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602-771-1601
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BASE-METAL AND PRECIOUS-METAL DISTRIBUTION
AT THE UNITED VERDE EXTENSION MINE,
JEROME, ARIZONA

Abstract of a talk to the AZ Conf. of AIME, Tucson, Dec. 8, 1986

Don White, Geologist, C.P.G.
521 East Willis St.
Prescott, AZ 86301
602-778-3140

The United Verde Extension mine operated from 1915 through 1938, principally as a high grade copper mine. Production totalled about 3.9 million tons grading 10.2% Cu, .04 oz/t Au, and 1.7 oz/t Ag. Some 80% of that was from one main supergene-enriched, volcanogenic, massive sulfide body which averaged 15% Cu and about .03 oz/t Au. That was the high-Cu, low Au, low SiO_2 "sulfide ore." Another ore type averaged about 5% Cu with intermediate gold (.06 oz/t) and silica (55%) values. This so-called "silica ore" occurred in a series of deposits above, flanking, and along strike from the main sulfide orebody. The final ore type has been called "gold-only" and contains less than 200 ppm of any base metals, but is an auriferous siliceous rock averaging 0.4 oz/t Au and 90% SiO_2. Thus there is a tri-modal distribution of ore types by silica percentage with a strong differentiation of Cu (with Fe, S) in the low-silica sulfide ore, both Cu and Au (plus the highest Ag and alumina grades) in an intermediate silica ore, and high gold (virtually no base metals) in the very siliceous gold-only ore. It is the latter that is the subject of ongoing underground exploration.

Gold-only ores are meta-chert-hosted. The chert bodies form wedges about 1,000 feet long off the north flank of the massive base metal sulfide body. The cherts display a great variety of hydrothermal fracturing, sedimentary brecciation, slumping, and oxidation. Stope geometries in one gold-only deposit clearly mimic small vent cone shapes. These cones were likely smaller, peripheral vents to the main sulfide vent, and were active after the bulk of the sulfide deposition. A clear grade zonation is also exhibited, with highest gold in the cores of the vents and near the stratigraphic footwall. The upper portions of the chert stratigraphy include thin, massive, hematite beds, and alternating, cyclic, chert breccias graded by clast size and topped by fine laminated, very fine grained, quartz-hematite-goethite. Double-graded bedding is evident, as is soft sediment deformation. Oxidation appears to be hypogene.

A very high-energy oxidizing environment including submarine volcanism and turbidites is indicated.

Gold occurs in the native state and as electrum and is associated with hematite and quartz veinlets. Hematite and coarse grained quartz are seen in thin section to fill fractures and vugs both within clasts and within matrix of the chert breccias. Hematite has also replaced carbonate. Limonite overgrowths are common and supergene gold enrichment must be suspected but has not yet been ascertained. Gold is associated with a trace metal assemblage of Ag, As, Sb, Bi, Sn, Mo, V and base metals. All except silver trail off across stratigraphy just as fast or faster than the gold.

Hydrothermal alteration is dominantly feldspar destribution by argillization of the immediate hanging wall and footwall volcanic rocks. A more distant hanging wall carbonate impregnation and veining up to three hundred feet above the cherts indicates either ongoing hydrothermal activity while the capping sequence of intermediate flows and pyroclastics accumulated or else carbonate remobilization by the later, perhaps subvolcanic diorite. Either way, carbonate in hanging wall rocks is an exploration aid for auriferous zones in the underlying chert.

Present gold exploration has identified unmined auriferous chert breccias of the gold-only type. Deposit delineation by underground drilling will continue and may well add to our understanding of volcanogenic gold deposits.

Don White
521 East Willis St.
Prescott, AZ 86301
602-778-3140

November 12, 1986

Robert G. Crook
IRON KING ASSAY, INC.
P.O. Box 56
Humboldt, AZ 86329

Dear Bob,

Attached are the results of the check assays performed by Skyline Labs, Inc. on samples first assayed by you. The graphic plot is annotated with my thoughts as to the quality of your assays and theirs, all generally good.

As discussed before, I shall keep you informed of such checks to the extent that it can help you monitor and improve the accurracy of your assays.

Best Regards,

Don

Don White
Geologist, C.P.G.

DW:sk

cc: Ben F. Dickerson, III

Don White
521 E. Willis St.
Prescott, AZ 86301
602-778-3140

November 11, 1986

Paul A. Handverger
VERDE EXPLORATION, LTD.
2160 Old Jerome Hwy.
Clarkdale, AZ 86324

Dear Paul,

This note is to confirm our phone conversation of earlier today in which I assurred you that the subject matter of my talk to AIME (Tucson, Dec. 8, 1986) will be substantially the same as that to A.G.S. (earlier this year) embellished with the new findings from the Gold Stope cross-cut (901-W) and the understanding of the U.V.X. ore types. These latter subjects are covered in my memos transmitted to you by my letter of October 23rd.

AIME has just requested a "summary" of the talk and I propose to send them the attached. If you have any criticisms of it, please give me a call by Monday, November 17.

Thank you for your letter regarding the chemical and mineralogic data on the diorite. That plus the structural explanation I received from Paul Lindberg make it much more convincing to me that the U.V.X. diorite could be plutonic.

Sincerely,

Don

Don White
Geologist, C.P.G.

DW:sk

cc: Ben F. Dickerson, III

BASE - AND PRECIOUS - METAL DISTRIBUTION AT THE UNITED VERDE EXTENSION MINE, JEROME, ARIZONA

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Gold-only ores are meta-chert-hosted. The chert bodies form wedges about 1,000 feet long off the north flank of the massive base metal sulfide body. The cherts display a great variety of brecciation, slumping, and oxidation. It appears that multiple generation breccias formed as a result of hydrothermal fracturing. Slumping was soft sediment deformation on the flanks of vent cones

and oxidation appears to be hypogene. A very high-energy oxidizing environment is indicated.

Stope geometries in one gold-only deposit clearly mimic small vent cone shapes. These cones were likely smaller, peripheral vents to the main sulfide vent, and were active after the bulk of the sulfide deposition. A clear gold zonation is also exhibited, with highest gold in the cores of the vents and near the stratigraphic footwall. The upper portions of the chert stratigraphy include thin massive hematite beds, and alternating, cyclic, chert breccias graded by clast size and topped by primary clay beds. Five such cycles are exhibited in one crosscut through a gold-only deposit. Each cycle is about ten feet thick and indicates a periodic explosive-to-quiescent pulse in an overall active setting.

Gold occurs as electrum and is associated with hematite and quartz veinlets. Hematite and coarse grained quartz are seen in thin section to fill fractures and vugs both within clasts and within matrix of the chert breccias. Hematite has also replaced carbonate. Limonite overgrowths are common and supergene gold enrichment must be suspected but has not yet been ascertained. Gold is associated with a trace metal assemblage of Ag, As, Sb, Bi, Sn, Mo, V and base metals. All except silver trail off across stratigraphy just as fast or faster than the gold.

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Present gold exploration has identified unmined auriferous chert breccias of the gold-only type. Deposit delineation by underground drilling will continue and may well add to our understanding of volcanogenic gold deposits. So far, the new data continues to fit the pattern of spatial, temporal, and chemical evolution described.

Don White
521 East Willis St.
Prescott, AZ 86301
602/778-3140

November 12, 1986

Charles L. Elliot
ELLIOT GEOPHYSICAL CO., INC.
4653 East Pima St.
Tucson, AZ 85712

Dear Chuck,

Enclosed herewith are the Briscoe files from Geodata which you sent me earlier this year. I gather they are to be combined with those you have for return to Jim Briscoe.

Thank you very much for obtaining this data. The geologic map was rather useful, as you know, and the drilling data benefitted both of our efforts.

I shall be in Tucson for the Monday, December 8 AIME Arizona Conference meeting at which I'll give another little talk on our U.V.X. findings. Any chance you'll be there? If not, and if I come down a day or two early, on the weekend, perhaps we can get together one way or the other.

Hope to see you in a few weeks.

Regards,

Don

Don White
Geologist, C.P.G.

cc: Ben F. Dickerson, III ✓

Don White
521 East Willis St.
Prescott, AZ 86301
602-778-3140

November 12, 1986

William L. Lehmbeck
SKYLINE LABS, INC.
P.O. Box 50106
Tucson, AZ 85703

Dear Bill,

I have attached a copy of your latest gold assay report on our 30 pulp samples. When we had no results after two weeks, I phoned and was able to get your newly completed results orally over the telephone. They were in p.p.m. which I converted to the oz/t figures also on the attached. What has me puzzled is why virtually all of the final reported assays were slightly different than those initially reported orally and why some shifted up and some down. Perhaps you can offer an explanation.

I expect to be in Tucson about December 5-8. If you can have those pulps handy (Job # UQX-045) I shall pick them up and perhaps be able to chat with you as well.

Regards,

Don White

Don White
Geologist, C.P.G.

DW:sk

cc: Ben F. Dickerson, III

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. UQX 045
October 29, 1986
MSC-1048-04 TO
MSC-1082-03

A.F. BUDGE (MINING) LIMITED
Attn: Mr. Ben F. Dickerson III
DMEA Ltd.
7340 E. Shoeman Lane, 111-B (E)
Scottsdale, Arizona 85251

Analysis of 30 Pulp Samples

ITEM	SAMPLE NUMBER	Written Report FIRE ASSAY Au* (oz/t)	Oral Report Original Skyline Assay *	Δ
1	MSC-1048-04	.010	.008	.002
2	MSC-1048-05	.085	.082	.003
3	MSC-1048-06	.040	.038	.002
4	MSC-1048-07	.325	.325	Ø
5	MSC-1048-08	.015	.015	Ø
6	MSC-1048-09	.005	.004	.001
7	MSC-1055-22	.005	.004	.001
8	MSC-1055-23	<.005	.004	-?-
9	MSC-1055-24	<.005	.003	-?-
10	MSC-1055-25	.020	.018	.002
11	MSC-1056-28	.015	.013	.002
12	MSC-1056-29	.010	.012	-.002
13	MSC-1056-30	.135	.140	-.005
14	MSC-1056-31	<.005	.001	-?-
15	MSC-1057-13	.010	.009	.001
16	MSC-1057-14	.230	.239	-.009
17	MSC-1057-15	.285	.277	.008
18	MSC-1057-16	.145	.143	.002
19	MSC-1072-04	.135	.134	.001
20	MSC-1072-05	.190	.225	-.035
21	MSC-1080-05	<.005	.003	-?-
22	MSC-1080-06	.050	.049	.001
23	MSC-1080-07	.060	.061	-.001
24	MSC-1080-19	.060	.058	.002
25	MSC-1080-20	.085	.087	-.002

*"Original" is the Skyline assay related over the phone in P.P.M. and converted to oz/t by .0291664 multiplier.

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

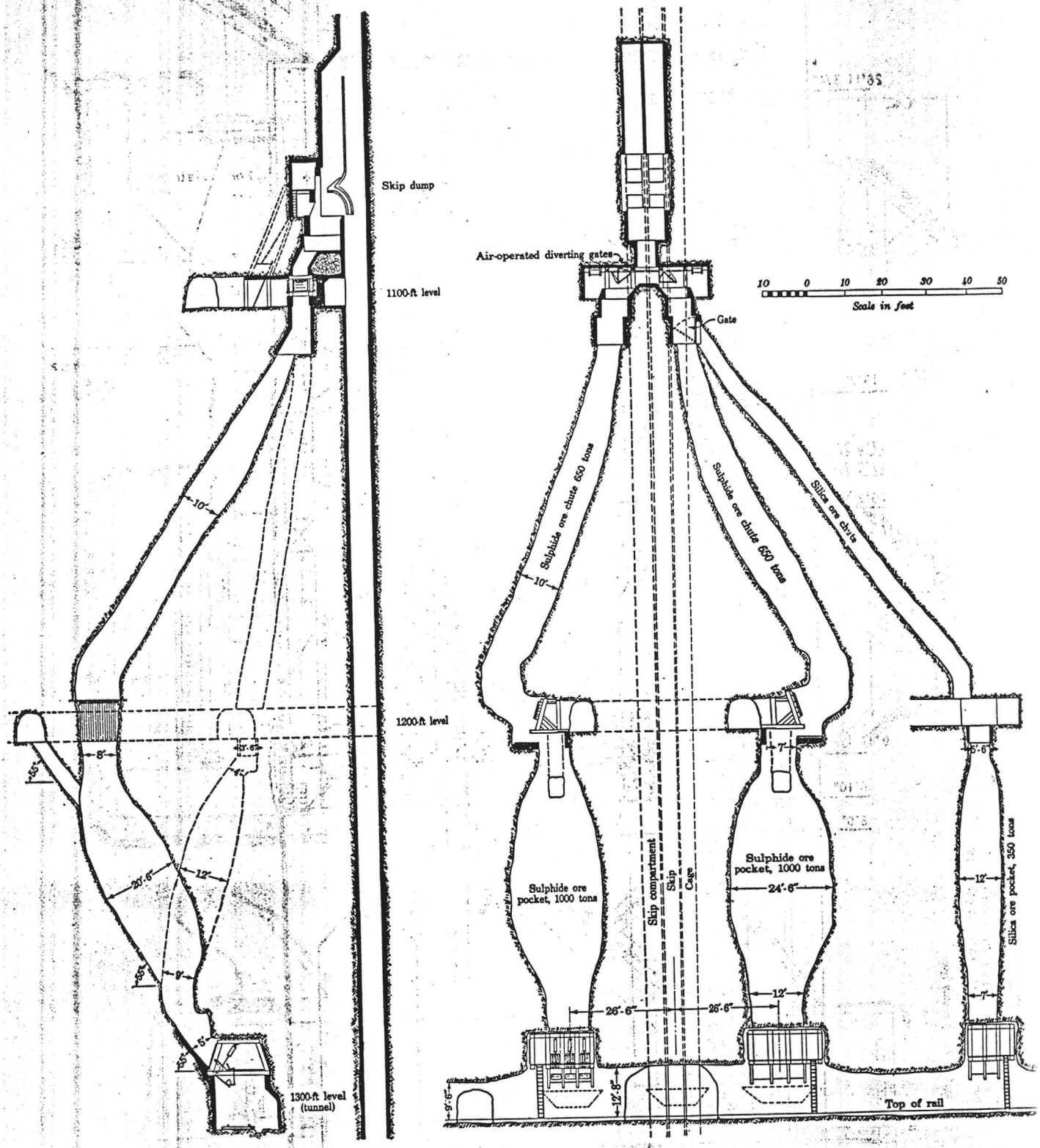
JOB NO. UQX 045
October 29, 1986

ITEM	SAMPLE NUMBER	FIRE ASSAY Au* (oz/t)	Oral	Δ
26	MSC-1081-01	2.400	2.400	Ø
27	MSC-1081-02	.005	.006	-.001
28	MSC-1081-08	.085	.084	.001
29	MSC-1082-02	.040	.038	.002
30	MSC-1082-03	.005	.006	-.001

*NOTE: Analysis based on a one assay-ton sample.

cc: Mr. Don White
521 East Willis St.
Prescott, AZ 85301

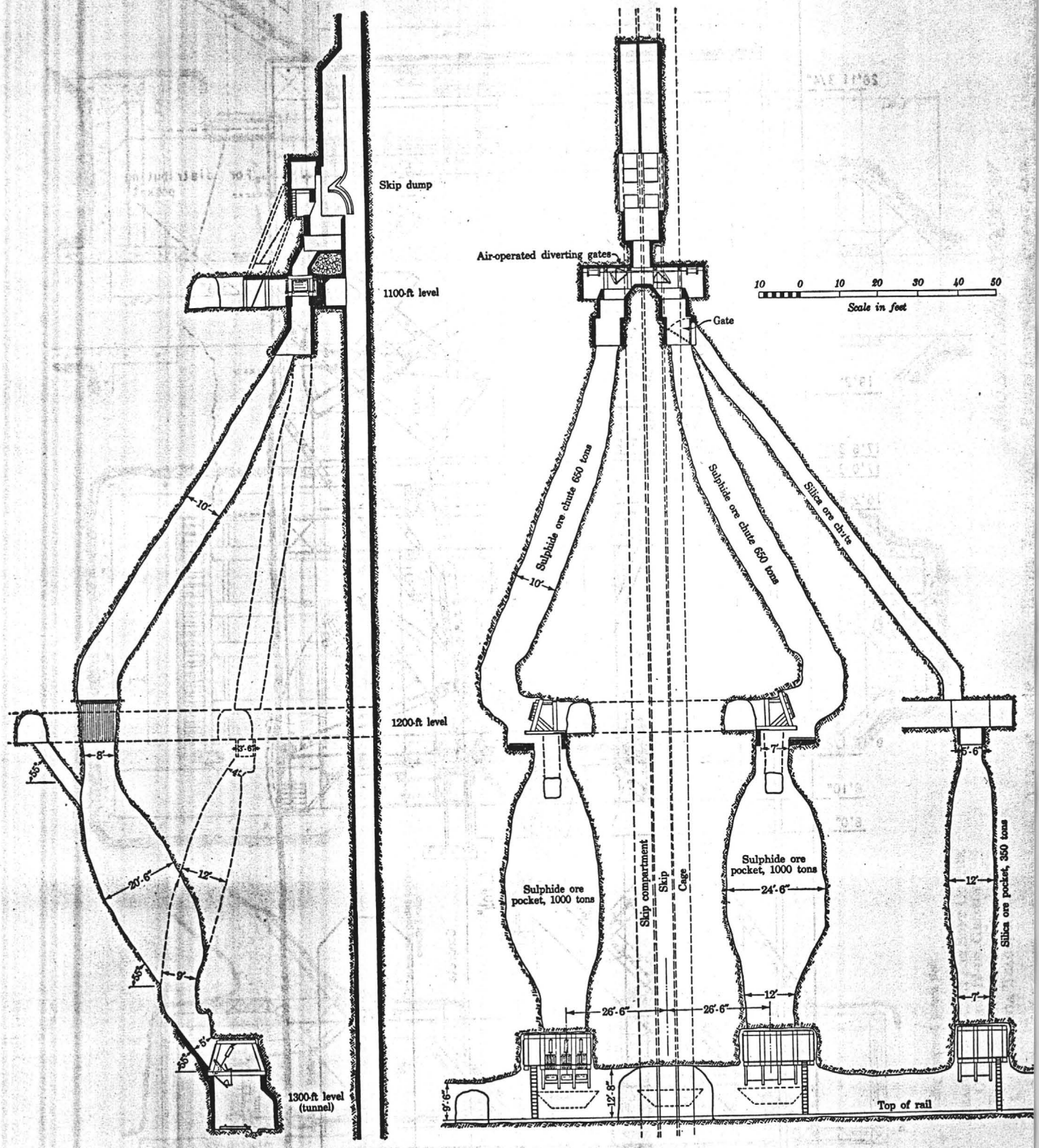
REGISTERED ASSAYER CERTIFICATE No. 9425 WILLIAM L. LEHMBECK ARIZONA
10/29/86



PROJECTION LOOKING SOUTH

PROJECTION LOOKING WEST

LOADING POCKETS, AUDREY SHAFT, UNITED VERDE EXTENSION MINING CO., JEROME, ARIZ.



PROJECTION LOOKING SOUTH

PROJECTION LOOKING WEST

XIX—6 (92)227 LOADING POCKETS, AUDREY SHAFT, UNITED VERDE EXTENSION MINING CO., JEROME, ARIZ.

MEMO

DMEA LTD.
JUN 11 1986
RECEIVED

TO: Ben F. Dickerson, III, Carole A. O'Brien

FROM: Don White

DATE: June 9, 1986

SUBJECT: Thoughts related to U.V.X. following meeting with B.F.D.,III 6/5/86

A number of thoughts on various subjects related to the UVX project are worth recording following our meeting in Jerome, June 5, 1986. They can be categorized by the following subject headings:

1) Coca/Verde news
2) Mine water use and changes
3) Paul Handverger's drill target
4) New importance of reaching 1300 level
5) Flux contract price
6) Drilling as part of current UVX work

1) Hugh Matheson's visit to Jerome was only his second since 1981 or so. Bob Rivera was giving his boss a pitch on the merits of the project in hope of improving its funding. The Jerome project has been the poor relation to their Middle Buttes project (development stage) in Currin, Co., CA. Kern Bob was anxious to have Hugh hear about our work and that of P.D. in and north of the pit, simply as reinforcement that the area is vital, that there is encouragement.

Coca has apparently had some difference of opinion with Verde Exploration, Ltd. over terms of their lease. The issue revolved around a sand and gravel operation and whether or not the lease included sand and gravel. Coca acquiesced to Verde's contentions that sand and gravel would not be included, on the condition that Coca's lease be extended. I don't know that Rivera had any doubts it would be but it's up for renewal (5 year anniversay - ?) soon. The sand and gravel operators are now dealing directly with Verde. Verde is apparently driving a hard bargain for Coca to accept Verde's southern block of claims (Copper Chief direction and beyond) as another term of renewal on what they already lease. That would increase payments or at least assessment work committments and stretch Coca's already small budget even thinner. Verde has apparently been grasping at straws, in the absence of any lessee for that block, to fulfill its assessment work. Rivera said something about even our work at the Edith being filed as assessment on "adjacent/contiguous" lands by Verde.

Bob Rivera may be selling off Coca's surface rights to certain lands. Coca picked up select properties north and east of Jerome several years ago. They took them on lease with purchase option. The plan now is to exercise

the option, resell the surface at a profit, and retain the minerals. This, he hopes, will cut the project costs (lease payments) and maybe even generate a little cash for exploration (profits on sale of surface). They had a Coldwell Banker real estate agent in their office Thursday afternoon, June 5th.

2) Ben mentioned the water use at the U.V.X. and the desireability of our making some sort of payment to Jerome for that water (it comes through city pipes from the common town supply).

I suggest some inquiries to Verde and P.D. first. I have heard that P.D. is happy we are using water because it exercises the rights of mining interests in general to that water. In fact one portion of Jerome's supply comes by surface flume from above the U.V. pit and is P.D.'s contribution, on a loan basis, to Jerome. Andy Peterson, P.D.'s resident agent, has said we are using that water and it costs us nothing.

I have tried to reach Paul Handverger for advice on this but he is apparently out of town.

3) Bob Hodder and I gave some thought to just how the present plans for drifting west could affect the logistics of drilling Paul Handverger's footwall target (condition of our lease). Unfortunately, none of the areas reached will be any more desireable than the 1125 drift (SW of Edith on 1100-level) already recommended. The reasons are mainly two; the extensive 1204-stope intervenes between the Verde area and P.H.'s target, and the angle of intercept through the Verde fault would be less desireable (longer, more oblique) as one collars further west. What seems rather clear now is that the only feasible underground drill site from which P.H.'s target can be reached is the 1125 area.

4) We have a new imperative for reaching the 1300 level in the Edith shaft. That is the Josephine haulage level and water level which we have never reached. We have inspected the 1200 level and used a line to test the water level which has fluctuated around the 1300 sill. P.D. replaced the shaft guides to the 1200 level. Bell signal ropes extend to the 1100. The hoist cable is suppossed to be adequate to reach the 1300.

Our new need to inspect the 1300 for access is to check the draw points on the three openings available for dumping muck from the 950 level (see 1" = 100' plans). If ever we wanted to use the Josephine or any other part of the 1300 level for anything, properly bulkheading the lower end of whatever void we throw all our waste into, could save an awful pain-in-the-neck later on.

While on the 1300 of course, the limits of navigation would be checked, particularly out the Josephine tunnel to see where and how badly it has caved.

5) Ben's discussion of the U.V.X. flux economics included the assumption of a 90% SiO_2-Al_2O_3-Fe figure and payment of 50 cents per unit over the 75% threshold. Thus the basic $7.50/ton for 75% plus 7.50 bonuses for extra units yields $15 / ton flux payments.

I have given our whole rock data a good look and feel obliged to recommend lower figures for the Verde area. There, as detailed in my memo of May 20, 1986, the average SiO_2 content will be about 88% (diluted by the 5-foot hematitic zone). The alumina could be up to 1% and the Fe content could be 6% (fully incorporating the hematitic zone as contamination). The smelter's payment formula, SiO_2-Al_2O_3-Fe is thus 88-1-6 = 81. Round that to 80% and the purchase price is $10/ton. I feel that is a more realistic and conservative prediction for the flux from the Verde area.

The decrease of $5/ton in flux value produces an overall decrease from approximately $75/ton to $70/ton (7% decrease), assuming 0.2 oz/t Au and 2.0 oz/t Ag, 325/oz Au and $5/oz Ag. Alternatively, that 7% unit value decrease would be balanced by either a grade increase of 2% (.003 oz/t Au) or a gold price increase of a mere 2%.

6) I believe we all appreciate the importance of accompanying the drifting and bulk sampling program with a suitable drilling program. There is no other way to know what we are dealing with overall or to locate a high grade core equivalent to that mined in the Gold Stope.

That drilling can not be exclusively longholing. I feel some core drilling is absolutely necessary. The reasons include:

B5.1 a) About a ~~60-foot~~ limit on longhole length. If we do not succeed in reaching the 800 level (via Morgan winze) or the 903 level (via a new raise) then a 60-foot limit on drilling restricts us to less than one fourth of all the chert in the Verde target area. Only core drilling can physically reach many areas as sketched on the attached sections. Holes a little over 300 feet will be required for some higher elevation targets (up near the 700-level).

b) Only core can yield the crucial structural information necessary to track out the higher grade zones and direct our exploration. The DDH-806-1 log reveals a curious symmetry of grade distribution suggesting we drilled a fold nose and passed through each limb. This is reflected in X-Sec E(2)-E' attached. Longhole sludge would be useless in deciphering this problem. Larger core would be indispensable.

c) Samples for metallurgical work will require coring. How are we to know what happens to the hematite zone (5 feet of 50% Fe_2O_3 in 806-1) so crucial to our flux quality? Any other number of surprises could also be found out only by core and missed in sludge.

d) Sludge sampling is notoriously frought with difficulties. Assays are rarely reproducible. The lack of casing and difficulty of hole cleaning mean samples can never be fully trusted to represent any given interval. The assay results from our earlier seven core holes, however, are reproducible within a very tight range and are assignable to narrow intervals of footage. Grades varying dramatically over two-foot intervals, as we know to be the case, can only be understood by splitting appropriate intervals of core, not by mixing long intervals of sludge in the hole.

e) Larger samples (HQ core) are possible by coring than by longholing. The importance of this can not be overemphasized in gold programs, especially when the grades are marginal.

f) Coring yields a product handled by fewer persons and, because it is solid, is less prone to tampering. There is always some concern for salting by someone interested in prolonging a project and sludge is easy to salt.

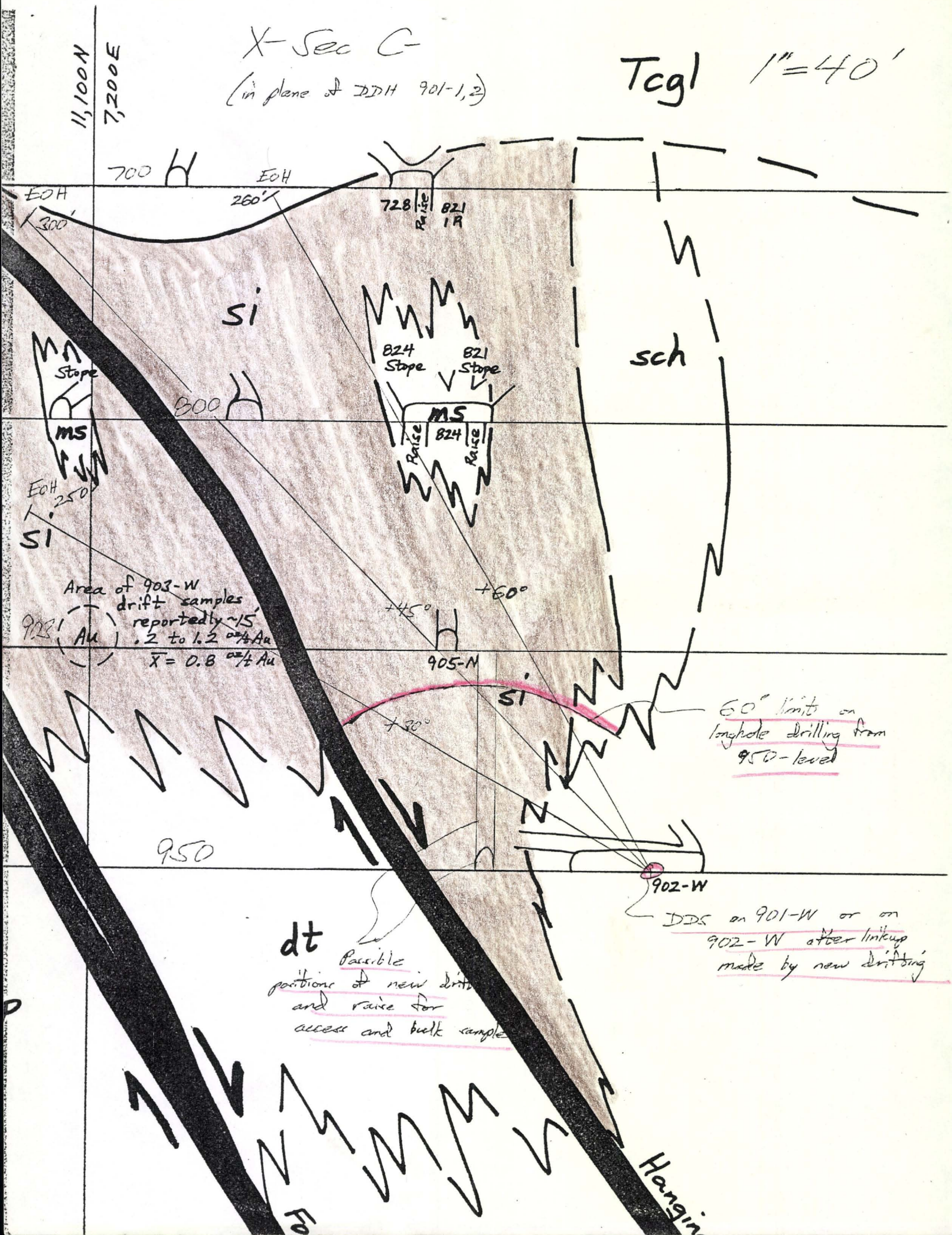
Of course drilling is time consuming and expensive. Careful planning to commence it early and keep it moving rapidly will have to be done. We know what kind of rig is necessary and we know a good driller.

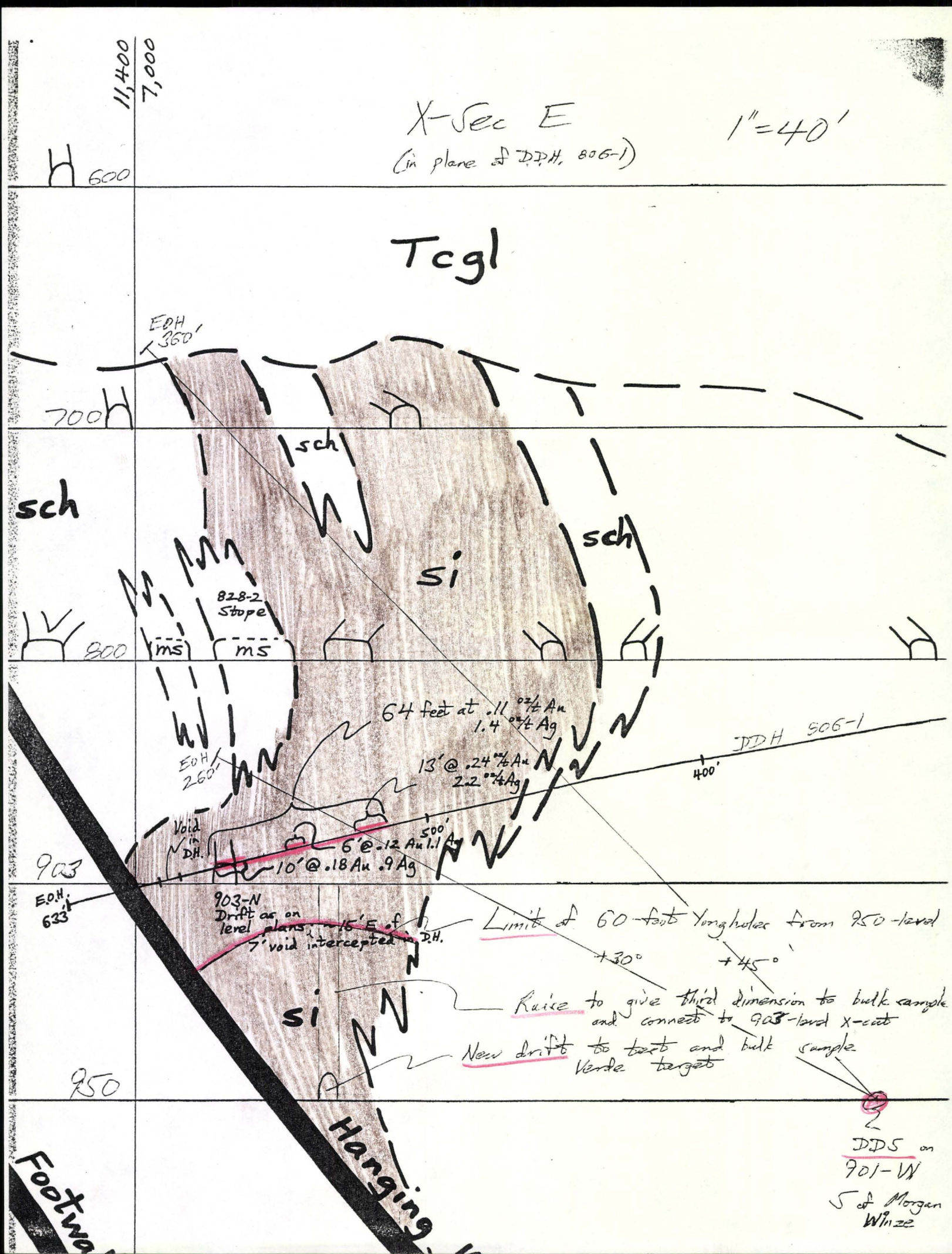
I recommend early establishment of a drill station at the dogleg just SW of the Morgan Winze on the 901-W drift (950-level). From there, up-holes to the S, SW, and W could test the maximum possible volume of the Verde target.

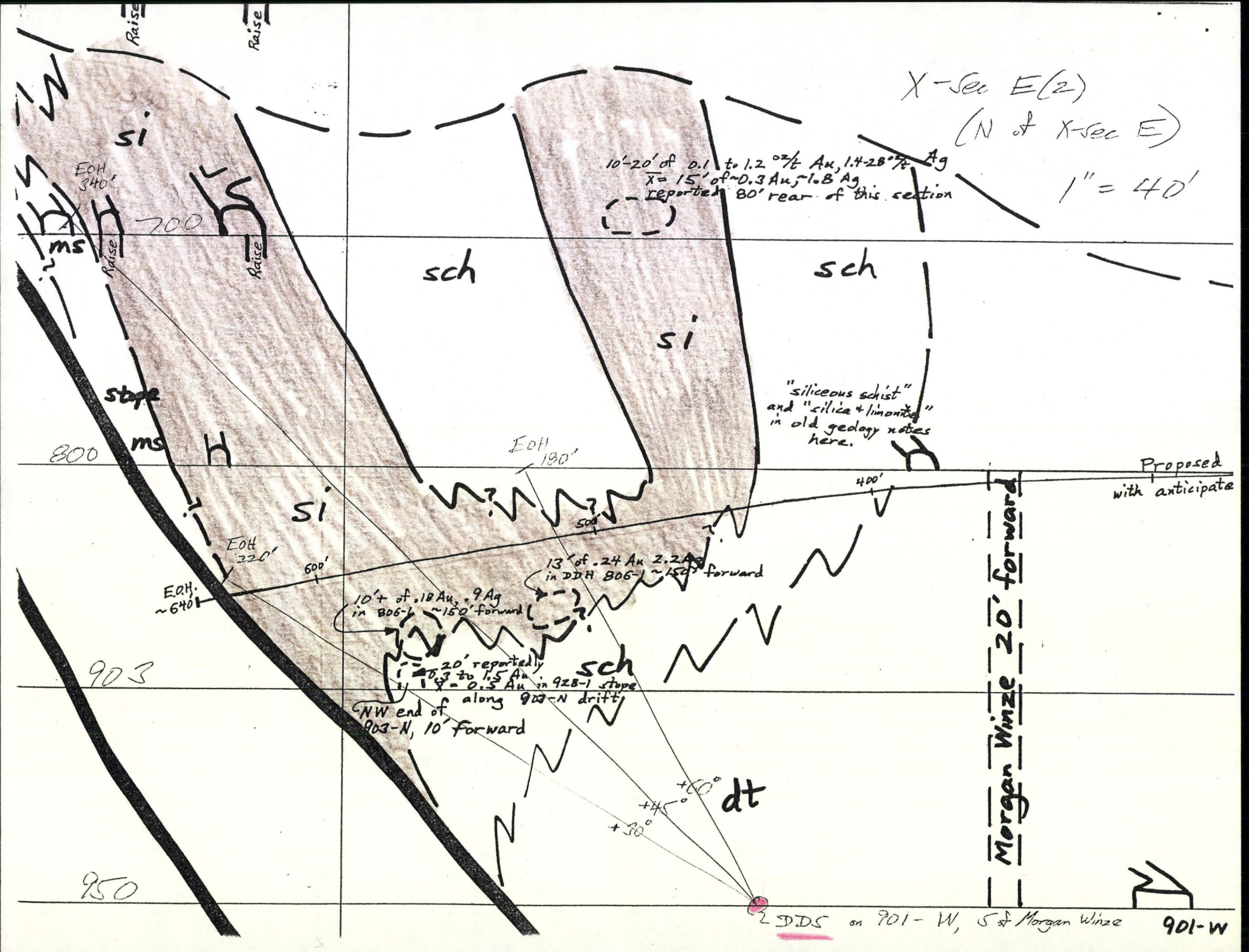
Concurrent with core drilling, channel sampling of ribs and longholing from the 902-W drift can be carried out. If access is gained to the Verde area at an upper level (903 or 800) then hand sampling and longholing can be carried out there too, but as a complement to core drilling rather than a subsititute for coring.

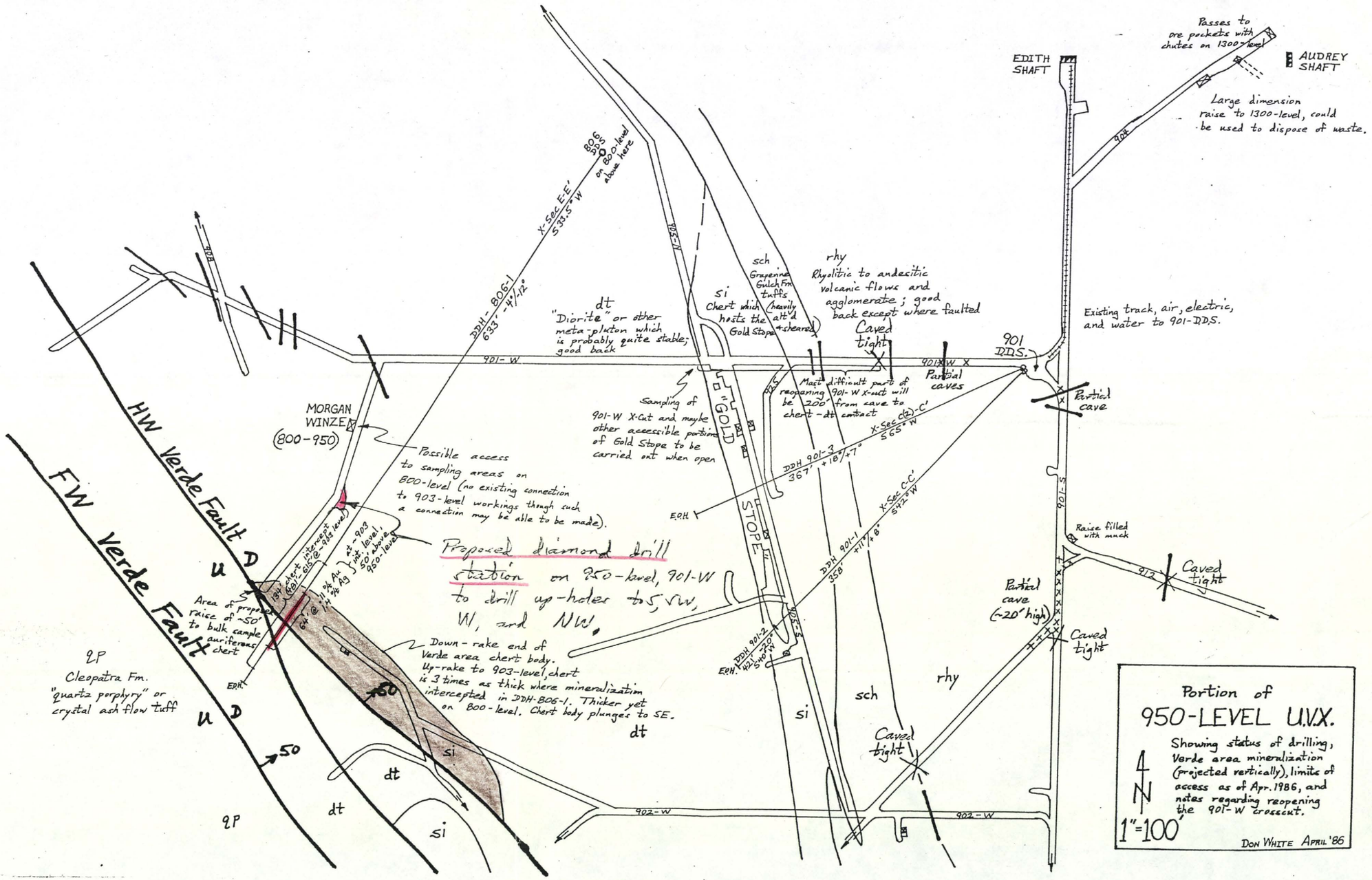
DW:sk

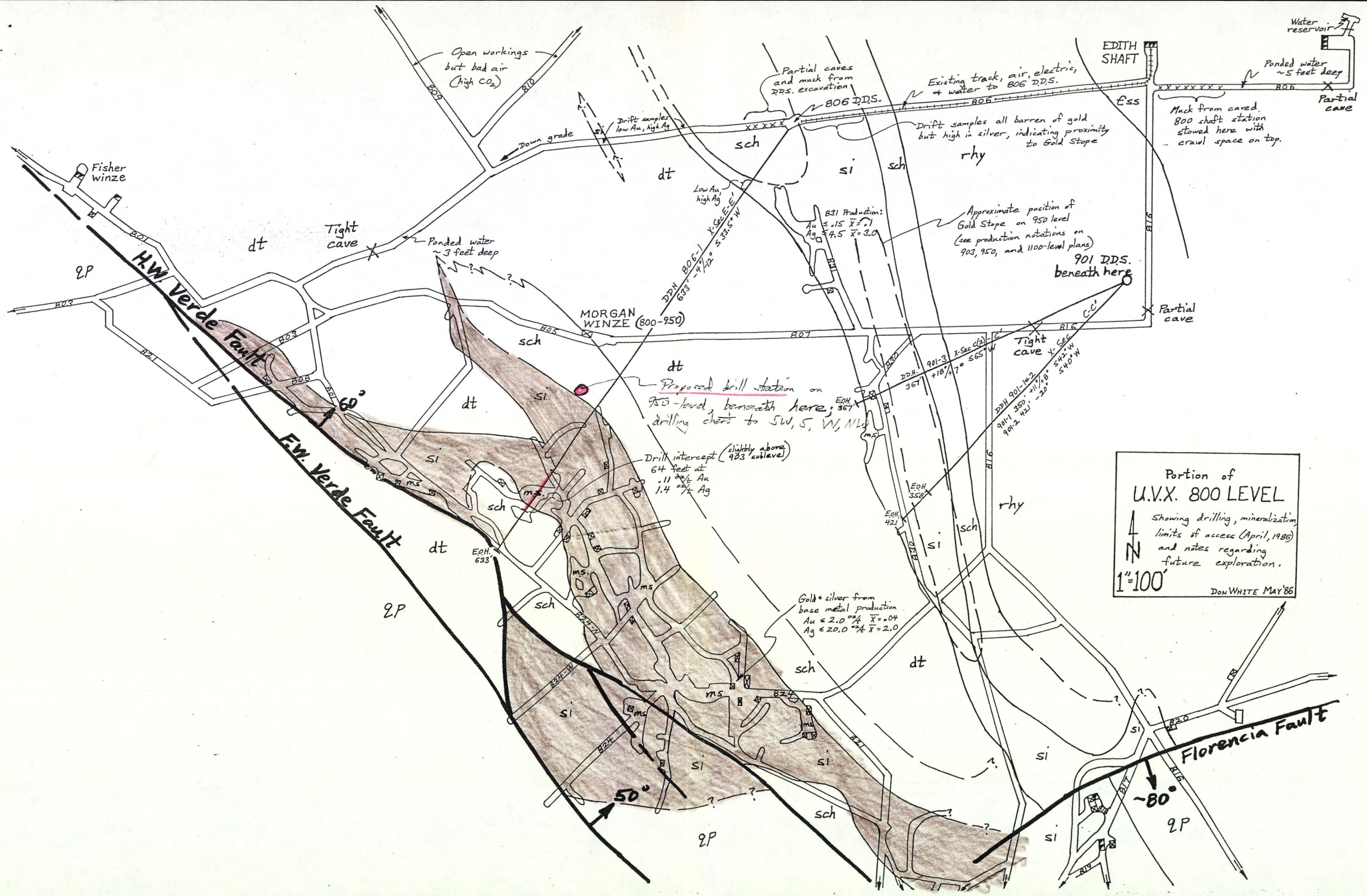
c.c. R.W. Hodder


X-Sec C-
(in plane of DDH 901-1,2)
Tcgl
1"=40'
11,100N
7,200E
700
EOH
260'
EOH
300'
728
Raise
821
IR
si
824
Stope
821
Stope
sch
Stope
MS
800
MS
824
Raise
Raise
EOH
250'
si
Area of 903-W
drift samples
reportedly ~15'
.2 to 1.2 oz/t Au
X = 0.8 oz/t Au
+45°
+60°
905-N
si
+30°
60' limit on
longhole drilling from
950-level
950
902-W
DDS on 901-W or on
902-W after linkup
made by new drifting
dt
Possible
positions of new drift
and raise for
access and bulk sample
Hangin


11,400
7,000
X-Sec E
(in plane of DDH. 806-1)
1"=40'
600
Tcgl
EOH 360'
700
sch
sch
sch
si
828-2 Stope
800
ms
ms
64 feet at .11 oz/t Au 1.4 oz/t Ag
DDH 806-1
400'
EOH 260'
13' @ .24 oz/t Au 2.2 oz/t Ag
Void in D.H.
500'
6' @ .12 Au 1.1 Ag
903
10' @ .18 Au .9 Ag
E.O.H. 633'
903-N Drift as on level plans, 15' E of 7' void intercepted in D.H.
Limit of 60-foot Yonghole from 950-level
+30°
+45°
Raise to give third dimension to bulk sample and connect to 903-level X-cut
si
New drift to test and bulk sample Verde target
950
DDS on 901-W S of Morgan Winze
Hanging
Footwa


X-Sec E(2)
(N of X-Sec E)
1" = 40'
10'-20' of 0.1 to 1.2 oz/t Au, 1.4-28 oz/t Ag
X̄ = 15' of ~0.3 Au, ~1.8 Ag
reported 80' rear of this section
si
sch
sch
si
si
ms
ms
stope
Raise
Raise
Raise
Raise
EOH 340'
EOH 220'
EOH 180'
EOH ~640'
700
800
903
950
"siliceous schist" and "silica + limonite" in old geology notes here.
Proposed
with anticipate
400'
500'
600'
13' of .24 Au 2.2 Ag in DDH 806-1 ~150' forward
10'+ of .18 Au, .9 Ag in 806-1 ~150' forward
20' reportedly 0.3 to 1.5 Au X̄ = 0.5 Au in 928-1 stope along 903-N drift
NW end of 903-N, 10' forward
sch
dt
+60°
+45°
+30°
Morgan Winze 20' forward
2 DDS on 901-W, S of Morgan Winze
901-W


Portion of
950-LEVEL U.V.X.
Showing status of drilling, Verde area mineralization (projected vertically), limits of access as of Apr. 1986, and notes regarding reopening the 901-W crosscut.
1"=100'
N
DON WHITE APRIL '86
EDITH SHAFT
AUDREY SHAFT
Passes to ore pockets with chutes on 1300-level
Large dimension raise to 1300-level, could be used to dispose of waste.
Existing track, air, electric, and water to 901-DDS.
901 DDS.
Partial cave
Partial caves
Caved tight
Raise filled with muck
Partial cave (~20' high)
rhy
Rhyolitic to andesitic volcanic flows and agglomerate; good back except where faulted
sch
Grapevine Gulch Fm tuffs (heavily alt'd + sheared)
si
Chert which hosts the Gold Stope
dt
"Diorite" or other meta-pluton which is probably quite stable; good back
Most difficult part of reopening 901-W x-cut will be 200' from cave to chert-dt contact
Sampling of 901-W X-Cut and maybe other accessible portions of Gold Stope to be carried out when open
Possible access to sampling areas on 800-level (no existing connection to 903-level workings though such a connection may be able to be made).
Proposed diamond drill station on 950-level, 901-W to drill up-holes to S, SW, W, and NW.
Down-rake end of Verde area chert body. Up-rake to 903-level, chert is 3 times as thick where mineralization intercepted in DDH-806-1. Thicker yet on 800-level. Chert body plunges to SE.
Area of proposed raise of ~50' to bulk sample auriferous chert
qP
Cleopatra Fm. "quartz porphyry" or crystal ash flow tuff
FW Verde Fault
HW Verde Fault
MORGAN WINZE (800-950)
"GOLD" STOPE
901-W
902-W
902-S
901-S
912
DDH 806-1 6'33" -4½/12°
X-Sec E-E' S33.5° W
806 DDS
800-level on above here
DDH 901-3 367' +18½/7°
X-Sec D(2)-C' S65° W
DDH 901-1 358' +11½/8°
X-Sec C-C' S42° W
DDH 901-2 921' -20° S40° W
E.O.H.
50


Portion of
U.V.X. 800 LEVEL
Showing drilling, mineralization, limits of access (April, 1986) and notes regarding future exploration.
1"=100'
DON WHITE MAY '86
N
Open workings but bad air (high CO_2)
Fisher winze
Tight cave
Ponded water ~3 feet deep
Down grade
Drift samples low Au, high Ag
Partial caves and muck from DDS. excavation
806 DDS.
Existing track, air, electric, & water to 806 DDS.
Drift samples all barren of gold but high in silver, indicating proximity to Gold Stope
EDITH SHAFT
Water reservoir
Ponded water ~5 feet deep
Partial cave
Muck from caved 800 shaft station stowed here with crawl space on top.
Low Au, high Ag
DDH 806-1 X-Sec E-E' 633' -4½° S33.5°W
B31 Production:
Au ≤ .15 X̄ = .1
Ag ≤ 4.5 X̄ = 3.0
Approximate position of Gold Stope on 950 level (see production notations on 903, 950, and 1100-level plans)
901 DDS. beneath here
Partial cave
MORGAN WINZE (800-950)
Tight cave
DDH. 901-3 X-Sec C(2)-C' +18° +7° S65°W
DDH 901-1&2 X-Sec C-C' 901-1 350' +11½° S42°W 901-2 421' -20° S40°W
Proposed drill station on 950-level, beneath here; drilling chart to SW, S, W, NW
EOH 367
Drill intercept (slightly above 903' sublevel) 64 feet at .11 oz/t Au 1.4 oz/t Ag
EOH. 633'
EOH. 358
EOH. 421
Gold + silver from base metal production
Au ≤ 2.0 oz/t X̄ = .04
Ag ≤ 20.0 oz/t X̄ = 2.0
HW Verde Fault
FW Verde Fault
Florencia Fault
60°
50°
~80°
dt
sch
si
rhy
ms
QP
fss
801
803
805
807
808
810
816
817
820
821
824
824-W
824-N
826
828
830

R.F.D. III

BASE-METAL AND PRECIOUS-METAL DISTRIBUTION AT THE UNITED VERDE EXTENSION MINE, JEROME, ARIZONA

Abstract of a talk to the AZ Conf. of AIME, Tucson, Dec. 8, 1986

Don White, Geologist, C.P.G.
521 East Willis St.
Prescott, AZ 86301
602-778-3140

The United Verde Extension mine operated from 1915 through 1938, principally as a high grade copper mine. Production totalled about 3.9 million tons grading 10.2% Cu, .04 oz/t Au, and 1.7 oz/t Ag. Some 80% of that was from one main supergene-enriched, volcanogenic, massive sulfide body which averaged 15% Cu and about .03 oz/t Au. That was the high-Cu, low Au, low SiO_2 "sulfide ore." Another ore type averaged about 5% Cu with intermediate gold (.06 oz/t) and silica (55%) values. This so-called "silica ore" occurred in a series of deposits above, flanking, and along strike from the main sulfide orebody. The final ore type has been called "gold-only" and contains less than 200 ppm of any base metals, but is an auriferous siliceous rock averaging 0.4 oz/t Au and 90% SiO_2. Thus there is a tri-modal distribution of ore types by silica percentage with a strong differentiation of Cu (with Fe, S) in the low-silica sulfide ore, both Cu and Au (plus the highest Ag and alumina grades) in an intermediate silica ore, and high gold (virtually no base metals) in the very siliceous gold-only ore. It is the latter that is the subject of ongoing underground exploration.

Gold-only ores are meta-chert-hosted. The chert bodies form wedges about 1,000 feet long off the north flank of the massive base metal sulfide body. The cherts display a great variety of hydrothermal fracturing, sedimentary brecciation, slumping, and oxidation. Stope geometries in one gold-only deposit clearly mimic small vent cone shapes. These cones were likely smaller, peripheral vents to the main sulfide vent, and were active after the bulk of the sulfide deposition. A clear grade zonation is also exhibited, with highest gold in the cores of the vents and near the stratigraphic footwall. The upper portions of the chert stratigraphy include thin, massive, hematite beds, and alternating, cyclic, chert breccias graded by clast size and topped by fine laminated, very fine grained, quartz-hematite-goethite. Double-graded bedding is evident, as is soft sediment deformation. Oxidation appears to be hypogene.

A very high-energy oxidizing environment including submarine volcanism and turbidites is indicated.

Gold occurs in the native state and as electrum and is associated with hematite and quartz veinlets. Hematite and coarse grained quartz are seen in thin section to fill fractures and vugs both within clasts and within matrix of the chert breccias. Hematite has also replaced carbonate. Limonite overgrowths are common and supergene gold enrichment must be suspected but has not yet been ascertained. Gold is associated with a trace metal assemblage of Ag, As, Sb, Bi, Sn, Mo, V and base metals. All except silver trail off across stratigraphy just as fast or faster than the gold.

Hydrothermal alteration is dominantly feldspar destribution by argillization of the immediate hanging wall and footwall volcanic rocks. A more distant hanging wall carbonate impregnation and veining up to three hundred feet above the cherts indicates either ongoing hydrothermal activity while the capping sequence of intermediate flows and pyroclastics accumulated or else carbonate remobilization by the later, perhaps subvolcanic diorite. Either way, carbonate in hanging wall rocks is an exploration aid for auriferous zones in the underlying chert.

Present gold exploration has identified unmined auriferous chert breccias of the gold-only type. Deposit delineation by underground drilling will continue and may well add to our understanding of volcanogenic gold deposits.

Don White
521 E. Willis St.
Prescott, AZ 86301
602/778-3140

December 1, 1986

Robert A. Rivera
MINERALS ENGINEERING CO.
910 Denver Center Bldg.
1776 Lincoln St.
Denver, CO 80203

Dear Bob,

Thanks for your OK to "steal" a couple diorite samples from your AV-27 core in Jerome. A student of Dr. Robert Hodder at Univ. of Western Ontario will be studying the U.V.X. diorite and your samples give him a little extra perspective.

The samples we took are blocked in the core boxes. They are two, each about 4 inches, from 1976' and 2056'. We shall be happy to share any chemical or petrologic data coming out of their study. Enclosed is an abstract of my upcoming talk to AIME in Tucson. I have completed a three-dimensional, balsa-wood, model of the U.V.X. workings which I think you'll want to see when next in Jerome. It is quite revealing as to deposit geometries and structures. Give me a call and we'll try to rendezvous.

Best Regards,

Don

Don White
Geologist, C.P.G.

DW:sk

Enclosure

cc: Ben F. Dickerson, III

M E M O

TO: Ben F. Dickerson, III, and Carole A. O'Brien

FROM: Don White

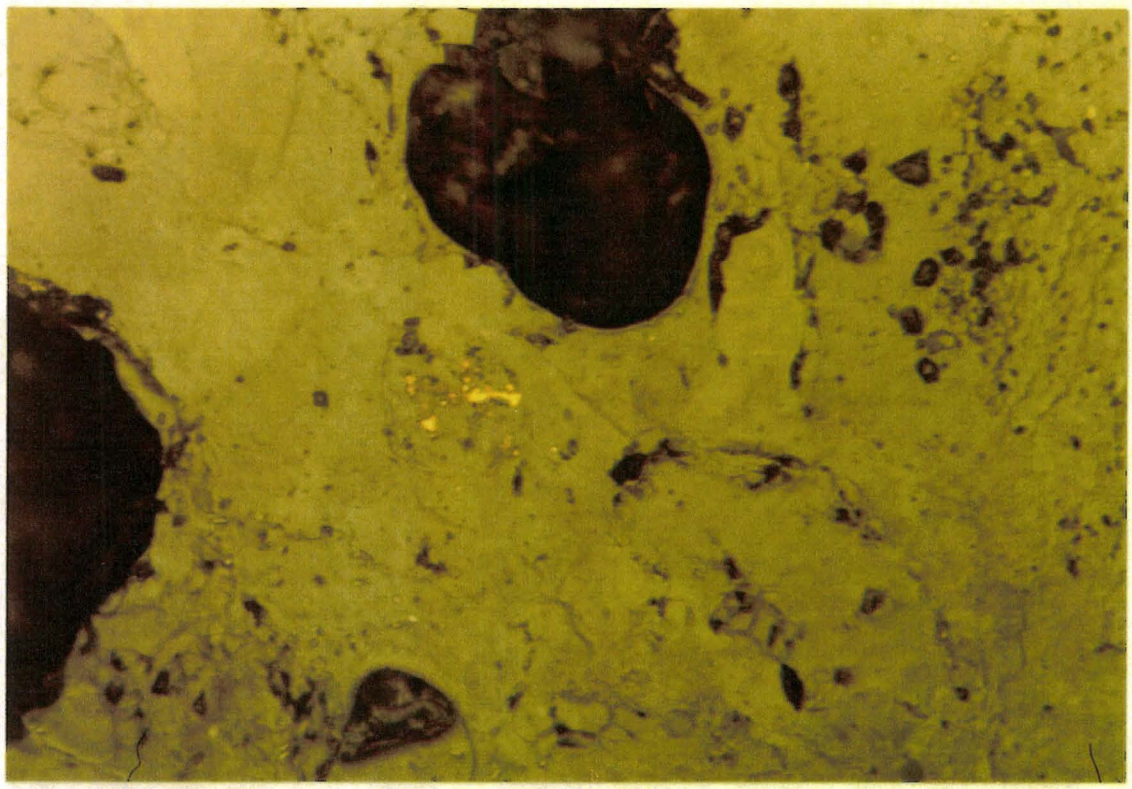
DATE: November 16, 1986

SUBJECT: U.V.X. ore minerals in polished sections

Peter McLean, one of R.W. Hodder's graduate students, has succeeded in spotting gold and what is probably electrum in highly polished sections (reflected light) from the 901-3 and 806-1 drill core. The attached photographs from Peter show how gold and electrum occur within gold and hematite and along their grain boundaries. The captions are taken from Peter's observations.

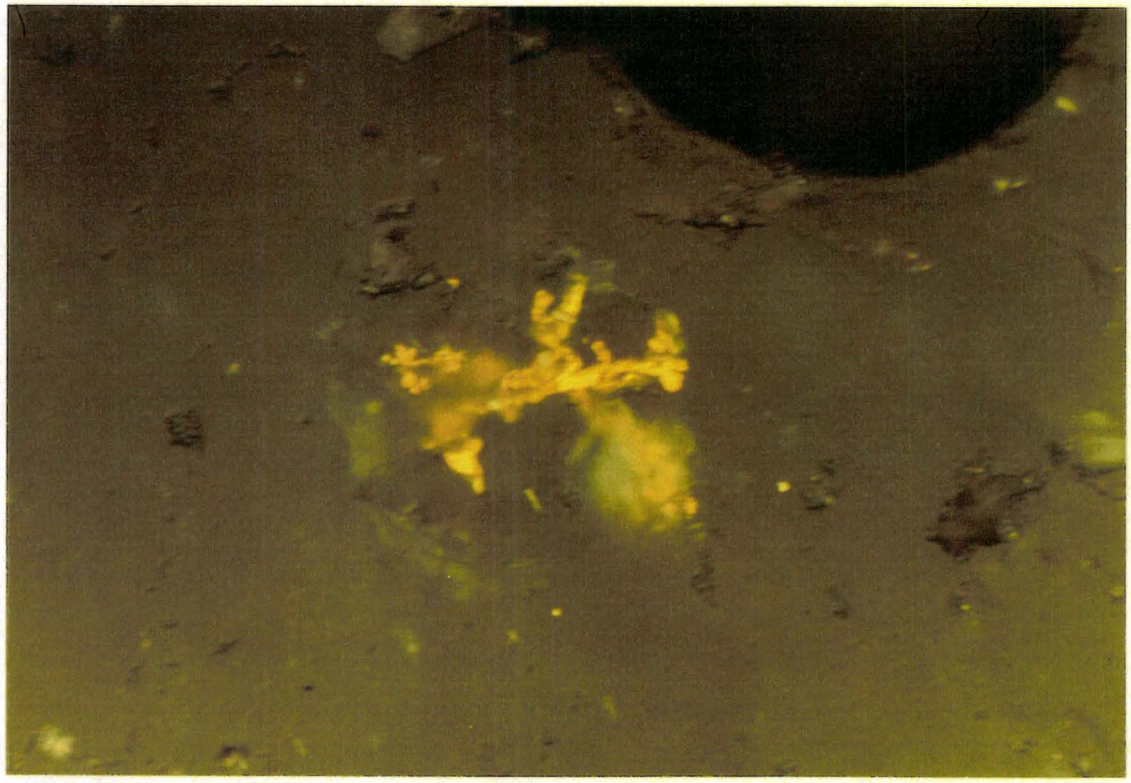
Also accompanying is an updated version of Peter's initial report of Sept. 15, 1986 including many thin-section descriptions and photos.

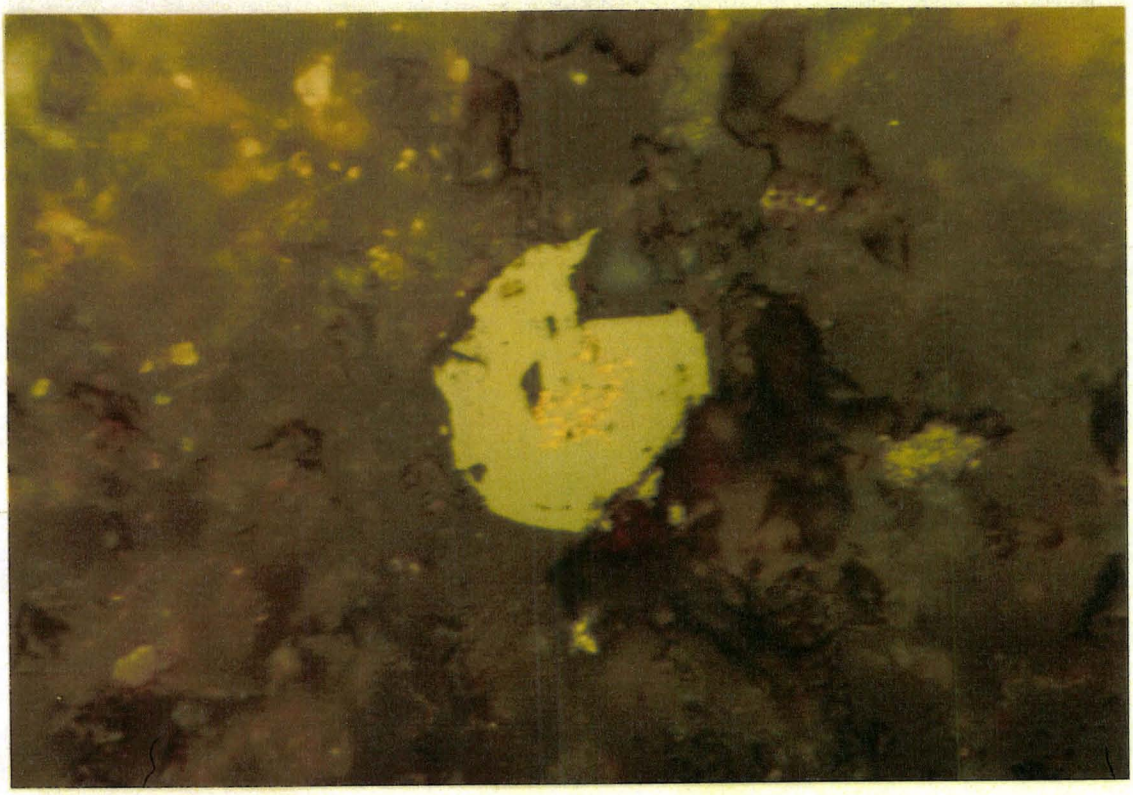
DW:sk



Sample 806-1, 577'

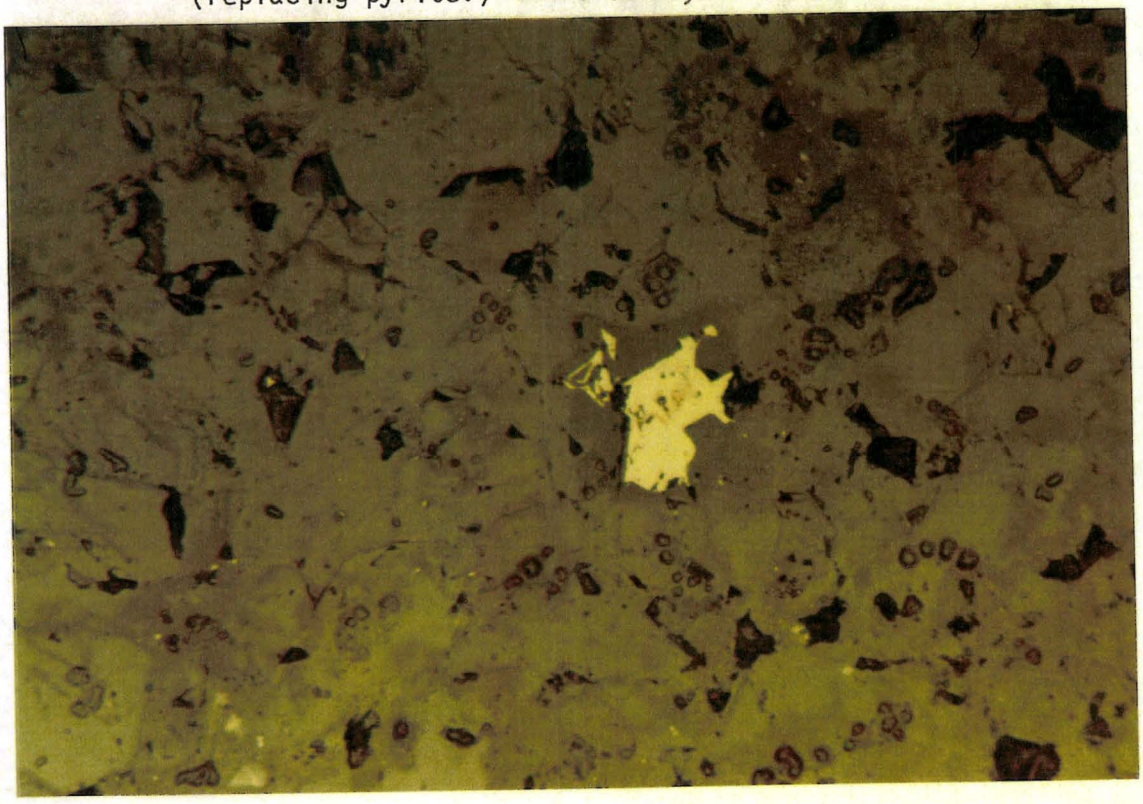
Some of the native gold grains seen above (128 X) and below (320 X). Occurrence is in quartz with some hematite occurring as blebs.

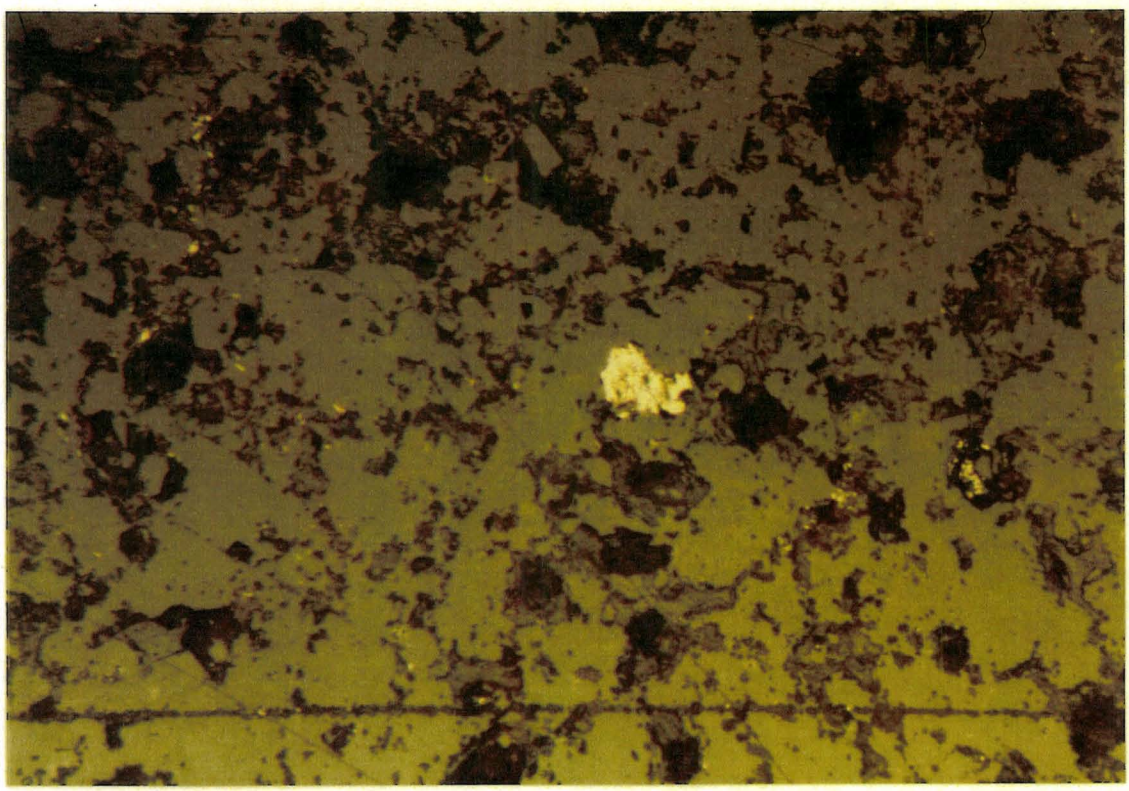




Sample 901-3, 316'

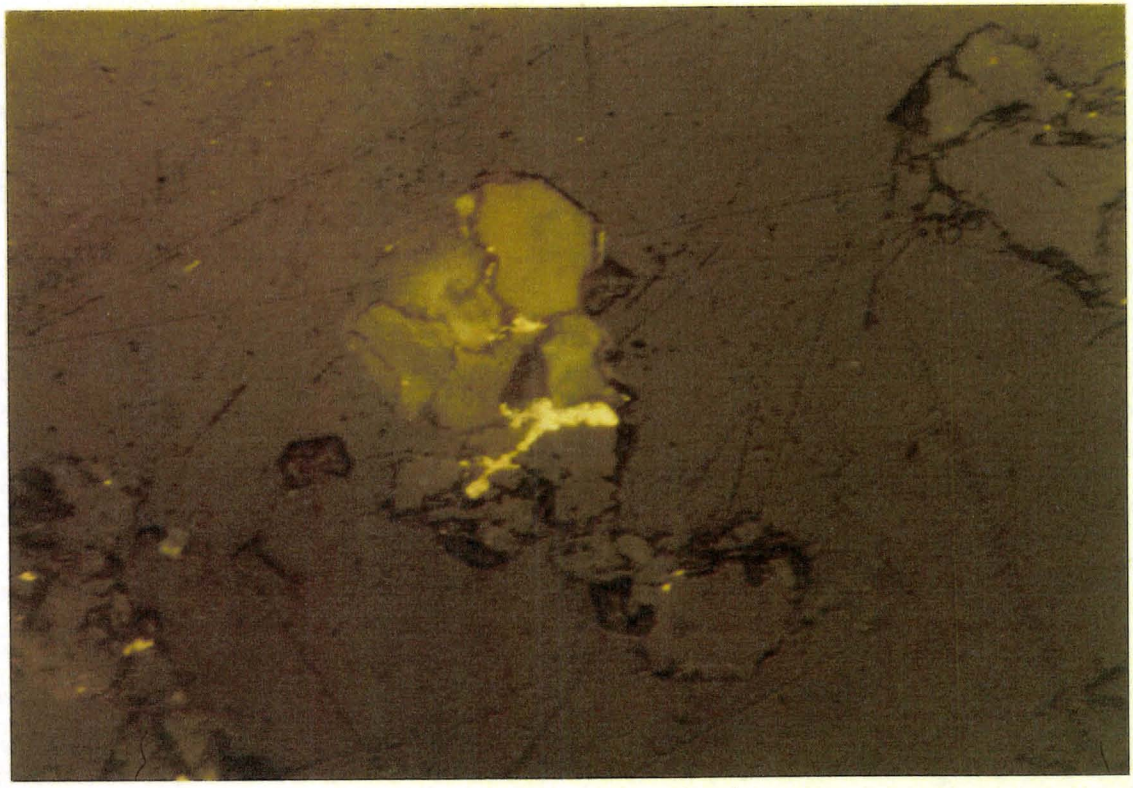
Gold in hematite; in both cases only within the core of the grain. Note hexagonal form of the hematite above (replacing pyrite?) 320 X above, 128 X below

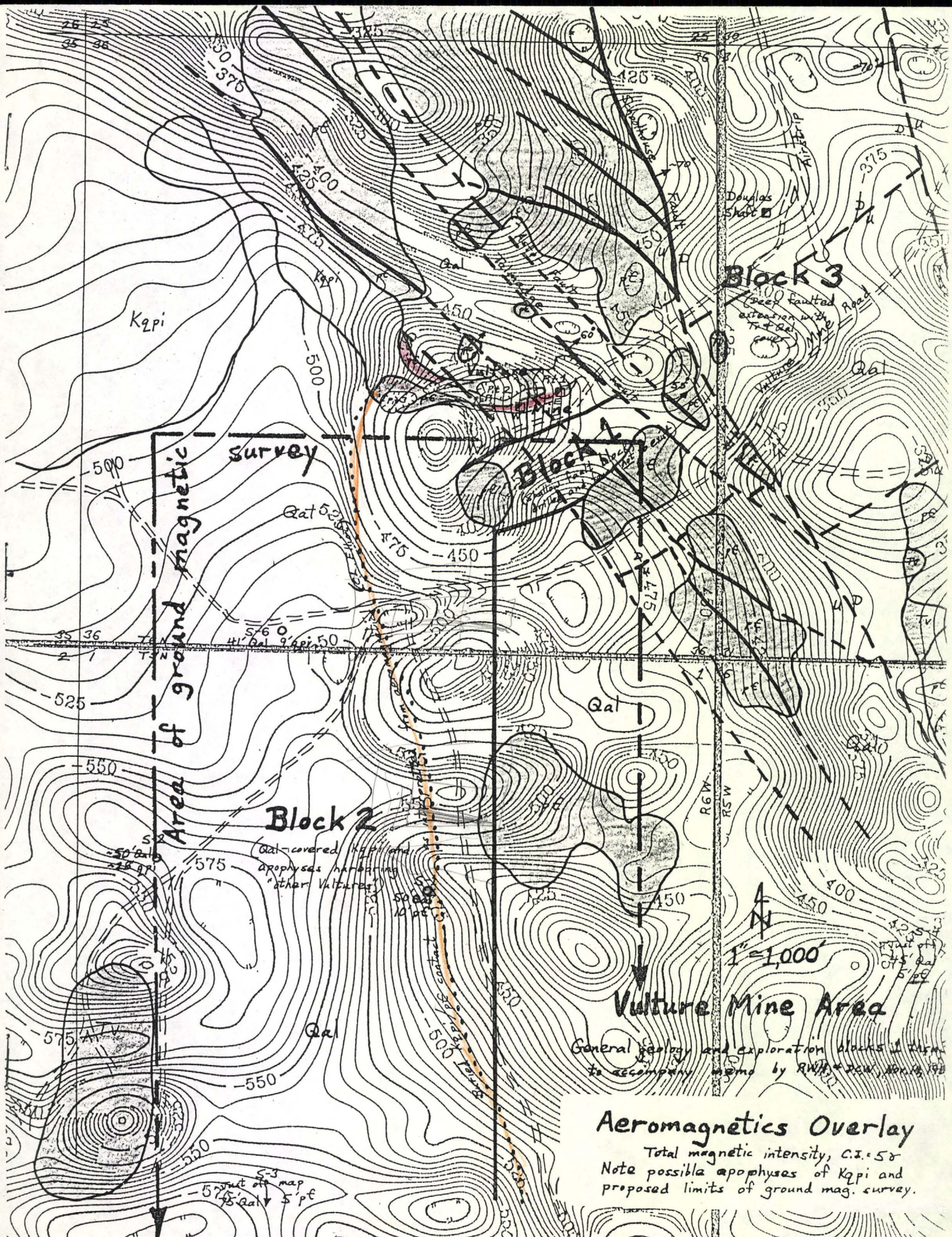




Sample 901-3, 321'

Above, a possible electrum grain in quartz with abundant hematite (128 X) and below, electrum between grains in a brecciated clast (320 X).




Area of ground magnetic survey
Block 3
(Deep faulted extension with Tertiary Qal cover)
Block 1
Block 2
(Qal-covered Kqpi and apophyses harboring "other Vultures")
Douglas Shaft
Vulture Mine Area
General geology and exploration blocks in this area to accompany memo by RWH & PCW, Nov. 13, 1981
Aeromagnetics Overlay
Total magnetic intensity, C.I. = 5γ
Note possible apophyses of Kqpi and proposed limits of ground mag. survey.
1" = 1,000'
Kqpi
Qal
R6W
R5W
T5N

Don White
521 E. Willis St.
Prescott, AZ 86301
602/778-3140

November 30, 1986

Robert W. Hodder
Univ. of Western Ontario
London, Ontario
Canada N6A 5B7

Dear Bob,

I trust you're returning from St. Vincent just about as I send this off. I regret very much having to miss that trip and hope to have another opportunity to join you there or elsewhere.

Peter McLean phoned yesterday to say he has some slides in the mail. I shall incorporate them into the AIME talk. Thanks much for that and to Peter for his efforts. Copies of his latest photomicrographs which I forwarded to Ben and Carole are also enclosed here for you.

Another enclosure is a series of longitudinal and cross sections of the Verde target area at U.V.X. in possible drill planes from a proposed drill station out near the Morgan Winze on the 950 level. Since we have started double shifting on the new crosscut drive, we hope to have that station set for drilling by the New Year. Thus I can anticipate wishing your review of core and assays, etc. by March or, at the latest, April. How about checking your calendar to see what we can tentatively schedule?

The other thing at the U.V.X. is that we're taking a harder look at reserves right around the Gold Stope; hanging wall extensions, strike extensions, pillars, and down-dip fringes. Since we may reopen the 1125 crosscut for Paul Handverger's drillhole, we will reap the benefit of access to the old draw points on the main body of the Gold Stope and be well positioned to drill the lower extremities.

For your student Steven Harding's benefit I have sent a 950 level plan. It allows him to locate the approximate positions of his diorite samples from drill core and those you collected from the 901-W crosscut. You already have the cross sections shown on the plan, and the drill logs.

Having looked anew at the so-called "schist" at the west margin of the diroite, I am all the more convinced that it is altered diroite. Paul Lindberg's theory of a dilatant intrusion, parting the stratigraphy at the chert breccia horizon, has me fascinated. My suspicion is that chemical and petrologic study of the diorite samples can add considerable support to this. If, for instance, a dilatant pluton parts the brittle chert and reacts with it on both walls, perhaps even assimilating some of it as in a natural fluxing phenomenon, then there should be some signature of that event and reaction in the diroite. Some thought as to what signature to search for may give Mr. Harding some assistance. I am familiar only with

megascopic characteristics and there we see that grain size, degree of foliation, fracture density, amount of iron staining, and carbonate content all seem to vary with distance from the chert-diorite contact. When time allows, I'll try to log those features along DDH-806-1 core and in our new crosscut.

I have had a fresh look at the hills just south of the Vulture Mine with an eye for veining, silicification, structural distortions or any hint of Laramide sills and see none. I'll talk with Chuck Elliot about the list of questions next week.

Thanks again for the Gold '86 Proceedings, an excellent volume. And thank you to Peter for the excellent microscope work and the XRD results.

Cheers,

Don

Don White
Geologist, C.P.G.

DW:sk

Enclosures

cc: Ben F. Dickerson, III

U.V.X. Diamond Drilling

from Morgan Diamond Drill Station
(901-SW drift)

Cross-Section	Direction	Inclination	Hole Length	Total footage in Section
III	due south	+ 15°	300 ft.	
		+ 30°	260 ft.	
		+ 45°	320 ft.	
				880 ft.
IV	S 30° W	+ 30°	200 ft.	
		+ 60°	280 ft.	
				480 ft.
V	S 60° W	+ 30°	300 ft.	
		+ 60°	200 ft.	
				500 ft.
VI	due west	+ 55°	350 ft.	
				350 ft.
VII	N 60° W	+ 55°	260 ft.	
				260 ft.
	Five planes	all uppers max. 60°	max. 350 ft.	2,470 ft.

D.C. White
November, 1986

DMEA

Author?
Date? (post 1924)
prob " 1934.

NOTES ON THE UNITED VERDE EXTENSION MINE

The United Verde Extension Ore Zone occupies an area in the hanging wall of the Verde fault about 1500 ft. along the strike of the fault by 600 ft. across. The ore is located in an area of Precambrian schists.

Ore has been mined from the 1900 level to above the 800 level in the schist areas, the bulk coming from between the 1600 and 1100 levels. Some ore has also been mined from the 700 to 300 level in a conglomerate formation in the north end of the ore zone.

wet tons
-6% H_2O

The mine has produced 4,110,000 tons of ore. The main orebody produced 2,100,000 tons, in round numbers; the 819 orebody, in the quartz area above the main orebody, produced 200,000 tons. North of the main orebody, the 1507 veins produced 350,000 tons, the 1207 country 475,000 tons. The remainder, some 475,000 ore tons come from smaller orebodies scattered thruout the mine.

Mining in the main orebody began in 1916. Stopes were started in the central portion of the orebody and also near the west edge. Later stopes were started in the east end of the orebody. From then on mining consisted in whitling slices off the ore mass until it was mined out. The mining was carried in steps, so the operations of the different levels did not interfere. The result was that the 1300 level was mined slightly ahead of the 1400, the 1400 ahead of the 1500, and so on.

The ore was mined by the ordinary square set method, with a Mitchell slice used in mining some of the pillars.

Over a period of years it was established that 90% of the square sets mined were filled; and that better than 90% of each set was filled [12 to 13 - 17 cuft. cars per set]. The fill may be assumed to compact 20%. The amount of compacted fill then is .9 x .9 x .8 = .648 or 65% of original volume. The timber left in the stopes will run from 8 to 9% by volume. Assuming 50% of the timber rots out, there remains 4% as fill. This leaves voids of 31% of the excavation.

where?

The fill was obtained from the usual development work consisting of drifts raises and shafts, and a surface glory hole. Considerable waste was also sorted out in the stopes, in the outside orebodies.

The excavation made thru mining is very nearly 36,000,000 cuft. or 1,333,000 cu. yds. A figure of 9 cuft. was used in estimating ore reserves. In estimating ore production a figure of 30 tons per square set of 247 cu.ft. was used. This method was used over a period of many years, and production figures checked very closely with shipments to smelter. This gives 8.25 cu. ft. per ton. Allowances for a certain amount of overbreak in mining raises this figure to 8.7 or 8.8.

After mining operations had been carried on for a few years a cave developed in the quartz area above the main orebody. This cave extended up thru the quartz and finally checked itself in the schist areas which it encountered from the 1100 level up. The mining of the smaller orebodies did not develope caves, except of very local character.

The effect of mining operations has been to cause a sag in the overlying rock formations with the greatest sag directly over the main orebody, diminishing from this point in all directions.

In the fall of 1921 the U.V.X. began the development of two new levels, the 950 and 550. These levels were driven for prospecting purposes. Both of these levels passed over the Main Orebody area. A level record dated March, 1918 of a frog at 816/817 in this area gives the elevation as 4340.33. The next record, dated September, 1921, gives 4340.19, a difference of .14 ft. in a 3½ year period. This marks the beginning of sagging of the formations. The next record, dated January, 1924, gives the elevation as 4339.29, a difference of .90 ft. over the 2 year, 4 month period. Sometime during 1923, a dislocation of the hanging wall of the fault was noticed at the old U.V. hospital, at a point 800 ft. above the described area on the 800 level. This is the first recorded instance of movement of the hanging wall block, to our knowledge.

The hanging wall block involved in the sag has settled slowly and very evenly. On the Bitter Creek Tunnel elevation the drop on the fault is about 2.5 ft. on the footwall proper and about 1 ft. on the hanging wall slip. On the east side there has developed a more or less vertical fracture, extending from below the 1300 to above the 550 level. To the south there is no discernible break on any level. The formations here simply sagged. This is also the case on the north end, with the exception of the 950 level, where some cracks have appeared in a quartz area in that end. The area involved is roughly 800 ft. x 1100 ft. on the 950 level. On the surface it comprises the area between School Gulch to the south, Bitter Creek to the east and north and the Verde fault to the west. The greatest amount of sag on the 950 level of which we have record is 14 ft. This amount is carried up past the 800 level. On the 550 and Bitter Creek elevations the sag amounts to about 12 ft.

During the years that the movement of the hanging wall block has been in progress extensive development work and mining has been carried on in the block.

It necessitated raising track and backs of drifts from time to time. But the movement has been so even and gradual that the rock structure within the block is still virtually undisturbed in the Precambrian from the 950 level up, and but very little disturbance is shown in the conglomerate and lava above. This condition also persists on the surface along the Daisy road and in the hillside above.

20 Mayfair Drive,
London, Ontario,
N6A 2M6

September 27, 1986

Mr. Donald C. White,
521 E. Willis Street,
Prescott, Arizona,
86301

Dear Don:

Thanks ever so much for the memo of September 15th. which just arrived with the facinating account of the siliceous rocks of the Gold Stope. It is very interesting that the color differences are so marked and the clast size and type so variable. The thicknesses of clay between siliceous horizons is also interesting and if you wish to send off some small samples of that material I shall get a little XRD work done to identify the clays. This might help us in thinking about primary versus secondary effects. It would be worth knowing if those clays are after feldspar or are primary clays.

XRD on Gold Stope clays

I have a chap working on the samples of diorite now and hope to have some intial descriptions shortly. Your ideas on the diorite actually being a flow which has been mineralized are important and will make us look hard for any evidence of precious metals in the diorite samples we have here.

Attached is Peter McLean's preliminary report. He has been in the field this past month on thesis work and hence the recommended additional work has not yet been done. I shall be getting at that next week after we have the Gold '86 meetings in Toronto. In brief, we have yet to get a solid indentification on any gold-bearing mineral. Peter thinks he has electrum in 3 sections, 806-1 515', 517' and 533'. It is in veinlets as is the late quartz and hematite after carbonate. There is a general impression in these thin sections of an initial fine grained quartz which has subsequently been broken and the fractures filled with a coarser grained quartz with some carbonate but mostly hematite. There is no good evidence of much initial sulphide, but rather a sulphur-poor environment throughout and probably concentration of the gold along with the hematite. We do not see much suggestion of silicification. Rather it looks like a primary siliceous deposit that has subsequently been broken, even stirred in some instances to give some hetrogeneity of clasts, and rehealed. We might possibly be able to add some support to this interpreted sequence if we found those clay horizons to be primary hydrothermal clays rather than clay after feldspar of a tuff.

Impressions from 806-1 samples studied by P. McLean with

I now have reservations which put me into Phoenix in the early evening of Wednesday, November 12. Hence, I could

Arriving evening of Nov 12 (Wednesday)

be anywhere you wanted me that evening, be it Wickenburg, Cottonwood, or Prescott. I need to be back at the school for Monday morning ideally but could stretch this to Tuesday if this would help your schedule. I've been tied down as classes have started but that mid-November time looks good and I would be delighted to hear your thoughts and to get caught up. I'll be less restricted by class times after December 5th. as our examination period starts then.

Sorry to have been a very random contact so far this Fall. Really look forward to getting back to the rocks with you and I much appreciate your good memos.

All the very best to the family.

Yours truly,

R.W. Hodder

Don White
521 East Willis St.
Prescott, AZ 86301
602/778-3140

October 7, 1986

Pat Harris
President
H.A.D., INC.
11650 Iberia Pl, Ste. N-1
San Diego, CA 92128

Dear Pat,

My compliments to your crew that just completed the drilling at the Vulture property. They are well trained, well equipped, well coordinated, hard working, and skilled. Thus I was most pleased with their performance on the job.

I encourage you and your crews to never lose track of your purpose in the eyes of your customers. That is to acquire good samples. Thus the quality of the sampling procedures should never be comprimised.

My only criticism of the most recent crew at the Vulture is their littering. After spending tens of thousands of dollars for accessories to your rig, why not 79 cents for a trash bag so geologists like me don't have to follow around picking up soda cans, rags, sandwich bags, and oil cans?

But thanks for a job well done.

Regards,

Don White

Don White
Geologist, C.P.G.

P.S. Those potential clients I mentioned, to whom you ought to send your brochure are:

Bruce D. Kay
Senior Geologist - Western U.S.A.
Western Mining Corporation (North America) Limited
Exploration Division - Western U.S.A.
14453 West 3rd Avenue
Golden, Colorado 80401
303-278-3527

and,

Paul Strobel
Resource Exploration and Development Company
P.O. Box 21088
Reno, NV 89515
702-329-0666

DW:sk

cc: Ben F. Dickerson, III

New Mexico Bureau of Mines & Mineral Resources
Socorro, NM 87801

A DIVISION OF
NEW MEXICO INSTITUTE OF MINING & TECHNOLOGY

Information: 505/835-5420
Publications: 505/835-5410

September 19, 1986

DMEA LTD.
SEP 25 1986
RECEIVED

Mr. Ben F. Dickerson III
D.M.E.A. Ltd.
7340 East Shoeman Lane
Suite 111-B-(E)
Scottsdale, AZ 85251

Dear Mr. Dickerson:

This is to formally request your permission to collect geologic samples from the UV Extension's Gold Stope workings, possible extensions, and appropriate drill intercepts on the property you are currently leasing from Verde Exploration. The samples will be used both to characterize the gold mineralization and chert host rocks and to assess possible relationships to the hydrothermal system that produced the UV Extension massive base-metal sulfide ores. In addition to myself, these studies will involve Drs. David I. Norman and Andrew R. Campbell of the Geoscience Department at New Mexico Tech, and possibly a graduate student to be named later.

More specifically, we would like to collect representative samples of both gold-bearing and apparently barren cherts to examine:

1) Mineralogy - What is the exact mineralogy of Au-bearing cherts, and how and where does the gold occur?
2) Chert structures and textures - As clues to depositional as well as subsequent tectonic history.
3) Chemistry of cherts - To see if there are significant differences between chert bodies or horizons and/or if there are compositional gradients within individual bodies or horizons.
4) Stable oxygen isotope analyses - As paleotemperature indicators.
5) Microlite sizes - Also a potential relative paleo-temperature indicator, although more susceptible to disturbance by subsequent regional metamorphism.

It is difficult to put an absolute time limit on a study like this, but I would guess that two years would be adequate to do the analytical work, organize and interpret the results, and prepare a manuscript for review.

I spoke with Paul Handverger yesterday and outlined the work we hoped to do in and around the Gold Stope. He was supportive of the study and indicated that Verde Exploration would have no objections as long as we kept them informed of our progress in a timely fashion. We would agree to give both you and Verde Exploration exclusive access to our analytical data as it is generated, and would plan on giving you both the opportunity to review the final report, be it an M.S. thesis or paper submitted to an appropriate journal, prior to the report's official submission. All of us doing the initial sampling would be willing to sign a standard release form if you require it.

Thank you for considering our request. Please feel free to call me if you have additional questions or concerns.

Sincerely,

James M Robertson

James M. Robertson
Senior Economic Geologist

JMR:lm
xc: Paul Handverger
Don White

M E M O

TO: Ben F. Dickerson, III, and Carole A. O'Brien

FROM: Don White

DATE: August 13, 1986

SUBJECT: U.V.X. underground cleanup progress

Joe Fernandez and the writer visited U.G. Tuesday, August 12 because the miners claimed they hit a "solid wall" where the 901-W crosscut enters the Gold Stope. Indeed, what they say is true.

We are now at a point about 250 ft west of the 901-DDH collars or about 11,700 N by 7,500 E on the U.V.X. mine grid. At a point just 15 ft W of the junction with the 925 drift branching south, there is a solid wall of chert with no apparent slip surface to explain a dropping of the back. We are fully 30 ft east of or short of the Gold Stope workings as documented on the stope sheets.

The solid wall is from a back that is only about 5 ft high to the top of a muck accumulation about 3 ft high. Upon cleaning up the heading we may find a gap underneath and ultimately, when we're past the point, we will probably figure out what slipped how, but in the meantime it is awfully puzzling.

The junction with the 925 drift going south (present end of track, rock bolting, timbering, etc.) is the contact between the "schist" (Grapevine Gulch Fm; tuffs, sediments, etc.) which is so cave prone, and the top of the Gold Stope-hosting chert body. The stratigraphic hanging wall zone of chert is dramatically colored red, white, and brown; hematitic, clean, and limonitic stained granulated (sandy textured) quartz respectively.

I have warned Pete Flores and the miners that another 30 ft ahead they should be prepared for the sill floor to drop away and/or the back to be open. At that point (grid 7,450 E) the 901-W crosscut goes through the workings of the Gold Stope. There it was worked two sets wide (about 11 feet) for five sets (about 40 ft) beneath the 950 level (e.g., 1100 level floors 15 through 19). Workings extend two sets wide and three sets high above the 950 level (e.g., 2nd thru 4th floors). Caving back and floor are to be expected and bridging that area may be necessary.

All this will be over in the next 100 feet, by which time we'll be into the diorite for many hundreds of feet. The 100 feet of cleanup, despite a difficult prognosis, still looks far preferable to the 300 ft or more of new drift necessary to circle north of all the Gold Stope workings.

DW:sk

BFD

Don White
521 East Willis St.
Prescott, AZ 86301
602-778-3140

August 15, 1986

Larry Fellows
State Geologist
Arizona Bureau of Geology
845 North Park Ave.
Tucson, AZ 85719

Dear Larry,

You may recall that I last visited you regarding some production records on the Vulture Mine, generally dating to the turn-of-the-century. You informed me in no uncertain way that those records were provided to your Bureau by the federal Bureau of Mines and that they are for your internal use only, and must remain confidential.

Let me lay out the circumstances of our situation.

1) I seek the data of behalf of the lessee of the Vulture Mine.
2) The Vulture is not in operation and the current owner has virtually no historical production records.
3) The data we're talking about relates to companies no longer in existence.
4) The records we want are in excess of 80 years old.
5) Your mandate as state geologist surely includes aiding the explorationist and abetting development of Arizona's mineral resources.
6) The production data we think you have, in combination with the time-related mining data we have, can be used to calculate grades and understand metal zoning in the deposit. This is of inestimable value to further exploration.

Does it not impress you too that this is a ludicrous situation. It's also terribly sad.

May I point out a precedent set within another federal bureau. The Census Bureau also claimed inviolability of records relating to individuals. This was successfully challenged in court and a new public disclosure system was established wherein all census data is released on a rotating basis. A sevent year cucle is used, I believe, so that even now you can get all the data through 1910 and in 1990 the 1920 census will be made public. Certainly the Bureau of Mines data is no more personal than the census and yet not even 1870 data will be released by them. Why shouldn't they too have a time-related disclosure system?

Of course there is the Freedom of Information Act which could be used to obtain release of such information. The age of the data, circumstances

of its acquisition, and present utility, I believe, would make it an easy case.

But I am a geolgoist with time and money to devote to field work. You are the individual charged with supplying such backup data. It's your job to seek the release of that data from the Bureau of Mines. Rather than heeding their ill-conceived edicts, how about negotiating some reasonable concession from them?

I hope that you can give this a good effort. If I can back you up in any way by providing any sort of test case I hereby volunteer but I believe you are the man in the best role to make the case.

I look forward to hearing of your progress.

Sincerely,

Don White

Don White
Geologist, C.P.G.

DW:sk

cc: Ben F. Dickerson III (Vulture Mine lessee)
Lorain Burgin (U.S. Bureau Mines State Liason, Denver)

P.S. The Vulture data alone may be a moot issue, what I am more interested in is seeing established a routine information release system so that everyone may benefit from the data on all the properties recorded.

Don White

M E M O

TO: Ben F. Dickerson, III, and Carole A. O'Brien

FROM: Don White

DATE: August 12, 1986

SUBJECT: Robert W. Hodder's next visit to Arizona

Bob Hodder phoned last evening to check on things and see what service he might be on our projects. I brought him up to date on the Vulture and U.V.X., discussed the ground magnetics being done now on block 1 of Vulture, the cleanup of the 901-W crosscut through the Gold Stope at U.V.X., and the outlook for the next few months.

We agreed that it wouldn't be very useful to have his help on these projects until we're further along. One good possibility is about 2-1/2 months hence, in late October, when Bob will most likely attend the GSA meeting in San Antonio. I told him to tentatively schedule us in for a visit then, pre- or post-meeting.

By that time the following items should be in hand or accomplished and be worth Bob's review:

VULTURE

- Vulture aeromagnetics report from Elliot
- Vulture block 1 ground magnetics plotted and interpretted
- Some further indication of where we stand on the Vulture townsite land deal

U.V.X.

- U.V.X. mine model complete
- Underground cleanup to the Verde target area
- Sample analytical results from the Gold Stope area (channel samples of walls) and access for inspection.
- Drilling plans completed for testing the Verde area

In addition, Bob mentioned the petrographic work nearing completion by graduate student Peter Malcolm. Gold has still not been spotted despite the abundance of samples, the sophisticated instrumentation, and a skilled operator/trained eye. Bob says some more scanning electron microscope work is yet to be done but Peter will write us up a report very soon. He has some thoughts in regard to the questions I posed to guide his work.

DW:sk

M E M O

TO: Ben F. Dickerson, III, and Carole A. O'Brien

FROM: Don White

DATE: August 15, 1986

SUBJECT: Chert-hosted gold occurrences like the U.V.X., available elsewhere

As you're well aware, volcanogenic gold targets are in vogue. Yours is the U.V.X., probably related to the metal zoning of the massive sulfide system. Paul Strobel's is a siliceous sinter chert with hydrothermal fracturing very similar to the U.V.X. in some ways but apparently remote from major vent activity and base metals. It appears that all silica-enriched lithologies in volcanogenic systems have gold potential. Those with hydrothermal fracturing have higher than average potential.

Thus my ears were piqued when, at lunch with COCA's new geologist, Greg Hahn (ex Noranda, Blackbird mine, Idaho), I heard him remark on the similarity of the chert atop the Pittsubrg-Tonto deposit to that at the U.V.X. The Pittsburg-Tonto is a small volcanogenic massive sulfide occurrence on Tonto Creek south of Payson. I looked at it in 1982 for Billiton. It was then claimed by Noranda. Apparently Noranda drilled it in 1979 and found, according to Greg Hahn, thick UVX-like chert intercepts of 0.1 to 0.2 oz/t Au. At the then $125./oz Au price and the scale of Noranda's interest, it didn't mean much. But at $400 gold and on behalf of an individual like A.F. Budge, it may be worth a look.

I checked the BLM microfiche for claim status in the Pittsburg-Tonto mine area. All three parties involved as of 1982 (Noranda, Exxon, and Canyon Resources) have relinquished their claims. Unfortunately a claimant called Star Exploration has picked up the bulk of it with claims located Dec. 17, 1984 and assessment work filed for 1985. I know nothing of Star Exploration since I have not seen the BLM file nor the Gila County records. If you feel it worthwhile, I could check those records during any future trip to Phoenix.

Let me know your interest in this.

DW:sk

IRON KING ASSAY INC.

02-Sep-86

LAB JOB #: MSC00952

Client name: DMEA Ltd.

Billing address: 7340 E. Shoeman Lane
Suite 111-B-E
Scottsdale, AZ 85251

Phone number: 778-3140

No. Samples: 9
Date Received: 8-26-86
Submitted by: Don White

INVOICE ATTACHED

ANALYTICAL REPORT

Client ID MSC00952	Lab ID	FA/AA Au oz/ton	FA Ag oz/ton
GS-6	MSC952 1	0.134	2.28
GS-7	MSC952 2	0.182	2.48
GS-8	MSC952 3	0.061	1.75
GS-9	MSC952 4	0.011	1.03
GS-10	MSC952 5	0.067	1.58
GS-11	MSC952 6	0.020	1.54
GS-12	MSC952 7	0.080	1.24
GS-13	MSC952 8	0.064	0.95
GS-14	MSC952 9	0.052	0.44

0.075

REGISTERED ASSAYER
CERTIFICATE NO. 14315
ROBERT G. CROOK
Signed 9-2-86
ARIZONA, U.S.A.

IRON KING ASSAY INC.

19-Aug-86

LAB JOB #: MSC00924

Client name: DMEA Ltd.

Billing address: 7340 E. Shoeman Ln.
Suite 111-B-E
Scottsdale, AZ 85251

Phone number: 778-3140

No. Samples: 5
Date Received: 8-14-86
Submitted by: Don White

INVOICE ATTACHED

ANALYTICAL REPORT

Client ID MSC00924	Lab ID		FA/AA Au oz/ton	FA Ag oz/ton
GS-1	MSC924	1	0.018	0.50
GS-2	MSC924	2	0.126	0.65
GS-3	MSC924	3	0.004	0.12
GS-4	MSC924	4	0.038	0.49
GS-5	MSC924	5	0.001	0.43

muck samples @ UVY

REGISTERED ASSAYER
CERTIFICATE No. 15583
JIM ROY WEATHERBY
Date Signed 8-19-86
ARIZONA, U.S.A.

P.O. Box 56 • Humboldt, Arizona 86329 • Phone (602) 632-7410

IRON KING ASSAY INC.

 12-Sep-86

LAB JOB #: MSC01010

Client name: A. F. Budge Mining, Ltd.

Billing address: 7340 E. Shoeman Ln.
Suite 111-B-E
Scottsdale, AZ 85251

Phone number: 945-4630

No. Samples: 3
Date Received: 9-10-86
Submitted by: Don White
778-3140

INVOICE ATTACHED

ANALYTICAL REPORT

Client ID MSC01010	Lab ID	FA/AA Au oz/ton	FA Ag oz/ton
GS-15	1010- 1	0.190	3.39
GS-16	1010- 2	0.025	0.30
GS-17	1010- 3	0.019	0.71

DMEA LTD.
SEP 1 5 1986
RECEIVED

REGISTERED ASSAYER
CERTIFICATE NO. 15583
JIM ROY WEATHERBY
Date Signed 9-17-
ARIZONA, U.S.A.

footwall
least altered footwall farthest w. #16
extremely altered diorite
next to gob #17
does not extend 3-4' to g. rib.
h.w. #15
immediate on north rib

M E M O

DMEA LTD.
MAY 21 1986
RECEIVED

TO: Ben F. Dickerson, III, Carole A. O'Brien

FROM: Don White

DATE: May 20, 1986

SUBJECT: Whole rock analyses of UVX cherts and wall rocks

We now have 14 of our own whole rock analyses of UVX samples. Nine of these are on chert with flux potential and are compiled on the attached table. Five more relate to possible contaminants of the flux, namely intra-chert ferruginous (hematitic) zones, and footwall and hanging wall rocks that may be included with chert if mining goes too far. These too have been compiled as another table attached. In addition, we will have two sets of results on splits of the same composit chert sample from the Florencia area. One was run by ASARCO at their Hayden smelter laboratory and one by Inspiration Consolidated Copper Company at their Inspiration smelter laboratory.

The Skyline Labs procedures we used are their standard whole rock analytical techniques for the following constituents:

Au, Ag - Fire assay/atomic absorption; one assay ton

SiO_2, FeO - Atomic absorption

Fe_2O_3, Al_2O_3, CaO, MgO, Na_2O, K_2O - I.C.P.

As, Hg, Sb, Bi, Ni, Co, S - Determined only by ASARCO and Inspiration, probably by A.A.

The conclusion from the key chert samples analyzed is that all three target areas (Verde area/806-1, Gold stope area/901-3, and Florencia area/1104-1) are chemically very similar. Each area averages greater than 90% SiO_2, generally less than 1% iron, less than 1% alumina, and only a few hundreths of a percent of each CaO, MgO, Na_2O, and K_2O. These are extremely good flux analyses.

The iron content is dominantly Fe_2O_3 (hematite) as oppossed to FeO (limotite/geothite). While it is generally less than 1%, the Florencia area chert has run up to 1.6% Fe_2O_3 (1104-1, 285-290) and the Verde area a little over 7% (806-1, 518-522 and 560-562). Penalties against iron generally commence at 3% Fe. The 7% hematite would be 5% Fe (Fe = 0.7 x Fe_2O_3) for those particular intervals. They are particularly hematitic samples and, upon dilution with the chert running less than 1% Fe_2O_3, the average would almost certainly be less than the 3% penalty threshold.

The only known exception to the iron dilution statement above is an intensely hematic (and manganiferous) zone within the Verde area (806-1, 550-555) from which we have one sample analyzed (806-1, 552-554). It runs about 50% Fe_2O_3 (or 35% Fe). If it were fully included within a block-caved zone of 60 feet thick, for instance, the average iron content could well creep over 3%, perhaps even to 5% or 6%. Thus the iron will have to be monitored carefully around that one particular zone at least. It should be noted that that one hematitic zone is also very low in gold (0.01 to 0.05 oz/t) and hence, if mined by any other method than block caving, would be worth

segregating from the better core.

With regard to the Al_2O_3 content, our chert measures up very well against the smelter's needs. They can tolerate 3% to 6% alumina while our chert is generally well below 1%. That presumes no overbreakage during mining. The hanging wall schists of the Grapevine Gulch Formation and footwall diorite, each about 20% Al_2O_3, would fast bring the average alumina grade up (and precious metal grade down). I believe that dilution is not likely, however, for structural reasons. The diorite footwall to the Gold Stope is quite competent and a strong visually contrasting rock type to the chert. It can probably be avoided. The hanging wall schists are not very competent but they are not immediately adjacent to auriferous chert either. They are hanging wall to the chert but the gold grades diminish into the stratigraphically upper chert zones before reaching the schist contact. Thus mining could be stopped in chert and the schists not touched.

As long as these adjacent lithologies are excluded from material shipped as flux, the other elements that smelters consider contaminates would all be very low. Calcium, sodium, magnesium, and potassium values together would almost always total less than 1%. The only constituent we do not know about is manganese. As a result of the writer's oversight, MnO analyses were not requested. It will be no more expensive to go back and have that run on the old pulps. As long as that is done, we may as well get arsenic and mercury results too, just to make sure we wouldn't be charged any penalties for volatiles by the smelter.

In general, the U.V.X. chert looks like excellent flux. It is far higher in SiO_2 content and lower in contaminants than what most smelters are used to, and hence should have a higher unit value. Our job at this early stage should be to continue to assess the flux potential with emphasis on the search for "fatal flaws" in the system. Early recognition of problem areas will save later disappointments and perhaps make major problems overcomable.

DW:sk

U.V.X. Charts

Whole rock analyses for flux potential, using I.C.P. and A.A.

	Au	Ag	SiO_2	Fe_2O_3	FeO	Al_2O_3	CaO	MgO	Na_2O	K_2O	As	Hg
806-1	Verde Area											
518-522	.27	2.6	90.5	7.9	.15	.13	.08	.03	.02	<.01		
544-546	.11	1.0	98.2	1.3	.05	.08	.02	.01	<.01	<.01		
560-562	.04	1.5	86.2	7.4	.15	1.60	.05	.02	.03	<.01		
576-578	.26	0.5	99.4	0.4	.05	.05	.01	<.01	<.01	<.01		
901-3	Gold Stope Area											
300-302	.03	1.7	95.3	0.8	.10	.13	.02	.01	<.01	.08	<500	
314-316	.25	3.5	94.8	0.7	.07	.07	<.01	<.01	<.01	.09		
1104-1	Florencia Area											
280-285	.06	0.1	98.9	0.4		.04	.02		<.01	.02	30	
285-290	.02	0.2	93.6	1.6		.35	.04		.01	.03	260	
245-250	.12	0.4	92.5	0.9		.26	.02		.01	.02	220	
193-225	.07	0.7	91.4			.3	<.1					
→ Hayden smelter (ASARCO) results				Cu <.04	Pb .05	Zn <.01	Sb	Bi	Ni	Co	S <.1	
193-225												
→ Inspiration smelter (ICCC) results												

UVX Chert Contaminants

Footwall, hanging wall, and intra-chert units with deleterious constituents for fluxing; possible contract penalty items.

	Au	Ag	SiO_2	Fe_2O_3	FeO	Al_2O_3	CaO	MgO	Na_2O	K_2O	As	Hg
806-1		Intra-chert contaminant										
552-554	.01	0.6	40.0	49.4	.15	1.60	.05	.02	.02	<.01		

Likely represents 5' (550-555) hematitic, manganiferous, low-gold zone in middle of Verde area intercept. Would be diluted at least 1/13 or to ≤ 8% of total.

901-3		Hanging wall contaminants										
268-272	<.001	0.5	71.9	2.8	.10	16.60	.10	.44	.06	2.30	<500	

Hanging wall of chert; Grapevine Gulch Fm; clay-altered tuffaceous sediments which may slightly dilute the chert in some areas if mined too close to contact.

272-274	<.001	0.7	89.0	8.7	.07	1.50	.05	.05	.03	.26	~1,000	

So-called "silica grit" unit occurring on top of chert (at contact with the Grapevine Gulch Fm or "sch" on maps) rarely more than 2' thick. May be incorporated as dilutants in chert if over-mined into HW.

901-3		Footwall contaminants										
339-343	<.001	0.2	59.2	2.7	.15	26.3	.12	.26	.12	1.50		

"Diorite" of footwall to Gold Stope; might be incorporated as dilutants in chert if over-mined into F.W.

806-1												
224	Probably Nil	Probably Nil	52.8	6.8	5.50	17.40	5.10	4.50	2.50	.90		

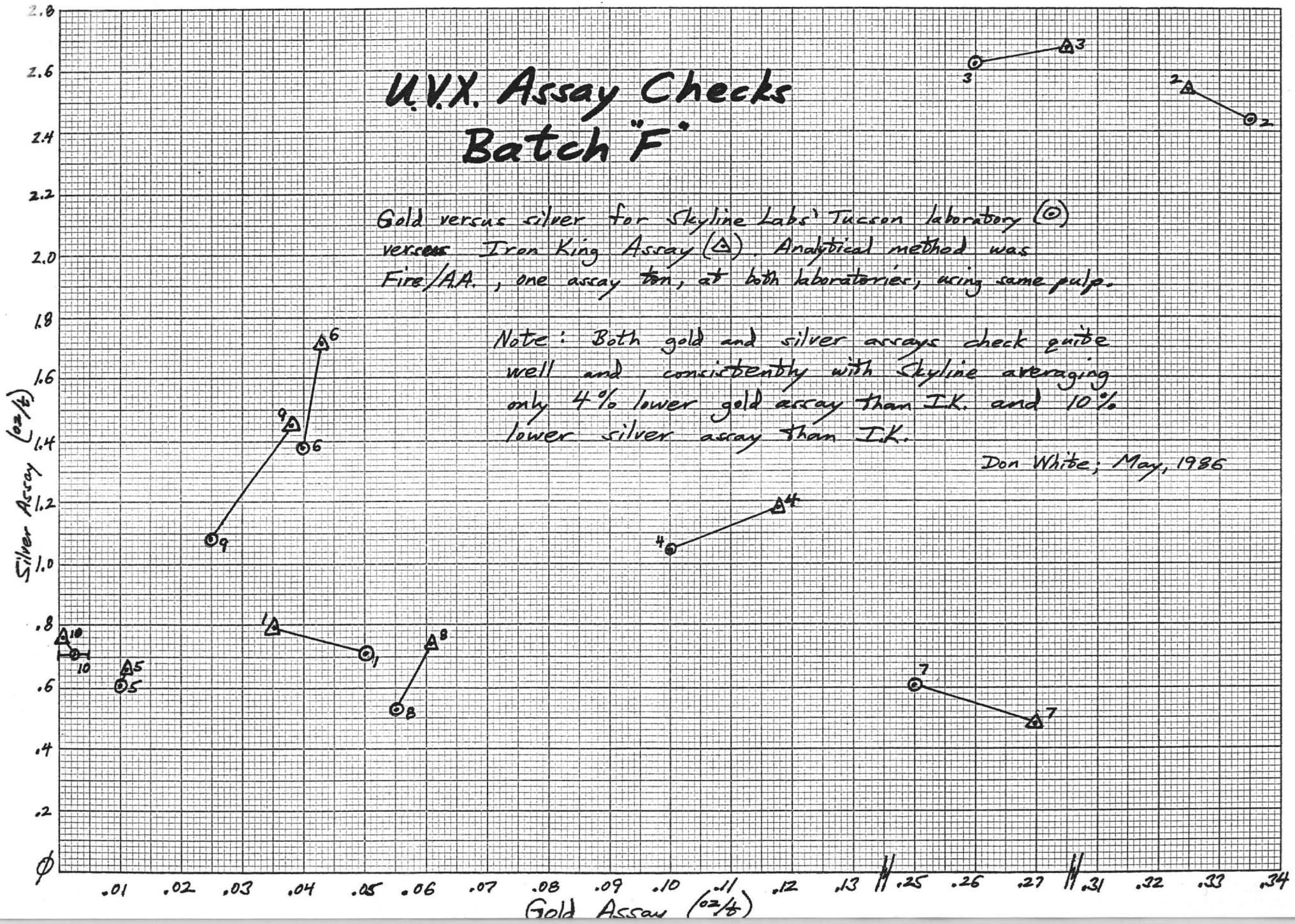
Least-altered diorite not likely to be included in any mining or overbreakage but occurring in more altered form like 901-3-339-343 (above) in FW to Gold Stope area and HW to Verde area.

U.V.X. Assay Checks
Batch "F"

Gold versus silver for Skyline Labs' Tucson laboratory (⊙) versus Iron King Assay (△). Analytical method was Fire/A.A., one assay ton, at both laboratories, using same pulp.

Note: Both gold and silver assays check quite well and consistently with Skyline averaging only 4% lower gold assay than I.K. and 10% lower silver assay than I.K.

Don White; May, 1986



SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. UQX 042
May 8, 1986
"BATCH F"

MR. DON WHITE
521 East Willis Street
Prescott, AZ 86301

UVX Assay checks – Batch "F"

Analysis of 10 Pulp Samples

ITEM	SAMPLE NUMBER	Δ Au	Au IK	FIRE ASSAY Au* (oz/t)		Ag* (oz/t)	Ag IK	Δ Ag	Al2O3 (%)	MgO (%)	CaO (%)
1	806-1-509-514	.015	.035	.050	43% higher	.71	.79	-.08			
2	806-1-514-516	.010	.325	.335		2.44	2.54	-.10			
3	806-1-518-522	-.015	.275	.260		2.62	2.67	-.05	.13	.03	.08
4	806-1-544-546	-.018	.118	.100		1.04	1.18	-.14	.08	.01	.02
5	806-1-552-554	-.001	.011	.010		.61	.66	-.05	.65	.07	.11
6	806-1-560-562	-.003	.043	.040		1.38	1.72	-.34	1.60	.02	.05
7	806-1-576-578	-.020	.270	.250		.61	.48	.13	.05	<.01	.01
8	806-1-578-580	-.006	.061	.055		.53	.74	-.21			
9	806-1-590-592	-.013	.038	.025	34% lower	1.08	1.45	-.37			
10	806-1-610-613	Ø	Nil	<.005		.71	.76	-.05			
	$\overline{X}$ =	-.005	.118	.113		1.17	1.30	-.13			
		-4% (Skyline lower)						-10% (Skyline lower)			

Meaning.... assays in this batch checked very closely for gold (Skyline was, on average 4% lower than IK. with differences ranging from Skyline being 34% lower to 43% higher than IK) and quite closely and consistently for silver as well (Skyline Ag assays averaged 13% lower than IK).

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

This is o.k. w/me

MEMO

DMEA LTD.
MAY 14 1986
RECEIVED

TO: Ben F. Dickerson, III, Carole A. O'Brien

FROM: Don White

DATE: May 13, 1986

SUBJECT: Usefullness of microscope/microprobe work to our U.V.X. project

Virtually every visitor to the U.V.X., who asks any questions at all, asks how the gold is occurring. Is it or was it within disseminated, very fine pyrite? Is it really electrum or microfractures? Does it occur more in clasts or matrix? These are all fundamental questions, answers to which will aid our effort in every way, from exploration for more, to marketing the product.

I think that as long as we are taking time to mull over where we stand and where to go from here, it is an appropriate time to contract the required microscope -- and possible microprobe -- work to answer those questions and possibly others such as:

- Was there carbonate in the rock fabric in the past? (as expected in some hydrothermal environments).
- What mineralogic associations are present between gold and, say, iron oxide and manganese minerals?
- What textural associations are evident between gold and, say, microfractures, voids, particular rock fabrics, etc.?
- What evidence of alteration is present?
- Does the alteration appear hydrothermal or contact metasomatic? (i.e., hydrothermal vent deposit only or that further altered by the diorite pluton).
- What was the likely paragenetic sequence?

We may be able to have Mountain States (Tucson) do such work or we may be able to get Steve Bussey of Colorado School of Mines (correspondence attached) to do it. The advantage of the latter is likely his lower cost. I can vouch for the quality of Bussey's work on the basis of his thesis work and presentation to G.S.A. a couple weeks ago.

Of course Paul Handverger tried to find gold in one or two thin sections and couldn't. I have no illusions about the ease of spotting it. Several sections will be necessary. Polished sections are probably best but thin sections may be necessary too. Furthermore, microprobe work may be very helpful for details of composition within and adjacent to the gold occurrences. Any combination of these tasks, including photomicrographs and report can probably be done for under $1,000. If you agree to its usefullness, let me know and I will querry candidates regarding their capabilities and charges.

DW:sk

Don White
521 East Willis
Prescott, AZ 86301
602/778-3140

May 13, 1986

Steven D. Bussey
Geology Department
Colorado School of Mines
Golden, CO 80401

Dear Steve,

Thanks for your letter of the 8th. And indeed I shall be interested to receive a copy of your manuscript on the Iron Dyke mine for the GSA Memoir as soon as possible.

Thank you too for your resume and offer of help on our U.V.X. project. I would very much like to have some thin- and polished- section work done and if that is approved by the client, I shall be in touch.

I am afraid exploration work in Arizona is pretty slow right now. If I had any good leads on summer projects I would let you know. The opportunities for seasonal work are usually best in Alaska and Canada but the only specific suggestion I can offer is Amselco with regard to their Greens Creek property in Alaska. Surely they shall do something on it and your experience with another massive sulfide deposit would be an asset. Amselco's Reno office is at: Amselco Exploration, Inc., 90 West Grove St., Suite 100, Reno, NV 89509 (702-827-2270). I don't know who is in charge there but one senior geologist is Walt Meyers. Don't consider him a personal referral, however, for he probably wouldn't recall me from our only meeting at the recent GSA field trip to Jerome.

I shall look forward to your manuscript.

Regards,

Don White

Don White
Geologist, C.P.G.

DW:sk

bcc. B.F.D.

Steven D. Bussey
Geology Department
Colorado School of Mines
Golden, Colorado 80401

May 8, 1986

Mr. Donald C. White
521 East Willis St.
Prescott, Arizona 86301

Dear Don:

Thank you for your comments after my talk in Flagstaff. I was unaware of the similarities between ore types from the Iron Dyke and UVX deposits. Knowing that has shed more light on the origin of the Iron Dyke.

I have included a copy of the paragenetic diagram you asked about but I must add that it is very general and reflects all the samples I studied. Some individual samples are more complicated while others represent only portions of the sequence. If you are still interested, I will send a copy of a manuscript in preparation for an upcoming GSA Memoir that describes the Iron Dyke Mine in a little more detail.

I would also like to take this opportunity to ask you what the job market is like in your area. I am looking for something to get me through the summer but have not yet looked into the southwestern U.S. I have included a resume just in case you (or someone you know) are in need of some additional help this summer. You mentioned the need to study paragenetic relations at the UVX deposit and that may be something I could do for you at slave labor prices.

Thanks again for your interest.

Sincerely,

Steve Bussey

Steven D. Bussey

STEVEN D. BUSSEY

701 14th Street
Apartment #2
Golden, Colorado 80401
(303) 279-6333

Geology Department
Colorado School of Mines
Golden, Colorado 80401
(303) 273-3800

EDUCATION

Ph.D. Geology - Colorado School of Mines - expected Spring 1987
Thesis topic: Geology and geochemistry of the Iron Dyke massive sulfide deposit, Baker County, Oregon.

MSc. Geology - Southern Methodist University, Dallas, Texas - December 1982. Thesis topic: Primary dispersion of Rb, Sr, Ba and evaluation of Rb/Sr ratios as a guide to mineralization at the Middle Mountain molybdenum prospect, Chaffee County, Colorado.

B.A. Geology and B.A. Mathematics - Western State College, Gunnison, Colorado - December 1979. Graduated cum laude.

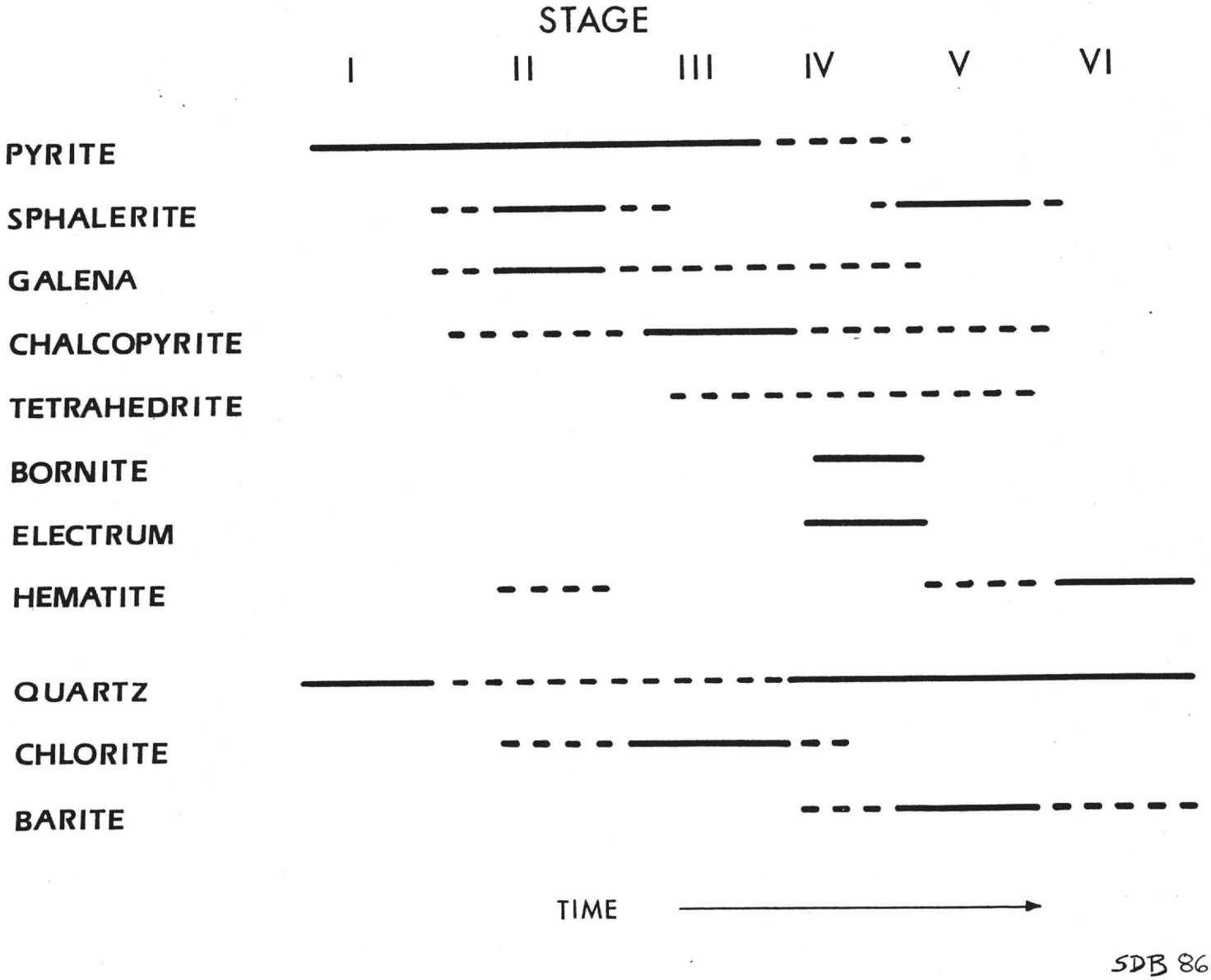
EXPLORATION EXPERIENCE

- Uranium exploration, resulting in definition of additional ore reserves in Lisbon Valley, Utah, for Homestake Mining Company.
- Generation and presention of geologic exploration models for carbonate-hosted bulk tonnage gold deposits in western U.S. as part of graduate-level mineral exploration class.
- Implementation of geologic mapping and sampling programs: regional mapping and sampling of Permian island arc terrane in northwestern U.S., stream sediment sampling during uranium exploration in Colorado.
- Surveying and claim staking in all types of terrain.
- Supervision of drill crews and heavy equipment operators during uranium exploration in Colorado and Utah.
- Evaluation of drill core and cuttings, leading to improved understanding of geologic factors controlling mineralization in Permian island arc terrane, northwestern U.S.

LABORATORY SKILLS

- Transmitted and reflected light petrography.
- Familiar with X-ray diffraction, X-ray fluorescence, and electron microprobe equipment; understanding of uses and limitations.
- Fluid inclusion studies and interpretation.
- Fission track analysis and interpretation; responsible for maintaining efficient operation of fission track laboratory at SMU.
- BASIC and FORTRAN programming utilizing mainframe and microcomputers.

PARAGENESIS



Overall paragenesis at the Iron Dyke Mine,

Don White
521 East Willis
Prescott, AZ 86301
602/778-3140

May 13, 1986

Peter Kirwin
LONG LAC MINERALS EXPLORATION, INC.
P.O. Box 21390
Reno, NV 89515

Dear Peter,

I have enclosed, at the request of Ben Dickerson, a copy of our summary report on gold exploration conducted at the United Verde Extension mine at Jerome.

Approximately $500,000 has been spent on this project over the past year and a half. That has resulted in the identification of three target areas for chert-hosted precious metals. Old data and new drill results have successfully confirmed the presence of significant mineralization as outlined in the report. We feel there is potential for an on-site leaching operation and/or contract sale of the product as smelter flux.

What will be needed soon, however, will be larger bulk sampling of the best zones. Drifting (and reopening old drifts) for access will be necessary. An incoming partner willing to match the sunk costs on an earn-in basis may be considered. If, after your review of the data, you care to ask more geologic questions, do not hesitate to contact me. For issues related to the earn-in arrangement, contact Carole A. O'Brien (602/945-4630) of Ben Dickerson's office.

Also, if you wish to see the property (drill core, larger maps and sections, and underground) I shall be happy to give you a tour.

Best Regards,

Don White

Don White
Geologist, C.P.G.

DW:sk

Enclosure

cc: Ben F. Dickerson, III

Scap 2

M E M O

DMEA LTD.
MAY 21 1986
RECEIVED

TO: Ben F. Dickerson, III, Carole A. O'Brien

FROM: Don White

DATE: May 20, 1986

SUBJECT: Visit to the Slattery claims north of Vulture Mine

Monday, May 19, 1986 was spent in the company of Byron Slattery, of Apache Junction, at his claims about 4 miles NNE of the Vulture Mine. His son, Bill was along as well.

Slattery's claims cover most of Section 7, T6N, R5W, about 1 mile W of Vulture Peak. Sec 6 to the N is claimed in full by elderly Mr. Rickard who lives on his unpatented claims, including the Renegade and Lucky Day mines. Slattery's section 7 is just N of but adjacent to our designated aeromagnetic block and hence in the chopper's turnaround area.

Rickard's Renegade and Lucky Day mines are gold occurrences with pyrite in high-angle quartz veins. The veins are rarely more than one or two feet thick. They are completely within the Wickenburg granite batholith and just NE of a low angle, W dipping fault zone.

The trace of that fault zone cuts S thru the center of Slattery's claims. Section 7 has some plutonic rocks, and abundant aplite dikes, but very little of the batholithic-type granite. Instead it is dominated by the breccia of the low angle fault. The fault zone must be awfully thick, perhaps over 100 feet, for the entire low relief in the area is made up of irregular, discontinuous patches of many disparate rock types, all brecciated. Zones of Precambrian amphibolitic and muscovitic schists occur, as do Laramide granites, aplites, pegmatites, and Tertiary basic dikes, flows, and ash falls. The latter may be early Tertiary because the suppossed Tertiary low angle fault cuts them too. The fault zone is characterized by abundant carbonate, generally a pulpy, poorly indurated, caliche-like carbonate. This can become, locally, sparry calcite. The breccia is poorly developed. Clasts are generally large, fault gouge not very abundant, and mylonite virtually nonexistent. Alteration is minimal. Mineralization of a disseminated type such as at Mesquite or Picacho would require more intense brecciation and alteration.

The only gold assays presented by Slattery (orally only) that I have any faith in are all related to very small quartz veins within the fault breccia and themselves brecciated. They carry much iron oxide, casts of pyrite, and the occassional unoxidized specks of pyrite and chalcopyrite. I believe their size precludes any economic importance and their infrequence within the fault precludes any chance of reasonable grade thruout (e.g., too much dilution).

I believe Mr. Flattery is a victim of both his own geologic naivity and opportunism by unscrupulous lessees. At one site after another Slattery's "gold" was variously sericite, pyrite, chalcopyrite, or pleochroic and irridescent residue after sulfides. His platinum "assays" are spectroscopic reports by a now out-of-business firm that also reported gold in percent.

Ben F. Dickerson, III, Carole A. O'Brien
May 20, 1986
Slattery claims

The platinum and nickel was suppossedly in an "ultrabasic rock" composed of much "olivine and niccolite." That is really epidote and magnetite.

Mr. Slattery has disputed the BLM regarding a water well they drilled for game after his claims were staked in excess of ten years ago. He says "water is a mineral" and hence the well on his claims is his. Slattery's claims have very little evidence of assessment work and I have little doubt that the requirements have not been fulfilled some years.

Slattery has had dealings with a number of lessees or potential lessees who promise all but ante up nothing. One reportedly promised a million dollars "development" money. All Slattery had to do was loan the newcomer $5,000 for "seed" money. Slattery wisely enough checked the generous man's Las Vegas, NV address and found it was a vacant lot.

Slattery, a man faithfull to his Eire, gives a good lecture on the evils of the Queen of England including how she's behind all the drug smuggling in the world!

Yup!

It seems we have Bruce Bouley to thank for the referral of Slattery to DMEA, Ltd. Perhaps this deserves some suitable prank in return.

Copy BFD

Don White
521 East Willis St.
Prescott, AZ 86301
602/778-3140

April 17, 1986

Al Binegar
INSPIRATION CONSOLIDATED
COPPER CO.
P.O. Box 4444
Claypool, AZ 85532

Dear Mr. Binegar:

This note accompanies a sample of the auriferous chert from the United Verde Extension mine at Jerome, Arizona. I am sending it to you on behalf of Ben F. Dickerson, III.

The sample is about 15 pounds of bulk rejects from assays and represents the interval of 193'-225' in our diamond drill hole 1104-1. That interval is in the so-called Florencia area, one of three broad target areas defined underground as auriferous chert with flux potential.

Because we have already consumed other bulk rejects in the course of other lab work and wish to preserve some of the more auriferous rejects for other work, what you have been provided is not the best mineralized. It will probably assay about 0.06 oz/t Au and 0.4 oz/t Ag. We have substantial intercepts in excess of 0.1 oz/t Au, 2.0 oz/t Ag, within which are smaller intervals in excess of 0.2 oz/t Au.

As I understand it, however, the work you propose to do on this sample is to check the SiO_2 content and to identify any undesireable constituents. I believe this sample should serve that purpose as it is lithologically the same as other areas with only the exception of the precious metal content.

If more material is required or should you have any questions, do not hesitate to contact me.

Sincerely,

Don White

Don White
Geologist, C.P.G.

DW:sk

Enclosure

cc: Ben F. Dickerson, III

Copy BFD

Don White
521 East Willis St.
Prescott, AZ 86301
602/778-3140

April 17, 1986

Thomas Aldrich
ASARCO, INC.
P.O. Box 98
Hayden, AZ 85235

Dear Mr. Aldrich:

This note accompanies a sample of the auriferous chert from the United Verde Extension mine at Jerome, Arizona. I am sending it to you on behalf of Ben F. Dickerson, III.

The sample is about 15 pounds of bulk rejects from assays and represents the interval of 193'-225' in our diamond drill hole 1104-1. That interval is in the so-called Florencia area, one of three broad target areas defined underground as auriferous chert with flux potential.

Because we have already consumed other bulk rejects in the course of other lab work and wish to preserve some of the more auriferous rejects for other work, what you have been provided is not the best mineralized. It will probably assay about 0.06 oz/t Au and 0.4 oz/t Ag. We have substantial intercepts in excess of 0.1 oz/t Au, 2.0 oz/t Ag, within which are smaller intervals in excess of 0.2 oz/t Au.

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If more material is required or should you have any questions, do not hesitate to contact me.

Sincerely,

Don White

Don White
Geologist, C.P.G.

DW:sk

Enclosure

cc: Ben F. Dickerson, III

2-4-85 Hi Carole — The three starred citations would be useful to us. The remaining red-bracketed item I do not have but probably are not of too much help. If you can acquire these items ~~and possibly that GSA Memoir 153 (1980)~~ it would help much — Don

UNITED VERDE EXTENSION

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2-5-85

Carole -
I just found that GSA Memoir with a friend here in Prescott, so no need to get it; thanks -

Don

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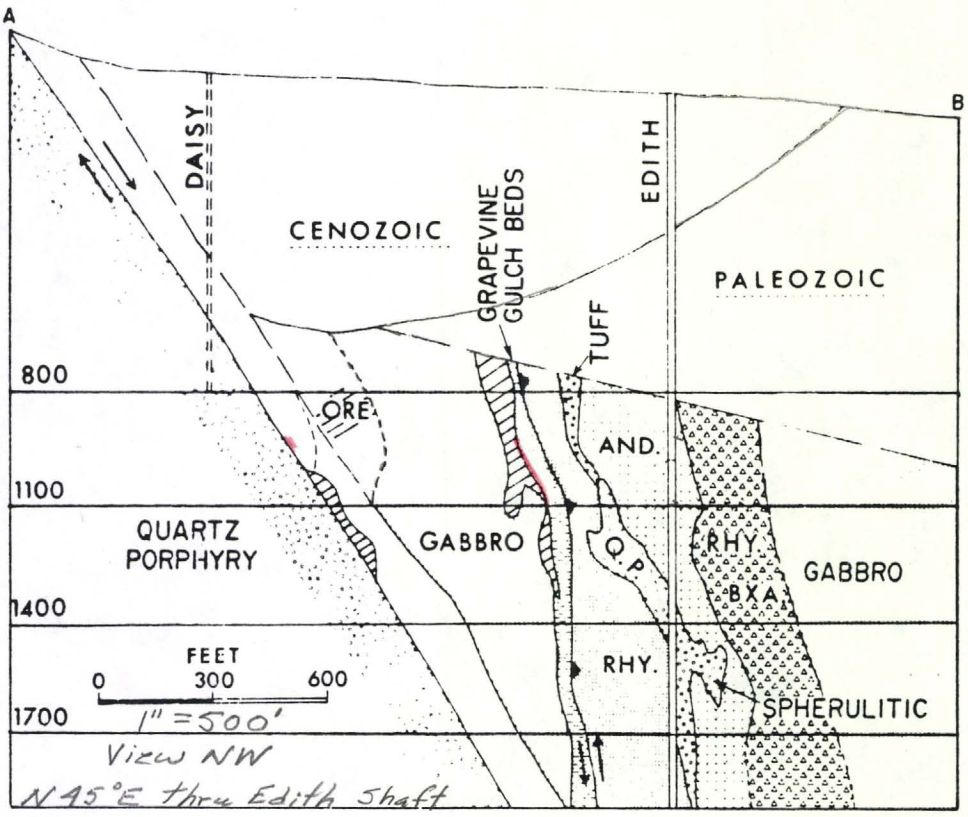

FIG. 4. U.V.X.—Mine Section A-B (location Fig. 2).

gabbro and of the porphyry at the Reverse Fault suggests that the quartz porphyry is older than the fault and that the gabbro if not older may be approximately contemporaneous. The mineralization is definitely younger than the porphyry and may be younger than, or contemporaneous with, the fault, which would make it younger than, or contemporaneous with, the gabbro.

Massive Sulfide Deposits

Introduction

Theories concerning the origin of the sulfide deposits in the Jerome district must account for their spatial and mineralogical relationships to enclosing rocks and structures. Sedimentary and volcanic horizons which form hosts to the deposits occur in

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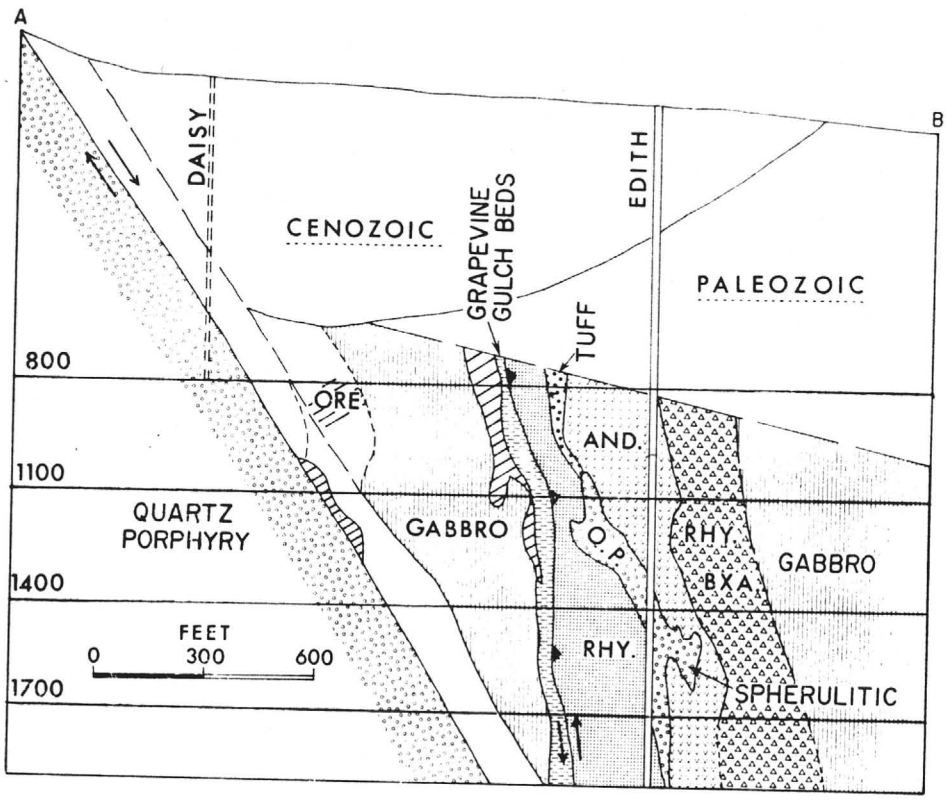

FIG. 4. U.V.X.—Mine Section A-B (location Fig. 2).

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Massive Sulfide Deposits

Introduction

Theories concerning the origin of the sulfide deposits in the Jerome district must account for their spatial and mineralogical relationships to enclosing rocks and structures. Sedimentary and volcanic horizons which form hosts to the deposits occur in the district's three major stratigraphic groups—the uppermost Grapevine Gulch Formation, the intermediate Deception Rhyolite, and the basal mafic vol-

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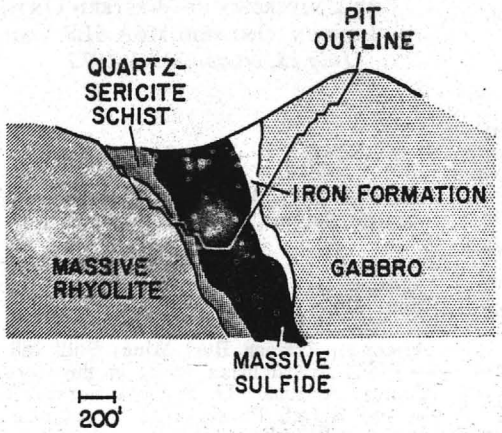

FIG. 3. Generalized geologic cross section of the United Verde mine, Jerome, Arizona, looking southwest. (Modified from Alenius, 1968)

massive sulfide body. Sharp contacts are characteristic not only between sulfide-bearing zones and country rock but also between bands of different sulfide minerals.

The United Verde deposit at Jerome (Fig. 3) and the Iron King deposit at Humboldt have these characteristics, and Anderson and Nash (1972) and Gilmour and Still (1968) have concluded that these deposits are volcanogenic. Similarly, the characteristics of volcanogenic massive sulfide deposits are common to many other occurrences in the Ash Creek group, and also to the Copper Queen, Old Dick, and Bruce deposits near Bagdad, Arizona. These last three are between the Dick Rhyolite and an overlying andesite (Baker and Clayton, 1968). The Antler mine south of Kingman (Anderson, 1969) and small occurrences south of Jerome have similar mineralogy and stratabound nature (Anderson and Creasey, 1958). All of these deposits have from trace to 0.05 oz/ton gold, and from about 0.5 to 1.5 oz/ton silver (Alenius, 1968). Lead content is generally less than 0.5 percent.

There are, however, notable differences between mineral deposits in the Big Bug group and the Ash Creek group. Copper and zinc appear to be the characteristic base metal assemblage in deposits within the Ash Creek group, whereas zinc, lead, copper, and silver are characteristic of deposits in the Big Bug group (Anderson, 1972). This distinction is perhaps a useful stratigraphic tool which permits differentiation and correlation of older Precambrian rocks, by virtue of the element assemblage in the massive sulfide deposits and complements the lithologic distinction between the Ash Creek and Big Bug groups. Similar relationships have been described for massive sulfide districts in north America and elsewhere (Hutchinson, 1975).

Base and precious metal occurrences within the Pinal Schist are less obviously related to volcanic source areas than those deposits of the Yavapai Series. Occurrences in Pinal Schist are extensive, stratiform, and pyritic, with minor base metal values. Small, high-grade zones have been exploited for precious metals, but no operations were large enough to support continued production (Peterson, 1963). It is possible that these occurrences, which have been examined in the field during exploration pro-

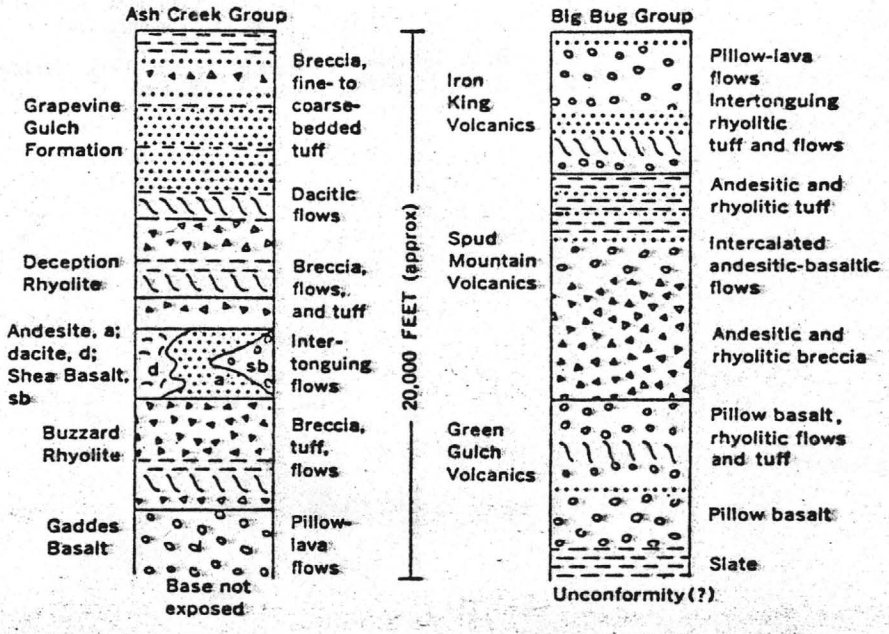

FIG. 4. Schematic Proterozoic tectonic-stratigraphic relationships in central Arizona.

grams, are the most distal deposition of iron-rich sediment relative to volcanic source areas; that is, they are a facies of volcanogenic iron-formation.

Conclusions

Massive sulfide deposits in the older Precambrian rocks of Arizona are volcanogenic. They are broadly divisible into two groups: (1) those in a volcanic center and associated with a succession of basalt through andesite to rhyolite and exemplified by the copper and zinc deposit at United Verde, (2) those distant from a volcanic source area and associated with lead, zinc, and silver, as at Iron King.

This twofold classification of massive sulfide occurrences in Arizona defines two distinct but gradational paleoenvironments in a Precambrian depositional trough, as schematically shown in Figure 4. Thick flows of the Ash Creek group are proximal with respect to a volcanic source area. The thinner volcaniclastic and pyroclastic sequences of the Big Bug group are distal and younger. Lithology comparable to that of the Ash Creek group was produced at other volcanic centers, giving rise to separated segments of lithologically similar strata. Similarly, replication of the Big Bug lithologies and metal distribution occurred about volcanic centers in a distal position. Contemporaneous deposition of volcanic-derived and extrabasinal sediment, with occasional tuffs and flows, resulted in what is now Pinal Schist.

Each paleoenvironment is characterized by a distinctive metal assemblage as well as distinct lithologies. Therefore, syngenetic base metal sulfide deposits can provide a unifying factor in an attempt to understand distribution of older Precambrian rocks in Arizona.

B. A. Bouley
R. W. Hodder

Department of Geology
The University of Western Ontario
London, Ontario M6A 5B8, Canada
July 28, November 3, 1975

REFERENCES

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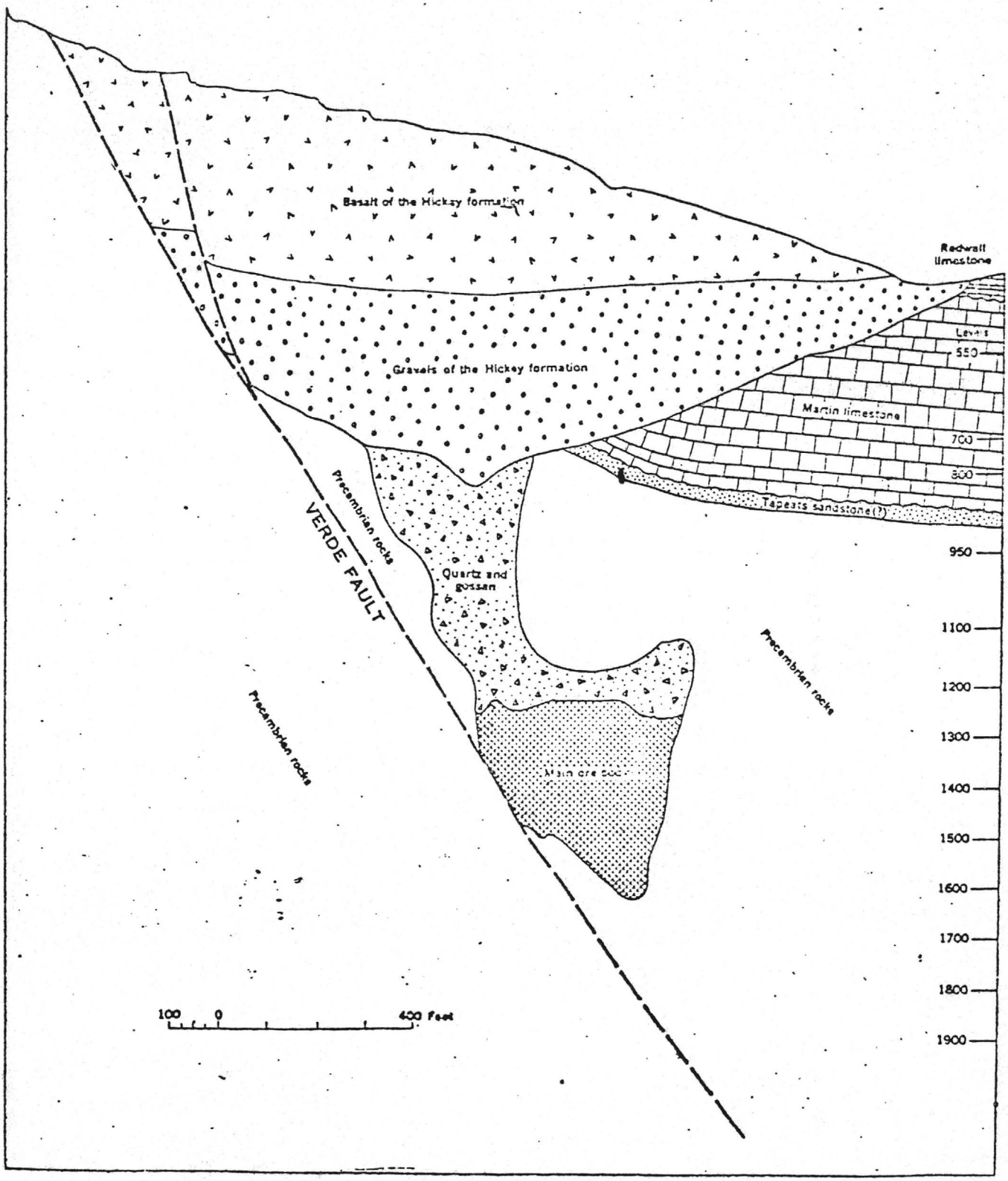


FIGURE 7.—Generalized section through United Verde Extension mine. From Reber (1938).

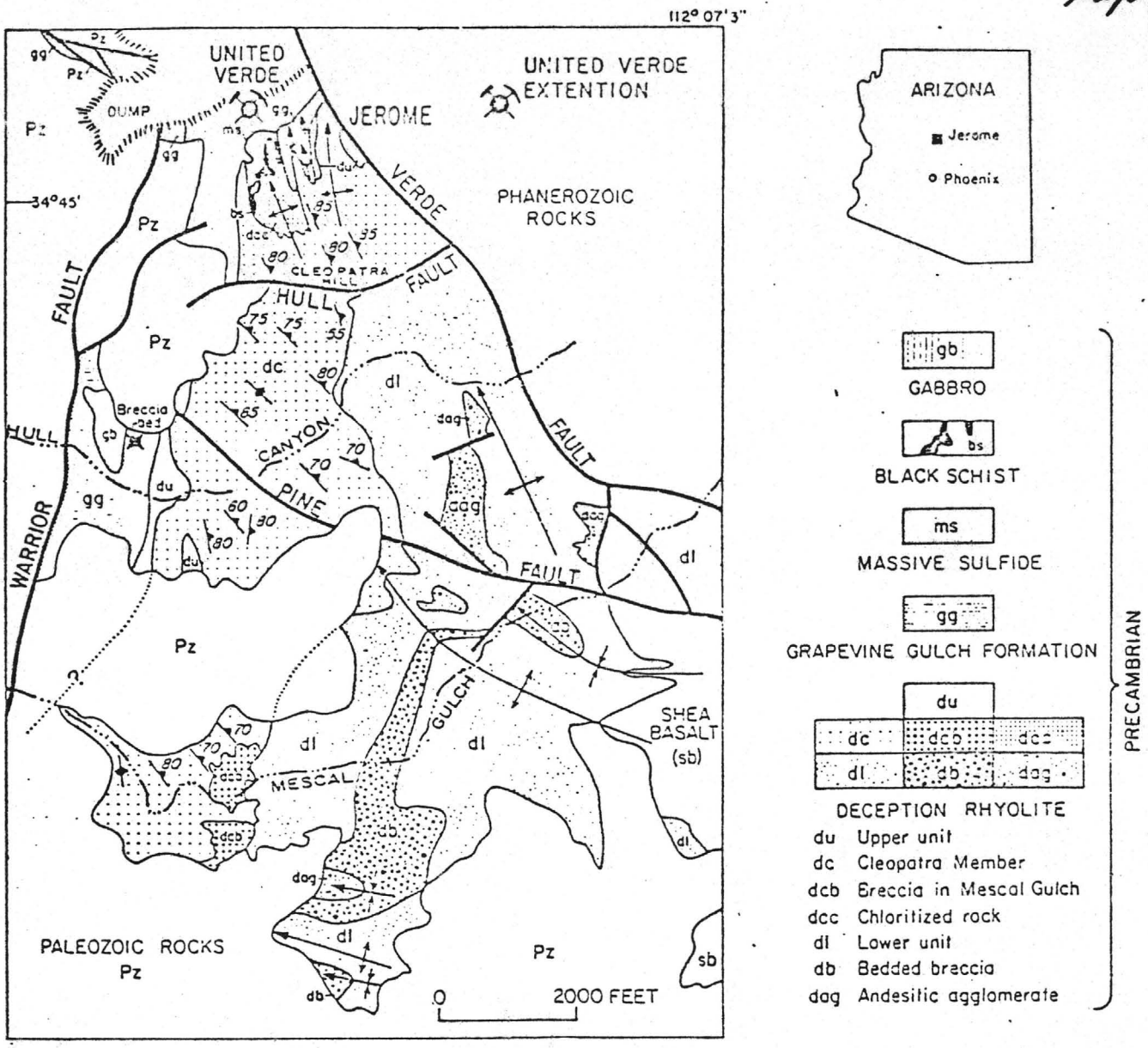


FIG. 3 Geologic map of area south of Jerome modified from Anderson and Creasey (1958, Pl. 1); inset shows location of Jerome.

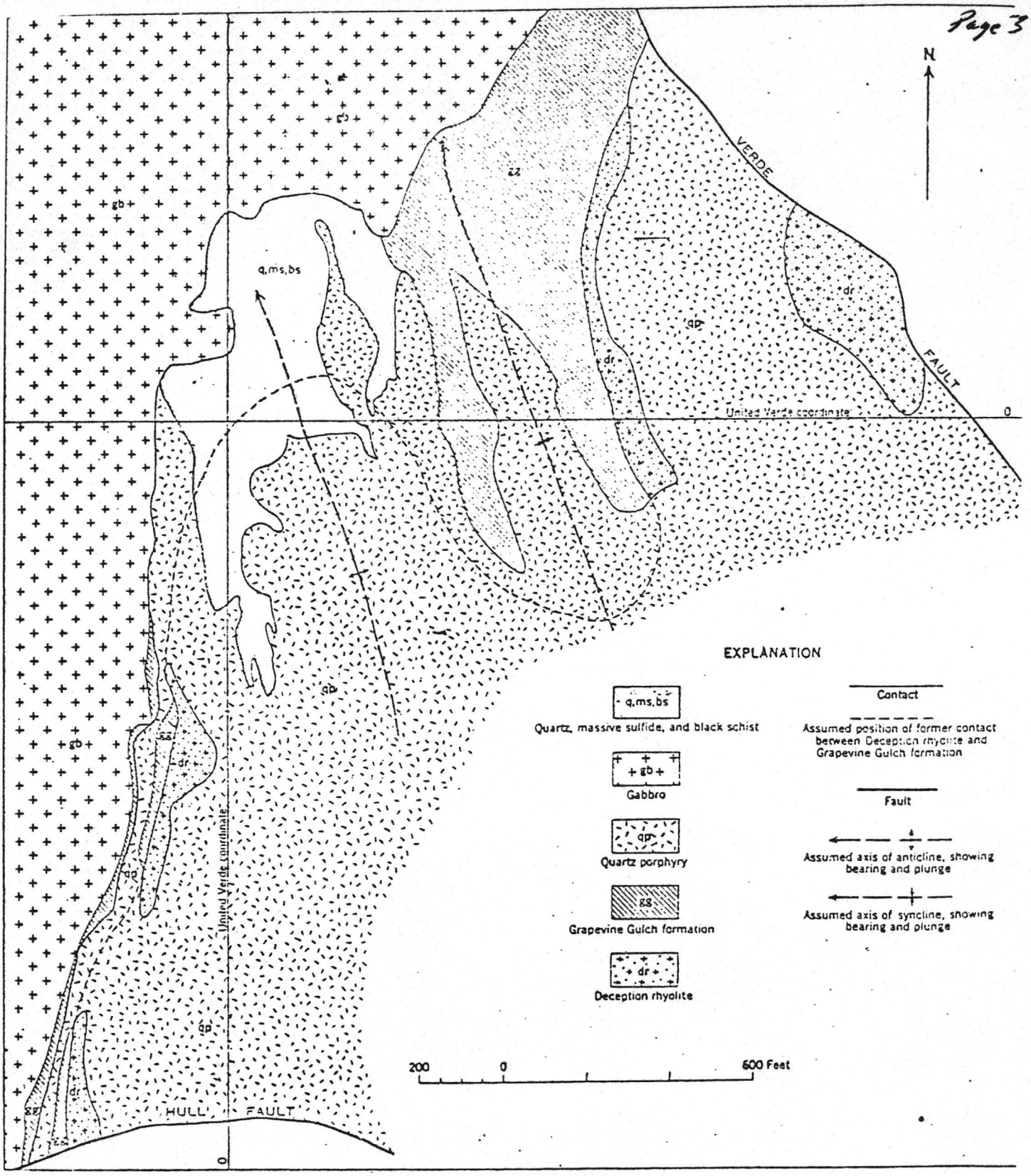


FIGURE 4—Suggested structural interpretation at United Verde mine.

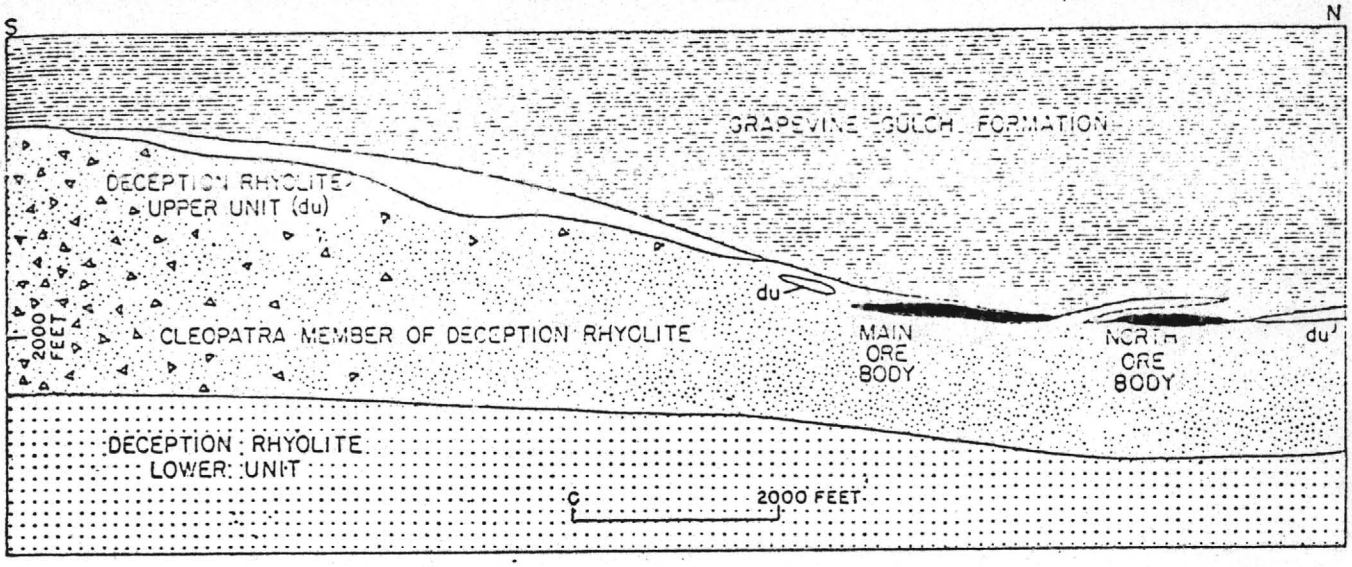


FIG. 5 Interpretative section of the Cleopatra Member and associated rocks after accumulation and before folding. In the northern part of the section, the Cleopatra Member is appreciably thinner and finer grained than to the south. The youngest crystal tuffs in the Cleopatra Member intertongue with the massive sulfide lenses, upper unit of the Deception Rhyolite, and lower beds of the Grapevine Gulch Formation.

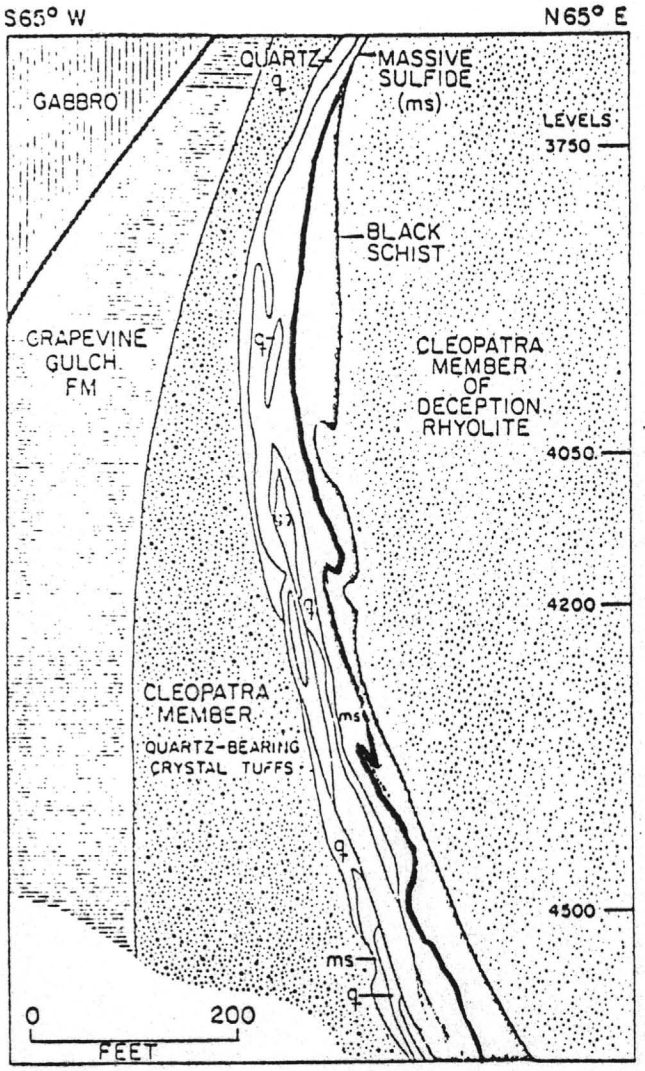


FIG. 6 Vertical section through the North ore body of the United Verde mine, showing intertonguing of quartz-bearing crystal tuffs of the Cleopatra Member with the fine-grained bedded rocks of the Grapevine Gulch Formation. Modified from Anderson and Creasey (1958, Pl. 7).

Carole

TELEDYNE
ISOTOPES

50 VAN BUREN AVENUE

WESTWOOD, NEW JERSEY 07675

(201) 664-7070

TELEX 134474 TDYISOT WTWD

6 July 1987

Mr. Don White
521 East Willis Street
Prescott, AZ 86301

Dear Mr. White:

I have reviewed the data from the Pb-Pb determination (W.O. #3-8003-172) of your galena sample which Mr. L. Casabona reported to you on 27 May 1987.

As I mentioned to you in our phone conversation of 5 June, the interpretation of Pb-Pb isotopic data of galenas is extremely model dependent and seldom straightforward. In reviewing the data for this particular sample, I have found that the data does not fit a single-stage growth model.

The interpretation of multistage leads with the ultimate goal of obtaining age information requires that Pb-Pb results from a suite of samples be used in conjunction with independently obtained age information (non Pb-Pb age data). Such a task is quite complex and must be undertaken with the knowledge the outcome is dependent on considerably more than just the lead isotopic analysis.

I have enclosed a photocopy of relevant chapters from the textbook, *Isotope Geology*, for your reference.

If you have an additional questions, please call me.

Very truly yours,

Jonathan A. Powell
Manager, Geochemistry

JP:rk

cc: L. Casabona

Carole

Don White
521 East Willis St.
Prescott, AZ 86301
778-3140

Date: July 10, 1987

Robert Crook / Jim Weatherby
Iron King Assay, Inc.
P.O. Box 56
Humboldt, AZ 86329
(632-7410)

UVX Batch # 63

Hello Bob + Jim + Kati;

Accompanying are 7 core, 5 coarse rej } 13 samples for one assay ton gold and silver fire assay with AA followup as appropriate. The samples are numbered:

1	809-5-160-162	8	A	Coarse rejects for check assays
2	809-5-162-165	9	B	
3	809-5-165-168	10	C	
4	809-5-168-172	11	D	
5	809-5-172-176	12	E	
6	809-5-176-180			
7	809-5-180-185			
8	809-5-185-190			

Please save all pulps + rejects for my pickup.
Please send a copy of the results + billing to Carole (below)

Thanks,

Don White
Geologist, C.P.G.

c.c. Carole A. O'Brien
A.F. Budge (Mining) Ltd.
7340 East Shoeman Ln.
Suite 111-B-(E)
Scottsdale, AZ 85251

Carole

Don White
521 East Willis St.
Prescott, AZ 86301
778-3140

Date: July 9, 1987

Robert Crook / Jim Weatherby
Iron King Assay, Inc.
P.O. Box 56
Humboldt, AZ 86329
(632-7410)

UVX Batch # 62

Hello Bob + Jim + Kati;

Accompanying are Eighteen (18) core samples for one assay ton gold and silver fire assay with AA followup as appropriate. The samples are numbered:

1	809-5	30-36
2	809-5	60-63
3	809-5	80-85
4		85-90
5		90-95
6		95-100
7		100-105
8		105-110
9		110-115
10		135-137
11		137-140
12		140-142
13		142-145
14		145-148
15		148-151
16		151-154
17		154-157
18	809-5	157-160

Please save all pulps + rejects for my pickup.
Please send a copy of the results + billing to Carole (below)

Thanks,

Don

Don White
Geologist, C.P.G.

c.c. Carole A. O'Brien
A.F. Budge (Mining) Ltd.
7340 East Shoeman Ln.
Suite 111-B-(E)
Scottsdale, AZ 85251

Prescott, AZ

May 31, 1987

Dear Bob,

Thank you so much for the two splendid gold texts you brought last time here. I'm afraid I'm not a speed reader, particularly of technical material, and that the U.V.X. work has precluded much time to study them yet, but I sure intend to review them both soon.

I look forward to your help the week of June 29th, by which time most of the 809 drilling and assays should be assembled. Furthermore, I hope to have the 1" = 20' M-3 zone plans and sections complete by then.

It appears that Friday, July 3rd may be a bank holiday and popular vacation day, as you suspected. Also beware that Precott's rodeo ("World's Oldest Rodeo") is on from Tuesday thru Sunday (June 30th - July 5th) and that Prescott lodging is probably quite difficult to come by at that time. You might want to reserve space in Cottonwood early too. Let Sara or me know if you and Mr. Fletcher may be interested in attending the rodeo. We were thinking of Friday evening and would enjoy having you and Mr. Fletcher for a BBQ beforehand.

I have enclosed some newly completed base metal and iron analyses for U.V.X. D.D.H. M-3 and my graphic representations of same (histograms and ternary diagram). I'll be anxious for your thoughts on the meaning of the patterns and trends they reveal.

See you soon.

Best Regards,

Don

Don White

DW:sk

cc: Carole A. O'Brien

Don White
521 East Willis St.
Prescott, AZ 86301
602/778-3140

May 31, 1987

Paul A. Handverger
VERDE EXPLORATION, LTD.
2160 Old Jerome Hwy.
Clarkdale, AZ 86324

Dear Paul,

Just a note to confirm that I have "liberated" the oak 4-drawer file cabinet from the U.V.X. engineering office as per your agreement. I am rather proud of it as a reward for "finding me a gold mine" as you offered about six months ago and confirmed in your phone conversation May 11th, before departing for Alaska, "...that's the deal, it's yours." I shall be refinishing it to match several other oak items in my office in Prescott. Thank you.

Hope things are going well in Alaska. I'll bring Paul Lindberg up to date on the U.V.X. when I next see him.

Regards,

Don

Don White
Geologist, C.P.G.

DW:sk

cc: Carole A. O'Brien

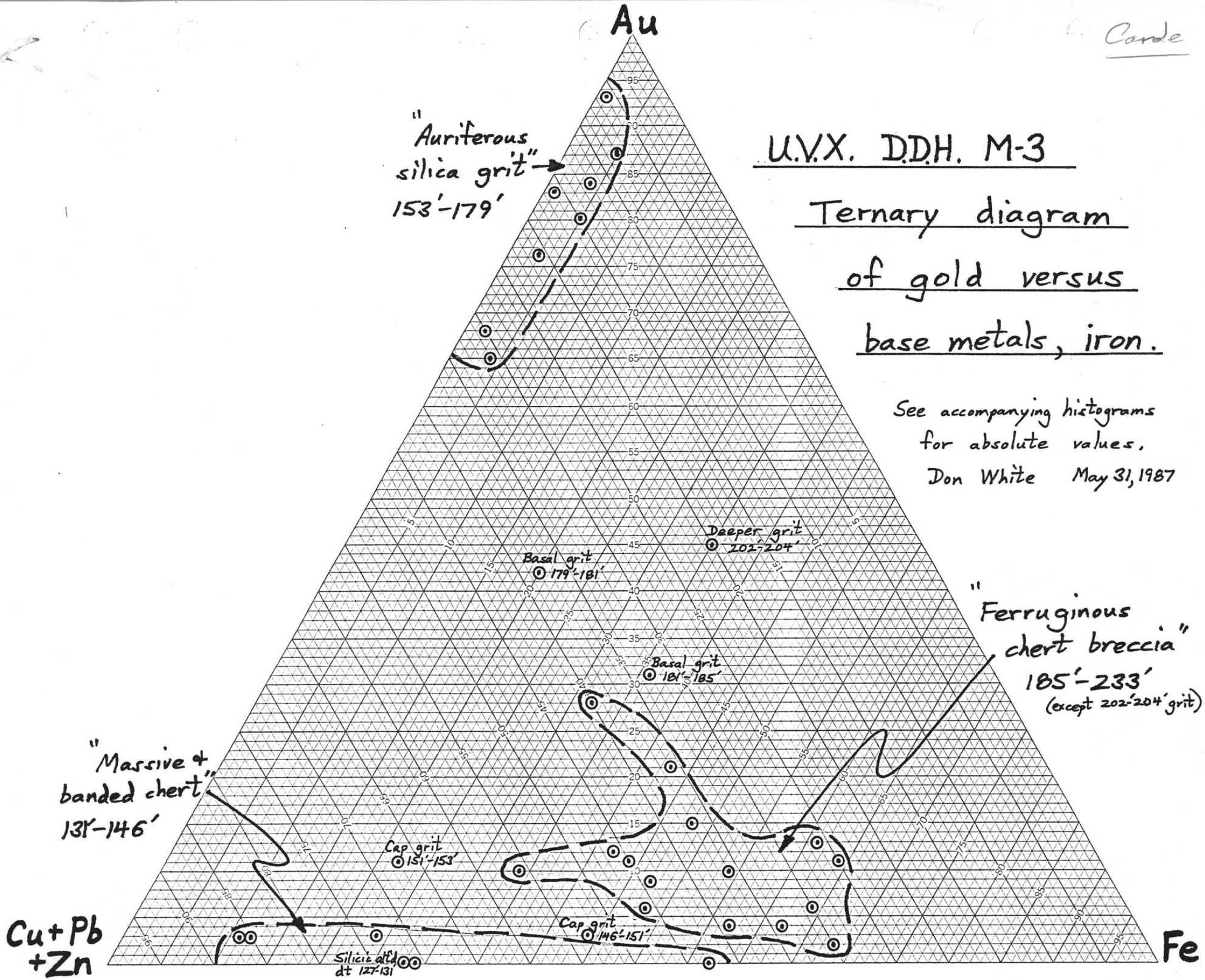
Carde

U.V.X. D.D.H. M-3

Ternary diagram of gold versus base metals, iron.

See accompanying histograms for absolute values.

Don White May 31, 1987



Calculation of values for ternary diagram of U.V.X. D.D.H. M-3 Gold vs (Cu+Pb+Zn) vs Fe

Don White
5-30-87

M-3 Footage	Actual Values: Au (oz/t)	Cu+Pb+Zn [bm] (ppm)	Fe (wt %)	bm′	Fe′	Au+bm′+Fe′	Normalized values (unit-less): Au_N	bm_N	Fe_N
127-131	<.001	263	1.30	.076	.029	.105	ϕ	72	28
135	<.001	320	5.50	.093	.125	.218	ϕ	43	57
138	<.001	382	2.05	.111	.046	.157	ϕ	71	29
141	.005	502	2.10	.146	.048	.199	3	73	24
144	.004	429	.80	.125	.018	.147	3	85	12
146	.005	580	.95	.169	.022	.196	3	86	11
151	.066	4,250	44.50	1.236	1.009	2.311	3	53	44
153	.161	3,420	14.80	.994	.335	1.490	11	67	22
156	1.216	1,165	1.90	.339	.043	1.598	76	21	3
158	.447	743	1.15	.216	.026	.689	65	31	4
161	1.045	675	3.00	.196	.068	1.309	80	15	5
163	1.541	327	.95	.095	.022	1.658	93	6	1
166	.916	456	2.15	.132	.049	1.097	84	12	4
171	1.113	347	3.00	.101	.068	1.282	87	8	5
176	1.379	896	1.30	.260	.029	1.668	83	16	1
179	.839	1,289	.80	.375	.018	1.232	68	30	2
181	.321	995	6.80	.289	.154	.764	42	38	20
185	.134	500	6.80	.145	.154	.433	31	33	36
188	.045	225	2.30	.065	.052	.162	28	40	32
191	.110	1,240	12.50	.360	.283	.753	15	48	37
194	.065	1,200	9.50	.349	.215	.629	10	56	34
196	.094	1,180	22.40	.343	.508	.945	10	36	54
198	.157	1,150	34.00	.334	.771	1.262	13	26	61
200	.062	890	11.20	.259	.254	.575	11	45	44
202	.249	1,430	22.40	.416	.508	1.173	21	36	43
204	.509	770	17.30	.224	.392	1.125	45	20	35
206	.029	1,400	41.30	.407	.936	1.372	2	30	68
209	.190	1,430	48.00	.416	1.088	1.694	11	25	64
213	.093	1,620	43.80	.471	.993	1.557	6	30	64
216	.103	2,620	35.00	.762	.793	1.658	6	46	48
221	.122	1,650	19.10	.480	.433	1.035	12	46	42
226	.099	1,640	22.40	.477	.508	1.084	9	44	47
230	.052	1,440	27.20	.419	.616	1.087	4	39	57
230-233	.033	1,110	26.00	.323	.589	.945	4	34	62
34 intervals	11.204	38,534	494.25						

Explanation of calculations

Σ = Summation of all values

$bm = Cu + Pb + Zn$

$$\frac{\Sigma Au}{\Sigma bm} = f = .0002908$$

$$\frac{\Sigma Au}{\Sigma Fe} = g = .0226687$$

$bm(f) = bm'$ (for each interval)

$Fe(g) = Fe'$ (for each interval)

Then, to obtain normalized values (X_N),

$$\frac{Au(100)}{Au + bm' + Fe'} = Au_N$$

$$\frac{bm'(100)}{Au + bm' + Fe'} = bm_N$$

$$\frac{Fe'(100)}{Au + bm' + Fe'} = Fe_N$$

LAB JOB #: AFB01569 ATTN: Carole A. O'Brien

Client name: A. F. Budge (Mining) Ltd. No. Samples: 34
Date Received: 05-19-87
Billing address: 7340 E. Shoeman Lane Submitted by: Don White
Suite #111-B-E
Scottsdale, AZ 85251
Phone number: 945-4630 / 778-3140 INVOICE ATTACHED

ANALYTICAL REPORT

Client ID AFB01569	Lab ID	AA Cu ppm	Pb ppm	Zn ppm	Fe wt%
UVX BATCH #49					
HOLE #M-3 / Core Samples					
127-131'	1337- 18	78	120	65	1.30
131-135'	1337- 19	55	190	75	5.50
135-138'	1337- 20	32	190	160	2.05
138-141'	1337- 21	52	325	125	2.10
141-144'	1337- 22	39	330	60	0.80
144-146'	1337- 23	30	450	100	0.95
146-151'	1337- 24	500	3200	550	44.50
151-153'	1337- 25	730	2300	390	14.80
153-156'	1337- 26	55	1050	60	1.90
156-158'	1337- 27	48	650	45	1.15
158-161'	1337- 28	69	560	46	3.00
161-163'	1337- 29	42	245	40	0.95
163-166'	1337- 30	43	375	38	2.15
166-171'	1337- 31	40	245	62	3.00
171-176'	1337- 32	72	775	49	1.30

Client ID AFB01569	Lab ID	AA Cu ppm	Pb ppm	Zn ppm	Fe wt%
176-179'	1337- 33	69	1190	30	0.80
179-181'	1337- 34	170	675	150	6.80
181-185'	1337- 35	100	195	205	6.80
185-188'	1337- 36	60	100	75	2.30
188-191'	1344- 10	610	290	340	12.50
191-194'	1344- 11	650	210	340	9.50
194-196'	1344- 12	490	230	460	22.40
196-198'	1344- 13	475	225	450	34.00
198-200'	1344- 14	410	200	280	11.20
200-202'	1344- 15	520	380	530	22.40
202-204'	1344- 16	300	190	280	17.30
204-206'	1344- 17	560	300	540	41.30
206-209'	1344- 18	530	380	520	48.00
209-213'	1344- 19	720	380	520	43.80
213-216'	1344- 20	1250	420	950	35.00
216-221'	1344- 21	750	500	400	19.10
221-226'	1344- 22	810	430	400	22.40
226-230'	1344- 23	600	300	540	27.20
230-233'	1344- 24	580	250	280	26.00

Verde

Don White
May, 1987

Verde Area Diamond Drilling from Proposed 902 D.D.S.

X-Sec	Drilling Direction	Drill Priority	Inclination	Hole length	Totals
270° (tests SE continuation of M-3 zone)	Due W	3	+15°	260'	770'
		1	+30°	250'	
		2	+42°	260'	
240°	S 60° W	6	+20°	370'	570'
		7	+40°	200'	
210°	S 30° W	4	+18°	380'	610'
		5	+35°	230'	
180°	Due S	8	+18°	270'	550'
		9	+35°	280'	
TOTALS	Four vertical drill fences (plus drill-ins)	Nine holes (plus followups)	+18° thru +42° (plus followup ∡'s)	200' Min. thru ~370' Max. hole length	~2,500 ft (plus followups) — of which ~1,000' in HW dt, ~1,500' in chert

Notes ① This proposed drilling of 9 holes totalling ~2,500' will give bare minimum exploration coverage (spacing 50'-80' between fences as measured along target horizon) of the stratigraphy known mineralized in the M-3 zone.

② Two of the holes (240°/+20° and 210°/+18°) are slated to penetrate the HW Verde Fault and test a major fault block of chert with known gold-only mineralization near its core.

③ The drilling tallied will take approx. 3 months, double-shifting. Allowance should be added for followup holes.

Carole —

These are the figures for next phase of drilling in Verde Area (902 D.D.r. this time).

Any more contractors for bids —?

Don

RESOURCES

and the

IMPLICATIONS

****

George W. Bain
Amherst
Massachusetts

February, 20, 1986

****

This is not a publication. It is an opinion prepared for former students and friends who guided study of the many deposits described therein.

DOUBLE ASSOCIATION WITH INDIVIDUAL ORE BODIES.

Many large ore bodies have a double association in addition to the principal tectonic structure; the mineralization declines away from this secondary influence even although the major structure may seem to continue Importance of the secondary influence assumes unusual economic signifance in assessing the resources and in attaining scientific understanding of the emplacement.

Examples of one group in this extraordinary type of deposit are the large high metal content massive sulphide pipes; listed in order of their discovery, these are the Verde Pipe (Jerome, Arizona), the Horne Mine (Noranda Quebec), and the Kidd Creek Pipe (Ontario, Canada). The Verde Pipe is the only one which was not a "lonesome" deposit, and for which a good history is available. All are associated with some tectonic structure which opened metamorphosed volcanics - the local wallrock - to intensive replacement by sulphides.

There exists a tendency to class the pipes near Springbok (South Africa) and at Messina, with the above group but they have too much wallrock breccia in them and have greater similarity to the simple pipe deposits described earlier. A small pipe within the Cleopatra Porphyry at Jerome is very similar to the simple pipe deposits.

The tectonic structure associated with another equally important deposit type is a flowage fold wherein the massive sulphides follow the plunge to the axis of the structure. A small simple example is the Elizabeth Mine at South Strafford (Vermont), and the most famous is the Broken Hill Lode in New South Wales.

The United Verde Sulphide Pipe, Jerome, Arizona.

The United Verde pipe is on an anticline pitching 56° northwestward in essentially massive volcanic fragmentals and some amygdaloidal flows. (Figure 126). Mineralization is principally in a fine ash member and is lacking in a conformably overlying bedded member of mixed ash and clay sized detritus. (Figure 127). The fold and mineralization begins to fade out at the 2850 level. (Figure 128 A). Both fold and mineralization are diminished greatly at the 3300 level. (Figure 128B). The fold as well as economic mineralization ceased below 4500. A number of small pre-ore faults are parallel to the axial plane of the pitching fold. (See Figure 126). The copper-gold mineralization in the volcanics and massive pyrite bodies is principally along or just lateral to these faults which are recorded by offset flows and ash members and by granulated pyrite cemented by chalcopyrite or marmotite through the almost barren pyrite pipe, or in pyritized schist below the 1050 level. (Figure 129).

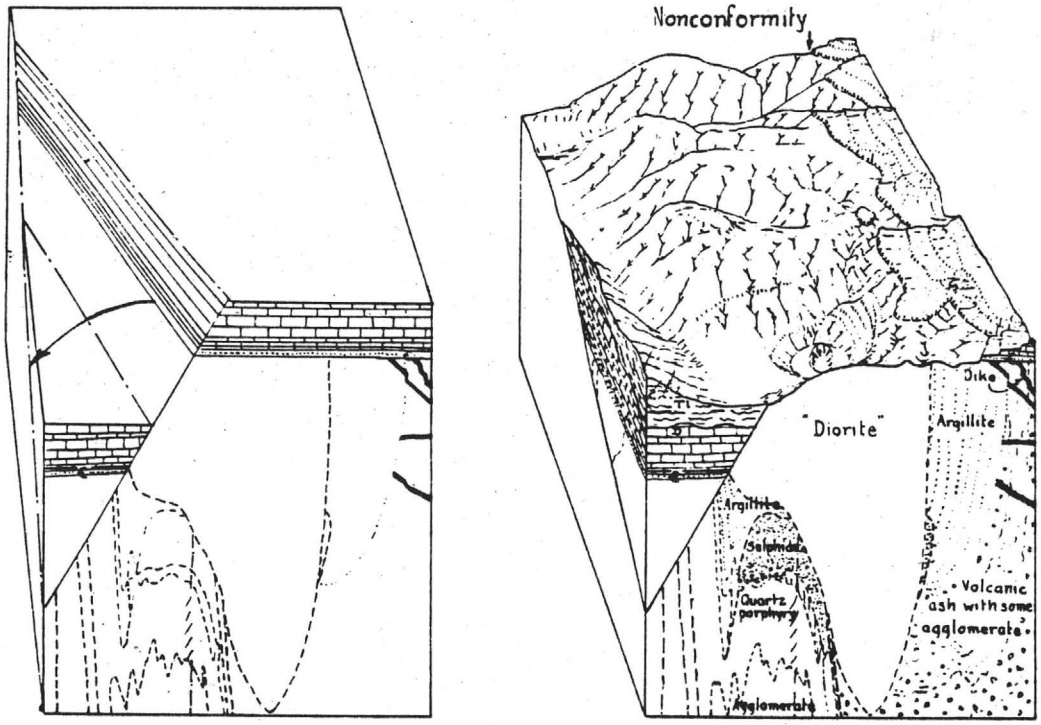


Figure 126. Block diagrams showing the Verde Pipe area.

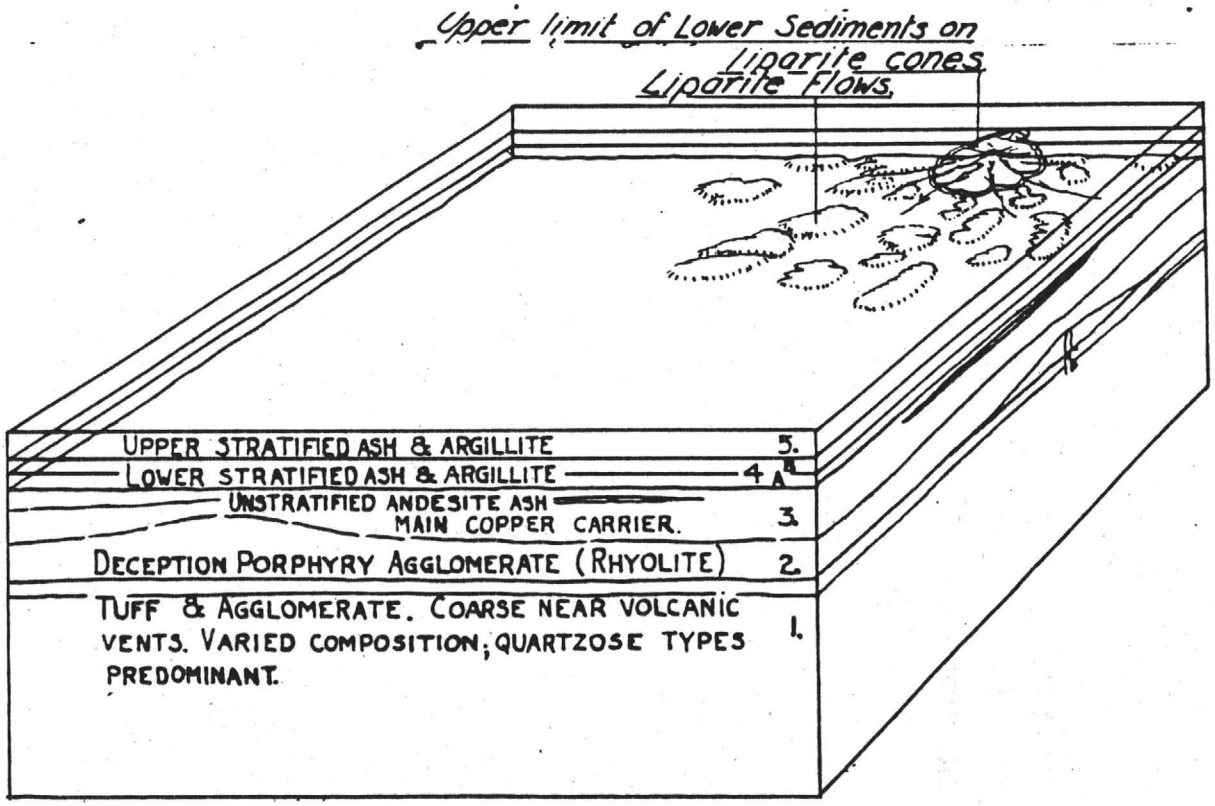


Figure 127. Stratigraphic succession at the United Verde Mine.

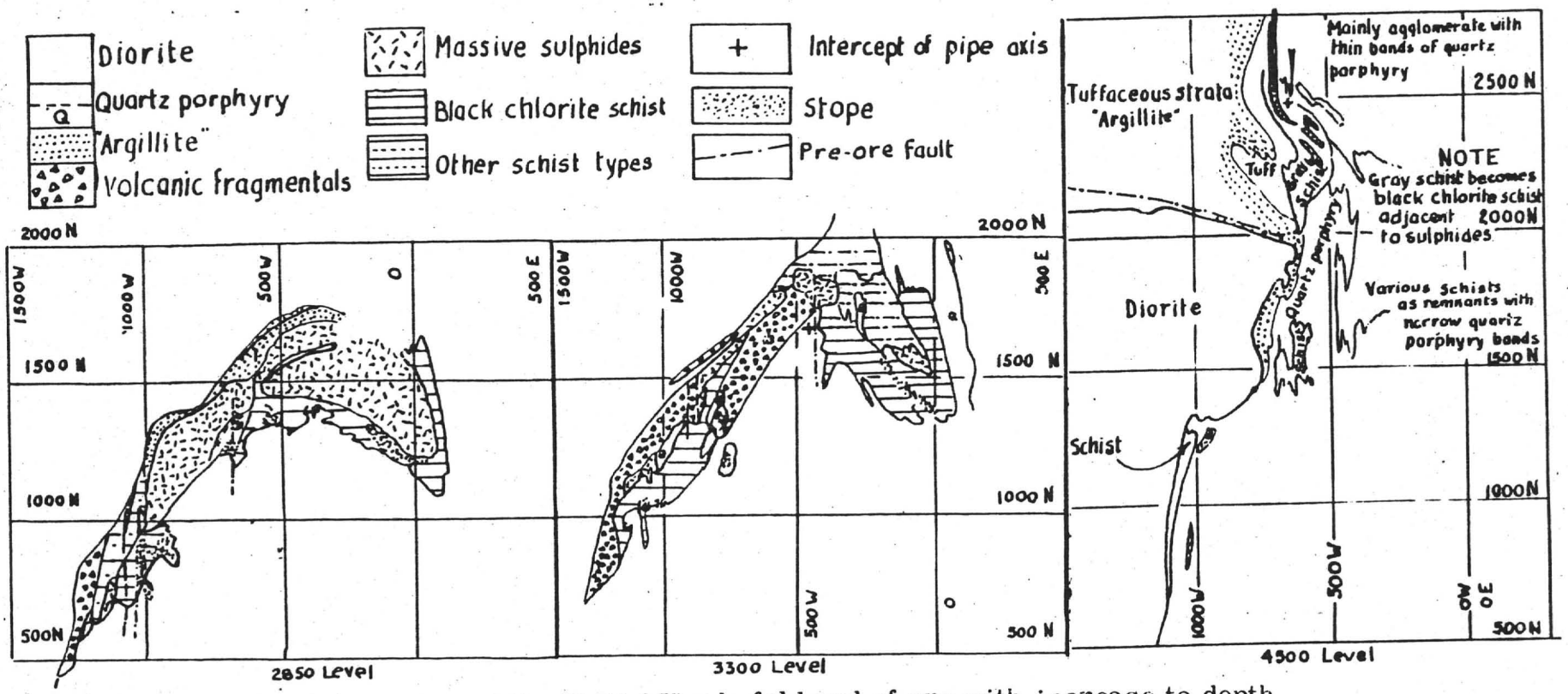


Figure 128. The waning of the United Verde fold and of ore with increase to depth.

Note the northward drift of the structure attending increase to depth.

A. The 2850 level shows dismemberment of the massive sulphide body beginning at gray schist zones along a pre-ore fault.

B. The 3300 level has only four small sulphide areas. Volcanic fragmentals predominate. Much black chlorite schist remains.

C. The sulphide bodies are small thin sheets parallel with the stratification. The quartz porphyry area is about one half schist residuals.

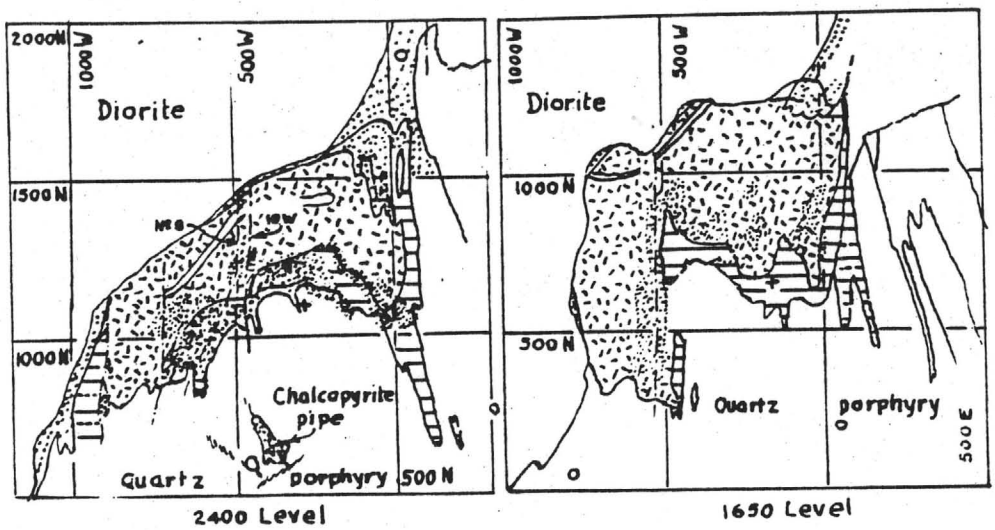


Figure 129. Stopes along pre-ore faults on the 1650 and 2400 levels.

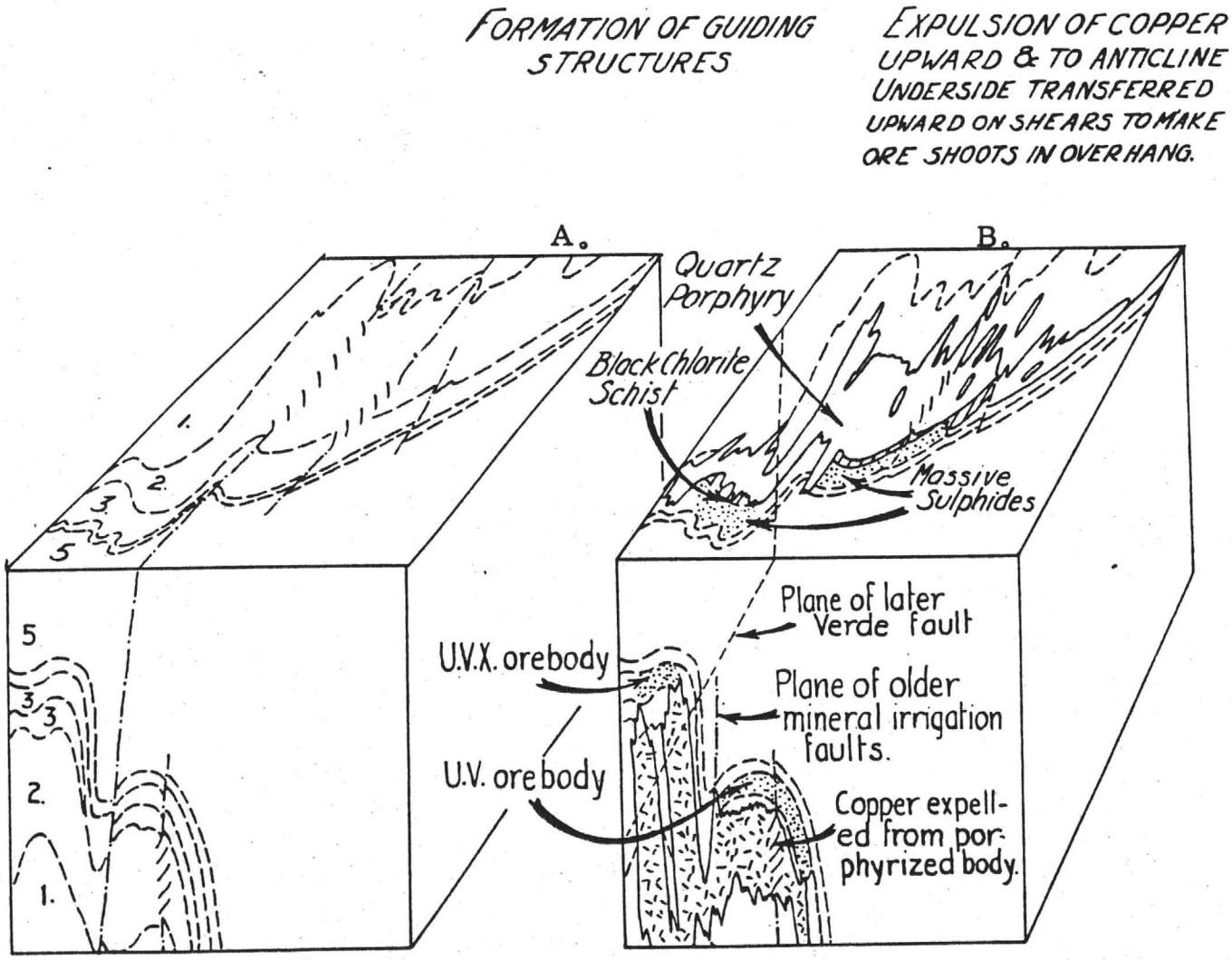


Figure 130. Porphyrization of the Deception porphyry agglomerate and overlying ash.

The principal economic mineral is chalcopyrite and the very high grade parts have some bornite. Marmotite is present on the fringes to the productive part of the pipe and also at depth below 3000 level.. Much of the chalcopyrite is in fractures through the massive pyrite and the black chlorite schist.

The underside of the pipe, pitching 56° northwestward, has the volcanic fragmentals converted to a black chlorite schist and usually this forms an envelope around the small sulphide bodies below the 3000 level; slightly weathered surfaces of the schist (underground) show relic ash fabric and

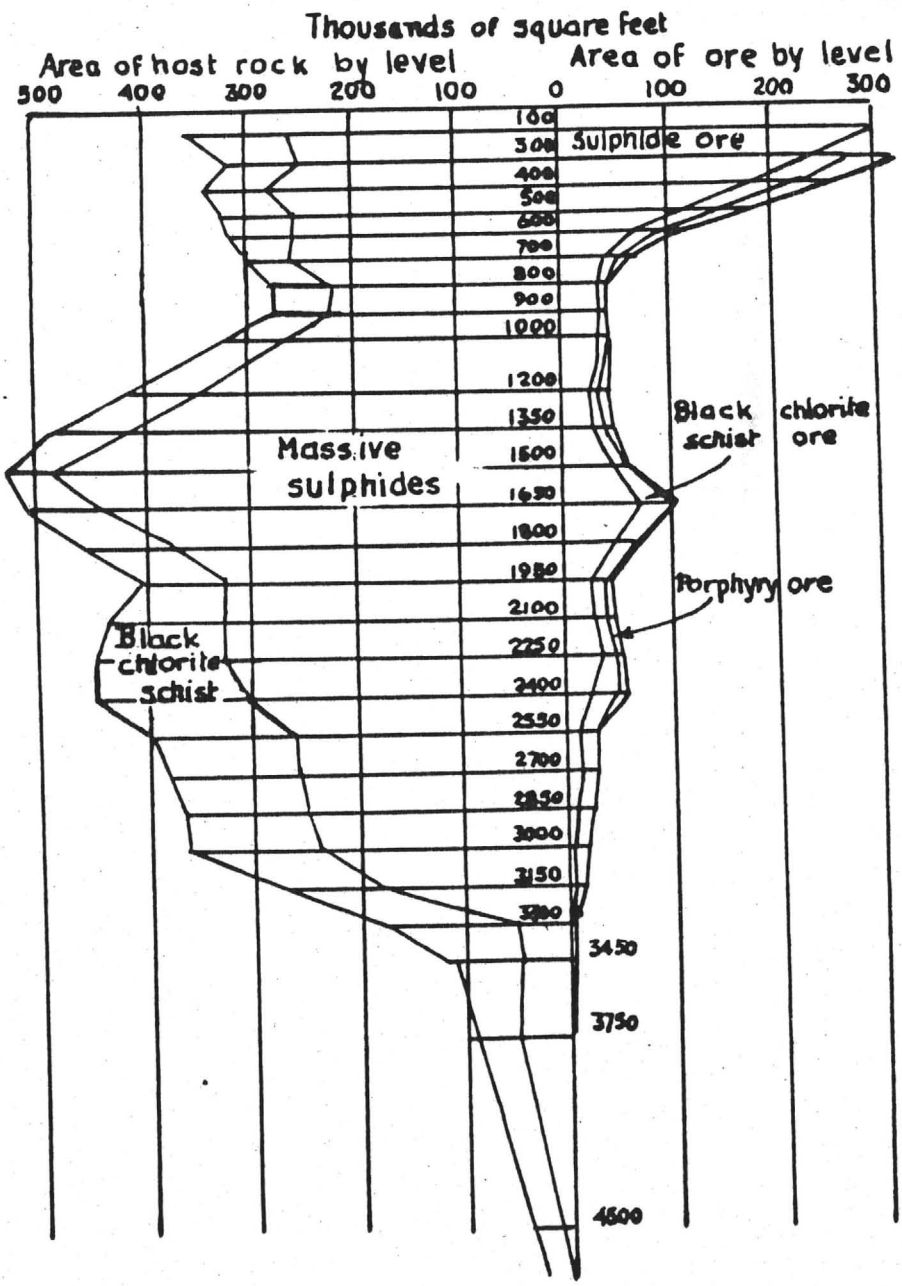


Figure 131. Changing pipe area and ore are relative to depth and wallrock

amygdules, and even some pillows in thin flows. The pipe has many sites where the chalcopyrite is in well defined fractures. Massive bodies of pyrite with less than 0.7 per cent copper along with much fine grained quartz are on the upper side of the fold and against the water laid strata.

Underneath and to southward from the black chlorite schist (outside of the pipe) is a quartz porphyry with relics of patterns seen better outside of the pipe and below the andesite ash and amygdaloidal flows which are host to the metallic mineralization. Drives were made to southward to reach the underside of the "quartz porphyry" on both the 1000 foot and 1650 foot levels; there squeezed agglomerate made long fingering partitions upwards into the "porphyry" and no mineralization existed. (See figure 130 B). The No. 7 shaft on the 1950 foot, 2550 foot, and 3000 foot levels penetrated porphyry deep enough to encounter stringers of recrystallized agglomerate near the underside of the mass. The relic structures in the quartz porphyry show that it is a metasomatized mass of ash and agglomerate with the lineation in it conforming approximately to the layering in the plunging fold. The iron and magnesium of the volcanics seem to have been expelled during the metasomatic process and reappear as the pyrite and black chlorite schist.

Two late generation fracture zones in the quartz porphyry have coarse quartz and pyrite mineralization with chalcopyrite from the 2550 foot level up to near the 1950 foot level and are mined as a chimney. Above the 2100 foot level, this small pipe intercepts the westernmost of the axial plane faults and a very large enriched stope (10 W) in the pyrite body extended upward from there. (Figure 129).

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plunging fold. Thereafter I came to look upon migmatite and granite bodies of great size as very different from the classical concept of a once homogeneous liquid mass; many granite bodies and all migmatites did not release magmatic solutions; they were made by them from rocks already there.

The mineralization was stratum selective for an ash with approximately andesite composition; it was located tectonicly on a plunging fold with small faults parallel to the axial plane which guided the transforming solutions; extent to their best mineralization was determined by the volume transformed to the unique Cleopatra Porphyry with location determined by the fold in the andesite ash layer from which it was extracted, (Figure 130).

The Elizabeth Mine, Vermont.

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A small flowage fold began to develope between the 725 and the 850 level and aborted in favor of a deeper one. The latter deposit at the 975 level began to develope thickening at the 850 level. (Figure 134). At coordinate 13725 N the fold in the footwall layers intercepted the level; there mineral inflation was under this structure - originating above - and the inflation intercept with the level extended southward or downward to the solution access at 13,500 N. Inflation induced mineralization as a "spur" in the eastern or hangingwall side of the structure. (See figure 133). This spur extends downward towards the access channel but was in the inhospitable layer and continued only a short distance. From the orebody southward on the side of solution approach, the host layer continues at near average thickness upward towards the surface. In plan (figure 133A) the frontal part of the flowage fold

RESOURCES

and the

IMPLICATIONS

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George W. Bain
Amherst
Massachusetts

February, 20, 1986

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This is not a publication. It is an opinion prepared for former students and friends who guided study of the many deposits described therein.

DOUBLE ASSOCIATION WITH INDIVIDUAL ORE BODIES.

Many large ore bodies have a double association in addition to the principal tectonic structure; the mineralization declines away from this secondary influence even although the major structure may seem to continue Importance of the secondary influence assumes unusual economic signifance in assessing the resources and in attaining scientific understanding of the emplacement.

Examples of one group in this extraordinary type of deposit are the large high metal content massive sulphide pipes; listed in order of their discovery, these are the Verde Pipe (Jerome, Arizona), the Horne Mine (Noranda Quebec), and the Kidd Creek Pipe (Ontario, Canada). The Verde Pipe is the only one which was not a "lonesome" deposit, and for which a good history is available. All are associated with some tectonic structure which opened metamorphosed volcanics - the local wallrock - to intensive replacement by sulphides.

There exists a tendency to class the pipes near Springbok (South Africa) and at Messina, with the above group but they have too much wallrock breccia in them and have greater similarity to the simple pipe deposits described earlier. A small pipe within the Cleopatra Porphyry at Jerome is very similar to the simple pipe deposits.

The tectonic structure associated with another equally important deposit type is a flowage fold wherein the massive sulphides follow the plunge to the axis of the structure. A small simple example is the Elizabeth Mine at South Strafford (Vermont), and the most famous is the Broken Hill Lode in New South Wales.

The United Verde Sulphide Pipe, Jerome, Arizona.

The United Verde pipe is on an anticline pitching 56° northwestward in essentially massive volcanic fragmentals and some amygdaloidal flows. (Figure 126). Mineralization is principally in a fine ash member and is lacking in a conformably overlying bedded member of mixed ash and clay sized detritus. (Figure 127). The fold and mineralization begins to fade out at the 2850 level. (Figure 128 A). Both fold and mineralization are diminished greatly at the 3300 level. (Figure 128B). The fold as well as economic mineralization ceased below 4500. A number of small pre-ore faults are parallel to the axial plane of the pitching fold. (See Figure 126). The copper-gold mineralization in the volcanics and massive pyrite bodies is principally along or just lateral to these faults which are recorded by offset flows and ash members and by granulated pyrite cemented by chalcopyrite or marmotite through the almost barren pyrite pipe, or in pyritized schist below the 1050 level. (Figure 129).

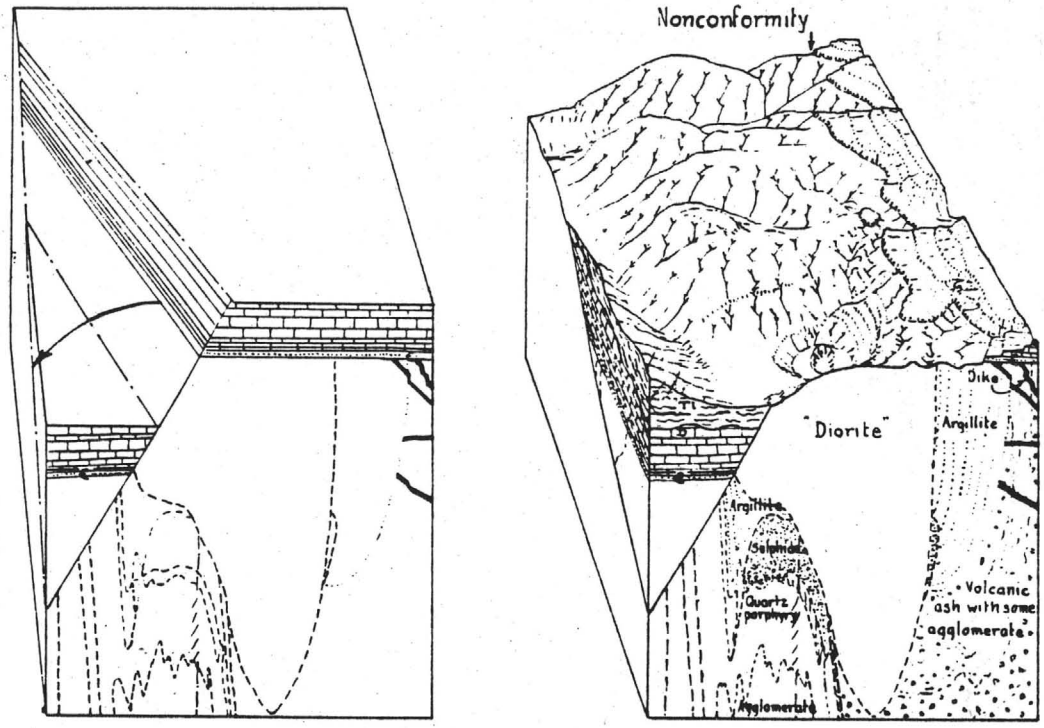

Figure 126. Block diagrams showing the Verde Pipe area.

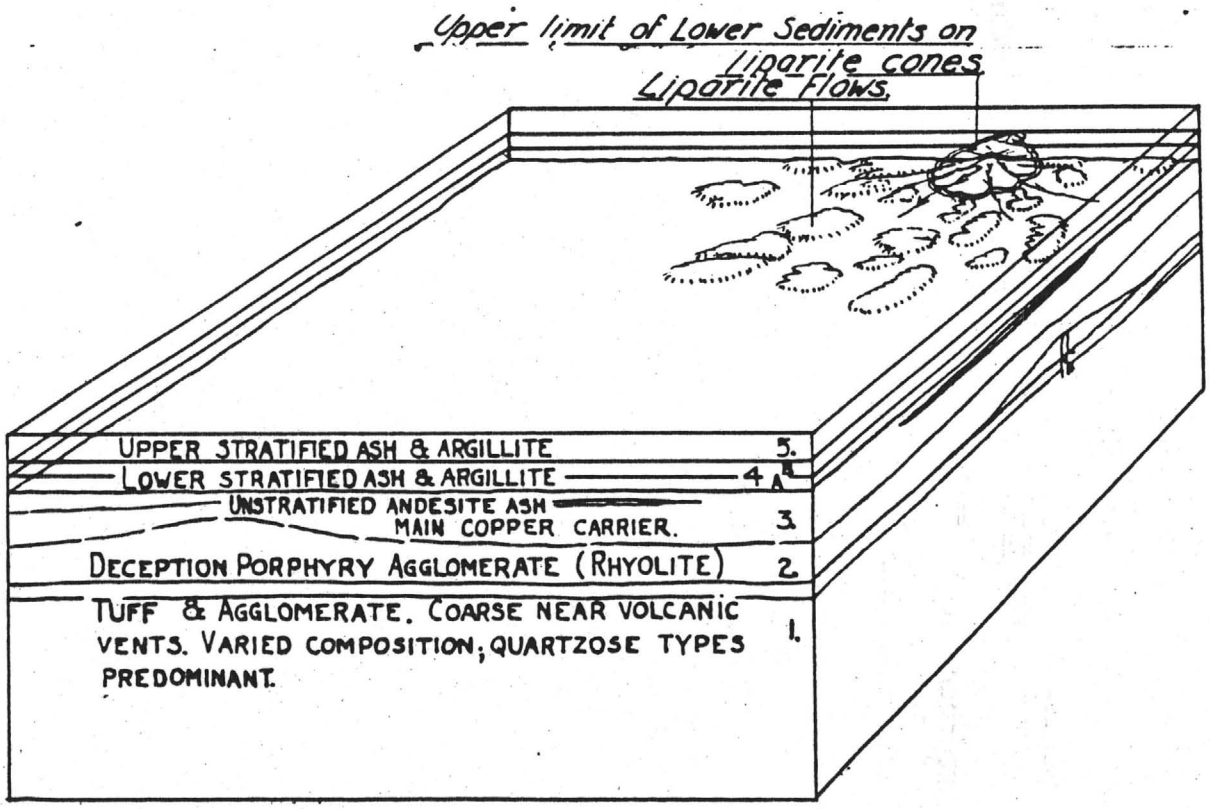

Figure 127. Stratigraphic succession at the United Verde Mine.

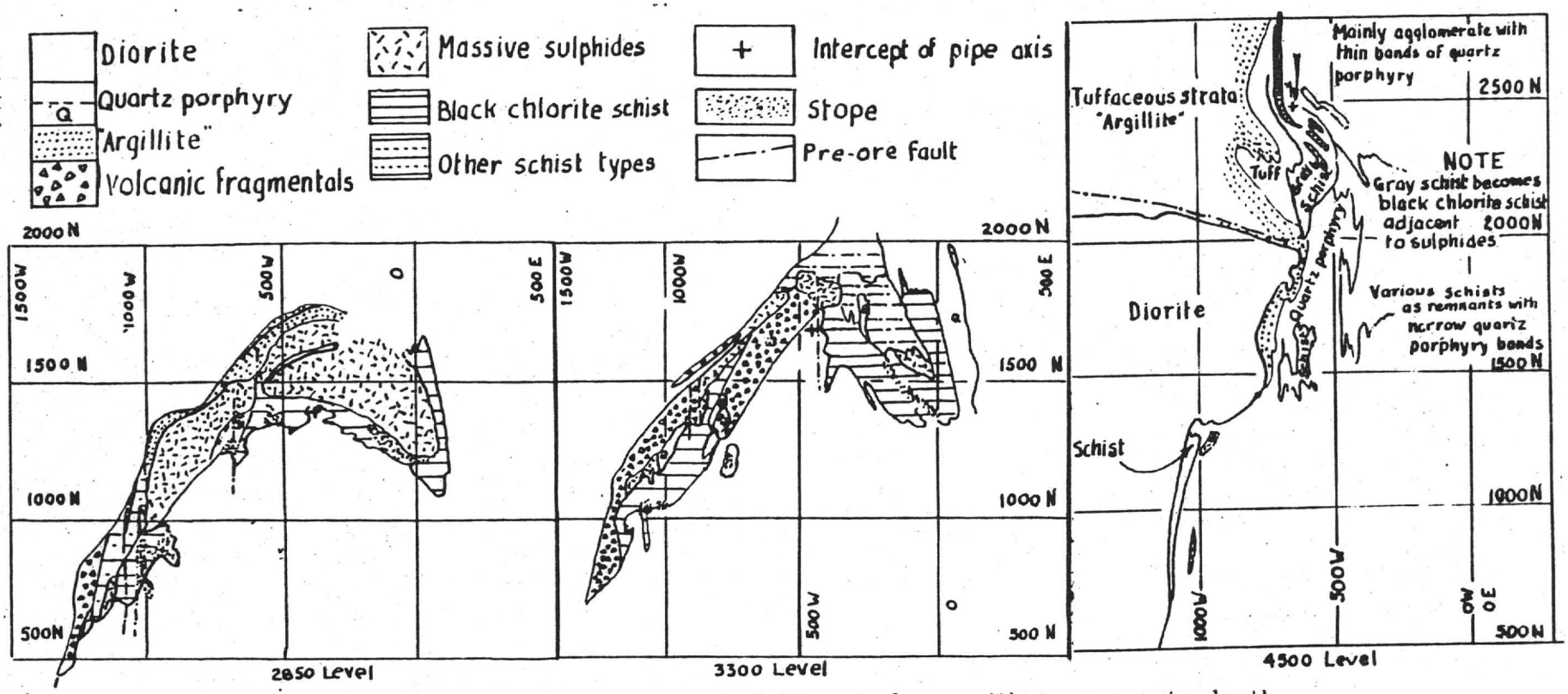

Figure 128. The waning of the United Verde fold and of ore with increase to depth.

Note the northward drift of the structure attending increase to depth.

A. The 2850 level shows dismemberment of the massive sulphide body beginning at gray schist zones along a pre-ore fault.

B. The 3300 level has only four small sulphide areas. Volcanic fragmentals predominate. Much black chlorite schist remains.

C. The sulphide bodies are small thin sheets parallel with the stratification. The quartz porphyry area is about one half schist residuals.

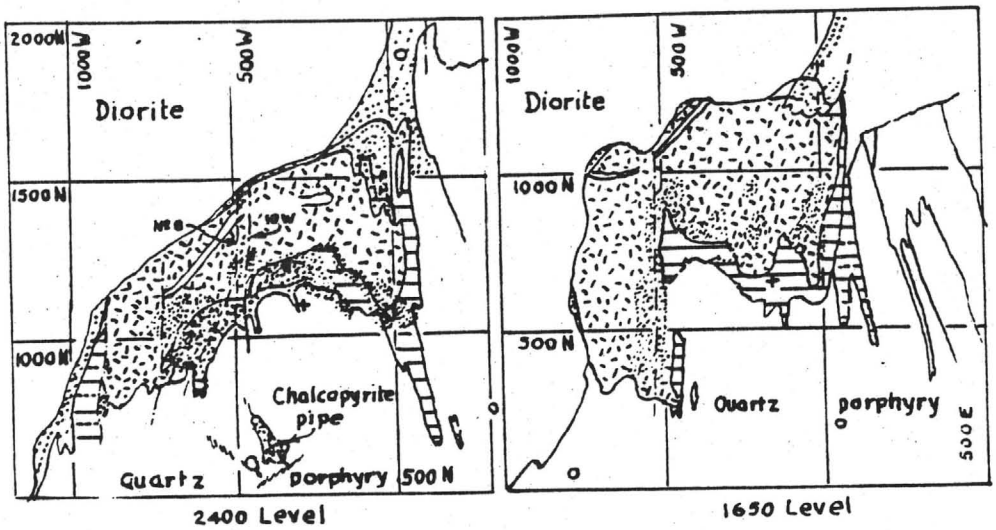

Figure 129. Stopes along pre-ore faults on the 1650 and 2400 levels.

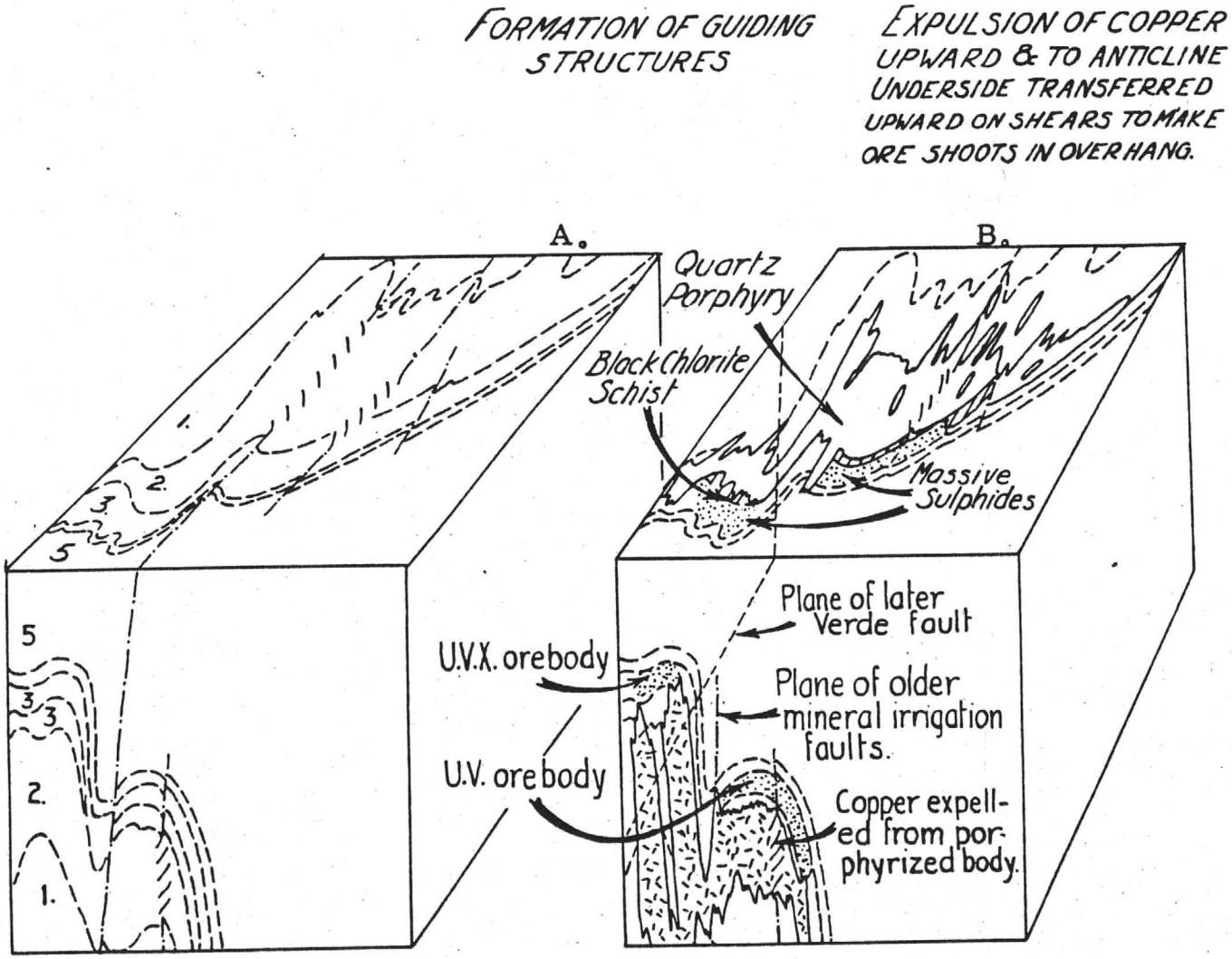

Figure 130. Porphyrization of the Deception porphyry agglomerate and overlying ash.

The principal economic mineral is chalcopyrite and the very high grade parts have some bornite. Marmotite is present on the fringes to the productive part of the pipe and also at depth below 3000 level.. Much of the chalcopyrite is in fractures through the massive pyrite and the black chlorite schist.

The underside of the pipe, pitching 56° northwestward, has the volcanic fragmentals converted to a black chlorite schist and usually this forms an envelope around the small sulphide bodies below the 3000 level; slightly weathered surfaces of the schist (underground) show relic ash fabric and

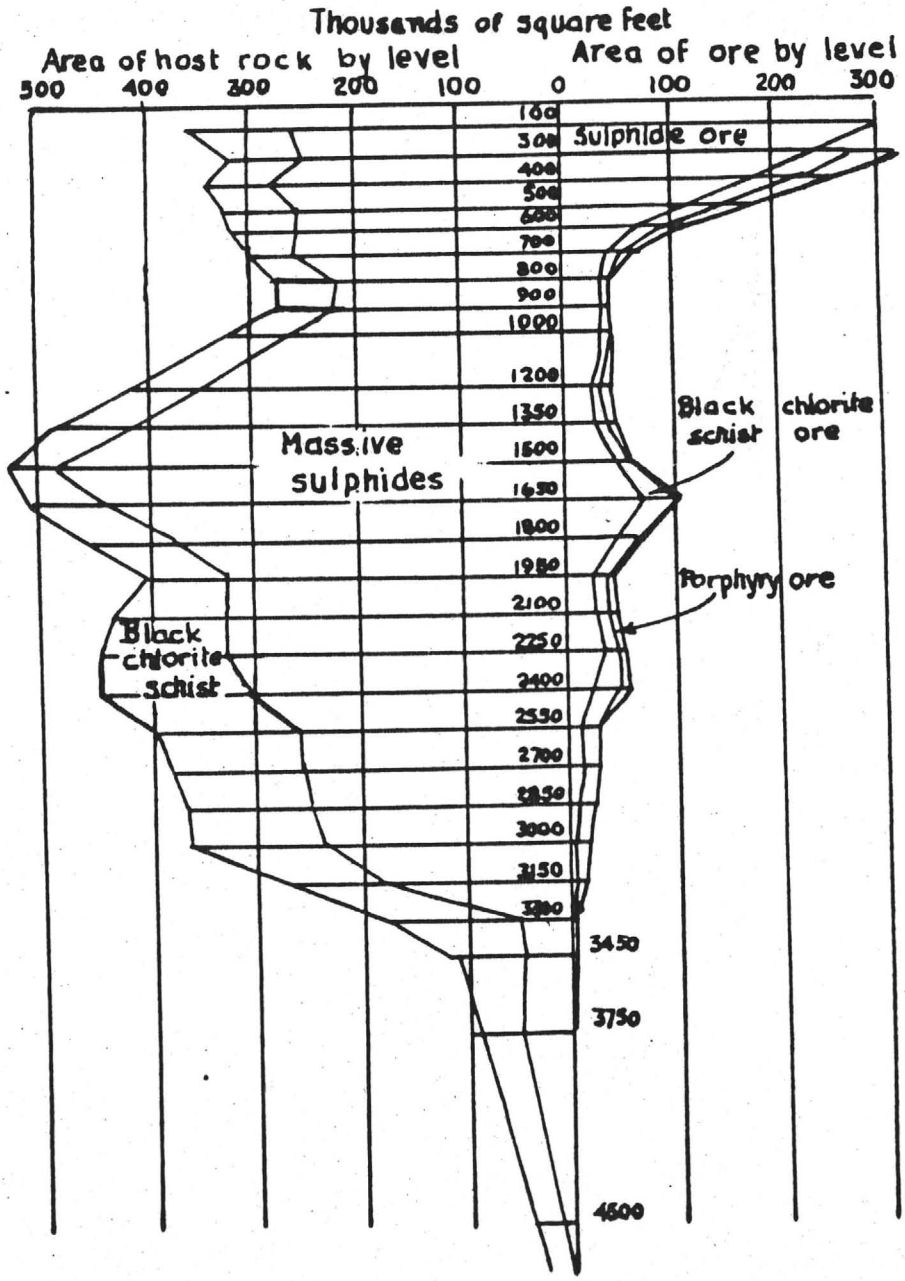

Figure 131. Changing pipe area and ore are relative to depth and wallrock

amygdules, and even some pillows in thin flows. The pipe has many sites where the chalcopyrite is in well defined fractures. Massive bodies of pyrite with less than 0.7 per cent copper along with much fine grained quartz are on the upper side of the fold and against the water laid strata.

Underneath and to southward from the black chlorite schist (outside of the pipe) is a quartz porphyry with relics of patterns seen better outside of the pipe and below the andesite ash and amygdaloidal flows which are host to the metallic mineralization. Drives were made to southward to reach the underside of the "quartz porphyry" on both the 1000 foot and 1650 foot levels; there squeezed agglomerate made long fingering partitions upwards into the "porphyry" and no mineralization existed. (See figure 130 B). The No. 7 shaft on the 1950 foot, 2550 foot, and 3000 foot levels penetrated porphyry deep enough to encounter stringers of recrystallized agglomerate near the underside of the mass. The relic structures in the quartz porphyry show that it is a metasomatized mass of ash and agglomerate with the lineation in it conforming approximately to the layering in the plunging fold. The iron and magnesium of the volcanics seem to have been expelled during the metasomatic process and reappear as the pyrite and black chlorite schist.

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