



CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

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REPORT ON
THE KEYSTONE MINE
GILA COUNTY, ARIZONA

44th Annual

Date

PREFACE

REPORT ON THE KEYSTONE MINE

2 pages →

Explanation of unstated factors underlying the
Keystone report by John E. Kinnison, dated Jan. 9, 1970

3 pages →

¶ (incident)

Geo-Comp Exploration, Inc. ^{was a small exploration company} ~~did not have mineral~~
~~examinations for its Parent Company, and outside~~
~~examinations for our own clients~~ ^{GFT Inc.} which also took on consulting work.

¶

Jack Fraser, president of Glen Explorations ~~(and~~
~~loosely affiliated with GFT)~~ was a principal Geo-Comp
client. Fraser had acquired ~~several~~ mineral
holdings, without any technical advice. He continued
to add new prospects while Geo-Comp began to evaluate
those already held.

¶

Fraser was spending a lot of money on some of
his properties, and my main effort was to extract him
from the more expensive programs ^{which had little hope of success}. My first examination
~~for him~~ was of a complex Cu-Pb-Zn-Ag vein high in the
Front Range of Colorado, where a ^{long} drift was being run
on a narrow vein. ~~I found that Fraser was basing his~~
~~enthusiasm on the the total combined gross value of~~
~~contained metal.~~

¶

Adequate assays were available, so I calculated an
~~estimated~~ ^{estimated all costs} and inferred ore reserve, ~~made a rough~~
~~estimate of products from a selective flotation mill,~~
~~estimated operating costs and~~ ^{including} smelter liquidation,
and ran a financial outcome which showed an
operating loss, without recovery of capital investment.
As it turned out, Fraser liked this type of

3-4-2.5

REPORT ON
THE KEYSTONE MINE
GILA COUNTY, ARIZONA

John E. Kinnison

Chief Geologist

January 9, 1970

Geo-Comp Exploration, Inc.
1706 W. Grant Road
(602) 626-5443

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Report No. 010970

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January 9, 1970

Mr. Jack Fraser
President
Glen Explorations
1204 Praetorian Building
Dallas, Texas 75201

RE: Keystone Mine, Gila County, Arizona

Dear Mr. Fraser:

I have examined the subject property, spending initially one day, Thursday, October 30, 1969, on the ground and subsequently reconnoitering the surface outcrop by helicopter. Additional work, including claim-staking, is described in the following. I herewith present my report thereon.



John E. Kinnison
Chief Geologist
Geo-Comp Exploration, Inc.



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Attachments

- A. Index Map, Arizona
- B. Access and Location Map: 1" = 4 mi.
- B1 Detailed Access Map and Topography: 1" = 1 mi.
- C Long Shorty Claim Group,
showing Keystone vein: 1" = 500'
- D. Sketch of Surface at Shaft 1" = 30'
- E. Sketch map, 65 ft. level 1" = 30'
- F. Sketch map, 115 ft, level 1" = 50'
- G. Sketch map, Gun Creek adit 1" = 100'
- H. Sketch map, Main workings and
drill hole 1" = 100'
- I. Cross-section through main
workings and drill hole 1" = 100'
- J1, J2, and J3. Landscape Photographs



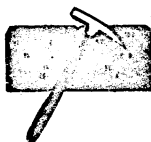
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SUMMARY AND RECOMMENDATIONS

The Keystone is a pre-Cambrian copper vein in schist, with an indicated total strike length approaching 2000 feet. A central area 550 feet long, prospected on the surface and by a few underground workings, is an oxidized, partially leached capping which will undoubtedly give way, probably in less than 300 feet, to a sulphide zone of pyrite and chalcopryite. My appraisal of this leached capping indicates that it is derived from the oxidation of a sulphide zone which could have contained about 5% copper. There is no reason to assume that the sulphides in depth, beneath the level of oxidation, are materially different from that indicated by the leached capping.

The pre-Cambrian copper veins in schist are represented by some notable small mines, as well as the large and famous United Verde at Jerome. One of the demonstrable characteristics of these deposits, in general, is to persist uniformly to considerable depth (1000 feet plus). The vein is indicated to be at least 20 feet wide. Thus, the tonnage available -- even if extensions beyond the central 550 foot outcrop area is not found -- is substantial.

I recommend that approximately \$10,000 be spent in further exploration, to determine if drilling is warranted. I recommend this work 1) to clear up some geological uncertainties that exist at present, and 2) also as preparation for drill site selection. To allow for contingencies, about \$12,000 should actually be available. It is



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premature to prepare drilling cost estimates, but you should have in mind that this would initially be about \$50,000 at a minimum.

The Keystone has a prospective possible profit yield of 18.5% on capital investment, over and above repayment of capital. If you, as the investor, consider this rate of return sufficiently attractive, you will naturally wish to follow it to conclusion. I believe the merits of the property are substantial enough to be attractive at that rate, and that initial exploration costs are low enough to warrant the risk attendant.

Although the prospect is currently very inaccessible -- and this feature will raise exploration costs somewhat -- it is not so extremely isolated when viewed as an operating mine. There will be a 12 mile haulage road to be constructed and a relatively long trucking route from mill to smelter. However, none of the adversities, individually or collectively, are sufficiently great to mitigate against a profitable operation, provided, however, that exploration actually finds sufficient tonnage of sulphides grading nearly 5% Cu.

To place the economics into focus, I have run the trial outcome given on page 3. I have assumed that drilling reached a point at which underground exploration was justified, and that this resulted in developed reserves as given in the table, with possible extension in depth. At this point exploration is temporarily suspended, and a 200 ton per day operation constructed, with anticipation of expansion



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POSSIBLE ECONOMIC OUTCOME*

Assumed: 5% Cu 400,000 tons

Net Smelter Return	\$27/ton
Trucking: Mine to mill	\$ 1.08/ton
Trucking: Mill to smelter	1.03/ton
Direct Mining	8.00/ton
Direct Milling	4.00/ton
Engineering	1.00/ton
Overhead	.75/ton
Local Taxes	.50/ton
<hr/>	
Total Operating Costs	\$16.36; or, in round figures: <u>\$16.50/ton</u>

Net Operating Profit Before Federal Income Tax: \$10.50/ton

@ 200 ton/per day, life of mine: 6-1/2 years \$1,620,000 Net Smelter/Yr.

1 year production, 60,000 tons \$ 630,000 Profit on Net Smelter

Capital Amortization @ 8% ^{out 259,000} \$205,000

Depletion, 15% Net Smelter
15% x 1,620,000 \$243,000

Operating profit less ^{128,000}
amort. & depl. \$182,000

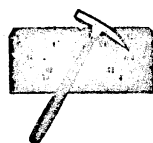
Federal Income Tax, 52% ^{67,000} \$ 95,000

Net Profit after Taxes ^{563,000} \$535,000 per year

Capital Costs: \$1,685,000

Hoskold Formula, Discount to Present Value, Factor: 3.05
6-1/2 year life of mine, total net profit \$535,000 per year, will pay
off capital investment of \$1,685,000 by a 6% sinking fund, and yield
18-1/2% return on investment.

* Refer to "Mining and Milling", also Appendixes 2 and 3 of this report,
for details of assumptions re: grade ore, concentrates, smelter
liquidation, operating and capital costs, and related data.

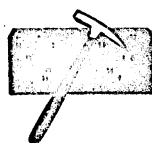


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at a later date. An overall reduction in cost structure, following expansion, would move the return to 20% or greater. Supporting details are given in the report and appendixes. It would be possible to run many such trial outcomes, predicated on different assumptions of tonnage, grade, etc. However, since this is but a hypothetical model of a geologic possibility, I will generalize using this one as a base.

I believe it is obvious that 3% copper (unless bolstered by substantial gold and silver) would not pay and that 4% is probably sub-marginal. The exploration target, then, must be 4.5 to 5% copper.

What are the odds of finding a sizeable deposit of this grade? I fully anticipate that an extensive sulphide zone exists and rate the chances on that part of the venture very good. As to grade, my appraisal of the leached capping shows 5% to be permissible. However, a leached capping of this type (massive sulphide) cannot be interpreted with sufficient finesse to distinguish with certainty between, say, 5% Cu and 3% Cu - the difference between pay and no-pay. Other veins of this type have graded between 3 and 4% copper, usually closer to 3%. Only the United Verde at Jerome, a major deposit, has produced 5% copper. Statistically then, the chances of discovering a 4.5% to 5% copper deposit must be rated as long-shot, but possible.



REVIEW OF HISTORY AND CURRENT EVENTS

Introductory:

In the sequence of a normal mining property report, I prefer to relegate historical detail to the end-portion, or refer it entirely to an appendix. In this instance, however, our telephone conversations have made only cursory reference to the past attempts to work the mine. Further, our current investigations have been conducted in a series of semi-connected "steps", one following the other. So that you may now have a full understanding of these matters in proper sequence, which I believe will give you a firm grasp of the property and will better enable you to follow the recommendations which I set forth in the following, I have included this section as an introductory chapter to the body of my report.

Historical:

The old Keystone workings consist of a vertical shaft, 115 feet deep, sunk near the center of the length of the main surface outcrop. There is a cross-cut on the 65 foot level. The 115 level adit drives toward the shaft and connects to it. The 185 level adit drives toward the shaft and beneath it. A drift driven from the surface at Gun Creek searched for the vein, and eventually found a sulphide stringer - which may or may not be the extension of the Keystone vein. Other small

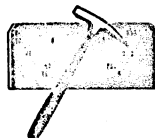


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diggings are present, including a caved-in adit at the northeast end of the main surface outcrop, a 60 foot deep inclined shaft at the southwest end, and some small prospect pits. The surface workings have exposed the vein at several points over a distance of about 550 feet (as surveyed by Ventures, Ltd.); my own first visual estimate, by helicopter traverse, was 800 to 900 feet. We may assume that most of these diggings were started on an actual outcrop of the vein.

No information is available on who did this work, or when it was done. Because there are no hand-forged square nails, the work probably is post-1900 (roughly). Most likely it was done during the period between 1900 and 1920 when other small mines in the Jerome-Mayer "schist belt" were first being operated. Due to erratic gold values in the outcrop and workings, I suspect that gold rather than copper was the objective. All work was confined to exploration of the vein, and no mining as such was done.

Clarence B. "Long Shorty" Pettengill, a life-long miner and prospector, who had for several years tried to open gold veins in the Del Shay basin several miles southwest of the Keystone, evidently liked the Keystone property. He found it obviously abandoned, and on December 21, 1948, located the Keystone claims No.'s. 1 through 4, together with Mrs. Edna Ray Haught. In a mining deed of October 11, 1951, Mrs. Haught quit claimed her interest in the property to Mr. Pettengill, leaving him sole owner.



Mr. Pettengill drove the 115 level adit, which had been stopped short, on through the vein and connected with the vertical shaft, this work being done by drilling with hand steel and single jack, and hand mucking into a wheel barrow. He channel sampled the vein where exposed, made a brunton and tape survey of the workings, and plotted a plan map and longitudinal section. He renovated the old Fred Pranty cabin on the property, where he lived from the late 1940's until his death in 1956, at age 74.

About 1952, he came to Tucson to try and interest my father in the property, without success. I liked the samples of sulphides from the Gun Creek adit, and the length and width of the vein as shown on Pettengill's maps. Later, while living in Globe in 1955, I located Mr. Pettengill, visited the property, and for a few months tried to promote it, hoping to make a "finders fee", but without success. About the same time, another geologist, one Paul Bennett, also examined the property and promoted it to Southwest Ventures, Ltd., a United States sub of the parent Canadian company. They actually operated under the name - if my recollection is correct - of "Southwest Metallurgical Laboratories". Ventures constructed a primitive road, following the old 2-1/2 mile foot trail to the property, and dug one diamond drill hole which apparently failed to find the vein. They also advanced the 185 level a distance sufficient to intersect the downward projection of the vein from the 115 level above - and reportedly failed to find it. The



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Ventures people concluded the vein was a small "pocket" and dropped the project at that point.

Certain details on the Ventures work are given later in the report. Their work was, if their report in my possession is any indication, poorly handled. While it signals a warning -- of which I will take due note -- there are several reasons why the reported results of their work are not conclusive. I will cover this fully in a subsequent section of this report.

Following Mr. Pettengill's death, the claims were sold to Anthony F. Scalone of Guymon, Oklahoma for \$500.00, by court order June 24, 1957. Either Mr. Scalone, or lessees from him, advanced the Gun Creek drift by slusher about 80 feet, and found the sulphides to be extremely spotty. This is the last evidence of work done on the property, and I can find no recorded transfer of the claims to any other party. Evidently Mr. Scalone dropped his interest in the property, and the brush and trees in the access roads are testimony to many years of non-use. The claims, unpatented, were open for new location by other parties at the time of my examination for Glen Explorations.

Current Events:

Having now given the past history of the property as I know it, I will briefly summarize recent events concerning our examination for Glen Explorations.



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On Friday, October 10, 1969, I telephoned you and reported on my examination of the Copper Queen mine near Mayer, Arizona - rejecting same. I briefly related the fact that a number of the veins in the so-called "schist belt" which runs northerly from Phoenix, through Mayer toward Jerome, had been notable producers in their time. These are pre-Cambrian deposits which have been mined to significant depths. I recalled to you the fact that, back in 1955, I had been impressed with the width, strength, and character of a vein known as the Keystone property, in the Sierra Ancha mountains, also a pre-Cambrian vein in schist. Thus, the Keystone project was initiated with your pronouncement "GO!". The examination of this particular property has been more expensive than the average due to its inaccessibility. There is simply no way to get to the property without a lot of time spent in driving, or in flying charter to the air strip in Young, or in using helicopter out of Phoenix as we have done on numerous occasions.

Initially, I made a preliminary investigation of the property to confirm or deny my earlier impressions made when I had seen it in the mid '50's. This examination was made in October 29, 1969, through October 31, 1969, accompanied by Mr. Peter L. Beery.

I was, following this initial examination, still favorably impressed with the exploration possibilities of the vein, and so reported to you on the telephone. I recommended, and you concurred, that the strike



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length of the outcrop be reconnoitered by helicopter -- this choice of method being made due to the dense brush and thick soil cover over most the outcrop. The helicopter reconnaissance was made Wednesday, November 5, 1969. The outcrop appeared to be straight and continuous in that area where it had been principally exposed by the old prospect diggings. The general trace was flagged by placing toilet paper on the brush so that the trace was readily observable. During this helicopter reconnaissance, I also noted that, on strike with the main vein outcrop, another outcrop had been test-pitted some 1000 feet to the northeast -- the interval between being entirely covered by soil and brush with no outcrops.

Inasmuch as the reconnaissance by "chopper" had disclosed an apparently continuous strong vein, with a possible extension northeast, I assumed that you would wish some further work to be done. The following day, November 6, 1969, Mr. Beery and I went to Globe -- the county seat -- and checked records in the County Recorder's office. This check was sufficiently thorough to corroborate the field appearance that it had been many years since anyone had worked the property, and that the unpatented mining claims were open for relocation. I further checked with the Bureau of Land Management for any known or contemplated land withdrawals, and with the United States Forest Service and determined that the Sierra Ancha Wilderness area did not include the Keystone ground.



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I am keenly aware of the rapidity with which news travels via the grapevine of the Sierra Ancha Mountains, and the communities of Payson, Young, and Globe. I deemed it advisable to protect your interest by staking claims. By using such base maps as were available to me, I drew up the layout for five mining claims, with sufficient overlap to allow for defects in the measurements given by the crude base map with which I worked, as well as to give due allowance for the crude brunton and pace survey which would be used for some of the locations. This was necessary to avoid having internal fractions. These overlaps can be partially corrected by amending the location notice calls when the transit survey of the location points has been completed.

Although we missed connection by telephone the day before the claim staking, I did contact your wife with a message of our intent and probable cost, and a telephone number at the Freeway Airport where you could reach me if you wanted to say STOP. I also took the precaution of having Mr. Victor Verity, a well known and highly competent mining law attorney, inspect the location notices which I had prepared, and discussed the general manner in which we planned to stake the claims. He made a suggestion in the wording of one claim, which I followed. Other than that, he saw no fault.

Mr. Beery and I left Tuesday, November 11, 1969, from Tucson for Scottsdale and thence by helicopter to the property. We established



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a general bearing using the compass on the helicopter by re-flying the previously flagged route of the main vein outcrop. Parallel claims were laid by brunton compass according to this bearing. We staked the five claims that day, constructed the location monuments, and documented the same with photographs.

On Thursday, November 13, 1969, we discussed the Keystone and the new claims by telephone, and I made a verbal recommendation to continue with work. You agreed that a transit survey of the discovery points should be made, and that the old Fred Pranty Cabin should be renovated for future work. You stated, however, that you wished to see my full report before considering the more expensive work of trenching, etc.

Accordingly, after some difficulty, we found two able men -- one a geologist temporarily out of work and another, a laborer. These two spent several days renovating the cabin, cleaning out the camp site, and in general making it fit for habitation. They also brushed trails to the major workings to allow for reasonable access thereto and built up the location monuments to fully comply with Arizona statutes. A registered engineer, Bill Joplin of Tucson, recently placed a three-man survey party into the field, and they have just finished surveying the discovery (location) points and have also surveyed the location of certain other critical points, such as the portals to the various workings.



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No further work in the field will be done until you have received this report and given your consideration to it.

The claim notices were recorded November 26, 1969, in Gila County at the court house in Globe, and are being quit claimed from my name to yours, as per your instructions.

LOCATION

The Keystone property is in the central mountain belt of Arizona, as shown on Attachment A, a general index map. Refer also to Attachment B, which gives details of the region. The best generally known geographic point from which to refer the property is the small village of Young, Arizona, which is shown on most road maps. The Keystone is 12 miles airline distance due west of Young, and 18 miles by road. The road, however, is very bad, requires 2-1/2 hours for the trip and a 4-wheel drive vehicle. For reference, note that Young is 128 airline miles due north of Tucson, and 50 airline miles north of Globe, Arizona. Details of access and location, and description of the route in, are given for the record in Appendix I.

GENERAL GEOLOGY

The Sierra Ancha Mountains, in which the Keystone Mine is situated, are dominated throughout most of their area by the younger pre-Cambrian Apache group, which overlies the Archean (older pre-



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Cambrian) basement of granite and schist. In the northwestern part of the range, the younger pre-Cambrian Apache series has been eroded, and the basement schist is there exposed. It is correlative with the pre-Cambrian Yavapai group of central Arizona, and is the host rock for the Keystone vein. In the Keystone vicinity, the schistosity generally strikes north 40° to 50° east, and dips vertically to steeply southeast.

The Sierra Ancha range is north of the regional boundary of Laramide ore deposits which characterize most of the copper deposits of southern and central Arizona. The Keystone, as will be discussed later, is undoubtedly older pre-Cambrian (Archean). In common with other Archean deposits in schist in central Arizona, such as Jerome, the Iron King, and others. I propose that the Keystone has a potential to be mined to a significant depth. This is an important aspect of the exploration potential of this property.

TOPOGRAPHY AND VEGETATION

Throughout most of the range, the Sierra Ancha Mountains are characterized by precipitous bluffs and steep slopes, with knife-like, sharply incised canyons. Local relief is extreme. In the northwestern part of the range, however, where the pre-Cambrian Apache Group strata have been eroded away, leaving exposed the basement schists, the topography is somewhat less rugged.



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The schist belt locally forms steep slopes, but the hills characteristically display a rolling topography, and the relief along steep canyons rarely exceeds a few hundred feet. In the Keystone vicinity Pranty wash is steep sided with about 500 feet of relief from top to bottom. Gun Creek is the most noticeable topographic incision, and cuts its path straight way across the bedding of the schist. The elevation at the Pranty cabin, as established by altimeter reading and roughly checked by the USGS topographic sheet is 4330 feet.

The elevation of the property is in the oak belt, and there is no timber suitable for mining. The southern slopes of the ridges show many spots bare of vegetation, with scattered oak and brush. The northern slopes and also the ravines and draws are another matter. A combination of oak interspersed with heavy brush make access along northern slopes exceedingly difficult. Manzanita grows abundantly, and there are many other types of low lying brush reaching a height of about 5 feet.* The growth hugs the ground too closely to crawl under it, and although thick enough to walk across on top it is limber enough to give way under weight. It is too pliable to be cut with an ax, for it gives way under the blow. It is too stout to be cut with a machete. The only instrument we have found useful in cutting and brushing the trails is a heavy, curved object with a sharp inside edge, attached

* The associated varieties which, collectively, are often called "chaparral".



to a long pole - known as a "lopper". This does a reasonably good job of snagging and cutting.

The photographs on Attachments J-1, J-2, and J-3 will give you a general impression of the topography and vegetation. J-1 indicates the brushy growth, You will note the bare spots on the southern slope behind Pranty cabin, J-1-A. Attachment J-2 shows typical rolling landscape in the distance. Attachment J-3 is a documentary of an unusual type of location monument - a five gallon army gasoline can, with the notice of location inside. This was lowered by rope from the helicopter. A standard rock monument has since been built beside it. Another brushy hillslope is seen in J-3-A.

The combination of dense brush, above described, together with the soil from rotten schist which spreads out over the hillside, nearly obscures the Keystone vein. Tracing on the ground from point to point of exposure is difficult, and is impossible without detailed surveying. It is for these reasons that helicopter traversing, traveling about 10 feet above the ground, was so necessary in determining rapidly the continuity of exposures.

I do not know the actual rainfall, but common to most mountainous regions in Arizona it is probably about 18 inches. Some snow may fall in the winter, but will not long remain on the ground. There is no difficulty in working year round.



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LAND STATUS

As already mentioned under the general heading, "current events", the vicinity of the Keystone is open, unoccupied federal forest land and is outside the limits of the Sierra Ancha Wilderness area. The physical appearance of the land, and our title search at Globe at the county courthouse, both reveal that the land had been abandoned for mining purposes. I have already described the general nature of the manner of staking five claims, November 11, 1969, by Mr. Beery and myself.

The claims are named as follows: The Long Shorty, Poor Boy, High Power, Low Power, and the Liz. Attachment C gives the general configuration of the claims and their relationship on to the other, and with reference to physical objects such as Gun Creek, Pranty Wash, the Keystone vein and the Pranty Cabin.

I signed the location notices in my name, with Mr. Beery as witness, for practical convenience. The claims were filed for your behalf, and at your request. Our lawyer here is drawing up a quit claim directly to you. As soon as the transit survey now completed has been plotted, I will file amended location notices to correct defects in the calls on the original notices.

For your information, Arizona statutes require that four claim corner monuments, and two end center monuments, one at each end, be constructed on the ground within 90 days from the date of location.



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Thus the first deadline date will be approximately February 11, 1970. Arizona statutes further stipulate that the locations must be perfected by digging "location pits" within 120 days of the date of location. These location holes are required to be 4 x 6 feet in aerial extent, and 8 feet deep; alternately, a four foot wide open cut may be trenched, having an 8 foot bank at its face.

At a later date, we may wish to file additional claims to allow for additional working room. For the moment, you are fully protected along the strike of the vein, and there is ample room for exploratory work to be done, including drilling.

DESCRIPTION OF THE VEIN

General Nature:

There is a region in central Arizona of pre-Cambrian pyritic copper deposits, which, beginning in the Bradshaw Mountains some 50 miles north of Phoenix, trends generally north for 50 miles to Jerome. The width of this zone is about 30 miles east to west. Within this general region, also, are gold quartz veins, some of which are pre-Cambrian. The pre-Cambrian pyritic copper deposits in schist share common features of mineralization among themselves, and are similar in their general form, character, and extent. The United Verde and United Verde Extension Mines at Jerome -- truly great mines -- are the largest, followed by a handful of others with



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notable copper production. In addition, there are numerous veins which have yielded minor amounts of copper. The deposits generally carry some zinc in the form of sphalerite and a little gold and silver. One of this group of pyritic schist deposits recently closed, was a major zinc producer. Jerome is an oval, pipelike body, 800 feet in diameter, extending many thousands of feet in depth. The others are replacement veins in schist, often consisting of a zone of parallel veins, or of overlapping veins and oreshoots. The veins tend to follow and replace shearing parallel to the schistosity of the enclosing wall rock.

The Keystone vein, also of undoubted pre-Cambrian age -- as will be discussed later -- displays the features characteristic of the other pre-Cambrian pyritic copper deposits in schist. It does, however, lie outside of the principal zone of pre-Cambrian deposits described in the foregoing -- extending through the Bradshaw Mountains to Jerome. However, there are pre-Cambrian gold quartz veins at Payson, roughly 50 miles east of the town of Mayer (Mayer is near the Copper Queen which I recently examined for you, located centrally in the "schist belt"). The Keystone deposit is approximately 15 miles southeast of Payson. This geographic isolation from the pre-Cambrian "schist belt" must undoubtedly count as a "strike" against the exploration potential of the property, for we are no longer hunting "elephants in elephant country". However, the Keystone shares, with its other pre-Cambrian



cousins, their mutual characteristics, and I feel it must be evaluated upon its individual merit, judged by what may be seen on this particular property.

The pyritic copper deposits, consisting generally of pyrite in a vein along a shear zone in schist, with lesser amounts of calcopyrite and sometimes bornite, tend to fall into that classification known as "massive sulphide veins". Any vein may be divisible into two main parts -- the valuable metallic minerals, in this case the sulphides, and the enclosed strands of country rock or other worthless minerals formed during mineralization. This combination of country rock and other worthless minerals are collectively known as the gangue. If the vein consists only of sulphides, there is little hesitancy in classifying the vein as a "massive sulphide vein". At the opposite end are those veins in which the gangue dominates, with a scattering of sulphides -- perhaps as little as 5%. There is no clearly defined definition among geologists concerning the quantity of sulphides requires to place a given deposit into the category of "massive", but suffice it to say that when the sulphides begin to occur in large clots and bunches, and in thick strands, and their appearance begins to dominate over the gangue, the vein is approaching that of the massive sulphide type. 50% sulphides, to the eye, gives the impression of a nearly solid sulphide vein, when in fact it is not. Probably a lower limit, for classification purposes, would be on the order of 25% total sulphides. Thus, these pyritic copper

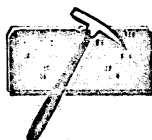


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deposits of pre-Cambrian age, containing as they do from 20% upwards toward 80% total sulphides, are properly classified as "massive sulphide replacement veins". I so classify the Keystone vein.

The Keystone vein is not exposed at the surface over its full strike length. Soil and talus obscures most of the outcrop. The vein is known mainly along a length of about 550 feet, where scattered diggings have exposed portions of the vein (this may have originally been an area of more abundant outcrop). An isolated outcrop, on strike with the principal outcrop area of the vein, 1000 feet to the northeast on the Liz claim, indicates an extension in that direction. To the southwest, about 400 feet the sulphides in the Gun Creek adit prove mineralization at that point. These sulphides are on strike with the vein -- or nearly so -- but may not be a direct extension of the principal vein. Thus, a mineralized structure in excess of 1900 feet long is indicated. The overall outcrop configuration is shown on Attachment C, which shows also the Long Shorty claim group and the major workings.

I should point out that, except for the sulphide lens in the Gun Creek adit, the surface and underground workings are all in the oxidized and leached zone, consisting of a limonite residue and copper oxides. My conclusions regarding the sulphides beneath the leached zone stems of an appraisal of the limonite residue.

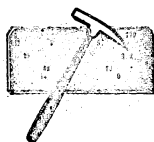


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At present, the vein is penetrated by too few exposures to determine whether it is a single, continuous vein, or whether it is a series of closely spaced, overlapping lenses, generally along the same shear zone. It could be a discontinuous series of lenses - although I do not expect this to be the case. Along the surface and also underground, the persistence of a specularite band on the hanging wall side of the vein suggests that it is a single, continuous vein. Extensions northeast and southwest of the main outcrop are covered by soil, and cannot be evaluated at this time. They appear to be in a general alignment, but could nonetheless be discontinuous lenses along the same structure.

Age:

The mineralogy and alteration of the vein, and its formation along a pronounced shear zone, are indicative of formation at a high temperature, by solutions ascending toward the surface. In the immediate vicinity of the Keystone, the overlying younger pre-Cambrian strata have been eroded. However, nowhere in the range do these younger strata show any deposit of deep seated origin formed by high temperature solutions. The entire range is in fact, beyond and northerly from the regional boundary of Laramide deposits. The significance of this latter is that, in Arizona, there are only two major episodes of ore deposition, the one being older pre-Cambrian



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(Archean), and the other being Mesozoic to Tertiary, largely of the age termed Laramide. Thus, the Keystone is undoubtedly pre-Cambrian. Also note that gold quartz veins near Payson 15 miles northwest of the Keystone, are positively overlain by Cambrian sandstone, proving their age without question.

Details of the Vein:

Sketch maps of the vein, with assays, at the surface near the 115 foot vertical shaft, 65 foot level, and the 115 foot level, are shown by Attachments D, E, and F, respectively. In the main, these maps are self explanatory and contain pertinent details thereon. The following supplementary remarks are worthy of record.

The vein at the shaft collar (Attachment D), is exposed principally by a small open cut adjacent to the shaft. The vein in the cut, being near the surface, has been decomposed to a great extent to soil, and many mineralized bands are bent and broken by downhill, gravity-directed creep. Limonite is diffused throughout the rock to such an extent, as a result of surficial accumulation, that it is very difficult to ascertain the original total content of sulphides -- although it must have been 30% or greater. As closely as could be measured, the vein is 18 feet wide where here exposed. Although no visible copper minerals are present, nearly .6% copper remains in the outcrop, as shown by sample 1998. This sample is also worth note in that it



contains .24 oz. per ton in gold – a notable amount of an auxiliary metal. Sample 1999 – selected pieces of rather solid, but slightly vuggy, dark hard hematite gossan, probably came from the 65 foot level. These were scattered about the dump, and a sample was made from them. I would estimate the former total sulphide content at 60% as a minimum. Here again, although no visible copper is present, .44% copper remains. These unidentified copper oxides are undoubtedly in the form of tenorite or copper "pitch", which, mixed with limonite, is very difficult to distinguish. As shown by the sketch, the band of specularite which characterizes the hanging wall is well displayed.

I should here comment that the open cut by the vertical shaft is the only surface exposure of the full width of the vein. The adit on the northeast end of the principal surface showing is caved, and the outcrop sloughed in, except for the specularite band. The inclined shaft on the southwest reveals only the specularite band and a few feet of the hanging wall of the vein. Other small diggings are only prospect pits now sloughed in.

The 65 foot level is now inaccessible. I visited it in 1955, and Attachment E results from a sketch made at that time. The samples shown were channels cut by Mr. Pettingill. My recollection is of a very strong hematite gossan throughout the length of the crosscut through the vein. The specularite band was just barely exposed in the face of the crosscut. Pettingill's assays showed that for his samples

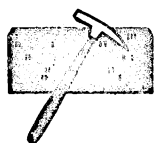


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No.'s 4 and 5, almost no copper remained. This, theoretically, fits the principal of a high ratio of pyrite to chalcopyrite, thereby inducing rather complete leaching. However, it is difficult to reconcile these very low assays with the nearly 1/2% copper assay which I obtained from similar gossan on the dump of the vertical shaft, and which probably came from this zone. Again worth note, is Pettingill's report of his sample No. 6, which assayed .77 oz. per ton gold. The vein on the 65 foot level is 27 feet wide as measured by Pettingill, and as checked by me by pacing.

The vein is 24.5 feet wide on the 115 foot level, as measured by myself and Mr. Beery (Attachment F). As shown by the assay for oxide copper, there are evidently some sulphides still left within this leached zone. The so-called "oxide assay" for copper is a difficult process, and is an approximation at best. However, the difference between the oxide assay and the total copper assay yields a rough idea of the amount of sulphide contained in the sample. In both cases, a few tenths appear to be represented by unrecognized sulphides, probably as small grains of chalcopyrite. The leached zone on this level did not originally have as great a content of total sulphide as indicated at the surface and on the 65 foot level.

My notes indicate that sample 2001 (nearest the shaft), 10.5 feet long, prior to leaching contained about 10% total sulphide. The adjacent sample, number 2000-14 feet long, was estimated to have



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contained 20% total sulphides at a maximum. Thus, although the sulphide replacement in the shear zone is uniform across the width of the vein, the total sulphides were less than 20%.

Attachment G is a sketch map of the Gun Creek adit. Here, the old workings were roughly aligned with the strike of the vein, as known near the workings around the old vertical shaft, and driven in through a mantle of talus in search of the vein. As seen from the sketch map, after cross cutting south, eventually a thin sulphide stringer was found and followed northeasterly for a short distance, to the point marked "face of drift 6/25/55". This was the position of the face at the time of my visit at that date. There was exposed a four inch stringer of unoxidized sulphides containing chalcopyrite and bornite, together with pyrite, replacing a chloritized shear zone in schst. Following Mr. Pettingill's death, and acquisition of the property by Mr. Scalone, either he or parties who leased the property from him set up a slusher, and advanced this drift about 80 feet, to the face where it now stands. This work showed that the sulphide stringer exposed in the mid-50's, at the end of the original face, was a very short lens of sulphide only, and the additional drifting failed to yield other than scattered grains of sulphides.

There is a question whether or not this sulphide zone is actually an extension of the Keystone vein. The band of specularite, which is so persistent at the shaft, is not present in the Gun Creek drift.



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Although a cross-cut, as shown on Attachment G, advanced into the hanging wall (southeast), the band of specularite was not found. The helicopter reconnaissance which I flew in tracing the vein on the surface establishes that the Gun Creek drift is approximately on strike with the main vein. However, that survey was not accurate enough to define the projection of the vein closer than a hundred or so feet. The recently completed transit survey will help establish the line of projection with more certainty.

I believe the principal importance of the showing of sulphide in the Gun Creek adit is that, whether it is the tail-end of the Keystone vein or whether it is a subsidiary strand, it furnishes an indication of the type of sulphides which we may expect. Mr. Pettingill had taken two assays from this four inch stringer in the original face, as it was when I first visited the property and obtained assays of 11.3% and 8.3% copper. Mr. Beery and I collected massive pyritic samples from the dump of the Gun Creek adit, with only a small amount of visible chalcopryrite, which assayed 13.5% copper, .03 oz. per ton gold, and .18 oz. per ton silver. We also collected a sample made of sulphide fragments containing much visible chalcopryrite along with bornite, and retained these as hand specimens -- they were obviously high grade and we did not assay them. I do not wish to leave the impression that I expect the Keystone vein to average as high as the copper values just quoted, for our sample was selected of sulphides



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only, and contained a smaller proportion of gangue than would be the case if we had cut a full sample across a sulphide vein.

Mr. Pettingill's assays, also, are suspect of being selected samples.

None the less, these samples indicate that considerable copper is present. The presence of bornite is an important point, also. This is so because, grain for grain, bornite contains about twice as much copper as does chalcopyrite. Thus, a lesser total percent of the sulphide, bornite, will materially raise the grade of ore, compared to an ore which contains chalcopyrite only.

I believe it might be appropriate at this time for you to refer again to Attachment C, which shows the various workings throughout the claim group, and their relation one to the other.

Finally, a note or two about the 185 level. Please refer to Attachment H, a sketch map of the main workings and the Ventures diamond drill hole. The outline of the 185 level is taken from a Ventures map in my possession. This adit is now caved and inaccessible, at the portal. However, I visited it in 1955, but without the aid of a base map of any sort. I recall a zone of spotty sulphides -- mostly pyrite -- and partly oxidized. Also, I recall a few thin sulphide fissures. On Attachment H, the "small vein" is taken from data by Ventures. The red dots, representing scattered, somewhat disseminated sulphides, are from my recollection of the same. The location and direction of the Ventures drill hole is also from their data. They reported a 4 foot



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intercept of sulphides which assayed 1.28% copper and a little silver, at a position in the drill hole which matches the projection of the mineralization as shown on the 185 level. The drill hole was continued well past the depth at which it should have crossed the downward projection of the keystone vein, and reportedly failed to do so. Ventures then advanced the 185 level - which according to their surveys had been stopped short of the vein - past the downward projection of the vein, and reportedly failed to find it. These relationships are shown in cross-section by Attachment I.

There are several unsolved problems regarding the Ventures, Ltd. work. In the first place, as nearly as I can ascertain, the drill hole was not surveyed for deflection, which ~~same~~ often is a serious problem when drilling angle holes in schist. The drill hole itself could well have deflected in such a manner that it never reached the vein. Advancing the drift and failing to find the vein is another matter. Could they have advanced through a lean portion of the shear zone and failed to recognize it? In fact, could there have been an error in their entire survey with regard to the portal of the 185 level and the collar of the drill hole, so that neither was extended far enough to intersect the vein? Our own survey will soon answer this latter question -- the figures are being reduced at this time, but I do not yet have the map at my hands. If the 185 level did indeed pass under the downward projection of the Keystone vein, it is imperative that we find out for ourselves whether



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or not it actually penetrated the vein. If it did not, we may well assume that the vein had been offset along a flat fault -- which is a geological problem to be considered in future exploration. It does not represent a deterrent to future exploration. There are yet other possibilities connected with the Ventures work, and the interpretation thereof. I will not try to enumerate these, or to speculate on them at this time. Suffice to say, I am keenly aware of the problem that exists and have given this due consideration.

In addition to pointing up the difficulty regarding the outcome of the Ventures work, Attachment H will place in perspective for you the vein as it is known on the surface and at the 115 level, and its comparison to the general trend of the vein as exposed at various points on the surface between the inclined shaft at the southwest edge of the main exposure, and the caved adit at the northeast end of this same main exposure.

Attachment I is a cross section through the main workings and drill hole, and is self explanatory. It portrays a cross sectional picture of the vein as known from the surface to the 115 level, and of the probable downward projection - which the 185 level reportedly failed to reveal.



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EXPLORATION POTENTIAL

Summary:

The Keystone is a replacement vein in a shear zone, of pre-Cambrian age, with sufficient possible length and of demonstrable width that it is a favorable exploration target. As mentioned previously, it is of the type that may be referred to in general terms as a massive-sulphide type of vein. The real potential hinges on the extension to considerable depth, perhaps well over 1,000 feet. This vein may, as have other pre-Cambrian veins of this type, reach such depths.

The indicated tenor in the primary (sulphide) zone could be on the order of 4% to 5% copper. As will be shown in the following, the already indicated length of 550 feet, developed to a mere 400 feet, will yield a substantial return on capital investment. This factor is of importance in exploring a vein at considerable depths. Basically, this means that a mine of smaller size may be first developed, and be in production and yielding profits while deeper exploration is being undertaken.

Additionally, there is a chance for lateral extension beyond the 550 foot main segment.

Continuity on Strike:

The principal area of old diggings is encompassed within a surface strike length of 550 feet (Ventures' survey). As noted in previous sections, there is indication that it extends northeast to



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the Liz claim, and southwest toward the Gun Creek drift. The widths of such extensions, and their continuity, is not at present known. The continuity within the 550-foot principle surface zone is not known in detail. Trenching on closely spaced centers may reveal overlapping lenses in the vein, or local pinch-outs. The workings put in by the old timers at various showings appeared, when reconnoitered by helicopter, to fall on a quite regular, straight line. Continuity, however, or lack of it, must be proven as an initial step, both for the northeast and southwest extensions, as well as for the internal 550-foot length segment.

Extension in Depth:

A crucial point in exploration potential of the Keystone vein is a possible extension to considerable depth.

As a background against which to compare this possibility, I should first point out the general case, which is that most small mines are shallow. Hoover, in 1909 in the hey-day of vein type mining, made the following pertinent statement: "All mines become completely exhausted at some point in depth, therefore the actual distance to which ore can be expected to exist below the lowest level grows less with every deeper working horizon". Concerning the average of many mines, Hoover further supplies us with the following data:



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"... prepared a list of several hundred dividend-paying mines of all sorts, extending over North and South America, Australia, England, and Africa. Notes were made as far as possible of the depth at which values gave out, and also at which dividends ceased. Although by no means a complete census, the list indicated that not 6% of mines (outside blanket) that have yielded profits, ever made them from ore won below 2000 feet. Of mines that paid dividends, 80% did not show profitable values below 1500 feet, and the ^{said}~~said~~ majority died above 500."

Some time a specific reason for a mine shut-down may be had -- a calamity such as a disastrous fire, a sudden influx of water, poor management, a decline in metal prices, etc. However, the most singular outstanding reason for failure -- and the one least often mentioned -- is that the ore plays out in depth.

Let us now, however, turn from generalities to specific conditions. If we were to explore some of the bonanza gold veins in Nevada, a shallow depth surely could be predicted. Furthermore, the extension of any known ore shoot could be predicted to bottom suddenly, perhaps within 100 feet. Such are the conditions with that particular region and particular type of deposit. Turning to the Arizona "schist belt copper deposits", we find the opposite. The United Verde was mined to about



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4000 feet, and deep drilling showed it to bottom at a little over 4500 feet. The United Verde Extension, which is the down-faulted upper half of the United Verde, was mined to 2000 feet. Thus, the original extent of this great deposit was, at a minimum, approaching 7000 feet. The Iron King, a zinc producer rather than copper, but otherwise similar to the massive sulphide copper deposits, was closed at 3000 feet due to excessive mining costs. The Blue Bell was mined to 1500 feet. The Binghampton, adjacent to the Copper Queen which I recently examined for you, has a 1000 foot shaft, and is reported to have been mined to 600 feet, with some ore still existing. The Copper Queen itself, which I rejected, did not show sulphides in sufficient quantity to pay -- but the mineralized structure had been followed to the 800 level and, under water, was reported to exist on the 900.

From the above, I conclude that one of the characteristics of the deposits in the pre-Cambrian schist belt is the tendency to extend to a significant depth. Focusing on the geologic history of the deposits, this is seen as a logical outcome. In Archean times, tremendously large, 'metamorphosed' mountain ranges were formed and intruded by masses of granite. Before the heat generated during mountain building and igneous intrusion subsided, additional earth movements formed permeable shear zones parallel to the schistosity of the rocks. Through these permeable zones, solutions of uncertain origin, but



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probably hot, passed upward towards the surface. Their passage was through many thousands of feet of rock, under conditions of uniform heat. Mineralizing solutions therefore had the chance to deposit their metals over a long distance under similar conditions, and thus formed relatively long vertical zones of sulphides. Subsequent erosion has exposed these veins to the present surface.

The characteristics of the Keystone vein, as seen in the cut near the vertical shaft on the surface, and in the 115 level adit, indicate a strongly mineralized shear zone. It is logical to assume that this would extend downward along its dip. The work by Ventures, Ltd. thus poses an anomalous situation. As already stated, it is their claim that the 185 level was advanced beyond the downward extension of the vein from the 115 and did not find it. This anomalous situation is depicted in cross-section, Attachment I. It will be necessary, and crucial to the analyses of this problem to clean out the caved portion of the 185 level for inspection.

Possible Tenor of Sulphides

The sulphides at depth below the oxidized zone will consist of pyrite and chalcopyrite, and, as shown by the Gun Creek adit, probably bornite as well. To arrive at a possible grade of copper which might exist in the sulphide zone, I carefully reviewed those exposures in the oxidized zone which are present. By interpretation, I have arrived at the conclusion that the grade could approach 5% copper. This is,



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of necessity, a highly subjective estimate, and one which is confronted with the possibility of gross error.

The analysis of a leached capping generally proceeds as follows. The trained eye scans the outcrop or exposure in a drift, and the geologist makes a judgement on the percentage of total sulphides which had been once contained in the gossan being viewed. Also, the color and texture, as well as distribution, of the limonitic products produced by sulphide oxidation is mentally recorded. The total sulphides estimate represents sulphides by volume, and this amount may be converted mathematically to sulphides by weight. It is my overall opinion, based on the various exposures of the leached zone, and in consideration of factors of permissability, that the vein will probably average about 25% total sulphides -- certainly no more than 35%. Thus, the Keystone is on the bottom margin of that which we might call a "massive sulphide" type of deposit. The grade of copper in the sulphide zone is dependent on the ratio of pyrite to copper sulphides, the two of which go together to make up the total sulphide content. In low-grade porphyry copper ores, it is possible to make rather good estimates by the type and color of limonite present, concerning the copper content of underlying sulphides. Unfortunately, in deposits with sulphide percentages exceeding 20%, there has usually been so much sulphuric acid liberated during oxidation of pyrite, that diagnostic limonite is not well formed. This is the case with the

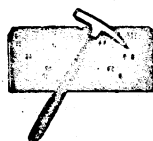


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Keystone. Most of the limonite is non-diagnostic, although there are occasional pockets surely derived from chalcopyrite.

Our assays have shown that the leached zone contains from 1/2 to 1% copper. This indicates incomplete leaching. If the ratio of pyrite to copper sulphides was high, an excess of sulphuric acid would have been produced, and the copper would all have been leached away. In a chemically non-reactive host rock (such as schist), a ratio of 2:1 between pyrite and chalcopyrite would probably induce complete leaching whereas equal amounts of pyrite and copper sulphides -- 1:1 ratio -- probably would produce insufficient acid for complete leaching. Thus, I conclude that for the Keystone vein, the pyrite to copper sulphide ratio is low -- on the order of 1 to 1. Given a total sulphide content in the range about estimated then, (25-35%), a grade approaching 5% Cu is permissible.

The actual grade of ore is, of course, a crucial point. I might note that the average run of the pre-Cambrian schist belt deposits, which is closer to 3% Cu than to 4% Cu, will not pay its way under present conditions. As I have stated in the general summary, however, 5% will pay off handsomely.



COMPARISON TO OTHER ARIZONA PRE-CAMBRIAN DEPOSITS

I believe it is instructive to compare the production from other deposits similar to the Keystone, to give a general indication of the extent of production which came from the better properties.

The two mines at Jerome, the United Verde, and the United Verde Extension, are the largest. There is no indication that the Keystone would even remotely approach the magnitude of these two great mines. However, they indicate the extent and strength of copper mineralization during the pre-Cambrian in the central Arizona schist belt. Production was:

United Verde

2-3/4 billion pounds copper

United Verde Extension

730 million pounds copper

Of the veins in schist, those with notable production are as follows:

Blue Bell

67 million pounds copper
900,000 tons ore

DeSoto

18 million pounds copper

Binghamton

8 million pounds copper

Stoddard

5 million pounds copper

The Iron King is similar in all respects to the pre-Cambrian schist belt copper veins, except that its chief production was zinc, with very subordinate copper. From 1942 through 1967, when the mine shut down, it produced approximately 350 million pounds zinc. The zinc content of 4 to 6% would alone, have been sub-marginal,



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but, sufficient gold and silver was also recovered to make a profitable mine.

MINING, MILLING AND MARKETING

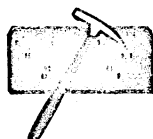
The vein, where exposed, appears to be of sufficient width and with sufficiently strong walls to permit mining by shrinkage stope methods. This is a low cost method with relatively little timber used.

Although one may eventually be found, through exploration, to extend to considerable depth, it is not likely to be explored and developed for mining to its full depth in one step. More than likely, a smaller mine would be installed after sufficient reserves had been developed to support, say, a 200 ton per day operation.

As a trial run, to more fully establish the grade which would be necessary to produce a profit with this type of mine in this locality, I have made certain assumptions and carried them through to an economic conclusion, as already given under the general summary.

I do not anticipate any difficulty in milling, and a recovery of 90% or better should be obtained from the copper sulphides. I have arbitrarily assumed that recovery of the gold and silver values (a minor quantity anyway) will be 50%.

Crude ore would be trucked from the mine to a mill site on Tonto Creek, probably near Gisela, along a road yet to be constructed for haulage purposes. Probable routes are shown on Attachment B.



I have reconnoitered these routes by helicopter, and sketched them on small-scale topographic sheets, to arrive at a very rough estimate of capital cost.

Concentrates from the mill would be trucked southward along the graded dirt country road towards Roosevelt. It may not be permissible to regularly cross this narrow dam with one trucks, so the graded dirt road which leads easterly, just north of the dam, would be taken towards a connection with the Young Road. From there the trucking would go southward to the bridge over Salt River, and thence into the Inspiration Smelter at Miami. Inspiration accepts custom ores, although all custom smelters fluctuate somewhat with the quantity they are willing to accept. The ASARCO smelter at Hayden also accepts custom ores, but would require additional trucking past Inspiration, through Superior, and then to Hayden. Trucking from the mill on Tonto Creek to the Inspiration Smelter amounts to 82 miles, and reduces to about \$1.00 per ton of crude ore from mill to smelter. Additional trucking required to take the concentrates to Hayden would be 48 miles.

All pertinent details to support the economic outcome given in the general summary are listed by Appendix 3. Details of the hypothetical ore reserve are given by Appendix 2. Basically, the economics calculated evolve from a possible development of 400,000 tons of ore with grades assumed as given. Other assumptions are:



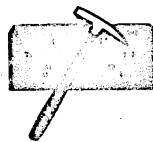
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1. 550 foot length of ore shoot. (the minimum known surface strike length).
2. 20 feet, average width.
3. 300 feet of leached zone.
4. 400 feet of sulphide, indicated by 10 diamond drill holes, and proven by underground development.
5. 90% mill recovery of Cu: 50% recovery of gold and silver.

The above assumptions indicate 200 tons per day to be the feasible rate of mining and milling, producing a life of 6-1/2 years. The net smelter return from the Inspiration smelter at Miami on concentrates produced from an assumed 5% Cu crude ore, with minor gold and silver, is \$27 per ton. The ASARCO smelter at Hayden, after deducting increased trucking cost from Miami to Hayden, yields \$27/ton. Details of the smelter liquidation are given by Appendix 4.

A mill site on Tonto Creek has been chosen as the closest place where adequate water may be developed. The inflow into the gravel beds in Tonto Creek is undoubtedly rather large, and although I have no specific well data as a basis for prediction, there is essentially no doubt that wells can be developed.

Water for mining purposes and camp site use at the mine would come from Gun Creek, which flows sufficiently for these purposes most of the year. During June -- usually a dry month, and in the later fall, water would have to come from wells in the creek bed, or from catchments. There is a chance that a water shortage might exist



for about two months out of the year.

EXPLORATION RECOMMENDATIONS

I recommend the following steps be undertaken to determine the continuity and extent of the vein at the surface, and to furnish more data regarding its width. Examination of the 185 level will help evaluate the problem of depth extension created by the Ventures work. The outcome of this work will determine whether or not the property warrants drilling.

- A. The road in to Keystone from the soldier camp jeep trail should be improved, using a D-6 Bulldozer and an experienced "mountain-road" cat skinner. Estimated, 3 days, \$700 including mobilization.
- B. The central area of the vein between the "east" adit and the inclined shaft should be trenched with a bulldozer, in so far as possible, to expose a depth of 2 to 5 feet of bedrock across the width of the vein, at 100 foot centers. Thus, about 5 trenches are suggested. The actual cost is somewhat open-ended, in that the length and depth of the trenches will be unknown until completed. Actual bulldozer time can be only crudely estimated. Probably 5 days, \$800.

The extension northeast from the "east" adit to the showing on the Liz claim should be trenched at, initially,



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200 foot intervals. Probably 4 or 5 trenches, \$1200 and 6 days.

Two trenches should be cut along the ridge southwest of the inclined shaft, at about \$300, or about 2 days. Total initial trenching, then, will cost about \$2300, and might be somewhat higher. Two weeks will be required.

- C. During the time occupied by A and B above, a geologist will be required for guidance and evaluation of the results. He will also utilize this time to map the 115 level and Gun Creek adit, plus tracing the specularite band on the surface (for use as a "marker", as it occurs near the hanging wall side of the vein). This surface tracing will be done by observing float, and by the use of a small hand-held magnetometer. This work will be coincided with the bulldozer trenches, and is estimated to cost about \$2000, including expenses.
- D. If the trenching shows favorable continuity, and the project appears worth continuing at this time, the 185 level must be cleaned out, timbered where necessary, and mapped geologically. I can merely offer a guess on this expense. If not caved at more than the portal and one or two other spots, it might be done for \$2000. Mapping would be an additional \$1000.



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- E. The above steps should be undertaken promptly to meet a decision on surveying and establishing corner monuments by February 11, 1970, which same will cost about \$1500.
- F. When the above data is gathered, it should be assembled and a decision regarding drilling and the cost of same then made. The first three drill holes may be expected to cost about \$55,000.

In summation, then:

<u>A through E</u>	
Road Work	\$ 700
Trenching	2,300
Opening 185 level	2,000
Geology	3,000
Supervision by Chief Geologist	1,000
Office follow up	1,000
<hr/>	
Total	\$10,000



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APPENDIXES



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LOCATION AND ACCESS

The following details of location and access of the Keystone mine - the Long Shorty group - is here given for the record.

Considered only from airline distances, the Keystone property is not far from major towns. As previously stated, it is 128 airline miles due north of Tucson, and 50 airline miles north of Globe. These latter distances are referenced to the small mountain village of Young, Arizona, the Keystone mine being 12 miles airline due west of Young. Arriving at the Keystone by available means of transportation, however, is quite another matter. The mine is in the northern slopes of the rugged Sierra Ancha mountains and is considerably isolated by road from any town of consequence.

The mine is reached from Tucson via Globe and Young. Driving distance to Globe via Florence is 125 miles and requires approximately 2 hours and fifteen minutes. One then drives northerly from Globe toward Young 26 miles on a paved, but sinuous road, to a bridge crossing the Salt River. From this bridge to Young, is 40 miles of winding mountain road, of improved graded dirt. The total driving distance, then, is 66 miles and requires 1.5 to 2.0 hours depending on the driver's inclination regarding speeds of travel over the winding mountainous portion of the road. There are no dependable accommodations at Young. The Antlers Cafe and Motel is operative most of the time --



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providing the owner, Bob Leturno, is in town. There are two stores and two gasoline stations. The general geography of access and mountainous regions are shown on Attachment B, for the area between Globe, Young and the Keystone mine. To reach the Keystone from Young, a 4-wheel drive vehicle is a necessity at the present time. Directions are as follows: Take a sharp left at the schoolhouse at Young. For the following descriptions, reference may be had to Attachment B1, which shows detailed access from Young to the Keystone mine. From the schoolhouse at Young, drive westerly 10.7 miles to the Flying W Ranch on a medium to fair graded ranch road. About 30 minutes is required. From the Flying W Ranch take the old road -- a primitive bulldozer road -- which leads towards the solder camp site and is generally known as the solder camp trail. Travel this road 4.7 miles. The road is bad and steep and rocky -- 4-wheel drive vehicle is a necessity. From this point just mentioned on the solder camp trail, take a sharp left and travel on a very, very bad bulldozer trail approximately 2.5 miles down to Pranty wash and the Pranty cabin. The road ends here at the Keystone property - the Long Shorty claim group. This latter 2.5 miles most definitely requires a 4-wheel drive vehicle. The road is basically well placed, it has been put in by an experienced mountain cat skinner, and has resisted 12 years of rain without serious washout. However, there are numerous steep grades and points where the road has sloughed on the cut-bank side,



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particularly along that portion going down into Pranty wash. The total driving time from Young to the Keystone is approximately 2.5 hours, over a total of 17 road miles. Travel over the final 2.5 miles will be greatly facilitated when a bulldozer has cleaned up this portion of the road.

For further reference on access, the following air flight times may be of interest. Globe has a municipal airport about 5 miles out of town. Flight time from Tucson to the Globe airport varies from 45 minutes to 1 hour and 15 minutes depending on the type of light aircraft chartered for this purpose.

There is Taxi service in Globe, but no rental car agencies. There are two airstrips -- if you can call them that -- in Young. Each is about 3400 feet long, of semi-maintained dirt. These are capable of allowing a light plane to land but will probably not take a twin engine or other hot, fast planes. On the other hand, the altitude, 5213 feet, and surrounding higher mountains requires a good, stout engine with a high rate of climb, for safety. The strips are unlighted and are so poorly defined that landing and take-off at night is not advisable and probably not possible. Flying time from Tucson to the Young airstrip is approximately two hours give or take 30 minutes, depending on the type of light aircraft used. Since there is no taxi service, arrangements must be made to be met at the airstrip at a pre-determined time by another party in an automobile.



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A third method of reaching the Keystone is by helicopter.

Flying time from Tucson to the Scottsdale municipal airport near Phoenix is about 45 minutes to an hour and a quarter, depending on the type of light plane chartered for this purpose. The Arizona Helicopter Service has adequate facilities and a well-kept maintenance shop, and is a first-rate helicopter service. Their ferry time from the Scottsdale airstrip to a landing site on a bend in the road near Gun Creek at the Long Shorty group is 1.2 hours. The chopper which I have used for this helicopter work has been a Bell, type B-1. This is a versatile machine capable of landing on the site available on the Gun Creek road. A larger helicopter will not be able to land in this restricted area.

In passing, I should note that there is a grassy mesa above the Pranty wash, which, with very little work, could be converted into an airstrip capable of landing a suitable plane -- say a Cessna 206 or in any event a light plane with plenty of engine to allow for the 5000 \pm ft. elevation, cross winds which may frequently occur at this spot. Such a strip would have an easy connection into the road leading to the Pranty Cabin, and may be highly desirable if exploration is to proceed further, particularly into a drilling stage. Such an airstrip would be within about .7 miles of the Pranty cabin.



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ORE RESERVE

Possible Hypothetical

Assume: Sulphide ore shoot, 400 feet deep, beneath 300 feet
of gossan (leached zone), average of 20' wide.

$$550 \times 20 \times 400 = 4,400,000 \text{ Cu. ft.}$$

Tonnage Factor taken as 10

$$\frac{4,400,000}{10} = 440,000 \text{ Tons}$$

10% allowance for loss left in drift and shaft pillars,
approximately 40,000 tons

Net Reserve, 400,000 tons

Mining/Milling at 200 tons per day, 6 day week, with allowance
for holidays and down time, use 300 days per year.

$$200 \times 300 = 60,000 \text{ tons per year production.}$$

Life of mine about 6-1/2 years.

NOTE: 400,000 tons ore, Mill Rec 90%, grade @ 5% Cu

Total production 36 mill pounds copper

If the ore shoot was extended for a total of 1000 feet
in depth, production would be 1 million tons ore and
90 million pounds Cu.



ESTIMATED OPERATING AND CAPITAL COSTS

MINING (operating)

Mining by shrinkage stoping, with four levels 100 feet vertically apart, and raise on 80-foot centers. Drift pillars used. Direct operating cost estimated: \$8/ton.

MILLING (operating)

Assumption: 6 day week, with 300 working days per year.

200 tons per day feed. All flotation mill.

Assumed Mill Feed and Products

Crude Ore	Concentrates	
Cu 5%	Cu 32%	90% Rec
Ag .2 oz/ton	*Ag .79 oz/ton	50% Rec
Au .06/oz/ton	*Au .24 oz/ton	50% Rec

* Calculated

Ratio Concentration: 7.9 to 1

200 tons crude ore per day yields:
25 tons conc. per day
or, 150 tons conc. per week
or, 680 tons conc. per month

Estimated Direct Operating Cost: \$4.00/ton crude ore



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TRUCKING (operating)

Ore, Mine to Mill

12 miles @ \$.09/ton mile

\$1.08 per ton Crude

Concentrates, Mill to Smelter

82 miles @ \$.10/ton mile,

Conc. Ratio 7.9 to 1

\$1.03 per ton Crude

Total Trucking

\$2.11 per ton Crude

MISCELLANEOUS (operating)

Engineering

\$1.00 per ton

Other overhead

.75

Local Taxes

(rough estimate)

.50

Total

\$2.25 per ton crude ore



MINE DEVELOPMENT (capital)

Drilling Program:

First	3 holes	\$ 55,000
Remaining	7 holes	105,000
		<hr/>
Total Drilling		\$160,000

Development will be by a shaft sunk 700 feet deep, the upper 300 of which is in the leached zone, and the lower 400 of which is in a sulphide ore shoot 550 long on strike. Assume the shaft is central to the ore shoot and that 4 levels are run 225 feet laterally on each side of the shaft, 100 feet vertically apart. Each 225 foot segment of level is further developed by raises between levels, 100 feet high on 80-foot centers, 3 each side of the shaft. For purposes of this estimate, assume that sampling of muck from these development workings confirms the ore reserve indicated by drilling.

Shaft	\$210,000
Levels & Raises	225,000
	<hr/>
Total	\$435,000
Mine Surface Plant	\$175,000
Mining Equipment	140,000
	<hr/>
Total Mine Capital Development	\$910,000



GEO-COMP EXPLORATION, INC.

TRUCKING ROAD, MINE TO MILL (capital)

A 12 mile, single-width dirt road, with culverts as needed for drainage control and three short wood bridges will be constructed from mine to a mill site on Tonto Creek near Gisela (see Attachment B). There are three possible routes which I have traversed quickly with helicopter, estimated probable switch-backs required, etc. The following estimated capital cost is, therefore, very approximate. Tonto Creek can be forded so that no bridge is there required.

Initial layout, engineering and cutting a primitive bulldozer trail	\$ 18,000
Finishing	153,000
	<hr/>
	\$171,000

or in even figures, \$175,000

ROAD WORK, PRANTY WASH AND MINE AREA (capital)

Probably: \$30,000

MILL (capital)

200 tons per day all flotation \$500,000

MILL AND MINE CAMP (capital)

\$40,000

WATER WELL DEVELOPMENT (capital)

\$30,000



GEO-COMP EXPLORATION, INC.

INSPIRATION CONSOLIDATED COPPER COMPANY

MIAMI, ARIZONA

SMELTER LIQUIDATION

Assume: Copper Concentrates;

Copper	32% (640 lb/ton)
Silver	.79 oz/ton
Gold	.24 oz/ton

Metal Forecast:

Cu-42¢/lb Ag-\$2.00/oz
 Au, London Final - \$40/oz

PAYMENTS

Copper: 640 lb less 30 lb deduct.
 Pay 610 lb @42¢ less 5.5¢ x 610
 deduct for refining and freight east \$222.65/ton

Silver: Less than 1 oz., no payment

Gold: 92% of \$40 x .24 8.85

 TOTAL PAYMENTS \$231.50/ton

Treatment Base Charge \$11.50/ton

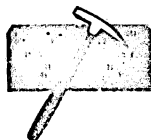
Plus: 5% of Excess Value
 above \$40/ton 9.60

TOTAL CHARGES 21.10

NET SMELTER RETURN \$210.40/ton

Concentration Ratio: 7.9 to 1

Value per ton crude ore: \$27.00



GEO-COMP EXPLORATION, INC.

AMERICAN SMELTING AND REFINING COMPANY

HAYDEN, ARIZONA

SMELTER LIQUIDATION

Assume: Copper concentrates;
Copper 32%
Silver .79 oz/ton
Gold .24 oz/ton

Metal Forecast:

Cu - 42¢/lb Ag -\$2.00/oz
Au, London Final - \$40/oz

PAYMENTS

Copper: 640 lb less 8 lb deduct
Pay 95% of 632 lb @ 42¢
less 4.5¢ x 632 \$225.00

Silver: 95% of .79 oz @ \$2.00 less
13¢/oz deduct 1.50

Gold: 92.57% @ \$40 x .24 oz 8.90

TOTAL PAYMENTS \$235.40

Treatment Base Charge \$8.00/ton

Plus: \$1.50 to maximum of
9.50/ton, based on ore
value 9.50

TOTAL CHARGES 17.50
NET SMELTER RETURN 217.90/ton

Additional trucking from Inspiration to
Hayden; 48 mi @10¢/ton mile 4.80
\$213.10

Concentration Ratio: 7.9 to 1

Value per ton crude ore: \$27.00



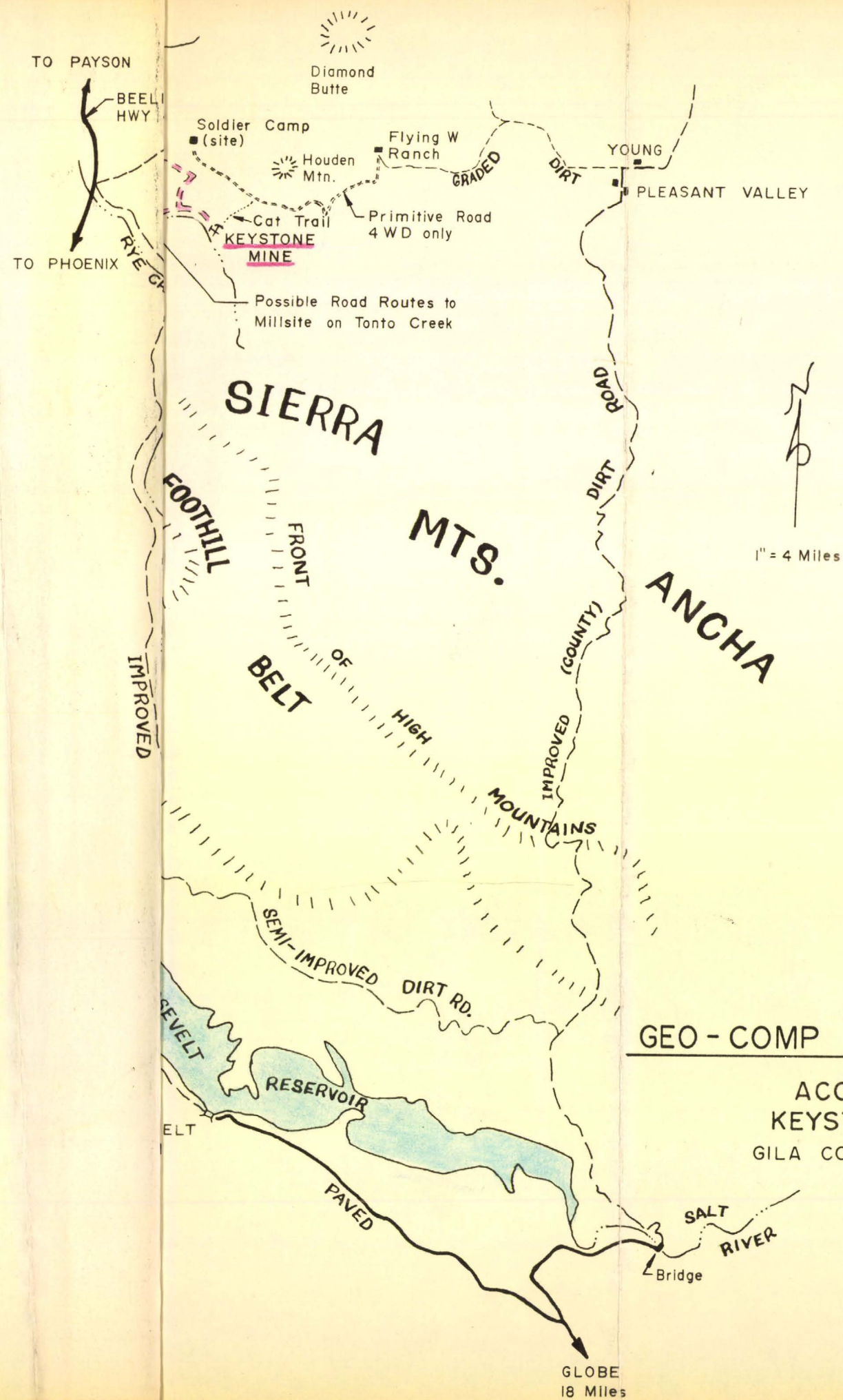
GEO-COMP EXPLORATION, INC.

ATTACHMENTS



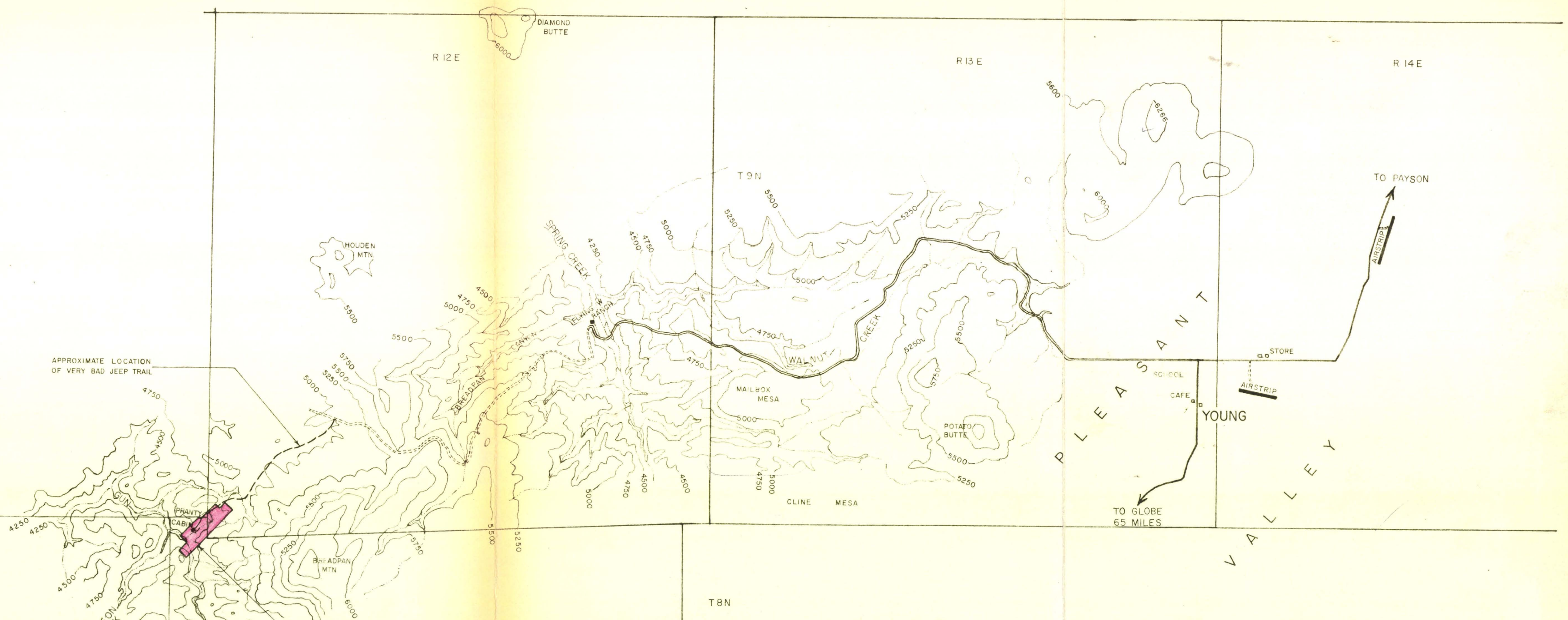
GEO-COMP EXPLORATION, INC.





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ACCESS MAP
KEYSTONE MINE
GILA COUNTY, ARIZONA



T8N

ROAD LEGEND

- IMPROVED DIRT ROAD (County Road)
- GRADED DIRT RANCH ROAD
- PRIMITIVE ROAD (4-WD only)
- JEEP TRAIL

GEO-COMP EXPLORATION INC.

KEYSTONE MINE REGION

GILA COUNTY, ARIZONA

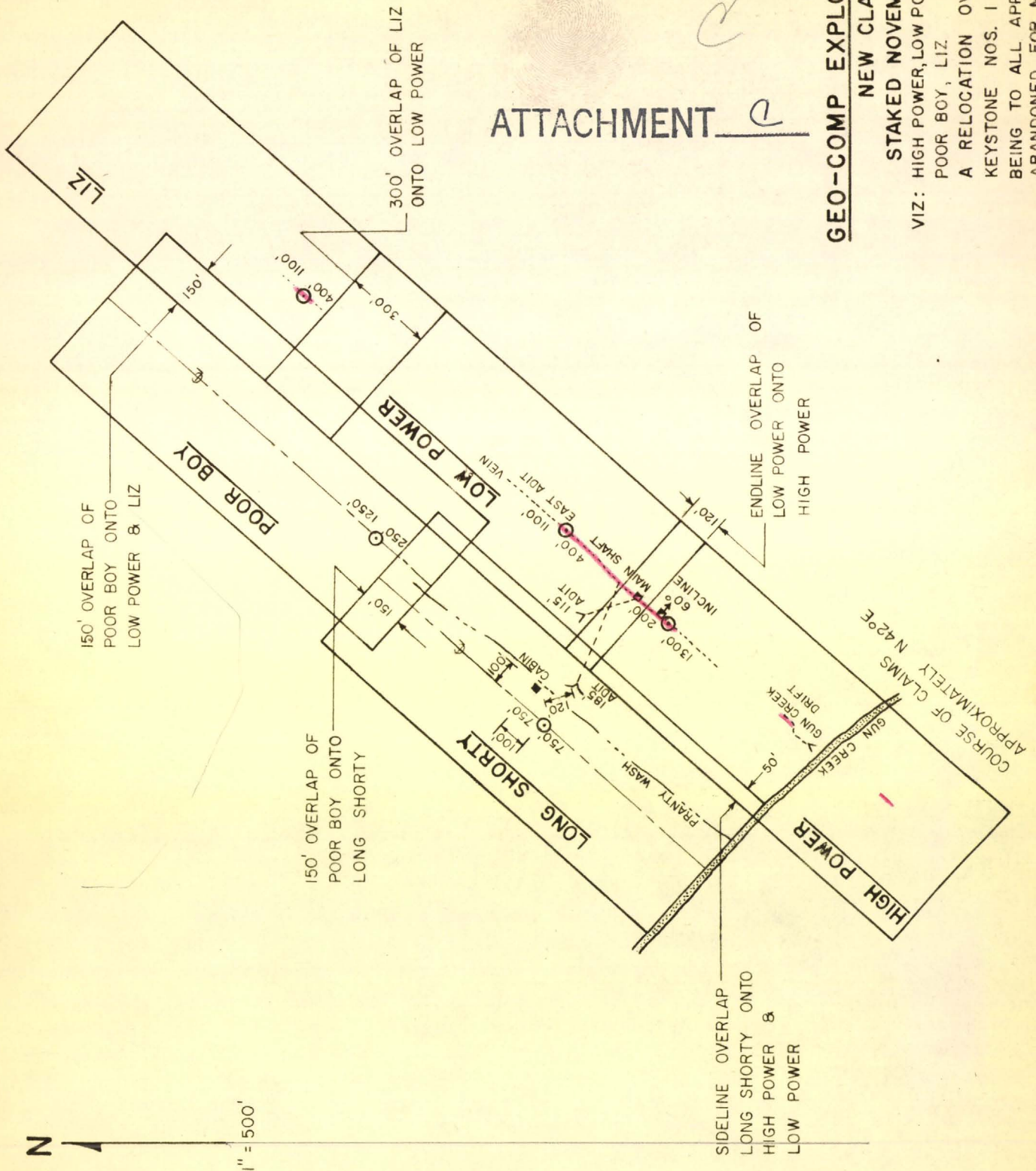
TOPOGRAPHY & ACCESS

SCALE 1"=1 MILE

CONTOUR INTERVAL: 250'

BASE: DIAMOND BUTTE QUAD, 1938

YOUNG QUAD, 1961



ATTACHMENT

GEO-COMP EXPLORATION, INC. NEW CLAIMS

STAKED NOVEMBER 11, 1969

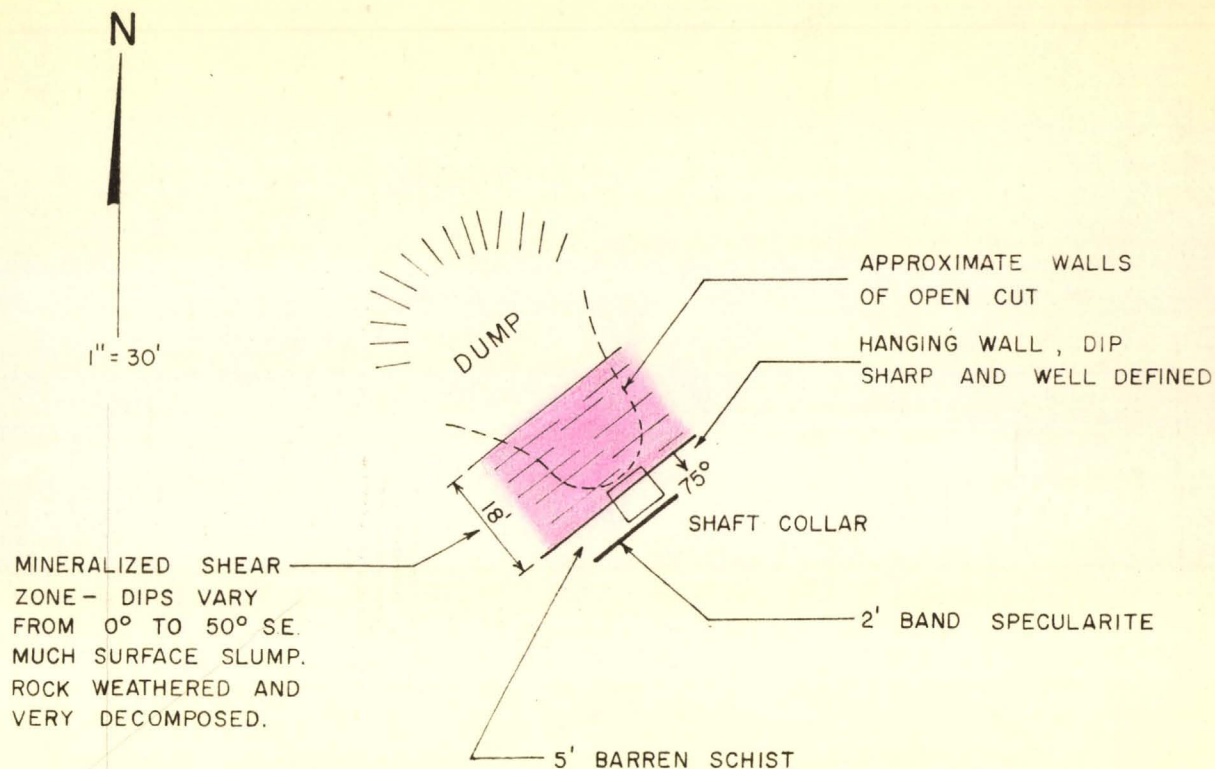
VIZ: HIGH POWER, LOW POWER, LONG SHORTY,
POOR BOY, LIZ

A RELOCATION OVER PARTS OF
KEYSTONE NOS. 1 THROUGH 4,
BEING TO ALL APPEARANCES
ABANDONED FOR MANY YEARS

DISCOVERY POINT
SHOWING DISTANCE
CLAIMED TO EACH END

1300' 200'

SPRING CREEK
MINING DISTRICT
GILA COUNTY, ARIZ.

DUMP GRAB SAMPLES

1998 - PROBABLY DERIVED LARGELY FROM SHEAR ZONE IN OPEN CUT. RUSTY SCHIST, FORMER SULFIDES VERY STRONG AS SHOWN BY QUANTITY OF LIMANITE.

.59 % Cu
0.240 OZ/TON Au
0.51 OZ/TON Ag

1999 - PROBABLY FROM THE SHAFT WORKINGS, SELECTED PIECES OF SOLID, SLIGHTLY VUGGY, HEMATITE GOSSEN. ESTIMATED 60% FORMER TOTAL SULPHIDES.

.44 % Cu
.065 OZ/TON Au
.21 OZ/TON Ag

GEO-COMP EXPLORATION INC.KEYSTONE MINE

Gila County, Arizona

**SKETCH OF SURFACE
AT VERTICAL SHAFT**

J.E. KINNISON

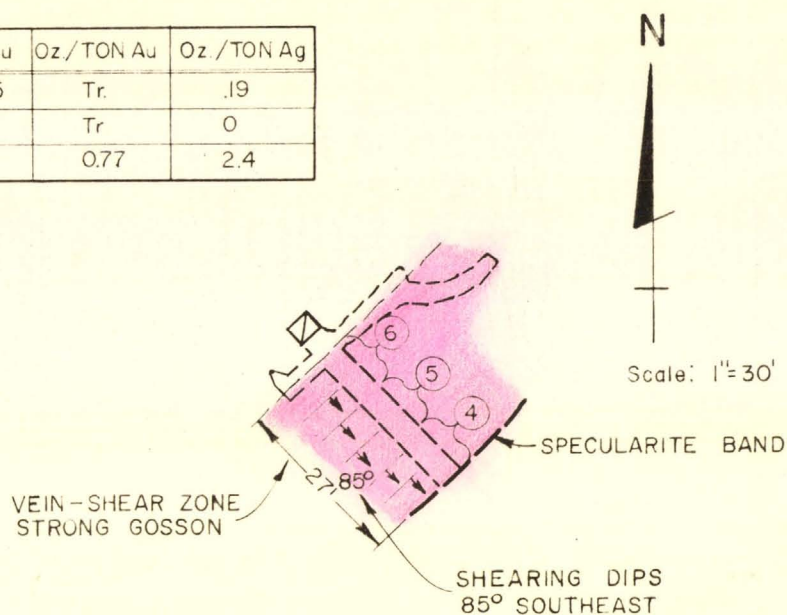
PL. BEERY

OCTOBER 30, 1969

NOTE:

CHANNEL SAMPLES CUT BY C.B. PETTENGILL.

SAMPLE NO.	WIDTH	%Cu	Oz./TON Au	Oz./TON Ag
4	9 Ft.	.05	Tr.	.19
5	9 Ft.	0	Tr.	0
6	9 Ft.	1.0	0.77	2.4



FROM BRUNTON AND PACE SKETCH
BY J.E. KINNISON, 6/25/55

NOTE:

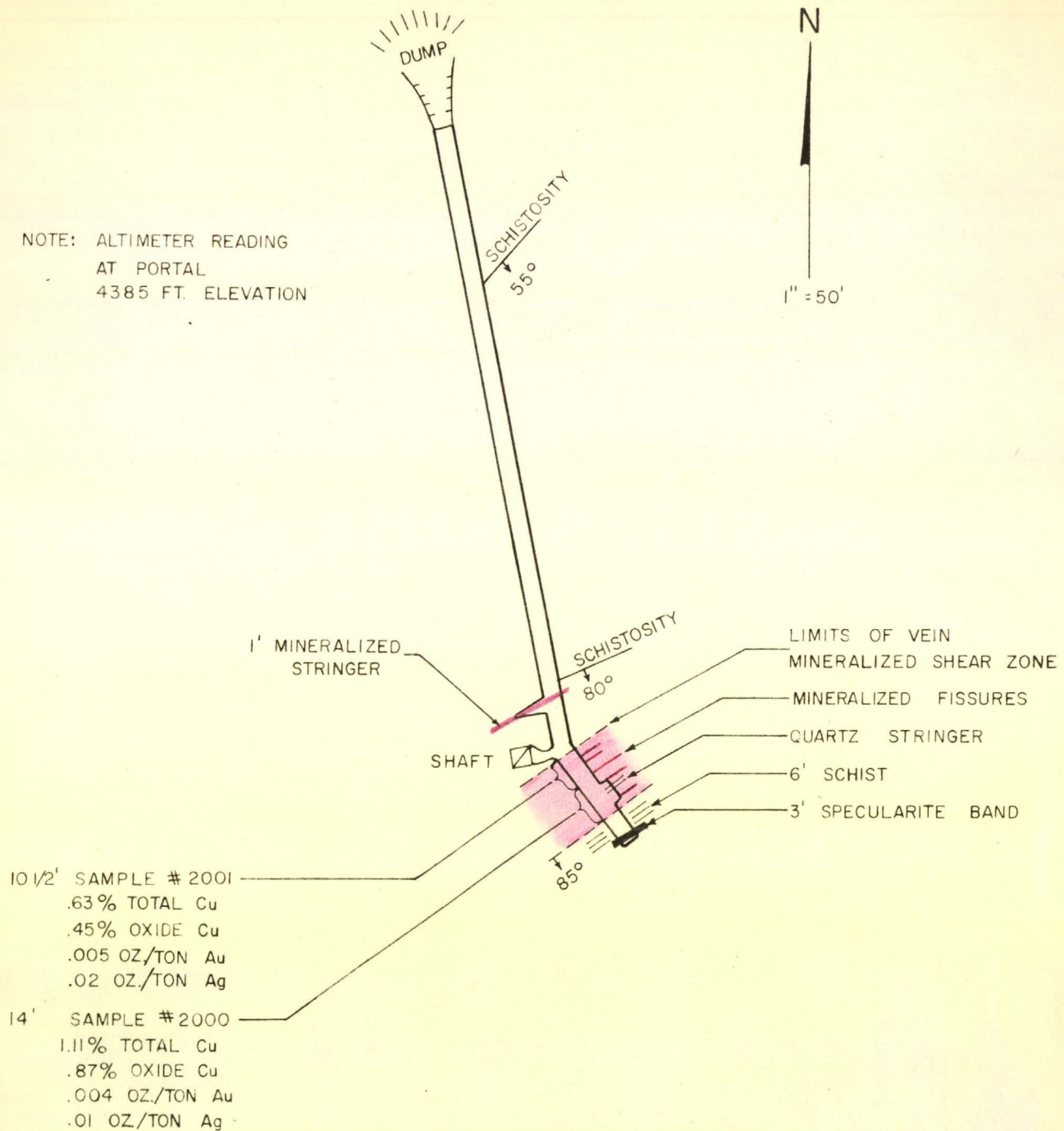
THE SHAFT AND 65' LEVEL ARE
PRESENTLY INACCESSABLE.

GEO-COMP EXPLORATION INC.

KEYSTONE MINE
Gila County, Arizona

SKETCH MAP 65 FT. LEVEL

NOTE: ALTIMETER READING
AT PORTAL
4385 FT. ELEVATION



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KEYSTONE MINE

Gila County, Arizona

SKETCH MAP

115 Ft. Level

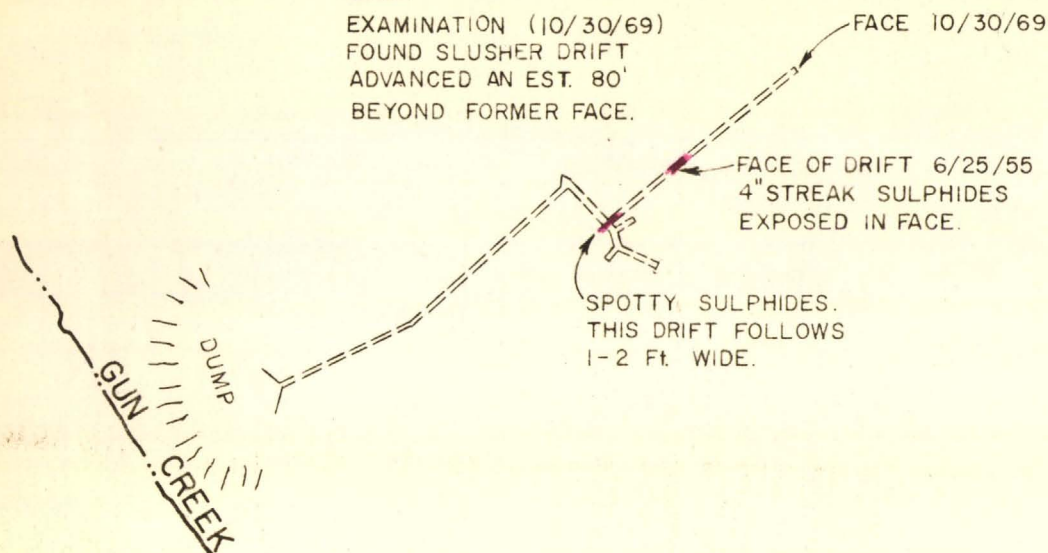
J.E. KINNISON

P.L. BEERY

OCTOBER 30, 1969

NOTE:

EXAMINATION (10/30/69)
FOUND SLUSHER DRIFT
ADVANCED AN EST. 80'
BEYOND FORMER FACE.



N

Scale: 1" = 100'

NOTE:

ALTIMETER READING 4270 Ft. ELEVATION.
THUS, ADIT IS LOCATED AT THE 230 Ft. LEVEL
WITH REFERENCE TO VERTICAL SHAFT COLLAR.

Sources:

1. Exam. by J.E. Kinnison 6/25/55.
2. Exam. by J.E. Kinnison and P.L. BEERY 10/30/69

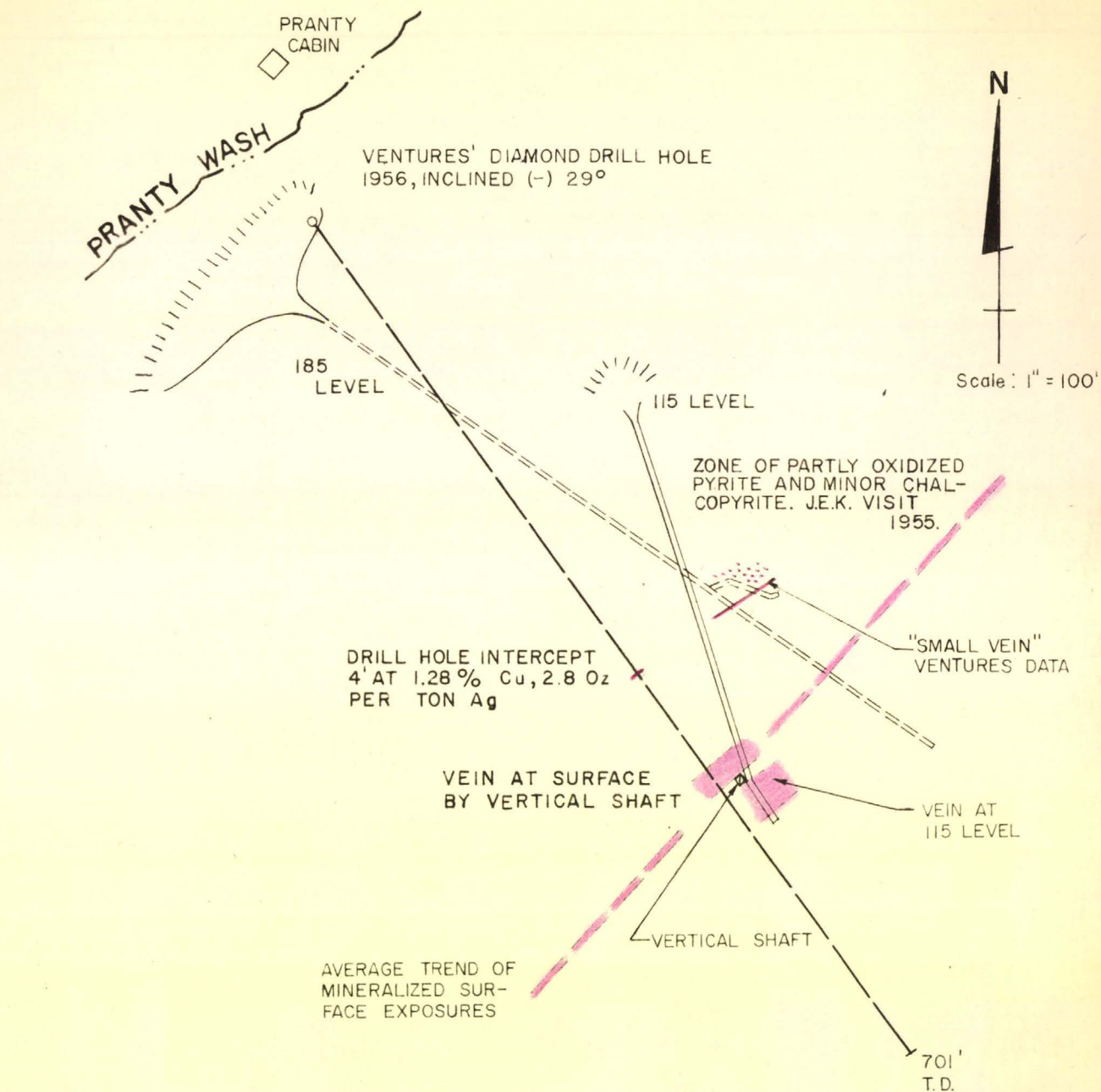
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KEYSTONE MINE

Gila County, Arizona

SKETCH MAP

GUN CREEK ADIT

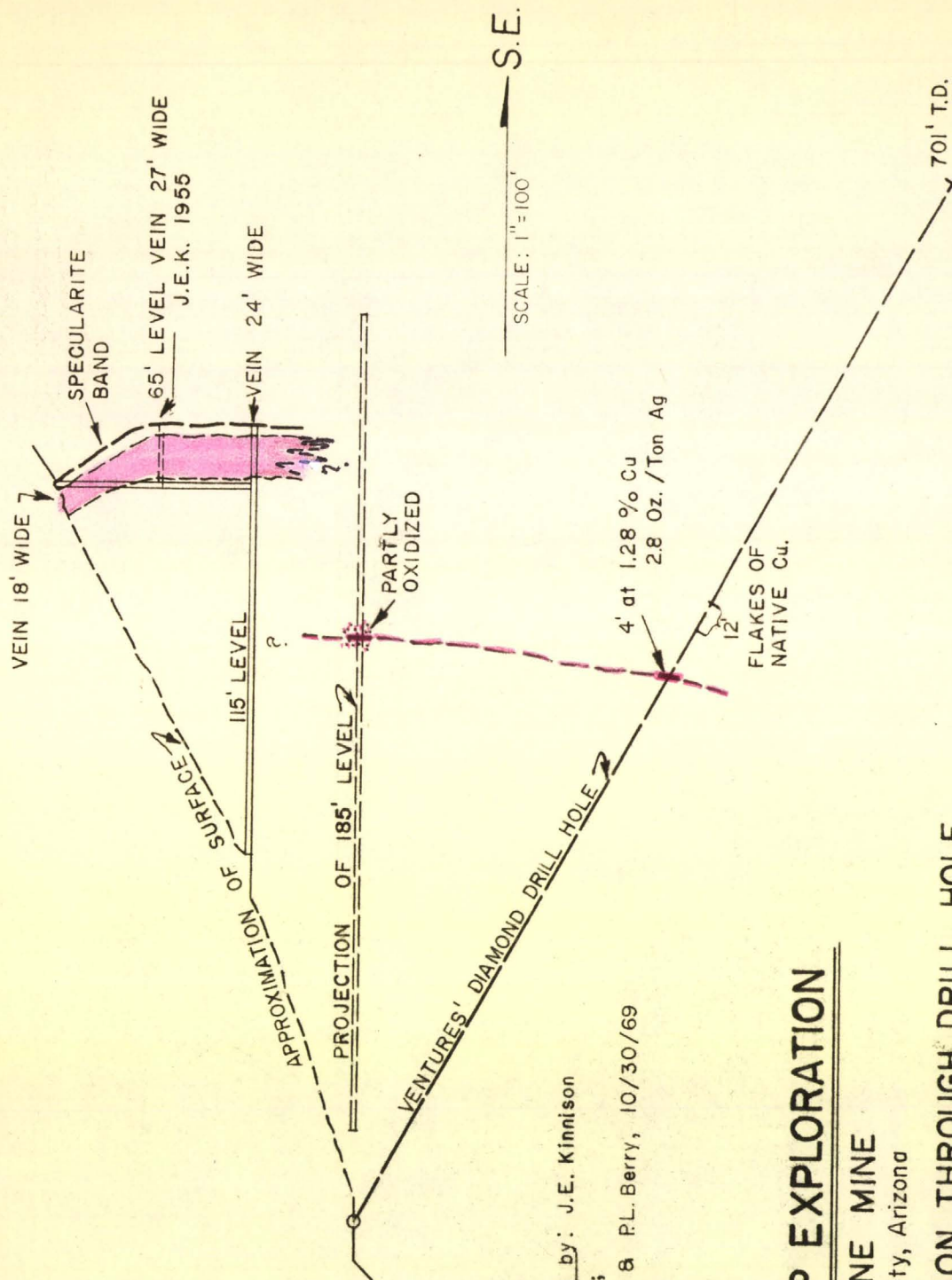


SURVEY OF WORKINGS BY VENTURES 1956
GEOLOGY BY J.E. KINNISON 1955,
AND OCTOBER 30, 1969

GEO-COMP EXPLORATION INC.

KEYSTONE MINE

SKETCH MAP SHOWING RELATIONSHIP
OF MAIN WORKINGS AND VENTURES'
DIAMOND DRILL HOLE



Geologic Interpretation by: J.E. Kinnison

Data: Ventures, 1956;

Exam. by: J.E. Kinnison & P.L. Berry, 10/30/69

GEO - COMP EXPLORATION

KEYSTONE MINE

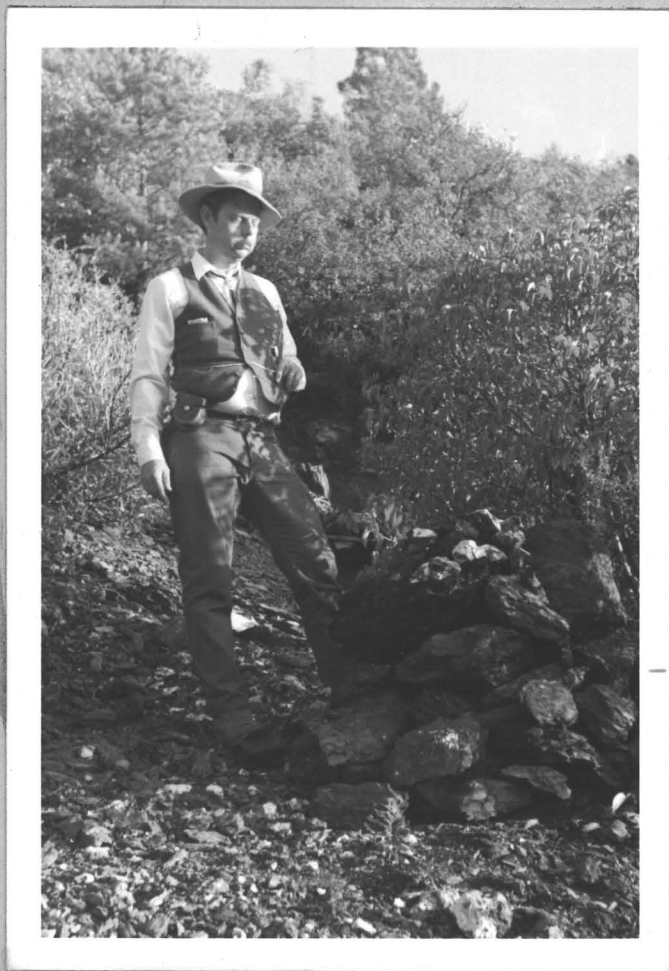
Gila County, Arizona

CROSS SECTION THROUGH DRILL HOLE (LOOKING NORTHEAST)

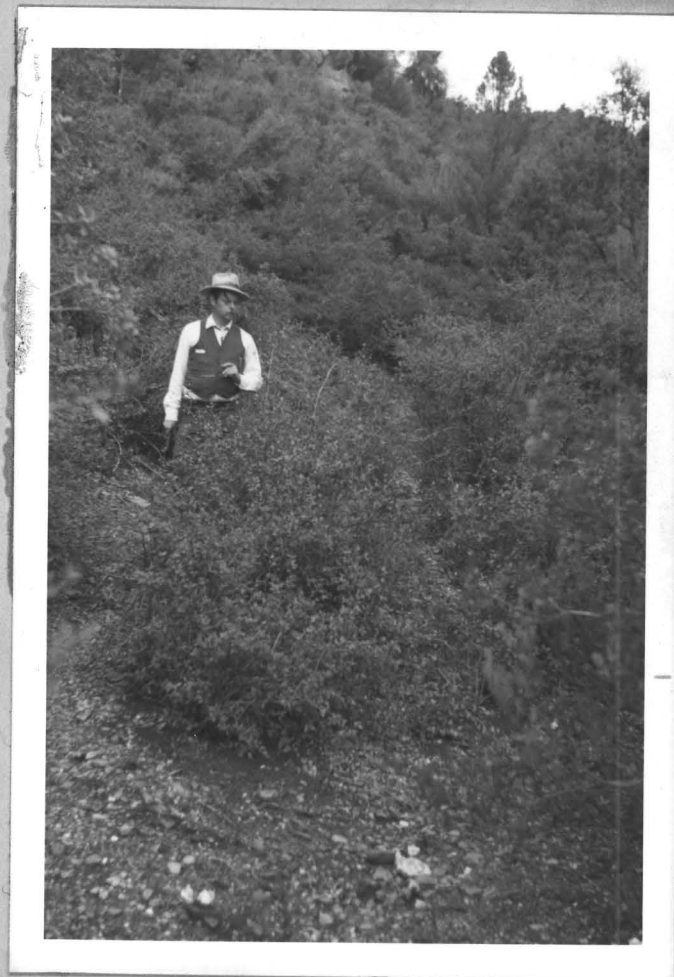
J.E. KINNISON & P.L. BEERY
OCT. 30, 1969



Pranty Cabin. Looking downslope from vertical shaft dump



Rock Monument. Low Power Claim

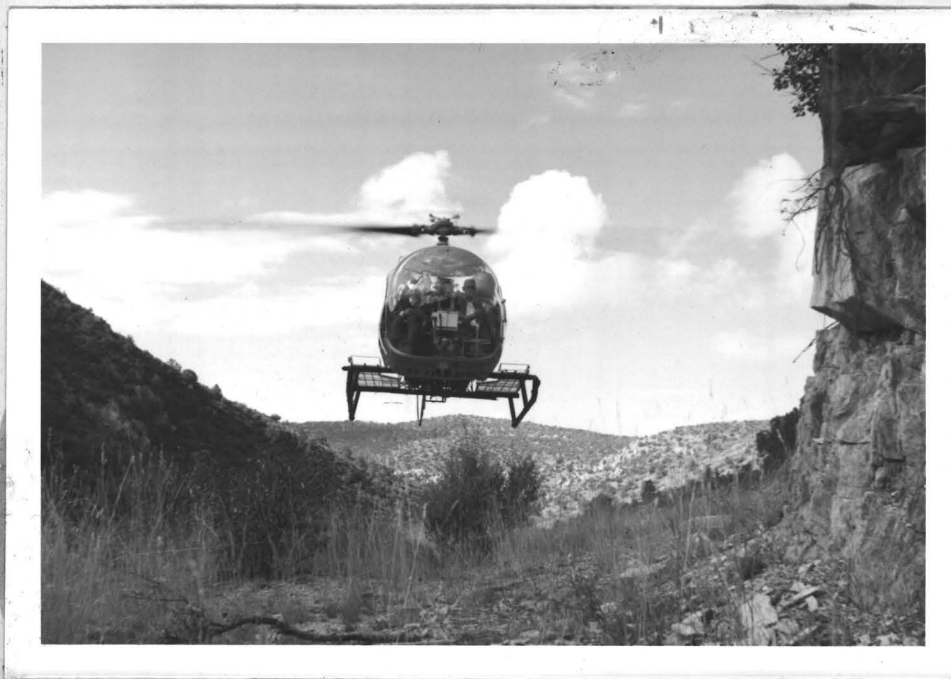


The road into Pranty Cabin.
Kinnison standing in right hand rut.
Brush documents non-use in recent years.



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LANDSCAPE AND
DOCUMENTATION PHOTOS



Helicopter landing bend in road.
Looking north down Gun Creek



Beery left, Kinnison right.
Looking north down Gun Creek





Liz Claim. Location can in center.



Close-up view 5-gallon gas can
used as Location Monument - Liz Claim



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LOCATION
DOCUMENTATION
PHOTOS
(also shows landscape)