CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
520-770-3500
http://www.azgs.az.gov
inquiries@azgs.az.gov

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FLORENCE PEDIMENT PROJECT

Pinal County, Arizona

By

H. G. Kreis

ASARCO Incorporated

July 1, 1981

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FIGURES

TABLES

INTRODUCTION

The Florence pediment is an expansive gravel-covered area located along a belt of porphyry copper deposits extending from the Santa Cruz-Sacaton area through the Poston Butte deposit to the Globe-Miami area. The Florence Pediment Project was initiated to explore for porphyry copper mineralization beneath the post mineral conglomerate-volcanic rock cover of the Florence pediment. A portion of the pediment, located six miles east-northeast of Florence (Fig. 1), was chosen for drilling and is the topic of this report.

ASARCO's exploration activity in the area dates back to 1960 when Asarco geologists discovered and drilled the Poston Butte deposit. In 1970 Asarco acquired a portion of the Poston Butte deposit which it still holds.

In the spring of 1978 all the outcrops along the Florence pediment were mapped by the author. Specific pediment targets were identified at Walker Butte, Cholla Butte, and in the post mineral covered area between the Poston Butte deposit and the Laramide Mineral Mountain stock. The Walker Butte target was drilled in 1979 and dropped (report by H. G. Kreis, 1979, "Walker Butte Project"). Drilling of the Cholla Butte target has yet to be done.

In 1979 gravity, magnetic, and resistivity surveys were run to estimate the depth to bedrock in the area between the Poston Butte deposit and the Mineral Mountain stock (J. P. Montgomery, July 1979, "Gravity, Magnetic, and resistivity Surveys, Florence Pediment, Pinal County, Arizona"). Drill holes were then planned in appropriate locations where the depth to bedrock was estimated to be less than 2000'.

In late 1979 and early 1980 five holes were drilled to bedrock to test the porphyry copper potential between the Poston Butte deposit and the Mineral Mountain stock (Figs. 1 and 2). This report will discuss the results of the five bedrock penetrations and make recommendations for future work.

CONCLUSIONS AND RECOMMENDATIONS

Laramide Sacaton Peak granodiorite was encountered in all five bedrock penetrations of the Florence Pediment Project (Figs. 1 and 2). Neither the granodiorite nor the conglomerate contain anomolous copper values. Furthermore, there is no direct evidence of porphyry copper sulfide mineralization in either the granodiorite or the conglomerate. Varying amounts and differing combinations of chlorite-epidote-calcite-sericite alteration replace up to 15% of the granodiorite. While the alteration may be related to porphyry copper mineralization, the overall results are insufficiently encouraging to recommend offset drilling at this time.

Presently, the best potential for porphyry copper mineralization in the Florence pediment area is under the Gila River flood plain between the Town of Florence and drill hole FP-4. A second area occurs within a two-mile radius of Cholla Butte. The potential of the Cholla Butte area has been tested to some degree by Conoco.

R. 7 E. R. 8 E. R. 9 E. R. 10 E. R. 11 E.

T. 2 S.

T. 3 S.

T. 4 S.

T. 5 S.

MINERAL BUTTE ALTERATION ZONE

Mineral Butte Deposit

WALKER BUTTE ALTERATION ZONE

Poston Butte Deposit

POSTON BUTTE ALTERATION ZONE

CHOLLA BUTTE ALTERATION ZONE

Florence

FP-6, 6a, 6b
Tv 250' T.D.

FP-5
1740' Lgr
1860' T.D.

FP-1
2020' Lgr
2543' T.D.

FP-3
2805' Lgr
3181' T.D.

FP-2
200' Lgr
1000' T.D.

FP-4
2450' Lgr
2797' T.D.

PR-1

PR-2

MINERAL MTN. QUARTZ SULFIDE VEINS

EXPLANATION

- Alluvium
- Tv — Post-mineral
- Lgr — Laramide stocks and dikes
- pEg — Precambrian granite
- pEs — Precambrian schist
- Porphyry copper alteration zone or sulfide veins
- Porphyry copper deposits extensively explored
- Outline of ground presently held and being aquired by ASARCO for Florence Pediment Drill Project.
- FP-2 ● 2020' Lgr 2810' T.D. — Completed drill holes with depth to premineral bedrock, rock type at T.D. and total depth
- ⊙ PR — Picture Rocks Holes; former pediment drill project; both bottomed in conglomerate at 1496 feet

N

TO ACCOMPANY REPORT
DATED 7-1-81
BY H.G. KREIS

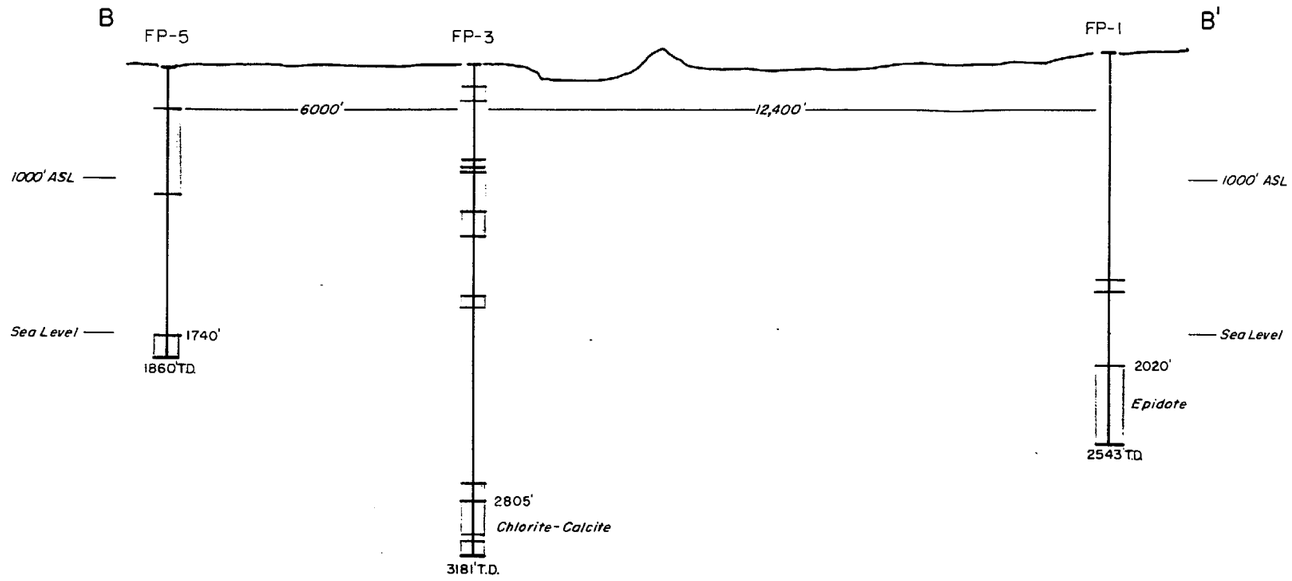
FIGURE 1

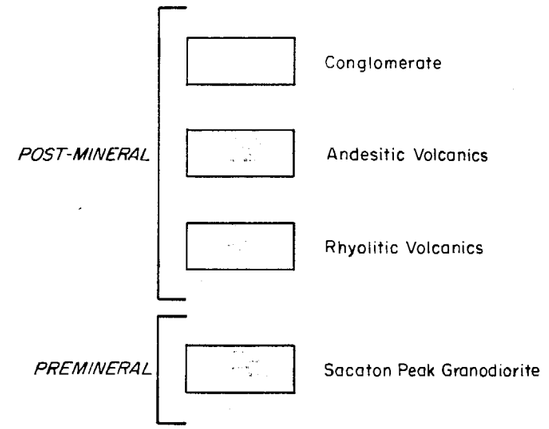
FLORENCE PEDIMENT PROJECT
PINAL COUNTY, ARIZONA
SCALE 1" = 2 miles

F.T. Graybeal – H.G. Kreis

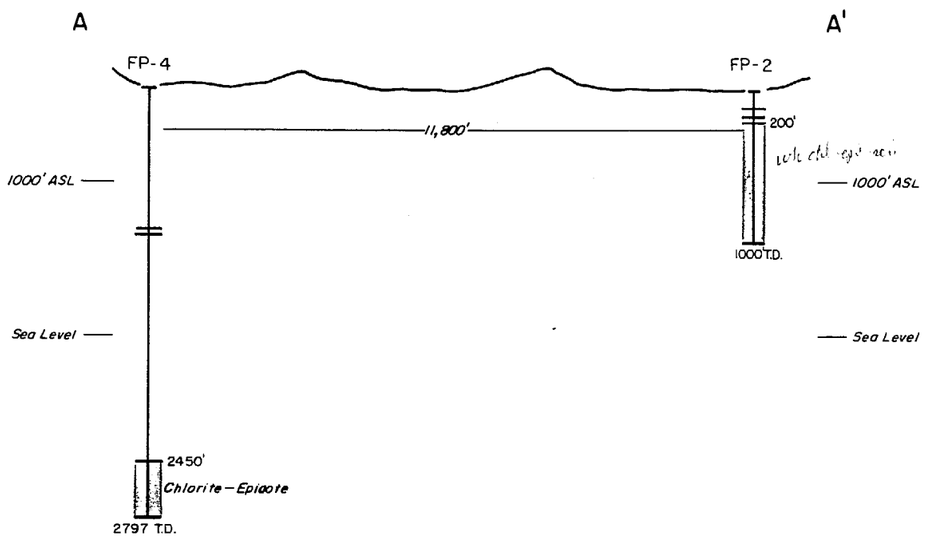
June 1981

mn 5261 dam 6/81





VERTICAL SCALE 1" = 1000'
HORIZONTAL SCALE 1" = 3000'



TO ACCOMPANY REPORT
DATED 7-1-81
BY H.G. KREIS

FIGURE 2

FLORENCE PEDIMENT PROJECT
CROSS SECTIONS A–A' and B–B'
PINAL COUNTY, ARIZONA

H.G. Kreis — June, 1981

mn 5261a dam 6/81

It is recommended that Asarco abandon its Florence Pediment Project land holdings. Concurrently, the merits of the fore-mentioned Gila River flood plain area and the Cholla Butte area should be reviewed. Both are likely candidates for further drilling on the Florence Pediment Project.

ROCK TYPES

All five of the drill holes, FP-1 to FP-5 of Figures 1 and 2, intersected premineral granodiorite beneath conglomerate and volcanic post mineral cover. The granodiorite is the oldest rock type penetrated by the drill holes. Mapping of the outcrops along the edge of the Florence Pediment shows that the granodiorite is intruded into Precambrian Pinal schist and Precambrian Oracle granite.

Granodiorite

The granodiorite is texturally and compositionally the same as the Sacaton Peak granodiorite exposed in outcrops to the west and the Mineral Mountain granodiorite exposed in outcrops to the east. The Sacaton Peak granodiorite is dated at 61 million years. The Mineral Mountain granodiorite has age dates of 71 million years (K-Ar date of biotite; Creasey), 124 million years (K-Ar date of hornblende; Creasey), and 157 million years (K-Ar date of biotite; Balla).

The color of the granodiorite is light gray with black biotite, white to smokey colored plagioclase, smokey colored quartz, and slightly pinkish tan colored K-feldspar. A very slight green coloration occurs in local areas of strongest chlorite-epidote alteration.

Based on visual estimates from all five drill holes, the granodiorite is composed of 9% biotite, 1% hornblende (varies from 0 to 3%), 53% plagioclase, 15% K-feldspar, 22% quartz, and minor amounts of accessory magnetite-sphene-apatite. Hornblende is present in the granodiorite of holes FP-1 and FP-2. No evidence of hornblende exists in holes FP-3, -4, and -5.

In hand sample the granodiorite has a slightly porphyritic, equigranular texture. Biotite is typically 1x1 mm to 1x3 mm in size. Plagioclase is commonly 1x2 mm and locally to 2x3 mm. K-feldspar varies from interstitial to phenocrystal, and the phenocrysts are commonly up to 7 mm in length. Most of the quartz occurs in phenocryst-like (quartz eye) aggregates typically 3-5 mm in diameter. Approximately 1% of the granodiorite in FP-3 and FP-5 has a myrmekitic texture.

Numerous aplite-pegmatite-alaskite dikes (up to 2' thick) are present in the granodiorite of FP-4. With the exception of a thin dike of volcanic(?) rock in the granodiorite of FP-3, to be discussed, no other intrusive rocks are found in the granodiorite.

The amount of granodiorite penetrated is listed in Table 1. Drill hole FP-2 was continued well into bedrock to reasonably eliminate the possibility of the granodiorite being a slide block in conglomerate. Geophysical methods predicted the top of bedrock in FP-2 at a depth of 1300' rather than the 200' at which it was found.

Table 1 Granodiorite Penetrations

Drill Hole	Top of Bedrock (depth)	Granodiorite Intercept	Bottom of Drill Hole
FP-1	2220'	323'	2543'
FP-2	200	800	1000
FP-3	2805	376	3181
FP-4	2450	347	2797
FP-5	1740	120	1860

Conglomerate

The conglomerate was carefully inspected to check for erosional evidence of buried porphyry copper mineralization. No such evidence was found in any of the samples of conglomerate (each sample was either an interval of 10' or 20'). Locally, iron oxide-stained clasts form a significant amount of the conglomerate; however, the iron oxide stain originated from mafic minerals rather than sulfide minerals. Furthermore, all of the conglomerate contained background copper geochem values (to be discussed in a following section).

The conglomerate clast types were not logged in detail. Most of the conglomerate clasts are Precambrian granite, Sacaton Peak granodiorite, Precambrian schist, quartz monzonite porphyry, rhyolite, and andesite. The clasts appear to be of local origin. Drill hole FP-5 from 1250' to 1740' penetrated conglomerate of monolithic schist clasts or schist bedrock (FP-1 and FP-3 penetrated conglomerate units with monolithic schist clasts).

The matrix of the conglomerate, as seen in spot cores and some vials of rotary cuttings, is commonly a grayish tan colored, tuffaceous-appearing material. Locally the matrix is red to reddish brown in color as in FP-4 below a depth of 1900'. Spot cores of conglomerate show it to be well indurated and lacking sorting and bedding.

Volcanics

There are andesitic, basaltic, and rhyolitic volcanic units in the conglomerate. Andesites and/or basalts are present in the conglomerate of every drill hole FP-1 to FP-6 (Fig. 2). Rhyolitic volcanics are not widespread and are present in FP-3. Rhyolitic volcanics were not drilled by FP-4 but cap the hill top above and immediately southwest of the FP-4 drill site.

An intrusive rock with flow banding is present in FP-3 from 3021' to 3051'. The texture and composition of this intrusive rock are obscured by strong kaolinite alteration. It is thought to be a volcanic rock of possible middle Tertiary age because of its flow banding.

STRUCTURE

The bedrock of the Florence Pediment forms a structural basin typical of the type produced by basin-range formation. The east edge of the pediment, along the west side of Mineral Mountain, is an obvious fault that strikes due north and dips to the west. The displacement on this fault is over 2000' vertically as evidenced by the depth to bedrock in FP-1. Variations in the drill hole depths to bedrock (Table 1) are thought to be due to similar fault offsets. Drill hole FP-2 is on a prominent bedrock high (200' depth to the top of bedrock); and drill hole FP-3 has the greatest depth to bedrock, 2805'.

Coring of the granodiorite bedrock in FP-3 and FP-4 yielded some structural information. The only fault evidence is relatively minor shearing and crushing in the top portion of the core in FP-3. In the lower part of FP-3 fractures have less than a 45° dip.

MINERALIZATION-ALTERATION

Mineralization and alteration of the granodiorite were evaluated by core logging, binocular microscope examination, thin section examination, and geochemical determinations. The work was done on a time-permitting basis during the last year and a half. The core logs and geochemical determinations are in the Appendix of this report.

Mineralization

All of the core and rotary cuttings of drill holes FP-1 to FP-5 have been examined for sulfides or evidence of former sulfides. Only rare traces of pyrite and chalcopyrite are present in the granodiorite. Traces of microscopic-sized native copper occur in a spot core of FP-4 granodiorite (2565' to 2570') but are not observed elsewhere. There are no other copper minerals in the granodiorite or the conglomerate.

The geochemical copper values in both the conglomerate and the granodiorite are not substantially anomalous (Table 2); nor do they suggest any trends. The highest copper values in the conglomerate and the granodiorite are 87 and 73 ppm, respectively. Approximately 95% of all the copper values in conglomerate and granodiorite are less than 60 ppm.

Table 2 Copper Geochemical Summary

Drill Hole		Copper (ppm) in Conglomerate		Copper (ppm) in Granodiorite	
		Common Range*	Highest Value	Common Range*	Highest Value
FP-1		30-53	62	21-31	38
FP-2		43-54	54	42-63	63
FP-3		26-64	87	5-40**	40**
FP-4	Rotary	26-45	45	27-47	73
	Core	---	--	5**	35**
FP-5		29-49	49	23-56	56

*At least 95% of the values.
**Skyline Labs determinations; all the rest are American Analytical determinations.

Lead, zinc, molybdenum, gold, and silver geochemical determinations on selected granodiorite samples are tabulated in Table 3. Lead values in the granodiorite vary from <5 to 107 ppm. As shown in Table 3 Skyline's lead determinations in FP-4 are half (or less) of American's determinations. Zinc values vary from 43 to 1127 ppm in rotary drilled granodiorite and from 40 to 50 ppm in cored granodiorite. The anomalous zinc values in the rotary cuttings are probably the result of sample contamination during the rotary drilling process. Molybdenum in granodiorite varies from <2 to 9 ppm. The higher values are either due to erroneously high American determinations or rotary drilling contamination. The former is suspected because American reported similar values on cored, nearly fresh rock on another recent project. Gold and silver values in strongly chloritized granodiorite of FP-3 and FP-4 are <0.005 and <0.01 ounces per ton, respectively.

Table 3 Lead-Zinc-Molybdenum In Granodiorite (ppm)

Hole	Depth	Lead	Zinc	Molybdenum	Gold oz/ton	Silver oz/ton	Sample	
FP-1	2300-2400	107	43	9	-	-	Rotary	Cuttings
	2400-2500	48	71	6	-	-	"	"
FP-2	220-300	21	42	7	-	-	"	"
	500-600	23	436	7	-	-	"	"
	700-800	19	393	3	-	-	"	"
	900-1000	25	1127	5	-	-	"	"
FP-3	2830-3000**	-	60	2*	-	-	Core	
	3070-3120	<5*	40*	<2*	<.005*	<.01*	"	
	3120-3181	<5*	45*	<2*	<.005*	<.01*	"	
FP-4	2500-2570	69	517	5	-	-	Rotary	Cuttings
	2570-2650	21	419	7	-	-	"	"
	2670-2710	40(20*)	50*	2*	<.005*	<.01*	Core	
	2710-2750	40(<5*)	40*	<2*	<.005*	<.01*	"	
	2750-2797	47(25*)	40*	2*	<.005*	<.01*	"	
FP-5	1740-1800	67	216	3	-	-	Rotary	Cuttings
	1800-1850	61	309	5	-	-	"	"

* Skyline Labs determination; all others are American Analytical Research Labs.
** Average of 5-10' samples (uniformly spaced).

Strongly chloritized granodiorite has been spectrographically analyzed, and the results are in Table 4. No anomalous metal concentrations were detected.

Table 4 Spectrographic Analysis Of Chloritized Granodiorite

Data: Skyline Labs Inc. Determinations.
FP-3: 3070-3120 Composite.
FP-4: 2670-2710 Composite.
Values in ppm except where noted.

Element	FP-3	FP-4	Element	FP-3	FP-4
Fe	1.5%	1.0%	La	<20	<20
Ca	.5%	.5%	Mn	200	200
Mg	.5%	.5%	Mo	<2	<2
			Nb	<20	<20
Ag	<1	<1	Ni	7	10
As	<500	<500	Pb	10	30
B	10	10	Sb	<100	<100
Ba	1500	1000	Sc	<10	<10
Be	<2	<2	Sn	<10	<10
Bi	<10	<10	Sr	300	200
Cd	<50	<50	Ti	1000	1000
Co	5	5	V	30	30
Cr	<10	20	W	<50	<50
Cu	15	30	Y	<10	<10
Ga	<10	<10	Zn	<200	<200
Ge	<20	<20	Zr	70	70

Alteration

The granodiorite in drill holes FP-1 to FP-5 is altered by a propylitic suite of alteration minerals. Chlorite, epidote, calcite, and sericite replace up to 15% of the granodiorite in certain drill holes. The abundance of these alteration minerals in each intercept of granodiorite is shown in Table 5.

Epidotization, amounting to 2% of the granodiorite, occurs in FP-1 and FP-4. Strong chloritization of biotite exists in FP-3 and FP-4, and the alignment of these holes suggests a possible north-northeast trend to the chloritization. Coexisting with the chlorite in FP-3 is 2% calcite and a similar amount of green clay occuring as veinlets and fracture coatings. Clay and calcite are also abundant in and along the contacts of a volcanic(?) dike in FP-3 (3021' to 3051') suggesting that at least the calcite and clay of FP-3 postdates the volcanic(?) dike, an intrusive rock of possible middle Tertiary age.

Table 5 Alteration of Granodiorite

Drill Hole	Chlorite	Epidote	Calcite	Sericite	Clay on Fractures
FP-1	0.5%	2.5%	Tr%	2%	-
FP-2	2	0.1-0.5	Tr	4	-
FP-3	8	-	2	3	1-2
FP-4	8	2	0.5	1	Tr
FP-5	1-2	-	Tr	1-2	-

In the granodiorite disseminated epidote replaces plagioclase and lesser amounts of biotite and K-feldspar. Disseminated epidote is more abundant than epidote veinlets. Chlorite replaces hornblende, if present, and biotite. Calcite occurs as veinlets, fracture coatings, and disseminations in plagioclase. Sericite prevasively dusts the grains of plagioclase.

The chlorite in granodiorite of drill holes FP-2, -3, -4 and -5 is Fe-rich based on optical properties. Magnesian chlorite is locally present in FP-2 and FP-4.

K-feldspar of the granodiorite was examined in each of the holes. In holes FP-1, -2, -3 and -4 the average abundance of microcline exceeds or is equal to that of orthoclase. In FP-5 the abundance of orthoclase exceeds that of microcline.

Fluid inclusions in the quartz of the granodiorite in drill holes FP-1 to FP-5 were examined. The inclusions are a liquid phase with a small vapor phase amounting to 10 to 20% of the volume of the inclusion. Daughter minerals are not present in the inclusions. In general the abundance and the size of the fluid inclusions are small. The largest and most abundant inclusions occur locally in drill holes FP-4 and FP-5. There are no obvious composition-size-abundance trends in the granodiorite fluid inclusions that would constitute a significant exploration lead. A more detailed evaluation of the fluid inclusions might be justified in any future work.

Discussion

Visually and geochemically there is no direct evidence of porphyry copper mineralization in or near the granodiorite intercepts of FP-1 to FP-5. Conceivably the epidotization in FP-1 and FP-4 and/or the chloritization in FP-3 and FP-4 could be fringe alteration associated with porphyry copper sulfide mineralization. Epidotization of of granodiorite and Precambrian granite is common elsewhere in the Florence-Casa Grande area. Much of this epidotization is obviously related to porphyry copper mineralization. Widespread, strong chloritization of granodiorite, however, is not reported elsewhere in the district. The chloritization in FP-3 and FP-4 appears to be of hydrothermal origin, but there is insufficient evidence to determine if it is associated with porphyry copper deposit formation or middle Tertiary volcanism-mineralization.

The clasts of the conglomerate and the copper geochemical values of the conglomerate show no indication of porphyry copper mineralization. Such evidence cannot establish the absence of nearby porphyry copper mineralization, but the chances for an occurance of nearby porphyry copper mineralization are substantially diminished.

DRILLING

Six drill sites were spotted on the Florence Pediment. Drill holes FP-1, FP-2 and FP-5 were rotary and spot core drilled into premineral bedrock. Drill holes FP-3 and FP-4 were rotary drilled into bedrock, cased, and core drilled to their total depth. Drill hole FP-6 was planned to intercept bedrock at a geophysically estimated depth of 900' and meet state work requirements on four adjoining Arizona State sections. Drill hole FP-6 and subsequent holes FP-6B and -6C were all abandoned at depths of less than 250' because of uncontrollable lost circulation, exceptionally hard formation (basalt), and satisfaction of state work requirements. The drilling footages are summarized in Table 6.

Table 6 Drilling Summary

Drill Hole	Rotary/Spot Core Drilling	Core Drilling	Drilling
FP-1	2543'	-0-	2543'
FP-2	1000'	-0-	1000'
FP-3	2819'	362'	3181'
FP-4	2657'	140'	2797'
FP-5	1860'	-0-	1860'
FP-6,6B,6C	555'	-0-	555'
Total	11,434'	502'	11,936'

LAND

Asarco land holdings in the Florence Pediment Project area consist of 422 Federal unpatented mining claims and six Arizona State prospecting permits all of which cover 18 square miles (Fig. 1). Asarco's land holdings adjoin the north and east edges of a military reservation having withdrawn mineral rights. All of the Asarco holdings are undeveloped grazing land.

EXPENDITURES

A total of $240,921 was spent on the Florence Pediment Project. Over 80% of this amount was surface drilling expense. A total of 11,936' of drilling was done at a total project cost of $20.18 per foot. Expenses are categorized in Table 7.

Table 7 Project Expenditures

Item	Expenditure	Cost/ft.
Surface Drilling	$196,030	$16.42
Rental Payment	25,486	2.14
General Administration	9,102	.76
Geology	4,109	.34
Auto	2,750	.23
Sampling & Assaying	1,920	.16
Temporary Construction	753	.06
Engineering	428	.04
Field Administration	343	.03
Total	$240,921	$20.18

SUMMARY

Five bedrock intercepts, at depths of 200' to 2805', have been achieved on Asarco's 18 square miles of land holdings. Each of the five bedrock intercepts is Laramide Sacaton Peak granodiorite with chlorite-epidote-calcite-sericite alteration amounting to less than 15% of the rock. No direct evidence of sulfide mineralization or anomalous copper is present in the granodiorite or the overlying post mineral conglomerate.

The alteration of the granodiorite is insufficient to justify offset drilling at this time. The presently held 18 square miles of land should be dropped. Targets in the Gila River flood plain and at Cholla Butte should be evaluated as a continuation of the Florence Pediment project.

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August 17, 1981

Mr. W. L. Kurtz
Western Exploration
Tucson Office

Florence Pediment Project, Arizona

Dear Mr. Kurtz:

Thank you for sending me your file copy of the summary report prepared by Mr. Kreis which is enclosed. The report is well organized and quite thorough. I note that Mr. Kreis recommends dropping the claims on the pediment and concentrating our efforts on the Gila River floodplain and at Cholla Butte. Although not stated in the report, I assume that the Cholla Butte target is actually the land previously identified by Mr. Crist as belonging to the Bolin family, which lies between the Poston Butte deposit and the weak mineralization exposed at Cholla Butte. No reason is given for retention of existing and possible acquisition of new land along the Gila River floodplain, although I assume Mr. Kreis was attracted by the occurrence of native copper in FP-2 and perhaps also by the more magnesian character of chlorite in holes FP-2 and 4. Mr. Kreis notes (p.6) that the highest copper value obtained was 87 ppm Cu, but the last assay sheet in his report gives 4 values over 200 ppm and 1 over 1000 ppm Cu. I can't tell from the sample number where these values come from, but I suspect FP-2.

Mr. Kreis concludes in his discussion that there's no direct, nearby evidence for porphyry copper mineralization and that, while the alteration may be related to porphyry copper mineralization, he can't recommend offset drilling on the pediment. Barren Laramide plutons are characterized by their lack of chlorite and near absence of epidote. Although I have not reviewed all the thin sections, the presence of widespread chlorite, particularly compositionally-mixed varieties, and the co-existence of epidote are both significant. The widespread distribution of chlorite and epidote argue strongly against an origin tied to the Mid-Tertiary rocks. Even more

fundamentally, the abundance of magmatic biotite is significant as an indication that the parent magma was relatively wet, as noted by Holland in an Economic Geology article of a few years back.

Although expenditures to date have been substantial, I am not convinced that we have thoroughly tested the potential of the pediment area. I think the alteration establishes that we are in a porphyry copper environment and I wonder whether additional geologic studies of variations in the copper content of biotite and thermal/salinity variations in the fluid inclusion should be made before ground is dropped. In addition, since all holes penetrate Laramide rock, I also wonder if additional drilling should be conducted to assess the contact zones between the Laramide and Precambrian rocks. Within this general region a large amount of mineralization, particularly at Poston Butte, Walker Butte, Mineral Butte, Olberg, and Sacaton-Santa Cruz, occurs along the contact of Laramide and Precambrian rocks. We do not yet have an accurate picture of the shape of the Laramide stock under the Florence Pediment, but it is often characteristic of large stocks that porphyry copper systems occur along their contacts, not within the stock itself. Although the shape of the Mineral Mountain stock is regular, the shape of the Laramide zones is anything but regular in the Walker Butte area and we therefore do not know that holes FP-1, 3 or 5 are near the northern contact of the Mineral Mountain stock.

Perhaps more holes should be drilled north of FP-1, 3 and 5, and south of FP-2 and 4 to explore the contact zones of the stock. Operating a mine in a floodplain (such as south of FP-2 and 4) is not an attractive thought, but I guess I would rather know what sort of deposit I have to operate before condemning the site as operationally too difficult. Drilling north of FP-3 may encounter excessive depths, but it might be useful to have the Geophysical Department re-assess their gravity data using the bedrock depth information now available.

Although porphyry copper zoning patterns are generally predictable and mineralization widespread, it is often difficult to detect zoning patterns in holes spaced 1-2 miles apart. Tilting and post-mineral faulting additionally complicate zoning patterns. I am not yet convinced that the density of drilling at Florence Pediment allows us to predict accurately zoning patterns. Therefore, we are left with our ability to recognize the presence or absence of characteristics indicating a favorable environment of ore deposition and I think such an environment still exists at Florence Pediment. You mentioned that it might be possible to hold some of the unpatented claims with minor or no additional expenditures in 1981. I would certainly be inclined to do so until biotite and fluid inclusion studies are completed and further consideration is given to testing the contact zones of the Laramide stock, particularly north of FP-3.

Very truly yours,

Original signed by
F. T. Graybeal

F. T. Graybeal

Encl.

cc: WDPayne

ASARCO

October 26, 1981

Exploration Department
Southwestern United States Division

Mr. J.R. Porter
Geophysical Office
Asarco Incorporated
3422 South 700 West
Salt Lake City, Utah 84119

Casa Grande - Florence Pediment
Geophysical Interpretations
Pinal County, Arizona

Dear Jeff:

As we had discussed on the telephone, you will find enclosed a geologic base map (1" = 1 mile) from Florence to Casa Grande, a gravity overlay, and an aeromagnetic overlay. Also enclosed is a 1" = 2 miles plan map showing the possible outline of the Laramide Three Peaks and Sacaton Peak stocks. The stock outlines are a best guess and were made without the benefit of the geophysical information.

In summary of our telephone conversation, bedrock depths and the contact of the Sacaton Peak granite in the Cholla Butte - Florence Pediment area are of primary interest (outlined on the 1" = 2 miles plan map). The buried portions of the Laramide stock contact are of interest to our ongoing evaluation of the Florence - Casa Grande area.

When time permits, I plan to run the magnetic susceptibility meter over the rocks and core that I have collected over the last seven years. If there is anyway my experience in the area can help you with your interpretation, please call me.

Sincerely yours,

Hank

Henry G. Kreis
Geologist

HGK/mlm

Attachments

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703
1150 North 7th Avenue (602) 792-3010

1/27/82

WP
HGK
ED Medlin
Perkins
Montgomery
Nicols

Resolution re Fairway Pedernal Project

Winter/Spring
1.) Acquire appropriate data package (plan + lines) for geometries
2) Geophysical Data Handling

Summer
3) Test of Geophysical Interpretation

Fall/Winter
4) Field Corrections
5) Target Testing

WDP

ASARCO

Southwestern Exploration Division

January 28, 1982

TO: W. D. Payne

FROM: H. G. Kreis

Monthly Report, January 1982
Florence Pediment Project, EA-0197
Pinal County, Arizona

A preliminary land status map of the Cholla Butte target area was prepared during January. It was found that two-thirds of the target area is controlled by one company (Arizona-Colorado Land and Cattle Company). The remainder of the target area is controlled by four other owners.

A data exchange with CONOCO for its drill hole information on the west end of the Cholla Butte target is still pending. No more progress will be made until our exploration plans for the target are formalized.

Estimated expenditures for the month are $ -0- , leaving an estimated overrun of $3,600.00.

H. G. Kreis

H. G. Kreis

HGK:mek

ASARCO

Southwestern Exploration Division

April 27, 1982

To: J. D. Sell

From: H. G. Kreis

Monthly Report, April 1982
Florence Pediment Project, EA-0197
Pinal County, Arizona

Mr. J. Montgomery and I spent a week measuring the magnetic susceptibility of rocks in the Casa Grande to Florence area. In addition to measurements on outcrops, measurements were taken on core in the Santa Cruz Project area, the Poston Butte Project, the Olberg Project, and the Walker Butte Project. Sufficient readings have been taken to form a preliminary interpretation of the aeromagnetic surveys.

Estimated expenditures for the month are $-0- leaving an estimated overrun of $3,921.

H. G. Kreis

H. G. Kreis

HGK/cg

ASARCO

Southwestern Exploration Division

May 27, 1982

To: J. D. Sell

From: H. G. Kreis

Monthly Report, May 1982
Florence Pediment Project, EA-0197
Pinal County, Arizona

There was no work performed on the Florence Pediment Project during the month of May. Past plans to purchase aeromagnetic survey data in the Florence area have been shelved and will not be reconsidered in 1982. In the fall of 1982 Mr. J. Montgomery will use the magnetic susceptibility readings acquired earlier this year to review past Asarco aeromagnetic interpretations in the Casa Grande to Florence area.

The Cholla Butte target remains of eminent concern. Apparently, little progress has been made along the lines of land acquisition. The terms under which favorable lands might be optioned still are not known.

Estimated expenditures for the month of May are $-0-, leaving an overrun of $3,921.

H. G. Kreis

H. G. Kreis

HGK/cg

ASARCO

Southwestern Exploration Division

June 17, 1982

To: J. D. Sell

From: H. G. Kreis

Monthly Report, June 1982
Florence Pediment Project, EA-0197
Pinal County, AZ

There was no activity on the Florence Pediment Project during the month of June.

There were no expenditures during the month, leaving an estimated overrun of $3,921.

H. G. Kreis

H. G. Kreis/cg

HGK/cg

ASARCO

Southwestern Exploration Division

August 27, 1982

To: J. D. Sell

From: H. G. Kreis

Monthly Report, August 1982
Florence Pediment Project, EA-0197
Pinal County, Arizona

There was no activity on the Florence Pediment Project during the month of August. There were no estimated expenditures for the month of August, leaving an overrun of $3,921.

H. G. Kreis

H. G. Kreis

HGK/cg

ASARCO

Southwestern Exploration Division

October 4, 1982

To: J. D. Sell

From: H. G. Kreis

Monthly Report, September 1982
Florence Pediment Project, EA-0197
Pinal County, AZ

There was no activity on the Florence Pediment Project during the month of September, and no work is planned in the remainder of 1982.

Estimated expenditures for the month of September is $-0-, leaving an overrun of $3,921.

H. G. Kreis

H. G. Kreis/cg

HGK/cg

ASARCO

Southwestern Exploration Division

November 3, 1982

To: J. D. Sell

From: H. G. Kreis

Monthly Report, October 1982
Florence Pediment Project, EA-0197
Pinal County, AZ

There was no activity on the Florence Pediment Project during the month of October, and no work is planned in the remainder of 1982

Estimated expenditures for the month of October is $-0-, leaving an overrun of $3,921.

H. G. Kreis

H. G. Kreis/cg

HGK/cg

ASARCO

Southwestern Exploration Division

December 3, 1982

To: J. D. Sell

From: H. G. Kreis

Monthly Report, November 1982
Florence Pediment Proj., EA-0197
Pinal County, AZ

There was no activity on the Florence Pediment Project during the month of November, and no work is planned in the remainder of 1982.

There were no expenditures for the month of November, leaving an overrun of $3,921.

H. G. Kreis

H. G. Kreis

HGK/cg

ASARCO

Exploration Department

February 2, 1982

MEMORANDUM

W. D. Payne
Tucson Office

Cholla Butte
Arizona

Reference is made to Mr. Kreis' memo of December 22, 1981. I mentioned to you, Crist, and Kreis that I am agreeable for someone to determine upon what terms we might obtain an option on the lands. Due to current lack of drilling funds we should strive to obtain terms without a major work commitment the first year.

W. L. Kurtz

WLK/cg

cc: RBCrist
HGKreis

ASARCO

Southwestern Exploration Division

December 22, 1981

TO: W.D. Payne

FROM: H.G. Kreis H.G. Kreis

Cholla Butte
Copper Target
Pinal County, Arizona

The concept of the Cholla Butte Copper Target and a recommendation to proceed with its exploration have been presented verbally to Mr. Graybeal, Mr. Kurtz, and you. An attached map shows the location of the Cholla Butte Copper Target as it was presented.

In summary, the target is an interpretation of outcrop geology (mainly Cholla Butte), district geology, core chips from abandoned CONOCO drill sites, and information obtained while arranging for a data exchange with CONOCO. Apparently, CONOCO drilled granodiorite with structurally controlled pyritic mineralization and anomalous copper and molybdenum. The depth to bedrock in most of their drill holes ("CM" designation) was 500' or less; however, depths to bedrock in the target area are estimated to be 1000' to 2500'. An east-west and north-south gravity-resistivity - I.P. profile may be helpful in refining the location of the target.

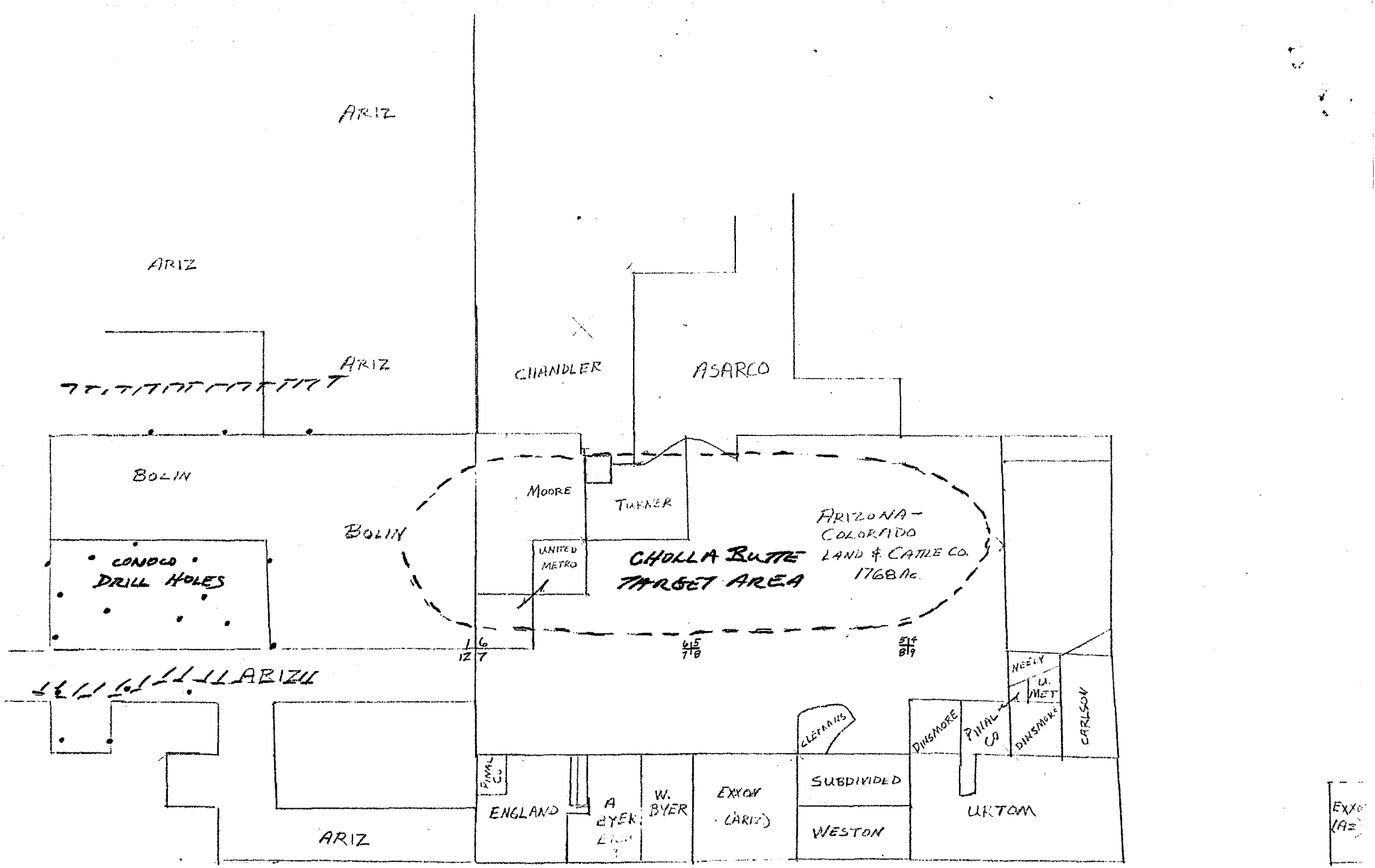
The Gila River overlies the target and is of some concern. The degree to which the Gila River and its subsurface water bearing gravels would effect a mining operation can be determined only when the depth, tonnage, grade, and mining method are known.

Because of the high quality of the target and recent Exxon land acquisition (one mile south of the target), it is recommended that we consider immediate land acquisition at this time. It would be helpful to have the CONOCO drill hole data, but it is not necessary prior to land negotiations. A comprehensive geological report on the target should follow acquisition of CONOCO's drill hole data.

HGK/mlm

Attachment

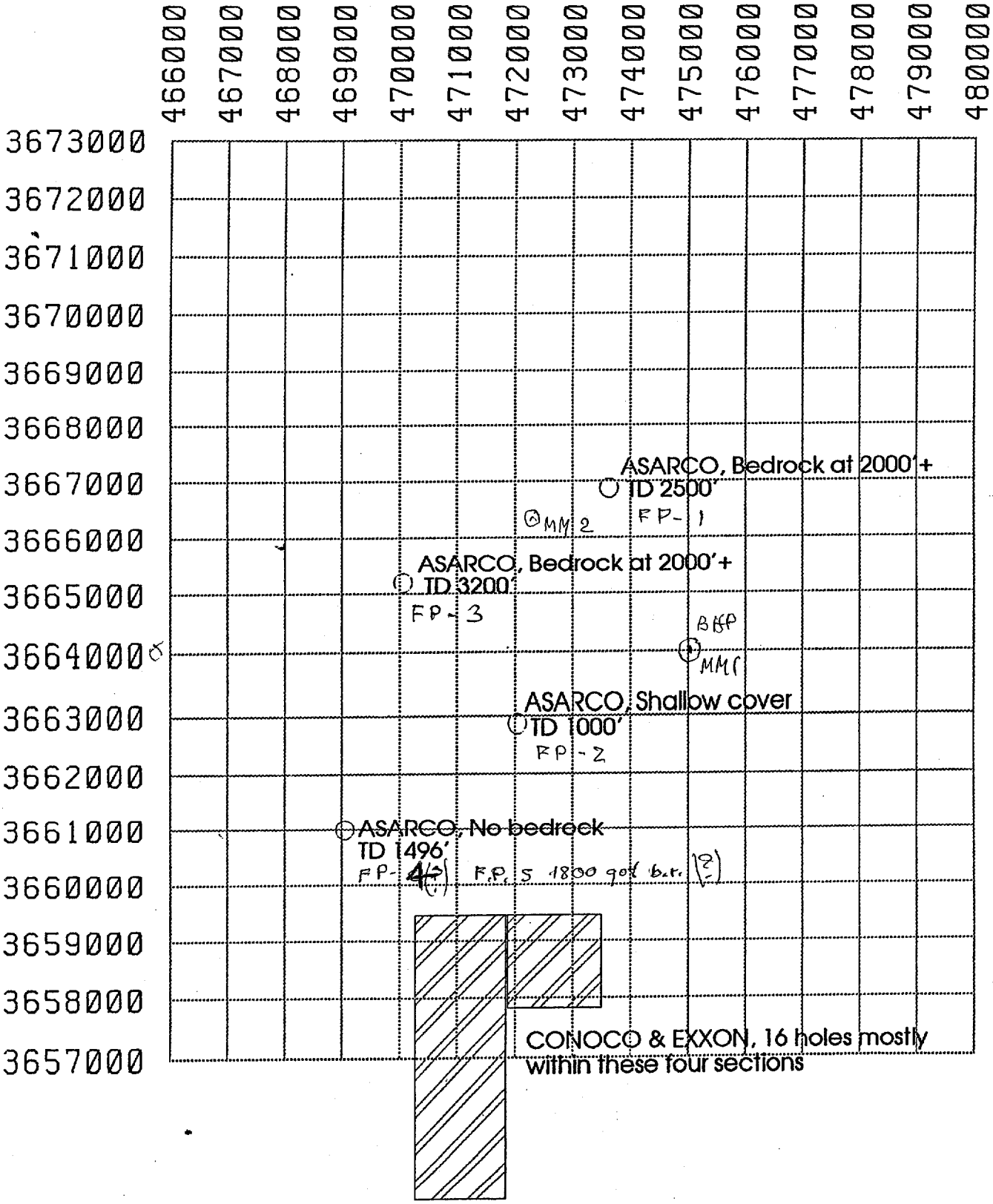
c: W.L. Kurtz



LAND STATUS
CHOLLA BUTTE

HK 1-1982 (1-18-82)

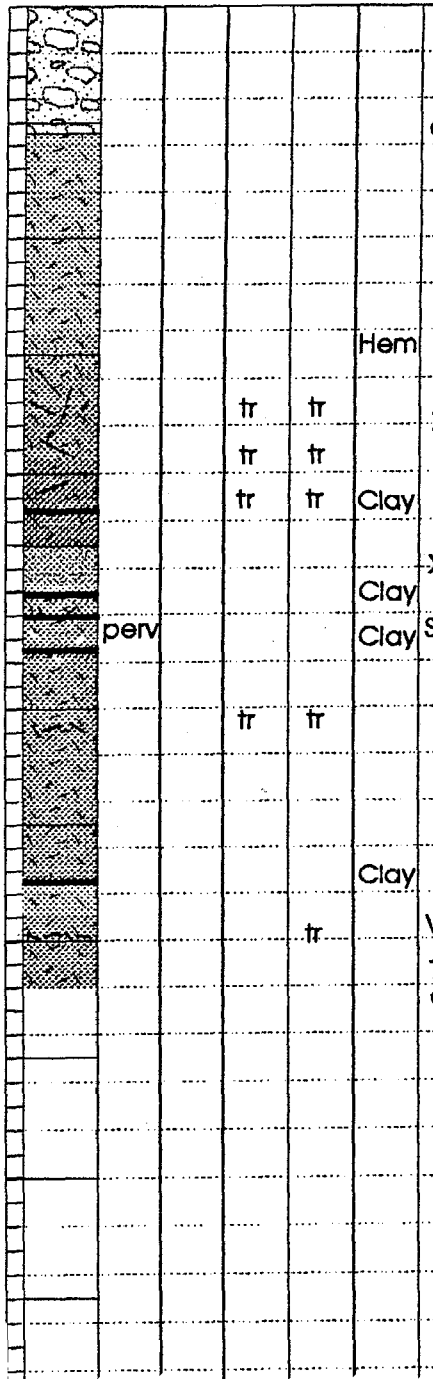
Mineral Mtn Drill Holes



Drill Hole: MM-2
Collar Elev: 1900'
TD: 1320'

MINERAL MTN PROJECT

Drilling Co: Boyles
Start: 11-Feb-94
Finish 23-Feb-94



SER	PYR	CHL	EPI	OTH		Au ppb	Ag	Cu	Pb	Zn	Mo
					Contacat with bedrock at 955' Enter Mineral Mountain granodiorite	10	0.4	24	10	65	<2
						4	0.1	18	<2	50	<2
						6	<.1	8	<2	60	<2
						20	<.1	8	<2	60	<2
						18	0.4	8	2	50	<2
				Hem	Varying degrees of hematite staining from 1040' to 1320' source of Fe appears to be entirely from biotites.	28	<.1	10	6	70	<2
		tr	tr		Zone of weak propylitic alteration	6	0.4	10	6	60	<2
		tr	tr			4	0.1	10	6	65	2
		tr	tr	Clay		8	0.3	12	<2	75	2
					Xenolith of pC schist	2	0.3	12	6	65	2
				Clay		4	0.3	16	8	70	4
	perv			Clay	Small zone of sericitic alteration possibly assoc with fault/shear	6	0.6	30	6	60	2
						<2	0.3	16	6	65	2
		tr	tr			2	0.3	12	8	65	2
						2	0.6	10	6	60	2
						<2	0.4	8	8	70	<2
				Clay		<2	0.3	10	8	70	6
						<2	0.1	10	2	65	2
			tr		Veinlets (<1mm) of epidote w/assoc chlorite	10	0.4	8	<2	70	2
					Total depth 1320' hole ended due to lack of significant alteration or mineralization.						

ASARCO

JDS

Exploration Department
Southwestern United States Division

February 2, 1988

Mr. Don L. Jenkins, President
Gold River Exploration Co.
P.O. Box 4106
Prescott, AZ 86302

Florence Area Copper
Pinal County, AZ

Dear Mr. Jenkins:

Yes, Asarco is interested in copper-silver deposits of the Florence area.

We would be interested in any preliminary data you might have, such as drill data, sample information, etc., and the land description of township-range-sections.

Thank you for the opportunity.

Sincerely,

James D. Sell

James D. Sell

JDS:mek

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

7-29-92

HGK/JDS

Magma's purchase of
CONOCO Florence Deposit:

Purchase price: "$22 million
or less according to the
company (Magma)"

Royalty: 3% net returns
to Conoco

H.G.K.