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

The following file is part of the

James Doyle Sell Mining Collection

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Budget - Exploration Meeting
Denver Colorado. Stapleton Plaza Hotel
Oct 24-25, 1981.

JBS

STAPLETON PLAZA HOTEL
AND FITNESS CENTER

10/24/91

TCO:

RL Bretries 12/31/91 !

search for new VP is on-going.

TCO in April.

Decision by COY.

Point: Exploration for NEW Profit Center.

Build skills in evaluation.

Su management believes Exploration is discretionary!!

New & different approaches.

3333 QUEBEC STREET, DENVER, COLORADO 80207
303-321-3500 1-800-950-6070

ASARCO

Rocky Mountain
Exploration Division

October 22, 1991

TO: All ASARCO Conference Attendees
Exploration Department Meeting

Room Locations,
Miscellaneous

THURSDAY

Breakfast: On your own at the regular hotel breakfast buffet. It opens at 6:00 am.

Meeting: Conference Room C-10, Second floor Conference Center. Mr. Osborne addresses the Exploration Department at 8:00 am.

Lunch: Room C-7, near the conference room, at Noon.

Dinner: A group reservation has been made at a local Mexican restaurant, for 7:00 pm. More on this Thursday afternoon.

FRIDAY

Breakfast: On your own at the regular hotel breakfast buffet.

Meeting: Conference room C-10 again, meeting begins at 8:00 am.

Lunch: Room C-5, near the conference room, at Noon.

Dinner Banquet: Room Arapahoe B, lower level off the lobby. Bar opens at 6:30 pm, Dinner at 7:30 pm.

The Conference Room will have the following audio-visual aids:

standard carousel-type 35 mm slide projector + screen
Overhead transparency projector
Flipchart paper tablet for sketching
Dry-erase type blackboard + colored markers
Lots of wall space for taping-up maps if needed
pointers

If questions or problems, contact Darby Fletcher

ASARCO

Exploration Department
Frederick T. Graybeal
Chief Geologist

BY TELECOPIER

October 14, 1991

RECEIVED
OCT 14 1991
EXPLORATION DEPARTMENT

TO: J.C. Balla
R.S. Gray
D.D. Harper
H.S. Jacobson
M.A. McClave
J.D. Sell
D.M. Smith, Jr.
P.G. Vikre
C.O. Windels
J.E. Worthington

Exploration Department Meeting

There will be a meeting of managers and all staff geologists at the Stapleton Plaza (303-321-3500) at the Denver Airport (Colorado) on Thursday October 24 and Friday October 25. There is a hotel courtesy car. Reservations will be in your names guaranteed for late arrival on October 23. The meeting will commence at 8:00 A.M. Thursday so you will need to arrive in Denver Wednesday October 23. Breakfast is on your own; the hotel has a buffet on the main floor which opens at 6:00 A.M. There will be a closing dinner October 25 so you should plan your departures for Saturday October 26. The meeting room is yet to be identified, but there will be a follow-up note and the room should be posted on the hotel information board.

Room C-9 2nd floor
MAM to stay

The purpose of this meeting is for each office to discuss plans for 1992 reconnaissance, drilling, and other specific or general proposals you think Asarco should undertake and then be questioned on them. This will not be a fancy high-tech slide show. Bring 35mm slides from previous presentations if they are relevant to 1992. Otherwise, use published maps, draw some hand-lettered maps or overheads, and bring current project maps and sections. Do not make new 35mm slides. We will have tape to hang maps on the wall or you can put them on the table. Assign topics to your staff as you wish, but not everyone is required to talk. We understand the group may be too large for ideal viewing by everyone so we'll do the best we can. A formal budget for 1992 will be assembled at a later date.

ASARCO Incorporated 180 Maiden Lane New York, N.Y. 10038 (212) 510-2000
Telex:RCA 232378 Cable: MINEDEPART Fax: (212) 510-1978

The attached agenda is flexible and is for scheduling only. If you need only 15 minutes to present your proposals, take 15 minutes even if you have been allotted 90 minutes; the rest will be used for discussion. We will compress and expand as required. This is your chance to describe, in open forum format, what you and your staff think we should be doing and where, in addition to describing what specific drill projects have been identified.

F.T. Graybeal

F.T. Graybeal

FTG/lj

Attachment
cc: W.L. Kurtz

RECEIVED
OCT 14 1991
EXPLORATION DEPARTMENT

RECEIVED

OCT 1 4 1991

EXPLORATION DEPARTMENT

EXPLORATION DEPARTMENT MEETING
October 24-25, 1991

Wednesday October 23:	Late arrival, reservations guaranteed at Denver Stapleton Plaza
Thursday October 24:	(Agenda shows order of reviews; timing of reviews is approximate and includes time for group discussion)
8 - 9 AM:	TCOsborne - Exploration Organization, Budgets, Planning
9 - 10 AM:	Southwestern Exploration Division
10 - 10:30 AM:	Break
10:30 - 11:30 AM:	Great Basin Exploration Division
11:30 - noon:	Eastern USA Exploration Division (gold)
12 noon - 1:30 PM:	Buffet lunch
1:30 - 2PM:	Eastern USA Exploration Division (lead)
2 - 3 PM:	Northwestern Exploration Division
3 - 3:30 PM:	Break
3:30 - 4:30 PM:	Rocky Mountain Exploration Division
4:30 - 5PM:	Acquisitions, Jump River Joint Venture

Quron-Cypress - Johnson ARCO

If we are ahead of time, Friday AM reviews will be moved to Thursday PM, so Friday speakers should bring their maps and be prepared to talk Thursday.

Dinner - on your own; ad hoc arrangements at local bistro for those up to it.

RECEIVED
OCT 14 1991
EXPLORATION DEPARTMENT

Friday October 25:

8 - 9 AM:	Bolivia, Peru, other South America
9 - 10 AM:	Mexico, Central America
10 - 10:30 AM:	Break
10:30 - 12 noon:	Eastern Canada Exploration Division
12 noon - 1:30 PM:	Buffet lunch
1:30 - 3 PM:	Western Canada Exploration Division
3 - 3:30 PM:	Break
3:30 - 5 PM:	Geophysics, Technology
5 - 5:30 PM:	Summary, review, general discussion
6:30 PM:	Cocktails
7:30 PM:	Exploration Department Dinner

Saturday October 25
Departure

ASARCO

Exploration Department
Frederick T. Graybeal
Chief Geologist

BY TELECOPIER

October 14, 1991

ASARCO Incorporated
OCT 18 1991
SW Exploration

TO: J.C. Balla
R.S. Gray
D.D. Harper
H.S. Jacobson
M.A. McClave
J.D. Sell
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F.T. Graybeal

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FTG/lj

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Saturday October 25
Departure

JDS

ASARCO

Exploration Department
Frederick T. Graybeal
Chief Geologist

October 16, 1991

BY TELECOPIER

To: JCBalla
RSGray
DDHarper
HSJacobson
MAMcClave
JDSell
DMSmith, Jr.
PGVikre
COWindels
JEWorthington

Exploration Dept. Meeting

This adds to my note of October 14, 1991. Every effort should be made by you and your staff to attend. Please confirm the names of all attendees from your divisions with either Darby Fletcher or Paul Bartos in the Denver Office by Friday morning October 18.

The Thursday Oct. 24 meeting is now scheduled in room C-9 on the second floor above the main lobby but check the hotel information board. Again, you are on your own for breakfast which is a buffet-style set-up on the main floor of the Stapleton. Do not be late for Mr. Osborne's discussion at 8 AM on Thursday.

For your talks we will have a 35 mm slide projector, carousels, an overhead projector, a large flip-chart sketch tablet, wide marking pens, a dry-erase blackboard, pointers and room to tape maps to the walls. Don't be rigid with your talks; the subject is serious but the format is informal. Don't worry if you have only 15 minutes of things to say, but a 1 hour slot. There will be discussion and if you finish ahead of time we'll go to the next speaker. If you need more time, we'll find it. Who speaks from your office and for how long is your decision.

I think the content of the meeting is clear from my October 14 note. Focus on what you propose for 1992 - per instructions from Mr. Osborne. If you have a theoretical or procedural axe to grind or an off-the-wall idea make some overheads or maps and

ASARCO incorporated 180 Maiden Lane New York, NY 10038 (212) 510-2000
Telex RCA 232378 Cable MINEDEPART Fax (212) 510-1978

put it in your review. Remember this is your chance to say what you think Asarco should be doing regardless of whether Asarco has done it before, is doing it now, or you think it wouldn't be interested. Change is not driven by silence, you must speak for it and this is an opportunity to be heard by Mr. Osborne.

I attach my itinerary if you have any questions.

F.T. Graybeal

F.T. Graybeal

Attachment

cc: WLKurtz
TCOsborne

FTG/mev

October 15, 1991

To: R.L. Brown

REVISED ITINERARY

Oct. 17:	Denver Office 303-986-0882 PM at Embassy Suites, Austin TX (late arrival)
Oct. 18:	Interra, Austin TX 512-346-2000 PM at Marriott, San Diego, CA 619-234-1500
Oct. 19-22:	SEG - GSA at San Diego (Messages at Marriott)
Oct. 23-25:	Exploration Dept. Meeting Stapleton Plaza, Denver, Colo. 303-321-3500

F.T. Graybeal

F.T. Graybeal

cc: WLKurtz/JDSell
DMSmith
COWindels
DDHarper
ARRaihl
PGVikre

QD Z2XRR
.

PASSENGER ITINERARY
PAGE NO. 1

ASARCO
1150 N 7TH AV
TUCSON AZ 85705

SELL/JAMES

Must be ticketed tomorrow. OK? Shall I ticket all then? yes

MICHELE 15OCT91

A WE 23OCT	LV TUCSON	401P	CONTINENTAL	1191H OK	
	AR DENVER	648P			OSTOP D9S
		SEAT	18-F **RESERVED**		
			SELL/JAMES		
A SA 26OCT	LV DENVER	650A	AMERICA WEST	844B OK	
	AR PHOENIX	744A			OSTOP 737
		SEAT	16-A **RESERVED**		
			SELL/JAMES		

REFUNDABLE 7 DAY ADVANCE FARE 579.00

HAVE A PLEASANT TRIP

ZAG 00060 10/151759

Budget - Exploration Meeting
Denver, Colorado Oct. 24-25, 1991

View 1.

Opening Good Morning Everone

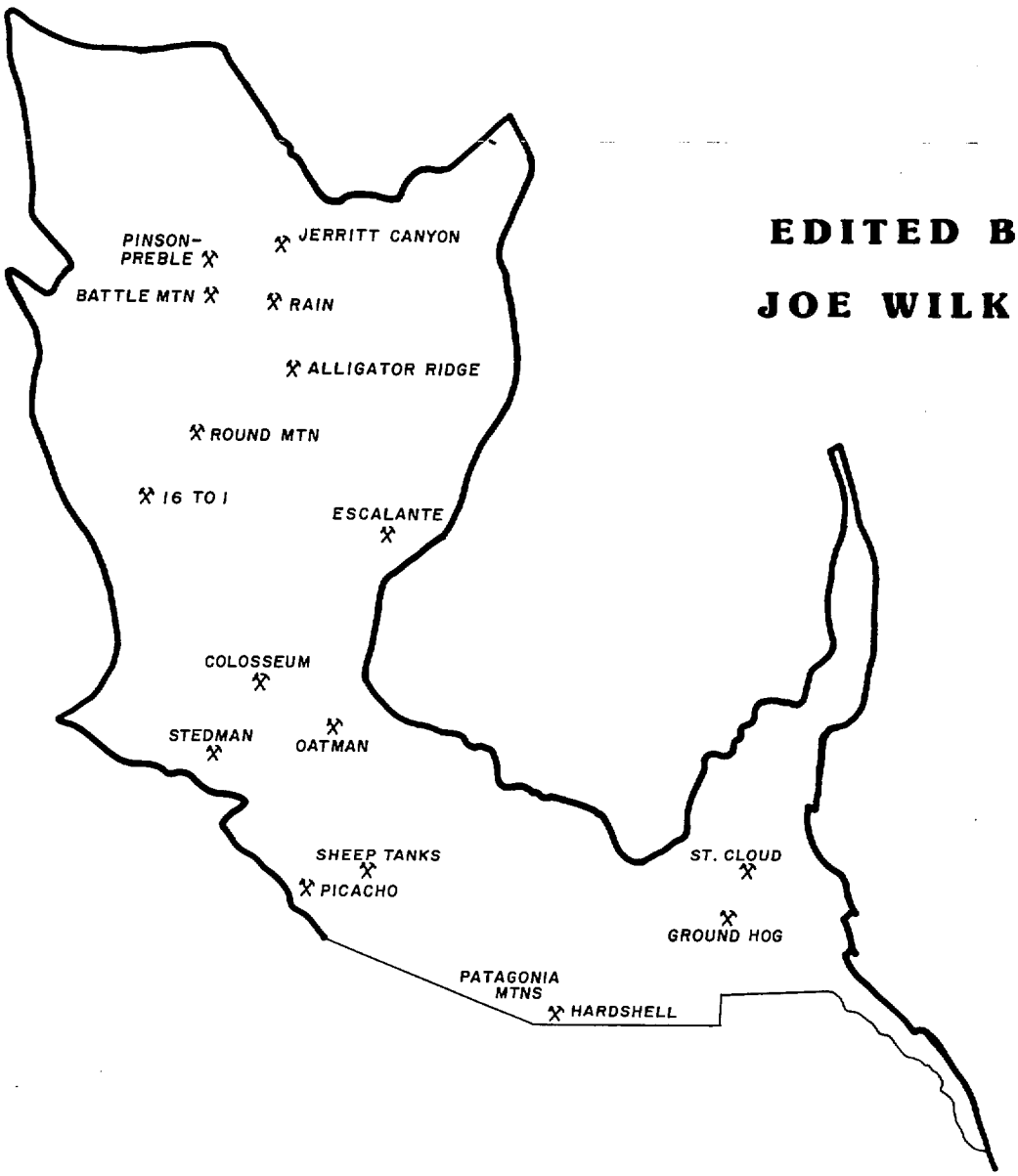
The SWED exploration proposal include four gold trends, and one porphyry copper-oxide copper trend as prime exploration targets. Each one will be discussed.

Continued drilling projects include Superior East, Santa Cruz, and the Patagonia Mtn area.

The general exploration philosophy is to meld the old fashion foot stogging, eyeball resolution, and mind integration during field work of mapping-sampling, with the newer concepts of integration and utilization of GIS (Geographic Information System) of public and ASARCO file data along with Landsat interpretation.

V-1

GOLD AND SILVER DEPOSITS OF THE BASIN AND RANGE PROVINCE WESTERN U.S.A.



EDITED BY

JOE WILKINS JR.

ARIZONA GEOLOGICAL SOCIETY DIGEST

VOLUME XV

TUCSON, ARIZONA 1984

ARIZONA
J/2
15
c.1

ASARCO
LIBRARY

Vrcio 2

This view covers a very large area, ~~and~~ Pete & Herb can relay as I'll say little about their areas.

However, plenty remains for SWED prospecting-evaluation-and discovery.

1. The Escalante-Tushar-Pioche gold trend.
2. The Oatman-Colosseum-Gold Basin gold trend.
3. The Wickenburg-Congress-Garnet gold trend
4. The Picacho-Mesquite-Silver District gold trend
5. The Miami-Ray-Sacaton-Ajo copper trend.

~~Note that the Mohave Block style of deposits and textures extends down into Mexico.~~

Joe Wilkins Jr.

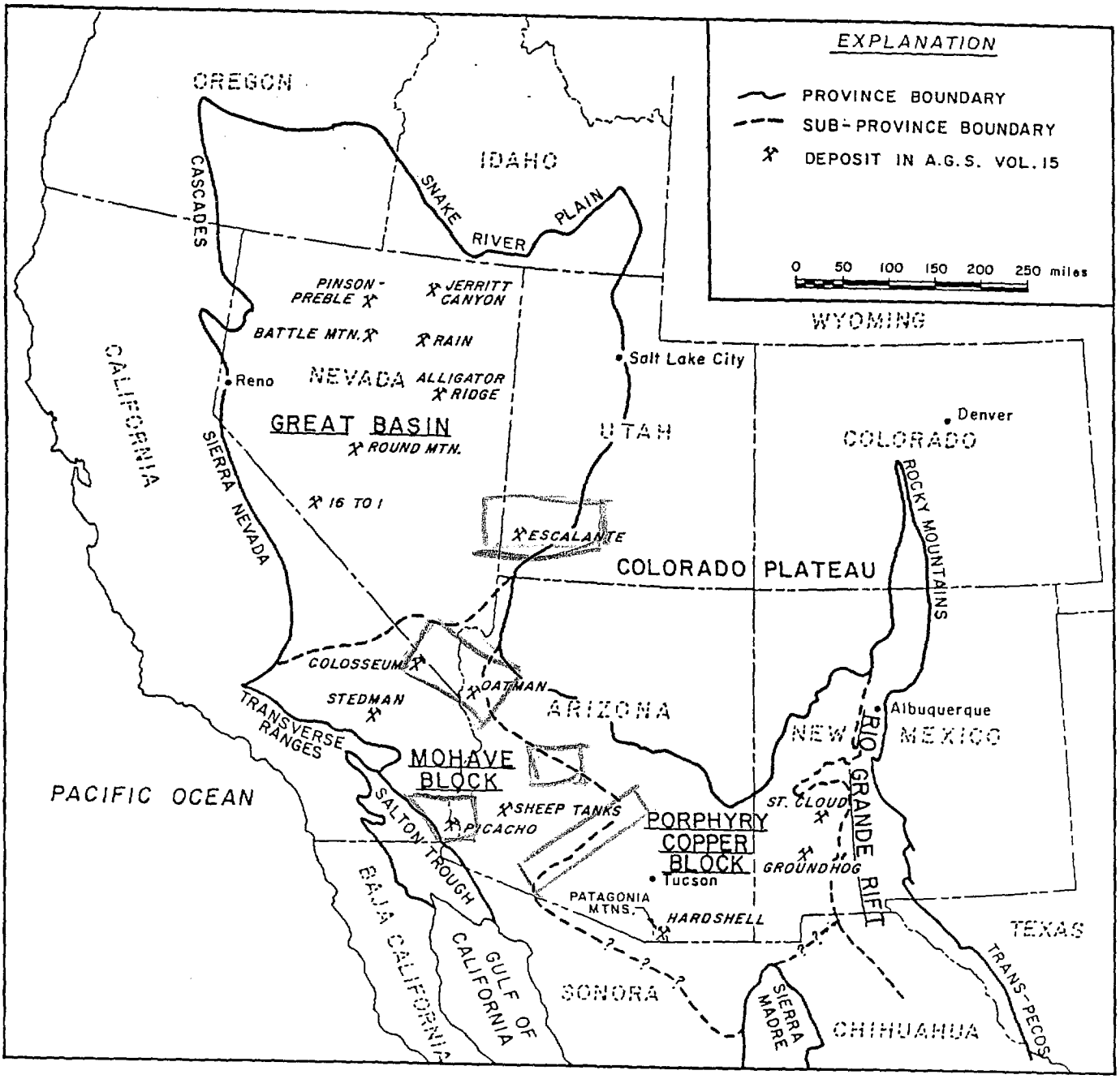


Figure 1. Location map of the Basin and Range province showing major subdivisions and adjacent provinces. -- Modified from Brooks and Raup (1968), Clark (1970), Garner (1978), Hawley (1978), Pansze (1975), Stokes (1976), and Wilson (1962).

View 3

Mohave Au-Ag deposits. This region contains three prime exploration trends.

From north to south.

1. The Oatman-White Hills-Gold Basin-El Dorado-Colosseum-Castle Mtn region. In the Kingman 1°x2° sheet, we have GIS studies in progress and some Landsat images.
2. Congress-Vulture-Yarnell region
3. Mesquite-Picacho-Silver District region. Landsat images are available here and GIS studies have been proposed.

Note the Mohave block style and tectonics of deposits extend southeastward into Mexico.

Joe Wilkins Jr,

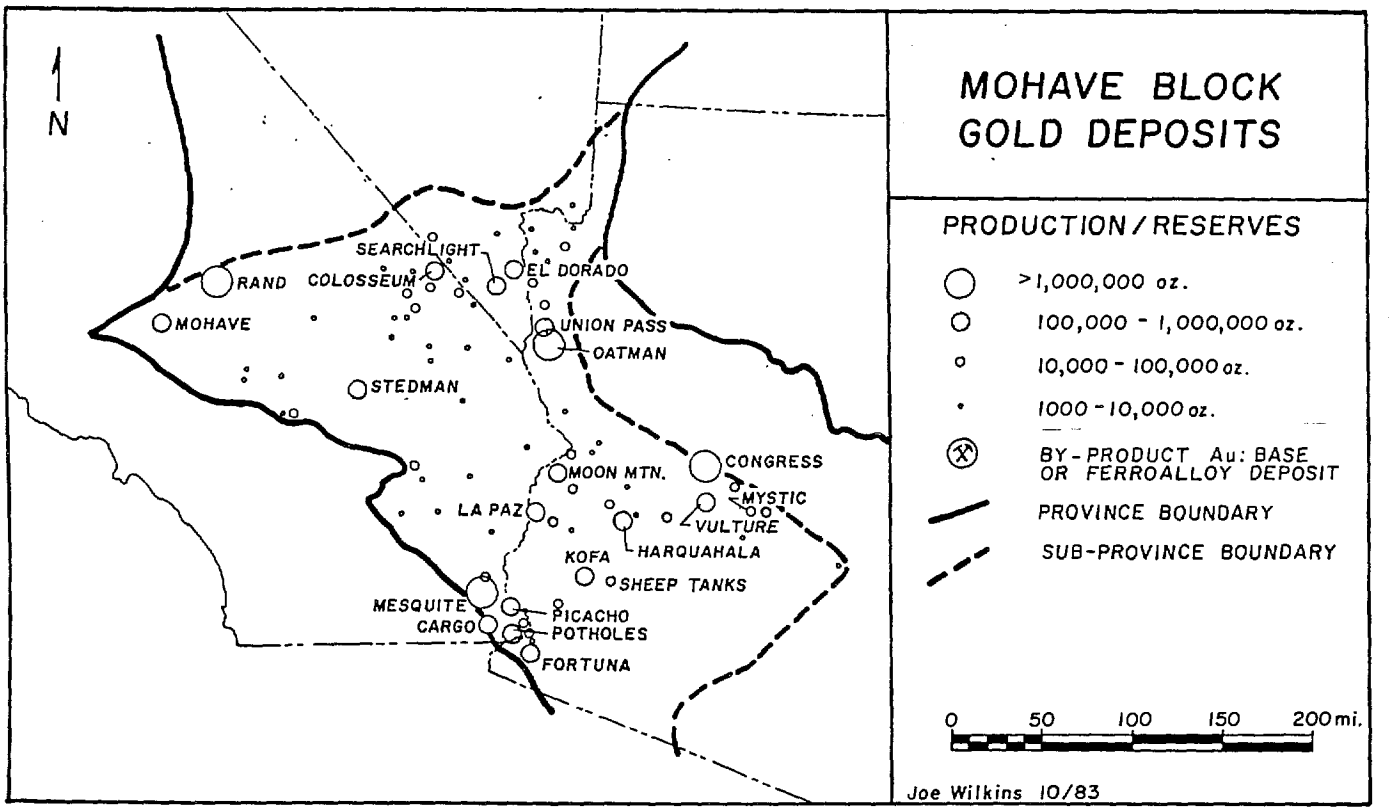


Figure 4. Distribution of gold and gold-bearing deposits in the Mohave block of the Basin and Range province. -- After Bergendahl (1964), Clark (1970), and Moore (1969).

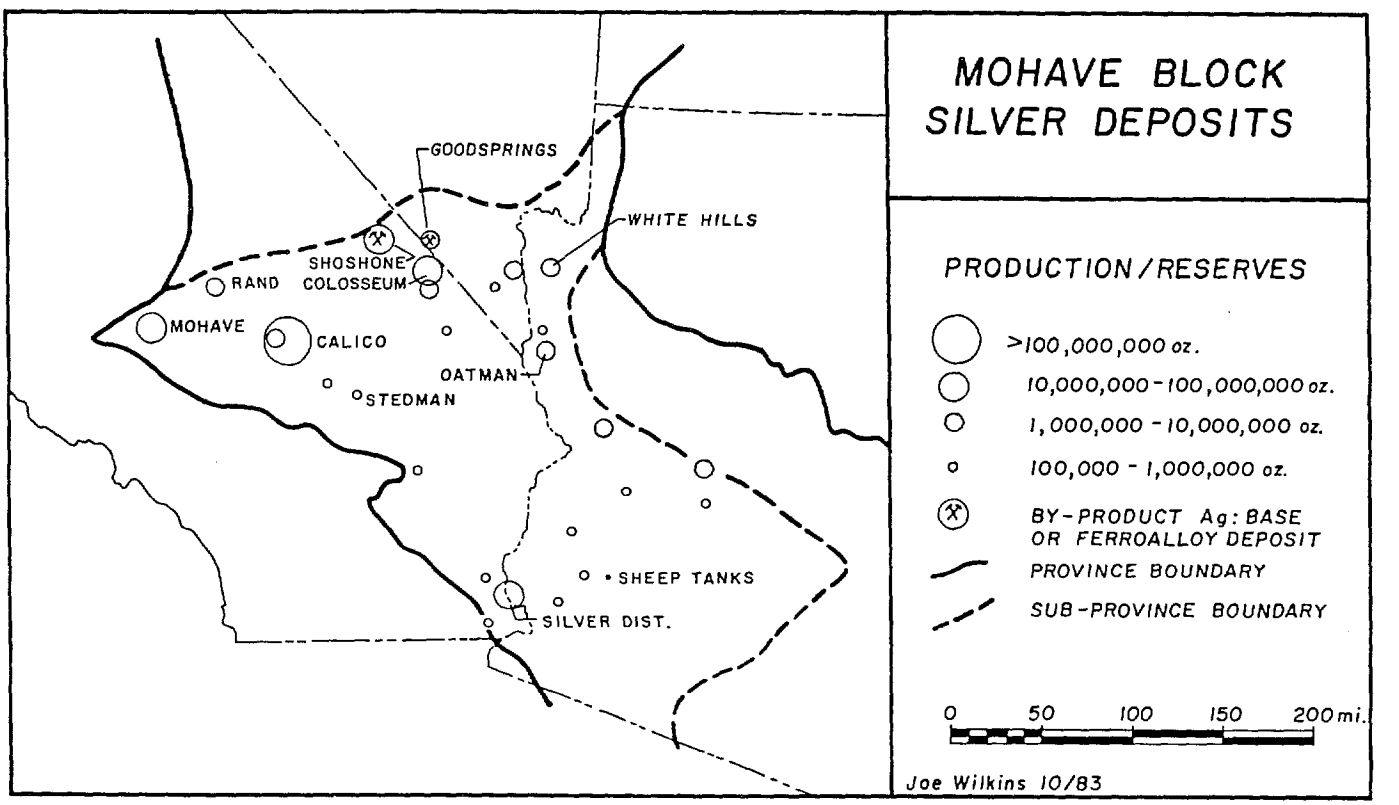


Figure 5. Distribution of silver and silver-bearing deposits in the Mohave block of the Basin and Range province. -- After Kleinhampl (1964), Moore and Roseveare (1969), and Stager (1966).

View 4

This list of gold-silver deposits in the Mohave block is somewhat outdated.

The production-reserve present data indicates:

1. The Oatman region 7.4 mill oz Au; 31.6 mill oz Ag
2. Congress region 1.7 " " Au; 1.7 " " Ag
3. Mesquite region 5.5 " " Au; 34.6 " " Ag

14.6 mill oz Au; 69.9 mill oz Ag,

Table 2. Gold- and silver-bearing deposits in the Mohave block of the Basin and Range province

Deposit or District	State	Production (000)				Estimated Reserves (000)			Totals (000)		Deposit Type	Age, m.y.
		Placer	Tons	Au, oz	Ag. oz	Tons	Au. oz	Ag. oz	Au, oz	Ag,oz		
Mesquite	CA	1	16	2	2	41,000	2,255		3,690 ~~2,258~~		Detachment	Miocene
Oatman	AZ		3,800	2,200	800				2,200	800	Vein	14-18
Congress-Octave	AZ	100	1,602	692	923	1,400	273	400	1,065	1,323	Vein	Precambrian
Rand	CA		4,600	837	5,700				837	5,700	Detachment	18?
Colesseum	CA			9	3,410	13,000	611		619 ~~620~~	3,410	Breccia	100
Cargo Muchacho	CA		570	195	86	6,000	400	120	913 ~~594~~	206	Detachment	Miocene
Mohave-Rosamond	CA		1,558	523	15,326				523	15,326	Vein, breccia	Pliocene
Picacho	CA		670	97		10,000	350		490 ~~447~~ ~~338~~		Detachment	Miocene
Moon Mountain	AZ					10,000	400		400		Detachment	15-18
Vulture	AZ	50	200	366	400				416	400	Vein	Precambrian?
Stedman	CA		270	252	180				252	180	Detachment, breccia	20
Search Light	NV		581	247	358				247	353	Vein	13-15
Kofa	AZ		779	229	104				229	104	Vein	20-23
Harquahala	AZ		159	143	90				143	90	Detachment	Miocene
Fortuna	AZ		153	131	14				131	14	Vein	?
Union Pass	AZ		704	128	303				128	303	Vein	Miocene
El Dorado	NV		580	100	2,359				100	2,359	Vein, listric normal fault	10-15
La Paz	AZ	100			26				100	26	Placer	
Potholes	AZ-CA	100							100		Placer	
Sheep Tanks	AZ		17	21	40	145	32	250	53	290	Detachment	Miocene
Calico	CA			14	17,500	45,000		117,000	15	134,500	Sedimentary-hosted	Pliocene
Silver district	AZ		52	2	1,559	7,000		31,500	2	33,059	Detachment	20-25
Shoshone	CA		410	41	22,200				41	22,200	Pb-Zn skarn	?
Good Springs	NV		759	91	2,102				91	2,201	Pb-Zn skarn	?
TOTALS		352	17,480	6,320	73,477	133,545	4,321	149,270	10,993	222,747	TOTALS	

Bullfrog 1,800
Castle Mtn 1,800
Yarnell 0.255

Oatman block: 7.4 mill oz Au, 31.6 mill oz Ag

Congress block 1.7 mill oz Au, 1.7 mill oz Ag

Mesquite block 5.5 mill oz Au, 36.6 mill oz Ag

Vreio 5.

As Herb will tell you, he doesn't believe in the Mojave-Sonora megashear, but he does believe in the gold deposits of northern Sonora, and will tell you about the exploration targets. SEED has been reviewing the files and has added to the data-exploration base.

V-5

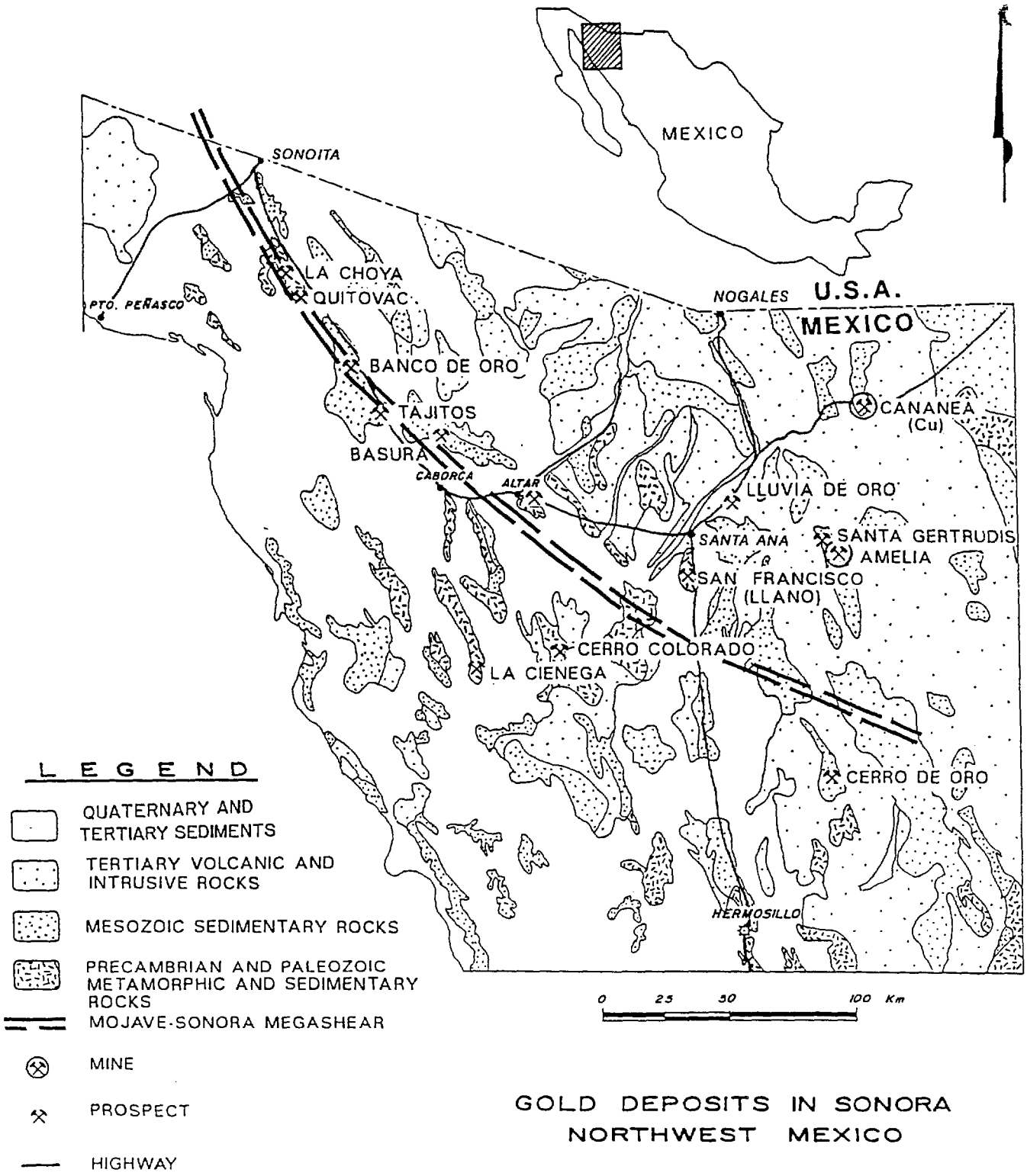


Figure 1 (Silberman and others). Gold mines and prospects and generalized geology of northern Sonora, Mexico. Modified from Silberman and others (1988).

Veins 6.

Gold in the Porphyry Copper block As noted the plus one million ounce production-reserve mines are the porphyry coppers, limestone replacement, vein deposits and the massive sulfide occurrences.

~~The exploration trend of importance~~

Within the porphyry copper block more than 20 million ounces of gold and 1 billion ounces of silver has been produced or is being mined at present.

For a future discussion note the position of the Miami-Ray-Sacaton-Casa Grande-Vekol-Ajo trend of deposits.

Joe Wilkins Jr.

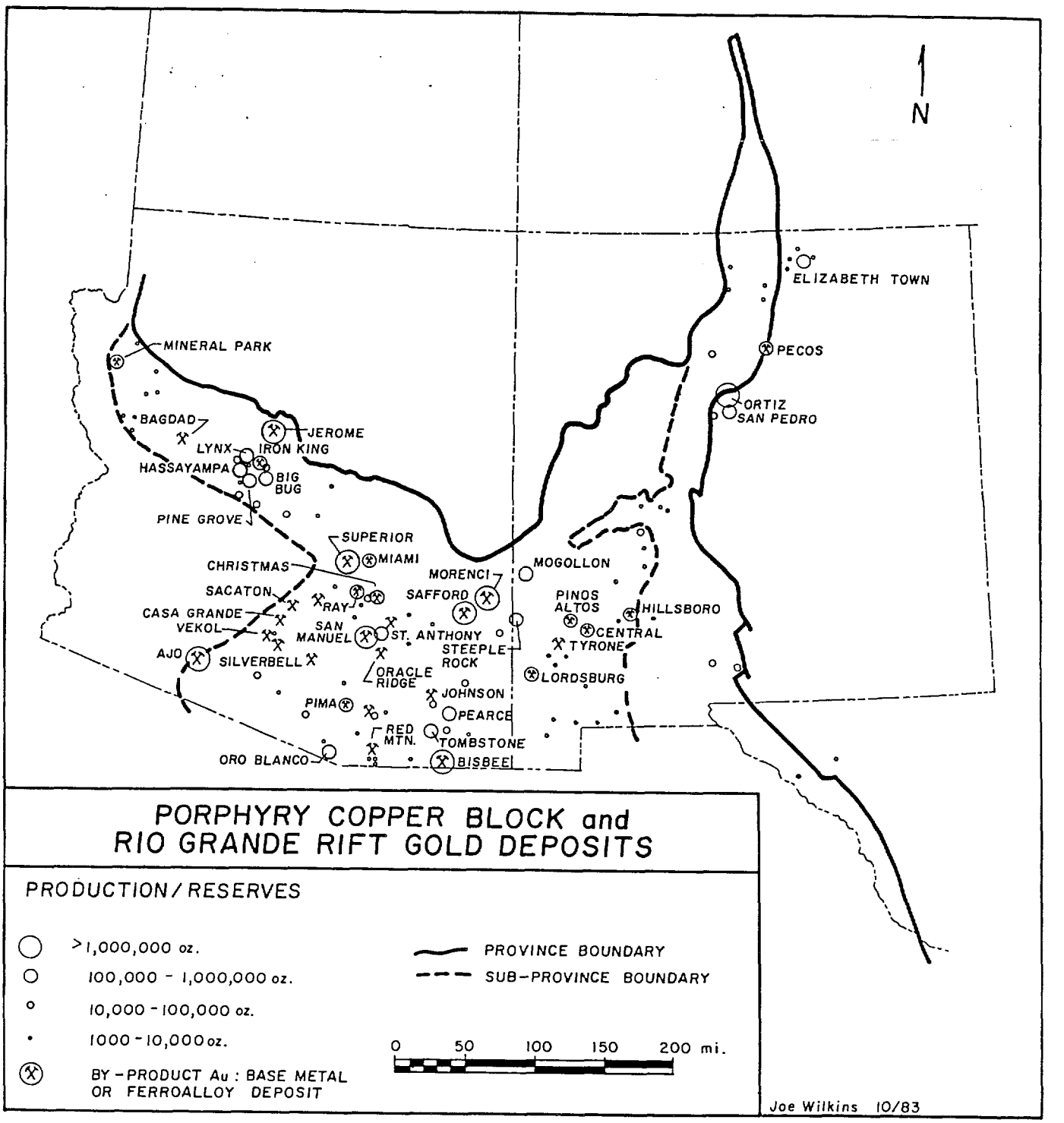


Figure 6. Distribution of gold and gold-bearing deposits in the Porphyry Copper block and Rio Grande rift of the Basin and Range province. -- After Bergendahl (1965), McAnulty (1970), and Moore (1969).

Views 7 Exploration trends in the Mohave block. In this region, major gold deposits are spacially associated with the Jurassic bodies known as the Rand^{Rs} - Pelona^{Ps} - Orocopia^{Os} schist. The prototype of these schist bodies are Jurassic intrusive and volcano-sedimentary units, and intrude schistose units of Precambrian thru Permian age.

Major ore zones include Yellowstone of +20 mill tons of 0.03+ gold;

The Rand schist changes to Pelona schist in name, and scoots down the southeast trending San Andreas style strike slip faulting, and again changes name to the Orocopia schist as it approaches the major deposits of Mesquite (90+ mill tons at 0.04), Cerro Mechoso (11+ mill at 0.083), and Picacho (14+ mill at 0.035) before it crosses the Colorado River and into & beyond the Silver District of AZ.

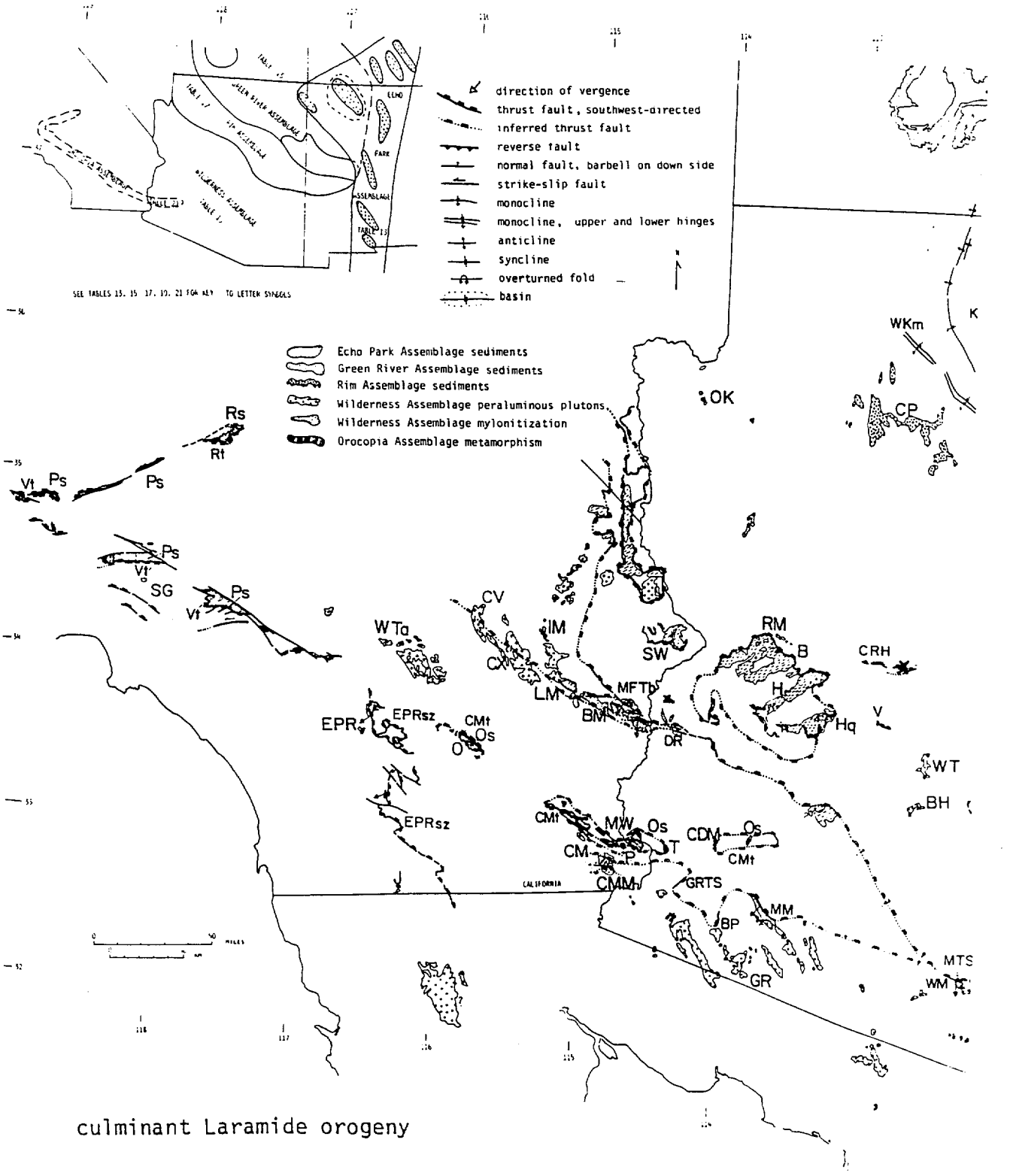
This belt of deposits is one of our target trends.

Geol Map Views 7A

The Silver District has abundant fluorite associated with the silver (11+ mill tons of 4-6 oz silver with 5-40% fluorite). I believe this mineralization is fringe, either lateral or vertical to a major gold deposit. However, at present it is best known for its famous Red Cloud vanadinite & vanadinite.

Complex faulting with a strong intra-plex of NE-NW high-angled structures, cut by low-angle structures have prepared large volumes of rock

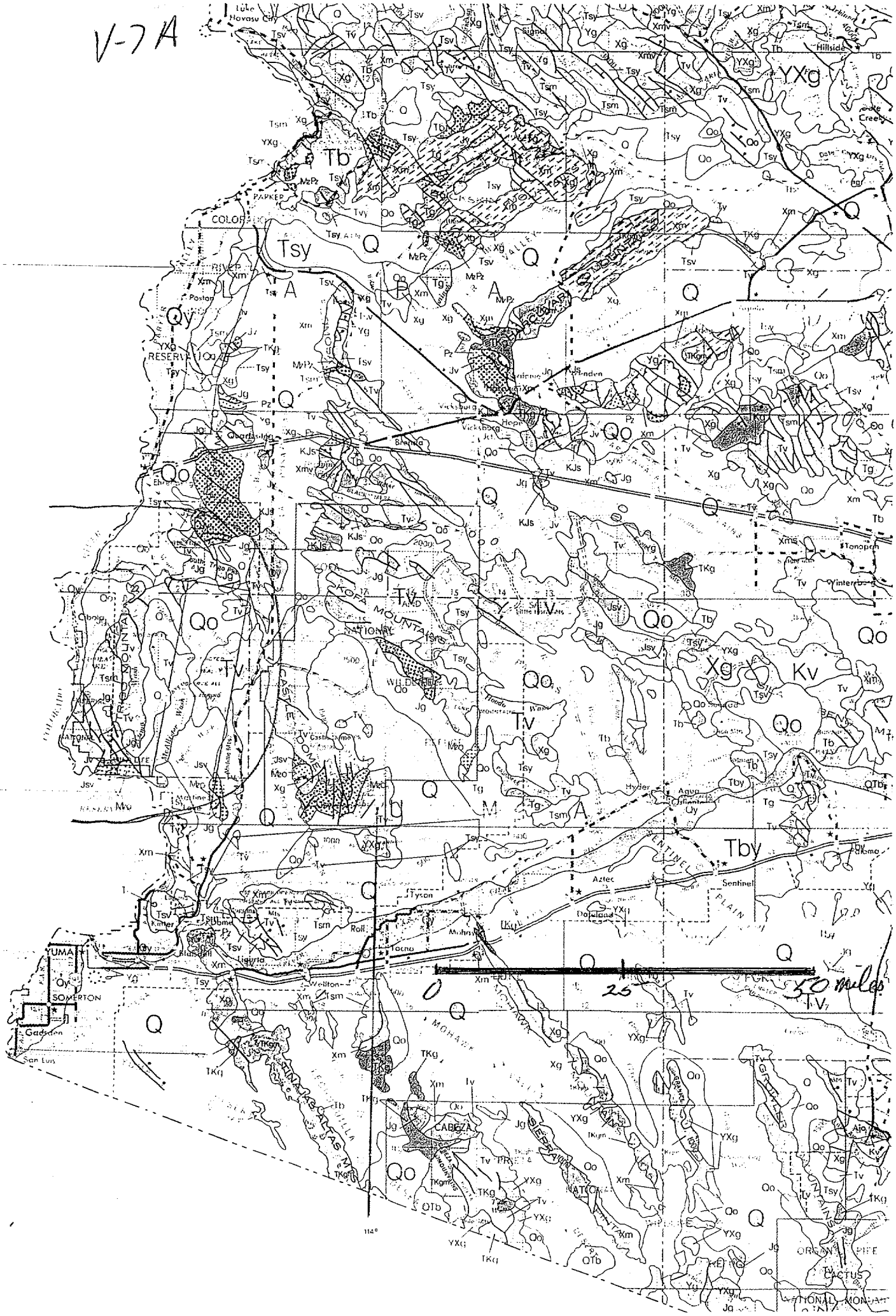
Verso 7



culminant Laramide orogeny

Figure 7. Map of Echo Park, Green River, Rim, Wilderness and Orocopia Assemblages of the culminant Laramide

V-7A



Lake Havasu City
Hillside
Creek
Signal
Parker
Colorado River
Poston
Reservation
Quartzsite
Vicksburg
Brenda
Tonopah
Winterburg
Kofa Mountains
National
Wildlife
Castle Dome
Hyder
Agua Caliente
Sentinel
Aztec
Tyson
Roll
Tacna
Mohawk
Wellton
Kimber
Blaisdell
Yuma
Somerton
Gadsden
San Luis
Cabeza
Sierra
Mohawk
Cactus
Ajo
Tb
Tsy
Q
Qy
Qo
Tv
Xg
Kv
Tby
YXg
0
25
50 miles

in the gold deposits named. The whole mess is then cut by NW high angled structures and ~~volcan~~ post mineral volcanics and gravel cover much of the area and it will take excellent visual reintegration to resolve drillable targets.

Bleaching, clay development, quartz veining, quartz flooding, and hematite — tourmaline is generally associated with the gold mineralization.

I anticipate that ASM will be a large factor in resolving this knot in looking for a viable deposit.

Note the relative positions of the Wecheibung-Congress region and the Oatman-Gold basin region.

View 8.

This view of Arizona lode and placer production of gold hints a two gold trends of interest. State Geol Map

View 8A

The Congress - Yarnell - Vulture - Wickenburg region has abundant, tho mostly small producers of lode & placer gold. The region has a Cretaceous granite intruded into a highly deformed Precambrian NE and N-S structures with an overprint of NE-NW Cretaceous Early Tertiary structures. The intrusion and older units are cut and displaced by multiple stands of flatlish structures, and all later chopped by NW strike-slip faults.

The major gold deposits include the Octave, Vulture, Congress, and Yarnell.

Numerous prospects and submittals have be examined in the past, and continues today, with special attention given to those with a patented claim core.

Much work remains.

V-8B

In the NW corner of AZ is the Kingman 1°x2° sheet. This covers the Oatman - Gold Basin - Castle Mts region and is a complex of flatlish faults cutting high-angled NE-NW structures, and as elsewhere, in turn is cut by the late NW strike-slip faulting

Altho not shown well in this view,

the Oatman block has production-reserves of plus 7 mill ounces of gold and 32 million ounces of silver with about half tied up in the Bullfrog and Castle Mtn deposits.

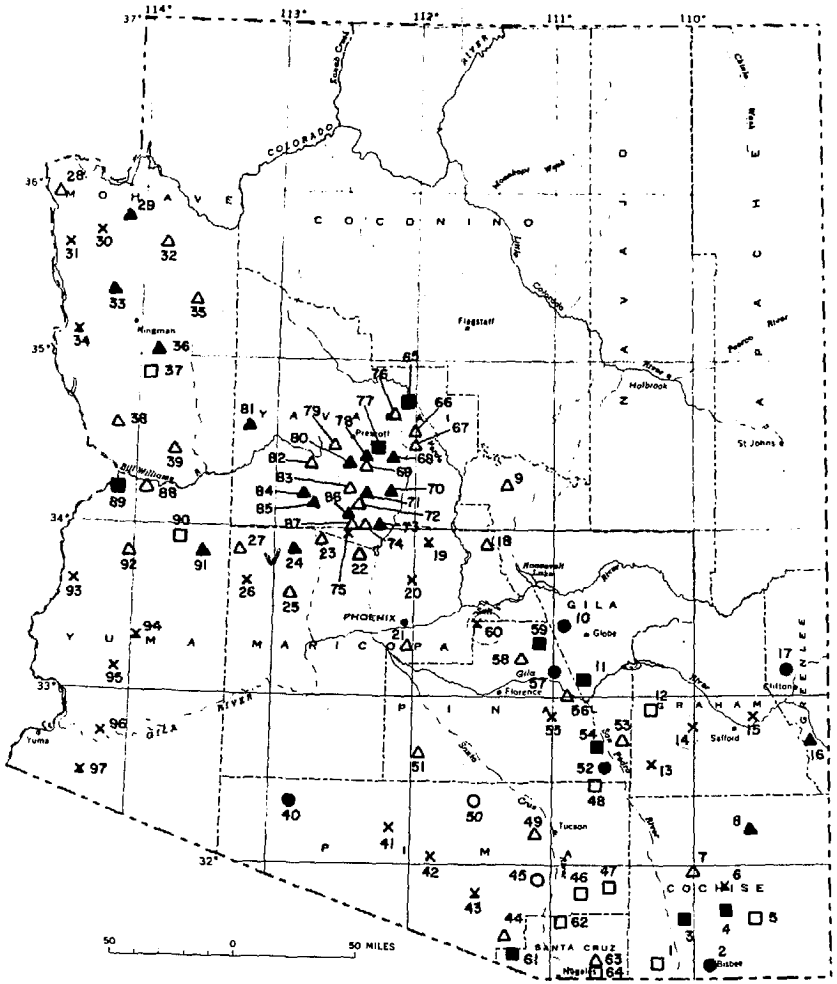
Gold is found in steep and flat structures, in veins cutting granites and volcanics, and in rhyolite dome settings.

Abundant smoke and major deposits in complex structural features allows careful reevaluation to find another big one.

SWEAD has input data into the Kingman GIS study in progress. The Gold Basin portion also has Landsat images being integrated.

I envision that AEM will also be used in evaluating the potential of this trend.

Copperstone 6 mill at 0.085
America 6 mill at 0.06



EXPLANATION

Types of deposits and total production in troy ounces

More than 10,000	Less than 10,000
●40	○50

Disseminated copper

■4 □5

Base-metal sulfide replacement

▲71 △9

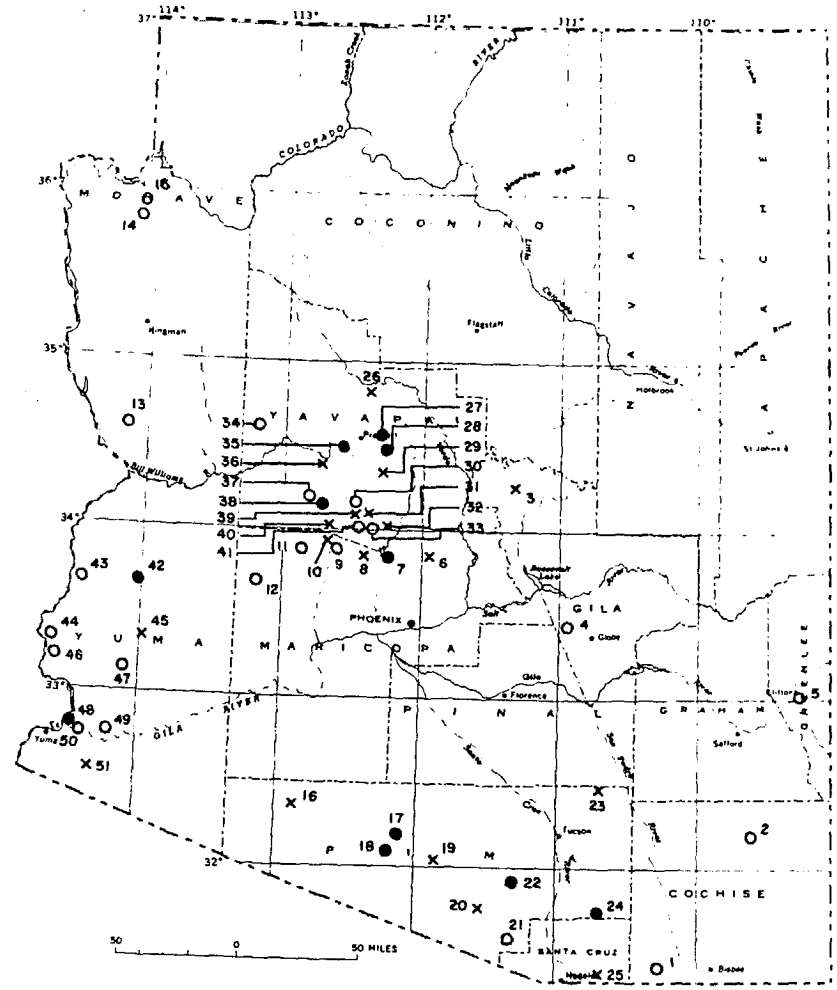
Siliceous base-metal vein

✕19 ✕14

Gold-quartz vein

(Numbers refer to districts listed in table 14 and mentioned in text)

-Lode gold in Arizona.



EXPLANATION

●7

Production more than 1,000 troy ounces

○4

Production 100 - 1,000 troy ounces

✕6

Production less than 100 troy ounces

(Numbers refer to districts listed in table 13 and mentioned in text)

-Placer gold in Arizona.

V-8A
25
50 miles
PRESCOTT
PHOENIX
COCONINO
FOREST
COTTONWOOD
JEROME
CLARKDALE
Camp Verde
Cordes Junction
Cleator
Congress
Stanton
Constellation
Wickenburg
Aguila
Circle City
Wittmann
Beardsley
SURPRISE
EL MIRAGE
Sun City
YOUNGTOWN
PEORIA
GLENDALE
Litchfield Park
TOLLESON
GOODYEAR
Perryville
Cashion
AVONDALE
BUCKEYE
Tonopah
Arlington
Palo Verde
Hassayampa
Winterburg
Vicksburg
Salome
Wenden
Hyder
Aguila
Gila Bend
Sentinel
Dateland
Mohawk
Aztec
Tacna
Gila Bend
Cotton Center
Ajo
Mobile
Maricopa
Stanfield
Eloy
Casa Grande
Francisco Grande
Arizona City
Chandler
Gilbert
Mesa
Tempe
Scottsdale
Paradise Valley
Guadalupe
Laveen
Sun Lakes
Chandler Heights
Rainbow Valley
Bapchule
Sacaton
Coolidge
Florence
Superior
Kearny
Hayden
Winkelman
Mammoth
Oracle
Tucson
Catalina
Marana
Picacho
Red Rock
Stanfield
Eloy
Casa Grande
Arizona City
Yuma
Gila Bend
Tacna
Aztec
Sentinel
Dateland
Mohawk
Wellton
Somerton
Yuma
Tb
Tsy
Xg
Tv
YXg
Q
Qo
Kv
Tby
Xm
Xms
Xmv
Tg
Tkg
Jsv
Jg
KJs
Pz
Ys
Tm
Tc
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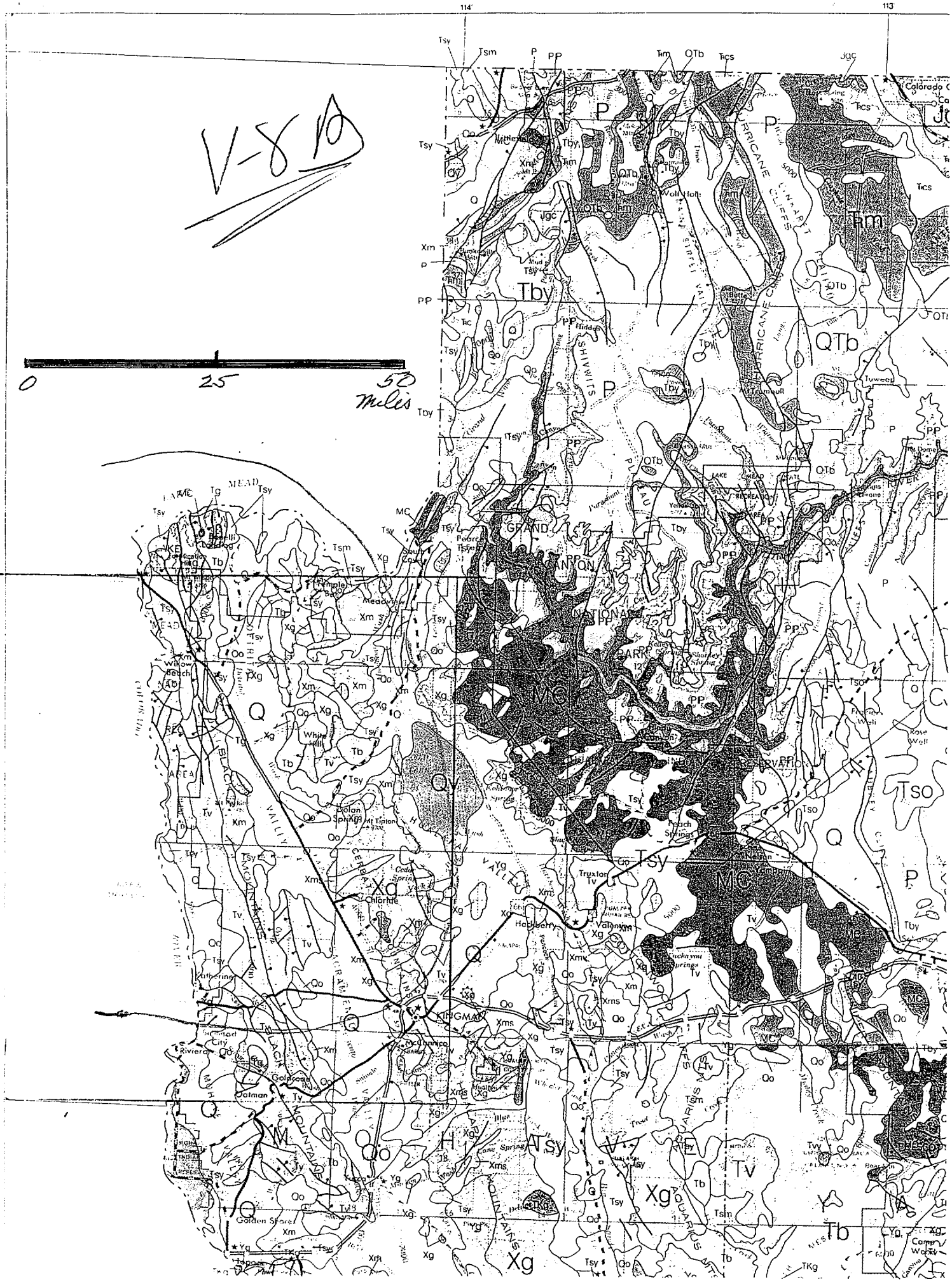
Tbu


V-8A
0
25
50
miles
114°
113°
37°
36°
35°
LAKE MEAD
GRAND CANYON NATIONAL PARK
KINGMAN
Golden Shores
Oatman
Chloride
Hackberry
Valentine
Truxton
Peach Springs
Nelson
Yampai
Colorado
Tuweep
Tbv
QTb
Tm
Tsy
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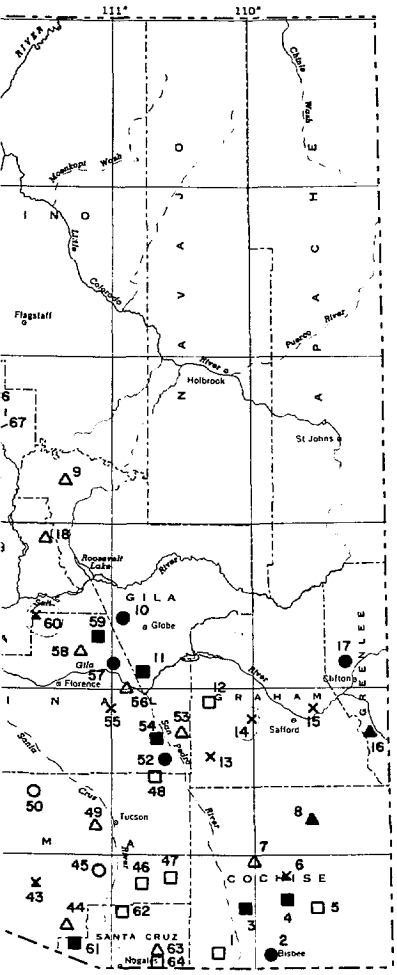
P
MC
Qv
Tb
Xg



.NATION

.l production in troy ounces

Less than 10,000

○50 ted copper

□5 ide replacement

△9 se-metal vein

×14 :tz vein

in table 14 and mentioned in text)

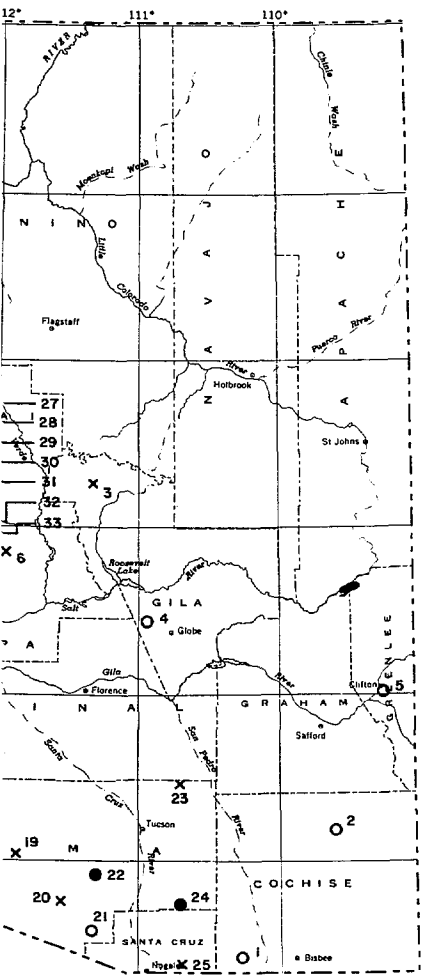
ld in Arizona.

TABLE 14.—*County listing of lode gold districts*

[Locations are shown in fig. 22]

Locality No. in fig. 22	*County and District*
	Cochise:
1.	Huachuca
2.	Warren
3.	Tombstone
4.	Turquoise
5.	Swisshelm
6.	Pearce
7.	Dragoon
8.	Dos Cabezas
	Gila:
9.	Green Valley (Payson)
10.	Globe-Miami
11.	Banner-Dripping Spring
	Graham:
12.	Aravaipa
13.	Rattlesnake
14.	Clark
15.	Lone Star
	Greenlee:
16.	Ash Peak
17.	Morenci-Metcalf
	Maricopa:
18.	Sunflower
19.	Cave Creek-Magazine
20.	Winifred
21.	Salt River Mountain
22.	Pikes Peak
23.	Wickenburg
24.	Vulture
25.	Osborn
26.	Big Horn
27.	Ellsworth
	Mohave:
28.	Minnesota
29.	Gold Basin
30.	White Hills
31.	Weaver
32.	Music Mountain
33.	Wallapai
34.	Oatman-Katherine
35.	Cottonwood
36.	Maynard-McConnico
37.	Cedar Valley
38.	Chemehuevis
39.	Owens
	Pima:
40.	Ajo
41.	Quijotoa
42.	Cobabi
43.	Baboquivari
44.	Arivaca
45.	Pima
46.	Helvetia
47.	Empire
48.	Control
49.	Amole
50.	Silver Bell
	Pinal:
51.	Casa Grande
52.	San Manuel
53.	Bunker Hill
54.	Mammoth
55.	Cottonwood
56.	Ripsey
57.	Mineral Creek (Ray)
58.	Mineral Hill
59.	Pioneer (Superior)
60.	Goldfield
	Santa Cruz:
61.	Oro Blanco
62.	Tyndall
63.	Harshaw
64.	Patagonia
	Yavapai:
65.	Verde
66.	Cherry Creek
67.	Ash Creek
68.	Agua Fria
69.	Turkey Creek
70.	Black Canyon
71.	Pine Grove-Tiger
72.	Silver Mountain
73.	Tip Top
74.	Humbug
75.	White Picacho
76.	Black Hills
77.	Big Bug
78.	Walker
79.	Copper Basin
80.	Hassayampa
81.	Eureka
82.	Kirkland
83.	Walnut Grove
84.	Martinez
85.	Weaver
86.	Black Rock
87.	Castle Creek
	Yuma:
88.	Planet
89.	Cienega
90.	Harcuvar
91.	Ellsworth
92.	Plomosa
93.	La Paz
94.	Kofa
95.	Castle Dome
96.	Muggins Mountain
97.	Fortuna

tiary volcanic rocks. They generally occur as irregularly shaped, tabular or lenticular masses, and consist of finely crystalline, greenish-yellow quartz, displaying marked banding or crustiform layering.



PLANATION

●7 than 1,000 troy ounces

○4 - 1,000 troy ounces

×6 s than 100 troy ounces

sted in table 13 and mentioned in text)

r gold in Arizona.

TABLE 13.—*County listing of placer gold districts*

[Locations are shown in fig. 21]

Locality No. in fig. 21	*County and District*
	Cochise:
1.	Hartford
2.	Dos Cabezas-Teviston
	Gila:
3.	Green Valley
4.	Globe-Miami
	Greenlee:
5.	Chase Creek-San Francisco River
	Maricopa:
6.	Cave Creek
7.	Agua Fria
8.	Pikes Peak
9.	San Domingo
10.	Hassayampa River
11.	Vulture
12.	Big Horn
	Mohave:
13.	Chemehuevis
14.	Gold Basin
15.	Lost Basin
	Pima:
16.	Ajo
17.	Quijotoa
18.	Horseshoe Basin
19.	Cobabi
20.	Baboquivari
21.	Arivaca
22.	Papago
23.	Old Hat
24.	Greaterville
	Santa Cruz:
25.	Patagonia
	Yavapai:
26.	Granite Creek
27.	Lynx Creek
28.	Big Bug
29.	Peck
30.	Walnut Grove
31.	Silver Mountain
32.	Tip Top
33.	Humbug
34.	Eureka
35.	Copper Basin
36.	Kirkland
37.	Martinez
38.	Weaver
39.	Black Rock
40.	Blue Tank
41.	Castle Creek
	Yuma:
42.	Plomosa
43.	La Paz
44.	Trigo Mountain
45.	Kofa
46.	Colorado River
47.	Castle Dome
48.	Laguna
49.	Muggins Mountain
50.	Dome
51.	Fortuna

208 closed essentially all of the gold mines in Arizona; since then gold production has been primarily a byproduct of base-metal mining.

TYPES OF DEPOSITS

The lode deposits in Arizona can be grouped into four main categories: (1) hydrothermal gold-quartz veins, (2) siliceous fissure veins containing gold-bearing base-metal sulfides, (3) massive sulfide replacement deposits carrying gold as an accessory, and (4) gold-bearing disseminated copper deposits. Nearly all of the known deposits in categories 1 and 2 in Arizona have been described in detail by Wilson (Wilson and others, 1934) from which the following summaries largely have been compiled.

GOLD-QUARTZ VEINS

In several districts notable quantities of gold have been produced from quartz veins in which gold, along with some silver, is the most valuable constituent. These veins are of the epithermal type, as defined by Lindgren (1933, p. 444), and in Arizona are best developed in Ter-

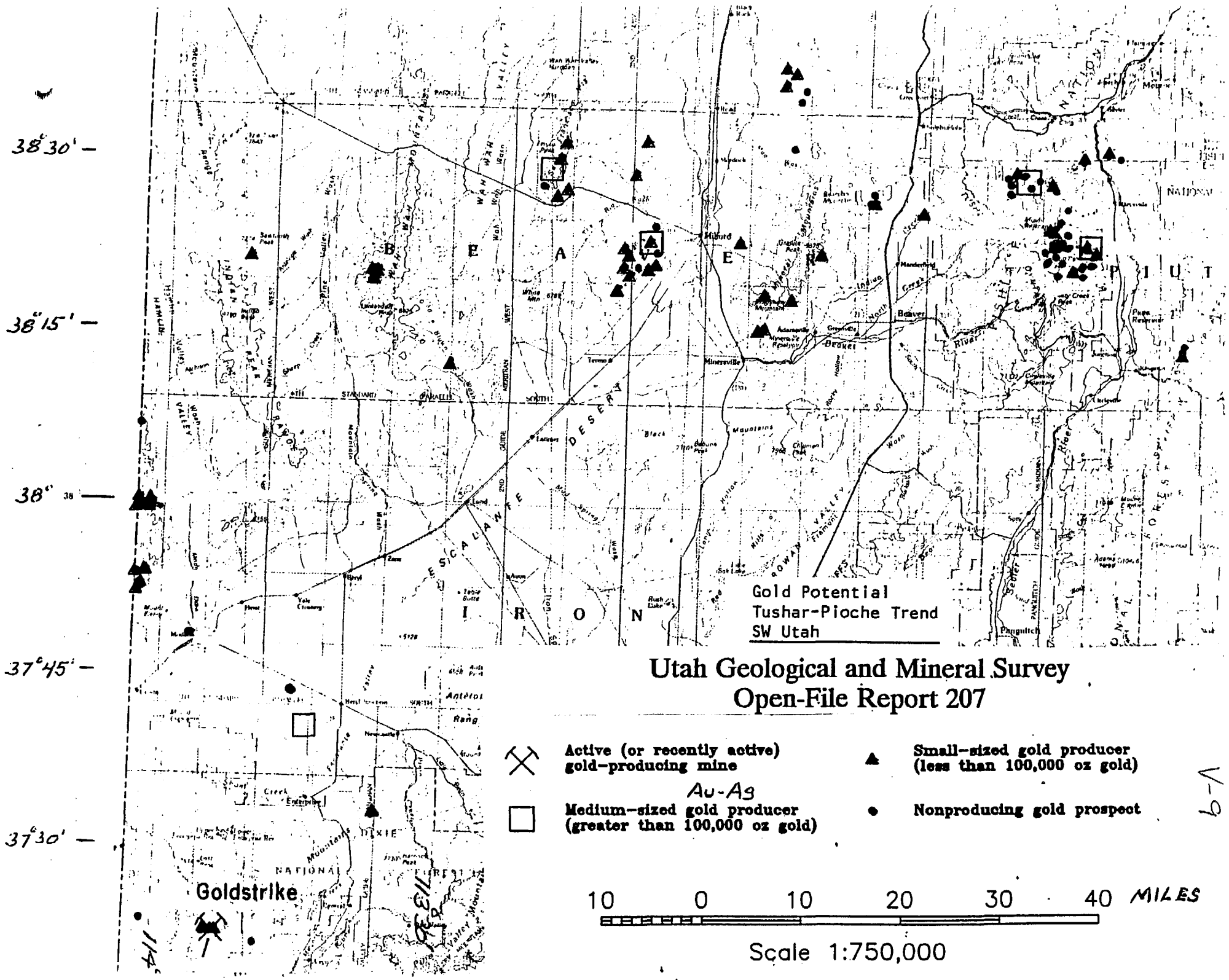
View 9.

The fourth trend of gold exploration targets is the Tushar-Pioche trend in SW Utah

From right to left, the medium sized Au-Ag producers are:

1. Lower Right Deer Trail Mine, Mt Baldy Dist
   215,000 oz Au
2. Upper Right Annie Laurie-Sevier Mines, Gold Mtn Dist
   145,000 oz Au
3. Lower Center Hickory-OK mines, Star District
   60,000 oz Au; 14 mill oz Ag and 260 mill # Cu,
4. Upper center Cactus Mine, San Francisco Dist
   17,000 oz Au; 400,000 oz Ag, 46 mill # Cu.
5. Lower left Escalante, Escalante Dist
   20 mill oz Ag.
6. bottom Goldstrike, Gold Strike Dist.
   212,000 + oz prod-reserves.

Numerous veins and hi-level system in volcanic terranes in conjunction with low angled thrust related faulting, all suggest that other Bullfrog and Castle Mtn type ore bodies should be found in this zone.



Utah Geological and Mineral Survey
Open-File Report 207

V-9

View 10 Copper in Arizona

SXEW copper oxide targets ~~and~~ are of two basic types:

1. Deposits from oxidation of sulfide systems in place with minor movement into the surrounding schist-granite wallrocks.

Undeveloped ASARCO deposits include deep Sacaton, Casa Grande West, Poston Butte, and Santa Cruz in situ.

Deposits presently being mined include the Miami block cave, San Manuel block cave & open pit, and the Ray open pit oxide.

2. Deposits formed by the movement of Cu-bearing waters into conglomerate-fanglomerates of Tertiary & Quaternary age, where native copper, tenorite, cuprodella, etc is precipitated.

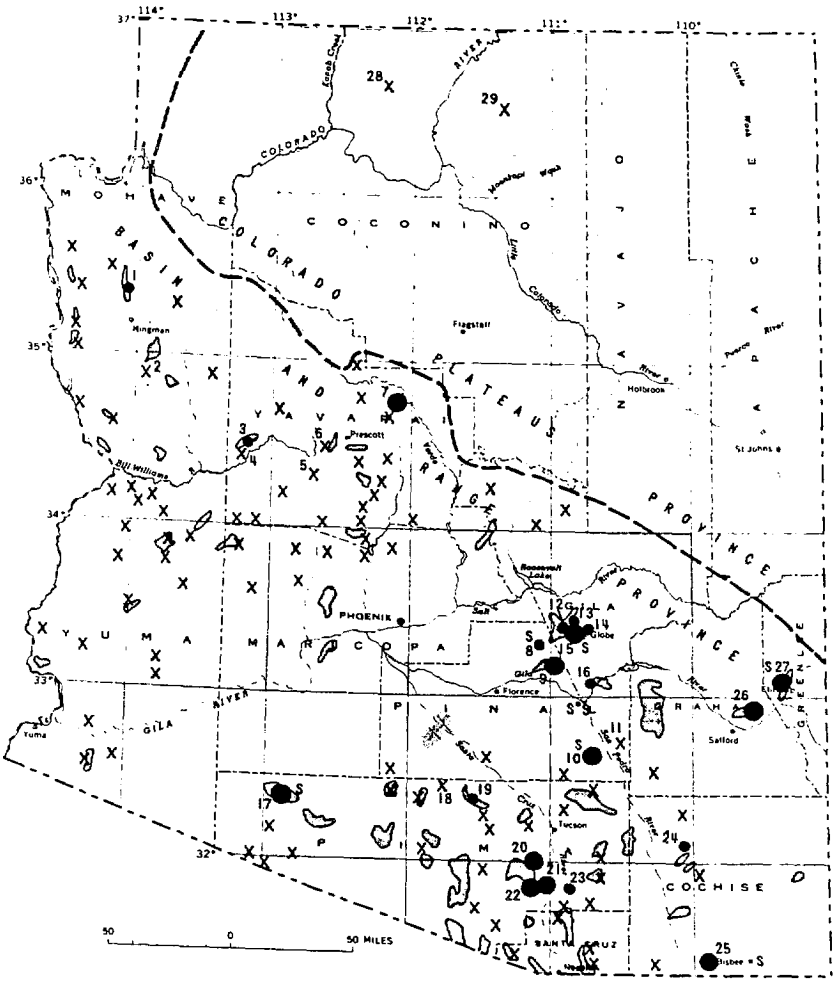
The mid-Tertiary conglomerate deposits are the largest, and the undeveloped Superior East and the Copper Butte-Buckeye-Rayburn deposits are notable.

Superior East

est. 430 mill tons at 0.80 % Cu, with probable 1.4 billion tons of similar grade, plus xx billion tons of 0.2 % Cu as native Cu.

Copper Butte, etc

est. 100 mill tons at 0.83 % Cu, including 28 mill tons at 1.06 % Cu.
and 2 billion tons of 0.2 % Cu as native copper, and chrysocolla, + MnCuOx.



EXPLANATION

Intrusive igneous rock of Late Cretaceous to early Tertiary age

Copper-producing districts, mines, or properties, showing relative amount of production plus estimated potential in tons of copper. Number refers to locality listed in Table 12 and referred to in text

17 More than 1,000,000

24 50,000-1,000,000

X5 10-50,000

3 Smelter

Copper in Arizona.

View 11.

All you olde timers will remember from which this view come from!

JH Courtright's compilation of porphyry copper deposits of the southwest.

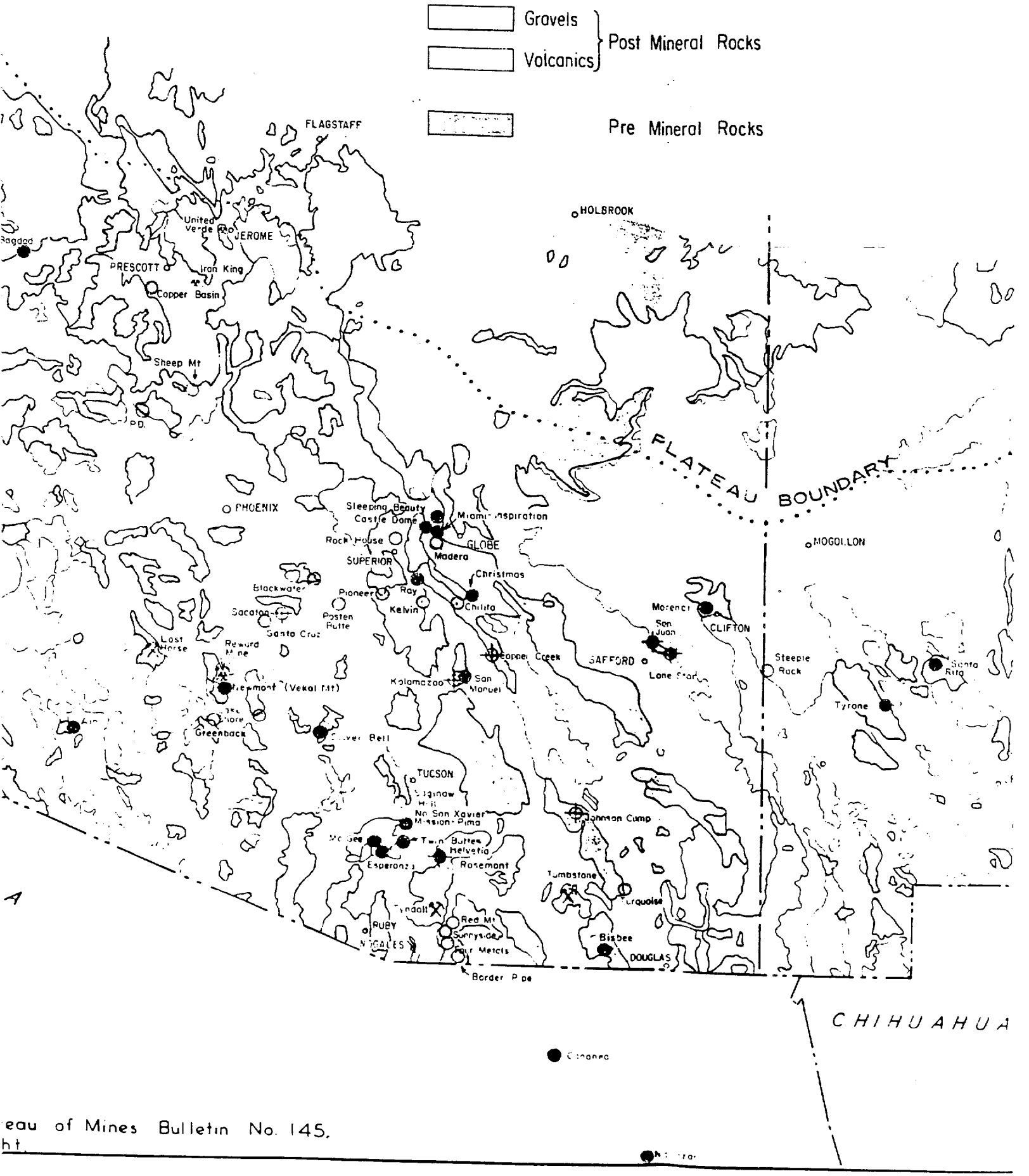
The exploration trend for copper oxide and sulfide deposits is here in the Miami-Ray, Sacaton to Ajo trend. These deposits had the highest grade chalcocite deposits (of plus 1% copper) and to date, the largest Tertiary ~~copper~~ conglomerate deposits, of those elsewhere in the porphyry systems of the southwest.

For exploration we intend to field reinvestigate all the known deposits and with ASM and possible landsat, we'll reopen the covered areas and pediments. Will pay particular attention to those areas we drilled in but found wanting at that time & place, but which may lead us to the adjacent viable deposit.

For openers we have the Paubs-Salzer indicated mineralization. Estimated 20 mill tons of sulfide at +0.50% copper, with possible 10-30 million tons of oxide cap and along the fringe, running 1-1½% copper as atacamite-chrysocolla.

Other exploration bets ~~are~~ are around the Morenci-Safford deposits and the greater Mission-Twin Buttes-Sierrita systems which may host additional porphyrys as well as conglomerate-fanglomerate oxide deposits.

Point out SE of Patagonia



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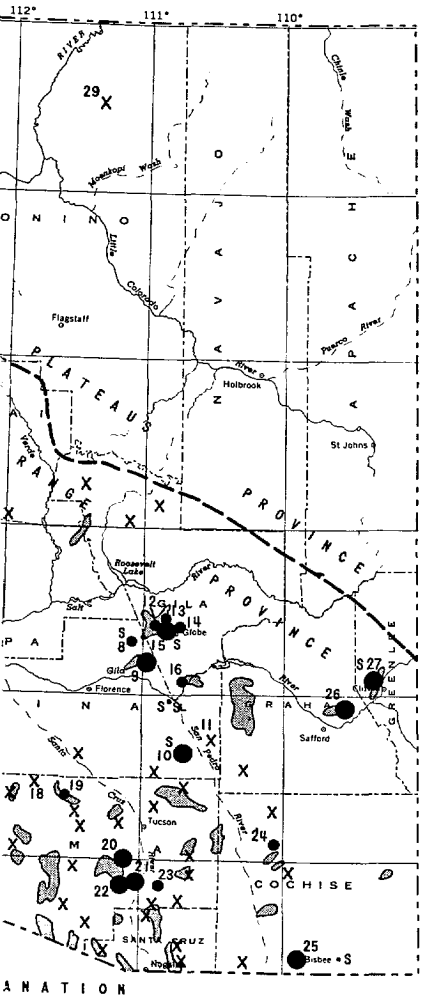

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24
0,000-1,000,000

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10-50,000

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elter

per in Arizona.

Locality No. in fig. 18	District or area, mine or property	County	Type of deposit and mine	References
1	Mineral Park mine	Mohave	Disseminated in quartz monzonite. Open pit.	Eidel, Frost, and Clippinger, 1968.
2	Antler mine	do.	Massive sulfide lens in metamorphic rock. Copper, zinc, and lead. Underground.	Romslo, 1948.
3	Bagdad mine	Yavapai	Disseminated in quartz monzonite. Open pit.	Anderson, Scholz, and Strobel, 1955.
4	Old Dick-Copper Queen mines	do.	Massive sulfide lenses in metamorphic rock. Copper, zinc, and lead. Underground.	Baker and Clayton, 1968.
5	Zonia mine	do.	Oxide-copper lenses, largely chrysocolla, in shear zone in schist. Opencut.	Kumke, 1947.
6	Copper Basin area	do.	Breccia pipes containing copper and molybdenum. Underground.	Johnston and Lowell, 1961; Kirkemo, Anderson, and Creasey, 1965.
7	Jerome area United Verde mine	do.	Massive pyritic pipe; copper and some zinc. Underground and opencut.	Anderson and Creasey, 1958.
	United Verde Extension mine		Massive sulfide lens, largely high-grade chalcocite ore. Underground.	
8	Magma mine	Pinal	Vein deposit with some replacement ore in limestone. Underground.	Hammer and Peterson, 1968.
9	Ray mine	do.	Chalcocite blanket in schist and chalcopyrite in diabase. Open pit.	Metz and Rose, 1966.
10	San Manuel mine	do.	Disseminated in granite and monzonite porphyry. Underground.	Schwartz, 1953; Creasey, 1965; Thomas, 1966.
11	Copper Creek area	do.	Breccia pipes containing copper and molybdenum. Underground.	Kuhn, 1941; Simons, 1964.
12	Castle Dome mine	Gila	Disseminated in quartz monzonite. Opencut.	Peterson, Gilbert, and Quick, 1951.
13	Copper Cities mine	do.	Disseminated in quartz monzonite. Open pit.	Simmons and Fowells, 1966.
14	Old Dominion mine	do.	Vein deposit with some supergene enrichment. Underground.	Peterson, 1962.
15	Miami-Inspiration properties	do.		
	Miami mine		Chalcocite blanket in schist and quartz monzonite. Underground.	Peterson, 1962.
	Inspiration mine		Same as Miami except some mixed oxide and sulfide ore. Open pit.	Peterson, 1962; Olmstead and Johnson, 1966.
16	Christmas mine	do.	Limestone replacement deposits. Underground.	Peterson and Swanson, 1956; Eastlick, 1968.
17	New Cornelia mine	Pima	Disseminated in quartz monzonite. Open pit.	Gilluly, 1946; Dixon, 1966.
18	Lakeshore mine	do.	Oxide-copper ore. Open pit.	E & MJ, 1960; 1966, no. 10.

TABLE 12.—Copper deposits in Arizona.

TABLE 12.—*Copper deposits in Arizona*—Continued

Locality No. in fig. 18	District or area, mine or property	County	Type of deposit and mine	References
19	Silver Bell mine	Pima	Disseminated chalcocite blanket. Open pits.	Richard and Courtright, 1966.
20	Mission mine Pima mine Banner-Anaconda mine	do.	Disseminated ore bodies in silicated limestone and altered siltstone and sandstone. Open pits.	Kinnison, 1966; Komadina, 1967; Bowman, 1963.
21	Twin Buttes property	do.	Same as Mission and Pima. Stripping for open pit.	Bowman, 1963; Beall, 1965; E & MJ, 1967, nos. 4 and 10.
22	Esperanza mine Sierrita property	do.	Disseminated deposits with some supergene enrichment. Open pit.	Lynch, 1966; E & MJ, 1967, no. 12.
23	Helvetia mining district	do.	Replacement deposits in silicated limestone. Underground.	Creasey and Quick, 1955.
24	Johnson Camp area	Cochise	Limestone replacement deposits of copper and zinc. Underground.	Cooper and Silver, 1964.
25	Copper Queen mine	do.	Replacement deposits in limestone. Underground.	Bryant and Metz, 1966.
	Lavender Pit mine		Disseminated deposit in silicified quartz porphyry and masses of breccia. Open pit.	
26	Lone Star mining district	Graham	Huge low-grade disseminated deposit in volcanic rocks. No mining to date.	Robinson and Cook, 1966; E & MJ, 1967, no. 11; Hansen and Rabb, 1968.
27	Morenci mine	Greenlee	Chalcocite blanket in granitic rock. Open pit.	Moolick and Durek, 1966.
28	Jacobs Lake area	Coconino	Disseminated deposits in sandstone. Opencut.	Tsinter, 1947.
29	White Mesa district	do.	Disseminated deposits in sandstone. Opencut.	Mayo, 1955.

same year, the first ore body of the Copper Queen gave out but fortunately a second ore body was found simultaneously in the Copper Queen and Atlanta properties. Litigation was avoided by consolidation of the rival interests in the Copper Queen Consolidated Mining Co. Subsequently the holdings of the Copper Prince, northwest of the Copper Queen, were acquired by purchase as well as other mines under separate ownership (Ransome, 1904, p. 13–14).

The average grade of the ore in 1884 was about 12 percent copper, which sold for about 18 cents a pound. The original smelting plant became inadequate in 1886 and was replaced by four new furnaces. In the early nineties, copper sulfide minerals were becoming important in the newly developed ore, so Douglas introduced a modification of the Bessemer process, as used at Butte, Mont.; thus, began the reduction of mixed sulfide and oxide ores.

Up to 1900, the Copper Queen continued to be the only important mine at Bisbee, but in 1903, the Calumet and Arizona Co. made a fabulous strike on the Irish Mag claim which eventually paid $15

million in dividends. Later, this
body to the south that thickened a
Peplow, 1959).

Phelps Dodge and Co., who cor
dissatisfied with the existing railv
son and the Southern Pacific Rail
El Paso and Southwestern Railro
El Paso, Tex. The new town of D
26 miles east of Bisbee, where the
supply was available. Phelps Doc
built new smelters in Douglas. T
again in Bisbee (Dunning and Pep

It is reported that in 1875, U.S
at Prescott, discovered mineral s
the Verde Valley (fig. 18, No. 7).
lowing year, which covered the im
low exploration revealed copper o
tion inhibited progress in mining
Co. was organized to purchase 12
from Jerome to Ash Fork, 60 m
Pacific Railroad. Two small wate
to Jerome and production of m
1883. Surface oxide ores, rich in si
mined, averaging about $30 per to

In 1884, the United Verde Cop
but the rich surface ores were exh
the mine closed that year. W. A. C
in March 1888 and immediately r
giving him 70 percent of the stoc
Under Clark's guidance, active m
the first dividend was paid in 1892
was built from Ash Fork to Phoe
built a narrow-gage railroad to co
Jerome Junction, north of Presco
at Jerome replacing the small sme
remainder of the widely scattere
time of his death in March 192
299,000 of 300,000 issued shares (

The United Verde ore body was
deposits in Arizona in that the o
Chalcopyrite, the chief ore miner
the south side of the pyritic pipe
shoot, the higher-grade the copper
appreciably more than 5 percent
went directly to the smelter for re
was plagued by underground fire
parts of the pipe, and subsequent
struction of a new smelter away
Clarkdale, east of Jerome by the
in 1915. As the mine was deepene
tended into a fringe of black schis
Clarksdale to handle that ore (A

Potential Heap Leach SX-EW Properties Examined

Name	Location	Type	Remarks	Future Interest
Emerald Isl.	Arizona	Exotic copper	Low grade. Limited tonnage.	None
Four Metals	Arizona	Breccia pipe, CuOx & chalcocite	Low grade. Limited tonnage.	None
Johnson Camp	Arizona	Porphyry copper skarn	Limited tonnage. Low grade. High waste to ore ratio.	None
Kingman Area	Arizona	Porphyry copper	Low grade. Limited tonnage.	None
Korn Kob	Arizona	Porphyry skarn	Limited tonnage. Low grade. High waste to ore ratio.	None
Lucky Susan (Castle Hot Spring)	Arizona	Porphyry & brecciated zone	Low tonnage. Low grade.	None
Old Reliable	Arizona	Brecciated andresite	Low tonnage.	None
Poston Butte	Arizona	Porphyry copper	Low grade. High waste to ore ratio.	None
Sacaton Mts.	Arizona	Alt porphyry & CuOx veins	Small prospects.	None
Sanchez	Arizona	Porphyry copper	Low grade. Environmental problems.	Review
Zonia	Arizona	CuOx in porphyry, sediments, metamorphics	Limited tonnage. High waste to ore ratio.	None
Zaldivar	Chile	Chalcocite & copper oxide porphyry copper	High waste to ore ratio.	None
Ann-Mason	Nevada	Porphyry system	Low-moderate grade. High waste to ore ratio.	None
Big Mike	Nevada	Exotic copper, Gila Conglomerate	Low tonnage. High waste to ore ratio.	None
Copper Basin	Nevada	Porphyry copper	Low grade. Limited tonnage.	None
Copper Canyon	Nevada	Porphyry copper	Low grade. Limited tonnage.	None

Potential Heap Leach SX-EW Properties Examined

Name	Location	Type	Remarks	Future Interest
Ely (Robinson)	Nevada	Chalcocite & copper oxide porphyry copper	Low grade. Some sulphide ore remains.	None
Lewis Peak	Nevada	Breccia pipes	Limited tonnage. Weak CuOx	None
Mayville Canyon	Nevada	CuOx in quartz veins & weak breccia	Limited tonnage.	None
Yerington	Nevada	Chalcocite & copper oxide porphyry copper	Low grade. Environmental problems.	Review
Bent	New Mexico	Sandstone Copper	Low tonnage/grade	None
Cerrillos	New Mexico	Chalcocite & copper oxide porphyry copper	Limited tonnage. Low grade.	None
Copper Hill	New Mexico	Chalcocite & copper oxide in Precambrian quartzite	Low grade. Limited tonnage.	None
Eureka	New Mexico	Sandstone Copper	Low tonnage. High waste to ore ratio.	None
Gallineas Peak	New Mexico	Alt intrusive	No mineralization.	None
Guadalupita	New Mexico	Sandstone Copper	Low tonnage/grade	None
Hammond	New Mexico	Sandstone Copper	Low tonnage/grade	None
High Rolls	New Mexico	Sandstone Copper	Low tonnage/grade	None
Hillsboro	New Mexico	CuOx in porphyry system	Low grade. Limited tonnage.	None
Ladron Mt. Area	New Mexico	Porphyry area	Reported weak CuOx. Not located.	None
Mt. Baldy-Moreno Ranch	New Mexico	Copper porphyry area	Low grade. Little tonnage.	None
Nacimiento	New Mexico	Sandstone copper	Low tonnage. High waste to ore ratio.	None
Peñas Negras	New Mexico	Sandstone Copper	Low tonnage/grade	None
Pintada Mine	New Mexico	Sandstone Copper	Low tonnage/grade	None
Scholle District	New Mexico	Sandstone Copper	Low tonnage/grade	None

Potential Heap Leach SX-EW Properties Examined

Name	Location	Type	Remarks	Future Interest
Stauber Mine	New Mexico	Sandstone Copper	Low tonnage/grade	None
Zuni Mts.	New Mexico	CuOx in Precambrian and adjacent arkose	Small prospects	None
Kirwin	Wyoming	Porphyry system, CuOx & chalcocite	High waste to ore ratio. Environmental problems.	None

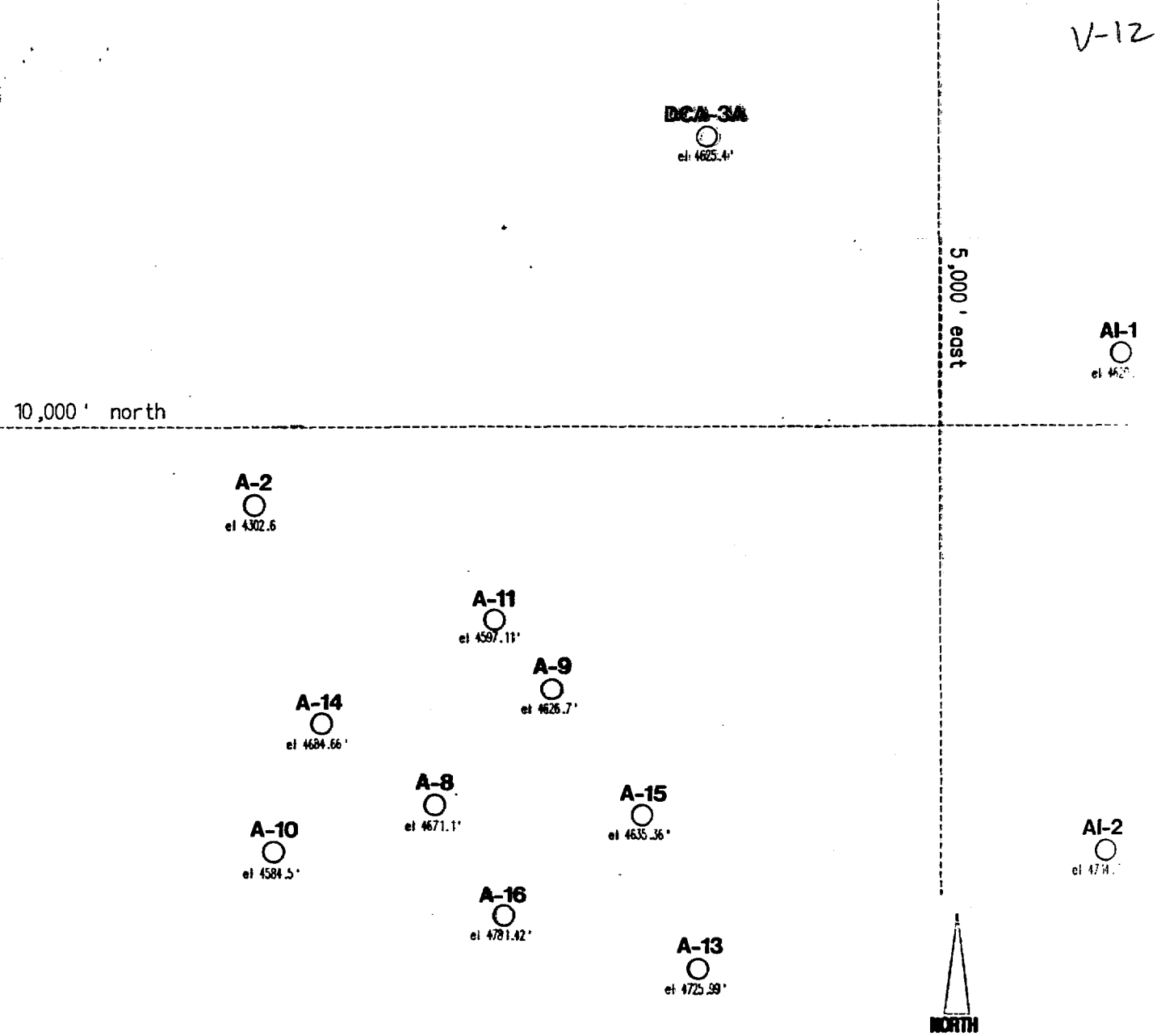
S. A. Anzalone
October 22, 1991

View 12

At the on-going project of Sergeion East, the drilling on 1000 foot centers has outlined a reserve with a core of 100 million tons of 1% copper, and decreasing grades outward.

As the drilling is through a thick sheet of Tertiary volcanics (ignimbrite), then a variable thickness of earlier volcanics and mid-Tertiary conglomerates, the drilling has been spread out over several years for each hole.

V-12



ASARCO Incorporated

SUPERIOR EAST PROJECT
DRILL HOLE SURVEY
PINAL COUNTY, ARIZONA

1"=500'

0 500' 1000'

MN 6817 WDG/DAM TUC 12-21-89
FILE SUP-6817.DWG

5,000 north

Vieco 13

13. In SE AZ, SWED has had an extended exploration effort in the Patagonia Mountains.

Besides the Hardshell Ag-Mn deposit handed over to the mining dept., SWED has identified 3 areas of interest.

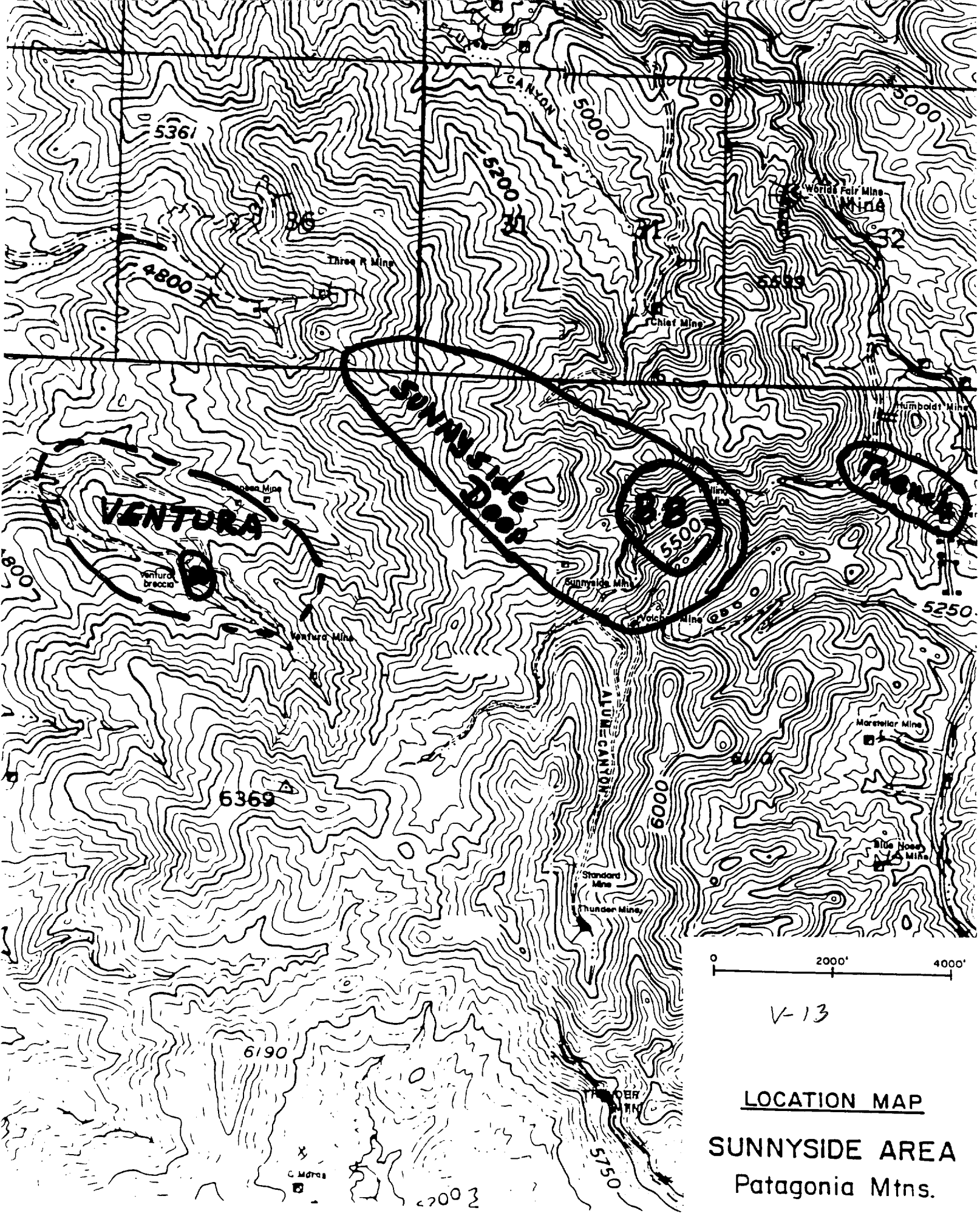
a) The Ventura Zone: JV from surface → w/ Noranda
Central moly pipe of 13 mill tons 0.28% Cu, 0.14% moly., with deeper, tops at 1700-2200', open-ended, flat tabular zone of 31 mill tons, 0.36% Cu, 0.035% Mo.

b) The Sunnyside Deep Zone JV w/ K-McGee at +2000' below surface. Estimated 450 mill tons of 0.34% Cu, 0.012% Mo, with several shallow chalcocite zones, such as the Bucket Breccia.

bb) Bucket Breccia, surface - 575 feet thick, estimated 37 mill tons, 0.28% Cu, Tr moly, tr silver, open-ended. (29% recovery, ferric acid, leach)

c) Trench Zone, w/ K-McGee deep shorn, 4000'+, 2 holes average 90' thick of 15% SZPhCu, with 10 oz Ag.

A 100 thousand $ work committment is due for the ~~[illegible]~~ Kerr-McGee part of the area at the Bucket Breccia. I propose we continue the evaluation of the Bucket Breccia zone, as it is a near surface chalcocite $ enargate deposit



V-13

LOCATION MAP

SUNNYSIDE AREA

Patagonia Mtns.

Santa Cruz Co., Arizona

Vrieo 14. This plan view shows the total thickness contours of the copper zone and some of the proposed holes for further evaluation. Note that the bar scale is 200 feet.

Vrieo 15. The total copper grade indicates a plus 0.4 % copper at hole TM-8 and extending over to hole BB-1. Copper values grade outward.

As the bulk of the drilling – 6 holes out of 11, were drilled from the TM-8 site, ~~the data~~ and from along the drainage road, our data points need improving.

I believe 50-100 mill tons of +0.3 % Cu can be outlined in this deposit, with up to 20 mill tons in the upper zone of plus 0.4 % copper.

Stripping ratio might be 4/1 or down to 2/1 depending upon final configuration ~~alon A-B-C~~.

I'll show some cross-sections along A-B-C-~~D~~.

Vrieo 16.

Section A-A' shows the interpretation of the total zone and is taken along the creek drainage road.

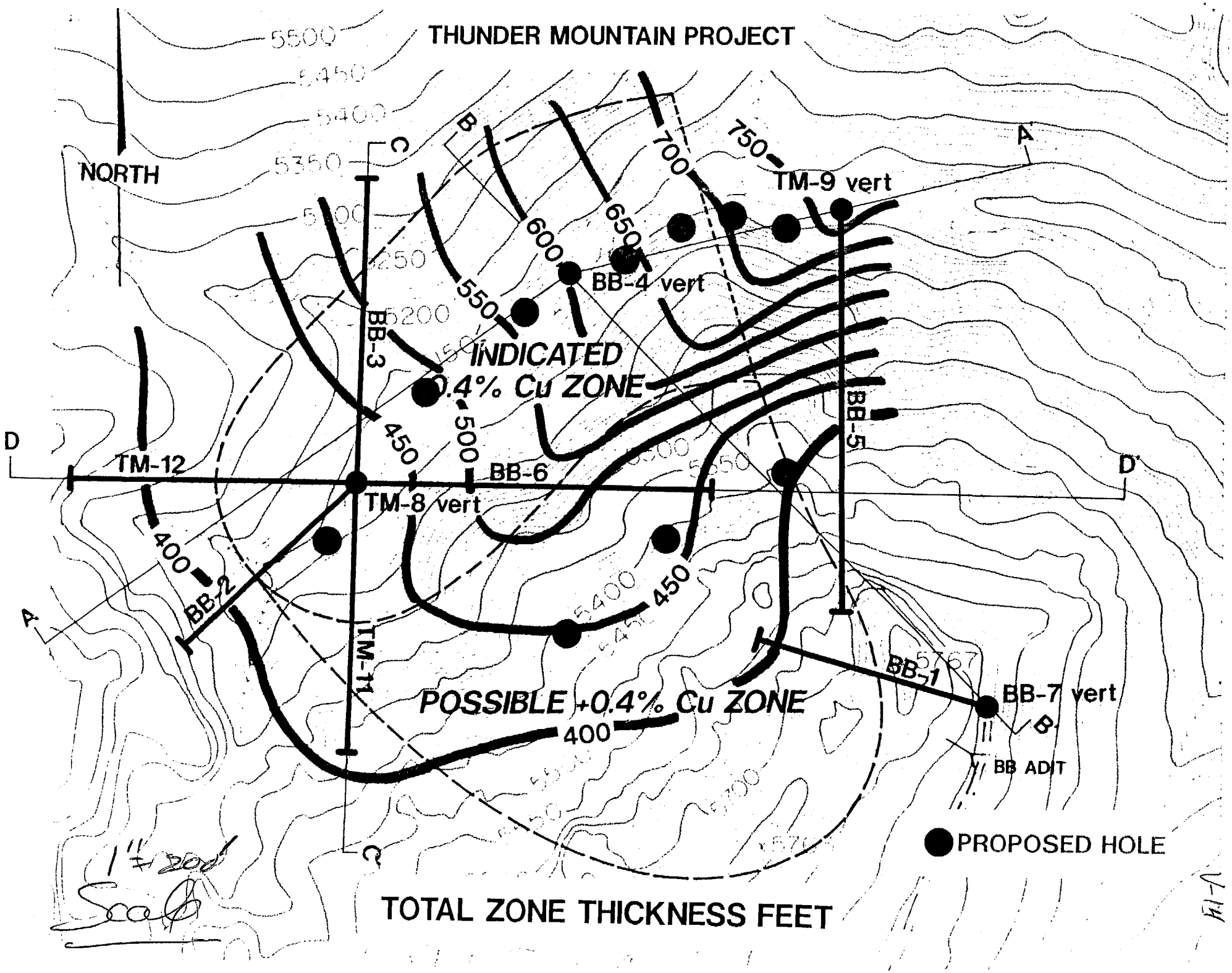
Note the three apparent levels of mineralization grade. A surface zone of +0.4% copper, then a general lower grade zone of 0.2-0.4 %, followed by the deeper zone of +0.4 %. This will also be evident in the other sections.

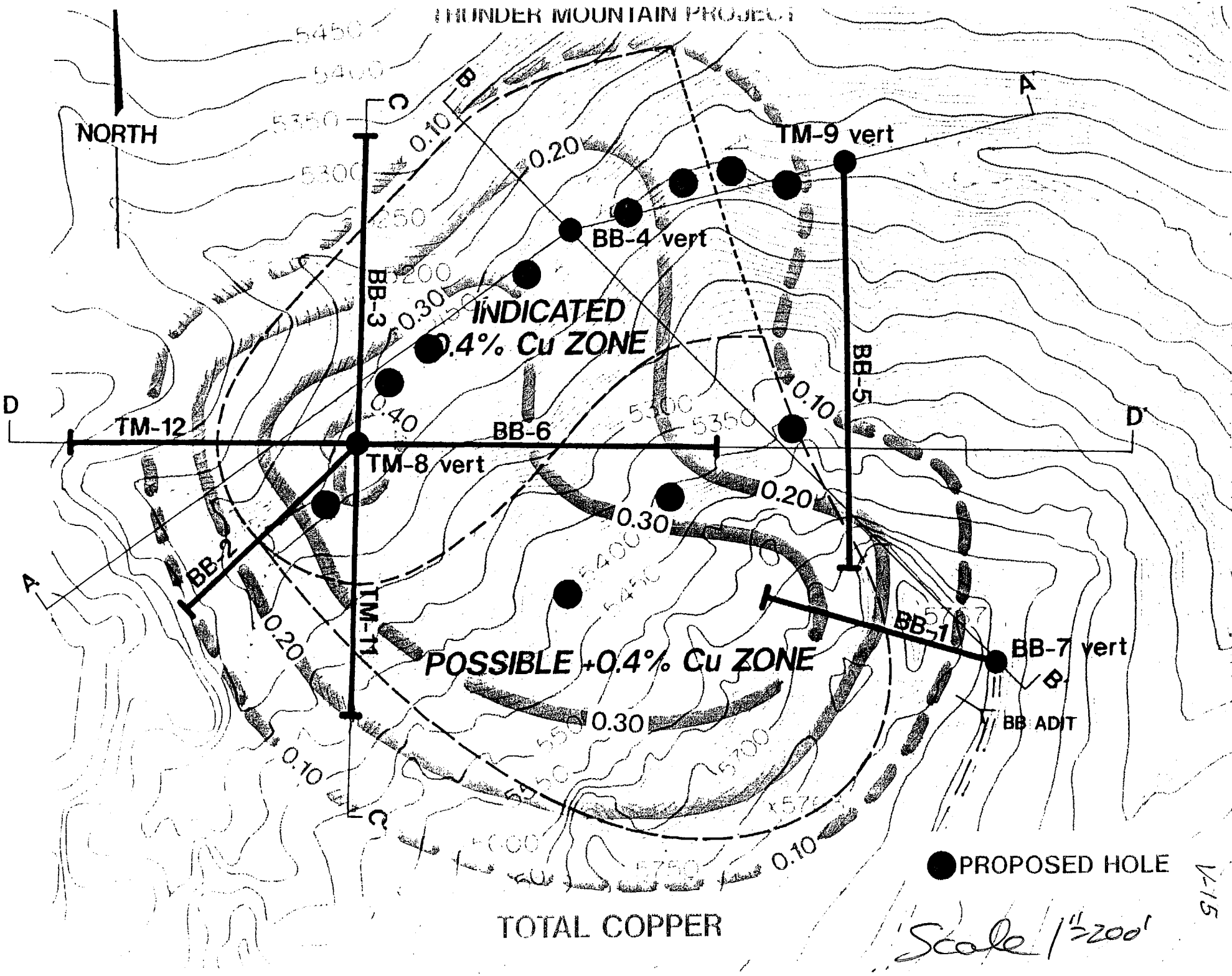
A negative feature of this deposit is the general lack of leachability of the primary copper. Our tests using ferric acid leach recovered only 29 % of the values. Milling may not be viable for this grade.

~~Item 13~~

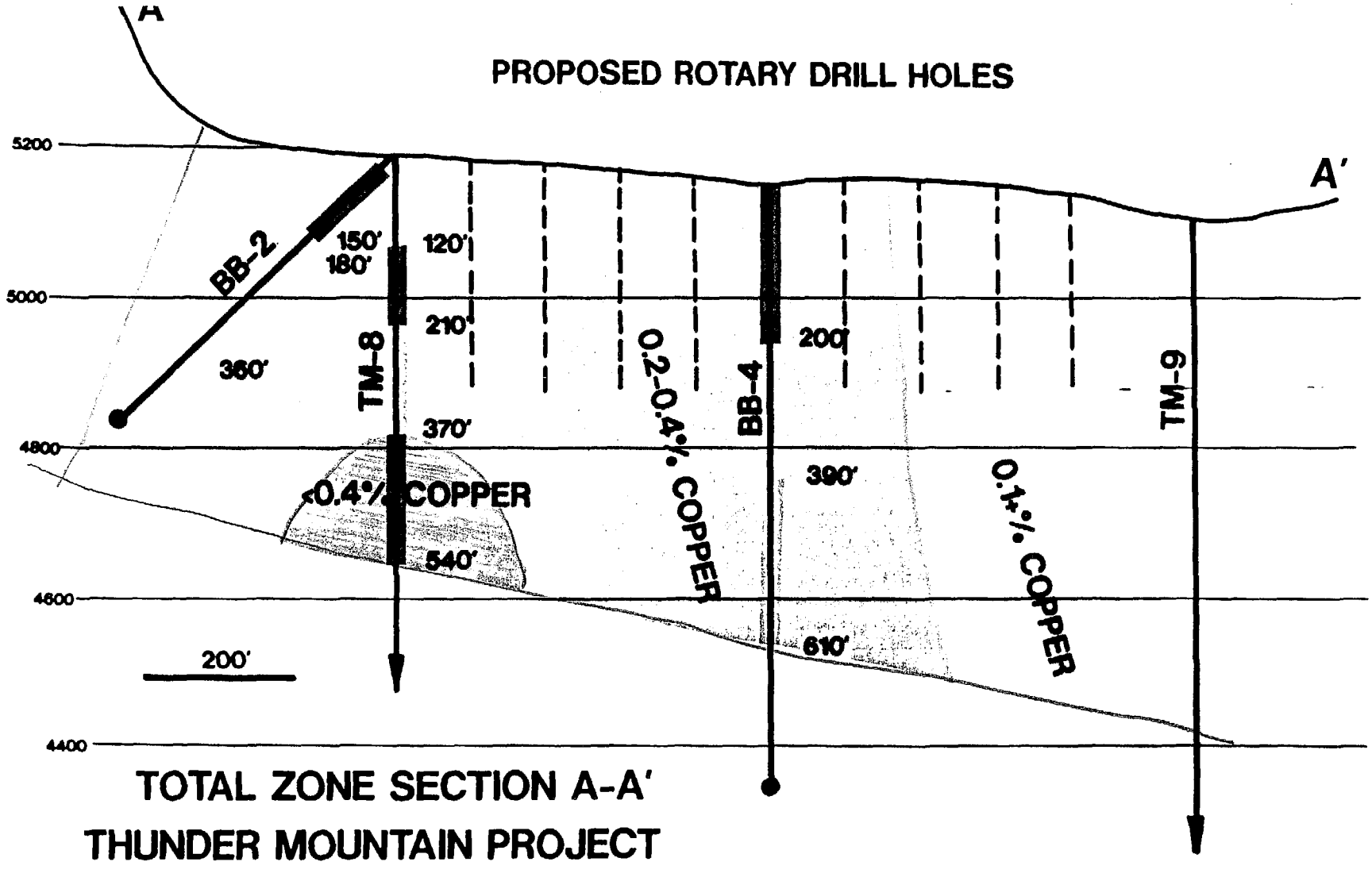
~~In SE Az, SWED has had an extended~~

~~etc~~


THUNDER MOUNTAIN PROJECT
NORTH
5500
5450
5400
5350
5300
5250
5200
5150
5100
5050
5000
5400
5450
5500
5700
5767
A
A'
B
B'
C
C'
D
D'
TM-9 vert
TM-8 vert
TM-12
TM-11
BB-1
BB-2
BB-3
BB-4 vert
BB-5
BB-6
BB-7 vert
BB ADIT
750
700
650
600
550
500
450
400
INDICATED
0.4% Cu ZONE
POSSIBLE +0.4% Cu ZONE
PROPOSED HOLE
TOTAL ZONE THICKNESS FEET
1" = 200'
Scale
V-14


THUNDER MOUNTAIN PROJECT
NORTH
TM-9 vert
BB-4 vert
INDICATED
0.4% Cu ZONE
BB-3
BB-5
TM-12
BB-6
TM-8 vert
BB-2
TM-11
BB-1
BB-7 vert
BB ADIT
POSSIBLE +0.4% Cu ZONE
0.10
0.20
0.30
0.40
A
A'
B
B'
C
C'
D
D'
PROPOSED HOLE
TOTAL COPPER
Scale 1" = 200'

V-15



TOTAL ZONE SECTION A-A'
THUNDER MOUNTAIN PROJECT

V-16

View 17

Section B-B', general N-S on the east side of the deposit. Again note the better grade values at the top of the zone.

View 18

Section C-C', N-S on the west side of the deposit. TM-8 was drilled for the deep Sennepside values.

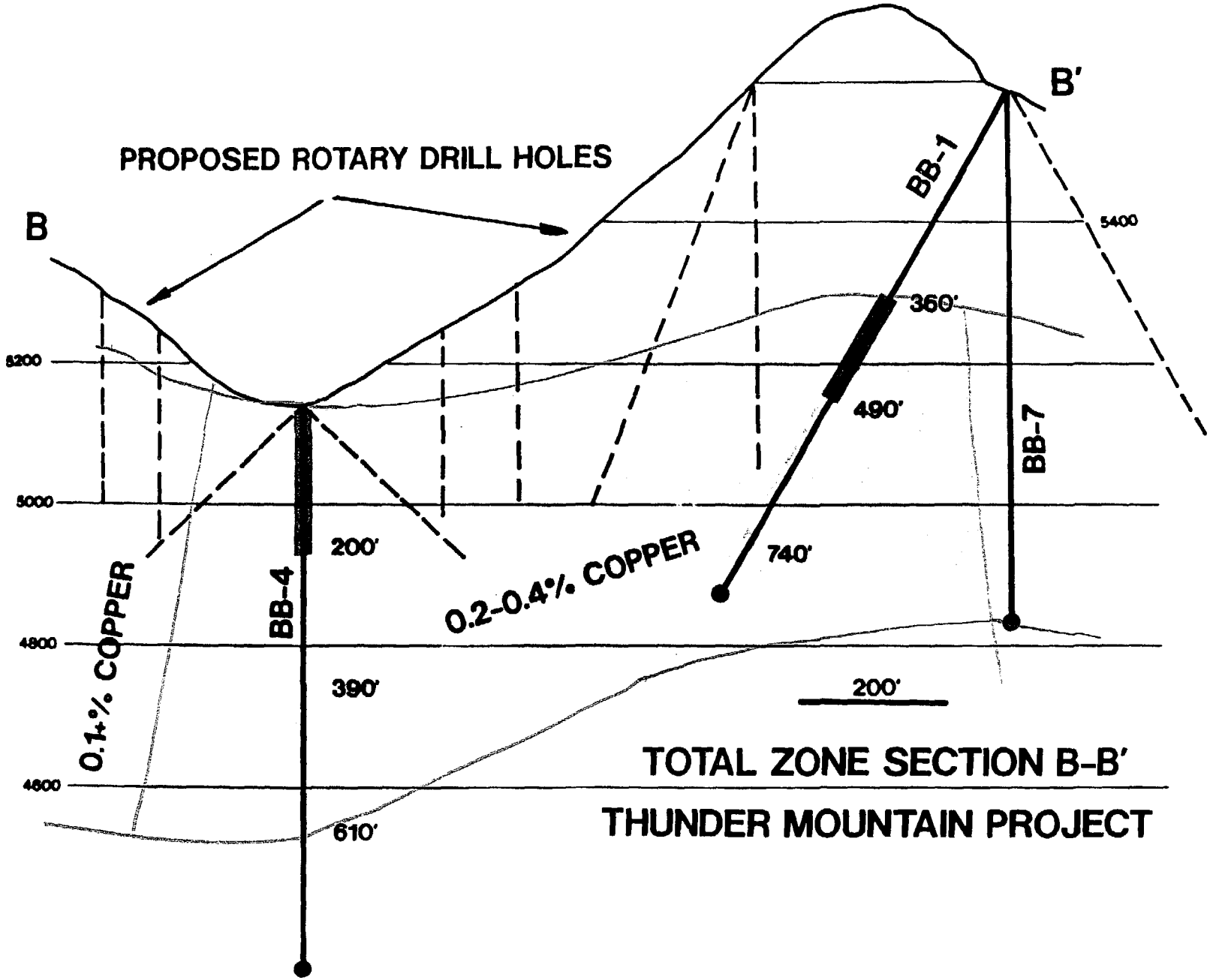
View 19 (V-15)

To return to the plan showing the total copper values. A number of proposed holes are on the view, with most being 200' step outs along the creek drainage access between TM-8 and TM-9.

Rotary drilling of these holes would provide a grade-distribution-continuity confirmation and would use up our $100,000 commitment.

Likewise, the three holes up on the side of the mountain slope would cost $100,000 as these would be skid-rig core drills with commencement problems. These holes would better define the tonnage/grade as they are 600-800 feet from all previous intercepts.

Thank You.

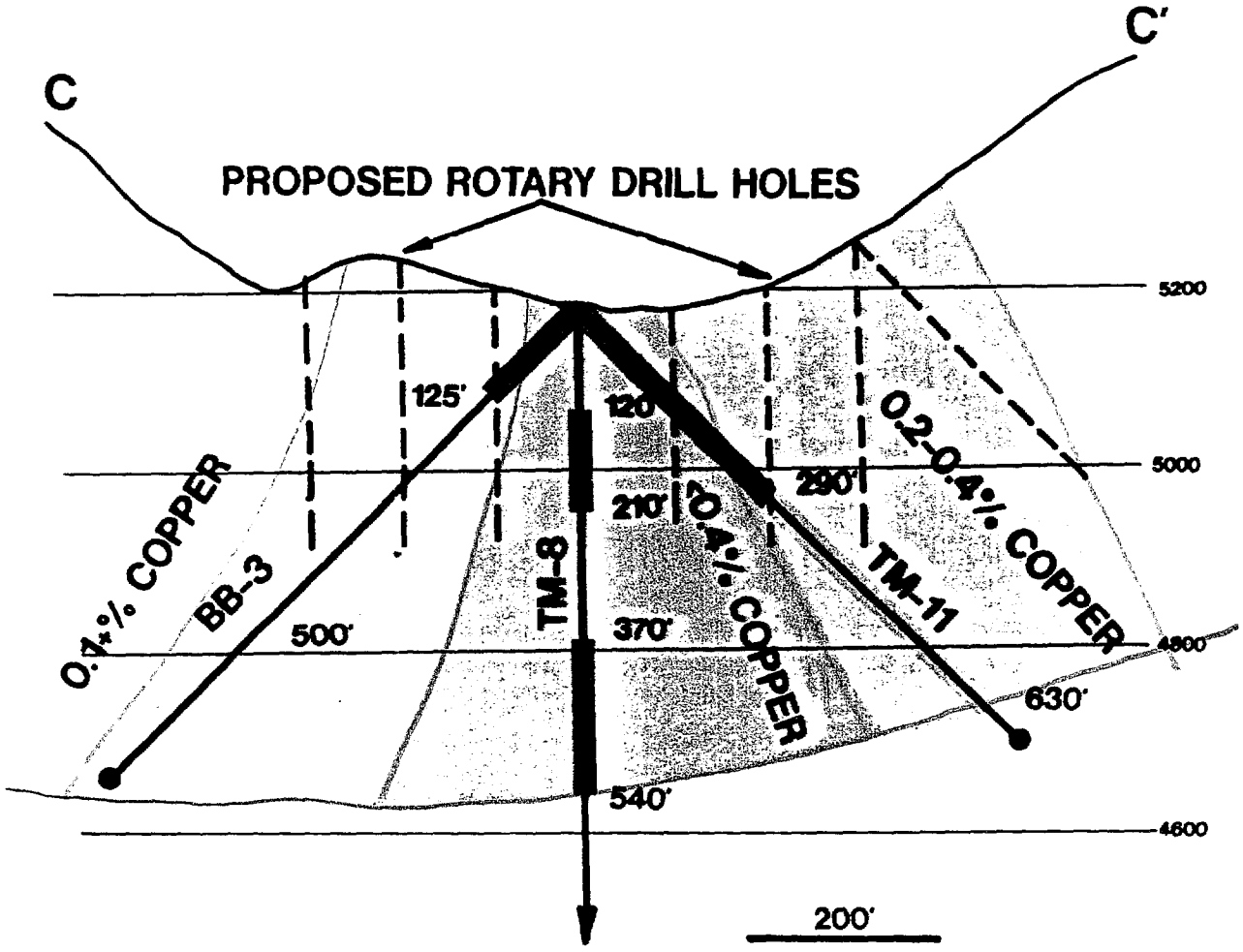


TOTAL ZONE SECTION B-B'

THUNDER MOUNTAIN PROJECT

V-17

V-18



TOTAL ZONE SECTION C-C'

THUNDER MOUNTAIN PROJECT

Landsat 1" = 2 miles Geospectra Corp. Ann Arbor, Mich

1. Gold Basin. 55 miles E-W; 65 miles N-S
   a. Natural Color, B-1 blue, B-2 green, B-3 red.
   b. Alteration
   c. Gypsum-calcite
2. SW AZ-SECA. 65 miles E-W; 55 miles N-S.
   a. Natural Color, B-1 blue, B-2 green, B-3 red
   b. False Color, B-1 blue, B-4 green, B-7 red.
   c. Alteration
   d. Sulfate-Carbonate

Examples: Slides

Geo Information System
GIS Study

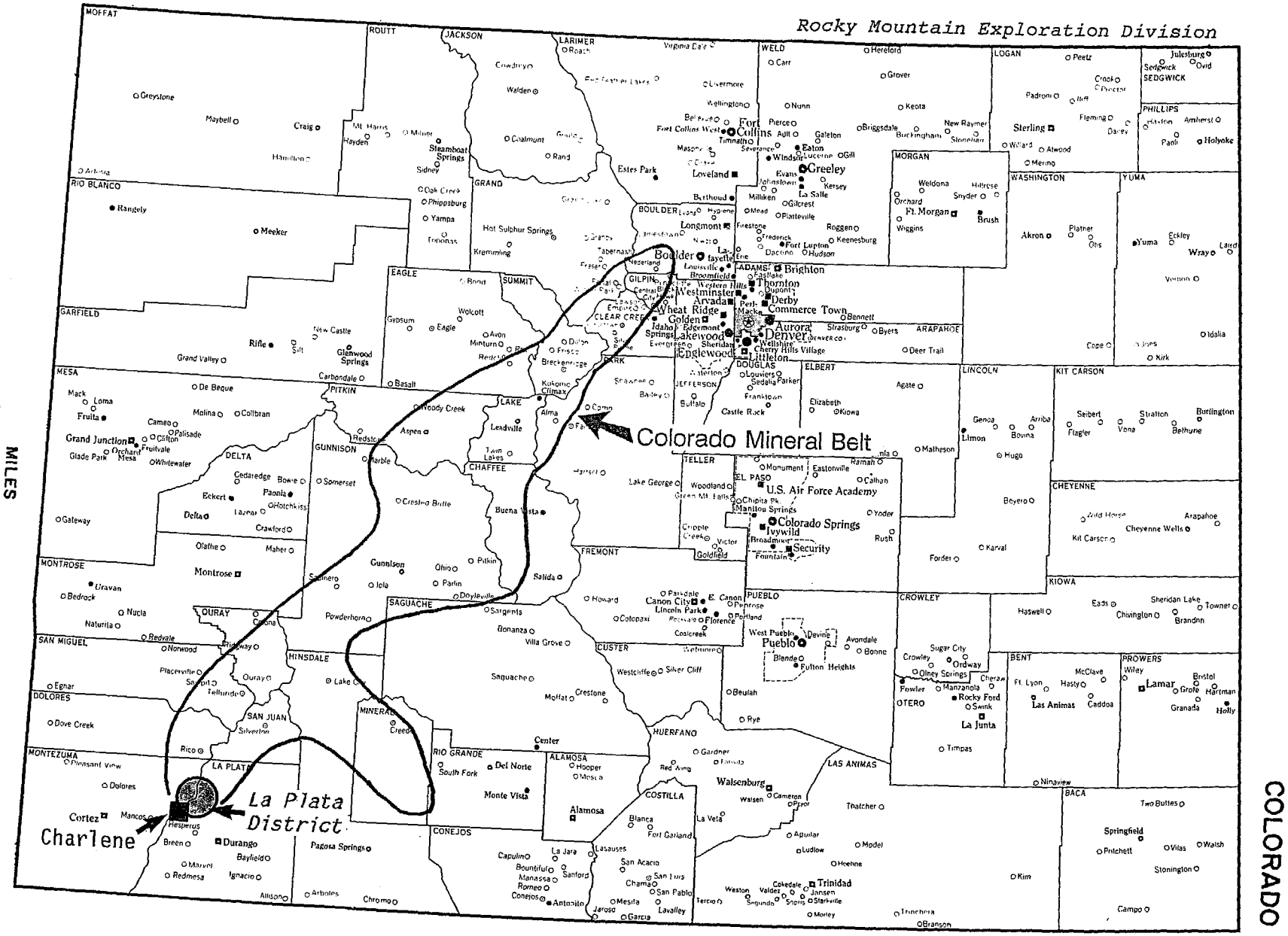
Kingman 1° x 2°

SWED input: AZ MIL data, SWED mine prospect data, geology.

AZ MIL data → purchased by County
aeromag; topo; gravity, etc
other USGS etc purchased.

SWED mine prospect data → 1 week for position community, name. 2 plus for detail

geology → 2-3 weeks if simple


Rocky Mountain Exploration Division
Colorado Mineral Belt
La Plata District
Charlene
Cortez
Durango
Colorado Springs
Denver
Pueblo
Grand Junction
Fort Collins
Greeley
Boulder
Aurora
Lakewood
Englewood
Littleton
Westminster
Arvada
Wheat Ridge
Golden
Brighton
Thornton
Commerce City
Derby
Longmont
Loveland
Estes Park
Steamboat Springs
Glenwood Springs
Aspen
Leadville
Salida
Gunnison
Montrose
Durango
Alamosa
Walsenburg
Trinidad
La Junta
Lamar
Sterling
Akron
Yuma
Limon
Burlington
Springfield
Cortez
U.S. Air Force Academy
Security
Ivywild
Fountain
Canon City
Florence
Lincoln Park
Rifle
Craig
Steamboat Springs
Hot Sulphur Springs
Kremmling
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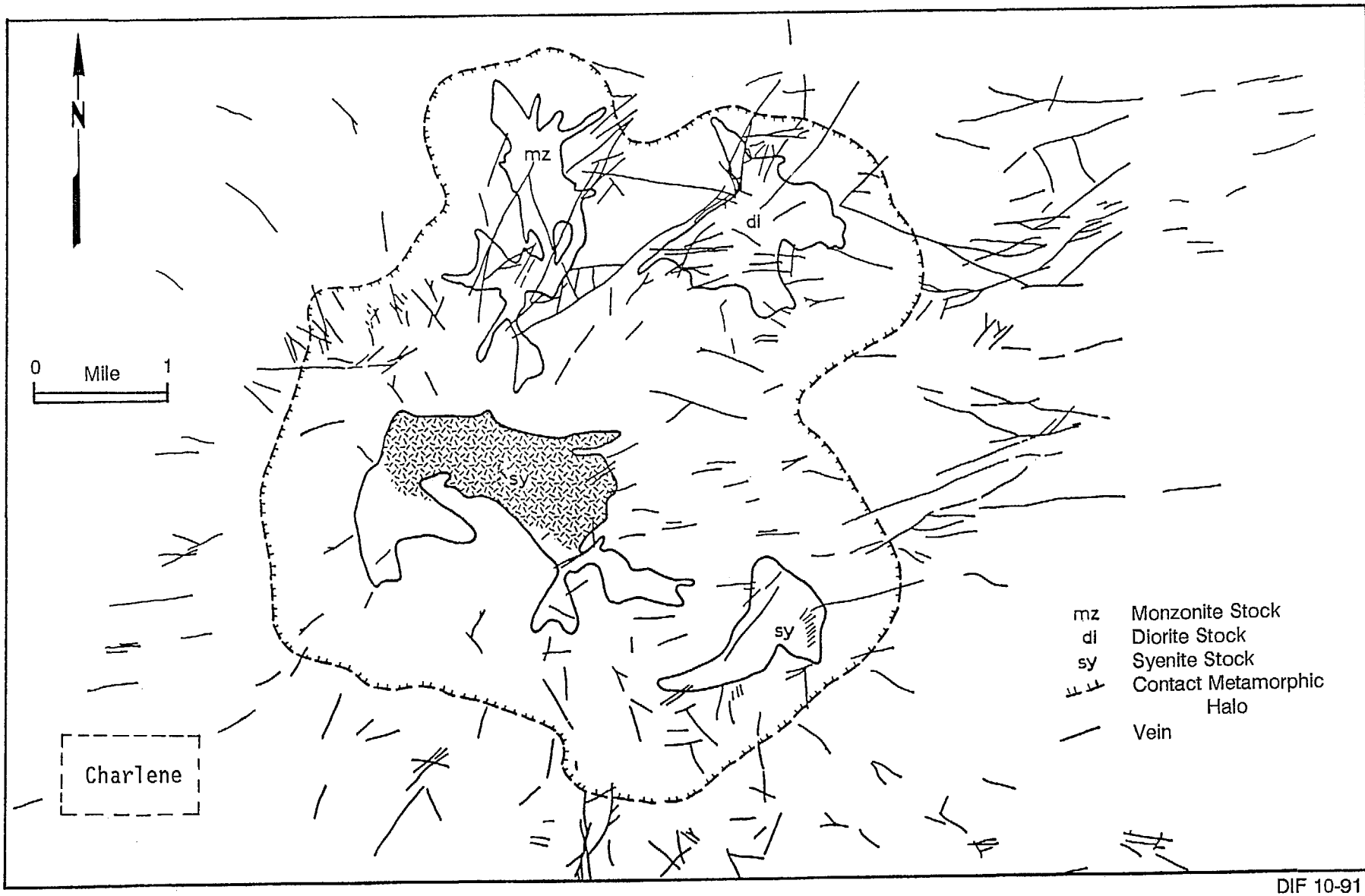
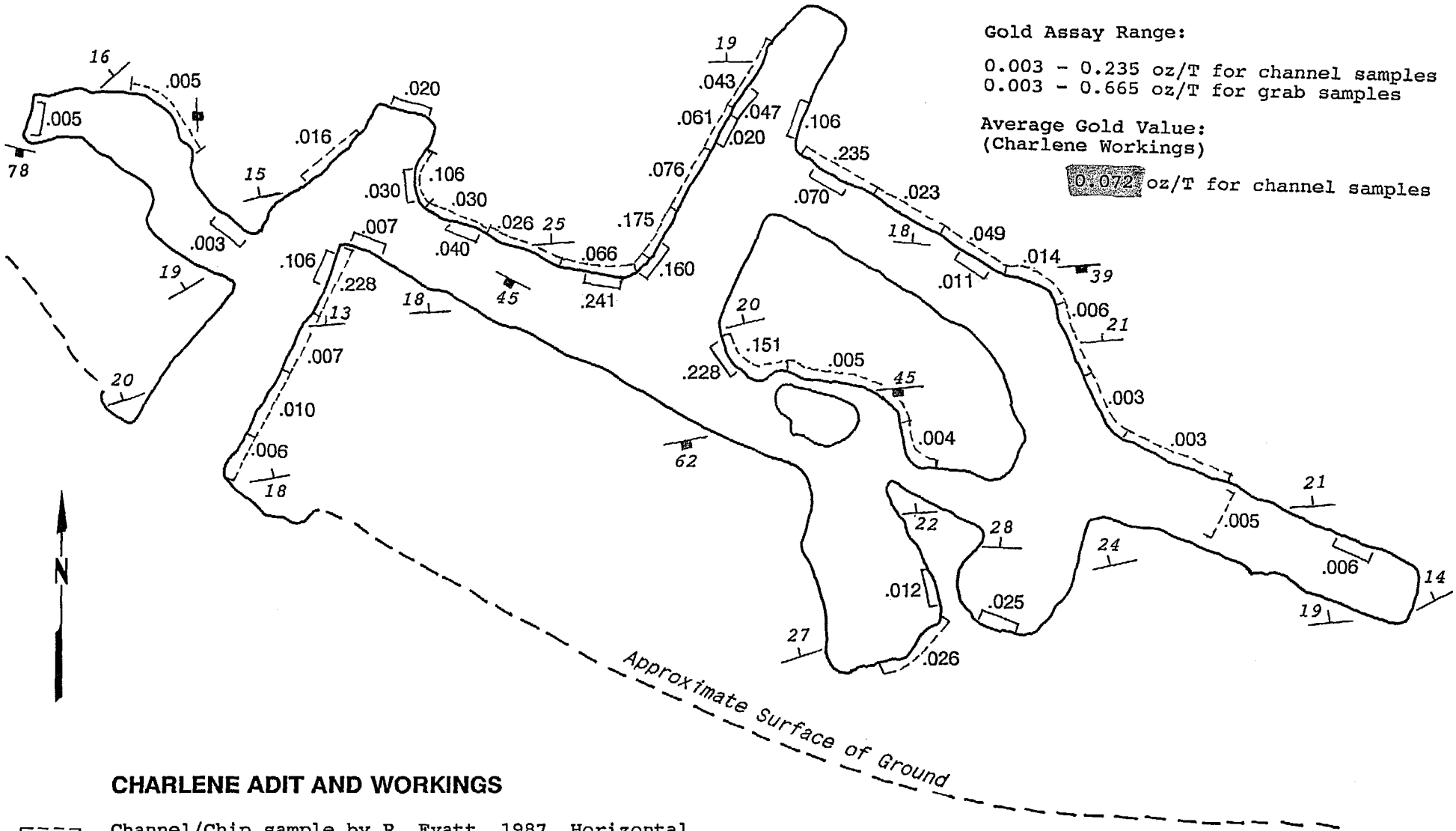
Silverton
Durango
Pagosa Springs
Del Norte
Monte Vista
Saguache
Lake City
Telluride
Dolores
Cortez
Mancos
Hesperus
Breen
Durango
Bayfield
Ignacio
Redmesa
Marvel
Allison
Arboles
Chromo
Pagosa Springs
Antonito
Capulin
Manassa
Romeo
Conejos
Sanford
La Jara
Lasauses
San Acacio
San Luis
Chama
San Pablo
Mesita
Garcia
Lavalley
Jaroso
Tercio
Weston
Segundo
Valdez
Cokedale
Jansen
Starkville
Sopris
Morley
Truchera
Branson
Kim
Model
Hoehne
Ludlow
Aguilar
Thatcher
Ninaview
Walsen
Cameron
Pyrot
Rye
Beulah
Pueblo
Blende
Fulton Heights
Avondale
Bonne
Devine
West Pueblo
Rocky Ford
Swink
Las Animas
Caddoa
Granada
Holly
Springfield
Pritchett
Vilas
Walsh
Stonington
Campo
Two Buttes
Lamar
Bristol
Grote
Hartman
Granada
Holly
Haswell
Eads
Chivington
Brandon
Sheridan Lake
Towner
Kit Carson
Cheyenne Wells
Arapahoe
Wild Horse
Seibert
Stratton
Bethune
Flagler
Vona
Genoa
Arriba
Bovina
Hugo
Karval
Forder
Matheson
Deer Trail
Byers
Strasburg
Bennett
Watkins
Elizabeth
Kiowa
Agate
Castle Rock
Franktown
Parker
Sedalia
Louviers
Littleton
Cherry Hills Village
Wellshire
Sheridan
Evergreen
Idaho Springs
Edgewood
Golden
Wheat Ridge
Westminster
Arvada
Thornton
Brighton
Commerce City
Derby
Aurora
Denver
Boulder
Longmont
Loveland
Estes Park
Berthoud
Milliken
Mead
Platteville
Gilcrest
La Salle
Evans
Greeley
Kersey
Eaton
Windsor
Lucerne
Gill
Fort Collins
Timnath
Wellington
Laporte
Bellvue
Masonville
Severance
Galeton
Briggsdale
Buckingham
Stoneham
New Raymer
Keota
Nunn
Pierce
Grover
Carr
Hereford
Peetz
Crook
Proctor
Padroni
Iliff
Fleming
Dailey
Paoli
Holyoke
Julesburg
Ovid
Sedgwick
Haxtun
Amherst
Ft. Morgan
Brush
Weldona
Hillrose
Snyder
Orchard
Wiggins
Roggen
Keenesburg
Fort Lupton
Hudson
Dacono
Frederick
Firestone
Erie
Louisville
Lafayette
Boulder
Nederland
Ward
Jamestown
Tabernash
Fraser
Granby
Grand Lake
Hot Sulphur Springs
Kremmling
Yampa
Phippsburg
Oak Creek
Steamboat Springs
Hayden
Mt. Harris
Milner
Craig
Maybell
Greystone
Hamilton
Rangely
Meeker
Rifle
Silt
New Castle
Glenwood Springs
Grand Valley
Carbondale
Basalt
Aspen
Woody Creek
Redstone
Marble
Somerset
Crested Butte
Gateway
Paonia
Hotchkiss
Delta
Eckert
Cedaredge
Bowie
Olathe
Maher
Crawford
Montrose
Uravan
Bedrock
Nucla
Naturita
Bedvale
Norwood
Ophir
Placerville
Sawpit
Telluride
Egnar
Dove Creek
Rico
Pleasant View
Dolores
Mancos
Hesperus
Breen
Durango
Bayfield
Ignacio
Redmesa
Marvel
Allison
Arboles
Chromo
Pagosa Springs
Silverton
Ouray
Lake City
Creede
Powderhorn
Gunnison
Ohio
Pitkin
Parlin
Doyleville
Sargents
Bonanza
Villa Grove
Saguache
Moffat
Crestone
Center
Del Norte
South Fork
Monte Vista
Alamosa
Hooper
Mosca
Capulin
Bountiful
Manassa
Romeo
Conejos
Antonito
Jaroso
Garcia
Mesita
Lavalley
Tercio
Weston
Segundo
Valdez
Cokedale
Trinidad



Rocky Mountain Exploration Division

DIF 10-91

La Plata Alkalic Intrusive Complex
La Plata Mining District
Southwestern Colorado



CHARLENE ADIT AND WORKINGS

Channel/Chip sample by R. Evatt, 1987, Horizontal channel, 1 assay-ton fire assay

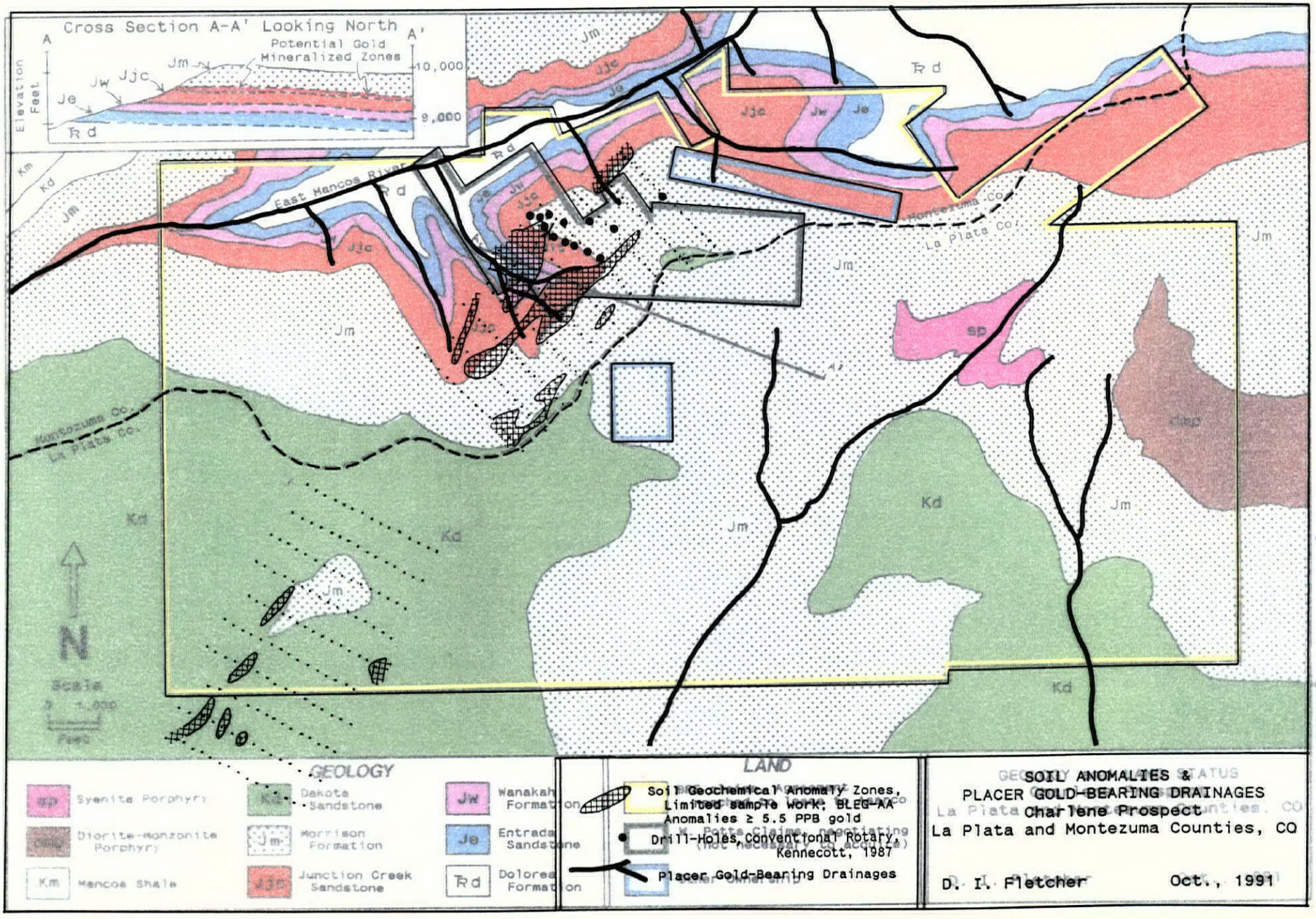
Channel sample by D. Fletcher & P. Bartos, ASARCO, 1991, both 5 ft. vertical and 5 ft. horizontal channels, averaged.

Gold Assays, in Tr.Oz./s.Ton

0 Feet 20

Scale: 1 inch = 20 feet

Surveyed by D. Fletcher, Tape & Compass, 8-22-91



Rocky Mountain Exploration Division