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M E M O

TO: R.R. Short, C.A. O'Brien, A.F. Budge, D.A. Allen

FROM: Don White

DATE: December 29, 1988

SUBJECT: A summary of exploration target types at and about the Vulture Mine, Arizona

Summary

An attempt is made here to define all the possible exploration targets around the Vulture Mine and determine which ones justify further effort. It is recommended that preliminary studies be started on two target types of major potential. One is the fault extension(s) which need a thorough data compilation and structural analysis at a cost of about $10,000. The other is the search for "blind" or alluvial-covered Vulture-like lodes by geophysical means and for that the help of a top notch geophysicist must be sought. An initial investment of $10,000. for that would determine whether or how to proceed. At stake is possibly a Vulture-scale, 350,000 ounce gold discovery.

Introduction and purpose:

A.F. Budge (Mining) Ltd. has been the lessee of the Vulture Mine patents and contiguous nine square miles of unpatented claims for four years. They have searched for open-pitable gold in the old pit area, tested some of the placer potential, experimented with the search for blind, alluvial-covered repeats of the Vulture lode, and evaluated the tailings. Only the tailings are known to be economic and on agglomeration/heap-leach cyanidation reprocessing scheme is now in progress.

The available tailings will be completely exhausted over the course of 1989 so that by early 1990 a decision will be pending as to the disposition of the lease. Either there is some justification to hold it at that time or else it should be dropped and the holding costs eliminated.

Thus any other targets or further exploration on Budge's behalf must be completed over the coming year. Anthony Budge's request is that "no stone be left unturned." Hence this memo to review what is known, define the targets remaining, consider how they may be tested, and appraise their merits on the basis of discovery potential versus exploration costs.

The Vulture Lode:

The Vulture Mine was principally an underground lode deposit. It yielded about 350,000 ounces of gold and 250,000 ounces of silver from about 1 million tons of mined quartz vein rock. Overall grades were thus 0.35 oz/t Au and 0.25 oz/t Ag but evidence indicates that early production from the oxide zone was substantially higher grade while the larger tonnage, sulfide ore production brought the grade averages down. Either way, at todays metal prices, a lode deposit of its type would be a lucrative find. Its metal content would have

a gross value of over $140 million.

The salient history of the Vulture, in outline form is,:

1) 1863 discovery and early oxide zone high grading with haulage of ores to Wickenburg and Smith's Mill on the Hassayampa River for arrastra and/or stamp milling and mercury amalgamation treatment.

2) 1880 commencement of on-site stamp milling and amalgamation. Deep underground mining.

3) 1917 loss of the vein zone against the Astor fault.

4) 1930's U.G. cleanup and partial cyanidation of earlier tailings.

5) 1942 shutdown.

6) Early 1980's mapping by Noranda and drilling/sampling by Pegasus.

7) 1984+ evaluation by Budge of open-pitable lode potential, stamp mill tailings and placer reserves, and some drill testing of alluvial-covered targets suspected to be blind lodes.

Results of exploration on behalf of Budge have culminated in an understanding of the Vulture geology that is more thorough and better supported than ever before. We are quite certain that the crucial event in the creation of the Vulture lode was intrusion of the Vulture stock in earliest Laramide time. That stock had at its cupola a sill-like apophysis which hosted and/or focused all the known quartz veins. Those veins occurred within the sill, particularly at its margins, and emanated into the immediately adjacent Precambrian volcaniclastic wall rocks, particularly the hanging wall. It is those quartz veins that carry the higher grade gold as native metal and electrum associated with minor disseminations of the sulfides galena, pyrite, and chalcopyrite.

The sill and the quartz veins are all semi-conformable to the bedding and foliation of the Precambrian host rocks. The sill and quartz veins have yielded a distinctive alteration pattern of sericite, disseminated pyrite, and silica flooding. The latter makes the lode area more resistant and hence a topographic high that begged discovery as "Vulture ridge."

Evidence for this interpretation includes structural and petrographic work, and also radiometric age dating. Both the stock and sill date at 85-90 million years before the present by two methods. Thus we have a clearly epigenetic vein system of late Cretaceous or earliest Laramide age. This constitutes a target type of known characteristics and exploration for Vulture-like deposits can take advantage of that understanding.

Geologic events subsequent to the formation of the Vulture lode have complicated the picture. One phenomena has been the post-mineral faulting of the vein into a number of segments by two sets of faults. The more major set is the series of northwest-trending, steeply northeast-dipping normal faults. The Talmage fault

of that set has an offset of over two hundred feet and forced a several year hiatus in mining until the next segment was found. The segment beyond the Astor fault, if it exists, has never been found.

Tertiary volcanic activity blanketed much of the area to the north and east with basalt, volcanic agglomerate and tuffs. Post-Tertiary regional tilting has rotated the Vulture lode from its original cupola position with respect to the stock to an apparent east flank position. The Tertiary volcanics have been tilted 20 to 80 degrees to the east of their primary position.

Erosion has then cut through Tertiary, Cretaceous and Precambrian rocks, all the way into the Vulture lode, yielding a mixed bag of alluvium covering nearly everything south of the Vulture lode and even coming close to burying the Vulture lode except for the relief of Vulture ridge. A by-product of this erosion was gold placers, particularly just south of the Vulture.

Target types:

An outline of the various target types classified by natural, engineering, and exploration parameters follows:

A. Lode

1. Known Vulture lode

   a. Open pitable reserves
   b. Underground fault extension

2. Other Vulture-like lodes

   a. About Vulture stock

      i Outcropping
      ii Buried by alluvium and/or volcanics

   b. About Cañon City stock

      i Outcropping
      ii Buried by alluvium and/or volcanics

   c. About Hartman Wash stock

   d. About other as yet unrecognized stocks

3. Other lode deposits, not Vulture-like

   a. Within Vulture or kindred stocks
   b. Within Precambrian rocks
   c. At unconformity beneath Tertiary units

B. Placer

1. Partially tested area beneath stamp mill tailings.

2. Further and wider from Vulture ridge.

C. Waste from earlier mining

1. Mine waste dumps

2. Tailings

a. Stamp mill tailings

i Wickenburg
ii Smith's Mill
iii Seymour
iv Vulture townsite

b. Cyanidation tailings

Some discussion of each of the target types is necessary to consider their realtive merits for further exploration. Let us consider them in order.

A1a Open-pitable reserves about the known Vulture lode -- This was the main focus of Pegasus' efforts and most of the drilling by Budge. Milton Hood was apparently involved in the latest Pegasus work and early Budge drilling and calculated reserves (1985) as:

Reserve	Tons	Grade	Contained Ounces
Proven	283,000	.066	18,700
Probable	66,000	.056	3,700
Dilution	35,000	.025	800
P.t. Total	384,000	.060	23,200

This was for a pit depth of 115 ft., a cutoff grade of .030 oz/t, and allowing for 10% dilution by .025 oz/t rock, all at 12 ft^3/s.t.

I have been involved in all the subsequent drilling to that which Milt Hood had to go by. I have logged the lithologies, structures, and workings, none of which had been done prior to my involvement. With the improved geologic understanding, I dispute Milt's interpretation and reserve figures. He correlated good assays over far too long distances, without regard for rock type changes and intervening faults. My own more detailed work, with more holes to go by as well, indicates about 100,000 tons in the 0.04 to 0.06 oz/t Au range. The best zone within that is less than 10,000 tons at about 0.08 oz/t between pits 1 and 2.

All the indications are that such grades can not be profitably mined because of the low recovery rates (only up to 50%) despite costly fine grinding (minus 200 mesh).

There are approximately 80 holes in this target. The drilling density (spacing of 50 to 100 ft between holes) and coverage (complete from stock to Astor fault and surface trace to open pit depth limits) are such that nothing remains to be tested that could significantly change that reserve. It has been viewed as a dead target type for over two years and I see no change in that.

A1b Underground fault extensions of the formerly mined Vulture lode -- These too have been recognized in the past and tested to various degrees. Three theoretical segments with exploration potential have been recognized. One was the so-called "Block I" (Hodder and White, Dec. 14, 1985 and White, May 15, 1986) or a step-like repeat of the oxide zone parallel to and just south of Vulture ridge. This target was geophysically surveyed and drilled and found not to exist.

The mined Vulture lode was two main segments, one footwall and one hanging wall to the Talmage fault. The hanging wall segment required several years worth of winzing, crosscutting, and drifting before being located some 210 ft. down-dip and 150 ft right-lateral across the Talmage fault. After the Astor fault was encountered, a goodly amount of effort was expended on underground exploration to pick up the next segment. It was never found but that effort is syspected to be in the wrong area. A thoroughly diagnosed structural appraisal would better direct any future effort.

Two segments east of the Astor fault may be sought. One is from the Astor to the Schoolhouse fault and the next is east of the Schoolhouse fault, beneath about 400 feet of Tertiary volcanics and an undetermined thickness of Precambrian. Either of these segments could be as large as all the rest of the Vulture mined to date.

A note of caution, however; as we pointed out in an appraisal of targets three years ago (Hodder and White, Dec. 14, 1985) there is some reason to doubt that there is any extension at all. The mineralization of the Vulture vein system died out short of the Astor fault. Only subeconomic vein was truncated by the fault. Exploration beyond the fault will require faith that dead spots occur in the vein and that it can be better grade beyond. I feel this is legitimate. Indeed, there are ore shoots in the Vulture with lean zones between.

To explore either of the fault segments a number of exercises are recommended. One is thorough research of the old reports, logs, maps, and sections. Another is fabrication of the mine model long recommended to work out the structural complexities. We're talking in terms of individual faults but there are in fact several sets of variously oriented faults, all cross-cutting each other and the veins. A model is the surest way to come to grips with these problems.

Physical evidence may possibly be obtained down either the Douglas Shaft and/or the presently flooded levels of the old Vulture. Professional climbing help would be needed to reach the bottom of the Douglas Shaft from which mapping

and sampling would be valuable. Such help can be hired. The West Incline is flooded up to 650 level. A careful inspection of the limits of navigation eastward on the 600 level would tell whether dewatering is useful there. The only connections to the 750 level are via the E incline, caved above but possibly open from 600 to 750. Deeper levels, if dewatered may then be accessed by winzes from the 750 to 850 and 850 to 950.

If the various analyses indicate any block(s) of untested ground with potential, a diamond core drilling program would be needed to test the target(s). Several holes of about 1,000 feet in depth are likely. But complete data compilation, including the mine model, is the first prerequisite to determine whether one or more targets truly do exist. Data compilation would require 1-2 man months or $5-10,000. Drilling would cost a minimum of $100,000 (three 1,000-ft. holes at $30/ft.) and likely more than that to pursue leads so developed.

A-2 Other Vulture-like lodes -- This discussion includes both outcropping and blind targets and those about the Vulture stock and kindred stocks of the same lithology and age. The possibility of outcropping high grade gold in quartz veins has been well investigated by old-time prospectors, by Pegasus' sampling program, and by Budge's support of reconnaissance efforts at the Hartman Wash and Cañon City stocks. There are no outcropping Vulture-like lodes.

The Hartman Wash pluton appears both slightly different in petrography and virtually devoid of quartz veins or any hints of alteration like the Vulture stock. Thus it is eliminated from further consideration.

The Cañon City stock has been traversed only. It is suspected to be as fertile as the Vulture stock for it harbors visible gold in quartz up to two feet thick in its core, just like the Vulture stock. Its margins, however, where Vulture-like lodes would form, are all concealed, some by alluvium, but most by Tertiary volcanics. Thus the real issue is blind or covered deposits.

Beneath cover geophysics must be considered and we have high resolution helicopter magnetics data flown and interpreted for Budge in early 1986. From it we recognize some magnetic lows extending east from the buried Vulture stock, parallel to the Vulture lode, and of similar length. In hope that they were other quartz porphyry apophyses, ten reverse circulation holes were drilled in Feb.-Mar. 1987 under Peter Hahn's supervision. None of the holes on any of the three targets found any convincing plutonic rocks or mineralization. Thus all three targets are believed to be low-magnetic interbeds within the Precambrian stratigraphy. The ideas were good and are still good. Those three targets just aren't it. The next one may be!

One either finds other geophysical tools to corroborate or better sort out the magnetic targets, or resign themselves to drill-testing a number of exclusively magnetic targets. What I would like to see is a good method to determine whether a Vulture-like ridge coincides with any magnetic lows. The combination would make an even better drill target. We were close to

attempting a shallow, high-resolution, micro-seismic survey on the three drilled mag targets before realizing that they were so shallowly covered that the travel times could not be resolved. Also, at such shallow depths, the direct drill testing of targets was plenty cheap.

Taking the blind target program further, however, should utilize either seismic or ground-penetrating radar to locate bedrock ridges beneath alluvium or volcanics. A crew and equipment for either technique costs about $1,500. per day and a week would be the minimum initial test of such a system. That is about $10,000. Drill testing thereafter could be by reverse circulation holes at $10./ft. A hypothetical program of ten holes, 300 ft. each would cost about $30,000.

Exploration should proceed from the Vulture south, retesting the initial three magnetic lows, and then extending beyond the present claim block. The economic limit of cover thickness must be decided. My guess is that at least 200 ft. of alluvium may be considered as stripable for a Vulture-size target. That should open up several geophysical targets.

The search for and testing of blind targets is a tedious, expensive process that should not be attempted in a hurry. Every scrap of evidence has to be gleaned to guide exploration. Some geophysical techniques may turn out to be expensive failures but they are the best tools available and will have to be attempted. Top notch geophysicists are a must and I can recommend some.

A-3 Other lode deposits, not Vulture-like -- Thinking has focused on three non-Vulture-like target types. One is auriferous quartz veins within the quartz monzonite stocks themselves, as oppossed to sill-related like the Vulture. Occurrences like this are known in the Vulture stock and in Cañon City stock. The best Vulture stock veins have been sampled and found to be vein-confined without any disseminated gold. The veins themselves have been deemed too thin (2" to 12") to be mined or diluted. The Cañon City vein, however, is up to 2 ft. thick and wall rock there has not been sampled. Some check for disseminated gold and the possibility of a drillable high-grade target should be made. The sampling of walls and dumps would cost about $500. Drilling, if decided upon, could be reverse circulation in conjunction with the drill testing of one of the other target types. A total of 1,000 feet would cost about $10,000. plus up to $5,000. for dozer work and assays.

The possibility of sygenetic gold in the Precambrian sequence seems remote at best. The Proterozoic volcanics are notably barren, as learned by early prospectors, Pegasus' efforts and minor efforts for Budge. No further consideration is justified for this.

Robert W. Hodder noted the possibility (letter of Jan. 2, 1986) of unconformity-related gold and sulfides at the base of the Tertiary volcanics or near the top of the pre-Tertiary erosion surface. Indeed gold was identified in two drillholes and a well near the Douglas Shaft in 1930. The succeeding shaft (1931) with exploration headings about 100 feet beneath the drilled gold apparently

found little. It's possible that a zone of abundant hematite/specularite, secondary quartz, and occassional gold reported in the drill holes could be a nearly flat-lying deposit up to 50 feet thick. If so, and beneath 400 feet of Tertiary cover, an 8:1 stripping ratio is indicated. This target could be tested as a byproduct of any drilling for fault extension targets between the Schoolhouse and East faults. Alternatively, if fault extensions are not sought, four 500-ft. reverse circulation holes into the graben would cost about $20,000.

B Placer potential -- The placer potential was tested on a reconnaissance basis N, E, and S of Vulture ridge by James Prudden using a portable sizing and washing plant with sluice. His report of Jan. 23, 1985 identified the area now being exumed by the removal of stamp mill tailings as having potential for 120,000 yd^3 grading about 0.5 g/yd^3. That is 2,000 ounces of gold with a 1:1 stripping ratio in the gravels alone (i.e., after removal of all tailings, then 5 ft. barren gravels stripped to recover 5 ft. of pay gravels). The more complete analysis of advantages and disadvantages of this target are summarized in my recent memo (Oct. 18, 1988).

C-1 Mine waste dumps -- These are much too small to constitute a target unto themselves. Most of the dumps were reportedly milled and cyanided by the Dickie operation in the late 1930's. Only a few thousand tons remain in pits 1 and 2 and nearby on the surface. They have not been sampled but could be at minimal cost in hope that some leachable gold may occur in enough tons to make it worth adding to the existing tailings heap leach.

C-2 Tailings -- These were recognized early on as a small but potentially lucrative reserve of leachable gold. The stamp mill tailings on site are the object of the present operation. They are being agglomerated and stacked at the rate of 1,000 tons per day and heap leached with recovery now reaching the target 100 ounces gold per week. The reserve has been auger-drilled and estimated at 215,000 tons at .037 oz/t or 5,500 recoverable ounces gold at 70% recovery. There is also about 150,000 tons grading 0.014 oz/t that may or may not be economic.

The gold grade distribution, silver distribution, thickness variability and reserve calculations are all contained in my memos of July 8, July 21, October 21, and October 25, 1988.

The on-site cyanide tailings contain so little remaining leachable gold that they are not economic.

Consideration was given to tailings at earlier mill sites. The original Vulture mill site in Wickenburg was partly washed away by floods. The remainder was trucked to Asarco's Hayden smelter as auriferous silica flux in the 1950's. The Smith's mill site has only some 3,000 tons of .03 oz/t remaining after flood erosion. Its poor road access renders it uneconomic as an add-on to the mine-site tailings. And finally, the tailings at Seymour have been fully washed away by the Hassayampa River. Thus the stamp mill tailings at the mine site are it. There are not even any other mines in the district with any tailings.

Conclusions

Consider again our outline of target types in light of the previous discussion.

A. Lode

1. Known Vulture Lode

a. Open pitable reserves

- ~100,000 s.t. @ .05 oz/t Au (~5,000 oz, only 2,500 recoverable)
- Including ~10,000 s.t. @ .08 oz/t Au
- Completely drill tested
- Poor leachability (~50%) despite 200 mesh grind
- Not economic

b. Underground fault extensions

- Two target segments up to 350,000 oz each
- Prerequisite comprehensive structural analysis, $10,000
- First stage drilling 3 holes - $100,000

2. Other Vulture-like lodes

a. About Vulture stock

i Outcropping - none
ii Buried

- Geophysical targets based upon areamag. Need geophysical consultant, maybe $10,000
- Need corroborative radar imagery or shallow seismic profiling at ~ $10,000
- Drill testable for ~$30,000

b. About Canon City stock

i Outcropping - none
ii Buried - need geophysical advice

c. About Hartman Wash stock

- Not right composition, no veins

d. About other as yet unrecognized stocks

- Need geophysical advice

3. Other lode deposits, not Vulture-like

a. Within Vulture or kindred stocks

- Small, high grade, discontinuous and subeconomic veinlets in the Vulture stock
- Cañon City vein up to 2 ft. with visible gold; ought to be evaluated as drill target and sampled for low grade halo.

b. Within Precambrian rocks - no encouragement

c. At unconformity beneath Tertiary units

- May explain gold reported in drilling near Douglas shaft
- Could be sampled in course of deep fault ext'n drilling, same area, or by 4 holes for ~ $20,000

B. Placer

- 120,000 yd^3 @ 0.5 g/yd^3 or ~2,000 oz Au postulated
- Too small reserve for plant costs
- Could be subleased, contracted

C. Waste from earlier mining

1. Mine waste dumps

- Only a few thousand tons
- Worth sampling in case heap leachable

2. Tailings

a. Stamp mill

i Wickenburg - all used up
ii Smith's Mill - 3,000 s.t. @ .03. Uneconomic recoveries and haulage costs.
iii Seymour - all washed away
iv Vulture townsite

- 215,000 s.t. @ .037 (~5,500 oz. recoverable)
- 150,000 s.t. @ .014

b. Cyanide tailings - no more recoverable Au

The economic significance of the various target types must be kept in perspective. The tailings now being reprocessed will yield about 5,500 ounces of gold. The placer potential, far from proven, is less than half that. The fault extension targets or blind Vulture-like lodes, however, each have potential for being over 100,000 ounces or about 350,000 ounces if similar to the Vulture in size.

Only the fault extension or blind target possibilities are worth major efforts. The other target types are either little known and difficult to quantify but modest (i.e., unconformity hosted Au) already studied and uneconomic (i.e., open-pit lode reserves) too small to consider independently (i.e., placers, waste dumps) or demonstrably non-existent (i.e., other tailings).

Recommendations

I recommend the basic steps be taken in pursuit of the two target types of major financial potential, the fault extension(s) and blind target(s). The basic steps are about $10,000 expense for each target type and will help decide whether they are worth taking onward to the more expensive testing stage.

Prerequisite to any search for fault extensions is a comprehensive structural analysis. This must include compilation of all available data and fabrication of a model to understand the complexities of multiple, intersecting structures. I would like to do this chore. When near complete, I may want to get advice from Bob Hodder and/or Paul Lindberg. The culmination of such study would be advice on whether or not it's worth testing, and if so where and how.

The search for blind Vulture-like targets is a difficult but high stakes geophysics exercise that must be very geologically oriented. The geologic understanding of the Vulture must be the guide and a geophysicist willing to learn and apply that understanding is crucial. For about $10,000 we ought to be able to get lots of good interpretation of our aeromagnetics and steering on the use of radar and/or seismics.

Some incidental time and expense should be devoted to sampling of waste dumps and the Cañon City vein. The main thrust, however, should be the total $20,000 allocated to determine whether the major targets are likely to exist and, if so, how to find them.

These studies would best be completed by summer, 1989, so that field work, if warranted, could be done in the fall and allow for drilling in the winter. Thus recommendations on the disposition of the lease could be made in early 1990.

DW:sk

Carole

RIXFORD A. BEALS
2 LEXINGTON ROAD
SOMERSET, N. J. 08873

Mr. Donald C. White
521 E. Willis
Prescott, Ariz. 86301

January 6, 1987

Re: Vulture Mine

Dear Mr. White:

Seeing an abstract of your paper on the Vulture mine for the SME annual meeting led me to review some of my notes and my late father's correspondnce files. He, Roger L. Beals, was a UC mining graduate with a 50-year career taking him from Alaska to Columbia, SA. While his activities at the Vulture are only a footnote to the history of the mine, you may find the enclosed copy a of letter interesting because he thought that considering the poor condition of the underground workings he might have been the last person to have had physical access to most of them.

The geological sections mentioned in the letter were his. While the geological terminology may be obsolete and the mineralogy imprecise by currect standards, he had adopted the methods installed at Butte by Reno Sales and his underground geological mapping was painstaking.

In 1923 my father and two partners installed a simple tailings treatment plant at the Vulture with the goal that the income would support examination and limited exploration of the mine. The following year they dropped it:

Tailings treatment was not very profitable and a project involving over a 1000 feet of new shaft, drilling, and drifting to locate a finite ore zone quite possibly smaller in tonnage and/or lower in grade than that which had been mined between the 700 and 1050 levels was unattractive. (It may still be so).

At the time he retired I was AIME Editorial Director and we talked and corresponded about the more interesting properties he had examined and operated. The following comments are from my notes and those letters.

I wondered why the earlier operators had floundered in seeking ore beyond the second fault. He told me that it was quite typical of the era to find good plans of the workings, as at the Vulture, but no evidence of geological mapping -- he didn't think they even had a good idea of the dip and strike of the key fault, let alone the throw.

It was difficult to document because extraction had been very complete and the stopes had caved -- through to surface in the upper workings -- but he believed that grade diminished consistently with depth. (This was another factor making exploration unattractive.)

There have been various reports about the richness of the first ore mined. From some fragments he found and assayed my father thought that selective mining and sorting could have yielded ore with 20 oz./ton -- sufficient to support pack animal or mule train haul to Ehrenburg, thence down the Colorado on rafts to the Gulf of Lower California and shipping on sailing vessels to San Francisco or Swansea in England.

The seeming isolation of the Vulture deposit struck me. My father thought there might well be others in the immediate region, obscured by the various volcanic flows and recent debris. His own reconaisance had not found any promising intrusives and he considered prospecting hopeless. As he put it, "a strike of that magnitude would have drawn scores, if not hundreds, of prospectors who went over the area on foot, and foot-by-foot."

He drew an interesting parallel to the Vulture at another property in the region. The following paragraph is from a 1928 letter about the Gold Bar mine. (You may be familiar with this mine which lies between Constellation post office and the Hassayampa river.)

"Was surprised at the similarity of the ore shoot at Gold Bar to that at the Vulture. With the exception that at Gold Bar they have granite instead of shist for wall rock, it looked to me as though what I had previously described as the sequence of mineralization and mineral suite at the Vulture held for this property."

When I visited this mine as a young man was surprised to find that what they referred to as a "glory hole" was actually a cave perhaps 100 feet wide and 50 feet high in the side of a mountain. The large angular pieces of waste rock protruding from the walls and roof and lying loose on the floor -- one the size of an automobile -- led me to think it an inclined pipe breccia. I do not know if anyone has done enough sound work there to truly define the deposit or, if my guess was correct, to identify the related intrusive incident.

I have not been involved with the mining side of the industry since about 1961 but enjoy keeping up with the evolution of geology and its impact on economic geology as well as having some non-enjoyment in the impact of economics on mining in this country.

Yours very truly,

COPY

To: AS&R, New York
From: R.L.Beals, Wickenburg, Ariz
Re: Vulture Mine

June 25, 1927

It is three years since I left the Vulture and since neither maps nor geological sections are now available this has to be largely from memory. However, I spent some six months trying to find what I could do with the mine and the following is the result of the findings.

Production at the Vulture came from two lenses or shoots. One bottomed at about 450 feet, the West shoot. The East shoot, the most productive, was cut by a fault at approximately 400 feet depth and the drag ore mined to 500 feet. The mine was developed and East shoot picked up on the 850 level and mined from near the 700 to the 1050 where it was cut off by another fault.

This latter fault was of the same approximate strike and size as the first fault and as the first one had a throw of 300 feet the Vulture company developed below looking for the faulted segment and expected it to come in about 300 feet below the 1050 level.

The lens where cut by the fault was approximately 200 feet long by 18 feet wide. The lens produced approximately 125,000 tons between the two faults, i.e. in approximately 300 feet depth. The grade was $20.50 taking the average tailing as sampled by me at $1.75 and 18.75 recovery.

The work was done in such a fashion that exploration at depth below the last fault was slow and prohibitive as to cost. There was shaft to 750, then at the end of a XC a winze to 1050, then a XC, and a winze to 1350 and a final winze to 1500.

They found by the winzes and development several small veins, giving good assays, but these did not open up and they did not develop them to any extent. The work was apparently based on the idea that there was no lateral movement to the fault. The first fault threw the vein considerably to the East and it appeared to me that they never did develop in the ground where it was probable that the faulted segment could be found.

The area to the East of the outcrop over the shoot is blind, covered by mud flow and surface wash.

There are really two veins, the main vein, and a footwall vein varying in width from 2 feet to 10 feet, parallel and 100 feet in the footwall.

The main fissure, in shist, is occupied by a strong wide vein made up of a dense flinty quartz and carrying a small amount, probably less than 1%, of sulphide. This sulphide is iron pyrite and the vein assays from a dollar to two dollars.

Later apparently a second period of mineralization set in and the first vein was fractured and the places where fracturing was greatest were filled with a different quartz. This quartz carries from 2 to 5% sulphides made up of pyrite, chalcopyrite, sphalerite and galena. This was the ore. The first vein [quartz] is unoxidized at the surface being very dense. The

second quartz is oxidized to water level, about 450 feet.

The West shoot narrowed and shortened with depth. The shist lies on granite which comes to the surface about 300 feet West of the West shoot. The fracture goes into the granite and rapidly fades out. The vein on the different levels decreases in width rapidly as the granite is approached.

The East shoot was also getting smaller with depth. The surface outcrop was apparently considerably longer than on the lower levels. From the 1500 level, or bottom of winze they picked up the granite at about 1600 or 1650 as I recall it, and it would look as though this would limit the vertical extent to which one would expect the ore to extend if the fissure behaved as it did where it approached the granite on the West.

In other words, it looked as if the East shoot was diminishing in size and that it would go into the granite at somewhere between 1600 and 1800 feet and that there was a block of ground between the 1050 and 1800 where the faulted segment would be found.

The mine is much faulted, but these are small and generally the throw is less than the width of the vein so there was no difficulty in following the ore but there was considerable added cost for mining.

I did considerable sampling of the old stopes and found that a great deal of the low grade vein had been mined to keep the mills running. It is these low grade stopes, quite impressive as to size, that have mislead a number of people as to the size of the old Vulture.

NOTE:

R.L. BEALS WAS WELL AWARE OF THE VARIOUS FACIES OF THE "GRANITE FAMILY" AND MADE CAREFUL DISTINCTIONS IN HIS FIELD WORK AND MAPPING BUT - ODDLY - NEVER BOTHERED WITH SUCH TERMINOLOGY. PERHAPS IT WAS BECAUSE HE WAS WRITING FOR NON-GEOLOGISTS OR MINING ENGINEERS OF AN EARLIER GENERATION. SO, IT WAS GRANITE, PERIOD, IN HIS LETTERS!

R.A.B.

Carole

M E M O

TO: Carole A. O'Brien, Anthony F. Budge

FROM: Don White

DATE: January 12, 1988

SUBJECT: Vulture Tailings at Smith Mill Site

Summary

The Smith Mill Site on the Hassayampa River 12 miles down from Wickenburg, offers some limited additional leachable tailings for the planned Vulture mine site heap leach. A quick appraisal indicates a minimum 3,000 s.t. of tails at average grade .043 oz/t Au.

Background

The following ad was spotted in the California Mining Journal, December, 1987, p. 86

> ARIZONA MILL SITE: Old Vulture Mine tailings dump, 20 acres on 19 year Arizona State Lease on the west bank of the Hassayampa River. Assay reports, transferable lease, ALL $20,000. P.O. Box 7517, San Diego, CA 92107; WOOLF, (619)225-8303. cDec1

A call to Mr. Marion Woolf in San Diego revealed that he and others have been puttering with the Smith Mill site tails since 1983 and have now "decided to sell to someone with more know-how." He is asking $20,000. for what he claims is 19 years remaining on a 20-year state of Arizona mining lease for the 20-acre site. This has not been checked with the State Land Dept.

Mr. Woolf sent some data, about the only thing useful being an assay report from Iron King Assay, 1983, indicating the average grade of twenty samples to be .044 oz/t Au.

Recent Evaluation

With Carole's blessing I made a visit to the site January 2nd and 3rd, 1988. Smith Mill site was simple to find and clearly of small tonnage potential. Most of the probably large original volume of tailings has been eroded by flood waters of the Hassayampa and literally washed away. What remains is likely 3,500 to 4,500 s.t. depending upon how tidily it can be cleaned up around old obstructions (i.e., buried tanks and pipes) and how close to the underlying alluvium one may scrape. The average of the twelve representative samples I collected is .043 oz/t Au, only .001 oz/t less than that reported by Mr. Woolf's sampling (both sets of assay data attached).

A concerted effort was made to locate any remaining tails from the other two mill sites used in the past. One was the original stamp mill site in Wickenburg, believed buried by housing and roads. The other was Seymour, three miles down-river from Smith Mill. Seymour could not be found and there are no tailings remaining in that area. They are believed to have been in the flood plain and totally washed away.

Economic Considerations

Assume 3,300 s.t. of salvageable tails at Smith Mill site. With .043 oz/t Au and 70% recovery (i.e., .030 oz/t) then there are about 100 recoverable ounces of gold. That can be approximated as $50,000.00 (assuming near-future $500/oz Au).

Haulage from Smith Mill site to the Vulture Mine could go two ways. It is about ten miles directly west by the same route the ore was hauled by freight wagons with mule teams in the 1870's. That route is still ungraded dirt road. The alternative is about one mile of ungraded dirt road across the Hassayampa (generally a dry, sandy wash) four more miles of graded road to Morristown, fifteen miles of paved road via Wickenburg, and a final twelve miles of graded road (Vulture Mine Rd.) to the mine. That total is about thirty-two miles, half dirt and half paved.

My suspicion is that the lease could be picked up for perhaps half the $20,000 asking price. Your estimates of haulage and handling costs will serve to tell whether these tails are worth pursueing any further. If so, let me know whether you'd like me to make Mr. Woolf an offer.

DW:sk

From: Spude, R.L. and Paher, S.W.; 1978
Central Arizona Ghost Towns.
Page 7.

HASSAYAMPA RIVER MILLS, one mile north to twelve miles south of Wickenburg, along the Hassayampa River.

The rust-stained rock canyon of the Hassayampa River was the site of important milling activity during the late 1860's and 1870's. Four different mills crushed ore from the Vulture mine and operated in conjunction with mining companies there. The first, the Coulter & Tyson 5-stamp mill, was built in 1865 and later enlarged by the Vulture Mining Co. Located one mile north of Wickenburg, it processed nearly $2 million in gold between 1866 and 1873. A small adobe camp named Vulture stood around the mill.

Later Vulture Mining Co
Coulter & Tyson Mill
1 mi N. of Wickenburg
5 stamps, plus 40 stamps in 1866
1865 - 1873

After the failure of the Vulture Co., P.W. "Bill" Smith erected a 10-stamp mill nine miles south of Wickenburg and operated it for five years. Smith employed 100 miners and laborers, whose adobe houses surrounded the mill while several Mexican families cultivated the adjacent land. When Smith sold out to the Central Arizona Mining Co. his millsite was abandoned for the new operation at Seymore, three mills further down river.

Smith's Mill
9 mi S. of Wickenburg
10 stamps
? - 1873 - 1879 - ?

During 1879 ore hauled by the famed Cerro Gordo freight outfits arrived at the new 40-stamp mill. Census takers counted 232 residents at Seymore in 1880 and newspaper reporters found stores, saloons, laundries, hotels, a stage stop, restaurant, butcher, barber, and feed yard in this tent and timber mill town. With the completion of a water pipeline from the river to the Vulture, all milling activity shifted to the mine. Only foundations and tailings mark the sites of Vulture, Smith's Mill, and Seymore. Roads to the latter two sites are non-existent; Vulture mill site has been absorbed by Wickenburg.

Seymour Mill
12 mi S. of Wickenburg
40 stamps
1879 - 18[illegible]

08-Jan-88

LAB JOB #: AFB02148

Attn: Carole A. O'Brien

Client name: A. F. Budge (Mining) Ltd.

No. Samples: 14
Date Received: 01-04-88
Submitted by: Don White

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

Phone number: (602) 945-4630/778-3140

INVOICE ATTACHED

ANALYTICAL REPORT

Smith Mill Site

Hassayampa River - side stamp - mill tailings piles

Client ID AFB02148		Lab ID		FA/AA Au oz/ton	
VULTURE BATCH #1988-1					
Tailings					
SM-1	Bottle Roll	2148-	1	0.026	3' Vertical channel - W tank of twin bins
SM-2		2148-	2	0.035	Grab across 200' diam. semicircle of tail. (surface tailings)
SM-3		2148-	3	0.021	1' Vertical channel, E edge of semi-circ. ta
SM-4		2148-	4	0.058	8' Vert. channel, center of half cone pile 18'
SM-5	Bottle Roll	2148-	5	0.061	Top 5' / Bottom 5' } 10' Vert. channel at N end of tail ridge
SM-6		2148-	6	0.028	
SM-7		2148-	7	0.045	Top 5' / Bottom 5' } 10' Vert. channel in middle of ridge
SM-8		2148-	8	0.044	
SM-9		2148-	9	0.042	Top 5' / Bottom 5' } 10' Vert. channel at S. end of ridge
SM-10		2148-	10	0.060	
SM-11		2148-	11	0.065	3' Vert. channel of contents of old wood tank
SM-12		2148-	12	0.035	Grab from top 1" across 200' of tails.
				$\bar{X}$ = .043	
Rock					
SM-13		2148-	13	0.494 *	Selected qtz fragments from old mill site. Probably representative of ore hauled by freight wagon from Vulture to Smith's Mill.

IRON KING ASSAY OFFICE

ASSAY CERTIFICATE

BOX 247 — PHONE 632-7410
HUMBOLDT, ARIZONA 86329

REGISTERED ASSAYER CERTIFICATE NO. 2978 WALTER G. STATLER Date Signed 1-11- ARIZONA, U.S.A.

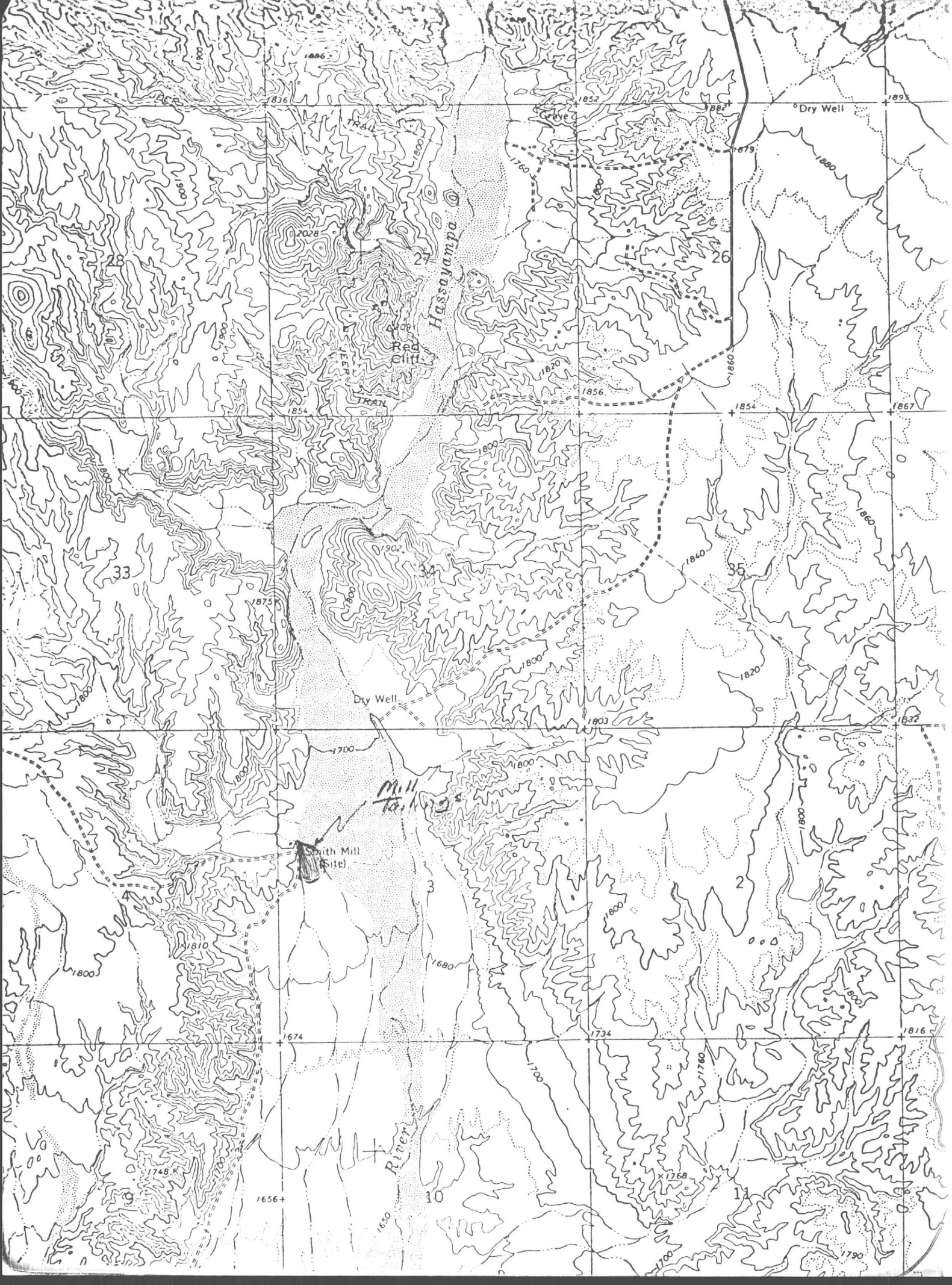
ASSAY MADE FOR: Marion Woolf, Wickenburg, Az. 85355

Jan 11, 1953

	SAMPLE DESCRIPTION	oz/Ton Au	oz/Ton Ag.
1-10-1	# 1 1st	0.026	0.32
-2	# 1 2nd	0.022	0.16
-3	# 2 1st	0.074	0.07
-4	# 2 2nd	0.076	0.19
-5	#2 A 1st	0.056	0.03
-6	#2 A 2nd	0.064	0.14
-7	#3 1 ft.	0.058	Tr
-8	#3 3 ft.	0.052	0.07
-9	#4 1st	0.046	0.06
-10	#4 2nd	0.062	0.06
-11	#5 1st	0.024	0.14
-12	#5 2nd	0.024	0.12
-13	#6	0.028	N.I
-14	#7 omit	0.180	0.26
-15	#8	0.044	0.12
-16	#9 1st	0.026	0.12
-17	#9 2nd	0.026	0.08
-18	#9 B	0.036	0.03
-19	#11 Top	0.078	0.36
-20	#12 S. Rd. omit	0.176	0.79
-22	#2	0.068	0.25
	Avg.	0.0445	.116
		(omitting 2 samples >.1 oz/t)	

CHARGES 215.25

ASSAYER


Dry Well
Hassayampa
Red Cliff
TRAIL
Dry Well
Mill Tailings
Smith Mill (Site)
River
28
27
26
33
34
35
4
3
2
9
10
11

meeting w/ Beal on Tuesday

To: Tony Budge

From: Ron Short

Date: May 10, 1989

Re: Lower Offset Section of Vulture Vein

I recommend that we do not pursue the exploration for the lower offset section of the Vulture vein. Based on my economic assumptions and evaluation, it is not a viable project.

If an offset section of the Vulture vein does exist, it could reasonably contain 500,000 tons of 0.35 opt gold. This was approximately what was mined from each of the two offset blocks of the Vulture vein.

Production costs are based upon actual cost of an underground mine of comparable size. Capital costs are estimates based on experience.

No costs have been included for the exploration which obviously will be needed to prove the existence of an offset section.

Even without exploration and royalty costs, it appears that this project would not make any money at current prices.

Expectations: 500,000 tons averaging 0.35 opt gold; underground at least 1,000 feet deep.

Assumptions: Gold price, $375/ounce
Recovery, 85%
Total costs (including mining, milling, G&A) $100/ton
Mining & milling rate: 250 t.p.d.
Mill construction, $3 million
Shaft, 1,000 ft. @ $3,000/ft $3.0 million
Development cost, $3.0 million

"Net" In-place Value: 500,000 x 0.35 = 175,000 ounces
175,000 x 85% recovery = 148,750 ounces
148,750 x $375 = $55,781,250

Cost: Capital	($ 9,000,000)
Production cost	
500,000 x $100/ton	($50,000,000)
"Net" on project	($ 3,218,750)

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	Production cost	
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	"Net" on project	($ 3,218,750)

M E M O

TO: Carole A. O'Brien, A.F. Budge, R.R. Short, D.A. Allen

FROM: Don C. White

DATE: October 17, 1988

SUBJECT: Confirmation of Vulture age dating, and its significance

We have some results back from the U.S.G.S. indicating that our theories on the origin of the Vulture are right on the mark. You'll recall that the key dispute has been between those that believe the Vulture lode is a Precambrian sygenetic gold occurrence and those including Bob Hodder, Steve Reynolds and myself that believe it is epigenetic and early Laramide. (Stan Keith and Bill Rehrig concur with the epigenetic interpretation but have varied on age estimates.)

First we acquired our own age dating in mid 1987 which was a Rb-Sr whole rock/muscovite separate date on the Vulture stock. That came in at 85 ± 3 m.y., or early Laramide. That was enough to convince me, for one can walk out the physical tie from the stock to the sill and the quartz veins, with successively more gold in each. Also the small mineralized quartz veins within the core of the stock are identical to those of the Vulture lode. But still we had doubters.

Ed DeWitt of the U.S.G.S. has dated two samples that clinch up the argument. He has an Ar/Ar date on the Vulture stock that confirms our Rb/Sr date. His is about 90 m.y. He also sampled a zenolith within the quartz porphyry sill. That would have to be a fragment of Precambrian wall rock caught up in the plutonic sill. Its Ar/Ar age is also about 90 m.y. as expected of a baked fragment with an effectively reset Argon clock. So we now have an 85-90 million year age on both the stock and the sill and by two isotopic methods.

This all means that the epigenetic theories we have used to postulate other Vulture-like occurrences are indeed valid. Ron and I have talked (the morning of Oct. 5th) about how to pursue exploration for "other Vultures"; where, how, risks, incentives, and costs. He did not seem very impressed and has stated that it shall not be done under his management which effectively kills it for Budge. That is because the tailings leaching will likely be completed by early 1990 and the lease from Beal terminated.

I believe the exploration for "other Vultures", deposits of 350,000 ounces of gold occurring as 0.35 oz/t coarse gold in quartz, beneath shallow (stripable) cover of alluvium, constitute such a lucrative target that the opportunity should not be passed up. Of course it's an expensive geophysical and drilling program to test such targets and a long shot of finding one but it's very unlikely that Vulture was one-of-a-kind. I hope to be involved whenever someone else decides it is worth a shot.

It should be stressed that this epigenetic origin for the Vulture in no way changes the merits of Stan Holmes' case for going after the possible fault extension. He happens to believe in the Precambrian syngenetic interpretation for the Vulture but the target he's interested in is strictly a structural one. He should be encouraged to get on with his venture as soon as possible in

Budge's interest though I understand he's intimidated, and rightfully so, by the 6% NSR royalty to Beal coupled with any sharing required by Budge. We're talking a deep (several 1,200-foot holes) core drilling proposition with any find requiring new shaft sinking and expensive, underground, narrow-vein mining. Chances are he and Stan West's stockholders would be better off waiting for Budge's lease to terminate and picking it up themselves with better terms and no joint venture.

That really leaves little more than the small placer potential to be tested. I have summarized that in a separate memo.

DW:sk

SCANNED 8-2010

Carole

M E M O

TO: C.A. O'Brien, R.R. Short, D.A. Allen, A.F. Budge

FROM: Don C. White

DATE: April 30, 1989

SUBJECT: Vulture mine fluid inclusion and radiogenic age dating results.

BACKGROUND As part of our trade of information with the Arizona and United States Geological Surveys, we were promised the results of laboratory studies on Vulture samples. Two of those studies are now complete. They are fluid inclusion work through the Arizona Survey's Jon Spencer, using Univ. of Arizona facilities and Argon 40/Argon 39 radiogenic dating through the U.S.G.S.'s Ed DeWitt using the Reston, VA lab. of U.S.G.S.

The fluid inclusion and geochronology studies are extensions of what Budge has already financed and learned by geologic mapping and a single Rb/Sr date.

Still hoped for are oxygen isotope study results from Rob Kerrich of Univ. of Saskatchewan who promised such data personally with Bill Rehrig over two years ago and also committed to provide it as part of the AZ Geol. Survey's Vulture Mtn. regional study.

None of these studies has cost Budge anything beyond my time for one meeting in the field to discuss objectives and collect samples.

FLUID INCLUSION RESULTS Accompanying is the writeup by Jon Spencer and John Duncan. They find that the thirteen fluid inclusion analyses conducted support our geologic interpretations of an epigenetic sill-like apophysis extending from the Vulture stock, originally in a cuopla position but now rotated to an east-flanking position and eroded to reveal a paleo-cross section.

Their data indicates a progression from high-temperature and high-salinity fluids ($\geq$ 300°C and $\geq$ 13% NaCl equiv.) in the stock samples through to relatively low-temperature and low-alinity fluids ($\leq$ 260°C and $\leq$ 6% NaCl equiv.) in the mine area of the quartz porphyry apophysis. This is supportive of our ideas on the genesis of the deposit and of our ideas on how to find more, such as the appropriateness of the present I.P. survey.

GEOCHROMOLOGY RESULTS Ed DeWitt's notes on the results and interpretation of the Ar40/Ar39 age dating are accompanying. In short, they confirm our earlier Rb/Sr date of 86 ± 3 m.y. by five new dates. He sampled the stock core, the apophysis, zenoliths of altered and thus reset Proterozoic rock within the apophysis, and more distal Proterozoic rocks. The stock, apophysis and zenolith all date late Cretaceous or earliest Laramide orogeny. The two more distal Proterozoic samples have been reset from 1.8 to 0.3 b.y. but the exact cause is uncertain and not terribly pertinent to the Vulture mineralization story.

CONCLUSIONS Both data sets are supportive of our epigenetic, mesothermal to epithermal interpretation of the genesis of the Vulture lode gold occurrence. The data thereby add conviction to the merits of the ongoing induced polarization survey of the east perimeter of the Vulture stock. That survey has already confirmed a resistivity and chargeability anomaly on an orientation line across the known lode and turned up other anomalies that will require further I.P. definition, geologic mapping and drill testing.

Notes on Vulture Mine $^{40}Ar/^{39}Ar$ samples - by E.D. DeWitt, U.S. Geol. Survey
April, 1989

3-1-88-10
Ms

Underground; Proterozoic cg msschist, extensively chloritized by mineralizing solutions. Probably from uppermost part of pluton, but can't say for sure

Age spectrum = Min = 93.5 ± 5.2 (2σ) errors for all
Max = 385 ± 3.0 Total gas = 279 Ma

K/Ca not plotted - (Analyzed in Reston)

Conclusions = Hydrothermal mineralization probably < 350°C, most likely ~ 285-300°C. Could fit diffusion curve, if knew what regional cooling of ms was like away from pluton; ie. reset from 800 Ma? 1.4 Ga? - what

SS-1091
Ms

Surface; Cretaceous ms-bt gneisenized pluton; sample from White.

Age Spectrum = Min = 86 ± 12 (3%) or 88.4 ± 1.3 (12% of gas)
Max = 100 ± 3.0

K/Ca not plotted - (Analyzed in Reston)

Conclusions = either partially degassed ~ 100 Ma pluton or mica in separate is mix of plutonic and hydrothermal muscovite, with plutonic being ~ 97 ± 2 (49% of gas) and alteration ms being younger (~ 88), or 97 Ma muscovite having cooled slowly and lost little bit of original argon. Slow cooling, however, doesn't look good w/ spectra from 3-1-88-3 below

3-1-88-3
Ms

Surface; Near Cretaceous pluton on North. Coarse ms adjacent to 1" to 6" qtz veins
Probably not more than ft away from pluton

Age Spectrum Min = 86 ± 6 (1.6%)
Max = Plateau for 92% of gas @ 97 ± 1.1 Ma

$^{39}/_{37}$ = Low(?), variable 25-180; 180 = degassing humps

Conclusions = Rapid cooling at 97 Ma; tiny gas fraction at beginning could be very low temp loss during any subsequent time or could reflect very minor loss during mineralization @ 86 ± 6 or from 86 to 97 Ma. Can't say that

Notes on Vulture Mine $^{40}Ar/^{39}Ar$ samples – (cont)

3-1-88-4
Hb

Surface; Proterozoic amphibolite ~ 400-500' N. of Cretaceous pluton. No alteration obvious. Collected ~ 4ft N to NW of 3-1-88-3 Ms.

Age Spectrum Min = 314 ± 5 Ma
Max = 940 ± 8 Ma Total gas = 820 ± 8 Ma

$^{39}/_{37}$ = constant at .04 over 77% of spectrum (low K hornblende)
K/Ca ~.0x2 ; K ~ 0.26 for hornblende

Conclusion – If Proterozoic hi-temp cooling @ ~ 930 Ma, then Hb has lost only ~13% of argon during Phanerozoic (i.e., probably Cretaceous), so temp in wallrocks here not high enough (~ 350-375°C) to reset hb. However, if Proterozoic cooling was 1.2, 1.4, or 1.6 Ga, then ~ 32%, 42%, or 49% of argon could have been lost during Cretaceous. See results from 3-1-88-6 for this tie point.

3-1-88-6
Hb

Surface; Proterozoic meta-diorite-gabbro that intrudes pelitic metasediments. Collected 0.5(?) mi NE of mine, near (~) base of Tv

Age Spectrum Min = 307 ± 7 Ma
Max = 900 ± 7 Ma Total gas = 786 ± 7 Ma

$^{39}/_{37}$ = constant at 0.6 over 95.4% of spectrum (slightly higher K than 3-1-88-4) K/Ca ~ .035; K ~ 0.4 for hornblende (12% Ca0)

Conclusion – Lowest point in saddles of 3-1-88-4 and 3-1-88-6 identical at 310 ± 6 Ma. High temp part of 3-1-88-6 actually slightly lower (~ 30 Ma) than 3-1-88-4. Total gas date of 3-1-88-6 actually less (~ 35 Ma) than 3-1-88-4. So, 3-1-88-4 can't have been affected by any heating event at 86-97 Ma of any significance that 3-1-88-6 didn't see. So, what remains to be discovered is the age of the disturbance which caused the ~ 900 Ma high-temperature part of both spectra, and the age of the heating responsible for the 300 Ma low-temperature end. Could it be the event in the south Mts or is it Cretaceous, but pre-97 Ma?

Jan. 20, 1989

Don White
521 East Willis St.
Prescott, AZ 86301

Dear Don:

Encolsed is all of the data we have generated so far on the Vulture Mine. I am still waiting for Ed DeWitt and Rob Kerrich to send me geochronology and oxygen isotope data, respectively. As I recall, you showed us a contour map of gold concentration in a cross section of the Vulture mine, based largely on assays of drill-core samples. Would it be possible for you to send me a copy of that map so that I could make a simplified version for publication along with the rest of the Vulture mine data?

Also enclosed is a copy of part of Scarborough and Meader's geologic map of the northern Plomosa Mountains. I hope it is useful.

Best regards,

Jon

Jon Spencer
Arizona Geological Survey (new name)
845 N. Park Ave.
Tucson, AZ 85719
(602) 882-4795 (new number)

Fluid-inclusion data from the Vulture Mine, west-central Arizona

Jon Spencer — Arizona Geological Survey
John Duncan — 845 N. Park Ave., Tucson, AZ 85719

January, 1989

The Vulture Mine mineral deposit is within and adjacent to an apophysis of a Cretaceous granitic intrusion (Fig. 1; Reynolds and others, 1988). Extreme Miocene crustal extension has affected the Vulture Mountains, including the area of the Vulture Mine. The rocks of the Vulture Mine area have been tilted approximately 90° to the ~~west~~ or ~~southwest~~ by movement on listric and/or planar normal faults. As a result of tilting, a vertical cross section of the deposit, the upper part of the Cretaceous stock, and the older host rocks is exposed in map view at the Earth's surface. The original orientation of the vein was approximately N11E 78NW, assuming no post-mineralization, pre-Miocene tilting (Fig. 2).

Fluid-inclusion salinity and homogenization data from samples of quartz veins reflect fluid conditions, at the approximate time of mineralization, through an originally vertical transect more than one kilometer deep. Fluid-inclusions in four samples from the structural base of the transect are characterized by the highest salinities and homogenization temperatures. The four samples define an approximately linear array on a salinity-temperature diagram (samples A, B, C, and D on Figure 3) that possibly represents mixing between a high-temperature (>300°C or higher), high-salinity (13 wt. % NaCl equiv. and greater) magma-derived fluid and a lower temperature (approx. 260°C or lower), lower salinity (5 to 6 wt. % NaCl equiv. or lower) hydrothermal fluid possibly containing a significant component of meteoric water. Both homogenization temperature and salinity are lower in fluid inclusions from samples at higher structural levels, including samples from the Vulture Mine, and a progressive decrease in temperature and salinity with decreasing paleodepth is suggested by the data (Figs. 4, 5).

FIGURE CAPTIONS

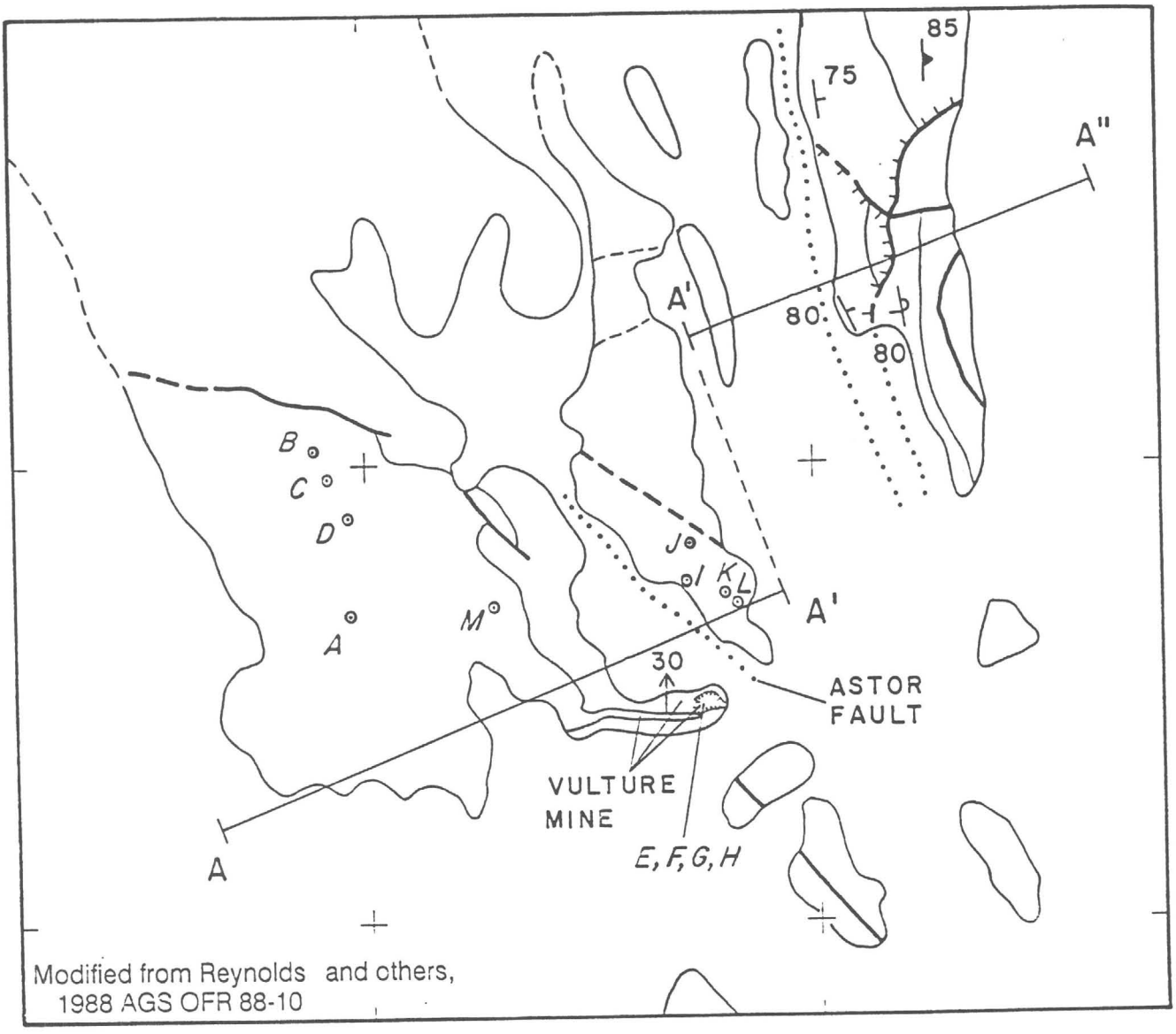
Figure 1. Simplified geologic map of the Vulture Mine area showing sample locations.

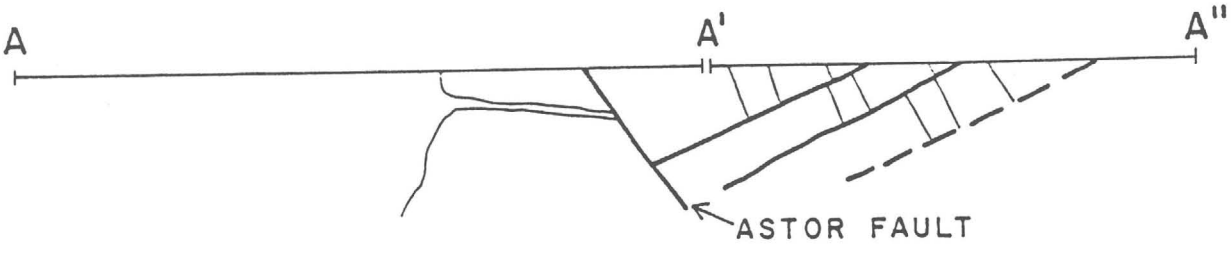
Figure 2. Stereonet showing restoration of Miocene rotation of Vulture mine vein.

Figure 3. Salinity versus homogenization temperature for fluid inclusions from quartz veins in the Vulture Mine area. Each point represents the mean for each sample. Error bars represent one standard deviation.

Figure 4. Paleodepth versus salinity (upper diagram) and homogenization temperature (lower diagram) for fluid inclusions from quartz veins in the Vulture Mine area. Paleodepth is distance perpendicular to approximately vertical contact at base of Miocene volcanic rocks that rest disconformably on the Vulture Mine block. Actual depth at time of mineralization is not known.

Figure 5. Fluid-inclusion data from the Vulture Mine area.





Aphyric rhyolite (Miocene)

Tuff and altered rhyolite (Miocene)

Basalt and andesitic flows (Miocene)

Granite (Cretaceous)

Metamorphic rocks (Early Proterozoic)

Low-angle normal faults, dashed where inferred, dotted where concealed

High-angle faults, dashed where inferred, dotted where concealed

Fig. 1

LOWER HEMISPHERE PROJECTION
VULTURE MINE VEIN

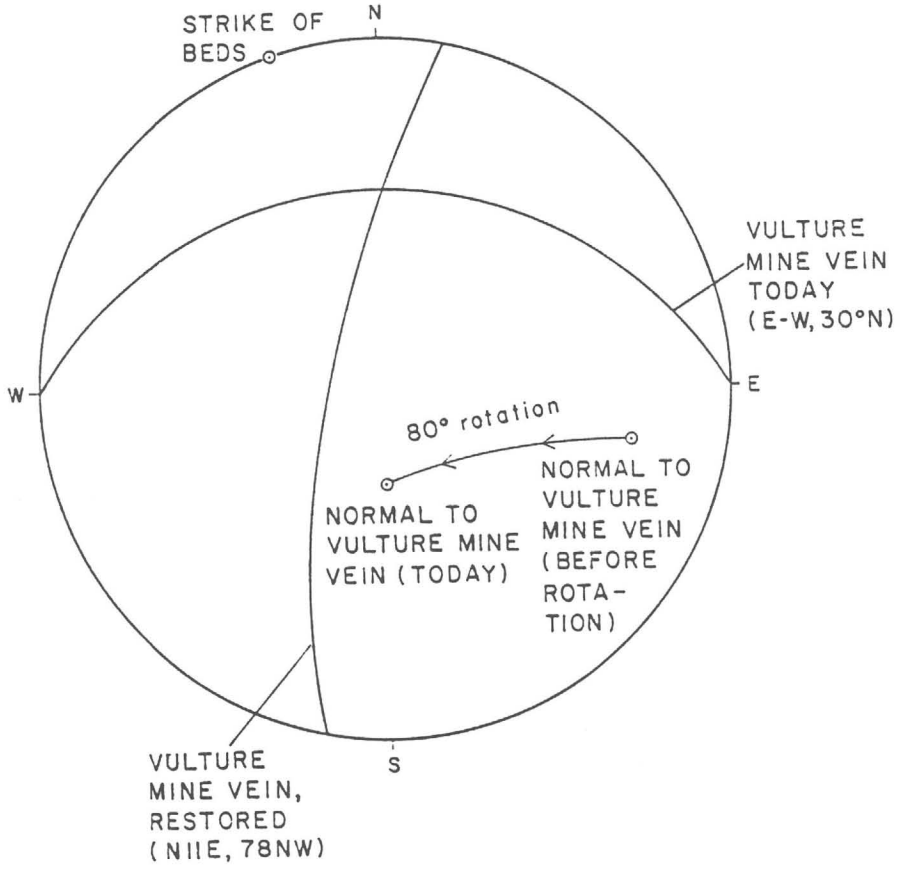


Fig. 2

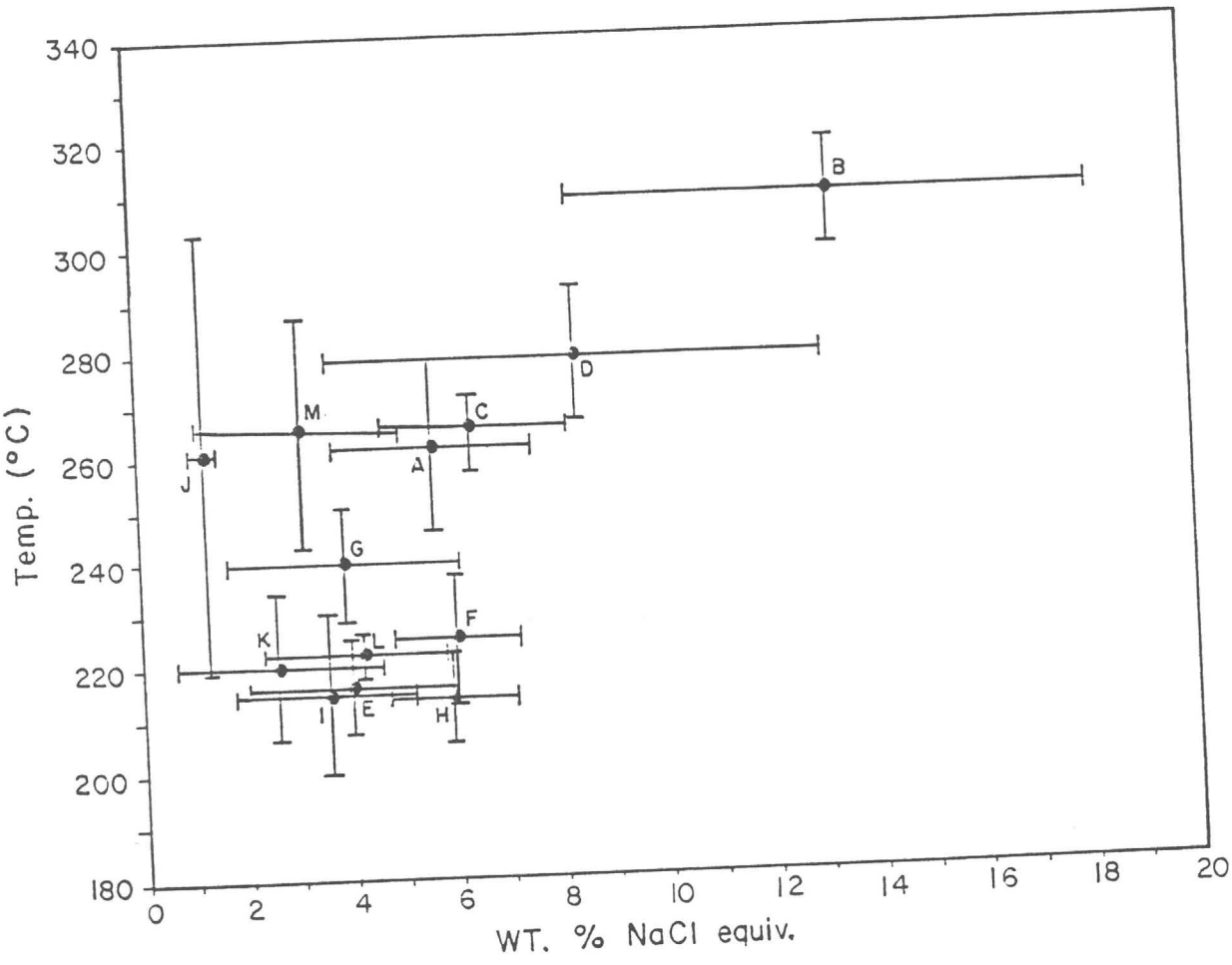

340
320
300
280
260
240
220
200
180
Temp. (°C)
0
2
4
6
8
10
12
14
16
18
20
WT. % NaCl equiv.
B
D
M
C
A
J
G
F
K
L
I
E
H

Fig. 3

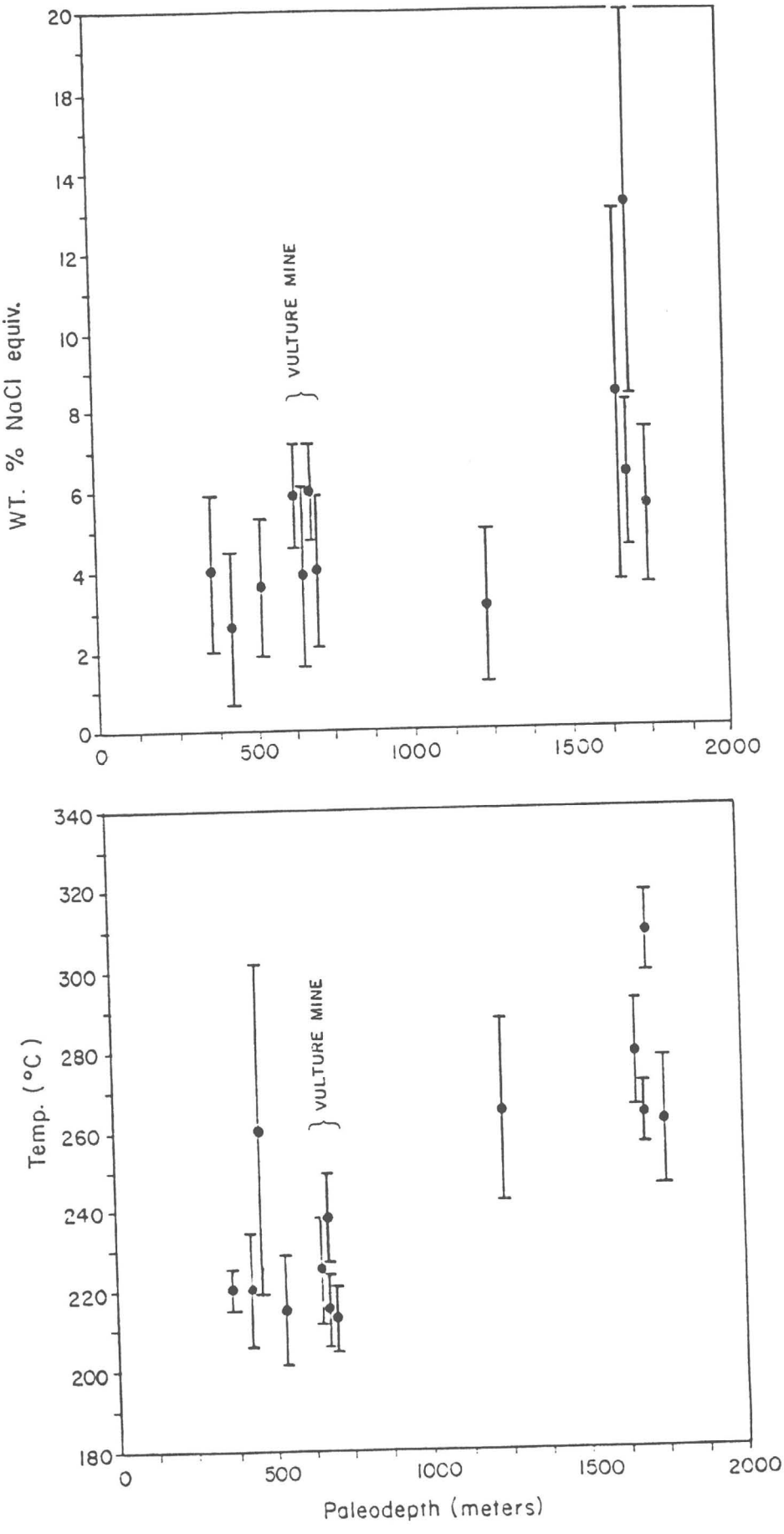

WT. % NaCl equiv.
VULTURE MINE
Temp. (°C)
VULTURE MINE
Paleodepth (meters)

Fig. 4

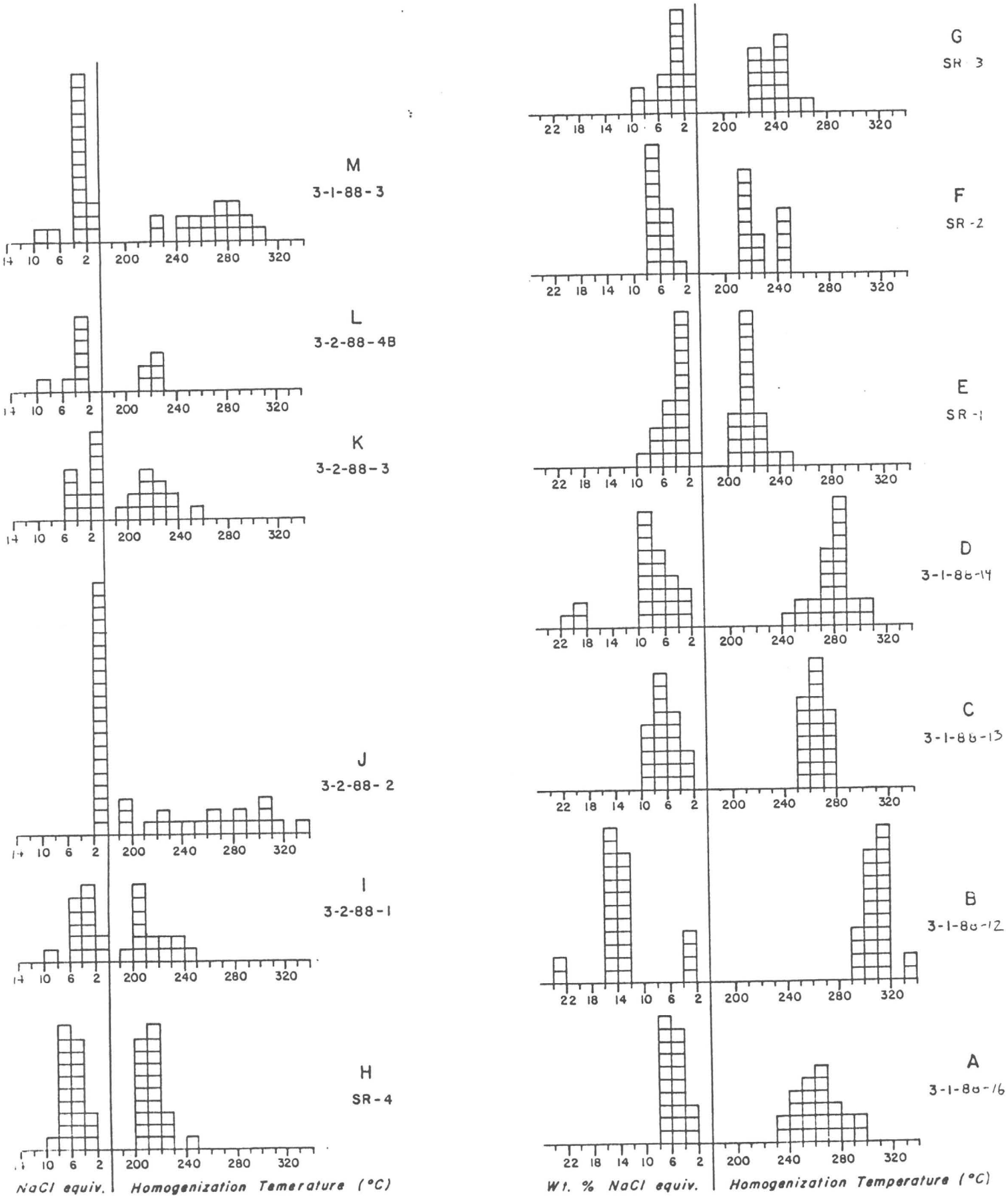

M
3-1-88-3
L
3-2-88-4B
K
3-2-88-3
J
3-2-88-2
I
3-2-88-1
H
SR-4
G
SR-3
F
SR-2
E
SR-1
D
3-1-88-14
C
3-1-88-13
B
3-1-88-12
A
3-1-88-16
14 10 6 2 200 240 280 320
22 18 14 10 6 2 200 240 280 320
NaCl equiv.
Homogenization Temerature (°C)
Wt. % NaCl equiv.
Homogenization Temperature (°C)

Fig. 5

SCANNED 8-2010

SCAPNCO 8-2010

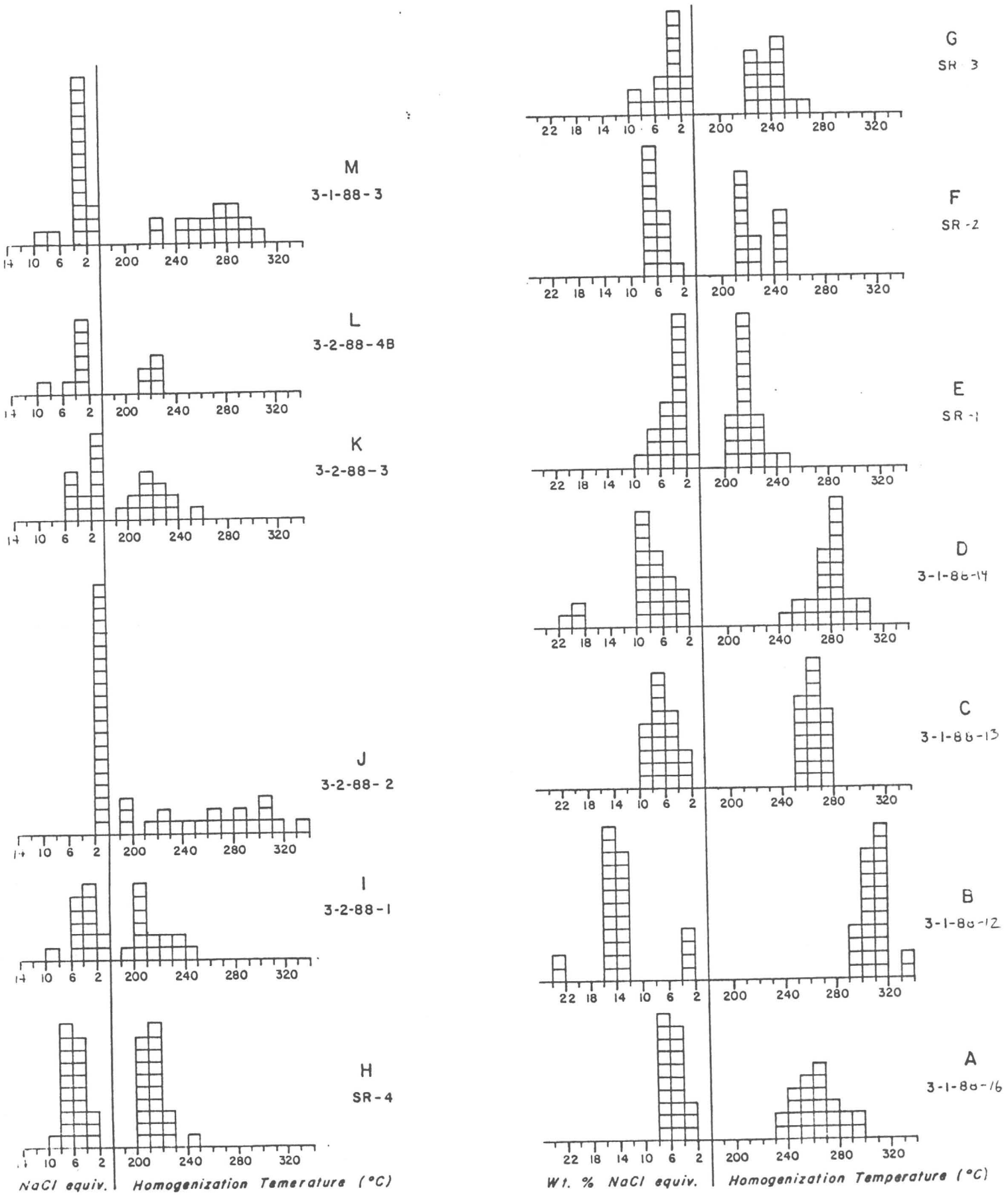

M
3-1-88-3
L
3-2-88-4B
K
3-2-88-3
J
3-2-88-2
I
3-2-88-1
H
SR-4
G
SR 3
F
SR-2
E
SR-1
D
3-1-88-14
C
3-1-88-13
B
3-1-88-12
A
3-1-88-16
14 10 6 2 200 240 280 320
22 18 14 10 6 2 200 240 280 320
NaCl equiv.
Homogenization Temerature (°C)
Wt. % NaCl equiv.
Homogenization Temperature (°C)

Fig. 5

M E M O

TO: R.R. Short, C.A. O'Brien, A.F. Budge, D.A. Allen

FROM: Don White

DATE: October 18, 1988

SUBJECT: Vulture placer gold potential and recommendations

Nearly four years ago (Dec. 1984) Jim Prudden conducted a placer exploration and testing program at the Vulture property.(1) His trenches, cut with a large backhoe, surrounded the lode area and channels of gravels cut from those trenches were run through a pilot plant.

Prudden's findings are summarized:

1) Most of the areas trenched are clearly subeconomic.

2) One area just south of Vulture ridge contains potentially economic grades averaging 0.5 g/yd^3. We call this Vulture South.

3) Vulture South was tested by only two trenches. The 0.5 g/yd^3 grade is the average of channels on opposite sides of the basal 5 feet of one trench, down to bedrock. The other trench did not reach bedrock, only caliche-cemented "false bedrock" but exhibited gold buildups at depth which are extrapolated to be akin to the 0.5 g/yd^3 trench. The upper 5 feet of alluvium in each trench was uneconomic.

4) The gold of the two Vulture South trenches (trenches 3 and 4) is about equally divided between very fine gold and small nuggets.

5) The gold is juvenile. It is angular, dendritic, often adhering to quartz or even containing galena or pyrite as is its association at the Vulture. Hence its likely provenance is the Vulture lode.

6) A roughly 15-acre area nearly corresponding to the stamp mill tailings now being excavated could average the 0.5 g/yd^3 found in the basal 5 feet of one trench. If so, reserves of 5-foot thickness would be 120,000 yd^3.

If Prudden's estimates of 120,000 yd^3 of 0.5 g/yd^3 are accurate, then the Vulture South zone contains about 2,000 ounces of gold at a 1:1 stripping ratio (after the tailings are removed). Getting at that placer gold seems to have certain advantages and disadvantages:

ADVANTAGES

1) Good grade; 0.5 g/yd^3

(1) Prudden, James M. 1985; Preliminary evaluation of the Vulture Mine placer potential, Maricopa Co., Arizona. Unpublished report to Ben Dickerson/A.F. Budge, Jan. 23, 1985, 36 p plus appendices.

2) Patented land; Beal lease and Vulture townsite owned by Budge.

3) Low stripping ratio; 1:1.

4) Already disturbed area beneath the tailings excavation.

5) No large boulders.

6) Good access.

7) Process water availability; present well production about 65 gpm less heap leach needs about 40 gpm leaves 25 gpm for placer makeup water.

KNOWN DISADVANTAGES

1) 120,000 yd^3 or 2,000 contained ounces is not a large enough reserve to amortize a plant and equipment.

2) There is a certain erracticness of values in immature desert alluvium that makes any sampling and evaluation risky. Actual grades overall may be better or worse.

3) The abundant hard caliche beds may present excavation problems and recovery problems if it can not be broken down in a trommel and with high pressure water.

4) Because of peculiarities of the lease, placer "mining" may introduce royalty or "production bonus" problems into the equation with Beal and not be worth the effort/expense.

Under the circumstances I recommend consideration be given to farming out the placer of Vulture South. A small, experienced contractor with his own placer equipment ought to be able to have at it and determine in short order whether it's worthwhile or not. If not, he's on his way soon. If so, he could operate only on non-Beal lands of the townsite or arrangement could be made to placer both properties.

A contractor would be well advised to test the area with backhoe trenches, running the entire contents of each trench through the plant. Such sample sizes should help alleviate the nugget effect and intrinsic erraticness of the desert placers. Such full scale testing would also provide the operators a chance to experiment with their recovery system.

A modest sized plant at 100 yd^3/hour capacity could complete the entire 120,000 yd^3 project in less than six months, one shift, five days per week.

If and when such a farm-out should be considered, I shall be happy to querry the few operators and equipment owners I know as to their interest.

DW:sk

IRON KING ASSAY INC.

08-Jan-88

LAB JOB #: AFB02148

Attn: Carole A. O'Brien

Client name: A. F. Budge (Mining) Ltd.

No. Samples: 14
Date Received: 01-04-88

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

Submitted by: Don White

Phone number: (602) 945-4630/778-3140

INVOICE ATTACHED

ANALYTICAL REPORT

Client ID	Lab ID	FA/AA Au oz/ton
AFB02148		
VULTURE BATCH #1988-1		
Tailings		
SM-1	2148- 1	0.026
SM-2	2148- 2	0.035
SM-3	2148- 3	0.021
SM-4	2148- 4	0.058
SM-5	2148- 5	0.061
SM-6	2148- 6	0.028
SM-7	2148- 7	0.045
SM-8	2148- 8	0.044
SM-9	2148- 9	0.042
SM-10	2148- 10	0.060
SM-11	2148- 11	0.065
SM-12	2148- 12	0.035
Rock		
SM-13	2148- 13	0.494 *

REGISTERED ASSAYER
CERTIFICATE NO.
15583
JIM ROY
WEATHERBY
Date Signed 1-11-88
ARIZONA, U.S.A.

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

Client ID	Lab ID	FA/AA Au oz/ton
AFB02148		
Tailings		
Mint East Tail	2148- 14	0.006

*Results for these samples were achieved by straight Fire Assay.

BFD
Vulture file

DMEA LTD.
MAY 16 1986
RECEIVED

M E M O

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

FROM: Don White

DATE: May 15, 1986

SUBJECT: Vulture "Block 1"

There is a growing weight of evidence that the so-called "Block 1" target at the Vulture has better than ordinary potential for harboring a down-faulted extension of the Vulture gold lode. The concept of a buried fault extension was brought to the reader's attention by White's memo of 6-20-85 after spotting the attached section, in figure 1, Thompson's (1930) report. The target was dubbed block 1 in the memo by Hodder and White, 12-14-85. The "1" indicated highest priority on the basis of geologic potential and ease of exploration.

The idea is that there are two major sets of post-mineral faults cutting the Vulture lode. The set of NW striking, steeply NE dipping normal faults including, most notably, the Talmadge, Astor, and Schoolhouse faults, have chopped the Vulture lode into a series of segments stair-stepping down along strike of the lode to the east. As the same time, a series of E to NE striking, moderately S dipping normal faults have cut the N dipping (stratabound) lode into a washboard-like series of segments down its dip. These two fault sets are represented schematically in figure 2.

The displacements on the NW trending faults vary from a few tens of feet as on the faults between each of the pits, to many hundreds of feet as known on the Schoolhouse fault. The Talmadge fault offset is documented underground with components of 210 feet of dip slip and 150 feet of right-lateral strike slip. These were major offsets that stymied mining for years on end. The S dipping faults, on the contrary, where documented in the old workings, were all a few feet to a maximum of about 60 feet of dip-slip component and seemed to have been followed more easily by the early miners. The hope is that at least one step in that series of faults was more major, say on the order of 400 to 500 feet of displacement. If such a fault cut the lode slightly above its present ground surface along the line of pits, it would have preserved a block of the Vulture lode (assuming that lode continued up-dip) at shallow depth beneath the tails just S of pits 1 and 2.

The evidence that has developed in the last few months in support of this possibility is both geophysical and geologic. First, as a result of the trial magnetic and VLF surveys earlier this year, an otherwise unexplained response with the proper orientation was picked up with both methods (shown on magnetic and VLF profiles by Don White, February 1985, and reported by Chuck Elliot in memos, 2-28-85 and 3-5-85). It is continuous over all three VLF and magnetic survey lines that cross it, yielding a length in excess of 1,000 feet.

Chuck Elliot then reported that the induced polarization survey run for Noranda also contained a response of similar orientation (his memo of 2-24-85). The positions of the I.P. lines on the plots available to him were not very well done and so the exact orientation of the anomaly is in doubt but it is generally a NE striking feature through the heart of block 1. The data was

good enough to interpret a north dipping responsive zone compatible with the expected dip of the slightly sulfidic mineralization.

More recently, the writer spent nearly a day carefully inspecting the area of outcrops just SE of the tailings and comparing it to the exposures just S of the main pits. There are both structural and mineralogic clues that something like the Vulture lode may lie within block 1. Structurally, there is evidence that the S dipping fault series continues to be active SE of the tailings. In small pits there, offsets of several inches to several feet are evident on post-mineral, E striking, S dipping faults. These could well be subordinate to a more major fault in the same orientation, capable of preserving a portion of the Vulture lode.

The footwall to the Vulture mineralization is generally more amphibolitic and characteristically more blocky fracturing than the sericitic and schistose hanging wall. The same amphibolitic, blocky rock types occur SE of the tailings. Furthermore, the SE area exhibits some silicification and some conformable and cross-cutting quartz veins, all indicators of proximity to the quartz porphyry sill and possible mineralization. Thus the outcrops SE of the tailings look just about like the known footwall rocks near the pits, about 1,000 feet further NW. Again, the suggestion is a fault extension beneath the tailings.

The spatial and geometric relations of the various faults and the possible extension are shown in plan, figure 3, and section, figure 4. Block 1 is 600 to 800 feet wide and about 2,000 feet long. It is bounded at its ends by the quartz porphyry stock to the SW and the Talmadge fault to the NE. Of course any extension found SW of the Talmadge could probably be traced more deeply in the NE side of the Talmadge, just the way the Vulture lode was.

Given the shallow, high grade potential of this target and its accessibility for drilling, I recommend that it be our priority drill target (but please, not until after the hottest part of summer!). It has never been tested and we now have I.P., magnetic, V.L.F., mineralogic, and structural evidence that it should be tested.

DW:sk

cc: Charles L. Elliot

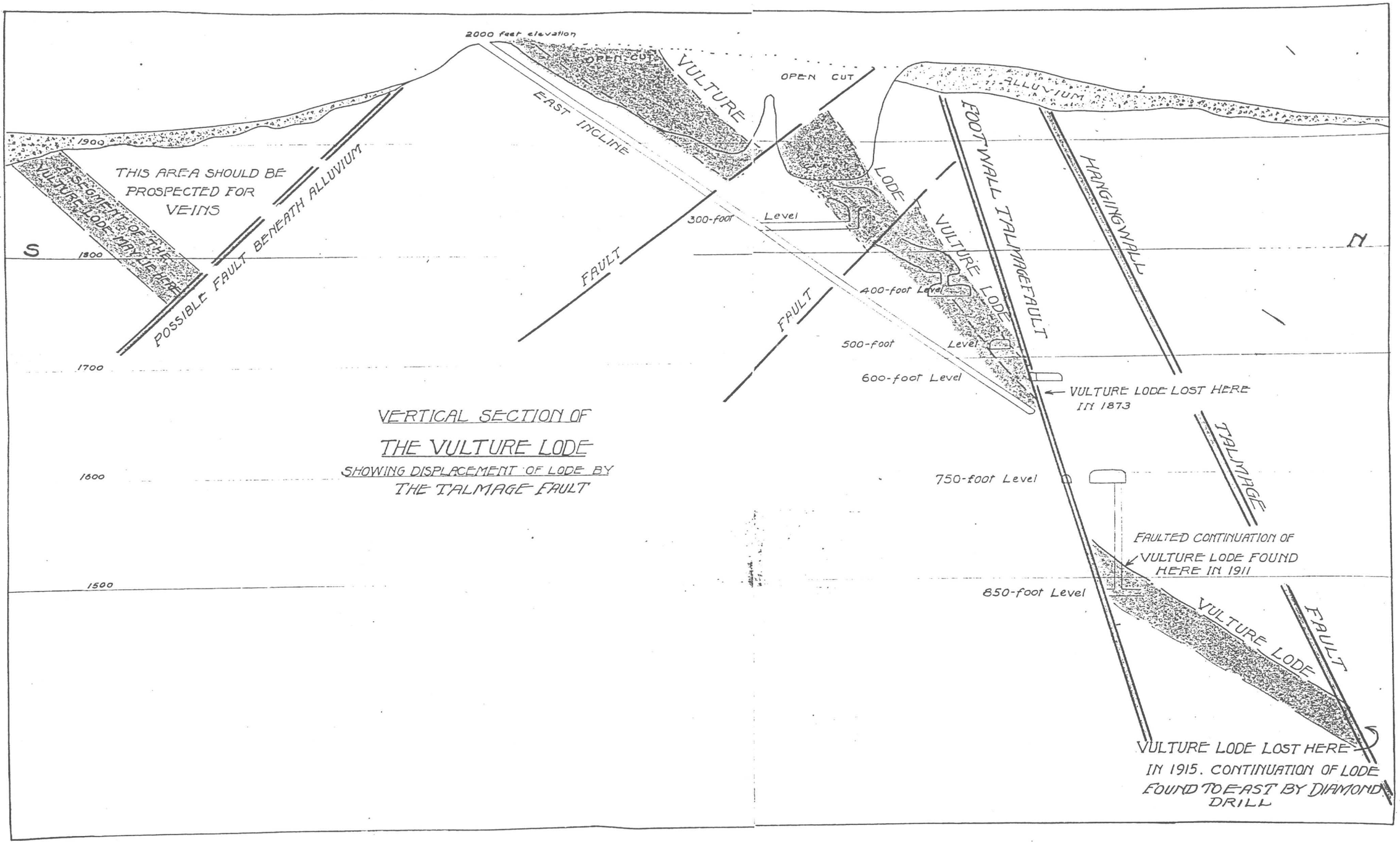


Figure 1 : Cross section from Thompson, A.P.; 1930;
Report on the Vulture Mine, Maricopa Co., Arizona, under development by the Vulture Mine and Milling Co., Sept. 11, 1930; first recorded recognition of shallowly buried fault extension possibility shown in upper left.

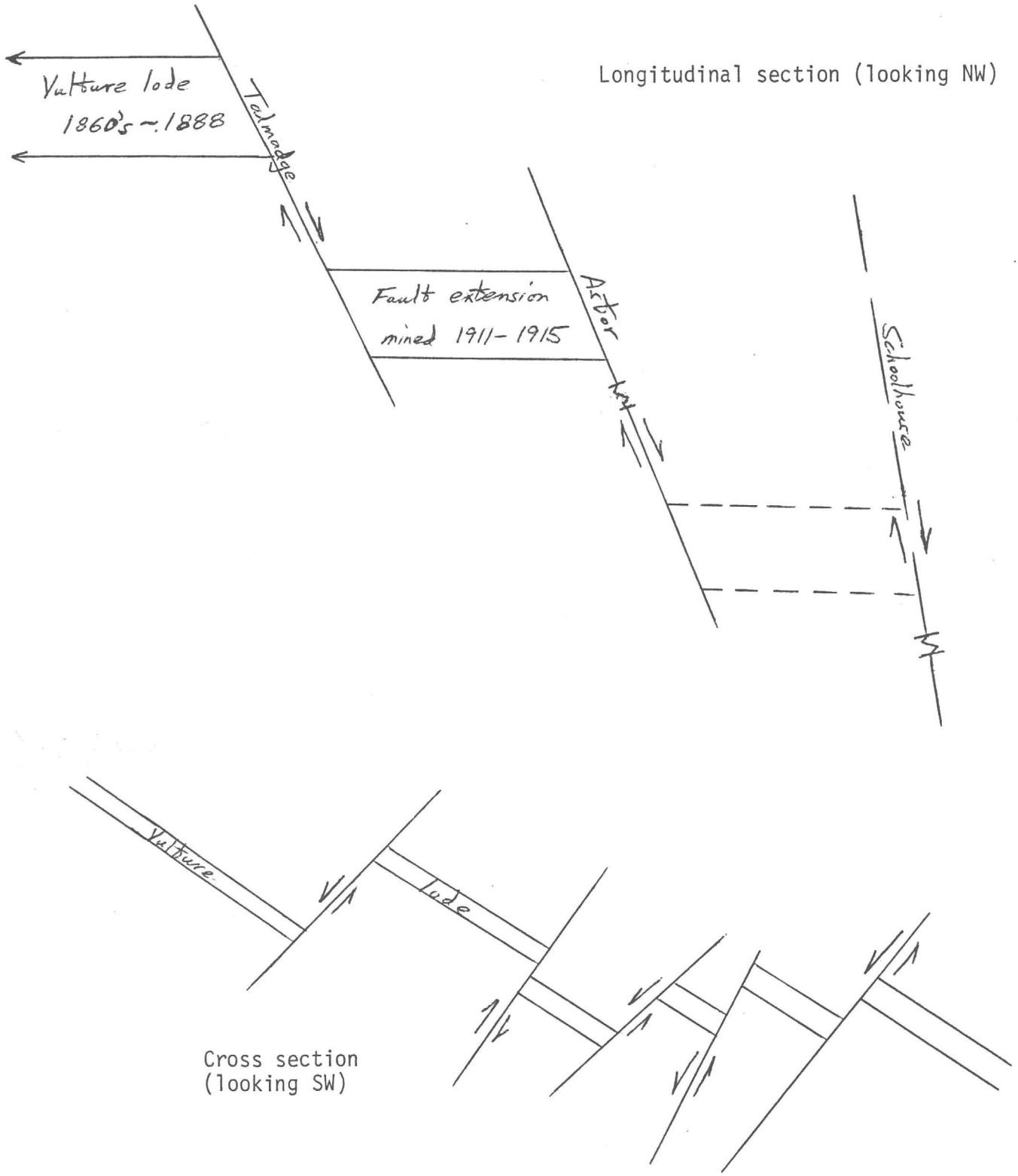
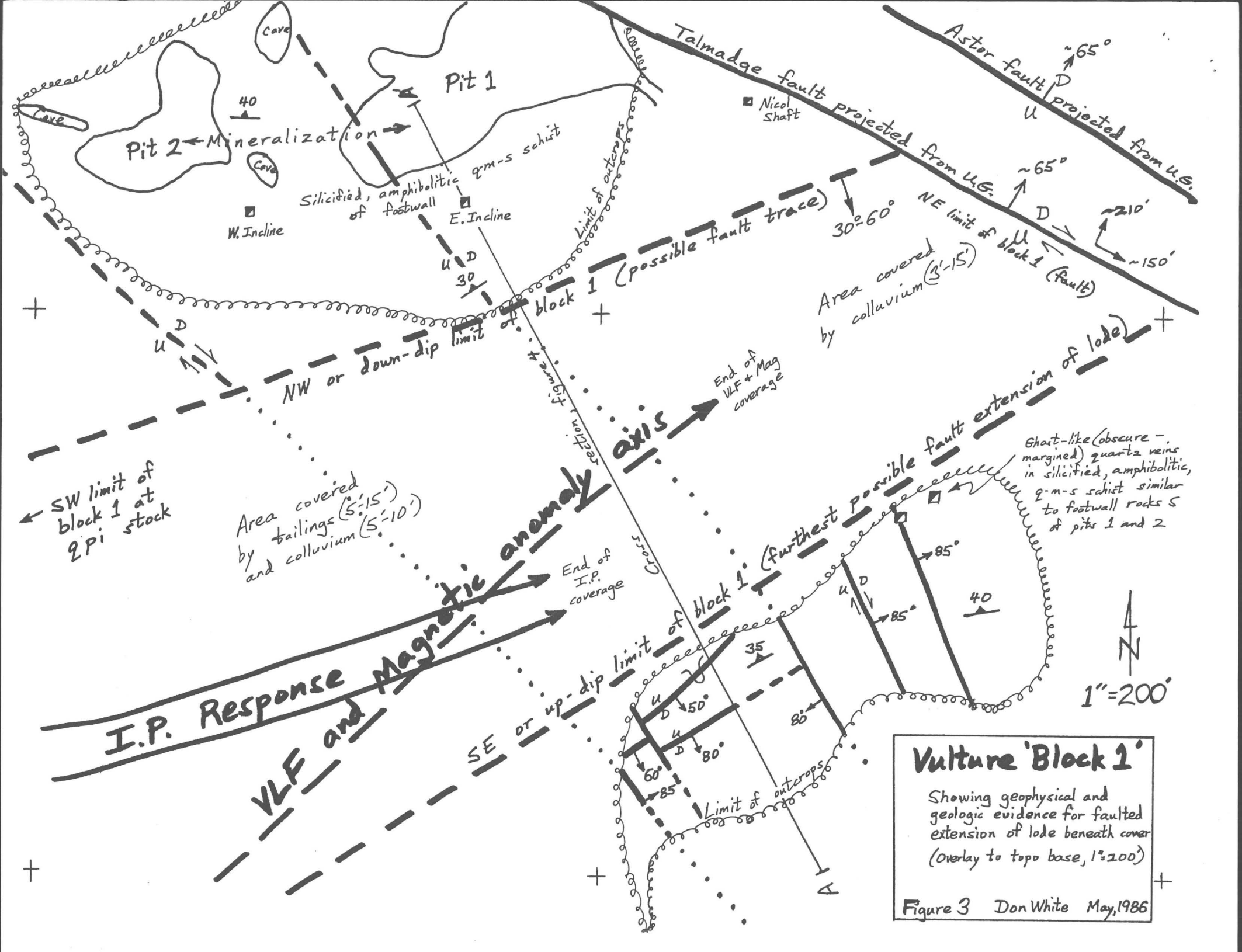


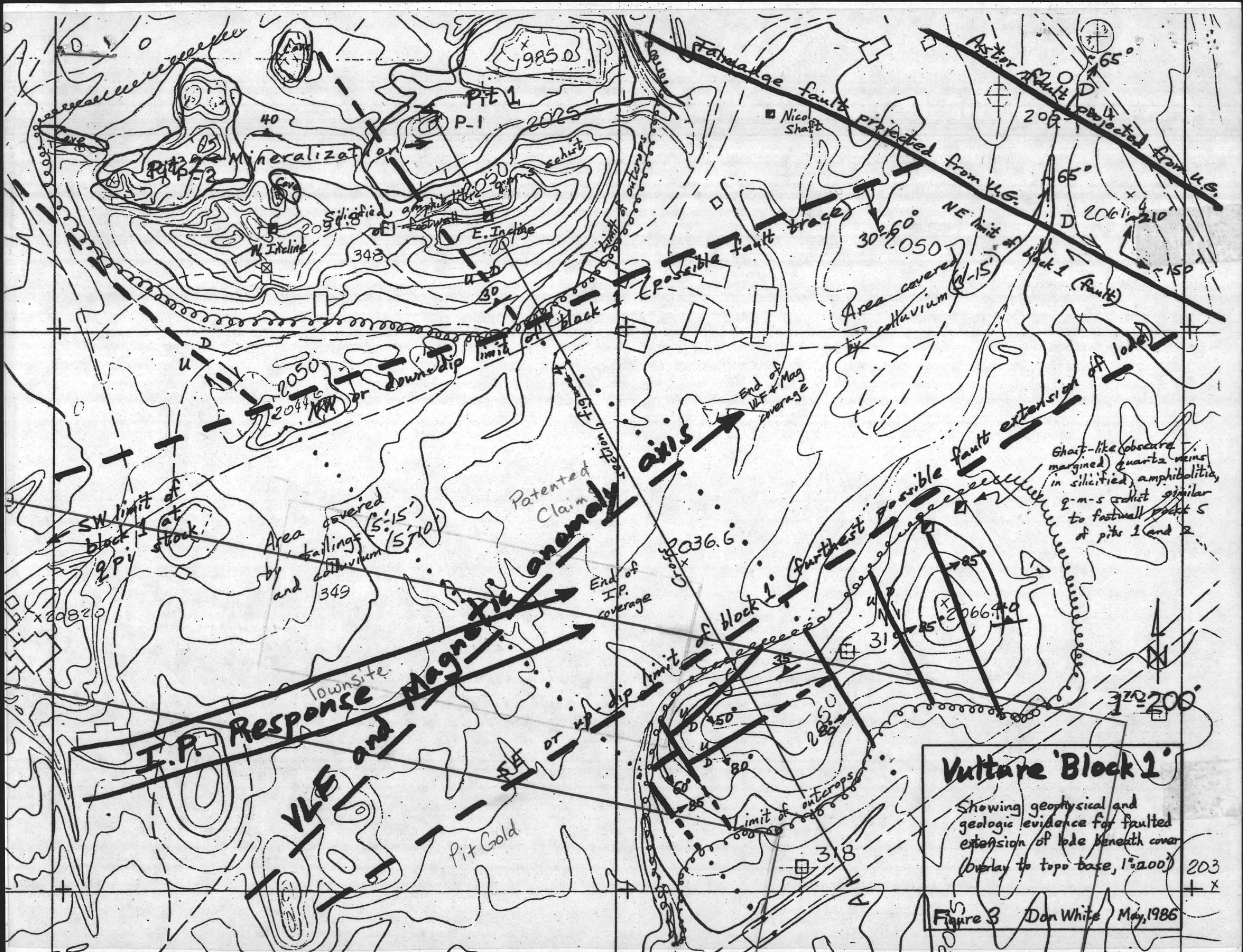
Figure 2: Schematic sections to illustrate the two major fault sets documented in the Vulture Mine workings.



Vulture 'Block 1'

Showing geophysical and geologic evidence for faulted extension of lode beneath cover (Overlay to topo base, 1"=200')

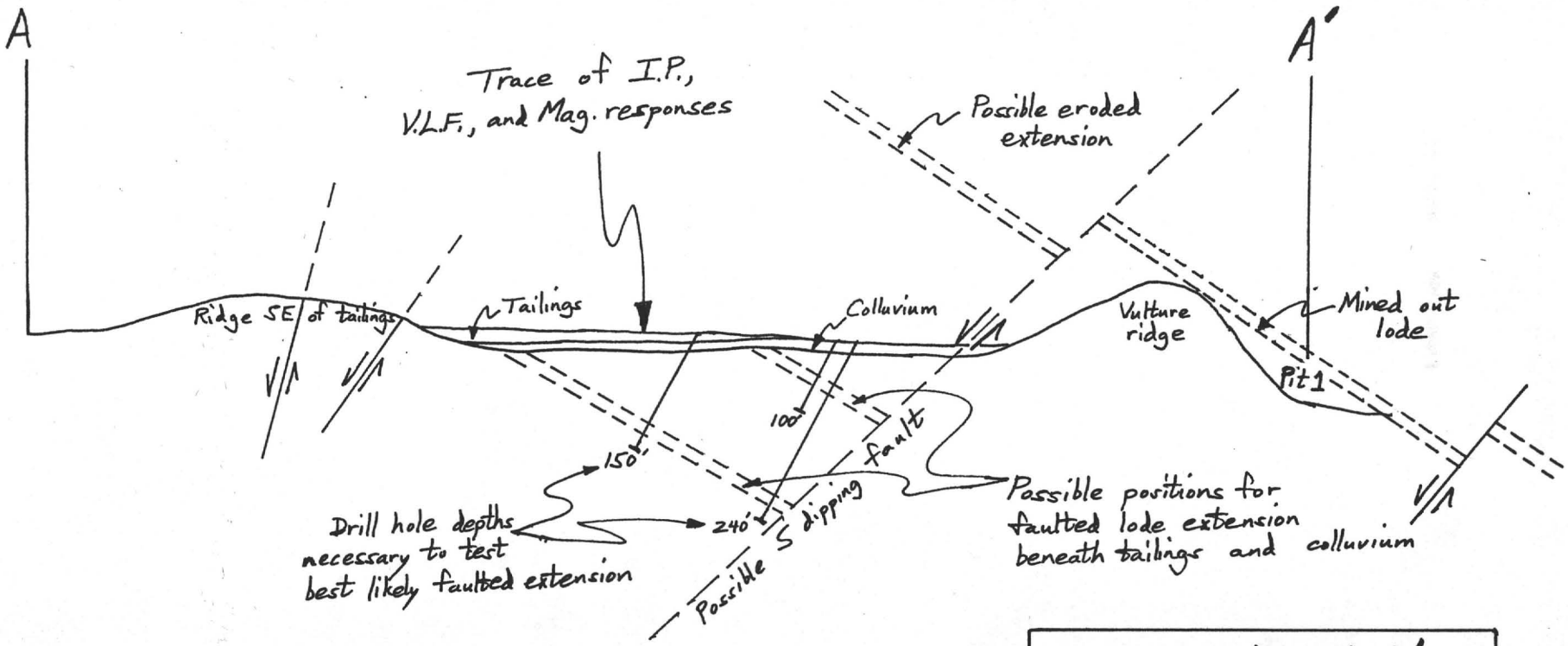
Figure 3 Don White May, 1986



Vulture 'Block 1'

Showing geophysical and geologic evidence for faulted extension of lode beneath cover (overlay to topo base, 1"=200')

Figure 3 Don White May, 1986



1"=200'

Vulture 'Block 1' Cross Section A-A'

(Looking SW)

Showing possible faulted lode extensions

Figure 4 Don White May, 1986

APPENDIX

Materials relating to the Block 1
recognition and understanding

MEMO

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

From: Don White

Date: June 20, 1985

Subject: Shallow, high-grade gold potential at the Vulture Mine

I earlier sent you a copy of Arthur Perry Thompson's September 11, 1930 report on the Vulture Mine. It is a promotional-toned report dating to the Vulture Mining and Milling Company. It led to the involvement, later that year, by the U.V.X. Mining Company.

The real value of Thompson's report is his data on the faults. He relates much specific information on their location, attitude, offset direction, throw, and so forth, all of which is valuable to future efforts to locate any faulted extensions.

What I want to alert you to is a shallow, high-grade fault extension possibility shown in Thompson's 'Vertical section of the Vulture lode', following page 20 (copy attached).

The rationale is simple. There is a set of normal faults known to have displaced the lode at shallow depths beneath the pit 1 and 2 area. That fault set may have had one more member with similar throw which could have hidden an upward extension beneath the present alluvium and tailings to the south of the old workings. This seems a worthy insight into the local structure and, to my knowledge, has never been tested.

Of course it would be very fortuitous of the suspected fault to be located just right and have the proper offset to preserve the upper extension precisely at the covered site least likely to be explored. But it is possible and at least as probable as many other exploration concepts. Given the low cost of exploration with shallow, angled, rotary drilling, I recommend we give consideration to this idea. If it seems worthwhile to you, I could spend a day field checking the southern portion of the property and a day preparing a cost estimate for exploration. I look forward to your reaction.

From memo by Hodder + White, 12-14-85 ; first priority exploration target.

Block I

Block I is in the immediate footwall of the Vulture Mine workings where they reach surface. The target is a down-faulted repetition of the Vulture ore body along a shallow easterly striking, south dipping fault. Block I should be between and without major complications from the youngest northwest-trending faults. The block is covered by alluvium and tailings to a depth of 20 feet as measured in backhoe trenches dug during evaluation of placer potential.

The target has not been drilled and is noted in the historic literature only by Thompson (1930, cross section p.20) on one figure but not in the text (White, 1985, a). It is the most approachable target comparable to Vulture Mine ore as it is near surface, has road access, and could be tested by 40 vertical percussion holes on 150 foot center, each to a depth of 100 feet. It would take approximately 2 months to complete this 4,000 feet of drilling and to have assays returned and evaulated. Drilling could be preceded by geophysics but the direct approach of sampling in the first instance is recommended.

From memo by Elliot, 3-5-86 ; magnetic anomaly/contact/conductor

One special contact within the pre-Cambrian has been noted on the attached map. It is located beneath the tailings between the Vulture Mine and the Vulture Mine Road. This feature was recognized in the magnetic data on lines 12, 13 and 14. It's specially noted here because of its congruity with a conductor mapped in the feasibility VLF study (memo 2-28-86). Presumably pre-Cambrian lies on both sides of this feature with the more magnetic unit on the north side.

From memo by Elliot, 2-28-86 ; VLF feature coincident with VLF

Another exception to the general northwest-southeast structural direction of the area is a peculiar feature lying between the Vulture Mine and the Vulture Mine Road and buried beneath the tailings. This feature was recognized on lines 12, 13 and 14 and has a clear northeast-southwest strike. Association of this feature geologically is unknown.

From memo by Elliot, 2-24-86 ; I.P. response along center of Block 1

Zone B : This zone is approximately parallel with zone A and has a strike extent in excess of 1000 feet. It was recognizable in the data from lines 1, 3 and 4, and consists of predominately an induced polarization responsive indication with no obvious congruent resistivity contrast. It occurs from near surface downward and has a possibly steep northerly dip. A good dip indication is precluded by the limits of the IP coverage. From the surface this zone is obviously buried beneath the extensive tailings that exist between the Vulture Mine Road and the Vulture Mine. Therefore it is of unknown origin other than pre-Cambrian rocks do outcrop near line 3 along the interpreted zone. Like zone A, this zone is open easterly beyond the extent of the IP coverage, but is firmly cut off to the west by the data for line 2. This zone undoubtedly needs further investigation.

VULTURE MINE
Maricopa Co. ARIZONA

CROSS-SECTION – 8
COORDINATE – 221,550E
SCALE: 1"=40'

Sample Cross section, 1"=40', looking W, to show abundant S dipping normal faults documented by underground workings/records.

ELEV. SCALE
2000
1900
1800
1755

LEVELS
150
350
450
550
600
750

41,900 Tons -- 0.036

50,500 Tons -- 0.105

1,026,500 N

ZORTMAN/LANDUSKY MINING COMPANIES
VULTURE MINES OPERATION
P. O. Box 1904
Wickenburg, Arizona 85358

TO: Don Duncan

FROM: Russ Walker

DATE: November 16, 1982

SUBJECT: Origin of Vulture Mine Tailings

Information on milling Vulture Mine ores until recent times is rather sketchy as would be expected. Two types of milling were used to treat the ores. First of these was stamp milling.

STAMP MILLING

1864 - 1866. Forty (40) Arrastras (simple crushing device using stones; then ore was panned or washed) were built at Wickenburg on the Hassayampa River.

1866 - 1872. A new 20 stamp mill was built at Wickenburg with a 40 ton/day capacity using amalgamation and concentration. Tailings accumulation estimated at 150,000 to 200,000 tons one mile north of Wickenburg. Tailings are on property owned now by Dave Underdown. Additional batteries of stamps were constructed at Smith's Crossing, Martinez Wash and Seymour - down the Hassayampa River in the vicinity of what is now Morristown.

1880 - 1884. A 9 inch reduced to 7 inch pipeline was built to the mine and water pumped from wells drilled in the Hassayampa River flood plain. A new 80 stamp mill was constructed at the mine. Estimated tailings at 248,000 tons from the operation.

1885 - 1909. Not much production. Tailings estimate - 50,000 tons.

1910 - 1915. Vulture Mines Co. 20 stamp mill operated and produced 100 to 120 tons/day. Each stamp was 1,600 lb. capacity crushing in cyanide solution and amalgamating inside mortars, Dorr classifier, 3 Australian grinding pans, 3 Dorr pulp thickeners, 32' X 12' and one Oliver filter. Three (3) Wilfley tables were used to concentrate the ore. Tailings estimate - 150,000 tons.

1927 - 1930. Five stamp mill produced estimated 30,000 tons.

1931 - 1933. Ten stamp mill produced 10 tons of concentrate per month with an estimated tailings total of 45,000 tons.

1934. 125 ton amalgamation and concentration mill operated using quarried unmined portions of vein. Old-tails dump was run through 100 ton cyanide leaching plant. Estimated tailings - 7,500 tons.

1935 - 1936. Tailings processed only.

COMPLEX MILLING

1937 - 1942. Dickie and Lincoln (East Vulture Mining Co.) constructed and operated a more complex and efficient milling operation. Their mill was built in 1939 with a capacity of 100 tons/day. It was enlarged to 200 tons/day in 1940 and 400 tons/day in 1941. A brief summary of the circuitry is as follows:

Crushing - Ore crushed to 2½ inch on a 14" X 20" primary. The product went to a double-decked Simplicity vibrating screen with the plus 1" being crushed in a cone crusher and the oversize from the bottom deck (plus 3/4 inch) rolled through 36" X 16" McFarlane rolls.

Grinding - Screen undersize minus 1/4" X 3/4" conveyed to fine ore bin. Two ore feeders fed 6' X 5' Allis-Chalmers and 4' X 8' Marcy ball mills. Both mills were in a closed circuit with a 54" Simplex Akins Classifier. Grinding was done with a one (1) pound cyanide per ton solution at 79% solids. Cyanide and lime were fed by a Denver Dry Reagent Feeder onto the ore feed belt.

Jigging - Discharge from the 4' X 8' and 6' X5' ball mills was jigged by 12" X 18" and 16" X 24" Denver Duplex Mineral Jigs. The jigs discharged into a dewatering and settling tank and the concentrates shipped to a smelter. Initial operational testing of the jigs produced a concentrate assaying 33% lead, 3.12 oz. gold and 2.76 oz. silver and a ratio of concentration 200 to 1.

Leaching - The classifier overflowed at 40% solids, minus 40-mesh and was pumped to a 12 foot Denver Hydro classifier. The overflow (minus 100-mesh) went to a 29' 8" X 10' Denver Primary Thickener. Underflow went to one of five 200-ton leaching tanks. The leaching tanks had slatted bottoms over which 1/4" cocoa matting and canvas was placed. Solution returned to the primary thickener and the sand was sluiced out to the tailings area south of the mill.

Slime Plant - Slimes from the Denver Primary Thickener were pumped to one of three 15' 4½" X 12' Denver Side Air-Lift Agitators in series. The agitators provided thorough mixing of the slime and allowed for more dissolution time. Slime pulp from third agitator flowed to first of four 29' 8" X 10' Denver Washing Thickeners which comprised a counter - current decantation system. Slimes from the fourth thickener were discarded to tailings while the solution progressed counter - current to the primary thickener. The overflow (gold bearing) from the primary thickener then joined the pregnant solution from the sand leaching plant where it was sent to a 600-ton Denver Precipitation Plant. The precipitate was then refined in a Denver Fire Clay Co. furnace.

Vulture Drilling — Feb. 26, 1987

Mag. Targets — assay samples + chips for logging

VS — 1 — 9 +

1	I	~ Line 24 W	500 N	250' each −60° S	2500' X −60° S
2			200 N		
3			100 S		
4			VS-6 400 S		
5	II	~ Line 20 W	VS-5 200 S	300' each −60° S	
6			VS-4 500 S		
7			VS-3 800 S		
8		~ Line 10 W	VS-2 1200 S	300' each −60° S	
9			VS-1 1500 S		

H 59 — 63 +

Pit 1 Area — bulk samples, assay samples, + chips

10	Within pit	Vertical	~120' each	~540'
11	" "			
12	N of pit	X 60° S	~150' each	
13	" " "			

Leach Pad Condemnation Holes — assays + chips only

C 1 — 3 +

14	Fence of 3 holes at ~300' spacing (N-S)	~~60° S~~ Vertical	~200' each	60
15				
16				

Total ~3640' in 16 holes of which 2 vertical + 14 X

Carole

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

Feb. 20, 1987

Teledyne Isotopes
50 Van Buren Av.
Westwood, N.J. 07675

Dear Sirs,

I have need of some age dating of geologic sample. They are rocks from Tertiary thru Proterozoic and hence require a range of different radiometric techniques.

Would you please send me any literature on your services, sample requirements, and price schedule?

Thanks for your help.

Sincerely,

Don White

Don White
Geologist, CPG.

cc. C.A. O'Brien / A.F. Budge (Mining) Ltd.

CERTIFIED PROFESSIONAL GEOLOGIST ARIZONA REGISTERED GEOLOGIST

DONALD C. WHITE
GEOLOGIST

521 EAST WILLIS ST.
PRESCOTT, ARIZONA 86301 U.S.A.

TELEPHONE
(602) 778-3140

M E M O

TO: Carole A. O'Brien

FROM: Don White

DATE: February 10, 1987

SUBJECT: Update on the Pittsburg-Tonto property, Gila Co., AZ

I checked the BLM microfiche listings and the up-to-date computer listings of assessment work on Jan. 15 and Jan. 27, 1987. The fiche is current through Nov. 18, 1986. The computer listings are updated daily but they have an immense backlog of yet-to-be-posted assessment work for 1986. While Star Exploration does not now have its assessment work posted for the Pittsburg-Tonto property (their "Argyros" claim #1-12, lead file 234, 546) it may have been done and filed but not yet posted. One BLM employee predicted that the last postings of 1986 assessment would not be completed until March, 1987.

I have also talked (by phone, Feb. 2nd) with Greg Hahn. Greg was the geologist who actually completed Noranda's work on Pittsburg-Tonto several years ago. He says he mapped the area at 1" = 200', sampled the surface, and drilled two shallow, angled Winkie-drill holes near the canyon bottom. The mapping, he says, clearly indicates tight isoclinal folding about vertical fold axes. Deformation is extreme with chert beds boudined and transposed. The best surface sample was a ten-foot channel across chert assaying 0.12 oz/t Au. That was in a fold nose 100 to 200 feet downstream (S) of the old shaft, on the W. side of Tonto Creek. He recalls no drill samples running over 1 ppm Au ($\sim$ 0.03 oz/ t).

Noranda interested Newmont in a short term option during which Newmont tried its state-of-the-art pulse EM system and found no responses (presumably requiring sulfides for a response) and dropped the option.

Noranda folks felt the base and precious metal potential would only be in fold noses and boudins with steep plunge and limited aerial extent. In the canyon bottom that effectively eliminates open pit potential and drilling would be deep and angled to test such targets. The targets were too small and difficult to explore for Noranda and so they dropped the claims.

Work by Star Exploration is totally unknown. Given what we now know about Noranda's conclusions, our interest is very diminished. This month and next, with ongoing U.V.X. drilling and planning for Vulture drilling, I haven't time to get to Pittsburg-Tonto for a visit and claim-staking. Perhaps we should let it drop. The Veracruz submittal should probably take priority.

DW:sk

Carole

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

February 10, 1987

Richard Robertson
GAS SEARCH, INC.
P.O. Box 632
Nowata, OK 74048

Dear Dick,

On behalf of my client and from myself please accept my thanks for all the research and arrangements you worked out for a shallow, high-resolution seismic survey. Were our alluvium deeper, you would be doing the job right now. Were your studies and information any less thorough, we would probably be finding the exercise futile right now. I'm afraid our present targets are just too shallow to seismically resolve. We will drill them directly within a month or so.

It is just possible that we could be looking for the same sort of target further out beneath the alluvial pediment at a later date. If that occurs, we shall certainly be back in touch regarding your instrumentation and crew.

I regret that we can't use the technique and your services now. Thanks again for the prompt and thorough help.

Sincerely,

Don

Don White
Geologist, C.P.G.

cc: Carole A. O'Brien w/ enclosures

DW:sk

GAS SEARCH, INC.

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Feb. 3, 1987

Contact re: side-looking radar
USGS Water Res. - Hartford Conn.
Pete Haeni' - 203-244-3299

Mr. Don White
521 Willis Street
Prescott, Arizona 86301

Dear Don,

We have the seismograph, software and computer suitable for shallow reflection surveying. The start-up "crew" would include an electrical engineer, a seismologist, and a geologist/party chief. The data processing can be done on-site using a computer. The emphasis on the start-up is to insure the data will show the topography of the Precambrian surface.

Enclosed are the results of a similar survey made by geophysists from the Canadian Geological Survey. We use computer programs obtained from CGS and use a newer model of the same seismograph. We would obviously test the configuration which worked for them.

We have an EG&G model 1225 seismograph with 120' cable (10' geophone spacing), a second 660' cable (55' geophone spacing), using a sledge-hammer or a shotgun energy source. Processing is by an Apple II-E computer using a software as described in the report.

The survey can advance using the 120' cable at 110'/hour on a reconnaissance basis, or 10 min/station on a 10' interval. Obviously we envision a detailed survey to verify your magnetometer targets.

The survey costs will require a set-up charge to cover logistics and enough preliminary measurements to be sure the rocks are measurable. Then a per-station cost on survey lines would allow the ultimate costs to be at your discression. The data processing costs would be negotiable. I will contact you with a firm price offer as soon as possible.

Dick phoned 2-4-'87
Could start Mon 2-9
$2,500 mobe/demobe/+test of system
(2 days each way, 1 day on site,
Van equipped w/ 3-man crew, AC
generator, computer.
If results satisfactory, then $2,000./crew day
& could cover ~¼ mile in 3 hrs.

Crew: Wes Hepke - geol. & crew chief
Army Quarter - seismologist - Amoco - vacation time
Bill Brown - electrical engineer

Best regards,

Richard Robertson
Certified Petroleum Geologist
AAPG # 2614

RR/mm

Enclosures

GEOPHYSICS, VOL. 49, NO. 8 (AUGUST 1984); P. 1381–1385, 5 FIGS.

Short Note

Shallow seismic reflection mapping of the overburden-bedrock interface with the engineering seismograph—Some simple techniques

{ dry silt/sand — 3,000 fps approx
{ granite — 20,000 fps approx

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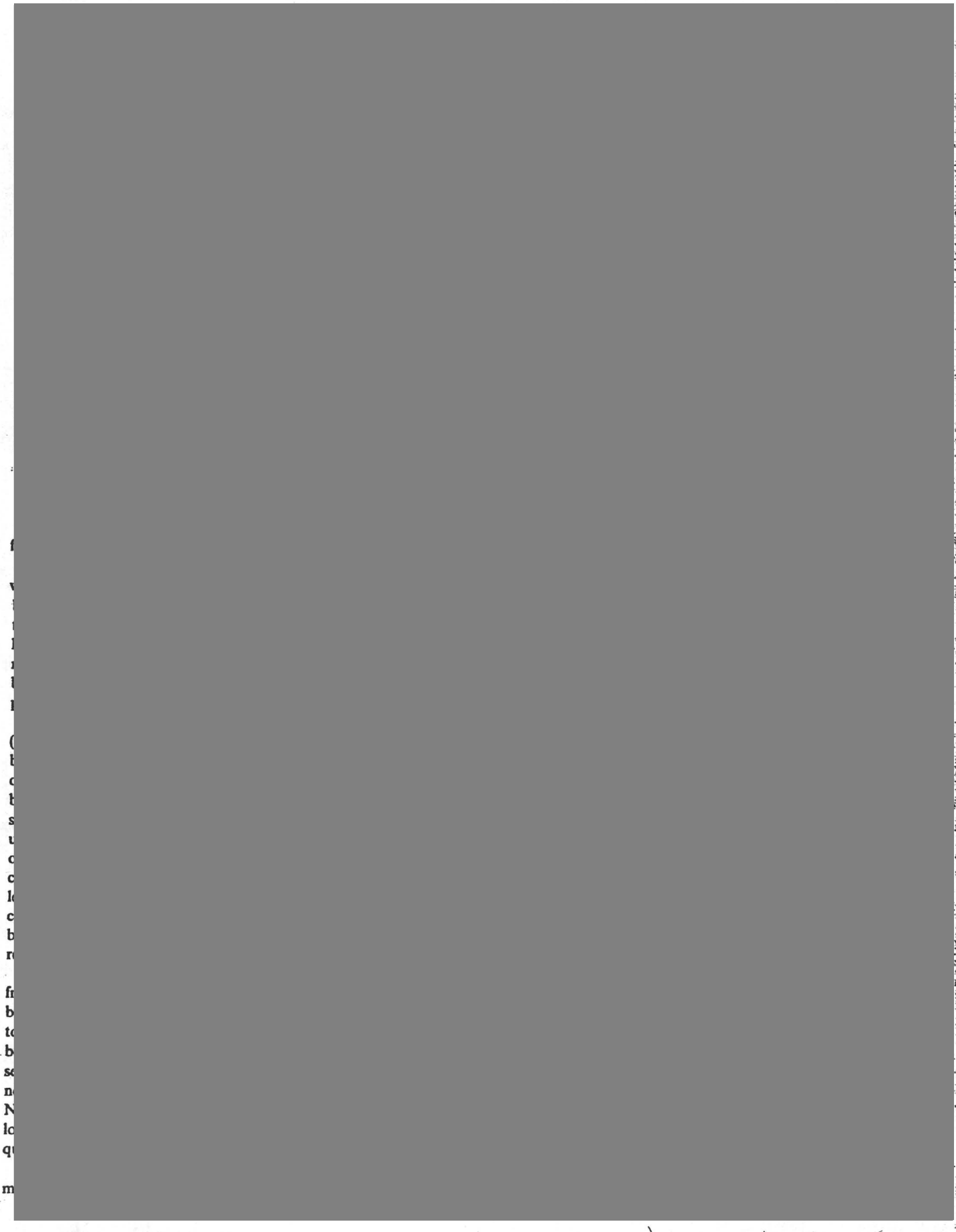

we have 50 Hz filters, ✓etal.