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James Doyle Sell Mining Collection

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# ASARCO

## Exploration Department

G.D. Van Voorhis  
Vice President

January 13, 1992

ASARCO Incorp

JAN 15 1992

SW Exploration

TO: J.C. Balla  
D.D. Harper  
H.S. Jacobson  
W.L. Kurtz  
M.A. McClave  
J.D. Sell ✓  
D.M. Smith  
C.O. Windels  
J.E. Worthington  
P.G. Vikre

Agenda for informal meeting of exploration managers January 16, 1992 in Denver.

1. Introduction - Van Voorhis
2. Brief District and Project Reviews - description of present staffing - current significant projects - plans for 1992.
  - Worthington - Acquisitions & Jump River
  - Smith - Rocky Mountains - Bolivia
  - Jacobson - Mexico
  - Sell - Southwest
  - Balla - Northwest
  - McClave - Western Canada
  - Vikre - Great Basin
  - Harper - Eastern U.S. - Missouri
3. Technical Issues - geophysics - use of computers - etc.
4. Organization and administrative issues - reporting - land acquisition and tracking - proposed changes to mining law.

*G. Van Voorhis*  
G.D. Van Voorhis

GDV/lj



**ITT Sheraton**

WORLDWIDE HOTELS, INNS, RESORTS & ALL-SUITES

1/14/92

Gr. D. Van Vorhes:  
 Quantity & quality - gather.  
 Cross-district working.  
 Eg. Mer this winter!  
 ASAREO will know covered cards.  
 EDVV reports directly to top (after Tomlin)  
 Need advanced projects - fast.  
 Started with KOC in 1984.  
 Company need about chains of commands  
 → direct reporting.  
 Growth in Mex. Mex - we need more  
 Bolinas, Mex - we need more  
 Ste. Pierre (NW) - Panama City (OT)  
 Coxostechus @ board.      Siemens int'l  
 [ Lehin, PNG      Safford  
 Sutton Sea & offshoot  
 Coal - Logint.  
 Rensselaer, NY  
 Then SOHIO - you had to sell off or ↓ U  
 most areas - incl. Ray AZ; Ogas head, Me  
 Left in 1989 (?)

FOR RESERVATIONS DIAL 800-325-3535 IN U.S.A. AND CANADA



**ITT Sheraton**

WORLDWIDE HOTELS, INNS, RESORTS & ALL-SUITES

1/14/92 (2)

1992 Tight year - but may peel up at end.  
 Need to focus efforts.  
 Rolo/O wants "changes" - don't know what get.  
 Exel must set up objective opportunities!  
 World may be open  
 Opportunities - see needed.  
 —————  
 Exel may be open.  
 500,000 or so probably low, best degree  
 on initial grade & area distribution.  
Grade is all important!  
Good business arrangement, 10 bottom line.

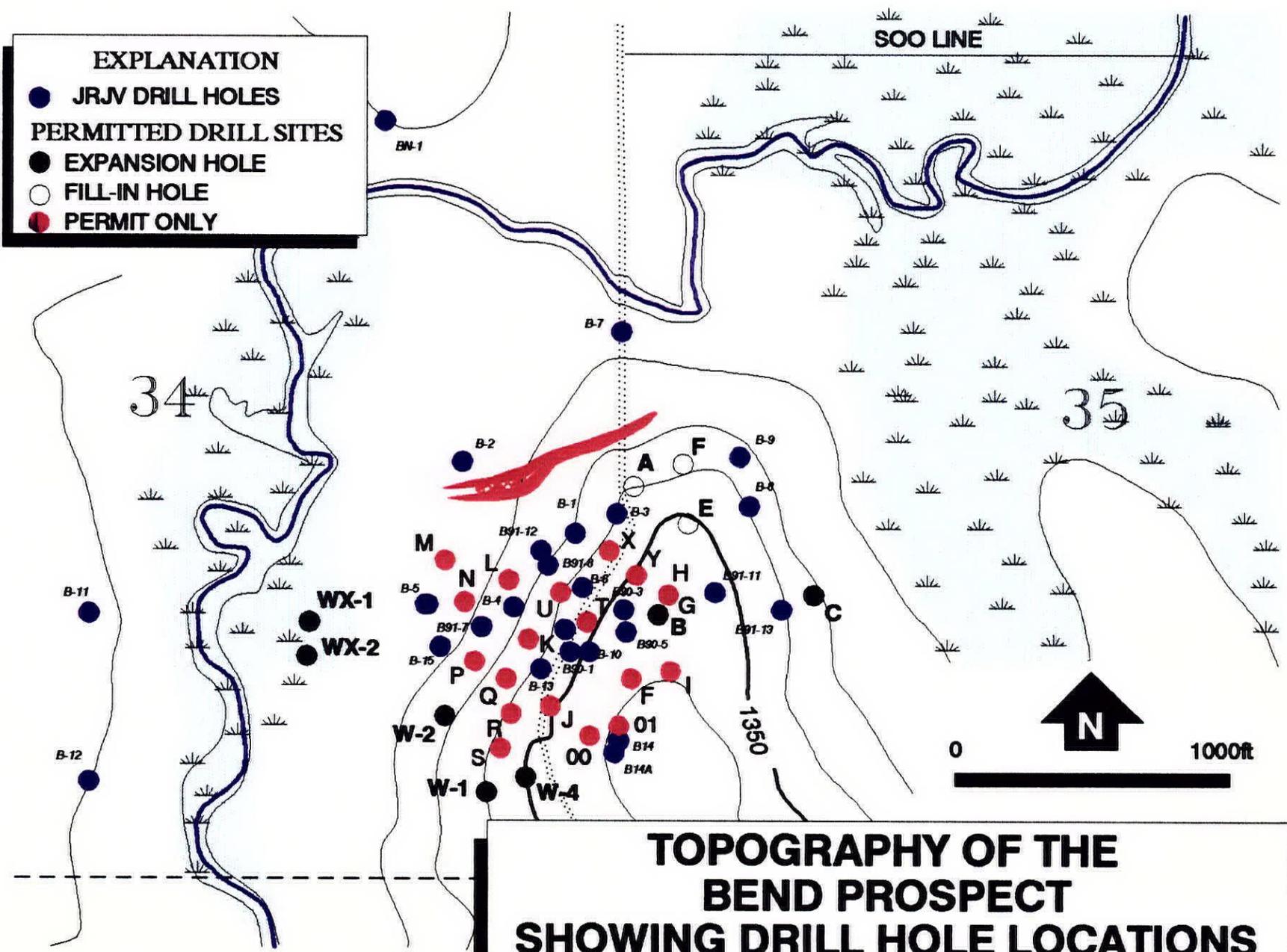
Borgins are: 1) present value is OK  
 because of distressed company, or 2) a threat  
 of greatly expanded reserves which others had not  
 taken & not included in prev. company  
 thoughts.

No high-priority acquisitions (SEU)  
 except, maybe, Taiwan. ??

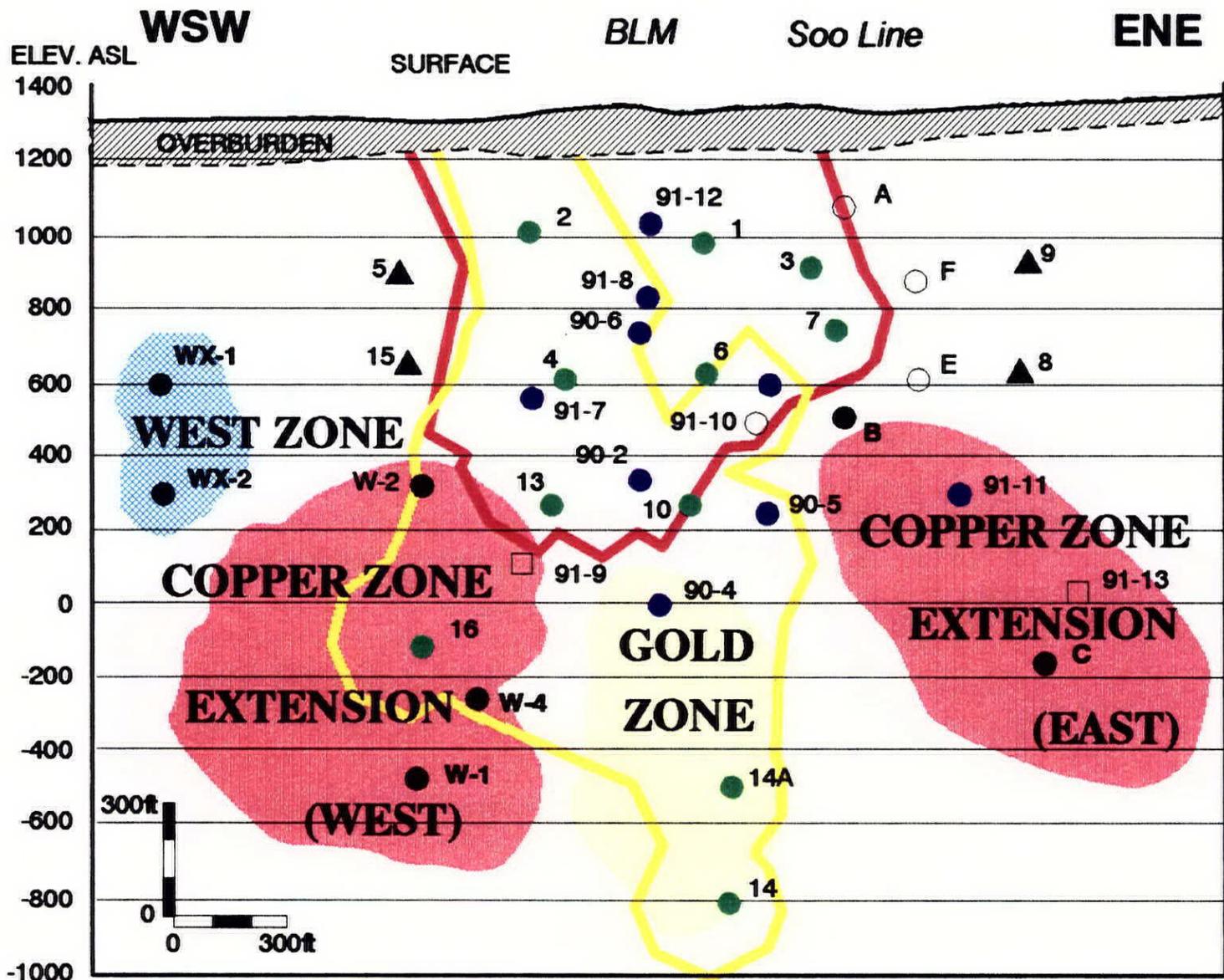
FOR RESERVATIONS DIAL 800-325-3535 IN U.S.A. AND CANADA

**EXPLANATION**

- JRJV DRILL HOLES
- PERMITTED DRILL SITES
- EXPANSION HOLE
- FILL-IN HOLE
- PERMIT ONLY



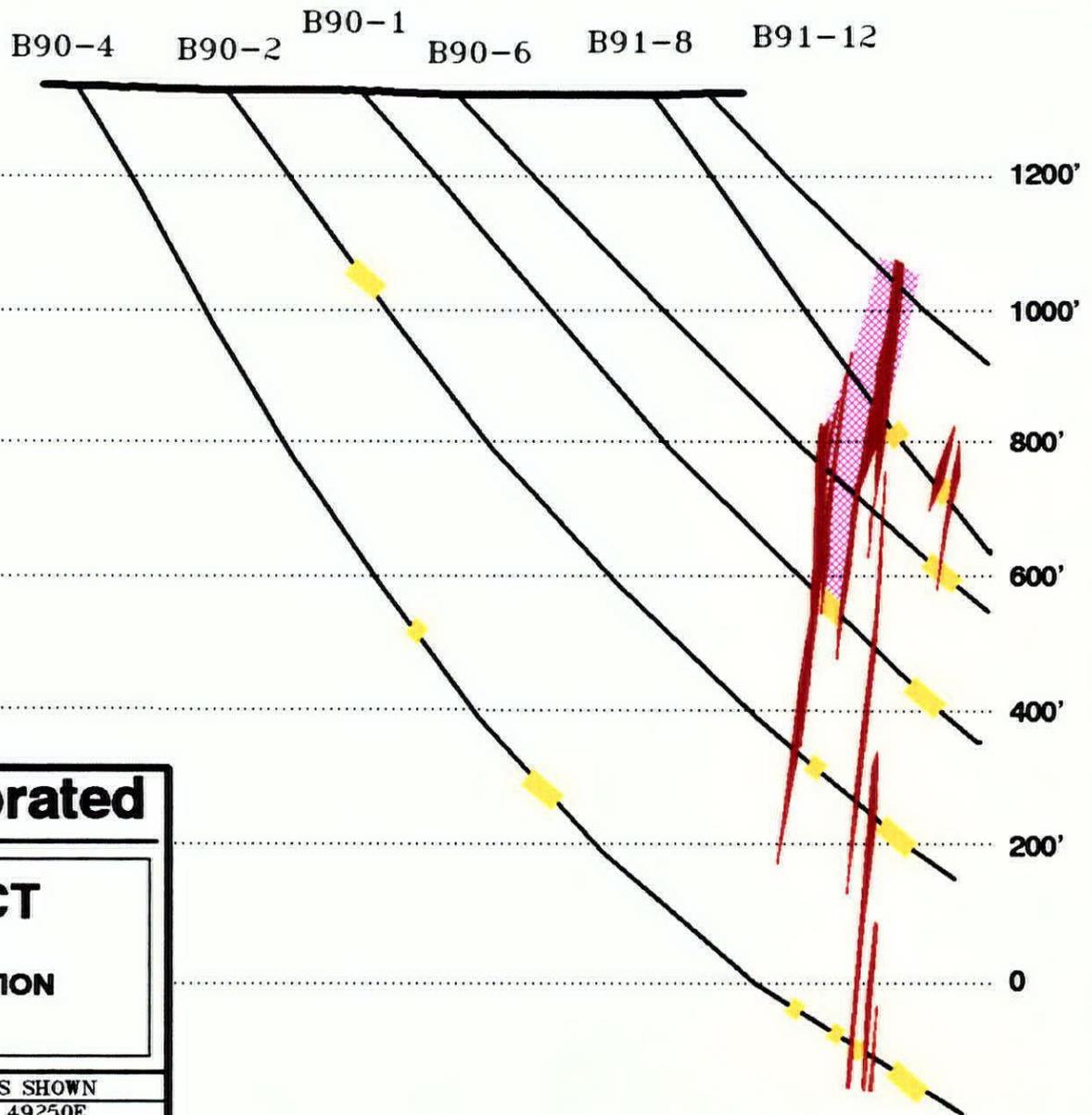
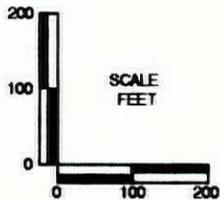
**TOPOGRAPHY OF THE BEND PROSPECT SHOWING DRILL HOLE LOCATIONS**



- ▲ Weakly Mineralized    ● 1986-1989 Drill Holes    ● 1990-1991 Drill Holes    ● Expansion Drill Holes
- Expected Intercept    ○ Fill-in Drill Holes

**LONGITUDINAL PROJECTION OF MINERALIZATION, BEND PROJECT**  
 TAYLOR COUNTY, WISCONSIN

- MASSIVE SULPHIDES**
- GOLD MINERALIZATION**
- STRINGER SULPHIDES**



<b>ASARCO Incorporated</b>	
Geophysical/Technology Division	
<b>BEND PROJECT</b>	
WISCONSIN	
<b>GEOLOGIC CROSS SECTION</b>	
<b>49250E</b>	
<b>Data By:</b>	<b>Scale:</b> AS SHOWN
<b>Date:</b> 1/92	<b>File Name:</b> 49250E

JRJV Target Inventory for 1992 (D. Worthington)

AR ID	Target	Survey Area	Land Status	Geophysical Characteristics	Geologic Characteristics	Proposed Work
73	<u>Bend North</u> +	BY	1 private lease	Good PEM conductor (late channels) with direct magnetic support, time constant similar to Bend anomaly	Along formational AEM conductor trend which contains Cu-bearing argillite and felsic tuffs	1 DDH
74	<u>Old Cabin</u> +	BY	2 federal prospecting permits, 1 private lease (minerals), 1 private option	Multiple weak to strong HLEM conductors	Along known mineralized trend, 1 DDH intersected Cu-bearing altered felsic metatuffs	1 DDH
75	<u>Bear Creek</u> +	BY	6 federal prospecting permits, 4 private options, 1 lease (minerals)	Weak multiple HLEM conductors with mag association	3 DDHs intersected Cu-bearing sulfide-rich interflow metasediments	1 additional DDH on untested fair HLEM conductor
78	<u>Miller Dam</u> +	BY	2 private options, 1 private lease, 3 federal prospecting permits	Good but deep HLEM conductor with associated mag	Along known mineralized trend	1 DDH
77	<u>Kidrick</u> +	BY	2 federal prospecting permits	Double HLEM conductors (moderate to weak)	Probably interbedded metavolcanic flows and interflow metasediments	1 DDH
76	<u>Wolf Pac</u> +	BY	3 federal prospecting permits	Strong mag associated with good HLEM conductor	same	1 DDH
56	<u>Noisy Creek</u> +	SH	2 county leases	Very strong HLEM conductor with associated weak mag	1 DDH tested eastern conductor and intersected sulfide- & graphite-bearing interflow metasediments with anomalous Cu-Zn values	1 additional hole on western HLEM conductor

Underlining indicates high exploration priority

+ Target is ready to be drilled

\* Winter drilling only

Survey Area: Bend-Yellow River (BY), Somo-Harrison (SH)

Individual Flight Blocks: Y - Yellow River P - Prentice S - Somo H - Harrison E - Enterprise

AR ID	Target	Survey Area	Land Status	Geophysical Characteristics	Geologic Characteristics	Proposed Work
79	<u>Camp Six*</u>	SH	1 county lease, 1 state lease	Very strong HLEM with direct mag support	1 DDH intersected mineralized (Cu) interflow metasediments-cherty sediments; section dominantly intermediate metavolcanic flows	Grid expansion and additional geophysical followup along strike; 1 DDH
43 D	<u>Spring Creek</u>	SH	5 private options	Strong HLEM conductor with associated mag	1 DDH intersected weakly mineralized (Cu-Zn) felsic metatuffs	Renegotiated several options and acquire additional land (20 acres); 1 DDH
43 B&C	<u>Tomahawk West</u>	SH	3 private options, 1 private lease (minerals)	Strong HLEM conductor with direct mag support metatuffs	Along known mineralized trend, 1 DDH intersected altered Cu-bearing felsic metatuffs	Recover and expand grid, geophysical followup with HLEM/Mag; 1 DDH
12 13	<u>Yellow River*</u>	BY	2 federal prospecting permits, 1 private lease (minerals)	Several poor to fair AEM anomalies	3 DDHs tested 2 moderate--strong HLEM conductors and intersected dominantly tuffaceous metasediments; Cu-bearing cherty metatuff found in section	Expansion of grid and geophysical followup to east and south; may be along mineralized trend; 1 DDH
80	<u>Mauer Creek*</u>	BY	1 federal prospecting permit	Weak HLEM conductor; AEM anomaly time constant similar to Bend anomaly	Along formational AEM conductor trend which contains Cu-bearing argillite and felsic tuffs	Grid expansion to southwest and geophysical followup (HLEM/Mag); 1 DDH
81	Sheep Ranch	BY	1 federal prospecting permit, 1 private lease (minerals)	Moderately strong HLEM	Along known mineralized trend; 1 DDH intersected Cu-bearing altered felsic metatuff section	Expand grid to SW, run additional HLEM/Mag to establish drill targets
82	Mondeaux	BY	4 private options 1 federal prospecting permit 1 private lease (Soo Line)	Weak HLEM conductor trend; 1 DDH intersected	Along known mineralized weak Cu mineralization in altered felsic metavolcanic section	Recover and expand grid; additional PEM on select lines to establish deep drilling target
83 84	Weasel Creek Weasel Creek East	BY	Federal prospecting permit and private lease (Soo Line) pending	Fair AEM anomalies	South of Bear Creek anomalies; intermediate-mafic flows and weakly mineralized interflow sediments	Acquire ground, cut grid, geophysical followup (HLEM/Mag)

AR ID	Target	Survey Area	Land Status	Geophysical Characteristics	Geologic Characteristics	Proposed Work
86	Gillette	SH	1 county lease	Fair to poor AEM anomaly, ground conductor poor but overlain by extremely conductive overburden	South of Noisy Creek anomalies; mafic-intermediate flows and cherty-graphitic interflow sediments	No work until Noisy Creek south zone is tested
87	Lincoln/Hilts Lake	SH	3 geophysical permits (expired), 1 county lease	Weak HLEM conductors	?	No work at this time; hold ground until Noisy Creek (west conductor) is tested
91	North Branch	SH	4 geophysical permits (expired)	Medium to strong HLEM conductors, no mag	?	Acquire land (private), recover and fill in grid, geophysical followup (HLEM mag)
90	Spirit Western Extension	P	1 county lease being negotiated	Weak broad conductor with magnetic and gravity anomaly support	6 DDHs tested main conductor and intersected a thin Zn/Pb/Cu-bearing massive sulfide pod, hosted by a mineralized qtz-sericite schist, overlain by Au-bearing cherty tuff	Complete land negotiations, recover grid, run PEM on select lines to better define drill target
91	Long John	S	1 county lease, 3 private options being negotiated	Strong HLEM conductor with direct magnetic support	6 DDHs by Exxon, 2 by JRJV; deep holes by JRJV intersected Cu/Zn-bearing massive sulfide mineralization in a felsic tuff	Complete land negotiations; 2 deep holes to test a strong off-hole PEM anomaly
89	Wagonmaker	SH	4 geophysical permits (expired)	Multiple strong HLEM conductors (previously tested by TexasGulf)	Graphitic argillites/interflow metasediments, rhyolitic breccias	Acquire land, recover and fill in grid, geophysical followup (HLEM/Mag).
88	Smith Lake	SH	No agreements in force; 3 private properties; no recent negotiations	Good multichannel INPUT anomaly with mag support	Along known mineralized trend, probably within a major felsic center	Acquire land
61	Hoebe	SH	1 county lease	Weak HLEM conductor (in-phase)	?	No additional work; drop lease
85	Southfork	BY	1 federal prospecting permit	Fair AEM anomaly	Ground followup suggests a cultural anomaly	No extension of permit

RECEIVED

JAN 13 1992

EXPLORATION DEPARTMENT

**ASARCO INCORPORATED**  
Fax # (212) 510-1978

**TELECOPIER COVER SHEET**

PLEASE DELIVER THE FOLLOWING PAGES TO:

NAME: J.D. Sell, W.L. Kurtz

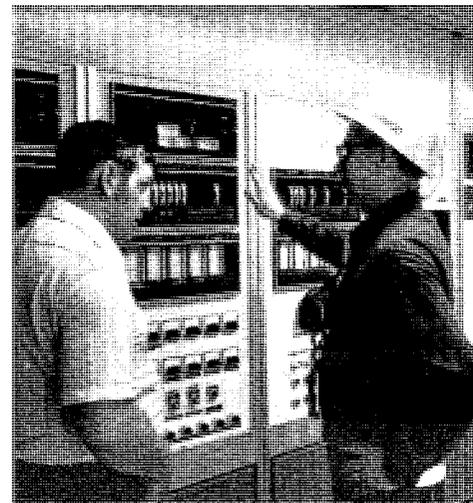
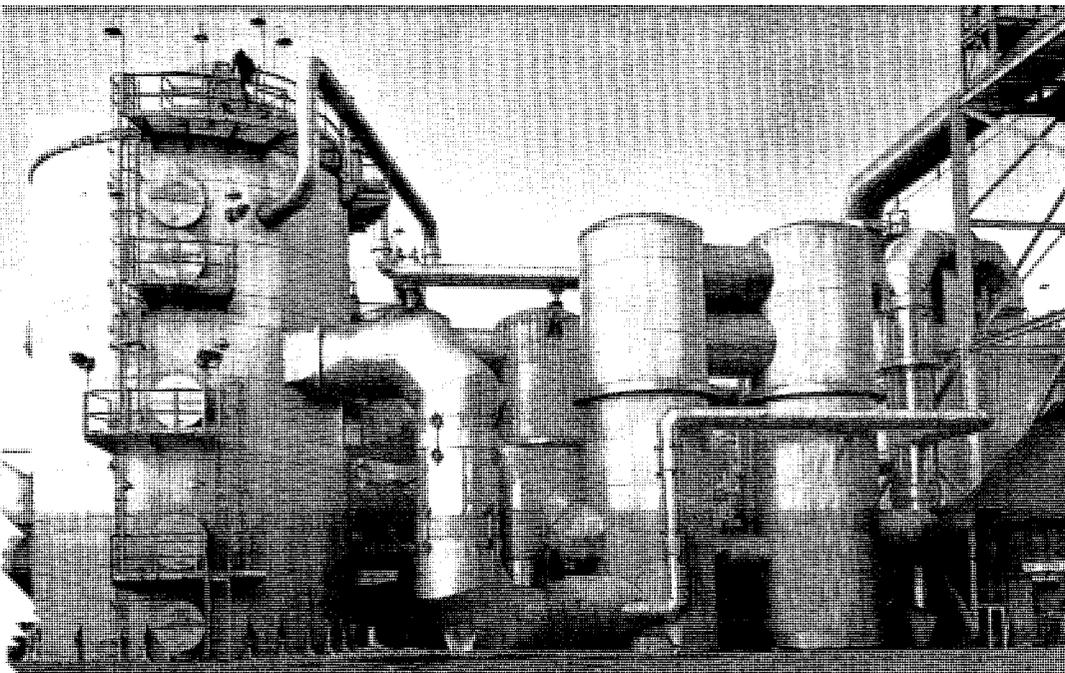
LOCATION: Tucson Office

FROM: G.D. Van Vleet

DEPARTMENT: New York Office

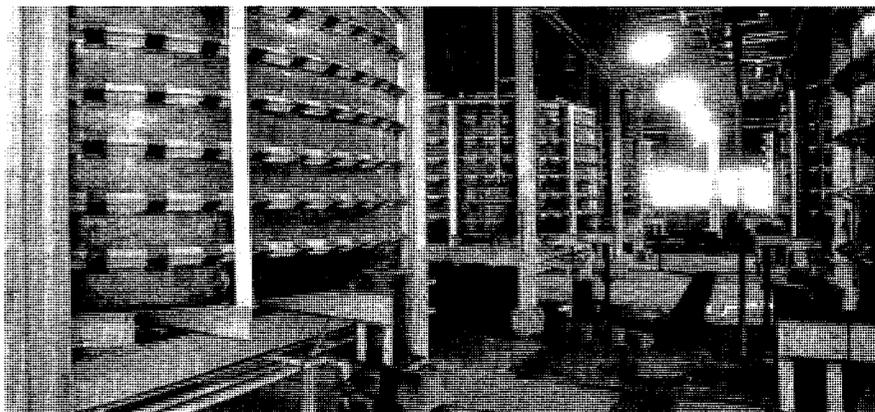
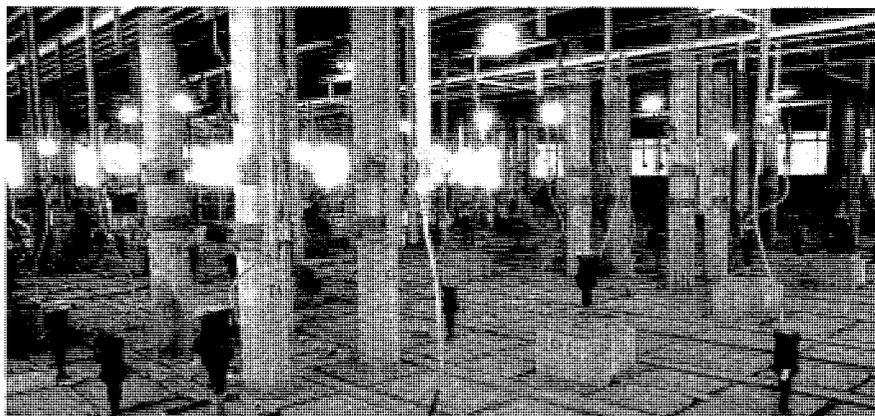
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IF YOU DO NOT RECEIVE ALL PAGES, PLEASE CALL BACK AS SOON AS POSSIBLE. MS. JONES @ (212) 510-1872 OR MS. VESCE @ (212) 510-1873.



Plant is operated from control room (above). Converter (large vessel at left) changes  $SO_2$  into  $SO_3$ ; units in center are heat exchangers. Absorbing tower (where acid is made) appears in upper right of photo at right.

# From smelter gas to sulfuric acid

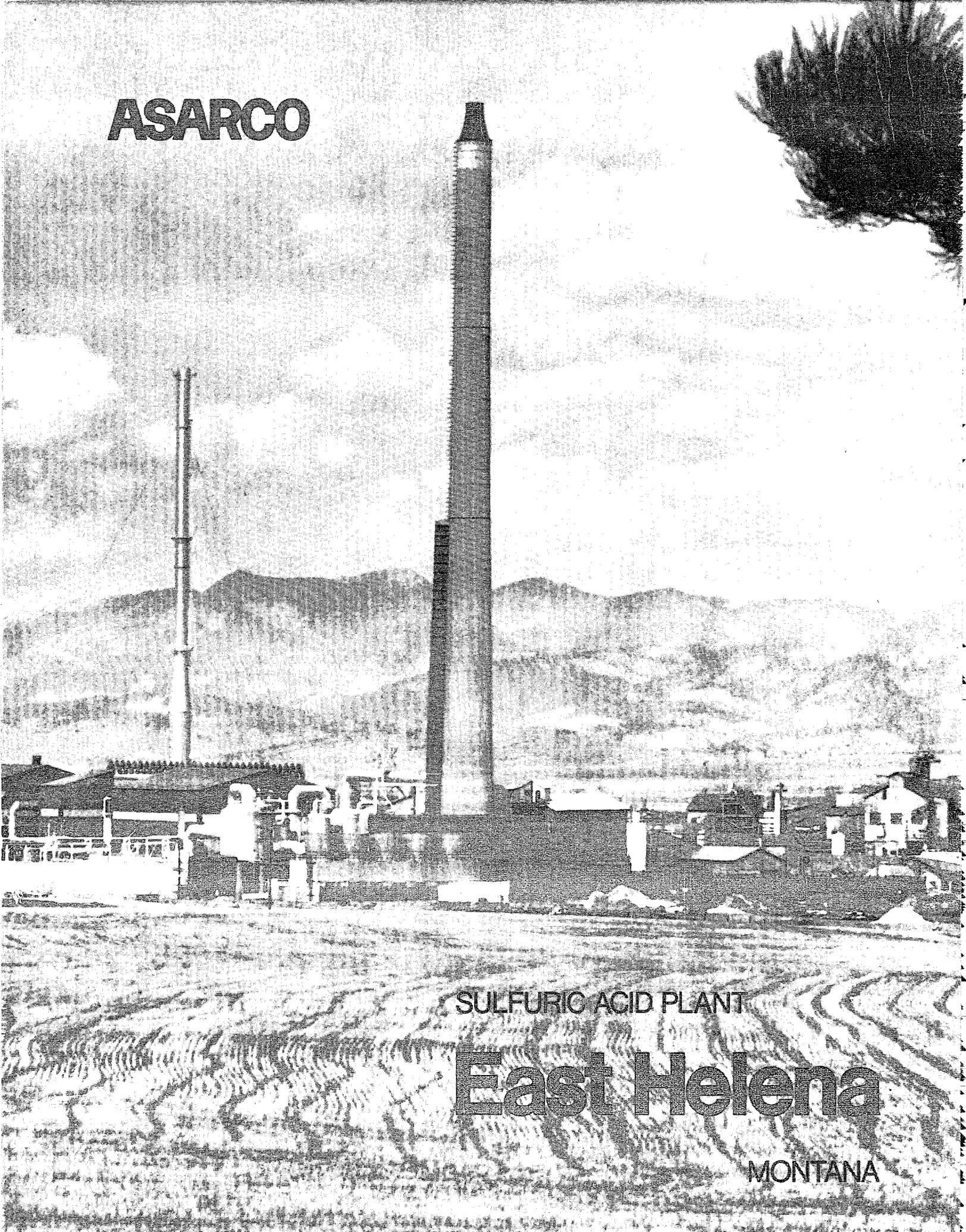


**L**EAD as an element occurs in nature principally as the sulfide galena ( $PbS$ ), but often as a complex ore in association with sulfides of iron, zinc, copper, silver, and other metals. In the sintering process, the sulfur serves as fuel to fuse the mixture of ores and fluxes into a porous, clinker-like material (called "sinter") which is amenable to smelting.

Sulfur dioxide ( $SO_2$ ) evolved during the sintering process normally is too dilute to be treated in an acid plant. At East Helena, however, the sinter machine was lengthened substantially and modified to permit recirculation of weak gases so the  $SO_2$  could be brought up to the concentration required for autothermal operation of an acid plant.

Gases from the sinter plant are drawn through an electrostatic precipitator which removes 99% of the particulates. The gases then pass through scrubbers and mist precipitators to remove the remaining particulates and

*Particulate matter is removed from  $SO_2$  by electrostatic precipitator (upper deck, above left), and mist precipitator (lower level, below left).*



**ASARCO**

SULFURIC ACID PLANT

**East Helena**

MONTANA



RECEIVED

JAN 15 1992

EXPLORATION DEPARTMENT

Exploration Department  
G.D. Van Voorhis  
Vice President

January 13, 1992

TO: J.C. Balla  
D.D. Harper  
H.S. Jacobson  
W.L. Kurtz  
M.A. McClave  
J.D. Sell  
D.M. Smith  
C.O. Windéls  
J.E. Worthington  
P.G. Vikre

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  - o Vikre - Great Basin
  - o Harper - Eastern U.S. - Missouri
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4. Organization and administrative issues - reporting - land acquisition and tracking - proposed changes to mining law.

*G.D. Van Voorhis*  
G.D. Van Voorhis

GDV/lj

*360*  
*Sheraton Hotel at Alluvion Blvd*  
*303/987-2000*

Cal Dean  
~~Turner~~

303/988-8830

JDS

**ASARCO**

Southwestern Exploration Division

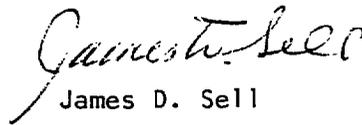
January 10, 1992

Mr. G. Van Voorhis  
Vice President of Exploration

Southwestern Exploration Div.  
Denver Review  
January 16, 1992

I submit for your review my synopsis of the four major project areas: Superior East, Santa Cruz, Thunder Mountain and Ventura projects; and the four exploration trends: Florence copper, Yuma gold, Kingman gold, and Pioche-Tushar gold-silver zones.

JDS:mek  
Atts.

  
James D. Sell

cc: F.T. Graybeal  
W.L. Kurtz

SUPERIOR EAST PROJECT EA-0010, Pinal County, Arizona

The Superior East Project is located 4 miles east of Superior, Arizona. The project was initiated in 1970 and two significant discoveries have been made.

1. A disseminated "porphyry copper" where 10 holes have encountered values ranging from 0.3% to 1.5% copper and 3 holes encountering fringe-type mineralization of plus 0.10% copper. Quartz porphyry dikes and masses intruding Precambrian Pinal Schist.

The deposit has been deeply leached and a substantial portion removed by erosion before being covered by post-mineral Whitetail conglomerate and dacite volcanics.

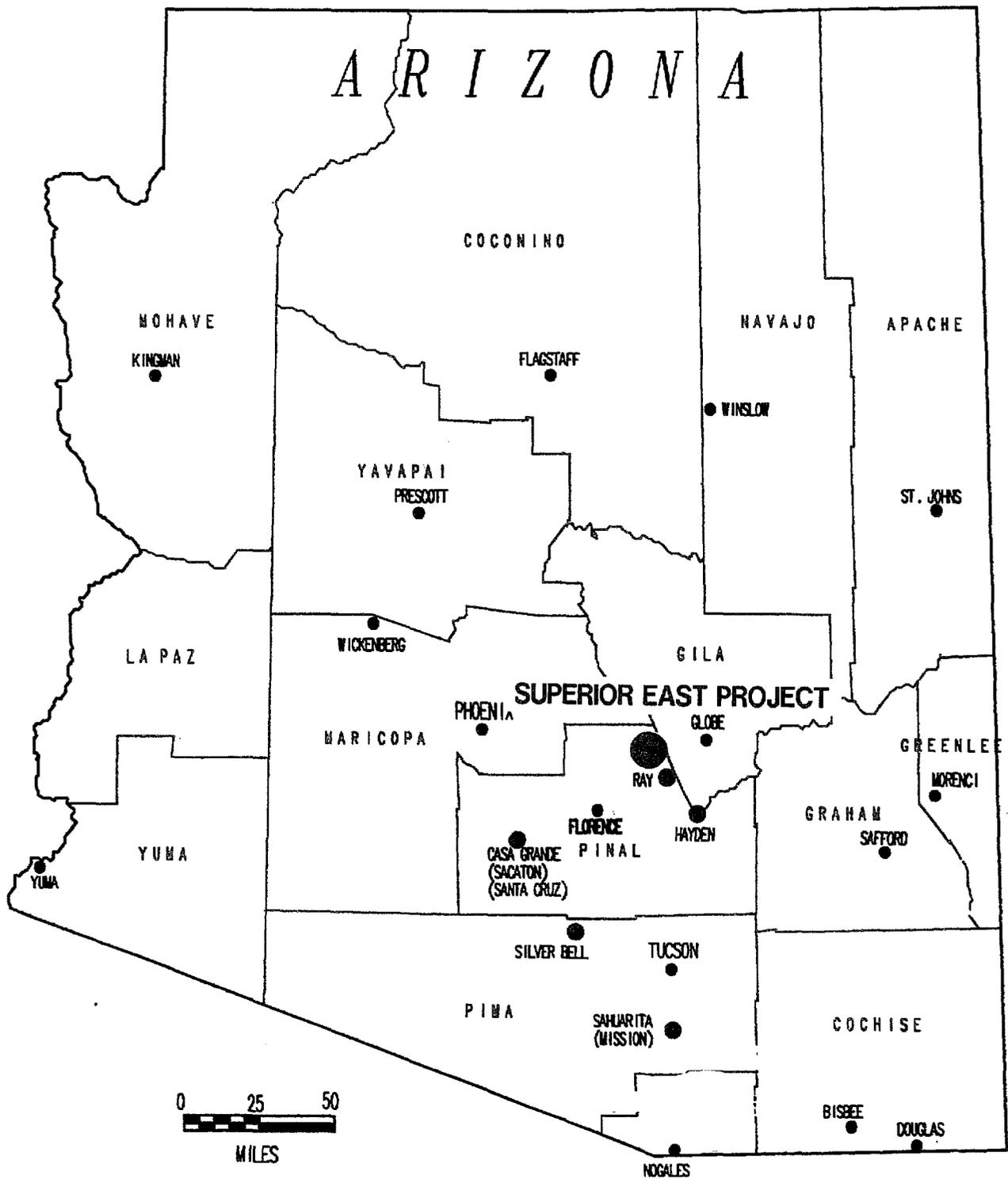
The surface elevation is around 4700 feet and 500-800 feet of sulfides encountered at 4,000 foot depth. Modeling of the drill holes and mineral grade distribution indicates that this tipped mineral body is a truncated three-dimensional elliptical body containing plus 200 million tons of 0.9% copper.

2. West of the porphyry deposit is a deep basin of Whitetail conglomerate under the dacite volcanics. Two holes have encountered native copper in the conglomerate, averaging 470 feet of 0.91% copper, at a depth of 5000 feet. Modeling of the basin and intercepts indicates a possible geologic resource of plus 400 million tons of 0.9% copper.

204 Claims are in the project area, including 152 claims under option with Continental Materials.

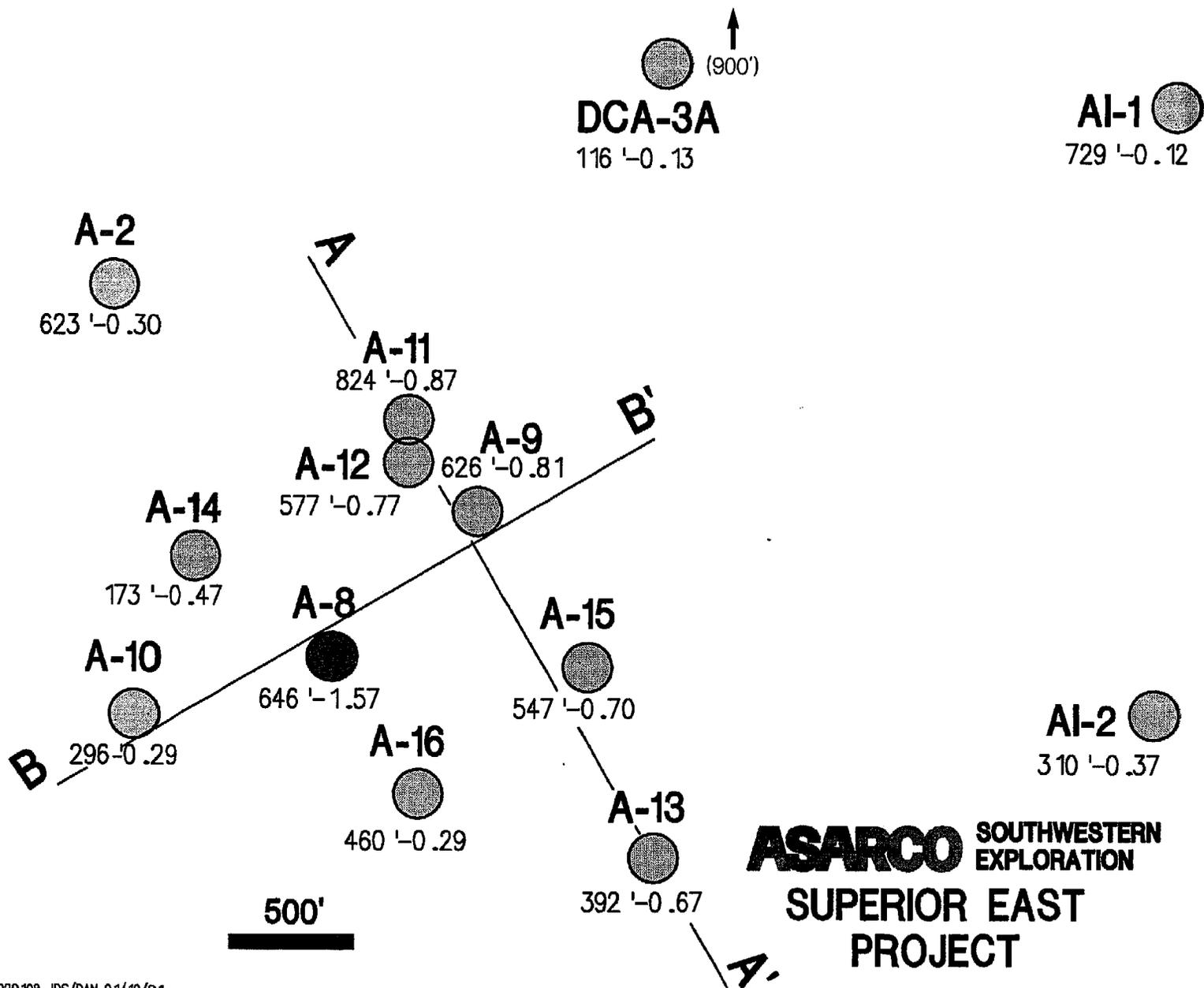
*✓ Location Map  
✓ Drill Hole Plan  
✓ Section A-A'  
✓ Section B-B'*

FIGURE 1



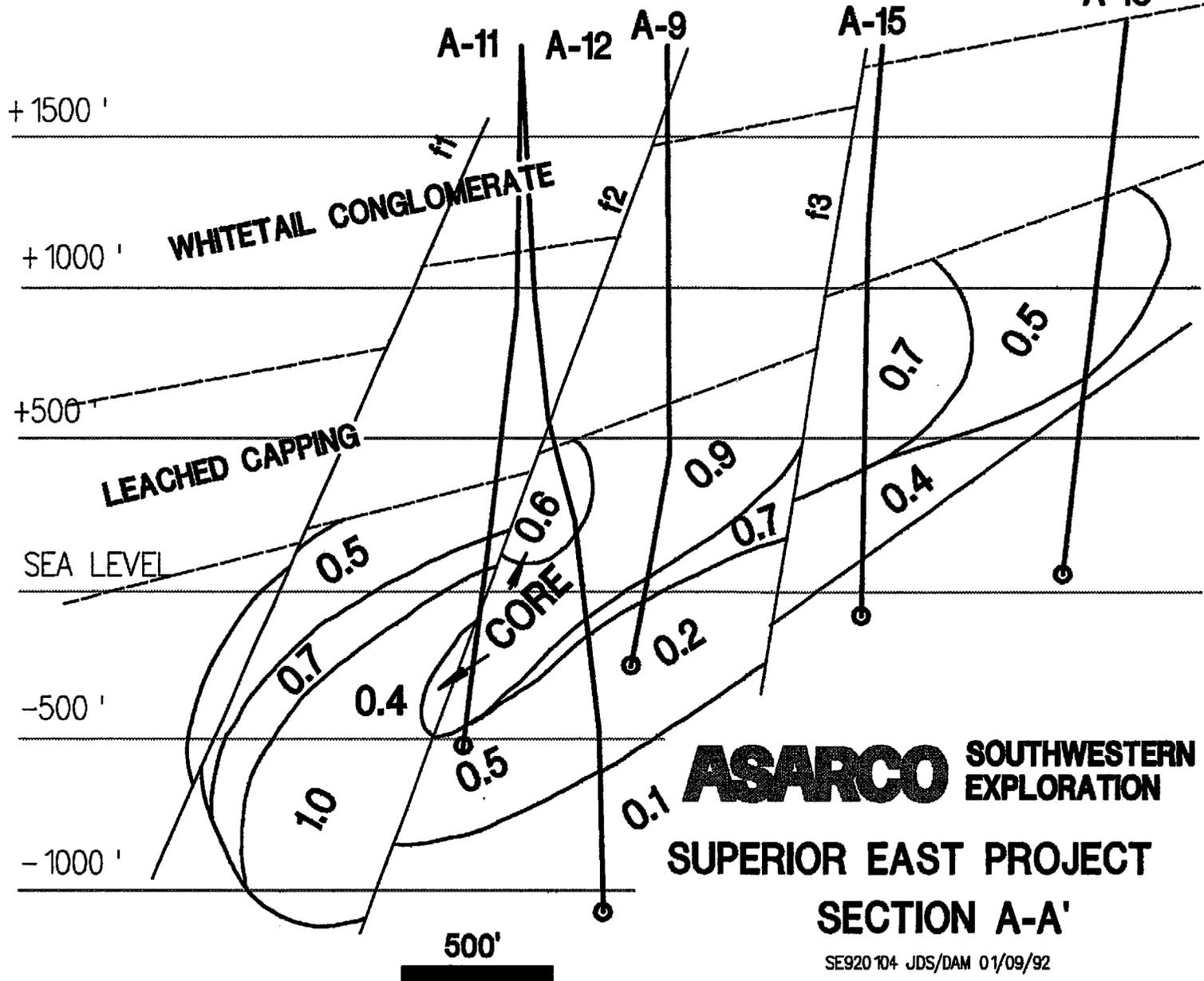
**ASARCO** SOUTHWESTERN EXPLORATION

**SUPERIOR EAST PROJECT**



SOUTHWEST

NORTHEAST



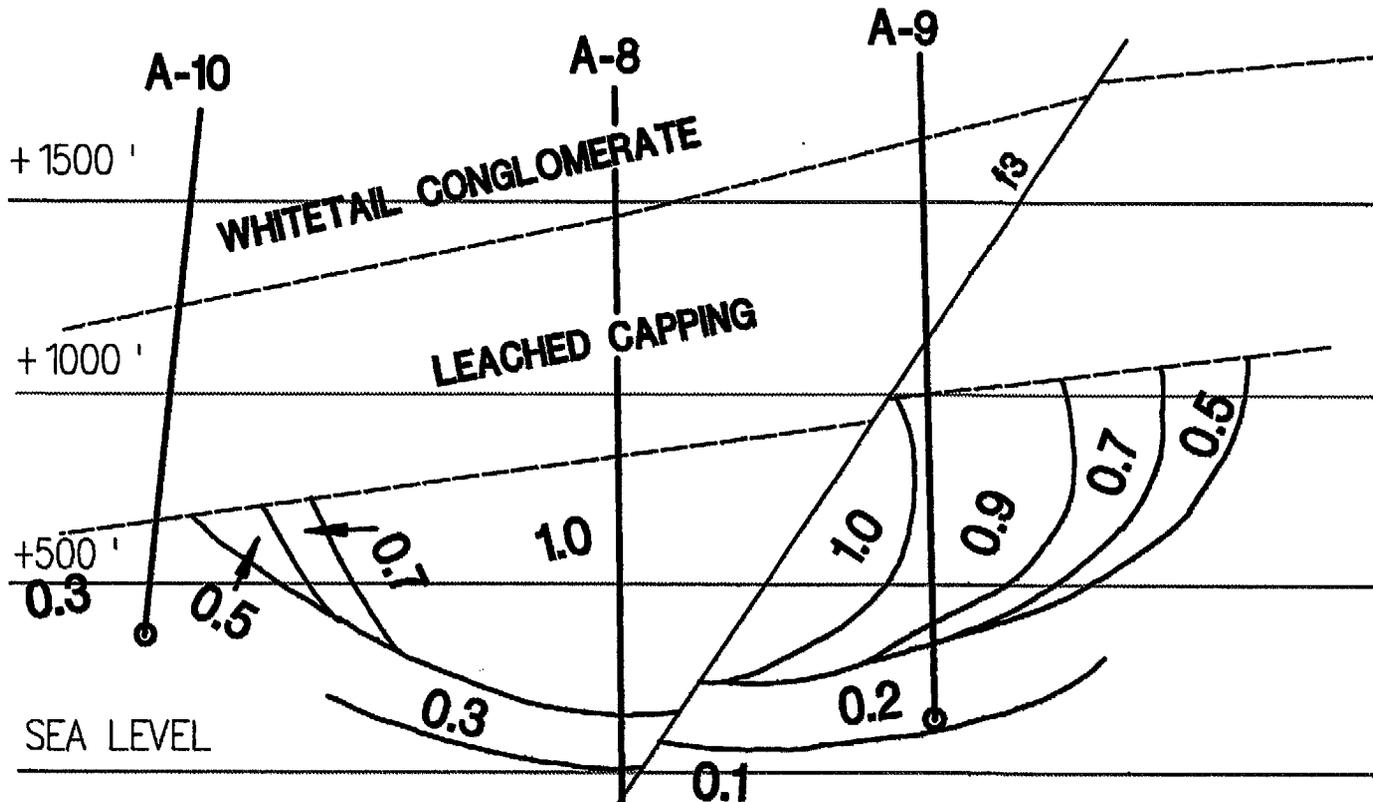
**ASARCO** SOUTHWESTERN EXPLORATION

SUPERIOR EAST PROJECT  
SECTION A-A'

SE920 104 JDS/DAM 01/09/92

SOUTHWEST

NORTHEAST



**ASARCO** SOUTHWESTERN  
EXPLORATION  
SUPERIOR EAST PROJECT  
SECTION B-B'

SANTA CRUZ PROJECT EA-0075, et al, Pinal County, Arizona

The Santa Cruz Project was initiated in 1964 to continue exploration for porphyry copper deposits of better grade after the Sacaton deposit, of 50 million tons of 0.89% copper, had been discovered.

Exploration spread out over the entire basin outward from Sacaton, and a number of discoveries were made.

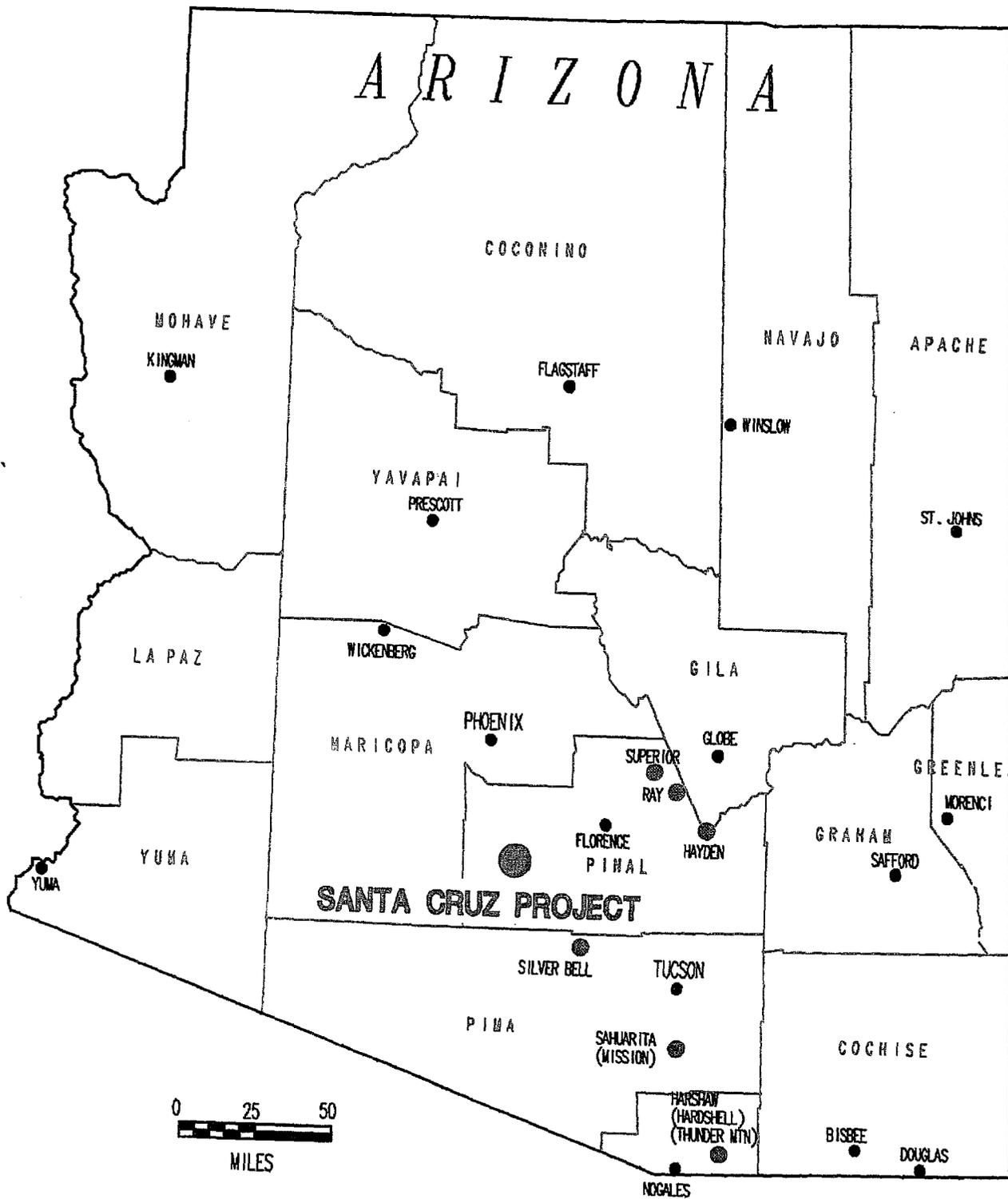
In 1974, the Santa Cruz Joint Venture with Freeport-McMoRan as 50-50 owners was formed to further the exploration.

At this time, two deposits are of interest. They include 1) The Hanna-Getty porphyry copper deposit that contains 140 million tons of 0.91% sulfide copper, with a cap of 80 million tons of 1.35% oxide copper, and 2) the extensive oxide reserve where the present in situ program is in progress.

The in situ program is an area of 52 million tons of 0.85% acid soluble copper within the larger plus one billion ton reserve at a lesser grade.

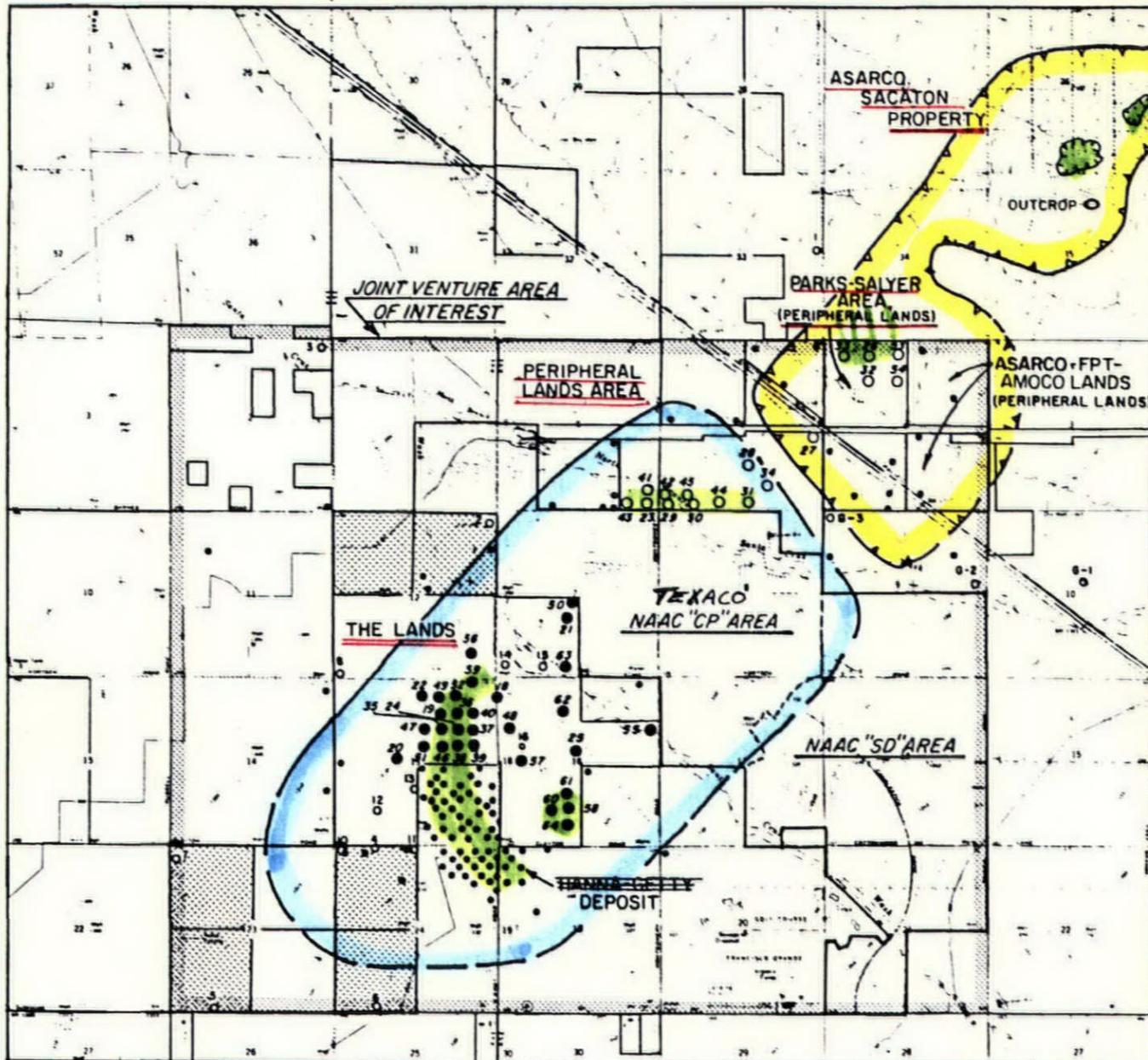
Depth of alluvium in the in situ holes is 650'-900', with an additional interval of leached capping to 1200', followed by 600' of oxide copper, then sulfides. Precambrian granite intruded by Tertiary porphyries is the host unit below the alluvium.

*Santa Cruz*  
✓ Location Map  
✓ Property Map - District  
✓ Cross-section DD'  
✓ Scheibelkopfer Reserve  
✓ Sacaton X-Section



**ASARCO** SOUTHWESTERN EXPLORATION  
**SANTA CRUZ PROJECT**

R. 4 E. R. 5 E.



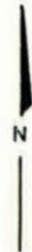
T. 5 S.  
T. 6 S.

R. 4 E. R. 5 E.

Base from USGS Casa Grande West & Stanfield 7.5' Quadrangles

**EXPLANATION**

-  ASARCO-FREEPORT HANNA-GETTY FEDERAL LODGE CLAIMS
-  HANNA-GETTY HANNA-GETTY FEDERAL LODGE CLAIMS
-  NAAC "CP" (SUBDIVIDED) (TEXACO)
-  NAAC "SD" (SUBDIVIDED)
-  OUTLINE OF SUBSTANTIAL ALTERATION & MINERALIZATION "IN PLACE"
-  OUTLINE OF DISPLACED ALTERATION & MINERALIZATION RESTING ON THE SACATON BASEMENT FAULT

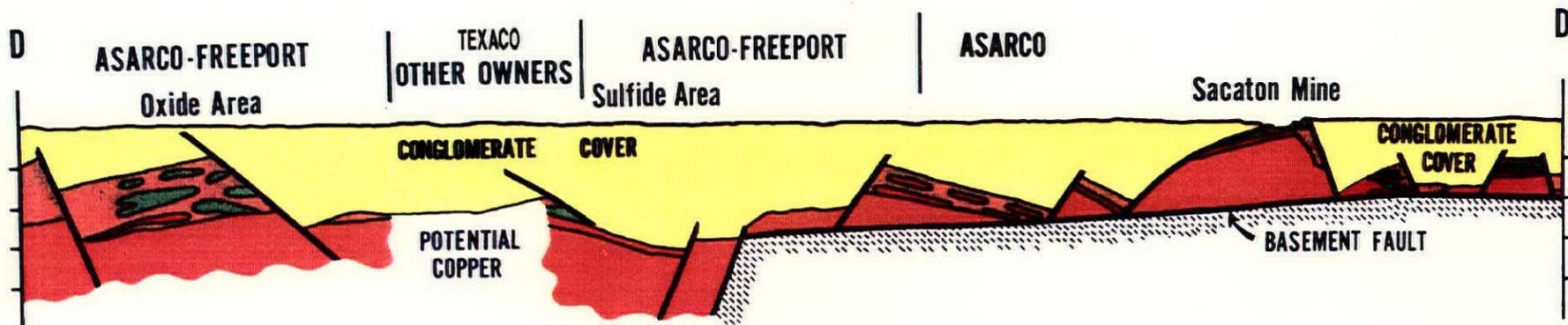


TO ACCOMPANY **REPORT**  
 DATE **B-27-82**  
 BY **H.G. TREIS**

FIGURE I

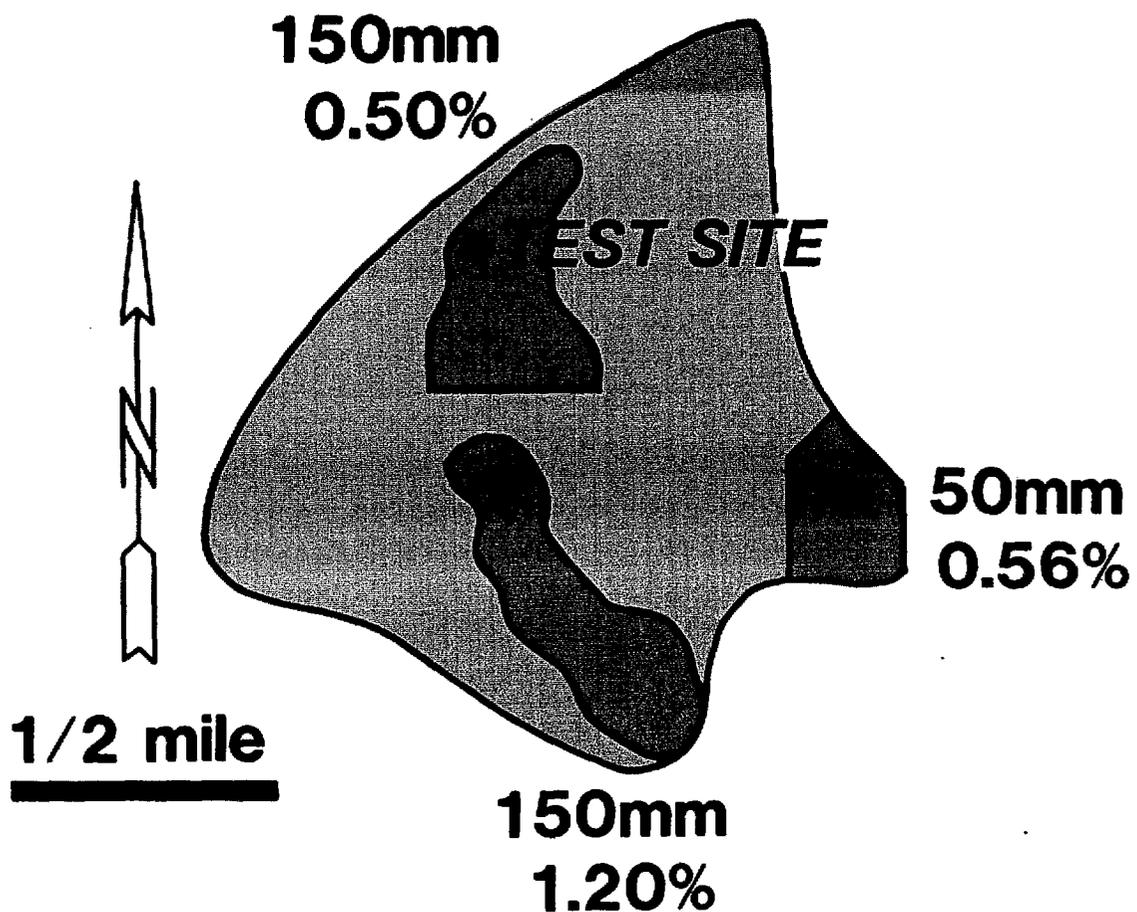
SANTA CRUZ PROJECT  
 PINAL COUNTY, ARIZONA  
**SANTA CRUZ PROJECT AREA**

-  PREVIOUS ASARCO DRILL HOLES
  -  ASARCO-FREEPORT DRILL HOLES OF THIS REPORT
  -  ASARCO-FREEPORT DRILL HOLES
- "SC" PREFIX NOT SHOWN



- Capping
- Copper Oxides
- Chalcocite
- Chalcopyrite

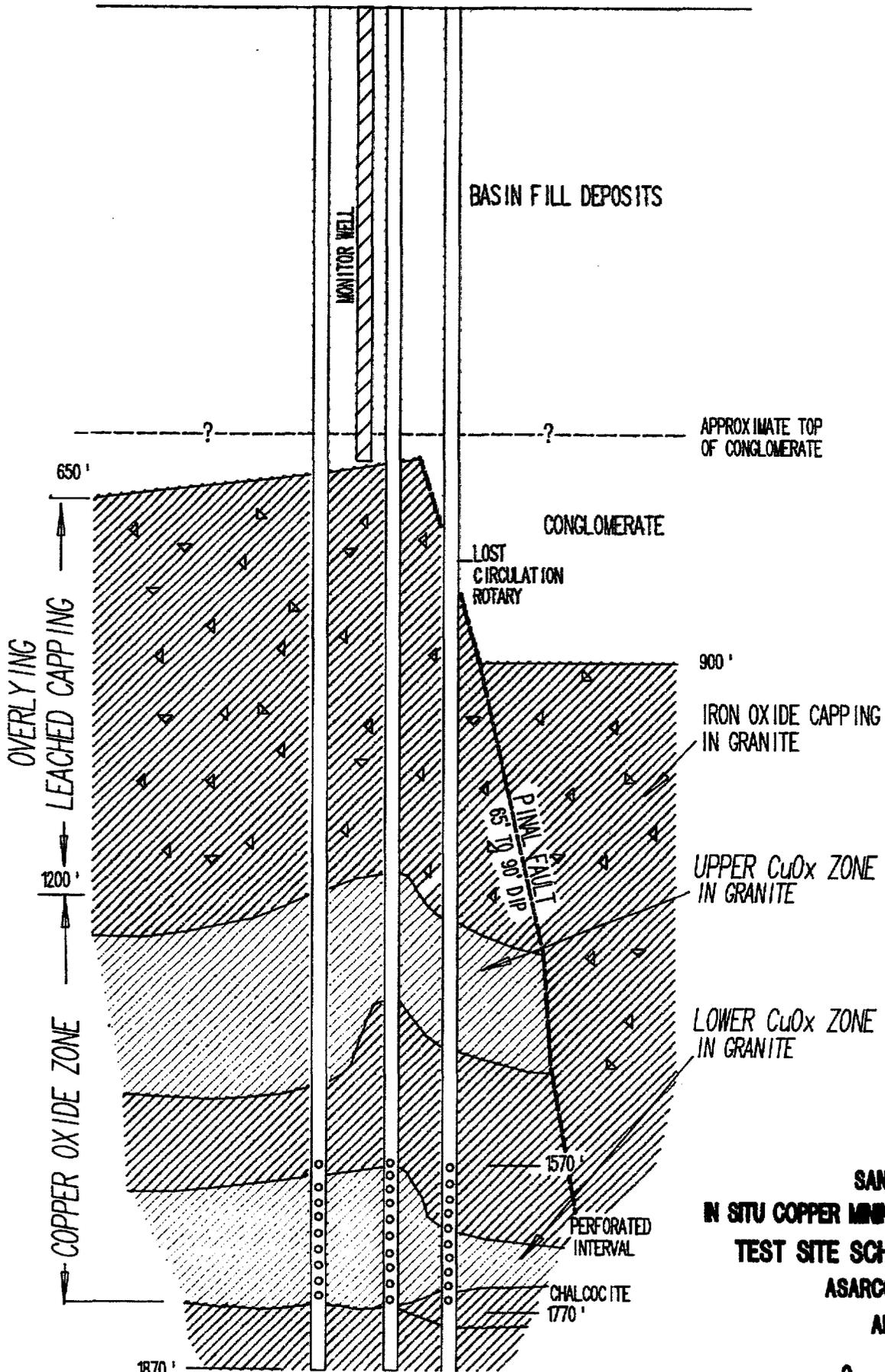
one mile  
**SANTA CRUZ PROJECT**



**SOLUBLE COPPER RESERVES**  
**350 MILLION TONS AT 0.81%**  
SANTA CRUZ PROJECT

LOOKING EAST

T-2 T-3 T-4



**SANTA CRUZ  
IN SITU COPPER MINING RESEARCH PROJECT  
TEST SITE SCHEMATIC SECTION  
ASARCO Incorporated  
APRIL 1990**



THUNDER MOUNTAIN PROJECT EA-0042, Santa Cruz County, Arizona

The Thunder Mountain Project was initiated in 1972 with Kerr-McGee and is 5 miles south of the town of Patagonia with 101 unpatented claims in the exploration agreement.

Two mineralization styles are present.

1. A high level chalcocite-covellite blanket which is near surface.

During the past two years Asarco has drilled 6 holes to further delineate the mineralization indicated by five previous holes. The Bucket Breccia zone is within a diatreme environment of tuffaceous slump breccias, intrusive breccias with feldspar porphyry intrusive, all of which have been highly altered with pyrophyllite, sericite, alunite, and kaolinite, the end products.

The present drilling indicates the depth to the top of mineralization may be 150 feet, with an average thickness of 575 feet of 0.28% copper. In excess of 32 million tons is suggested in this zone.

Bottle-roll tests indicate only 50-60% recovery by heap leach.

2. The Sunnyside deep primary chalcopyrite zone in Jurassic granodiorite. Six holes to depths around 5500' have been drilled into the system with the top being around 3000 feet and extending an additional 2500 feet of mineralization which average 0.22% copper. Indicated resource is in excess of 3 billion tons within this zone.

Half of the potential is under the Asarco Three R claim group and is not part of the Kerr-McGee Thunder Mountain agreement.

On the north end of the postulated zone on Asarco's Three R claims is the Sunnyside breccia pipe of 3 million tons of 0.48% copper with a surrounding shallow chalcocite zone. The chalcocite mineralization starts at a depth of 360 feet and is 170 feet in average thickness at a grade of 0.37% copper, with 35 million tons indicated by a 4-hole pattern.

*Thunder Mtn*

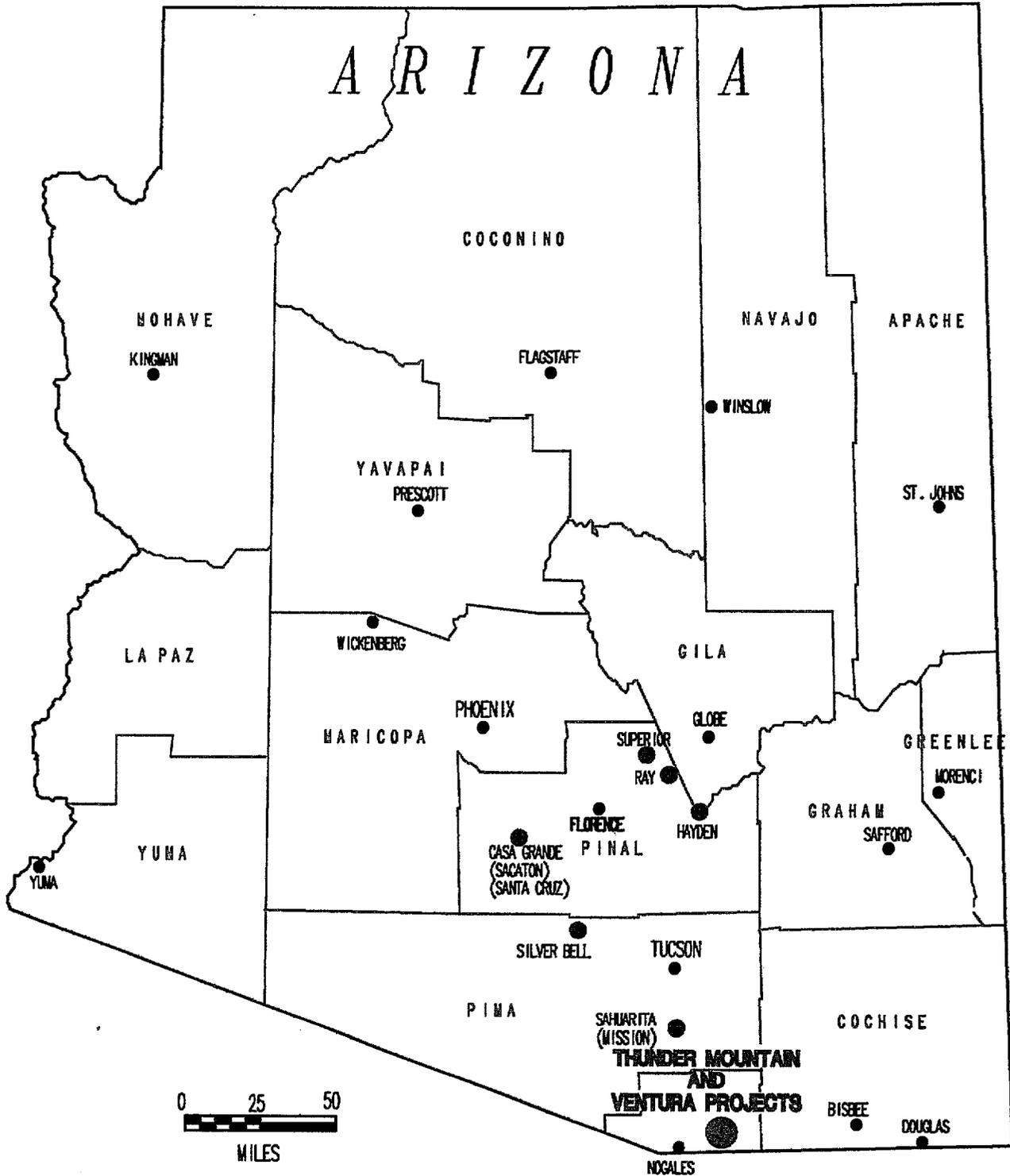
*✓ AZ location map  
✓ Property location/  
depth/width  
zone map*

*✓ Bucket Breccia*

*✓ ~~Cross section~~ A-A'  
B-B'  
C-C'*

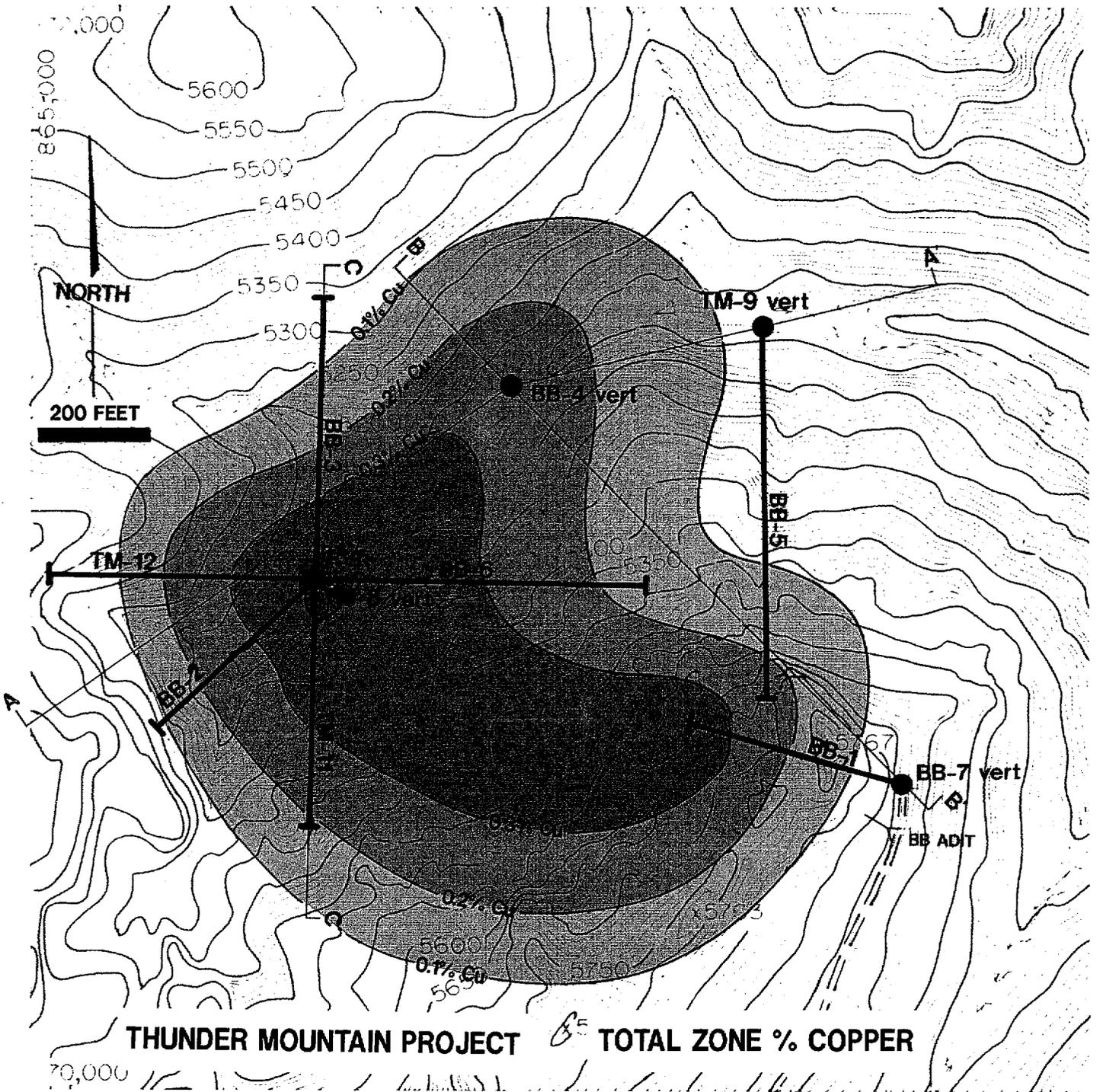
*✓ repeat Property/location/depth  
width zone*

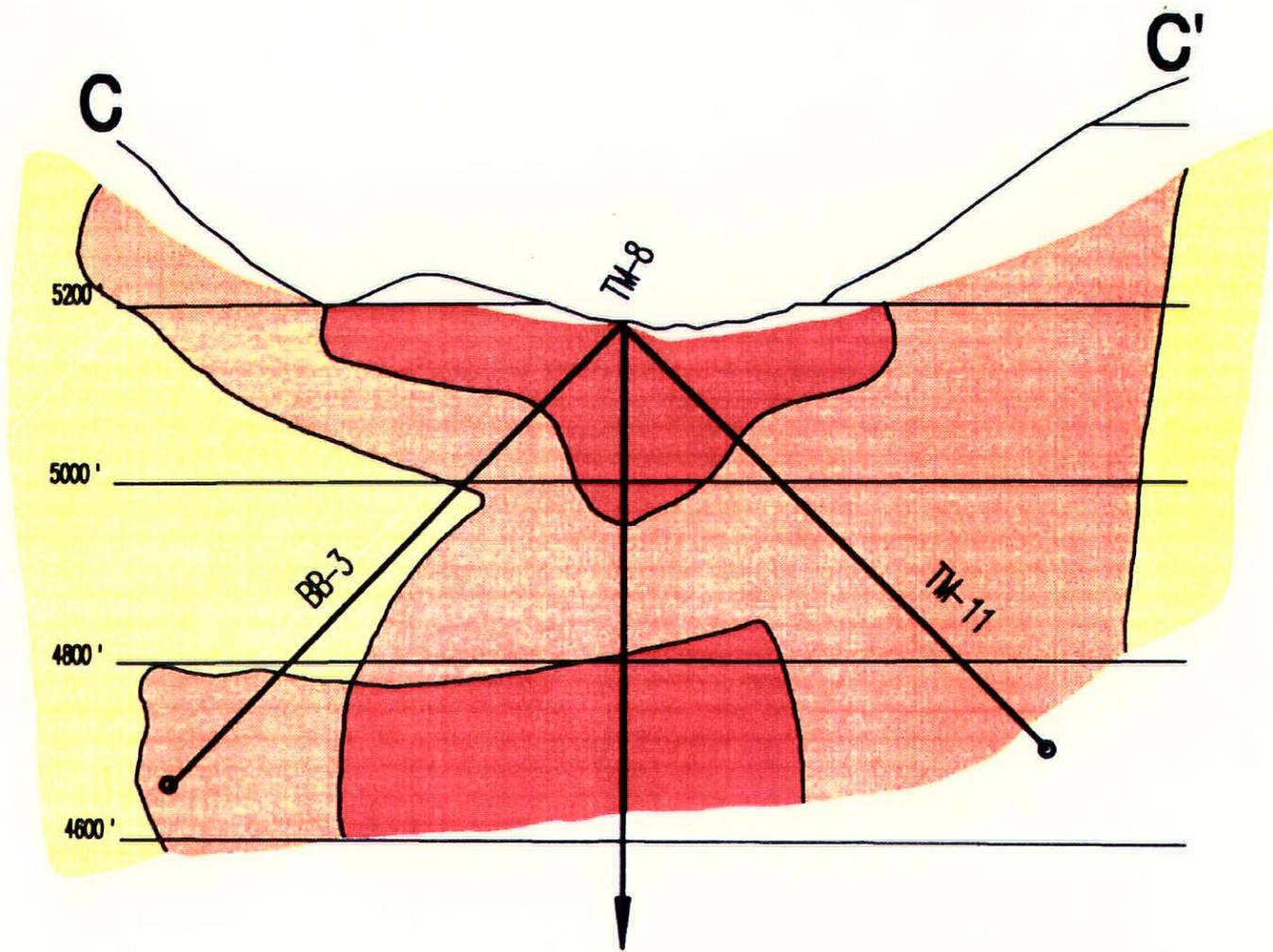
FIGURE 1



**ASARCO** SOUTHWESTERN EXPLORATION  
**THUNDER MOUNTAIN AND VENTURA PROJECTS INDEX MAP**







EXPLANATION

- <0.4% COPPER
- 0.2-0.4% COPPER
- 0.1-0.2% COPPER

**ASARCO** SOUTHWESTERN  
EXPLORATION

THUNDER MOUNTAIN PROJECT

SECTION C-C'

PATAGONIA MOUNTAINS, ARIZONA

J.D.S.

0 100' 200'

01-01



min TM911204 JDS/DAM TUC 12/20/91

VENTURA PROJECT EA-0165, Santa Cruz County, Arizona

The Ventura Project was initiated in 1978 with Noranda Exploration and is 6 miles southwest of the town of Patagonia and within the Jurassic granodiorite complex of the Patagonia Mountains.

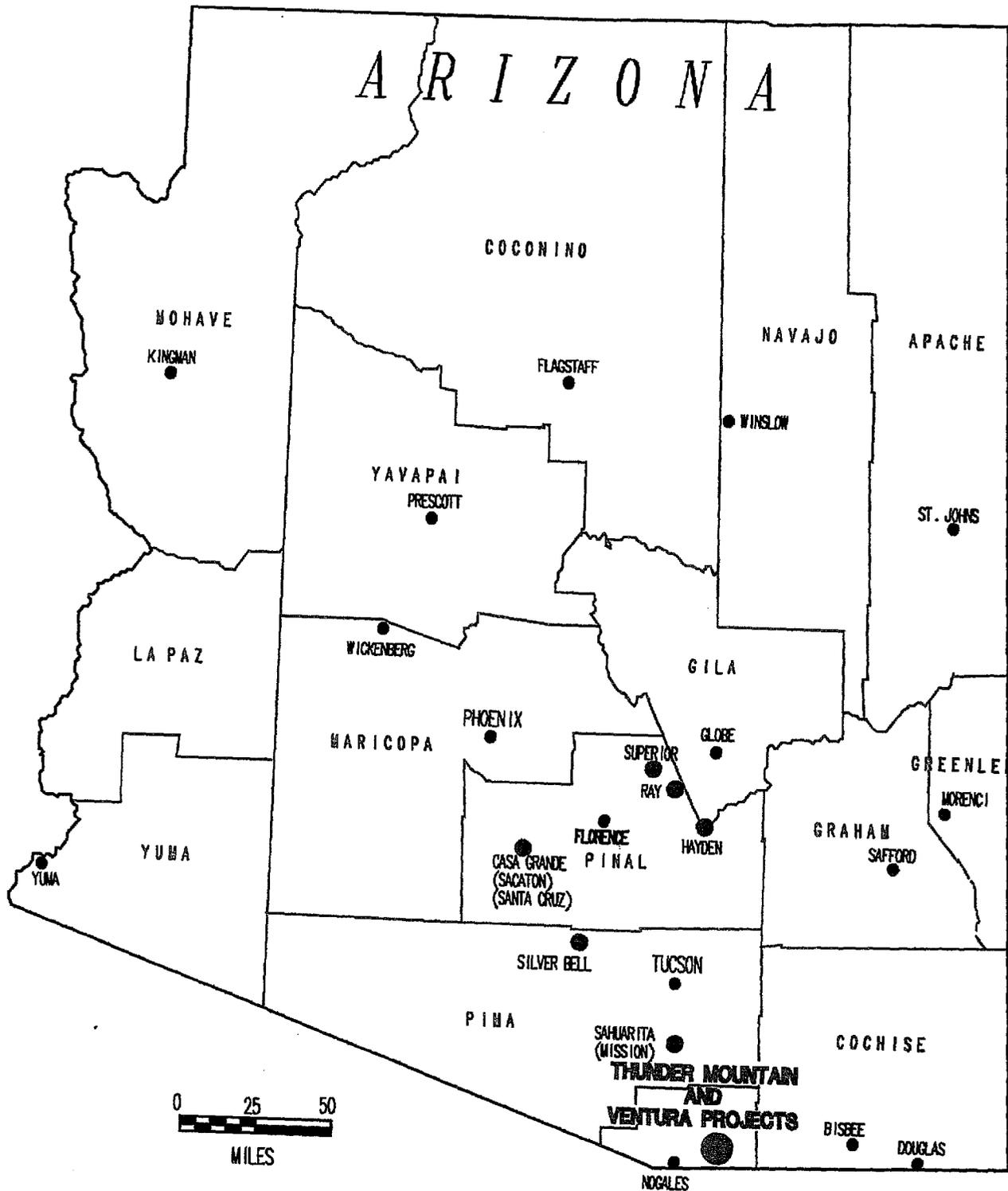
Prior to Asarco securing an exploration option, West Range and Noranda had completed a number of shallow holes mainly in the breccia pipe throat, but some deep enough to suggest the flaring outward flattish tabular zone of primary chalcopyrite mineralization.

Four Asarco holes have been drilled and one previous hole deepened to test the deep tabular zone on this 32 unpatented claim group.

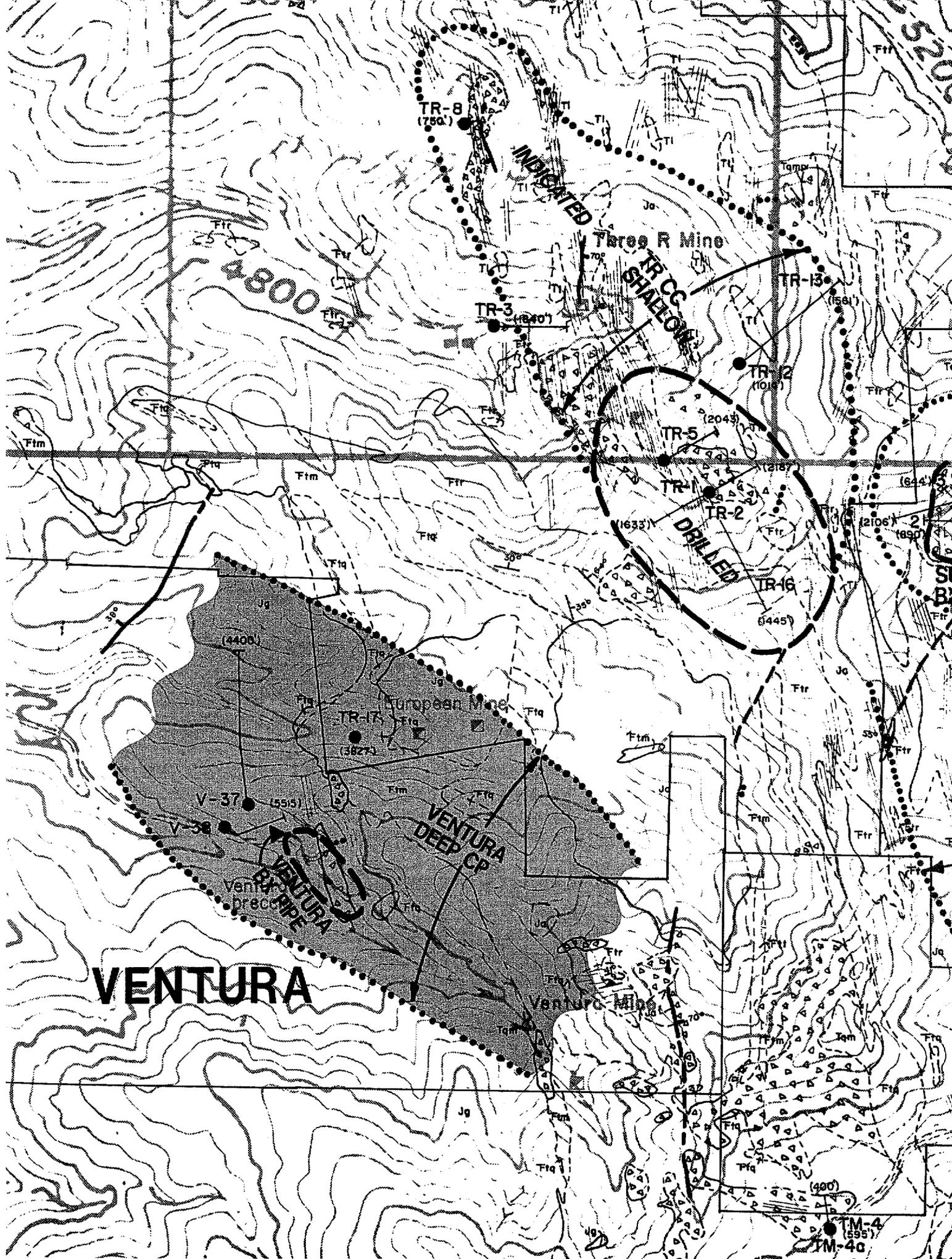
The breccia pipe resource is estimated at 13 million tons of 0.28% copper and 0.136% moly ( $0.23 \text{ MoS}_2$ ). The tabular chalcopyrite resource, drilled, is estimated at 31 million tons of 0.36% copper and 0.035% moly. The projected mineralization based on the outlying holes suggests an open-ended resource in excess of 150 million tons. The top of the 400'-1000' thick tabular zone is at a depth of 1700'-3000' and is surrounded by thick intervals of 0.1% copper.

*Ventura*  
*✓ AZ loc. map*  
*✓ Ventura Zone plan*  
*✓ V. Bx drill plan*  
*✓ V. Bx Section C.O.*  
*w/ floor*

FIGURE 1



**ASARCO** SOUTHWESTERN  
EXPLORATION  
**THUNDER MOUNTAIN AND  
VENTURA PROJECTS INDEX MAP**



# VENTURA

European Mine

Three R Mine

TR-8  
(750')

TR-3  
(1840')

TR-2  
(1018')

TR-13  
(1541')

TR-5  
(2043')

TR-1  
(1633')

TR-2  
(218')

TR-16  
(1445')

TR-17  
(3827')

V-37  
(1515')

V-38

VENTURA DEEP CR

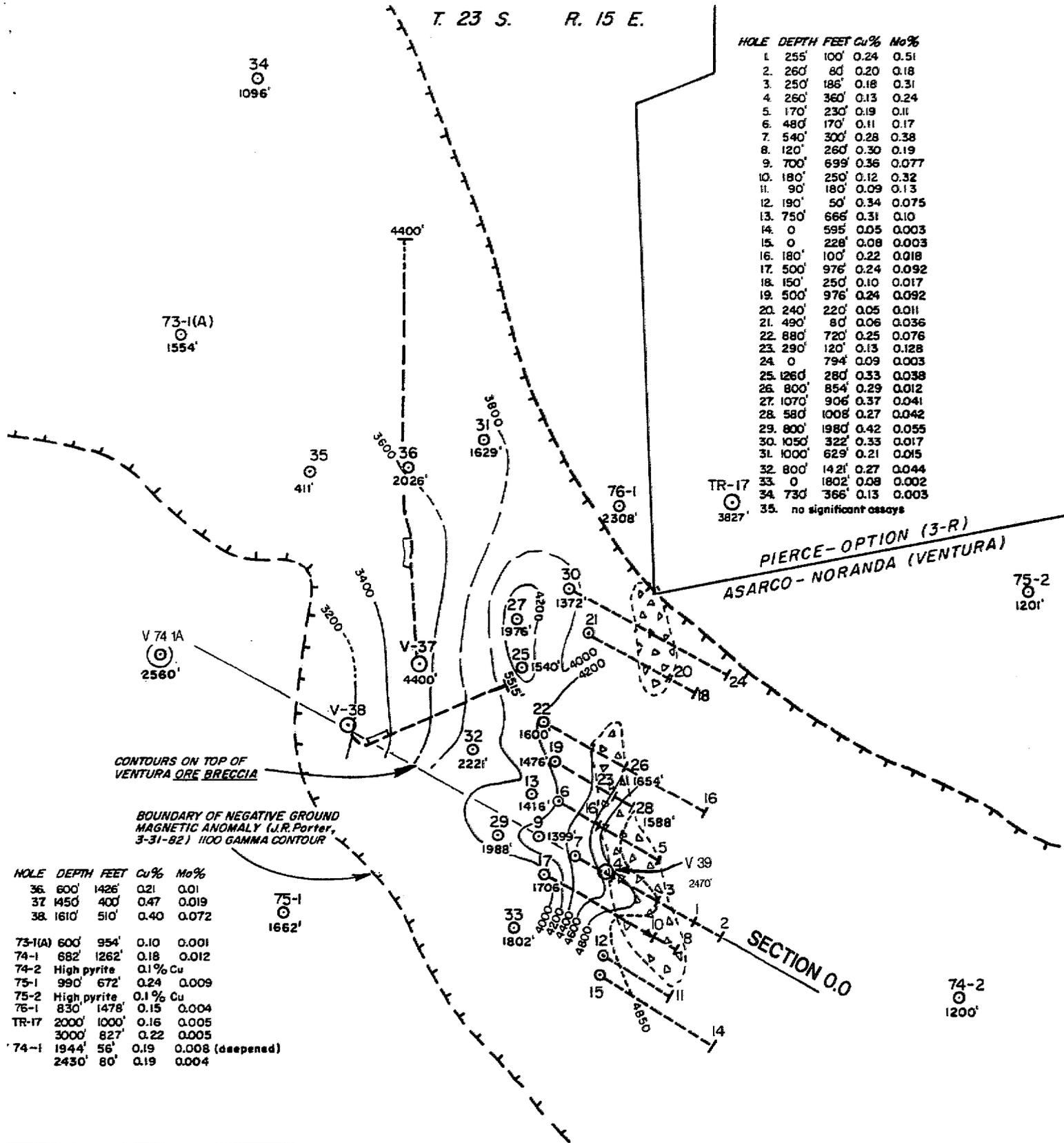
VENTURA  
RY-RIFE  
Ventura  
precip

Ventura Mine

TM-4  
(595')  
TM-40

T. 23 S. R. 15 E.

HOLE	DEPTH FEET	Cu%	Mo%
1	255'	100'	0.24 0.51
2	260'	80'	0.20 0.18
3	250'	188'	0.18 0.31
4	260'	360'	0.13 0.24
5	170'	230'	0.19 0.11
6	480'	170'	0.11 0.17
7	540'	300'	0.28 0.38
8	120'	260'	0.30 0.19
9	700'	699'	0.36 0.077
10	180'	250'	0.12 0.32
11	90'	180'	0.09 0.13
12	190'	50'	0.34 0.075
13	750'	666'	0.31 0.10
14	0	595'	0.05 0.003
15	0	228'	0.08 0.003
16	180'	100'	0.22 0.018
17	500'	976'	0.24 0.092
18	150'	250'	0.10 0.017
19	500'	976'	0.24 0.092
20	240'	220'	0.05 0.011
21	490'	80'	0.06 0.036
22	880'	720'	0.25 0.076
23	290'	120'	0.13 0.128
24	0	794'	0.09 0.003
25	1260'	280'	0.33 0.038
26	800'	854'	0.29 0.012
27	1070'	906'	0.37 0.041
28	580'	1008'	0.27 0.042
29	800'	1980'	0.42 0.055
30	1050'	322'	0.33 0.017
31	1000'	629'	0.21 0.015
32	800'	1421'	0.27 0.044
33	0	1802'	0.08 0.002
34	730'	366'	0.13 0.003
35	no significant assays		



HOLE	DEPTH FEET	Cu%	Mo%
36	600'	1426'	0.21 0.01
37	1450'	400'	0.47 0.019
38	1610'	510'	0.40 0.072

73-1(A)	600'	954'	0.10 0.001
74-1	682'	1262'	0.18 0.012
74-2	High pyrite	0.1% Cu	
75-1	990'	672'	0.24 0.009
75-2	High pyrite	0.1% Cu	
76-1	830'	1478'	0.15 0.004
TR-17	2000'	1000'	0.16 0.005
	3000'	827'	0.22 0.005
74-1	1944'	56'	0.19 0.008 (deepened)
	2430'	80'	0.19 0.004

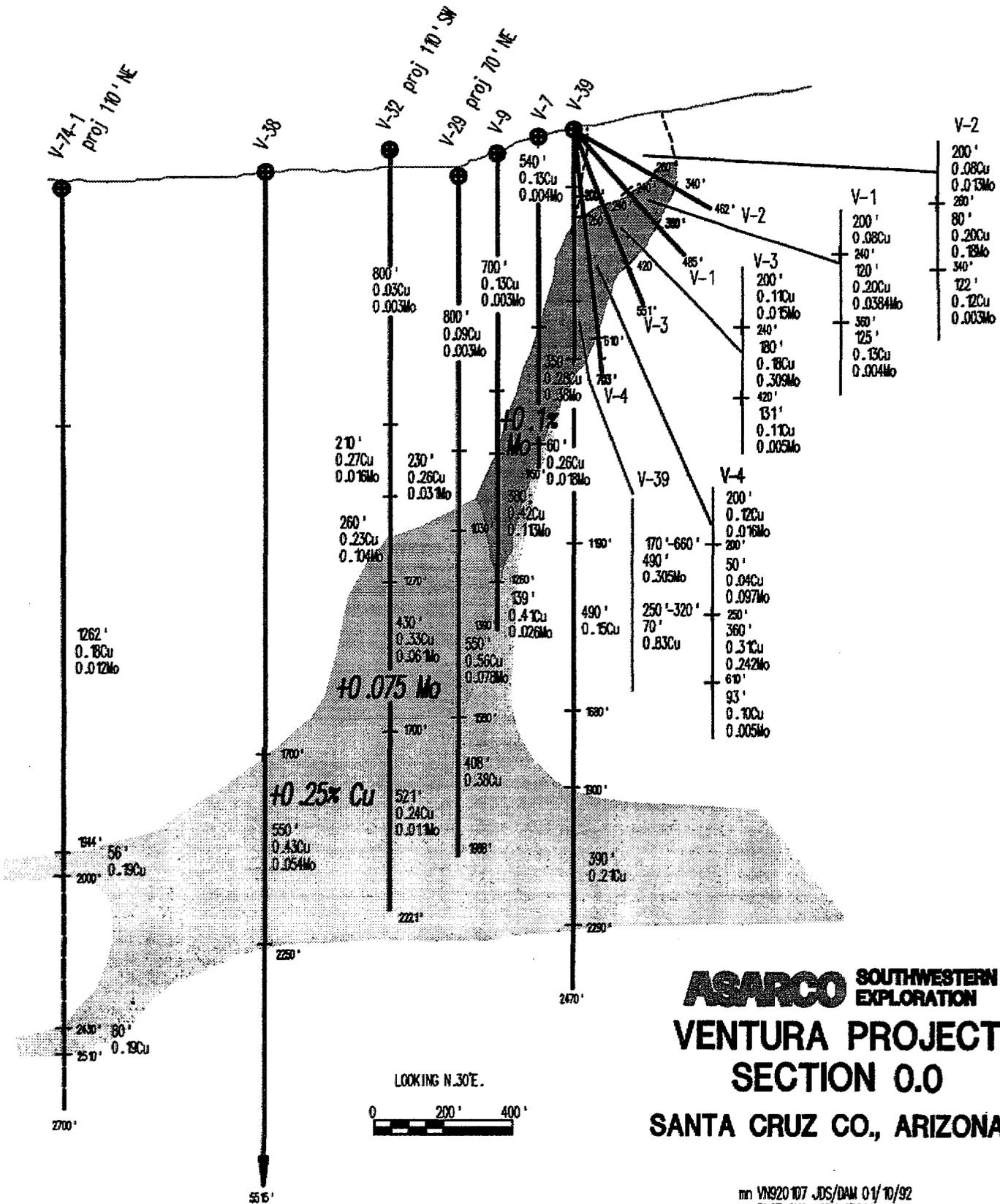
**EXPLANATION**

- V-37  
○ ASARCO Inc. drill hole showing total depth & (—) mineral intercept
- 76-1  
○ Noranda drill hole (V-prefix not shown)
- 36  
○ West Ronge drill hole (V-prefix not shown)
- △ Ventura breccias, surface expression

NOTE: Unsurveyed area, topography flown for Noranda.



**DRILLING PROGRESS MAP**  
**VENTURA PROJECT**  
**Patagonia Mountains**  
**SANTA CRUZ COUNTY, ARIZONA**  
**SCALE: 1" = 400'**



**ASARCO** SOUTHWESTERN EXPLORATION  
**VENTURA PROJECT**  
**SECTION 0.0**  
**SANTA CRUZ CO., ARIZONA**

mn VNS20107 JDS/DAM 01/10/92  
 PLOT CHG: SP1-SP249  
 SP2-SP119  
 SP3-SP193  
 SP8-SP9

EXPLORATION ZONES, Southwestern Exploration Division

Evaluation using the multiple discipline features of geology, geochemistry, geophysics, and field evaluation of four major trends.

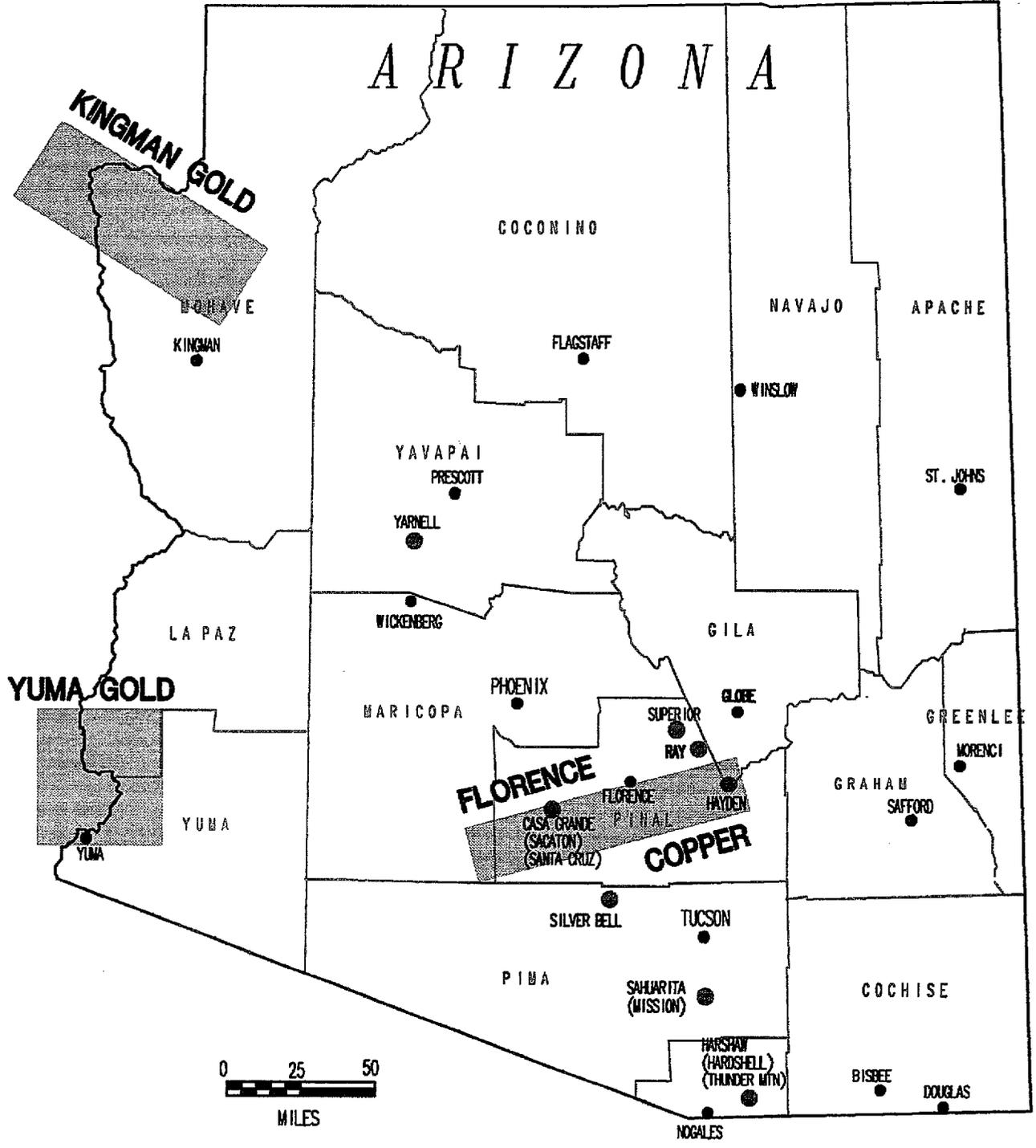
1. Florence copper zone where known higher grade protore and supergene enrichment has produced plus 100 million tons of 1-1½% copper reserves. Oxide copper production is associated with the known porphyry deposits. Large volumes of native (and oxidized) copper mineralization is known in two major Tertiary fanglomerate basins and others are suggested to be present.
2. Yuma gold zone. Silver and gold-bearing meta-volcanic hosted deposits in detachment-style tectonics will be investigated for Mesquite-type mines.
3. Kingman gold zone. Detachment style mineralization with deposits also in footwall and hanging wall sequences will be investigated for Oatman and Castle Mountain style mineralization.
4. Pioche(NV)-Tushar(UT) gold-silver zone. An abundance of small mines and high-level alteration in volcanic sequence is a lead to a major deposit.

Reintegration of file data, including past drill holes reevaluation, geology, public available geochemistry (NURE), and geophysical (magnetics, gravity) and deposits (MILS, MDS) using GIS format. Data bases on hard copy will provide input with full utilization being with computer GIS programming and intra-action of themes. Present SWED computers need to be updated to utilize the benefit of GIS.

*Exploration  
Trends*

*AZ-UT  
Zones*

**PIOGHE(NV)-TUSHAR(UT)  
GOLD-SILVER**



**ASARCO** SOUTHWESTERN  
EXPLORATION

**INDEX MAP  
OF FAVORABLE  
EXPLORATION TRENDS**

## Serpent East

- ✓ AZ location map
- ✓ Drill hole plan w/ footcage assay
- ✓ Section AA'
- ✓ Section B-B'

## Santa Cruz

- ✓ location map
- ✓ Property map - drill areas
- ✓ Cross-section D-D'
- ✓ Soluble Copper Reserves
- ✓ du-Site x-section

All  
Over-Heads  
on File  
in Drafting  
according to  
Project-Activity

## Thunder Mt

- ✓ AZ location map
- ✓ Property location - drill map
- ✓ Plan of Bucket Breccia Sullies
- ~~Cross Section A-A'~~
- ~~" B-B'~~
- ✓ Cross-Section C-C'

## Ventura

- ✓ AZ location map
- ✓ Ventura zone plan
- ✓ Ventura bx pit drill plan
- ✓ Ventura bx Section DD' (w/ plans)

✓ Exploration Trends AZ-UT plan

**ASARCO**

Exploration Department  
 G.D. Van Voorhis  
 Vice President

September 13, 1993

RECEIVED

SEP 27 1993

EXPLORATION DEPARTMENT

To Exploration Managers

**Re: September 23rd Exploration Planning Meeting**

The purpose of this meeting is to review what we have accomplished this year and to consider what must be done to acquire some worthwhile projects for the future. A strong emphasis will be placed on the future direction for exploration.

8:00 am	Asarco's current status and --- G. Van Voorhis Other issues	
8:30	Latin America	D. Smith, Jr.
9:30	Northwest	M. McClave
10:15	Break	
10:30	Western U.S.	P. Vikre J. Sell
11:30	Eastern U.S.	D. Harper
12:00	Lunch Break	
1:00 pm	Canada	R. Gray
2:00	Russia & French Guiana	F. Graybeal
2:45	Portugal, Turkey, etc.	J. Worthington
3:15	Break	

3:30 General discussion of exploration issues.

- a) computer implementation.
- b) project size requirements.
- c) how do other groups acquire good projects?
- d) what do we need to do to acquire good projects?

I expect everyone in attendance to be prepared to discuss these and other issues. The meeting will probably continue into the evening.

*G. D. Van Voorhis*  
G. D. Van Voorhis