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GEOLOGIC MAP
OF
YUMA COUNTY, ARIZONA

PREPARED BY THE

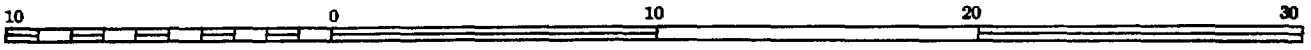
ARIZONA BUREAU OF MINES
UNIVERSITY OF ARIZONA

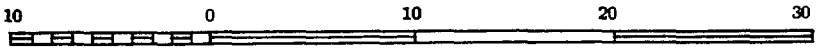
TUCSON, ARIZONA

BY

Eldred D. Wilson

Scale $\frac{1}{375,000}$



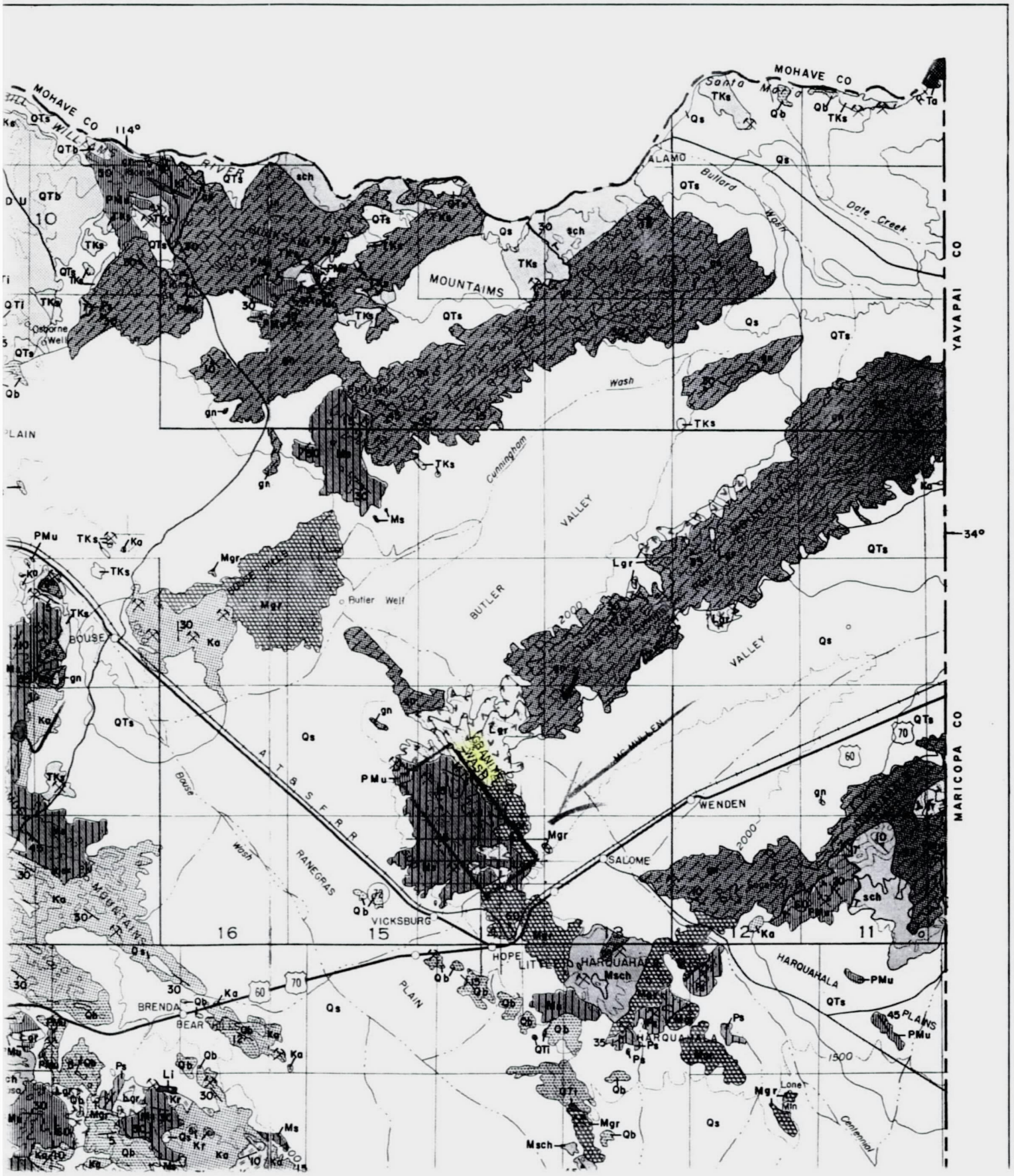


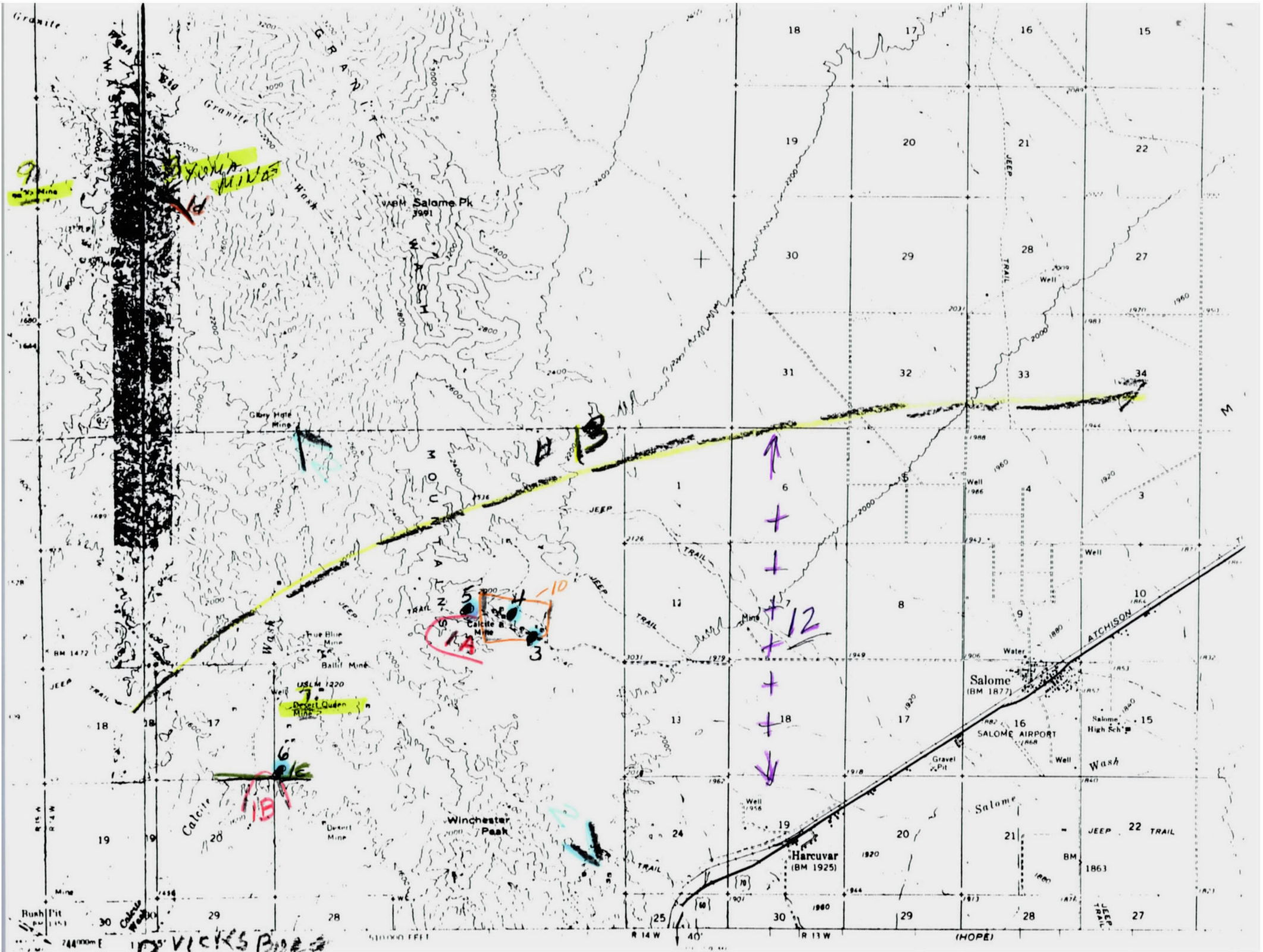
Contour interval 500 feet
datum is mean sea level

1960

E X P L A N A T I O N

UNIVERSITY OF ARIZONA
ARIZONA BUREAU OF MINES
J. D. FORRESTER, DIRECTOR




Granite Wash
Big Granite Wash
GRANITE MOUNTAINS
Salome Pk
3991
Glory Hole Mine
True Blue Mine
Ballit Mine
USGS 1220
Desert Queen Mine
Calcite Wash
Calcite B Mine
Desert Mine
Winchester Peak
Harcuvar
(BM 1925)
Salome
(BM 1877)
SALOME AIRPORT
Salome High Sch
Salome Wash
Gravel Pit
Water
Well
Mine
JEEP TRAIL
ATCHISON
Rush Pit
R 14 W
R 13 W
(HOPE)
VICKS BURG

ATTACHMENT TO GRANITE WASH MTNS. PROSPECTS -
MOST ARE APPROXIMATE LOCATIONS

1A & B. Open-ended I.P. anomalies (Canadian Aero interpretaion). Strike of "B" not well defined.

1c. Heinrich's 6000 foot response line through D.H.#3 (NK#3).

1d. Response SE from Yuma Mine - Heinrichs

2. Aerial photo tension fracture wrenched left-laterally(?).

3. N.K.#15 - syn-metamorphic pyrrhotite in bands; also petrographic sphalerite and chalcopyrite. T.D. 2214 feet.

4. N.K.#10 - 70 feet from Calcite shaft. Substantial anhydrite and gypsum. T.D. 1134 feet.

5. N.K.#6 - Bottom in augen gneiss; "colors" starting around 2500 feet; drilled at deep, high repsonse on Heinrich line. T.D. 3400 feet.

6. N.K.#3 - at section corner 16,17,20,21; Sid Williams states hydrothermal chalcopyrite in gash veins of biotite.

7. Desert Queen Mine - old gold producer; millsite; tellurium found, according to Ranson.

8. Yuma Mine - Copper, high grade in veins.

9. Three Musketeers Mine - Tungsten

10. Bleached zone - intense alteration as mapped by Blucher and MacKensie. May reflect apex of deeper mineralization (Blucher).

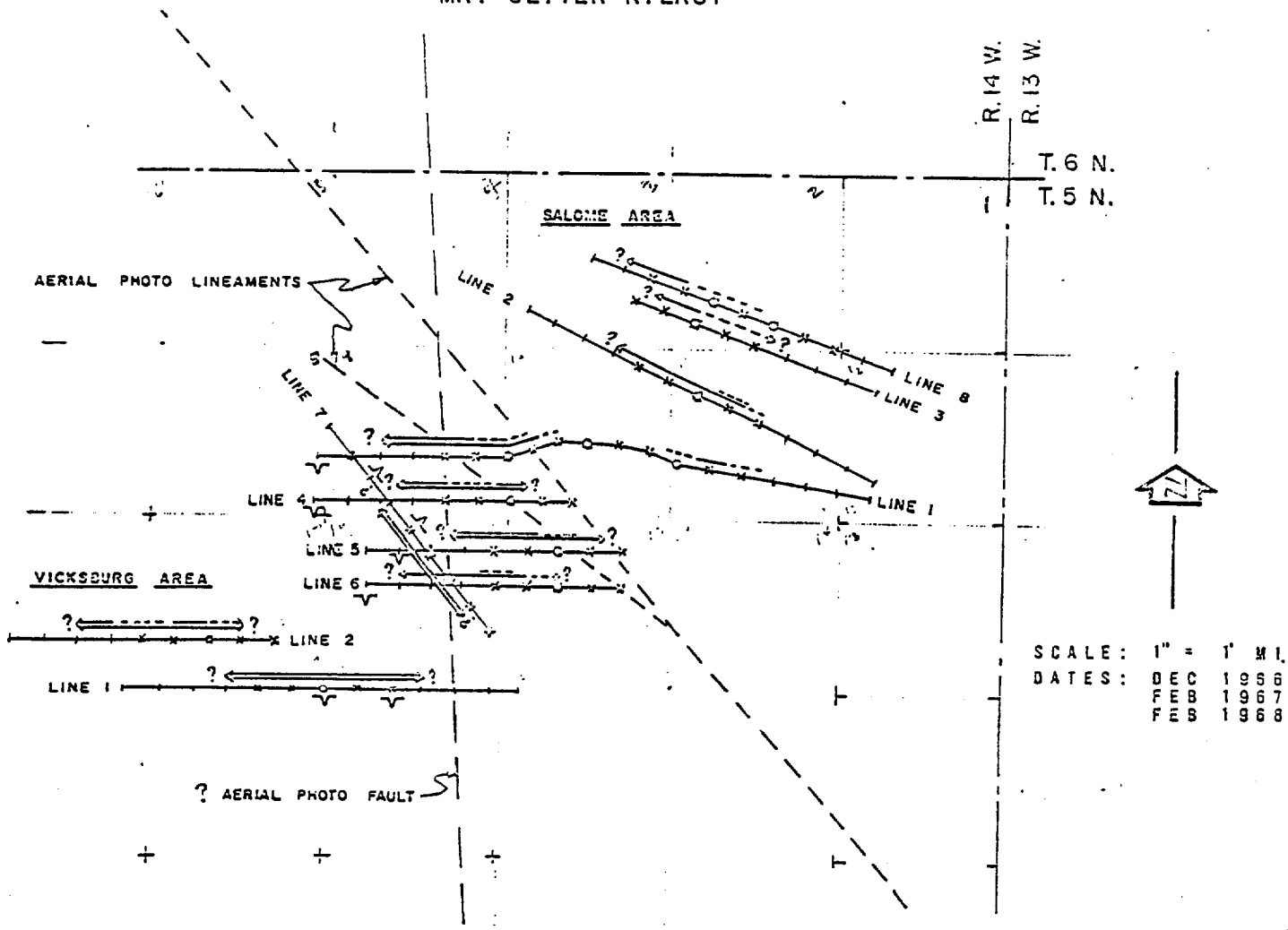
11. (at bottom left of map) - Town of Vicksburg on highway and railroad. Town lies approximately 1½ miles north of C.A.P. aqueduct(water).

12. Approximate location, east of zone A, of high voltage power line.

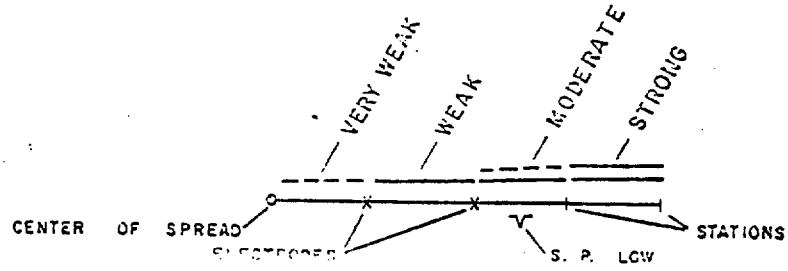
13. 60 mile arch or reversal. Seismic work done twice, as I understand it. Warrants Cambrian sand stratigraphic test.

HEINRICHS
GEOEXPLORATION COMPANY
BOX 5671 TUCSON, ARIZONA 85703
PH: 602 623-0578 CABLE: GEOEX, TUCSON
GEOPHYSICAL ENGINEERS SYDNEY VANCOUVER

INDUCED POLARIZATION LOCATION & INTERPRETATION PLAN OVERLAY
SALOME AREA
YUMA COUNTY, ARIZONA
for
MR. OLIVER KILROY



RELATIVE ANOMALY STRENGTH



HEINRICHS GEOEXPLORATION COMPANY

806 WEST GRANT ROAD, TUCSON, ARIZONA, 85703. P.O. BOX 5671. PHONE: (AREA CODE 602) 623-0578

March 7, 1967

Mr. Oliver D. Kilroy
Stanford Inn
Room 31
Salome, Arizona

Dear Mr. Kilroy:

As you requested last week, here is a brief memorandum on the second phase of induced polarization reconnaissance over the Salome Area done February 27 and 28, 1967. This work consists of one spread on Line 1 and one-half spread on Line 2, and are considered to be in the Vicksburg Area as distinct from Salome. This additional coverage has been added to the first phase Preliminary Induced Polarization and Interpretation Plan.

The Vicksburg work found an extremely strong anomaly, particularly on Line 1. This anomaly is at least 6,000 feet long and indicates from 5% to 20% total sulfide (and possibly graphite) by volume which is roughly 10% to 40% total sulfide by weight along at least the 4,000' from Station 10W to 30E on Line 1. Line 2 also shows some strong anomalism but more limited in extent. The best zone being a narrow anomaly between 0 and 10W.

Both lines suggest sulfides within about 300 feet of the surface and having depth extent to at least 1000 feet below surface. Also, Line 1 shows a strong (up to 370 millivolts) self potential low (see plot) between 10W and 30E, further suggesting oxidizing sulfides in significant quantities within several hundred feet of the surface.

Because of the size and strength, this is a very interesting anomaly and should definitely be further pursued by geophysics and drilling. The surface rock type correlating with this anomaly is apparently a black phyllite or slate. Several samples

MINERAL ENGINEERING CONSULTANTS AND CONTRACTORS. GEOPHYSICAL, GEOLOGICAL AND ECONOMIC APPRAISAL

of this material were tested in the laboratory and did not show any significant polarization, although a sample of what appears to be the same rock-type taken a mile or so north shows considerable pyrite. This pyritic material, if also occurring in the area of the anomaly, could be the cause of the anomaly and not unusually be of much economic interest. In fact, anomalies of this size and continuity are often formational rock-type anomalies resulting from syngenetic pyrite or graphite and not generally of much economic importance. However, an anomaly this strong should definitely be tested unless a non-economic cause is obvious from surface geology.

A 300± foot vertical drill hole at or near 0 E-W on Vicksburg, Line 1 would likely intersect sulfides and explain the anomaly and determine its economic significance. It is suggested that representative drill samples be sent to us for laboratory testing to be certain of verifying the anomaly and procuring maximum feedback.

There is possibly some relation between the Line 1, Salome Area anomaly and the Vicksburg anomaly and further work may even show them to be parts of the same anomaly.

Enclosed are two copies each of the Plan, Sectional Data Plots for Line 1 and 2, and a self potential plot. If we can be of further service, please let us know.

Very truly yours,
HEINRICHS GEOEXPLORATION COMPANY

Chris S. Ludwig
Chris S. Ludwig
Senior Geophysicist

APPROVED: [illegible]
[illegible] Manager

CSL:je
Enclosures

IP & RESISTIVITY SURVEY
N K CLAIM GROUP
ELLSWORTH MINING DISTRICT
YUMA COUNTY, ARIZONA
FOR
O. B. KILROY

SUMMARY

A series of ten expanders were surveyed at random orientations to determine the nature of sulphide mineralization believed present in the area. Results indicate an extensive responsive zone exists, including two areas of extremely high response. The response is near to surface (40) to the west, and occurs at depths below 330' in the east half of the survey.

The whole area is responsive in varying degrees -- background values were not observed within the area, except in the overlying rock above the main anomaly "A", where surface values of 1 to 2 milliseconds exist. The whole area is believed to contain response material (possibly sulphides), and the partial closure of high values at "A" and "B" indicates abnormally high concentrations of response material. Until the IP coverage is completed, it would not seem prudent to recommend extensive drilling. However, a relatively inexpensive test could be made in the vicinity of Expander H, where response occurs within 40 to 50 feet of surface. A test anywhere along the G-H line would satisfy this condition.

CANADIAN ATLAS Mineral Exploration

INTRODUCTION

In the period from February 6, 1967, to February 9, 1967, an induced polarization survey was carried out by Canadian Aero Mineral Surveys Limited in Yuma County, Arizona, on behalf of Mr. O. B. Wilroy. A total of 10 expanders were completed to spacings of 2000'.

The purpose of the survey was to possibly determine the presence of responsive sulphide mineralization and delineate the area of response.

A high sensitivity D.C. pulse type equipment was employed, with a current-on time of 1.5 seconds and a measuring time of 0.5 seconds. At each observation point along the expander profile, both the primary and the secondary voltages are measured. The primary voltages (steady state voltages) are converted by formula to apparent resistivities in units of ohmmeters. The secondary voltages (polarization voltages) are measured by integration and then divided by the corresponding primary voltages to obtain the apparent "chargeability", the resulting polarization characteristic of the region. It is expressed in units of millivolt seconds per volt, or milliseconds.

The chief application of induced polarization is in the direct detection of disseminated metallic sulphides. However, a transition in conduction from ionic to electronic, and vice versa, will also give rise to IP effects. Therefore, in addition to the metallic conducting sulphides -- pyrite, pyrrhotite, chalcopyrite and chalcocite, etc. -- graphite, magnetite, manganese oxides and some clay minerals also respond. At present there is no unique way of defining the response material involved except by careful geologic studies, including test drilling.

DISCUSSION OF RESULTS

All ten expanders surveyed indicated the presence of anomalous response material. The amplitude of response varies as shown on accompanying contour plan. Zones "A" and "D" are, of course, the highest amplitude zones. Nowhere in the survey was background of 1 to 2 units response encountered except in the rocks overlying the response zone. It is expected that background values will be reached laterally as the coverage is extended.

In brackets along each expander are shown the response value of the anomalous zone, the resistivity of the anomalous zone, and the depth below which it occurs. The depth solutions are average values, but should be accurate within ± 10% under ideal conditions.

We would not recommend any drill targets based on the limited coverage of this report. There is, however, a very near surface response in the vicinity of Expander K -- calculated at 40' below surface -- and an inexpensive test could be made in this area to guide future thinking.

Respectfully submitted,

John L. Irvine

John L. Irvine
Geophysicist

Tucson, Arizona
March 7, 1967
Project 7517

APPENDIX

THE USE OF EXPANDERS IN IP & RESISTIVITY SURVEYS

Ten three-array expanders make up the field data. An expanding array is made by fixing the current (transmitting) electrodes at a distance greater than 6 times the largest potential electrode spacing to be used. From one of the current electrodes, the potential survey begins. Electrode spacings between the near current and first potential electrode remain equal to the potential dipole spacing. With each reading the distance between electrodes increases accordingly. In this survey, the spacing started at 25', 50', etc., and expanded out to 2000'. Within this range of spacings, the area can be effectively prospected to at least 1000' depth. Where response material is believed to be extensive, effective penetration is increased to 1500' and under ideal conditions a penetration to 2000'. For example, a zone the size of this one should be clearly visible past a depth of 1500'.

In general, there is a preference for the expanding array in exploration of large bodies of disseminated sulphides expected to go to considerable depth, for the following reasons:

1) A knowledge of the near-surface physical properties is essential and is obtained by expanding from small spacings and utilizing this information.

2) Ability to recognize variations in depth to response zones is obtained with each expander.

3) Mobility in choice of layout direction: if the target is

large, expanders may be run in any direction or in such a manner as to eliminate fence or powerline effects without seriously affecting the apparent pattern of a response zone.

Large contrasts in surface resistivity and IP response give rise to "lateral" effects. These contrasts are indicated by sharper gradients in the apparent curves than are possible from true layered conditions. Such contrasts can render an expander ineffective in interpreting response or resistivity at depth. However, this limitation can be overcome by increasing the density of expanders in any one area, thereby assuring good depth solutions on the majority of expanders.

The lateral effects indicate an expander's limited ability to survey "in profile" as well. Dikes and contacts with physical property contrasts give rise to characteristic curve shapes. These features, when crossed by an expanding electrode, can be mapped. An example of this is seen in Expander "D", where a large area of high response occurs near the surface. A depth solution from this expander is not possible; however, the existence of the near-surface response is recognized.

September 3, 1969

Oliver B. Kilroy
Suite 401
Tucson Title Insurance Building
Tucson, Arizona, 85701

Dear Mr. Kilroy:

I apologize for my tardiness in answering your questions re biotite-my files are not well organized I'm afraid.

The biotite I considered hydrothermal occurred in DH-3 at 900' and was described sometime in December of last year.

Hydrothermal biotite is difficult to distinguish from contact-metamorphic biotite-the best proof of hydrothermal biotite is when it occurs in veins and cannot logically be derived from local constituents in the rock. It looks like any other biotite but tends to occur in clusters and often is of finer grain size than other biotites.

The biotite I consider contact metamorphic in a number of your specimens has clearly formed later than the rock it is in and at the expense of other minerals which can supply the constituents. It tends to occur in random orientation (whereas biotite formed during regional metamorphism tends to be oriented in the stress fields which exist during the process).

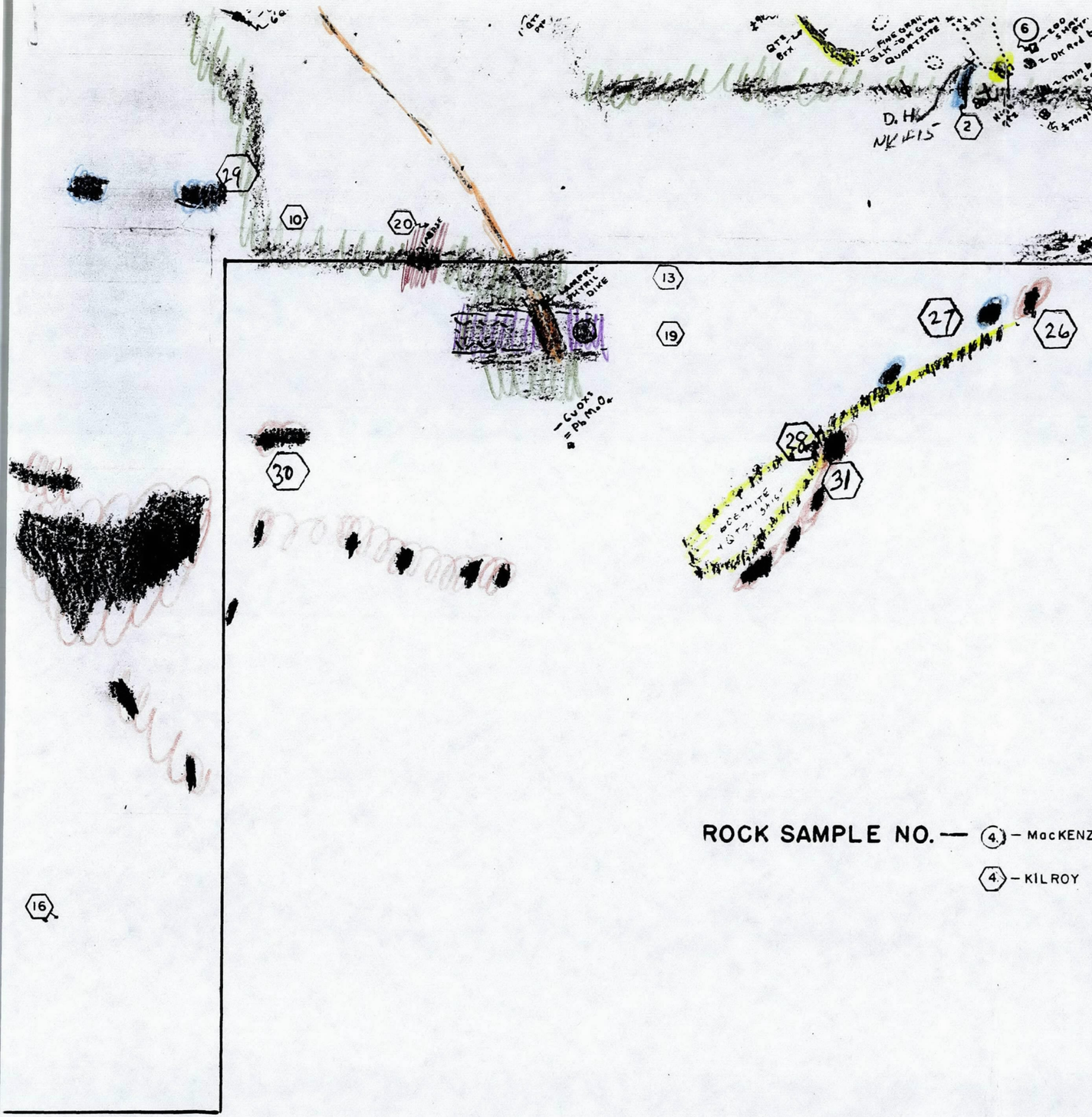
There are other more subtle and less reliable criteria which I use; should you wish to pursue this further I suggest conversation as the best medium. But the two major criteria-orientation and availability of constituents-are those that are most reliable.

I hope this discussion is of some aid to you,
Sincerely,

Sid Williams

Sidney A. Williams

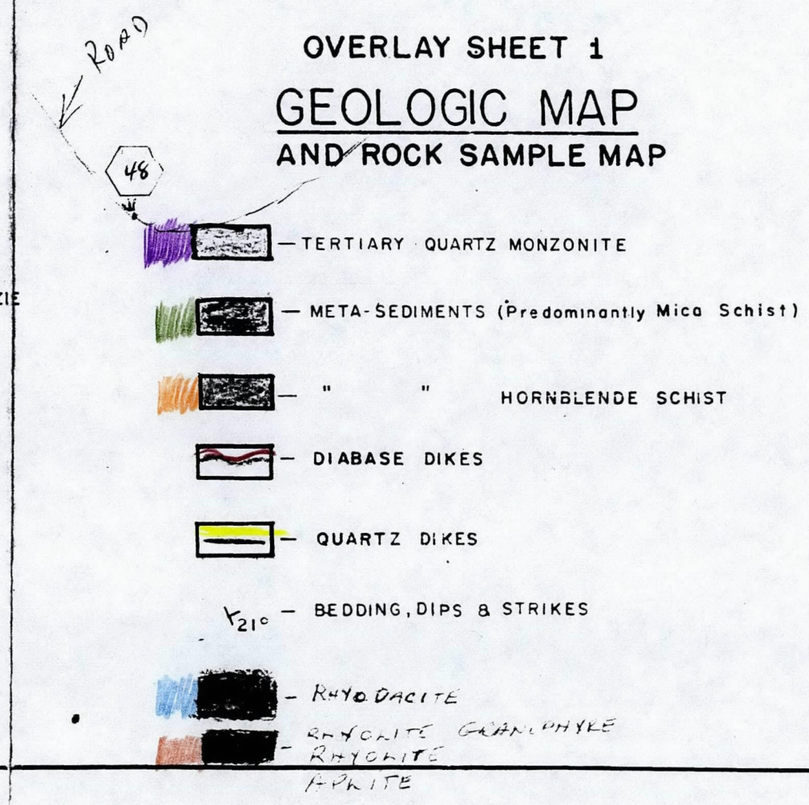
saw/s

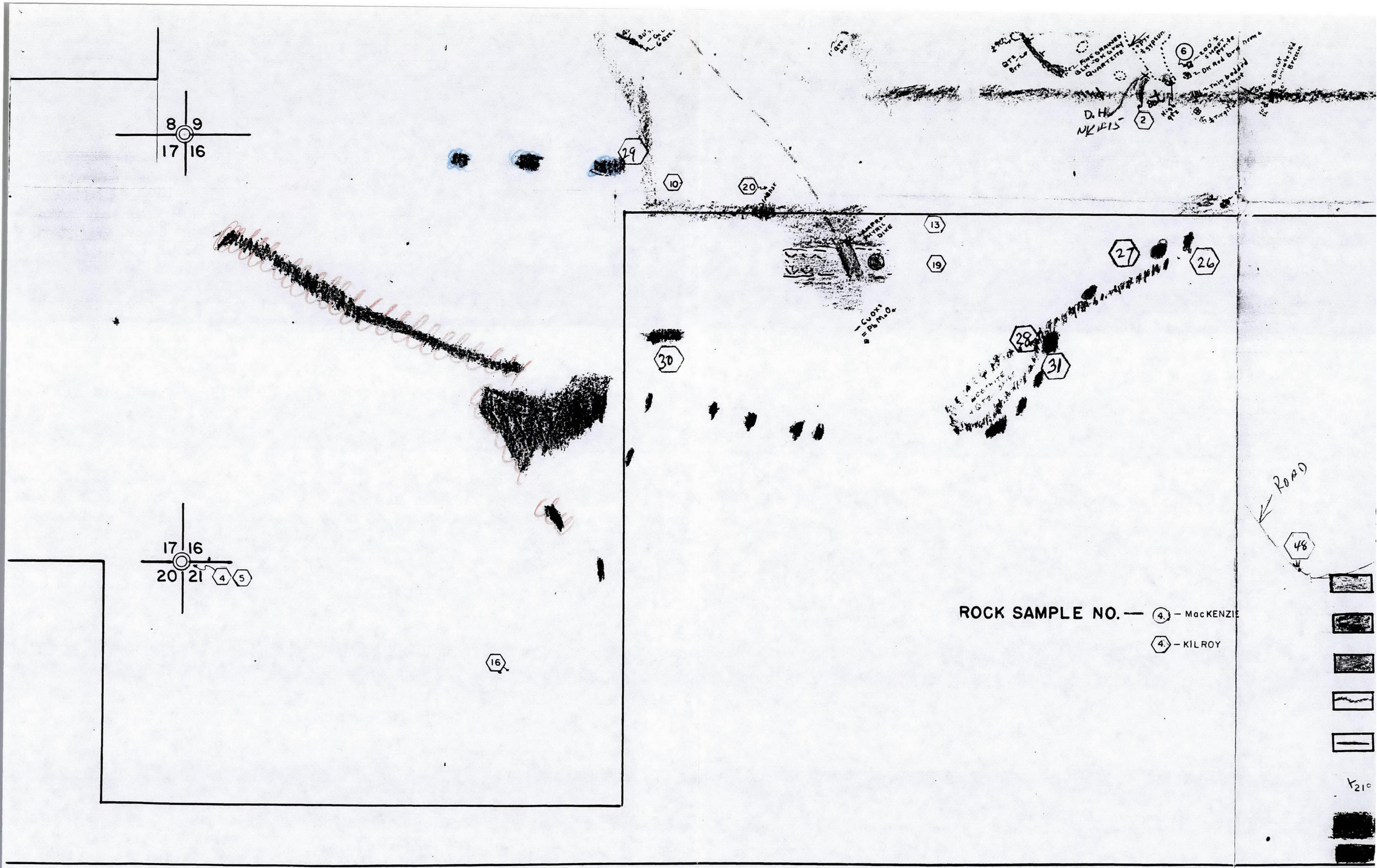


OVERLAY SHEET 1

GEOLOGIC MAP

AND ROCK SAMPLE MAP




8 9
17 16
17 16
20 21
29
10
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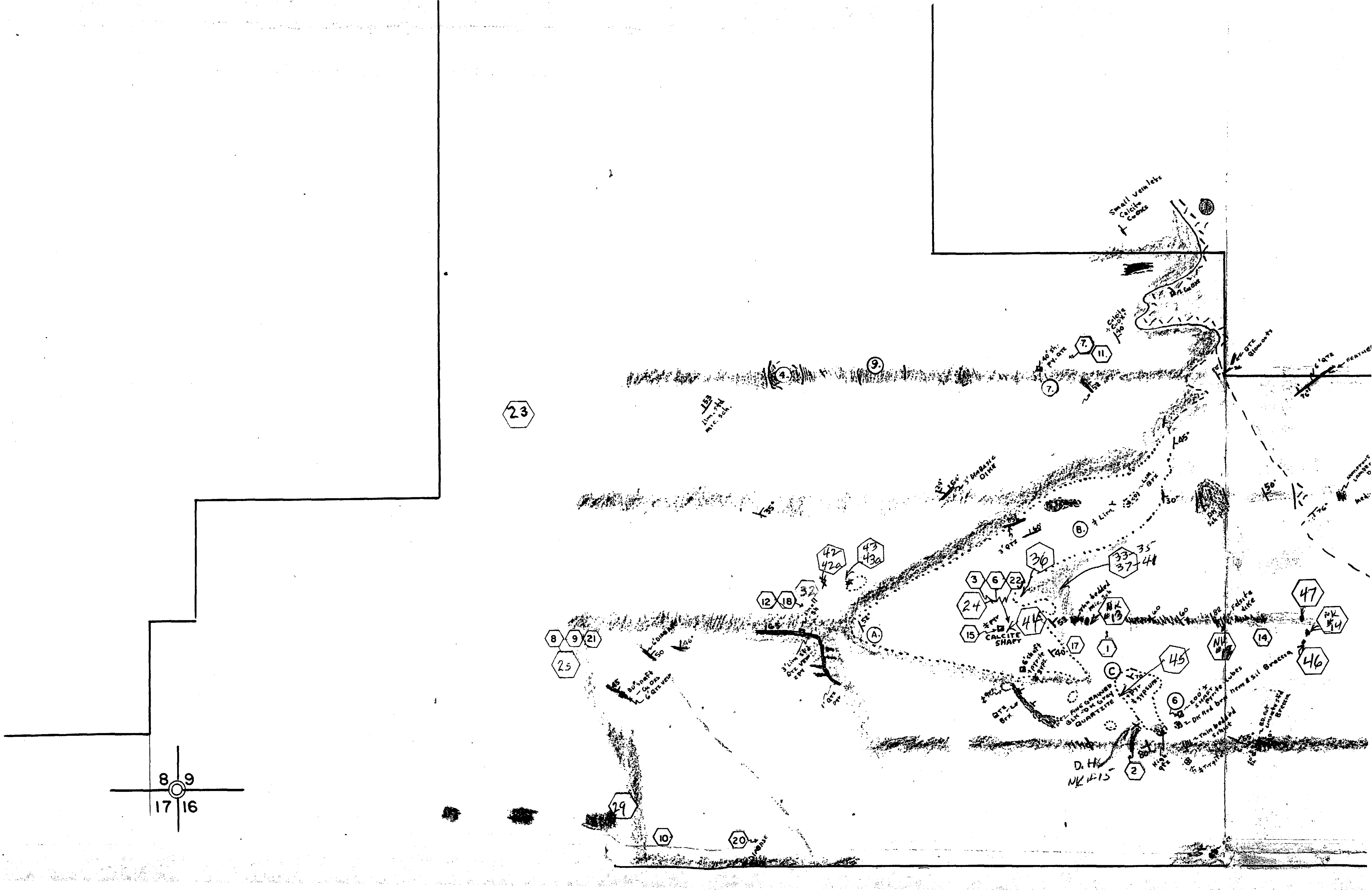
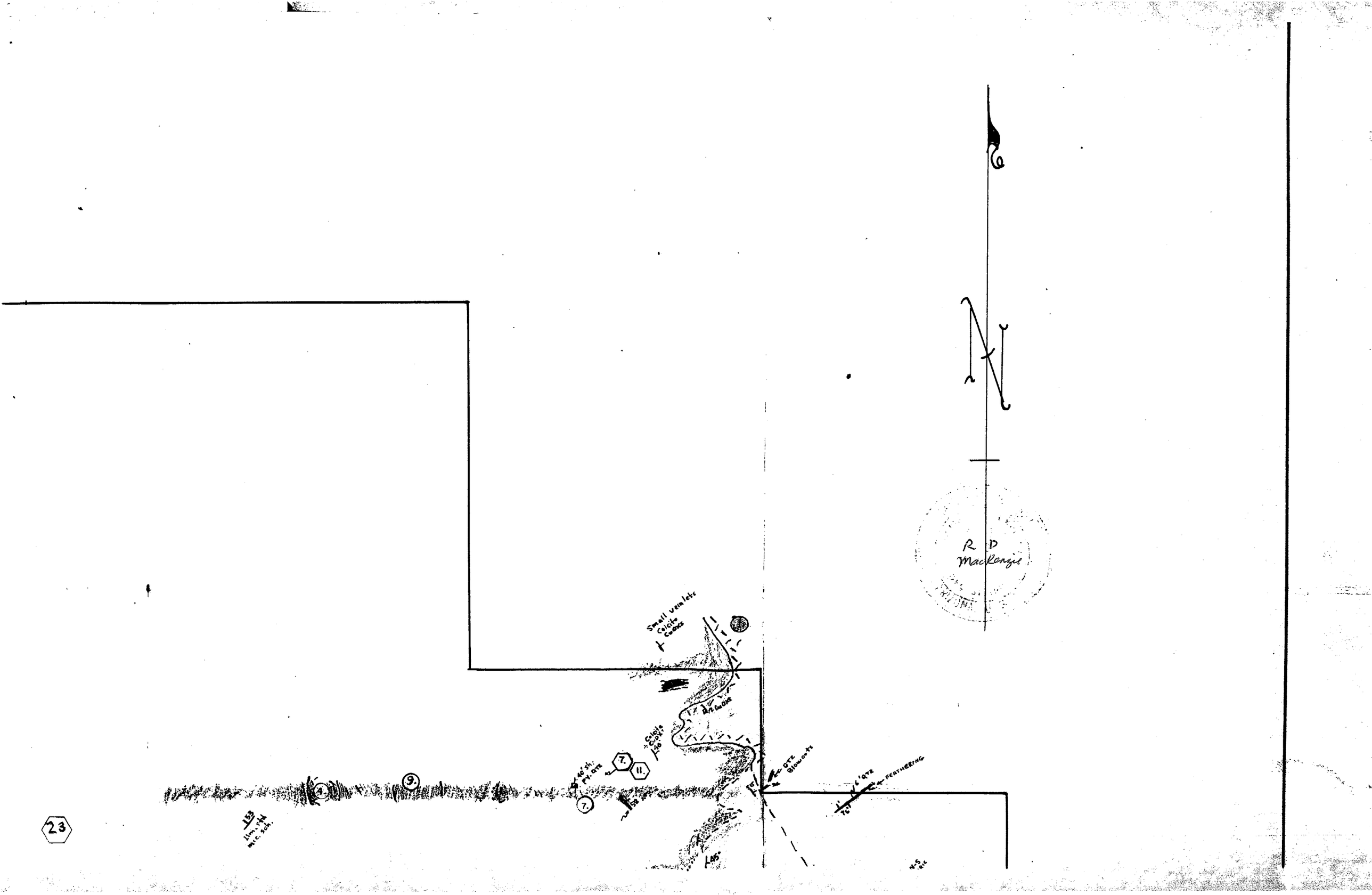
13
19
27
26
28
31
30
6
2
D. H. NICHOLS
ROAD
48
16
4
5
ROCK SAMPLE NO. — 4 – MacKENZIE
4 – KILROY

Small veinlets
Calcite
Cooks
Calcite
Cooks
Qtz
Blowouts
6' Qtz
Feathering
Numerous N-S
Lamprophyric
Dikes
Medium grained
Grano-diorite
3' Marble
Dike
Thin bedded
Mic. Sch.
Felsite
Dike
CALCITE
SHAFT
Fine grained
Blk-ox Qtzy
Quartzite
Thin bedded
Schist
Breccia
D. H.
NK #15
23



23
8
9
17
16
CALCITE SHAFT
3' Diabasic dike
Felsite dike
FINE GRAINED BLK-DK GRAY QUARTZITE
D. H.
NK #15
29
10
20


N
R D
MacKenzie
Small veinlets
Calcite
Crons
Calcite
Crons
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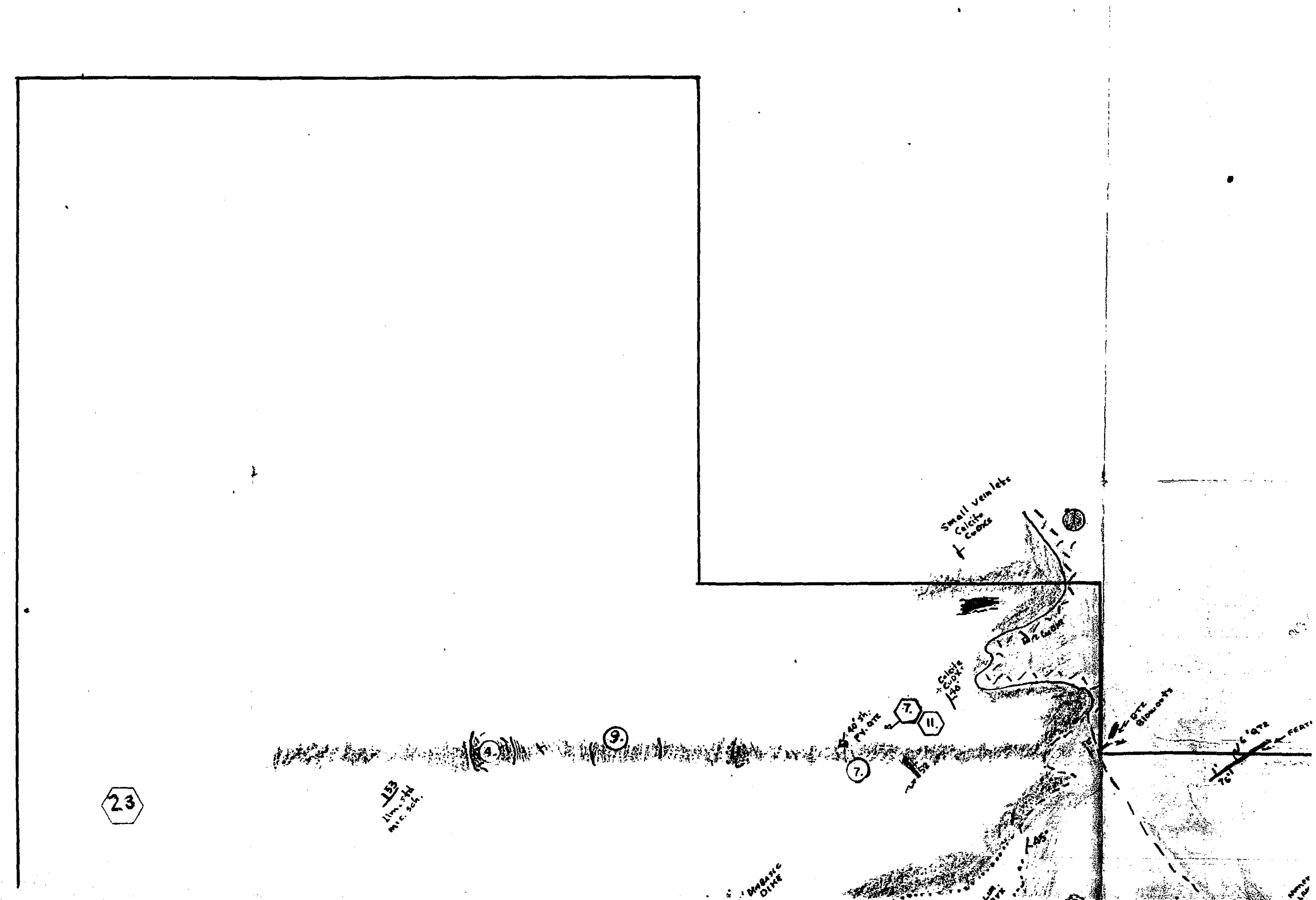
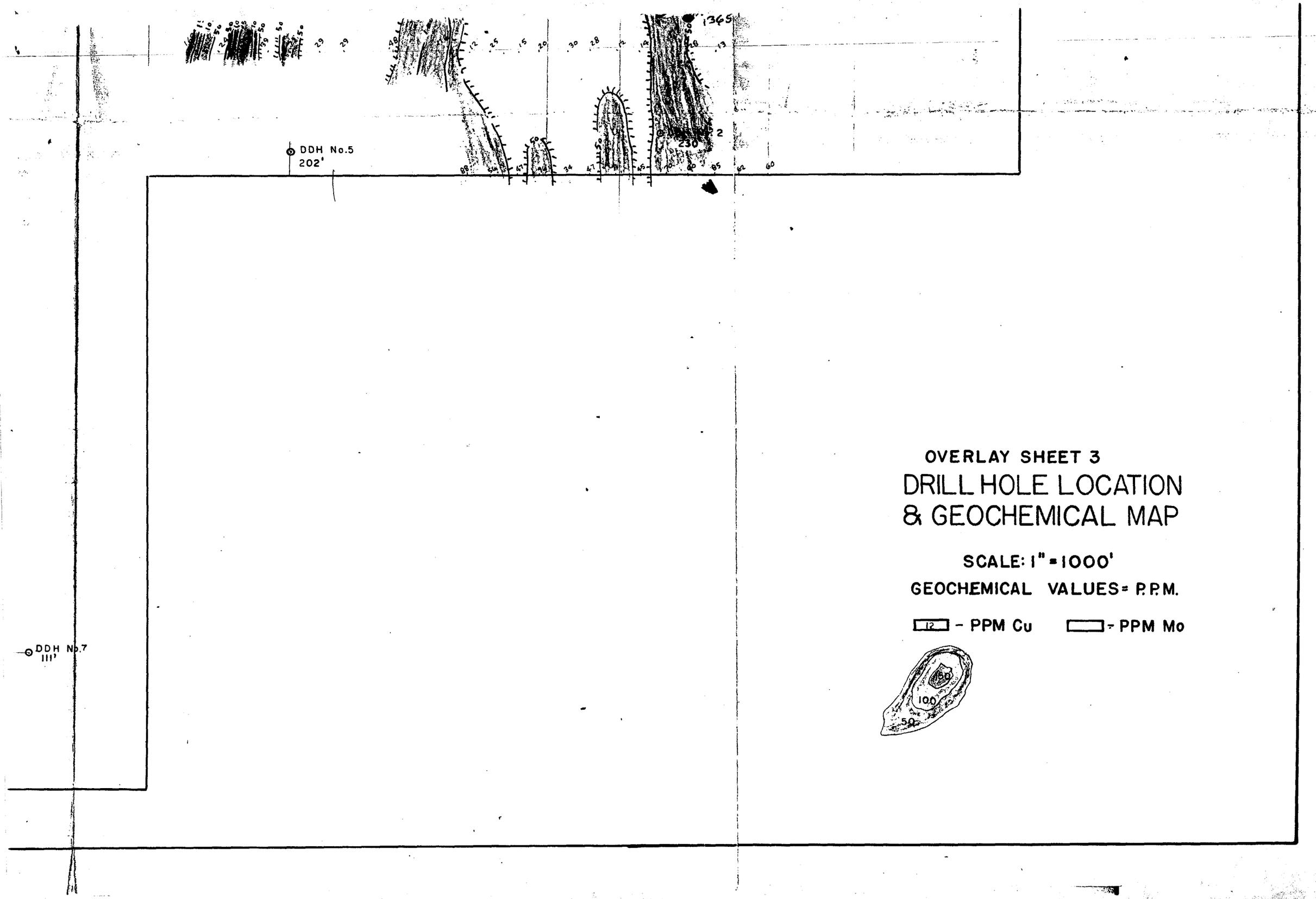
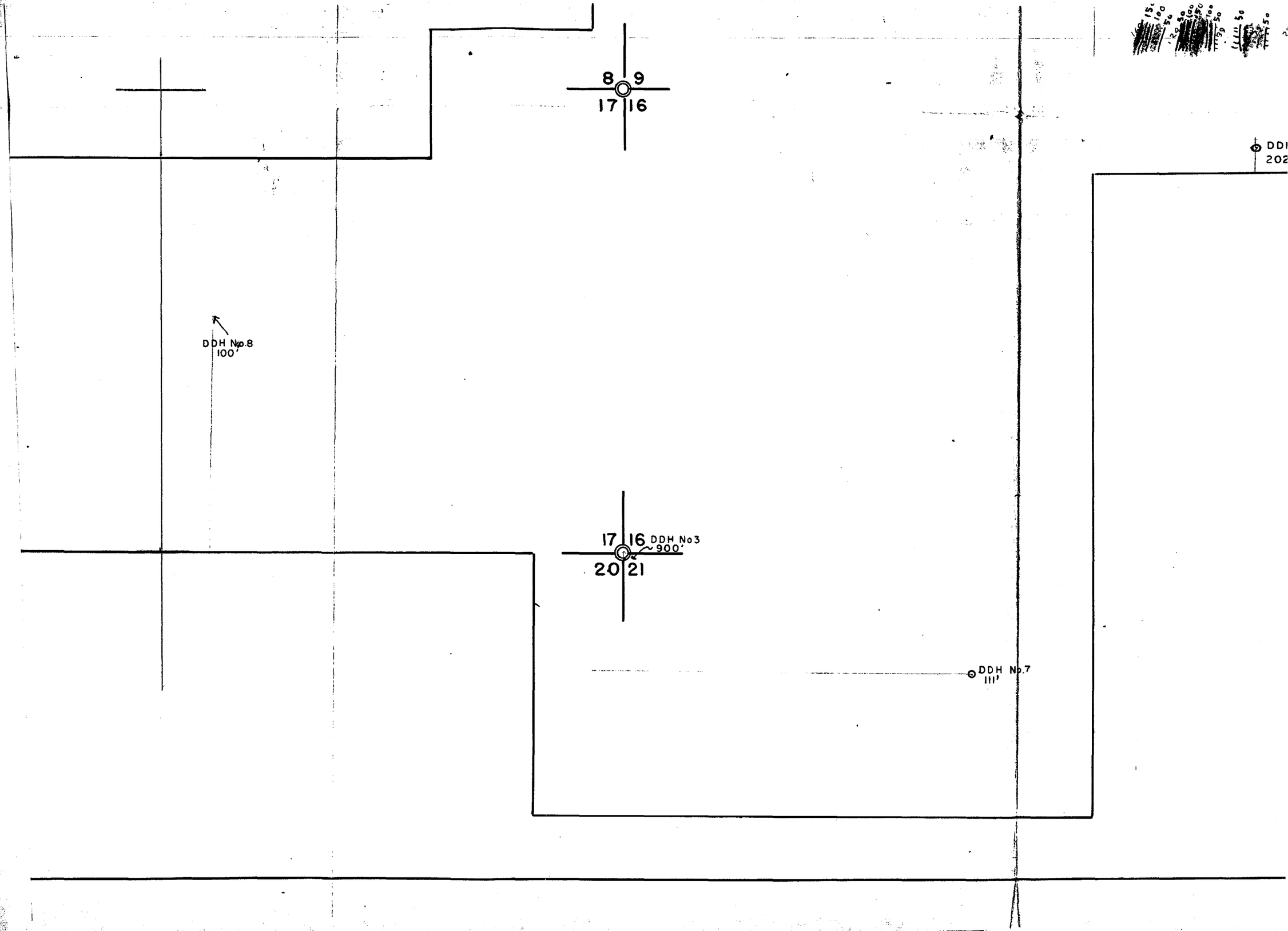
Pr. QTZ
QTZ
Blowouts
6' QTZ
FEATHERING
153
Lim. sh.
Mic. sch.
23



Small veinlets
23
9.
4.
7.
11.


DDH No.5
202'
DDH No.7
111'
OVERLAY SHEET 3
DRILL HOLE LOCATION
& GEOCHEMICAL MAP
SCALE: 1" = 1000'
GEOCHEMICAL VALUES = P.P.M.
12 - PPM Cu
- PPM Mo
150
100
50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9
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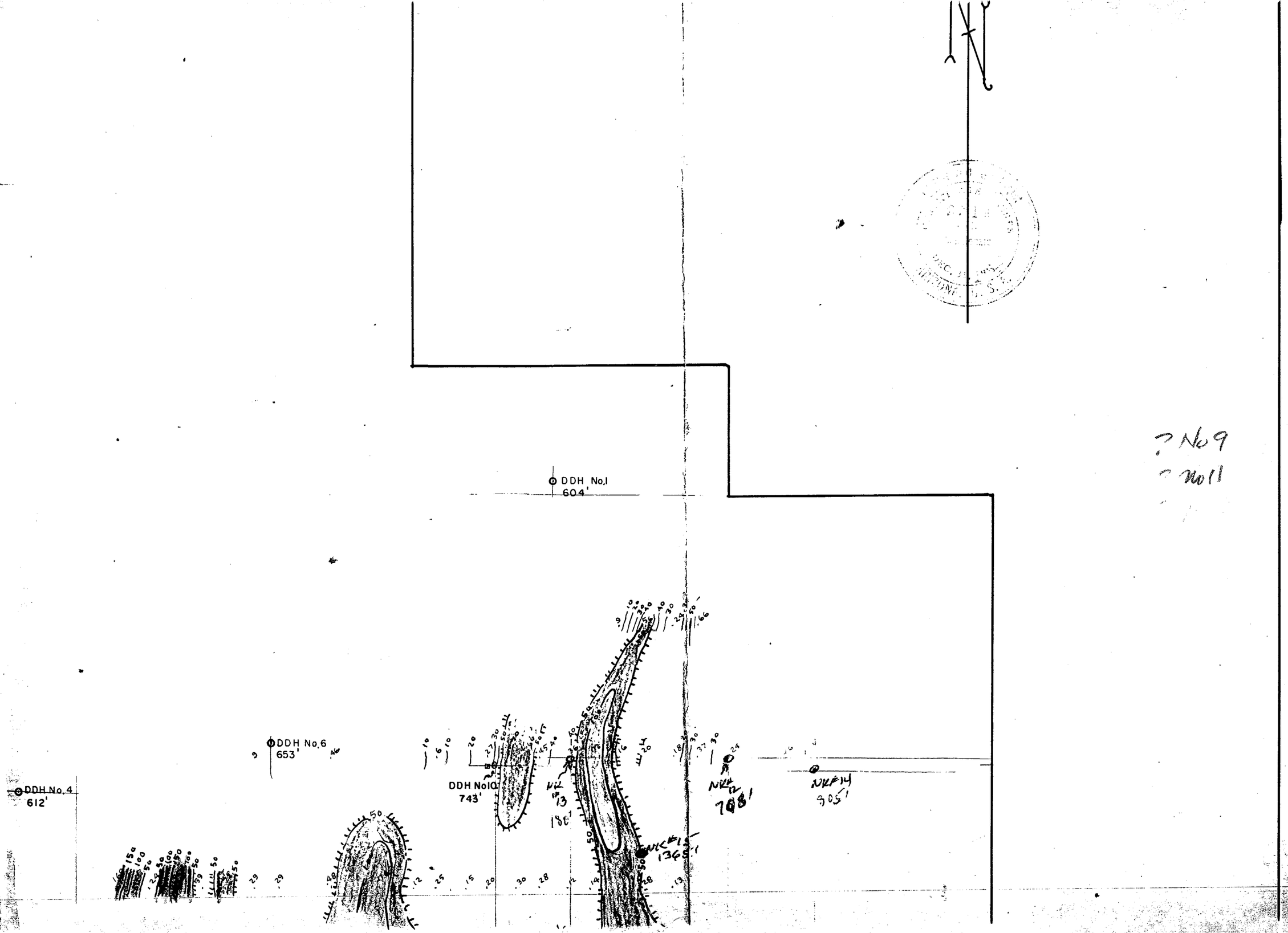
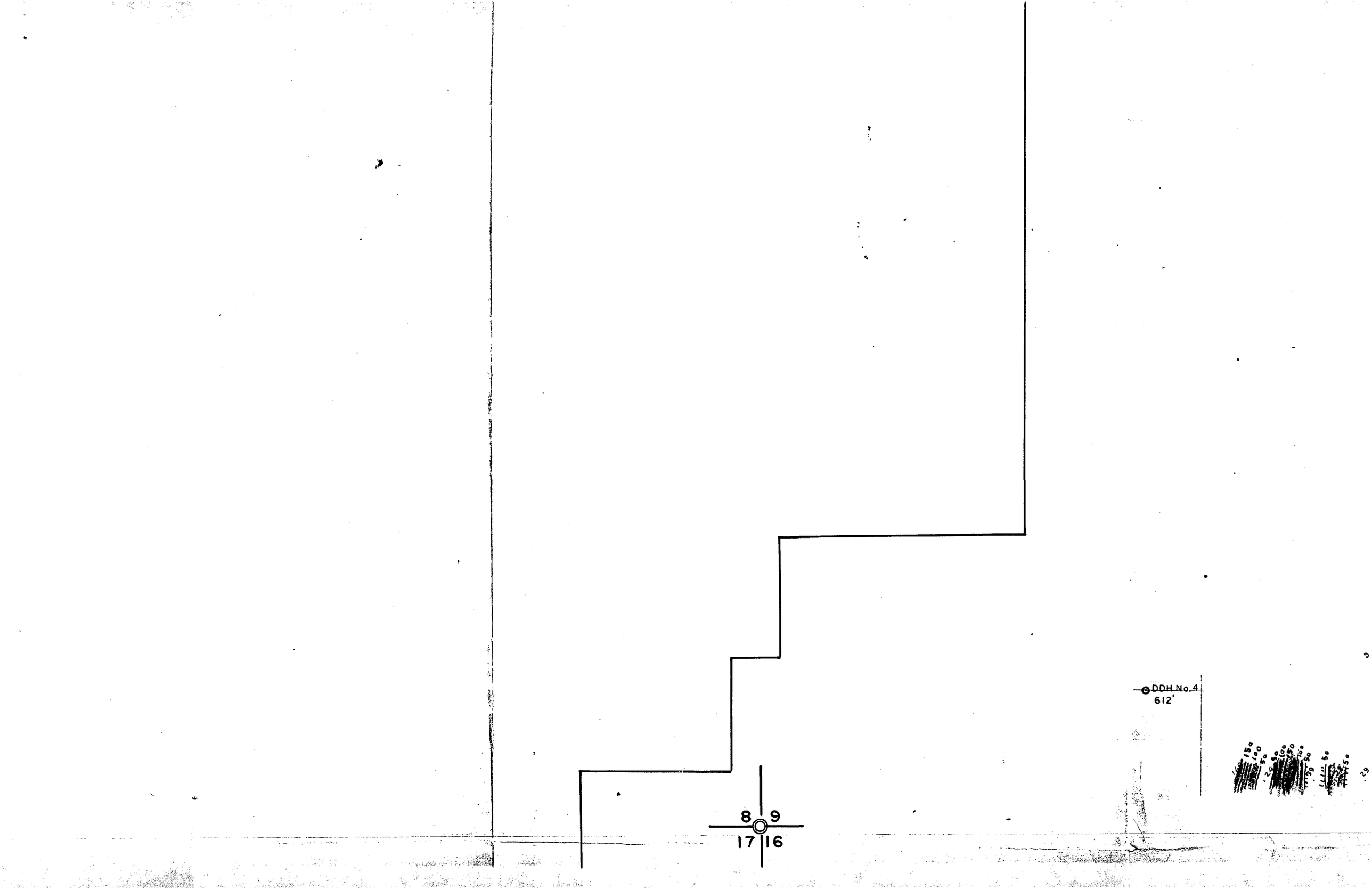
16
DDH No.8
100'
17
16
DDH No3
900'
20
21
DDH No.7
111'


N
DDH No.1
604'
DDH No.6
653'
DDH No.4
612'
DDH No.10
743'
NKE #13
180'
NKE #12
708'
NKE #14
905'
NKE #15
1365'
? No 9
? No 11


DDH No. 4
612'
8
9
17
16

HEINRICHS GEOEXPLORATION COMPANY

806 WEST GRANT ROAD, TUCSON, ARIZONA, 85703. P.O. BOX 5671. PHONE: (AREA CODE 602) 623-0578

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Room 31
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Both lines suggest sulfides within about 300 feet of the surface and having depth extent to at least 1000 feet below surface. Also, Line 1 shows a strong (up to 370 millivolts) self potential low (see plot) between 10W and 30E, further suggesting oxidizing sulfides in significant quantities within several hundred feet of the surface.

Because of the size and strength, this is a very interesting anomaly and should definitely be further pursued by geophysics and drilling. The surface rock type correlating with this anomaly is apparently a black phyllite or slate. Several samples

MINERAL ENGINEERING CONSULTANTS AND CONTRACTORS. GEOPHYSICAL, GEOLOGICAL AND ECONOMIC APPRAISAL

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Very truly yours,
HEINRICHS GEOEXPLORATION COMPANY

Chris S. Ludwig
Chris S. Ludwig
Senior Geophysicist

APPROVED: Walter E. Heinrichs, Jr.
President & General Manager

CSL:je
Enclosures

March 19, 1968

INTRODUCTION

At the request of Mr. Oliver Kilroy, Heinrichs Geoexploration Company conducted and completed a continuation of an induced polarization reconnaissance survey in the Salome Area, Yuma County, Arizona. The new field work was done in the interim February 20 to March 2, 1968. The initial phases were done in December 1966 and February 1967.

The new work consists of Lines 3 through 8 and Spread 3 of Line 1. This amounts to 58,000 feet of surface coverage of which 27,000 feet is "subsurface" plotted data. All work has been done on a dipole spacing of 1,000 feet. For line orientation and approximate position with respect to the land net see the Induced Polarization Location and Interpretation Plan Overlay.

The induced polarization technique used was the dual frequency system utilizing sending frequencies of 0.05 and 1.0 Hz. The electrode configuration used was the conventional collinear dipole-dipole array which on a 1,000 foot spacing typically gives resolvable penetration within the zone from 300 feet to 1,200 or 1,500 feet below surface.

The purpose of the survey was to discover and delineate any sulfide zones in the area having any possible economic potential.

Data are presented on sectional data sheets, one for each line, showing resistivity, percent frequency effect (PFE) and metallic conduction factor (MCF) contoured in section, with self potential in profile form. Also, the plan map shows the interpretation in plan projection including the Vicksburg data just to the southwest of the Salome Area.

Heinrichs personnel involved in the field work were R. Palmer, geophysical crew chief, G. Hix and D. Erickson, technical assistants. Report and interpretation by Chris S. Ludwig, Senior Geophysicist with the assistance of the Geoex staff.

INTERPRETATION

All eight lines show anomalous response of probable sulfide character outlining a complexly shaped sulfide zone of varying strength and depth.

On an overall basis, the anomalism becomes stronger and/or shallower from Line 8 to the southwest where it is strongest on Line 1 of the Vicksburg Area. The anomalism can be categorized into several areas having a particular character.

Lines 2, 3, 8 and the east half of Line 1 all show weak to moderate strength anomalism of similar character becoming quite deep on Lines 3 and 8. In general, this area shows the I.P. response being related to relatively high resistivity material and shows no S.P. anomalism. The strongest zone seen was on Line 2 near 10E where several percent by volume sulfides are indicated within 500 feet of the surface. This could be a potential drill target if the geology in this area is of interest. This Line 2 anomaly near 10E may correlate with the weak anomaly near 10E on Line 1 just east of the Calcite Mine. Another characteristic this area has is that it is separated from the stronger anomalism to the southwest by the major aerial photograph lineament (see plan). This could be a major structural break and be separating two possibly non-related zones of

mineralization. However, not enough detailed coverage is available on the near northeast side of the lineament to be certain of this interpretation.

Lines 3 and 8 in this same area show the highest resistivity I.P. anomalism and although weak could be of interest. However, the source of anomalism appears to be becoming shallower to the northwest down the lines and therefore, it is possible that if the lines were extended northwest, a more shallow drill target could be located that would test the same material. Deepening the existing drill hole near Line 3 may intersect the source of anomalism, however, extreme depths may be necessary (1,500').

Just southwest of the lineament but northeast of Line 7 is the next area of characteristic anomalism. The response is moderate to strong and indicates roughly 1 to 5% by volume sulfide. This zone shows no S.P. response and is generally low to intermediate in resistivity. The strongest response in this general zone is seen on Line 4 particularly where the resistivity is lowest (20W to 30W).

Line 6 has the weakest response but is still definitely mineralized and shows a banded pattern of high and low resistivity material. Line 5 shows a uniformly strong response decreasing only on the east end.

Line 1 shows a very gradual increase from 40W to the west until possibly the extreme west end of the line where it may decrease. This increase could be the effect of going updip to the west or perhaps the effect of increased sulfides to the west or both. Drilling is recommended to test this zone. However, the existing drill hole near 70W, Line 1 that is now 180 feet deep would do so if deep enough, say 500 to 750 feet or so. The existing hole at 40W Line 1 which has been drilled to 644 feet may need to go to 1,000

feet or more to intersect the indicated sulfides if it would intersect at all since it is on the fringe of anomalism. An alternate site that would test the strongest response would be a 750 foot hole near 25W, Line 4.

More data is needed near the major lineament to determine if any of this low resistivity I.P. anomalism relates to the eastern Line 1 anomalism. It is possible that an easterly anomalous trend as suggested by Mr. Kilroy does exist say from Line 4 on to the east past the lineament, however, more information is necessary to verify this.

The third area of characteristic anomalism is from Line 7 on to the southwest possibly including the Vicksburg Area. The distinguishing feature of this zone is the strong, related self potential anomalism. The associated resistivity is low to intermediate. However, data is lacking for this area being mostly end of line effects.

Except for the Vicksburg Area, this S.P. anomalism relates to a topographic high, apparently a volcanic rock type. A test drill hole is recommended in this area in the possibility that the anomalism is distinct from the black shale anomalism intersected in the Vicksburg Area. A 500 foot plus drill hole near 10NW or 20NW, Line 7 would test the strong I.P. anomalism as well as the S.P. low. The S.P. low suggests that significant quantities of oxidizing sulfides will be intersected within several hundred feet of the surface.

Lines 1, 4, 5, and 6 all need to be extended further west to further outline the zone if still of interest.

CONCLUSIONS AND RECOMMENDATIONS

All the lines show anomalism in varying degrees outlining an extensive and complicated zone of probable sulfide mineralization.

Drill holes have been suggested and additional induced polarization recommended to further test and explore areas of interest as described in the Interpretation.

The main problem here is that a very large area of sulfide mineralization has been located (several square miles in area with many open-ended indications) making it difficult to pinpoint targets. An attempt has been made to categorize the anomalism into groups and drill holes recommended (or additional I.P.) to test each group separately.

Geology and geochemistry integrated with the geophysical results could be quite useful in further localizing targets say in areas with good surface trace copper anomalism or interesting geological intersections or zones of weakness correlating with I.P. effects.

Regionally the limits of sulfide mineralization have not been delineated and therefore a reconnaissance I.P. program could prove fruitful particularly if coupled with regional geochemical sampling and/or magnetics, and of course geology.

Respectfully submitted

HEINRICHS GEOEXPLORATION COMPANY

Chris S. Ludwig
Senior Geophysicist

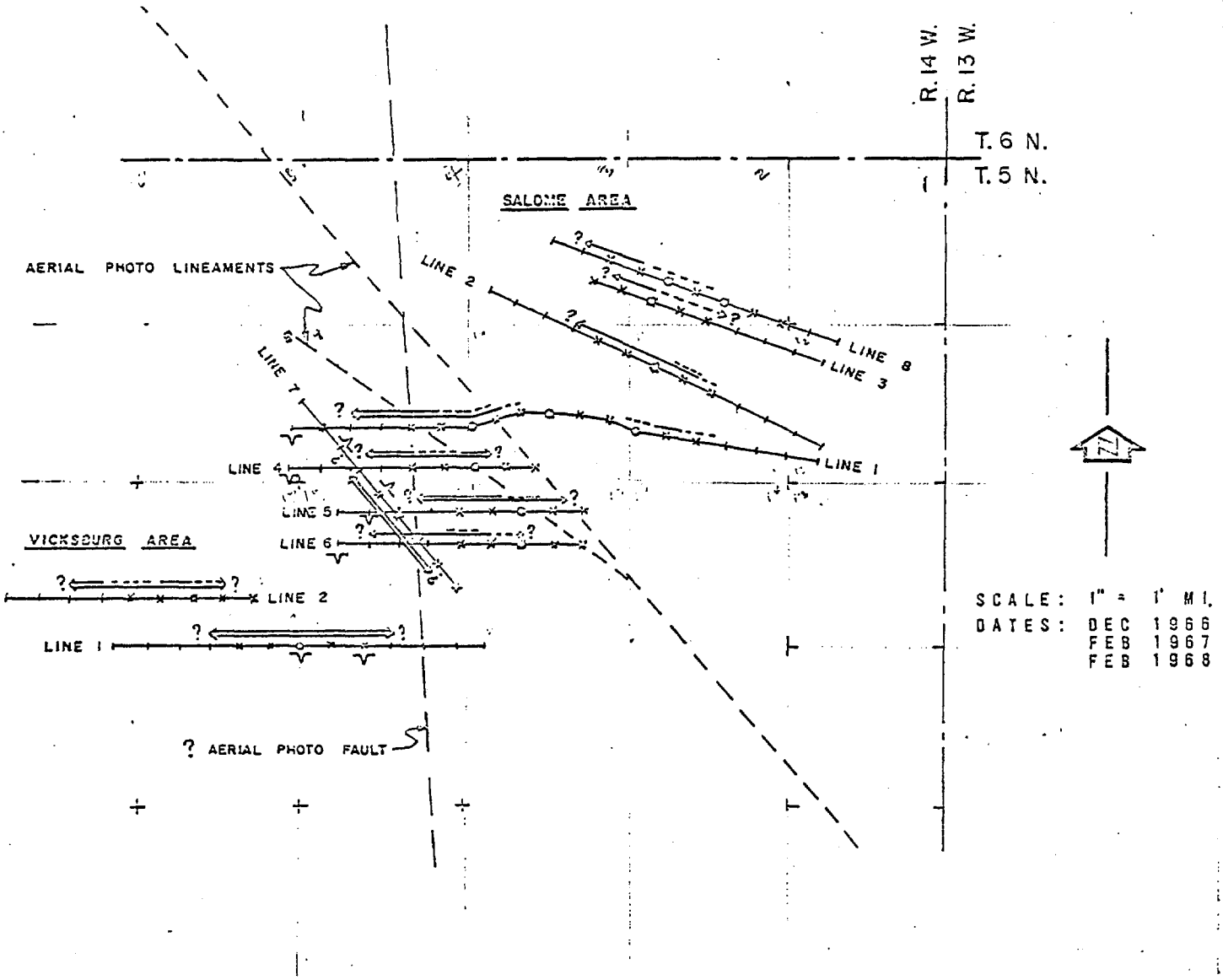
APPROVED:

Walter E. Heinrichs, Jr.
President & General Manager

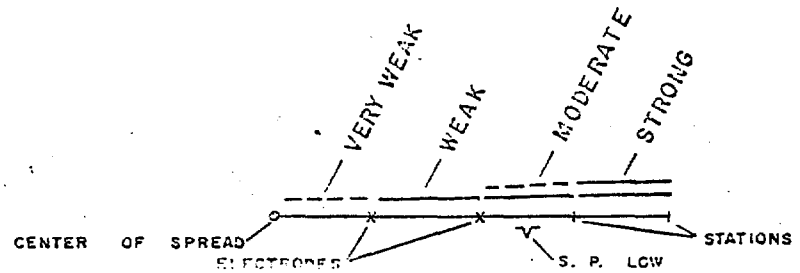
March 19, 1968
Tucson, Arizona

HEINRICHS
GEOEXPLORATION COMPANY
BOX 5671 TUCSON, ARIZONA 85703
PH: 602 623-0578 CABLE: GEOEX, TUCSON
GEOPHYSICAL ENGINEERS SYDNEY VANCOUVER

INDUCED POLARIZATION LOCATION & INTERPRETATION PLAN OVERLAY
SALOME AREA
YUMA COUNTY, ARIZONA
for
MR. OLIVER KILROY



RELATIVE ANOMALY STRENGTH



March 9, 1968

Mr. Oliver B. Kilroy
Suite 401
Tucson Title Insurance Building
Tucson, Arizona 85701

FIELD TRIP
23-26 February 1968

Dear Mr. Kilroy:

Following are my notes on our observations during the trip to your properties in western Arizona and southern Nevada.

SUMMARY AND CONCLUSIONS

Of the areas in which you have interest the Salome Prospect is the most promising. On the basis of the limited geologic information which we have to date the property might be offered for option to one of the major mining companies. The Nelson Prospect also shows some promise--at least to the extent of deserving geologic mapping and, possibly, an Induced Polarization geophysical survey over promising areas, should any be found. In the Bouse areas I saw no definite leads, but parts of the region may deserve additional reconnaissance.

SALOME PROSPECT

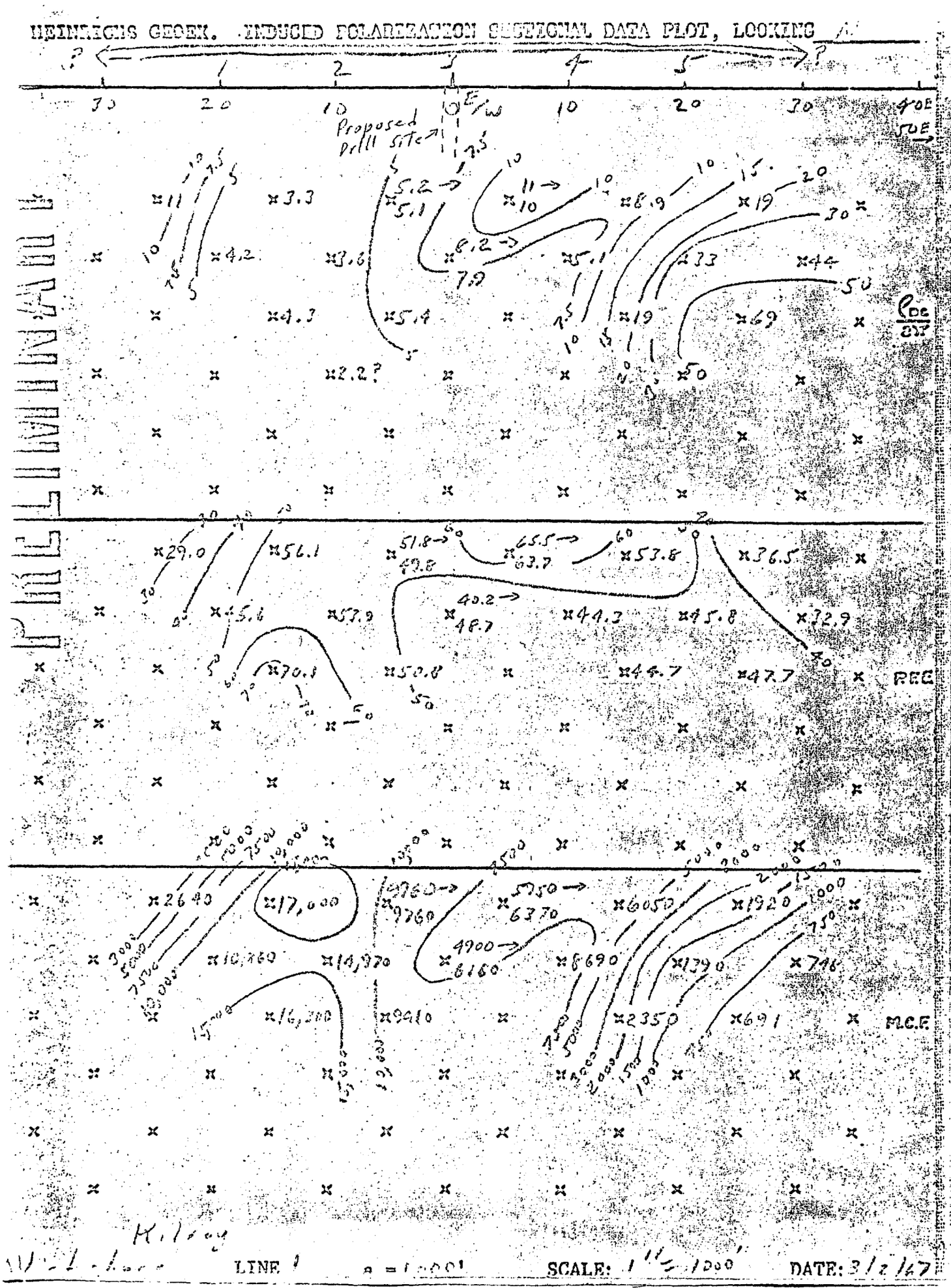
At the Salome Prospect northwesterly dipping shales and other clastic sedimentary rocks strike generally NW and dip SW. These are cut by various intrusive rocks one of which is a biotite quartz monzonite stock similar to the Laramide age intrusives with which copper mineralization is often associated. The metamorphosed shales have been hydrothermally altered and mineralized over an area of about one-half square mile, and the leached outcrops indicate moderate to strong, though spotty, mineralization. The eastern end of this zone of alteration may be covered by a thrust fault and/or alluvium and valley fill. Geophysical surveys, and several drillholes, have failed in finding significant alteration or mineralization.

This prospect deserves a careful geologic study and, possibly, two or three drillholes. A preliminary report and map will be prepared on my return from South America.

BOUSE AREAS

East Bouse--Granitic rocks of Precambrian, or possibly Mesozoic, age are cut by occasional aplite and diabase dikes with little or no associated

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING



LINE 1 n = 1000' SCALE: 1" = 1000' DATE: 3/2/67

mineralization. The only mineralization seen was copper oxides and specular hematite with bull quartz along a very narrow and short lenticular vein. The region may deserve further reconnaissance, but the specific area shows no promise.

Bouse Manganese--Just northeast of Bouse is a wide area of spotty manganese mineralization with some brecciation and silicification. High angle faults cut this zone with some frequency, and this mineralization may reflect base metal mineralization at depth. However, without much more knowledge of mineral zoning than we now have, a test by a deep drill-hole cannot be recommended.

West Bouse--Just southwest of the town of Bouse, Tertiary lakebeds and volcanics overly Precambrian granite and are cut by steeply dipping veins which have been exploited from early times. There is no recorded production in Ariz. Bur. of Mines Bul. 140, but evidence on the old dumps suggests that the ores were of precious metals with some copper. Our traverses to the south found no clear leads to mineralization. As with the West Bouse area, the region may deserve additional reconnaissance.

NELSON PROSPECT

The Nelson Area is about 42 miles southwest of Las Vegas, Nevada, and is accessible by good dirt road turning east off U.S. Hwy 95 10 miles north of Searchlight, Nevada, or by paved highway turning off about 10 miles south of Boulder City. It is an old district from which fairly large amounts of gold and silver and base metals have been extracted.

On this prospect a monzonite porphyry stock intrudes Precambrian granite and, on the north, Tertiary volcanic rocks. The intrusive itself contains lenses and pods of copper mineralization which might be of ore grade were they of larger dimensions. In many places these mineralized zones show breccia textures without foreign fragments. Coupled with this, the erraticity of composition and grain size of the intrusive suggest an emplacement environment of shallow depth.

An E-W trending zone of sporadic hydrothermal alteration crosses the intrusive. The rocks affected by this alteration resemble rhyolite, but close examination shows relict textures of the original porphyry. Iron stained vugs and fractures indicate less then 3% total original sulfides, and there is no suggestion that these rocks contained appreciable sulfides of copper before oxidation and leaching.

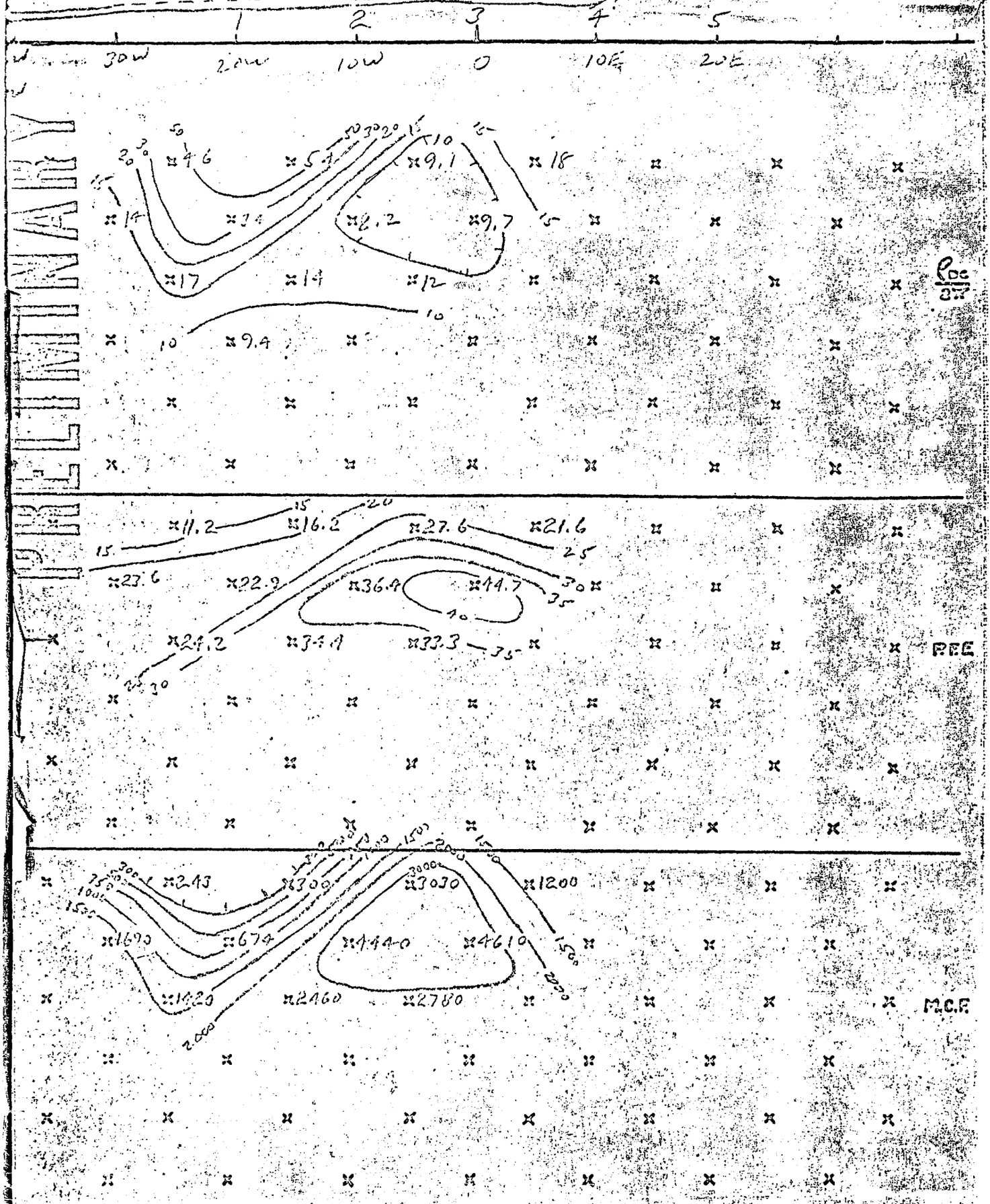
Although this prospect fails in having many of the geologic characteristics of a typical porphyry copper deposit, it has the merit of being a cupriferous Laramide stock cut by an E-W trending zone of alteration. It deserves a close geologic study.

Very truly yours,

Original signed by
Arthur G. Blucher
Arthur G. Blucher

cc: 2 Kilroy
File

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING N



Wilbur-Wilson LINE 2 W½ - - 1000' SCALE: 1" = 1000' DATE: 7-1-77

ARTHUR G. BLUCHER
MINING GEOLOGIST
201 SUN BLDG.
2030 EAST SPEEDWAY
TUCSON, ARIZONA 85719

326-4807

September 20, 1968

Mr. Oliver B. Kilroy
Suite 401
Tucson Title Insurance Building
Tucson, Arizona 85701

SALOME PROSPECT
Yuma County, Arizona

Dear Mr. Kilroy:

Following are my observations and conclusions reached during the recent short visit to your mining property near Salome, Arizona.

As was stated in the memorandum which I wrote after our reconnaissance trip in February, there is in the eastern part of your property an area of spotty hydrothermal alteration and mineralization. Although most of the limonites in the leached capping appear to be the product of the oxidation of iron pyrite, there are some favorable features such as the presence of quartz veinlets in parts of the area, and the existence of fairly widespread sericite. I recommended that the area be mapped with an eye to the possibility that the general "spottiness" might be the result of flat faulting and/or that the alteration might extend beneath cover to the northeast. A third possibility is that this mineralization and alteration might be the barely exposed apex of a deep zone of disseminated and veinlet sulfides.

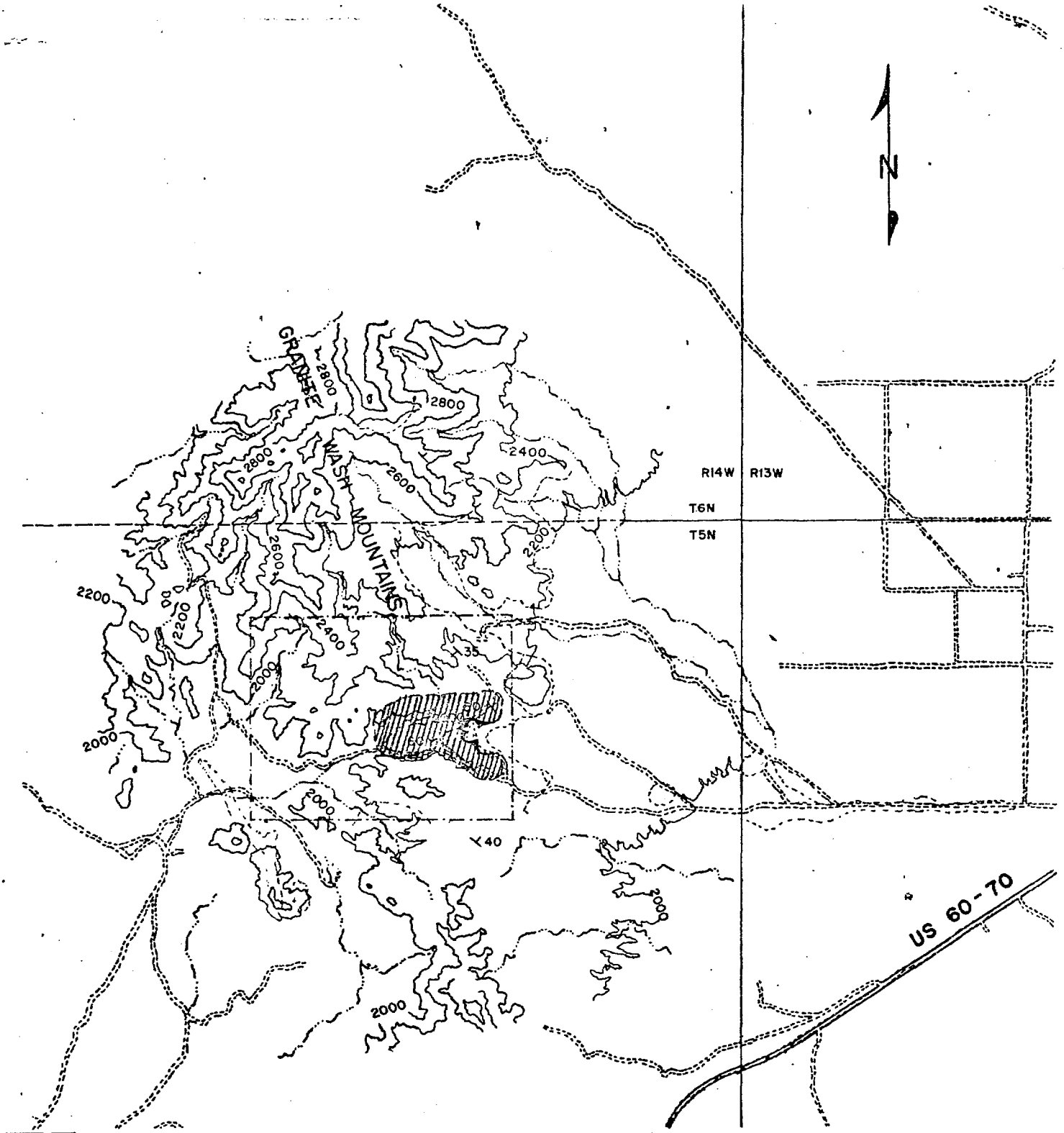
The purpose of the second trip--September 3rd and 4th--was to determine whether or not a few days of reconnaissance study might enable you to choose sites for test drilling without the recommended intermediate step of detailed geologic mapping. From observations made on this trip I must conclude that the preparation of a good map is necessary to the problem of a choice of drillhole locations, in fact, necessary in order to determine whether or not the prospect deserves drilling. If, however, you wish to do a limited amount of drilling in satisfaction of assessment work requirements then the additional subsurface information gained would be of great value to the geologist making a subsequent geologic study.

The detailed study should include: (1) A geologic scale of about 1 inch equals 200 feet of the zone of alteration to the north of the Calcite Mine; (2) An outcrop evaluation map on the same scale showing the mineralization as three degrees--weak, moderate, and strong; and (3) A geochemical map showing the distribution of Cu, Mo, Au, Ag, and possibly some of the low temperature minerals such as As or Hg. Thus, subsurface information from almost anywhere in the area of mineralization would aid in the interpretation of the mapping results.

Very truly yours,

Arthur G. Blucher

AGB:fw
cc: File



SOIL & ALLUVIUM

RHYOLITE

BIOTITE QTZ. MONZ.

&

HORNBLEND - DIORITE

LAYERED ROCKS & DIABASE

ALTERED AREA

POSSIBLE THRUST FAULT

PRELIMINARY MAP
SALOME PROSPECT
YUMA CO., ARIZONA

1 inch = 1 mile
A. G. Blucher Feb. 1968

F. D. MACKENZIE
MINING GEOLOGIST

March 28,1969

Oliver B. Kilroy
Suite 401
Tucson Title Insurance Bldg
Tucson,Arizona 85701

At your request a reconnaisance geological trip and examination was conducted during January 3,4,5,1969 upon a portion of mining claims known as the"NK" and Koans groups.These claims are located in Ellsworth mining district of the county of Yuma,Arizona approximately ~~10~~ 5 miles west of Salome .

Durimg the three days spent here approximately 10 miles of traverse along claim lines and in between,generally in an east-west direction was covered for the purposes of geologic mapping.All available diamond drill core was logged but not in a detailed sense because of the shortness of time.

From the information gathered four(4) 1-1000 scale maps were constructed.An attempt will be made to make an economic evaluation of the property examined.A more accurate and complete evaluation would be possible for the claim group only after more detailed and complete geological mapping and studies are made.

The area mapped is comprised of regionally metamorphosed sediments and igneous rocks which have been intruded by later (Tertiary) quartz monzonite.The general trend of the metamorphics strikes in a Northwesterly direction and dipps towards the north east approximately at 45 degrees.The northwest trends of weakness have been hosts to lamprophyric and diabasic dikes as well as to the mineralization.

Mineralization consists of weak oxides of copper grading downwards into hypogene sulfides in the matter of a few feet. The presence of the sulfides so close to the surface precludes the possibility of much supergene sulfide enrichment. The quartz monzonite intrusion no doubt had considerable influence on the local metamorphism and the subsequent mineralization. The quartz monzonite itself is fairly barren of mineralization and any extensive amounts of minerals would have to be found within the meta-sediments adjacent to the intrusive. It appears that numerous small apophyses of the intrusive have penetrated the metamorphics and it would be in proximity to these that should be investigated, as well as any folding of the meta-sed iments.

I would conclude that any further drilling in the area mapped would be confined to the deepening of drill holes numbered 1 and 10 and then determining from these whether any additional drilling should be warranted.

Registered Geologist
CERTIFICATE EXPIRES
2915
F. D. MacKENZIE
ARIZONA, U. S. A.

Enclos:
1. Geol and rocksample map
2. Alteration & Geophys. "
3. Drill hole loc. & Geochem. map
4. Claim map (1"-1000')
5. Drill log reports.

P. O. Box 872
Douglas, AZ 85607
December 27, 1976

Oliver B. Kilroy
Investments
Suite 110 - 4625 East Broadway
Broadway Terrace
Tucson, AZ 85711

Dear Olly:

Enclosed are descriptions of the nine samples you recently sent.

I would divide these into two groups. Samples 4, 7, and 8 are older gneissose rocks representing the wallrock as I see it. Younger pegmatitic rocks (1, 2, 5, 5A, and 6) are all similar despite their differing names, which owe to various ratios between plagioclase and microcline. In some cases I suspect that these pegmatites are of metamorphic origin or at least of synmetamorphic age. Sample #3 is an oddity, perhaps merely a vein but also possibly a silicified gneiss.

I see no conceivable relation between these rocks, or their origin, and potential mineralization. There is no hydrothermal alteration here.

I hope this work helps you, and will be happy to clarify any points you wish.

Best regards,

Sid

Sidney A. Williams

SAW:bj
encls:

#1

The rock is a granodiorite pegmatite composed mostly of large anhedral grains of sodic oligoclase. These often have kinked or deformed twin lamellae. Equally coarse quartz and microcline fill the interstices and the quartz also shows strain features. Graphic intergrowths of quartz and either feldspar are common. In the case of plagioclase, the intergrowths center on radial bursts of stubby laths of plagioclase. Irregular books of muscovite that is sometimes poikilitic occur in the interstices or as contorted foliae showing synneusis structure and cutting across grains. Except for the presence of colloidal clay dust in the feldspars, the rock is perfectly fresh.

33

Mineral percentages are estimated as: quartz 18%, microcline 13%, plagioclase 64%, muscovite 5%, clinozoisite tr., sphene tr., magnetite 0.5%.

#2

The rock is a quartz monzonite pegmatite composed primarily of very coarse grained quartz, microcline, and plagioclase. These three minerals occur as large irregular anhedra that are intergrown in a crude parallel alignment, giving the rock a runitic structure. Coarse granular magnetite occurs in loose clusters with foliae of poikilitic muscovite. Granular epidote is often embedded in the muscovite while pennine and sphene are interstitial to magnetite grains or plastered on them. All minerals show mild distortion or undulatory extinction. The rock is perfectly fresh although calcite fills late fractures.

34

Minerals are present in the following estimated amounts: quartz 32%, microcline 25%, plagioclase 27%, magnetite 5%, pennine 2%, muscovite 4%, epidote 3%, zircon tr., calcite 0.5%, sphene 1%.

#3

The rock is vein matter that may derive from a sediment by total replacement. It consists almost exclusively of quartz; large irregular grains that interlock along irregular or sutured borders. The quartz shows strain and undulatory extinction. Embedded in the quartz are thin stringers of finely acicular, matted tourmaline needles. The stringers are numerous and, although sinuous, exactly parallel. Where most curved or folded, the tourmaline in the stringers tends to lie normal thereto.

35

Volume percentages are estimated as: quartz 92%, tourmaline 8%.

#4

The rock is a gneissose one derived from a tonalite by epi-mesozonal metamorphism during severe deformation. Stubby to equant plagioclase grains of anhedral outline dominate the fabric; finer grained quartz occurs sparingly in the interstices. Cores of plagioclase may be stippled with coarse, skeletal epidote grains or merely by a splash of shreddy sericite. Granular epidote also occurs in sheaves of pennine derived from former hornblende. Biotite also alters to pennine, but only partly so, and many crystals show interlayered mixtures of chlorite and relict biotite.

36

Following are estimated mineral percentages: plagioclase 69%, quartz 6%, sericite 4%, epidote 5%, magnetite 2%, pennine 9%, biotite 4%, sphene 0.5%, apatite tr., calcite tr..

#5

The rock is a quartz monzonite pegmatite. This is a leucocratic rock consisting of small, equant plagioclase anhedra scattered in a coarser matrix of quartz and microcline. These two minerals enter into graphic intergrowth, typically in ragged, optically parallel stringers. Poikilitic muscovite lies in interstitial folia that may contain a central lens of prochlore derived from earlier biotite. Except for colloidal clay dust in feldspars, the rock is very fresh.

37

Following are estimated mineral percentages: quartz 26%, microcline 40%, plagioclase 30%, muscovite 3%, prochlore 0.5%, allanite tr., zircon tr., apatite tr., magnetite tr..

#5A

The rock is a tonalitic pegmatite or runite. The area sectioned is a domain occupied essentially by two crystals, one plagioclase, one quartz. The two are intergrown in alternate parallel stringers. Plagioclase shows degenerate albite twinning normal to the grain boundaries. Accessory muscovite occurs as poikilitic and skeletal books aligned with and in the plagioclase strings. Irregular portions of the rock (not sectioned) carry vuggy α quartz and chlorite.

38

The following mineral percentages are estimates: quartz 43%, plagioclase 41%, muscovite 15%, zircon tr., epidote tr., calcite tr..

#6

The rock is a granite with occasional anhedra of plagioclase set in a granular quartz-microcline matrix. The microcline often shows late growth, trapping quartz grains at its margins or even within them as inclusions. Finer grained quartz and feldspars also occur in discontinuous stringers that appear to represent healed crush zones. Parts of the matrix are filled with a filigree of dark tourmaline, one large, poikilitic crystal in each instance.

39

Mineral percentages are estimated as: quartz 16%, microcline 58%, plagioclase 21%, tourmaline 3%, epidote 0.5%, calcite 0.5%, ilmenite tr., malacon tr., muscovite 0.5%, magnetite tr..

#7

The original rock may have been a diorite. It was subsequently mesozonally metamorphosed with but little change in texture and mineralogy.

Plagioclase occurs as large anhedra showing zoning; crystal cores may be severely attacked by sericite and coarse epidote. Bunches of large hornblende prisms and occasional large biotite books occupy the interstices and give the rock a crude foliation. The hornblende poikiloblastically encloses many smaller biotite and magnetite crystals. Hornblende also appears to penetrate and replace plagioclase on occasion.

40

Minerals are present in the following estimated amounts: quartz 3%, plagioclase 37%, hornblende 36%, biotite 8%, magnetite 6%, sphene 0.5%, sericite 4%, epidote 4%, clinochlore tr., calcite tr., apatite 1%.

#8

The rock is a gneiss derived from a tonalite by mesozonal metamorphism. The alignment of coarse plagioclase laths probably ones to original flowage orientation.

The plagioclase survives with only a few flecks of sericite although its twinning is degenerate. Parallel to the plagioclase grains are thick books of biotite, now wholly retrogressed to pennine. Clusters of coarse prismatic epidote subhedra derived from both plagioclase and earlier mafites lie on grain boundaries and at the fabric as thick, synmetamorphic veins.

The following mineral percentages are estimates: plagioclase 41%, epidote 32%, quartz 9%, pennine 12%, sphene 2%, magnetite 0.5%, goethite 1%, calcite 1%, sericite 1%.

SKYLINE LABS, INC.

Hawley & Hawley, Assayers and Chemists Division
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

REPORT OF SPECTROGRAPHIC ANALYSIS

Job No. 122591
H & H No. 762669
January 8, 1977

Mr. Kilroy
45 West Pennington Street, #212
Tucson, Arizona 85701

Values reported in parts per million, except where noted otherwise, to the nearest number in the series 1, 1.5, 2, 3, 5, 7 etc.

Element	Sample Number #3 - 35 Mr. O.B. Kilroy
Fe	2%
Ca	.5%
Mg	.3%
Ag	<1
As	<500
B	2,000
Ba	50
Be	3
Bi	<10
Cd	<50
Co	<5
Cr	200
Cu	5
Ga	10
Ge	<20
La	20
Mn	200
Mo	2
Nb	20
Ni	5
Pb	20
Sb	<100
Sc	<10
Sn	<10
Sr	100
Ti	200
V	30
W	<50
Y	<10
Zn	<200
Zr	20

William L. Lehmbeck
Manager

P. O. Box 872
Douglas, AZ 85607
November 26, 1977

Oliver Kilroy
4625 E. Broadway
Suite 110
Tucson, AZ 85711

Dear Oliver:

Enclosed are descriptions of your samples. I have tried to answer most of your questions in them.

The four samples are similar and could well be the same unit. As you indicate, however, 1A and 1B match well, also 2A and 2B.

Cordially,

Sidney A. Williams

SAW:bj

encls:

1A

The rock is a gneiss derived from a quartz-rich sediment by mesozonal metamorphism. The quartz is granular but varies greatly in grain size, indicating brecciation before the metamrophism. Coarser grained fragments are set in and separated by a matrix of fine granular quartz. Small flakes of muscovite, usually in finer grained quartz, define s foliation that wraps around fragments. Very coarse hematite may occur as tablets lying with muscovite or as clusters of crystals filling gash veins in fragments. Minor amounts of bleached biotite occur with the hematite. Irregular seams of dark blue tourmaline follwo the foliation or cut across it; tourmaline crystals are randomly oriented within these seams. There are also irregular structures carrying barite and lazulite mantled with triplite.

42

The hematite shows a bright iridescent tarnish in blues and greens; no copper minerals were seen.

Mineral percentages are estimated as: quartz 63%, tourmaline 4%, hematite 22%, muscovite 8%, biotite 1%, barite 0.5%, lazulite 0.5%, triplite 1%.

1B

The rock is a gneiss derived from a quartz-rich sediment; it closely resembles 1A. It consists mostly of granular quartz of quite uniform grain size. Small muscovite flakes lie in strings of crystals that are well foliated; individual crystals often lie within quartz. Tiny beads of hematite lie in rows parallel to foliation and generally wholly enclosed in quartz. Coarser hematite tablets lie with muscovite. There are also peculiar leached cavities lined by corroded quartz. These contain very large euhedra of hematite. Dark blue (black in hand) tourmaline crystals and occasional triplite grains are disseminated.

42a

Except that 1A is brecciated and more phosphate-rich, these two samples are nearly alike.

Minerals are present in the following estimated amounts: quartz 54%, muscovite 16%, hematite 14%, tourmaline 5%, triplite 0.5%.

2A

The rock is a quartz-rich sediment converted to a gneiss by mesozonal metamorphism. Quartz is granular and varies slightly in grain size. Some ill-defined bands of coarser quartz locally cut the fabric as ill-defined viens. Tiny muscovite flakes are crudely aligned to foliation and are often enclosed wholly within the quartz. Pale blue-green tourmaline prisms are packed into a net of vein-like structures that parallel or cut the foliation. Mild shearing has later occurred and the healed tourmaline is nearly colorless. It occurs with pyrite, now entirely oxidized to jarosite and goethite.

43

Volume percentages of minerals are estimated as: quartz 56%, muscovite 4%, tourmaline 36%, jarosite 3%, goethite 0.5%, rutile 0.5%.

43a

The rock is a gneiss derived from a quartz-rich sediment by mesozonal metamrophism. Coarser grained quartz comprises most of the rock. Crystals are often strained and show slightly sutured boundaries. Small flakes of muscovite are concentrated in narrow bands; the flakes are well foliated although often wholly enclosed in the quartz. Pale blue tourmaline occurs in broad bands or syn-metamorphic veins that either parallel or cut the foliation. Disseminated pyrite occurs in interstices between quartz grains; it is wholly oxidized to jarosite.

The estimated mineral percentages are: quartz 70%, tourmaline 19%, muscovite 6%, rutile 1%, jarosite 4%.

SKYLINE LABS, INC.

Hawley & Hawley, Assayers and Chemists Division
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

REPORT OF SPECTROGRAPHIC ANALYSIS

Job No. 122758
H.H. No. 772707
December 29, 1977

Mr. O. B. Kilroy
4625 E. Broadway, Suite #110
Tucson, Arizona 85711

Values reported in parts per million, except where noted otherwise, to the nearest number in the series 1, 1.5, 2, 3, 5, 7 etc.

Composite: outcrop 800' NE of MKH 6 and outcrop 600' east of #2 outcrop 424 43

Element	Sample Number 9084
Fe	15%
Ca	.1%
Mg	.05%
Ag	<1
As	<500
B	200
Ba	500
Be	<2
Bi	<10
Cd	<50
Co	<5
Cr	100
Cu	7
Ga	10
Ge	<20
La	<20
Mn	30
Mo	2
Nb	20
Ni	<5
Pb	10
Sb	<100
Sc	10
Sn	<10
Sr	1,000
Ti	3,000
V	300
W	<50
Y	<10
Zn	<200
Zr	200

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK ARIZONA U.S.A.

William L. Lehmbeck, Manager

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
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Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Au ppm	Ag ppm	U ppm	F ppm					
	9084	<0.02	<0.2	< 2	880	Composite Sample 1. E-W 14' vein — 800-1000' NE NK #6 2. 10' N-S vein — West tip of bleached area (MacKenzie) 42 + 43				

TO:
Mr. Oliver B. Kilroy
4625 East Broadway, Suite 110
Tucson, Arizona 85711

REMARKS:
Trace analysis

CERTIFIED BY:
William L. Lehmbeck
REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK DATE SIGNED 12-5-77 Arizona U.S.A.

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
11/23/77	12/5/77	772707 - Part I

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
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Tucson, Arizona 85703
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REPORT OF SPECTROGRAPHIC ANALYSIS

Job No. 122609
H&H No. 770180
February 1, 1977

Mr. O. B. Kilroy
45 West Pennington Street, #212
Tucson, Arizona 85701

Values reported in parts per million, except where noted otherwise, to the nearest number in the series 1, 1.5, 2, 3, 5, 7 etc.

Element	Sample Number #1
Fe	2%
Ca	3%
Mg	.02%
Ag	<1
As	<500
B	<10
Ba	300
Be	<2
Bi	<10
Cd	<50
Co	7
Cr	150
Cu	30
Ga	<10
Ge	<20
La	<20
Mn	<10
Mo	<2
Nb	<20
Ni	<5
Pb	<10
Sb	<100
Sc	<10
Sn	<10
Sr	100
Ti	2,000
V	20
W	<50
Y	<10
Zn	<200
Zr	50

44

William L. Lehmbeck
Manager

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Arizona Registered Assayer No. 9425

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Sn ppm	U ppm	F %	
	#1 (44)	<10	< 2	0.11	- CALCITE MINE DUMP
	#2 (45)	<10	< 2	0.34	- SHAFT JUST NORTH OF ROAD THAT IS ON WESTERN PART OF MAIN BLEACHED ZONE - EASTERN PART OF PROPERTY

TO: Mr. O. B. Kilroy
4625 E. Broadway, Suite 110
Tucson, Arizona 85711

REMARKS: Trace analysis

CERTIFIED BY:

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
1/24/77	2/9/77	770180

SS - 1, (11) April 2-4, 1980

The rock is a pegmatite of granitic composition. It consists mainly of large, microcline grains that are virtually free of perthite and meet on simple mutual grain boundaries. The rock has been sheared and crackled. As a result, quartz may be disaggregated and drawn out into shear zones. Less deformed quartz fills cleavage cracks or gash veins in the microcline. Large books of muscovite are warped or bent and may be drawn out into shears. Grain boundaries and cracks throughout the fabric are filmed with supergene hematite.

(46)

Minerals are present in the following estimated amounts: quartz 6%, microcline 70%, muscovite 20%, hematite 4%.

SS - 2, (12)

The rock is a tonalite composed mainly of equant plagioclase subhedra. Interstitial areas of roughly equal size are filled with quartz. The plagioclase rims may be myrmekitic. Small biotite flakes are aligned to a faint flowage direction. They occasionally gather into sizeable clusters.

(47)

The rock is fairly fresh, but near a shear zone biotite shows progressive penninization and epidote grains begin to appear in plagioclase. Within the shear zone, primary quartz remains but is severely strained. All plagioclase and biotite are obliterated by clusters of tourmaline or coarse epidote prisms.

Original mineral percentages are estimated as: quartz 22%, plagioclase 60%, biotite 18%, sphene tr., apatite tr..

SS-3(13)

The rock is a quartz monzonite of gneissose structure. Large augen of plagioclase and microcline have boundaries that interlock with an aplitic matrix of quartz and feldspars. Grains tend to be slightly elongate parallel to gneissosity, and the direction is emphasized by occasional stringers of quartz. Thick muscovite books lie on grain boundaries. They may occur with pennine, showing evidence of proxying for biotite. Smaller muscovite flakes also occur sparingly in feldspars.

(4B)

Volume percentages of minerals are estimated as: quartz 18%, microcline 31%, plagioclase 45%, muscovite 5%, calcite tr., apatite tr., goethite 0.5%, pennine tr., leucoxene tr..

Petrographic Work
Sidney A. Williams
Douglas, Arizona

Younger Mineralization No.1

1. The specimen is a meta-tonalite (quartz diorite) composed of randomly oriented plagioclase laths and coarse poikilitic hornblende crystals with interstitial quartz. Biotite was also abundant as coarse, thick, randomly oriented crystals but is now heavily altered to chlorite. The plagioclase-especially in crystal cores-is intensely altered to sericite, calcite, and minor epidote. Locally, epidote and calcite replace hornblende-especially near chalcopyrite grains.

Late veins of orthoclase and calcite cut the fabric. Hematite related to this veining occurs as eunedral crystals replacing biotite.

Metamorphism has been static and epizonal.

Minerals are present in the following estimated amounts: plagioclase 46%, quartz 8%, hornblende 13%, biotite 6%, pennine 12%, epidote 3%, sericite 7%, calcite 2%, magnetite 2%, apatite 1/2%, orthoclase 1/2%, and zircon, allanite, and sphene in traces.

Older Mineralization No.5A

2. The original rock was a gneissose meta-tonalite composed of quartz bands and pods interlayered with areas of randomly oriented plagioclase and mafites. Intense epizonal alteration has caused replacement of plagioclase and mafites by clays and diaspore. Foliated bands originally rich in biotite now consist of sericite and abundant diaspore. Topaz crystals tend to be clustered along the margins of such bands.

Late gypsum cements the fabric.

The sample has suffered very intense epizonal hydrothermal alteration. The original rock was like No.1.

Minerals are present in the following estimated amounts: diaspore 5%, gypsum 15%, kaolin 46%, topaz 1%, quartz 28%, rutile 1%, jarosite 1%, and sericite 3%.

NK-10 402'

3. The specimen is a meta-sandstone and shaly sandstone now converted to a banded quartzite and muscovite phyllite. Very intense mesozonal alteration has followed the metamorphism and produced a new assembalge. Formerly the rock was layered quartz and muscovite-the muscovite is studded with newly-formed diaspore and occasional andalusite which is not oriented with the fabric. Minor diaspore and topaz also occur in the quartzite bands.

Late gypsum abundantly veins the fabric.

Minerals are present in the following estimated amounts: gypsum 8%, sericite and muscovite 19%, quartz 61%, diaspore 8%, topaz tr., andalusite 1%, and rutile 2%.

Hexagonal Symbols used
on overlay sheet #1

Petrographic Work
Sidney A. Williams
Douglas, Arizona

DH-3-900'

The specimen is a chlorite schist composed of peculiar foliated intergrowths of albite and clinochlore which occur in a banded fabric with augen of calcite. The albite-rich portions of the fabric have outlines suggestive of original plagioclase phenocrysts. Biotite occurs in gash veins cutting the foliation transversely. These veins are post-foliation and seem related to the disseminated sulfides in the rock. Sphene is an abundant accessory. Quartz occurs locally with albite and chlorite and is filled with small inclusions of sphene, epidote, and chlorite.

4.

Metamorphism has been epizonal followed by low mesozonal veining and mineralization. The original rock was probably a diabase.

Minerals are present in the following estimated amounts: albite 29%, chlorite 31%, calcite 22%, quartz 6%, biotite 6%, sphene 3%, epidote 2%, and chalcopyrite and pyrite in traces.

DH-3-840'

The specimen is a diabase composed of randomly oriented laths of plagioclase with interstitial augite. The plagioclase is only slightly attacked by hydromicas along fractures. Augite has been partly replaced by uralite and the uralite has further altered to chlorite with accessory calcite. Other basaltic hornblende crystals of magmatic age remain fresh; these have replaced augite earlier. Biotite is rare and is often intergrown with magnetite of skeletal habit. Accessory sphene occurs on the margins of the magnetite.

5.

Alteration has been mild and deuteric only.

Minerals are present in the following estimated amounts: plagioclase 56%, augite 27%, magnetite 3%, basaltic hornblende 2%, biotite 0.5%, apatite 1%, chlorite 8%, calcite 2%, and traces of sphene.

The metallic mineral circled is magnetite.

Hexagonal Symbol used on
Overlay Sheet #1

Petrographic Work
Sidney Williams
Douglas, Arizona

NK -10 743'

The specimen is a biotite schist composed of crystalloblastic augen of quartz and plagioclase set in a foliated, fine grained matrix of plagioclase and biotite. Biotite is not only disseminated and foliated but also occurs in clusters with sphene and epidote that probably represent original hornblende. The plagioclase augen, originally sericitized, have randomly oriented biotite flakes replacing the sericite. Apatite is locally abundant as clusters of anhedral grains in feldspar-rich portions of the matrix.

Metamorphism has been mesozonal and synkinematic; retrograde metamorphism is negligible. The original rock was probably a sediment rich in volcanic debris.

6. Minerals are present in the following estimated amounts: quartz 38%, orthoclase 1%, plagioclase 38%, biotite 19%, epidote 1%, apatite 1%, and the following in traces: pennine, allanite, sphene, muscovite, and magnetite.

NK-1-330

The specimen is a hornblende schist composed of ragged, irregular hornblende prisms which show a crude foliation. The hornblende gathers in irregular clusters and, although concentrated in bands, does not participate in the foliation. Microcrystalline plagioclase fills interstices and occurs in bands alternating with hornblende. Sphene is an abundant accessory, often in hornblende, and is about one third replaced by rutile. Lens-shaped, discontinuous bands of muscovite crystals occur; the muscovite is not foliated.

Late veins carry quartz and calcite. They have selvages of chloritized hornblende which contain rare pyrite.

7. The original sample was probably a reworked andesite. Metamorphism has been mesozonal.

Minerals are present in the following estimated amounts: hornblende 57%, plagioclase 27%, sphene 2%, calcite 3%, quartz 2%, clinochlore 5%, rutile 1%, and muscovite 3%.

A fracture noted in hand specimen carries pyrite with traces of chalcopyrite.

Hexagonal Symbols used on
Overlay Sheet #1

Petrographic Work
Sidney A. Williams
Douglas, Arizona

No. 1 DH-4 390'
(NK)

The specimen is a meta-siltstone consisting of small, strained augen of quartz, feldspars, and lithic fragments of various kinds in a banded matrix of quartz, feldspars, and interleaved graphite. Biotite crystals are newly-formed in the matrix but may cut across the foliation of the pulverized quartz and feldspars; the clinozoisite present shows similar behavoir.

Accessories such as magnetite, apatite, and sphene are relatively common. Retrograde clinochlore is sparingly present as coarse crystals which cut the fabric. Late calcite and orthoclase occur in veinlets.

8. The sample has suffered mesozonal, mostly post-kinematic metamorphism.

No. 2 DH-4 290'
(NK)

The specimen is a meta-calc-shale composed of well-foliated muscovite and interleaved graphite. Certain calcareous bands contain clusters of poikiloblastic clinozoisite and pods of calcite strung out along the foliation. Pyrite, associated with calcite and quartz, occurs in veins which usually lie on the foliation but may cut the fabric.

The foliation is largely mimetic and biotite and clinozoisite are post-kinematic and/or mimetic orientation. The pyrite may originally have been syngenetic.

9. The specimen has been metamorphosed in the low mesozone.

Minerals are present in the following estimated amounts: clinozoisite 6%, quartz 2%, graphite 18%, biotite 4%, muscovite 57%, calcite 12%, clinochlore 1%, and traces of zircon; pyrite in veins only.

No. 3

The sample (not sectioned) is a very graphitic shale much like No. 2. Veins of pulverunt iron oxides and malachite parallel the foliation. There are no in situ pseudomorphs after copper sulfides.

10.

No. 4

The original rock was a quartz latite with phenocrysts of plagioclase, biotite, and hornblende in a matrix of microcrystalline quartz, orthoclase, and plagioclase. Epizonal metamorphism has resulted in partial replacement of plagioclase by calcite and orthoclase. The biotite and hornblende are wholly replaced by pennine, calcite, and epidote. The matrix is silicified

Petrographic Work
Sidney A. Williams
Douglas, Arizona

Hexagonal Symbols used on
Overlay Sheet #1

D. H. #1 - 600'

The specimen is an actinolite schist composed of crushed and sheared plagioclase interlayered with sprays of broken and bent actinolite prisms. Augen of plagioclase which have survived may enclose small, randomly oriented actinolite and be heavily replaced by fine grained clinozoisite. A few areas in the rock are rich in bleached shredded biotite with clinozoisite rather than actinolite. Other areas are rich in quartz fragments which evidently represent fragmented vein quartz.

11.

Late veins cut the fabric and carry pyrite, traces of galena, and minor sphalerite. The gangue is quartz, heulandite, and the vein walls may be chloritized mafites. These veins are also involved in the shearing which has evidently been of long duration.

Metamorphism was low mesozonal and static, followed by epizonal veining and mineralization.

Hexagonal symbols used on
Overlay Sheet #1

Petrographic Work
Sidney A. Williams
Douglas, Arizona

1)

The specimen is an andesitic lamprophyre (melaandesite) originally composed of plagioclase laths, diopsidic augite, and basaltic hornblende arranged in a disbasic texture. The plagioclase is replaced by soda-plagioclase with abundant epidote inclusions. Diopsidic augite is largely replaced by pennine and calcite and only a few corroded relicts of the pyroxene have survived. Basaltic hornblende is quite fresh and may have normal hornblende overgrowths. Original perovskite was replaced largely by lamellar sphene and both minerals are heavily leucoxenized. Apatite is fresh and occurs as long, thin prisms. Pyrite is a minor accessory.

12.

Alteration of the rock appears to be wholly deuteric and pyrite must have been generated at this time.

Minerals are present in the following estimated amounts: plagioclase 31%, basaltic hornblende 16%, epidote 13%, pennine 27%, calcite 5%, quartz 3%, apatite 1%, sphene, perovskite, and leucoxene 2%, diopsidic augite 2%, and pyrite in traces.

2)

Random specimen from intrusive on east.

The specimen is a gneiss composed of crudely oriented and banded quartz, plagioclase, epidote, biotite, and hornblende. The plagioclase is rather heavily saussuritized and mafites are wholly replaced by pennine, epidote, and accessory sphene. Primary sphene subhedra also occurs with the mafites where also are clustered accessory allanite, magnetite, and apatite. Much of the coarser epidote occurs in bands rich in altered mafites and it is evidently genetically distinct from the saussuritic epidote.

The sample shows evidence of retrograde metamorphism.

Minerals are present in the following estimated amounts: quartz 16%, plagioclase 17%, sericite 33%, pennine 17%. epidote 15%, apatite, allanite, in traces, magnetite .5%, calcite .5%, and sphene 1%.

3)

Random specimen from intrusive on east.

The specimen is a quartz monzonite composed of interlocking anhedra of equigranular quartz, microcline, and plagioclase. Microcline tends to be interstitial to the plagioclase. Biotite is clustered in large, ill-defined areas with epidote. Traces of altered pyrite (to goethite) occur as inclusions in iron-rich epidote. Plagioclase crystals show progressive zoning and slightly saussuritized cores.

The rock shows the effects of weathering and very mild retrograde metamorphism.

Minerals are present in the following estimated amounts: quartz 15%, plagioclase 25%, biotite 28%, epidote 4%, magnetite 2%, microcline 25%, sericite 1%, and apatite and goethite in traces.

4)

Random specimen from intrusive on South.

The specimen is a quartz monzonite composed of subhedral plagioclase crystals set in an equally coarse matrix of microcline and quartz. Biotite occurs as large crystals which tend to be entrained along one direction in the fabric. Epidote is closely associated with the biotite. The calcic cores of plagioclase crystals contain inclusions of epidote, sericite, and traces of calcite. Accessory apatite, magnetite, and sphene tend to be clustered together somewhat independently of biotite distribution.

Late calcite veinlets are associated with weathering and disaggregation of the fabric.

Minerals are present in the following estimated amounts: quartz 12%, plagioclase 22%, microcline 34%, epidote 3%, biotite 24%, magnetite 1%, sericite 3%, sphene .25%, and apatite and calcite in traces.

5)

Random specimen from intrusive on South.

The specimen is a granodiorite composed of large, randomly-oriented plagioclase subhedra with interstitial quartz and microcline. Coarse biotite and hornblende crystals show a preferred orientation; most of the epidote is closely associated with these minerals. Sphene is relatively common as perfect euhedra often embedded in microcline. Minor amounts of sericite and epidote occur in the cores of plagioclase crystals.

Minerals are present in the following estimated amounts: quartz 8%, plagioclase 54%, microcline 13%, hornblende 9%, biotite 9%, sphene 2%, epidote 2%, magnetite 1%, sericite 1%, and apatite and calcite in traces.

Hexagonal symbols used on
Overlay Sheet #1

Petrographic Work
Sidney A. Williams
Douglas, Arizona

Specimen No. 1

"Is black mineralization manganese?"

The black mineral occurring with altered chalcopyrite is tenorite, a black copper oxide.

13. "Is copper mineralization related to manganese (if present)?"

The copper mineralization is related to retrograde epizonal alteration of the mesozonally metamorphosed quartz-feldspar gneiss. The later alteration associated with the copper is evidenced by alteration of biotite in the gneiss to chlorite.

Specimen No. 2

"Is manganese introduced with quartz?"

14. This rock is a meta-diabase showing only a late retrograde epizonal metamorphism. The veins cutting the specimen are calcite (not quartz). The black manganese oxides are dendrites formed by cold surface waters and are related only to weathering.

Specimen No. 3 From Calcite Shaft 40'-50'

"Is copper mineralization later epizonal or earlier assembalge?"

15. The copper occurs in quartz calcite veins which are certainly post mesozonal metamorphism. There is no wallrock present in this sample but I have seen similar late, copper-bearing veining in other samples.

Specimen No. 4 Mk -7 111'

"Is hematite hydrothermally introduced?"

No, the hematite has formed by weathering of iron-bearing chlorite in slip planes in the gneiss.

"What assemblage?"

16. The original mesozonal biotite-plagioclase-microcline gneiss has been converted to a later epizonal retrograde assemblage characterized by the chlorite.

"Is green facies related to other specimens?"

Yes, the late chlorite is common in this suite of samples.

Hexagonal symbols used on
Overlay Sheet #1

Petrographic Work
Sidney Williams
Douglas, Arizona

"Is this related to specimen No. 5?"

Yes, the rocks were originally identical just after the mesozonal metamorphism.

Specimen No. 5

"Is this related to other rock types of this group or others you have seen, especially sample No. 4?"

Yes, it is like No. 4, also No. 1 and 7. The difference is that No. 5 shows none of the late retrograde epizonal alteration which is associated with copper mineralization.

17

Specimen No. 6 NK -6 643'

"Which mineral assemblage involved, or are both?"

The original mesozonal gneiss (plagioclase + hornblende) has suffered late epizonal veining but the late assemblage consists of prehnite + zeolites and is not certainly the same late assemblage that carries copper in other specimens.

18

Specimen No. 7

"Which mineral assemblage involved, and is it related to any other(s) specimens?"

The rock is a mesozonally metamorphosed gneiss (quartz-plagioclase-microcline) with retrograde epizonal epidote along shear zones. The history of the rock is like Nos. 1 and 4, and similar to 5 except as noted in that description, (i.e.-no late alteration in No. 5).

19

Specimen No. 8 NK -5 202'

"Which mineral assemblage involved?"

The specimen is a mesozonally metamorphosed diabase like Nos. 6 and 9, and has later epizonal veins which consist of chlorite-adularia-quartz but are not clearly related to the copper mineralization.

20

Specimen No. 9 NK -4 545'

"Is the rock type like other specimens?"

Yes, it is much like No. 8, also No. 6

21

"Isthere introduced hydrothermal biotite?"

No, the biotite is early, mesozonal metamorphic. There are late zeolite veins like in No. 6.

Hexagonal and Circular symbols
used on Overlay Sheet #1

Petrographic Work
Sidney A. Williams
Douglas Arizona

DH-10-743'

22

The specimen is a quartz-feldspar gneiss composed of fine grained, equant quartz and microcline showing a banded texture with interlayered pennine. Plagioclase crystalloblasts poikiloblastically emclose quartz and microcline and are slightly sericitized. Calcite occurs in coarser quartz bands. Pyrite euhedrons tend to occur in chloritic bands and the pyrite crystals are often overgrown with muscovite.

Retrograde metamorphism, at least, has been epizonal and post-kinematic. The chlorite may replace biotite of mesozonal grade.

(2) "C"

C

The original granodiorite (?) has been severely altered in the epizone. Quartz crystals remain unchanged in a matrix now composed of coarse, randomly oriented muscovite crystals surrounded by clays containing corroded diaspore. Magnetite crystals are also relics in the clays. Cataclasis of the quartz crystals and crystallization of muscovite evidently belong to an earlier episode of metamorphism which has been followed by the later diaspore and development of an aluminous assemblage.

Minerals are present in the following estimated amounts: quartz 32%, clay 44%, muscovite 18%, diaspore 3%, and magnetite 3%.

There has been no K metasomatism.

(3) "B"

B

The specimen is a quartzite composed of equant, rounded quartz grains intergrown with occasional muscovite crystals and clusters of anhedral andalusite. The muscovite is slightly sericitized or shows evidence such as a decrease in birefringence and the andalusite is relatively fresh and occurs with much more abundant topaz locked in quartz.

Later clays fill fractures crossing the fabric and the clay has spread through the fabric from these fractures. Mesozonal metamorphism has been followed by epizonal hydrothermal alteration.

Minerals are present in the following estimated amounts: quartz 54%, clay 29%, muscovite 3%, rutile 1%, andalusite tr. and topaz 13%.

(4)

4.

The specimen is a granodiorite composed of subhedral plagioclase set in an almost equally coarse quartz-microcline matrix. The plagioclase is quite fresh but may contain skeletal muscovite crystals. Microcline is perfectly fresh.

Muscovite also apperas to have partly replaced biotite and it occurs in parallel intergrowths with biotite. The biotite in such cases may contain ragged grains of later epidote. These alteration effects are especially common near small pyrite crystals.

Metamorphism has been mild but epizonal or low mesozonal.

The sample is similar to (7) but has not suffered the same low degree of alteration.

Minerals are present in the following estimated amounts: quartz 24%, microcline 20%, plagioclase 43%, biotite 6%, epidote 3%, muscovite 3%, magnetite 0.5%, and traces of pyrite.

(5) "A"

A

The original rock evidently contained euhedral crystals of plagioclase in an equigranular, coarse matrix including quartz. The quartz remains but is accompanied not by plagioclase but its alteration products such as topaz and diaspore and then later isotropic clays which embay the diaspore. Clays corrode the topaz slightly and particularly attack diaspore and the minor amounts of lazulite present. Rutile is an abundant accessory.

Late calcite fills interstices in the fabric among quartz grains.

Minerals are present in the following estimated amounts: quartz 50%, clay 27%, topaz 13% lazulite 0.5%, rutile 0.5%, calcite 5%, and diaspore 4%.

There is no evidence of K-metasomatism.

(6) From Bottom of Shaft (about 200' deep)

6.

The specimen is a tonalite composed of subhedral plagioclase, hornblende, and biotite with interstitial, equally coarse quartz. Epizonal hydrothermal alteration has resulted in mild sericitization of plagioclase and replacement of mafites by coarse clinochlore. The hornblende evidently was replaced by biotite in a late magmatic stage. Accessory apatite and sphene are present.

Introduction of pyrite near old mafites accompanied the alteration.

Minerals are present in the following estimated amounts: quartz 23%, plagioclase 40%, sericite 6%, clinochlore 28%, pyrite 2%, leucoxene 0.5%, apatite 0.5%, and traces of sphene.

Petrographic Work
Sidney A. Williams
Douglas, Arizona

(7)

7. The original tonalite consisted of elongate plagioclase laths and coarse biotite with less hornblende set in an equally coarse matrix of quartz and occasional orthoclase. The orthoclase tends to mantle plagioclase and may indicate minor potassium metasomatism. The original hornblende was converted to biotite and most of the biotite has been replaced by chlorite. This later alteration is associated with veining by calcite and sericitization of plagioclase. Also, traces of pyrite were introduced in mafites at this time.

Minerals are present in the following estimated amounts: plagioclase 33%, quartz 18%, orthoclase 2%, calcite 8%, sericite 7%, epidote 8%, chlorite 12%, biotite 2%, and sphene, apatite, and pyrite in traces.

(8)

ullion Mine Area

The specimen is a schist derived from a shaly limestone. Large oval patches of granular to crystalloblastic calcite are surrounded by microcrystalline clay and sepiolite which show a crude foliation parallel to the long axes of the calcite ovals. Locally these ovals contain oriented sericite relics. Chalcopyrite occurs in thick bands and is interstitial to the gangue minerals. The alteration has been epizonal.

Minerals are present in the following estimated amounts: calcite 36%, clays 27%, sulfides 22%, and sericite 15%.

(9)

9. The specimen is a metasomatic rock composed of coarse sprays of patchily pleochroic tourmaline replacing coarse, strained, and crudely banded quartz. Muscovite which has largely replaced crudely foliated biotite (relic biotite is now mostly replaced by prochlore)— establishes a foliation which is almost obliterated by the later tourmaline. Mesozonal metamorphism has been followed by epi-mesozonal Boron metasomatism.

This alteration is unlike any seen in the previous suite of samples.

Minerals are present in the following estimated amounts: quartz 41%, tourmaline 39%, muscovite 12%, epidote 3%, apatite and sphene in traces, and prochlore 4%.

NK 82 Location Monument

1) Two specimens are meta-andesite showing mesozonal metamorphism, one is a meta-tonalite like No. 1 on the map. All show retrograde epizonal metamorphism which is, in one case, associated with mineralization. The mineral assemblage associated with this episode is quartz, chlorite, and epidote. One sample clearly shows pseudomorphs of hisingerite after chalcopyrite in place, as well as malachite and tenorite. The mineral in the red-lined areas is altered pyrite.

23

DH-10-403'

The area circled in red in the large piece is coarse, recrystallized quartzite much like the small piece. It was recrystallized during the alteration accompanyiny the crystallization of the pyrite.

24

DH-4

264' Both patches are galena. Likewise for 281' and
592 592

DH-4-592'

25

The specimen is a n epizonally metamorphosde shale showing small scale crumpling of individual laminae. The bedding is well outlined by foliated sericite interlayered with quartz-rich bands. Graphite is abundant in certain bands also. Tourmaline is a very minor but conspicuous accessory.

Some quartz-rich augen have recrystallized as crosscutting lenses which may continue as veins. There are also veins of adularia and calcite which may carry accessory coarse pennine, pyrite, and galena. The galena is probably of about the same age as pyrite but paragenetically later.

No. 1

The specimen is a rhyolite granophyre composed of scattered phenocrysts of β quartz, orthoclase, and plagioclase in a granophyric matrix. The matrix consists of small euhedral orthoclase-some derived from plagioclase by replacement-in a microcrystalline fibrous orthoclase-quartz base. Quartz phenocrysts show large overgrowths filled with orthoclase inclusions. Irregular interstitial patches of shreddy sericite are associated with calcite, hisingerite, and rutile and represent the breakdown of mafites.

A few altered pyrite crystals were noted.

26 Minerals are present in the following estimated amounts: quartz 8%, orthoclase 72%, plagioclase 15%, sericite 4%, calcite and hisingerite each 0.5%, and traces of rutile.

No. 3

The specimen is a rhyodacite composed of scattered phenocrysts of β quartz, plagioclase, and hornblende in a flow-oriented plagioclase matrix. Quartz in the matrix occurs as filigreed networks interstitial to plagioclase. Orthoclase is also interstitial to plagioclase which it marginally replaces. Coarse hornblende phenocrysts are wholly replaced by sericite and hematite. Hematite disseminated throughout the fabric may in part be derived from glass. Leucoxene is a rare accessory.

27 Minerals are present in the following estimated amounts: quartz 7%, orthoclase 10%, plagioclase 68%, sericite 10%, hematite 4%, and traces of leucoxene.

No. 5

The specimen is a muscovite schist composed of crudely foliated coarse muscovite interlayered with bands richer in quartz and feldspars. Larger quartz or plagioclase grains are present as broken augen wrapped around by muscovite. Rutile occurs as clusters of small grains concentrated in muscovite bands.

28 Pyrite originally present is replaced by coarsely crystalline goethite. The pyrite appears to be of at least metamorphic age. Its oxidation has resulted in veining of muscovite by clays.

The original sandy shale has been mesozonally metamorphosed.

Minerals are present in the following estimated amounts: quartz 22%, muscovite 61%, plagioclase 3%, orthoclase 5%, goethite 6%, rutile 1%, and clays 2%.

NO. 6

The specimen is a granodiorite (or rhyodacite) porphyry composed of phenocrysts of hornblende and clusters of plagioclase crystals in a fine grained matrix of subhedral plagioclase and granular quartz. Orthoclase is interstitial to and slightly embays matrix plagioclase. Hornblende phenocrysts are sharply euhedral. Many are replaced by pennine, epidote, and traces of calcite. Plagioclase is only very slightly replaced by sericite.

29

Alteration has been deuteric.

Minerals are present in the following estimated amounts: quartz 22%, orthoclase 8%, plagioclase 55%, hornblende 4%, pennine 7%, epidote 2%, sericite 0.5%, calcite 0.5%, magnetite 0.5%, and sphene and allanite in traces.

No. 7

The specimen is a rhyolite granophyre composed of rare phenocrysts of β quartz, sanidine, and plagioclase in a slightly granophyric matrix of plagioclase and interstitial quartz. The matrix plagioclase is extensively replaced by orthoclase. β quartz phenocrysts show thin poikilitic overgrowths. Sericite and calcite, probably originally derived from mafites, have been redistributed and recrystallized interstitially throughout the fabric.

30

Traces of sharply euhedral pyrite disseminated throughout the fabric have been altered to hisingerite.

Minerals are present in the following estimated amounts: quartz 5%, orthoclase 64%, plagioclase 23%, sericite 4%, calcite 3%, and hisingerite 1%.

No. 8

The specimen is a rhyolite or microgranite porphyry composed of small isolated plagioclase and β quartz phenocrysts in a matrix nearly as coarse grained. The matrix consists of euhedral plagioclase and especially orthoclase pseudomorphs after plagioclase with interstitial quartz. The quartz is only very slightly graphically intergrown with orthoclase. Coarse, randomly oriented sericite shreds are interstital to other minerals. Calcite occurs in thin stringers winding along grain boundaries and shows a tendency to replace plagioclase. Rutile is a rare accessory.

31

Traces of euhedral pyrite are altered to hisingerite.

Minerals are present in the following estimated amounts: quartz 28%, orthoclase 59%, plagioclase 6%, sericite 5%, calcite 1%, hisingerite 0.5%, and traces of rutile.

no. 2

The specimen is a meta-andesite composed originally of plagioclase phenocrysts in an equigranular matrix. Mafites have been wholly replaced by new hornblende and associated disseminated biotite. Sphene in altered mafites is recrystallized and surrounded by thin rims of pennine. The new biotite is also disseminated in, and formed at the expense of plagioclase.

NK #6
640'

This low mesozonal metamorphism has been followed by veining by quartz, adularia, and stilbite. In thin zones along these veins plagioclase and mafites are slightly altered to clinozoisite and calcite.

Minerals are present in the following estimated amounts: plagioclase 39%, hornblende 26%, biotite 14%, adularia 8%, sphene 3%, clinozoisite 1%, pennine 3%, stilbite 3%, quartz 2%, and apatite and calcite in traces.

32

Pyrite is related to the later, epizonal veining.

no. 3

(Thin section study in toto not requested)

The rock is very similar to no. 2 above and the biotite is metamorphic.

Box 872
Douglas, Arizona, 85607
November 7, 1968

Mr. Oliver B. Kilroy
Suite 401
Tueson Title Insurance Building
Tucson, Arizona, 85701

Dear Mr Kilroy:

I promised to clarify the metamorphic relations in your prospect area when we discussed it today.

From the few thin sections I have seen, I am tempted to piece together the following sequence of events: Regional metamorphism of upper epizonal grade has been locally affected by intrusives in the sequence of rocks-these have produced aureoles of higher (mesozonal) metamorphic grade. This metamorphism has produced the assemblage biotite-epidote-hornblende. Cooling of the mesozonally metamorphosed rocks has again produced an epizonal assemblage of minerals-among which are pyrite and chalcopyrite.

A later and evidently unrelated episode involves production of andalesite, topaz etc. in the mesozone followed by epizonal sericite, gypsum etc. This second alteration episode does not seem to have been related to introduction of copper and, in many other areas studied which show similar alteration, the alteration is barren in terms of mineralization.

Hope this helps clarify the situation.

Sincerely,

Sidney A. Williams

saw/s

Box 872
Douglas, Arizona, 85607
February 28, 1969

Oliver B. Kilroy
Suite 401
Tucson Title Insurance Building
Tucson, Arizona, 85701

Dear Mr. Kilroy:

I have reviewed the thin sections I had previously analyzed in context with F. D. MacKenzie's geologic map of the Ellsworth mining district. This will represent an attempt to create a model for the district insofar as possible with available data.

The major rock type exposed in the district is a banded sequence of metamorphic rocks which evidently lose their compositional banding in some areas. Petrographic study of these rocks indicates that the original units were largely intrusives such as tonalite with lesser exposures of pelitic, or rarely limy sediments. Areas now showing bedding may well represent original sedimentary sections while homogenous units probably are derived from intrusive rocks.

These rocks have been regionally metamorphosed under conditions of moderate confining pressure and little shearing stress in the low mesozone. New metamorphic assemblages produced are generally characterized by biotite or hornblende with stable plagioclase.

Retrograde metamorphism was then imposed upon these rocks and was often controlled by fractures or, less commonly, compositional horizons in the metamorphics. The dominant new mineral of this episode is chlorite which can invariably be shown to be isochemically derived. Other minerals observed in this assemblage are as follows: pyrite, chalcopyrite, galena, sphalerite, quartz, calcite, sericite, adularia, prehnite, and heulandite. These minerals normally

are confined to veins and their chemical compatibility with the enclosing rocks is striking; only Cu and S are really exotic. Isochemical derivation of these elements is strongly suggested. The low packing index and highly hydrous state of these minerals is in agreement with the textural evidence for a structurally relaxed environment during veining.

There is no evidence for temperature zoning during either the regional metamorphism or the later veining described above.

The lamprophyric and diabasic dikes in the metamorphics are undoubtedly late or post-metamorphic for the most part, and it seems likely that there have been several episodes of hypabyssal intrusions. There is no evidence that any of these dikes is a likely ore generator; however, some have behaved passively as favorable sulfur receptors and may even have contained sulfur during deuteric alteration.

The quartz monzonite intrusive shown on the east edge of MacKenzie's map has not effected thermal metamorphism of the metamorphic host rocks over most of the area. It has probably profoundly affected rocks in the area mapped as "bleached", however. Rocks in these zones, originally meta-igneous and metasedimentary, have been later metamorphosed almost beyong recognition to a new highly aluminous assemblage characterized by diaspore, kaolin, andalusite, topaz, and lazulite. This assemblage contains exotic F.

Thermal metamorphism of sulfur-bearing rocks by an outside source is indicated. The new assemblage contains abundant alumina, silica, and sulfur-an end composition shown to be derived from thermal metamorphism of pelitic or volcanic rocks rich in sulfur in many other districts. The crucial component seems to be high sulfur fugacity-this favors an aluminous assemblage. The volume losses commonly observed in such rocks have been observed in the samples from the Ellsworth district.

The general absence of structurally controlled sulfides in these rocks argues for an earlier age for the sulfides-the quartz monzonite is a highly unlikely source.

There are two interesting conclusions to be drawn from this model of the district. One is that the aluminous assemblage is likely to occur in (and over) relatively sulfur-rich rocks, and these rocks are obviously more favorable targets.

A more important conclusion is based on the well established evidence for late regional metamorphic mobilization of sulfides. Since these sulfides and their low density gangue minerals favor structurally relaxed areas, folds in the metamorphic terrain should be carefully prospected.

Respectfully submitted,

S. A. Williams

Dr Sidney A. Williams

saw/s

CONSULTING
MINING GEOLOGIST
TUCSON, ARIZONA

SCALE 1"-40'

MT. SECTION
INCLINATION -90
STARTED
COMPLETED
DEPTH 900'
NOTES BY W. D. MacKENZIE

HOLE NO. O.B. Kilroy
PROPERTY
LOCATION NK No 3
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 1 OF 3

ROCK AND ALTERATION	U.S.C.	GEOLOGY	% REC.	CORE ASSAYS SECTION	CU.				SLUDGE ASSAYS SECTION	CU.			
		0-340' Rotary drill Lt gray schist with some diabase.											
			80	322-333	.06	(ARIZONA ASSAY OFFICE)							
		340'	75	333-346	.065	(ARIZONA ASSAY OFFICE)							

HAWLEY & HAWLEY ASSAYERS AND CHEMISTS, INC.
TUCSON, ARIZONA

F. D. MacKenzie
CONSULTING
MINING GEOLOGIST
TUCSON, ARIZONA

SCALE 1"-40'

DIRECTION Vertical
INCLINATION -90
STARTED
COMPLETED
DEPTH 900'
NOTES BY F.D.MacKENZIE

HOLE NO. NK No.3
PROPERTY O.B.Kilroy
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 3

ROCK AND ALTERATION	COL	GEOLOGY	% REC.	CORE ASSAYS BY KILROY SECTION	CU.	S	FE		SLUDGE ASSAYS SECTION	CU.
350' 340-500' weak pyrite mineralization		340-500' Light gray schist.	65	346-363	.065	ARIZONA ASSAY OFFICE				
			85	363-376	.06				11	
			90	376-384	.085				11	
			90	384-393	.06				11	
			85	423-433	.06				11	
			95	451-461	.075	1.57	6%		11	
		500' 500-529' Thin bedded black shale.								
		529' 529-540' Lt gray diabase and 540' shale interbedded.								
		540-562 Black shale								
		562 566 Lt -med dk green-gray diabase								
		566-582 Black shale 582								
		582-604' Diabase								
weak marcasite and pyrite mineralization		604' 610' Black shale								
		610-622 Diabase								
		622' 622-661' Black shale								
		661' 665' Diabase								
		665-702' Black shale and diabase intermixed.								

HAWLEY & HAWLEY ASSAYERS AND CHEMISTS, INC.
TUCSON, ARIZONA

F. D. MacKenzie
CONSULTING
MINING GEOLOGIST
TUCSON, ARIZONA

SCALE 1"-40'

DIRECTION Vertical
INCLINATION -90
STARTED
COMPLETED
DEPTH 900'
NOTES BY F.D.MacKENZIE

HOLE NO. NK No. 3
PROPERTY O.B.Kilroy
LOCATION
COLLAR COORD. N E
COLLAR ELEV.
SHEET 3 OF 3

ROCK AND ALTERATION	GOL	GEOLOGY	% REC.	CORE ASSAYS BY K. HARDY SECTION	CU.				SLUDGE ASSAYS SECTION	CU.			
700		702'											
702-745' weak calcite		702-745' Black shale											
		745'											
		745-765' Diabase and shale intermixed.											
		765'											
		765-826' Black shale											
		826'											
mild alteration (5)		826-852' Lt green-gray med. grained diabase											
		852'											
		852-870' dk gray -blk shale											
		870'											
876		870-876' Diabase											
		876-887' blk shale.											
		887											
Abundant Chlorite very wk pyrite & chalcopyrite		887-900' Diabase and schist.	390	896-900	.035	(Arizona Assay Office)							
900 EOH (4)													

HAWLEY & HAWLEY ASSAYERS AND CHEMISTS, INC.
TUCSON, ARIZONA

F. D. MacKENZIE
CONSULTING
MINING GEOLOGIST
TUCSON, ARIZONA

SCALE 1" = 40'

DIRECTION Vertical
INCLINATION -90
STARTED
COMPLETED
DEPTH 623.5'
NOTES BY F.D.MacKENZIE

HOLE NO. NK No.4
PROPERTY O.B.Kilroy
LOCATION N.K.No.91 claim
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 1 OF 2

ROCK AND ALTERATION	LOG	GEOLOGY	% REC.	CORE ASSAYS BY KILROY SECTION	CU.	SILVER (OZ)		SLUDGE ASSAYS SECTION	CU.			
		0-181' No core located										
		HANDPICKED SPECIMENS FROM CORE BOXES	80	50-100	>1000 PPM		(HAWLEY & HAWLEY)					
		HAND PICKED SPECIMENS FROM CORE BOXES	85	138-176	.06	1.0	(ARIZONA ASSAY OFFICE)					
Moderate pyrite in bedding 45		181' 181-199' Thin bedded Black shale 199	90	181-490	48 PPM		(HAWLEY & HAWLEY)					
		199-230' Thin bedded lt gray-green shale and sandstone.										
		230' 230-428' Alternating light gray and dark(Black) shale Below 250' core is broken badly.										
1" seam quartz with specks of MoS_2 at 265' Weak gypsum at 277' Numerous seams of calcite between 300-385'			90	290-300	46 PPM	.98	SULPHIDES (HAWLEY & HAWLEY)					

F. D. MacKenzie
CONSULTING
MINING GEOLOGIST
TUCSON, ARIZONA

SCALE 1"-40'

DIRECTION Vertical
INCLINATION -90
STARTED
COMPLETED
DEPTH 623.5'
NOTES BY F. D. MacKENZIE

HOLE NO. NK No.4
PROPERTY O.B.Kilroy
LOCATION NK N. 91 claim
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 2

ROCK AND ALTERATION	LOG	GEOLOGY	% REC.	CORE ASSAYS (BY HAWLEY) SECTION	CORE ASSAYS CU.	SLUDGE ASSAYS SECTION	SLUDGE ASSAYS CU.
350'							
(8)			90	385-395	48 PPM (HAWLEY & HAWLEY)		
		428'					
		428'-446' Lt gray Diabase					
		446'					
		446-500' Thun bedded black shale					
		500'					
		Lt gray diabase					
		511'					
11-517 Weak pyrite		517' Dk gray diabase					
		524 Black shale					
24-527' Minor pyrite		527' Md-dk green gray diabase.					
eak epidote.		533' Black shale					
27-533' small calcite		Lt gray fine grained diabase.					
veinlets. (21)		549'					
		549-623.5 Black Shale					
579-EOH Thin calcite veinlets faulted from (592-595' 610-623'							
		623.5' EOH					

HAWLEY & HAWLEY ASSAYERS AND CHEMISTS, INC.
TUCSON, ARIZONA

CONSULTING
MINING GEOLOGIST
TUCSON, ARIZONA

SCALE 1"-40'

DIRECTION Vertical
INCLINATION -90
STARTED
COMPLETED
DEPTH 653 ft.
NOTES BY F.D.Mackenzie

HOLE NO. NK No.6
PROPERTY O.B.KILROY
LOCATION NK No.51 Claim
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 1 OF 2

ROCK AND ALTERATION	LOG	GEOLOGY	% REC.	CORE ASSAYS SECTION	CORE ASSAYS CU.	SLUDGE ASSAYS SECTION	SLUDGE ASSAYS CU.
		0-112' Diabase					
		112'					
	(12)	112-120' Schist					
		120					
		120-168' Fine grained greenish Diabase					
		168'					
		168-207' Lt. grayish Hornblende gneiss					
		207'					
		207-250.5' fine grained light green Diabase					
		250.5'					
Abundant epidote 250.5-259' 55°		259' grayschist or gneiss					
		267 Diabase					
		271 Gneiss					
		271-314' Diabase					
Abundant epidote 271-314'							
		314'					
		314-353' Micaceous schist.					

F. D. MACKENZIE
CONSULTING
MINING GEOLOGIST
TUCSON, ARIZONA

SCALE 1"-40'

DIRECTION Vertical
INCLINATION -90
STARTED
COMPLETED
DEPTH 653
NOTES BY F.D.MacKENZIE

HOLE NO. NK No.6
PROPERTY O.B.Kilroy
LOCATION NK No.51 claim
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 2

ROCK AND ALTERATION	LOG	GEOLOGY	% REC.	CORE ASSAYS (By Kilroy) SECTION	CU.				SLUDGE ASSAYS SECTION	CU.			
350		353-450' Diabase											
370-381' fault with feOxs													
		450' 450-615' Lt grayish Schist(gneiss?)											
			Na	480-483	.04	(ARIZONA ASSAY OFFICE)							
		615' 615-653' Light gray Dolerite?											
(18)		653' EOH											

CONSULTING
MINING GEOLOGIST
TUCSON, ARIZONA

SCALE 1"-40'

DIRECTION Vertical
INCLINATION -90
STARTED
COMPLETED
DEPTH 111 feet
NOTED BY F.D.MacKENZIE

HOLE NO. NK No.7
PROPERTY O.B.Kilroy
LOCATION NK No.210 claim
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 1 OF 1

ROCK AND ALTERATION	LOG	GEOLOGY	% REC.	CORE ASSAYS SECTION	CORE ASSAYS CU.				SLUDGE ASSAYS SECTION	SLUDGE ASSAYS CU.			
		0-111' Medium gray quartz monzonite with minor amounts of pyrite thru-out.											
(16)		111' EOH											

HAWLEY & HAWLEY ASSAYERS AND CHEMISTS, INC.
TUCSON, ARIZONA

L. CLARK ARNOLD
Consulting Geologist
5115 NORTH ORACLE ROAD
TUCSON, ARIZONA 85704

(602) 887-5341

Dec. 2, 1975

Mr. Oliver B. Kilroy
45 West Pennington Street
Tucson, Arizona 85701

Dear Oliver:

At your request I have examined, logged and sampled the interval between 641 and 1665 T.D. in assessment drill hole NK-WO-6 at your Salome prospect. Since I have not been involved in any other work on the property my comments and conclusions pertain only to the interval referred to above. Briefly stated, my conclusions are as follows:

(1) Drilling, sampling, assaying and petrographic work have been done in a methodical and systematical way - analytical results appear to be reliable.

(2) The rock cored represents a series of fine-grained Mesozoic (?) clastic rocks which have been intruded by small andesitic dikes and sills and subsequently subjected to regional metamorphism.

(3) My experience suggests that the pyritic mineralization observed is adequate to explain the I.P. anomaly described by Mining Geophysical Surveys.

(4) The general intensity of alteration and mineralization does not appear to change significantly within the 1000-foot interval cored in this hole.

Within the interval cored thinly laminated, obviously sedimentary rocks, alternate with more massive schists and phyllites. Comparison of hand specimens with specimens described petrographically indicates that the finer grained, more massive schists and phyllites tend to represent the metamorphic product of intrusive rocks of andesitic composition. Alteration effects which may have been produced by the andesitic dikes and sills appear to have been subsequently masked by the medium grade regional metamorphism which has effected these rocks. Sulfide mineralization consisting principally of pyrite and/or pyrrhotite, sphalerite, galena and chalcopyrite is sparse throughout the hole although disseminated pyrite accounts for 1-2% of total rock volume in some sections, particularly the metamorphosed black shales. Sparse sulfides are also noted in thin, discontinuous quartz-carbonate veinlets.

My feeling is that the sparse sulfide mineralization observed is a combination of syngenetic pyrite in the shaley sections and minor amounts of pyrite, chalcopyrite, sphalerite and galena which were introduced along with the small intrusive bodies which cut the fine-grained clastic section. The relationship between sulfides and intrusive rocks is neither pronounced nor consistent as shown on the accompanying graphic assays, and I suspect that remobilization during metamorphism may account for this affect.

The presence of disseminated and veinlet sulfide mineralization anywhere in southern Arizona merits careful examination and systematic evaluation of the source which you have recently completed. My feeling regarding this work is that it tends to be negative rather than encouraging for two reasons. The first is the virtual total absence of skarn minerals in an environment which would be expected to form an excellent skarn assemblage under the right conditions of temperature and pressure. Also discouraging is the absence of even moderately strong or continuous mineralized structures in the 1000-foot section examined.

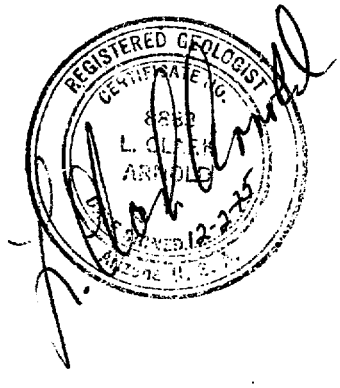
Regarding future exploration and potential, I suggest that a comparison of the effects observed in this hole be made with those encountered in previous drilling and that the prospect be evaluated in that light rather than as a vertical zoning target since the only real vertical change appears to be an increase in anhydrite beginning at about 1427 feet. As you know, I feel that this anhydrite is probably a reflection of the sedimentary stratigraphy rather than a notable change in intensity of hydrothermal processes.

Yours very truly,

L. Clark Arnold

L. Clark Arnold

LCA/jeb
Enclosures



LOG SUMMARY
NK-WO-6

Drill hole NK-WO-6 was deepened from 641' to 1665' between September 23 and October 18, 1975. Statistical data for the coring are tabulated below:

Contractor	Grubbs & Sons - Casa Grande, Arizona
Type of core	~~NX~~ BX
Depth cored	1024 feet
Core recovered	963.25
Overall recovery ...	94%
Days coring	25
Footage per 24-hour day	41

Drilling in this interval intersected a series of regionally metamorphosed fine-grained clastic sedimentary rocks of probable Mesozoic age as well as small meta igneous bodies which were also found to be regionally metamorphosed. These rocks were found to contain up to 1-2% disseminated pyrite particularly in the meta shale sections, but no important mineralized structures were intersected and despite the occasional presence of chalcopyrite, galena and sphalerite, assay values remained near background throughout the interval drilled.

Sampling of the core for assaying was done by chipping rather than splitting the core systematically on approximately one-foot intervals.

L. CLARK ARNOLD
Consulting Geologist
5115 NORTH ORACLE ROAD
TUCSON, ARIZONA 85704

(602) 887-5341

Dec. 5, 1975

Mr. Oliver B. Kilroy
45 West Pennington Street
Tucson, Arizona 85701

Dear Oliver:

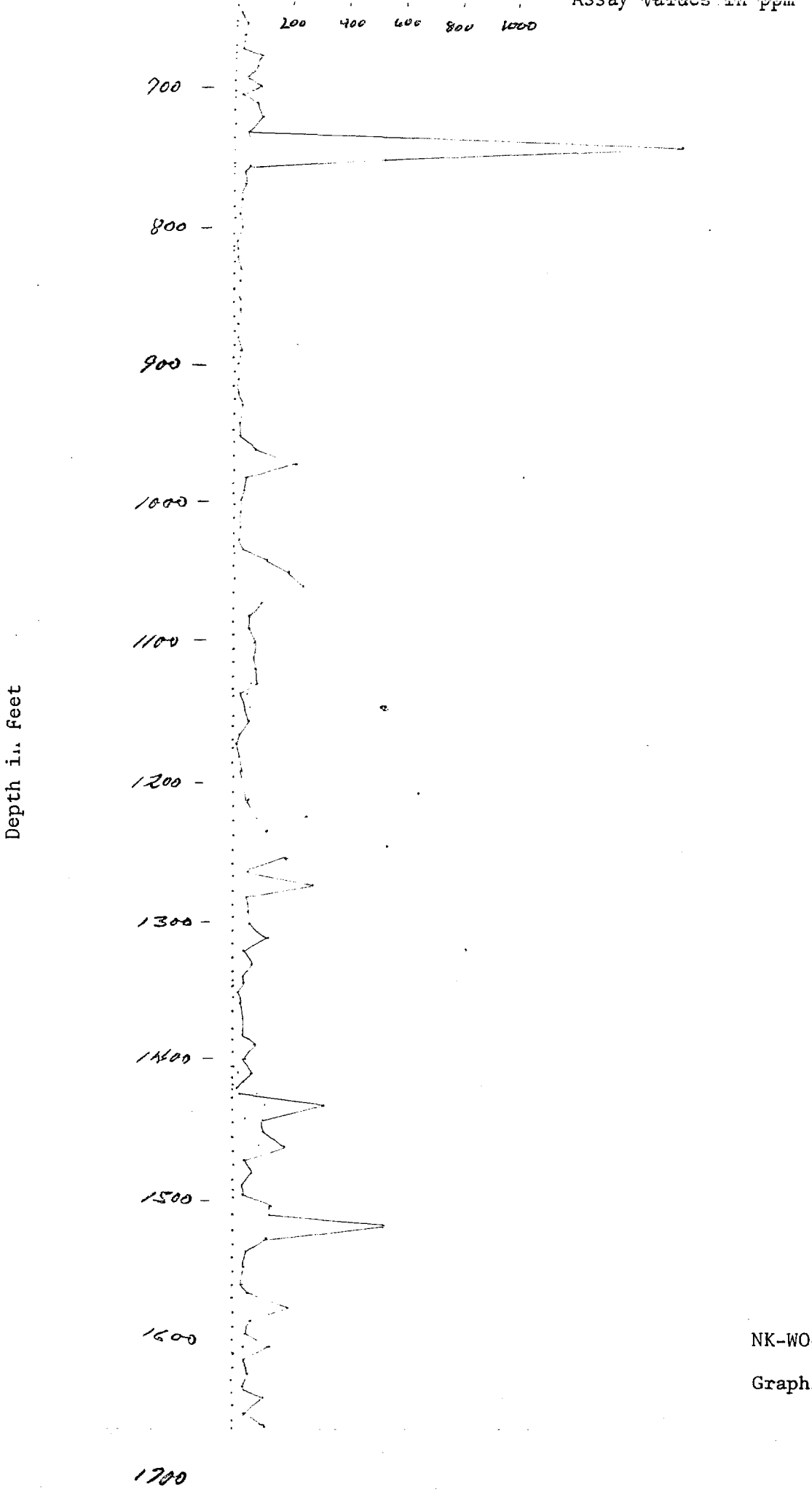
Enclosed are Pb-Zn-Cu graphic assays which I had intended to include with the log for NK-WO-6. They were mistankenly omitted when we assembled the report.

Yours very truly,

Clark

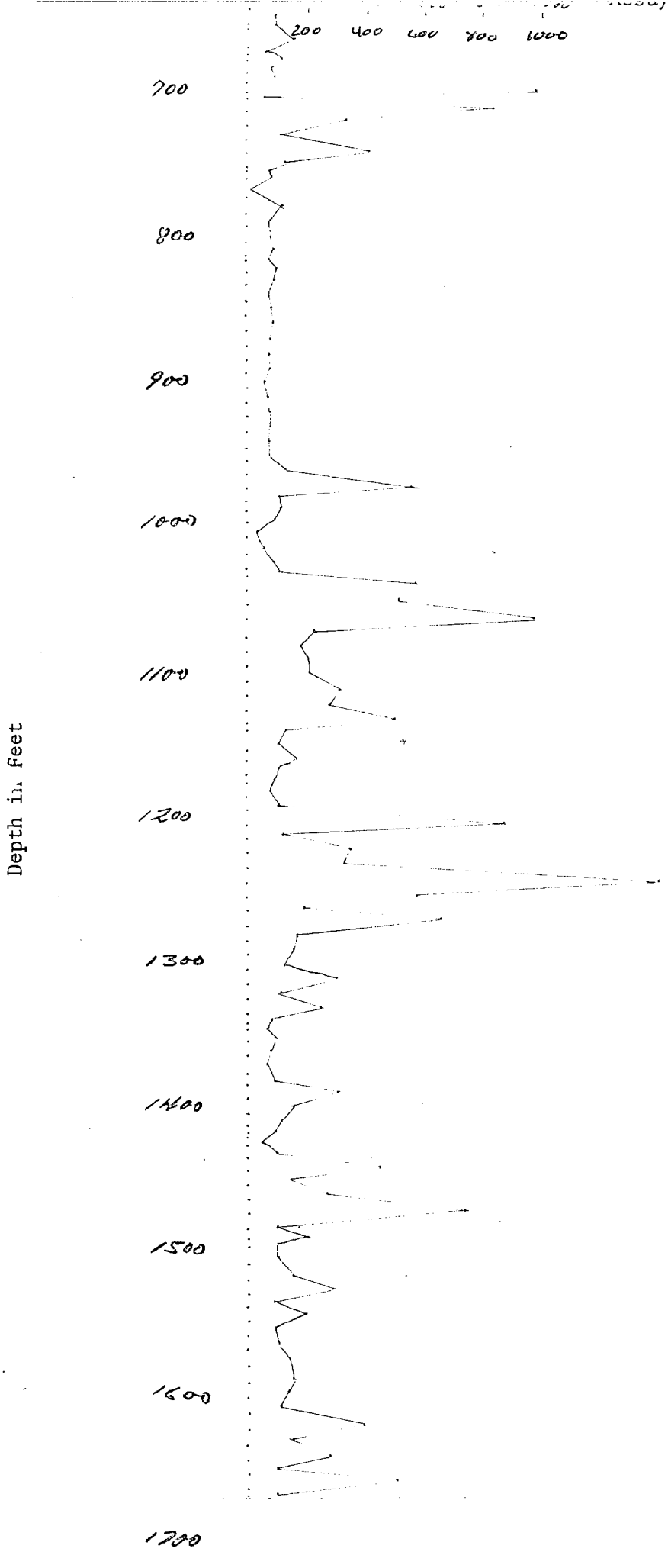
L. Clark Arnold

LCA/jeb
Enclosures



NK-WO-6

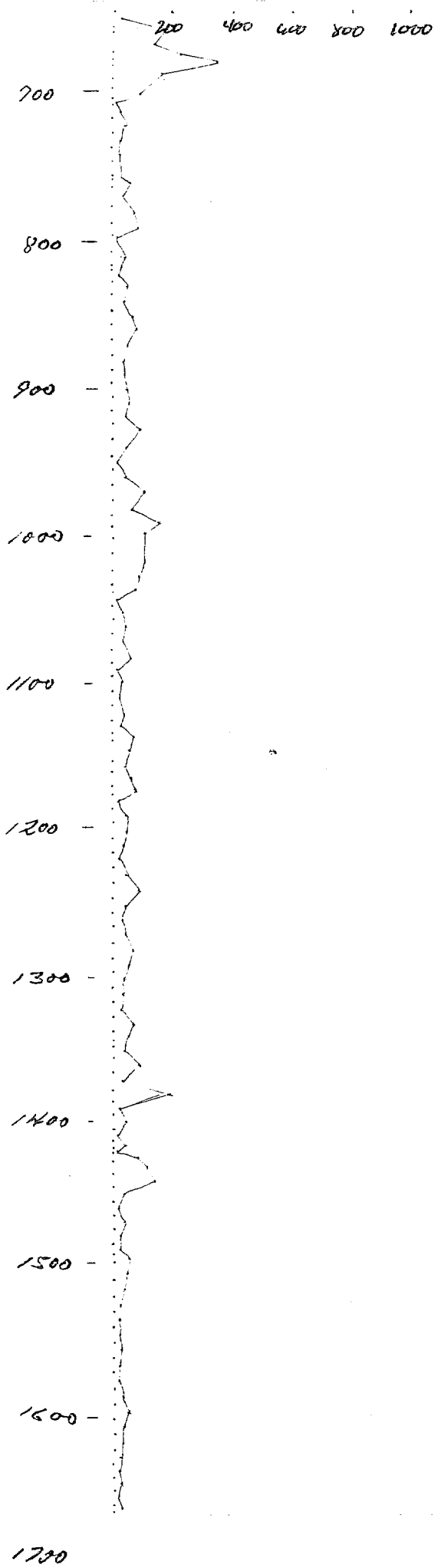
Graphic Assay Pb



NK-WO-6

Graphic Assay Zn

Assay Values in ppm



Depth in Feet

NK-WO-6

Graphic Assay Cu

PROJECT _____ PAGE _____

D.D.H. No. NK-WO-6 SCALE 1"=10' BY L. C. ARNOLD

CO-OR _____ COLLAR EL ±1920 DATE 9-23-75 TO 10-18-75

±8000' EAST AND 2250' N OF SW COR. SEC. 9 T5N R14W Yuma Co.

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu		Pb	Zn	MINERAL Au	Ag	Mo	Ni
					START CORING										
1/2 2/1					641-652 CHLORITE-BIOTITE SCHIST GREENISH GRAY - VERY FINE GRAINED. FOLIATION DIPS 30° - PARTING 20° 1/4-1/8" CARB. BANDS PARALLEL FOLIATION.	641	652	55		15	80				
3/10					652-656 STEEPLY DIP IRREG QTZ-CARB. VEINS - SPARSE PY, CPY & MARCASITE.	652	656	170		40	85				
5/15					656-670 SPOTTED CHLORITE SCHIST - GRAY - VERY FINE GRAINED. FOLIAT. DIPS 30° PARTING DIPS 20° 1/8-1/4 CARB. BANDS PARALLEL FOLIATION. SPARSE IRREG. QTZ-CARB. VNLTS WITH VERY SPARSE CPY.	656	670	140		35	150	<0.02	1.0	<2	55
2/9					670-675 IRREG QTZ. CARBONATE VEINS IN SCHIST. VEINS 1"-2" CARRY SPARSE PY - HAVE STRONG CHL. EDGE.	670	675	230		25	55				
12/22					675-679 CHLORITE SCHIST - LIGHT GREENISH GRAY - WEAK FOL. ±30°	675	679	350		90	115				
8/7					679-688.5 ZONE OF IRREG. QTZ CARB. VEINS 6" TO 1' - CARRY SPARSE DISSEM CHALCOPYRITE.	679	688.5	170		75	75				
4/16					688.5-695 QTZ. CARB.-CHLORITE SCHIST. GRAY - VERY FINE GRAINED. FOLIATION DIPS 0°. OCCASIONAL QTZ-CARB. VEINS 1/2-1" WITH 1/16 BIO. ALT. SELVAGE.	688.5	695	95		45	80	<0.02	0.2	2	55
1/3					695-701 BIOTITE SCHIST - BLACK - VERY FINE GRAINED. STRONGLY DEFORMED FOLIATION IRREG. BUT ±25° DIP.	695	701	10		80	1000				
10/1					701-706 CHLORITE - CARB. SCHIST - LIGHT GRAY GREEN - VERY FINE GRAINED - FOLIATION DIPS ±40° - DEFORM CARB. BANDS PARALLEL FOL.	701	706	35		20	50				
9/2					706-734 META CALC SILTSTONE - DARK GRAY VERY FINE GRAINED - WELL DEVEL LAMINAE DIP ±20°. VERY SPARSE PYRITE ON BEDDING PLANES. NOTE POSSIBLE VERY SPARSE SPHALERITE IN CARB. VEINLETS.	706	715	40		75	830				
5.5/2						715	725	25		100	330				
1/10					734-735 META QTZITE? LT. GRAY - VERY FINE GRAINED - SPARSE PYRITE.	725	735	25		50	105	<0.02	0.8	<2	35
15/2 15/8					735-753 META CALC SILTSTONE - SAME AS 706-734 LAMINAE DIP ±20' SOME DEFORM AT 735'. 740	735	745	30		1600	400				

PROJECT _____ PAGE 2
D.D.H. No. NK-6 SCALE _____ BY _____
CO-OR _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralization	Alteration	Structure	Rock Type	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu		Pb	Zn	MINERAL Au	Ag	Mo	Ni
5/8					740	735	745	30		1600	400				
7/21												<02	0.8	<2	35
8/8					750	745	753	30		520	115				
					753-757 CHLORITE SCHIST - GRAY - SPOTTED PSEUDO PORP. TEX - PORPHYROBLASTS ARE CARB - NO ATTIT OF FOL. RECOGNIZED	753	757	60		50	65				
4.5/7					757-761 META LIMY SILTSTONE - DARK GRAY - LAMINAE DIP ±25°. OPEN SPACES FILLED WITH CALCITE - VERY SPARSE PY IN VN. 760	757	761	20		35	55				
4/6					761-774 STRONGLY DEFORMED CARBONACEOUS SHALE. INCLUDES WHITE LIMY BRECCIA FRAGS ? 770 VERY SPARSE CHALCOPYRITE. FRACTURE SURFACES ARE SMOOTH AND SLICKENSIDED.	761	774	45		35	15	SEE SPEC. ANAL ATTACHED.			
1.5/															
2.5/4															
1.5/					774-814 QUARTZ - CHLORITE SCHIST - LIGHT GRAY - VERY FINE GRAINED. FOLIATION FAINT TO ABSENT - WELL DEVEL PARTING DIPS ±40° UNIT CARRIES 780 VERY SPARSE PYRITE. THIS SECTION NON LIMEY EXCEPT FOR SMALL AMOUNTS OF INTRODUCED CALCITE IN VEINLETS. NO REACTION HCl.	774	785	80		25	110	<02	0.2	<2	55
1.5/2															
4/40															
25/															
5/45					790	785	795	95		10	60				
2/															
1/															
1.5/															
1/															
1/					800	795	805	15		20	60				
3.5/4															
2/2.5					(807-814 PROBABLY ORIGINALLY A NON LIMEY FINE GRAINED CLASTIC ROCK) 810	805	814	45		5	65				
5.5/45															
5.5/5					814-818 META ANDESITE (?) - GRAY - VERY FINE GRAINED REMNANT POR. TEX. ABUN. CHLOR. - NO FOLIATION - CALCITE VNLTS.	814	818	30		5	55				
15/8.5					820 818-947.5 CHLORITIC PHYLLITE - LIGHT GRAY - VERY FINE GRAINED. WEAK FOLIATION DIPS ±0°. - FORMS	818	825	25		5	85	<02	0.2	<2	65
5.5/					830 "LENSES" OF DARK FINE GRAINED MATERIAL. ROCK CUT BY VEINS OF CARBONATE & OCCAS. ANHYDRITE AS AT 831'. VEINS HAVE APPEARANCE OF HEALED BRECCIA.	825	835	50		15	70				
5.5/5															
5.5/5					840	835	845	45		10	55				

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D.D.H. No. No 6 SCALE _____ BY _____

CO-OR _____ COLLAR EL _____ DATE _____

% Core Recovery | Mineralization | Alteration | Structure | Rock Type

840

DIP 50-90°. THOSE WITH SLIGHTLY HIGHER CARBONATE CHLORITE CONTENT OFTEN CARRY SPARSE PYRITE.

850

(848-850 - 2' ZONE OF HEALED BRECCIA)

860

870

880

(881 - 1' ZONE HEALED BRECCIA)

890

(890-892 - 2' ZONE HEALED BRECCIA)

910

920

930

940

CORE ASSAYS

INTERVAL FROM	INTERVAL TO	MINERAL Cu		MINERAL Pb	MINERAL Zn	MINERAL Au	MINERAL Ag	MINERAL Mo	MINERAL Ni
835	845	45		10	55	<.02	0.2	<2	65
845	855	70		10	65				
855	865	85		15	70				
865	875	50		5	65	<.02	<0.2	<2	60
875	885	30		5	65				
885	895	35		20	65				
895	905	40		5	45				
905	915	55		5	50				
915	925	35		5	55	<.02	<0.2	<2	70
925	935	100		15	65				
935	947.5	40		10	60				

PROJECT [illegible] PAGE 4
D.D.H. No. No. 6 SCALE ____ BY ____
CO-OR ____ COLLAR EL ____ DATE ____

% Core Recovery	Mineralization	Alteration	Structure	Rock Type	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu		Pb	Zn	MINERAL Au	Ag	Mo	Ni
5/5					940										
5/5						935	947.5	40		10	60	<.02	<0.2	<2	70
5/5					947.5 - 992										
5/5					Metasiltstone - dark gray -	947.5	955	10		15	65				
5/5	PY				very fine grained - well laminat.										
5/5					Laminae dip ±20°. Section is										
5/5					locally limey (956-970) and limey	955	965	40		70	105				
5/5	PY				section carries sparse pyrite										
4/5					as bedding plane replace-							<.02	0.2	<2	30
4/5					ment and in carbonate										
4/5					970 veinlets.	965	975	110		210	540				
5/5					@ 970 - 1' zone of strong										
5/5					deformation and carbonate										
5/5					addition.										
5/5					980 978 - 1' zone strong deform.	975	985	65		40	85				
5/5					and carb. addition or mobilization.										
5/5						985	992	165		35	90				
5/5					990										
5/5					992 - 1021 Spotted phyllite.										
5/5					Light gray green - fine grained.	992	1000	110		20	70				
5/5					Very weak foliation dips ±40°.										
5/5					1000 Spots are chlorite aggregates										
5/5					Unit carries sparse pyrite on	1000	1010	115		20	35				
5/5					chloritized slickensided parting										
5/5					surfaces which dip 0-20°										
5/5					1010										
5/5					@ 1008, 1010, & 1012 note med to							<.02	0.2	<2	85
10/10					strong carb veins dip ±60°.										
10/10					Veins irreg. - no appar. min.	1010	1021	85		20	45				
10/10					1020										
5/5					1021-1036 Meta siltstone - light gray										
5/5					fine grained - non limey except where										
5/5					introduced. Weak - mod. fol. dips ±20°	1021	1030	75		10	60				
5/5					Carb. veinlets carry sparse py.										
5/5					1030 Very fine grained reddish										
5/5					brown mineral in matrix - possib.										
5/5					oxidized biotite.	1030	1036	5		25	95				
5/5															
5/5						1036	1045	35		115	560	<.02	0.4	<2	20
5/5					1040										

PROJECT _____ PAGE 5

D.D.H. No. NK-6 SCALE _____ BY _____

CO-OR _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralization	Alteration	Structure	Rock Type	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu		Pb	Zn	MINERAL Au	Ag	Mo	Ni
					1040										
					1036-1132 METASIDERITE - HIGH CHLORITE - DARK GRAY - VERY FINE GRAINED. WELL DEVELOPED LAMINAE DIP 3 40°. UNIT IS LARGELY LIMEY AND CARRIES AMPLE CARBONATE VEINLETS THROUGHOUT. GARNETS NOTED IN THIN SECTION AT 1050' ARE BARELY VISIBLE IN HAND SPECIMEN. ALSO @ 1050' NOTE SPARSE PYRITE ON LAMINAE ASSOCIATED WITH BLUE GRAY GRAPHITE. SPARSE PYRITE IS PRESENT THROUGHOUT AS LAMINAE REPLACEMENT AND ON HAIRLINE CARB VEINLETS.	1036	1045	35		115	560				
					1050	1045	1055	45		195	500				
					1060	1055	1065	35		250	970	602	0.4	2	20
					1070	1065	1075	55		90	205	SEE SPEC. ANAL. ATTACHED			
					(1064 - 1/2' ZONE FRACTURING AND SLICKENSIDES) 1080	1075	1085	15		60	160				
					(1066-68 - NOTE VERY FINE GRAINED CHLORITIC PHYLLITE - WEAK FOLIATION THIS UNIT STANDS SHARP CONTRAST TO STRONG BANDING IN OTHER UNITS) 1090	1085	1095	35		60	190				
					1100	1095	1105	35		70	195				
					1110	1105	1115	30		75	290	602	0.2	2	20
					1120	1115	1125	40		75	265				
					(1128 - 1' ZONE STRONG DEFORM. & CARBONATE INTRUSION) 1130	1125	1133	30		80	400				
					1133-1139.5 CHLORITIC PHYLLITE - GREENISH GRAY - VERY FINE GRAINED. WEAK FOLIATION DIPS @ 30°. NON LIMEY EXCEPT AS INTRUDED IN 1/2" VEINLETS. NOTE REDDISH BROWN MICA IN MATRIX 1140	1133	1139.5	70		25	115	602	0.2	2	70
						1139.5	1152	50		35	90				

PROJECT _____ PAGE 6

D.D.H. No. NK-6 SCALE _____ BY _____

CO-OR _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralztn	Alteration	Structure	Rock Type	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu		Pb	Zn	MINERAL Au	Ag	Mo	Ni
5/5					1140 1139.5-1152 META LIMEY SHALE-META SILTSTONE - GRAY TO DARK GRAY WELL DEVEL. LAMINAE ∠20° MOD. CARB. CONTENT APPEARS ORIGINAL. NOTE SPARSE PYRITE ON LAMINAE.	1139.5	1152	20		25	90				
5/5					1150										
5/5					1152-1176 CHLORITIC PHYLLITE - GREENISH GRAY - WEAK FOLIATION DIPS ± 20°. NOTE	1152	1160	45		50	150	<.02	0.2	<2	70
25.5/25.5					1160 MODERATE FREQUENCY OF QTZ-CARB VEINLETS DIPPING ± 35°. AT 1157 NOTE 1/2" QTZ-CARB VEIN WITH GALENA	1160	1170	60		20	40				
					1170	1170	1176	70		10	70				
					1176-1225										
10/10					1170 METASHALE - METASILTSTONE - GRAY TO DARK GRAY VERY FINE GRAINED WELL DEVELOPED LAMINAE DIP ∠20°. LIME IS PRESENT THROUGHOUT AND IS	1176	1185	20		25	65				
					1190 INTRODUCED OR REMOBILIZED ON 1/16" - 1/2" CARB. VEINLETS.	1185	1195	40		30	95				
10/10					PYRITE (SPARSE) ON LAM. SURFACES AND CARB. VEINLETS. VEINLETS										
6.5/6					1200 ALSO CARRY VERY SPARSE SPHALERITE.	1195	1205	45		660	880	<.02	0.2	<2	25
5.0/5.0					1210	1205	1215	35		50	100				
8.5/8.5															
10/10					1220	1215	1225	20		260	335				
10/10					1230 (1231-1235 - 4' CRUSH ZONE - POSSIBLE GRAPHITE ON SLICKENSIDED SURFACES.	1225	1235	45		115	310	<.02	0.4	<2	20
6/6.5					1240	1235	1245	10		540	1400				

PROJECT [illegible] PAGE 7
D.D.H. No. NIL-6 SCALE BY
CO-OR COLLAR EL DATE

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu		Pb	Zn	MINERAL Au	Ag	Mo	Ni
[illegible]					1240	1235	1245	90		540	1400				
[illegible]					1250 (@1251' NOTE 1' ANDESITE DIKE - GRAY GREEN WITH MODERATE DEVELOP PORPHYRITIC OR PARPHYRITIC DIABASIC TEXTURE.	1245	1255	40		120	360	<.02	0.4	<2	20
10/					1260	1255	1265	30		60	170				
9/ 10					1270	1265	1275	45		295	630				
10/ 10					1280	[illegible]	[illegible]	70		50	155				
10/ 10					1290	1285	1295	50		55	140	<.02	0.2	<2	20
10/ [illegible]					1300	1295	1305	25		55	105				
5.5/ [illegible]					1310	1305	1315	30		135	285				
[illegible]					1320	1315	1325	25		40	80				
4/ [illegible]					1330	1325	1335	45		70	215	<.02	0.2	<2	45
4.5/ 5.0					1335-1341 META ANDESITE-PORPHYRY - GRAY - VERY FINE GRAINED WITH POORLY DEVELOPED HIATAL TEXTURE - CARRIES VERY SPARSE DISSEM Py. 1340	1335	1341	50		30	60				

PROJECT _____ PAGE 8
D.D.H. No. NIL-6 SCALE _____ BY _____
CO-OR _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralization	Alteration	Structure	Rock Type	Description	CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu		Pb	Zn	MINERAL Au	Ag	Mo	Ni
15/15					1340	1340	1341	50		30	60				
2/2					1341-1345.5 META SHALE AND META SILTSTONE SAME AS 1176-1335	1341	1345.5	35		35	55				
14/15					1345.5-1355 META ANDESITE - GRNY. FINE GRAIN 1350 WEAKLY DEVEL. DIABASIC TEX. FELDSPAR IS FRESH TO SLIGHTLY CLOUDED. ABUN. CHL - V. SPARSE DISSEM & UNLT PY.	1345.5	1355	75		20	70	<.02	0.2	<2	45
10/10					1355-1378 1360 META SHALE AND MUDSTONE SAME AS 1176-1335.	1355	1365	25		30	65				
7/4.5			Δ		1370	1365	1378	190		30	45	SEE SPEC. ANAL ATTACHED.			
7/5			Δ												
7/5			Δ												
7/5			Δ												
7/5			Δ		1380 1378-1385 PHYLLITE - GRAY - VERY FINE GRAINED. FOLIATION DIPS 20°. CARRIES V. SPARSE PY ON HAIRLINE CARBONATE VEINLETS.	1378	1385	15		30	65				
10.5/10.5					1385-1412							<.02	0.2	<2	20
					1390 META LIMY SHALE - META LIMY SILTSTONE. SAME AS 1176-1335	1385	1395	40		75	285				
					CARRIES SPARSE PYRITE (PYRRHOTITE?) ON BEDDING LAMINAE. LAMINAE 1400 DIP ± 20°	1395	1405	40		45	130				
26.5/25.5					(@1401 NOTE IRREGULAR CORE - QUARTZ VEIN - UNMINERALIZED)										
					1410	1405	1412	15		55	100				
					1412-1418 SPOTTED PHYLLITE - GRAY GREEN - MED GRAINED. FOLIATION POORLY DEVEL. - HAS PSEUDO POR. TEXTURE. ABUN. CHLORITE, SPARSE EPIDOTE AND ANHYDRITE. SPARSE DISSEM PY & PY IN CARB VEINLETS.	1412	1418	40		30	75				
					1420 1418-1420 SAME AS 1385-1412	1418	1420	15		20	35				
					1420-1427 META DIABASE - SAME AS 1345.5-1355.	1420	1427	85		25	70	<.02	0.2	<2	50
10/					1427-1491.5 META LIMEYSHALE & 1430 META LIMEY SILTSTONE - GRAY WITH WELL DEVELOPED LAMINAE WHICH DIP 40° CARRIES SPARSE	1427	1435	110		320	425				
10/10					1440	1435	1445	40		120	135				

PROJECT NK-Group PAGE 9
D.D.H. No. NK-6 SCALE BY
CO-OR COLLAR EL DATE

% Core Recovery	Mineralization	Alteration	Structure	Rock Type	Depth	Description
10/10					1440	PYRITE, CHALCOPYRITE AND POSSIBLE SPHALERITE-GALENA ON CARB-ANHYDRITE VEINLETS.
10/					1450	
					1460	
20/20						
					1470	
10/10					1480	
9/10					1490	1491.5-1498 DIABASE-GRAY GREEN VERY FINE GRAINED WITH POORLY DEVELOPED DIABASIC TEXTURE SPARSE EPIDOTE AND DISSEM PYRITE
10/10					1500	1498-1665 TD.
						METASHALE-META LIMEY SILTSTONE DARK GRAY-VERY FINE GRAINED WITH WELL DEVEL LAMINAE DIP 15°-30°. UNIT CUT BY NUMEROUS CARB-ANHYDRITE VEINS. THESE VEINS CARRY SPARSE GAL, SPHALERITE AND PYRITE.
10/					1510	
6/					1520	(C1517 - QTZ VEIN WITH SPARSE GALENA - DIPS 45°
4/						
9/10					1530	DIP 20°
3/4					1540	

CORE ASSAYS

INTERVAL FROM	INTERVAL TO	MINERAL Cu		MINERAL Pb	MINERAL Zn	MINERAL Au	MINERAL Ag	MINERAL Mo	MINERAL Ni
1435	1445	40		100	135	<.02	0.2	<2	50
1445	1455	30		105	250				
1455	1465	20		195	710				
						<.02	0.2	2	20
1465	1475	40		45	75				
1475	1485	20		65	185				
1485	1491.5	20		35	85				
1491.5	1498	60		35	85				
1498	1510	50		130	135				
1510	1520	35		530	275	<.02	0.2	<2	35
1520	1530	25		125	65				
1530	1540	20		50	185				

PROJECT [illegible] PAGE 10
D.D.H. No. 6 SCALE BY
CO-OR COLLAR EL DATE

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type	Depth	Description
9/4					1540	
10/10					1550	
10/10					1560	
10/10					1570	
10/10					1580	
					1590	(1591 - 2" ANHYDRITE VEIN WITH GALENA.)
10/10					1600	
10/10					1610	
10/10					1620	
10/10					1630	
11/11					1640	(1635 - ANHYDRITE ZONE)

CORE ASSAYS

INTERVAL FROM	INTERVAL TO	MINERAL Cu		MINERAL Pb	MINERAL Zn	MINERAL Au	MINERAL Ag	MINERAL Mo	MINERAL Ni
1530	1540	20		50	125	<.02	0.2	<2	35
1540	1550	20		40	70				
1550	1560	30		60	95				
1560	1570	20		55	115	<.2	0.2	2	20
1570	1580	20		210	145				
1580	1590	30		85	120				
1590	1600	50		40	80				
1600	1610	30		145	385	<.02	0.2	<2	20
1610	1620	30		50	130				
1620	1630	20		60	275				
1630	1640	15		50	75				

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D.D.H. No. NL-4 SCALE _____ BY _____

CO-OR _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralization	Alteration	Structure	Rock Type	
11/11					1640
14'					
10/10					1650 (1650 2" ZONE ANHYDRITE)
					Dip 20°
10/10					1660
					1665 BOTTOM OF HOLE.
					1670

CORE ASSAYS

INTERVAL FROM	INTERVAL TO	MINERAL Cu		MINERAL Pb	MINERAL Zn	MINERAL Au	MINERAL Ag	MINERAL Mo	MINERAL Ni
1630	1640	15		50	75	<.02	0.2	<2	20
1640	1650	25		105	420	<.02	0.2	2	25
1650	1660	15		55	10				
1660	1665	25		105	120				

SEE SPEC. ANALYSIS ATTACHED.

P. O. Box 872
Douglas, AZ 85607
October 31, 1975

Oliver B. Kilroy
#5 Calle Corta
Tucson, AZ 85716

I have sectioned all of the core samples you sent, examined them all, and described some of them formally. I hope I have answered all the specific questions you put forth in the formal descriptions. As for the others, those not described, I list answers to your questions below. These samples have not been formally described because they so strongly resemble others that have been described.

NK - 6	930	similar to 1162 but coarser grained. The blue color in the vein you question owes to calcite enclosing chlorite. No tremolite or wollastonite noted.
NK - 6	1050	silty shale like 711' and also with a few garnets. The blue-grey spots on one end are graphite.
NK - 6	1075	shale with an occasional garnet just like 711'. The pink spots you question are laumontite, occurring in late or post-metamorphic veins.
NK - 6	1250	meta shale like 711, etc.
NK - 6	1286	some shale. A few shattered garnet crystals but rock is not garnetized.

NK - 6	1389	biotite-rich meta shale; you are correct in spotting pyrrhotite on fractures
NK - 6	1480	meta-shale; coarse quartz-rich lamina carries pyrite, galena, and sphalerite; pyrrhotite in rock.
NK - 6	1665	meta-shale with pyrrhoite; late zeolite - calcite veins carry pyrite.

I hope these data are of help to you. I will keep the slides on file here in case you have further questions.

Best regards

Sid

Sidney A. Williams

SAW:bj
encls.

NK - 6 653

The original rock was a dioritic intrusive porbably composed primarily of coarse, randomly oriented plagioclase laths and interstitial hornblende. Textures have been almost obliterated by intense mesozonal metamorphism and some K-metasomatism.

Plagioclase has recrystallized to coarse amoeboid crystals showing little twinning. Granular quartz and plagioclase occupy the interstices. The former calcic cores of these crystals are heavily sericitized. Small brown biotite flakes stipple the crystals and are concentrated closely where they have replaced former mafites. These clusters include ragged hornblende relicts or pennine derived from hornblende, granular sphene, apatite, and magnetite.

Garnet (the brown mineral marked with arrows) occurs only along shear zones. These are filled with coarse quartz and lenses of ragged, interlocking orthoclase grains. Orthoclase attacks the vein walls as well. Pyrite and minor marcasite and chalcopyrite were noted in the veins together with coarse calcite.

NK - 6 711

The original rock was a black, carbonaceous shale, perhaps with some alternate lamellae of silty or calcareous material. The rock has been mesozonally metamorphosed.

Most of the rock consists now of parallel foliae of sericite that kink and warp around lenses or individual grains of quartz and orthoclase. The sericite is liberally dusted with graphite. Small tablets of biotite lie in the bedding plane and seldom cut across the foliation.

Other lamellae appear as veins, parrallel to the bedding owing to recrystallization. Typically these consist of coarse quartz (with frilly, sutured mutual boundaries), calcite, and sericite. Strings, lenses, and border zones carry coarse clinozoisite and pennine along with other species such as pyrite, apatite, sphene, etc. Coarse fresh orthoclase may fill interstices between quartz grains. One lamina, rich in clinozoisite, carries a few fractured garnet anhedra. Tiny quartz veinlets cut across the foliation leading away from the siliceous laminae and rapidly dying out.

No manganese minerals were noted.

NK - 6 760

The specimen is a breccia of shale fragments. These are angular chunks of a black calc-shale and brecciation may have occurred during synmetamorphic (epizonal) deformation, for many fragments are crumpled or folded.

NK - 6 760 con't.

As a result of the epizonal metamorphism quartz and orthoclase have recrystallized, together or indipendently and usually in the breccia matrix or fold cores of crumpled fragments. Coarse sericite has developed in most fragments and its foliation appears to be mimetic. Opaque graphitic material still clouds the shale but has been expelled or pushed aside by calcite crystalloblasts. Small brown tourmaline euhedra are crystallized sparingly in some fragments.

Thin quartz - calcite veins cutting the fabric carry rare pyrite. These are cut by later large veins of fluorite, stilbite, calcite and anhydrite that carry small beads of galena and sphalerite. The anhydrite subsequently has mostly altered to gypsum.

NK - 6 850

The original rock seems to have been a diorite. It was a porphyritic rock with numerous equant phenocrysts of plagioclase and poikilitic hornblendes set in a granular matrix of plagioclase, mafites, and accessories such as magnetite and sphene. The rock was strongly sheared prior to mesozonal metamorphism.

The plagioclase has been broken down physically and recrystallized with typical degenerate albite twinning. Patchy replacement by microcline was noted in some crystals. Clusters of small pale brown biotite flakes doubtless derive from former hornblende and in some places relicts of this hornblende were seen. Climps of granular sphene also tend to be embedded in biotite clusters. Pyrite occurs in retrograde or late metamorphic fractures, sometimes with quartz.

Minerals are present inthe following estimated amounts: microcline 3%, plagioclase 71%, biotite 13%, hornblende 3%, quartz 4%, sphene 2%, pyrite 2%, magnetite 0.5%, apatite 0.5%, calcite 0.5%, pennine 0.5%.

NK - 6 1162

The original rock may have been an andesite composed of uniform sized laths of plagioclase and interstitial mafites. Small blocky phenocrysts of plagioclase are few indeed, and flowage alignment is crude. The rock has been mesozonally metamorphosed.

Plagioclase remains essentially fresh but appears to be recrystallized; it now occurs as irregular grains, virtually untwinned, with new granular plagioclase along grain boundaries. It is in these interstitial areas that skeletal or ragged flakes of biotite and slender poikilitic hornblende prisms have formed. Hornblende tends to concentrate in knots or pods; it is slightly coarser have and associated with coarse calcite crystalloblasts. Pyrrhotite is associated with retrograde effects, whether disseminated or in veins with calcite, pennine, and prehnite.

Mineral percentages are estimated as: plagioclase 71%, hornblende 12%, biotite 9%, calcite 3%, pyrrhotite 0.5%, sphene 1%, magnetite 0.5%, quartz 2%, pennine 0.5%, prehnite 0.5%, apatite tr..

NK - 6 1350

The specimen is an andesite of lamprophyric aspect, doubtless a hypabyssal rock. The texture is even, with randomly oriented plagioclase laths and interstitial basaltic hornblende and augite. Numerous magnetite and sphene subhedra occur in the interstices. Minor accessory quartz occurs in the interstices. The rock shows mild epizonal alteration.

Plagioclase is fleckes with coarse, shreddy sericite and the margins nibbled by coarse calcite crystalloblasts. While basaltic hornblende remains markedly fresh, augite is severely corroded by coarse pennine and calcite. Traces of pyrite occur in shear zones, sometimes occupied by veinlets, that cut the fabric. These carry a gangue of zeolites, calcite, and minor quartz, and have bleached selvages.

Percentages of minerals present are as follows: plagioclase 29%, basaltic hornblende 22%, calcite 9%, magnetite 2%, augite 1%, sphene 1%, pennine 13%, stilbite 1%, chabazite 0.5%, quartz 1%, pyrite tr..

NK - 6 1572

The specimen is a silty sediment with numeorus quartz clasts in a thick-bedded matrix of fine grained quartz, feldspars, mafites, and other detritus. One graphitic shale lamina also was noted. The rock has been metamorphosed in the mesozone.

Quartz shows strong growth, especially in the matrix where it forms lacy crystalloblasts. Other new species have formed in abundance in the matrix, particularly randomly oriented flakes of biotite. Less common are hornblende prisms (riddled with included quartz and feldspar) and stubby clinozoisite prisms. Calcic plagioclase clasts form peculiar sieve-like intergrowths with quartz. Granular calcite, perhaps of late metamorphic age, occurs in lenses throughout the matrix. Biotite has formed abundantly in the shaly lamina.

Late metamorphic veins carry albite; these are cut by later veins of laumontite, calcite, and minor sulfide (pyrite and galene).

P. O. Box 872
Douglas, AZ 85607
November 4, 1975

Oliver B. Kilroy
#5 Calle Corta
Tucson, AZ 85716

Dear Oliver:

I have reviewed your slides and prepared an additional three in order to answer the specific questions you have posed.

Referring first to your letter:

1.) I see little difference in metamorphic grade in the hole and biotite is of the same age and significance throughout. My apologies if a carelessly used adjective implied something special about biotite at 1572.

2.) My answer here is similar; the quartz appearing in some specimens is, in my opinion, "local" quartz. For this reason, its abundance would only relate to the composition of the original rock. It is possible that its appearance in veins or pods (by remobilization) is important, but an impression of this could only be gained from a log of the core, not from detailed study of isolated specimens.

Below I have referred to the questions enclosed with the four latest core samples.

1133.5 The rock is not garnetized as you ask, but has the assemblage biotite - clinochlore (chlorite), as well as remnants of earlier actinolite. The white fluffy mineral on fractures is clay (with calcite); other large veins in the sample carry stilbite.

1589.5 The cream colored mineral you circled is gypsum. It derives from anhydrite, much of which also survives in the vein.

1639.5 The brownish mineral you marked is pyrrhotite. Another you marked is indeed biotite and chlorite but the alteration is the reverse - biotite going to chlorite. You ask about the veins. In this case, and in most other samples, I consider them retrograde metamorphic rather than hydrothermal. However, just classifying them in this manner avoids the genetic argument. The fact is, it's difficult to assess the origin of the veining and sulfides except to say that evidence favors this hypothesis: the metals and materials were available in the rocks during the peak of the metamorphic event and migrated (as vein materials) while the rocks cooled down. The metamorphic event leaves me no clues as to whether the metals are syngenetic or were hydrothermally introduced *prior* to metamorphism.

1648 The brown mineral indicated, and throughout the veinlets, is sphalerite, not garnet. The other mineral at the arrow is pyrite, not chalcopyrite.

I am interested in your observation that the anhydrite veining increases with depth. This could be readily explained if you are drilling in upper Paleozoic rocks.

I hope my comments will prove helpful to you.

Best regards,

Sid

Sidney A. Williams

SAW:bj

P. O. Box 872
Douglas, AZ 85607
November 28, 1975

Oliver B. Kilroy
45 West Pennington Street
Tucson, Arizona 85701

Dear Oliver:

Enclosed are descriptions of your last samples. I trust these will satisfactorily answer your questions.

You refer to high values of Ba, Sr, and F. I have seen fluorite on occasion as you know, but have seen no mineral containing essential Ba or Sr. The Ba could well be hidden in the orthoclase, Sr in a number of species. If your anomalous values are in the order of 0.X%, this suggestion would surely be tenable.

Best regards,

Sideny A. Williams

SAW:bj
encls.

NK - 6 1650A

The original rock was a black shale, a well bedded finely laminated rock. Laminae of fine detrital quartz alternate with those rich in argillic matter, and the latter were generally rich in organic matter. The rock has been subsequently metamorphosed in the mesozone.

Quartz has recrystallized, even to the extent of migrating as veins or pods of coarse, granular material. One such vein, seen here, carries coarse biotite (now largely retrograde pennine), pyrite, and is partially lined with crude prisms of lotrite. Calcite blebs in the quartz are common. The argillic laminae are converted to mimetically foliated scales of both biotite and muscovite stippled with ill-formed flakes of graphite. Very fine grained orthoclase may occur in the interstices.

Minerals are present in the following estimated amounts: quartz 42%, orthoclase 5%, biotite 11%, pennine 0.5%, calcite tr., graphite 18%, magnetite 2%, pyrite 1%, muscovite 20%, lotrite 0.5%.

Specific questions asked are answered as follows:

1) The blue mineral on the fracture is allophane, a very late-formed clay.
2) The brownish film seen spotting the blue is hisingerite; elsewhere in the specimen I think you are observing biotite.
3) The black specks in the white mineral (which is calcite) are bits of graphite. This vein was not cut in the slide.

NK - 6 1650B

The specimen is a shale similar to 1650A but differs slightly in carrying some coarser, sandy laminae that alternate with silty and argillaceous layers. Quartz is the major detrital species in sandy lenses, but is accompanied by plagioclase is silty ones. The rock has been mesozonally metamorphosed.

Argillaceous laminae are recrystallized to mimetically foliated biotite and muscovite. The biotite may retrogress to pennine. Microcrystalline orthoclase may fill the interstices, and these laminae are particularly occluded with graphite. Where graphite is most abundant, small prisms of clinozoisite may occur. In silty laminae, growth of quartz may result in peculiar quartz - feldspar intergrowths. One large, highly irregular garnet crystalloblast was also seen in this assemblage.

Percentages of minerals present are as follows: orthoclase 4%, quartz 51%, graphite 11%, calcite 10%, biotite 13%, muscovite 4%, plagioclase 6%, clinozoisite 0.5%, pyrite 0.5%, garnet 0.5%, pennine 0.5%.

Specific questions are treated below:

1) The blue mineral is again allophane. I saw no anhydrite, but suspect it would be older than the allophane.

NK - 6 1656

Specific questions are listed below:

1) The tan mineral you refer to is pyrrhotite, although you suggest gypsum. This leads me to believe that arrow #1 is intended to point at the very faintly tan calcite in that area.
2) The blue "string" is retrograde pennine, probably admixed with graphite.
3) There is pyrrhotite over arrow #3; the grey area is calcite darkened somewhat by graphite dust-like inclusions.
4) The green and brown mineral (s) over arrow #4 are biotite that is partly retrogressed to chlorite.
5) The shimmering brown at arrow #5 is foliated biotite mixed with some graphite.

Sample No.: 1250

Name: Quartz-sericite schist

Mineralogy:	Comp. (%) Est. x PC Orig.	Pres.	Individual Minerals Average size (mm)	% Alt'd.	Alteration products
quartz		55			
plagioclase		10			
ser/muscovite		20			
biotite		4			
K-feldspar		2			
chlorite		4			
opaques		3			
iron oxides		2			
tourmaline		tr			
leucoxene		tr			
apatite		tr			

Petrography:

As seen in thin section, this sample is a quartz-sericite schist (composed predominantly of those two minerals, along with relatively minor amounts of plagioclase, K-feldspar, biotite, etc.) Extremely fine-grained opaque minerals (probably largely carbonaceous material) are scattered throughout the rock, generally being concentrated along certain bands and lenses.

Most of the mineralogy and textures have apparently been derived entirely from the metamorphic processes. However, a few narrow, irregular veinlets composed of opaque minerals and iron oxides cut through the rock nearly at right angles to the overall schistosity. No hydrothermal effects are visible in the rock marginal to these veinlets, except for slight, local chloritization. Nearly all of the chlorite in the rock, however, other than this, appears to be metamorphically derived.

WESTERN PETROGRAPHIC

Sample No.: 1562

Name: Altered arkosic sandstone (or graywacke)

Mineralogy:	Comp. (%) Est. x PC Orig.	Pres.	Individual Minerals Average size (mm)	% Alt'd.	Alteration products
quartz		45			
plagioclase		11			
ser/muscovite		2			
other mic. alt. prods.		5			
biotite		1			
calcite		12			
K-feldspar		4			
clays		6			
chlorite		3			
epidote		1			
opaques		2			
iron oxides		2			
zeolites		4			
tourmaline		-			
leucoxene		2			
apatite		tr			

Petrography:

As seen in thin section, this sample is an altered, metamorphosed impure sandstone (or graywacke). The rock is composed of poorly sorted quartz, feldspar, calcite, etc.

Subsequent fracturing and veining are prominent in this sample. The veins are generally at high angles to the bedding or schistosity, and have been filled with mixtures of calcite, K-feldspar, zeolites, clays, opaques, and iron oxides. However, hydrothermal effects extending from the veinlets are very slight to nonexistent on the rock itself.

WESTERN PETROGRAPHIC

Sample No.: 1593

Name: Quartz-biotite schist

Mineralogy:	Comp. (%) Est. x PC Orig.	Pres.	Individual Minerals Average size (mm)	% Alt'd.	Alteration products
quartz		55			
plagioclase		10			
ser/muscovite		1			
other mic. alt. prods.		-			
biotite		9			
calcite		3			
K-feldspar		2			
clays		3			
chlorite		2			
epidote		-			
opaques		3			
iron oxides		1			
zeolites		10			
tourmaline		tr			
leucoxene		1			
apatite		tr			

Petrography:

This sample has undergone metamorphism of a higher grade than the two previous samples (1250 and 1562). The rock has a somewhat similar texture to Sample 1250, but biotite is now abundant (at the expense of sericite-muscovite. This effect is metamorphic, rather than hydrothermal).

Later veins containing zeolites, calcite, K-feldspar, and opaques cut through the rock. The veinlets of K-feldspar tend to be very narrow and irregular. They cut the rock at high angles to the schistosity, but it is not certain whether they are of hydrothermal origin or merely late stage metamorphic. These veinlets generally contain only K-feldspar, except where they cut across quartz grains; there the fractures through the quartz have often been filled with calcite.

WESTERN PETROGRAPHIC

Sample No.: 1630

Name: Schist

Mineralogy:	Comp. (%) Est. X PC Orig.	Pres.	Individual Minerals Average size (mm)	% Alt'd.	Alteration products
quartz		50			
plagioclase		9			
ser/muscovite		12			
biotite		10			
K-feldspar		1			
clays		1			
chlorite		-			
epidote		-			
opaques		15			
iron oxides		2			
tourmaline		tr			
leucoxene		tr			
apatite		tr			
zircon		tr			

Petrography:

As seen in thin section, this sample is a strongly schistose rock consisting primarily of quartz, feldspar, micas, and opaques. The opaque minerals consist of extremely fine-grained, apparently largely carbonaceous, material strongly disseminated throughout the rock (concentrated especially in certain bands and lenses).

The rock is cut by apparently secondary veinlets of quartz generally parallel to the schistosity; these veins usually contain abundant calcite. Other quartz bands, metamorphically derived, generally contain no calcite. The rock has been weakly to moderately fractured (at high angles to the schistosity); these fractures have generally been filled with calcite. No hydrothermal alteration effects extend into the rock from these fractures.

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

REPORT OF SPECTROGRAPHIC ANALYSIS

Job No. 122347
H&H No. 752350
November 12, 1975

O. B. Kilroy
Kilroy Investments
45 W. Pennington St., #212
Tucson, Arizona 85701

Values reported in parts per million, except where noted otherwise, to the nearest number in the series 1, 1.5, 2, 3, 5, 7 etc.

Element	Sample Number NK-6 761-774	NK-6 1065-1075	NK-6 1365-1378	NK-6 1650-1660
Fe	3%	5%	3%	3%
Ca	3%	5%	3%	2%
Mg	1%	2%	1%	1.5%
Ag	<1	1	1	<1
As	<500	<500	<500	<500
B	50	30	50	30
Ba	700	1,000	700	1,000
Be	2	<2	2	2
Bi	<10	<10	<10	<10
Cd	<50	<50	<50	<50
Co	20	20	15	10
Cr	100	300	200	200
Cu	100	150	500	20
Ga	<10	10	10	10
Ge	<20	<20	<20	<20
La	50	20	50	70
Mn	500	1,000	500	500
Mo	<2	<2	<2	<2
Nb	20	20	20	20
Ni	20	70	20	15
Pb	20	100	20	50
Sb	<100	<100	<100	<100
Sc	30	30	20	30
Sn	<10	<10	<10	<10
Sr	100	700	300	700
Ti	2,000	3,000	2,000	3,000
V	100	100	70	70
W	<50	<50	<50	<50
Y	30	30	30	30
Zn	<200	<200	<200	<200
Zr	100	70	100	100

W. L. Lehmbeck-Manager

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
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(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION		Cu ppm	Pb ppm	Zn ppm
1	NK-6	641-652	55	15	80
2		652-656	170	40	85
3		656-670	140	35	150
4		670-675	230	25	55
5		675-679	350	90	115
6		679-688.5	170	75	75
7		688.5-695	95	45	80
8		695-701	10	80	1000
9		701-706	35	20	50
10		706-715	40	75	830
11		715-725	25	100	330
12		725-735	25	50	105
13		735-745	30	1600	400
14		745-753	30	520	115
15		753-757	60	50	65
16		757-761	20	35	55
17		761-774	45	35	15
18		774-785	80	25	110
19		785-795	95	10	60
20		795-805	15	20	60
21		805-814	45	5	65
22		814-818	30	5	55
23		818-825	25	5	85
24		825-835	50	15	70
25		835-845	45	10	55
26		845-855	70	10	65
27		855-865	85	15	70
28		865-875	50	5	65
29		875-885	30	5	65
30		885-895	35	20	65
31		895-905	40	5	45
32		905-915	55	5	50
33		915-925	35	5	55
34		925-935	100	15	65
35	NK-6	935-947.5	40	10	60

TO:

Kilroy Investments
45 West Pennington St., # 212
Tucson, Arizona 85701

Attn.: Mr. O. B. Kilroy

REMARKS:

Trace analysis
Spectrographic analysis to follow.
Page 1 of 4 - Part I

CERTIFIED BY:

DATE REC'D: 10/24/75

DATE COMPL.: 10/31/75

JOB NUMBER: 752350 - Part I

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Pb ppm	Zn ppm
36	NK-6 947.5-955	10	15	65
37	955-965	40	70	105
38	965-975	110	210	540
39	975-985	65	40	85
40	985-992	165	35	90
41	992-1000	110	20	70
42	1000-1010	115	20	35
43	1010-1021	85	20	45
44	1021-1030	75	10	60
45	1030-1036	5	25	95
46	1036-1045	35	115	560
47	1045-1055	45	195	500
48	1055-1065	35	250	970
49	1065-1075	55	90	205
50	1075-1085	15	60	160
51	1085-1095	35	60	190
52	1095-1105	35	70	195
53	1105-1115	30	75	290
54	1115-1125	40	75	265
55	1125-1133	30	80	480
56	1133-1139.5	70	25	115
57	1139.5-1152	50	35	90
58	1152-1160	45	50	150
59	1160-1170	60	20	80
60	1170-1176	70	10	70
61	1176-1185	20	25	65
62	1185-1195	40	30	95
63	1195-1205	45	660	880
64	1205-1215	35	50	100
65	1215-1225	20	260	335
66	1225-1235	45	115	310
67	1235-1245	90	540	1400
68	1245-1255	40	180	560
69	1255-1265	30	60	170
70	NK-6 1265-1275	45	295	630

TO: Kilroy Investments

Attn.: Mr. O. B. Kilroy

REMARKS:

Trace analysis

Page 2 of 4 - Part I

CERTIFIED BY:

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
10/24/75	10/31/75	752350- Part I

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Pb ppm	Zn ppm
71	NK-6 1275-1285	70	50	155
72	1285-1295	50	55	140
73	1295-1305	35	55	105
74	1305-1315	30	135	285
75	1315-1325	25	40	80
76	1325-1335	65	70	215
77	1335-1341	50	30	60
78	1341-1345.5	35	35	55
79	1345.5-1355	95	20	70
80	1355-1365	25	30	65
81	1365-1378	190	30	45
82	1378-1385	15	30	65
83	1385-1395	40	75	285
84	1395-1405	40	45	130
85	1405-1412	15	55	100
86	1412-1418	40	30	75
87	1418-1420	15	20	35
88	1420-1427	85	25	70
89	1427-1435	110	320	425
90	1435-1445	40	100	135
91	1445-1455	30	105	250
92	1455-1465	20	195	710
93	1465-1475	40	45	75
94	1475-1485	25	65	185
95	1485-1491.5	20	35	85
96	1491.5-1498	60	35	85
97	1498-1510	50	130	135
98	1510-1520	35	530	275
99	1520-1530	25	125	65
100	1530-1540	20	50	185
101	1540-1550	20	40	70
102	1550-1560	30	30	95
103	1560-1570	20	55	115
104	1570-1580	20	210	145
105	NK-6 1580-1590	30	85	120

TO:

Kilroy Investments

Attn.: Mr. O. B. Kilroy

REMARKS:

Trace analysis

Page 3 of 4 - Part I

CERTIFIED BY:

DATE REC'D: 10/24/75

DATE COMPL.: 10/31/75

JOB NUMBER: 752350 - PartI

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
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Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Cu ppm	Pb ppm	Zn ppm	Au ppm	Ag ppm	Mo ppm	Ni ppm		
106	NK-6 1590-1600	50	40	80						
107	1600-1610	30	145	385						
108	1610-1620	30	50	130						
109	1620-1630	20	60	275						
110	1630-1640	15	50	75						
111	1640-1650	25	105	480						
112	1650-1660	15	35	80						
113	1660-1665	25	105	120						
	Composites:									
114	641-679				<0.02	1.0	< 2	55		
115	679-715				<0.02	0.2	2	55		
116	715-757				<0.02	0.8	< 2	35		
117	757-805				<0.02	0.2	< 2	55		
118	805-845				<0.02	0.2	< 2	65		
119	845-895				<0.02	<0.2	< 2	60		
120	895-947.5				<0.02	<0.2	< 2	70		
121	947.5-992				<0.02	0.2	< 2	30		
122	992-1036				<0.02	0.2	< 2	85		
123	1036-1085				<0.02	0.4	< 2	20		
124	1085-1133				<0.02	0.2	2	20		
125	1133-1176				<0.02	0.2	< 2	70		
126	1176-1225				<0.02	0.2	< 2	25		
127	1225-1275				<0.02	0.4	< 2	20		
128	1275-1325				<0.02	0.2	< 2	20		
129	1325-1365				<0.02	0.2	< 2	45		
130	1365-1412				<0.02	0.2	< 2	20		
131	1412-1445				<0.02	0.2	< 2	50		
132	1445-1491.5				<0.02	0.2	2	20		
133	1491.5-1540				<0.02	0.2	< 2	35		
134	1540-1590				<0.02	0.2	2	20		
135	1590-1640				<0.02	0.2	< 2	20		
136	NK-6 1640-1665				<0.02	0.2	2	25		

TO: Kilroy Investments

Attn.: Mr. O. B. Kilroy

REMARKS: Trace analysis

CERTIFIED BY:

Page 4 of 4 - Part I

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
10/24/75	10/31/75	752350 - Part I

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
(602) 622-4836

CERTIFICATE OF ANALYSIS

Charles E. Thom
Arizona Registered Assaye
William L. Lehm
Arizona Registered Assaye

SAMPLE IDENTIFICATION	GOLD	SILVER	COPPER	LEAD	ZINC	MO	F ppm	
NK-6 1235-1245							2200	

TO:
Kilroy Investments
45 W. Pennington St., # 212
Tucson, Arizona 85701

Attn.: Mr. O. B. Kilroy

REMARKS:
Trace analysis

CERTIFIED BY:

CHARGES:
PREPARATION $
ANALYSIS $ 2.

DATE REC'D:	DATE COMPL.:	JOB NUMBER:	$ 2.
11/17/75	11/20/75	752350-A	

PILLAR, LOWELL AND ASSOCIATES
CONSULTING MINING & GEOLOGICAL ENGINEERS
5115 NORTH ORACLE ROAD
TUCSON, ARIZONA 85704
(602) 887-5341

L. CLARK ARNOLD
CONSULTING GEOLOGIST

March 20, 1978

Mr. Oliver B. Kilroy
5 East Calle Corta
Tucson, Arizona 85716

Dear Oliver:

At your request, I have examined, logged and assisted in sampling of the drill core from drill hole NK-WO-6, at your Salome prospect. This work was done in light of my previous experience with the drilling at Salome (see report L.C. Arnold, December 2, 1975), but without visiting the prospect. I have also reviewed assay and petrographic results, and my conclusions, briefly stated, are as follows:

1. Drilling, sampling and assaying have been accomplished in a very systematic way -- the exploration work meets current industry standards in every way.

2. The general intensity of alteration and mineralization in the interval 1665 - 2464 does not differ significantly from the previous interval logged from 641 - 1665.

3. With perhaps one exception, all assay and petrographic results may be attributed to minor thermal effects associated with small intermediate to basic intrusive bodies which cut the metasedimentary section.

I have prepared graphic assays as well as a summary sheet on a scale of 1":100' to facilitate comparison with previous work. I have also reviewed the assay results in some detail and discussed them with Mr. Bill Lehmbeck of Skyline Laboratories. I have noted six items on the summary sheet which are referred to below:

1 & 2 - Petrographic work by Phelps-Dodge Corporation has revealed the presence of 11% to 24% tremolite at an approximate depth of 2,300 feet in drill hole NK-WO-6. Tremolite rather than chlorite may therefore account for the light greenish color associated with the lower portion of the drill hole and my hand specimen identification of serpentine on page 18 of the drill log should probably be revised. Tremolite is a relatively common product of low to medium grade regional metamorphism and I do not think that its presence in this setting is necessarily

. . .

diagnostic of increasing temperature of formation.

3 & 4 - Apparently anomalous nickel and chromium assays (see Skyline Laboratories' spectrographic analysis) are spacially related to diabase dikes. Under different circumstances, such values for nickel and chromium would be considered anomalous but actually only represent background values for basic igneous rocks.

5 - The assay value of tungsten is somewhat anomalous -- I cannot account for these results but I feel that the significance is very limited because of the nearby background values for tungsten.

6 - This section of the drill hole was described by Phelps-Dodge Corporation as tonalite and appears on my log as marble. I suggest that this interval be rechecked to confirm the lithology.

As you know, fluorine is presently being used as a guide to prospecting in connection with the search for disseminated molybdenum deposits, and background values of 400 - 2,000 ppm fluorine are typical for typical background values in this setting.

The petrographic work by Sid Williams suggests that the narrow quartz carbonate veins intersected by NK-WO-6 in the metasedimentary section do have some pegmatitic affinity. This in itself, however, does not constitute encouragement unless it can be shown that such veins are distinctly related to larger mineralized structures. I suggest that before going further with the Salome prospect that you consider collecting and assaying a suite of calibration samples collected at distances up to several thousand feet from some of the stronger mineralization or mineralized areas in the district.

Yours very truly,

L. Clark Arnold

L. Clark Arnold

LCA/gam

REGISTERED GEOLOGIST
CERTIFICATE NO.
8883
L. CLARK
ARNOLD
DATE SIGNED 3-20-78
Arizona U. S. A.

LOG SUMMARY

NK-WO-6

Drill hole NK-WO-6 was deepened from 1665' to 2464' between January 4 and February 3, 1978. Statistical data for the drilling are tabulated below:

Contractor	Joy Manufacturing, Tucson, Az.
Type of Core	BX
Depth Cored	799'
Core recovered	766.8'
Overall recovery	96%
Days coring	30
Footage per 24 hour day	26.6

Drilling in the interval 1665 - 2464 intersected a series of regionally metamorphosed fine-grained clastic sedimentary rocks which were found to be intruded by small igneous bodies having a basic to intermediate composition.

Rocks locally contain several percent sulfide in the form of pyrrhotite, pyrite, galena, sphalerite and chalcopyrite. No strong mineralized structures were recognized and assay values remained at or near background levels throughout the interval cored.

NK-WC-6

NK-WC-6 1-4-78

1600

1700

1800 Spec #1

1900 Spec #2

Spec #3

2000

Spec #4

2100

2200

Spec #5

Spec #6

2300

Spec #7

Spec #8

2400

T.D 244.4 2-3-78

2500

2600

Composite Assays

Composite Mix - 10 ft Assays

Calc Phyllite

Diab. Dike

Limey Calc Phyllite

Felsic Latite Por

Calc Phyllite

Marble

Reiche Lithologies

Calc Phyllite

Gneiss - 2'

Meta Latite Por (?)

Calcareous Hornfels

Gneiss

Calc Hornfels

Gneiss

Diab Dike - 2'

Calc Phyllite

Diab Dike

Pet Exam
P.D. Corp.

x Meta Calc Silty

x Granodio Por

x Tonalite

x Meta Shale

x Meta Shale

x Shale w/ Sulf.

x Meta Sh w/ Sulf.

x Calc Shale

x Shale Bx.

x Crushed Vein

x Vein & Meta Sed Wall Rock

Meta Shale.

x Meta-Basalt

Meta Shale

Meta Sed w/ Veins

Basalt

Basalt

x Meta Sed ?
Basalt Lamp.
Wk Sulfides.

PROJECT Kirkby - Salome Prospect PAGE 12
D.D.H. No. NK-WO-6 SCALE 1" = 10' BY L.C. Arnold
LOCATION _____ COLLAR EL _____ DATE 1-4-78 / 2-3-78

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
					1660						
					Commence Drill @ 1665' 1-4-78						
					1665-1843						
3/5											
2/3.5					1670 Chl. Phyllite - med lt. gray to med dark gray N4-N6.						
					Very fine grained thin well						
					1680 level. Laminae dip 5-25° to						
21.5/21.5					hole axis.						
					Strongly limy - partic. in						
					lt. col. areas. Carries v. sp.						
					1690 Py - cpy - pyr on fracs.						
3/3					Tot. sul. <1% [illegible]						
					contin. mica. structures.						
10/10					1700 Note lions level. Lenses						
					med coarse mica. phlogopite (?)						
					Dark bands may carry bio or u. dark						
					chlorite.						
9/9					1710						
10/10					1720						
10/10					1730						
2/3											
5/5.5					1740						
2/2					@ 1744. Gouge zone w/ graphite.						
10/10					1750						
					1760						

PROJECT _____ PAGE 13

D.D.H. No. NK-W06 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
10/10					1760						
8/8					1770						
4/4											
9/10					1780						
? 8/7					1790						
10/10					1800						
9.5/9.5					1810						
9.5/9.5					1820						
8/8					1830						
10/10					1840						
? 9/8					1843-1850.5 DIABASE - GRAYISH YELLOW GREEN SGY ½. POORLY DEVEL. DIAB TEX. FIAG APHANIC SERPENTINIZED. CARRIES ±1-2% Py AS BLEB-W/ST. EPI. 1850						
0.1/0.6 6/7					1850.5 - 1909.5 LIMY CALC PHYLLITE SIMILAR TO 1665-1843. BROKEN W/ PARTIALLY CADEN BLEBDIAB IN VICINITY OF DIAB DIKE.						
					1860						

PROJECT _____ PAGE 14

D.D.H. No. NK-WO-6 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
3/4					1860						
2.5/2.5											
6/7											
					1870						
5/5											
5/5											
					1880						
10/10											
					1890						
20.5/20.5					1900						
					1910 1909.5 – 1941 QTZ LATITE TFF. LT. GRAY, N7 – OPEN HIATAL POR TEX. CONSISTS CLOUDED SUBHEDRAL FDL & CHL BIO. IN V.F.G MATRIX						
9/9.5					1920 CARRIES MAG. EPIDOTE SULFIDES SPARSE TO ABSENT.						
17.5/17.5					1930						
4/5					1940 1941-1944 CALC PHYLLITE AS 1665-1843.						
10/10					1944 – 2010 MARBLE. WHITE – TO V. LT GRAY NE-N 9. – FINE GRAINED – [illegible] 1950 LOCALLY NOTE THIN CHL ZONES ON U NATURAL FRACS						
7/7.5											
					1960						

PROJECT _____ PAGE 15

D.D.H. No. NK-WO-6 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
10/10					1960						
5/5											
					1970						
4.5/5											
5/5					1980						
4.5/4.5											
? 6.5/11					1990						
6/7.5					2000						
4/6											
					2010						
7.5/7.5											
5/5					2020						
8.5/8.5											
					2030						
10/10											
					2040						
10/10											
					2050						
7/7											
					2060						

(1979 - SP. HEM AFT SULF(?) ON VERT FRAC)

CONTACT SHARP BUT V STRONGLY BROKEN

2009 - 2157

CALC PHYLLITE LT. GRAY TO

PROJECT _____ PAGE 16

D.D.H. No. NK-WO-6 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
10/10					2060						
8/8.5					2070						
2.5/2.5											
10/10					2080 *						
10/10					2090						
7/7					2100						
10/10					2110						
10/10					2120	(2119-2121 See description of Gneiss @22625)					
10/10					2130						
17/17					2140						
					2150						
					2160						

PROJECT _____ PAGE 17

D.D.H. No. NK-WO-6 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizatn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
9/9.5					2160						
8/8.5											
2/2					2170						
6/6											
3/4					2180						
8.5/10											
10/10.5					2190						
1.5/1.5					2200						
5/5.5											
1/1.5					2210						
5.5/5.5											
2.5/2.5											
1.5/1.5					2220						
10/10											
					2230						
10/10											
					2240						
16.5/16.5											
					2250						
4/4											
					2260						

PROJECT _____ PAGE 18

D.D.H. No. NK-WO-6 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralizn	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
10/10					2260						
10/10					2270						
16.5/16.5					2280						
5.5/6.5					2290						
6/6					2300						
4/4					2310						
2.5/4			Δ Δ Δ								
1/3					2320						
10/10											
5/6					2330						
8.5/9					2340						
12.5/13					2350						
					2360						

PROJECT _____ PAGE 19

D.D.H. No. NK-NO-6 SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralization	Alteration	Structure	Rock Type		CORE ASSAYS INTERVAL FROM	TO	MINERAL Cu	Mo		
5/5					2360						
7.5/8											
					2370						
13/13											
					2380						
5.5/6											
3/3					2390						
2.5/2.5											
7/7											
					2400						
5/6.5											
0.7/0.51 7/7.5											
					2410						
6.5/6.5											
					2420						
10.5/10.5											
					2430						
6.5/6.5											
					2440						
8/8											
					2450						
11/11.5											
					2460						

PROJECT _____ PAGE 20

D.D.H. No. _____ SCALE _____ BY _____

LOCATION _____ COLLAR EL _____ DATE _____

% Core Recovery	Mineralzn	Alteration	Structure	Rock Type		CORE ASSAYS					
						INTERVAL		MINERAL			
						FROM	TO	Cu	Mo		
8/9					2460						
					2464 T.D.						
					2470						

J. DAVID LOWELL
CONSULTING GEOLOGIST

Drill Hole No. NK-WO-6 Property SALOME PROSPECT

Type Hole BX CORE Location SALOME, AZ

Size Hole Joy MANNIS Co-ord DEPENDED 1665'-2464 T.D.

Date Started 1-4-78 Date Completed 2-3-78

Depth	Sample No.	Cu	Mo	Au	Ag		Descripti
1665-85							
1685-1705							
1705-25							
1725-45							
1745-65							
1765-85							
1785-1805							
1805-25							
1825-43							
1843-51							
1851-75							
1875-95							
1895-1909							
1909-29							
1929-41							
1941-61							
1961-81							
1981-2001							
2001-09							
2009-30							
2030-50							
2050-70							
2070-90							
2090-2110							
2110-19							
2119-21							
2121-40							
2140-2160							
2160-2180							

J. DAVID LOWELL

CONSULTING GEOLOGIST

Drill Hole No. ..... Property .....

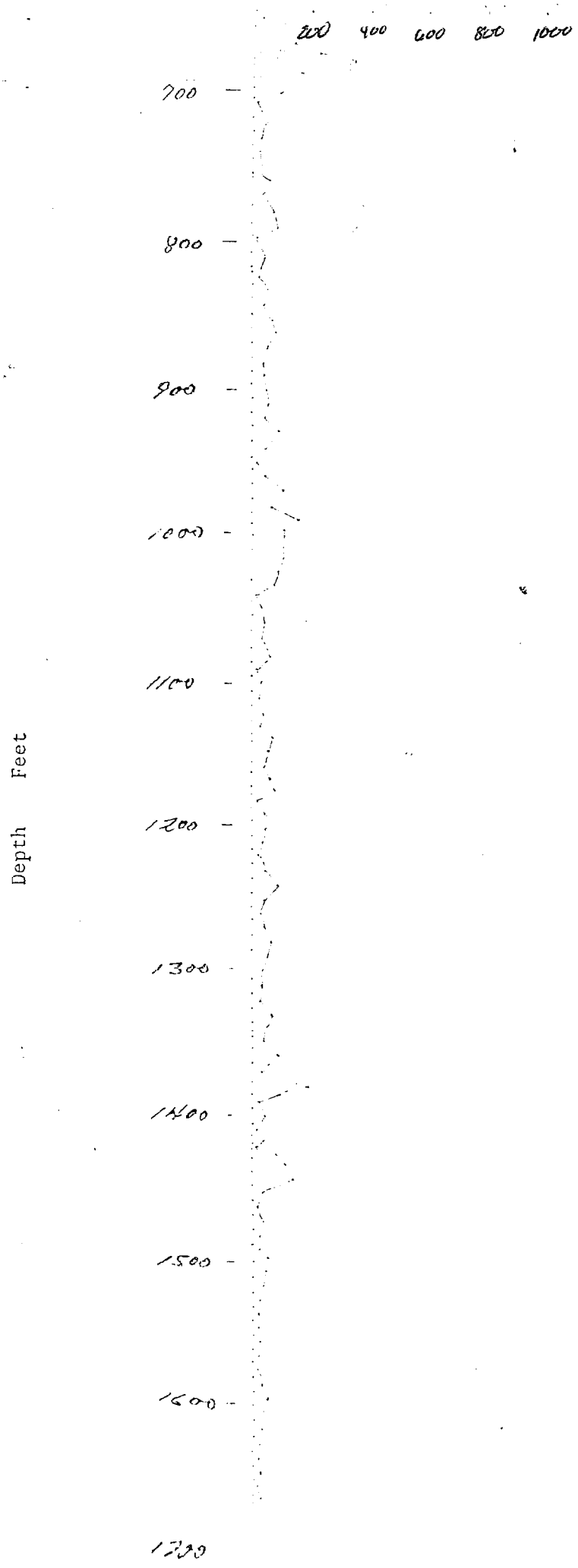
Type Hole ..... Location .....

Size Hole ..... Co-ord .....

Date Started ..... Date Completed .....

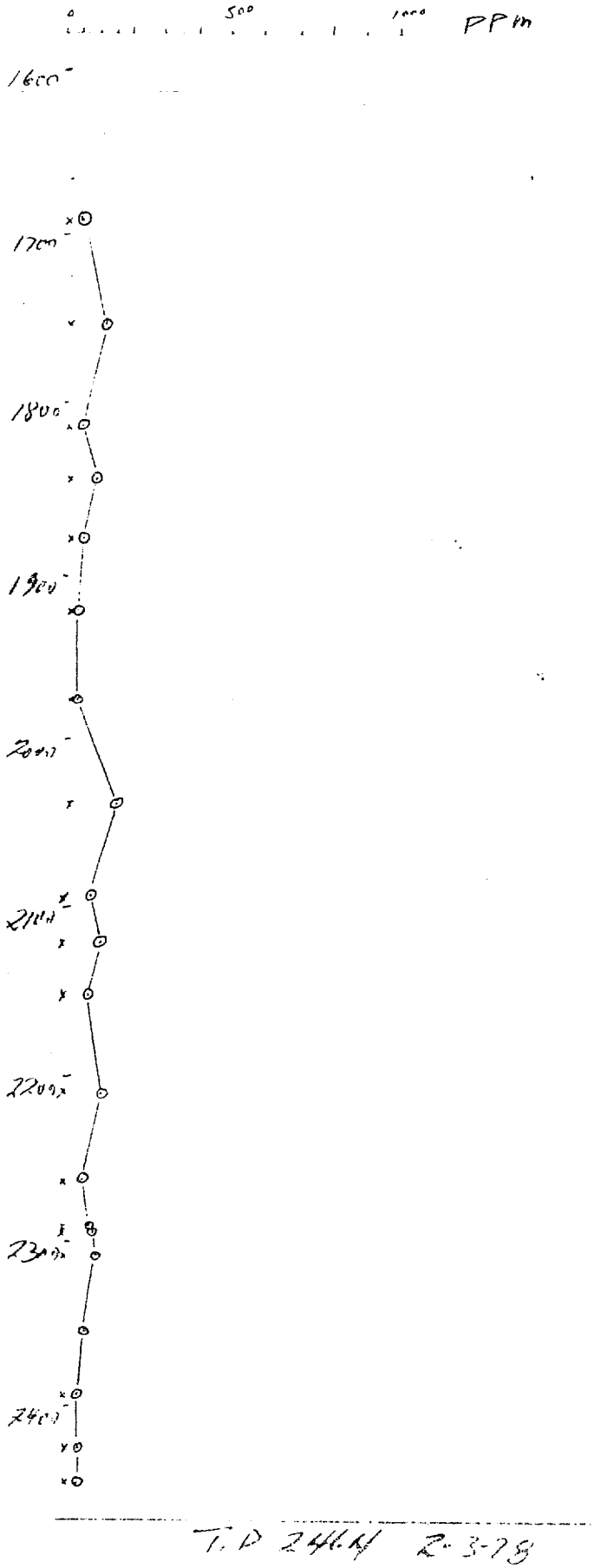
Depth	Sample No.	Cu	Mo	Au	Ag		Descriptio
2180-2200							
2200-2220							
2220-2234.5							
2234.5-2255							
2255-75							
2275-2289.5							
2289.5-91.5							
2291.5-2298							
2298-320							
2320-40							
2340-60							
2360-80							
2380-2400							
2400-22							
2422-29							
2429-50							
2450-64							
T.D.	—	—	—	—	—	—	—

Assay values in ppm

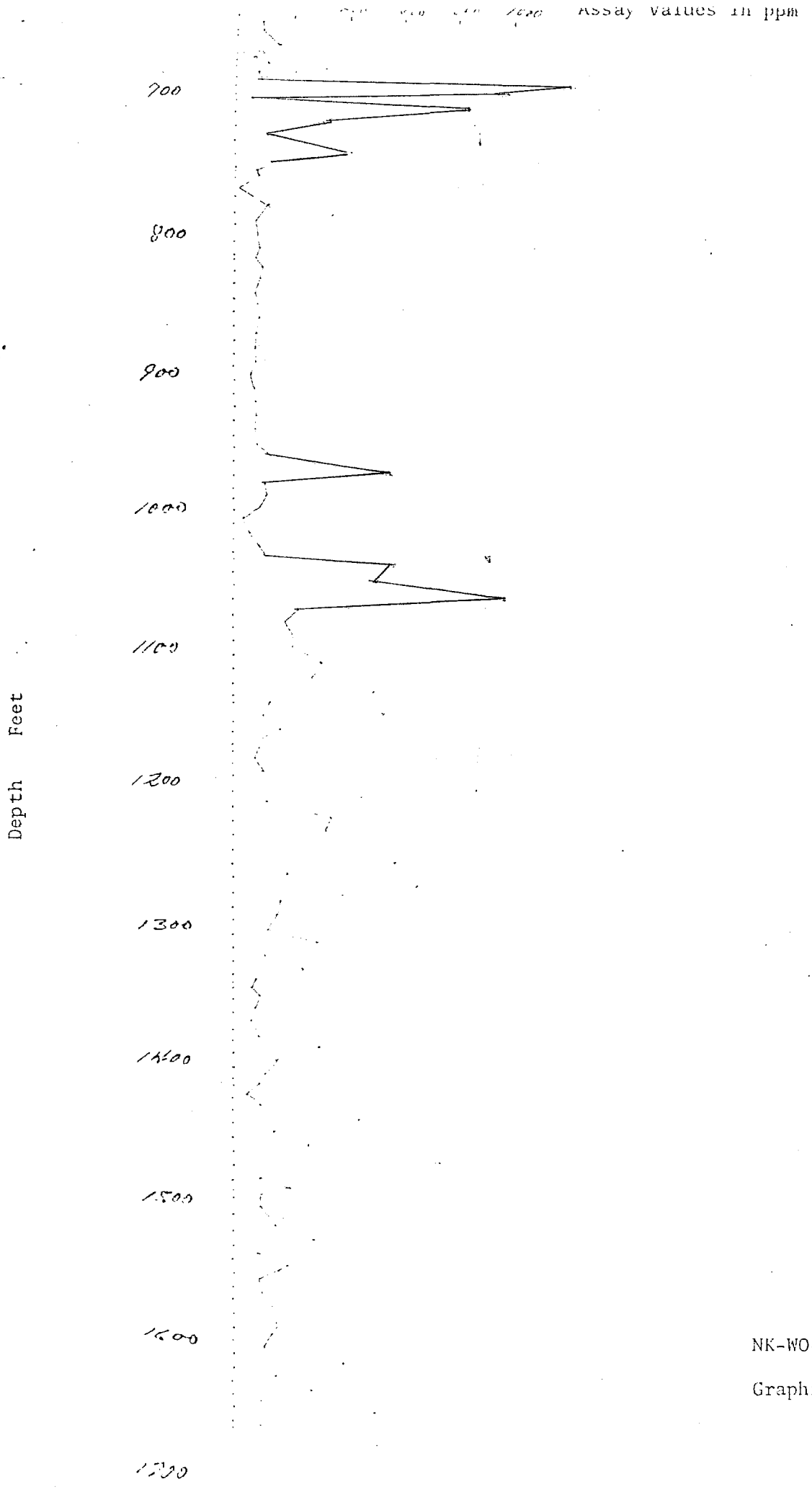


NK-WO-6

Graphic Assay Cu

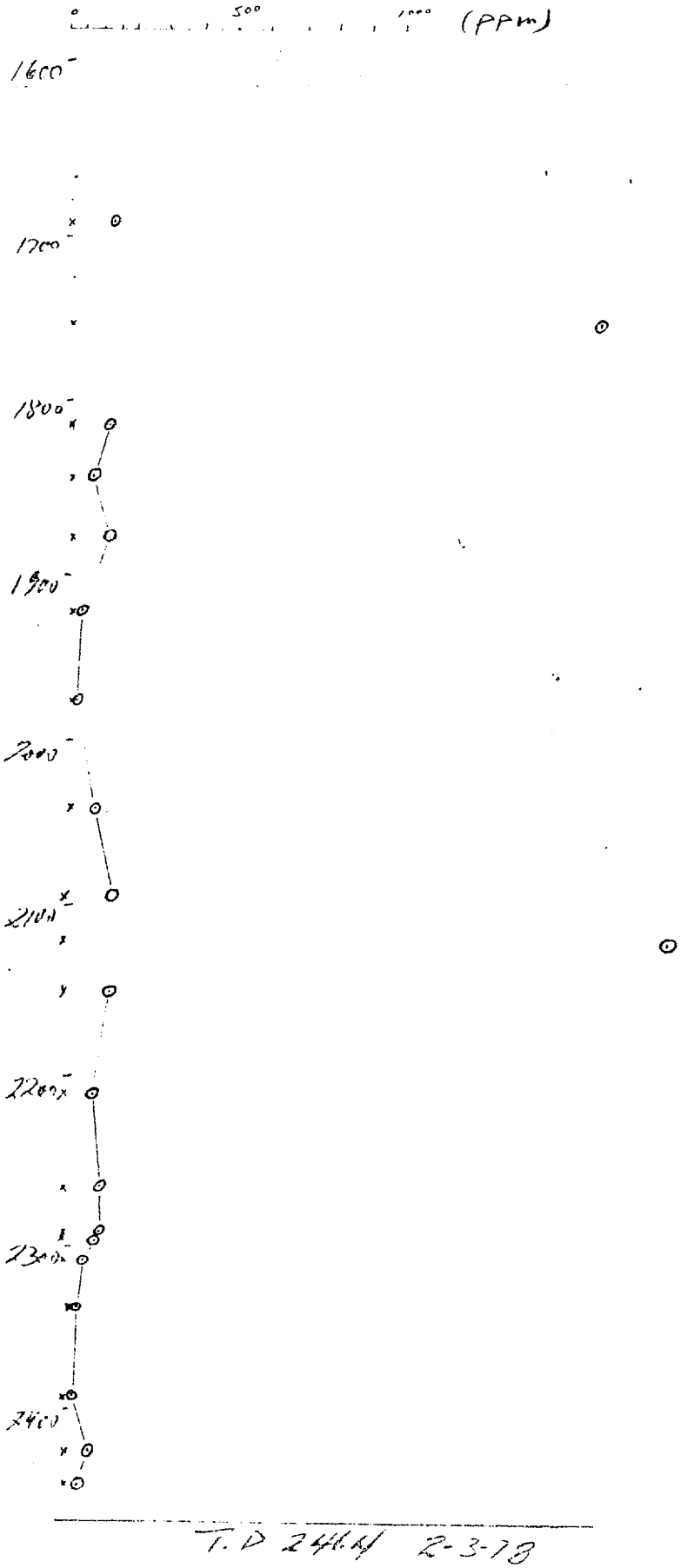


GRAPHIC ASSAY
NK-WC-6
Cu (PPM)
1000 PPM = 0.10%



NK-WO-6

Graphic Assay Zn



GRAPHIC ASSAY
NK-10C-6
ZN (PPM)
1000 PPM = 0.10%

Assay values in ppm

Depth Feet

700

800

900

1000

1100

1200

1300

1400

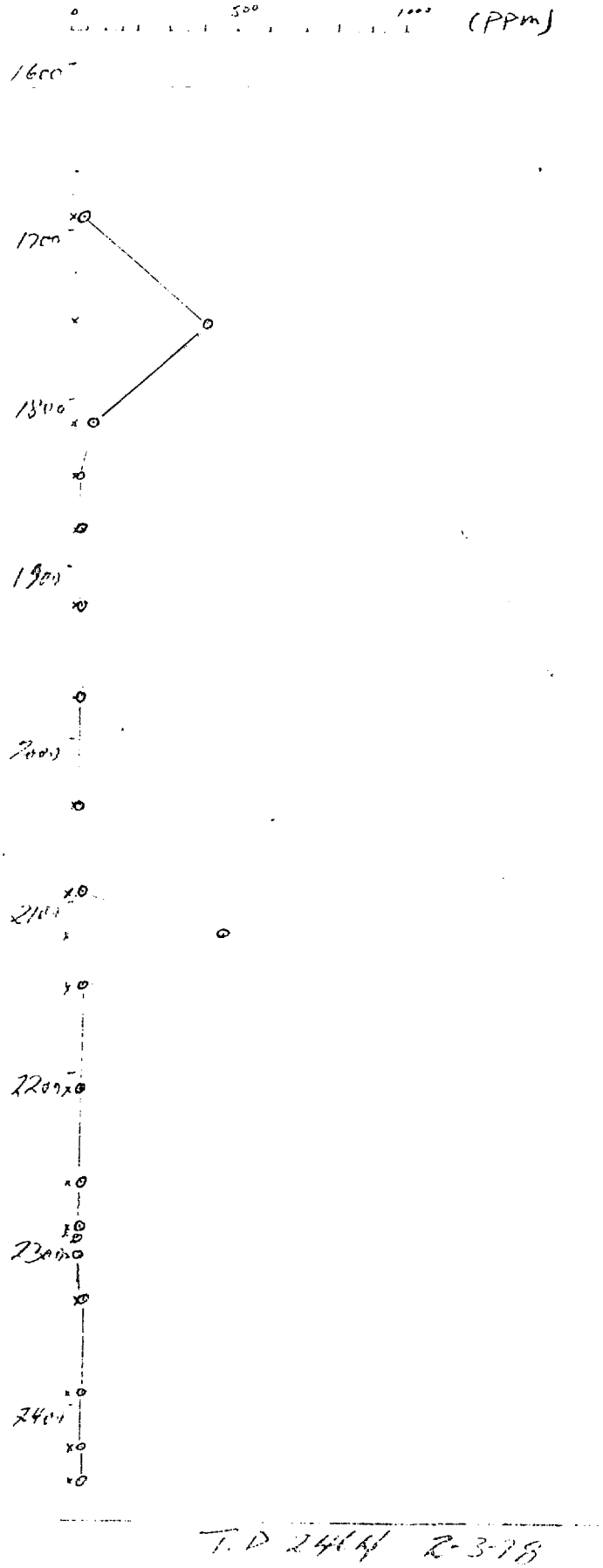
1500

1600

1700

NK-EO-6

Graphic Assay Pb



GRAPHIC ASSAY
NK-WP-6
Pb (PPm)
1000 ppm = 0.10%

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9422

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Au ppm	Ag ppm	Cu ppm	Pb ppm	Zn ppm	Mo ppm	*W ppm a	b	*F PPM c	d	e	*P PPM d
	Project NK-WO-6:												
1	Composite 1665-1725	<0.02	<0.2	45	30	140		4	3				
2	Composite 1725-1785	<0.02	1.2	105	405	1600		4	5				
3	Composite 1785-1843	<0.02	0.2	45	60	130		2	5				
4	1843-1851	<0.02	<0.2	85	5	85		<2	2				
5	Composite 1851-1909	<0.02	<0.2	40	35	130		3	4				
6	Composite 1909-1941	<0.02	<0.2	20	5	45		2	8				
7	Composite 1941-2009	<0.02	<0.2	5	5	20		2	3				
8	Composite 2009-2070	<0.02	<0.2	145	5	95		4	2				
9	Composite 2070-2119	<0.02	<0.2	55	20	140	<2	2	2	1500			
10	2119-2121	<0.02	0.8	90	445	1800	2		2				
11	Composite 2121-2180	<0.02	<0.2	50	20	145	<2		3				
12	Composite 2180-2234.5	<0.02	<0.2	95	5	80	<2		4				
13	Composite 2234.5-2289.5	<0.02	<0.2	25	10	105	2		4				
14	2289.5-2291.5	<0.02	<0.2	50	5	105							
15	2291.5-2298	<0.02	0.2	60	5	90	<2		5.6	740	730		1325
16	2298-2320	<0.02	0.4	70	5	65	4		3	520	650		570
17	Composite 2320-2360	<0.02	<0.2	5	5	35	2		3	520	550		240
18	Composite 2360-2422	<0.02	<0.2	5	5	45	2		3	400	470		225
19	2422-2429	<0.02	<0.2	5	5	90	<2						
20	Composite 2429-2464	<0.02	<0.2	5	5	50	< 2		3	800			475

* ALL BALL-PEN FIGURES INSERTED FROM OTHER REPORTS

a - 3/21
b - 5/19
c - 2/15
d - 3/21
e - 5/19

TO:
Mr. Oliver B. Kilroy
Broadway Terrace, Suite 110
4625 East Broadway
Tucson, Arizona 85711
cc: Clark Arnold, 5115 N. Oracle Road
Tucson, AZ 85704

REMARKS:
Trace analysis
Project: NK-WO-6

CERTIFIED BY:
REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK ARIZONA U.S.A.
DATE SIGNED 2/23/78

(8 Spectrographic analysis follow as Part II).

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
2/15/78	2/23/78	YAQ 001 Part I

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Mo ppm	F ppm	W ppm
9	Comp. 2070-2119	< 2		22
10	2119-2121	2	1500	2
11	Comp. 2121-2180	< 2		3
12	Comp. 2180-2234.5	< 2		4
13	Comp. 2234.5-2289.5	2		4
15	2291.5-2298	< 2		5.6
19	2422-2429	< 2		3
20	Comp. 2429-2464		860	

TO:
Mr. Oliver B. Kilroy
Broadway Terrace, Suite 110
4625 East Broadway
Tucson, Arizona 85711

REMARKS:
Trace analysis
Project: NK-WO-6

CERTIFIED BY:

DATE REC'D: 2/15/78
DATE COMPL.: 2/2/78
JOB NUMBER: XAO 001 Part I

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427
William L. Lehmbeck
Arizona Registered Assayer No. 9425
James A. Martin
Arizona Registered Assayer No. 11122

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	F ppm	W ppm	P ppm
	NK-WO-6			
1	Comp. 1665-1725		4	
2	Comp. 1725-1785		4	
3	Comp. 1785-1843		2	
4	1843-1851		< 2	
5	Comp. 1851-1909		3	
6	Comp. 1909-1941		2	
7	Comp. 1941-2009		2	
8	Comp. 2009-2070		4	
15	2291.5-2298	740		1325
16	2298-2320	520		590
17	Comp. 2320-2360	520		240
18	Comp. 2360-2422	400		225
20	Comp. 2429-2464			275

TO:
Mr. Oliver B. Kilroy
Broadway Terrace, Suite #110
4625 East Broadway
Tucson, Arizona 85711

REMARKS:
Trace analysis

CERTIFIED BY:

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
3/21/78	4/26/78	YAQ 001-A

P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

Arizona Registered Assayer No. 9427
William L. Lehmbeck
Arizona Registered Assayer No 9425
James A. Martin
Arizona Registered Assayer No. 11122

CERTIFICATE OF ANALYSIS

CORRECTED REPORT

ITEM NO.	SAMPLE IDENTIFICATION	F ppm
	Series: NK-WO-6	
15	2291.5-2298	780
16	2298-2320	650
17	Composite: 2320-2360	580
18	Composite: 2360-2422	470

RERUN - USING ORIGINAL PULPS

TO: Mr. Oliver B. Kilroy
Suite #110, Broadway Terrace
4625 East Broadway
Tucson, Arizona 85711

REMARKS: CORRECTED REPORT

CERTIFIED BY: W. L. LEHMBECK

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
	5/19/78	YAQ 001

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

CERTIFICATE OF ANALYSIS

CORRECTED REPORT

ITEM NO.	SAMPLE IDENTIFICATION	Our Job	W ppm
	Series: NK-WO-6:		
1	Composite: 1665-1725	YAQ001	3
2	Composite: 1725-1785		5
3	Composite: 1785-1843		5
4	1843-1851		2
5	Composite: 1851-1909		4
6	Composite: 1909-1941		8
7	Composite: 1941-2009		3
8	Composite: 2009-2070		2
1	CWT T-1 1805-1917	YAQ002	7
2	1917-2031		7
3	2031-2143		6
4	2143-2257		2
5	2257-2362		2
6	T-1 2362-2475		2
7	T-44 451-501		2
8	501-547		4
9	547-592		5
10	CWT T-44 592-625		20
1	CWT T-1 1150-1259	YAQ003	<2
2	1259-1352		3
3	1352-1450		3
4	1450-1563		2
5	1563-1688		4
6	CWT T-1 1688-1805		2

RERUN - USING ORIGINAL PULPS

To: Mr. Oliver B. Kilroy
Suite #110, Broadway Terrace
4625 East Broadway
Tucson, Arizona 85711

REMARKS: CORRECTED REPORTS

CERTIFIED BY: 9425 WILLIAM L. LEHMBECK Arizona U.S.A.

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
	5/19/78	YAQ-001, -002, -003

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

REPORT OF SPECTROGRAPHIC ANALYSIS

Job No. DSJ023
H&H No. YAQ001
February 27, 1978

Mr. Oliver B. Kilroy
Suite #110, Broadway Terrace
4625 East Broadway
Tucson, Arizona 85711

The attached pages comprise this report of analysis. Values are reported in parts per million (ppm), except where otherwise noted, to the nearest number in the series 1, 1.5, 2, 3, 5, 7, 10, etc. within each order of magnitude. These numbers represent the approximate boundaries and midpoints of arbitrary ranges of concentration differing by the cube root of ten. The "accepted" value for each element is considered to be within ± 1 step of the range reported at the 68 percent confidence level and within ± 2 steps at the 95 percent confidence level.

Charles E. Thompson

William L. Lehmbeck
Arizona Registered Assayer No. 9425

February 27, 1978
Job No. DSJ 023
PAGE 1

ITEM NO.	SAMPLE NO.
1 =	NK-WO-6 1785-1843
2 =	NK-WO-6 1909-1941
3 =	NK-WO-6 1941-2009
4 =	NK-WO-6 2070-2119
5 =	NK-WO-6 2234.5-2289.5
6 =	NK-WO-6 2291.5-2298
7 =	NK-WO-6 2422-2429
8 =	NK-WO-6 2429-2464

ITEM	1	2	3	4	5	6	7	8
ELEMENT								
Fe	7%	2%	.7%	10%	7%	10%	7%	2%
Ca	7%	5%	1.5%	10%	2%	7%	10%	10%
Mg	1.5%	1%	.15%	3%	.7%	3%	10%	2%
Ag	<1	<1	<1	<1	<1	<1	<1	<1
As	<500	<500	<500	<500	<500	<500	<500	<500
B	20	15	10	30	200	20	<10	20
Ba	150	300	100	200	500	300	50	150
Be	<2	<2	2	<2	<2	<2	<2	<2
Bi	<10	<10	<10	<10	<10	<10	<10	<10
Cd	<50	<50	<50	<50	<50	<50	<50	<50
Co	5	<5	<5	15	5	15	20	<5
Cr	30	50	50	50	50	200	500	50
Cu	70	15	3	50	20	50	30	<2
Ga	<10	10	10	10	10	10	<10	10
Ge	<20	<20	<20	<20	<20	<20	<20	<20
La	50	50	50	50	70	100	30	30
Mn	1000	500	300	1000	500	1000	700	500
Mo	<2	<2	<2	2	3	3	<2	<2
Nb	20	<20	20	20	20	30	20	20
Ni	15	20	<5	20	10	100	200	10
Pb	50	10	<10	30	20	15	<10	10
Sb	<100	<100	<100	<100	<100	<100	<100	<100
Sc	10	<10	<10	15	15	20	20	<10
Sn	<10	<10	<10	<10	<10	<10	<10	<10
Sr	300	500	100	300	300	500	300	200
Ti	7000	3000	500	5000	5000	10000	7000	2000
V	100	70	<10	200	100	200	150	100
W	<50	<50	<50	<50	<50	<50	<50	<50
Y	10	<10	10	20	20	20	10	10
Zn	<200	<200	<200	<200	<200	<200	<200	<200
Zr	70	70	50	70	200	200	70	100

SKYLINE LABS, INC.
SPECIALISTS IN EXPLORATION GEOCHEMISTRY

for Edwin V. Post
William L. Lehmbeck
Manager

CC: Clark Arnold

N = #6 WD
246 3.40

P. O. Box 872
Douglas, AZ 85607
April 8, 1981

O. B. Kilroy
Suite 110
4625 East Broadway
Tucson, AZ 85711

Enclosed are descriptions of the 21 samples you recently sent. I hope you find them helpful.

You asked other questions which i will try to answer:

1.) Pegmatite formation is indeed shown by 2940 but the similar looking material is post-metamorphic veining at 1799.
2.) The large orangeish crystals of calcite in 2484 are in a lens segregated during metamorphism of the sediment. This process is indeed analogous to pegmatite formation seen at 2940.
3.) I am certain that the veining carrying sulfides (veins of calcite, quartz, epidote, hematite) is younger than and unrelated to pegmatitic segregations.
4.) The tan to orange color you ask about is usually hematite, the color tempered by admixed clays in some feldspars. It has formed in two ways 1.) due to late hydrothermal activity such as anhydrite veining and 2.) simple pulverization of iron-bearing minerals along late fractures.
5.) Chlorite is not really increasing with depth. How much is seen depends strictly on the composition that the original rock may have had.

In general the suite shows high grade, then retrograde metamorphism. Later are basic dikes. I suspect these as possibly related to oxidation (hematite), calcite, zeolites, and anhydrite seen occasionally in veins and fractures. Finally, there has been some very late fracturing and related oxidation.

I hope the data are useful. As always, call if you have questions.

Best regards,

Sidney A. Williams

SAW:bj
encls:

NK6 1799

This sample consists mainly of very coarse, finely twinned calcite and thick books of muscovite. The muscovite seems to fringe the calcite, occasionally occurring as inclusions within it. Also noted in the calcite are euhedral prisms of apatite.

Anhydrite fills crackled zones or cleavages in the calcite. If these intersect an apatite prism, that mineral is decayed to anhydrite. Even muscovite may be rimmed and corroded by anhydrite.

NK6 2483.5

The rock is a schist derived from a calc-shale by epimesozonal metamorphism. The original rock featured rapidly alternating lamellae of silt and calcareous clays.

Following metamorphism the silty laminae persist as seams of granular quartz. Sometimes calcite fills the interstices, or clinochlore scales may lie on grain boundaries, paralleling the foliation. Shaly or clayey laminae are rich in very well foliated muscovite and pennine scales. These are embedded in a fine granular base of quartz and orthoclase or in granular epidote. Epidote is very abundant in some laminae, uncommon in others. The rock is cut by late, irregular veinlets of heulandite and calcite.

NK6 2484

The original rock was a calc-shale with relatively thick silty or sandy laminae in alternation with others of calcareous argillite. The rock has been thoroughly recrystallized during mesozonal metamorphism.

Silty or sandy laminae are now a mosaic of coarse quartz grains that interlock in jigsaw-puzzle fashion. Calcite may occur in the interstices. These laminae may be deformed into lens-like shapes surrounded by well foliated material from the calcareous laminae. These are replaced by aple green, well foliated phlogopite heavily stippled with tiny epidote prisms. Both minerals are also present in sinuous microfractures that cut the margins of the granular quartz lenses.

NK6 2509

The rock is a diabase. Long slender plagioclase laths lie randomly and dominate the fabric. The angular interstitial spaces may host a rounded olivine grain mantled with augite, or merely augite. The augite tends to be corroded by hornblende whereas traces of accessory biotite present are plastered on magmetite grains. An unusual concentration of olivine in one place seems to be due to a cognate xenolith, nearly absorbed into the host. The rock is quite fresh, showing only deuteric alteration.

Augen and hornblende remain quite fresh. By contrast, all olivine is replaced entirely by fine scaly bowlingite. Plagioclase is generally fresh, but some crystal cores are severely corroded by sericite.

Original mineral percentages are estimated as: plagioclase 52%, olivine 6%, augite 32%, biotite 1%, magnetite 4%, hornblende 5%, apatite ½%.

NK6 2576A

The rock consists almost exclusively of quartz, and it may represent a segregation within a metasediment. The individual crystals are large, interlocking along relatively simple or slightly sutured boundaries. A few show strain where shearing has begun to occur. This is also shown by rows of elongated fluid inclusions cutting through grains along what appear to be incipient rock cleavage directions. Traces of wispy sericite are trapped in the quartz. Minute hairline fractures cutting the fabric may be filled with calcite.

NK6 2581

The original rock may have been an intermediate volcanic. There is little evidence of this except a scattering of β quartz eyes because the rock has been recrystallized during metamorphism.

The rock matrix is uniformly fine grained granular quartz with lesser amounts of orthoclase in the interstices. Patches of sericite, epidote beads, and cloudy calcite may represent former plagioclase phenocrysts. The sericite especially is drawn out in a crude foliation due to deformation. As a result of the same deformation quartz eyes are disaggregated to granular quartz.

NK6 2627.5

The rock is a diabase. Thick plagioclase laths lie randomly, with angular interstitial areas filled by mafites. Often olivine is at the center of a cluster of brown hornblende prisms, but just as often augite proxies for olivine. Accessory magnetite occurs with mafites whereas apatite needles lie in the plagioclase. The rock is only deuterically altered.

Olivine is totally altered to talc, bowlingite,and dolomite. Hornblende remains quite fresh. Augite is corroded by pennine and accessory leucoxene. Plagioclase is attacked by sericite and calcite. Finally, chabazite fills veins cutting the fabric.

An estimate of the original rock mode is as follows: plagioclase 42%, olivine 8%, augite 4%, hornblende 42%, magnetite 3%, apatite 1%.

NK6 2771

The rock is an augen gneiss. It may be derived from an original volcanic rock, but recrystallization during mesozonal metamorphism has blurred any primary textural features.

The matrix is a fine pebbly aggregate of quartz, orthoclase, and minor plagioclase. A foliation is shown by occasional books of biotite and strings of tiny epidote beads and accessory magnetite. The foliation wraps around large eyes of orthoclase (or microcline) and polycrystalline lenses of quartz. Plagioclase may be intergrown with the orthoclase. Retrograde effects have been mild, confined to some sericitization of the plagioclase and decay of biotite to pennine.

NK6 2880

The rock is an augen gneiss similar to 2771. Although no good textural evidence has survived mesozonal metamorphism, it seems probable that the original rock was a porphyritic volcanic.

The matrix is a fine granular aggregate of quartz, orthoclase, and plagioclase. There is a crude compositional banding shown by these minerals. Foliation, however, is shown by bands or lenses of shreddy sericite that occur only occasionally. Some host strings of granular epidote as well. Augen include pods of granular quartz and squarish grains of plagioclase. The plagioclase is albitized, hosting either epidote or piemontite and veined along cleavages with sericite. An unusual feature of the rock is the presence of small, very thin scales of hematite lying in sericitic strings and sometimes interleaved with the sericite. Late calcite veinlets cut across the fabric.

NK6 2940

The rock is a granite pegmatite. It consists mainly of coarse quartz. Grains are large but irregular, and interlock on minutely sutured borders. They are also severely strained, exhibiting incipient rupture along two sets of rock cleavages. Microcline occurs interstitially to quartz. It shows graphic intergrowth with quartz and also may be penetrated by later, parallel quartz veinlets. Occasional scales of sericite lie in the microcline; it also shows incipient sericitization.

Volume percentages of minerals are estimated as: quartz 72%, microcline 27%, sericite 1%.

NK6 3036

The rock is an andesite of almost lamprophyric character. It may be related to 2509 or 2627.5 but is less basic.

Thick plagioclase laths lie randomly in diabasic fashion. Augite crystals occur in the angular interstitial areas. They may be mantled by brown hornblende, and coarse magnetite occurs with both minerals.

The rock shows modest epizonal alteration. Plagioclase laths are stippled with sericite in their cores, and the outer parts of the crystals may be significantly corroded by orthoclase. The mafites show some decay to pennine and minor calcite. The alteration is earlier than crush zones cutting the fabric. These are hematite-stained rubble zones showing no alteration.

Original minerals are present in the following estimated amounts: plagioclase 56%, augite 22%, hornblende 16%, magnetite 5%, apatite 1%.

NK6 3074

The rock is a microbreccia, a crush zone that may border a dike cutting the section. The larger identifiable fragments are of two types. One is augen gneiss composed primarily of quartz, microcline, and plagioclase. This rock invariably shows evidence of severe deformation, even mylonitization. The other fragments are severely chilled andesitic rocks with glassy matrices. These, although occurring as fragments, do not show any internal deformation. The glass is altered to colloidal clays. The breccia matrix is a maze of crosscutting calcite veinlets.

NK6 3132.5

The rock is a gneiss of uncertain origin. Metamorphism has been mesozonal.

The rock consists primarily of quartz, microcline, and plagioclase. A crude layering is apparent. Some bands are granular quartz-feldspars; they may alternate with others composed mainly of coarse plagioclase. Other lenses or bands are coarse granular quartz + microcline or quartz + plagioclase. A crude foliation is shown by strings of sericite and epidote that lie within plagioclase. These minerals are clearly retrograde and derived from the plagioclase. In a few places plagioclase was seen heavily replaced by cloudy clinozisite and garnet, the garnet showing some retrograde decay to calcite. Late, discontinuous calcite veinlets cut the fabric.

NK6 3140

The rock is a gneiss, either a reworked volcanic or an arkosic sediment originally. Mesozonal and retrograde metamorphism have been thorough.

A good compositional layering is visible. Bands of granular quartz alternate with others composed mainly of plagioclase. Orthoclase occurs more sparingly, usually intergrown with quartz. Biotite tablets once present were well aligned to foliation, occurring almost exclusively in the plagioclase laminae. The biotite is retrograded to clinochlore and plagioclase is heavily sericitized. Epidote grains are strung out in the plagioclase but they may not be retrograde for similar strings are a common feature in quartzose layers. Epidote also occurs in veinlets with chabazite and calcite.

NK6 3236.5

The rock is an augen gneiss, perhaps a dacitic porphyry originally. It has been well recrystallized by metamorphism.

The matrix is a granular aggregate of quartz and plagioclase, orthoclase appearing only in certain thin bands. Sericite occurs abundantly as bunches or isolated plates cutting along grain boundaries and well aligned to foliation. Whereas the sericite wraps around augen of quartz, it may cut right through those of plagioclase. Other scales of fine grained sericite in the plagioclase seem to be retrograde. Late calcite veinlets cutting the fabric follow oblique rock cleavage directions.

NK6 3243.5

The rock is an augen gneiss, doubtless an intermediate volcanic originally. Recrystallization during metamorphism has been thorough.

A fine grained granular mosaic of quartz and orthoclase, occasionally joined by plagioclase, comprises the matrix. Subtle variations in the ratios of these minerals serve to define a banding. This is followed by scattered flakes of pale brown biotite and strings of small epidote beads in which magnetite may be entrained. The foliation wraps around augen of granular quartz, perthitic microcline, and plagioclase. The fabric is cut by synmetamorphic veins of quartz, plagioclase, and biotite. Retrograde alteration has been negligible.

NK6 3263.5

The rock is an augen gneiss, probably an intermediate volcanic originally. Metamorphism has caused modest recrystallization.

Many augen are plagioclase showing peculiar degenerate twinning and complexly intergrown with microcline. Augen of microcline alone are uncommon. Others are polycrystalline quartz, perhaps β crystals initially. The matrix is a fine grained pebbly to jigsaw-puzzle aggregate of quartz and feldspars. Sericite scales are common on grain boundaries and show crude foliation that wraps around the augen. Epidote, rare piemontite, and garnet occur sparingly in sericitic foliae or in plagioclase augen. Thin sinuous veinlets of stilbite and anhydrite cut the fabric.

NK6 3267.5

The rock is an augen gneiss, doubtless a porphyritic volcanic initially. Augen of microcline and plagioclase are of various sizes and often poikilitic. Other clusters of granular quartz doubtless represent former β crystals. The plagioclase exhibits peculiar degnerate twinning. The matrix is a fine grained aggregate of quartz and feldspars. They tend to be slightly elongate on the plane of foliation. Slender flakes of sericite are abundant on grain boundaries and are slavishly aligned to foliation. Epidote, garnet, and biotite are all rare accessories in sericitic foliae or in plagioclase augen. Piemontite was also noted in the augen.

NK6 3342

The rock is an augen gneiss, undoubtedly a porphyritic volcanic originally. Metamorphism has been mesozonal.

Augen include polycrystalline lenses of quartz, poikilitic microcline, and perthitic plagioclase showing peculiar degenerate twinning. The matrix is fine granular quartz and orthoclase. It is well layered, and tiny sericite scales cut along grain boundaries in abundance, slavishly aligned to foliation. In places the matrix may cut through a fractured augen. Grains of epidote occur in sericite or plagioclase only rarely. Once piemontite was also seen in plagioclase.

NK6 3395.5

The rock is an augen gneiss, undoubtedly a porphyritic volcanic originally. It has been mesozonally metamorphosed.

Lenses of coarse quartz may show former embayments of β crystals clearly. Other, smaller augen include microcline and perthitic plagioclase. The matrix is a uniform, granular aggregate of quartz and orthoclase. Scales of sericite lie on grain boundaries or even cut through grains, for they are very well aligned to foliation. Pale biotite tablets lie with the sericite; they may be askew to foliation in pressure shadows of augen. Accessories such as epidote, magnetite, and piemontite occur sparingly. Piemontite outlines a relic hornblende prism in one place.

NK6 3416

The rock is an augen gneiss, doubtless an intermediate porphyry originally. Augen of perthitic plagioclase and of microcline tend to be poikilitic. Those of quartz, once β quartz, are now polycrystalline. The matrix is an aggregate of quartz, orthoclase, and plagioclase in nearly equal proportions. In places it is granular, in others it shows a jigsaw-puzzle texture. Sericite is abundant and may well foliated, but it also occurs in strands of tangled plates that may cut right through (and replace) feldspar augen. An occasional synmetamorphic quartz veinlet cuts the fabric, curving into the foliation and dying out.

The rock is cut by a maze of late calcite veins. These seem related to occasional alteration of accessory magnetite to hematite.

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, 263, Az. Kilroy #6 DH core DH-6- 1870

Submitted by: WJW Petrographer BK

Probable Original Mode	Present Mode	Notes
%	59 % quartz	
%	8 % plagioclase	
%	15 % muscovite	
tr % apatite	4 % biotite	
%	13 % calcite	
1/2 % magnetite/FeOx	1/2 % sphene → leucoxene	
tr % pyrite.	tr % zircon.	

Rock Name metasediment. Original Rock calc-silty s.s.

Alteration: mesozonal metamorphism.

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, 263, Az. Kilroy DH#6 - 1929.6'

Submitted by: WJW Petrographer Pik

Probable Original Mode	Present Mode	Notes
%	38 % plagioclase	(sodic)
%	26 % orthoclase	(perthitic w/. plagioclase replaced by sericite flakes
%	16 % quartz	
2% calcite	7 % chlorite	
1/4% apatite	3 % epidote	
1/2% magnetite (dissem.)	6% sericite	
%	1/2% ferromagnesian	(incl. relic sphene)

Rock Name granodiorite porphyry (hypabyssal) Original Rock

Alteration: feeble, regional (probably a thermal metam. effect).

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, 263, Az. Kilroy DH #6 - 1970'

Submitted by: WJW Petrographer BrK.

Probable Original Mode	Present Mode	Notes
%	40% quartz	
%	48% plagioclase (andesine)	
%	4% orthoclase.	
%	5% sericite (maybe coarse, muscovite).	
%	1% calcite	
%	1½% chlorite (Fe-rich) (more like prehnite in fractures).	
~~%~~ % FeOx	~~%~~ % leucoxene	

Rock Name fine-grained granodiorite (hypabyssal). Original Rock

Alteration: deuteric.

PETROGRAPHIC ANALYSIS

Run 263 A2

Date 21 Jan 1979 Sample Location Salome Az DDH-6 2041'

Submitted by: OEK / WWW Petrographer SAW

Probable Original Mode	Present Mode	Notes
%	50% quartz	
%	28% sericite	
%	3% graphite	
%	4% calcite	
%	tr% pyrite	
1/2% hornblende	14% pennine	(+ relict bio.)
1/2% montmorillonite	tr% tourmaline	

Rock Name ..... Original Rock shale

Alteration: mesozonal meta.

PETROGRAPHIC ANALYSIS

Date 25 Jan 1979 Sample Location Tucson Az OEK DDH-6 2060.5'

Submitted by: OEK/NWW Petrographer SAW

Probable Original Mode	Present Mode	Notes
%	35% quartz	
%	42% biotite	
%	7% graphite	
%	tr% pyrite	
%	13% clinochlore	
1% magnetite	1% calcite	{veins}
1/2% montmorillonite	1/2% heulandite	

Rock Name ..... Original Rock shale

Alteration: mesozonal meta.

PETROGRAPHIC ANALYSIS

Date 25 Jan 1978 Sample Location Salome Az DDH-6 2110.5

Submitted by: DEK/WJW Petrographer SAW

Probable Original Mode	Present Mode	Notes
%	24% quartz	
%	57% sericite	
%	2% biotite	
%	1% pennine	
%	1% sphene	
8% plagioclase	12% tourmaline	
14% zircon	3% sulfides	(pyrrhotite (isocumulated), $CuFeS_2$, FeS_2, ZnS in calcite veins)

Rock Name ..... Original Rock shale

Alteration: mesozonal meta → epizonal

PETROGRAPHIC ANALYSIS

Date 25 Jan 1970 Sample Location [illegible] 3[illegible]-6 211[illegible]

Submitted by: [illegible] Petrographer [illegible]

Probable Original Mode	Present Mode	Notes
%	44 % quartz	
%	18 % sericite	
%	21 % plagioclase	
1/2 % apatite	2 % sphene	
1/2 % zircon	2 % pennine	
2 % sulfide *	4 % biotite	
2 % adularia	4 % calcite	

Rock Name ..... Original Rock shale/ss

Alteration: mesozonal metam.

* mainly pyrrhotite; more ZnS (diss.) & cpy (in veins)

PETROGRAPHIC ANALYSIS

Date 25 Jan 1975 Sample Location Tucson Az DDH-6 2184'

Submitted by: OBK/WWW Petrographer JAW

Probable Original Mode	Present Mode	Notes
%	22% quartz	
%	13% pennine	
%	6% tremolite	
%	42% calcite	
%	1½% sulfide	
%	5% graphite	
11% sericite	1½% leucoxene	

Rock Name ..... Original Rock calc-shale

Alteration: v. epizonal meta.

PETROGRAPHIC ANALYSIS

Date 25 Jan 1978 Sample Location Bisbee Az DDH-6 21'-17'

Submitted by: DBK (WJW) Petrographer JAW

Probable Original Mode	Present Mode	Notes
%	30% quartz	
%	21% plagioclase	
%	25% biotite	
tr% zircon	4% sulfide	(pyrrhotite; minor pyrite in fractures)
tr% sphene	12% sericite	
tr% tourmaline	1% orthoclase (veins)	
2% pennine	3% graphite	

Rock Name ..... Original Rock shale breccia

Alteration: mesozonal meta.

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, 263, Az. Kilroy #6 - 2203.6'

Submitted by: WW Petrographer BK

Probable Original Mode	Present Mode	Notes
%	64 % quartz	
%	21 % calcite	
%	5 % chlorite	
%	4 % sericite	
%	5 % pyrite	
%	½ % magnetite (fine dust)	
%	tr % chalcopyrite	

Rock Name crushed vein Original Rock

Alteration: epizonal metas veinings?

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, 263, Az. Kilroy #6 - 2234½'

Submitted by: WDW Petrographer BK

Probable Original Mode	Present Mode	Notes
%	42 % quartz	(incl. vein).
%	11 % plagioclase	
⅓ % zircon	8 % microcline	
½ % apatite	13 % muscovite	(after prior sericite).
½ % sphene (leucox)	2 % chlorite	
%	12 % biotite	
2 % magnetite	9 % calcite	(later than qtz. veins).

Rock Name vein & 'metased.' wallrock? Original Rock silty shale sediment?

Alteration: mesozonal meta. & veining (s).

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, 263, Az. Kilroy #6-2239'

Submitted by: WJW Petrographer BK

Probable Original Mode	Present Mode	Notes
%	44 % quartz	
%	23 % biotite	
%	21 % muscovite	
%	½ % apatite	
%	½ % sphene (+ leucoxene)	
%	4 % plagioclase	
½ % magnetite	6 % calcite	

Rock Name metashale (sediment) Original Rock

Alteration: mesozonal meta

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, 263, Az. Kilroy Dit #6 2290½'

Submitted by: WJW Petrographer BJK

Probable Original Mode	Present Mode	Notes
%	39 % hornblende (basaltic)	
%	7 % augite.	
%	4 % biotite	
%	19 % plagioclase (relict)	
tr % lenoxene	20 % serpite	(& smectite clay - may be in veinlets w/ calcite).
½ % hematite	8 % calcite	
2 % magnetite	½ % apatite	

Rock Name mela-basalt (lamprophyric - hypabyssal). (Original Rock)
(rather coarse)

Alteration: epizonally metamorphosed.

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Sulphur, 263, Az. Kilroy DH #6. 2298½'

Submitted by: WOW Petrographer BK

Probable Original Mode	Present Mode	Notes
%	26% quartz	
%	21% plagioclase	(sodic)
tr% leucoxene	16% biotite	
18% microcline	7% chlorite	
½% tourmaline	6% sericite	(+clay)
2½% magnetite	2% calcite	
tr% cpy.	¼% zircon	

Rock Name metashale Original Rock

Alteration: mesozonal metam

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, 263, Az. Kilroy DH #6 2302'

Submitted by: NDW Petrographer BiK

Probable Original Mode	Present Mode	Notes
%	28 % quartz	
%	41 % epidote	
%	24 % actinolite / tremolite	
%	6 % calcite	
%	½ % sphene	
%	½ % pyrite	
%	%	

Rock Name metasediment w/veinings. Original Rock

Alteration: low mesozonal metam.

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, 263, Az - Kilroy DH #6 - 2302½'

Submitted by: WW Petrographer B.K.

Probable Original Mode	Present Mode	Notes
%	21% plagioclase	
%	37% diopside	/ augite
%	18% microcline	(porphyroblasts?/inclusions?)
1% sphene → leucoxene	7% calcite	
3% sericite	6% chlorite	
½% pyrite	3% epidote	
2% magnetite (fine, disseminated)	1½% analcite	

Rock Name basalt. Original Rock

Alteration: Some retrograde metam

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, 263, Az. Kilroy DH #6 2312½'

Submitted by: WOW Petrographer BAK

Probable Original Mode	Present Mode	Notes
%	32 % plagioclase	
%	42 % basaltic hornblende	
%	6 % augite (relict).	
%	9 % sericite / clay	
½ % magnetite (fine).	8 % calcite	
%	1½ % leucoxene.	
tr. % pyrrhotite	½ % pyrite.	

Rock Name 'basalt'. * Original Rock

Alteration: up. a prograde - metamorphism.

* similar to 2290½'.

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Solome, 263, Az. Kilroy DH #6 2336

Submitted by: WDW Petrographer BIC

Probable Original Mode	Present Mode	Notes
%	30 % quartz	
%	18 % albite	
12 % biotite (phlogopite)	11 % actinolite / tremolite	
% ~~(phlogopite)~~	22 % epidote	
%	3 % calcite	
% sulfide (cpy?)	1/2 % sphene	
tr. % FeOx	3 % chlorite	(incl. chrysotile mixed with phlogopite).

Rock Name metasediment Original Rock impure ss.

Alteration: mesozonal meta.

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, Az. Kilroy DH #6 2424'

Submitted by: WJW Petrographer BK

Probable Original Volc./sill or hypabyssal. Present Sediment

Mode	Mode	Notes
52% hornblende (basaltic)	48% quartz	
8% pyroxene (augite)	12% epidote	
18% plagioclase	31% sericite / phlogopite	
7% calcite	6% chlorite	
6% chlorite	2% calcite	
1½% clays.	½% apatite	
½% py/pyr.	½% leucoxene	
6% biotite (very fine)	½% magnetite	

Rock Name ↓ Original Rock ↓

Alteration: metasediment.

basaltic hornfels.

very sharp contact between the 2; minor basaltic glass (palagonite) development along the contact.

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, 263, Az. Kilroy DH #6 2426½'

Submitted by: WOW Petrographer BK

Probable Original Mode	Present Mode	Notes
37% hornblende (uralitic)	%	
33% plagioclase (+ pathite)	3% chlorite	
12% augite	7% sericite	
1% biotite	4% calcite	
½% apatite	%	
½% sphene	%	
2% magnetite	%	
tr% pyrite.		

Rock Name gabbro. Original Rock

Alteration: may be all deuteric.

PETROGRAPHIC ANALYSIS

Date 2-22-78 Sample Location Salome, 263, Az. Kilroy DH #6 2464'

Submitted by: WOW Petrographer BK

Probable Original Mode	Present Mode	Notes
%	34% calcite	
%	21% epidote	
%	22% quartz	
%	19% sericite	
%	4% phlogopite	
%	tr% FeO_2 / magnetite	
%	%	

Rock Name metasediment (veining) Original Rock

Alteration: upper epizonal

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

N.K #6

REPORT OF ANALYSIS

JOB NO. TMQ 014
June 18, 1981

Mr. Oliver B. Kilroy
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 20 Pulp Samples

ITEM	SAMPLE NO.	Cu ppm	Mo ppm	U ppm	F ppm	W ppm
1	2464-2500	30.	14.	2.	960.	2.
2	2500-2550	10.	2.	4.	760.	2.
3	2550-2600	5.	2.	4.	600.	2.
4	2600-2650	95.	2.	4.	900.	2.
5	2650-2700	<5.	2.	3.	1800.	2.
6	2700-2750	<5.	2.	3.	800.	6.
7	2750-2800	<5.	2.	4.	1400.	5.
8	2800-2850	<5.	2.	5.	980.	<2.
9	2850-2900	<5.	2.	2.	1100.	<2.
10	2900-2950	<5.	2.	3.	740.	4.
11	2950-3000	<5.	2.	4.	800.	<2.
12	3000-3050	20.	<2.	2.	820.	<2.
13	3050-3100	40.	<2.	<2.	900.	2.
14	3100-3150	5.	<2.	3.	960.	<2.
15	3150-3200	<5.	2.	3.	740.	<2.
16	3200-3250	<5.	<2.	4.	680.	<2.
17	3250-3300	<5.	2.	4.	760.	<2.
18	3300-3342	<5.	2.	3.	640.	<2.
19	3342-3379	<5.	2.	3.	840.	2.
20	3379-3416	<5.	2.	3.	1300.	2.

ROCKY MOUNTAIN GEOCHEMICAL CORP.
2561 EAST FORT LOWELL ROAD · TUCSON, ARIZONA 85716 · PHONE: (602) 795-9780
TUCSON OFFICE

Certificate of Analysis

RMGC Numbers:
Local Job No.: 81-6-39T
Foreign Job No.:
Invoice No.: T10445

Date: June 2, 1981

Client: Kilroy Investments
4625 E. Broadway, Suite 110
Tucson, Arizona 85711

Client Order No.:

Report On: 20 Samples

Submitted by: O. B. Kilroy

Date Received: May 11, 1981

Analysis: Cu, Mo, U_3O_8, W, F

Analytical Methods: Determined by atomic absorption.

Remarks: W to be reported from Salt Lake City

cc: Enc: 1
Mr. Clark Arnold, 5115 N. Oracle Rd, Tucson, Arizona 85704
RMGC/SLC
file

SJA/kd

All values are reported in parts per million unless specified otherwise. A minus sign (—) is to be read "less than" and a plus sign (+) "greater than." *Values in parenthesis are estimates. This analytical report is the confidential property of the above mentioned client and for the protection* of this client and ourselves we reserve the right to forbid publication or reproduction of this report or any part thereof without written permission.

ND = None Detected 1 ppm = 0.0001% 1 Troy oz./ton = 34.286 ppm 1 ppm = 0.0292 Troy oz./ton

Client Kilroy Investments Date June 2, 1981 RMGC Job No. 81-6-39T

Sample Numbers	Cu ppm	Mo ppm	U_3O_8 ppm	F %
2464-2500	50	11	2	0.017%
2500-2550	25	2	4	0.011%
2550-2600	15	3	5	0.011
2600-2650	105	3	4	0.022
2650-2700	5	3	4	0.067
2700-2750	5	5	5	0.036
2750-2800	15	5	5	0.095
2800-2850	5	4	6	0.051
2850-2900	5	5	4	0.057
2900-2950	5	4	4	0.035
2950-3000	5	4	4	0.037
3000-3050	40	2	4	0.051
3050-3100	55	1	2	0.065
3100-3150	15	3	3	0.099
3150-3200	5	3	5	0.036
3200-3250	5	3	5	0.063
3250-3300	5	3	4	0.057
3300-3342	5	3	4	0.051
3342-3379	5	3	5	0.046
3379-3416	5	3	5	0.133

ROCKY MOUNTAIN GEOCHEMICAL CORP.
SALT LAKE CITY, UTAH RENO, NEVADA TUCSON, ARIZONA

Shirley J. Riker

WEST JORDAN OFFICE

ROCKY MOUNTAIN GEOCHEMICAL CORP.

1323 W. 7900 SOUTH • WEST JORDAN, UTAH 84084 • PHONE: (801) 255-3558

Certificate of Analysis

RMGC Numbers:

Local Job No.: 81-12-[illegible]-81

Foreign Job No.: 81-[illegible]-39[illegible]

Invoice No.: M 103336

Date: June [illegible], 1981

Client: Kilroy Investments
4625 E. Broadway, Suite #110
Tucson, Arizona 85711

Attn: O. B. Kilroy

Client Order No.: [illegible]

Report On: [illegible]

Submitted by: [illegible]

Date Received: 5/[illegible]/[illegible]

Analysis: Tungsten

Analytical Methods: Determined colormetrically.

Remarks:

enc.

cc: file (2)
report: Clark Arnold, [illegible] No. Oracle Rd., Tucson, Az 85704
report: RMGC - Tucson
GJC/lw

All values are reported in parts per million unless specified otherwise. A minus sign (—) is to be read "less than" and a plus sign (+) "greater than." Values in parenthesis are estimates. This analytical report is the confidential property of the above mentioned client and for the protection of this client and ourselves we reserve the right to forbid publication or reproduction of this report or any part thereof without written permission.

ND = None Detected 1 ppm = 0.0001% 1 Troy oz./ton = 34.286 ppm 1 ppm = 0.0292 Troy oz./ton

Client Kilroy Investments Date 6/3/81 RMGC Job No. 81-12-36-SL

Sample No.	ppm Tungsten
2464-2500	10
2500-2550	5
2550-2600	5
2600-2650	10
2650-2700	5
2700-2750	-5
2750-2800	-5
2800-2850	-5
2850-2900	5
2900-2950	5
2950-3000	5
3000-3050	5
3050-3100	10
3100-3150	-5
3150-3200	-5
3200-3250	5
3250-3300	5
3300-3342	-5
3342-3379	5
3379-3416	-5

By Jim Cardwell
Jim Cardwell

S 3187

SOUTHWESTERN ASSAYERS & CHEMISTS, INC.

WIL WRIGHT
ARIZONA REG. NO. 5875

DNYANENDRA A. SHAH
ARIZONA REG. NO. 8868

REGISTERED ASSAYERS
P. O. BOX 7517
TUCSON, ARIZONA 85725

710 E. EVANS BLVD.
PHONE 602-884-5811
884-5812

Mr. O. B. Kilroy
Suite #110
4625 E. Broadway
Tucson, Arizona 85711

JOB # 026131
RECEIVED 4-20-81
REPORTED 5-8-81

SAMPLE NUMBER	Au ppm	Ag ppm	Cu ppm	Mo ppm	F ppm	P %	U_3O_8 ppm	WO_3 ppm
2550-2600	< .01	1	54	2	755	0.001	5	2
2750-2800	< .01	< 1	24	2	0.12%	0.001	5	19
2950-3000	< .01	1	44	3	905	< .001	4	15
3150-3200	< .01	< 1	43	4	0.11%	< .001	3	10
3379-3416	< .01	< 1	42	2	0.10%	0.002	3	9

REGISTERED ASSAYER
CERTIFICATE NO.
5875
WILBUR D.
WRIGHT
DATE ISSUED
ARIZONA U. S. A.

1 ppm = 0.0001% 1 troy oz./ton = 34,286 ppm 1 ppm = 0.0292 troy oz./ton

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

006

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

NK #6

REPORT OF ANALYSIS

JOB NO. TMQ 013
April 23, 1981

Mr. Oliver B. Kilroy
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 20 Drill Core Samples

ITEM	SAMPLE NO.	Cu ppm	Mo ppm	Au ppm	Ag ppm
1	2464-2500 9066	15.	<2.	<.02	<.2
2	2500-2550 9067	5.	<2.	<.02	<.2
3	2550-2600 9068	5.	<2.	<.02	<.2
4	2600-2650 9069	30.	<2.	<.02	<.2
5	2650-2700 9082	<5.	<2.	<.02	<.2
6	2700-2750 9085	<5.	<2.	<.02	<.2
7	2750-2800 9087	<5.	<2.	<.02	<.2
8	2800-2850 9088	<5.	<2.	<.02	<.2
9	2850-2900 9089	<5.	<2.	<.02	<.2
10	2900-2950 9090	<5.	<2.	<.02	<.2
11	2950-3000 9091	<5.	<2.	<.02	<.2
12	3000-3050 9092	25.	<2.	<.02	<.2
13	3050-3100 9100	45.	<2.	<.02	<.2
14	3100-3150 9101	5.	<2.	<.02	<.2
15	3150-3200 9304	<5.	<2.	<.02	<.2
16	3200-3250 9299	<5.	<2.	<.02	<.2
17	3250-3300 2491	<5.	<2.	<.02	<.2
18	3300-3342 2492	<5.	<2.	<.02	<.2
19	3342-3379 9150	<5.	<2.	<.02	<.2
20	3379-3416 9151	<5.	<2.	<.02	<.2

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Tucson, Arizona 85703
(602) 622-4836

JOB NO. TMQ 013
April 23, 1981

ITEM	SAMPLE NO.	P ppm	F ppm	U ppm	W ppm
1	2464-2500 9066	<50.	1200.	<2.	<2.
3	2550-2600 9068	<50.	880.	3.	3.
5	2650-2700 9082	<50.	2300.	3.	<2.
7	2750-2800 9087	100.	2100.	3.	<2.
9	2850-2900 9089	50.	1200.	3.	<2.
11	2950-3000 9091	150.	840.	4.	<2.
13	3050-3100 9100	300.	1300.	<2.	<2.
15	3150-3200 9304	100.	920.	3.	<2.
17	3250-3300 2491	<50.	940.	3.	<2.
20	3379-3416 9151	<50.	1400.	3.	<2.

William L. Lehmbeck
Manager

cc: Pillar Lowell & Associates
5115 North Oracle Road
Tucson, Arizona 85704
Attn.: Mr. Clark Arnold

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

REPORT OF SPECTROGRAPHIC ANALYSIS

JOB NO. TMQ 013
April 23, 1981

Mr. Oliver B. Kilroy
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 20 Drill Core Samples

The attached pages comprise this report of analysis. Values are reported in parts per million (ppm), except where otherwise noted, to the nearest number in the series 1, 1.5, 2, 3, 5, 7, 10, etc. within each order of magnitude. These numbers represent the approximate boundaries and midpoints of arbitrary ranges of concentration differing by the reciprocal of the cube root of ten. The 'accepted' value is considered to be within + or - 1 step of the range reported at the 68 % confidence level and within + or - 2 steps at the 95 % confidence level.

William L. Lehmbeck
Manager

SKYLINE LABS, INC.
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Tucson, Arizona 85703
(602) 622-4836

JOB NO. TMQ 013
PAGE 1

ITEM NO.	SAMPLE NO.
1 =	2464-2500 9066
3 =	2550-2600 9068
5 =	2650-2700 9082
7 =	2750-2800 9087
9 =	2850-2900 9089
11 =	2950-3000 9091
13 =	3050-3100 9100
15 =	3150-3200 9304

ITEM	1	3	5	7	9	11	13	15
ELEMENT								
Fe	5.%	5.%	3.%	3.%	3.%	5.%	10.%	1.5%
Ca	7.%	2.%	2.%	1.%	1.5%	1.%	5.%	.5%
Mg	1.%	.5%	.5%	.5%	.5%	.5%	3.%	.5%
Ag	<1	<1	<1	<1	<1	<1	<1	<1
As	<500	<500	<500	<500	<500	<500	<500	<500
B	30	20	10	10	10	<10	70	<10
Ba	200	500	150	150	150	150	100	200
Be	<2	<2	<2	<2	<2	<2	<2	<2
Bi	<10	<10	<10	<10	<10	<10	<10	<10
Cd	<50	<50	<50	<50	<50	<50	<50	<50
Co	<5	<5	<5	<5	<5	<5	30	<5
Cr	15	10	<10	10	15	10	15	10
Cu	7	7	<2	5	<2	<2	70	<2
Ga	<10	<10	<10	<10	<10	<10	<10	<10
Ge	<20	<20	<20	<20	<20	<20	<20	<20
La	<20	<20	<20	<20	<20	<20	<20	<20
Mn	700	1000	200	200	200	200	1500	150
Mo	<2	<2	<2	<2	<2	<2	<2	<2
Nb	<20	<20	<20	<20	<20	<20	<20	<20
Ni	7	<5	<5	<5	<5	<5	50	<5
Pb	<10	15	<10	10	<10	<10	<10	<10
Sb	<100	<100	<100	<100	<100	<100	<100	<100
Sc	<10	<10	<10	<10	<10	<10	10	<10
Sn	<10	<10	<10	<10	<10	<10	<10	<10
Sr	<100	<100	<100	<100	<100	<100	150	<100
Ti	1500	1500	1000	1000	1000	1000	7000	700
V	20	20	15	15	15	15	150	15
W	<50	<50	<50	<50	<50	<50	<50	<50
Y	<10	<10	<10	<10	<10	<10	<10	<10
Zn	<200	<200	<200	<200	<200	<200	<200	<200
Zr	70	50	70	100	30	30	70	150

Charles E. Thompson

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

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(602) 622-4836

JOB NO. TMQ 013
PAGE 2

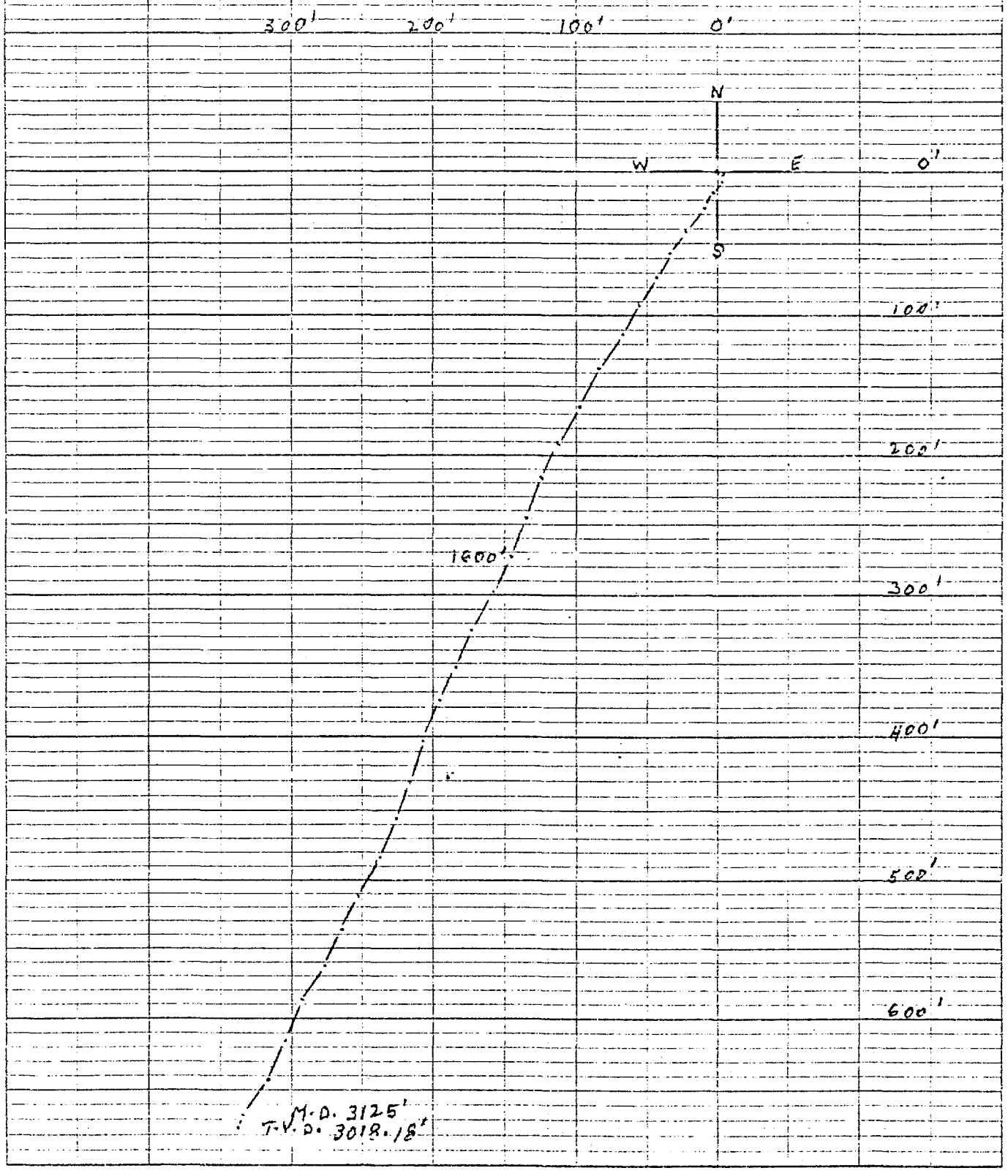
ITEM NO.	SAMPLE NO.
17 =	3250-3300 2491
20 =	3379-3416 9151

ITEM	17	20
ELEMENT		
Fe	1.5%	2.0%
Ca	.7%	.7%
Mg	.3%	.5%
Ag	<1	<1
As	<500	<500
B	10	<10
Ba	150	200
Be	<2	<2
Bi	<10	<10
Cd	<50	<50
Co	<5	<5
Cr	<10	15
Cu	<2	<2
Ga	<10	<10
Ge	<20	<20
La	<20	<20
Mn	150	150
Mo	<2	<2
Nb	<20	<20
Ni	<5	<5
Pb	<10	10
Sb	<100	<100
Sc	<10	<10
Sn	<10	<10
Sr	<100	<100
Ti	500	1000
V	10	20
W	<50	<50
Y	<10	10
Zn	<200	<200
Zr	50	50

cc: Pillar Lowell & Associates
5115 North Oracle Road
Tucson, Arizona 85704
Attn.: Mr. Clark Arnold

PROFILE [illegible] NK # 6 W

KILROY ENTERPRISES
SALOME PROJECT
YUMA COUNTY ARIZONA
SCALE 1"=100' 4-23-81



46 0780

MOLLEN-HAUER SURVEYING COMPANY

COMPANY Kilroy Enterprises Inc. JOB NO. _____ PAGE 1 OF 2

PROSPECT NO. ~~[illegible]~~ LOCATION Salome Project DATE 3-23-81

STATION NO	MEASURED DEPTH	COURSE LENGTH	DRIFT ANGLE	VERTICAL DEPTH	TRUE VERTICAL DEPTH	SECTION	COURSE DEVIATION	DRIFT DIRECTION	COORDINATE DIFFERENCES NORTH	SOUTH	EAST	WEST	RECTANGULAR COORDINATES NORTH	SOUTH	EAST	WEST
	100	100	1 3/4	99 95	99 95			S 71 E		99	2 59			99	2 59	
	200		1 1/2	99 97	199 92			S 34 E		2 17	1 46			3 16	4 35	
	300		2 3/4	99 88	299 80			S 21 W		4 48		1 72		7 64	2 63	
	400		5 1/4	99 58	399 38			S 29 W		8 00		4 44		15 64		1 81
	500		7 1/4	99 20	498 58			S 36 W		10 21		7 42		25 85		9 23
	600		10 3/4	98 25	596 93			S 38 W		14 70		11 48		40 55		20 71
	700		12	97 81	694 64			S 38 W		16 38		12 80		56 93		33 51
	800		11 1/4	98 08	792 72			S 29 W		17 06		9 46		73 99		42 97
	900		12 3/4	97 53	890 25			S 31 W		18 92		11 37		92 91		54 34
	1000		15	96 59	986 84			S 33 W		21 71		14 10		114 62		68 48
	1100		17	95 63	1082 47			S 31 W		25 06		15 06		139 68		83 50
	1200		17 1/4	95 50	1177 97			S 29 W		25 94		14 38		165 62		97 88
	1300		16 3/4	95 76	1273 73			S 29 W		25 21		13 97		190 83		111 85
?	1400		17 1/2	95 37	1369 10			S 24 W		27 47		12 23		218 30		124 08
?	1500		17 1/2	95 37	1464 47			S 20 W		28 26		10 28		246 56		134 36
	1600		16 3/4	95 76	1560 23			S 22 W		26 72		10 80		273 28		145 16
	1700		17 1/4	95 50	1655 73			S 26 W		26 65		13 00		299 93		158 16
	1800		16 3/4	95 76	1751 49			S 25 W		26 12		12 18		326 05		170 34
	1900		16	96 13	1847 62			S 26 W		24 77		12 08		350 82		182 42
	2000	100	17	95 63	1943 25			S 26 W		26 28		12 82		377 10		195 24

MOLLEN-HAUER SURVEYING COMPANY

COMPANY Kilroy Enterprises Inc JOB NO. PAGE 2 OF 2

PROSPECT NO. 796114 LOCATION Salome Project DATE 3-23-81

STATION NO.	MEASURED DEPTH	COURSE LENGTH	DRIFT ANGLE	VERTICAL DEPTH	TRUE VERTICAL DEPTH	SECTION	COURSE DEVIATION	DRIFT DIRECTION	COORDINATE DIFFERENCES NORTH	SOUTH	EAST	WEST	RECTANGULAR COORDINATES NORTH	SOUTH	EAST	WEST
	2100	100	16 3/4	95 76	2039 01			S 24 W		26 33		11 72		403 43		206 96
	2200		16 3/4	95 76	2134 77			S 22 W		26 72		10 80		430 15		217 76
	2300		16 1/2	95 88	2230 65			S 20 W		26 52		10 18		456 67		227 94
	2400		17	95 63	2326 28			S 21 W		27 30		10 48		483 97		238 42
?	2500		17 1/4	95 50	2421 78			S 24 W		27 09		12 06		511 06		250 48
	2600		16 3/4	95 76	2517 54			S 27 W		25 68		13 68		536 74		263 56
	2700		17 1/4	95 50	2613 04			S 28 W		26 18		13 92		562 92		277 48
?	2800		17 1/2	95 37	2708 41			S 26 W		27 03		13 18		589 95		290 66
	2900		17	95 63	2804 04			S 29 W		25 57		14 17		615 52		304 83
?	3000		17 3/4	95 24	2899 28			S 28 W		26 92		14 31		642 44		319 14
?	3100	100	18	95 11	2994 39			S 30 W		26 76		15 45		669 20		334 59
?	3125	25	18	23 78	3018 17			S 31 W		6 62		3 98		675 82		338 57

O. B. KIRBY

DATA SHEET NO. ____ OF ____

COMPANY KIRBY ENTERPRISES INC. JOB NO. ____ DATE ____

ADDRESS SUITE #110, 4625 E. BROADWAY TUCSON, ARIZ. 85711

LEASE ____ WELL NO. 1 FIELD Salome Prospect

COUNTY YUMA STATE Ariz TOTAL DEPTH ____

STABILIZER TYPE ____ SIZE ____ " NO. OF STAB. ____ TOTAL DIST. BETWEEN STAB. ____

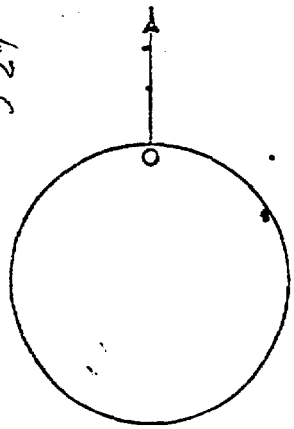
REF. PT. Pig BEARING S52W HOW OBTAINED Brunton ____ °E/W DECL.

RUN NO. ____ FILM CODE ____ SURVEY DEPTHS ____ ' TO ____ ' "0" PT. ____

GYRO NO. ____ A.U. NO. ____ ° INST. NO. ____

S24

FIRST FLASH 00-00	LAST FLASH ____
VOLT. W/LOAD DC 30	DC ____
START GYRO AZ. S51W	FINISH AZ S52W DRIFT ____ TILT ____
TIME, ORIENT. 02-25	TIME FINAL ORIENT. 121-45
CASE ORIENT. 04-25 TO 08-25	FROM 114-15 TO 117-45



REMARKS ____

IN RUN SURFACE TIME	MEASURED DEPTH	OUT RUN SURFACE TIME	IN RUN SURFACE TIME	MEASURED DEPTH	OUT RUN SURFACE TIME	IN RUN SURFACE TIME	MEASURED DEPTH	OUT RUN SURFACE TIME
[illegible]	1		[illegible]	18 X	[illegible]			
[illegible]	2		[illegible]	19				
[illegible]	3		55-12	20				
17-20	4		[illegible]	21				
[illegible]	5		[illegible]	22				
[illegible]	6 X	[illegible]	[illegible]	23				
[illegible]	7		[illegible]	24 X	[illegible]			
[illegible]	8		[illegible]	25				
[illegible]	9		[illegible]	26				
[illegible]	10		[illegible]	27				
[illegible]	11		[illegible]	28				
[illegible]	12 X	[illegible]	[illegible]	[illegible]				
[illegible]	13		[illegible]	[illegible]				
[illegible]	1		[illegible]	3109				
[illegible]	2		[illegible]	3105				
[illegible]	1							
[illegible]	7							

MOLLEN-HAUER SURVEYING COMPANY

WORK ORDER AND RECEIPT

P.O. Box 17376 • Tucson, Ariz. 85731 • Phone (602) 298-2779

Customer [illegible] Date 3-23-81

Invoice Address [illegible] Well Name & No. [illegible]

[illegible] 85711 Job No. [illegible]

Field Solome County Yuma State [illegible]

Hole size BX to ft. size to Ft. Others

This is to verify the order for a [illegible] survey on the above mentioned well.

The Customer agrees to the Rates, Terms and Conditions as set forth in Price List No. as quoted.

Is filing of survey with Governing Agency required by existing Law, Rule or Regulation? ____

By ____
Customer/Agency thereof

Arrived at well: Date 3-23-81 Time - Left well: Date 3-23-81 Time - Standby time ____

Travel from [illegible] to [illegible] Round trip 420 miles. Surveyed from 0 to 3150 75

Footage surveyed 3150 75

Distance between Survey Stations: 100 Traversed from - to - Footage traversed -

Remarks: ____

By [illegible]
Mollen-Hauer Surveying Company

By ____
Customer/Agency thereof

COLLAR ELEVATION _____
LOCATION _____
INCLINATION _____
TOTAL DEPTH _____
LENGTH CORED _____
CORE RECOVERY _____

PHELPS DODGE CORPORATION

WESTERN EXPLORATION OFFICE

GEOLOGIC LOG

PROJECT Kil-Sal - Salome

HOLE NO. Kilroy #6
LOGGED BY W J Walker
DATE STARTED _____
DATE COMPLETED _____
TYPE DRILL _____
SCALE _____

Footage	Core Recovery	Rock Type and Description		% Pyrite	Est. % of Metals			Graphic Log	Depth	Assays				
1665		Gray laminated phyllite; well indurated												
1670	2½'													
1673.6	2'													
1679	3.4'													

GEOLOGIC LOG

HOLE NO. Kilroy #6

PROJECT Kil-Sal

SHEET NO. 13

Footage	Core Recovery	Rock Type and Description	% Pyrite	Est. % of Metals	Graphic Log	Depth	Assays
1680	9.0	Dark gray phyllite, laminated to 1686, then granular rocks, feldspar grains, chlorite			80	40	
1688	9.0	Hole cores tight fold, axis at 39° to core. Dark gray phyllite, locally granular, feldspars(?) and chlorite to 1691, then finely laminated dark gray argillite					
1697	9.0					100	
1706	9.0	Dark gray banded phyllite; calcareous in part.					
1715	9.0						
1723.8	9.4	Dark gray thinly laminated phyllite, calcareous in part.			70		
1735.8	9.2	Same, but with light colored quartzitic bands with mica.					
1745	1.6	Banded gray phyllite, calcareous in part, some light gray quartzitic bands up to 1" thick. Pyrite ubiquitous.					
1746.6	7.0						
1753.6	2.0	Dark gray phyllite					
1756.6	6.4						
1763	3.0	Dark gray phyllite, some impure quartzitic bands, 1"-6". At 1767, quartz, galena, in deformed zone. The hole cuts a minor fold, plus faulting, to 1774.			80		
1766.6	3.0						
1769.6	3.4	Dark gray phyllite					
1773	5.0						
1778	4.5	Dark phyllite.					
1783	5.0	Gray phyllite, quartzitic in part, to 1787, then fine grained greenish quartzitic rock-(meta-tuff?) to 1791, then gray phyllite. Large biotite books at 1797. Fold axis at 1796½.					
1788	5.0						
1793	2.0						
1801.6	6.8	Phyllite, gray; somewhat massive, quartzitic in part.					
1810	8.4						

GEOLOGIC LOG

HOLE NO. Kilroy #6

PROJECT Kil-Sal-Salome

SHEET NO.

Footage	Core Recovery	Rock Type and Description	% Pyrite	Est. % of Metals	Graphic Log	Depth	Assays
1810							
1811	1.0						
1814.6	3.0	Gray finely banded phyllite, calcareous in part			75		
1821	6.4	Gray to dark gray phyllite, calcareous in part, some lighter gray in pure quartzites in beds up to 6"				40	
1830	9.0					30	
1840	9.0					do	
1842	2.0	Dark gray phyllite in bands, interspersed with more massive finely granular, feldspathic quartzite (?) with chlorite shreds, granular material increases to chilled contact with diabase at 1844. Diabase mafics → chlorite					
1849	7.0	Diabase to 1851, then 2" calcareous phyllite, then dark impure quartzite to 1853.5, then fine dark feldspathic rock to 1857, then dark gray calcareous argillite.					
1850.6	1.6					50	
1857	6.0						
1857.6	0.6						
1858.6	1.0	Dark gray calcareous phyllite to 1859.6, then 2" breccia, then fine to medium grained impure grayish green quartzite to 1876					
1861	2.4						
1868	7.0						
1868.6	0.6						
1871	2.4				85		
1876	5.0	Thin bedded gray phyllite, calcareous in part. Some disseminated pyrite - less than 1%			85		
1881	5.0						
1886	5.0						
1891	5.0						
1895.6	4.6	Very fine gray siltstone, sandy in part. Shows syngenetic slumping, grades downward into more calcareous section represented by remobilized calcite generally parallel to bedding. Sandy sections up to 10", most much thinner, about ½". Very fine pyrite in beddings and as very fine veinlets, up to 2%. Intrusive contact at 1909.6 slight chilling of intrusive. Contact is conformable with bedding.					
1905	9.4						
1911.6	6.6				80		
1914.6	3.0	Medium grained porphyry, feldspars → clay, ferromags → chlorite Weak foliation suggests that this is a sill.					
1921	6.4				60		
1924	3.0						
1928.6	4.6						
1936	5.2	Splotchy granular textured rock, feldspars → clay, green chlorite as wisps and books, to 1942					
1940	4.0						

GEOLOGIC LOG

HOLE NO. Kilroy #6

PROJECT Kil-Sal - Salome

SHEET NO.

Footage	Core Recovery	Rock Type and Description	% Pyrite	Est. % of Metals	Graphic Log	Depth	Assays
1940							
1942.6	2.6	White impure quartzite with pale splotches of chlorite to 1942. Finely laminated gray calcareous phyllite with up to 10% pyrite, to 1944.5					
1944.5	1.9	1/4" calcite-chlorite vein at 10° to axis, scorodite on clearage.					
1948.6	4.1	Very fine white quartzite, grain size less than 0.1 mm. Some spots recrystallized ?, grades downward to following -					
1951.6	3.0						
1953.6	1.8	White impure quartzite, grain size 0.1 to 0.25 mm. random clear grains to 1mm. Greenish clay and chlorite on partings,					
1956	2.4	60° to axis.					
	10'	Spot of sulfides on fracture 1966.6, pyrite, pyrrhotite, also iron oxides, minor quartz as crystals.					
1966							
1970.6	4.6						
1971	0.4	White impure quartzite, grains 0.1 to 0.25 mm, a few					
1976	5.0	grains to 1mm. Greenish biotite as specks. Some very fine specks of magnetite (?), to 1989, to fault at 2009					
1980	4.0						
1981	1.0						
1985.6	4.6						
1989	3.4						
	9.0						
1998							
	9.0						
2007		Fault, 2009-2010.					
2009	2.0						
2010	0.2						
	7.0	Finely laminated gray phyllite to 2013, then granular impure gray quartzite with chlorite to 2017.6, then					
2017		laminated gray phyllite, gray quartzitic beds up to					
	9.0	10" thick after 2021.					
2026							
	9.0						
2035							
	9.0						
2044.6		Finely laminated gray phyllite with quartzite bands to 2056, then dirty fine grained quartzite.					
	9.0						
2054							
	9.0						
2063.6							
	6.4						
2070							

GEOLOGIC LOG

HOLE NO. Kilroy No.6

PROJECT Kil-Sal - Salome

SHEET NO.

Footage	Core Recovery	Rock Type and Description	% Pyrite	Est. % of Metals	Graphic Log	Depth	Assays
2070	2.6	Calcareous thin-bedded platy phyllite, quartzitic in part, fine banding at 2071, then gray dirty calcareous phyllite to 2077, then dark fine banded phyllite showing syngenetic slump features. Pyrite ubiquitous in darker bands.					
2073	9.0						
2083	9.0	Phyllite becomes darker with depth. Dark gray finely banded to			70		
2093	9.0						
2102.6	9.0						
2111.6	9.0						
2119.6	2.0	Dirty quartzite, some pyrrhotite on seams, calcareous in part, to 2121. Alternating phyllite and dirty quartzite, to 2141.					
2121.6	7.0				75		
2131	9.0						
2141	9.0	Phyllite, fine banded to massive, calcareous 2142-2143 Phyllite, dark to medium gray, calcareous in part					
2150	8.0						
2158	9.0	Dark banded phyllite			50		
2168	9.0						
2177.8	9.0	Dark banded phyllite, grading into medium gray calcareous phyllite to 2186.6.					
2186.6	9.0	Metavolcanic tuff (?), 1mm feldspars → epidote			45		
2196	4.0						
2200							

GEOLOGIC LOG

HOLE NO. Kilroy No. 6

PROJECT Kil-Sal - Salome

SHEET NO.

Footage	Core Recovery	Rock Type and Description		% Pyrite	Est. % of Metals			Graphic Log	Depth	Assays				
2200	5.6	Metavolcanic tuff? greenstone; 1mm feldspars gone to epidote, to 2199 fed. Mottled brecciated rock, calcite veinlets to 2203.6 (Petro.-												
2205.6	9.0	Thin band of light gray phyllite to 2234, banded with fine brown biotite, to 2234.6.						80						
2215	9.0													
2224	9.0													
2234	9.0	Spotted porphyroblastic schist from 2234.6 to 2239. Porphyroblasts are quartz. Petro at 2234.6 and at 2239.												
2244	9.0	Dark brown (greenish) fine grained phyllite to 2243, then spotted porphyroblastic schist with brown chlorite folia, to 2289.5.						65						
2253	9.0													
2262.6	9.0													
2272	9.0													
2282	9.0	2289.5 to 2291.5, diabase (now greenstone), then spotted porphyroblastic schist as before to 2297, then 1½' fine diabase (greenstone), then spotted schist grading into banded light gray to medium gray phyllite, to 2309½, then 12" diabase (greenstone), then calcareous phyllite to 2315, then 12" diabase (greenstone), then banded light to medium gray phyllite to 2330.												
2292	9.0													
2301	8.0													
2309	9.0													
2320	9.0													
2330														

GEOLOGIC LOG

HOLE NO. Kilroy #6

PROJECT Kil-Sal-Salome

SHEET NO.

Footage	Core Recovery	Rock Type and Description		% Pyrite	Est. % of Metals			Graphic Log	Depth	Assays				
2330		Banded light to medium gray phyllite to 2424.												
	9.0													
2339														
	9.0													
2349														
	9.0													
2358.6														
	9.0													
2368														
	9.0													
2377.6														
	9.0													
2387														
	9.0													
2396.6														
	9.0													
2406.6														
	9.0													
2416														
	9.0	Metavolcanics (?) from 2424 to 2428½, then fine light gray banded phyllite becoming somewhat more calcareous (more epidote banding) to 2464, bottom of the hole.												
2426														
	9.0													
2435.6														
	9.0													
2444.9														
	9.0													
2454														
	9.0													
2464														

GLOBO DE PLOMO ENTERPRISES

P.O. BOX 872
DOUGLAS, AZ 85607
USA

October 1, 1984

NK-#10
744'-1134'

OLIVER B. KILROY
INVESTMENTS
Suite 110 - 4625 East Broadway
Broadway Terrace
Tucson, AZ 85711

Dear Oliver:

Enclosed are data for your 17 core samples. I thought 5 thin sections adequate for the basic data and examined the remainder with the stereomicroscope. Some features have been marked on the core, returned to you by parcel post.

The assemblages are as follows:

1.) metamorphic biotite-plagioclase
2.) late metamorphic epidote-pyrite-calcite-quartz
3.) shearing producing chlorite-muscovite
4.) late gypsum veining.

Assemblage (2) is the band at 1134, the remainder of this piece is (1). The chloritized shear material is hosting the gypsum veins at 1119 and is beautifully seen in 903.5.

Please do call if you have further questions.

Best regards,

Sidney A. Williams

SAW:bj
encls.

TEL: (602) 364-9637 / TLX: "GLOPLO" / SHIPPING: 1201 F AVENUE, DOUGLAS

746

The pink spots are anhydrite partly altered to gypsum.

759

The original rock was a porphyritic intrusive one with squarish plagioclase phenocrystals in a granular quartz-feldspar matrix. Mesozonal metamorphism has not obliterated texture.

Plagioclase phenocrysts have been altered in part to granular epidote, the remaining outer portions subsequently sericitized, and quartz phenocrysts have disaggregated to granular lenses. Granular orthoclase comprises the matrix, hosting strings of epidote grains and hornblende prisms that follow a vague foliation. Parallel to the fabric are vaguely defined veins in which pyrite is disseminated. The gangue replacing the host rock in these features includes muscovite, calcite, epidote, actinolite, and quartz. Retrograde alteration to produce pennine is more pronounced in these structures.

786

Pink gypsum veins cutting across earlier white quartz veins of metamorphic age.

790

Quartz-calcite vein with hematite, chlorite, calcite assemblage in walls.

791

The rock represents a gneissose porphyry but here has been sheared and severely retrograded. Little remains of primary features.

Quartz remains unchanged in the matrix whilst all feldspars have altered to coarse shreddy sericite and calcite. Oval plagioclase augen are replaced by sericite or muscovite plus a little pennine. All matrix mafites have been replaced by rosettes of pennine and granular calcite, the two minerals in strings and bands due to earlier shearing. Large pink spots of anhydrite have formed in the matrix, since altering entirely to gypsum.

866

White (and pinkish) gypsum in shars cutting earlier quartz veins.

903.5

Pyrite disseminated in detached lenses (pieces of vein matter) in the grey spots. The core is in a shear zone and the brecciated material cemented by calcite.

944

The rock is a gneiss derived from a porphyritic intrusive by mesozonal metamorphism. Plagioclase phenocrysts remain as augen that are either fresh or have been retrograded to fine grained sericite. They lie randomly in a fine grained matrix of quartz and orthoclase in which are embedded innumerable small books of biotite. The biotites swarm along foliae and occur in bunches outlining hornblende in the protolith. Accessories such as sphene and epidote occur with the biotite.

Granular quartz veins follow the fabric and are synmetamorphic. They are bordered by hornblende, green biotite (it is brown elsewhere), calcite, and host abundant epidote. Seams of gypsum cut across these veins.

964

The original rock appears to have been a porphyritic intrusive or hypabyssal rock carrying small plagioclase, quartz, and mafite phenocrysts in a granular quartz-feldspar matrix. Quartz veins with sericitized selvages may have cut the rock prior to mesozonal metamorphism and retrograde alteration.

Plagioclase augen remain in outline but are replaced by very fine grained sericite and calcite. Rosettes of pennine scales replace mafites. Vein quartz is strained and has begun to shear along the walls though the pyrite in it seems unaffected. Muscovite books foliated along the vein margins are considered to have developed from a sericite envelope present earlier. Very fine shreddy sericite packs fractures that cut across the vein.

1007

Plagioclase-biotite gneiss cut by late veinlets of white gypsum (marked on core). Parallel lines show retrograde bleached zone with calcite-filled fracture in center.

1026

Fresh plagioclase-biotite gneiss. Calcite vein (A on core) is cut by gypsum vein (B).

1065

The thick vein is coarse gypsum. The crystals you marked are calcite.

1066

Fresh plagioclase-biotite gneiss cut by gypsum veins.

1082

The original rock was a basic porphyry, perhaps hypabyssal, with a few quartz eyes and numerous plagioclase phenocrysts packed in a matrix of plagioclase. Hornblende phenocrysts were also present. The rock has been mesozonally metamorphosee.

Hornblende is most affected, altering entirely to biotite which has begun to foliate in the matrix and flow around phenocrysts. Accessory calcite and sphene may occur with it. Plagioclase was fresh during prograde effects, later to be clouded with a little retrograde sericite. Plagioclase is heavily altered to sericite and epidote along veins of strained quartz cutting the fabric. Calcite-filled fractures cut cleanly across the veins.

1104

Crushed retrograded gneiss in shear zone cemented by chlorite and muscovite.

1119

Chloritized gneiss, sheared, with chunks of coarse vein quartz (Q) and younger veins of gypsum (G on core).

1134

Gneiss; most pyrite is in epidote bands (between lines on core). The larger flaky crystals are gypsum; the grey-green you marked is smectite filming a late fracture surface.

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

REPORT OF ANALYSIS

JOB NO. TMQ 019
October 10, 1984
744-790 1
PAGE 1 OF 1

Mr. Oliver B. Kilroy
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 8 Rock Chip Samples

ITEM	SAMPLE NUMBER	Au (ppm)	Ag (ppm)
1	744-790 1	<.02	<.2
2	790-843 2	<.02	<.2
3	843-897 3	<.02	<.2
4	897-942 4	<.02	<.2
5	942-984 5	<.02	<.2
6	984-1028 6	.02	1.0
7	1028-1081 7	<.02	<.2
8	1081-1133 8	<.02	<.2

REGISTERED ASSAYER
CERTIFICATE NO. 9425
WILLIAM L. LEHMBECK
EXP. 31 DEC 84
Arizona U.S.A.

William L. Lehmbeck
Manager

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

REPORT OF SPECTROGRAPHIC ANALYSIS

JOB NO. TMQ 019
October 10, 1984
744-790 1

Mr. Oliver B. Kilroy
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 3 Rock Chip Samples

The attached pages comprise this report of analysis. Values are reported in parts per million (ppm), except where otherwise noted, to the nearest number in the series 1, 1.5, 2, 3, 5, 7, 10, etc. within each order of magnitude. These numbers represent the approximate boundaries and midpoints of arbitrary ranges of concentration differing by the reciprocal of the cube root of ten. The 'accepted' value is considered to be within + or - 1 step of the range reported at the 68 % confidence level and within + or steps at the 95 % confidence level.

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK DATE SIGNED Arizona

William L. Lehmbeck
Manager

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

JOB NO. TMQ 019
PAGE 2

ITEM NO.	SAMPLE NO.
1 =	744-790 1
4 =	897-942 4
8 =	1081-1133 8

ITEM	1	4	8
ELEMENT			
Fe	5%	5%	7%
Ca	5%	5%	3%
Mg	2%	2%	2%
Ag	<1	<1	<1
As	<200	<200	<200
B	10	20	10
Ba	700	500	500
Be	<2	<2	<2
Bi	<10	<10	<10
Cd	<50	<50	<50
Co	20	10	15
Cr	100	70	150
Cu	7	50	20
Ga	20	30	30
Ge	<20	<20	<20
La	30	50	30
Mn	1500	1500	1500
Mo	<2	<2	<2
Nb	<20	<20	<20
Ni	10	5	5
Pb	10	50	15
Sb	<100	<100	<100
Sc	15	10	15
Sn	<10	<10	<10
Sr	500	200	300
Ti	5000	3000	5000
V	200	200	200
W	<50	<50	<50
Y	20	20	20
Zn	<200	<200	<200
Zr	150	100	150

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

REPORT OF SPECTROGRAPHIC ANALYSIS

JOB NO. TMQ 019A
November 7, 1984
744-790 1

Mr. Oliver B. Kilroy
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 1 Pulp Sample

The attached pages comprise this report of analysis. Values are reported in parts per million (ppm), except where otherwise noted, to the nearest number in the series 1, 1.5, 2, 3, 5, 7, 10, etc. within each order of magnitude. These numbers represent the approximate boundaries and midpoints of arbitrary ranges of concentration differing by the reciprocal of the cube root of ten. The 'accepted' value is considered to be within + or - 1 step of the range reported at the 68 % confidence level and within + or - 2 steps at the 95 % confidence level.

William L. Lehmbeck
Manager

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

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

JOB NO. TMQ 019A

ITEM NO. SAMPLE NO.
6 = 984-1028 6

ITEM 6

ELEMENT	
Fe	7%
Ca	10%
Mg	3%
Ag	<1
As	<500
B	10
Ba	700
Be	<2
Bi	<10
Cd	<50
Co	20
Cr	150
Cu	1000
Ga	10
Ge	<20
La	20
Mn	1000
Mo	<2
Nb	<20
Ni	10
Pb	30
Sb	<100
Sc	<10
Sn	<10
Sr	100
Ti	5000
V	200
W	<50
Y	10
Zn	<200
Zr	100

P. O. Box 872
Douglas, AZ 85607
December 27, 1979

NK-12 & 13

O. B. Kilroy
Suite #110
4625 E. Broadway
Tucson, AZ 85716

Dear Oliver:

Enclosed are descriptions of thin sections taken from the samples you went me last week. I hope they will help answer your questions.

Both holes show the country rock to be gneiss, derived from original igneous and sedimentary rocks by virtue of mesozonal metamorphism. There was also an older volcanic unit present (NK - 12 705-708). Probably during the dying stages of metamorphism, the rocks were retrograded and minor pyrite introduced.

Secondly, hole 12 shows an abundance of younger volcanic rock, probably occurring as dikes. All of these are essentially the same, described as basalt or basic andesite. These have altered themselves and adjoining gneisses to minerals such as hematite - calcite - sericite. These dikes appear unrelated to the sulfides, which I believe were earlier.

Your pegmatites - quartz veins are certain bands and segregations in the gneiss. No younger pegmatitic rocks were found.

As for specific questions:

1) The mineral resembling fluorite in 685-695A is cleavable, iron-stained feldspar.
2) The gradational change you noted in some volcanic fragments is due to chilling along contacts. This chilled border effect darkens the rock.
3) Iron oxides in veins such as 485-495 are primary.
4) The rock at 395-405 is a light colored layer in the gneiss, not a pegmatite or aplite
5) The prisms in 13 - 130A are brown (rare earth bearing) epidote.
6) Iron oxides in 13 - 125 - 130 are of retrograde age, those at 140A are related to weathering.

Best regards,

Sid

Sidney A. Williams

SAW:bj
encls:

December 31, 1979

Dear Sid:

Much obliged for your petrographic work and enclosed is my check for the bill.

Taking into consideration the location NK#12 and NK#13 - #13 is 900 feet east, approximately, of #10 and #12 is 2100 feet east of #13 - and the results of some of your previous work, would you comment, ranging from possible to probable, yes, no or maybe, on my following conclusions:

1. The allanitic epidote at NK#13-140A represents pegmatitic or related activity. (Was any of the other epidote also allanitic, such as the prismatic at NK#12-675-685?)

2. From 1, therefore, at least some of the epidote found on the property and in the drilling may be accessory or propylitic to pegmatitic activity.

3. The muscovite in 140A is related to the activity in 1 and its being found inside the plagioclase outside the fractures indicates muscovite may be developed at variable distances from fractures not seen. Therefore, the muscovite found at NK#13-180, NK#12-685-695 A & B, NK#10-743 and in some of the other previous petrographic results is pegmatitic.

4. The biotite in 685-695A is newly introduced and, because of its proximity to the muscovite, is pegmatitic. Therefore, some of the other non-foliated biotite found in this suite, such as at 705-708 and 675-685 and in other holes such as at NK#10-743 is also pegmatitic.

4a. In a synkinematic environment, some minerals that look metamorphic are really hydrothermally introduced. The biotite at 685-695B and 575-585, as examples, may be of this nature.

5. There is lateral zoning between #13 and #12 where the fractures at 140A are related to those of 675-685. Therefore, the assemblage pyrite, allanitic epidote, sphene, muscovite, sericite may grade into quartz, calcite, pyrite and, by proximity, pennine, sericite and the clay.

6. The vein at 485-495 also is related to 675-685 and, thus, to 140A. Thus, the assemblage is extended to include iron oxides.

7. Since magnetite is found with the biotite at 575-585,

it should be included in the assemblage as should some of the mag. found elsewhere on the property.

7a. The iron oxides proxy for sulphides with the pegmatitic activity.

8. Although the strong deuteric alteration seems to be fading with depth, alteration, actually, is increasing in strength because biotite is being introduced at depth, not seen in the deuteric zone, prior to retrograde. The latter may be decreasing simply because the temperature of the rock is not falling off as fast at depth.

9. The volcanics that alter themselves (I assume this means the solutions attendent with their intrusion or forced out during solidification impregnated the volcanics and formed certain minerals) to hematite, calcite and sericite may be related to 485-495 and, therefore, to 140A by zoning. Additionally, the other volcanics on the prospect which you've petrographed and found pyrite, hematite, sericite and graphic intergrowths are related.

10. The orthoclase and hematite crystals found in veins as described in one of your first descriptions designated as "Younger Mineralization #1" and my map symbol #1 is related to the orthoclase of 705-708. Therefore, orthoclase is added to the above assemblage.

By the way, in as much as the two holes each had five feet of surface casing, preparatory to deep drilling, the liklihood of surface sluffing seems minimal. Relative to your statement #6 about iron oxides at 140 feet being due to weathering, is any other explanation a possibility?

I'd appreciate your brief answers to the above, includ- a comment about allanitic epidote possibly being found elsewhere in the holes. Thanks again for your help.

Best Regards,

Olly Kilen

P. O. Box 872
Douglas, AZ 85607
January 2, 1980

O. B. Kilroy
Suite 110
4625 East Broadway
Tucson, AZ 85711

Dear Oliver:

In answer to your questions in your letter of the 31st.

1) I would have noted allanite wherever I saw it, and only saw it in the one specimen. The presence of rare earths in epidote (thus allanite) is usually due to either pegmatitic intrusions or to segregations developing in rocks undergoing metamorphism. I prefer the latter interpretation because I saw such segregations developing in these rocks.

2) The epidote in the rocks has formed in response to quite ordinary metamorphic conditions, not due to proximity of igneous pegmatites.

3) The muscovite has formed by addition of water and potassium; the fractures along which these ingredients entered the rock have doubtless long since been healed.

4) The non-foliated biotite appears to have formed during metamorphism but after deformation. I take this as evidence that the rocks were heated (and recrystallizing) much longer than they were subjected to stress.

4a) Well, at least the potassium and water may be introduced, but these two components alone don't signify amy particular source.

5) There may be lateral zoning, with more "goodies" such as allanite and muscovite in #13. But this could be due to the proximity of #13 to some sort of structural zone that was active during metamorphism.

6) No. The iron oxides are definitely younger, related to vulcanism.

7) The magnetite is certainly related to the biotite; they were compatible during metamorphism.

7a) No, in fact the reverse seems to be true. When elements such as rare earths, potassium, and water are mobile, sulfur is also.

8) Probably true.

9) No. Alteration related to the volcanics is really feeble, and low temperature. It would be unreasonable to expect a "hot" vein or assemblage to be related to vulcanism I have seen.

10) Orthoclase (in veins or recrystallized) seems to be related both to younger vulcanism and to recrystallization and segregation during metamorphism.

Finally, I still think iron oxides at 140 feet likely to be due to weathering. Surprisingly, oxygenated waters can even reach to 1000' or more in some cases!

I hope these comments help. Just to make sure we are communicating well, I want to reiterate that all evidence suggests to me that "pegmatitic activity" has begun to occur during metamorphism, using locally derived materials from the gneisses. I see no sign of pegmatites from some foreign source invading the country rock.

Best regards,

Sidney A. Williams

SAW:bj

NK - 12 15 - 25

The rock is a gneiss of uncertain origin. It consists of lenses and bands of plagioclase and microcline with stringers of strained quartz in between. Larger microcline grains may host beads of plagioclase but there are no evidences of replacement. Hornblende and biotite crudely aligned to foliation occur mainly in feldspar-rich bands.

Following mesozonal metamorphism was an epizonal event, probably retrograde in character. Biotite is entirely replaced by pennine and minor hematite; hornblende is partly altered to pennine and coarse epidote. Plagioclase is clouded with sericite and may host epidote while microcline remains fresh.

NK - 12 45 - 65

The rock is a gneiss similar to above but distinctly more leucocratic. It consists of relatively fine grained quartz, microcline, and plagioclase which are intergrown in a peculiar mottled texture. Any of the three minerals may locally host another. There are occasional lenses of strained quartz but elsewhere the fabric shows little evidence of deformation and is only crudely foliated. Small biotite flakes lie on grain boundaries and tend to be aligned to foliation.

Following mesozonal metamorphism was a mild retrograde alteration. Biotite is partly altered to pennine and granular epidote. Plagioclase is corroded by sericite/hydromicas while microcline remains fresh. Traces of pyrite (now oxidized) present are associated with coarse epidote. Late caliche-like calcite films fractures.

NK - 12 75 - 85

The rock shows the contact between a basalt and gneiss, the latter doubtless a xenolith in the younger basalt.

The basalt is severely chilled. The glassy matrix is turgid and contains innumerable minute microlites of plagioclase, augite, and magnetite. Large subhedral phenocrysts of augite and plagioclase are sparingly present. Epizonal deuteric alteration has occurred. Plagioclase is replaced by coarse granular calcite and augite by feathery sheaves of antigorite. The fabric is laced with thin calcite veins. Pods of orthoclase and quartz may replace the basalt near the gneiss contact.

Within the gneiss orthoclase remains fresh but plagioclase is clouded with sericite and calcite. Calcite, epidote, and pennine replace mafites.

NK - 12 145 - 155

The rock is a gneiss of uncertain origin but most likely a tonalite originally. It consists of large squarish plagioclase subhedra set in a finer grained matrix of quartz, plagioclase, and crudely foliated biotite. Retrograde epi-mesozonal changes have been considerable.

The biotite books are slightly penninized and bleached. They cluster with abundant coarse epidote, suggesting that both minerals in fact have replaced earlier hornblende. Plagioclase is uniformly clouded with sericite and calcite. Calcite also occurs in thin veins of orthoclase that parallel the foliation. Pyrite occurs in or near these veins but may also be disseminated in the rock, usually in association with epidote.

NK - 12 195 - 205A

The rock is an andesitic one but of lamprophyric character. It carries small euhedral phenocrysts of hornblende that are sparingly scattered in a matrix of uniform sized plagioclase and hornblende laths. Tiny grains of accessory magnetite or ilmenite and of sphene are common in the matrix. Epizonal deuteric alteration has been strong.

Although some plagioclase survives (as albite) most is replaced by a paste of sericite and calcite. Hornblende is replaced by nearly isotropic pennine and calcite. Calcite also veins the fabric. Accessory minerals are entirely replaced by iron oxides and leucoxene.

Original mineral percentages are estimated as: plagioclase 38%, hornblende 55%, magnetite 4%, sphene 3%.

NK - 12 195 - 205B

The original rock was probably a tonalite like 145 - 155. It consists mainly of large squarish plagioclase subhedra and a few ragged hornblende prisms closely crowded in a quartz-plagioclase matrix. The rock has been mesozonally metamorphosed and is crudely foliated, but probably is not much changed from its original state except that quartz has flowed slightly.

Retrograde effects have been fairly strong, however. Plagioclase is clouded with shreddy sericite, hosting a few grains of epidote and calcite. Hornblende is entirely altered to coarse epidote and pennine. Orthoclase may appear in the interstices of some coarser epidote clusters. Pyrite is eidely disseminated and seems associated with retrograde epidote in some cases. It is now oxidized to earthy goethite.

NK - 12 225 - 235A

The rock is a gneiss similar in texture to 45 - 65. It consists mainly of plagioclase and quartz, here with less microcline than at 45 - 65, but the three minerals form a peculiar mottled or pebbly texture. Gneissosity is poorly displayed although a few biotite flakes occur on grain boundaries and are crudely foliated.

The rock is cut obliquely by "veins" that appear to be of late metamorphic age. These are filled with coarse, strained quartz with a lining of coarse biotite and abundant accessory apatite.

Finally, the rock has been pervasively altered in the epizone. While microcline and quartz remain unchanged, plagioclase is uniformly clouded with sericite and minor calcite. Biotite is entirely altered to pennine, calcite, and earthy leucoxene.

NK - 12 225 - 235B

The rock is a basalt or basic andesite of lamprophyric character. It resembles both 195 - 205 and 75 - 85. Subhedral phenocrysts of plagioclase and augite are widely dispersed. The matrix is a swarm of tiny plagioclase and basaltic hornblende laths showing no clear flowage alignment. Tiny grains of ilmenite are also common in the matrix. Mild epizonal deuteric alteration has occurred.

Plagioclase is mildly sericitized in the matrix while phenocrysts show somewhat heavier alteration to sericite and calcite. Augite is mostly replaced by antigorite and calcite but a few corroded remnants survive. Hornblende in the matrix may be attacked by calcite but is generally surprisingly fresh.

Original mineral percentages are estimated as: plagioclase 43%, augite 3%, hornblende 49%, ilmenite 5%.

NK - 12 245 - 255A

The slide shows the contact between gneiss and a younger basaltic volcanic rock.

The gneiss consists mainly of plagioclase anhedrons intergrown jigsaw-puzzle fashion. Clusters of hornblende and crudely foliated biotite once accompanied the plagioclase. The hornblende has retrogressed to coarse, granular epidote and biotite has been penninized. Lenses of coarse, strained quartz cement patches of plagioclase in a manner that shows brecciation of post or late metamorphic age. Additionally, at the contact, there is a crush zone of epidote, pennine, and hematite veined and cemented by orthoclase.

The basalt has a turgid glass matrix hosting phenocrysts of augite and plagioclase. The plagioclase is partly altered to sericite, the augite mostly altered to antigorite. Next to the sheared gneiss, the glass is heavily replaced by calcite crystalloblasts and thin calcite veinlets cut all other features.

NK - 12 245 - 255B

The rock is a basalt or basic andesite of lamprophyric aharacter. It consists of small plagioclase laths, augite and basaltic hornblende prisms. These are all of equal size and are randomly oriented in a nearly diabasic texture. Small magnetite ocatahedra are a common accessory. Phenocrysts of augite and basaltic hornblende are rare and of small size. Moderate epizonal alteration has doubtless been deuteric.

Plagioclase is heavily altered to sericite with minor calcite. Mafites are notably fresher, especially augite, but may be attacked by pennine and calcite. Thin orthoclase veinlets cut the fabric.

Estimated original mineral percentages are as follows: plagioclase 51%, augite 24%, hornblende 19%, magnetite 6%.

NK - 12 265 - 275

The rock is a basic andesite or basalt nearly identical to 245 - 255B. Here it is slightly coarser grained and carries no phenocrysts at all. It consists of plagioclase laths, augite and basaltic hornblende prisms arranged in a diabasic texture. Skeletal magnetite octahedra are a common accessory. Small interstitial patches in the matrix may carry orthoclase, probably a late magmatic mineral. Epizonal deuteric alteration has been milder than above.

Plagioclase is about half altered to shreddy sericite and minor calcite. Calcite and pennine may attack mafites, but they remain generally quite fresh. Calcite was also observed in hairline veinlets with Fe-rich epidote.

Original mineral percentages are estimated as: plagioclase 53%, augite 13%, hornblende 26%, magnetite 7%, orthoclase 0.5%.

NK - 12 385 - 395

The rock is a basalt or basic andesite like those samples immediately above, but here is notably coarser grained (or less chilled). Again the texture is diabasic, with randomly oriented subhedral laths of plagioclase, prisms of augite and basaltic hornblende in the interstices. Octahedra of magnetite (probably with some ilmenite) are a common accessory. Epizonal deuteric alteration has been relatively mild.

Plagioclase is flecked with sericite and may be invaded by pennine along cleavages. Larger hornblende prisms alter to hisingerite-stained prochlore with lesser amounts of epidote, leucoxene, and calcite. Calcite may also attack augite.

Original minerals are present in the following estimated amounts: plagioclase 48%, augite 12%, hornblende 33%, magnetite 7%.

NK - 12 395 - 405A

The rock is a gneiss. Because of mesozonal and retrograde metamorphism, it is unclear whether it was originally an aplitic rock or arkosic sediment.

Quartz and microcline are most abundant and tend to form a mosaic of granular to slightly interlocking grains. Plagioclase occurs more sparingly as twinned oval grains. The three minerals show slight strain along the foliation and have a tendency to segregate into bands. Tiny garnet grains occur along grain boundaries. Biotite books align to foliation only poorly. There are entirely altered to retrograde pennine.

The estimated mineral percentages are: quartz 32%, microcline 44%, plagioclase 17%, garnet 2%, pennine 3%, epidote 1%, magnetite 1%.

NK - 12 395 - 405B

The rock is a basic andesite or basalt much like those described above. This sample carries a few lath-like plagioclase phenocrysts and stubby augite prisms in a chilled matrix. This consists of tiny plagioclase laths and hornblende prisms. Beads of augite are uncommon here while magnetite grains are an abundant accessory. Epizonal deuteric alteration has been mild.

Plagioclase is about half altered to fine shreddy sericite and hydromicas with minor calcite. Augite and any hornblende phenocrysts are altered to contorted sheaves of pennine scales, minor epidote, and hematite stain. Mafites in the matrix are quite fresh but contrast. Hairline orthoclase veinlets are rare.

Original mineral percentages are estimated as: plagioclase 43%, augite 7%, hornblende 42%, magnetite 8%.

NK - 12 485 - 495

The rock is a basic andesite or basalt of lamprophyric quality. This example is relatively coarse, with numerous laths of plagioclase and subhedral prisms of augite and basaltic hornblende. These crystals lie randomly in a matrix of skeletal basaltic hornblende prisms, plagioclase laths, and accessory magnetite octahedra. Epizonal deutric alteration has been modest.

Plagioclase is heavily altered to shreddy sericite. Augite tends to alter to cloudy, iron-stained calcite, the larger pseudomorphs perhaps carrying some granular quartz. Although basaltic hornblende in the matrix is mostly fresh, phenocrysts alter to pennine. Pennine also fills lenses in thick calcite veins that cut the fabric.

Original volume percentages of minerals are estimated as: plagioclase 41%, augite 22%, hornblende 32%, magnetite 5%.

NK - 12 575 - 585

The rock is a gneiss of uncertain origin although of tonalitic composition. It has been mesozonally metamorphosed with virtually no retrograde effects.

Large round eyes of plagioclase are thickly scattered. The slightly finer grained matrix carries irregular plagioclase grains intergrown with strained quartz. Although some laminae are quite leucocratic, others carry abundant biotite flakes. These are well foliated, winding around resistant plagioclase eyes. Magnetite is a common accessory with the biotite.

Biotite is slightly attacked by pennine and epidote. Traces of epidote also occur in plagioclase with sericite.

An estimate of the rock mode is: quartz 14%, plagioclase 44%, biotite 30%, magnetite 5%, epidote 2%, sericite 0.5%, pennine 4%.

NK - 12 675 - 685

The rock is a gneiss of uncertain origin but it could have derived from a greywacke. It has been mesozonally metamorphosed.

The rock is rich in fine grained granular, untwinned plagioclase with lesser amounts of quartz. Greenish-brown biotite books are abundant on grain boundaries and are only poorly aligned to foliation. Skeletal epidote prisms often occur with the biotite and are abundant (and coarse) in certain laminae.

Subtle fractures and crush zones cutting the fabric have permitted retrograde alteration in some places. Biotite alters to pennine, plagioclase to sericite and montmorillonite. These fractures may also carry lens-like veins with quartz, calcite, and occasional grains of pyrite.

NK - 12 685 - 695A

The rock is a gneiss, perhaps originally a clastic sediment. It has been mesozonally metamorphosed and mildly retrograded in the epizone.

The rock consists mainly of quartz and feldspars in alternating lamellae. Quartz is coarse grained and elongated on the foliation plane. It is usually strained, and it may host corroded grains or small lenses of plagioclase and microcline. Feldspathic lamellae carry equant anhedra of plagioclase of varying size with microcline tending to fill the interstices. Small flakes of biotite and larger, skeletal books of muscovite tend to lie on grain boundaries with the feldspars.

Plagioclase is now clouded with fine sericite and host occasional epidote grains. Biotite is replaced by streaky sericite and pennine. Pyrite grains are scattered throughout the rock on grain boundaries.

NK - 12 685 - 695B

The rock is a gneiss of tonalitic composition and probably derives from such a rock. It has been synkinematically metamorphosed in the mesozone.

Large, finely twinned plagioclase subhedra are abundant and seem to represent former phenocrysts. They lie in a matrix of granular plagioclase and interstitial quartz. Sheaves of large biotite books are common in some lamellae. They wind around grain boundaries, giving a good foliation. Skeletal muscovite tablets occur in plagioclase, seeming to be replacing it during prograde metamorphism.

Retrograde effects have been minor. Biotite shows little tendency to alter to pennine. Plagioclase, however, is frequently clouded with sericite and a few grains of epidote. Traces of pyrite are associated with the alteration.

NK - 12 705 - 708

The original rock was an andesite, probably a flow. It carried a few small, squarish phenocrysts of plagioclase, and stubby hornblende prisms. The matrix was nearly as coarse, composed of plagioclase laths and hornblende prisms well aligned to flowage. The rock was then mesozonally metamorphosed with strong retrograde deterioration.

Plagioclase is uniformly dusted with sericite shreds and minor calcite. Tiny pods of orthoclase occur on grain boundaries at the expense of plagioclase. Hornblende had been replaced by clusters of biotite and minor epidote, but the biotite is retrograded to pennine with hematite and leucoxene along the cleavages. Thin veinlets of calcite occasionally cut the fabric.

NK - 13 125 - 130

The rock is a gneiss of tonalitic composition, probably deriving from such a rock. It has been mesozonally metamorphosed with little retrograde decay.

Finely twinned plagioclase anhedra are common, lying at random in a matrix of interstitial quartz of equally coarse grain size. Hornblende and biotite cluster on grain boundaries showing only a crude foliation winding through the fabric. Accessory grains of magnetite and epidote occur with them. Biotite remains fresh and hornblende is only slightly attacked by hematite. Corrosion of plagioclase to hydromicas has just begun along cracks and in crystal cores. These altered areas may be stained with supergene hematite.

NK - 13 140A

The rock is a gneiss of uncertain origin. It is of tonalitic composition but is quite leucocratic. It has been mesozonally metamorphosed.

Large grains or clusters of plagioclase are strung out in lenses set in quartz. Plagioclase is slightly deformed but the interstitial quartz has disaggregated and flowed along the foliation, showing severe strain.

Fractures oblique to the foliation seem to have formed during metamorphism. These carry pyrite thickly mantled with Fe-rich epidote, sphene, and long slender prisms of allanitic (rare-earth bearing). Plagioclase near these fractures is clouded with sericite and may even host coarse muscovite.

NK - 13 140B

The rock is a gneiss of tonalitic composition similar to 125-130 above. It has been mesozonally metamorphosed.

The rock consists mainly of plagioclase and interstitial, slightly strained quartz. The two minerals often show complex, frilly boundaries and frequently enter into myrmekitic intergrowth. Ragged biotite books cluster on grain boundaries but show no discernible foliation. Occurring with the biotite are epidote prisms, traces of hornblende, and abundant accessory apatite. Retrograde effects have been mild. Plagioclase may be clouded with squsserite, sometimes heavily, while other crystals remain fresh. Biotite has just begun to alter to pennine.

NK - 13 180

The rock is a gneiss of uncertain origin. It could have been a tonalitic rock or even a greywacke. Mesozonal metamorphism has been followed by moderate epizonal retrogression.

Plagioclase tends to occur in thightly packed clusters of fine, granular material with occasional larger, equant "phenocrysts". These clusters are isolated in a matrix of coarse, strained quartz that has begun to be drawn out in ribbon-like bands due to deformation. Biotite books cluster on grain boundaries with occasional epidote grains; they are poorly foliated. By contrast, skeletal muscovite books forming in plagioclase seem randomly oriented.

Pyrite grains are common on grain boundaries and seem associated with retrogression. Biotite is entirely altered to pennine and plagioclase is often clouded with minute flecks of sericite.

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Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION	Au ppm	Ag ppm	F ppm
1				
2				
3	NK #12 9132 145'-155'	<0.02	<0.2	
4	9134 165'-175'	<0.02	<0.2	1100
5	9249 195'-205'	<0.02	<0.2	1300
6	9263 305'-315'	<0.02	<0.2	1400
7	2493 395'-405'	<0.02	<0.2	760
8	9123 495'-505'	<0.02	<0.2	1100
9	9124 595'-605'	<0.02	<0.2	940
10	NK #12 9128 695'-705'	<0.02	<0.2	680
11	NK #13 9298 125'-130'	<0.02	<0.2	1300
12	9117 160'	<0.02	<0.2	
13	NK #13 9129 180'	<0.02	<0.2	900

TO:

OLIVER B. KILROY
Suite 110 Broadway Terrace
4625 E. Broadway
Tucson, Arizona 85711

REMARKS:

Geochemical Analysis

CERTIFIED BY:

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
12/27/79	2/2/80	YAQ 008

SKYLINE LABS, INC.
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Charles E. Thompson
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Arizona Registered Assayer No. 9425

CERTIFICATE OF ANALYSIS

REPORT OF SPECTROGRAPHIC ANALYSIS

Values reported in parts per million, except where noted otherwise, to the nearest number in the series 1, 1.5, 2, 3, 5, 7 etc.

Element	NK #12 9083 15'-25'	NK #12 9126 95'-105'	NK #12 9249 195'-205	NK #12 9263 305'-315'	NK #12 2493 395'-405'
Fe	5%	5%	5%	3%	3%
Ca	1%	1%	2%	1%	1%
Mg	1%	1%	1%	0.7%	0.2%
Ag	<1ppm	<1ppm	<1ppm	<1ppm	<1ppm
As	<500	<500	<500	<500	<500
B	10	10	10	10	10
Ba	200	150	100	200	100
Be	<2	<2	<2	<2	<2
Bi	<10	<10	<10	<10	<10
Cd	<50	<50	<50	<50	<50
Co	5	10	10	5	5
Cr	10	10	20	10	10
Cu	70	70	100	50	50
Ga	10	10	10	10	10
Ge	<20	<20	<20	<20	<20
La	<20	<20	<20	<20	<20
Mn	700	500	700	700	500
Mo	<2	<2	<2	<2	<2
Nb	20	20	20	20	20
Ni	50	50	50	50	50
Pb	10	<10	<10	<10	<10
Sb	<100	<100	<100	<100	<100
Sc	<10	<10	<10	10	<10
Sn	<10	<10	<10	<10	<10
Sr	100	200	300	150	200
Ti	3000	3000	3000	3000	3000
V	100	100	100	100	70
W	<50	<50	<50	<50	<50
Y	<20	<20	<20	<20	<20
Zn	<200	<200	<200	<200	<200
Zr	100ppm	50ppm	100ppm	100ppm	150ppm

TO:
OLIVER B. KILROY
Suite 110 Broadway Terrace
4625 E. Broadway
Tucson, Arizona 85711

REMARKS:
Spectrographic analysis
Page 1 of 2

CERTIFIED BY:

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
12/27/79	2/2/80	YAQ 008

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Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

CERTIFICATE OF ANALYSIS

REPORT OF SPECTROGRAPHIC ANALYSIS

Element	NK #12 9123 495'-505'	NK #12 9124 595'-605'	NK #12 9128 695'-705'	NK #13 9298 125'-130'	NK #13 9129 180'
Fe	7%	5%	5%	7%	5%
Ca	1%	1%	2%	2%	1%
Mg	0.5%	0.3%	0.5%	0.3%	0.2%
Ag	<1ppm	<1ppm	<1ppm	<1ppm	<1ppm
As	<500	<500	<500	<500	<500
B	10	10	20	10	10
Ba	150	150	200	200	150
Be	<2	<2	<2	<2	<2
Bi	<10	<10	<10	<10	<10
Cd	<50	<50	<50	<50	<50
Co	15	5	10	10	10
Cr	100	<10	100	<10	<10
Cu	70	50	200	150	100
Ga	10	10	10	20	10
Ge	<20	<20	<20	<20	<20
La	<20	<20	<20	<20	<20
Mn	500	300	500	500	300
Mo	<2	<2	<2	<2	<2
Nb	20	20	20	20	20
Ni	500	50	300	100	50
Pb	<10	<10	<10	<10	<10
Sb	<100	<100	<100	<100	<100
Sc	10	<10	10	10	<10
Sn	<10	<10	<10	<10	<10
Sr	200	300	300	500	200
Ti	5000	3000	5000	7000	5000
V	150	100	150	300	200
W	<50	<50	<50	<50	<50
Y	<20	<20	<20	<20	<20
Zn	<200	<200	<200	<200	<200
Zr	100ppm	150ppm	150ppm	200ppm	150ppm

TO:	REMARKS:	CERTIFIED BY:	
OLIVER B. KILROY Suite 110 Broadway Terrace 4625 E. Broadway Tucson, Arizona 85711	Spectrographic analysis Page 2 of 2		
	DATE REC'D: 12/27/79	DATE COMPL.: 2/2/80	JOB NUMBER: YAQ 008

NK-14

P. O. Box 872
Douglas, AZ 85607
April 24, 1980

O. B. Kilroy
Suite 110
4625 East Broadway
Tucson, AZ 85711

Dear Oliver:

Enclosed are descriptions of your samples which I hope will answer most of your questions. Although your letter refers to 11 samples, 13 were actually sent.

The sulfides I saw, especially in #8(A), are indeed related to alteration to the assemblage epidote-hematite. This alteration is related to deformation of the intrusive rock and hence is clearly younger than both the intrusive and the pegmatitic rocks on the surface. Although I couldn't see sulfides in the tourmalinized sample, the alteration and structure look similar to those carrying epidote and sulfides. Thus, we agree fundamentally on the sulfide-related mineral assemblage.

(SAMPLE #47) SEE ROCK SAMPLE MAP, OVERLAY SHEET #1 WITH ATTACHMENTS

You ask about the white coating on #9(B). It is orthoclase, its whiteness enhanced by alteration to clays along a fracture.

Best regards,

Sidney A. Williams

SAW:bj
encls:

NK 14 0 - 10 (1)

The rock is a tonalite with squarish subhedra of plagioclase set in a matrix of equally coarse interstitial quartz. Very thick books of biotite and a few hornblende prisms cluster on grain boundaries. Some of the hornblende may have altered in part to late magmatic biotite. Modest epizonal alteration, probably deuteric, has occurred.

Plagioclase is heavily altered to sausserite, in this case clinozoisite and sericite in roughly equal amounts. Both hornblende and biotite show some decay to coarse epidote with lesser amounts of calcite and pennine.

Original mineral percentages are estimated as: quartz 18%, orthoclase 0.5%, plagioclase 65%, hornblende 3%, biotite 11%, sphene 2%, magnetite tr., apatite tr..

NK 14 110 - 130 (2)

The rock is a granodiorite. Stubby plagioclase laths are randomly oriented and crowded in an equally coarse, granular matrix of quartz and orthoclase (locally microcline). Orthoclase is almost non-perthitic, and myrmekite was noted on plagioclase. Thick biotite books and small hornblende prisms lie on grain boundaries. Deuteric alteration has been feeble; the rock is almost perfectly fresh.

A few plagioclase cores are splashed with sericite or lacy crystalloblasts of epidote. Epidote was also noted at the margins of biotite or hornblende.

Original minerals are present in the following estimated amounts: quartz 16%, orthoclase 19%, plagioclase 41%, hornblende 14%, biotite 9%, sphene 0.5%, magnetite 0.5%, apatite tr..

NK 14 150 - 170 (3)

The original rock was andesitic, perhaps a lamprophyre in character. It consisted of a few small phenocrysts (augite?) set in a matrix of randomly oriented plagioclase laths and mafites. Epizonal alteration of the rock has been quite strong.

All mafites are altered to a scaly paste of pennine dotted with accessory leucoxene and blotches of calcite. Where pennine seems to have replaced augite rather than hornblende, it is stained with dust-like goethite. The pennine invades or corrodes plagioclase which is otherwise quite fresh.

Volume percentages of minerals are estimated as: plagioclase 48%, pennine 41%, calcite 8%, leucoxene 2%, quartz 1%.

NK 14 310 - 330 (4)

The rock is a tonalite. Squarish, finely twinned plagioclase subhedra are closely packed, with quartz and minor orthoclase wedged in the interstices. Very thick books of biotite are common, and there are a few small hornblende prisms. Some clusters of smaller biotite flakes could represent late magmatic replacement of hornblende. Epizonal alteration of the rock has been modest.

Plagioclase is usually heavily clouded with sausserite; only a few fresh areas remain. Biotite hosts clumps of Fe-rich epidote grains but rarely alters to pennine. Hematite was noted filming cleavage planes in some crystals. The quartz in the matrix is strained due to mild deformation of the rock.

The estimated original mineral percentages are: quartz 15%, orthoclase 0.5%, plagioclase 65%, biotite 16%, hornblende 2%, sphene 1%.

NK 14 510 - 550 (5)

The rock is a tonalite with finely twinned subhedra of plagioclase closely packed in a matrix of equally coarse quartz and orthoclase. Very thick biotite books and a few small, nearly euhedral hornblende prisms lie in the matrix. The rock shows deformation and moderate alteration in the epizone.

Plagioclase is lightly and evenly dusted with sericite. Cloudy clinozoisite may be abundant in crystal cores. Quartz is deformed and partially disaggregated, starting to flow around feldspars. Also deformed are pennine pseudomorphs after biotite and sericitized (and iron-stained) hornblende prisms. Where fractures occur they are likely to be filmed with pennine or sealed by calcite.

An estimate of the original rock mode is: quartz 19%, orthoclase 4%, plagioclase 57%, biotite 13%, hornblende 5%, magnetite 1%, sphene 0.5%, apatite 0.5%, zircon tr..

NK 14 590 - 610 (6)

The rock is a gneissose one; it seems to be a deformed or sheared pegmatite. Remnants of undeformed fabric suggest a coarse grained rock composed of quartz, plagioclase, and graphically intergrown quartz and orthoclase. Thin biotite books occurred sparingly on grain boundaries.

As a result of shearing, quartz tends to disaggregate, eventually breaking down into ribbon-like bands that flow, hosting angular fragments of feldspars. Feldspars usually remain fresh, or host rare sericite, but a few host large calcite crystalloblasts. Biotite is wholly penninized.

Mineral percentages are estimated as: quartz 47%, orthoclase 26%, plagioclase 15%, calcite 11%, leucoxene, hematite, and pennine occur in trace amounts.

NK 14 730 - 750 (7)

The rock is a lamprophyric andesite, undoubtedly hypabyssal. It is clearly a fresher version of 150-170 (3). Lath-like plagioclase crystals, stubby prisms of basaltic hornblende, and augite lie in random orientation in a nearly diabasic texture. Phenocrysts of augite are few and small. A quartz clast with a thick augite corona was also noted. Magnetite is a common accessory. Deuteric alteration has been mild.

Some augite (?) phenocrysts are entirely altered to goethite-stained prochlore and calcite. Others remain perfectly fresh. Pennine has just begun to corrode hornblende. Most plagioclase is liberally dusted with sericite.

Original minerals are present in the following estimated amounts: plagioclase 38%, basaltic hornblende 20%, augite 35%, magnetite 7%.

NK 14 770 - 785 (8)A

The rock is a tonalite composed of stubby plagioclase laths thickly clustered and randomly oriented in a matrix of equally coarse quartz. Both biotite and hornblende may once have been present. Clusters of biotite books could represent mafic xenoliths. The rock has been moderately altered in the upper epizone.

Plagioclase is uniformly and heavily clouded with sericite. Epidote seldom occurs in crystal cores, but large clusters of this mineral have developed in mafite sites, rarely with hematite and chalcopyrite. Epidote was also noted in veins with quartz. Some biotite remains fresh, about half penninized.

Volume percentages of minerals are estimated as: quartz 24%, plagioclase 25%, biotite 5%, epidote 23%, sericite 18%, pennine 3%, sphene 1%, hematite 0.5%, byssolite tr., apatite tr., calcite 0.5%.

NK 14 770 - 785 (9)B

The rock is a tonalite or granodiorite. It is rich in stubby plagioclase laths that lie randomly in a somewhat granular matrix of quartz and partially ordered microcline. Hornblende prisms and biotite books are thickly scattered on grain boundaries, giving a faint impression of alignment to flowage. The rock has been mildly altered in the epizone.

Plagioclase is moderately clouded with sericite; clinozoisite or epidote may occupy the crystal cores. The mafites are generally fresh, or biotite slightly streaked with pennine, but in some places large epidote crystalloblasts blot them out.

The estimated original mineral percentages are: quartz 16%, orthoclase 5%, plagioclase 40%, hornblende 23%, biotite 15%, sphene 0.5%, magnetite 0.5%, apatite tr., zircon tr..

NK 14 770 - 785 (10)C

The rock is a granodiorite. It is similar to, but coarser grained than A or B. Squarish, complexly twinned plagioclase subhedra are crowded in a finer grained, interstitial matrix of quartz and microcline. Long hornblende prisms and very thick biotite books showing kink structure lie on grain boundaries. Epizonal alteration has been mild, probably deuteric.

Plagioclase cores show heavy alteration to cloudy sausserite but most of the outer parts of the crystals remain quite fresh. Hornblende or biotite hsot the occasional epidote grain, and hematite may film biotite along cleavages.

An estimate of the original rock mode is: quartz 13%, microcline 8%, plagioclase 65%, biotite 8%, hornblende 5%, sphene 1%, apatite tr., magnetite tr..

SKYLINE LABS, INC.
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Tucson, Arizona 85703
(602) 622-4836

REPORT OF SPECTROGRAPHIC ANALYSIS

JOB NO. TMQ 012
JULY 30, 1980
NK#14

Mr. Oliver B. Kilroy
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 1 Pulp and 9 Crushed Rock Samples

The attached pages comprise this report of analysis. Values are reported in parts per million (ppm), except where otherwise noted, to the nearest number in the series 1, 1.5, 2, 3, 5, 7, 10, etc. within each order of magnitude. These numbers represent the approximate boundaries and midpoints of arbitrary ranges of concentration differing by the reciprocal of the cube root of ten. The 'accepted' value is considered to be within + or - 1 step of the range reported at the 68 % confidence level and within + or - 2 steps at the 95 % confidence level.

William L. Lehmbeck
Manager

SKYLINE LABS, INC.
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(602) 622-4836

TMQ 012
PAGE 1

ITEM NO.	SAMPLE NO.
1	550-570
2	570-590
3	590-610
4	610-630
5	630-650
6	650-670
7	670-690
8	690-710

ITEM	1	2	3	4	5	6	7	8
ELEMENT								
Fe	.7%	.7%	.7%	.7%	.7%	.7%	.7%	.7%
Ca	2%	2%	1.5%	2%	2%	2%	2%	2%
Mg	.7%	.7%	.7%	1%	.7%	1%	1%	.7%
Ag	<1	<1	<1	<1	<1	<1	<1	<1
As	<500	<500	<500	<500	<500	<500	<500	<500
B	20	10	15	30	15	20	10	15
Ba	300	500	500	700	500	700	500	500
Be	<2	<2	<2	<2	<2	<2	<2	<2
Bi	<10	<10	<10	<10	<10	<10	<10	<10
Cd	<50	<50	<50	<50	<50	<50	<50	<50
Co	30	50	30	70	50	70	50	30
Cr	150	150	50	200	100	200	200	100
Cu	70	300	500	700	300	200	100	70
Ga	<10	<10	<10	<10	<10	<10	<10	<10
Ge	<20	<20	<20	<20	<20	<20	<20	<20
La	<20	<20	<20	<20	<20	20	<20	30
Mn	700	700	700	700	700	700	700	700
Mo	<2	<2	<2	2	<2	2	2	<2
Nb	20	30	<20	30	20	30	20	20
Ni	70	100	30	100	50	150	150	70
Pb	15	10	<10	10	<10	15	<10	<10
Sb	<100	<100	<100	<100	<100	<100	<100	<100
Sc	10	15	10	20	15	30	20	15
Sn	<10	10	<10	10	<10	15	10	<10
Sr	500	700	700	700	700	700	700	700
Ti	3000	3000	3000	5000	3000	5000	3000	3000
V	150	150	150	200	200	300	200	150
W	<50	<50	<50	<50	<50	<50	<50	<50
Y	20	30	20	30	30	30	30	30
Zn	<200	<200	<200	<200	<200	<200	<200	<200
Zr	50	150	70	100	70	150	150	150

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

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ITEM NO.	SAMPLE NO.
9	= 710-730
10	= 750-770

ITEM	9	10
ELEMENT		
Fe	.7%	.7%
Ca	1.5%	2%
Mg	.5%	.7%
Ag	<1	<1
As	<500	<500
B	15	15
Ba	500	500
Be	<2	<2
Bi	<10	<10
Cd	<50	<50
Co	20	30
Cr	70	100
Cu	15	70
Ga	<10	<10
Ge	<20	<20
La	<20	<20
Mn	500	500
Mo	<2	<2
Nb	<20	20
Ni	15	50
Pb	<10	<10
Sb	<100	<100
Sc	10	15
Sn	<10	<10
Sr	700	700
Ti	3000	3000
V	150	150
W	<50	<50
Y	20	20
Zn	<200	<200
Zr	150	150

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REPORT OF ANALYSIS

JOB NO. TMQ 011
MAY 20, 1980

Mr. Oliver B. Kilroy
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 11 Crushed Rock Samples

ITEM	SAMPLE NO.	Au ppm	Ag ppm
1	NK#14 #1 20-30	<.02	<.2
2	NK#14 #2 30-40	<.02	<.2
3	NK#14 #3 130-150	<.02	<.2
4	NK#14 #4 230-250	<.02	<.2
5	NK#14 #5 330-350	<.02	<.2
6	NK#14 #6 430-450	<.02	<.2
7	NK#14 #7 510-530	<.02	<.2
8	NK#14 #8 530-550	<.02	<.2
9	NK#14 #9 630-650	<.02	<.2
10	NK#14 #10 730-750	<.02	<.2
11	NK#14 #11 770-785	<.02	<.2

William L. Lehmbeck
Manager

Charles E. Thompson
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William L. Lehmbeck
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SKYLINE LABS, INC.
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REPORT OF SPECTROGRAPHIC ANALYSIS

JOB NO. TMQ 011
MAY 20, 1980

Mr. Oliver B. Kilroy
Broadway Terrace,Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 8 Samples

The attached pages comprise this report of analysis. Values are reported in parts per million (ppm), except where otherwise noted, to the nearest number in the series 1, 1.5, 2, 3, 5, 7, 10, etc. within each order of magnitude. These numbers represent the approximate boundaries and midpoints of arbitrary ranges of concentration differing by the reciprocal of the cube root of ten. The 'accepted' value is considered to be within + or - 1 step of the range reported at the 68 % confidence level and within + or - 2 steps at the 95 % confidence level.

William L. Lehmbeck
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SKYLINE LABS, INC.

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TMQ 011
PAGE 1

ITEM NO.	SAMPLE NO.
1	= NK#14 #1 20-30
2	= NK#14 #2 30-40
4	= NK#14 #4 230-250
6	= NK#14 #6 430-450
7	= NK#14 #7 510-530
8	= NK#14 #8 530-550
9	= NK#14 #9 630-650
11	= NK#14 #11 770-785

ITEM	1	2	4	6	7	8	9	11
ELEMENT								
Fe	10%	7%	5%	5%	7%	7%	10%	10%
Ca	2%	1.5%	1%	1%	1.5%	1.5%	2%	2%
Mg	3%	1.5%	1%	1%	1%	1%	2%	1.5%
Ag	<1	<1	<1	<1	<1	<1	<1	<1
As	<500	<500	<500	<500	<500	<500	<500	<500
B	50	50	30	30	30	50	50	30
Ba	700	700	700	500	1000	500	700	500
Be	<2	<2	<2	<2	<2	<2	<2	<2
Bi	<10	<10	<10	<10	<10	<10	<10	<10
Cd	<50	<50	<50	<50	<50	<50	<50	<50
Co	50	15	10	10	20	20	50	20
Cr	200	15	10	15	20	20	50	30
Cu	150	70	50	3	10	100	700	100
Ga	<10	<10	<10	<10	<10	<10	<10	<10
Ge	<20	<20	<20	<20	<20	<20	<20	<20
La	<20	<20	<20	<20	<20	<20	<20	<20
Mn	1000	1000	700	700	700	1000	1000	1000
Mo	2	<2	<2	<2	<2	<2	2	<2
Nb	<20	<20	<20	<20	<20	20	30	<20
Ni	500	70	20	15	15	20	100	20
Pb	70	50	30	20	30	20	20	30
Sb	<100	<100	<100	<100	<100	<100	<100	<100
Sc	30	15	<10	<10	10	20	30	15
Sn	10	<10	<10	<10	<10	<10	10	<10
Sr	500	700	700	700	1000	700	1000	1000
Ti	7000	5000	3000	5000	5000	7000	7000	5000
V	300	200	200	200	200	300	500	300
W	<50	<50	<50	<50	<50	<50	<50	<50
Y	20	<10	<10	<10	15	20	30	10
Zn	<200	<200	<200	<200	<200	<200	<200	<200
Zr	150	100	20	70	100	150	100	150

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William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

P. O. Box 872
Douglas, AZ 85607
November 4, 1982

NK-#15

O. B. Kilroy
Suite #110
4625 East Broadway
Tucson, AZ 85711

Dear Oliver:

Enclosed are descriptions of your 12 samples from NK - 15. I have tried to discuss your general and specific questions in each description.

There are large orange garnets in the sample at 1545'. They are ample for the study you and I discussed last week. I hesitate to use these, however, for they occur in a rock fragment once present in the original material and therefore are of questionable value. However, they are surrounded by withamite and are surely Mn-rich garnets.

For the most part, the green coloration to the rocks is due to hornblende. The chlorite I saw is retrograde metamorphic, not hydrothermal. It is especially apt to develop on fractures or shears, and since the core is likely to break on these surfaces you seen a disproportionate amount of the mineral.

I don't see more hydrothermal alteration down-hole, but I do see more retrograde structures that I associate with the sulfides.

Please do call if you have further questions. We monitor the telephone on Mon-Wed-Fri at 12:00 to 1:00.

Best regards,

Sid Williams

Sidney A. Williams

SAW:bj

encls.

NK15 1354

The original rock was a calc-shale or siltstone, a bedded sediment showing rapid compositional fluctuations. It has been mesozonally metamorphosed.

Shaly laminae now consist of fine, granular quartz and orthoclase with strings of plagioclase grains. Small biotite scales are common on grain boundaries and tend to foliate mimetically to bedding. More calcareous laminae are composed chiefly of coarse plagioclase, quartz, and actinolitic hornblende prisms. Often the hornblende aligns itself across the foliation.

There has been a moderate degree of retrograde change. Plagioclase is strongly affected, altering to coarse clinozoisite and sericite. Much of the biotite has been penninized. Pyrrhotite and pyrite are sparingly disseminated and seem retrograde. Often they are associated with calcite. No replacement of pyrite by chalcopyrite was observed.

NK15 1454

The original rock was an andesite, a porphyry with large plagioclase phenocrysts set in a finer grained plagioclase-hornblende matrix. Textures have been considerably modified during mesozonal metamorphism.

Matrix plagioclase remains fresh but has recrystallized into a mosaic of granular or interlocking grains. Often they are littered with tiny biotite and hornblende inclusions. Primary hornblende has recrystallized as bundles of much smaller prisms of aluminous hornblende. Sometimes coarse clinochlore scales occur inside the clusters, or as groups wholly unassociated with hornblende. These could represent former augite crystals.

A brecciated zone cutting across the fabric is cemented by fuzzy calcite grains and pods of quartz. Pyrite is heavily disseminated in this structure.

NK15 1545

The rock is an amphibolite. Probably it was a reworked or fragmental andesite originally, but primary textures failed to survive strong mesozonal metamorphism.

The bulk of the rock has a matrix of fresh granular calcic plagioclase in which are set small, mimetically foliated hornblende prisms and biotite scales. A few larger poikiloblastic hornblende prisms also occur and may be of darker green or brown color. There are also occasional plagioclase augen riddled with hornblende inclusions. One milky colored band, probably a basaltic clast originally, now consists of sharp clinozoisite prisms set in an interstitial mix of clinozoisite (locally withamite) and calcite. Sphene is also a common accessory here. The large orange crystals questioned (also in this band) are garnets.

NK15 1600

The rock is an amphibolite, doubtless a fragmental or reworked andesite originally. It carries recognizable basaltic clasts just like at 1545. Metamorphism has been mesozonal and has blurred primary textures.

Plagioclase augen (phenocrysts) survive but are littered with small hornblende prisms. They lie in a matrix of granular calcic plagioclase, small hornblende prisms, and biotite that is well banded but not clearly foliated. Some clusters of clinochlore could represent altered augites but most clinochlore occurs along late-stage veins paralleling the fabric. These carry calcite, orthoclase, and prehnite. Basaltic clasts are replaced mainly by cloudy to milky clinozoisite and interstitial sericite.

NK15 1699

The original rock was a banded sediment with alternate shaly or silty laminae, others of sandy greywacke. The compositional banding has been preserved during mesozonal metamorphism.

Greywacke-rich laminae have a matrix of clastic quartz which has recrystallized to coalesce, all grains being elongate parallel to bedding (also foliation). Tiny orthoclase beads may be trapped on grain boundaries. However, all of the plagioclase clasts are replaced by coarse clinozoisite with lesser amounts of sericite and calcite. Mafites have been replaced by actinolite and clinozoisite. Shaly laminae have matrices of fine granular quartz and orthoclase. Strings of biotite course along bedding but the individual crystals are poorly foliated. Lacy muscovite crystalloblasts dot the fabric.

NK15 1799

The original rock was a very finely laminated calc-shale. It has been mesozonally metamorphosed.

The argillic/clastic laminae have recrystallized as very fine grained, clear orthoclase and lesser amounts of quartz. Tiny hornblende and biotite crystals litter the matrix, and they show a tendency to orient directly across the bedding. Thin calcareous partings alternate very rapidly with the above-described laminae and they consist of fine, granular diopside that is usually clouded with black organic matter. Where the rock is more calcareous, the thin organic rich laminae lie between bands whose matrix is calcite, or coarse diopside, or some mixture of the two minerals. The few tiny pyrite grains seen in the rock seem fully compatible with the metamorphic assemblage.

NK15 1899

The original rock was a calc-shale with some sandy partings. Sedimentary features have remained well preserved during mesozonal metamorphism.

Generally, the rock matrix is granular calcite. Grains show a slight tendency to be elongate parallel to bedding. There are thin alternate laminae whose matrix is very fine grained quartz and orthoclase, and still others composed primarily of quartz detritus. Small hornblende prisms and pale biotite flakes dot the calcitic laminae. Calc-shale bands consist mainly of cloudy clinozoisite and sericite. They are also the laminae colored by opaque organic matter.

Pyrrhotite is most thickly disseminated in calcitic bands. Coarse, granular calcite veins cut across the fabric. Although they are generally devoid of sulfides, where calcitic bands carrying pyrrhotite approach them, pyrrhotite gives way to disseminated chalcopyrite and sphalerite.

NK15 1999

The original rock was an impure sediment, a sandy shale with a few calc-shale laminae. The rock was deformed, with bedding flexed or disrupted prior to mesozonal metamorphism.

Within the more calcareous laminae, early plagioclase that developed has since altered to cloudy clinozoisite and sericite. Coarse poikiloblastic hornblende prisms develop along these laminae and project into sandy layers where they are riddled with undigested quartz inclusions. Thinner calc-shale laminae consist of cloudy clinozoisite, sericite, and perhaps biotite. They are particularly apt to be clouded with opaque carbonaceous matter. Sandy lamellae have recrystallized to coarse, granular quartz, perhaps with calcite. Orthoclase may also recrystallize to considerable size where shaly laminae have been folded or disrupted. Pyrrhotite disseminated in the rock seems compatible with the metamorphic assemblage.

NK15 2099

The original rock was a coarse fragmental vitrophyre (perhaps tuff) of dacitic composition. Textures have survived surprisingly well despite mesozonal metamorphism followed by severe shearing.

The glassy fragments consist primarily of ragged, interlocking grains of sodic plagioclase. Strings of ragged quartz may outline the former streaky texture of the glass but most quartz has migrated into thick lenses where it was later severely sheared into ribbon-like bands. Small pale prisms of actinolitic hornblende dot the fragments, occasionally forming in larger clumps and foliae with accessory sphene. Crackling of the plagioclase-rich fragments during shearing has permitted them to be invaded by dust-like calcite. More prominent shears are filled with calcite and carry pyrite and sphalerite. Sphalerite was also seen (with chlorite) on the flat surface questioned.

NK15 2209

The original rock was a sandy calc-shale. It has retained its sedimentary features well during mesozonal metamorphism.

Generally the matrix consists of very fine grained quartz and orthoclase. Larger quartz clasts are thickly scattered along some lamellae. Accessory minerals scattered in these laminae are mostly clinozoisite and hornblende, their abundance varying and being greatest in calc-shale bands. Biotite was once sparingly present but has since altered to clinochlore. Coarse clinozoisite was seen in one coarse sandy layer with calcite crystalloblasts.

The rock is riddled with irregular veins and pods of coarse, platy lotrite, and by later veinlets of calcite and stilbite. The fracture surface questioned is such a vein, dotted with crystals of calcite, galena, and sphalerite. The brown patch questioned is sphalerite, the blue patch is sphalerite thinly filmed with covellite.

NK15 2213

The original rock was a silty shale composed mainly of argillic matter with thin strings of quartz clasts along the bedding. Recrystallization caused by mesozonal metamorphism has been thorough.

The argillic matrix has recrystallized as fresh clear orthoclase of a fine cherty texture. It is intergrown thoroughly with the quartz clasts. Quartz in some layers has recrystallized to granular texture and migrated along bedding, often with pyrite. Strings of small biotite scales occur frequently across the bedding and are commonly colored with opaque carbonaceous matter. Although the strings follow bedding, the individual crystals are invariably oriented normal thereto. A few lacy muscovite crystalloblasts dot the fabric.

NK15 2213 1/2

The rock is an amphibolite that probably represents reworked basic volcanic trash. Except for the banding of the fabric, all textures have been lost by recrystallization during mesozonal metamorphism.

The bulk of the rock consists of matted actinolitic hornblende fibers in continuous bands with biotite, sericite, and clinozoisite packed in the interstices and in thin alternate lamellae. Despite the pronounced banding, individual grains of micas or hornblende seem to be oriented preferentially at right angles to the banding.

Various late-metamorphic and retrograde veins occur, usually paralleling the fabric. The earlier veins carry quartz, datolite, adularia, calcite and pyrite. Pyrite also occurs in later calcite-stilbite veinlets.

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

REPORT OF ANALYSIS

JOB NO. TMQ 017
October 22, 1982
NK# 15 DRILL HOLE

MR. OLIVER B. KILROY
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 3 Rock Chip Samples

ITEM	SAMPLE NO.	Cu ppm	Zn ppm
1	1978-2007 1/2 9152	50.	80.
2	2040-2069 9397	55.	100.
3	2007 1/2- 2040 9153	50.	90.

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

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

REPORT OF SPECTROGRAPHIC ANALYSIS

JOB NO. TMQ 017
October 22, 1982
NK# 15 DRILL HOLE

MR. OLIVER B. KILROY
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 1 Sample

The attached pages comprise this report of analysis. Values are reported in parts per million (ppm), except where otherwise noted, to the nearest number in the series 1, 1.5, 2, 3, 5, 7, 10, etc. within each order of magnitude. These numbers represent the approximate boundaries and midpoints of arbitrary ranges of concentration differing by the reciprocal of the cube root of ten. The 'accepted' value is considered to be within + or - 1 step of the range reported at the 68 % confidence level and within + or - 2 steps at the 95 % confidence level.

William L. Lehmbeck
Manager

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Tucson, Arizona 85703
(602) 622-4836

JOB NO. TMQ 017
PAGE 2

ITEM NO. SAMPLE NO.
2 = 2040-2069 9397

ITEM	2
ELEMENT	
Fe	3%
Ca	3%
Mg	1%
Ag	<1
As	<500
B	15
Ba	150
Be	<2
Bi	<10
Cd	<50
Co	<5
Cr	<10
Cu	50
Ga	<10
Ge	<20
La	<20
Mn	500
Mo	<2
Nb	<20
Ni	10
Pb	10
Sb	<100
Sc	<10
Sn	<10
Sr	<100
Ti	2000
V	20
W	<50
Y	10
Zn	<200
Zr	50

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REPORT OF ANALYSIS

JOB NO. TMQ 017A
November 11, 1982
NK# 15 DRILL HOLE

MR. OLIVER B. KILROY
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 3 Pulp Samples

ITEM	SAMPLE NO.	Au ppm
1	1778-2007 1/2 9152	<.02
2	2040-2069 9397	<.02
3	2007 1/2- 2040 9153	<.02

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

SKYLINE LABS, INC.
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Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TMQ 018
November 11, 1982
NK 15 DRILLHOLE

Mr. Oliver B. Kilroy
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 1 Rock Chip Sample

ITEM	SAMPLE NO.	Au ppm	Cu ppm	Zn ppm
1	9154 2180-2214	<.02	50.	430.

REGISTERED ASSAYER
CERTIFICATE NO.
9425
WILLIAM L.
LEHMBECK
DATE SIGNED
Arizona

William L. Lehmbeck
Manager

SKYLINE LABS, INC.
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Tucson, Arizona 85703
(602) 622-4836

REPORT OF SPECTROGRAPHIC ANALYSIS

JOB NO. TMQ 018
November 11, 1982
NK 15 DRILLHOLE

Mr. Oliver B. Kilroy
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 1 Rock Chip Sample

The attached pages comprise this report of analysis. Values are reported in parts per million (ppm), except where otherwise noted, to the nearest number in the series 1, 1.5, 2, 3, 5, 7, 10, etc. within each order of magnitude. These numbers represent the approximate boundaries and midpoints of arbitrary ranges of concentration differing by the reciprocal of the cube root of ten. The 'accepted' value is considered to be within + or - 1 step of the range reported at the 68 % confidence level and within + or - 2 steps at the 95 % confidence level.

REGISTERED ASSAYER
CERTIFICATE NO. 9425
WILLIAM L. LEHMBECK
DATE SIGNED
Arizona U.S.A.
11-12-82

William L. Lehmbeck
Manager

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

JOB NO. TMQ 018
PAGE 2

ITEM NO. SAMPLE NO.
1 = 9154 2180-2214

ITEM 1

ELEMENT	
Fe	5%
Ca	3%
Mg	2%
Ag	<1
As	<500
B	10
Ba	200
Be	<2
Bi	<10
Cd	<50
Co	15
Cr	10
Cu	30
Ga	<10
Ge	<20
La	<20
Mn	700
Mo	<2
Nb	<20
Ni	30
Pb	30
Sb	<100
Sc	10
Sn	<10
Sr	150
Ti	7000
V	70
W	<50
Y	<10
Zn	<200
Zr	70

NK# 15

P. O. Box 872
Douglas, AZ 85607
November 28, 1981

Oliver B. Kilroy
Suite 110
4625 East Broadway
Broadway Terrace
Tucson, AZ 85711

Dear Oliver:

Enclosed are descriptions of your nine samples, and I have generally included answers to your questions in them. To reiterate, there is pyrrhotite in two samples where you question it, and two others host magnetite (black) of metamorphic age that has been subsequently altered to hematite. Even so, the former magnetite grains reamin black, the red color of hematite visible only where iron has leaked into the nearby rock.

Finally, I should point out that 1211, 905, and 1090 are indeed similar volcanic-derived sediments that compare reasonably well with 1365A, B, D. I hope this information answers you questions adequately.

Best regards,

Sidney A. Williams

SAW:bj
encls.

NK15 885-905

The rock is a gneissose one, possibly derived from a quartz monzonite by mesozonal metamorphism. It carries augen of perthitic microcline that are crudely squarish in section. They are thickly scattered in a granular matrix of quartz and plagioclase. Small muscovite and pennine scales litter grain boundaries in the matrix, and these minerals are not foliated. The muscovite seems to have formed at the expense of plagioclase, and the pennine is retrograde after biotite. Leucoxene is abundant in the biotite. Traces of retrograde sericite and calcite occur in the microcline.

Mineral percentages are estimated as follows: microcline 28%, muscovite 18%, pennine 15%, quartz 14%, plagioclase 20%, leucoxene 4%, magnetite ½%, calcite ½%, apatite tr..

NK15 1070-1090

The rock is a gneiss that originally was either an andesite or a greywacke of andesitic derivation. It has been mesozonally metamorphosed.

There are thick laminae with plagioclase augen scattered in granular quartz and plagioclase. The plagioclase shows deterioration, however, for it is dotted with small books of muscovite and in the matrix hosts skeletal epidote prisms. These crystals tend to lie parallel to the rock layering. Small biotite scales also lie on the foliation and they occur in larger clusters that represent former hornblende. The biotite is retrograded heavily to epidote, pennine, calcite, and leucoxene. There are other laminae in which granular quartz is abundant. Magnetite is an accessory here (now oxidized to hematite). Such bands comingle with the plagioclase-rich layers.

NK15 1191-1211

The original rock was a fragmental andesite probably. It carried larger crystals of hornblende and plagioclase, and it was veined by quartz prior to mesozonal metamorphism.

The plagioclase remains fresh but has recrystallized to a jigsaw-puzzle texture in which the few larger phenocrysts are embedded. Hornblende is replaced by dark brown biotite and minor epidote. These minerals are drawn out in parallel strings to give the rock a gneissose appearance. Vein quartz is merely recrystallized, tending to blur into the walls.

Estimated mineral percentages are as follows: quartz 17%, plagioclase 52%, biotite 27%, epidote 1%, sphene 1%, magnetite 1%, apatite ¼%.

NK15 1311-1331A

The original rock was perhaps a calc-shale or similar fine grained and laminated sediment. Mesozonal metamorphism has been accompanied by deformation.

Very fine granular orthoclase, quartz, and plagioclase occupy thin laminae. These alternate rapidly with other laminae composed of tiny biotite scales clouded with carbonaceous matter. Small zoisite prisms also occur here. The laminae are kinked and folded, even offset, throughout the rock. Where folding permits, pods of coarser grained orthoclase have formed by segregation, and these contain large patches of pyrrhotite.

NK15 1341-1361A

The rock is a muscovite schist, probably an argillic or shaly sandstone initially. Metamorphism has been mesozonal.

The matrix consists of granular quartz of uniform grain size. Set in this are laminae of coarse, well foliated muscovite. Smaller muscovite beads are often entrapped in the quartz. Clusters of magnetite crystals have formed in certain spots, but the magnetite was subsequently oxidized to hematite.

Mineral percentages are estimated as: quartz 38%, muscovite 58%, hematite 4%.

NK15 1361-1365A

The rock is a gneiss derived from a greywacke or similar reworked andesitic debris. Metamorphism has been mesozonal.

The fabric is banded, mainly by virtue of variations in the amounts of granular quartz and plagioclase that comprise the matrix. There are also some laminae in which coarse plagioclase clasts are abundant. Biotite occurs in most laminae. Although strings of crystals parallel the banding, individual grains may have any orientation. Rarely does garnet accompany the biotite. One lamina carries shreddy muscovite books instead of biotite. This layer also hosts peculiar lacy sphene crystals. Pyrrhotite is disseminated in certain layers and is synmetamorphic. Often there are traces of calcite or clinozoisite in the vicinity.

NK15 1361-1365B

The original rock was an arkose or greywacke, similar but not identical with 1365A. Mesozonal metamorphism was followed by strong retrograde decay.

The rock consists mainly of scattered quartz grains, all tending to oval shapes elongate on the foliation. Finer grained plagioclase packs the intervening spaces and comprises the bulk of the rock. Small biotite flakes lie on grain boundaries and are mimetically foliated. Thicker muscovite books occur sporadically and they are randomly oriented. Sphene is a prominent accessory, and garnet a rare one.

The plagioclase is now clouded with sericite while most of the biotite is retrograded to pennine.

NK15 1361-1365C

The rock consists almost exclusively of quartz. The grains are uniformly large and interlock in jigsaw-puzzle fashion on sutured borders. Tiny fluid inclusions occur in cloudy bands that cut freely across grain boundaries, suggesting that the quartz may be synmetamorphic.

Small muscovite books lie on grain boundaries or are enclosed in the quartz. Magnetite grains associated with them are oxidized, resulting in local hematite staining.

NK15 1361-1365D

The original rock was similar to 1365B in particular. A banded arkose or greywacke originally, it was converted to a gneiss by mesozonal metamorphism.

The rock then consisted mainly of granular plagioclase, less quartz, and small biotite scales well aligned to foliation. Unlike 1365B, however, hornblende accompanied by biotite here. Epidote was a minor accessory.

Later epizonal retrograde alteration has been intense. Coarse stilbite prisms dotted with calcite grains blot out much of the plagioclase, the remainder simply decaying to smectite. Biotite is moderately penninized, hornblende almost not at all.

SKYLINE LABS, INC.
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REPORT OF ANALYSIS

JOB NO. TMQ 016
December 18, 1981

MR. OLIVER B. KILROY
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 71 Rock Chip Samples

ITEM	SAMPLE NO.	Au ppm
1	20-25	<.02
2	25-30	<.02
3	30-35	<.02
4	35-40	<.02
5	40-45	<.02
6	45-60	<.02
7	60-80	<.02
8	80-105	<.02
9	105-125	<.02
10	125-145	<.02
11	145-165	<.02
12	165-185	<.02
13	185-205	<.02
14	205-225	<.02
15	225-245	<.02
16	245-265	<.02
17	265-285	<.02
18	285-305	<.02
19	305-325	<.02
20	325-345	<.02
21	345-365	<.02
22	365-385	<.02
23	385-405	<.02
24	405-425	<.02
25	425-445	<.02

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JOB NO. TMQ 016
December 18, 1981

ITEM	SAMPLE NO.	Au ppm
26	445-465	<.02
27	465-485	<.02
28	485-505	<.02
29	505-525	<.02
30	525-545	<.02
31	545-565	<.02
32	565-585	<.02
33	585-605	<.02
34	605-625	.10
35	625-645	<.02
36	645-665	<.02
37	665-685	<.02
38	685-705	<.02
39	705-725	<.02
40	725-745	<.02
41	745-765	<.02
42	765-785	<.02
43	785-805	<.02
44	805-825	<.02
45	825-845	<.02
46	845-865	<.02
47	865-885	<.02
48	885-905	<.02
49	905-925	<.02
50	925-945	<.02

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JOB NO. TMQ 016
December 18, 1981

ITEM	SAMPLE NO.	Au ppm
51	945-965	<.02
52	965-990	<.02
53	990-1010	<.02
54	1010-1030	<.02
55	1030-1050	<.02
56	1050-1070	<.02
57	1070-1090	<.02
58	1090-1111	<.02
59	1111-1131	<.02
60	1131-1151	<.02
61	1151-1171	<.02
62	1171-1191	<.02
63	1191-1211	<.02
64	1211-1231	<.02
65	1231-1251	<.02
66	1251-1271	<.02
67	1271-1291	<.02
68	1291-1311	<.02
69	1311-1331	<.02
70	1341-1361	<.02
71	1361-1365	<.02

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Tucson, Arizona 85703
(602) 622-4836

JOB NO. TMQ 016
December 18, 1981
PAGE 4

ITEM	SAMPLE NO.	Ag ppm	U ppm
14	205-225	.2	4.
38	685-705	<.2	4.
62	1171-1191	<.2	3.
71	1361-1365	.2	2.

William L. Lehmbeck
Manager

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

REPORT OF SPECTROGRAPHIC ANALYSIS

JOB NO. TMQ 016
December 18, 1981

MR. OLIVER B. KILROY
Broadway Terrace, Suite 110
4625 E. Broadway
Tucson, Arizona 85711

Analysis of 4 Samples

The attached pages comprise this report of analysis. Values are reported in parts per million (ppm), except where otherwise noted, to the nearest number in the series 1, 1.5, 2, 3, 5, 7, 10, etc. within each order of magnitude. These numbers represent the approximate boundaries and midpoints of arbitrary ranges of concentration differing by the reciprocal of the cube root of ten. The 'accepted' value is considered to be within + or - 1 step of the range reported at the 68 % confidence level and within + or - 2 steps at the 95 % confidence level.

REGISTERED ASSAYER
STATE NO. 9125
WILLIAM L. LEHMBECK
Arizona

William L. Lehmbeck
Manager

SKYLINE LABS, INC.

P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

JOB NO. TMQ 016
PAGE 1

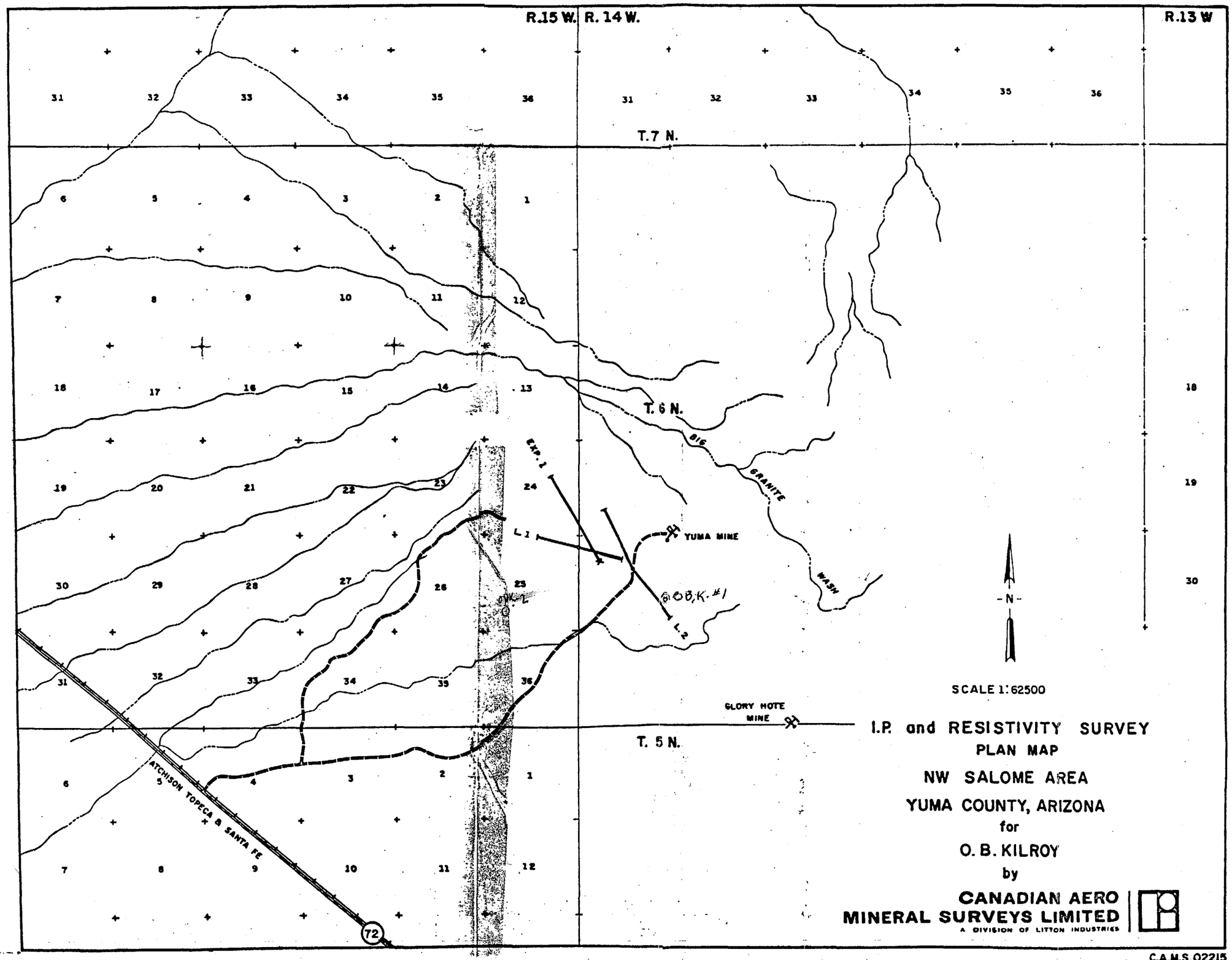
ITEM NO.		SAMPLE NO.
14	=	14
38	=	38
62	=	62
71	=	71

ITEM	14	38	62	71
ELEMENT				
Fe	7.%	5.%	5.%	3.%
Ca	1.5%	2.%	2.%	2.%
Mg	1.5%	1.%	1.%	1.%
Ag	<1	<1	<1	<1
As	<500	<500	<500	<500
B	10	<10	<10	10
Ba	500	700	700	500
Be	<2	<2	<2	<2
Bi	<10	<10	<10	<10
Cd	<50	<50	<50	<50
Co	15	15	10	<5
Cr	<10	10	<10	10
Cu	50	50	15	70
Ga	<10	<10	<10	<10
Ge	<20	<20	<20	<20
La	<20	<20	20	<20
Mn	1000	1000	1000	1000
Mo	<2	<2	<2	<2
Nb	20	20	20	<20
Ni	7	5	5	7
Pb	<10	<10	<10	10
Sb	<100	<100	<100	<100
Sc	10	10	10	<10
Sn	<10	<10	<10	<10
Sr	100	200	300	100
Ti	5000	5000	3000	3000
V	100	70	70	70
W	<50	<50	<50	<50
Y	10	15	10	10
Zn	<200	<200	<200	<200
Zr	70	100	50	100

Charles E. Thompson
Arizona Registered Assayer No. 9427

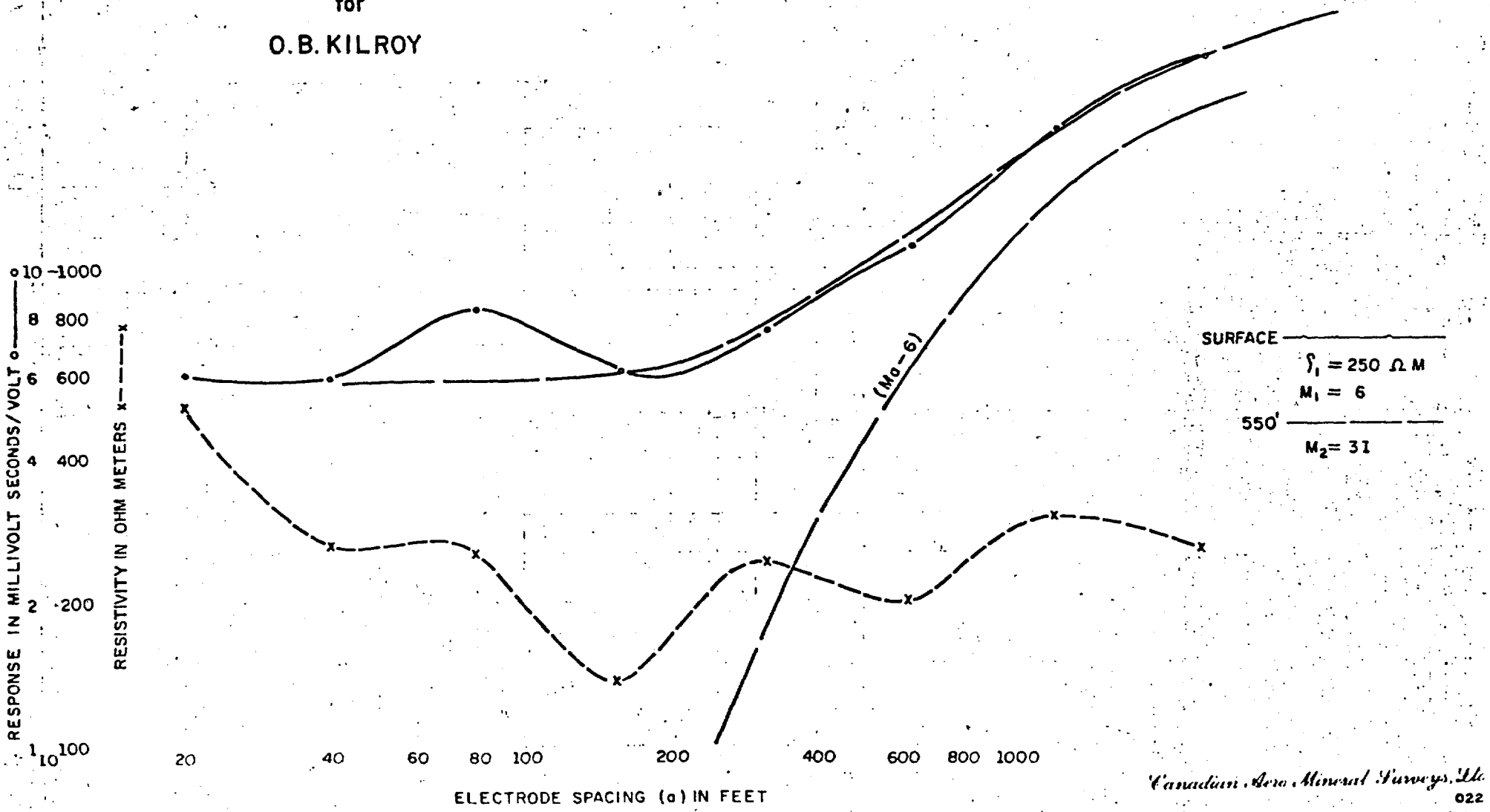
William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122


R.15 W.
R. 14 W.
R.13 W
T.7 N.
T. 6 N.
T. 5 N.
EXP. 1
L 1
L 2
YUMA MINE
O.B.K. #1
BIG GRANITE WASH
GLORY HOLE MINE
ATCHISON TOPECA & SANTA FE
72
N
SCALE 1:62500
I.P. and RESISTIVITY SURVEY
PLAN MAP
NW SALOME AREA
YUMA COUNTY, ARIZONA
for
O. B. KILROY
by
CANADIAN AERO
MINERAL SURVEYS LIMITED
A DIVISION OF LITTON INDUSTRIES

C.A.M.S.02215

I.P and RESISTIVITY SURVEY
3 ARRAY EXPANDER
EXPANDER 1
NW SALOME AREA
YUMA COUNTY, ARIZONA
for
O.B. KILROY



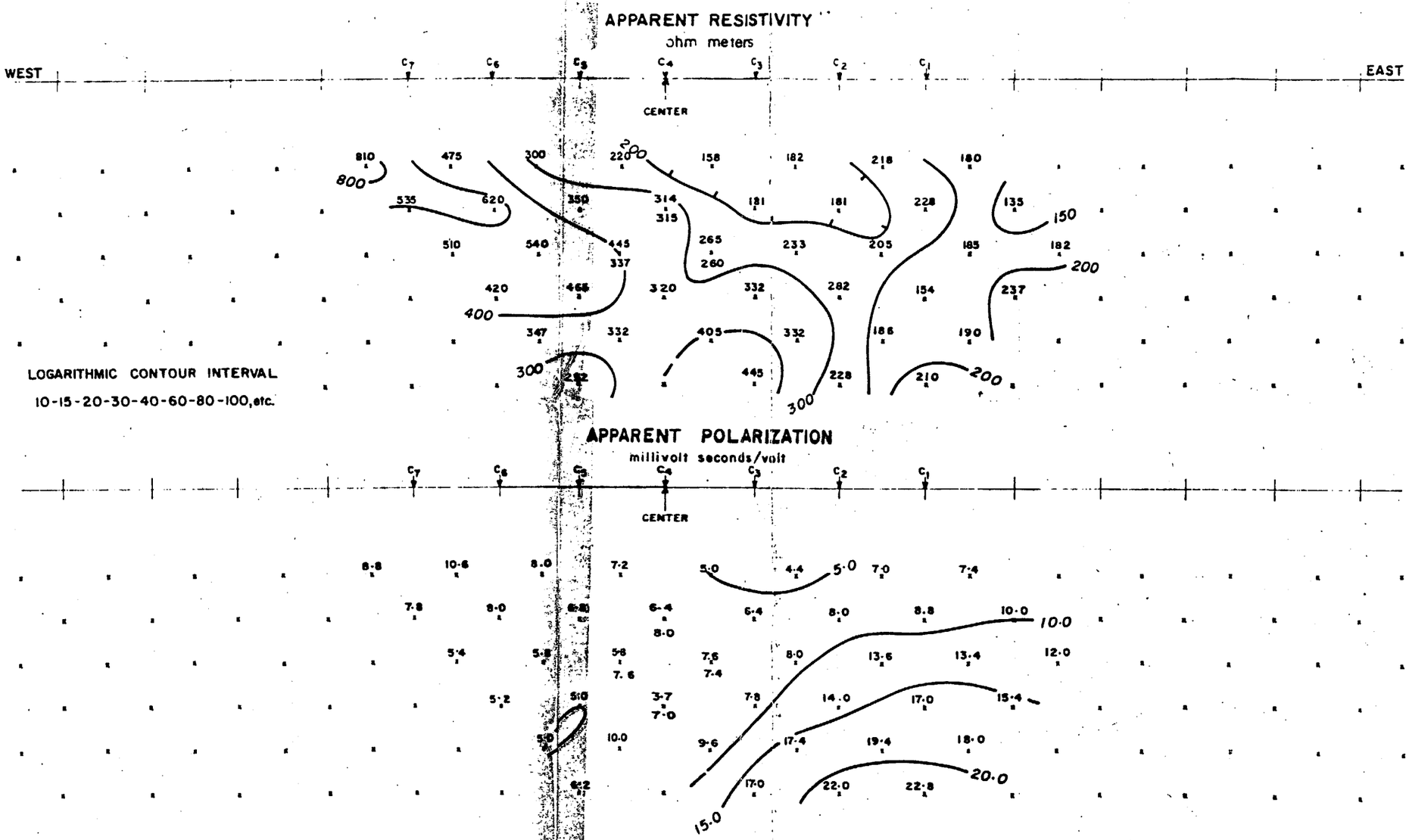
Canadian Aero Mineral Surveys, Ltd.
022

TIME DOMAIN INDUCED POLARIZATION AND RESISTIVITY SURVEY

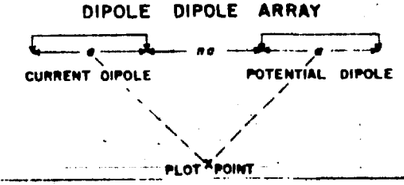
NW SALOME AREA – YUMA COUNTY, ARIZONA

FOR

O. B. KILROY



DIPOLE DIPOLE ARRAY



LINE: . . . . . .

LOOKING: . NORTH

DIPOLE LENGTH. . . . 500

DATE: 11,15,1969

LEGEND

FENCE . . . . . .

PIPELINE. . . . .

POWERLINE. . . .

ROAD . . . .

CANADIAN AERO Mineral Surveys LTD.

OTTAWA, ONT. CANADA

TUCSON, ARIZONA. U.S.A.

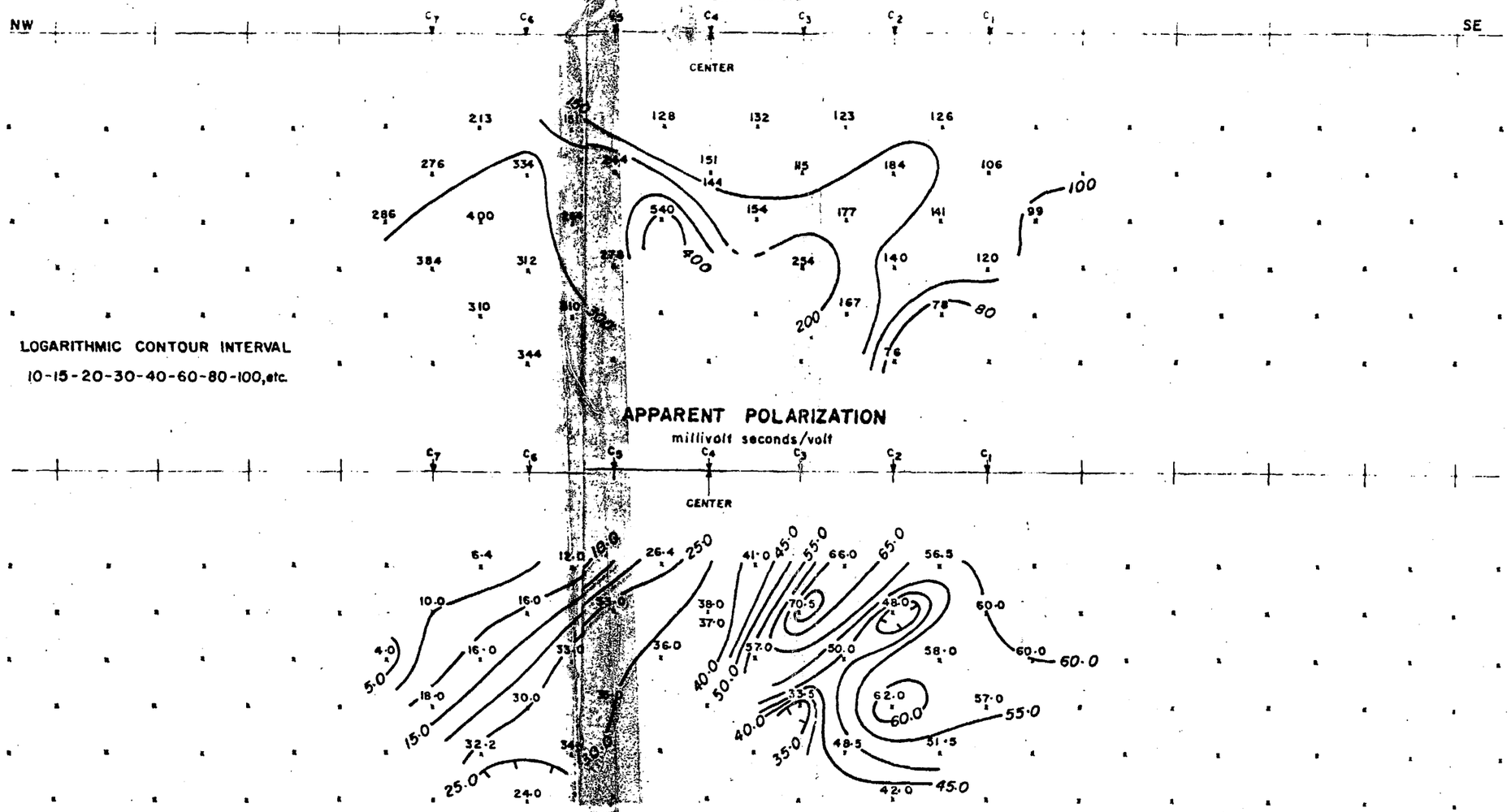
C.A.M.S 02215

TIME DOMAIN INDUCED POLARIZATION AND RESISTIVITY SURVEY

NW SALOME AREA - YUMA COUNTY, ARIZONA

FOR

G. B. KILROY



DIPOLE DIPOLE ARRAY

CURRENT DIPOLE — POTENTIAL DIPOLE

PLOT POINT

LINE: . . . . . .

LOOKING: . . . . NE

DIPOLE LENGTH. . . .1000'

DATE. 11,21,1969

LEGEND

FENCE . . . . .

PIPELINE. . . . .

POWERLINE. . . .

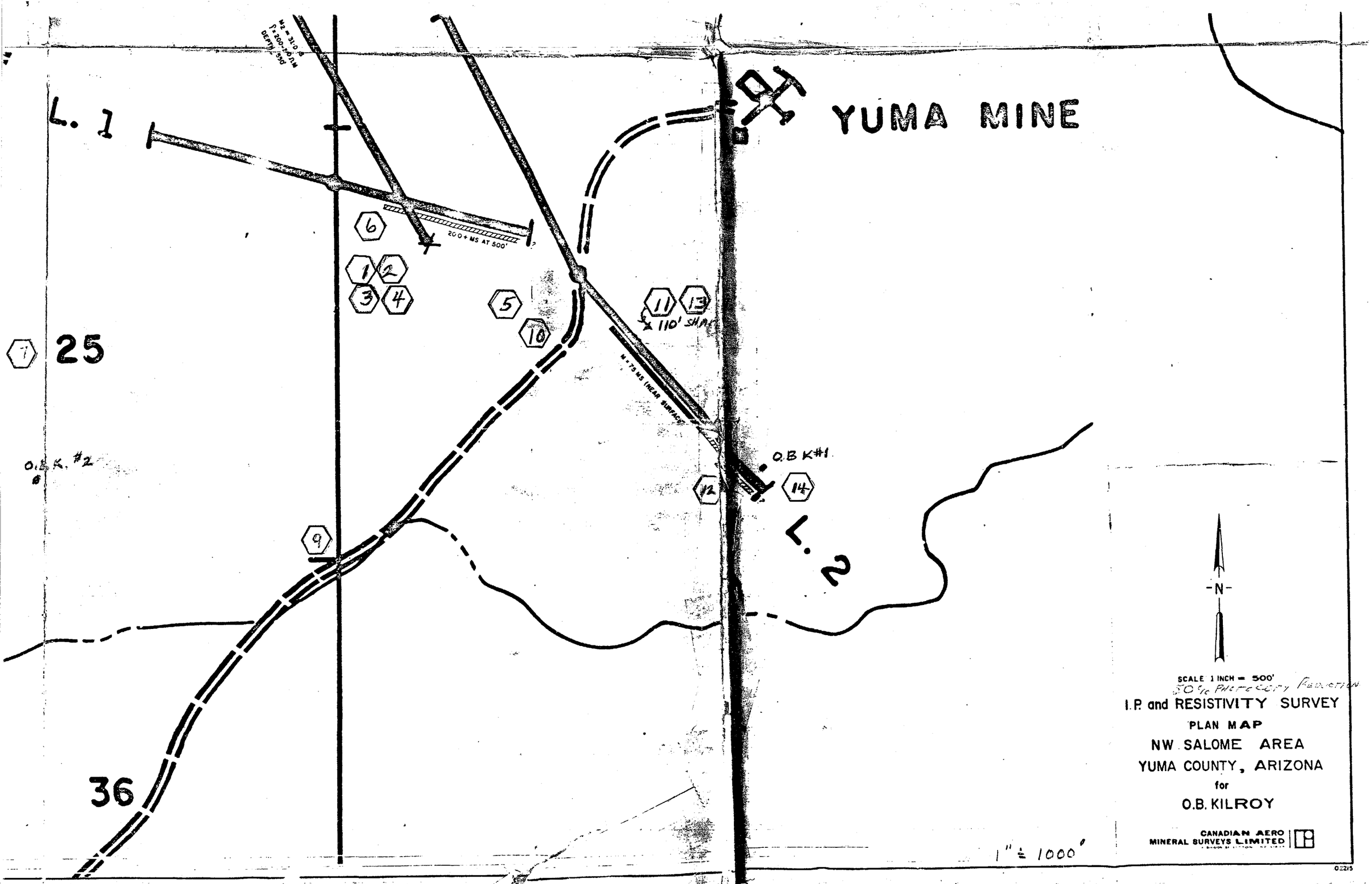
ROAD . . . .

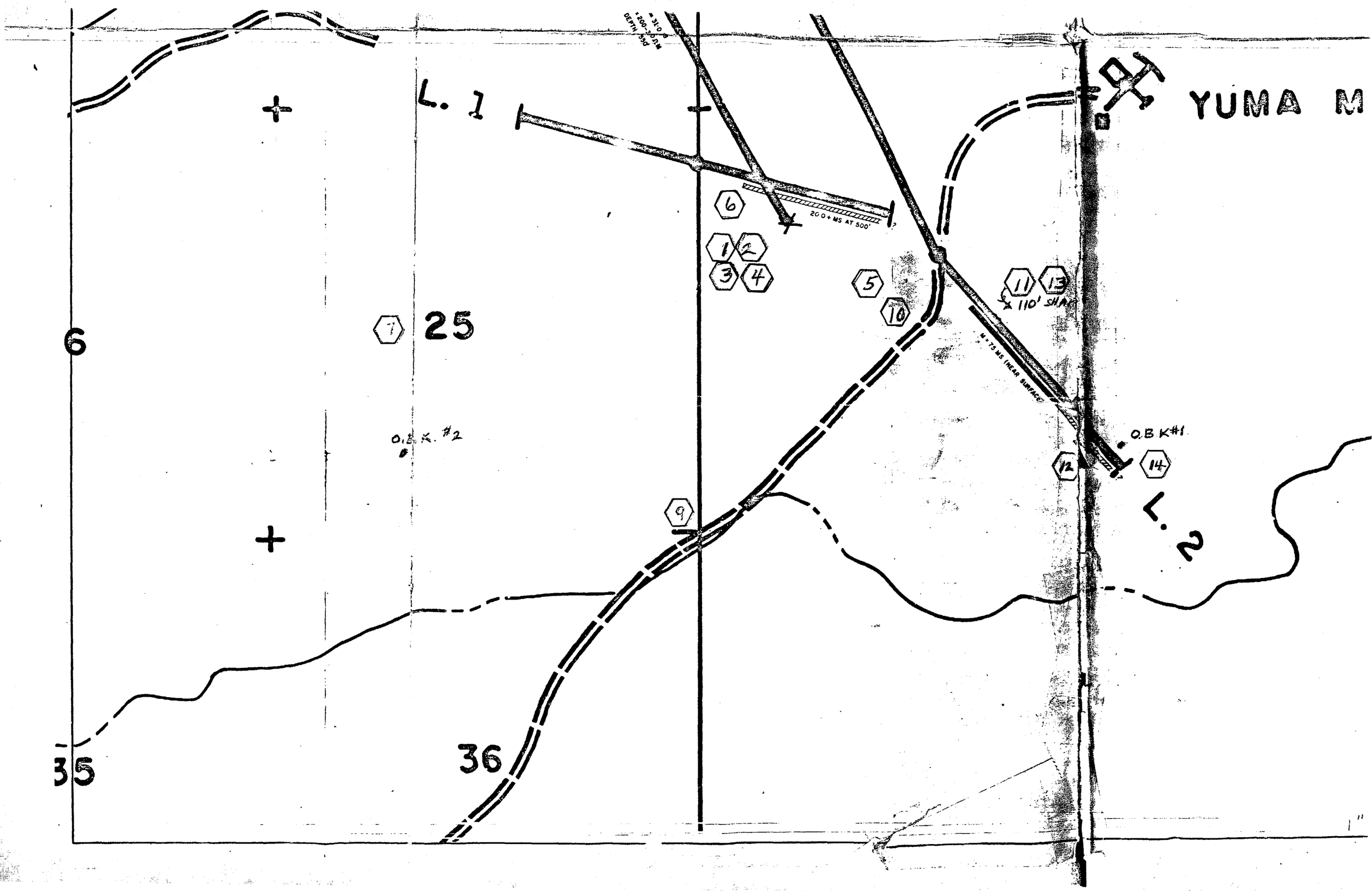
CANADIAN AERO Mineral Surveys LTD.

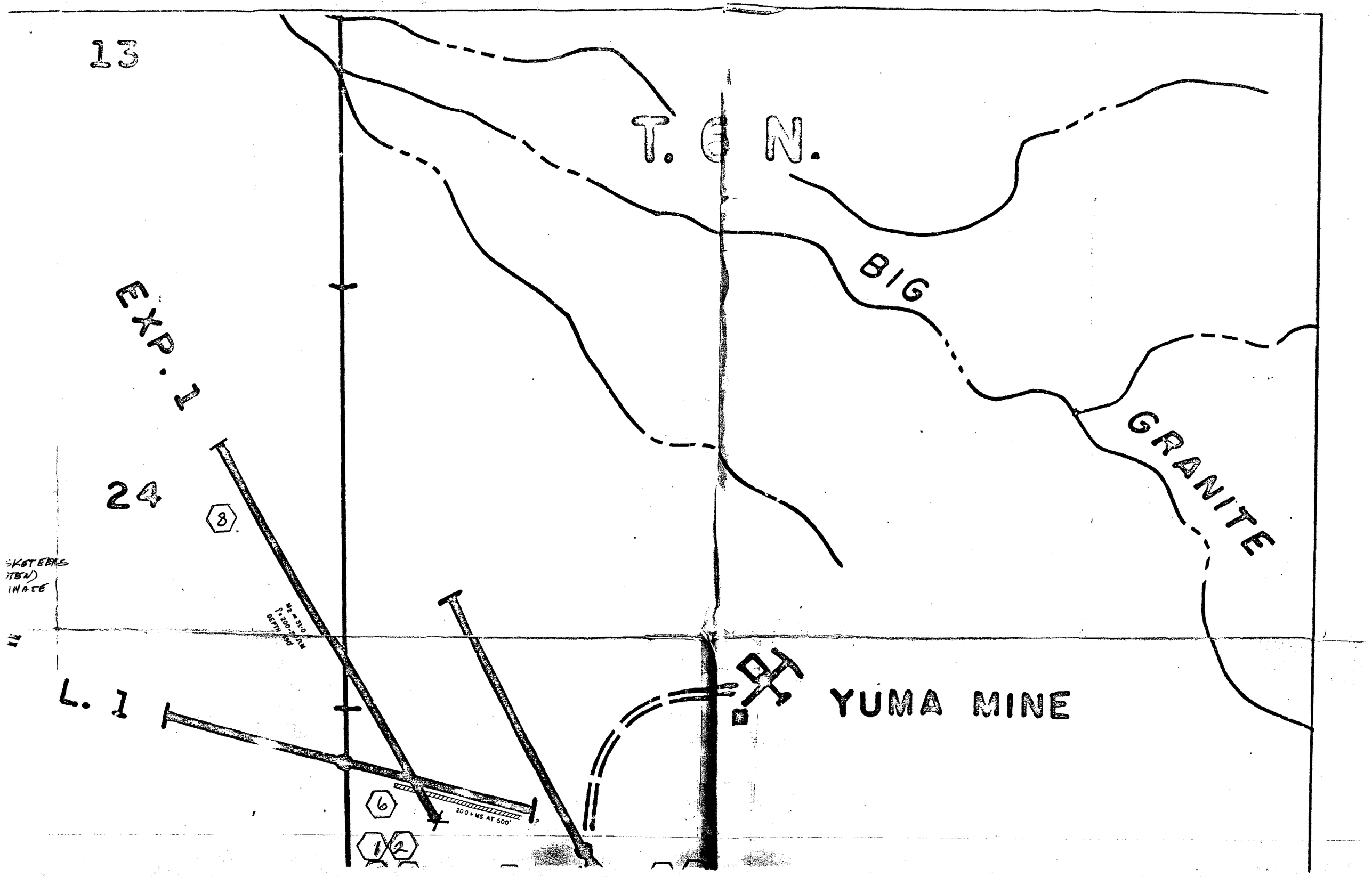
OTTAWA, ONT. CANADA

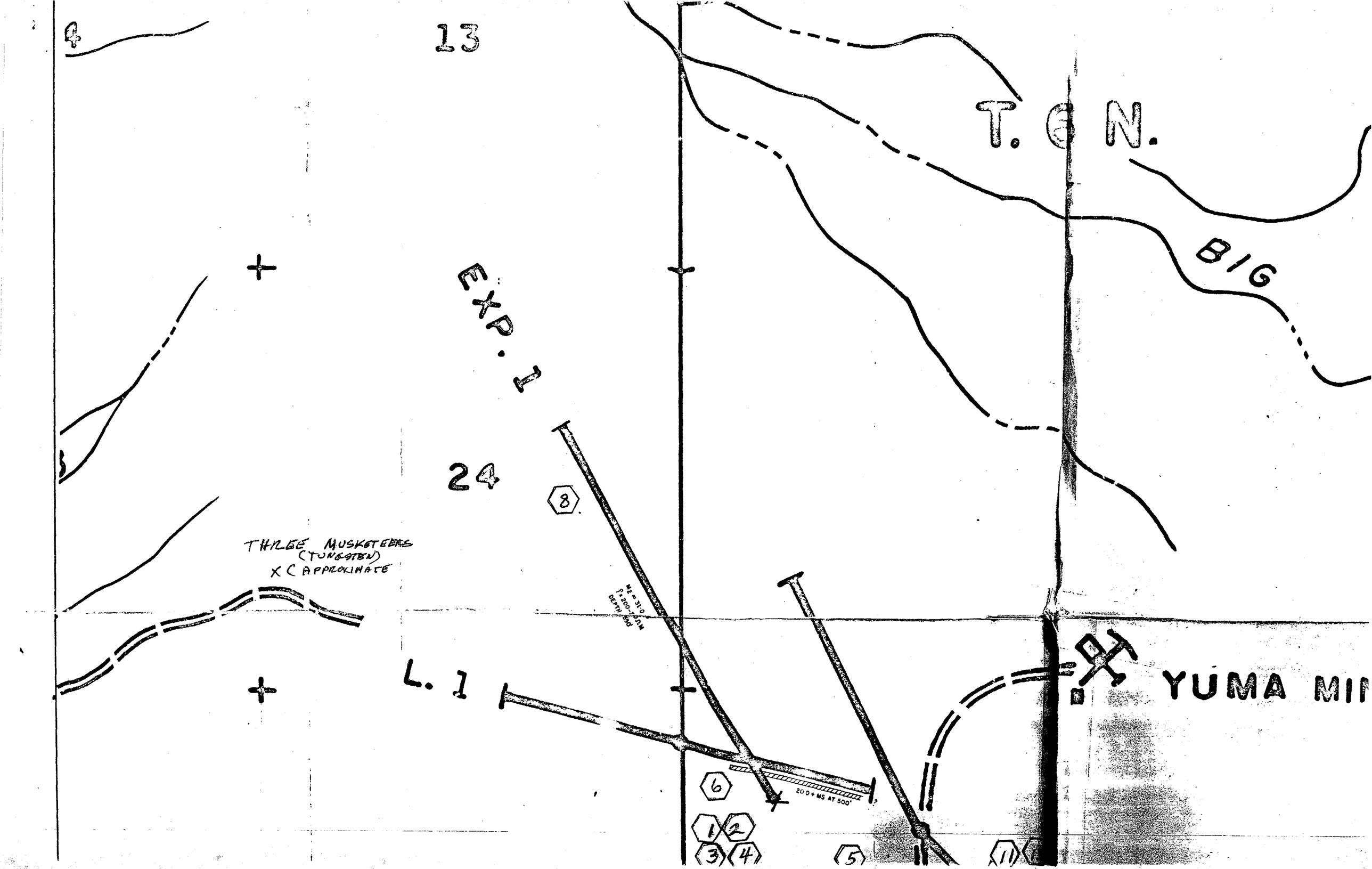
TUCSON, ARIZONA, U.S.A.

C A.M.S.02215


YUMA MINE
L. 1
L. 2
25
36
O.B. K. #2
O.B K#1
200+ MS AT 500'
N = 75 MS (NEAR SURFACE)
110' SHAFT
1
2
3
4
5
6
9
10
11
12
13
14
N
SCALE 1 INCH = 500'
50% Photo Copy Reduction
I.P. and RESISTIVITY SURVEY
PLAN MAP
NW SALOME AREA
YUMA COUNTY, ARIZONA
for
O.B. KILROY
CANADIAN AERO
MINERAL SURVEYS LIMITED
1" = 1000'


YUMA M
L. 1
L. 2
6
25
36
35
O.B.K. #2
O.B K#1
200+ MS AT 500'
M=75 MS (NEAR SURFACE)
110' SHAFT
1
2
3
4
5
6
7
9
10
11
12
13
14


T. 6 N.
BIG
GRANITE
EXP. 1
24
8
L. 1
6
1
2
200+ MS AT 500'
YUMA MINE


4
13
24
T. & N.
BIG
EXP. 1
THREE MUSKETEERS
(TUNGSTEN)
X C APPROXIMATE
L. 1
YUMA MIN
200+MS AT 500'
8
6
1
2
3
4
5
11

[illegible] — FOR LOCATION, SEE "IP" map

[illegible] PLAN MAP (ENLARGED VERSION)

No. 1

The specimen is a meta-limestone composed of crudely foliated antigorite. Large patches of angular outline within the fabric are composed dominantly of granular calcite and interstitial antigorite. Small corroded apatite crystals are a not uncommon accessory in the antigorite.

1. Large chalcopyrite crystals replaced the fabric. These are altered to hisingerite and surrounded by zones rich in chrysocolla and malachite.

Minerals are present in the following estimated amounts: antigorite 55%, calcite 26%, apatite 1%, malachite 1%, hisingerite 3%, and chrysocolla 4%.

Metamorphism has been epizonal and associated with the introduction of chalcopyrite.

No. 2

The specimen consists largely of vein matter with foliated selvages. The vein material is very coarse quartz with later (and probably wholly unrelated) interstitial chalcopyrite. The chalcopyrite is partly altered to chalcocite, hisingerite, goethite, malachite, brochantite, and chrysocolla. Hisingerite and chrysocolla vein the wallrock.

2. The walls of the vein are crudely foliated sericite with augen of quartz. Some hydrobiotite is interleaved with the sericite. The foliation is nearly normal to and cut off by the quartz vein.

The wallrock appears to have been an argillaceous sandstone which was epizonally metamorphosed.

No. 3

The specimen is a garnet amphibolite composed of fine-grained quartz and bundles of actinolitic hornblende prisms which show variable orientation and contorted foliation. The foliation is interrupted but continues through large, very poikiloblastic andradite crystals which abound in certain layers. Some crystals are so filled with matrix material that they consist of isolated grains in a patch

3. whose outline is that of an anhedral crystal. Epidote and sphene are accessories. The epidote is commonest along "veins" whose outline cuts the fabric and which consist only of a row of chalcopyrite anhedra. The chalcopyrite is altered to hisingerite, goethite, and chrysocolla.

Metamorphism has been mesozonal; the rock a dirty lime.

Minerals are present in the following estimated amounts: actinolitic hornblende 30%, sphene 1%, andradite 25%, quartz 39%, epidote 1%, hisingerite and goethite 2%, and chrysocolla 2%.

No. 4

The specimen is a tactite derived from a breccia (of dirty limestone fragments) by mesozonal thermal metamorphism.

Original fragments have wholly lost textures and consist largely of anhedral microcline and rare quartz grains. These fragments are widely separated in a matrix consisting of coarse andradite anhedra cemented with microcrystalline Fe-rich epidote. The epidote veins and otherwise replaces the andradite and has been sheared.

4.

Thin quartz veins, associated with incipient chloritization of garnet carry minor amounts of chalcopyrite (now altered to goethite and chrysocolla).

Minerals are present in the following estimated amounts: quartz 2%, microcline 11%, andradite 23%, epidote 62%, goethite 1%, and traces of sphene, chrysocolla, and pennine.

No. 5

The specimen is a sheared arkose composed of cracked and strained grains of quartz, plagioclase, and orthoclase as well as some lithic fragments, in a fine-grained matrix of quartz and feldspars. Wavy, parallel seams of sericite developed during the epizonal metamorphism cut the fabric and may replace feldspar crystals along fractures.

5.

Late veins of allophane cut all other features and some isolated feldspar grains are also replaced by the allophane.

Minerals are present in the following estimated amounts: quartz 22%, orthoclase 18%, plagioclase 53%, sericite 5%, hematite o.5%, allophane 1%, and traces of rutile and calcite.

No. 6

The specimen is a meta-limestone composed of calcite which occurs as uniform-sized, irregular crystals abundantly penetrated by tabular scales of antigorite. "Veins" of calcite and cross-fibered antigorite cutting the fabric appear to be old shear zones. Randomly-oriented euhedral tremolite crystals occur sparingly in some parts of the fabric. Small sphene grains are a conspicuous accessory.

6.

The original rock was thermally metamorphosed in the upper epizone.

Minerals are present in the following estimated amounts: calcite 83%, antigorite 12%, tremolite 4%, and sphene 1%.

No. 7

The specimen is a tremolite marble composed of randomly oriented tremolite euhedra of variable size in a matrix of anhedral calcite. The calcite grain size varies along parallel bands and where coarse, the tremolite is also coarser. Sphene is a prominent accessory. Small patches of clinochlore are rare.

7.

Hisingerite derived from chalcopyrite occurs in grain boundaries in coarser portions of the fabric. Chrysocolla pods in the fabric are also thus derived.

Metamorphism has been upper epizonal.

Minerals are present in the following estimated amounts: calcite 54%, tremolite 42%, clinochlore 2%, sphene 1%, chrysocolla 0.5%, and traces of apatite and hisingerite.

No. 8 (mineralized piece)

The specimen is an amphibolite composed of large ragged actinolitic-hornblende prisms set in a matrix of actinolite (which is relatively Fe-impoverished). Locally the larger actinolitic hornblende crystals show foliation but the direction of foliation is highly variable. Magnetite and apatite are abundant accessories as augen crushed between laminae of actinolite.

8.

Large pyrite masses replace the fabric and cut across the foliation.

The original rock is uncertain; metamorphism has been epi-mesozonal.

Minerals are present in the following estimated amounts: actinolitic hornblende and actinolite 93%, pyrite 3%, magnetite 3%, and apatite 1%.

No. 8 (unmineralized specimen)

The specimen is an amphibolite composed of well foliated, small actinolite prisms which show unusually tight chevron folding on a microscopic scale. The matrix consists of fine-grained quartz and orthoclase; the cores of some folds are also filled with coarser quartz and orthoclase. Small equant epidote granules tend to

The specimen is a hornblende schist composed of winding bands of crudely oreinetd actinolitic-hornblende interlayered with thick bands of calcite and granular quartz. These two minerals are interstitial accessories in the actinolitic-hornblende bands as well. In one part of the specimen the compositional layers are sharply folded and one band is rich in randomly-oriented phlogopite as well as altered magnetite and calcite. Traces of altered sulfides occur here as well. Retrograde alteration of phlogopite to pennine is minor. Sphene and granular orthoclase are accessories in some bands.

10.

Metamorphism has been mesozonal followed by epizonal veining (including sulfides).

No. 5

The specimen is a garnet tactite composed of coarse anhedral garnet crystals-these show irregular compositional zoning and tend to have Fe-rich rims. The interstices of the fabric are filled with sprays of ragged actinolitic-hornblende prisms set in granular calcite. Quartz occurs here and fills small patches in garnets as well.

Pyrite veins garnet and occurs in the retrograde metamorphis assemblage (hornblende) in the interstices. It may enclose round grains of Fe-rich epidote.

11.

The original impure limestone has been metamorphosed in the mesozone with later epi-mesozonal retrograde metamorphism and crystallization of pyrite.

Minerals are present in the following estimated amounts: garnet 75%, pyrite 2%, actinolitic-hornblende 6%, calcite 12%, quartz 4%, ano traces of epidote.

No. 6

The specimen is a sericite schist (possibly a reworked dacite) composed largely of well foliated sericite. Foliation planes are crumpled and often interrupted by shears at oblique angles. The foliation wraps around small quartz augen which are cracked and strained-borders of such grains are often granulated. Tiny calcite blebs lie along healed fractures in some quartz. Leucoxenized sphene is dragged out along foliation planes.

12.

Late jarosite and hisingerite vein the fabric.

Metamorphism has been epizonal synkinematic. The original sediment was certainly volcanic-derived.

Minerals are present in the following estimated amounts: quartz 9%, sericite 89%, jarosite 0.5%, hisingerite 0.5%, and traces of calcite and sphene.

Percentages for No. 4
omitted above:

quartz 19%, actinolitic-hornblende 22%, calcite 46%, magnetite 4%, sphene 0.5%, pennine 2%, phlogopite 5%, altered sulfides traces, and orthoclase 0.5%

No. 3 The specimen is a calcite-biotite schist composed of quartz, biotite, and calcite in a well banded and foliated fabric with foliation along compositional planes.

Layers rich in quartz carry swarms of small biotite or ferroan phlogopite platelets. Thin stringers rich in dust-like magnetite may occur here; small euhedral clinozoisite (or epidote) prisms often are obscured by these magnetite particles as inclusions.

13. Calcite layers are largely devoid of other minerals. The calcite grains are elongated ovals parallelimg the foliation. Sphene is an abundant accessory as clusters of ting round grains. Traces of orthoclase occur amongst quartz grains. Locally the biotite is replaced by clinochlore.

Metamorphism has been mesozonal.

Minerals are present in the following estimated amounts: quartz 44%, biotite 16%, calcite 30%, epidote 3%, sphene 2%, clinochlore 2%, magnetite 2%, and orthoclase 1%.

No. 2

The specimen is a schist derived originally from a reworked (?) dacite. Cracked, strained, and broken plagioclase crystals are set in a mush of clinochlore whose foliation wraps around grain boundaries. There is a general compositional banding as well, but the foliation is only local and variable. Associated with the interstitial clinochlore are stringers of calcite and rather well-formed plates of muscovite. Rutile is an abundant accessory.

14. Quartz occurs in pods of strained but healed grains which tend to cut the fabric for short distances. It probably has not been introduced, however. Coarse euhedral crystalloblasts of pyrite replace the fabric and are not associated with and new minerals.

Metamorphism has been epi-mesozonal.

Minerals are present in the following estimated amounts: plagioclase 40%, clinochlore 23%, calcite 7%, quartz 14%, rutile 2%, muscovite 9%, pyrite 1%, and traces of apatite.

Obr #1

DEPTH	DRILLING METHOD AND COMMENTS	FORMATION & COLOR	ASSAYS - PPM				COMMENTS - MINERALIZATION
			Depth	Au	Ag	Cu	
0-15	Rotary & Hammer set surface	Metamorphosed Volcanic					Iron Oxides; traces Pyrite
15-60	Hammer	Same as above Color/Gray	20-25 30-35 45-50	.02 .02 <.02	1.5 1.5 1.2		Same as above
60-85	Hammer	Quartzite & Lime mixed Color/Gray to White	65-70 70-75 75-80 80-85	<.02 <.02 <.02 <.02	1.6 1.6 2.5 8.7		Traces of Pyrite
85-345	Hammer Went to Foam at 115'	Shale, Quartz, Biotite(?), Thin Quartzite zones. Green Mineral from 125-135 and 250-345. Color(Foam)/ Black	85-90 90-95 95-100 100-105 105-110 125-130 145-150 165-170 185-190 200-210 225-230 245-250 265-270 285-290 300-310 325-330	1.06 1.55 <.02 1.02 <.01 <.01 <.01 <.01 <.01 <.01 <.01 <.01 <.01 <.01 <.01 <.01	10.6 1.8 3.3 12.2 1.8 1.7 1.6 1.5 1.6 1.6 1.5 1.8 1.7 1.7 1.9 2.4		Moderate Pyrite 85-100? Traces of Pyrite 100-345?
345-550	Hammer Large cuttings increasing problem with foam, major problem at T. D.	Break at 345 Quartzite, Garnet (Brown & Black); Biotite? and/or Chlorite? with Associated Pyrite Green Mineral 500-550 Color (Foam)/ Brownish Red & Brownish Gray	No Assays				Traces to nil of Pyrite 345-540 At bottom, Quartzite fractured, with green and black mineral in fractures with Pyrite.

Obr #1

OBK #2

DEPTH	DRILLING METHOD AND COMMENTS	FORMATION & COLOR	ASSAYS - PPM				COMMENTS - MINERALIZATION
			Depth	Au	Ag	Cu	
0-10	Rotary - Soft Drilling	Intrusive? Red					Hematite staining and minor crystallization
15-45	Hammer - Soft Drilling	Intrusive? Red	25-30	<.02	.09	98	Same
45-165	Hammer - Soft Drilling	Lime, White Green Mineral at 155'.	145-150 155-160	<.02 <.02	1.0 .4	137 56	No mineralization
165-235	Hammer - Foam at 165'. Large cuttings a problem; shut-down at 235'.	Quartzite, Red to White	180-185	<.02	1.1	14	One small particle of Pyrite at 235'. some Hematite Crystals

OBK #2

DRILL HOLE IS
± 4400 FT. S. OF
YUMA MINE

O.B.K. #1
N.W. SALOME PROSPECT

#1- 540-545

The specimen is a biotite phyllite, probably derived from a reworked volcanic originally. Crude sedimentary layering is obeyed by the foliation imposed by later mesozonal synkinematic metamorphism.

Only a few larger detrital grains of quartz and feldspars occur in laminae of very fine-grained quartz; these laminae tend to pinch and swell laterally. Clusters of biotite flakes occur in these laminae and tend to be strung out along the foliation and wrap around larger detrital grains. Seams of calcite parallel the foliation; the calcite is rather coarsely crystalline but tends to fill interstices among other grains. Small grains of pyrite occur sparingly in clusters of biotite flakes.

Minerals appear in the following estimated amounts: sericite 2%, quartz 49%, orthoclase 0.5%, plagioclase 12%, biotite 16%, calcite 20%, pyrite 0.5%, apatite tr., zircon tr..

#2- 540-545

The specimen is a sericite phyllite probably derived from a reworked volcanic. Detrital plagioclase (and less quartz) occur as augen in a well-foliated sericite-rich matrix. Epi-mesozonal metamorphism has been synkinematic.

Many augen are cracked or strained, some show rotation. The matrix is fine-grained granular quartz interlarded with sericite. Some biotite (retrogressively altered to prochlore) occurs with the sericite. The foliation of these minerals does not wrap around larger grains but ends abruptly at the grain boundary. Some laminae of coarser quartz occur and are relatively devoid of sericite; calcite is likely to fill interstices here.

Minerals are present in the following estimated amounts: quartz 34%, orthoclase 1%, plagioclase 19%, prochlore 5%, calcite 3%, sericite 38%, apatite tr., zircon tr..

OBK-1 614

The original rock was a siltstone, probably representing, for the most part, reworked dacitic material. Relicts of β quartz and plagioclase catacrysts may be seen but textural details have been obliterated by upper epizonal synkinematic metamorphism.

Larger strained quartz and plagioclase eyes survive in a foliated matrix of alternating sericite and quartz laminae. Quartz grains here are elongate parallel to the foliation and pennine flakes tend to be interspersed in the interstices. Sericite flakes occur in thick bunches showing crossfolding and other distortions. Tiny corroded epidote prisms occur sparingly in the sericite. Pyrite grains lie in quartz-rich laminae and may be partly mantled with biotite.

The white mineral you ask about is not clay but sericite.

Minerals appear in the following estimated amounts: quartz 39%, sericite 52%, pennine 3%, magnetite 1%, pyrite 0.5%, plagioclase 3%, zircon tr., apatite 0.5%, biotite 0.5%, tourmaline tr., epidote tr..

OBK-1 619

The original rock was probably a reworked dacite similar to 614'. Despite epi-mesozonal synkinematic metamorphism, catacrysts of plagioclase may be clearly observed, although broken or strained.

The rock is crudely foliated with thin discontinuous stringers of sericite layered with streams of quartz and plagioclase. These wrap around larger catacrysts. By contrast, one laminae consists of recrystallized silty material (quartz and plagioclase) set in large post-kinematic calcite crystalloblasts. One patch consisting of coarse, randomly oriented pennine and calcite may represent a basic xenolith. Pyrite euhedra scattered in quartz-rich laminae may be mantled with pennine.

In answer to your question, calcite is associated with the chlorite.

Mineral percentages are estimated as: quartz 18%, plagioclase 44%, pennine 12%, sericite 14%, calcite 10%, pyrite 0.5%, magnetite 0.5%, biotite tr., epidote tr., leucoxene tr..

OBK-1 660

The rock is a spessartite composed of numerous stubby prisms of basaltic hornblende and clusters of coarser subhedral augite. These are scattered in a matrix of randomly oriented plagioclase laths. Irregular magnetite grains are uniformly disseminated and are a common accessory. Quartz occurs sparingly as an accessory as rather large grains in the matrix as if by contamination. There are a few amygdules filled with quartz, pennine, calcite, and rare pyrite euhedra. Cognate xenoliths are uncommon. The rock has only experienced deuteric alteration.

As a result of this, plagioclase is mildly sericitized. Basaltic hornblende shows a slight tendency to alter to actinolite, then pennine and calcite.

In answer to your question, this rock is a younger dike, wholly unrelated to 662'.

An estimate of mineral percentages is: plagioclase 31%, augite 7%, basaltic hornblende 35%, actinolite 2%, pennine 10%, sericite 4%, calcite 4%, magnetite 5%, quartz 2%, apatite tr..

OBK-1 662

The rock is a phyllite derived from a sediment (possibly reworked dacitic material) by epizonal synkinematic metamorphism.

There are numerous large subangular grains of quartz and plagioclase. These are set in a well-laminated matrix of fine detrital quartz and plagioclase. Thick and thin, wispy anastamosing seams of well-foliated sericite parallel the banding and wrap around larger clasts. These are punctuated by calcite crystalloblasts that often are surrounded by dense matted patches of pennine. Where calcite growth is strong, orthoclase shows partial or complete replacement of adjacent plagioclase grains.

Mineral percentages are approximately as follows: quartz 33%, plagioclase 24%, sericite 25%, calcite 14%, magnetite 0.5%, pennine 2%, epidote tr., orthoclase 1%, apatite tr., leucoxene tr..

OBK-1 685

The original rock was probably a reworked dacitic volcanic. There are numerous catacrysts of β quartz and plagioclase set in a crudely layered matrix of granular quartz and minor plagioclase. The rock has experienced upper epizonal synkinematic metamorphism.

Some clasts are strained or broken; a few quartz eyes are surrounded by envelopes of granular quartz due to incipient crushing. Shreddy laminae of sericite wind though the fabric, giving a good foliation. Pennine flakes and interstitial calcite grains are interstitial to other minerals. Traces of pyrite were noted with calcite, pennine, and magnetite (this is also an affirmative answer to your question). These veinlets lie along synmetamorphic quartz veins or cut the fabric.

Minerals are present in the following estimated amounts: quartz 43%, plagioclase 18%, sericite 37%, pennine 6%, pyrite tr., calcite 4%, magnetite 0.5%, hisingerite 0.5%, leucoxene tr., apatite tr..

OBK-1 743

The rock is a quartz latite granophyre. Originally it carried sharply euhedral phenocrysts of β quartz, orthoclase, plagioclase, and biotite. These were scattered in a spherulitic matrix with small included orthoclase laths. Epizonal alteration has been late magmatic/deuteric.

Glass is devitrified to radial bursts of quartz stained with colloidal hematite (the pink mineral you questioned). Biotite is altered to sericite and crystalloblastic calcite with accessory anatase and montmorillonite. Plagioclase is only weakly sericitized.

Mineral percentages appear as follows: quartz 47%, orthoclase 24%, plagioclase 15%, magnetite tr., sericite 9%, anatase tr., montmorillonite tr., apatite tr., calcite 4%.

OBK-1 748

The specimen represents the contact between two rock types.

The host (older) rock is a diorite with a diabasic texture. It consisted originally of randomly oriented plagioclase laths and interstitial basaltic hornblende. Accessory biotite and coarse granular magnetite cluster with the hornblende. Minor quartz and orthoclase occur as graphic intergrowths in the matrix. The rock has been moderately altered in the epizone. Although biotite is mostly fresh, basaltic hornblende is heavily altered to calcite and pennine. Plagioclase is moderately altered to calcite and sericite.

This diorite is cut by a quartz latite with scattered phenocrysts of β quartz and plagioclase in an originally glassy matrix. The contact is marked by a thin mylonitized zone of dioritic debris against a banded glassy phase of the quartz latite. This rock has been strongly silicified with sericite replacing both feldspars and biotite. Close to the diorite it is heavily impregnated with lacy calcite crystalloblasts. Rare disseminated pyrite was observed in both rock types.

OBK-1 783

The specimen is a diorite, a rock undoubtedly related to 748 and 660. It consists of randomly oriented plagioclase laths and abundant interstitial basaltic hornblende (mantled with uralite). Accessory ilmenite clusters with the hornblende. Interstitial areas are filled with coarse quartz and minor orthoclase. The rock has been deuterically altered.

Plagioclase cores are heavily occluded with spongy aggregates of anhedral epidote. Hornblende is only mildly altered to pennine and minor calcite. Ilmenite has altered to leucoxene. A fracture surface carries heulandite stained pink by colloidal hematite (the "shiny iron oxide" questioned).

An estimate of mineral percentages is: quartz 5%, orthoclase 1%, plagioclase 20%, amphiboles 32%, pennine 10%, epidote 26%, calcite 1%, leucoxene 3%, magnetite 1%, apatite 0.5%.

OBK-1 816

The rock is a diorite composed initially of randomly oriented laths of plagioclase with interstitial subhedra of augite. Small basaltic hornblende prisms may be attached to the augite. There are a few larger phenocrysts of augite and hornblende. Small interstitial patches of quartz and orthoclase occur sparingly. Cognate xenoliths are few and usually of coarser grain size than the host. The rock has been strongly altered in the epizone.

Plagioclase is only slightly clouded with sericite and epidote. The hornblende phenocrysts are wholly altered to fibrous epidote and pennine but matrix basaltic hornblende only partially so. Traces of pyrite are associated with this alteration. Late veins of heulandite and calcite cut the fabric.

Mineral percentages appear as follows: plagioclase 51%, quartz 2%, orthoclase 0.5%, epidote 3%, pennine 10%, augite 19%, basaltic hornblande 6%, magnetite 4%, calcite 2%, sphene 0.5%, heulandite 1%, sericite 0.5%.

OBK-1 855

The rock is a sericite schist derived from a pelitic sediment by mesozonal synkinematic metamorphism. It initially consisted of alternating silty and shaly laminae.

Silty laminae consist of granular quartz that is only slightly flattened on the plane of foliation. Slender flakes of sericite are crudely aligned along planes that weave through the quartz. Shaly laminae consist almost wholly of subparallel sericite scales and thin stringers of minute rutile grains. A few pale biotite books are scattered here but not aligned with the foliation. Veins of coarse strained quartz (of metamorphic age) roughly parallel the foliation and may enclose stringers of sericite and biotite.

Calcite occurs in interstices of the fabric throughout the specimen, and it seems aligned along ill-defined planes normal to the foliation.

OBK-1 925

The rock is a sericite schist much like 855 but in this sample only shaly laminae were noted. These consist exclusively of curved foliae of sericite plates, minor interstitial quartz, and strings of minute rutile beads parallel to the foliation. Coarse synmetamorphic quartz veins parallel the foliation and enclose small discontinuous laminae of sericite.

Very coarse calcite penetrates and replaces the fabric, invading quartz veins along grain boundaries. Where calcite is in contact with sericite there is apt to be an intervening patch of coarse clinochlore. Both the calcite and clinochlore show evidence of deformation. Small patches of hematite are scattered within the calcite.

OBK-1 954

The section has been cut from one of the quartz veins as described in the previous two samples. These veins may derive from very sandy laminae in the original sediment.

OBK-1 954 (con't.)

The rock consists almost exclusively of coarse strained quartz grains that are elongate in parallel and interlock along frilly boundaries. A few wispy foliae of sericite wind along grain boundaries and may be accompanied by granular quartz. Calcite occurs sparingly through the rock, filling interstitial voids.

An estimate of mineral percentages is: quartz 95%, sericite 3%, calcite 2%.

OBK-1 995

The original rock was a layered pelitic sediment. It has been synkinematically metamorphosed with some brecciation.

The rock consists essentially of slender, foliated scales of sericite. Pennine may be laminated with sericite or occur as small crystals oriented at variance with the foliation. The matrix consists of granular quartz showing very little flattening on the plane of foliation.

Fragments of this shist are isolated in patches of coarse strained "vein" quartz and separated by crushed zones within the schist. Coarse calcite invades grain boundaries in the quartz veins and occurs as crystalloblasts in the schist.

Minerals appear in the following estimated amounts: quartz 43%, sericite 20%, pennine 8%, calcite 29%, rutile tr., tourmaline tr..

OBK-1 974

The specimen is a sericite schist derived from a pelitic sediment by synkinematic metamorphism. It consists of sheaves of parallel sericite scales that define a plane of foliation that is severely crumpled. Small books of clinochlore may be interlayered with the sericite. The intervening laminae consist largely of granular quartz but wisps of sericite parallel to the foliation cut across grain boundaries in these areas. Thin hematite tablets lie along sericite cleavages or in rock cleavage planes cutting the foliation.

Veins and patches of coarse crystalloblastic calcite cut or replace the fabric.

Mineral percentages are estimated as: quartz 33%, calcite 38%, sericite 22%, clinochlore 5%, hematite 2%, epidote tr..

OBK-1 1023

The rock is a quartzite derived from a slightly argillaceous sandstone by synkinematic metamorphism.

The rock consists of ragged interlocking quartz grains that vary erratically in size. In some cases the size differences appear to owe to synmetamorphic crushing. Thin flakes of sericite may either lie along grain bounderies or be locked in the quartz. They are slightly concentrated in certain laminae that meander through the fabric, showing some degree of folding. Minute flakes of clinochlore occur in these laminae.

Small calcite crystalloblasts have formed in the interstices throughout the fabric.

Mineral percentages are approximately as follows: quartz 86%, calcite 5%, sericite 6%, clinochlore 2%, zircon tr., rutile tr., apatite tr., tourmaline tr..

OBK-1 1036

The specimen is a sericite schist derived from a shaly sandstone by epizonal synkinematic metamorphsim.

Wispy laminae of well foliated sericite are rather evenly spaced in a matrix of granular quartz. These laminae are curved and anastamosing. Small clinochlore flakes parallel the sericite. There also may be stringers of tiny subhedral epidote prisms in sericite-rich bands. Hematite tablets occur as an accessory, sometimes interlayered with sericite crystals.

Irregular patches or isolated crystalloblasts of calcite tend to be concentrated in, and replace, certain laminae.

Minerals are present in the following estimated amounts: quartz 52%, sericite 17%, calcite 24%, hematite 2%, clinochlore 3%, epidote 1%, zircon tr., tourmaline tr..

3226 East 46th Street

Phone 624-0049

AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS - CHEMISTS - METALLURGISTS

TUCSON, ARIZONA 85713

SAMPLE SUBMITTED BY Mr. O. B. Kilroy

DATE Dec. 27, 1969

SAMPLE MARKED	GOLD OZ./TON	SILVER OZ./TON	PER CENT COPPER	PERCENT LEAD	PERCENT ZINC	PERCENT MOLYBDENUM	PERCENT IRON	
NWS # 1	.008	0.10	0.48					
			SAMPLE # 11					

PAID 12-23-69 RCA

CHARGES $ 5.25

REGISTERED ASSAYER CERTIFICATE NO. 6852 PETE S. ELLIOTT Date Signed 12/27/69 Arizona U. S. A.

ASSAYER-CHEMIST

ARIZONA TESTING LABORATORIES

A DIVISION OF CLAUDE E. McLEAN & SON LABORATORIES, INC.
817 WEST MADISON ST. PHOENIX, ARIZONA 85007 PHONE 254-6181

For: Kilroy Enterprises
Tucson Title Bldg., Suite 212
45 West Pennington
Tucson, Arizona 85701

Date: August 21, 1974

Lab. No.: 7547

Sample: Ore

Marked: See Below

Received: 8-19-74

Submitted by: same

REPORT OF LABORATORY TESTS

GEOCHEMICAL REPORT

Sample No.	Gold ppm	Silver ppm	Copper ppm
553-569	lt* 0.1	1	110
569-579	"	lt* 1	110
578-588	"	"	65
588-597	"	"	80
597-611	"	"	50
611-623	"	"	170
623-632	"	"	50
632-641	"	"	40
641-654	"	"	35
654-662	"	"	75
662-670	"	"	50
670-680	"	"	70
680-689	"	1	70
689-699	"	lt* 1	70
699-708	"	"	60
708-718	"	"	70
718-727	"	"	100
727-737	"	"	120
749-750	--	--	130

OTBK#1

---

lt* = less than

Respectfully submitted,

ARIZONA TESTING LABORATORIES

Claude E. McLean, Jr.

ASSAYERS AND CHEMISTS, INC.
1700 W. GRANT RD. • BOX 50106 • 622-4836
TUCSON, ARIZONA 85703

BRANCHES
DOUGLAS, ARIZONA
HAYDEN, ARIZONA
EL PASO, TEXAS
ST. LOUIS, MO.

IDENTIFICATION	GOLD OPT	SILVER OPT	LEAD %	COPPER %	ZINC %	MO. %	IRON %		
No. 9166 540-545				22					

CC: Mr. Oliver B. Kilroy
ADD: 212 Tucson Title Building
CITY: 45 West Pennington
DD: Tucson, Arizona 85701
CITY:

REMARKS:

Trace analysis

ANALYSIS CERT. BY

PREPARATION $

Minimum charge ANALYSIS $ 5.00

1H3A ACC: MR OLIVER B KILROY | DATE SPL. RECEIVED 1/5/73 | DATE COMPL. 1/5/73 | TUC 346793 | $ 5.00

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION		Au ppm	Ag ppm	Cu ppm
1	OBK #1	553-569			155
2		569-579			140
3		579-588			65
4		588-597			95
5		597-611			55
6		611-623			250
7		623-632			50
8		632-641			45
9		641-654			45
10		654-662			100
11		662-670			50
12		670-680			75
13		680-689			80
14		689-699			145
15		699-708			60
16		708-718			85
17		718-727			150
18		727-737			190
19		749-750			140
20		750-755	<0.02	<0.2	70
21		755-765	<0.02	<0.2	65
22		765-775	<0.02	<0.2	70
23		775-785	<0.02	<0.2	60
24		785-793	<0.02	<0.2	70
25		793-803	<0.02	<0.2	70
26		803-813	<0.02	<0.2	70
27		813-834	<0.02	<0.2	40
28		834-832	<0.02	<0.2	35
29		832-840	<0.02	<0.2	20
30		840-850	<0.02	<0.2	40
31	OBK #1	850-861	<0.02	<0.2	5

TO:
Mr. O. B. Kilroy
212 Tucson Title Bldg., Suite 212
45 West Pennington
Tucson, Arizona 85701

REMARKS:
Trace analysis

CERTIFIED BY:
REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK DATE ISSUED 5-8-74 Arizona U.S.A.

DATE REC'D:	DATE COMPL.:	JOB NUMBER:
8/26/74	8/29/74	741689

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

CERTIFICATE OF ANALYSIS

ITEM NO.	SAMPLE IDENTIFICATION		Au ppm	Ag ppm	Cu ppm						
1	OBK #1	862-872	<0.02	<0.2	5						
2		872-889	<0.02	<0.2	5						
3		889-900	<0.02	<0.2	5						
4		900-922	<0.02	<0.2	5						
5		922-932	<0.02	<0.2	60						
6		932-945	<0.02	<0.2	40						
7		945-955	<0.02	<0.2	5						
8		955-964	<0.02	<0.2	5						
9		964-974	<0.02	<0.2	5						
10		974-983	<0.02	0.2	5						
11		983-993	<0.02	<0.2	5						
12		993-1003	<0.02	<0.2	5						
13		1003-1013	<0.02	<0.2	5						
14		1013-1023	<0.02	<0.2	5						
15	OBK #1	1023-1036	<0.02	<0.2	5						

TO:
Mr. O. B. Kilroy
212 Tucson Title Bldg
45 West Pennington
Tucson, Arizona 85701

REMARKS:
Trace analysis

CERTIFIED BY:

DATE RECD:	DATE COMPL.:	JOB NUMBER:
9/[illegible]/74	9/18/74	741810

HAWLEY & HAWLEY

ASSAYERS AND CHEMISTS, INC.
BOX 50106 1700 W. GRANT RD.,
TUCSON, ARIZONA 85703 (602) 622-4836

Registered Assayers
OVER 50 YEARS

BRANCHES
Douglas
Hayden
Morenci
Inspiration
El Paso
St. Louis

IDENTIFICATION	Gold ~~oz/t~~ ppm	Silver ~~oz/t~~ ppm	Lead %	Copper %	Zinc %	Mo. %			
85 - 90	1.06	10.6							
105 - 110	< 0.01	1.8							
125 - 130	< 0.01	1.7							
145 - 150	< 0.01	1.6							
165 - 170	< 0.01	1.5							
180 - 190	< 0.01	1.6							
205 - 210	< 0.01	1.6							
225 - 230	< 0.01	1.5							
245 - 250	< 0.01	1.8							
265 - 270	< 0.01	1.7							
285 - 290	< 0.01	1.7							
305 - 310	< 0.01	1.9							
325 - 330	< 0.01	2.4							

CC: Mr. Oliver B. Kilroy
ADD: 212 Tucson Title Building
CITY: 45 West Pennington
ADD: Tucson, Arizona 85701
CITY:

REMARKS:

Trace analysis
(Pulverized & Dried)

Analysis Cert. By H. E. RICHARD

REGISTERED ASSAYER CERTIFICATE NO. 6784 Arizona U. S. A.

Preparation $ 11.70
Analysis $ 48.75

ACC:	Date Spl. Received	Date Compl.		$
MR OLIVER B KILROY	10/6/72	10/11/72	TUC 346581	60.45

HH3

HAWLEY & HAWLEY

ASSAYERS AND CHEMISTS, INC.
BOX 50106 1700 W. GRANT RD.,
TUCSON, ARIZONA 85703 (602) 622-4836

Registered Assayers
OVER 50 YEARS

BRANCHES
Douglas
Hayden
Morenci
Inspiration
El Paso
St. Louis

IDENTIFICATION	Gold ~~oz/t~~	Silver ~~oz/t~~	Lead %	Copper ~~%~~	Zinc %	Mo. %			
	ppm	ppm		ppm					
OBK # 2									
25 - 30	< 0.02	0.9		98					
145 - 150	< 0.02	1.0		137					
155 - 160	< 0.02	0.4		56					
180 - 185	< 0.02	1.1		14					
OBK # 1									
20 - 25	0.02	1.5							
30 - 35	0.02	1.5							
45 - 50	< 0.02	1.2							
65 - 70	< 0.02	1.6							
70 - 75	< 0.02	1.6							
75 - 80	< 0.02	2.5							
80 - 85	< 0.02	8.7							
90 - 95	1.55	1.8							
95 - 100	< 0.02	3.3							
100 - 105	1.02	12.2							

REGISTERED ASSAYER CERTIFICATE NO. 8784 H. E. RICHARD

CC: Mr. Oliver B. Kilroy
ADD: 212 Tucson Title Building
CITY: 45 West Pennington
ADD: Tucson, Arizona 85701
CITY:

REMARKS:

Trace analysis
(Pulverized & dried only)

Analysis Cert. By

Preparation $ 12.60
Analysis $ 58.50

ACC:	Date Spl. Received	Date Compl.		$
MR OLIVER B KILROY	10/17/72	10/19/72	TUC 346597	71.10

HH3

See Anderson, C.A. article, p. 14 of Talley & Hicks PC Vol.
See Wilson, E.D. ~~AGS~~ Bull Ore Deposits in Northern
Yuma Co, AZ p. 96 → 103 plus 148-149
Also Bull 182, Table N, p. 288-289
Also AGS Bull AZ Zn & Pb Deposits Chapter X - Castle
Dome District, p. 98 → 105