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R12E
R13E
EISENHOWER
POOR BOY
RICH BOY
RHODA
SENATOR TAFT
FLYING SAUCER
REBECCA ANN
LITTLE EVA
STATE 1
LUPITA
BECKY B
OPPORTUNITY
Golden West No 6
Golden West No 5
Golden West No 7
Golden West No 4
Golden West No 2
Golden West No 1
Jo-Jo No 3
Jo-Jo No 2
Jo-Jo No 1
Little Mammoth 1649
36
31
32
FED No 19
FED No 20
FED No 21
FED No 24
FED No 22
FED No 25
FED No 26
FED No 27
FED No 28
FED No 29
FED No 30
FED No 34
FED No 35
FED No 32
Kino No 1
Kino No 3
Kino No 4
Kino No 5
Kino No 6
Kino No 7
Kino No 9
Kino No 10
Kino No 11
Kino No 12
Kino No 13
Kino No 14
Kino No 15
Kino No 16
Kino No 17
Cobre Hondo No 1
Cobre Hondo No 2
Cobre Hondo
Papago fm
Papago formation
Kino fm
Pima fm
CRETACEOUS
REDBEDS
EAST PIMA UNDERGROUND GEOLOGY SHOWN AT 2790' ELEV
EASTERN LIMIT OF ALTERATION
APPROX OUTLINE EXOTIC CHRYSOCOLLA
STA 1
STA 2
STA 3
STA 4
STA 5
STA 6
STA 7
STA 8
STA 9
STA 10
STA 11
STA 12
STA 13
STA 14
STA 15
STA 16
ALPHA NO 88
ALPHA NO 89
ALPHA NO 90
ALPHA NO 91
ALPHA NO 92
ALPHA NO 93
ALPHA NO 97
ALPHA NO 99
ALPHA NO 100
ALPHA NO 101
ALPHA NO 102
STAF NO 1
ALPHA NO 5
ALPHA NO 6
ALPHA NO 7
ALPHA NO 8
ALPHA NO 24
ALPHA NO 25
ALPHA NO 28
Mission No 1
Mission No 2
Mission No 3
Mission No 4
Mission No 5
Mission No 6
Mission No 7
Mission No 8
Mission No 9
Mission No 12
Mission No 18
Mission No 19
T16S
T17S
Carbonate 1649
Ninety Six 1649
Crest 1649
DELTA
Pima formation
UNION NO 1
UNION NO 2
ALPHA NO 4
HERRICK NO 1
HERRICK NO 2
ALPHA NO 26
ALPHA NO 27
ALPHA NO 3
RED HILL ARKOSE
3726 PLUMED KNIGHT
3726 PLUMED KNIGHT NO 2
3726 LAKE GEORGE
3726 LAKE GEORGE NO 2
3726 SOUTH SIDE
3726 SOUTH SIDE NO 2
3726 SUNNY SIDE NO 2
3726 OUTSIDE NO 2
3726 MARTHA B KETZ NO 2
3726 EIDA B NO 2
4295 COLUMBIA
CHOLLA NO 1
CHOLLA NO 7
CHOLLA NO 8
ALPHA NO 1
ALPHA NO 2
ALPHA NO 9
ALPHA NO 10
ALPHA NO 11
ALPHA NO 12
ALPHA NO 13
ALPHA NO 14
ALPHA NO 15
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ALPHA NO 61
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ALPHA NO 63
ALPHA NO 64
ALPHA NO 65
ALPHA NO 66
ALPHA NO 67
ALPHA NO 68
ALPHA NO 69
ALPHA NO 70
RED HILL
6
5
FED No 5
FED No 7
FED No 9
FED No 10
FED No 11
FED No 12
FMR No 5
FMR No 6
FMR No 7
FMR No 8
FMR No 9
FMR No 10
FMR No 11
FMR No 12
FMR No 13
FMR No 14
FMR No 15
FMR No 16
FMR No 17
FMR No 18
PYROCLASTIC (?) Rocks
UNCONFORMITY
INTRUSIVE CONTACT
Holes Drilling During Month of
Hole Drilling (Aug. 30, 1957)
Hole complete but all assays not available
Sufficient mineral for claim discovery
Possibly insufficient mineral for discovery
Discovery holes planned
Patent application made
BEDROCK GEOLOGY
AMERICAN SMELTING AND REFINING COMPANY
CLAIM MAP
OF
PIMA MINING DISTRICT
Pima County, Arizona
SCALE 1" = 500'
APRIL, 1954
REVISED JUNE, 1954
JUNE, 1955
FEB, 1957
JUNE, 1957
August, 1957
MAP NO. EP-5-2E

T 16 S

TRACT

TRACT

SAN XAVIER INDIAN RESERVATION

SAN XAVIER INDIAN RES.

SAN XAVIER INDIAN RESERVATION BOUNDARY

ASARCO

BANNER MINING COMPANY

ASARCO

PIMA MINING COMPANY

ASARCO

36
(STATE)

31
(FEDERAL)

R 12 E

R 13 E

Section 6150 N

Section 5850 N

Section 5550 N

Section 5250 N

Section 4950 N

Section 4650 N

Section 4350 N

Section 4050 N

Section 3750 N

Section 3450 N

Section 3150 N

Section 2850 N

Section 2550 N

Section 2250 N

Section 1950 N

Section 1650 N

Section 1350 N

EXPLANATION

ORE INTERCEPTS IN DRILL HOLES

1 Depth to top of ore
2 Length of ore intercept
3 Average % Cu (≥ .40 cutoff)
4 Total depth of hole

Holes drilling

Hole complete but all assays not available

OWNERSHIP MINERAL RIGHTS

American Smelting and Refining Company

Pima Mining Company

Banner Mining Company

ASARCO

EAST PIMA PROJECT

Pima County, Arizona

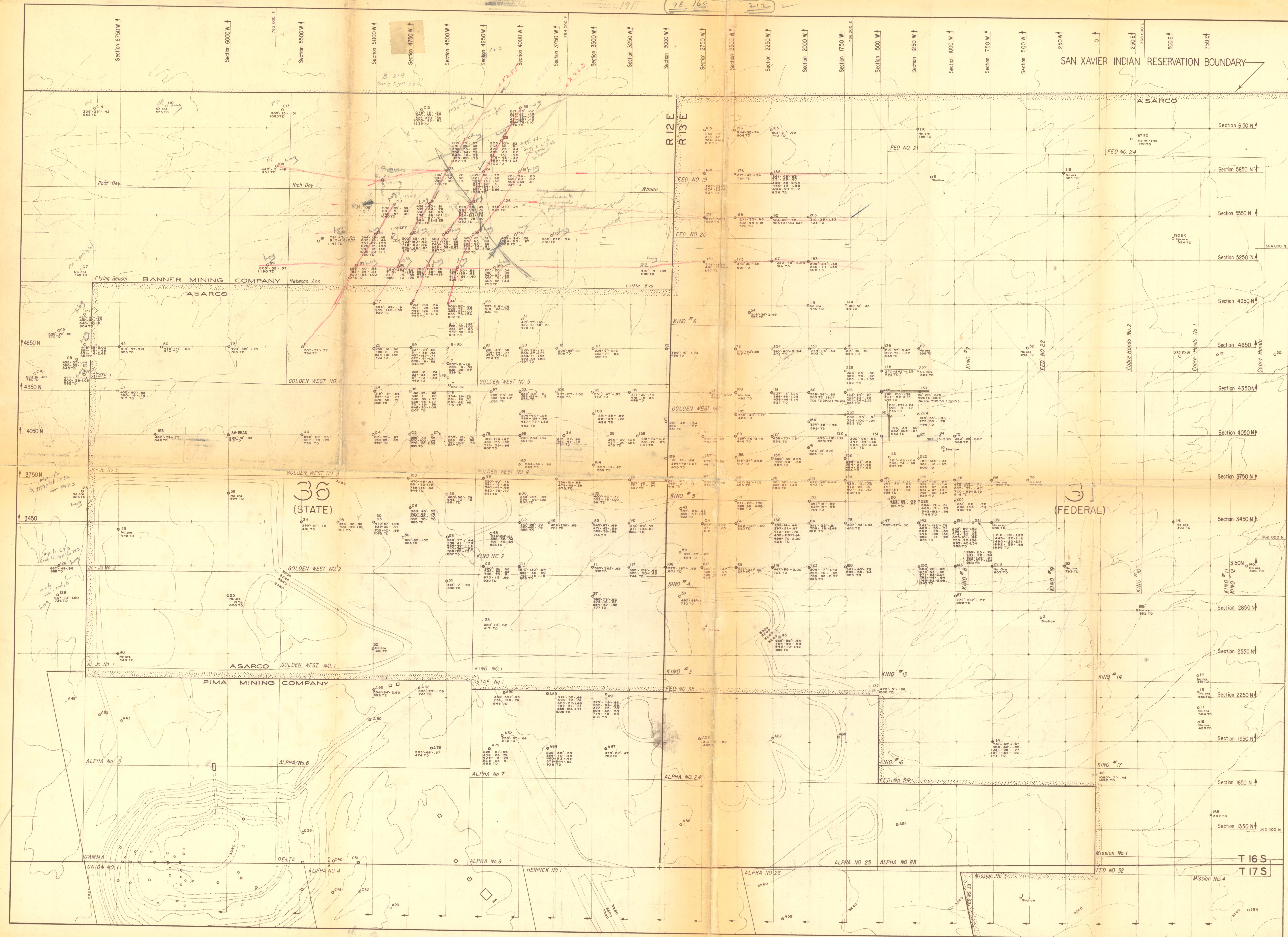
DRILLING MAP

SCALE 1" = 300'

CONTOUR INTERVAL - 20'

MAY, 1957 MAP NO. 4524 EP-11-4E

SEPTEMBER, 1958 JULY, 1959
MARCH, 1959
MAY 1, 1959
JUNE 1, 1959



EXPLANATION

ORE INTERCEPTS IN DRILL HOLES

	①	②		③
○ 20	213'	33'	-	1.71
	289	67	-	1.07
	434	11	-	1.55
	473	38	-	1.30
④	597 TD			

① Depth to top of ore
② Length of ore intercept
③ Average % Cu (± .40 cutoff)
④ Total depth of hole

Holes drilling

Hole complete but all assays not available

OWNERSHIP MINERAL RIGHTS

American Smelting and Refining Company

Pima Mining Company

Banner Mining Company

ASARCO

EAST PIMA PROJECT

Pima County, Arizona

DRILLING MAP

SCALE 1" = 300'

CONTOUR INTERVAL - 20'

MAY, 1957 MAP NO. ~~1324~~ EP-11-4E

SEPTEMBER, 1958 JULY, 1959
MARCH, 1959
MAY 1, 1959
JUNE 1, 1959

BANNER HOLE MAP
+ MISSION

John Kinnison

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona
December 28, 1961

MEMORANDUM FOR T. A. SHERMAN

MISSION ORE BODY
Development Diamond Drilling

A configuration designated "ultimate open pit" was used in the final ore reserve estimate (March, 1959) upon which the pre-mine engineering and economic studies were based. The term "ultimate" applied only in the sense that the pit shape was the maximum size within limitations of property lines and waste/ore ratios which seemed generally feasible at that time. Ore-grade material was known to extend outside of this so-called ultimate pit in nearly all directions except east, but these possible extensions were incompletely drilled.

The hole-spacing is relatively wide in the western half of the ore body within the ultimate pit. This spacing was adequate for pre-mine estimations of tonnage and grade, but interspaced holes eventually will be needed for year-to-year and month-to-month planning of pit development.

There are two other factors which were recognized, but which were not then germane to the problem of the termination of drilling and the preparation of the March, 1959 ore reserve estimate. These factors are the possible extensions of open pit mining into the Pima mining property on the South and Banner's Eisenhower claims on the North. These are problems which, in the latter case, now are being subjected to engineering analysis, and which require additional development drill hole information before mining plans can be formalized.

Altogether, then, a large number of development drill holes are required. Some of these are needed now; some, not for several years. In the following paragraphs the drilling has been segregated into areas having somewhat different objectives, and these areas are arranged in their approximate order of drilling. However, the principle intent of this memorandum is to show the order of magnitude of the overall program. Both the sequence and the rate of drilling no doubt will be varied from time to time. Also, the number of holes and their positions and depths may be changed, depending on drilling results.

The attached two maps, prepared by John Kinnison, show the various proposed hole locations and approximate depths.

A - Area immediately North and Northeast of Present Pit - 1500'
A' - Area at Southeast Edge of Present Pit - 1000' - 5 holes

At the present time these two areas need interspaced holes to permit placing permanent haul roads in the proper positions. In the case of area A,

Information from the pit mapping of Mr. Gale and Mr. Stauffer should be used to determine the positions of holes. Grid lines probably can be ignored and angled holes might be advantageous.

D - Pit Extension into Banner Ground - East - 5700' - 11 holes:

The good results in recent hole C3 suggest the need for additional holes in the surrounding area.

D'- Pit Extension into Banner Ground - West - 5000' - 6 holes:

These holes in Asarco ground are needed for proper appraisal of maximum open pit possibilities in Banner Ground as well as Asarco ground.

E - Northeast Ore Extension - 13,400' - 27 holes:

The holes already drilled in this area show a spotty condition of mineralization, and the results do not quite constitute an ore body. It is thought that a number of interspaced holes has a chance to improve the average grade enough to put this block into the commercial category. It is considered that high grade structures such as the East vein may exist in this area but have been missed by the holes already drilled. Admittedly, this is a rather long-range chance; but it is worth the expense because, for another reason, any ore body here would permit open pit access to ore on the Reservation.

F - Pit Extension Southerly - 24,000' - 24 holes:

These holes are needed to determine how far south mining can be carried. The ore may connect with the new ore body which Pima is planning on mining.

E - West Extension - 3000' - 5 holes:

Depending somewhat on the drilling results in area D', there is a moderate chance that open pit ore extends into this extreme west area.

E'- Southwest Area - 5000' - 5 holes:

The mineralized zone lies deep here, and it is further buried by the Pima dump. However, there could be ore-grade material of eventual interest to underground mining.

F - Interspaced Drilling - Western Half of Mission Ore Body - 29,000' - 33 holes:

The western half of the ore body was not drilled as closely as the part now being mined, although enough drilling was done for pre-mine ore reserve estimation purposes. For month-to-month planning of mining, though, interspaced drill hole information is needed. This can be done either from the

present undisturbed ground surface (where holes can be positioned more accurately), or it can be done from pit benches as stripping progresses westward. The latter procedure would cost less, and the information actually would not be needed at any one point until a year or so in advance of mining. But it has the disadvantage of awkwardness in spotting drill rigs in the right positions on pit benches.

E - Extension into the Reservation - 4,700' - 9 holes:

These holes are needed to measure the indicated open pit ore on the Reservation. But they may not be needed if the drilling in area C is unfavorable.

In areas A through E the drill hole information is needed rather soon. This would total 54,600' of drill hole. One drill shift should average 25' or about 7,500' per year. Two rigs drilling two shifts each per day would complete this part of the program in about two years. It is suggested that two rigs be contracted, and that they be operated only on day shift for a time until drilling and sampling procedures become standardized. Then they can be operated two shifts each.

It is absolutely necessary to get good core recovery. This was accomplished during the exploration drilling, but it required very close supervision of the contractor. Gale and Stauffer should be responsible for this work because logging and handling the core goes hand in hand with observation and checking on drilling performance. They will need at least one additional man to function as sampler on the rigs and possibly to assist in core logging. I have in mind that Gordon, a young engineer-geologist who is presently sampler on our Sonoma project, should fit in well for this work. More personnel will be needed when the project is expanded to four shifts per day.

Yours very truly,

Kenyon Richard

KR/lw
Attachs: 2 maps
cc: CPPollack)
BJPope)
ABBoom) w/attachs.
SLTolnter)
AEGale)

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

July 21, 1961

Memorandum for Mr. S. Teinter

Re: Our telephone conversation

Metallurgy and Rock Types
Mission Mine

Enclosed for your reference is a copy of memo by me in 1958, concerning rock type distribution, which is self-explanatory.

I checked with our draftsman who is coloring and preparing rock type plans in accordance with a request by Pope and under instructions from K. Richard. These are being prepared on a base plan reduced to 200' per inch. These plans show ore polygons and the grade and specific gravity of each polygon. The outline of each pit-year is also shown. Somewhere there is a tabulation of the tonnage of each polygon. Schubel will know about this. The geology is shown on these maps, but in coloring, the units are grouped to present a simpler picture. The units are being colored according to the following divisions:

1. Argillite
2. Tactite-hornfels
3. Quartzite
4. Marble
5. Metaporphyry
6. Felsite porphyry
7. Andesite

Nearly all ore mined will be from argillite or tactite-hornfels. The other units are shown to complete the geologic picture. Quartzite as shown will contain some pit ore (in this general category are grouped some feldspathic rocks of the Pima formation which carry hi-grade values locally). The others have practically no copper ore values. The andesite is post-ore and was always calculated as waste in the ore reserve.

Of the various methods we discussed on the phone, it seems to me, on reflection, that an estimation based on a tabulation of polygon grades and tonnages, segregated by visual estimation where more than one rock type or pit-year line crosses a polygon, would be the most satisfactory compromise. In any effect, Schubel knows so much about the original ore calculation method, that I suggest you obtain his opinion in this matter of mechanics.

As to segregation of tactite and hornfels, this would require considerable time and effort for a measurable estimate to be obtained. However, referring to the attachment with my metallurgical memo, you will see that approximate figures are given so that a ratio of tactite:hornfels could be obtained. Perhaps it will suffice to use this ratio to each pit-year or other divisions that are to be made. This will lead to some error in any one year, but the overall accuracy should be within the same limits as described in the text, p. 1, paragraph 3.

The ratios calculated from the table are:

West and Central area	East area
Tactite:Hornfels	Tactite:Hornfels
1:1	~~1:1~~ 3:1

JEK:lc
encl.

John E. Kinnison

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

March 27, 1961

MEMORANDUM FOR R. B. MEEN

ASARCO-BANNER JOINT DRILLING

The following are Mr. Kinnison's suggestions for depths of drill holes:

C-2 - Drill through Papago formation into the tactite. Drill at least 200' of marble. Total +700'.

C-3 - Drill through Papago into tactite and into marble about 100'. Total depth probably 600'.

C-4 - Drill through Papago into tactite (probably 450-600'). Drill through tactite to bottom thrust. Drill through bottom thrust and about 100' into the Kino formation (pebbly argillite). Thrust fault may be at about 700' Total depth about 800'.

Mr. Kinnison will attempt to keep in touch with this work through Mr. Gale, but the above suggestions can be used in case Mr. Kinnison cannot be contacted.

Through most of the drilling on their Eisenhower claims, Banner has penetrated a uniform sequence of formations and the ore has always been bottomed by marble. In the area of these present holes structure is more complicated and not too well understood. In this circumstance, the usual criteria for stopping a drill hole might not always apply. It is suggested that this point should be emphasized in any discussions in the field between our geologists and Banner's.

Original Signed By
K. Richard

KENYON RICHARD

KR/ds
cc: JEKinnison
REGale

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

September 14, 1959

FILE MEMORANDUM

HELMET PEAK GEOLOGY
Banner Co. Drilling, Deep Hole
East of Mission Area, Arizona

During the spring of 1959 Banner Mining Company drilled a deep hole in the NW corner of Section 33, T 16S, R 13 E; about 200 feet south of the San Xavier Reservation and about 200 feet east of the diagonal access road to the Pima Mine. Drilling was stopped in black siltstone at 2000 feet, on May 19, 1959. No granite was encountered.

Numerous small chips of core were left about the sample table. These indicate that most of the rock probably was black siltstone, with a lesser amount of arkose. The chips may be grouped into three rock units: (1) Black, strongly calcareous, soft aphanitic rock -- probably siltstone or mudstone. One piece contained veinlets of white calcite. (2) Grey white fine- to medium-grained arkose of the Red Hill type. (3) Grey to tan-grey sandy argillite. This rock borders on the grain-size limit of fine-grained arkose.

Stratification in 2 chips of argillite dips 25° -- a smaller dip than the rocks on the East margin of AS&R claims. No alteration or mineralization appears in the chips observed.

A sludge sample from the discharge pond was washed and examined, and showed that a trace amount of pyrite had been cored. No Cu minerals were observed.

JOHN E. KINNISON

JEK/ds

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

September 14, 1959

CONFIDENTIAL

MEMORANDUM FOR K. E. RICHARD

MISSION MINE GEOLOGY

While logging Banner Mining Company's core during August, 1959, I logged Diamond Drill Hole 109, which was not included in the information exchange. The core showed direct similarity to Pima Mine rock types. Casual conversation with F. D. MacKenzie revealed that DDH 109 is located between the Pima pit and the Daisy shaft.

The geology near the bottom of the hole may be significant in deciphering the relationships between the Pima ore zone and the Mission ore zone. A log of the hole is attached, showing correlations which I believe probable.

JOHN E. KINNISON

Attachment
JEK/ds
cc: JHCourtright

BANNER MINING COMPANY
Diamond Drill Hole 109

Located between Pima pit and Daisy Shaft

- Pima Mine hanging wall clastics -

181.0 - 232.0	Arg, rock brown colored. Spotty weak Cu silic.
232.0 - 300±	Arg, black. Traces lim., w/py-cpy below 257'.
300+ - 345.0	Recrystallized arg, chloritic. Trace of oxidation to 310'.

- Pima Mine ore zone rocks -

345.0 - 378.0	Tactite, gray-green. Waste.
378.0 - 403.0	Diop. Hf, greenish and dense. Spotty weak cpy.
403.0 - 488.0	Tactite, strong diop. Chlorite-magnetite replacements at 423', 424', 417.0-418.5'. Tactite waste; but strong cpy in chlorite-mag. zones.
488.0 - 514.0	Diop Hf. Mod. cpy to 495'.
514.0 - 548.0	Tactite. Strong cpy 514-517'; very strong cpy-spotty-w/ strong mag, from 526 to 548'.
548.0 - 568.0	Marble.
568.0 - 573.0	Tactite. Diss py, tr. of sph.
573.0 - 580.0	Qtz-chl-calcite rock. Spotty strong cpy.
580.0 - 593.0	Tactite, with blebs of calcite. Diss. py.
593.0 - 609.0	Marble, strong serp-chl, local diop. and gouge. Cpy from 606-609.
609.0 - 614.0	Tactite and marble. Diss py.
614.0 - 667.0	Tactite, light yellow w/strong clay-like diop. Chlorite mag rock, intervals less than one foot, at: 628', 629', 631.5', 640', 641', and 643'. From 644-647 chl-mag rock, last foot w/garnet and cpy. From 659-667' is chl-mag rock with garnet.
667.0 - 675.0	Marble, brecciated and serpentinized. Spotty cpy.
675.0 - 691.0	Tactite. Strong blebs and vns of cpy.

Banner Diamond Drill Hole 109 - continued

691.0 - 695.0 Massive magnetite - cpy.

695.0 - 721.0 Mag-chlorite rock. Finely diss. strong cpy.

721.0 - 735.0 Probably footwall breccia zone. Recovered only 0.6' core in fragments, rock similar to above.

- Pima Mine Footwall Clastics -

735.0 - 750.0 Feldspathic rock. Tr. of py. Weakly oxidized with limonite films.

750.0 - 755.0 Shear zone. Finely granulated breccia and many chlorite seams. Slightly calcareous. Frags. are of feldspar rock as above.

- Mission Ore Zone(?) -

755.0 - 779.0 Diop. Hf. Fractured and strongly altered to chl-mag. Contains diss cpy.

779.0 - 786.0 Meta-porphyry(?). Recrystallized qtz-feldspar mosaic, with wisps of chlorite after biotite(?). No phenocrysts visible. Weak diss py.

Bottom

cc. Kinnison

BANNER MINING COMPANY
Tucson, Arizona

August 29, 1959

TO : General Manager

FROM : Mine Engineer

SUBJECT: Methods Used in Calculating Ore Reserves in the Eisenhower Group

---

GENERAL: Diamond and churn drill holes are being drilled on approximately 250 foot centers. By the polygon method described below, each hole is given an area of influence and the volume of ore is calculated from the thickness of ore cut by the hole. The various factors applied in these calculations and the methods by which they were obtained are as follows:

DILUTION: All mineralized sections were expanded to a minimum thickness of 25'. If the section would not exceed the 0.50% cutoff selected, it would be classified as millable capping or waste, millable capping being between 0.36% copper and 0.50% copper. Millable capping and ore are then combined by tonnages to give an average grade of about 0.82 to the orebody.

POLYGONS: The method of construction was to erect a perpendicular to each line drawn between a hole and the other adjacent holes, at the midpoint of the line. In connecting these perpendiculars, the polygon is formed. As the polygon is not a perfect hexagon, a planimeter was used to measure the area.

TONNAGE FACTORS: The tonnage factors for each of the rock types carrying ore were calculated from the core and sludges of 5 diamond drill holes and averaged. A beam balance and a 500 cc graduate were used to compute specific gravity by Archimede's Principle. Factors are: Graywacke, 12.15 Cu Ft/Ton; Tactite, 10.89 Cu Ft/Ton; and Porphyry, 12.48 Cu Ft/Ton of ore in place.

GRADE: Drill sludges and core were weighted by Longyear tables for a combined assay for each run. For core recoveries over 80% drill sludges were not considered.

The following formula was used in connection with the tables:

$$Aw = \frac{FcAc + FsAs}{100}$$, where Aw is the combined or weighted assay,

Ac and As are the assays of the core and sludge respectively, Fc and Fs are the factors for core and sludge obtained from the tables knowing the core recovery in % and the size of bit used.

Each ore zone was averaged separately by weighting the footages of the runs. Tonnages were computed for each ore zone and the final grade obtained by weighting with tonnages.

/a/ Norman Harvey
Mine Engr

NH:d

East Pima 221

~~2972.6'~~ 3450 N
875
Bedrock 218.0'
oxid to 227'
No Cc
3190.6

218-227	Ark, local arg.	} -
227-231	feld. qtzt, grey md-gr	feld. & qtzt. 60° @ 250'
231-248	feld rock	
248-253	Arg & feld rock, banded. 60°	
253-263	feld. qtzt.	
263-267	Arg, grey, Bx 263-264 oxid Tr.	Arg & feld Bx 263 oxid.
267-271	Feld rock. steep veins. epid, grnt in tr.	
271-278	Diop. Hf chl alt.	Hf & Tt
278-287	Tactite. some qtz-feld.	
287-289	diop (?) Hf. hard, greenish.	
289-299	Qtz feld. 65° qtz-feld veins @ bottom	Ark, arg, qtz-feld 60° Banded
299-317	Ark & arg. 60° bding.	
317-320	Feld rock chl veins 60°	
320-321	Fault, steep dip.	Fault zone steep.
321-324	Arg.	
324-327	Fault zone.	
327-330	feld rock, diopside, trem (?).	Feld rock Arg, pebbly ark Local $CaSiO_2$ 40°-65° dips
330-332	feld rock. 40° cpy veins. 40° bottom cut.	
332-338	Ark, feld rock; Tt, diop. in tr. 65° (?)	
338-370	Brown & pink arg w/ local pebble zones. 344- 1/2' Tt	
370-387	Feld rock.	
387-406	And. 60°-90° cuts w/ thin intercepts feld rock.	rest of log missing

EI 3192.6

East Pima 222

Bedrock @ 183.8
Oxid to 204'
Cu 204 - 232

183.8 - 196	Qtzt or sandy arg.	
196 - 198	Diop Hf.	Hf & qtz-feld rock, 40° cnts.
198 - 200	Tactite	
200 - 202	Qtz-feld rock 40° bot cnt	
202 - 206	Diop Hf. chl veins w/ sulf.	
206 - 208	Qtz-feld & Gg.	
208 - 211	Diop Hf. Act. veins. 40° bottom cnt	
211 - 232	Qtzt or qtz-feld rock.	
232 - 242	Diop or tram Hf. 60% Act (?) veins	Hf
242 - 245	Diop. Hf.	
245 - 255	Tactite	Tt & Hf
255 - 267	Tactite and hand digs. Hf.	
267 - 275	Feld rock w/ Act veins	feld rock & Hf.
275 - 282	Feld rock & diop Hf (?)	
282 - 284	feld rock ? w/ qtz veins	
284 - 304	Tactite with some Hf.	
304 - 360	Calc Arg, mixed with Tt & Hf.	
360 - 367	Arg.	Arg. 15' feld @ 367
367 - 373	Feld rock.	
373 - 405	Arg	
405 - 420	Tt @ 414 steep bed? Tt	steep bd? @ 414 ← 45° cnt
420 - 500	Arg. up. cnt 45° ± hi-angle bd? @ 438	steep bd? @ 438

BOTTOM

Bedrock @ 213.2'
. oxid. to 224'

East Puna
DDH 223
3600 N
1000 W
3192.5 ' El.

213.2 - 217 Arg.

217 - 225 Tactite

225 - 230 Arg (?), chl.

230 - 233 Qtz-feld. 45° bottom cut.

233 - 294 Tactite.
Mixed with Hf below 270.

294 - 298 feld and garnet.

298 - 342 Tactite.
Hf 321-325

342 - 351 Qtz-feld., patches grey arg.

351 - 361 Tactite Bottom cut 80°

361 - 399 Arg, feld rock, Tactite, and Hf.
gradational

399 - 413 Tactite and dense Hf.

413 - 443 interbedded tactite and arg. Trace of 70° bedding.

443 - 482 Arg. grey, calc.
Bottom foot feld-qtz w/ heavy py.

Bottom

East Pima

DDH 224

4200 N

1250 W

3188.9 El.

Bedrock 189.6

189.6 - 225 Andesite. Cu silicates
20° bottom cut

225 - 231 Dense Hf.
45° bottom cut.

231 - 273 Arg. calc.; grey.

273 - 398 Tactite, heavy diops.
Mb @ 300'

398 - 402 Andesite 80° cuts

402 - 408 Tactite sliver of andesite
at 404 on side of core.

408 - 412 And.

412 - 419 Tactite

419 - 421 And.

421 - 450 Tactite

450 - 452 Breccia (?) Tactite and black pebbly ark.
40-60° slip at bottom. 60° slips in Bx zone.

452 - 458 Black arkose

458 - 458.5 Tactite. Tight 60° upper cnt.

458.5 - 498.5 Cgl. Black to pink.

Bottom

East Pima

DDH 226
3600 N
1250 W
3196.3 El.

Bedrock 208.3
Oxid to 221.6

208.3 – 298 Diop Hf (hard greenish)
gradational cnt.

298 – 368 Tactite and diop Hf intermixed.

368 – 405 Hf/1.5 ft diop with grnt. and Tactite.

405 – 453 Tactite (local diop Hf)

453 – 456 Qtz-feld-rock

456 – 504 Tactite
483-485 BX. 80° bottom slip.

504-507 feld-qtz rock

507 – 520 Tactite

520 – 532 Tactite with feld at beginning and end

532 – 549 Hf.

549 – 600 Tactite. admixed diop.
564-585 Steep feld-actinolite veins

600 – 690 Hf.

690 – 705 Hf. pulverent diop. grad. bottom cut

705 – 744.6 Dolomite and Mb
Bottom

Bedrock 194.6
Oxid. to 227.

East Penna
DDH 227
4500 N
1250 W
3185.6 El.

194.6-322 Dark grey to brown cgl.
limonite on fractures to about 227.'

Bottom

East Pima
DDH 228
3150N
750W
3189.6 El.

Bedrock @ 214.0'
Oxid. to 235

214-250 ± Arg and sandy arg.

250 - 276 ± Light grey glyt. slightly feldspathic, grade to ark at bottom

276 - 281 Arg. Bottom foot is fault gouge and feld rock (?).

281- 347 felsite porph.

347-353 Arg. Bedding ? 30 -50°.

353 - 385 felsite porph. (?).

385 - Black and brown arg. bleached along veinlets
feld. rock 425-431'
Vert. bedding (?) @ 447'

Bedrock at 206.5
Ovid to

East Pima
DDH 229

4500 N
1750 W
3197.3 El.

206.5 - 290 Arg.

290 - 318 feld rock or arg. 70° slip bottom cut.

318 - 329 Tactite

329 - 334 feld rock and Tactite

334 - 356 Tactite

356 - 360 feld. rock

360 - 393 Diop. Hf. possibly some feldspathic alteration, appears to grade into alt calc. arg toward bottom

393 - 400 Brown arg, a few 2 mm pebbles (?).

400 - 414 Feld rock.

414 - 433 Tactite. grades in to feld rock below 425.

Bottom

East Pima
DOH 230
4200 N
1950 W
3201.5 El.

Bedrock @ 212.8'
Oxid. to 230.7

212.8 - 375± Tactite w/heavy disp. Short lengths of disp. Hf.

375 - 413 Hf. Very hard dense, buff colored.

413 - 423 Disp. Hf.

423 - 432 Marble. partly alt to Disp. Hf.

432 - 442 Mb.

442 - 452 Serpentinized Mb

452 - 461 Marble and fault gauge.

461 - 498 Mb

498 - 501 Hf.

501 - 569 Calc. Arg.
544-552 "silicean" tactite

569 - 588 Tactite

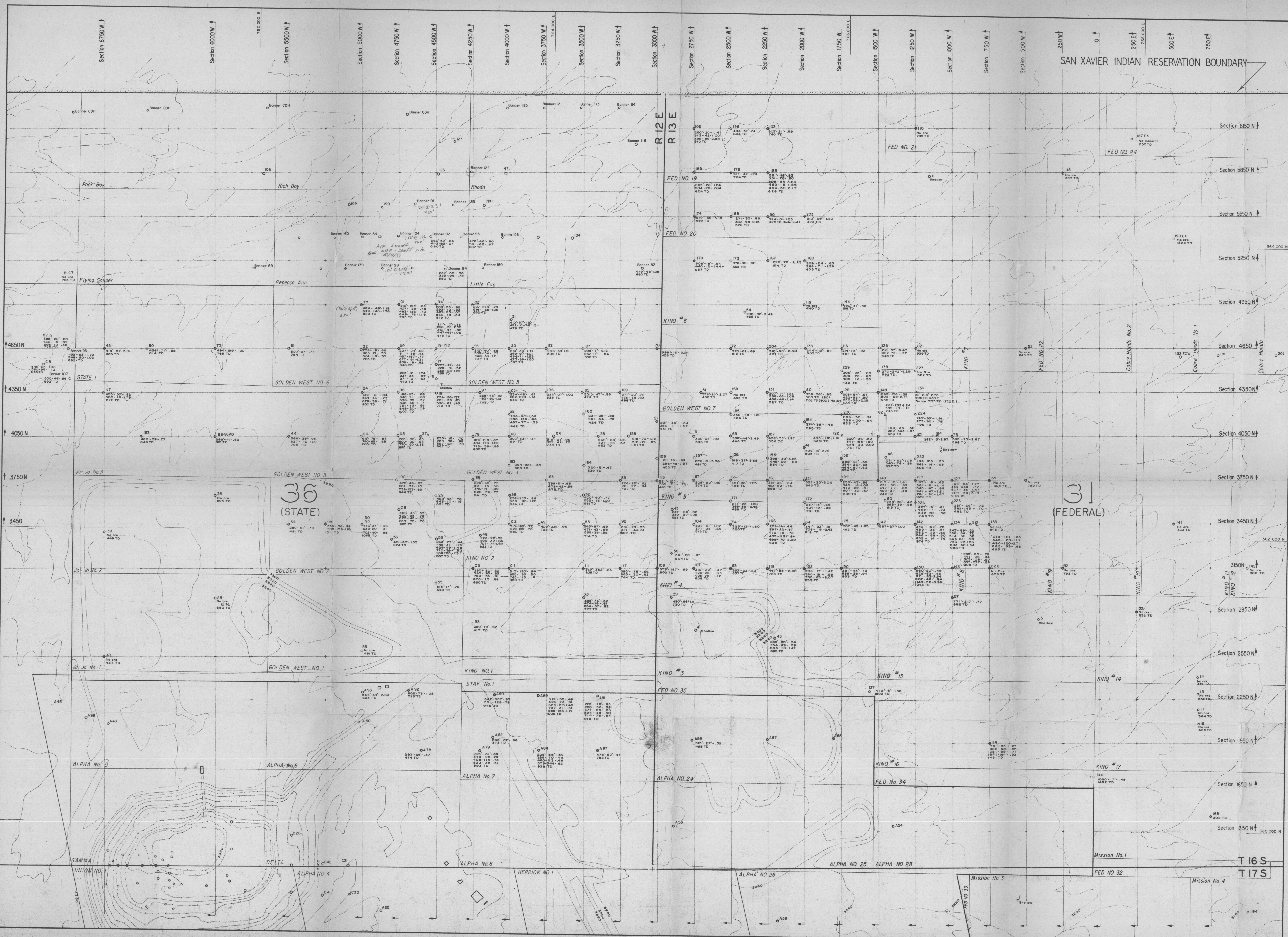
588 - 612 Mb.

612 - 627 Tactite

627 - 633 Arg. Upper cut high angle irregular.

633 - 653 Arg or felsite

Bottom


SAN XAVIER INDIAN RESERVATION BOUNDARY
Section 6750 W
Section 6000 W
Section 5500 W
Section 5000 W
Section 4750 W
Section 4500 W
Section 4250 W
Section 4000 W
Section 3750 W
Section 3500 W
Section 3250 W
Section 3000 W
Section 2750 W
Section 2500 W
Section 2250 W
Section 2000 W
Section 1750 W
Section 1500 W
Section 1250 W
Section 1000 W
Section 750 W
Section 500 W
250 W
0
250 E
500 E
750 E
Section 6150 N
Section 5850 N
Section 5550 N
Section 5250 N
Section 4950 N
Section 4650 N
Section 4350 N
Section 4050 N
Section 3750 N
Section 3450 N
3150 N
Section 2850 N
Section 2550 N
Section 2250 N
Section 1950 N
Section 1650 N
Section 1350 N
364 000 N
362 000 N
360 000 N
4650 N
4350 N
4050 N
3750 N
3450
R12E
R13E
T16S
T17S
36
(STATE)
31
(FEDERAL)
Poor Boy
Rich Boy
Rhoda
Flying Saucer
Rebecca Ann
Little Eva
STATE 1
GOLDEN WEST NO. 6
GOLDEN WEST NO. 5
GOLDEN WEST NO. 7
GOLDEN WEST NO. 3
GOLDEN WEST NO. 4
GOLDEN WEST NO. 2
GOLDEN WEST NO. 1
Jo-Jo No. 3
Jo-Jo No. 2
Jo-Jo No. 1
FED NO. 19
FED NO. 20
FED NO. 21
FED NO. 24
FED NO. 22
FED NO. 35
FED No. 34
FED NO. 32
FED NO. 33
KINO #6
KINO #5
KINO #4
KINO #3
KINO NO. 2
KINO NO. 1
KINO #7
KINO #8
KINO #9
KINO #10
KINO #11
KINO #12
KINO #13
KINO #14
KINO #16
KINO #17
Cobre Hondo No. 2
Cobre Hondo No. 1
Cobre Hondo
STAF No. 1
ALPHA No. 5
ALPHA No. 6
ALPHA No. 7
ALPHA No. 8
ALPHA NO. 4
ALPHA NO. 24
ALPHA NO. 25
ALPHA NO. 26
ALPHA NO. 28
GAMMA
DELTA
UNION NO. 1
HERRICK NO. 1
Mission No. 1
Mission No. 3
Mission No. 4

EXPLANATION

ORE INTERCEPTS IN DRILL HOLES

20

①	②	③
213'	33'	1.71
289	67	1.07
434	11	1.55
473	38	1.30

④ 597 TD

① Depth to top of ore
② Length of ore intercept
③ Average % Cu (± .40 cutoff)
④ Total depth of hole

Holes drilling

Hole complete but all assays not available

OWNERSHIP MINERAL RIGHTS

American Smelting and Refining Company

Pima Mining Company

Banner Mining Company

ASARCO

EAST PIMA PROJECT

Pima County, Arizona

DRILLING MAP

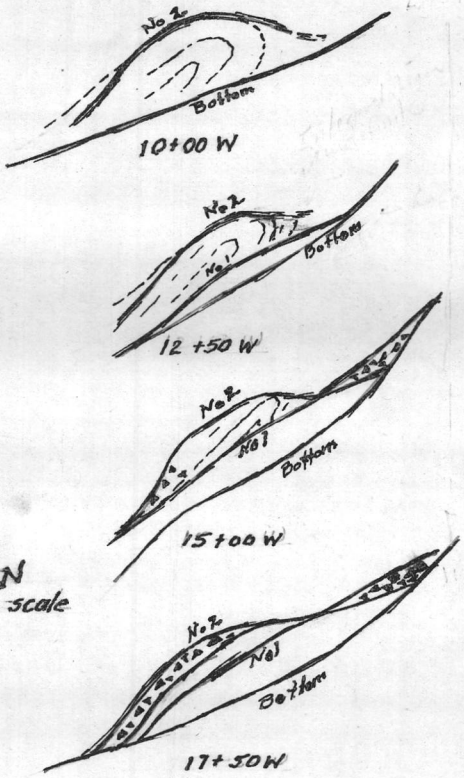
SCALE 1" = 300'

CONTOUR INTERVAL - 20'

MAY, 1957

MAP NO. ~~1324~~ EP-11-4E

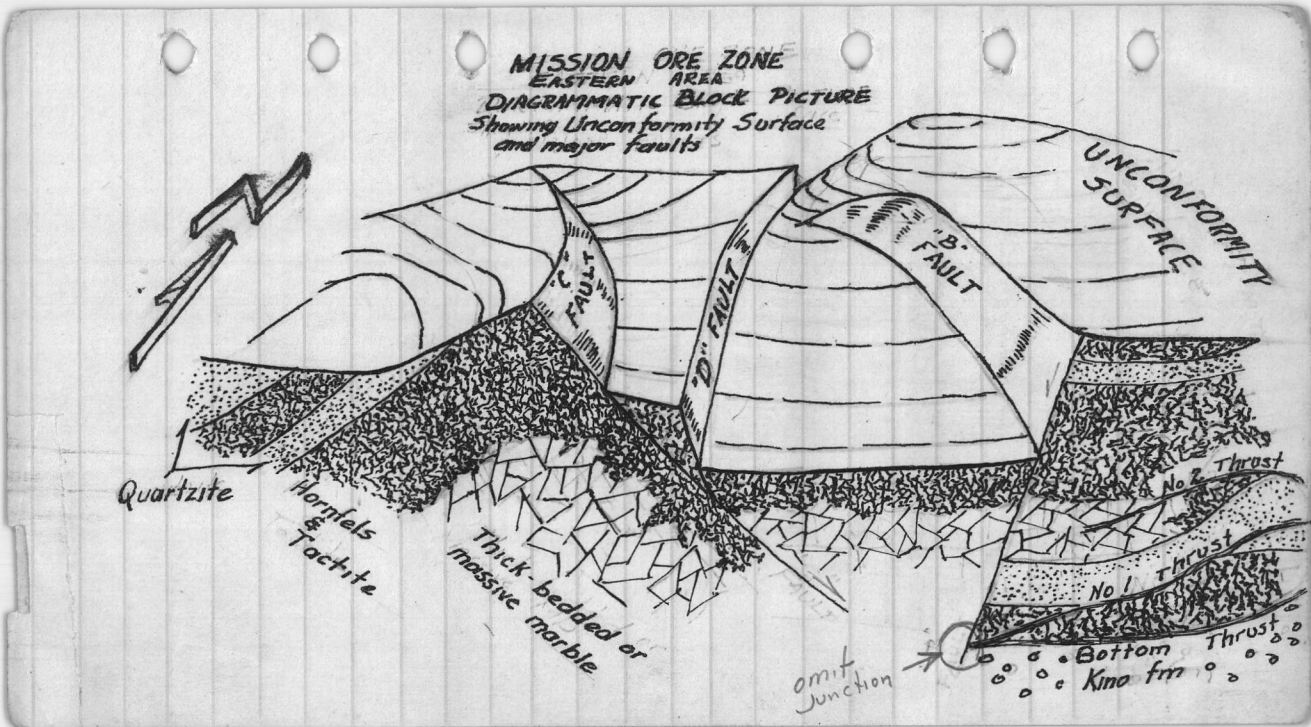
SEPTEMBER, 1958
MARCH, 1959



DIAGRAMATIC CROSS SECTIONS SHOWING PROGRESSIVE CHANGES OF "BOTTOM", "No 1", & "No 2" THRUSTS, FROM EAST TO WEST

Looking West

MISSION


MISSION ORE ZONE
EASTERN AREA
DIAGRAMMATIC BLOCK PICTURE
Showing Unconformity Surface
and major faults
UNCONFORMITY SURFACE
"B" FAULT
"C" FAULT
"D" FAULT
Quartzite
Hornfels & Tactite
Thick-bedded or massive marble
No 2 Thrust
No 1 Thrust
Bottom Thrust
Kino fm
omit Junction