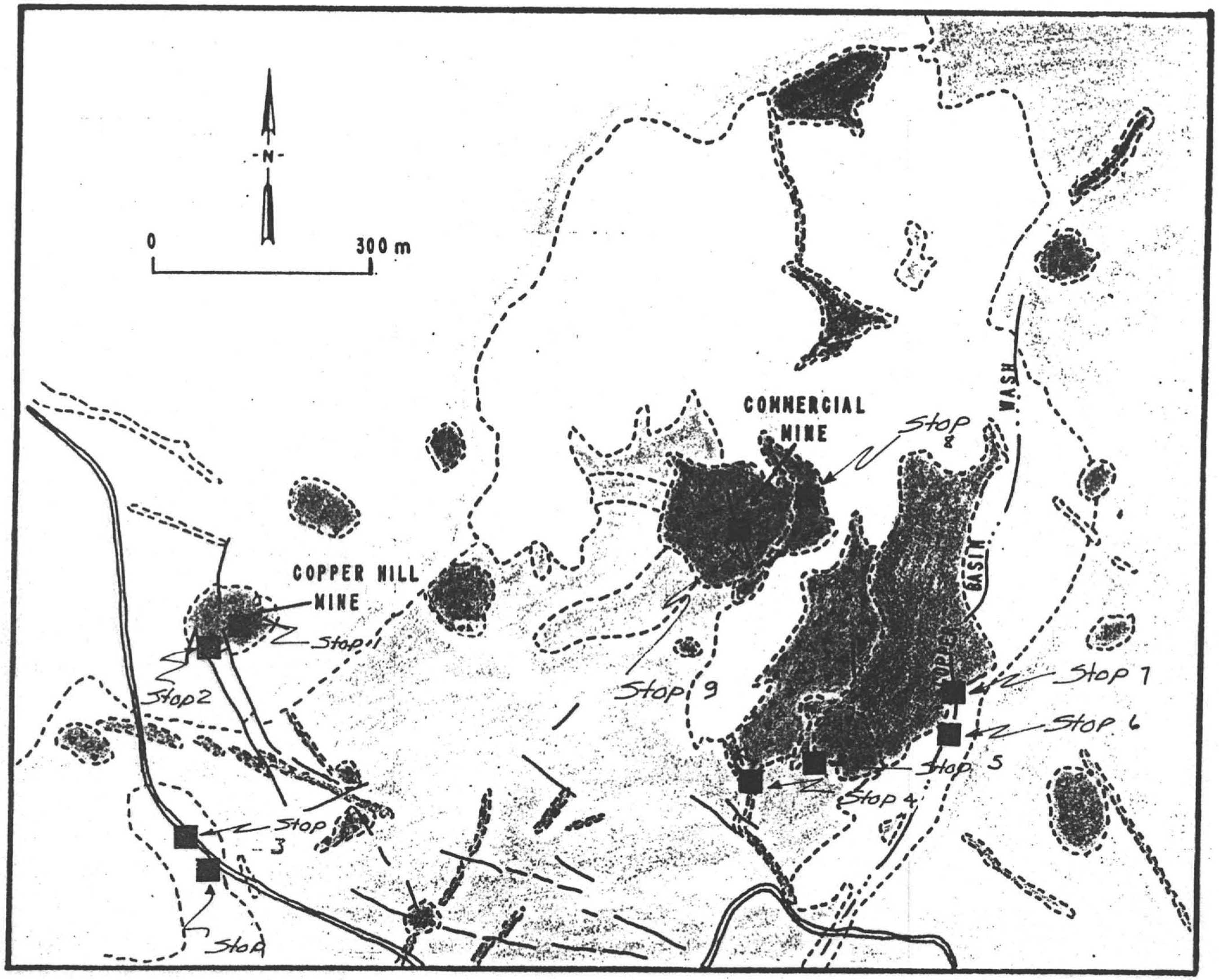
Figure 3. Generalized surface geology of the Copper Basin deposit (modified after Johnston and Lowell, 1961).



175 MM Tons @ ~ .5 CuMo equiv.
At Lower Cut off get 500 MM Tons

Copper Hill area
has ~ .7% MoS2





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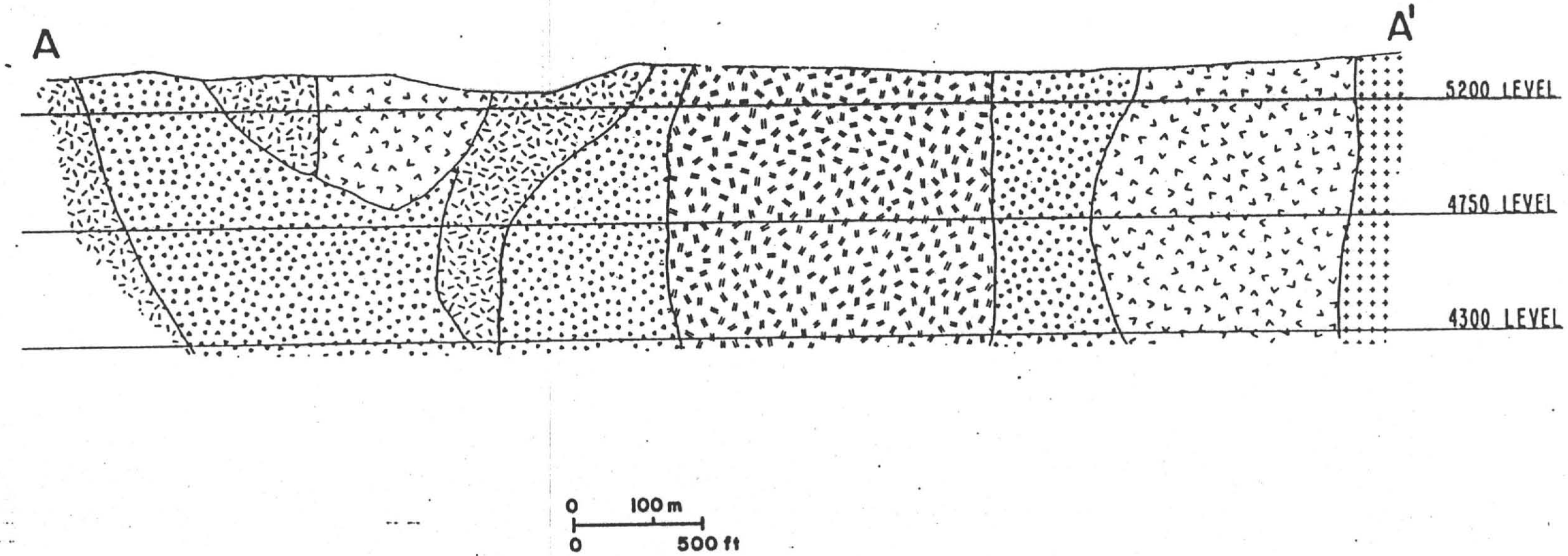

Figure 7. Lithology of the Copper Basin deposit along cross-section A-A' (Figs. 4, 5, and 6). See Figure 4 for explanation of symbols.

Table 2. Summary of the characteristics of the Copper Basin alteration zones.

Alteration Zones	*Essential Minerals	*Accessory Minerals	Mode of Alteration	Principal Mineralization Zones	Principal Host Rock(s)
PROPYLITIC	4% chl 1% ep tr-0.5% ser	tr-1.5% ser 0.5% sph tr-4% mgt 0.5% leu tr-1.5% py	chl, p > v ep, p > v cal, p > v sph-mgt-leu, p py, v > p ser, p v	4	bf, grd-qm, qd
POTASSIC	-- --				
Secondary Biotite Subzone	5-15% sbt tr-10% sor	3-15% ser tr-1% rt tr-2% leu tr-2% cal 1-10% qtz	sbt, p sor, v > p ser, p > v rt-leu, p cal-qtz, v > p	3 > 2	grd-qm, oqlp
Secondary Orthoclase Subzone	10-40% sor 20-50% qtz	tr-0.5% ad 1-5% cal tr-5% sbt 0.5% dol tr-0.5% anh	sor, bxf qtz, bxf ad-cal-dol-anh, bxf	3 > 2	bx
PHYLLIC	10-50% ser 10-50% qtz	tr-1% cal tr-1% leu	ser, p=v qtz, v p cal, p leu, p	1	oqlp

Abbreviations: ad=adularia, anh=anhydrite, bf=border facies rocks, bx=breccia, bxf=breccia filling, cal=calcite, chl=chlorite, cp=chalcopyrite, dol=dolomite, ep=epidote, grd-qm=granodiorite-quartz monzonite, leu=leucoxene, mgt=magnetite, oqlp=older quartz latite porphyry, p=pervasive, py=pyrite, qtz=quartz, qd=pC quartz diorite, rt=rutile, sbt=secondary biotite, ser=sericite, sor=secondary orthoclase, sph=sphene, tr=trace, less than 0.5 volume %, v=veinlet-controlled

1= ≤1.5 weight % pyrite zone, (py:cp > 6:1)
2= 3 to 5 weight % pyrite zone, (py:cp > 5:1 and < 10:1)
3= 1.6 to 2.9 weight % pyrite zone, (py:cp=1.5:to 2:1)
4= "marginal pyrite zone", (py:cp > 10:1)

*=reported as volume %