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JEROME PROJECT
YAVAPAI COUNTY, ARIZONA
RESULTS OF EXPLORATION PROGRAM
CONDUCTED IN JAN.-FEB. 1981

R.A.RIVERA JUNE 1982

NICON

Jerome dist., Yavapai Co. Az. State

MEMORANDUM

DATE: July 8, 1982

TO: H. J. Matheson cc: TEC/WJC FPC JCM CFB LWF

FROM: R. A. Rivera

SUBJECT: Summary Report on Jerome Project

Attached hereto is a summary report on the Jerome Project describing the results of exploration to date. This work leads to the conclusion that two exceptionally fine exploration targets exist in the northern part of the Verde (Jerome) district at less than a 1 mile distance from the two bonanza orebodies which made the district famous.

An aggressive leasing effort followed by a major exploration program is recommended to evaluate the mineral potential of the targets.

Robert A. Rivera

R. A. Rivera

RAR:njb
Attachment: Results of Exploration Program Conducted in January-February 1982, R. A. Rivera, July 1982

JEROME PROJECT
YAVAPAI COUNTY, ARIZONA

RESULTS OF EXPLORATION PROGRAM
CONDUCTED IN JANUARY - FEBRUARY 1982

R. A. Rivera

July 1982

JEROME PROJECT
YAVAPAI COUNTY, ARIZONA
RESULTS OF EXPLORATION PROGRAM
CONDUCTED IN JANUARY - FEBRUARY 1982
R. A. Rivera July 1982

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JEROME PROJECT
YAVAPAI COUNTY, ARIZONA
RESULTS OF EXPLORATION PROGRAM
CONDUCTED IN JANUARY-FEBRUARY 1982

R. A. Rivera July 1982

SUMMARY

Geophysical surveys were conducted in early 1982 in connection with the evaluation of part of the A&A property. This property is located in an area roughly 4000 ft north of the two major massive sulfide ore deposits in the Verde (Jerome) District. The geophysical work resulted in the discovery of a strong induced polarization (I.P.) anomaly (the Hopewell anomaly) and in the refinement of the position of a second, previously known I.P. anomaly (the So. A&A anomaly).

The apparent size and positions of the geophysical anomalies suggest the following optimistic interpretations:

1) The So. A&A anomaly represents the upward and northward continuation of the "North Orebody" mined in the last years of the United Verde mine's life.

2) The Hopewell anomaly represents a large (100 million tons) massive sulfide body similar to the United Verde deposit. A total of 32.7 million tons of ore grading (recovered) 4.5% Cu, 0.043 oz/s.ton Au and 1.55 oz/s.ton Ag was mined from this roughly 100 million ton body and its adjacent altered rocks.

Inasmuch as both of the anomalies were found on or near lands unsecured by CoCa Mines Inc. an hiatus in exploration activity followed the geophysical work. At the current time an agreement on the major part of the unsecured lands is in the final drafting stage with Verde Exploration Ltd.

An 18 month, $800,000 work plan consisting of additional geophysical surveying, geological compilation and 13,500 ft of test drilling has been recommended. It is believed that the execution of this work plan will result in the definitive evaluation of the geophysical anomalies discovered in the January-February 1982 surveys. The odds that at least one of these anomalies represents a large massive sulfide deposit are considered very favorable at this time.

INTRODUCTION

The Verde (Jerome) mining district is located in Central Arizona in northeastern Yavapai County (see Figure 1). The project area lies in and around the historically important town of Jerome at an elevation of 4600 to 5300 ft (the town is built on a steep hillside). Access to Jerome from Phoenix, 110 road miles away to the south, is excellent via interstate, federal and state highways. Facilities and most business services are available in Cottonwood, 8 road miles east of Jerome in the Verde Valley at an elevation of 3300 ft (See Figure 2 in the section on "Geologic Setting").

Rail service is available to the area through a 30 mile Atchison, Topeka and Santa Fe spur line. This line winds down the Verde River Canyon from the main north-south line between Ash Fork and Wickenburg. The railroad is now serving the Phoenix Cement Company plant lying 1 mile northeast of the project area. Several dismantled railbeds exist on the property which connected at one time to the AT&SF line.

Population in the Jerome-Cottonwood-Clarkdale (northern) portion of the Verde Valley totals about 12,000 and is growing at a very fast rate. Principal influx element is the medium-income, retired class attracted to the commodious, country setting. Annual precipitation averages 11 inches of rain in Cottonwood and 17 inches (including occassional snow) in Jerome. Average temperatures are 43°F in January and 81°F in July (Anderson & Creasey, 1958, p 5).

Mining played an overwhelming important role in the area during the period 1883 to 1953 when the final 1000 STPD mining operation at the United Verde mine closed down. Two smelting operations were active during most of this period. Currently the only major industries are the Phoenix Cement Co. mine and plant employing about 200, a garment manufacturer employing about 110 and the Jerome Instrument Company employing about 20 people. Small, irrigated alfalfa, corn and hay farming activities have been a regular feature of the Verde Valley since it was first occupied by non-natives in 1865.

The present exploration activities by CoCa Mines Inc. in the Verde District date from early 1981. A study of exploration data acquired by other parties, principally Anaconda Mining Company, on lands owned by Verde Exploration Ltd. resulted in the decision to lease a small portion of Verde lands at the north end of the district, the A&A lands. (See Rivera 1981a, b). An analysis of the results of the exploration work undertaken under the lease agreement is the subject of this report.

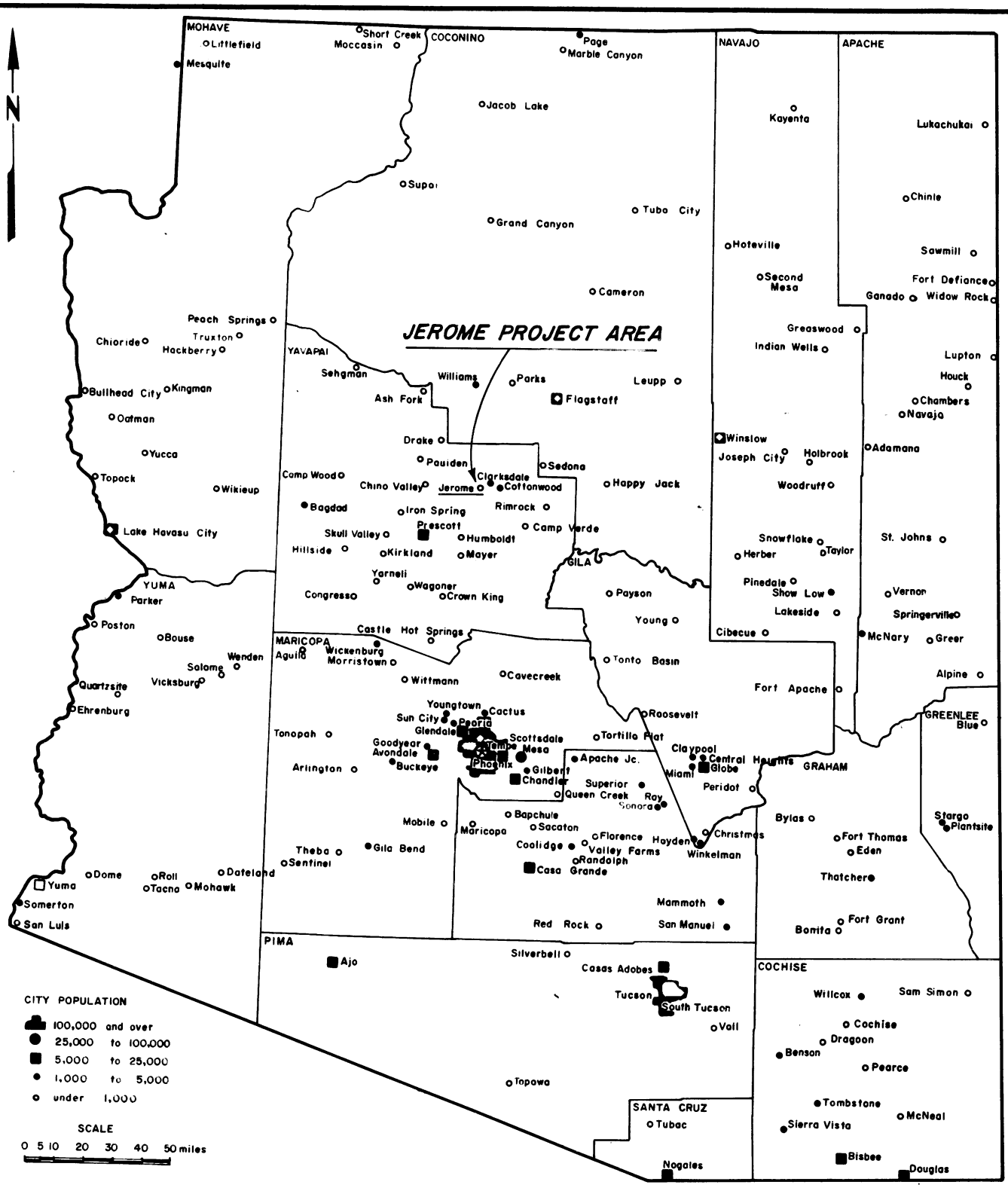

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FIGURE 1

JEROME PROJECT LOCATION MAP

YAVAPAI COUNTY ARIZONA

for: RAR date: 3-1-82 by: TR serial no. 267

LAND SITUATION (See Plate 2)

The status of most of the land in the Verde (Jerome) District is private, most of it consisting of patented lode and placer (limestone) mining claims. The lands in the Verde Valley on the east side of the district are also private fee lands, often with mineral rights severed from surface rights. Lands on the north, south and west sides of the district are mostly federal, administered by the USFS as part of the Prescott National Forest.

The two main mineral producers in the district were the United Verde Mine (now owned by Phelps Dodge Corp) and the United Verde Extension Mine (UVX mine). The corporate successor to the company who owned the UVX mine is Verde Exploration, Ltd. (Verde). Phelps Dodge and Verde dominate the land ownership picture of the district, each controlling approximately 12,000 acres of mineral rights, including large blocks of unpatented mining claims.

A third major landowner in the district is the Phoenix Cement Company controlling about 3,000 acres in the northern part of the district including some unpatented lands. Phoenix Cement is currently exploiting Carboniferous limestone deposits (the Redwall Limestone unit) on these lands in connection with their cement manufacturing plant on the premises.

Cooperative business relationships are the norm amongst the three major landowners in the district. Thus Phelps Dodge has leased to Phoenix mineral rights for the Redwall Limestone unit on nearly 1000 acres in Sections 9, 15 and 16, T16N, R2E. Verde has leased to Phelps Dodge mineral and access rights for the gossan zone above the UVX orebody. In 1930, the United Verde Copper Co. (taken over by Phelps Dodge in 1935) granted access rights through the interior of the United Verde mine to Verde for the purposes of exploiting the Haynes ore shoot! Perhaps these harmonious relationships are due to the agreement reached by the early operators in the camp to honor vertical sidelines rather than to seek apex rights in litigation.

CoCa Mines Inc. is in the process of leasing approximately 1800 acres of mineral rights from Verde and is negotiating for approximately 900 acres from Phelps Dodge in the north-central part of the district. Another recent entrant to the mineral land picture in the district is Occidental Minerals Corporation. Oxy has located unpatented claims and has leased a large number of Verde's unpatented claims in the southeastern end of the district. The total size of Oxy's position is in the order of 4,500 acres.

Two medium size land positions composed entirely of patented mining claims are presently held by independents in the south central part of the district. These are the Gadsden Copper Company lands comprising approximately 700 acres and the Silver Plate lands totalling approximately 1100 acres. Contact is being maintained with the owner of the Silver Plate lands who has expressed the desire to lease to CoCa Mines Inc.

Two small groups of patented mining claims whose mineral rights are not yet consolidated with a larger group are present in the Verde (Jerome) District. Both groups are surrounded by Verde lands which are part of the Verde/CoCa agreement. The two parcels are indicated on Plate 2 as "Yavapai Packing" (20.66 acres) and "Dundee" (40.58 acres). Both parcels (but especially the Dundee) are considered favorable with respect to the current exploration model being pursued by CoCa Mines Inc. and efforts to secure the mineral rights will be undertaken upon resumption of activity.

It is surprising to find only two blocks of unpatented mining claims held by local prospectors in this famous mineralized camp. The first is a block of 16 lode claims known as the H. C. group on the west side of the district. These were located in May, 1981 by Wayt Douglas. The second is a block of 9 lode claims off the south end of the district staked by Carroll and Davis in November 1981. Neither group of claims is currently of interest with respect to the exploration model being considered.

A number of small areas within the patented mining claims such parcels are located in the southern part of the district, south of the area currently of interest. There are a few small such areas, however, within or adjacent to the lands currently being secured by agreement. These parcels are listed as follows (all in T16N, R2E):

Section 13	Lots 1 and 2	2.94 acres
Section 14	Lots 1, 2 and 3	5.10 acres
	E. Part of Lot 4	Approx. 1.1 acres
	So. part of Lot 5	Approx. 1.0 acres
Section 15	So. part of Lot 4	Approx. 0.9 acres
	Lot 5	0.11 acres

Seven lode mining claims would be required to secure these 11 acres of open lands.

Note in Proof: The listed small parcels were secured by CoCa Mines Inc. in July, 1982 by staking lode mining claims.

The generalized land map presented as Plate 2 has been compiled using a combination of bases including the most recent BLM protraction diagram for unsurveyed areas. Outlines of patented lands were obtained from BLM records of mineral surveys, township plats and mining district compilation maps. Ownership information was obtained from the Yavapai County tax assessment records and from maps put together in the 1950s by Mingus Mountain Mining Company (a joint venture of Phelps Dodge, Verde, Newmont and Homestake). Further land information was provided on maps prepared by Anaconda in the 1970s. Data on unpatented mining claims was obtained by a review of the BLM index dated June 22, 1982 and by a study of individual files.

Information not yet compiled onto Plate 2 is of four types:

First - The details of surface ownership in the highly subdivided areas of T16N, R3E, and in Jerome are not shown. Such information is readily available from the Yavapai County assessor's office in Prescott.

Second - Ownership information for private parcels not deemed of interest has not been compiled. Again, tax assessor's records are the best source for this information.

Third - Outline of unpatented mining claims in areas deemed of little interest are not shown. Such outlines can usually be obtained by study of individual files at the BLM office in Phoenix.

Finally - Ownership of mineral rights on many parcels of private lands on the east side of the district are not shown. Determination of the ownership will require, in many cases, a comprehensive chain of title study for each parcel in the Yavapai County recorder's office.

As is clear from the foregoing, Plate 2 should be regarded as a provisional land map subject to refinements and corrections during the course of the Jerome project.

Inquiries have been made regarding the current market value of land in large parcels in unirrigated portions of the Verde Valley. On February 12, 1982 a 210 acre parcel near the common corners Sections 19, 20, 29, 30, T16N, R3E was on the market for $5500/acre. Offers were being considered at the $4500/acre level. This lot is in an area well situated for development given the discovery of a new ore deposit at Jerome, 4 road miles away. A 70 acre parcel located just south of Cottonwood with highway frontage recently sold for $6500/acre. Land in the Cornville area, about 6 miles east of Cottonwood is currently trading at $3500 to $5000 per acre depending on size.

GEOLOGIC SETTING

The Jerome project area lies at the northern end of the Verde Mining District. This district includes the northern end of a 1½ mile wide exposure of Precambrian schists of the Yavapai Series (the Ash Creek group of Anderson and Creasey, 1958). These Precambrian rocks host the massive sulfide deposits which are the targets for exploration in the district. The age of the Precambrian rocks is believed to be in the order of 1.8 billion years (Anderson et al, 1971). There is evidence to suggest that the Yavapai Series represents a greenstone belt similar to older such belts in the North American Craton (Anderson and Silver, 1976, See also Anderson and Gilbert, 1979).

Overlying the Yavapai Series in profound unconformity are the Paleozoic marine sediments locally referred to as the Grand Canyon series. These rocks are generally flat lying,deposited on a Precambrian surface of very little relief. While it is surmised that thick sediments of Permian and early Triassic age once covered the project area, erosion during most of Mesozoic and early Tertiary time removed all trace of these formations from the area. As shown on Table 1, there remains a maximum of about 1200 ft of Paleozoic sedimentary rocks in the project area.

In the period from 10 million years ago to present, extensive relief developed in the area. Initially, during Pliocene time, basaltic flows with intercalated course sedimentary rocks were deposited on an erosional surface having relief in the order of 500 ft (Hickey formation). Subsequently the finer clastics and lake bed facies of the Verde formation were deposited in the major graben which developed in the Verde Valley.

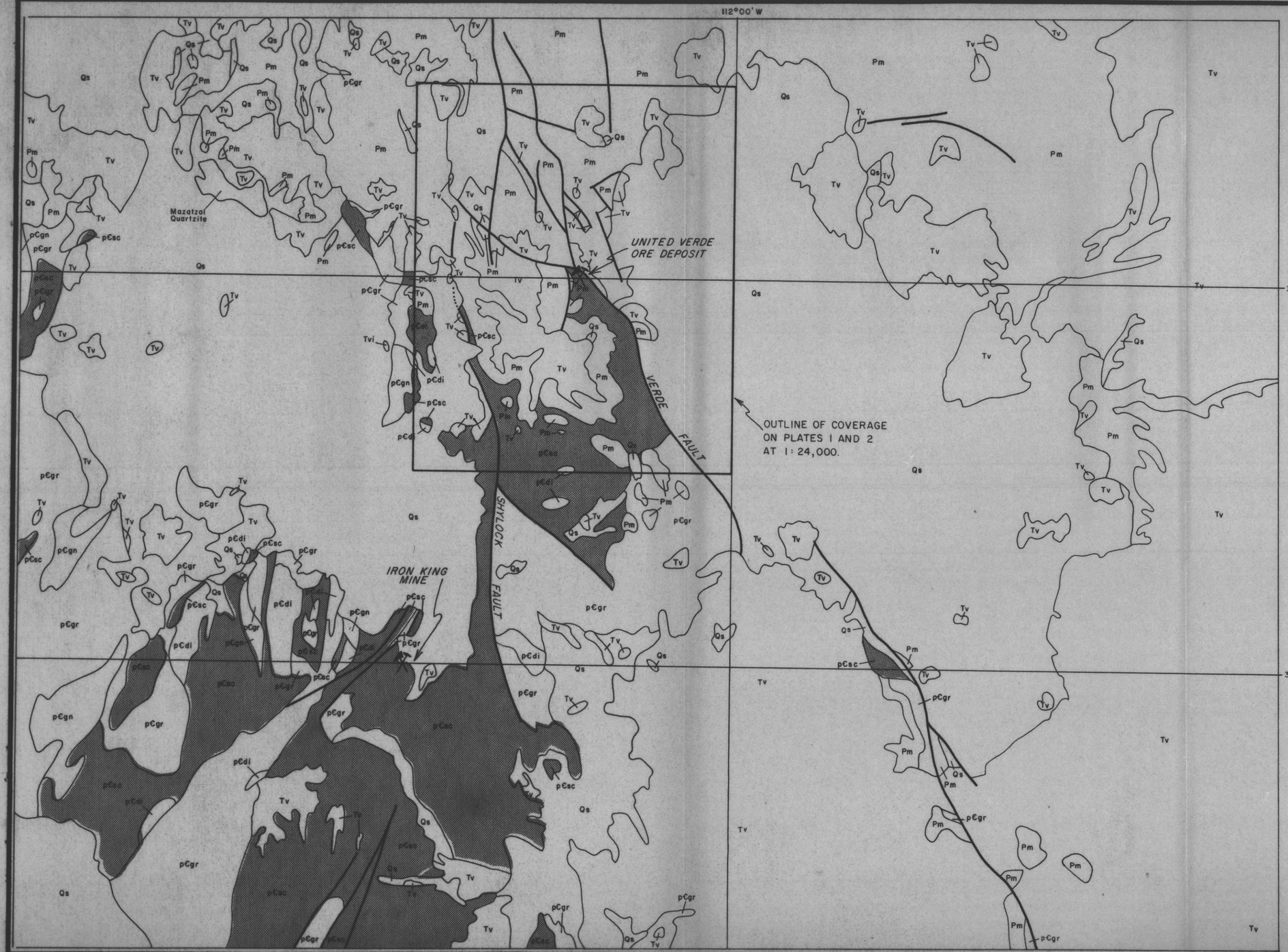
These relationships are illustrated on Figure 3, a geologic overlay to Figure 2. They are shown in greater detail on Plate 1.

Geographically the Verde District lies in the transition zone between the Colorado Plateau to the northeast and the Sonoran Desert Region to the southwest. The abrupt dropoff at the edge of the Plateau (known as the Mogollon Rim) forms spectacular vistas in the Oak Creek Canyon area and at Sedona, about 25 miles away to the northeast.

The main point of emphasis in the study of the geologic setting of Jerome is that the exposures of Precambrian rocks which host the target massive sulfide deposits are very restricted. Major vertical motion on the Verde and Hull faults limits the exposure to the north and east while erosion has not yet stripped overlying Paleozoic and Tertiary rocks from the west. Thus highly prospective areas in the immediate area of the United Verde Mine are hidden from view, buried by as much as 1200 ft or more of barren cover.

TABLE 1
Stratigraphic Thickness of Paleozoic Units in the Verde (Jerome) Mining District
(Source: P. A. Lindberg, pers. commun., Anderson and Creasey, 1958)

Formation Name	Age	Description	Thickness (ft)	Depth from Top to Pre-Cambrian (Ft)
Supai Fm. (Basal Part)	Pennsylvanian-Permian	Red beds comprising chiefly sandstone and siltstone cemented by lime.	370	1140 ± 50
Disconformity				
Redwall Limestone	Mississippian	Limestone, arenaceous at base but generally massive.	240-286	770 ± 30
Disconformity				510
Martin Dolomite (Upper Unit)	Devonian	Uniformly bedded dolomitic limestone.	110	510
Coral-Bioherm Marker				400
Martin Dolomite (Middle Unit)	Devonian	Various thin interbedded units including some sandy horizons. Mostly dolomitic limestone.	180	400
Red Sandy Marker Bed				220
Martin Dolomite (Lower Unit)	Devonian	Grey, medium to coarse grained dolomite. The upper portion is dense, fine grained limestone.	150	220
Disconformity				70
Tapeats(?) Sandstone (Upper Unit)	Cambrian (?)	Vari-colored marly shale.	20	70
Tapeats (?) Sandstone (Lower Unit)	Cambrian(?)	Reddish, medium to coarse grained sandstone and pebble conglomerate	50	50
Basement	Pre-Cambrian		-	0



EXPLANATION

USE THIS MAP AS AN OVERLAY TO FIGURE 2: "VERDE AND NEARBY MINING DISTRICTS - ACCESS AND INFRASTRUCTURE."

Qs	QUATERNARY AND TERTIARY CONTINENTAL SEDIMENTARY ROCKS AND COVER.
Tv	MOSTLY TERTIARY BUT SOME QUATERNARY VOLCANIC FLOWS AND PYROCLASTICS.
Pm	PALEOZOIC MARINE SEDIMENTS.

PRECAMBRIAN ROCKS

pCgr	GRANITE, QUARTZ MONZONITE, GRANODIORITE, AND QUARTZ DIORITE
pCdi	DIORITE, DIORITE PORPHYRY, AND GABBRO
pCsc	YAVAPAI AND OTHER SCHIST UNITS. LOCALLY INCLUDES SMALL INTRUSIVE UNITS
pCgn	GNEISS

SOURCE: This map is a generalization of information taken from the 1:500,000 scale Geologic Map of Arizona published by the USGS in 1969.

0 5 10 MILES

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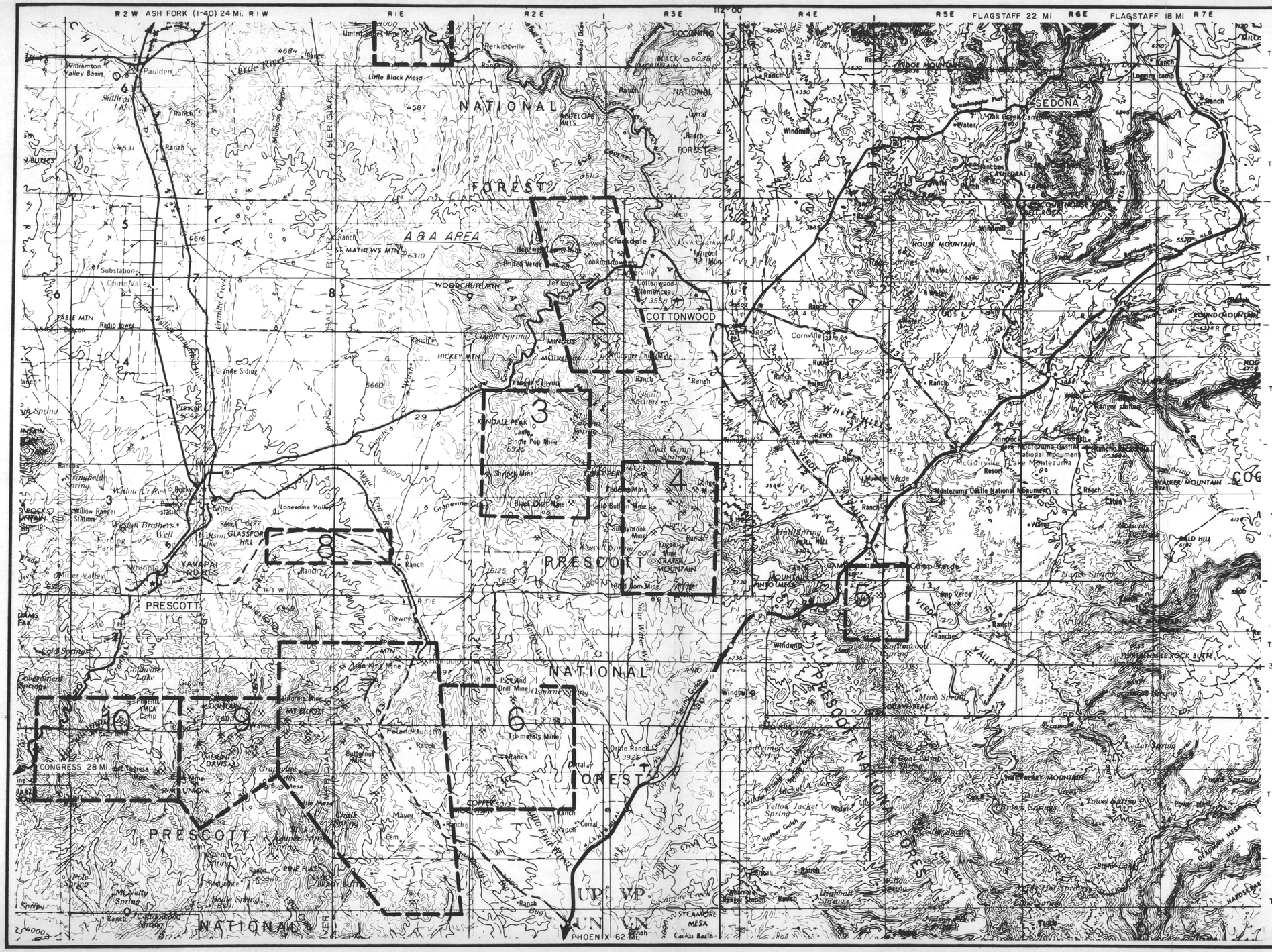
FIGURE 3

JEROME PROJECT

GEOLOGIC SETTING OF THE VERDE AND NEARBY MINING DISTRICTS

YAVAPAI COUNTY ARIZONA

for: RAR date: 4-6-82 by: TRL serial no. 1310



MINING DISTRICTS
(OUTLINES ARE APPROXIMATE)

1. MINERAL POINT
2. VERDE (JEROME)
3. BLACK HILLS
4. CHERRY CREEK
5. CAMP VERDE
6. AGUA FRIA
7. BIG BUG
8. LYNX CREEK (PLACER Au)
9. WALKER
10. HASSAYAMPA

SOURCE: BASE MAP IS A COPY OF A PORTION OF USGS 1:250,000 SERIES QUADRANGLE MAPS OF THE PRESCOTT AND HOLBROOK QUADS, BOTH 1954 (REVISED 1970). MINING DISTRICT NAMES TAKEN FROM: MAP AND INDEX OF ARIZONA MINING DISTRICTS, PUBLISHED BY ARIZONA BUREAU OF MINES, AUGUST, 1961.

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FIGURE 2

JEROME PROJECT

VERDE AND NEARBY MINING DISTRICTS
ACCESS AND INFRASTRUCTURE

YAVAPAI COUNTY ARIZONA

for RAR date 3-4-82 by TRL serial no 1269

GEOLOGY OF ORE DEPOSITS

The massive sulfide deposits of the Verde (Jerome) District occur within the Yavapai Series Precambrian rocks. According to a recent interpretation of the Precambrian geology of the district (Lindberg and Jacobsen, 1974) the two main deposits (the United Verde and the United Verde Extension) "occur at the top of a submarine volcanic pile which includes a mafic unit, the Shea Basalt, overlain by felsic rocks, the Deception Rhyolite and its medial Cleopatra member." Quoting further: "The lower unit of the Deception Rhyolite is composed of numerous thin flows and associated fragmental beds. Above this series of rhyolites is the thick Cleopatra Member, a complex of quartz-bearing crystal tuff, breccia, and subordinate amounts of intrusive and extrusive quartz porphyry. The Cleopatra exhibits varying degrees of welding and probably constitutes several cooling units. It was formerly interpreted as an intrusive body and referred to as 'quartz porphyry.' The upper unit of the Deception Rhyolite is composed of a thin basal chert layer and numerous rhyolite blister domes and associated fragmental layers. This unit is missing the vicinity of the orebodies. The upper unit of the Deception Rhyolite grades upward into the thinly bedded, fine-grained metasedimentary and metavolcanic rocks of the Grapevine Gulch Formation, some of which may have been deposited by turbidity currents."

The two mentioned deposits"are located at the contact of the Cleopatra Member with the overlying Grapevine Gulch Formation where the upper unit of the Deception Rhyolite is absent. The contact is folded, and the ore bodies are in the highly deformed parts of the folds." Several small pyritic masses are also present along the Cleopatra-Grapevine Gulch contact as well as within the Grapvine Gulch formation itself. As will be discussed below, the ore deposits are presently regarded as being volcanogenic exhalative in origin deposited on the submerged surface during the time of deposition of the lowermost Grapevine Gulch unit.

A diorite or gabbro sill-form mass intruded the Precambrian section near the Cleopatra-Grapevine Gulch contact. This intrusion is thought to be post-mineral in age and is believed to have been responsible for splitting a once much larger United Verde deposit into separate sulfide masses. Thus the Haynes pyritic body and the North ore-body, now separated from the United Verde deposit,are believed to have originally been a part of it.

There has been a recent major revision to the theory of origin for the massive sulfide deposits at the Cleopatra-Grapevine Gulch contact. Early workers regarded these deposits as being hydrothermal replacements of schistose quartz porphyry intrusive and tuffaceous sedimentary rocks. (See Reber, 1922, 1938, Lindgren, 1936, Fearing, 1926 and Anderson and Creasey, 1958). The epigenetic concept is still defended by some (Bain, 1973). Most recent workers believe that the submarine volcanic hot spring mechanism is responsible for the main deposits at Jerome. (See Anderson and Nash, 1972, Lindberg and Jacobson, 1974 and Handverger, 1975 as well

others listed in the "References" section of this report).

The United Verde ore deposit is developed predominantly on the underside of a steeply northwardly plunging pipe shaped body of massive pyrite (See representation on Plates 3 and 4 and on Figure 5). The massive pyrite body has typical cross sectional dimensions of 1000 x 400 ft and a down plunge extent of over 4500 ft. A thick zone of "black schist" (magnesium rich chlorite schist) is present along most of the underside of the massive pyrite body grading into chloritized quartz porphyry further away from the sulfide mass. Discontinuous cherty jasper units are common along the upper side of the pyrite mass in contact with the overlying Grapevine Gulch or gabbro lithologies.

The copper content of the massive pyrite body is not uniform. Rather it varies systematically from over 5% on its underside and in the adjoining black schist zone to less than 0.25% at the upper side. (Bain, 1973,p709,See also Fig. 17, p 117 in Anderson and Creasey, 1958.) Thus,in imprecise terms,ore tonnage at the United Verde mine totalled only about 30% of the tonnage of the massive pyrite body!

The United Verde Extension (UVX) ore body is located 3500 ft east of the United Verde deposit in the down faulted block of the Tertiary Verde Fault. According to Handverger, 1975, and Lindberg and Jacobson, 1974, this smaller body exhibits the same primary features as the United Verde deposit. They believe that the two deposits were formed independently of each other but at or near the same time. Earlier workers have postulated that the UVX deposit represents a down faulted apex of the United Verde deposit.

A very stong supergene enrichment has operated on the UVX deposit whose effect has increased the ore grade to over 10% Cu. Early workers believed that the enrichment process operated on the UVX deposit during a long period of peneplane formation in late Precambrian time prior to the deposition of the Paleozoic marine sediments. (See Reber, 1922, p 15, and Anderson and Creasey, 1958, p 144). Another hypothesis, supported by Lindberg and Handverger (pers. commun.) has much of the secondary enrichment occuring during the Tertiary period. Apparently the Paleozoic sedimentary rocks covering the UVX body were very locally removed by a combination of tectonics and erosion. A major stream channel passed over the deposit which was in a small exposed window of Precambrian rocks. Much of the secondary enrichment is thought by the recent workers to have been a result of water movement in connection with this Tertiary channel.

The secondary enrichment argument is of much more than purely academic interest. The geologic situation occurring during Tertiary time over the top of the UVX deposit was very local, not common elsewhere in the district where the Paleozoic rocks remain in place over the prospective areas. If significant enrichment occurred in Precambrian times we could expect bonanza grades to be present in the upper portions of a new discovery given that it reaches the unconformity. If enrichment was limited to Tertiary time, however, only primary grades would obtain.

The environment of deposition of the United Verde and the UVX massive sulfide deposits is thought to be proximal to a volcanic center. Handverger (1975, p 17) postulates that this center is immediately south of the UVX deposit. The massive sulfide bodies are believed to have been deposited as the result of a large convective cell causing the movement of hot waters through a great volume of rock and expulsion of these waters through fissures and broken zones at or near caldera rims into troughs or small basins. (Lindberg, pers. commun.) The chloritized footwall rocks culminating in zones of black schist are regarded as marking the conduits from which the hydrothermal fluids were expelled. An intrusive quartz porphyry body exposed 2 miles south of Jerome has been mentioned as a possible heat source driving the geochemical cell (Anderson and Nash, 1972, p 861). The subaquious surface topography of the depositional environment is considered to have been very unstable, even violently changing. This is reflected by rapid facies variations and highly variable unit thicknesses in the stratigraphy of the Grapevine Gulch formation. (Handverger, 1975)

While the two largest deposits thus far discovered in the district lie stratigraphically at or near the Cleopatra/Grapevine Gulch contact smaller deposits do occur elsewhere in the section. The third largest producer in the district (only 120,000 tons of ore) was the Copper Chief massive sulfide deposit. It is located at the base of the Precambrian volcanic stratigraphy in the Shea Basalt. At the other extreme are several exhalite horizons recognized within the Grapevine Gulch formation near the top of the succession. Apparently processes similar to those which formed the United Verde and the UVX deposits were operational during the entire period of volcanism, albiet, apparently at a smaller scale. Nevertheless, in exploring for additional deposits in the district one should not concentrate unduely on the Cleopatra/Grapevine Gulch contact.

Structure has profoundly affected the ore deposits in the district. (Lindberg, 1975). Thus, high amplitude, tight folding with axes trending NNW has been complicated by more gentle folding with an E-W axis (the Haynes Syncline). Complex faulting has also played a role, principally along the Verde, Warrior and Haynes faults. Although much movement has occurred on these structures during late Tertiary time, it is believed that all were also active in the Precambrian.

As might be appreciated from the foregoing, exploration in the Verde District suffers under numerous handicaps. Thus: uncertainties as to target stratigraphic horizons, inability to correlate lithologies due to rapid facies changes, incredibly complex folding patterns due to cross folds, the presence of a sill-form but disruptive intrusive mass in the part of the section of interest, major faulting over a long period of geologic time and finally the presence of thick post mineral cover creates a serious challenge to the exploration geologist.

Two factors, however, are an aid in this problem. One is precision to which the thickness of Paleozoic cover can be predicted. As Table 1 shows, numerous marker horizons are present in relatively unfolded sedimentary rocks allowing precise definition of the structure contour at the top of the Precambrian and a precise solution for vertical movement in the Tertiary on the numerous faults of the area. The second factor working in favor of the exploration geologist is the strong geophysical response of the target deposits to several geophysical methods. It is this factor which has yielded the high quality targets described in this report.

PRODUCTION HISTORY OF THE VERDE (JEROME) DISTRICT

The history of metal production from the district has been detailed in several reports. (Lindgren, 1926, Elsing and Heineman, 1936, Anderson and Creasey, 1958.) Using the latter as the most recent source and extrapolating for production in the last year of operation of the United Verde mine (1952) the writer has obtained the figures given on Table 2. Note that grades stated on the table were derived from the recovered metal figures. Ore grades in the ground were undoubtedly 5 to 15% higher!

A small leasing operation was run at the surface of the United Verde mine by Big Hole Mining Company during the period 1953-73. (John McMillan, pers. commun.) This group mined ore from the footwall (south) of the United Verde Pit, trucked the ore to pads near the Hopewell adit, leached the material on pads to form an 80% copper concentrate which was then shipped by rail to the Phelps Dodge smelter at Douglas, Arizona. Evidently pods of high grade material and much low grade massive pyrite remained on the wall at the conclusion of mining in 1953. Production from this operation is not included in the total given on Table 2.

Zinc is also present in the ores of the United Verde deposit, although not in uniform proportions. Anderson and Creasey mention one ore shoot in the north orebody whose content was 85,000 tons grading 4% Cu and 9% Zn (1958, p 135). Apparently, metallurgical difficulties attended the zinc occurrences and the metal was not recovered prior to 1948. A large zinc reserve is reported to still be present in unmined portions of the United Verde orebody.

The production history of the Jerome camp is a colorful story. It is detailed in Anderson and Creasey, 1958 (p 84-91) and will not be repeated here except to state the following list of notable events:

May 8, 1585	United Verde deposit visited by Antonio de Espejo. Takes no action.
Nov. 24, 1598	Marcos Farfan de Los Godos locates claims on the United Verde deposit. Finds large dump and several workings.
1863	Joe Walker's party discovers gold near Prescott.
1865	First settlement of non-natives in the Verde Valley. Indian raids
1875-76	Rediscovery of the United Verde deposit. Claims located.

TABLE 2
Mineral Production From Verde (Jerome)
Mining District, Yavapai County, Arizona
(Source, Anderson and Creasey, 1958)

Mine Name	Ore Produced 10^6 s.tons	Grade (Recovered)		
		% Cu	oz/s.ton Au	oz/s.ton Ag
United Verde	32.66**	4.50*	0.043*	1.55*
United Verde Extension	3.88	10.23	0.039	1.66
Jerome Verde	.01	7.5	0.048	1.08
Copper Chief (West)	.09	-	0.288	3.23
Copper Chief (East)	.03	2.17	-	-
Dundee	.03	4.5	-	-
Shea Mine	.001	-	0.48	31.0
Verde Central	.09(?)	-	-	-
Cleopatra Copper (Dillon Tunnel)	V. small	-	-	-
Total, Verde District	36.70+	5.09	0.043	1.56

* Calculated from district total figures given in Anderson and Creasey, 1958

** Tonnage of ore from United Verde Mine determined from the following figures given in Anderson and Creasey, 1958 (p 101-102)

Underground Production through 1951	22,519,846 tons
Estimated Production 1952	300,000 tons
Direct Shipping ore from pit	8,153,000 tons
Oxide Siliceous Flux used	1,688,200 tons
TOTAL	32,661,046 tons

1882	United Verde Copper Company organized and buys key claims. Road constructed to Jerome from Ash Fork on the AT&SF line.
August 1883	Production started on surface oxide ores rich in gold, silver and copper. Ores processed at small smelter on the property.
1884-1887	Mine produces at a loss during several short lived periods of mining.
1888	Control of company purchased by W. A. Clark. Mining recommences.
1893	Narrow gauge railroad built to connect Jerome to the AT&SF line.
1894	New smelter built at Jerome. First major mine fire.
1900-1930	Period of intense exploration activity around United Verde property. Much money invested on several properties. Small operations active on the Jerome Verde mine (Mined by the UVX group), the Copper Chief mine (both east and west sides), the Shea mine and the Verde Central mine.
1914	Standard gauge railroad line built to Jerome.
1915	New Smelter built at Clarkdale
1916	UVX orebody discovered by the James S. Douglas group.
1918	Smelter built at Cottonwood to handle the UVX ore.
1922	Open pit mining starts on United Verde deposit to stop underground fires. Stripping had begun in 1917.
1927	Flotation concentrator installed at Clarkdale to handle siliceous ore from the United Verde mine.
1930	A 200 TPD flotation mill installed at Cottonwood for the UVX ores.

1931	Underground operations stop on the United Verde mine due to low metal prices. Open pit mining continues.
1935	United Verde mine purchased by Phelps Dodge Corporation.
1937	Underground mining resumes at the United Verde mine.
1938	UVX mine closed. Reserves depleted.
1940	United Verde open pit completed to 630 level.
1942-1945	Small production by leasor on the Dundee mine.
June 1950	5000 STPD United Verde smelter at Clarkdale closed. Flotation concentrator continues to operate at about 1000 STPD.
February 1953	United Verde mine closes. "Scalping" operations start on the open pit walls under a small leasing group.
1973	Leasing operation at the United Verde mine ceases due to "break even" economics.

PREVIOUS EXPLORATION WORK IN THE VERDE (JEROME) DISTRICT

As stated in the previous section much exploration activity was undertaken in the Verde (Jerome) district during the early part of the 1900s. This activity intensified greatly once the bonanza discovery of the UVX deposit was announced in 1916. A great deal of effort and wealth was expended on these programs, almost all of which bore little fruit in terms of discovery of economically minable mineral deposits. Anderson and Creasey (1958) and Lindgren (1926) chronicle much of this early work. Notes by Thayer Lindsley (1915-1916) give some flavor as to the optimism of some of these earlier exploration efforts.

Concern regarding the immenent exhaustion of high grade ores at the United Verde deposit in 1947 resulted in the launching of an ambitious exploration program. Phelps Dodge joined with Verde Exploration Ltd. (the direct corporate descedent of the United Verde Extension Mining Co.), Homestake Mining Co. and Newmont Mining Company to form a new company called Mingus Mountain Mining Corp. Geological and geophysical work was carried out over the period 1947-1951 under the supervision of G. W. H. Norman. Geophysical work was done under the direction of A. Brant of Newmont. Eight diamond drill holes were drilled from the surface (MM series), four holes were drilled from underground at the United Verde mine and two underground holes were deepened under this program. Results of these labors are presented in Norman, 1952 and two reports by Brant (1949, 1950). The program failed in its mission of discovering additional reserves; however the compilation of records and the information from the drill holes has proved valuable to subsequent exploration.

The New Jersey Zinc Company leased the Verde Exploration and other lands during the period 1953-56. A large area was covered with geochemical surveys and seven holes were drilled in the south central part of the district (JD series). No discovery was made.

In 1959-60 Cerro de Pasco Corp. leased the Verde Exploration lands and explored the area with a series of 15 drill holes (C series). This program was under the direction of G. W. H. Norman and was evidently designed to map the Precambrian formations immediately below the Paleozoic cover. No discoveries were made.

A group of graduate students under H. E. McKinstry of Harvard undertook studies in the district during 1960-63. The program suffered a setback with the death of Professor McKinstry but at least one important PhD thesis resulted.

Noranda, Inc. undertook an evaluation of the district in 1962 through consultant Peter Price. Later Price and Paul Handverger were financed by Anglo American Corp. and drilled a target in the southern part of the district with a series of at least 6 holes (A series). No discovery was made.

Meanwhile, Phelps Dodge formed a joint venture with Cominco during 1963-65 under the direction of Jack Phillips. At least 21 holes were drilled through the Paleozoic cover rocks on the southwest part of the district (The M series) again with no discovery resulting.

Newmont Mining Company briefly entered the picture again during 1968 under Robert Fulton. Five rotary holes were drilled to evaluate a geologic target in the southern end of the district. (Holes V-12 through 16). Induced polarization surveys were run in these holes but the survey failed to yield strong encouragement and Newmont again left the area.

During 1969-1970, Copper Range Company retained Ira Joralamon to run an exploration program in the district. Mr. Joralamon had earlier figured prominently in the United Verde Extension discovery and was regarded as one of the most able geologists of his time. Copper Range drilled at least 10 holes in four different areas (These were: south of the Dundee mine, south of the Gadsden mine, in the south central part of the district and in the southern part of of the district). No discovery resulted from this work. The later part of the Copper Range program was run under a joint venture with Freeport Exploration Company.

The Anaconda Company took an interest in the district in 1971 and leased all of the lands not held by Phelps Dodge. Extensive induced polarization surveys were carried out over much of the district (except in a few key areas to be discussed later). More than 30 deep holes were drilled by Anaconda before leaving the area in early 1981. The Anaconda exploration program was under the direction of Paul Lindberg through 1975 during which time much data compilation work was completed.

During a brief period in 1976-77 a joint venture between Phelps Dodge and Anaconda was considered. As negotiations proceeded an induced polarization survey was carried out by PD over Verde Exploration lands north of Jerome. This work, although reconnaissance in nature, strongly suggested the presence of an anomaly which is referred to herein as the South A&A anomaly.

The exploration activities by Phelps Dodge during the period after 1951 to present are not completly known to this writer except at times when those activities affected Verde Exploration, Ltd. as detailed above. Public records do show, however, that Phelps Dodge located a large claim position off the extreme north end of the district during the period 1969-1974 and again in 1980. Approximately 5 sq. miles of these unpatented claims remain held by PD as of the 1981 assessment year. Records show drilling and geophysical activity by Phelps Dodge in the area.

Copies of most, but not all, of the information gathered by the various exploration efforts listed above is now available for study through Verde Exploration Ltd. or through public records.

With the departure of The Anaconda Company from Jerome in early 1981, Verde Exploration Ltd. was contacted by CoCa Mines Inc. with an expression of interest on the A and A property at the north end of the district. This resulted in an agreement in late 1981 under which the exploration program decribed herein was carried out.

ACTIVE EXPLORATION PROGRAMS IN THE AREA

Several exploration programs are now active in and near the Verde (Jerome) district. In the northern part of the district where CoCa Mines Inc. is working, other activity is being undertaken by Phelps Dodge Corp. In addition to regular assessment work on the large block of unpatented claims in the north, Phelps Dodge, through its Small Mines Division, has leased a small volume of ground from Verde Exploration Ltd. This lease constitutes the "Little Daisy" project.

The Little Daisy project area is limited to a roughly 1500 x 2600 ft irregularly bounded block from the surface down to an elevation of 3800 ft at the 1300 ft level of the UVX mine. This small volume of land, belonging to Verde Exploration Ltd., contains the oxide (gossan) zone overlying the UVX massive sulfide body. Based on old records, Handverger (1980) has suggested that a potential exists for 0.1 to 1.0 million tons of material grading above 0.2 oz/s.ton Au in the gossan zone.

Based primarily on Handverger's projection but possibly also on other, proprietary information, Phelps Dodge has undertaken to refurbish the Edith shaft and certain of the underground workings so that an evaluation can be made. This work was begun in December 1981, and appears to have been suspended in June 1982. A new headframe has been installed and new timber placed down to the 1200 level.

The Verde-PD lease specifies that Verde reserves the right of use of all mine workings in the leased premises provided only that such use does not interfere with PD operations. Thus underground access to lands leased to CoCa Mines Inc. through the PD lease area may be possible.

Phelps Dodge is also involved in geophysical surveys on their lands at the south end of the district, specifically near the Copper Chief mine. Extensions to this small massive sulfide body are being sought by means of induced polarization surveys (A. Hauck, pers. commun.).

An announcement has recently been noted (Mining Record, January 6, 1982) stating that Wallaby Enterprises Inc., a small geologic consulting group based in Prescott, has entered a contract with Phelps Dodge to reevaluate the PD holdings at Jerome. The extent of Wallaby's involvement is not known nor is it understood why the Western Exploration group of PD is not doing this work on its own behalf.

The Occidental Minerals Corporation has located a small block of claims and has leased the adjacent much larger block of unpatented claims from Verde Exploration, Ltd. in the southeastern part of the district. Efforts by Oxy to lease Phelps Dodge lands in this area have been unsuccessful to date (A. Hauck, pers. commun.). Occidental has been engaged in geophysical surveying, principally induced polarization, and is rumored to have obtained some encouragement. The program is under the direction of Dale G. Armstrong. (See BLM assessment records.)

A large area immediately northeast of the towns of Clarkdale and Cottonwood was the site of a uranium exploration play during 1978-80. Pioneer Nuclear Corporation was involved to some extent in this program. Targets were apparently developed in radioactive zones within the late Tertiary continental sediments of the Verde formation. Although many claims staked in this play have now been allowed to lapse,some are still held current by a complex group of individuals and holding companies.

An exploration play has been staked in an area approximately 10 miles south of Jerome in the Cherry Creek Mining District. A company by the name American Moly-Gold of Arizona, Inc. figures prominently in the records.

Newmont Mining Corporation followed the Anaconda Company in evaluating a gold bearing exhalite zone in the Agua Fria Mining District 22 miles SSW of Jerome. Some of the exploration data on this property (known as the Agua Fria prospect) has been published by Swan (1982). This Precambrian play is considered to have some potential for success; the current status, however, is not known to the writer at this time.

The first hardrock mine opened up by American settlers in the area was on the Silver Belt-McCabe "vein" near the Iron King mine in the Big Bug Mining District. This area lies 19 miles SW of Jerome and 12 miles ESE of Prescott. The Silver Belt mine was located in 1870 and production of rich silver ore began in the same year. The McCabe-Gladstone mine was located at the south end of the Silver Belt-McCabe vein and started production of gold/silver ore in 1880. (Anderson and Creasey, 1958). The "vein" is now considered by some to be an exhalative horizon in the Precambrian metavolcanic rocks of the district.

The Jerome Mining Corporation (Stan West Mining Corporation) has been exploring the McCabe-Gladstone property since 1979. Over 35,000 ft of diamond drilling has evidently located the structure at depth below the old workings. Jerome has contracted American Mine Services to sink a 14 ft circular concrete lined shaft to a depth of 950 ft so that the deeper levels can be explored by drifting and cross cutting. As of July 1982, this shaft has been completed to the 835 ft level and diamond drilling from the underground station is in progress (Alan St. James, pers. commun.) Old records give analyses of shipping ore to be (Mining Record, 12/2/81 and 1/13/82):

Cu - 2.0%	Sb - 1.0%
Pb - 2.1%	Au - 1.6 oz/s.ton
Zn - 4.7%	Ag - 10.2 oz/s.ton
As - 3.9%	

Rumor has it the Jerome Mining Corporation has encountered good values at depth in the structure.

EXPLORATION WORK AND PROCEDURES

Following the execution of a lease agreement with Verde Exploration, Ltd. in late 1981, a geophysical survey program was undertaken by CoCa Mines on the A and A lands north of Jerome. The field program was executed during the period January 12 to February 14, 1982 and consisted of layout of survey line control, induced polarization traversing, ground magnetic surveying and VLF electromagnetic surveying. Table 3 lists the extent of the coverage under the various geophysical methods while Figure 4 shows the layout of traverse lines relative to topography. Plate 3 shows the location of geophysical traverses at a greater level of precision. The field program was under the direction of the writer.

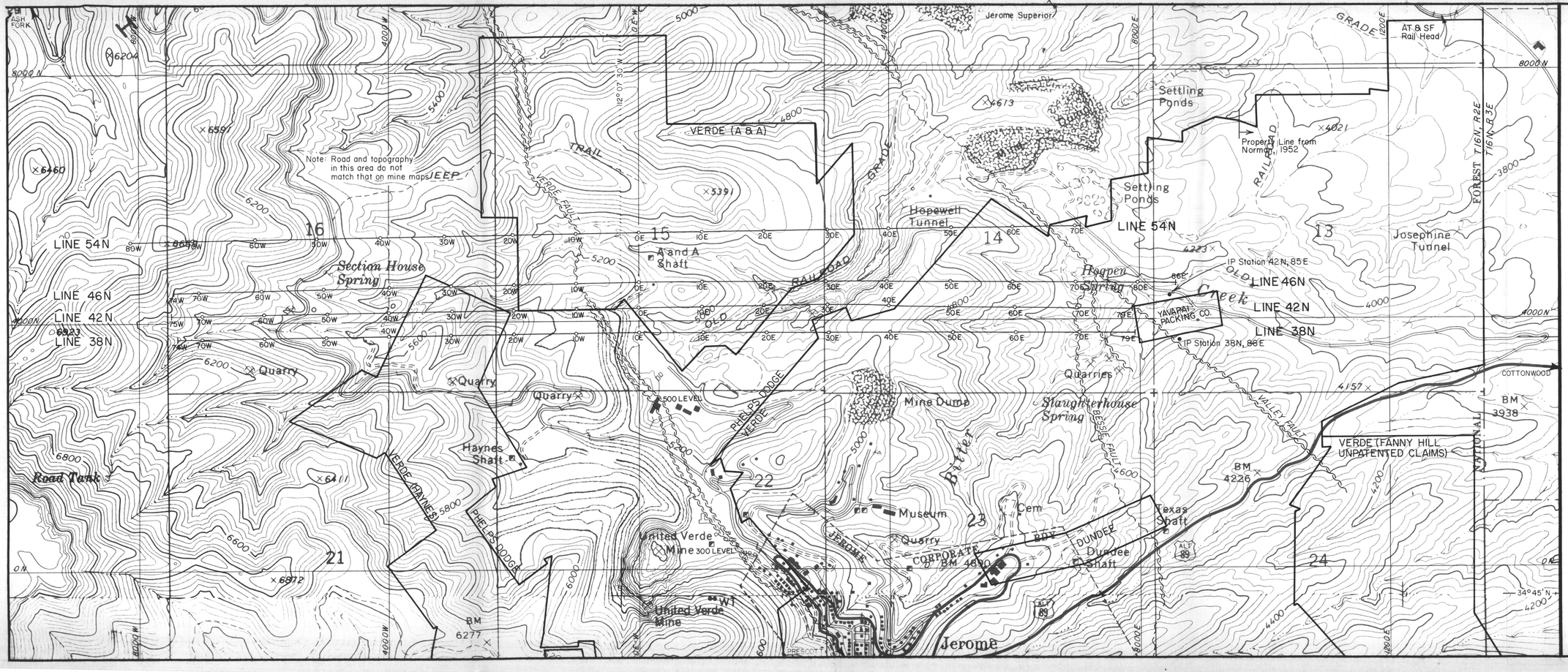
In addition to the geophysical program, CoCa Mines has undertaken a geological recompilation project (still in progress) whose end result will be a new set of plans and sections of the entire exploration area north of the two major deposits at Jerome. Most of this work is being carried out by Paul A. Lindberg under a consulting relationship. Mr. Lindberg has developed an intimate knowledge of the Jerome camp and has recognized the ore controls for the type of deposit being sought.

Control lines for the geophysical surveys were laid out as follows: A north-south base line was established on the ground with reference to buildings and other features shown on the 1:4800 scale base map prepared by the Anaconda Company of the area. (This map is available from Verde Exploration, Ltd.) A coordinate system was used in conformance with the UV coordinates commonly in use in the district. Thus, the N-S baseline lies along the 0+00E coordinate line.

Using a transit, 90° angles were turned at each station on the baseline where a traverse line was to cross. Long foresights and backsights were noted and a compass bearing taken. Traverse lines were then established by chain and sight/compass means in both directions from the baseline. Four foot pickets were placed and flagged at each 100 ft station along the traverse, again labelled using UV coordinates. (Thus station 46N, 17W is located at or near 4600N, 1700W.) It is unlikely that any given station marked on the ground will lie more than 100 feet from the true coordinate position once allowances are made for base map distortion. (See below)

TABLE 3
Geophysical Coverage During
Jan-Feb 1982 Exploration Program
Jerome Project, Arizona

Line Number	IP From - To: Ft	Magnetics From - To: Ft	VLF From - To: Ft
38N	74W-84E:16,000 (Ran twice)	74W-76E:15,000	34W-79E:11,900
42N	75W-85E:16,000	76W-79E:15,500	55W-22E:7,700
46N	74W-86E:16,000	74W-81E:15,500	16W-83E:9,900
54N	80W-70E:15,000	80W-71E:15,100	80W-71E:15,100
	63,000 feet (11.9 miles)	61,100 (11.6 miles)	44,600 (8.4 miles)



SOURCES OF INFORMATION

1. BASE MAP IS A 2X ENLARGEMENT OF MUNDS DRAW, CLARKDALE, HICKEY MNT, AND COTTONWOOD 7.5 MIN. QUADRANGLES. (USGS)
2. ANACONDA, 1972, GEOLOGIC MAP OF JEROME DISTRICT, NORTH SHEET: A 1:4800 SCALE MAP OBTAINED FROM VERDE EXPLORATION WHICH WAS REDUCED TO MATCH THIS 1:12000 SCALE. THIS MAP IS THE SOURCE OF MOST OF THE LAND BOUNDARIES, FAULTS, AND THE UV MINE GRID. THE GRID HAS BEEN SUPERIMPOSED BY A "BEST FIT" PROCEDURE TO ROADS, BUILDINGS, SHAFTS, ETC. COMMON TO BOTH THE ANACONDA AND USGS MAPS.
3. NORMAN, G.W.H., 1952, REPORT ON EXPLORATION, JEROME AREA, ARIZONA: MINGUS MNT. MINING COMPANY REPORT DATED JANUARY 29. A REDUCTION OF FIGURE 3 A WAS USED TO OBTAIN THE LAND BOUNDARIES ON THE EAST SIDE OF THE MAP. THESE DO NOT AGREE WITH THOSE SHOWN ON THE ANACONDA MAP.

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(303) 861-5400

REVISIONS		
For	Date	By

FIGURE 4

JEROME PROJECT

LOCATION OF GEOPHYSICAL TRAVERSES

JAN. FEB. 1982 SURVEY

YAVAPAI COUNTY ARIZONA

for: RAR date: 3-10-82 by: TRL serial no: 1288

Ties were made to natural features shown on the base map from time to time as the traverses were run. Thus imperfections in the layout are known, relative to the map, at a resolution of about 20 feet. Base map imperfections and distortions were found, in particular at the extreme west end of the lines. Discrepancies of up to 200 feet were found and are noted on the plates and figures presented herein. Similarly possible discrepancies were found in the land boundary positions as marked on the ground relative to those shown on the base map. These too are noted on the plates and figures.

The induced polarization survey was conducted under contract with Mining Geophysical Surveys Inc. of Tucson. The technical specifications and preliminary data plots resulting from this work are given in Wieduwilt, 1982, a copy of which is attached hereto as Appendix 3. Briefly, a Dipole-Dipole array was used with "A" spacing of 1000 feet and "N" separations (on 1 or ½ "N" intervals) of 6 or more. A 10 amp(maximum)generator was used through an Elliot Geophysical Company model 45A time domain transmitter (Ser. No. 119) and Model R-20A receiver (Ser. No. 2017). Chargeability readings were repeated, occassionally 72 or more times,until a reasonable gaussian sample population was obtained.

Electrode positions were established at stations remote from cultural interference in the form of pipelines, fences, etc. This was done in an effort to minimize distortions in the data from these sources. The positions of all such known features were duely noted and have been plotted on the sectional representations of the I.P. data.

The VLF data was obtained using a Phoenix Geophysics VLF-2 Receiver (Serial No. L1182). The transmitting station used was that near Seattle, Washington at a frequency of 24.8 Khz (recently changed from 18.6 Khz). Three readings were taken at each 50 foot station along the line. Namely: The maximum field strength observed with the receiver coil rotated on a horizontal plane, the tilt angle of the quasi-horizontal plane of polarization along its major axis, and the residual field strength observed with the coil oriented in its final null position. No diurnal corrections have been applied to field strength readings. Direction of signal propagation at 46N, 52E is S18^{o}E.

The magnetic data was obtained using a Scintrex MP-2 proton precession magnetometer. (Serial No. 8106747) A reading was obtained at each 50 foot station along the line. No diurnal corrections have been applied.

The major thrust of the field program was in the generation of high quality, detailed and carefully located induced polarization data. It was felt desireable, however, once the traverse line positions had so carefully been laid out, to obtain the relatively inexpensive magnetic and VLF data so as to maximize the use of control lines.

DATA REDUCTION AND PRESENTATION OF RESULTS

The induced polarization chargeability data presented herein has been processed as follows:

1) Histøgrams of repeat chargeability readings were constructed using a class interval of 5 milliseconds in most cases.

2) Erratic high and/or low readings were then rejected based on criterion whereby readings greater than 2 standard deviations from the mean are considered erratics.

3) The mean and standard deviation was then recalculated and posted on standard pseudo-sectional form. Note that the "standard error of the mean" is defined as the standard deviation divided by the number of readings, "n". Typically "n" was in the range 16 to 72.

The problem of representing induced polarization data in plan was handled by choosing the N separation of 5 as corresponding to the depth of interest. Each reading posted on the psuedo sections at N=5 was averaged with the readings at the adjacent N=4 and N=6 separations to obtain a "smoothed" value. Similarly a "smoothed" value was calculated at intermediate N=5 positions by averaging adjacent values from the N=4, 5 and 6 levels. Thus a "smoothed" value was obtained every 500 feet along the traverse (250 feet in the case of Line 38N). This "smoothed" value, posted at the corresponding station on the plan map,was contoured to produce Figure 5 and Plate 4. The psuedo sectional data is presented together with a geologic cross section and the interpreted locations of the sources of anomalies on Figures 7a-d and Plates 5a-d.

An effort to compare the chargeability results from the CoCa Mines survey with available information from earlier surveys is shown on Figures 6a-c which should be studied in combination with Figure 5.

Figure 6a relates to the 1977 Phelps Dodge dipole-dipole I.P. survey run in the A&A area. Only the 1000 foot Dipole information is used. "Smoothed" values were calculated using the same procedure noted above. Frequency effect values were converted to the chargeability units used in the CoCa Mines survey by means of a 6.7X conversion factor. (Ken Zonge, pers. commun.).

The 1974 and 1977 Anaconda pole-dipole survey results are presented on Figures 6b and 6c, respectively. The "A" spacing used in these surveys was 800 feet thus the "N" level chosen for use in a plan representation was N=4. As above, "smoothed" values were obtained at 400 foot intervals by averaging adjacent readings from the N=3 layer. (The Anaconda surveys were not run with "N" values higher than 4.) Ambiguities and inconsistencies between the two Anaconda surveys lead to the decision not to make a theoretical conversion of units. Thus the values shown on the plans are in units given on the Anaconda psuedosections (minutes of phase angle).

Electrical noise plagued the survey on several days during the period. The source of most of this noise is believed to be in D.C. motors at the Phoenix Cement plant 2 miles to the east of the survey area. The means chosen to overcome this problem was the generation of maximum power from the transmitter and the taking of many,many readings at each station. As suggested by the high values obtained for standard deviation (shown on the psuedosections) this procedure was less than successful in some cases. Future electrical work will require higher power transmitters to more efficiently overcome the problem.

Occassional receiver operator error was discovered either in the field or during data reduction. These errors relate to the 2X range switch on the receiver. In each case discovered, the switch was set on 2X while the notes stated that it was set on 1X. This had the effect of halving the recorded chargeability. The problem in each case was confirmed by repeating the suspect readings. On line 46N the initial readings on receiver setup 8-9 were rejected in their entirety (along with all the initial readings on receiver setup 7-8 and 9-10 taken during a wet snowstorm). (Compare Figure 7b with the pseudosection for this line in Appendix 3.) On line 38N chargeability readings reported for receiver setups 9-10 (5 rdgs) and 3-2 (3 rdgs) were doubled so as to be in better agreement with repeat values.

The noise and suspicious reading problems made repeats advisable in several cases. Further, the dramatic positive results of line 38N required confirmation. Thus repeat surveys were run on incremental ½N spacings on the east end of line 42N and on line 38N in its entirety. Repeat surveys were also run on incremental 1N spacings to extend line 46N eastward into the newly discovered anomalous zone.

The interpreted source positions shown on the psuedosections were made with the aid of a set of theoretical and/or analogue model studies drawn from the literature. Seven such cases are presented in Appendix 2 for study in combination with the results of this survey. These theoretical results are plotted at the same scale and in the same units used on Plates 5a-d. Unit conversion procedure used to produce these templates is explained in the text of Appendix 2.

The vertical projection of the interpreted sources' positions are indicated on the plan map representations of the I.P. results, Figure 5 and Plate 4. In the case of the South A&A anomaly information from the 1977 Phelps Dodge survey is used to surmise the southern end of the hypothetical massive sulfide body.

Profiles of the magnetic survey results and the 3 parameters measured on the VLF survey are presented on Plates 6a-d. Anomalies or other features interpreted from these profiles are rated (A=definate, B=probable, C=possible anomaly; 1=strong, 2=moderate and 3=weak anomaly). Positions are posted on the I.P. psuedo-sections and, in plan on Figure 8. Plan representations of the magnetic and VLF fields have not yet been constructed in view of the preliminary nature of the results. The results are preliminary inasmuch as diurnal corrections have not been applied to the magnetics and the VLF survey is only about 70% complete.

A preliminary version of the detailed Precambrian geologic map is presented as Plate 7. As stated above, the geologic data compilation project is still in progress. The final geologic map must await extensive relogging and remapping efforts.

DISCUSSION

DISCUSSION

General

The A and A patented lands at the north end of the Verde (Jerome) district have long been considered very prospective. As documented in notes by Thayer Lindsley (1915-1916) this property was considered to be "on-trend" with the United Verde deposit itself and was thought to contain the deeper extensions of the orebody. This idea has now been found to be incorrect.

Later work (Norman, 1952) showed that the favorable Cleopatra Quartz porphyry was present in the area. He states (page 41) that ..."a quartz porphyry tongue 800 feet wide extends for more then 3500 feet northward from A & A gulch along the footwall of the Verde fault..." Still later work by Paul Lindberg and Anaconda lead to an explanation, through complex folding and faulting, of the presence of the Cleopatra member in the area. (See geologic cross sections on Figures 7a-d and plan on Plate 7.)

The highly prospective "tongue" of quartz porphyry was tested by Mingus Mountain Mining Company drill holes MM-4 and 6 and by Anaconda drill hole AV-18 all of which failed to encounter massive sulfides of any consequence at the Grapevine Gulch/Cleopatra contact. Underground workings from the A & A shaft reportedly encountered some "ore" near the contact in the Verde fault zone on 3 levels (See cross section in Rivera, 1981b). Evidently "ore" in commercially exploitable quantities was not found.

The primary reason the A & A area was drilled by Mingus Mountain Mining Company related to geophysics. An I.P. survey run by A. Brant in what was then called the "Dog" area outlined an anomaly which, as will be demonstrated below, was probably due to sulfide material in the large dump in the area. Brant (1950) used a Wenner array with a 1000 foot "A" spacing to survey the area in random traverse fashion.

Anaconda, in 1974, covered the A & A area with an I.P. survey. As shown on Figure 6b a weak anomaly was discovered on line 29 which seemed to indicate the presence of a source immediately to the south near the Phelps Dodge property line. This anomaly, known as the A & A anomaly, was the subject of much interest at Anaconda and negotiations were begun with Phelps Ddoge to joint venture in the "Corridor" area of Phelps Dodge lands immediately south of the A & A lands. Due, reportedly, to anti-trust considerations the negotiations between Anaconda (Arco) and Phelps Dodge eventually came to nothing. Not wishing to explore lands so close to the property line Anaconda pursued other targets in the Jerome area instead. (Paul Lindberg, pers. commun.)