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TO RECONSTRUCT MAP ALIGN PHOTOS AS SHOWN BELOW

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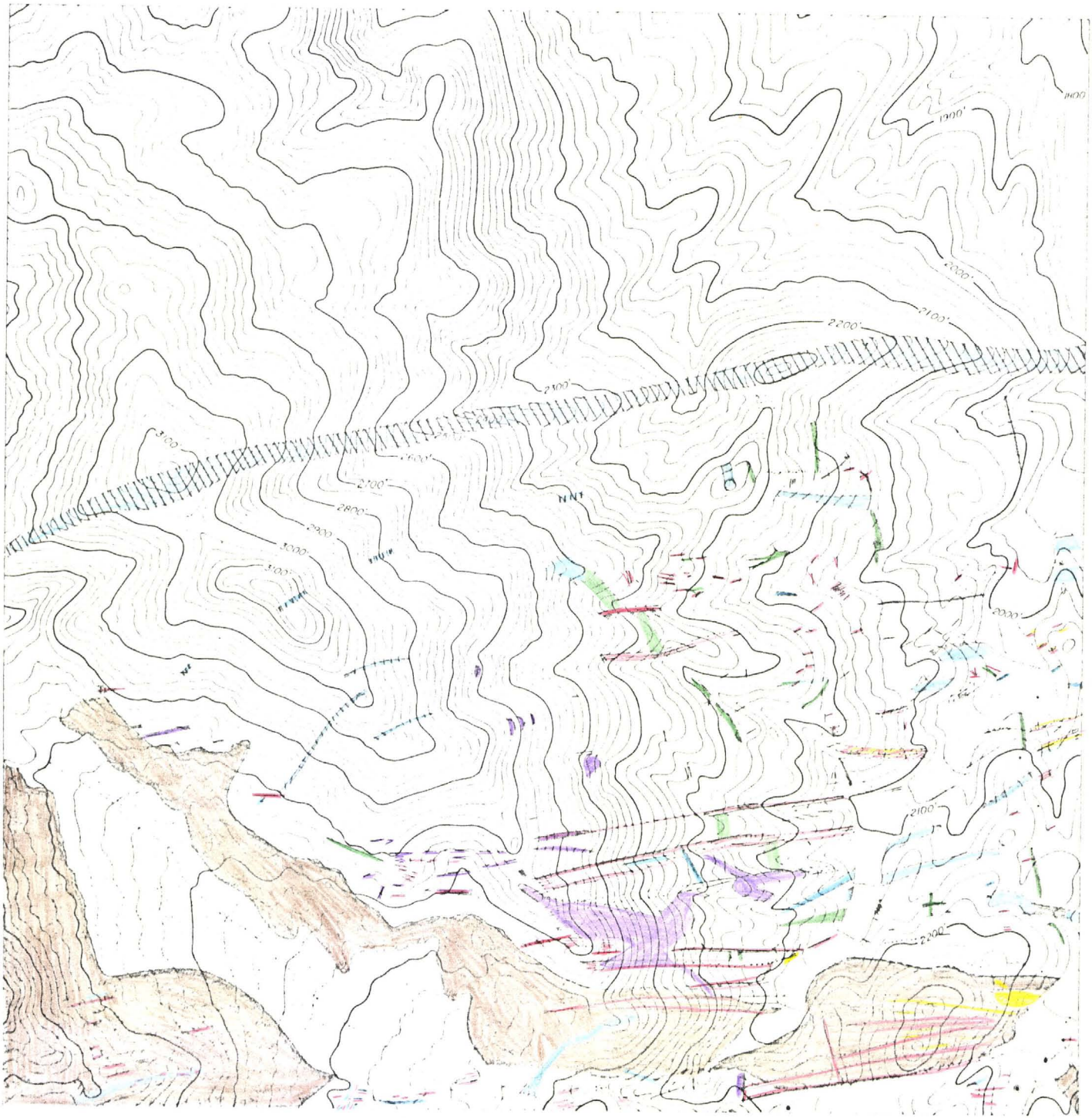
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LEGEND

- ALLUVIUM
- GILA CONGLOMERATE
- APLITE
- QUARTZ
- QUARTZ MONZONITE
- QUARTZ DIORITE PORPHYRY
- QUARTZ DIORITE PORPHYRY - Mafic Groundmass > 20%
- QUARTZ DIORITE PORPHYRY with some K-spar
- DIABASE
- DIABASE (rice-grain)
- DIABASE (scattered plag. Xl's)
- DIABASE (dark pyroxene Xl's)
- PORPHYRITIC GRANITE
- STRIKE SLIP FAULT
- STRIKE & DIP OF CONTACT
- PROSPECT PIT
- ADIT
- SHAFT
- CONTACT
- APPROXIMATE CONTACT
- INFERRED CONTACT
- T R C drill hole
- Minbanco drill hole
- Discovery drill hole

FRACTURE SYSTEMS —

- Fracture with Dip
- Fracture - Position approximate
- Fracture - Inferred

MINERALIZATION —

- fe stain
- Limonite boxwork
- Quartz vein & stringers
- Silicification
- cu stain
- cp (disseminated)
- py (disseminated)
- py (in fracture usually with limonite)
- Moly
- Epidote (disseminated)
- Epidote (fracture filling)
- Shear zone
- Hematite (veins)
- Hematite (stain)
- Azurite & Malachite
- Chrysocolla

TIPPERARY RESOURCES CORPORATION

500 W. ILLINOIS MIDLAND, TEXAS

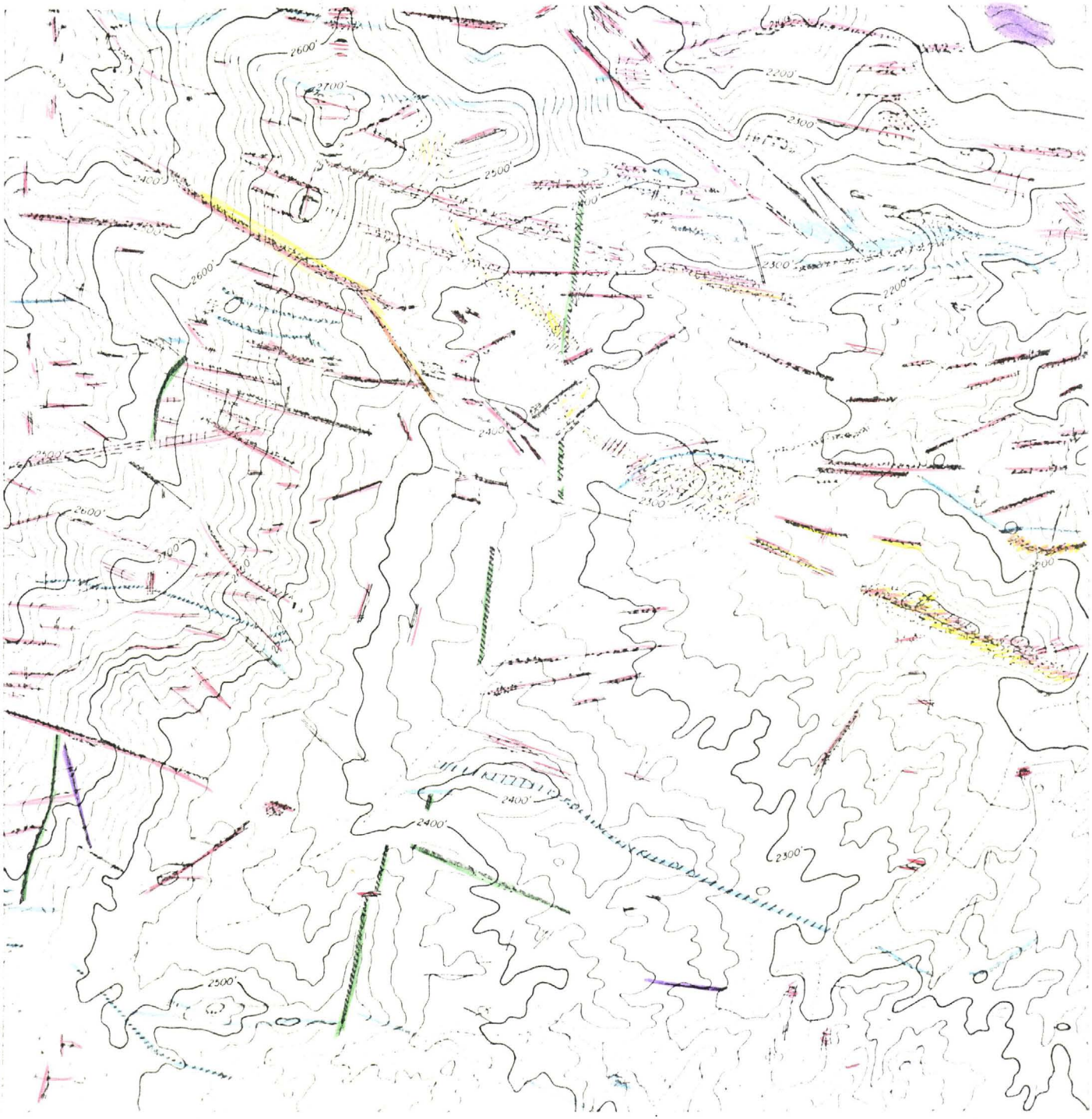
GEOLOGY OF THE KELVIN PROSPECT

T-4-S, R-13-E

PINAL COUNTY, ARIZONA

Geologists Bill Zelinski & David Brown June 18, 1970

Approved C. R. Williams Drawn By G.E.M.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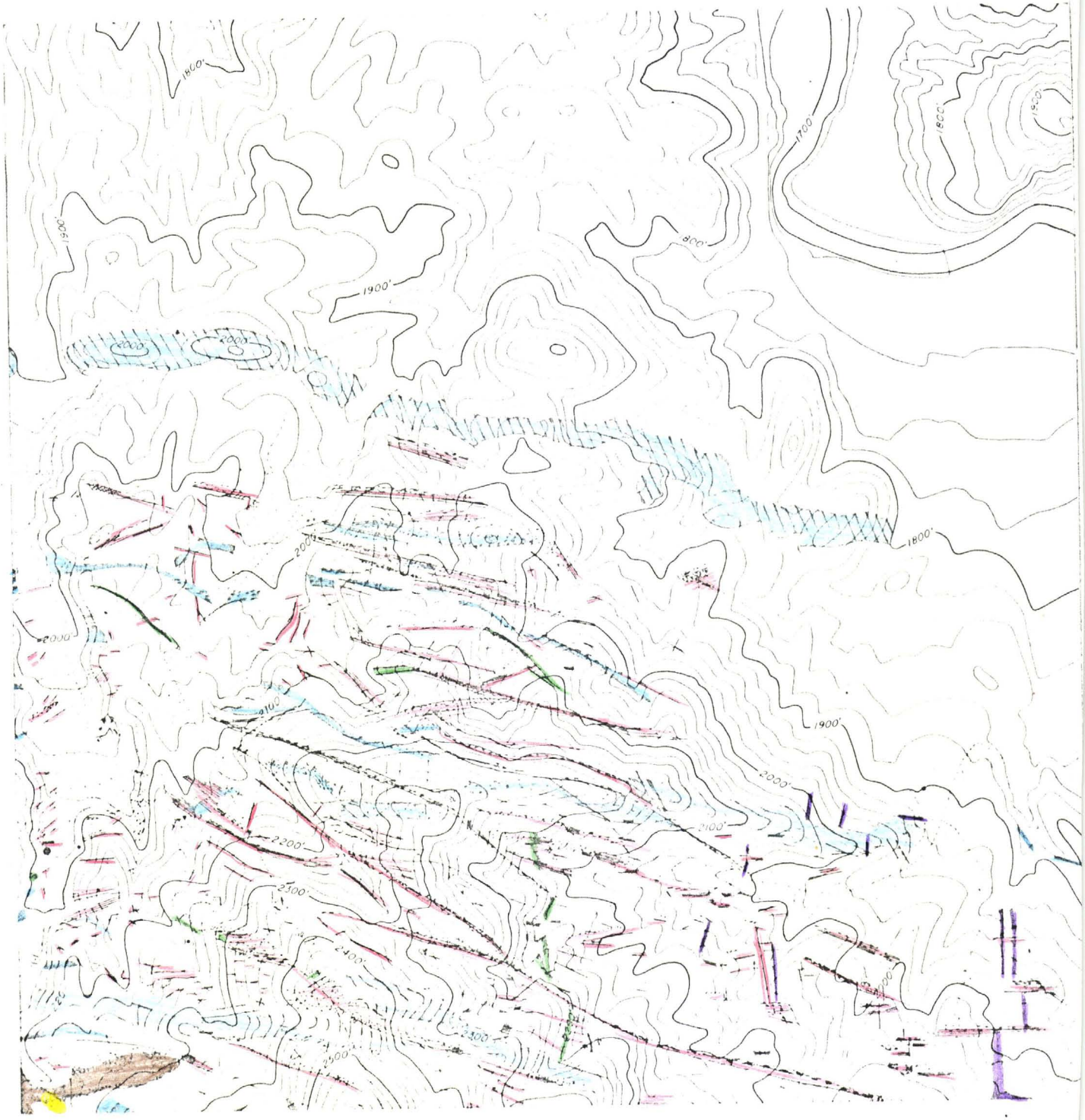
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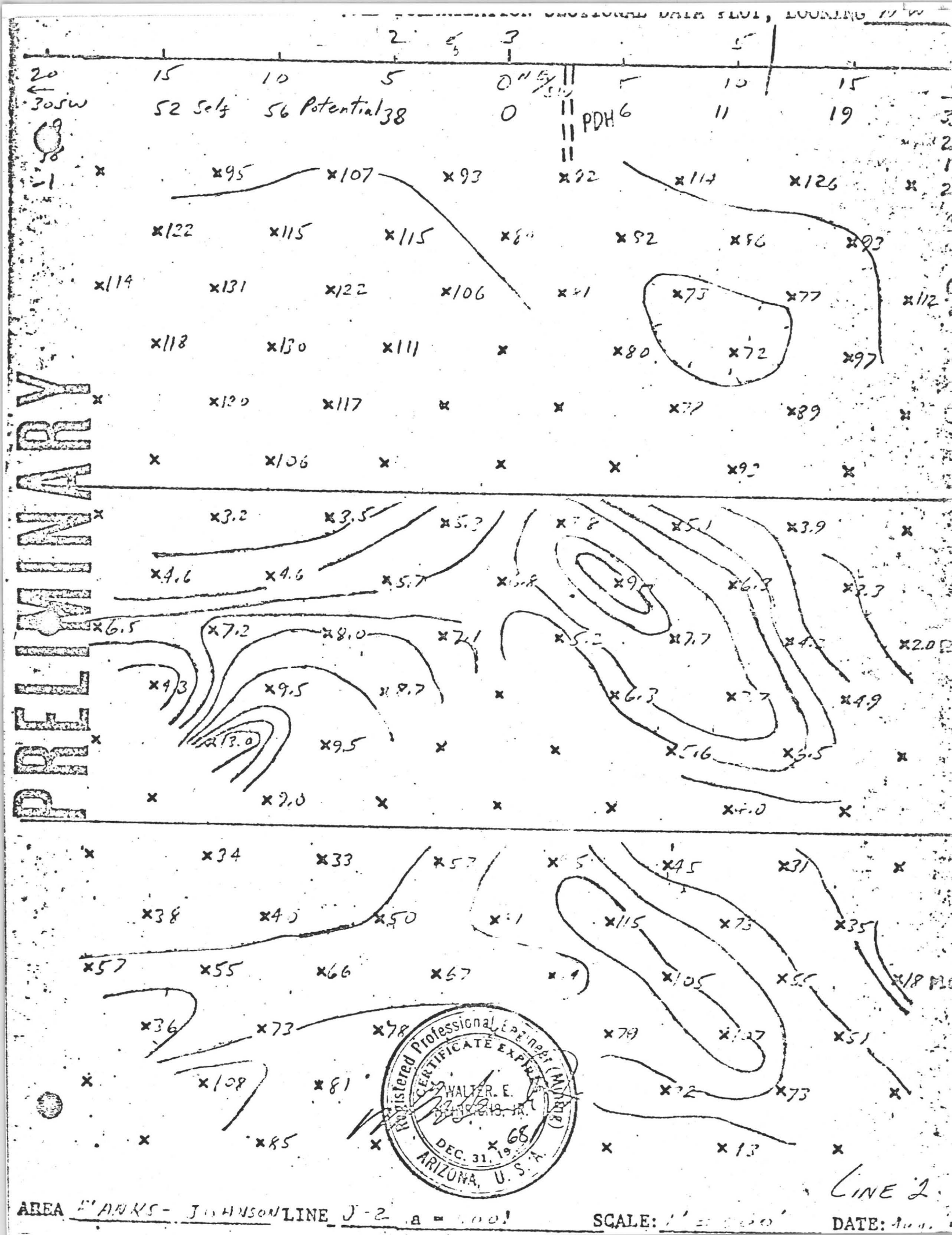
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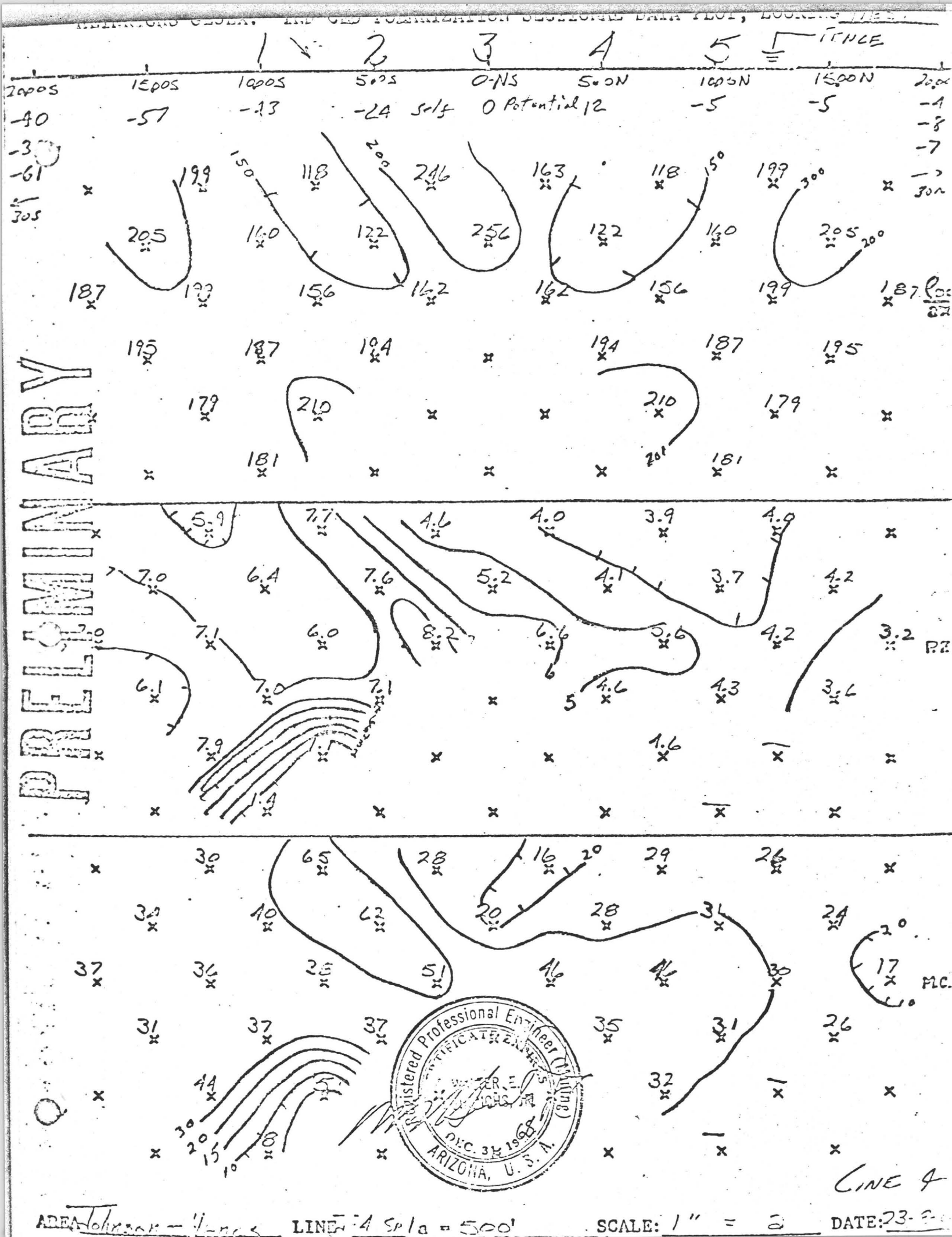

TIPPERARY RESOURCES CORP.

VOLUME I

KELVIN GEOLOGICAL REPORT

TIPPERARY RESOURCES CORPORATION
A Subsidiary of
TIPPERARY LAND & EXPLORATION CORPORATION
500 W. ILLINOIS — MIDLAND, TEXAS 79701

A. L. EDGAR
President

PHONE 915 684-7151
TELEX 743414

September 4, 1970

Mr. Kelsey Boltz
Nuclear Dynamics, Inc.
2871 Sky Harbor Blvd.
Phoenix, Arizona 85034

Subject: Kelvin Copper-Molybdenum Prospect
Pinal County, Arizona

Dear Sir:

In accordance with my conversation with you on September 3, submitted herewith are the following reports prepared by Tipperary:

(1) Volume I, Kelvin Geological Report

(2) Volume II, Kelvin Geophysical Report

In addition, a report entitled "Volume III - Petrographic Examination of 16 Rocks", prepared by Colorado School of Mines Research Institute, is available for your review.

We believe results of our exploration program to date, as contained in the above material, justify additional exploration efforts. We are interested in obtaining a joint venture partner and in undertaking additional work. Our terms of joint venture participation are as follows:

1. You are to reimburse Tipperary in the amount of $100,000 representing approximately 90 percent of exploration costs to date.

2. Cost of future exploration and definition work and a feasibility study are to be borne 90 percent by you and 10 percent by Tipperary. Salaries, salary burdens and travel expenses attributable to Tipperary personnel will be charged to the joint venture account at cost.

3. By bearing costs as set out in (1) and (2) above, you earn a 60 percent interest in the prospect. Costs

incurred subsequent to the feasibility study will be borne 60 percent by you and 40 percent by Tipperary. Revenue likewise will be shared on a 60/40 basis with each party bearing its proportionate share of royalty, operating costs and other burdens.

If you wish to discuss this prospect in more detail with our personnel or to inspect the property in person, please advise and appropriate arrangements will be made.

Yours very truly,

Arlen L. Edgar

Arlen L. Edgar

ALE:jm

encl.

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110-112

GEOLOGICAL REPORT

OF THE

KELVIN PROSPECT, PINAL COUNTY, ARIZONA

FOR

TIPPERARY RESOURCES CORPORATION

JUNE, 1970

BY

C. R. WILLIAMS - SR. MINERALS GEOLOGIST
WILLIAM ZELINSKI - GEOLOGIST
DAVID BROWN - GEOLOGIST

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2 PROSPECT TOPOGRAPHIC MAP SHOWING CLAIM BOUNDARIES . . . 4

PLATES

1 GEOLOGIC MAP OF THE KELVIN PROSPECT

2 DRILL HOLE NO. 1 SAMPLE LOG

3 DRILL HOLE NO. 2 SAMPLE LOG

ABSTRACT

The Kelvin Copper-Molybdenum Prospect located in Pinal County, Arizona, has been the subject of an extensive geological and geophysical program designed to investigate the economic potential of copper-molybdenum mineralization. Review of both local and regional geological relationships points out numerous similarities between structure, petrology, and mineralization at Kelvin and Kennecott Copper's Ray open pit mine five miles to the northeast.

Results of geophysical and geological investigations show the presence of an anomalous zone of sulfide mineralization trending approximately east-west across the prospect. Tipperary drilled two holes on the property, which were located on the basis of surface mineralization and prior geophysical observations (before completion of geophysical surveying). Mineralization in both holes is submarginal to marginal but several short intervals contain ore grade mineral. The leached character of the granite host in the drill holes combined with increasing amounts of sulfide mineralization at increasing depth in Drill Hole 2 may be indicative of an enriched zone at greater depth. Support for this hypothesis are the numerous shows of chalcocite pseudomorphism after pyrite and the highly leached and altered nature of the granite.

The geophysical anomaly tends to be confined between two bordering Laramide intrusives. The northern boundary of the anomaly subparallels a large diorite porphyry dike and the southern boundary parallels an apophysis of a quartz monzonite stock. Because of the restriction of significant mineralization to the main anomalous zone it is possible that the mineralization is the result of hydrothermal migration upward through the basement weakness zone created by intrusion of the monzonite stock and confinement of solutions by the monzonite barrier on the south and the diorite porphyry dike to the north.

Additional exploratory core tests are needed to ascertain the economic potential of the prospect as recommended in the geophysical report.

INTRODUCTION

The Kelvin Copper-Molybdenum Prospect was acquired by Tipperary Resources Corporation in January, 1970 through negotiations with claim owners and prospecting permitees.

An extensive preliminary exploratory program was initiated to ascertain the extent of mineralization in the Kelvin area. A thorough geologic mapping program was initiated to run concurrently with an extensive induced polarization survey and drilling of two holes. This report is a summary of pertinent geological data derived from the current study and a review of the regional geology and ore deposits.

LOCATION AND ACCESSIBILITY

The Kelvin Prospect is located in the Riverside Mining District, also known as the Mineral Creek and Kelvin Mining Districts. (Fig. 1.) The prospect consists of 33 unpatented lode mining claims, one patented mining claim known as the Zelleweger Claim and two state sections. All of the property is in a contiguous block located in Sections 8, 9, 10, 16 and 17, Township 4 South, Range 13 East of the Gila and Salt River Base and Meridian, Pinal County, Arizona as shown on Figure 2. Quit claim deed to additional claims which are not contiguous with the main group have also been obtained.

The property is located five miles south of Kennecott Copper's Ray open cast copper mine which is currently mining 110,000 tons per day. Access to the prospect is via State Highway 177 from Superior,

Arizona, 15 miles south to Kelvin where an improved gravel road extending from Kelvin to Florence, Arizona, intersects Highway 177. This road is followed six miles to the A-Diamond Ranch Road and Southern Pacific Railroad's access turnoff. The railroad access road is followed a distance of two miles to the entrance of Johnson Wash from where a mine road extends south one mile to the prospect.

CLIMATE AND VEGETATION

Temperatures range from a minimum of approximately 20 degrees during the winter months to a maximum of 120 degrees during extreme periods in the summer. Rainfall is scant, averaging between 10 and 15 inches per year. Excessive periods of rainfall create hazardous conditions in the numerous gullies and washes in the prospect area and flash flooding conditions occur in numerous areas between Kelvin and the prospect area.

Vegetation consists predominately of saguaro and cholla cacti. Ocotillo, creosote and paloverde are also common as is mesquite in the lower topographic areas.

CLAIM DESCRIPTIONS AND OWNERSHIP

Tipperary has acquired through a purchase agreement a total of 33 unpatented mining claims in a contiguous block in Sections 8, 9 and 17, Township 4 South, Range 13 East. The relative position of these claims is shown on Figure 2. All of the claims have been

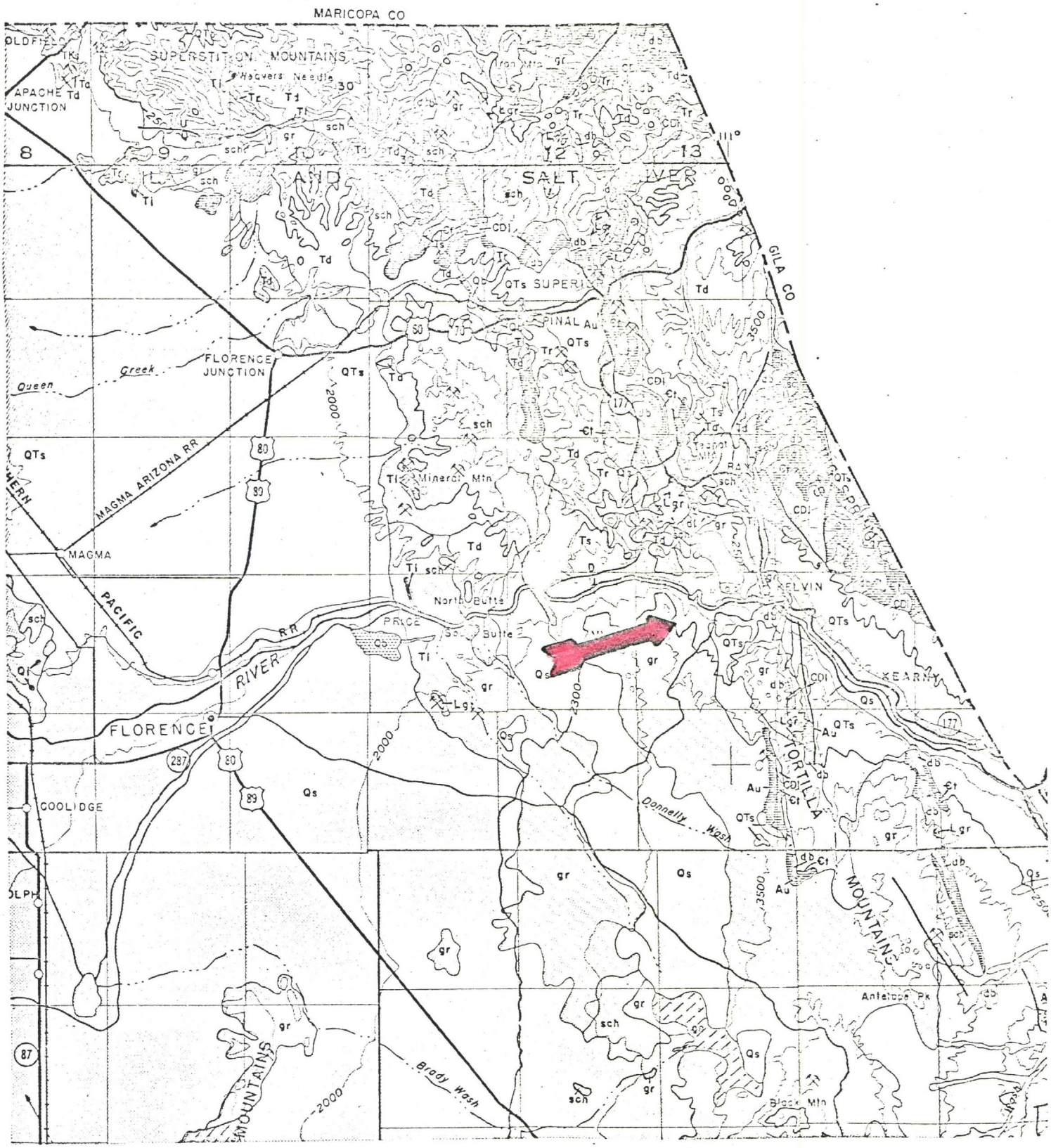

Fig. I

KELVIN PROSPECT
Cu - Mo

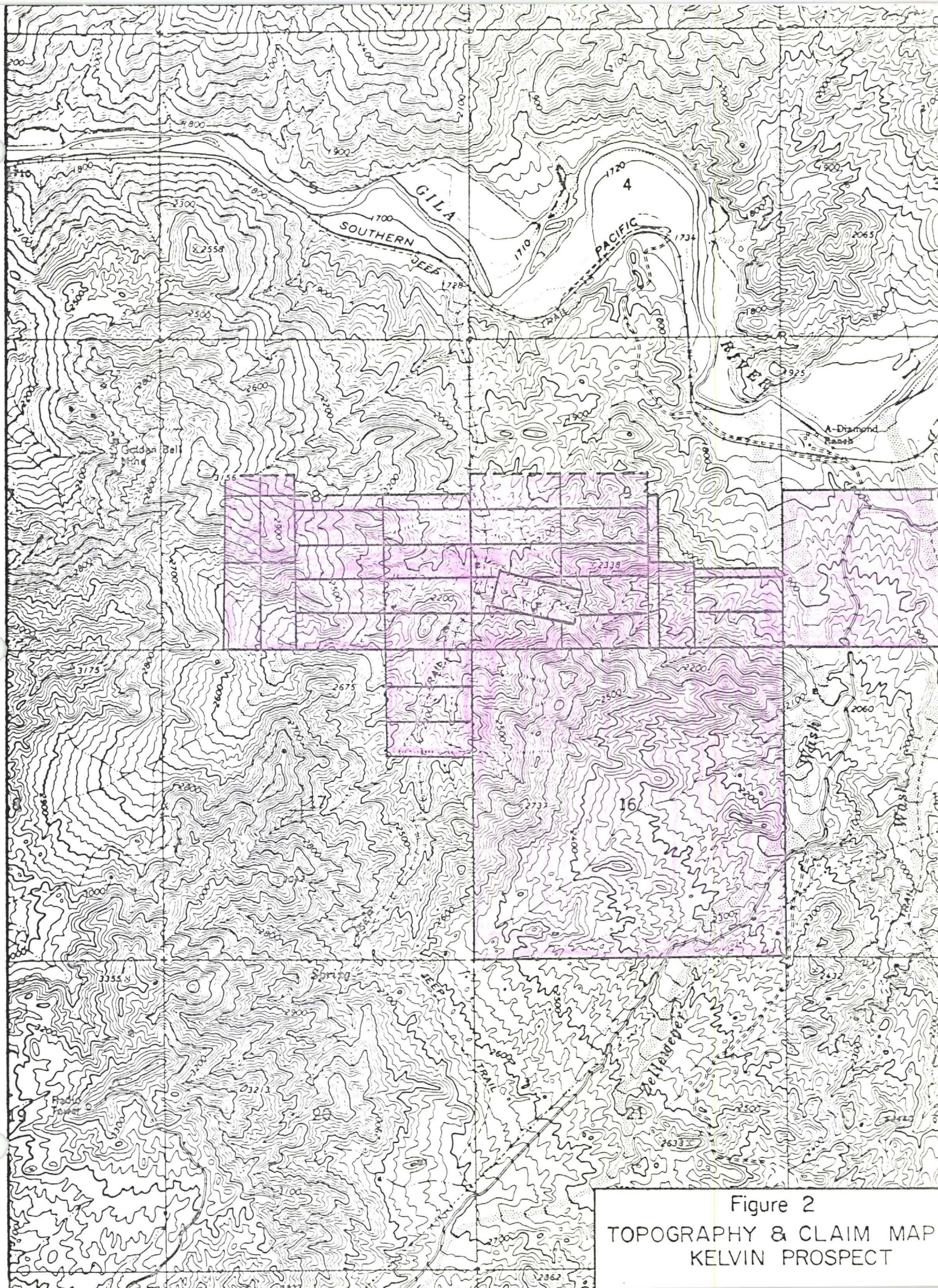

Figure 2
TOPOGRAPHY & CLAIM MAP
KELVIN PROSPECT

surveyed by Carl Weckerly and Associates, Registered Land Surveyors, Chandler, Arizona. In addition to the unpatented claims mentioned above, one patented claim, known as the Zelleweger Claim was acquired to complete the block so that no internal voids exist. Two State of Arizona sections (Nos. 10 and 16) were acquired for additional coverage. Both sections are held under prospecting permits.

HISTORY

Mining in the Ray area is reported to have begun during the early 1880's at which time many claims in the general area were located and prospected. Although exact records are not available, prospecting in the Kelvin area is thought to have been initiated during the 1910 to 1920 decade. Several old claim papers dating back to 1917 have been found and are thought to represent the earliest stages of exploration in the prospect area. The Zelleweger claim was patented in 1924 and is the most extensively developed property within the prospect boundary. Approximately $40,000 in gold, copper and zinc were reportedly mined from the property in the 1920's and early 1930's. A. H. Johnson located several claims in the area in 1933 (Black Copper Claims) and prospected numerous surface shows for copper and gold. Numerous other shallow pits and tunnels were worked about this time by other prospectors but no large accumulations were found. Johnson continued prospecting the area and located several encouraging shows of molybdenum and copper oxides. The filing of additional mining claims during 1953 through 1957 and the subsequent sinking of two sixty foot shafts on the molybdenum mineralization were the last attempts at small scale production on the prospect.

Inspiration Copper ran two IP lines across the property during 1967 and Minbanco Corporation acquired the property for an exploratory program during 1968-1969.

Minbanco drilled nine exploratory holes on the property from September to December of 1968. Drilling procedures and sample collecting were inadequate for complete evaluation. Results from preliminary induced polarization lines pointed out anomalous sulfide concentrations which were only partially tested by drilling. A more complete description of the work done and results obtained is compiled in Appendix A.

Tipperary acquired the prospect in December of 1969 and initiated a detailed exploratory program utilizing geologic, geochemical and geophysical techniques. Geologic mapping was done on a 1" = 200' horizontal scale using plane table and alidade. Both fracture system and mineralization overlays were prepared to be superimposed upon the basic geologic map. All old mine workings were mapped and systematically sampled and a petrographic examination of the various rock types was initiated by the Colorado School of Mines Research Institute. Results of the School of Mines research is presented in Volume III.

A detailed geophysical survey program was designed for the Kelvin area with the technical assistance of Heinrich's Geoexploration of Tucson, Arizona. A north-south grid system was designed to evaluate the postulated mineralization by utilizing induced polarization techniques. Both 500 foot and 1000 foot dipole arrays were used. A complete report of all geophysical survey work conducted by Heinrich's is presented in Volume II.

GENERAL GEOLOGY

A general review of the basic geology of the Ray quadrangle and Tortilla Mountains is necessary to provide an adequate background for the more detailed study of the Kelvin prospect area. Numerous parallelisms and similarities between surficial geology of the Ray mine area and the Kelvin prospect area can be noted.

Physiographically the Ray - Kelvin area may be classified as lying in the Mountain Region of Southeast central Arizona. The mountain region is characterized by numerous short relatively parallel mountain ranges, few of which exceed fifty miles in length. The Ray-Kelvin area is traversed by two of the typical ranges in a southeast to northwest direction.

The Dripping Spring Range, six miles northeast of the Kelvin Prospect, east of the Ray open pit presents a complicated picture of numerous small fault blocks composed mostly of Paleozoic sediments and irregular intrusives. Southwest of the Dripping Spring Range is the Gila River valley which is characterized by extensive thicknesses of Quaternary Gila conglomerate. The Tortilla Range marks the southwestern edge of the mountain region. The higher portions of the range consist mainly of Pre-Cambrian granite with younger intrusives flanked by sharp narrow ridges of the lower Paleozoic sedimentary formations on the east and a gentle slope to the west. The Kelvin Prospect is situated on the northern portion of the Tortilla Range.

The geologic section in the Ray - Kelvin area consists of Pre-Cambrian Pinal Schist and granitic rocks overlain by the Apache Group, a sequence of Scanlan conglomerate, Pioneer shale, Barnes conglomerate, Dripping Spring quartzite, Mescal limestone and basalt. Succeeding the Apache group is the Troy quartzite, Martin limestone (Devonian), Escabrosa limestone and undifferentiated Cretaceous limestones. Numerous diabase sills, dikes and irregular intrusives were emplaced during late Paleozoic or early Mesozoic time.

To the south of the Ray - Kelvin area is a sequence of andesite tuff, breccias and flows cut by andesitic to monzonitic dikes. Eruption of the andesites was followed by an intrusive cycle of quartz diorite, granite, quartz monzonite porphyry, and quartz diorite porphyry during the Laramide. The granitic and monzonitic rocks are closely related to the copper deposits of the general area. Late Tertiary time is represented by extensive dacite flows which have been broken by faulting and erosion. The Gila conglomerate of Quaternary age occupies a large portion of the present day Ray - Kelvin area and has been deformed by extensive faulting and erosion.

The relationships of the various intrusive rocks in the Ray - Kelvin area have been studied in detail by the U.S.G.S. (Professional Paper 115) and are summarized below:

<u>Precambrian Granite (Biotite Granite)</u> - according to the U.S.G.S. this rock type crops out over most of the Tortilla Range and is the dominant rock type of the Tortilla

batholith. Composition of the granite varies slightly but is principally potash feldspar phenocrysts in a ground mass of anhedral plagioclase and quartz with moderate amounts of biotite.

Mesozoic Diabase - The diabase intrusives in the vicinity of Ray and Kelvin intrude all rock types up to and including the Cretaceous limestones. It is conceivable, however, that repeated intrusions of diabasic magmas during separate geologic periods account for the irregular and apparent dissimilar nature of many of the intrusions. Petrographically the diabase is a dark gray to black holocrystalline medium grained to aphanitic rock with accessory magnetite and large tabular plagioclase crystals. Younger diabase dikes cut across some older diabase and are typically the finer grained variety. Mineralogically the diabase is composed of labradorite, augite, olivine and accessory amounts of biotite, apatite, titanite and magnetite.

Quartz Diorite - Quartz diorite dikes and irregular intrusive bodies crop out in numerous areas within the Ray - Kelvin vicinity. The rock is light to dark gray, of fine grained texture and normally consists of hornblende, augite, and biotite crystals in a mass of euhedral plagioclase with anhedral orthoclase, interstitial quartz and accessories of titanite, magnetite and apatite. The quartz diorite is the oldest of the Tertiary intrusives.

Quartz Monzonite Porphyry - Several small irregular intrusions are recognized west and southwest of Ray. Most of the Monzonite porphyry is associated with copper mineralization. Petrographically the rock is light-gray to white and consists of plagioclase phenocrysts and a medium grain groundmass of quartz, orthoclase and occasional biotite. Age of the monzonite is Tertiary.

Quartz Diorite Porphyry - Numerous dikes, sills, and irregular intrusive bodies crop out in the Ray - Kelvin area. Ore deposits at the Christmas mine appear to be genetically dependent upon the quartz diorite porphyry.

Petrographically the rock varies radically in both texture and composition but is typically exemplified by the larger intrusions as a light gray speckled rock with phenocrysts of white plagioclase, black biotite, or quartz in a fine groundmass of the same composition. Most of the dikes exposed show extreme textural differences between the central core and outer fringes.

Several other rock types occur in the Ray vicinity but are not pertinent to the area under study or to the ore deposition in the area.

STRUCTURE

As described previously, this area is characterized by north-northwest-trending mountain ranges. Regionally the fault systems parallel the mountain ranges. Most faulting in the area is normal, but thrust and reverse faults are also represented. Repeated movement of the prominent faults dates back to the Precambrian.

RAY ORE DEPOSITS

A review of the mineralization at Ray is provided for background information and because of its proximity to the Kelvin Prospect.

Disseminated copper mineralization at Ray covers an area roughly two miles square and at least 3000 feet in its vertical dimension. The ore body is a combination of supergene enriched ore which occurs as an irregular blanket of considerable thickness and large zones of copper oxides in the eastern portion of the Ray pit.

Ore minerals consist of hypogene pyrite, chalcopyrite, molybdenite, and bornite with traces of galena and sphalerite. Chalcocite is the dominant secondary sulfide and is the most important ore mineral. Native copper, cuprite and chalcotrichite along with chrysocolla comprise the bulk of the oxidized portions of the ore body.

Past production has come mainly from enriched zones in Pinal Schist. Ore grade is erratic and at present averages less than one percent copper. Protore in the leached schist capping averages between 0.1 and 0.2 percent copper. Because of this leached capping totalling approximately 500 feet the supergene ore body is believed to have originated from protore of the same grade.

Diabase intrusives in the Ray Mine form an important ore reserve as they were apparently the most important primary host rock in the area. The diabase exhibits little or no enrichment and copper values are thus derived from primary chalcopyrite. Diabase containing primary sulfides are often found above rocks which have been leached.

Alteration of the rocks in the Ray mine area is of three types as follows:

1. Biotite-orthoclase
2. quartz-sericite
3. propylitic - chlorite, epidote, clay minerals, etc.

Each of the alteration types is considered to be of hypogene nature.

Ore controls of the Ray mine are essentially structural with the primary controlling agents being the major faults and the zone of basement weakness along which the Granite Mountain Porphyry intruded.

GEOLOGY OF THE KELVIN PROSPECT

Surface geology of the Kelvin Prospect area is similar to the geology at Ray in some respects. The dominant host in the Kelvin Prospect is the Precambrian granite of the Tortilla Mountain batholith. The granite has been fractured, faulted and subsequently intruded by a wide variety of dikes, sills, and irregular bodies of rock ranging in composition from diabase to aplite. Repeated movement along fractures and faults has resulted in the broken nature of the rocks as is apparent on the geologic map. A discussion of the petrology of the various rock types and a review of their field relationships is presented to establish a basic geologic environment suitable for the emplacement of ore deposits.

Precambrian granite - (Grayback granite)

The granite of the Tortilla batholith crops out in over 60 percent of the mapped area. Typical hand specimens exhibit a medium grained texture ranging from light gray to pink in color. Common

minerals are phenocrysts of pink orthoclase feldspar, occasionally of a perthitic texture; quartz, both interstitial and as phenocrysts; and accessory amounts of magnetite, biotite, plagioclase, hornblende and apatite. The granite outcrops form rounded, highly weathered slopes except where silicification and sericitization has occurred. Alteration of the granite is intense over most of the mapped area and contact metamorphism is present to a lesser degree adjacent to intermediate dikes and irregular intrusives. The granite exhibits both propylitic and quartz-sericite stages of alteration and appears to have undergone an intense alteration along fractures where secondary orthoclase has been formed.

The granite host is highly fractured throughout the mapped area as evidenced by the geologic map. Many of these fractures are associated with the transecting dikes, but there are a number not associated with the exposed dikes. The geologic map shows the preponderance of fractures accompanied by disseminated sulfides along the fracture borders and also the presence of iron staining, goethite and limonite, and sulfide boxwork structures.

Mineralization in the granite is of two main types; primary sulfide minerals disseminated throughout the granite and more particularly associated with the feldspars and sulfide minerals along microfractures and quartz stringers. Mineralization is also present in the granite adjacent to many of the intermediate to basic dikes. Examination of available drill hole cuttings shows the persistence of low grade mineralization at depth in the granite, but also shows a marked leaching effect near the surface and a

partially leached zone down to approximately 1500 feet. Propylitic alteration is present at all depths thus far examined in drill hole cuttings.

Dacite porphyry - (Diorite porphyry)

The difference in terminology as applied to the porphyry dike systems is basically due to groundmass size rather than compositional differences. The dikes exhibit great textural changes from the central core to the outer fringes and representative samples are difficult to obtain. The dacite porphyry dikes intrude the Precambrian granite, diabase dikes and diabase porphyry dikes. Compositionally the dacite porphyry contains large 3 to 6mm phenocrysts of anhedral to subhedral quartz and occasional smaller phenocrysts of plagioclase and biotite in an aphanitic groundmass of gray to black augite, olivine and pyroxene with minor accessories of magnetite and apatite. At least two separate cycles of intrusion are represented by the diorite porphyry or dacite porphyry.

The majority of the dikes are more accurately described as quartz diorite porphyry or granodiorite porphyry depending upon varying amounts of potassium feldspar. These coarser grained dikes are younger than the dacite porphyry dikes.

Andesite - (Diabase)

Terminology is dependent upon grain size as in the dacite above with andesite pertaining to the finer grained variety. The diabase dikes are identical to the diabase of the Ray Mine area. Compositions vary considerably from the central portions of the dikes to their

borders. Typical diabase dikes show an aphanitic texture with occasional plagioclase phenocrysts.

Andesite Porphyry (Porphyritic Diabase)

The porphyritic diabase dikes crop out in scattered areas within the prospect and are not as numerous as the diabase above. The main difference is the tabular or rice grain shaped plagioclase phenocrysts. A few dikes contain dark pyroxene phenocrysts in an aphanitic groundmass.

Quartz Latite Porphyry (Quartz Monzonite Porphyry)

A quartz monzonite porphyry stock, intruded along a general east-west trend, is present in the southern part of the prospect. The monzonite is generally fresh with no significant alteration except along narrow east-west trending fractures where molybdenite and pyrite occur in small quantities.

The quartz monzonite or quartz latite depending on groundmass textures generally consists of anhedral quartz, orthoclase, plagioclase and biotite. A number of small metamorphosed biotite schist xenoliths and dacite porphyry xenoliths are present in the monzonite.

Aplite and Pegmatites

Aplite and pegmatite dikes are the youngest of the intrusives present in the prospect area. The aplite is a pink, fine grained rock consisting primarily of orthoclase feldspar, quartz and muscovite. Pegmatite veins consist of large massive quartz zones and large subhedral to euhedral crystals of orthoclase with minor

amounts of black tourmaline and occasional garnets. These dikes are generally fresh except near east-west or northwest-southeast trending fracture zones where pyrite, limonite and hematite fill fractures in the pegmatites.

Alteration

As discussed briefly in the section on rock descriptions two main types of alteration are prominent in the prospect area - propylitic and sericitization. A third type of alteration exemplified by the formation of secondary orthoclase is occasionally present along prominent fractures in the host granite and along margins of crosscutting dikes.

Propylitic alteration is the most extensive alteration type found in the prospect area as it occurs in virtually all rock types. Alteration products are typified by chlorite and epidote with minor amounts of albite, montmorillonite, limonite and sericite. Bleaching effects are also prominent.

Zones of quartz-sericite alteration are scattered throughout the area and are most prominent along east trending dikes and fracture systems. Several silicified zones occur in the granite along the east-west trends with no apparent relationship to the exposed dikes or other intrusive bodies.

Secondary alteration products such as limonite, goethite and jarosite are also present in scattered fracture systems and are pronounced in the vicinity of the Zelleweger claim.

Structure

Structure is the most important localizer of mineralization in the prospect area as well as in the Ray District. Prominent north-south, east-west, northwest-southeast and northeast-southwest faults marked by the dike systems intruded along zones of weakness and offsets of dikes show results of repeated movements through geologic time.

The north-south fracture pattern is the most obscure and oldest of the faulting in the area. Its existence is marked by diabase dikes striking north-south and apparent north-south offsets in the granite. Very little alteration or mineralization is present along this set of fractures. North-south diabase dikes are offset by east-west faults and the north-south movement occurred prior to quartz monzonite and quartz diorite intrusions.

Most of the diabase, quartz diorite and quartz monzonite dikes have been intruded along east-west fractures. Strike-slip movement is evident along a few vertical east-west faults. Many of the east-west striking dikes have been cut by northwest trending faults dipping steeply to the southwest (60° - 80°). The northwest dikes are extensively altered and contain significant mineralization. Heavy iron staining and copper oxide stringers crop out along these faults.

The intrusion of a large quartz latite (monzonite) porphyry stock in the southern part of sections 8 and 9 apparently occurred along a major weakness in the Precambrian structure. Mineralization associated with the later stages of intrusive activity appears to be closely

related to the quartz latite porphyry particularly along the outer margins although the major portion of the stock to the south and west of the prospect area is barren.

Minor east-west trending shear zones are developed in at least three places as indicated on the geologic map. The shear zones show evidence of repeated movements and contain significant amounts of molybdenum and copper mineralization. The shearing has altered a diabase or andesite dike into a chlorite-sericite schist and the host granite has undergone propylitic alteration and, to a minor degree, silicification. Disseminated molybdenite is present in the granite adjacent to the shear zones.

Mineralization

Mineralization in the Kelvin prospect is predominately copper-molybdenum with trace amounts of silver and gold.

As mentioned above the fracture systems and faults apparently control near surface mineralization. Most of the exposed dike systems carry copper oxides and contact zones show disseminated copper and molybdenum mineralization. The shear zones and adjacent wall rocks both carry copper and molybdenum mineralization.

Copper mineralization in the form of chrysocolla, azurite, malachite, chalcocite and melanconite occur in fractures in the granite and along the fringes of the quartz latite porphyry. Oxides also occur in the diorite porphyry dikes, diabase dikes and in silicified zones. Remnant sulfide zones containing chalcopyrite and pyrite have been found in scattered outcrops in the shear zones and along the north-west trending faults.

A drift 500 feet long has been cut along one of these northwest trending faults on the Zelleweger claim. The wall rock, Precambrian granite, has been sericitized and propylitized. Veinlets and stringers of chalcopyrite, bornite, chalcocite (after pyrite), sphalerite and specular hematite occupy fractures in the granite wall rocks. Some disseminated pyrite, chalcopyrite and minor amounts of bornite occur in the wall zones. Chalcanthite, leached from the granite is abundant along the entire length of the underground workings. Surface exposures of the northwest faults exhibit extensive chrysocolla veinlets and heavy iron staining. Numerous other shallow workings expose varying degrees of copper oxides.

Molybdenum mineralization is exposed in several shallow workings on the prospect and is most conspicuous on Rare Metals Claims 1 and 2 west of the southernmost minor shear zone and in Rare Metals 4. Ferrimolybdite and molybdenite are the most common molybdenum bearing minerals. A small quantity of powellite was also noted. The molybdenum minerals are found along fractures in the granite, along the northern fringe of the quartz monzonite porphyry intrusion, in the shear zones and in quartz veinlets. Both fracture fillings and disseminated mineralization are present.

Zinc mineralization has been noted in samples from the Johnson Prospect and in the Zelleweger tunnel. The ore mineral is the zinc sulfide, sphalerite.

Gangue constituents in the fault zones and quartz veinlets consist of minor amounts of calcite, barite and iron oxides. A quantity of specular hematite occurs along the minor shear zones in association with calcite and chlorite.

Previous Exploratory Programs

To fully understand the results of previous data derived from drill holes a review of drilling procedures and sample collecting techniques is necessary.

Minbanco Corporation initiated exploratory drilling on the prospect in late 1968. Drilling was accomplished using an air hammer technique and rock bit methods when encountering excessive water and samples were collected from the sample trench leading to the mud pits.

Due to extensive mixing of samples in both techniques a representative sample was difficult to obtain. Examination of many drill samples indicates considerable contamination occurred. Logs of the drill holes 1 through 4 and 6 through 9 are included in Appendix "A". Rock names were apparently derived from visual examination. As shown on the logs no distinction was made between quartz monzonite and granite and contacts can only be inferred between granite and monzonite in the available logs. Locations and depths of drill holes as shown on Minbanco's map were apparently designed through use of geologic and geophysical data. Inconsistencies between interpretation of the geophysical anomalies and the location of drill holes are apparent and are probably due to a lack of complete geophysical data. Sulfide mineralization encountered in drill holes J-1 and J-2 shows low grade copper and molybdenum. Accuracy of the samples is not known.

Tipperary Resources Corporation drilled two tests as located on the geologic and geophysical maps. Both tests were drilled on the basis

of surface geological features and proximity to shallow mineralization encountered in Minbanco's J-1 and J-2 drill holes. Both tests were designed to drill to a depth of 1500 feet.

A unique approach to hard rock drilling was utilized in the project to insure good sample recovery. A con-cor reverse circulation rig utilizing a double string of drill pipe and a revolutionary new sample catcher were used by the drilling contractor, Elenburg Exploration Inc. The sample collection system involved cycling all of the sample and drilling fluids through a rotating circular splitter which retains one-quarter of the sample and fluids. The portion retained was cycled through sizing screens and into a centrifuge which recovered all of the fine particles. Due to the tendency of molybdenum to escape by suspension in the drilling fluids a Baroid Molybdenum depressant was used to settle out and coagulate molybdenite particles.

No circulation problems were encountered and sample quality was considered excellent.

Results of drilling the initial two holes are inconclusive in establishing the presence of an ore body. This is due to (a) the submarginal grade of mineralization in both holes and (b) the hole location relative to anomalies shown by the I-P surveys. Copies of both drill logs are in Appendix B with corresponding petrologic names and assays. Copper equivalents for the molybdenum mineralization are also presented and are calculated on a ratio of 5 to 1, or 0.1% Mo = 0.5% Cu.

Drill Hole No. 1

Located 125' FSL and 300' FEL of Section 8, drill hole No. 1 was spudded in alluvium and encountered Precambrian granite at 36 feet. The granite exhibited propylitic alteration and traces to 2% of sulfide mineralization. The quartz latite porphyry stock (quartz monzonite) was encountered at 225 feet and continued to 918 feet. Precambrian granite was encountered from 918 feet to 1400 feet. Two minor zones of metallization were encountered. The upper zone from 135' to 144' contained an average of 0.6% Cu and 0.05% Mo. This zone was encountered immediately above a narrow diabase (andesite) dike. The lower zone from 720' to 785' averaged approximately 0.2% Cu and 0.1% Mo. Several five foot zones show significantly higher grade mineralization as shown on the log in Appendix B.

It is significant to note that alteration of the granite and partial leaching of the pyrite and chalcopyrite disseminated throughout the granite occurs beneath the quartz latite stock.

The position of the drill hole is toward the southern edge of the geophysical anomaly and is not a true test of the anomalous conditions.

Drill Hole No. 2

Located approximately 1260' FSL and 150' FWL of Section 9, Drill Hole No. 2 was spudded in Quaternary alluvium and encountered Precambrian granite at 30 feet. The granite is highly altered and exhibits strong propylitic alteration. Bleaching and heavy iron staining are common. A number of narrow diabase dikes were

encountered in shallow drilling. Larger dikes of granodiorite and diorite porphyry were encountered at a depth of 650' to 765'. (See Appendix B)

Mineralization in Drill Hole No. 2 varies from background content to marginal grade. The granite is highly altered and partially leached to a depth of approximately 900 feet. The most common alteration products are limonite, goethite, hematite, epidote, chlorite, montmorillonite and secondary orthoclase. Ore minerals are chalcopyrite, pyrite, chalcocite, bornite and molybdenite. The mineralization is of the disseminated type although occasional fractures and veinlets are mineralized. It is significant to note that the leaching effect on the granite and associated ore minerals has produced some replacement of pyrite grains by chalcocite. It is also apparent that the copper content, although of a submarginal grade, has generally increased with depth. The possibility exists that effective leaching within the limits of the observed geophysical anomaly could produce an ore grade supergene enriched body at considerable depth. Additional drilling is needed to test this possibility.

Conclusions

It has been established by previous exploratory efforts that mineralization of a submarginal grade is present in the Kelvin Prospect. The program being followed by Tipperary was designed to evaluate the prospect for further development by a thorough geological examination and detailed geophysical investigations. Results of the geological and geophysical surveys are sufficiently encouraging to warrant an additional exploratory program as outlined by the geophysical report.

Available data indicates that the leaching of ore minerals in the granite host may have resulted in the creation of enriched zones at depth. An exploration program designed to comply with geophysical recommendations is needed to test this possibility. The relationship of the mineralization to the monzonite stock combined with the restriction of the geophysical anomaly to the area of the monzonite stock on the south and the diorite porphyry dike to the north provides an adequate ore-trapping structure which should be thoroughly evaluated by core drilling.

APPENDIX "A"

August 28, 1968

HEINRICHS GEOEXPLORATION COMPANY

806 WEST GRANT ROAD, TUCSON, ARIZONA, 85703; P.O. BOX 5671. PHONE: (AREA CODE 602) 623-0678

Mr. Ted Hanks
P. O. Box 247
Salem, Utah 84653

Re: I. P. Survey, Johnson Area
near Kelvin, Pinal County
Arizona

Dear Ted:

As you requested August 26, here is a brief letter report on the results of a preliminary reconnaissance induced polarization (I.P.) survey over parts of the Johnson Area near Kelvin, Pinal County, Arizona. This work was done during the interim August 17 to August 27, 1968.

A total of five spreads of I. P. coverage were obtained on a total of four lines. A dipole spacing of 500 ft. was used which on the dipole-dipole electrode configuration utilized on this survey, typically gives resolvable penetration within the zone from about 150 ft. to 600 or 750 ft. below surface. The dual frequency I. P. system was used with sending frequencies of 0.05 and 3.0 Hz.

All four lines show anomalism, but Lines 1 and 2 have the strongest effects.

Line 1 is moderately strong in I. P. response between stations 12.5 SW and 5 ~~SW~~ NE with weaker fringing response for about 500 ft. SW and 750 ft. NE. The causative body likely suboutcrops near 12.5 ~~SW~~ 30 between 300 and 500 ft. of the surface and has a gentle apparent NE dip or top slope. Approximately one to two percent total polarizable sulfide is indicated by volume (two to four percent by weight) across the moderate strength zone. If in a zone narrower than 500 ft., as may well be the case, considerably more sulfide by volume could be present. A vertical drill hole near 8.8SW is recommended to test the strongest portions of the anomalous source somewhat downdip. This hole should be at least 500 ft. in depth to be certain of intersection.

A very weak, but definite and near surface, narrow anomaly is noted near 30SW.

On Line 2 there is moderate strength anomalism from about 2.5 SW to 5 NE with weaker fringing response for about 500 ft. to the NE and at least 1,000 ft. to the SW. This anomaly is somewhat similar in appearance to the moderate strength anomaly on Line 1 except that the dip or the top slope is apparently gently to the SW on Line 2 rather than NE.

The source of this response is likely within about 400 ft. of the surface suboutcropping between 0 NE/SW and 2.5 NE and is probably in a zone about 500 ft. in width. There is some possibility that the stronger portion of this anomaly is caused by a zone of considerably less than 500 ft. in width and if so could contain more than the interpreted one to two percent sulfide by volume. The deeper weak response to the southwest of the moderate anomaly has not been cut off to the southwest and future work here may be advisable.

A 500 ft. and vertical drill hole at 2.5 NE is recommended to test the moderate anomaly on Line 2.

Line 3 shows weak shallow I. P. effects from about 2.5N to 12.5N and south at about 17.5S for an indeterminate distance. The remainder of the line shows only very weak response indicative of less than one percent total sulfide by volume.

Line 4 shows weak but definite I. P. response from 12.5 S to 5 S with very weak fringing response for about 750 ft. north and at least 500 ft. south of the weak anomaly. The weak anomaly appears to be due to a narrow (less than 500 ft. wide) near surface (less than 300 ft. deep) weak sulfide zone. The percentage of indicated sulfide is probably less than one percent by volume unless in a very narrow body.

The resistivities are relatively high and fairly uniform, not showing any strong electrical structure. The self potentials show mainly minor background variations suggestive of a lack of significant quantities of interconnected actively oxidizing sulfides within several hundred feet of the surface. This is not in opposition with the I. P. data in that the I. P. suggests relatively deep and disseminated sulfides which usually do not give much self potential response.

Field plots of the four lines are enclosed showing all data and surface projected anomalism.

If the initial drilling proves interesting, additional I. P. coverage is recommended to further delineate and hopefully extend these anomalous zones.

Respectfully submitted,
HEINRICHS GEOEXPLORATION CO.

Chris S. Ludwig
Senior Geophysicist

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

Registered Professional Engineer (Mining)
WALTER E. HEINRICHS, JR.
DEC. 31, 19
ARIZONA, U. S. A.

WEH:CSL/jh

Enclosures

Johnson Claims
Pinal County
Arizona
SCALE 1" = 20'

DIRECTION Vertical
INCLINATION -
STARTED 9-11-68
COMPLETED 9-16-68
DEPTH 530'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling Co.

HOLE NO J-1
PROPERTY A. H. Johnson
LOCATION SW¼ Sec. 9, T5S, R1E
COLLAR COORD. N 2324 E 9771
COLLAR ELEV. 2085
SHEET 1 OF 4
HOLE SIZE 5½" Hammer Bit

Depth	Log	Rock Type and Description	Mineral (%)	Recovery (%)	Sample (No.)	ASSAYS Au	Ag	Cu	Mo	Zn
10		Hole collared in Qtz. monz. on contact with alluvial wash. Py, chpy, malachite and specularite in outcrop.	10	10	J-1	0	0	.01	.001	
20		Qtz. Monz.: Large orthoclase xls. Traces of malachite.								
30		Iron oxide with minor malachite.								
		Est. 5% specularite.	5	5	J-2			.03		
40		Est. 5% total sulfides.	5	5	J-3			.13		
		do.	5	5	J-4			.19		
50		do.	5	5	J-5			.61		
60		Qtz. Monz.: Minor py & chpy, pronounced orthoclase xls & biotite.	10	10	J-41			.13		
70		do.								
80		do.	10	10	J-6	0	.03	.07	.001	
90		do.								
100		do.								
110		do.								
120		Diabase dikes starting at about 118', Slightly pyritized, chpy traces. ~~Hard drilling 118-126'~~	10	10	J-7			.05		
130		Qtz. Monz.: Considerable pink orthoclase, some chpy, minor chlorite.								
140		do. Water at 140', slurry thereafter.	10	10	J-8			.04		
150		do. Diabase fragments, minor dikes.								
		do. 155-158' native cu fragments. Al[illegible] fra[illegible]	10	10	J-9	0	.04	.13	.001	

Pyrite (py), chalcopyrite (chpy), sericite ([illegible]r), chlorite (ch), crystals or crystalline (xl, xln) and mineralization (mt[illegible]).

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-1
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 4
HOLE SIZE

Depth	Assay	Log	Rock Type and Description	Sample (Wt)	Sample (Vol)	Sample (No)	ASSAYS Cu				
170			Qtz. Monz.: Few diabase fragments; minor py, chpy and anecularite.								
180			do. Spec. of native cu, considerable ortho some sulfides.	10	10	J-10			.03		
190			Scattered cu oxides from surface to about 250'. Epidote increasing with depth.								
200			do.	10	10	J-11			.07		
210			do.								
220			do. Minor bornite. Increasing chloritization.								
230			do. Sericite	10	10	J-12	0	0	.06	.001	
240			do. Some bornite. Rock particles ½-1'' with strong py and chpy mtzn at 237'.	10	10	J-13			.07		
250			do. Py & chpy increasing below 230'.	10	10	J-14	0	0	.08		
260			Diabase and epidote. do.	10	10	J-15	0	.02	.08		
270			do. Sharp increase in mtzn at 268'; total sulfides est at 5%. Hard drilling.	10	10	J-16	0	0	.20		
280			do. Diabase fragments throughout.	10	10	J-17	0	.02	.32	.003	
290			do.	10	10	J-18	0	0	.53		
300			do.	10	10	J-19	0	0	.69	.011	
310			do.	8	8	J-20	0	.06	.45		
			do.	7	7	J-21	0	.03	.32	.007	
			do.	5	5	J-22	0	.03	.29		

J-1

SCALE

CORPORATION
CONSOLIDATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Sample (ft)	Sample (in)	Assay (oz)	Au	Ag	Cu	Mo	Zn
		J-31 303-345'	37	37	J-31	0	.03	.20	.001	
		J-32 250-303'	58	58	J-32	0	.11	.69	.001	.03
		Spectrochemical composite J-17 to J-23 inc. (270-325', 55' total)								
320		Qtz. Mons.: Diabase fragments, some chlorite and ser.	5	5	J-23	0	.04	.20		
330		do. 231' dec. in mtn.	5	5	J-24	0	.03	.10	.001	
		Cu oxide 331-338', py & chpy.	5	5	J-25	0	.07	.10		
340		do.	10	10	J-26		.07			
350		do.	10	10	J-27		.15			
360		do.	10	10	J-28		.12			
370		do. Minor epidote & bornite.	10	10	J-29		.14			
380		do. Chpy & py increasing beg. at 383'.	10	10	J-30		.08			
390		Strong chloritization & some ser.	10	10	J-33		.12			
400		do.	10	10	J-34		.07			
410		do. malachite	5	5	J-35		.07			
		do. py, hematite, sert.	5	5	J-36		.11			
420		do. Hem and Magnetite	5	5	J-37		.10			
430		do. Cu oxides	10	10	J-38		.08			
440		do. Minor mtn, bornite & malachite; ser.	10	10	J-39		.14			
		do.	5	5	J-40		.09			

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

SCALE

HOLE NO J-1
PROPERTY
LOCATION
COLLAR COORD. N. S.
COLLAR ELEV.
SHEET 4 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Recovery (%)	Recovery (%)	Sample (No.)	ASSAYS Au				
455		Qtz. Monz.: Considerable orthoclase & ch sericite, py & chpy, 3% magnetite & traces of oxides.								
465		do. Occasional pronounced veinlet of chpy.	10	10	J-42			.06		
475		do.								
485		do.								
495		do.	10	10	J-43			.05		
505		do.								
515		do.	10	10	J-44			.08		
525		do.								
530	TD	do.	5	5	J-45			.08		

Johnson Claims
Pinal County
Arizona

SCALE 1" = 20'

DIRECTION Vertical
INCLINATION -
STARTED 11-15-56
COMPLETED 11-20-56
DEPTH 502'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling Co.

HOLE NO J-2
PROPERTY A. N. Johnson
LOCATION SW4 Sec. 9, T3S, R13E
COLLAR COORD. N 2454 E. 10, 2[illegible]
COLLAR ELEV. 2133
SHEET 1 OF 4
HOLE SIZE 6 1/2" Hammer Bit

Depth	Log	Rock Type and Description	Sample Wt.	Sample Size	Sample No.	ASSAYS Cu				
10		Hole collared in decomposed qtz. mons. 9 5/8" hole to 17' & cased with 8 5/8" surface pipe.								
20		Qtz. Mons.: Strong surface weathering to 23'; magnetite.	10	10	J-46			.07		
30		do.								
40		do. Epidote, biotite and minor pyrite.								
50		do.								
60	53	Base of surface weathering. Qtz. Mons.: Epidote, considerable biotite magnetite. Some py with traces of chpy.								
70		do. Granitic zone.	10	10	J-47			.02		
80		do.								
90		Qtz. Mons.: Minor chlorite, epidote & sulfides. Water beginning just below 80'.								
100		do.								
110		do.								
120		do. Much biotite, partial alteration to chlorite, less than .5% sulfides.								
130		do.								
140		do. Traces of chpy & py.	10	10	J-48			.01		
150		do.								
		do.								

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-2
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample (No)	ASSAYS Cu
170		Qtz. Monz.: biotite, magnetite & fragments of secondary orthoclase which usually has sulfides assoc. with it; less than 1% sulfides.				
180		do.				
190		do.				
200		Qtz and considerable biotite, moderate chlorite, only traces of chpy. Few large ortho. (large pink) xls that appear to be secondary orgin.				
210						
220		do.	10	10	J-49	.01
230		do. Py &chpy in veinlets associated with quartz & secondary orthoclase.				
240		do.				
250		do. Less than 1% sulfides, traces of chpy, sericite and chlorite.				
260		do.				
270		do.				
280		do. Decreasing biotite below about 280'.				
290		do.				
300		Increase py, est. 2%. Chpy usually found on darker pink orthoclase xls. Magnetite & chlorite.	10	10	J-50	.02
310		do.				
		do.				

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-2
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 4
HOLE SIZE

Depth	Assay	Log		Rock Type and Description	Interval (ft)	Core (%)	Sample (No)	ASSAYS Au Oz			
330				Qtz. Monz.: 1-2% py, shows of chpy. About 5% magnetite; chlorite.							
340				do. (Constant drilling rate from surface to 431', about 45' per hour.)							
350				do.							
360				Homogeneous unit from 320-400' with gradual sulfide increase from 350-420. Chpy showings.	10	10	J-51			.01	
370				do.							
380				do.							
390				do.	10	10	J-52			.02	
400				do. Total sulfides est. at 3%.							
410				do.	10	10	J-53			.01	
420				do.	10	10	J-54			.01	
430				Strong py mtsn; minor chpy. 429' sharp water increase.	10	10	J-55			.02	
440			432	Diabase: Greenish-gray, micro-crystalline, strong py mtsn with minor chpy.	10	10	J-56		0	.06	
450				Some qtz. Monz.; strong sulfides that are mostly py.	10	10	J-57			.06	
460				Qtz. Monz.: Dark pink orthoclase xls with sulfides mtsn (est. 4% total).	10	10	J-58		0	.02	
470			469	Less sulfides; traces of diabase and epidote.							
				Diabase: from about 469-478'; only traces of sulfides. Abundant epidote	10	10	J-59			.01	

J-2

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
SCALER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. Z.
COLLAR ELEV.
SHEET 4 OF 4
HOLE SIZE

Depth	Assay	Log	Rock Type and Description	Sample (m)	Sample (cm)	Sample (No.)	ASSAYS Au	Cu
490			Qtz. Monz.: Est. 1-2% sulfides, epidote, chlorite. Dark pink orthoclase xls.					
500			do.					
510			do.					
520			Chpy in veinlets and as coating on orthoclase & qtz. Sulfides est at 1%.	10	10	J-60		0 .03
530			524-45' extremely soft drilling; some diabase.					
540			do.					
550			do.					
560			do.					
570			do.	10	10	J-61		.01
580			do.	10	10	J-62		.02
	RB2							

Johnson Claims
Pinal county
Arizona
SCALE 1" = 20'

DIRECTION Vertical
INCLINATION -
STARTED 11-21-68
COMPLETED 12-6-68
DEPTH 1165'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling Co.

HOLE NO J-3
PROPERTY A. H. Johnson
LOCATION SE¼SE¼ Sec. 6, T3 1S
COLLAR COORD. N. 6,270 E. 9,294
COLLAR ELEV. 2170
SHEET 1 OF 6
HOLE SIZE 6½" Ham. Bit to 6h2'
6¾" Rock Bit, 6h2-1165'

Depth	Log	Rock Type and Description	Sample No.	Sample Wt.	Sample Type	ASSAYS Cu			
10		Hole collared in Quartz Monzonite with showings of pyrite, chalcopyrite & malachite. 9 5/8" hole to 10' and cased.	10	10	J-65			.05	
20	18	Qtz. Monz.: Sericite, considerable biotite and some chlorite. Minor sulfides. Diabase: Beg. at about 18'. Dark greenish-gray, microcrystalline. Some py and chpy and traces of malachite.	10	10	J-66			.21	
30		do.							
40	36	Qtz. Monz.: Minor sericite and py. Pronounced orthoclase crystals which have the sulfides associated with them							
50		do.							
60	58	Diabase: Beg. around 58'. Traces of py & chpy. First water coming in between 60-70'							
70		Diabase: Same as above.							
80		Diabase: Some Qtz. monz. with chpy & typical orthoclase crystals.							
90		do. No significant sulfides.							
100		do.							
110		Qtz. Monz.: Some diabase; traces of py & chpy.							
120		Diabase: Dark Greenish-gray, fine-grained. Carrying some sulfides. Scattered white quartz veins and crystals.							
130		do.							
140		do.	10	10	J-67			.02	
150		do.							

pyrite (py), Chalcopyrite (chpy), sericite (ser), chlorite (ch), crystals or crystalline (xl, xln), mineralization (min).

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
SCALE

HOLE NO J-3
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 8
HOLE SIZE

Depth	Log		Rock Type and Description	Recovery (%)	Core (%)	Sample No.	ASSAYS Cu				
170			Diabase: Dark greenish-gray, microcrystalline, pyritized and chloritized, magnetite & white quartz. Sulfides	10	10	J-63			.03		
180			(est. 1-2%) appears to be fairly well disseminated with concentrations along veinlets.								
190			do.								
200			do. Less pyrite and strong chloritization.								
210			do.								
220			do. Py est. at near 1% & 3% magnetite.	10	10	J-64			.10		
230			Less than a percent pyrite.								
240			do.								
250			do.								
260		252	Qtz. Mons.: Minor sulfides.								
270			do. Between about 260-285' the rock is more granite than a monzonite.								
280			do.								
290		285	Diabase: Same as upper units. No important sulfides.								
300			do.								
310		300	Qtz. Monz.: Traces of py and cpy. Typical orthoclase xls. Biotite and an estimated 3% magnetite. Moderate chloritization. Minor sericite.	10	10	J-68			.03		

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-3
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 8
HOLE SIZE

Depth	Log	Rock Type and Description	Sample No.	From	To	ASSAYS Cu
330		Qtz. Monz.: Typical pronounced orthoclase xls. Considerable biotite & 2-3% magnetite. Traces of py & chpy.				
340	339	do. Water at 336'. Drilling rate to 339' about 75'/ hour. Slower penetration below this depth.				
350		Qtz. Monz.: Few scattered fragments of diabase. Sulfides less than 1% with about half composed of chpy. Chpy is associated with quartz or orthoclase crystals.				
360		do.				
370		do.				
380		do.				
390		do.	10	10	J-69	.03
400		do.				
410		do.				
420		Granite & Qtz. Monz.: Sharp decrease in orthoclase. Much biotite. Fragments of py and chpy.				
430		do.				
440		Qtz. Monz.: Same as above without the diabase.				
450		do. Minor diabase.				
460		Qtz. Monz.: About an equal amount of diabase. Traces of sulfides.				
470		do. Some of diabase fragments have disseminated through them finely xln py and chpy.				

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLED

HOLE NO. J-3
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 8
HOLE SIZE

Depth	Log	Rock Type and Description	Recovery	Core	Sample	Assays Au	Ag	Cu	Mo	Pb	Zn
400		Qtz. Mons.: Minor quantity of sinoses									
450		do. Scattered fragments of chpy and mo.									
510		do. Vein type coatings of chpy with mo lining outside (earlier mineralization	10	10	J-70			.07	.003		
520		Chpy & mo., trace pyrite. Total sulfides est. @ less than 1% but incr. with depth. Starting @ 520-530'.	10	10	J-71	0	0	.07	.003		
530		Heavy sh & sil. Chpy & mo present in strong sulfide mbn. Sphalerite having slightly green cast.	10	10	J-72			.32	.03		[illegible]
540		do.	10	10	J-73	0	0	.10	.031		.39
550		do. Easy drilling through ore zone, exceptionally soft at about 545'.	10	10	J-74			.31	.055		2.12
560		Ore washed out in cleaning hole from 520-590'; sample no. J-68 also complete spectrochemical analysis.	10	10	J-68 J-75	0	0	1.52 .45	.13 .133	.02	7.91 1.60
570		567-569 No. J-77	10	10	J-77 J-76	.005	.03	1.22 .40	.12 .095		4.39 2.13
580		Strong sericite below about 570'	10	10	J-78			.63	.095		1.52
590		Decreasing mbn beg. about 575'. Strong chloritization, some fine hematite.	10	10	J-79	.005	.19	.72	.238		1.74
600		Est. sulfides 1%, chpy to moly about 1:1	10	10	J-80			.15	.040		.82
610		Considerable biotite, minor mbn. More granitic than qtz. mons.	10	10	J-81	0	0	.08	.025		.14
620		do.	10	10	J-13[illegible]			.17			
630		Qtz. Mons.: Some sulfides of chpy, py and mo. Sericitic.	10	10	J-13[illegible]			.06	.011		.19
		Increasing sericite and hematite.	10	10	J-82			.04	.009		
J-83		Drilled sample from chip [illegible]				0	.04	.[illegible]	[illegible]		2.88
J-88		Hanks Sample				.005	.13	.[illegible]	[illegible]		2.[illegible]

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
COLLAR

HOLE NO J-3
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
DIRECT. S 87 W
HOLE SIZE

Depth	Log	Rock Type and Description										
550		Qtz. Mons.: Some granitic material. Good stain beg. at 641'. Sulfides Semi-continued.	2 8	2 8	J-88 J-89	0	.13	.19 .72	.07	[illegible]		
600		J-83 from around collar at beg. of shift. Qtz. Mons.: With granitic and diabase material. Moderate chlorite.	10	10	J-83 J-90	0	.04	.61 .18	.09 .06	[illegible]		
650		Qtz. Mons.: Stain. Est. total sulfides at over 2%. Hematite. Sand-sized particles	10	10	J-91	0	0	.20	.05	[illegible]		
700		do.	10	10.	J-92	0	.25	.37	.23	[illegible]		
750		do. Thin diabase dikes.	10	10	J-93	0	0	.20	.07	.7		
800		do.	10	10	J-94	0	0	.21	.03	[illegible]		
850		do. Total sulfides 1% or less. Dropped some. Feldspars partially bleached.	10	10	J-95			.07	.02			
900		do. Minor ox oxides & poly.	10	10	J-99			.04	.01			
950		Total sulfides less than .5%; hematite and stain diabase.	10	10	J-100			.05	.01			
1000		do.										
1050		do.	10	10	J-101			.03	.02			
1100		do.										
1150		do.	10	10	J-102	0	0	.03	.01			
1200		do. Increasing diabase and sulfides.										
1250		do.	10	10	J-103			.03	.01			
1300		Increasing sulfides and ox oxides below 790' & between 800-810'.	10	10	J-104	0	0	.12	.04	.2		

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-3
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 6 OF 8
HOLE SIZE

Depth	Weld Seed	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample No.	ASSAYS Au	Ag	Cu	Mo	Zn
			Same as above.	10	10	J-96	0	0	.10	.105	
810			Qtz. Monz.: Diabase dikes. Est. sulfides less than 1% mostly as chpy, minor py & mo. Chlorite and ser. Mtzn appears to be associated with diabase.	10	10	J-95	0	.07	.25	.052	
820			Small specks of copper oxide. Hematite and decreasing chlorite.	10	10	J-97			.20	.028	
830			do. Mtzn does not appear to increase with diabase content.	10	10	J-105			.19	.025	.21
840		842	Decreasing Mtzn. Pred. biotite over chlorite.	10	10	J-106	0	0	.12	.008	.13
850			do.								
860			do. Total sulfides est. @ .8%	10	10	J-107			.10	.014	.17
870			Qtz. Monz.: Some diabase. Biotite & ch, Sulfides less than 1%. Specks of oxide.	10	10	J-108			.12	.015	.16
880			Homogeneous unit from 870-960', except for increasing diabase at about 938'.	10	10	J-109			.10	.015	.14
890			do.	10	10	J-110			.11	.011	
900			do.	10	10	J-111	0	0	.09	.018	
910			do.	10	10	J-112			.10	.015	
920			do.	10	10	J-113			.08	.011	
930			do.	10	10	J-114			.08	.017	
940			do.	10	10	J-115			.09	.027	
950			do. Silightly more sulfides; inc. diabase.	10	10	J-116	0	0	.10	.043	.49

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO. J-3
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 7 OF 8
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Sample Wt. (lb)	Sample No.	Assays Cu	Assays Mo
	963	Qtz. Monz.; some diabase. Twisted of at 50°.	3	3	J-11	-	-	.08	.033
		Diabase: A little qtz. monz. with py, chpy and moly; sericitized.	10	10	J-11			.20	.10
970		Qtz. Monz.: Diabase dikes. Est. sulfides .75%; py, chpy, mo. and occasional fragment of copper oxide.							
980		do.							
990		Alun may be occurring on or near monz diabase contacts.							
1000		do.							
		do. Increasing diabase.	10	10	J-11			.11	.008
1010		Diabase & Qtz. Monz.: Minor sulfides.							
1020		do.							
1030		do.	10	10	J-12			.06	.005
1040		Qtz. Monz.: About 1/3 of particles are diabase. Fairly large fragments of py chpy. Partially chloritized, some ser.	10	10	J-12			.12	.012
1050		do. Sulfides and traces of copper oxides.							
1060		Minor diabase. Equal amounts of biotite and chlorite.							
1070		do. Partial kaolinization of feldspars.	10	10	J-12			.05	.00
1080		do.							
1090		do.							
1100		do. Increased drilling rate between 1107 & 1129'; may be due to interbedded diabase and qtz. monz. and altered contacts.	10	10	J-12			.09	.007
1110		do.							

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-3
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 8 OF 8
HOLE SIZE

SCALE

Depth	Geology Sketch	Log		Rock Type and Description	Interval (ft)	Recovery (%)	Sample No.	ASSAYS		Cu	Mo	
1130				Qtz. Monz.: Minor diabase. Pronounced pink ortho. xls with traces of py & chpy; about 3% magnetite.	10	10	J-12			.04	.003	
1140				do. Flakes of oxide copper, may be coming from higher in hole.								
1150				do. Increasing diabase at 1150' to bottom of hole.	10	10	J-12			.06	.007	
1160				do.	10	10	J-12			.05	.001	
				do.								
1170		1165 TD										

Jack Sharp's School Lease
Pinal County
Arizona

SCALE 1" = 20'

DIRECTION Vertical
INCLINATION -
STARTED 12-6-68
COMPLETED 12-9-68
DEPTH 426'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling Co.

HOLE NO J-4
PROPERTY Sharp-State Section
LOCATION NW¼ Sec. 16, 4S, 13E
COLLAR COORD. N. 7760 E. 9983
COLLAR ELEV. 2305
SHEET 1 OF 3
HOLE SIZE 6 1/2" Hammer Bit

Depth	Hydraulic	Log	Rock Type and Description	Interval (m)	Recovery (%)	Depth (m)	Assays Cu				
			Hole started in Qtz. Monz., 9 5/8" hole to 20' and permanently cased.								
10											
			Qtz. Monz.: Surface weathering. Pronounced pink feldspars. Little or no ch, no sulfides.								
20											
			do.	10	10	J-127			.03		
30			~~Base of intense surface weathering at~~ about 32'. Some ser, mostly biotite with limited ch; no sulfides detected.								
40											
			Qtz. Monz. & Diabase: Diabase dike carrying cu oxides and sulfides	10	10	J-128			.07		
50											
			Qtz. Monz.: Slightly weathered, minor ch, traces of copper oxides.								
60											
			do.								
70											
			do. Considerable biotite & magnetite.								
80											
			do.								
90											
			do. Minor sulfides, water starting near 90'.								
100											
			Qtz. Monz.: Prevailing lime-green coloration of feldspars.	10	10	J-129			.01		
110											
			do. 107-117' Soft drilling (water course).								
120											
			Diabase & Qtz. Monz.: Minor sulfides mostly of pyrite.								
130											
			Diabase: Pyritized (Est. 1%), some chpy and a few Qtz. Monz. fragments.	10	10	J-130			.05		
140											
			do.								
150											
			do.								

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

SCALE

HOLE NO J-1
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 3
HOLE SIZE

Depth	Log	Rock Type and Description	Mineral (%)	Sulphide (%)	Sample (No.)	ASSAYS Cu				
		Qtz. Monz.: Few pyritized diabase fragments.								
170										
		do.								
180										
		Diabase & Qtz. Monz.: Less than .5% sulfides with traces of chpy.	10	10	J-13[illegible]			.0[illegible]		
190										
		do.								
200										
		Decreasing diabase. do.								
210										
		do.								
220										
		do.								
230										
		Qtz. Monz.: Est. 3-5% magnetite. Minor py & chpy. Increase water 221-240', Sludge samples starting at 230'.								
240										
		do. Considerable biotite.								
250										
		Slightly more sulfides, chlorite & ser. Few scattered diabase fragments.								
260										
		do.	10	10	J-13[illegible]			.03		
270										
		do.								
280										
		do.								
290										
		do. Possibly some sphalerite.								
300										
		do.								
310										
		do. Homogeneous unit below 210'.								

J-4

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER
SCALE

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 3
HOLE SIZE

Depth	Log	Rock Type and Description	Recovery (%)	Core (%)	Sample No.	ASSAYS Au	Ag	Cu	Mo
330		Qtz. Monz.: Little alteration except for some chlorite and sericite. Considerable biotite and magnetite. Py & chpy.							
340		do.	10	10	J-13			.02	
350		do.							
360		do.							
370		Qtz. Monz.: Pyritized diabase with traces of chpy.							
380		do.							
390		do.							
400		Qtz. Monz.: Pyritized diabase (est. py 1-2%). Traces chpy. Large pink k-feld. xls.	10	10	J-11	0	.04	.05	.001
410		Minor diabase. Sulfides on or near diabase-monz. contacts. Moderately chloritized.							
420		do.	10	10	J-13			.02	
426 TD									

Johnson Claims
Pinal County
Arizona
SCALE 1" = 20'

DIRECTION Vertical
INCLINATION -
STARTED 12-13-68
COMPLETED 12-21-68
DEPTH 12[illegible]'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling Co.

HOLE NO J-6
PROPERTY A. H. Johnson
LOCATION NE¼ Sec. 17, T3S, R3E
COLLAR COORD. N. 7283 E. 8960
COLLAR ELEV. 2286'
SHEET 1 OF 8
HOLE SIZE 6¼" Hammer bit to 110' [illegible]

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (ft)	Sample No.	ASSAYS Cu			
10		Hole collared in qtz. monz. 9 5/8" hole to 10' and cased with 8 5/8" pipe.							
20		Qtz. Monz.: Considerable biotite, minor ch, a few specks of sulfides. Epidote, magnetite.	10	10	J-169			.01	
30		do.							
40		do. Surfact water starting at about 30'. Epidote.							
50		do.							
60		do.							
70		do. Diabase: Dark gray to black, micro-xln & slightly pyritized.							
80		do.	10	10	J-170			.01	
90		do.							
100		do.							
110		do.							
120		do.							
130		do.							
140		Qtz. Monz.: Pink orthoclase xls with associated sulfides; traces chpy.	10	10	J-171			.02	
150		do. some diabase							
		Qtz. Monz.: Highly altered (ser), about 2% sulfides. Sand-sized part., moly.	10	10	J-172			.01	.013

J-6

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 8
HOLE SIZE

Depth	Log	Rock Type and Description	Sample (Ft)	Sample (Ft)	Sample (Ft)	ASSAYS Cu				
330		Qtz. Monz.: Sulfides, ch & considerable ser. Strongly seritized frag. are heavily pyritized.								
340		do.								
350		do. More epidote.								
360		do.	10	10	J-177			.01		
370		do.								
380		do. Decreasing biotite below 370?								
390		do.								
400		Qtz. Monz.: Less ch & ser. Sulfides in ortho. and qtz. xls.								
410		do. Epidote. Some feldspars altered to a light bluish-green.	10	10	J-178			.10		
420		do.								
430		Qtz. Monz.: Moderate ch & ser. Minor chpy and moly. 2nd ortho. darker pink and carries sulfides.	10	10	J-179			.05		
440		do. Epidote								
450		Qtz. Monz.: Same as above.								
460		do.								
470		do.								
		do.	10	10	J-180			.01		

J-6

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 8
HOLE SIZE

Depth	Log	Rock Type and Description	Sample (ft)	Sample (%)	Sample (No)	ASSAYS Cu	Mo		
170		Qtz. Monz.: Slightly pyritized & ch. Ser.; traces of chpy. & diabase.							
180		do.							
190	189	do.							
200		Diabase: Gray, heavily pyritized. Minor qtz. monz.	10	10	J-173		.01		
210		do. Decreasing sulfides.							
220		Qtz. Monz.: Small diabase dikes. Specks of epidote. Conversion to sludge.							
230		Qtz. Monz.: Dark fine-grained biotite. Traces of py & chpy associated with quartz and or orthoclase xls. Appears to be more sericitic than holes No. 1-5.							
240		do.	10	10	J-174		.01	.002	
250		do.							
260		do.							
270		do.							
280		do.							
290		do.	10	10	J-175		.02		
300		do.							
310		do. Slightly more chpy.	10	10	J-176		.02	.001	
		do.							

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

SCALE

HOLE NO J-6
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 6
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Core (%)	Sample No.	ASSAYS Cu
490		Qtz. Mons.: Sulfides, epidote and minor ch. Total sulfides est at less than .5%.				
500		do.				
510		? Diabase: Black, micro-xln, mtxm with py and chpy.	10	10	J-181	.01
520		do.	10	10	J-182	.07
530		do. Few fragments showing strong ser.				
540		do.				
550		do. ? Qtz. Mons.: Light colored, few ortho. xln, some traces of sulfides. Epidote & gypsum flakes.				
560		do.				
570		do.				
580		do. More ser and gypsum. Inc. water 570'				
590		do. Inc. ser with larger cuttings showing considerable py in cube form up to 1/8" in diameter.	10	10	J-183	.01
600		do.				
610		do.				
620		do. Strong ser., py plus 1%. Cemented at 614'				
630		do.	10	10	J-184	.01
		do.				

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-6
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 5 OF 5
HOLE SIZE

Depth	Hyperg	Log	Rock Type and Description	Sample (m)	Sample (%)	Sample (%)	ASSAYS Cu	ASSAYS Mo
			qtz. Monz: Moderate to strong ser. less than .5% sulfides. Epidote.					
650	652							
			Diabase: Medium-xln, pyritized, some chny.	10	10	J-187	.03	
660								
			do. Fragment of qtz. monz. Sulfides seen to decrease to 717'.	10	10	J-188	.03	
670			3-5% magnetite.					
680			do.					
			do.					
690								
			do.					
700								
			do.	10	10	J-189	.03	
710								
			do.	10	10	J-190	.04	.003
720	717		qtz. Monz.: Good sulfides than. Limited ch & ser. About 1% total sulfides. Sand-sized particles.					
730								
			do.					
740								
			do.					
750								
			do. Varying amounts of ser & ch.					
760								
			do.					
770								
			do.	10	10	J-191	.05	
780								
			do.					
790								
			do.					
	798		Diabase:					

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-6
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 3
HOLE SIZE

Depth	Log	Rock Type and Description								
810		Diabase: Pyritized, moderate ser. Soft drilling 800-833'.								
820		do.	10	10	J-192		.01			
830		do								
840	833	do.								
850		Qtz. Monz.: Dark pink orthoclase xls. ~~less than 1% py, some chpy and ser.~~								
860		do.								
870		Diabase: Sand monz., micro-xln, dark gray to black. Heavily pyritized with shows of chpy. Moderate ser & ch.	10	10	J-193		.03			
880		Same as above except with more monz.	10	10	J-194		.02			
890		Qtz. Monz.: a little diabase. Dark pink orthoc. xls and qtz. also with sulfides.	10	10	J-195		.02			
900		do.								
910		Qtz. Monz. & Diabase: Slightly monz.	10	10	J-196		.02			
920		Qtz. Monz.: Strong ser., sulfides with showing of moly.	10	10	J-197	.01	0	.06	.015	.07
930		do.	10	10	J-198		.03			.05
940		do. Decreasing ser and sulfides.								
950		do.								
960		do. Minor ser and sulfides. Traces Epidote.								
970		do. Sulfides associated with qtz.	10	10	J-199		.02			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-6
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 7 OF 8
HOLE SIZE

Depth	Log	Rock Type and Description	Core Size	Core Size	Core Size	Assays Oz.	Assays Oz.	Assays Oz.	Assays Oz.	Assays Oz.
970		Qtz. Monz.: Ser, Sulfides. Biotite appears to be partially converted to chlorite. Epidote xls.								
980		do.								
990		do. Partial alt of feldspars to clay. Chpy & moly in or on orthoclase or qtz. xls.	10	10	J-200			.01	.001	
1000		do.	10	10	J-201			.03	.010	
1010		960-1050' zones of strong sericite alteration, sulfides & showings of Epidote.								
1020		do.	10	10	J-203			.01	.002	
1030		do.								
1040		do.								
1050		do.								
1060		Qtz. Monz.: Fine particles, moderate ser minor sulfides and epidote.								
1070		do.								
1080		Strong sericite. do.	10	10	J-203			.01		
1090		do.								
1100		do.	10	10	J-204			.01	.001	
1110		do.								
1120		Sand-sized fragments, less ser & sulfides.								

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLED

HOLE NO J-6
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 8 OF 8
HOLE SIZE

Depth	Log	Rock Type and Description	Core (%)	Core (%)	Core (%)	ASSAYS Au	Ag	Cu	Mo	Zn
		Qtz. Monz.: Sand-sized fragments. Biotite, some ser & ch. Minor sulfides; magnetite								
1130		Slightly more ser & sulfides.	10	10	J-20[illegible]			.03		
1140		do. Moly coated & fracture-lined qts.	10	10	J-20[illegible]	0	0	.02	.005	.01
1150		do.								
1160		Qtz. Monz.: Ser & some ch. Sulfides .5% or less. Particles of chpy & moly. Mole serving somewhere above.								
1170		do. Increase in water.								
1180	118[illegible]'	Converted to drilling with water and rock bit.								
1190		do. Strong ser & cst. 1% sulfides, traces of moly.								
1200		do.								
1210		do. Chpy increasing 1212-1217'.	10	10	J-20[illegible]			.06		
1220		Qtz. Monz.: Minor diabase, sulfides, moderate ser.								
1230		do.	10	10	J-20[illegible]			.03	.00[illegible]	
1240		do.								
1241										

Johnson Claims

Pinal County

Arizona

SCALE 1" = [illegible]

DIRECTION Vertical

INCLINATION -

STARTED [illegible]-69

COMPLETED [illegible]-69

DEPTH [illegible]

LOGGED BY T. [illegible] Hands

DRILLER Whatley Drilling Co.

HOLE NO. J-7

PROPERTY Johnson Claims

LOCATION [illegible] Sec. 8, [illegible]

COLLAR COORD. N [illegible] E. [illegible]

COLLAR ELEV. [illegible]

SHEET 1 OF 4

HOLE SIZE [illegible]

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu	Mo
10		Hole collared in quartz monzonite porph. 9 5/8" rock bit to 14', cased with 14' 8 5/8" surface pipe.					
20		Qtz. Monz.: Weathered, light tan to br. 2-4% magnetite; pyrite fragments & py oxidization, moderate biotite.					
30		do.	10	10	J-209	.02	
40		do.					
50		Surface weathering extends to near 50'. do.					
60		do.					
70		do.					
80		do.					
90		do. Pyrite increasing.					
100		Some oxidization; silicification & chloritization. Qtz. carries about 1% pyrite, specs of chcy and moly.	10	10	J-210	.03	.001
110		do.					
120		do. Water beg. at 110' & inc. sharply @ 130'.					
130		do.					
140		do.					
150		do.					
		do.	10	10	J-211	.02	

J-7

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample (No.)	ASSAYS		Cu	Mo	
170		Qtz. Monz.: Dk gray, few dk pink ortho. xls, ch. Associated with ortho. is ser, chlorite & few epidote xls.	10	10	J-212			.03		
180		Seams & disseminations of py & chpy. Considerable magnetite.								
190		do.								
200		do.								
210		do. Bottom portion has plag. partially alt. to white clay.								
220		do.								
230		Qtz. Monz.: Prevaling tan with pink K-feld. & qtz. Traces of sulfides & epidote.								
240		do.								
250		do.								
260		do. Tan & gray, fine-grained chlorite; Traces of sulfides.								
270		do. Considerable water increase.								
280		do. Hammer bit buttons broke off at 273'								
290		do.								
300		do. Trace of mo.	10	10	J-213			.01	.002	
310		303' rods pulled-hole cemented, heavy water concentration (This sample contains about 5% cement).								
		Qtz. Monz.: Slightly chloritized, minor pyrite.								

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-7
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No)	ASSAYS Cu	ASSAYS Mo
330		Qtz. Monz.: Moderately chloritized, traces of py. Some of the ortho. xls have sulfides scattered through them or on cleavage					
340		faces. Total sulfides est. @ .5%. Fine-grained biotite which also has some sulfides assoc. with it. Epidote.					
350		do.					
360		do.	10	10	J-211	.01	
370		do.					
380		do.					
390		do.					
400		do.					
410		do.					
420		do. Partial kaolinization of plag. Only few sulfides.	10	10	J-215	<.01	
430		do.					
440		do.					
450		Slight increase in pyrite. do.					
460		do.					
470		do.					
480		do.					

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-7
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample (cs)	ASSAYS Au	Ag	Cu	Pb	Zn
490		478-495' Qtz. Monz. & Diabase: Sulfides est. at 1%, large ortho xls.	10	10	J-216			.01		
500	495	Qtz. Monz.: White to light-gray, biotite. sulfides less than .5%. Extremely hard from 495 to 581'. (Aplite dikes)								
510		do.								
520		do.								
530		do. Caving from about 250'								
540		Qtz. Monz.: Small diabase dike. Traces of sulfides.								
550		Qtz. Monz.: Hard, few sulfides, higher qtz. content.								
560		do.								
570		do.								
580		do.	10	10	J-217			.01	.001	
	581 TD	Note: Below 495' hole was cemented three times ing an attempt to shut off the large water volume (est. 100-200 gpm). Rock composed partially of aplite dike material which is unusually hard; nine rock bits used in this interval.								

Johnson Property
Pinal County
Arizona

SCALE 1" = 20'

DIRECTION Vertical
INCLINATION –
STARTED 1-24-69
COMPLETED 2-1-69
DEPTH 972'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling Co.

HOLE NO J-8
PROPERTY Johnson Claims
LOCATION SW¼SW¼ Sec. 9, 4S, 13E
COLLAR COORD. N 8270 E. 10,105
COLLAR ELEV. 2295
SHEET 1 OF 6
HOLE SIZE ~~Ch 1~~ Ham. Bit to 762' Rock Bits to 972'

Depth	Log	Rock Type and Description	Interval (ft)	Sample Wgt (lb)	Sample No.	ASSAYS Cu				
10		Hole collared in weathered QTz. Monz. 9 5/8" rock bit to 20' & cased. ~~Small c-x mtzn streaks NW of collar.~~								
20		Weathered Qtz. Monz.: Considerable magnetite and iron oxides.								
30		do. sericite	10	10	J-21[illegible]			.01		
40		Qtz. Monz.: Large fragments showing moderate ser & considerable qtz. ~~Very few sulfides.~~								
50		do. Partial alt. of biotite.								
60		do.								
70		Slight oxidization, first sig. pyrite minor sericite.								
80		Minor ser., est .5-1% total sulfides. First water.								
90		Diabase coming in at about 85'. Py, chpy and some bornite.	10	10	J-21[illegible]			.02		
100		Diabase & Qtz. Monz.: Diabase dike 85-93', sulfides within dike and on contact. ~~Minor sericite.~~								
110		Chpy on dk pink ortho xls.								
120		do.								
130		do.								
140		do. Inc. pink feld. Py veins.								
150		do.								
		do. Iron oxide frag. to 160'								

J-8

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 6
HOLE SIZE

SCALE

Depth	Log	Rock Type and Description	Lost (%)	Sample (%)	Assays Au	Ag	Cu	Mo	Zn
170'		Qtz. Monz.: Increasing pyrite with xls to 1/8" dia. Some chpy and ser.	10	10			.01	<.001	.01
180		About 178' sulfides of py, chpy and sphalerite (1-2%). Minor 2-nd ortho.	10	10	0	0	.01	<.001	.4
		do. Heavy oxides 183-85.	5	5		.03	.01	<.001	.3
190		do. Decreasing sulfides	5	5			<.01	<.001	.0
200		Qtz. Monz.: About 20% limonite, some ser and minor sulfides.							
210		do. Iron oxidized water 180-200'							
220		Plag a light bluish-green. Py less than 1%. Diabase dike at 214'. Considerable sericite.							
230		Traces of chpy. Oxidized frag. do.	10	10			.01		
240		do.							
250		do.							
260		do.							
270		do.	10	10			<.01		
280		do. Chpy							
290		do. Iron oxide, sulfides and sericite.							
300		do.							
310		do.							
		do.							

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

SCALE

HOLE NO 7-9
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 9
HOLE SIZE

Depth	Geology	Log	Rock Type and Description	Mineral (%)	Mineral (%)	Assay	ASSAYS				
			Qtz. Mons.: Minor iron oxides & sulfides (py & chpy), sericite. Magnetite.								
330			do.								
340			do.								
350			Biotized granite; much like thin zones near diabase-like contacts as seen at surface. (Water fairly cont. at about 10 gpm)								
360			do.								
370			do.								
380			Plag. are light-bluish-green as drilled through higher up. Traces of py with flakes of chpy, some sericite.								
390			do.								
400			do.								
410			do.	10	10	3-22			.03		
420			Some dk pink ortho with sulfides. Traces of ser & iron oxides persisting to 440'								
430			do.								
440			do.								
450			Slightly pyritized with traces of chpy, ser and ch. Iron oxides; flakey ser.								
460			do.								
470			do. Hematite; slightly more sulfides.								

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. S.
COLLAR ELEV.
SHEET 4 OF 6
HOLE SIZE

Depth	Log	Rock Type and Description	Core (%)	Core (%)	Core (%)	Assays					
								Cu	Mo	Zn	
470		Qtz. Mons.: Partial alteration of biotite to ch. Traces of sulfides & sor, epidote, Cpy & Mo assays, with core of the quartz fragments.									
480		do.									
490		do. Cpy on orthoclase.	10	10	J-227			.03	.003		
500		do.									
510		Partial chloritization. Cpy veinlets in dk pink ortho. Micaceous iron oxides.									
520		do.									
530		do.									
540		Minor sulfides and traces of micaceous iron oxides.									
550		do. Few pink feldspars; generally white & gray with chpy and bornite showings.									
560		Slight increase in overal sulfides. Ch and sor showings.	10	10	J-228			.04			
570		do.	(Composite of No. 229 & 230 @ 470) (" " 231 & 232 less than 2003 ft.)								
580		do.									
590		do. Cpy traces.									
600		do. Pyrite mainly in biotized zones around feldspar crystals.									
610		do.									
620		do.	10	10	J-229			.03			

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
COLLAR

SCALE

HOLE NO J-8
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 5 OF 9
HOLE SIZE

Depth	Log	Rock Type and Description				Au	Ag	Cu	Mo	Zn
650		3% Mons.: Minor sulfides, slightly cor Chpy as veinlets on or within dk pink ortho. Miscellaneous iron oxides.								
660		Sulfides begin increasing about 500' were there are approx. .5% to this interval where there is slightly over 1%. Traces of chpy and mic. iron oxides, some hematite.								
670		do.								
680		do.	10	10	J-230			.04		
690		do. Ins. in water.								
700		do.	10	10	J-231			.03		
710		do.								
720		do.	10	10	J-232			.02		
730		Sulfides 1-3%; hole caving at about 660' and 160-290' (Iron oxides)	4	4	J-233			.01	.001	
740		Extremely fine sulfides, some chpy, sp mic. iron oxides and sphalerite. Minor diabase.	10	10	J-234	0	0	.06	.001	.1
750		do.	10	10	J-235			.07	.001	.5
760		do.	10	10	J-236			.06	.001	
770		do. 1-2% sulfides.								
780		do. 1% sulfides.								
790		do.	10	10	J-237			.03		

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-8
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 6 OF 6
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu				
		Qtz. Mons.: Extremely fine particles; some ortho (secondary) & mo traces.								
810		Thin diabase dike. Qtz, sulfides, ch and some moly. (Rock bit with drilling mud starting at 812')								
820		do. Part. alt of biotite	10	10	J-238			.04		
830		do. Increase in ser and ortho, less diabase								
840		do.								
850		Minor sulfides and diabase and kaolinization. Total sulfides est at less than 1%.								
860		do.								
870		do.								
880		About 3% of the fragments are made up of diabase, some chlorite.								
890		do.								
900		Minor diabase, ser and ch. Some clay alt.								
910		Sulfides and secondary ortho. Inc. calcite content.								
920		do.								
930		do.	10	10	J-239			.04		
940		do.								
950		do.								
960		do.								
		do.								

Johnson Property
Pinal County
Arizona
SCALE: 1" = 20' or as shown

DIRECTION Vertical
INCLINATION -
STARTED 2-3-69
COMPLETED 2-27-69
DEPTH 2320'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling Co.

HOLE NO J-9
PROPERTY Johnson Claims
LOCATION NE¼NE¼ Sec. 17, 4S, 13E.
COLLAR COORD. N. 7790 E. 9160
COLLAR ELEV. 2210
SHEET 1 OF 10
HOLE SIZE 6" Ham. Bit to 538'
Rock Bit 538'-

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (ft)	Sample No.	ASSAYS Cu	Mo
10		Hole collared in wash near contact with Qtz. Monz. Porph. 9 5/8" rock bit to 41' and cased with 8 5/8" surface pipe.					
20		Alluvial Wash: Sulfides in outcrop near collar.					
30		do.					
40	38	do. Bedrock at about 38'					
50		Qtz. Monz.: Predominantly a light-gray, few pronounced ortho fragments. Minor sulfides. Shows of copper oxides.					
60		Little alteration. Traces of sulfides, fine-grained biotite, partial alt. to ch.	10	10	J-24		.01
70		do.					
80		Part. alt feld; moderate chlorite. Rust stained joints and fractures. Traces of sulfides & ser, inc. with depth. Epidote traces.					
90		do.					
100		do.					
110		do.					
120		do.					
130	129	Moderate ch & ser, some secondary ortho. Inc. chpy and mo beg. at 129'.	10	10	J-24	.01	.001
140		do.	10	10	J-24	.03	
150	145	do.	10	10	J-24	.01	
	155	Diabase: Dk gray to black; py, chpy and some epidote. do.	5	5	J-24	.02	
		Minor qtz. mon.. Pyritized					

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (in)	Core Size (in)	Sample No.	ASSAYS Au	Mo
		Diabase: Pyritized, some qtz. Monz.					
	168						
170		Qtz. Monz. & Diabase: Thin dikes of diabase which are pyritized and carry some chpy. Moderate ch and fine biotite.	5	5	J-245		.01
180							
		do.					
190							
		do.	5	5	J-246		.01
200							
		Qtz. Monz.: Moderate ch & ser, fine-grained biotite; traces of chpy.					
210							
		do.					
220							
		do.					
230			5	5	J-247		.01
		do.					
240							
	244	Diabase: Py and chpy, est total-1%.	5	5	J-248		.01
250			5	5	J-249		.04 .001
		do.					
	257						
260		Qtz. Monz. and Diabase: Diabase dikes 257 to 273'. Sulfide traces.					
		do.					
270							
	273	Qtz. Monz.: Minor ser, chpy and py. Sulfides associated with the qtz.					
280							
		do.					
290							
		do.					
300							
		do.					
310							
		Minor diabase. Alluvium washing into hole beneath surface casing.					

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

SCALE

HOLE NO J-9
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description	Sample (in)	Assay (in)	Sample No.	ASSAYS Cu				
330		Qtz. Monz.: with small dikes of pyritized diabase. Some ser and minor ch; sulfides assoc with qtz. or secondary ortho.								
340		do.								
350		do	5	5	J-250			600		
360		Diabase dikes from a few inches thick to 5-10'; mts thorough with slightly more sulfides near the contacts.								
370		do.								
380		do.								
390		do.								
400		do.								
410		do. Some sample pollution from beneath casing. Hole cemented back to the surface from 416'. Total sulfides in diabase 1-3%; less than one percent in Qtz. Monz.	5	5	J-251			601		
420										
430		Diabase and Qtz. Monz.: Sulfides in dia. Ch and very few ortho frag.; gypsum & some calcite.	10	10	J-252			603		
440		do.								
450		do.	10	10	J-253			605		
460		do.								
470	465	Diabase & Qtz. Monz.: pyritized, chby in dark pink ortho and qtz. Traces of epidote.								
		do.								

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. S.
COLLAR ELEV.
SHEET 4 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description				ASSAYS			
490		Qtz. Monz.: few frag of diabase. Sulfides less than .5%. Traces of chpy on Dark pink ortho crystals.							
500		do.							
510		do.							
520		Moderate ch; traces of chpy & py, some ser. Pronounced dark pink ortho xls.	10	10	J-251			301	
530		do.							
540		do. (Hammer bit not properly working due to large volume of water. Hole drilled below 538' with rock bits.)							
550		do.							
560		do.							
570		Begining about 570' rock becomes a darker greenish-gray with more chlorite.							
580		do.							
590		do. Slightly more chpy	10	10	J-259			303	
600		Qtz. Monz.: Same as above except with a few frag of py & chpy bearing diabase.							
610		do.							
620		do.							
630		do.							

J-9

SCALE 1" = 40'

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO
PROPERTY
LOCATION
COLLAR COORD. N. S.
COLLAR ELEV.
SHEET 5 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description	Assay (Au)	Assay (Ag)	Assay (Cu)	ASSAYS Au
650		Qtz. Monz.: Few scattered frag. of hy & chby bearing diabase. Minor chlorite and small about of clay alteration in the plagioclase. Some scattered and very minor particles of epidote. Homogeneous unit from about 610 to 800 feet.				
660						
670						
680						
690						
700						
710						
720						
730						
740						
750			10	10	3-256	.01
760						
770						
780						
790						
800						
810		Qtz. Monz.: Some diabase; Est. 1% sulfides Minor ch & ser; decrease in secondary orthoclase.				
820			10	10	3-257	.01
830						
840						
850		Qtz. Monz.: Gradual increase in ch & sulfides. Prevailing greenish-gray. Minute flases of hy & chby in ortho particles. Continued minor showings of clay alteration. Sulfides est at slightly more than 1%.	10	10	3-250	.01
860						
870						
880						
890						
900						
910		Less chlorite; same as above				
920			10	10	3-259	.04
930		Diabase and minor Qtz. Monz.: Moderately pyritized with showings of chby; ch. Total sulfides around 1%. Epidote fragments.				
940						
950						

SCALE 1" = 10'

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-9
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 6 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description	Sample (ft)	Sample (cm)	Sample (%)	ASSAYS Cu
970		Qtz. Monz.: Light greenish- gray, slightly sericitized with an estimated .5% sulfides. Moderate ch and clay alteration. Epidote fragments.				
980						
990						
1000						
1010						
1020		Pale green coloration of plagioclase and some orthoclase 962-1070'; few pyrite and chalcopyrite bearing diabase fragments.	10	10	J-26[illegible]	.001
1030						
1040						
1050		No.				
1060						
1070						
1080		Pronounced dark pink orthoclase with moderate clay alteration.				
1090						
1100						
1110		Homogeneous unit 1070 to 1240'; diabase increases in last 30-40'.	10	10	J-26[illegible]	.001
1120						
1130						
1140						
1150						
1160						
1170						
1180						
1190						
1200						
1210						
1220						
1230						
1240		Diabase & Qtz. Monz.: Pyritized; slight overall sulfide increase. (Five foot samples 1240-1290').				
1250						
1260			5	5	J-26[illegible]	.001
1270		Diabase, qtz. monz. same as above.				

SCALE 1" = 40'

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-9
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 7 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description	Sample Size	Sample Size	Sample Type	ASSAYS Au	ASSAYS Ag	ASSAYS Cu	ASSAYS Pb
1200		Dia. Mons.: Moderate chlorite and clay alteration only traces of sulfides. Some clay and pyrite found either on or within the dark pink orthoclase crystals or the quartz. Scattered fragments of epidote.							
1300									
1310									
1320									
1330									
1340									
1350									
1360									
1370									
1380									
1390		Gradual increase below this depth in the quantity of clay content.							
1400									
1410									
1420		Homogeneous unit with little variation except for some small diabase dikes and varying clay alteration.							
1430									
1440									
1450									
1460									
1470									
1480			10	10	J-26		.01		
1490									
1500									
1510									
1520									
1530									
1540		Lam. diabase, flakes or so in quartz.	10	10	J-26		.001		
1550		Same as above.							
1560									
1570									
1580									
1590									

SCALE 1" = 100'

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO. J-9
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 8 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (in)	Recovery (%)	Specific Gravity (lb/ft³)	ASSAYS				
1610		Qtz. Monz.: Moderate chlorite and clay alteration. Minor diabase which has pyrite and traces of chalcopyrite disseminated through it and concentrated along the fractures. Chpy is more common on the orthoclase crystal faces. No moly shows detected below 630 feet. Clay alteration consists of from 5 to 20% of the total samples.								
1620										
1630										
1640										
1650										
1660										
1670										
1680										
1690										
1700										
1710										
1720										
1730										
1740										
1750										
1760		Increase in diabase.								
1770		Qtz. Monz.: About 10% of the particles made up of diabase. Clay alt. to near 1800'.								
1780										
1790										
1800										
1810		Qtz. Monz.: Little clay alt. Sulfides increasing slightly above previous 300-foot interval								
1820		1820' Return of clay alteration. Chpy seen on dark pink orthoclase particles.								
1830										
1840										
1850										
1860										
1870										
1880		Sharp increase in fine-grained, black biotite.								
1890										
1900		Diabase: Pyritized with some chpy. Few qtz. Monz. fragments.	10	10	4-265			.03		
1910		Qtz. Monz.; Same as above.								

SCALE 1" = 10'

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-9
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 9 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample (m)	ASSAYS Cu	ASSAYS Mo
1930		Qtz. Monz.: Few pyritized diabase particles. Moderate chlorite & sericite. Total sulfides are approximately .5% with traces of chalcopyrite. 3-5% magnetite. Clay alteration is about 15% of the returns. Nearly 1/3 of the cuttings are made up mostly of mafic minerals; this decreases below 1980'		10	J-266	.03	.001
1940							
1950							
1960							
1970							
1980							
1990							
2000							
2010							
2020							
2030		More mafic material.					
2040							
2050		Qtz. Monz. & Diabase: Diabase is pyritized and includes showings of chpy; biotite					
2060			10	10	J-267	.04	
2070							
2080							
2090			10	10	J-268	.04	
2100		Qtz. Monz.: Minor chlorite and sericite Clay alteration, minor sulfides.					
2110							
2120							
2130							
2140							
2150							
2160		Chpy on dark pink (secondary) orthoclase crystals.					
2170							
2180							
2190			10	10	J-269	.04	
2200							
2210							
2220							
2230							

SCALE 1" = 40'

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO J-9
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 10 OF 10
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample No.	ASSAYS Cu
2250		Qtz. Monz.: Moderate chlorite, some ser. Only minor sulfides. Limited clay alteration.	10	10	J-270	.01
2260						
2270		Some pyritized diabase.				
2280						
2290						
2300		Qtz. Monz.: Considerable diabase which is carrying considerable py and traces of cpy.				
2310						
2320 T.D.			10	10	J-271	.05

TIPPERARY RESOURCES CORP.

VOLUME II

KELVIN GEOLOGICAL REPORT

INDUCED POLARIZATION SURVEY

OF THE

KELVIN AREA, PINAL COUNTY, ARIZONA

FOR

TIPPERARY RESOURCES CORPORATION

MAY 1970

BY

HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964 TUCSON, ARIZONA 85703
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Line 10E (Spreads 2 & 3, a = 500')

Line 20E (Spread 1, a = 1000')

Line 30E "

Line 40E "

Line 50E "

Line 10W (Spread 1, a = 1000')

Line 10W (Spreads 2 & 3, a = 500')

Line 20W (Spread 1, a = 1000')

Line 30W "

Line 40W "

Line 50W "

Basis of the Induced Polarization Method

GENERAL LOCATION
of
THE KELVIN AREA
FOR
TIPPERARY RESOURCES CORPORATION

ARIZONA

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INTRODUCTION

At the request of Mr. C.R. Williams, Senior Minerals Geologist, Tipperary Resources Corporation, Heinrichs GEOEXploration Company conducted and completed a comprehensive induced polarization survey in the Kelvin Area, Pinal County, Arizona. The field work was done during the interim March 10 to May 5,1970.

A total of eleven lines were completed, all oriented N-S. A coordinate grid was used whose origin is the southeast corner of Section 8, T4S, R13E to which all lines and stations have been referred. The lines are separated by 1000 feet and a station spacing (dipole or "a" spacing) of 1000 feet was utilized except on Lines OE/W, 10E and 10W where a more detailed spacing of 500 feet was also employed. The total surface coverage counting both dipole spacings was 37.5 miles of which 24.5 miles was "subsurface" plotted data points.

The dual frequency I.P. technique was used with sending frequencies of 0.3 and 3.0 Hz with a GEOEX MK-7 sender and a GEOEX MK-4C receiver. The collinear dipole-dipole configuration was the electrode arrangement employed which on a 1000 foot spacing should typically give resolvable penetration within the zone from roughly 300 feet to approximately 1200 to 1500 feet below surface.

The purpose of this survey was to aid in delineating a subsurface sulfide zone and thereby help to define drilling targets in a mineralized area evidenced by several surface showings of copper and molybdenum and partially defined by several existing drill holes.

The data are presented on Sectional Data Sheets, one for each line and spacing, showing resistivity, percent frequency effect (PFE) and metallic conduction factor (MCF) contoured in section with self potential (SP) in profile form. An "Induced Polarization Location and Interpretation Plan" is also included showing the surface projected plan interpretation of the 1000 foot dipole data relative to the land net and overlays a portion of the U.S.G.S. 1:24,000 scale Grayback Topographic Quadrangle which is also included herewith and which shows the surface projected 500 foot dipole data interpretation. For additional details concerning theory, interpretation and presentation, see the "Basis of the Induced Polarization Method" appended to the report.

Heinrichs personnel involved in the field work were D. Chaffin, geophysical crew chief; D. Kern, J. Boduch, J. Patten, B. Coons and W. Wright, technical assistants with W. Freeman, Geophysicist supervising in the field. Report and interpretation by C. Ludwig, Senior Geophysicist assisted by the GEOEX staff.

CONCLUSIONS

Anomalous induced polarization effects are seen on all lines and define a WNW-ESE trending zone roughly through the central portion of the area surveyed. The total width of this zone varies from about 3500 feet to 5000 feet considering the very weak (and sometime poorly defined) fringes. The stronger core of the anomaly is about 1500 feet to 2000 feet in width and lies roughly between 15W and 35E.

The cause of the anomalous response is likely metallic lustered sulfide mineralization. Within the stronger anomalous core about 0.5 to 2.0% by volume total bulk average sulfides is indicated based on a comparison with "typical" disseminated sulfide zones in the Southwest. This concentration crudely represents 1.0 to 4.0% total sulfide by weight and therefore could certainly be of economic interest providing the ratio between minerals of copper, molybdenum etc., to the iron minerals is reasonably high.

Depth to the top of this indicated mineralization varies from within 150 feet of the surface on portions of Lines 0E/W and 10E and becomes progressively deeper east and west thereof. The greatest depth to the top of polarizable mineralization noted is on Line 50E where the main causative body may be deeper than 1500 feet below surface. Dip is difficult to determine by the I.P. technique but there is some evidence of a southerly dip (or top slope of a broad body) in several portions of the area.

Based on the geologic data available to us, no obvious correlation is noted between any particular geologic units or structure and the I.P. anomaly. Therefore it is possible that the polarizable zone is caused by or related to some unexposed intrusive or structure at depth roughly below the anomalous area. However, no obvious change is seen in the geophysical data with depth, thereby suggesting in excess of 1500 feet to this postulated intrusive or structure or simply that there is a lack of electrical contrast with the overlying material. The induced polarization response in general shows no obvious evidence of having a depth limited source. Sulfides are expected to persist to at least 1500 feet in depth - the probable limit of resolvable "penetration" of the resultant data.

The resistivity is relatively uniform and rather non-diagnostic. Portions of the more strongly polarized zone have lower associated resistivities probably caused by the concentration of conductive sulfide mineralization and associated alteration.

Lower resistivity is also seen where there is an appreciable thickness of recent alluvium overlying the crystalline bedrock as on the north ends of Lines 20E and 30E in the Gila River gravels. Higher resistivities are associated with the topographic effect of erosional resistant ridge crests and perhaps tighter or more silicified rock. The highest resistivities are noted near 35N on Lines 40W and 50W where the most extreme topography on the survey was traversed.

Many of the lines show a broad self potential low, correlating with the anomalous I.P. response, which is likely reflecting concentrations of relatively interconnected, actively oxidizing sulfides within several hundred feet of the surface.

RECOMMENDATIONS

Because of the geophysical correlation with encouraging copper - molybdenum mineralization at depth in DH-2 it is recommended that a fairly extensive and deep drilling program be executed to more completely evaluate the rest of the significant appearing induced polarization anomaly. Eight drill holes are proposed in order of geophysical priority - some of which will of course depend on the results of higher priority holes, existing drilling and geological and geochemical information available, all of which should be in constant correlation.

1. Line 0E/W near 19N to test a rather strong but narrow near surface polarizable zone apparently merging at depth with the broad main anomaly. This drill hole should go to about 600 feet to evaluate the shallow anomaly but could effectively be carried to at least 1000 feet and preferably to 1500 feet to also test the northern portion of the broad anomaly at depth.

2. Line 10E near 13N to test the strongest I.P. response noted on the survey. This hole should be at least 1000 feet in vertical depth to properly evaluate the zone of interest. Mineralization is expected from within about 150 feet of the surface to at least 1200 to 1500 feet in depth.

3. Line 0E/W near 7.5N (or essentially equivalently near 5N on Line 10E)to test one of the stronger and deeper portions of the main anomaly. This hole is approximately midway between your DH-1 and DH-2 and will give additional information as to the mineralization across the width of the anomalous zone. To completely evaluate the section of interest, the hole should be programmed for about 1500 feet total depth and should depend to some degree on the results of Recommendation 1. above.

4. Line 0E/W near 7S to test a minor zone of increased mineralization, within the fringe zone, which shows up best on the more detailed 500 foot coverage. A relatively shallow hole - about 500 feet - should suffice to evaluate this target unless encouragement is obtained. The expected strength of mineralization in this area is roughly only one half that of the stronger core of the main anomaly and it will therefore necessitate a very high copper to iron ratio to be economically interesting. Because of this low expected sulfide content, drilling at this stage should only be considered if there is supporting geological or geochemical data.

5. If Recommendation 2. proves encouraging then a hole is suggested near 7.5N on Line 20E to test a zone of similar response. A minimum drilling depth of 1000 feet should be considered to properly sample the interesting section.

6. If Recommendation 5. proves encouraging, a drill hole near 5S on Line 30E should be considered and again should be programmed for a minimum of 1000 feet in depth.

7. and 8. Depending on drilling results on Line OE/W, two holes could be considered on Line 10W; near 17.5N and 7.5N. Somewhat deeper and/or weaker mineralization is expected compared to Line OE/W and drilling here should be in excess of 1000 feet in depth to effectively sample the target.

All of the above drilling is considered vertical as recommended. However, if after several holes have been completed and if a definite and persistent dip is established, inclined drilling may prove more efficient.

Additional geophysical drill targets can be located by reference to the interpretation plan surface projected anomalism and its correlation with existing drill information. The weaker fringes of the I.P. anomaly should be given some consideration especially if in areas having evidence of a high copper to iron ratio. In fact in many mining areas, the weaker I.P. zones are of more interest than the stronger portions which may only be reflecting high pyrite concentrations. In this area, because of the rather low overall indicated sulfide concentration, initial attention has been focused on the stronger sulfide zones in the hope that they would have the highest probability of being economically interesting.

Further detailed I.P. coverage should be considered particularly if some of the more shallow mineralization becomes of interest. Reconnaissance I.P. along the general strike of the mineralized zone east and west of the present coverage is also suggested if the prospect continues viable. A semi-reconnaissance ground magnetic survey would conceivably delineate a related intrusive at depth as well as other possibly significant features of mineralization and structure and would be relatively inexpensive.

DRILLING OF I.P. TARGETS

To maximize the probability that a recommended drill hole will intersect the source of an induced polarization anomaly, the following points should be considered.

1. The anomaly has been caused by some physical property, hopefully a polarizable body containing economically interesting metallic mineralization, and this property should be determined before abandoning the anomaly.

2. Location of drill holes should be made relative to the actual sending and receiving electrode positions as they exist on the ground.

3. Due to inherent limitations in the I.P. method, depth interpretations are only approximate and the determination of dip is severely limited, particularly for angles greater than 45°. Also, targets can generally be laterally resolved no finer than the station spacing (dipole length). Because of these limitations, targets less than one dipole spacing in width, particularly when steeply dipping or deeper than the dipole length, may be difficult to intersect. In these cases, several drill holes in a fence line should be considered. For the steeply dipping cases, angle drilling may also prove advantageous, mainly where the direction of dip can be geologically inferred and the drill hole oriented such that an optimum intersection of the zone of interest is obtained.

4. An observed anomaly can be the effect of a polarizable body laterally offset to the side of a line and therefore if practical, drilling should be confined to those portions of the anomalous zones well defined by several lines. Also, it should be noted that a single line cannot define the strike direction of an elongate anomalous zone - another reason for utilizing several parallel lines.

5. Logging of the drill core <u>must</u> be done with special care to note the quantity of <u>all</u> possible polarizable material such as pyrite, graphite, magnetite, manganese oxides and clay minerals as well as the polarizable ore minerals. The anomalous source could conceivably be overlooked if the core is not carefully logged.

6. Typical sections of core representing the gross physical properties of material encountered in the drilling should be tested in the laboratory for their I.P. parameters, if there is some doubt about confirmation of the anomalous source.

INTERPRETATION

Line OE/W (Spread 1, a = 1000', Spreads 2 & 3, a = 500'):

The detailed coverage on Spreads 2 & 3 defines a moderately strong, narrow (about 500' in width) near surface and somewhat depth limited anomaly whose source is indicated near 20N and is associated with a self potential low suggestive of relatively interconnected, actively oxidizing sulfides. Depth to the top of this anomaly source is likely less than 150 feet and the source probably continues to 300 or 400 feet below surface where it becomes weaker in indicated strength of mineralization. This somewhat reduced indicated mineralization may persist indefinitely below the near surface body and in fact may persist below 1500 feet based on the 1000 foot dipole coverage. There is even some indication that the overall sulfide content may increase again below about 1000 feet in depth.

North of this moderate strength anomaly, the response fairly rapidly decreases to background near 27.5N. A minor probably very narrow source anomaly is noted near 45N and is apparently quite limited in size since it is not observed on nearby parallel traverses.

South of the moderate anomaly the response more gradationally diminishes to very weak in strength from 12.5N to 2.5S where slightly increased response is noted continuing to about 10S. This minor increase in anomalism is probably caused by a zone roughly 500 feet in width, coming to within 150 feet of the surface but having very good depth persistence. South of 15S very uniform background is noted.

The deeper penetrating 1000 foot dipole coverage shows a zone between about ON/S to 25N of moderate strength I.P. response having very good depth persistence and a sharp cutoff to background to the north and a gradational decrease to the south.

In the area of the moderate anomalism, there is some evidence of a fairly steep southerly dip of the overall mineralization. This may explain in part why DH-2 intersected interesting mineralization shallower than DH-1. Both of these drill holes appear to be within the zone of stronger anomalism but DH-1 is quite near the southern fringe and this may also explain why less mineralization was intersected compared to DH-2 which is more centrally situated in the anomalous zone.

This deeper information suggests that the shallow anomalies seen near 20N and 7S on Spreads 2 and 3 are continuous with and just projections of the broad deeper main anomaly.

The resistivity is quite uniform on this Line. A minor low correlates with portions of the stronger I.P. zone. The weak zone near 7S appears to relate to an area slightly higher in resistivity perhaps due to silicification or simply less fractured, tighter rock. The self potential shows a general low over the entire width of the complete I.P. anomaly but with a pronounced fairly narrow low relating to the shallow moderate strength I.P. anomaly at 20N on Spread 2 likely reflecting the near surface oxidizing concentrated sulfides in that area.

Line 10E (Spread 1, a = 1000', Spreads 2 & 3, a = 500'):

The I.P. response on the Line is quite similar to that seen on Line OE/W, but is somewhat stronger, in fact the strongest seen on the survey. There is a rather pronounced resistivity low associated with the stronger I.P. response which lies mainly between 7.5N and 20N. A definite self potential low also correlates with the stronger I.P. effects. Again there seems to be several near surface zones of concentrated sulfide merging at depth with the main broad anomaly. The strongest of these shallow zones appears to originate from near 17.5N and to progressively become deeper to the south. Another, but weaker, near surface zone is noted near 7.5S correlating with a similar anomaly 1000 feet to the west on Line OE/W. Resistivities on this line are more erratic, at least on Spread 2, than on Line OE/W perhaps due in part to topographic ridge effects.

Line 20E (Spread 1, a = 1000'):

Line 20E shows a good correlation to Line 10E, Spread 1 except for being somewhat weaker in I.P. response and indicating about 300 to 500 feet to the top of the main concentration of mineralization instead of less than 150 feet as on Line 10E. Also, the two near surface projections noted on the two lines directly west are no longer evident. There is still a broad self potential low and a minor resistivity low correlating with the stronger I.P. effects which lie mostly between ON/S and 15N.

Line 30E (Spread 1, a = 1000'):

This Spread shows a well defined I.P. anomaly whose source is mainly between 20S and 15N and having a moderate strength core from 10S to 5N obviously correlating with the moderate zone on Line 20E but displaced about 1000 feet to the south. Depth to the source and anomaly strength is similar to Line 20E and again there are

associated resistivity and self potential lows.

The extreme north end of this line and Line 20E show lower resistivities apparently related to relatively conductive gravels in the Gila River channel.

Line 40E (Spread 1, a = 1000'):

As on Line 30E, a well defined anomaly is seen between 20S and 15N. However this anomaly suggests a considerably deeper source than on Line 30E, perhaps in excess of 1000 feet to the zone of most concentrated sulfides. Weak mineralization may come to much closer to the surface, however. Again there is an associated broad self potential low. Minor zones of high and low resistivity are seen to relate to the I.P. anomaly.

Line 50E (Spread 1, a = 1000'):

A very deep source is indicated on this Spread, perhaps in excess of 1500 feet below surface, and likely correlating with the deep response noted on Line 40E. A broad self potential low and erratic resistivities are associated. As on Line 40E, weak sulfides may be present much shallower than the indicated depth to the main concentration of mineralization.

Line 10W (Spread 1, a = 1000', Spreads 2 & 3, a = 500'):

Line 10W shows a fair degree of pattern correlation with Line OE/W but is quite a bit weaker in strength of I.P. response and somewhat deeper appearing. The near surface anomaly near 20N is much subdued and has almost completely merged with the main broad anomaly. At depth, on the 1000 foot dipole coverage, the response is nearly as strong as data from a similar depth on Line OE/W and is therefore of some interest. It is possible however, that the response at depth is actually a lateral effect from mineralization east of the line near Line OE/W.

The resistivities are fairly uniform and show no obvious correlation with the I.P. response. The self potential also shows no well defined relation to the I.P. response.

Line 20W (Spread 1, a = 1000'):

The I.P. response on this line is quite similar to that noted on Line 10W in strength (except at depth where it is weaker), position, shape and indicated depths. However, there is a pronounced resistivity high centered near ON/S which gives some complexity

to the MCF pattern. This resistivity high may be caused by a quartz monzonite or aplite dike as indicated on the Geologic Map by Mr. T.L. Hanks. There is no obvious significant appearing sulfide response from this dike based on the I.P. data. No self potential data was obtained on this line due to improperly balanced non-polarizing electrodes.

Line 30W (Spread 1, a = 1000'):

An I.P. anomaly centered near 10N similar to that on Line 20W is noted but which is somewhat deeper and narrower. The resistivities are quite complex and again show a high area near 0N/S perhaps caused by the same dike as on Line 20W. Another resistivity high is noted near 20N which is likely related to the high ridge topographic effects and/or erosionally resistant, tighter, less conductive material. A broad self potential low is apparently related to the zone of increased I.P. response.

Line 40W (Spread 1, a = 1000'):

This line shows only very weak and very deep appearing I.P. effects. The depth to the causative source may be in excess of 1200 feet in the vicinity of 5N but the source is likely a portion of the same sulfide zone seen on lines to the east. A minor but more shallow appearing anomaly is noted south of 15S. There is no obvious resistivity correlation but a broad self potential low seems to relate to the 5N I.P. zone. There is a very high zone of resistivity near 30N again apparently reflecting the high topographic ridge in that area.

Line 50W (Spread 1, a = 1000'):

Very similar I.P. effects are seen here compared to Line 40W with deep response below about 5N and more shallow but still very weak effects south thereof. The resistivity is erratic but still shows very high values crossing the ridge near 35N. A near surface conductive zone is present roughly between 25S and 5N perhaps reflecting more deeply weathered material. No significant self potential effects are seen along the traverse.

Respectfully submitted:

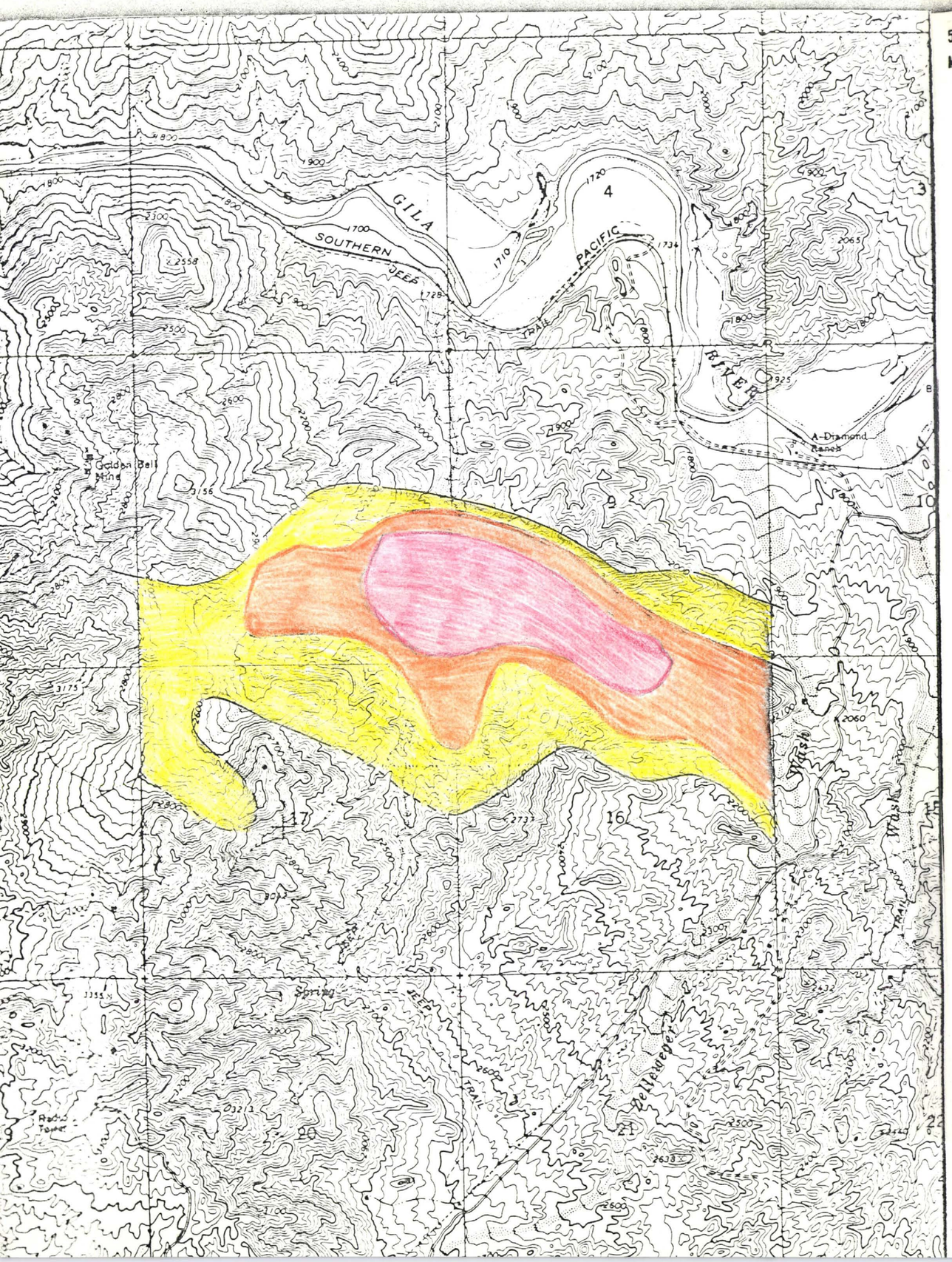
HEINRICHS GEOEXPLORATION COMPANY

Chris S. Ludwig

Chris S. Ludwig
Senior Geophysicist

APPROVED: _____
Walter E. Heinrichs, Jr.
President

May 22, 1970
Tucson, Arizona



516-70
MAY 1970

TOPOGRAPHIC MAP
of
THE KELVIN AREA
PINAL COUNTY, ARIZONA
for
TIPPERARY RESOURCES CORPORATION
by
HEINRICHS GEOEXPLORATION COMPANY

ZONES OF EQUAL RELATIVE ANOMALY STRENGTH
BASED ON a 1000' DATA:

- MODERATE
- WEAK
- VERY WEAK

NOTE: This map is a portion of U.S.G.S. Grayback quadrangle, 7.5 minute series (scale 1:24 000) 1964.

TRC 6-18-70

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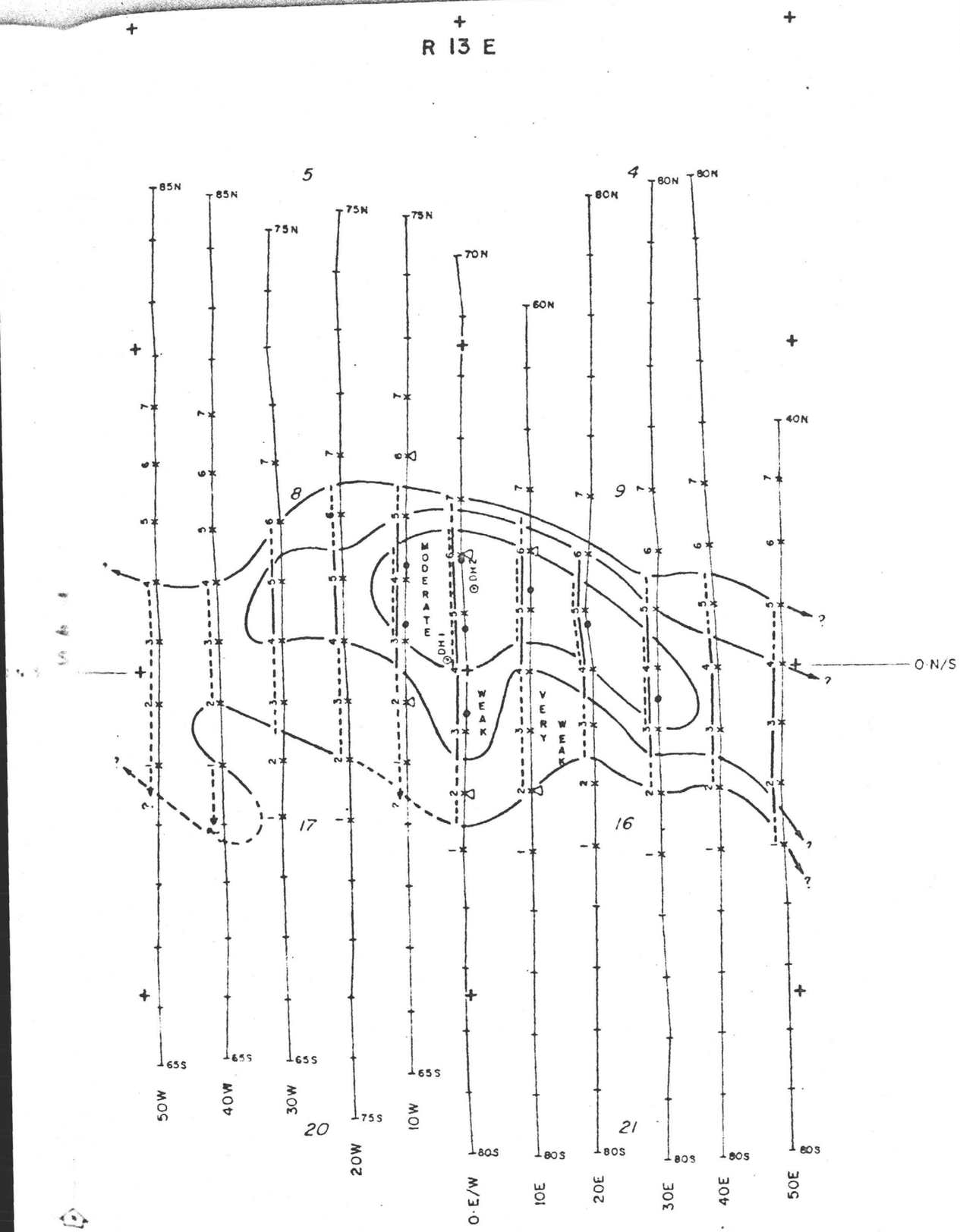
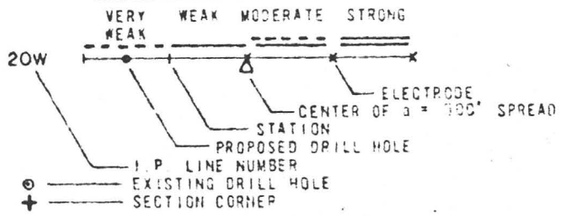
516-70
MAY 19.

INDUCED POLARIZATION LOCATION AND INTERPRETATION PLAN
of
THE KELVIN AREA
PINAL COUNTY, ARIZONA
for
TIPPERARY RESOURCES CORPORATION
by
HEINRICHS GEOEXPLORATION COMPANY



Moderate - Red
Weak - ORANGE
Very weak - Yellow

RELATIVE ANOMALY STRENGTH



NOTE: This sheet overlays U.S.G.S Grayback quadrangle 7.5 minute series (scale 1:24 000) 1964.

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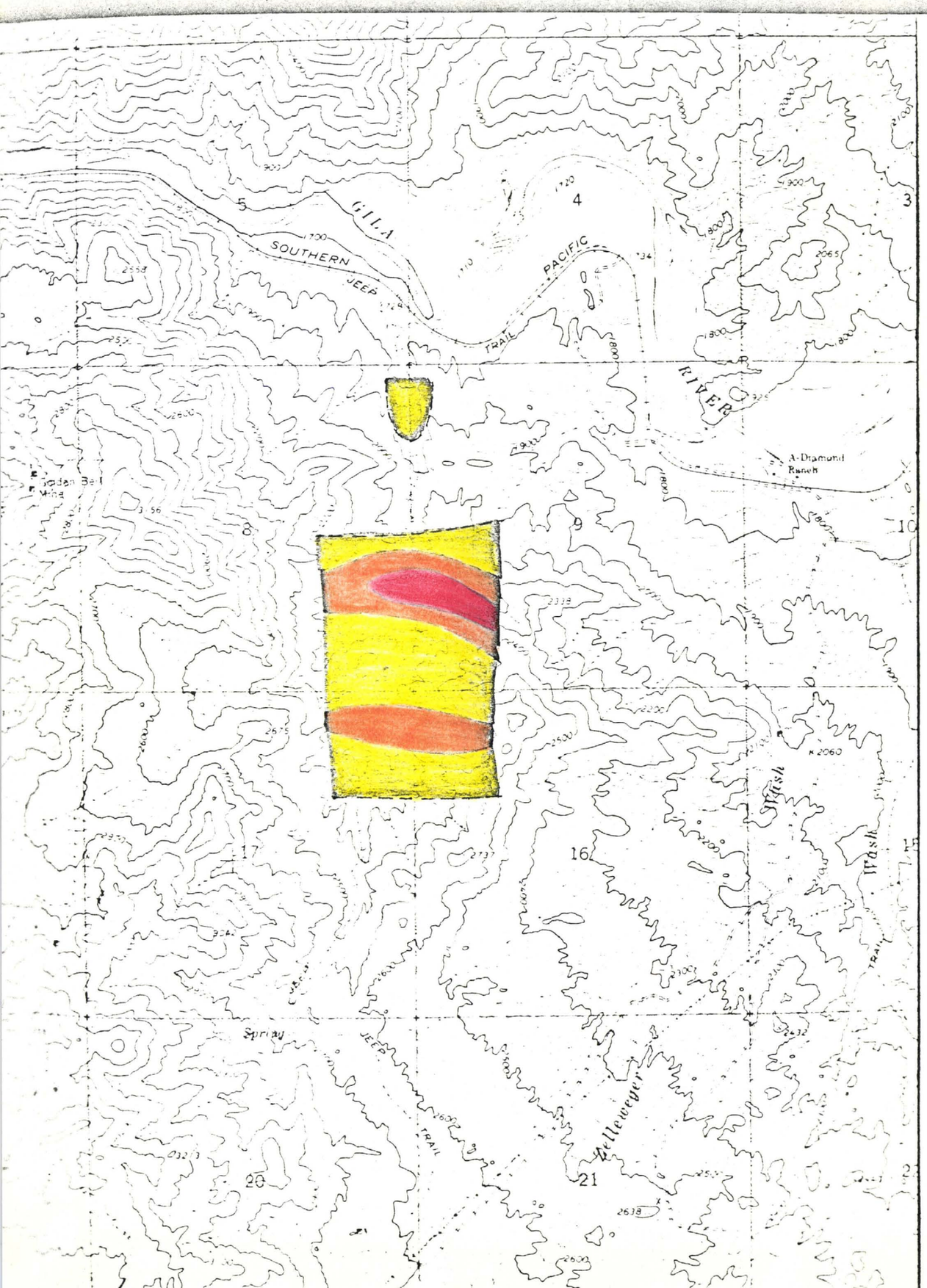
MAY 1970



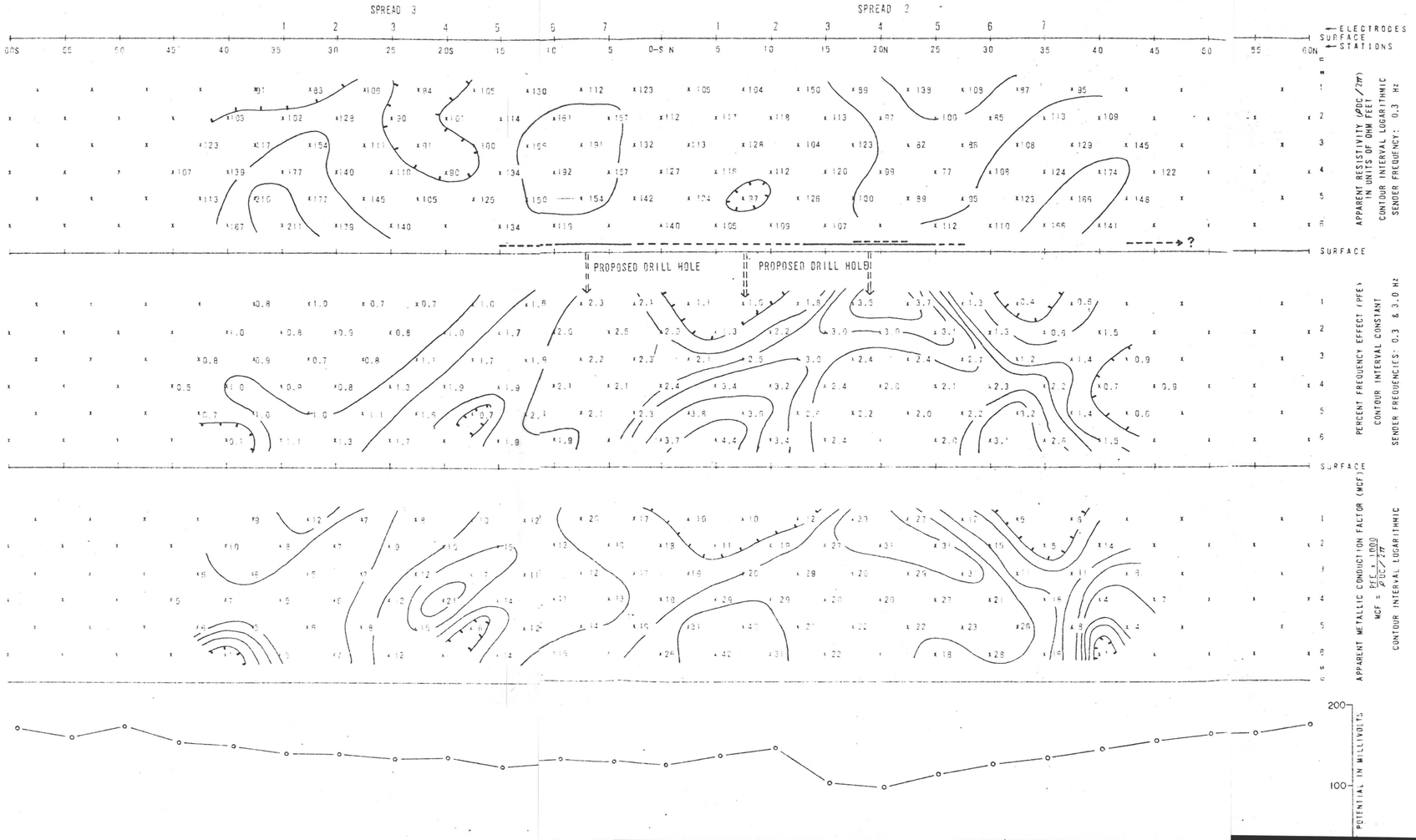
TOPOGRAPHIC MAP
of
THE KELVIN AREA
PINAL COUNTY, ARIZONA
for
TIPPERARY RESOURCES CORPORATION
by
HEINRICHS GEOEXPLORATION COMPANY

ONES OF EQUAL RELATIVE ANOMALY STRENGTH
ASED ON a =1000' DATA:

- MODERATE
- WEAK
- VERY WEAK

OTE: This map is a portion of U.S.G.S. Grayback quadrangle, 7.5 minute series (scale 1:24 000) 1964.

HEINRICHS
GEOEXPLORATION COMPANY
POST OFFICE BOX 5964, TUCSON, ARIZONA, 85703
Phone: 602/623-0578 Cable: GEOEX, Tucson
vancouver



516-70

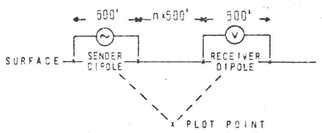
LINE NO.
0 E/W
SPREAD(S)
2 & 3

INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY

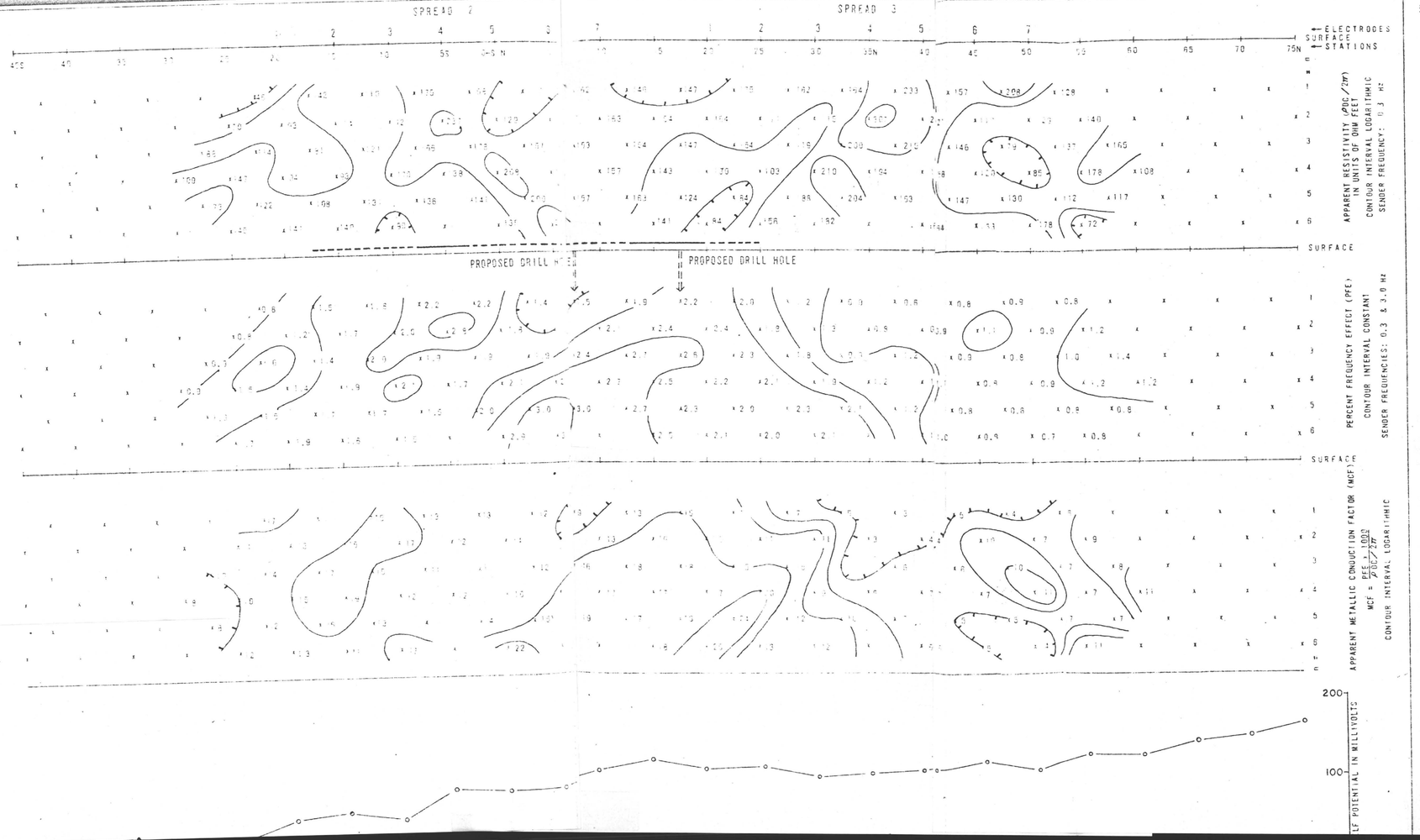


AREA
KELVIN

LOOKING
WEST

DATE
MARCH 1970

HEINRICHS
GEOEXPLORATION COMPANY
GEOPHYSICAL ENGINEERS
AUSTRALIA
(SYDNEY)
39 Hume Street,
Crows Nest, NSW
Phone: 439-1793
U.S.A.
Post Office Box 5964
Tucson, Arizona 85703
Phone: (602) 623-0578
Cable: GEOEX, Tucson



516-70

LINE NO.
10W

SPREAD(S)
2 & 3

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RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

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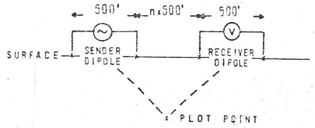

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AUSTRALIA (SYDNEY) 39 Hume Street Crows Nest, NSW Phone: 439-1793
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316 70

LINE NO.
10E
SPREAD(S)
2&3

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RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

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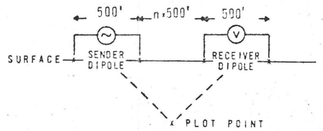

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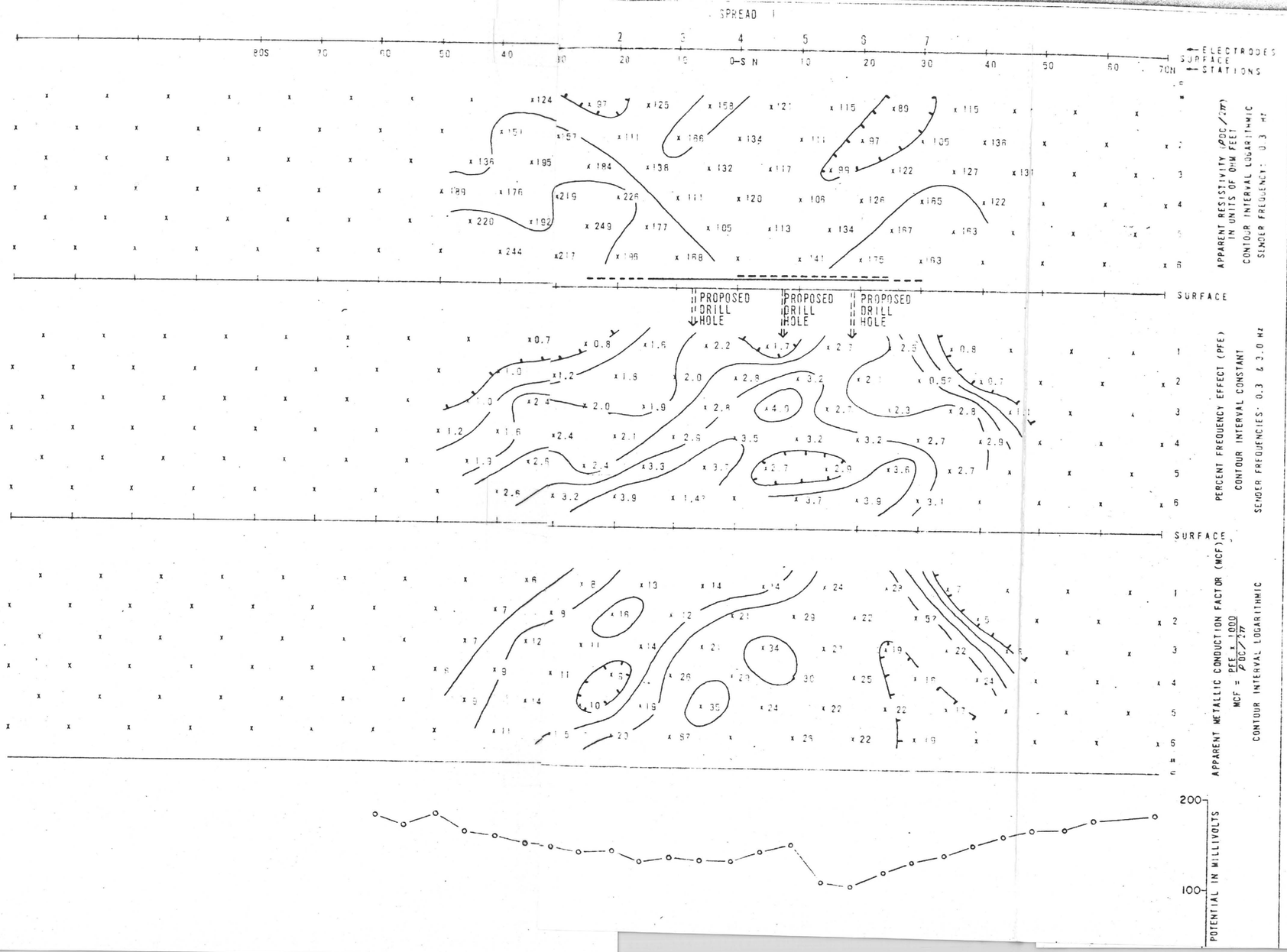

516

INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

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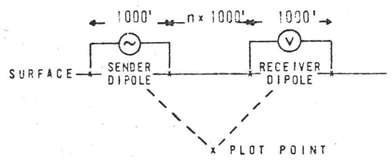

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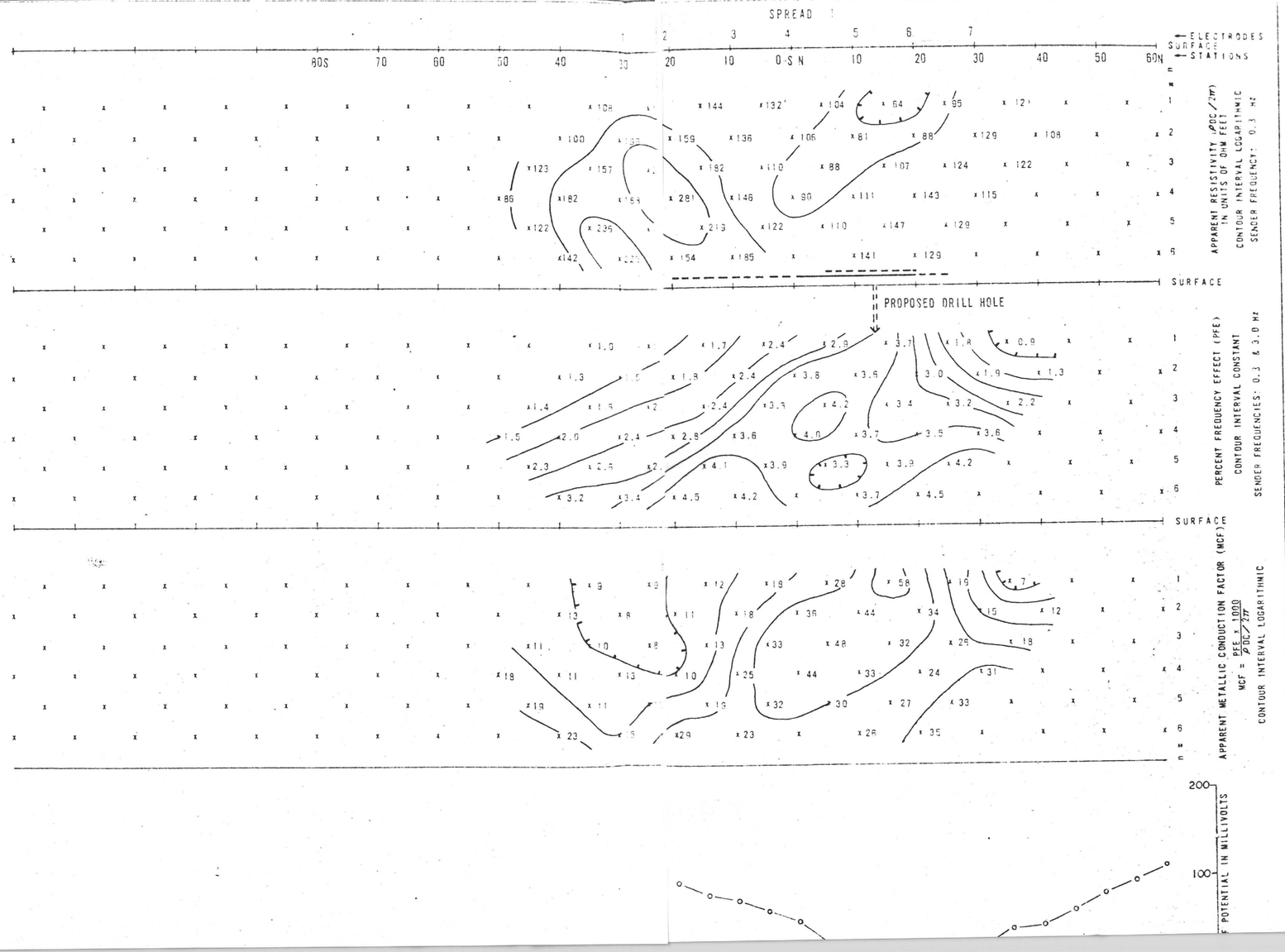

5 6-70

LINE NO.
10E
SPREAD(S)
1

INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

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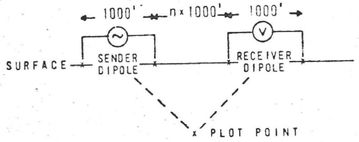

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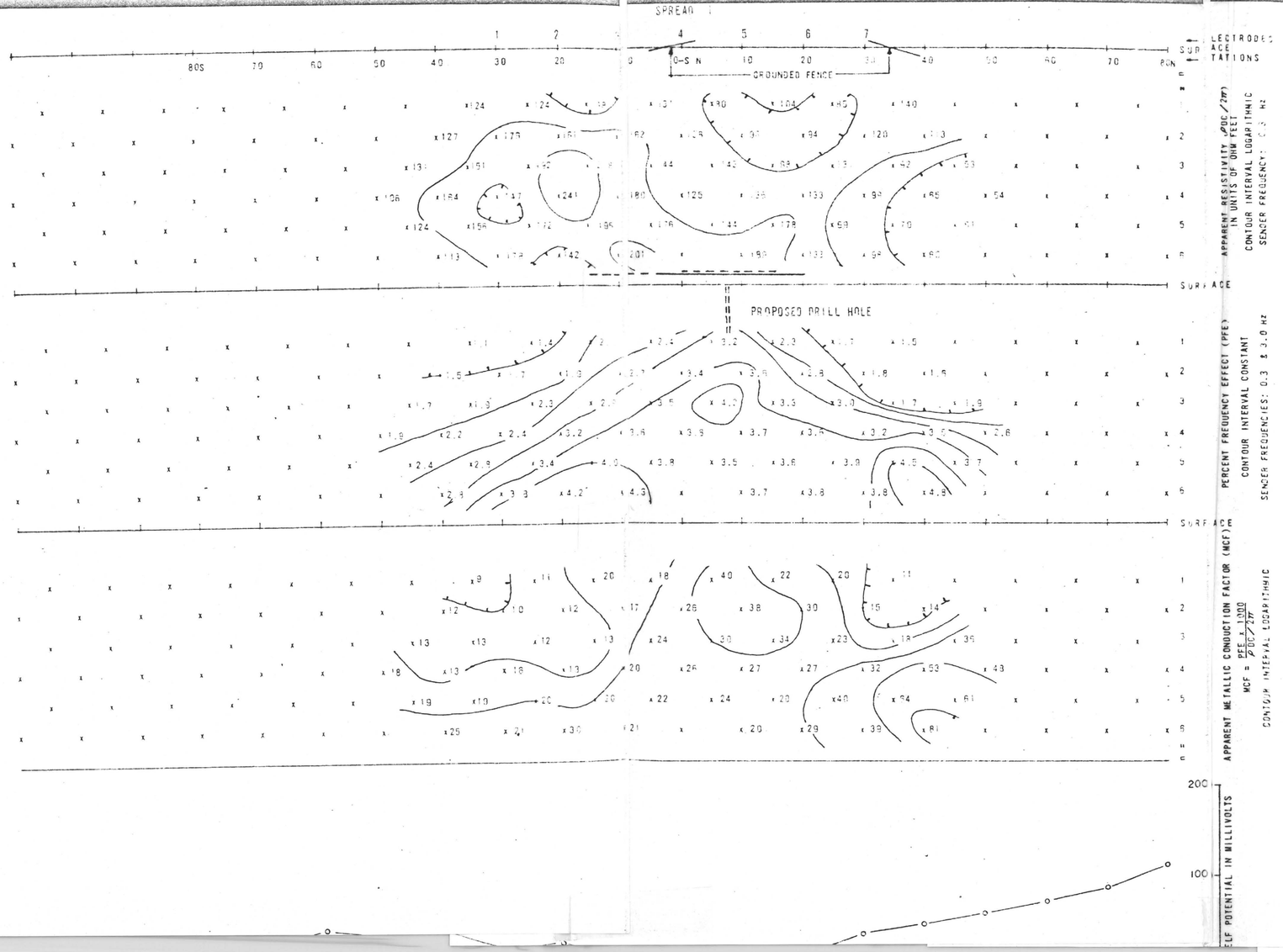

516-70

LINE NO.
20E
SPREAD(S)
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INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET
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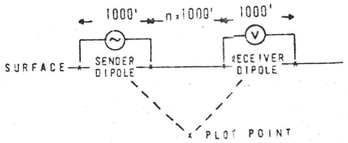
DIPOLE DIPOLE ELECTRODE ARRAY



AREA
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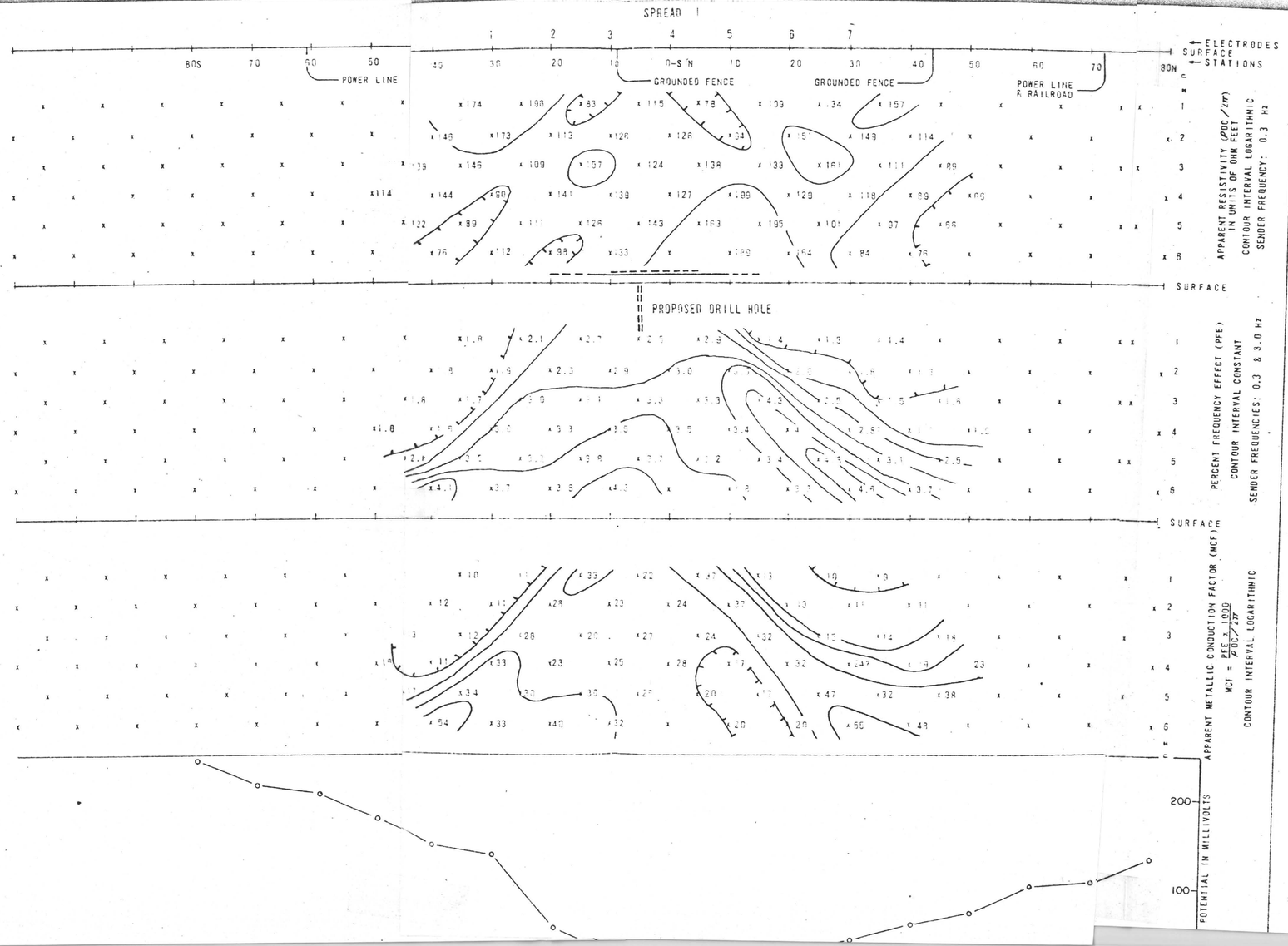


516-70

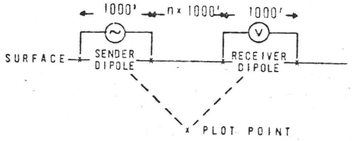
LINE NO.
30E
SPREAD(S)
1

INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



AREA
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DATE
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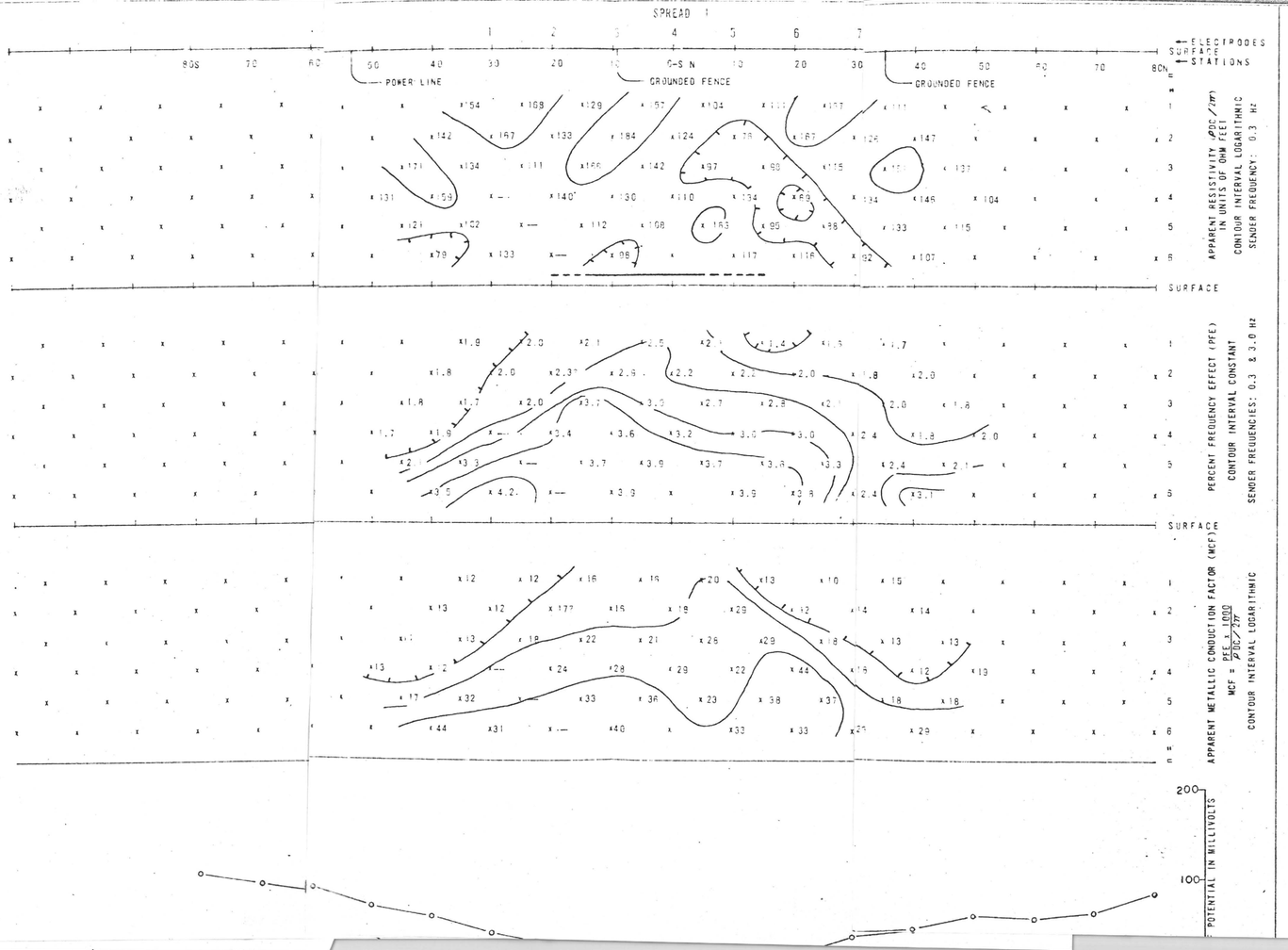


516-70

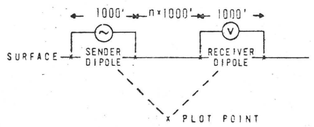
LINE NO.
40E
SPREAD(S)
1

INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



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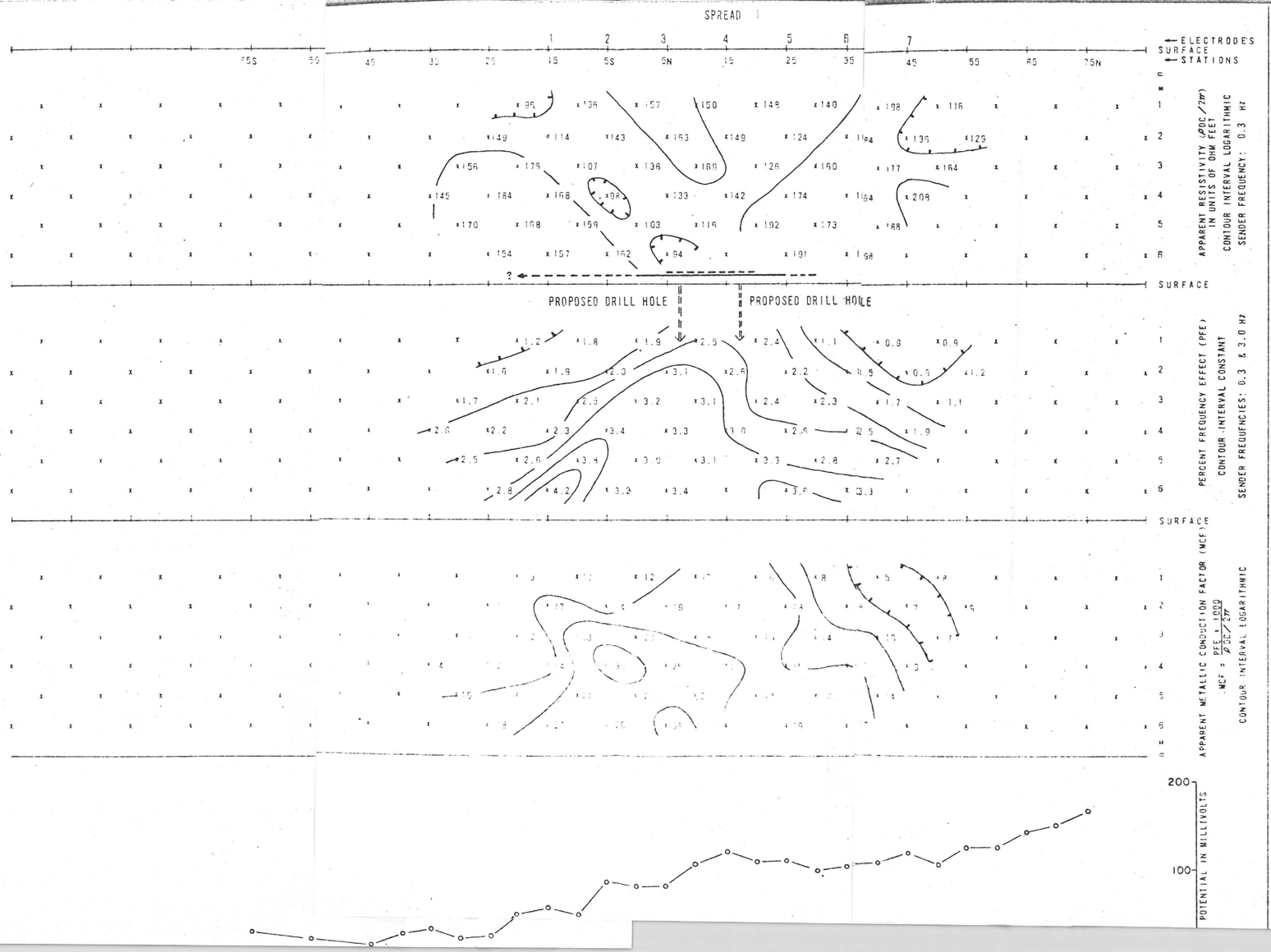


516-70

LINE NO. 10W

SPREAD(S) 1

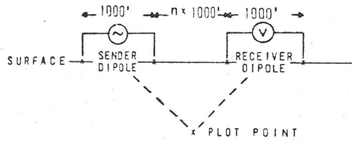
INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for

TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



AREA

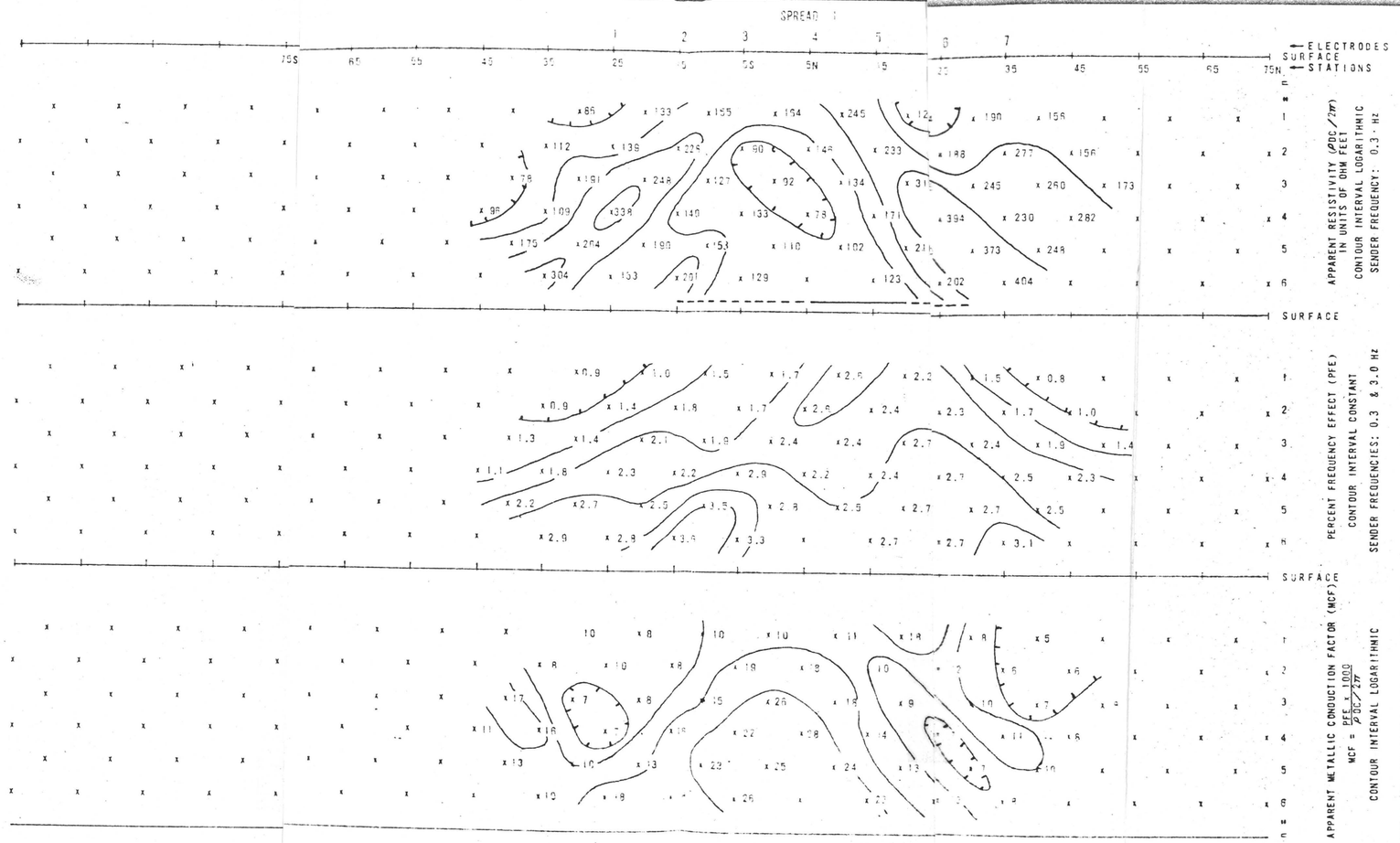
KELVIN

LOOKING WEST

DATE

MARCH 1970

HEINRICHS
GEOEXPLORATION COMPANY
GEOPHYSICAL ENGINEERS
AUSTRALIA (SYDNEY) 39 Hume Street Crows Nest, NSW Phone: 439-1793
U.S.A. Post Office Box 5964 Tucson, Arizona 85703 Phone: (602) 623-0578 Cable: GEOEX, Tucson



516-70

LINE NO.
20W
SPREAD(S)
1

INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

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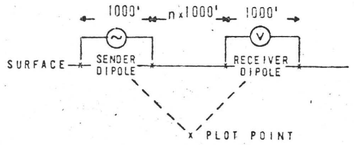
DIPOLE DIPOLE ELECTRODE ARRAY



AREA
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DATE
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GEOPHYSICAL ENGINEERS
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516-70

LINE NO.
30W
SPREAD(S)
1

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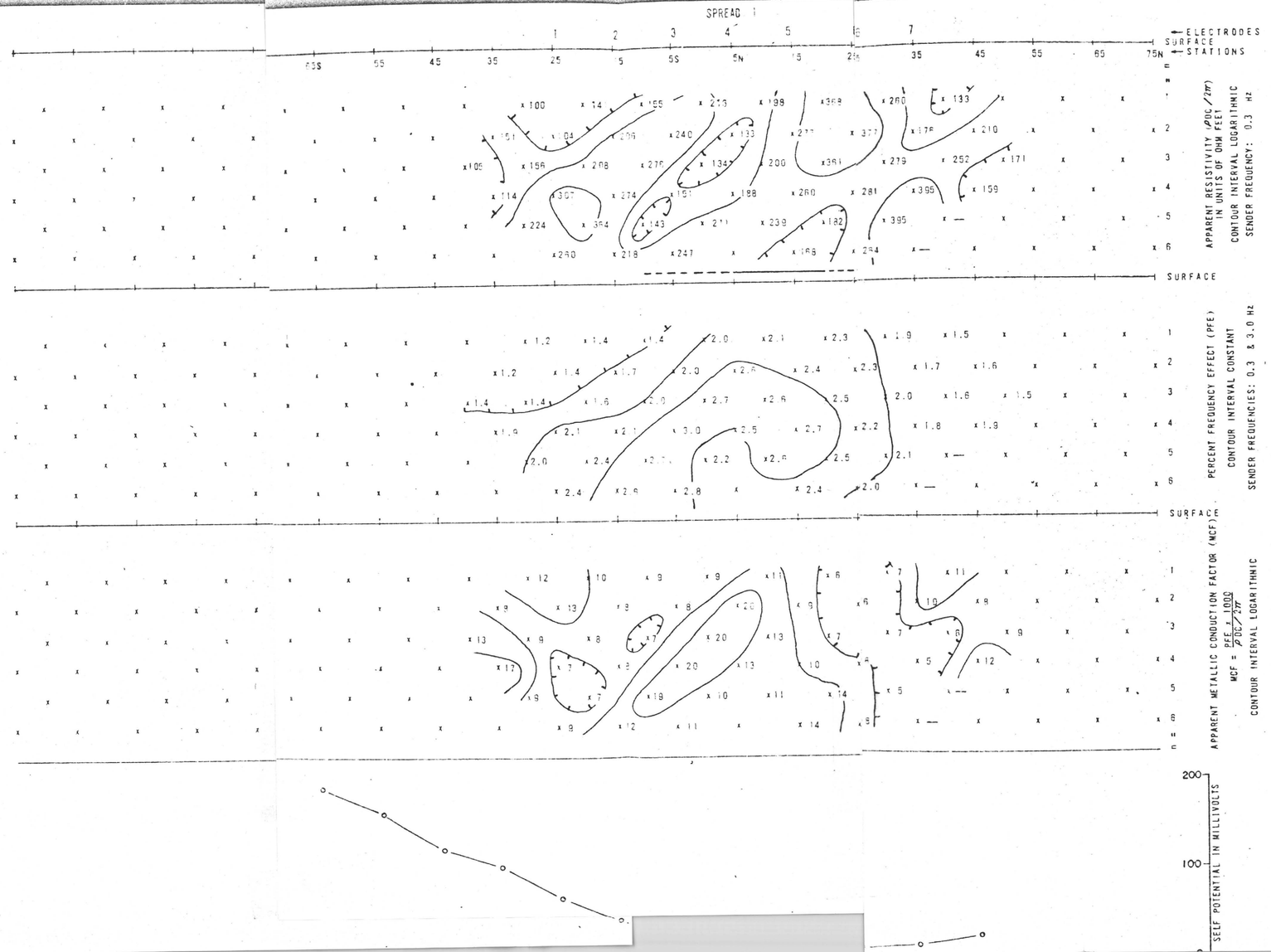

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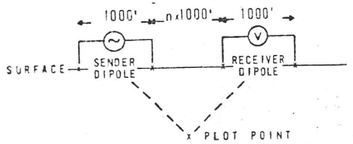

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GEOPHYSICAL ENGINEERS

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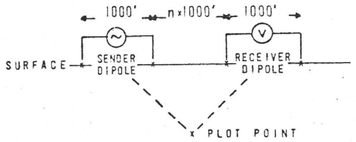

AREA
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DATE
MAY 1970

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GEOPHYSICAL ENGINEERS
AUSTRALIA
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39 Hume Street
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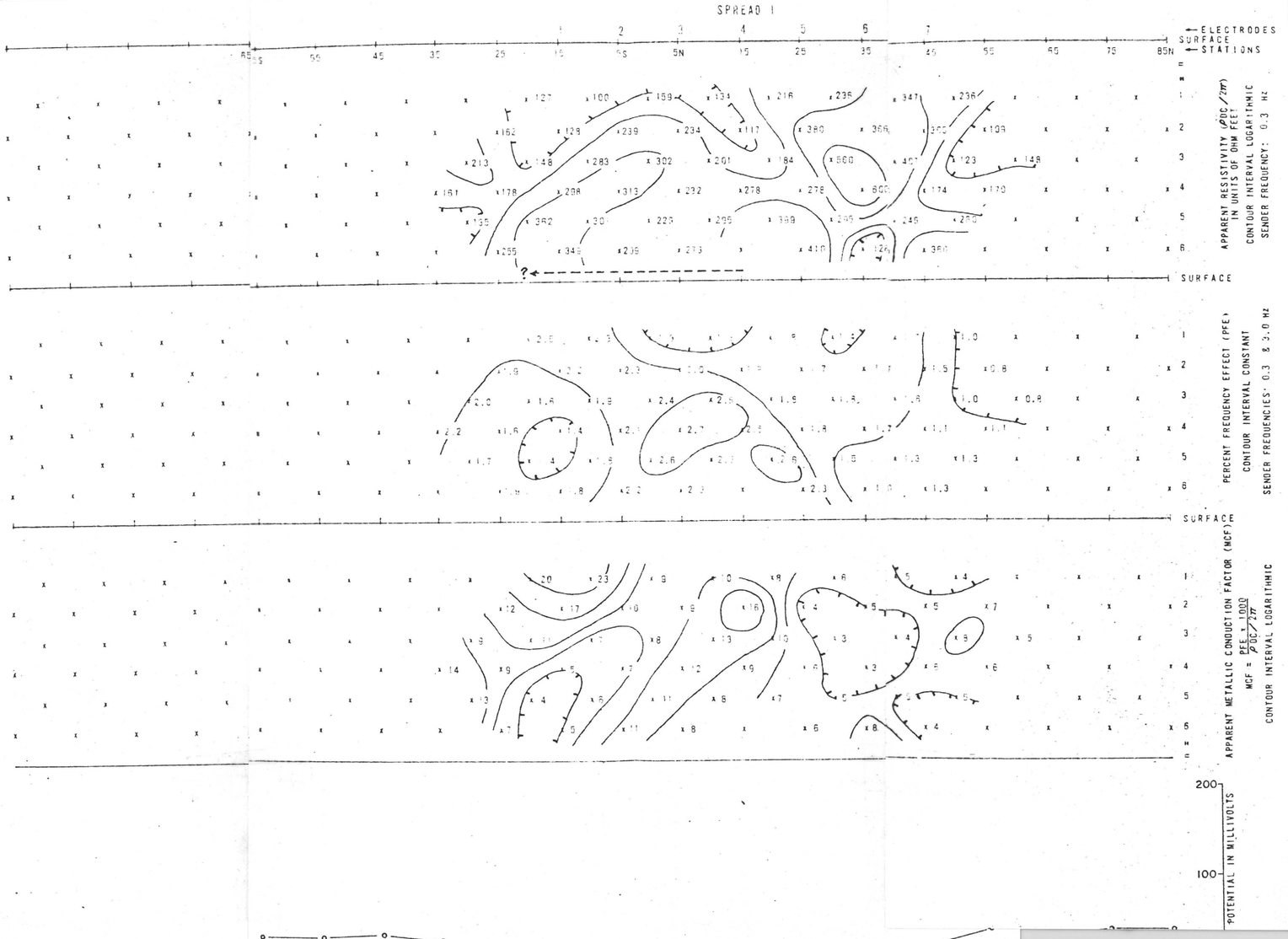

516-70

LINE NO.
50W
SPREAD(S)
1

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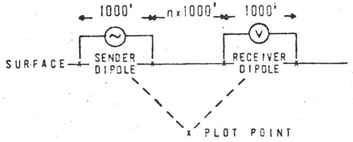

AREA
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Post Office Box 5964
Tucson, Arizona 85703
Phone: (602) 623-0578
Cable: GEOEX, Tucson

Lat & Long 33 - 34 111°

TO: Mr. Boltz and Mr. Miller

FROM: Lou Purigraski

J.P.

Please use my name in calling Mr. Arlen Edgar, Tipperary Land and Resources Company, Midland, Texas, telephone 915-684-7151.

They have drilled near Kearny, Arizona, and have a tremendous potential of ore. (Copper) They are going to joint venture. I have discussed this with Mr. C. R. Williams, Exploration Manager, Chief Geologist for Tipperary. I have recommended NDI for this. I recommend this call to Mr. Edgar to open discussion. What you work out with me will be acceptable.

Lou Purigraski
Tele 263-8546

P. S. They have complete reports, etc.

3 Sept 70

Called Edgar — he is sending reports on their Kearny properties

KB

REPLY
Phoenix

KELSEY L. BOLTZ
VICE PRESIDENT

October 9, 1970

Mr. Arlen L. Edgar, President
TIPPERARY RESOURCES CORPORATION
500 West Illinois
Midland, Texas 79701

RE: Kelvin Copper-Molybdenum Prospect
Pinal County, Arizona

Dear Mr. Edgar:

We have reviewed and copied the material submitted to us by you on September 4, 1970, and herewith return the originals to you.

While the material is very well presented, the prospect is one which does not fit our program at the present time.

We appreciate your consideration.

Very truly yours,

NUCLEAR DYNAMICS, INC.

Kelsey L. Boltz

Kelsey L. Boltz

KLB/plw

NUCLEAR DYNAMICS, INC. PHOENIX, ARIZONA 85036 • P. O. BOX 20766 • 2871 SKY HARBOR BLVD. • 602 : 267-0581
PRESCOTT, ARIZONA 86301 • P. O. BOX 2337 • 100 UNION STREET • 602 : 445-0834

REPLY
Phoenix

KELSEY L. BOLTZ
VICE PRESIDENT

October 9, 1970

Mr. Arlen L. Edgar, President
TIPPERARY RESOURCES CORPORATION
500 West Illinois
Midland, Texas 79701

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Kelsey L. Boltz

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KLB/plw

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TIPPERARY RESOURCES CORPORATION
A Subsidiary of
TIPPERARY LAND & EXPLORATION CORPORATION
500 W. ILLINOIS — MIDLAND, TEXAS 79701

A. L. EDGAR
President

PHONE 915 684-7151
TELEX 743414

September 4, 1970

Mr. Kelsey Boltz
Nuclear Dynamics, Inc.
2871 Sky Harbor Blvd.
Phoenix, Arizona 85034

Subject: Kelvin Copper-Molybdenum Prospect
Pinal County, Arizona

Dear Sir:

In accordance with my conversation with you on September 3, submitted herewith are the following reports prepared by Tipperary:

(1) Volume I, Kelvin Geological Report

(2) Volume II, Kelvin Geophysical Report

In addition, a report entitled "Volume III - Petrographic Examination of 16 Rocks", prepared by Colorado School of Mines Research Institute, is available for your review.

We believe results of our exploration program to date, as contained in the above material, justify additional exploration efforts. We are interested in obtaining a joint venture partner and in undertaking additional work. Our terms of joint venture participation are as follows:

1. You are to reimburse Tipperary in the amount of $100,000 representing approximately 90 percent of exploration costs to date.

2. Cost of future exploration and definition work and a feasibility study are to be borne 90 percent by you and 10 percent by Tipperary. Salaries, salary burdens and travel expenses attributable to Tipperary personnel will be charged to the joint venture account at cost.

3. By bearing costs as set out in (1) and (2) above, you earn a 60 percent interest in the prospect. Costs

incurred subsequent to the feasibility study will be borne 60 percent by you and 40 percent by Tipperary. Revenue likewise will be shared on a 60/40 basis with each party bearing its proportionate share of royalty, operating costs and other burdens.

If you wish to discuss this prospect in more detail with our personnel or to inspect the property in person, please advise and appropriate arrangements will be made.

Yours very truly,

Arlen L. Edgar

Arlen L. Edgar

ALE:jm

encl.

KELVIN PROSPECT - HOLE No. 1		TD 1400'	Mar. 5, 1970		
	Rock Type	Location: 125' FSL & 300' FEL of Section 8, T 4 S, R 13 E, PINAL CO., ARIZONA — Description	ASSAY DATA Cu	Mo	Cu eq
0		Alluvium: Med-crs frags granite, diabase, diorite, quartz			
5					
10					
15	Qal				
20					
25					
30					
35		P€ granite: wht qtz, orang orth feld, tr biot, 10%			
40		grn chlorite, tr micro fract w/iron stns.			
45		gran: qtz, orth hily alt, tr chlor biot, hvly chloritized, micro fracts w/iron stn.			
50		gran: inc qtz, som sec. qtz, Fe stn, alt orth, chlorite, tr py, tr qtz vng.			
55		aa tr py, cpy			
60		gran aa			
65		gran w/inc chlor (15%) sec qtz tr py (orth, qtz, chlor)			
70		gran w/tr cpy, py, tr Mo (orth, qtz, chlor)			
75		chloritic granite w qtz & orth, orth boundaries indistinct som alt			
80	P€gn	gran aa w/stgrs alt diabase (amph & chlor) chlr cutting orth.			
85		aa tr py few chlor pods replcg biot.			
90		aa stgrs chl cutting orth, feld, qtz dominant			
95		aa 20% chl, 20% feld, 60% qtz.			
100		gran, inc in qtz 70%, 20% chlor, 10% feld.			
105		aa, tr slickensides, micro fract			
110		gran 20% feld 20% chlor, 60% qtz, tr micro fract			
115		aa, abt py, tr cpy, inc fracts			
120		gran w/microfracts, qtz veins; gran, gry-grn w/chlor,	.017	.010	
125		orth, qtz, hvly chloritized gran, comp of orth, qtz	.027	.010	
130		aa chlor stgrs crs cutg orth	.418	.040	.6
135		gran to 138 gran w/dissem py, cpy, mo to 140, sml cpy rimmed w/Mo. 1% Sul.	.800	.069	1.15
140		Mo, cpy 1% in gran as dissem on feld & in qtz, ct diabase dike @144	.097	.010	
145	Db	black diabase dike w/stgrs qtz, cpy, Py	.058	.010	
150		diabase to 153, ct w/gran to 155 hvly chloritized qtz, orth	.064	.023	.16
155		chloritized gran			
160		Chlor granite w/abt py			
165		aa gran w/chlor, bio, tr pyr, cpyr			
170		gran w/bt, >chl & feld. <1% pyr & cp			
175		gran w/bt trace cp & py			
180		gran w <1% py, tr bt & chl			
185	P€gn	gran w/chlor, py, <1% plag, bio, tr cp			
190		chlor gran tr py Fe color			
195		gran 20% chlor 20% orth 60% qtz tr py cp bi plag			
200		chl gran no orth Fe color			
205		gran w/chl, Fe color, sil			
210		chl gram, tr Fe color, sil			
215		chl sil gran, tr cp & py, little orth			
220		gran upper sil & alt, lower fresh feld			
225		monz dike 10% bt, 20% feld, 70% qtz, feld alt tr py			
230		gran w/chl			
235		monz w/Cu, 1% bt, plag			
240		Chl, monz			
245		chl, monz, bt books, tr py bt partly chl			
250		chl, monz, py dissem & stringers, some orth			
255		monz w/orth, pyr stringers			
260		monz qtz 50% wht plag 30% bi 10% chlor 10% orth <1%			
265		monz aa			
270		monz w/tr chl & Fe color			
275		monz w/tr py			
280		monz w/Fe stain & chl bt			
285		monz, bt fresh w/chl			
290		monz, tr Fe stain & py w/chl			
295		monz, tr Fe stain, chl			
300		monz, tr Fe stain			
305		monz bt partly chl			
310		monz bt partly chl			
315		monz py stringer, bt chl			
320	Tm	monz, chl bt tr py			
325		monz			
330		monz w/bi chl tr py			
335					
340		monz w/bio chl, <1% orth			
345		monz w/bio chl, 1% orth			
350		monz, fe-st, tr py			
355		monz w/chl as flakes & diss on qtz, tr py			
360		monz, tr py on qtz			
365		monz <1% py 10% orth			
370		monz			
375		monz 5% orth, chl bt			
380		monz bt slightly chl			
385		monz, Fe stains			
390		monz bt partly chl			
395		monz			
400		monz, w/Fe stain			
405		monz			
410		monz w/slight Fe staining			
415		monz, bt sl chl			
420		monz abundant Fe stains on bt			
425		monz some Fe stains but bt fresh			
430		monz, tr Fe			
435		monz			
440		monz			
445		monz			
450		monz, Fe-st flakes from fracts			
455		monz, Qtz Fe-st bi ptly alt chl			
460		monz w/cpy py flakes w/cpy on mal from fract			
465		monz tr py cpy mal			
470		monz w/ ≈10% orth			
475		tr slickensides w/sul tr py cpy ≈10% orth			
480		tr py cpy on qtz, micro fract			
485		monz w/tr py			
490		monz tr Fe st bi partly alt chl			
495		monz, 70% qtz, 10% fldsp, 10% bi, 10% chl tr py			
500		monz			
505		monz, tr Fe-st on qtz, sul, tr py			
510		monz			
515	Tm	monz w/fresh bi tr py			
520		monz			
525		monz, ~60% qtz 20% fldsp 20% bi & chl, tr Fe-st			
530		monz, ~10% chl, <1% orth			
535		monz			
540		monz, striations on fresh plag, tr py w/Fe st rim in qtz			
545		monz tr py Fe-st			
		monz tr py cpy			
555		monz			
560		Monz, 10% bi, 5% chl			
565		Monz, Tr Fe stain & Py			
570		Monz, py stringers, tr cp			
575		Monz, tr py, chl bt			
580		Monz.			
585		Gran, tr Fe stain			
590		Monz, <5° orth			
595		Monz w/partly chl bt, no orth			
600		Monz, tr Fe stain			
605		Monz, tr Fe & py			
610		Monz, bt partly chl & some w/Fe stain			
615		Monz, Fe stains less bt			
620		Monz w/chl bt, tr py & cp			
625		Monz w/Fe stain, tr py cp, mo			
630		Monz w/Fe stain, <1% Mo, tr py			
635		Monz w/tr py & Fe			
640		Monz w/tr py, cp, Fe stain			
645		Monz w/<2% bt, Fe stain, light chl.			
650		Monz w/<2% bt			
655		Monz w/Fe stain			
660		Monz, Fe stain abundant			
665		Monz, chl bt			
670		Monz w/pipe dope, Fe stain			
675	Tm	Monz w/only tr Fe stain			
680		Monz w/Fe stain, chl bt			
685		Monz w/chl bt, tr Fe stain			
690		Monz w/Fe stain, chl bt			
695		Monz / tr Fe stain			
700		Monz w/almost no fresh bt			
705		Monz w/almost no fresh bt			
710		Monz w/almost no fresh bt			
715		Monz w/partly chl bt, tr Fe stain			
720		Monz w/chl bt Fe stain	.06	.023	.17
725		Monz w/tr Fe stain	.01	.184	.720
730		Monz w/chl bt	.01	.168	.840
735		Monz w/chl bt	.01	.068	.35
740		Monz w/tr mo, sil & alt, feld boundaries indistinct	.02	.010	.03
745		Monz w/<1% cp & py, tr Mo	.08	.010	.08
750		Monz w/tr py, Fe stain	.177	.555	2.94
755		Monz w/<1% Mo, <1% py and cp (Mo obvious)	.169	.329	1.81
760		Monz w/<1% Mo, cp, py	.798	.087	1.2
765		Monz w/≈1% Mo, Cp, py; no Fe	.632	.073	.98
770		Monz w/≈1% py, tr cp & Mo	.265	.019	.365
775		Monz w/≈1% py & cp, tr Mo	.818	.032	.97
780		Monz w/≈2% py & cp, tr Mo	.363	.039	.56
785		Monz <1% py & cp	.076	.024	.178
790		Monz w/partly chl bt, <1% py	.114	.010	.114
795		Monz w/tr py, fresh & chl bt	.058	.010	
800	Tm	Monz w/chl bt tr py			
805		Monz w/tr py & Fe stain			
810		Monz w/tr py			
815		Monz w/tr py			
820		Monz, bt mostly fresh			
825		Monz w/tr cpy			
830		Monz 10% chl <5% bi, tr py, cpy			
835		Monz w/tr py, cpy			
840		Monz w/tr py, cpy			
845		Monz, bi <1%, tr py, cpy			
850		Monz w/tr py, cpy			
855		Qtz monzonite, pfel & o-fel consid alt biot, alt to cl, tr cpy, py, Mo.			
860		Monz predom qtz minor o & plag biot alt to chlorite			
865		aa			
870		aa			
875		aa			
880		Qtz monz microfracts, biot alt to chlor <1% py cpy mo tr mo, cpy nat cu			
885		aa			
890		Qtz monz w/stgrs gran tr cpy			
895		Qtz monz w/biot alt to chlor			
900		aa tr Mo			
905		Qtz monz incl orth feld 5% predom qtz & chlor			
910		aa tr cpy, py			
915		918 qtz monz-granite contact monz predom qtz-chl/gran orth, qtz, chlor			
920		granite w/crs grn qtz, orth & chlor			
925		aa tr py			
930		gran w/milky qtz, or-pnk orthfeld grn chlor			
935		aa tr py			
940		aa tr py cpy			
945		aa			
950		gran milky qtz, sli alt orthfeld, grn chlorite(alt biot)			
955		aa som kaol alt			
960	P€gn	aa			
965		gran qtz alt feld, grn chlorite			
970		gran aa cut by few thin qtz stgrs carrying py, tr mo.			
975		gran w/milky qtz indistinct orth feld, biot, chlor tr apatite, tr cpy, py			
980		gran qtz orth chlor tr plag.			
985		inc plag, qtz monz			
990		inc plag, qtz monz, qtz, biot, tr orth, plag			
995		aa equal plag, orth			
1000		biotite, qtz monz, tr py, chlor			
1005		aa contact w/gran @ 1009			
1010		gran: qtz, orth, chlor			
1015		gran qtz, orth, biot, chlor			
1020		aa			
1025		aa tr py			
1030		granite, qtz, orth, biot alt to chlor			
1035		aa			
1040		aa			
1045		gran inc chlor, tr qtz vning feld 10% chlor 6% qtz			
1050		aa			
1055		gran inc orth feld 40% qtz 40% biot & chlor 20%			
1060		aa			
1065		aa 30% feld			
1070		aa 40% feld			
1075		aa inc 25% chl			
1080		aa			
1085		gran 35% feld 20% chlor, 45% qtz.			
1090		aa			
1095		gran 35-40% feld 10-20% chlor 45-55% qtz			
1100		gran 35-40% feld 10-20% chlor 45-55% qtz			
1105		20% chlor aa			
1110		larger orth phenocrysts, biot alt to chlorite tr py			
1115		gran aa			
1120		gran aa			
1125		gran aa tr py			
1130		gran w/dissem py tr py <1%			
1135		gran: qtz, orth, inc chlorite tr py, sph			
1140		gran: inc orth 50% qtz 40% chlor 10%			
1145		aa			
1150		aa tr py			
1155		gran aa inc 15% chlor			
1160		gran aa			
1165		aa			
1170		gran 40% orth 40% qtz 20% chlor			
1175		qtz, biot, chlor, plag, <15% orth tr py			
1180		crs grn qtz monz dike to 1181, gran to 85 w/tr py			
1185		gran w/1% sul			
1190		gran w/dissem py, cpy, bn, tr mo sulfides 1%			
1195		gran inc in plag dec in orth, gradational chg.			
1200		gran w/20% orth, 10% plag, 60% qtz, 10% chlor			
1205		aa, tr Fe stn, tr cpy, py			
1210		aa			
1215		gran w/60% qtz, 20% orth, 20% chlor, tr py dissem.			
1220		aa			
1225		gran 60% qtz, 25% orth, 15% chlorite			
1230		aa sli inc chlor			
1235	P€gn	aa tr py, cpy dissem			
1240		aa			
1245		gran, tr qtz stgrs, 60% qtz,30% orth,10% chlor & biot			
1250		aa tr py			
1255		gran aa inc 20% chlor, tr py dissem			
1260		aa: 15% chlor, tr py dissem			
1265		gran: 50% qtz, 35% orth, 15% chlor			
1270		gran: 55% orth, 30% qtz, 15% chlor			
1275		aa			
1280		gran: 40% orth			
1285		aa; tr qtz fracts			
1290		aa:, numerous qtz stgrs			
1295		aa:, tr cpy in qtz stgrs			
1300		gran; 35% orth, 50% qtz, 15% chlor, tr py			
1305		aa			
1310		aa			
1315		gran w/tr py			
1320		gran: 35% orth, 50% qtz, 15% chlor, tr py			
1325		gran: 30% pink orth, 50% qtz, 20% chlor			
1330		aa: tr qtz stgrs, tr cpy, py			
1335		gran aa			
1340		gran aa			
1345		gran: 15% orth, 70% qtz, 15% chlor, tr py, cpy			
1350		aa			
1355		gran: 20% orth, 70% qtz, 10% chlor, tr py			
1360		aa tr py			
1365		aa tr py, cpy			
1370		gran: 30% orth, 50% qtz, 20% chlor, tr py, cpy			
1375		aa			
1380		gran aa			
1385		aa: tr py, cpy			
1390		aa			
1395		gran aa tr py, cpy			
1400					

TD 1400' granite
6-5/8 casing @ 52' Temp Abd.

KELVIN PROSPECT - HOLE No. 2 TD 1625' Mar. 12, 1970

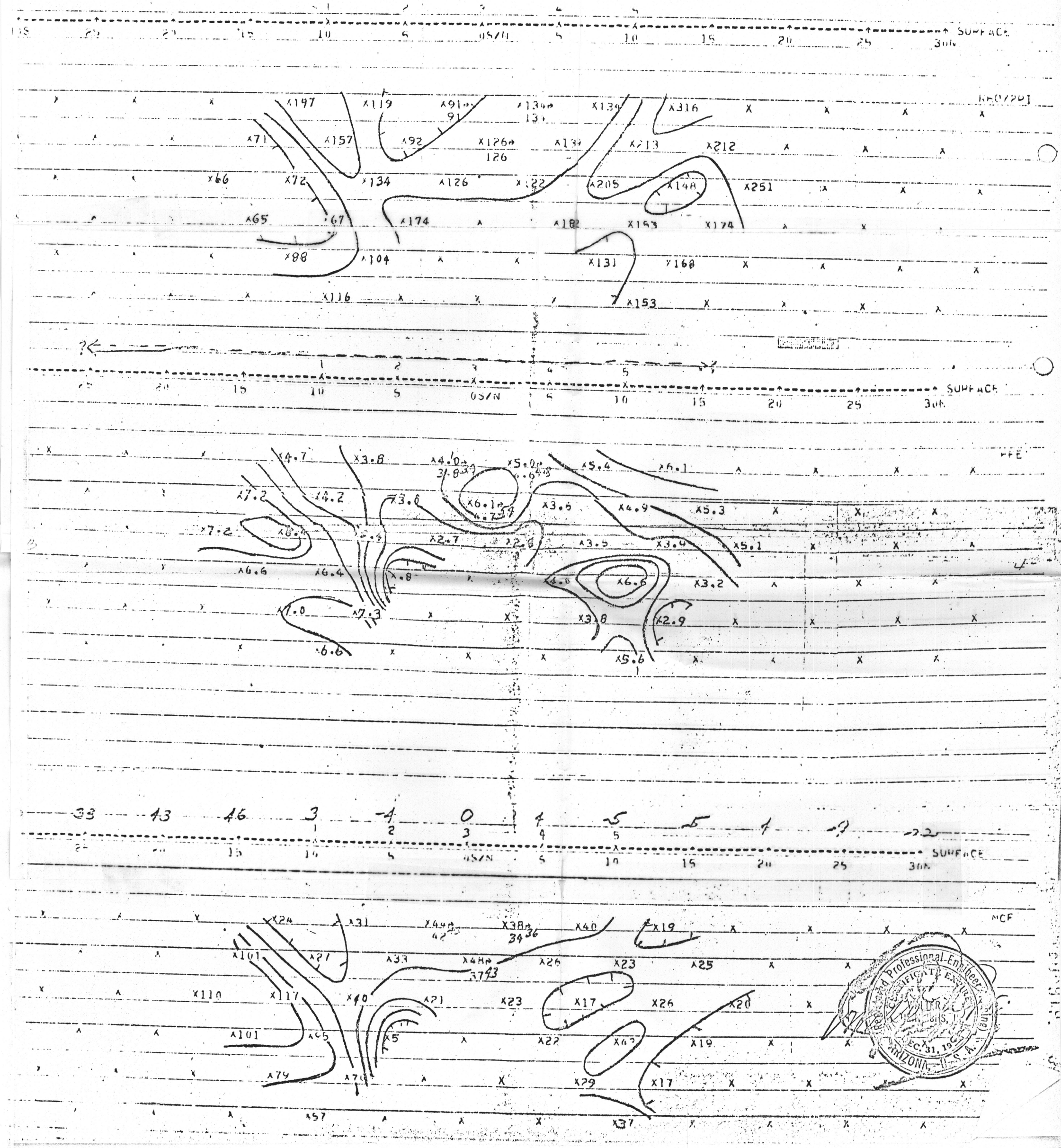
Location: 1260' FSL & 150' FWL of Section 9
T 4 S, R 13 E, PINAL CO., ARIZONA

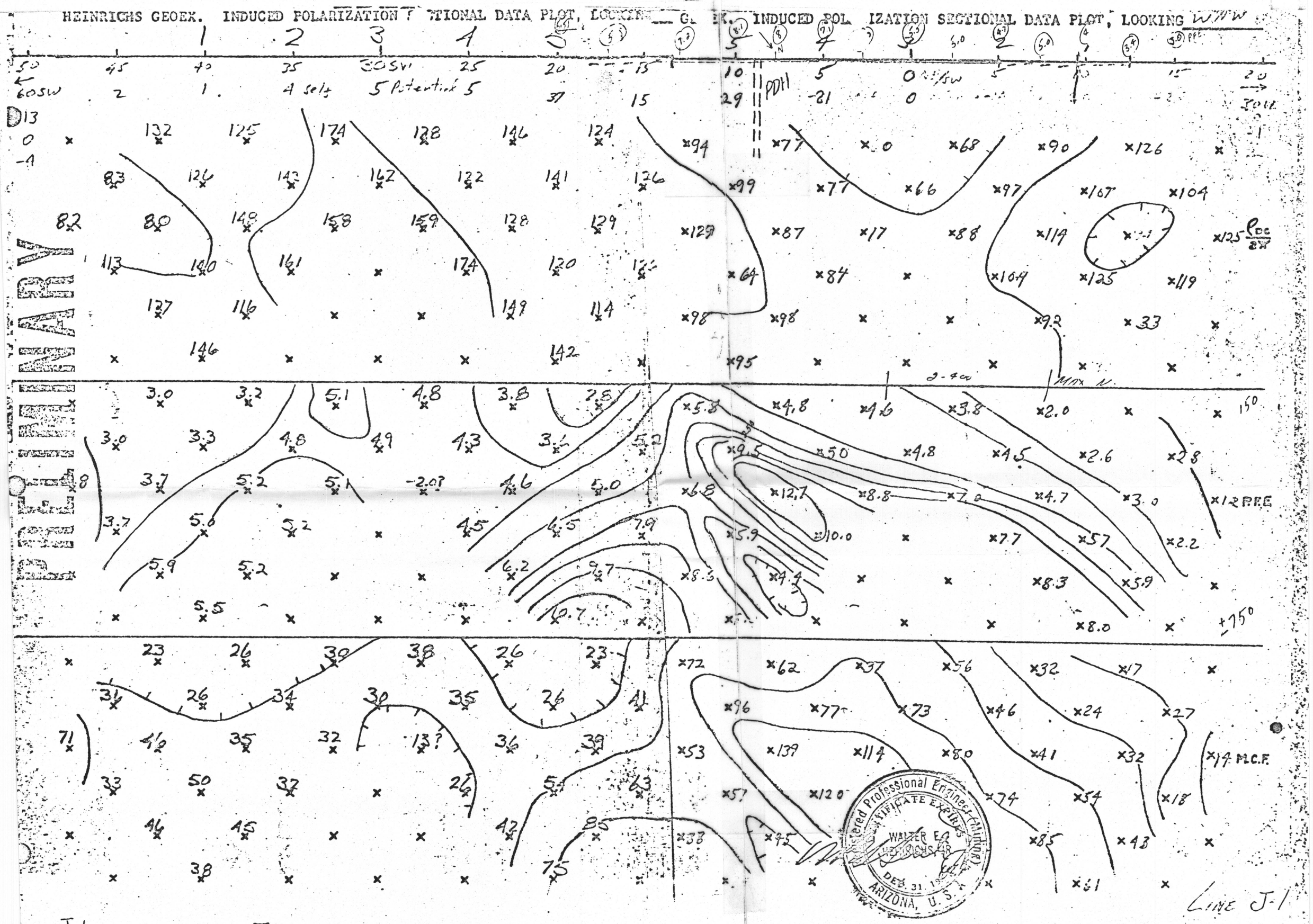
Depth	Rock Type	Description	Cu	Mo	Cu eq
0		Alluvium			
5					
10					
15	Qal				
20					
25					
30		granite: 60% qtz, 20% chlor, 20% orth, tr mal. stn			
35		aa numerous micro fract fill w/chlor			
40	p€gn	gran w/numerous fracts Fe stn, tr py			
45		gran aa to 49, diabase, blk vfn grn w/stgrs cpy			
50		diabase tr py, cpy, chl alt along fracts			
55	Mdb	diabase aa			
60		diabase to 62, alt gran to 65			
65		hily fract gran, chlor 30%, feld 20%, qtz 50%			
70		aa			
75	p€gn	gran fract w/fe stns, tr py, sph			
80		aa few qtz stgrs			
85	Mdb?	gran aa			
90		diabase stgr at 90-93 gran to 95, gran 40% chlor			
95		hily alt gr, stgr of dbs, gr: 40% chl, 50% qtz, 10% alt feld			
100	p€gn	aa diabase stgr, hvy Fe stns along fracts			
105		hily alt gran, 50% chlor			
110		diabase, chlor alt. along fracts			
115	Mdb	diabase to 118, gran to 120			
120		gran: 40% qtz, 45% chlor, 15% orth feld fract & sli alt			
125		gran highly alt, 50% chlor, Fe stns, tr py			
130		aa tr red oxide Fe			
135		gran 30% chlor, 20% feld, 50% qts			
140		aa hvy Fe stn			
145		aa tr py & Fe stn			
150		gran 45% chlor, 50% qtz, 5% orth, tr py			
155		aa			
160		gran 20% feld, 60% qts, 20% chlor, tr py, stgrs qtz w/py			
165		hily alt & fract gran hvy fe stns along fracts, tr py			
170	p€gn	aa tr py cpy			
175		aa hvy red & orng fe stns			
180		sml stgr diabase 182-183, gran hily alt orth along frac w/chlor fill			
185		gran 20% orth, 60% qtz, 20% chlor, tr py, cpy			
190		gran: aa			
195		gran tr py, cpy, chlor, qtz, hvy Fe stn 1%			
200		gran: aa			
205		hvy shr zn w/Fe stns, tr py, cpy, gran			
210		gran 10% orth (alt) 60% qtz, 30% chlor, 7% Fe stns, hily alt			
215		gran: aa sli decrease in Fe stns			
220		hily alt gran tr shr, tr py, cpy			
225		gran: aa			
230		gran: aa diabase at 234 1/2			
235	Mdb	diabase to 237, gran (hily alt) to 240, tr py			
240		gran, sli alt; 30% chlor, 20% orth, 50% qtz, tr py			
245		gran: aa tr Fe stns			
250		gran 10% orth, 10% chlor, 80% qtz, tr biot (v. little alt.			
255		gran: aa tr epidote			
260		gran 15% orth, 15% chlor, 70% qtz			
265		gran: aa inc epidote, tr py			
270		gran: aa			
275		gran few qtz stgrs, dissem py, cpy			
280		gran: aa tr py, cpy, bn, cc after py			
285		gran: tr fe stn, 20% alt feld, 60% qtz, 20% chlor, tr cc			
290		gran: aa tr cpy, py, bn, cc in alt gran, dissem tr mag			
295		gran: aa 1% sulfides, tr mo, .5% spec, tr cc			
300		gran: tr spec, 70% qtz, 10% feld, 20% chlor, tr mag			
305		gran: inc orth 20%, 20% qtz, 10% chl, 2% spec, tr cpy,py,cc			
310		gran: aa			
315	p€gn	gran: aa orth fract indist bndries, tr cpy, py, 1% spec	.02		
320		gran: aa tr evid.	.036		
325		gran hily fract aa, tr mo, py, cpy, .5% spec	.084		
330		gran: aa tr bn, cpy, spec, cc	.030		
335		gran 1% spec. 20% orth, 60% qtz, 20% chlor-epidote	.029		
340		dec spec aa			
345		gran: aa, inc chlor 25%	.032		
350		gran inc spec >1% tr py, cpy chlor 25%, feld 10%, qtz 65%	.044		
355		gran: aa	.074		
360		gran inc in spec, tr mag, tr cc, py 20% feld, 20% chlor 60% qtz	.030		
365		gran: aa spec >1%, tr cc, cpy, py	.024		
370		gran 2% spec, tr mo, cpy, cc, py bn (hily alt gran stgrs qtz & spec	.048		
375		gran: aa > 1% spec	.363		
380		gran 20% feld (alt) 25% chlor & hem, 55% qtz, tr py	.029		
385		gran: aa 1% mag, tr cpy	.028		
390		gran: aa	.016		
395		alt gran tr fe stns, 2% spec, tr cpy, py, 20% feld, 60% qtz	.058		
400		alt gran: aa	.025		
405		alt gran: aa	.013		
410		hily alt gran, dec spec to 1%, inc. chlor 25%,tr py, mag	.033		
415		hly alt gran, 3% spec & mag, chlor 25%, tr mo, cpy, py	.016		
420		gran 30% orth tr cpy, py, cc sph, mo	.074		
425	Mdb	th. diabase stgrs 27, 29, 30	.018		
430		th. diabase stgr at 32, granite 34.5, diabase to 35, tr spec, mag, py	.010		
435	Mdb	diabase to 39.5 tr calc, crscutting diabase, tr py, gran to 40	.010		
440		sli alt gran,1% spec,tr py, 25% orth, 65% qtz, 10% chlor	.010		
445		alt gran, inc Fe stns, moly seam, tr ep, cpy, py	.014		
450		gran aa, tr mo, py, cc, cpy	.023		
455		alt gran hvy Fe stns (red-yellow) tr py, cpy	.032		
460		gran aa, tr py, cpy	.052		
465		alt gran aa, tr py	.034		
470		gran aa, tr py, mag, spec	.025		
475		aa, tr mo, py, mag, cc	.066		
480		aa, tr mo, cpy, py, mag 3% Fe stns & stgrs	.116		
485		gran, hily alt, hvy (2%) Fe stns, tr py, mo, cc	.040		
490		aa, tr py, cpy, mo, bn, sulfides 1% hvy fe stn silic an, qtz	.067		
495		gran: highly alt, chl & Fe stain, spec, tr py, tr orth	.086		
500		gran: highly alt. <1% py, cpy, & mo			
505		gran: highly alt, tr py & cpy	.118	23.	
510		gran: highly alt, tr py	.086	14.	
515		gran: heavy chl, slickenside w/lm, Fe oxide	.027	6.	
520		gran: tr py, less Fe oxide	.093	7.	
525		gran: aa	.159	8.	
530	p€gn	gran: py stringers, tr Fe stn; 533.gran: 30% pink orth			
535		gran: ≈ 30% orth, dec chl.			
540		gran: ≈ 40% orth			
545		gran: som sec orth			
550		gran: aa			
555		gran: aa			
560		gran: some Fe color			
565		gran: some Fe color			
570		gran: ≈ 15% orth, lim, < 1% py, tr cpy & mo	.093	6.	
575		gran: lim, tr py & mo	.032	4.	
580		gran: ≈ 25% orth, tr py & mo	.024	1.	
585		gran: ≈ 25% orth, lim	.019	7.	
590		gran: ≈ 10% orth, Fe stain, tr py	.026	14.	
595		gran: lim, Fe stain	.028	16.	
600		gran: lim			
605		gran: ≈ 10% orth, tr lim			
610		gran: ≈ 15% orth, lim, tr py & spec			
615		gran: ≈ 20% orth, tr lim			
620		gran: ≈ 15% orth, lim < 1%, tr py			
625		gran: ≈ 10% orth, tr ep, lim			
630		gran: spec, lim, tr py	.054	16.	
635		gran: spec & lm	.023	7.	
640		gran: spec & lm			
645	Td	Dior., qtz, p'crysts in dk green Matrix of ferro-mag: minerals, ptly chlor, < 1% pyr			
650		gran from ~ 647', ~ 20% K-spar, tr py			
655		gran w/spec.	.042	6.	
660	p€gn	gran ~ 85% qtz & orth, 1% spec, tr py & mo	.018	3.	
665		gran w/spec, tr py; 669: gran < 1% m	.029	4.	
670		gran, bi alt chl, spec, py	.029	7.	
675		monz dike, bi ~ 20%, tr py, ep	.072	10.	
680		monz, qtz ~ 50%, bi ptly alt chl, ep, tr lim af py	.021	2.	
685	Tm	monz, orth < 1%, ep, tr py, cp & mo	.018		
690		monz, < 1% sph, tr py, cp & mo	.040		
695		monz, tr mo, py; < 5° bt, tr cpy	.048		
700		monz w/spec, tr py & ep; 703: dior, < 5% orth, < 1% sph, < 2% bt	.038		
705		dior, < 5% bi ptly alt chl, orth < 1%, some py, spec, cpy	.044		
710		dior, ≈ 2% py as stringers, tr ep	.028		
715		dior, tr py stringers, < 1% cpy	.015		
720		dior, < 1% py & ep	.022		
725		dior, < 1% sph, tr py & mo	.016		
730	Td	dior, < 1% mo, < 1% py	.024		
735		dior, < 2% orth, tr py & mo	.038		
740		dior, < 4% orth, tr py, ep & mo	.054		
745		dior, tr sph & py; 748: dior, qtz stringers, tr py	.208		
750		dior, tr py & mo	.084		
755		dior, tr py, mo & ep	.018		
760		dior, tr py & ep; gran: 25% orth, 1% py stringers	.041		
765		gran, tr mo	.039		
770		gran, < 1% py, spec	.064		
775		gran, < 1% mo, tr py, < 1% spec	.050		
780		gran, < 1% mo, tr py & cpy	.036		
785		gran, < 1% mo, tr py	.049		
790		gran, tr mo, py	.030		
795		gran, < 1% mo, < 1% spec, tr py	.040		
800		gran, < 1% mo, spec, py, tr cpy	.046		
805		gran, < 1% py, < 1% spec, tr mo	.048		
810		gran, ~ 1% py, spec, tr mo	.075		
815	p€gn	gran, < 1% py, < 1% spec, tr sl sides	.106		
820		gran, < 1% py, < 1% spec, tr mo	.132		
825		gran, ~ 60% qtz, 30% orth, some spec, 1% py	.094		
830		gran, bi alt chl, < 1% spec	.026		
835		chlor gran, spec, tr sph, tr py, tr qtz veins w/lm stn	.110		
840		gran, bi & orth lgly alt chlor, < 1% py, < 1% spec			
845		gran, bi mostly alt chl, < 1% py, tr spec, tr ep			
850		gran, bi & orth alt chl, < 1% py, tr ep			
855		gran, ~ 10% fresh orth, < 1% py, tr ep, tr mo, tr cc			
860		gran, < 1% py, tr mo; sl sides, py veins, chl, mo			
865		gran, < 1% py, tr mo			
870		gran, < 1% py, tr spec			
875		gran, bi fresh, < 1% py, tr ep, spec			
880	Td	dior, bi, ptly alt chl, < 1% py, tr bn, tr mo, tr cpy, tr spec	.162	.025	.28
885		gran w/ 1% py, tr mo, 1% spec	.141	.016	.2
890		gran, 1% py, 1% spec, tr mo	.192	.010	
895		gran, 2% sul, spec, py	.141	.010	
900		gran, micro-fract w/mo + spec, 1% py	.050	.010	
905		gran, mo + spec, m veins & micro fract, 1% py	.084	.010	
910		gran, 1% mo & spec, 1% py (no fines)	.092	.010	
915		gran, 2% sul, tr mo, py, cc	.088	.012	.14
920		gran, 2% sul, tr mo, spec, py	.504	.017	.58
925	p€gn	gran, 1% sul, tr mo, py	.160		
930		gran, 2% sul & spec, tr cpy	.102		
935		gran, 1% sul & spec, tr py	.029		
940		gran, 1% sul tr py, cpy	.132		
945		gran, 2% sul, sl side, fract, overall dk gray color	.151		
950		gran, 1% sul, tr py, tr sph	.144		
955		gran, 1% sul & spec, tr py	.098		
960		gran, 15% orth, 65% qtz, 20% chl, tr spec, tr mo, py, cpy	.057		
965		gran, 20% orth, 20% qtz, 10% chl & biot, tr spec, tr py, cpy	.058		
970		gran aa			
975	Mdb	gran to 971, diabase alt to biotite & chlor to 975			
980	Tqdp	aa			
985		diorite porph dike @ 981-985 qtz, amph, biot & epid. plag feld 5%			
990	p€gn	gran 15% alt orth, 65% qtz, 20% biot-chlor 1% py & cpy, tr mo	.104		
995		gran to 996 tr orth, tr plag hily alt w/75% qtz, 25% bio-chl, w/2% cpy, py	.088		
1000		qtz diorite phpy dike, mo in seams, dissem cpy, py 1%	.258		
1005	Tqdp	aa qtz dior porph, tr mo, cpy, py, spec 1% sulfides	.146		
1010		gran w/25% orth, 65% qtz, 10% bio-chlor, tr mo, cpy, py, fe stn, spec	.182		
1015		aa	.051	33.	
1020		gran aa tr mo, cpy	.044	12.	
1025		gran w/dissem cpy, py, tr mo (tot sul 1%) gran: 25% orth, 65% qtz, 10% chlor & spec			
1030		gran, dec sul, tr py, cpy			
1035		gran aa, tr py, mo, cpy, spec			
1040		gran: 20% orth, 60% qtz, 20% chlor & spec, w/tr py, cpy			
1045		gran aa, tr py, cpy; 1048: gran, fresh 40% orth			
1050		gran, fresh 40% orth, tr py	.078	.004	
1055		gran, 1% py, Fe stain, fract., 5% dior, 20% plag	.218		
1060		gran, 1% py, tr mo	.060		
1065		gran, py stringers, tr bt	.106		
1070	p€gn	gran, 1% py, tr mo, & bt	.074		
1075		gran, tr py & mo	.049		
1080		gran, tr py, cpy, mo, sph, ep	.059		
1085		gran, py stringer, tr cpy	.776	.010	.83
1090		gran, 1% py & cpy, mud, tr Fe color	.133	.019	.33
1095		gran, tr bt, 1% py, cpy	.214	.015	.26
1100		gran, 1% py & cpy			
1105		gran, tr py, cpy & mo, light chl, heavy mud			
1110		gran, tr ep & py, light scattered Fe stain, tr ep			
1115		gran, cpy stringers, 1% py & cpy			
1120		gran, 1% py, tr mo & misc.	.144	.011	.20
1125		gran, 1% py, tr ep & mo, tr bt, 20% orth	.138	.012	.19
1130		gran, 1% py Xl, tr mo	.184		
1135		gran, tr mo, 1% mo			
1140		gran, tr py & chl			
1145		gran, tr py, cpy; 1149: diab, tr ep			
1150		gran, 5% diab, tr py, fresh, 35% orth			
1155	Mdb	gran, 10% diab; 1157: diab, 5% orth, tr ep			
1160		diab, 10% orth, tr ep; 1161: gran, 30% orth,10% diab, tr ep	.240	.016	.32
1165		gran, 20% diab, 1% py	.131	.008	
1170		gran, 40% orth, 1% py, tr ep, heavy mud			
1175	Tdp	dior, py stringers, 20% orth			
1180		dior, py stringers, 5% diab, 15% orth, mud; 1182: 1% py & cpy, mud	.122 .165	.019	.22
1185		tr py, 1% cpy, mud			
1190		gran, tr py, tr ep, tr diab			
1195		gran, 1% py, some m veins, tr cpy, tr ep			
1200		gran, tr py, tr mo	.488	.007	
1205		gran, 20% diab, tr py	.230		
1210	Mdb	diab 60%, 1% py, tr gran			
1215		gran 50%, tr py			
1220		gran, chl 5%, tr py			
1225		gran, orth 5%, a few diab frags, 1% py			
1230		gran, bi & chl 10%, 1% py, some veins	.166	.010	.21
1235		gran, bi mostly alt chl, 1% py, tr mo	.472		
1240		gran w/ 2% diab, 1% py, bi compl alt to chl			
1245		gran, chl 20%, tr py, tr spec			
1250	Mdb	diab 70%, tr ep			
1255		gran, chl 10%, tr py			
1260		diab 95% w/tr py			
1265	Mdb	diab 40%, tr py; 1268, 1269: heavy mud - 1% py	.131		
1270		diab & gran - 2% py, tr mo			
1275		diab, 40% qtz			
1280		gran, 40% orth, tr py, cpy, 10% diab	.262		
1285		gran, tr py cpy	.216	.004	
1290		gran, tr py, 40% orth			
1295		gran, tr lim & py, 1% bt			
1300		gran, tr py & chl,			
1305		gran, tr py & chl			
1310		gran, py stringers			
1315		gran, tr py, chl fract.			
1320		gran, tr chl, barren			
1325	p€gn	gran 30% orth, 55% qtz, 15% chlor, 1% py, tr cpy, spec			
1330		gran aa 1% py, tr cpy, mo	.254	.016	.33
1335		gran aa 1% py, cpy, tr mag, spec, num micro fracts	.212		
1340		aa 0.5% py, cpy, micro fracts w/Fe stns	.115		
1345		gran 40% orth, 15% chlor, 45% qtz, tr py, cpy, spec, mag, micro fracts, tr diabase	.070		
1350		gran aa 1% py, tr cpy, bn			
1355		gran 40% orth, sli alt, 15% chlor, 45% qtz, tr py, cpy	.085		
1360		gran crs phase w/50% orth, micro fracts w/cpy, mo, py, spec	.106	.002	
1365		aa dec 0.5% sulf, tr cpy, py, mo			
1370		gran 35% orth, 20% chlor, 45% qtz, tr py, cpy, mag			
1375		diabase @ 1376 w/stgrs qtz & tr py, cpy	.140	.004	
1380	Mdb	diabase 1% py, cpy in stgrs dissem	.150	.004	
1385		diab to 86 gran to 90 1% py, cpy, gran w/30% chl	.626	.011	.68
1390	Mdb	stgr diab @ 90 gran 90.5 to 95, 65% qtz, 20% orth, 15% chl w/tr mo, py, cpy			
1395		gran 20% qtz, 20% orth, 10% chl, tr py.			
1400		gran aa tr py, cpy			
1405		aa			
1410		gran w/20% orth, 20% chl, 60% qtz, 0.5% py, tr cpy			
1415		aa	.069		
1420		gran aa tr py, cpy, mo			
1425		gran 30% chl, 20% orth, 50% qtz, tr py			
1430		gran aa			
1435		gran less alt than above biot alt to chlor, 10% chl, 25% or, 65% qtz			
1440		gran tr py, cpy			
1445		aa			
1450		barren gran, tr py			
1455		gran 35% orth, 15% chl, 50% qtz, 0.5% py, cpy, tr mo			
1460		aa tr mo, py, cpy			
1465		gran 40% orth, 20% chl, 40% qtz, tr py			
1470		aa			
1475		aa			
1480		gran 25% orth, 20% chl, 55% qtz, tr mo, py, cpy		.017	.19
1485		aa tr py, cpy			
1490		gran aa tr py, cpy, mo, inc chlor			
1495		aa	.134		
1500		gran 20% chlor, 30% orth, 50% qtz 1% sulf-py & cpy, tr mo	.080		
1505		aa 1% py, cpy, tr mo			
1510		gran 25% chlor, 20% orth, 55% qtz, 0.5% sulf-py			
1515		aa	.087		
1520		gran 1% sulf all py, tr cpy, mo aa	.168	.004	
1525	p€gm	gran 25% chlor, 20% orth, 55% qtz, tr py, cpy			
1530		aa tr py, cpy, 0.5% sulf			
1535		gran 15% chlor, 20% orth, 65% qtz, tr mo, cpy, py			
1540		aa 0.5% sulf, py, cpy			
1545		gran 25% chlor, 25% orth, 50% qtz, tr py, cpy			
1550		gran aa tr py			
1555		gran w/tr py, cpy & mo 1% tot sulf	.110	.003	
1560		aa tr sulf	.050	.002	
1565		gran 1% sulf, py, cpy, mo			
1570		gran 25% chlor, 25% orth, 50% qtz 1% py, tr cpy, mo			
1575		gran aa tr py, cpy	.195	.005	
1580		gran aa 1% py, tr cpy	.178	.007	
1585		gran 20% chlor, 30% orth, 50% qtz, 1% sulf - py, cpy mo			
1590		aa			
1595		gran tr py			
1600		gran 70% qtz, 10% chlor, 20% orth, tr py, cpy			
1605		aa			
1610		gran aa tr py	.299	.005	
1615		gran aa tr py, cpy	.304	.004	
1620		aa			
1625					

TD 1625

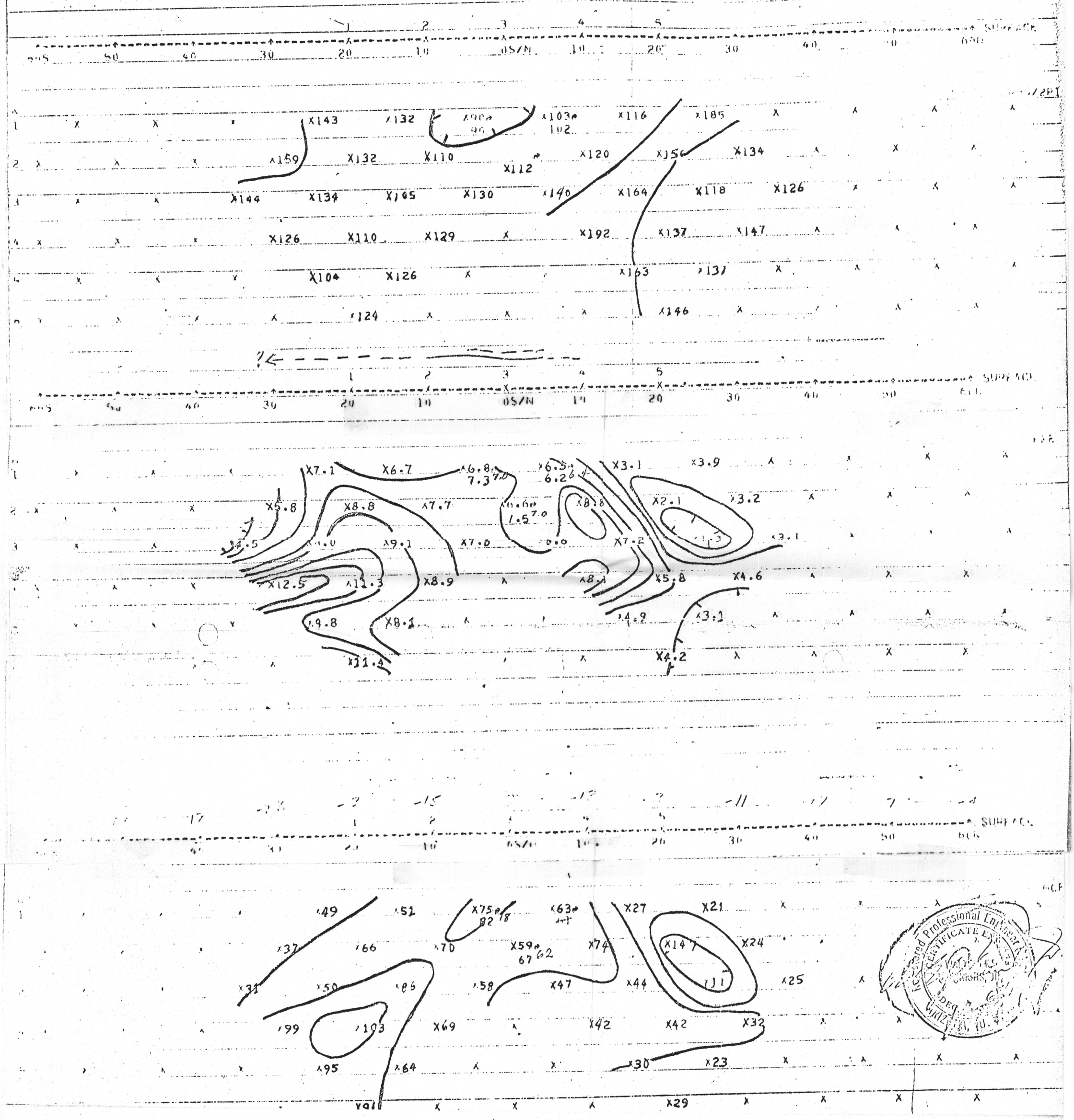
LINE 3B

INSTRUMENT GEORX X298-68 LINE 3B SPU 1 LOOKING TOW 10-4-68 AE 500 FEET





AREA Johnson-Hanks LINE J-1 Sec 2h = 500 SCALE: 1" = DATE PDH LINE J-1 = 500' SCALE: 1" = 500'

HEINRICHS GEDEX 8298-68 LINE 1 SPD 3 LOOKING NNW 10-2-68 A= 1000 FEET

LINE 1
SPREAD 3