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VOLUME I

TIPPERARY RESOURCES CORPORATION
KELVIN GEOLOGICAL REPORT

GEOLOGICAL REPORT

OF THE

KELVIN PROSPECT, PINAL COUNTY, ARIZONA

FOR

TIPPERARY RESOURCES CORPORATION

JUNE, 1970

BY

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FIG.

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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,

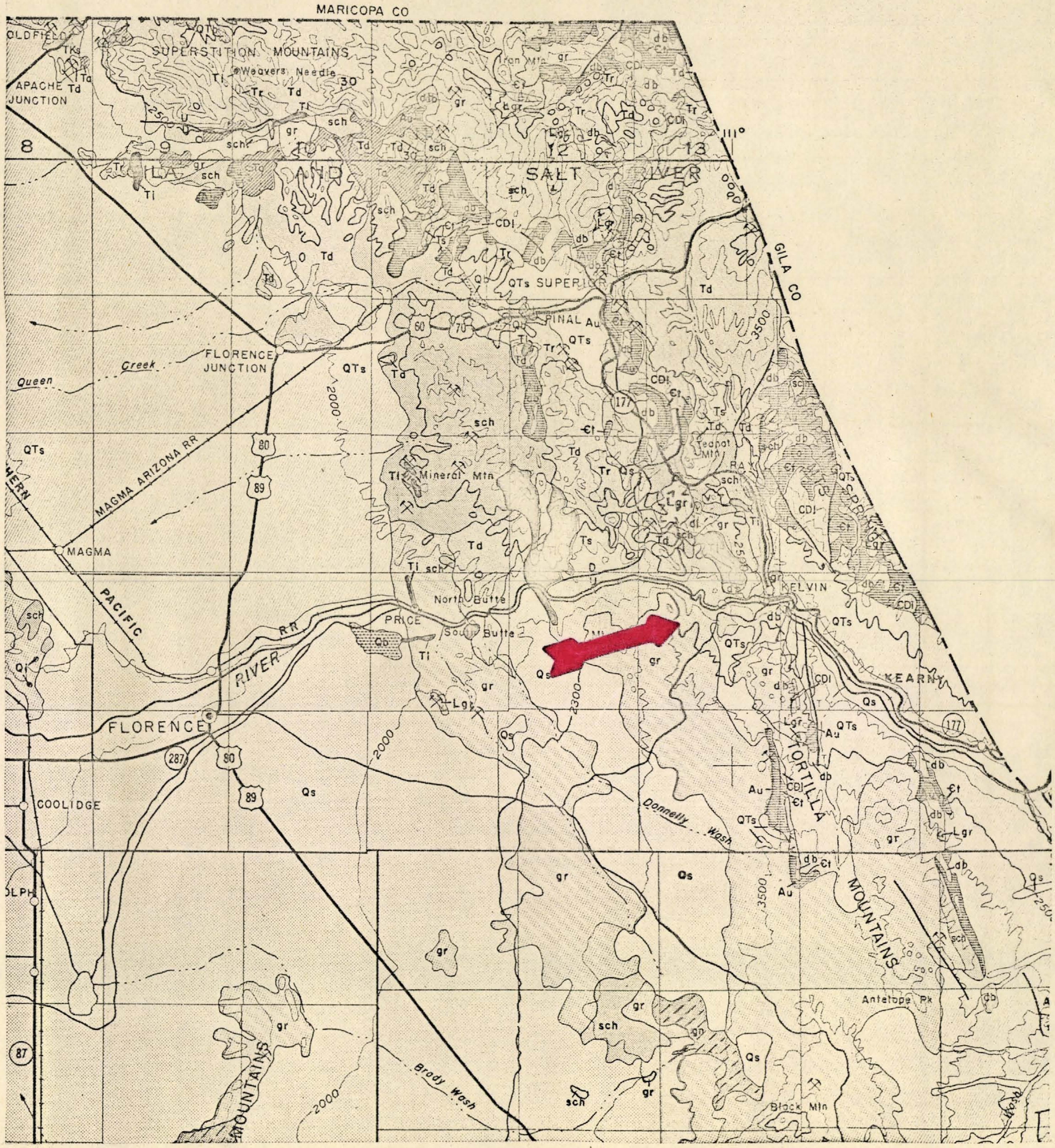


Fig. I

KELVIN PROSPECT
Cu - Mo

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

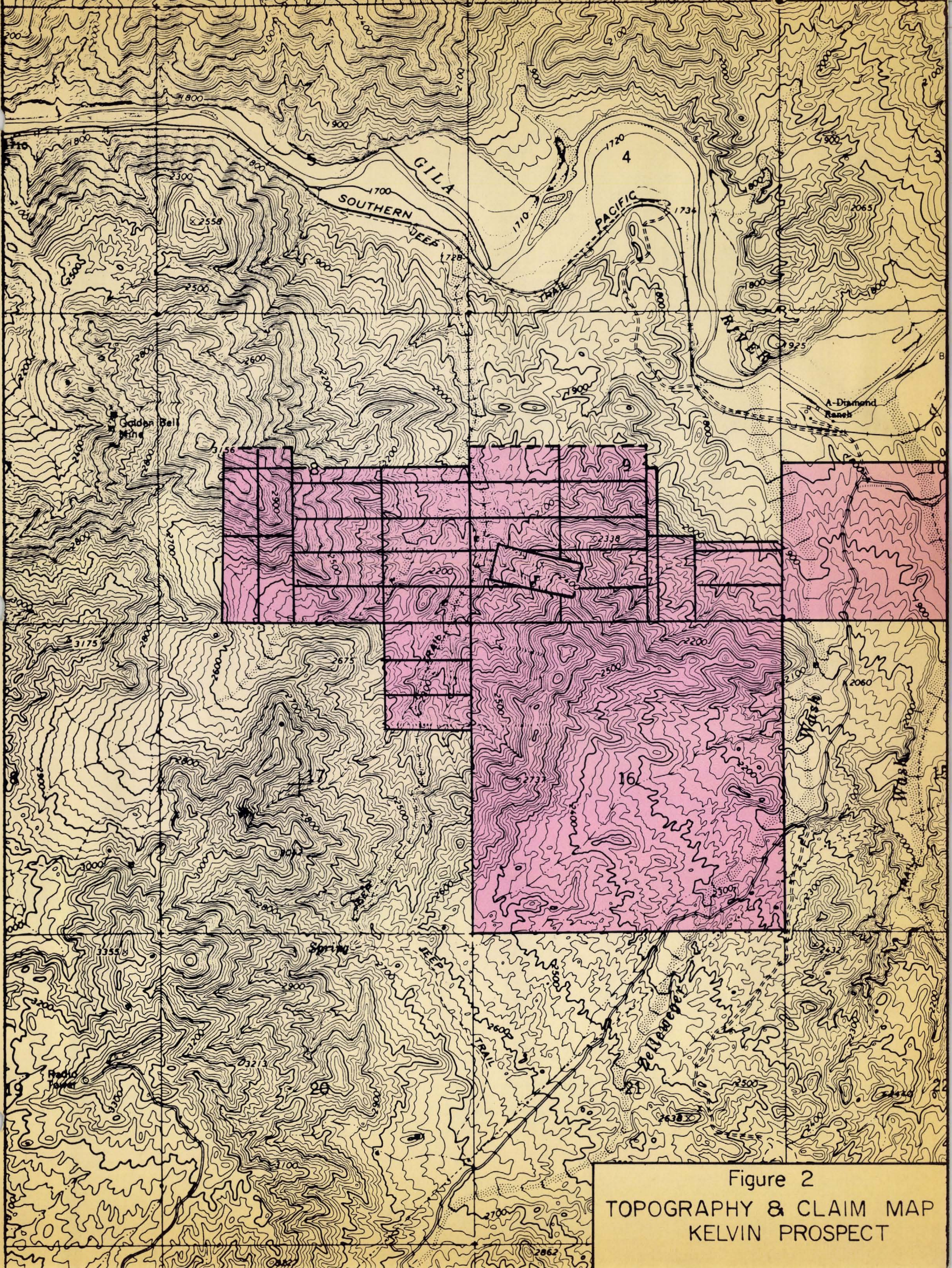


Figure 2
TOPOGRAPHY & CLAIM MAP
KELVIN PROSPECT

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 1-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) 623-0578

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 NE with weaker fringing response for about 500 ft. SW and 750 ft. NE. The causative body likely suboutcrops near 12.5 SW 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)
CERTIFICATE EXPIRES
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, 5S, 13E
COLLAR COORD. N 2324 E 9771
COLLAR ELEV. 2085
SHEET 1 OF 4
HOLE SIZE 5¼'' Hammer Bit

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample	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-4A			.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... from 80' to about 260'.	10	10	J-9	0	.04	.13	.001	

Pyrite (py), chalcopyrite (chpy), sericite (ser), chlorite (ch), crystals or crystalline (xl, xln) and mineralization (mtz).

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	

SCALE

Depth	Intensity	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS			
									Cu	
170			Qtz. Monz.: Few diabase fragments; minor py, cpy and specularite.							
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 ¼-1'' with strong py and cpy mtzn at 237'.	10	10	J-13			.07	
250			do. Py & cpy 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	.63	.01
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

DIRECTION ______ HOLE NO ______
INCLINATION ______ PROPERTY ______
STARTED ______ LOCATION ______
COMPLETED ______ COLLAR COORD. N ______ E ______
SCALE ______ DEPTH ______ COLLAR ELEV. ______
LOGGED BY ______ SHEET 3 OF 4
SCALE ______ HOLE SIZE ______

Depth	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample (no.)	Au	Ag	Cu	Mo	Zn
		J-31 308-345'	37	37	J-31	0	.08	.20	.00[illegible]	
		J-32 250-308'	58	58	J-32	0	.11	.69	.005	.08
		Spectrochemical composite J-17 to J-23 inc. (270-325', 55' total)								
320		Qtz. Monz.: Diabase fragments, some ~~chlorite and ser.~~	5	5	J-23	0	.04	.28		
330		do. 231' dec. in mtzn.	5	5	J-24	0	.03	.19	.003	
		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, soft.	5	5	J-36		.11			
420		do. Hem and Magnetite	5	5	J-37		.10			
		do. Cu oxides	10	10	J-38		.08			
430		do. Minor mtzn, bornite & malachite; ser.	10	10	J-39		.14			
440		do.	5	5	J-40		.09			

SCALE	DIRECTION	HOLE NO J-1
	INCLINATION	PROPERTY
	STARTED	LOCATION
	COMPLETED	COLLAR COORD. N. E.
	DEPTH	COLLAR ELEV.
	LOGGED BY	SHEET 4 OF 4
	DRILLER	HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (no)	ASSAYS Cu
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	.06
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 11-15-68
COMPLETED 11-20-68
DEPTH 582'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling Co.

HOLE NO. J-2
PROPERTY A. H. Johnson
LOCATION SW¼ Sec. 9, T.8, 13E
COLLAR COORD. N.2454 E.10,222
COLLAR ELEV. 2133
SHEET 1 OF 4
HOLE SIZE 6 1/2'' Hammer Bit

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (ft)	Sample (No.)	ASSAYS Cu
10		Hole collared in decomposed qtz. monz. 9 5/8'' hole to 17' & cased with 8 5/8'' surface pipe.				
20		Qtz. Monz.: 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. Monz.: Epidote, considerable biotite magnetite. Some py with traces of cpy.				
70		do. Granitic zone.	10	10	J-47	.02
80		do.				
90		Qtz. Monz.: 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 cpy & 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 260'.				
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	HOLE NO J-2
	INCLINATION	PROPERTY
	STARTED	LOCATION
	COMPLETED	COLLAR COORD. N. E.
	DEPTH	COLLAR ELEV.
	LOGGED BY	SHEET 3 OF 4
	DRILLER	HOLE SIZE

Depth	Assay	Log		Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS				
									Ag	Cu		
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 mtzn; minor chpy. 429' sharp water increase.	10	10	J-55			.02		
440			432	Diabase: Greenish-gray, micro-crystalline, strong py mtzn 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 mtzn (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

DIRECTION	HOLE NO.
INCLINATION	PROPERTY
STARTED	LOCATION
COMPLETED	COLLAR COORD. N. E.
DEPTH	COLLAR ELEV.
LOGGED BY	SHEET 4 OF 4
DRILLER	HOLE SIZE

SCALE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (no.)	Au	Ag	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	
582 TD									

Johnson Claims	DIRECTION Vertical	HOLE NO J-3
Pinal county	INCLINATION -	PROPERTY A. H. Johnson
Arizona	STARTED 11-21-68	LOCATION SE¼SE¼ Sec. 8, 4S 13E
SCALE 1" = 20'	COMPLETED 12-6-68	COLLAR COORD. N. 8,278 E. 9,294
	DEPTH 1165'	COLLAR ELEV. 2170
	LOGGED BY T. L. Harks	SHEET 1 OF 8
	DRILLER Whatley Drilling Co.	HOLE SIZE 6¼" Ham. Bit to 642'; 6¼" Rock Bit 642-1165'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (no.)	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						
40	36	do. Qtz. Monz.: Minor sericite and py. Pronounced orthoclase crystals which have the sulfides associated with them				
50						
60	58	do. Diabase: Beg around 58'. Traces of py & chpy. First water coming in between 60-70'				
70						
80		Diabase: Same as above.				
90		Diabase: Some Qtz. monz. with chpy & typical orthoclase crystals.				
100		do. No significant sulfides.				
110		do.				
120		Qtz. Monz.: Some diabase; traces of py & chpy.				
130		Diabase: Dark Greenish-gray, fine-grained. Carrying some sulfides. Scattered white quartz veins and crystals.				
140		do.				
150		do.	10	10	J-67	.02
		do.				

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

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

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

SCALE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	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	.18
230		Less than a percent pyrite.				
240		do.				
250		do.				
260	252	Qtz. Monz.: 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	30[illegible]	Qtz. Monz.: Traces of py and chpy. Typical orthoclase xls. Biotite and an estimated 3% magnetite. Moderate	10	10	J-63	.03
		chloritization. Minor sericite.				

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	

SCALE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (ft)	Sample (no.)	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	.08
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 dissem-~~inated through them finely xln py and~~ chpy.				

DIRECTION		HOLE NO.	J-3	
INCLINATION		PROPERTY		
STARTED		LOCATION		
COMPLETED		COLLAR COORD. N.		E.
DEPTH		COLLAR ELEV.		
LOGGED BY		SHEET	4	OF 8
DRILLER		HOLE SIZE		

SCALE

Depth	[illegible]	Log	Rock Type and Description	[illegible]	[illegible]	[illegible]	Au	Ag	Cu	Mo	Pb	Zn
490		✓ ✓ ✓	Qtz. Monz.: Minor quantity of diabase									
500		✓ ✓ ✓	do. Scattered fragments of chpy and mo.									
510		✓ ✓ ✓	do. Vein type coatings of chpy with mo lining outside (earlier mineralization	10	10	J-70			.09	.003		
520		✓ ✓ ✓	Chpy & mo., traces pyrite. Total sulfides est. ? less than 1% but incr. with depth, starting @ 400-500'.	10	10	J-71	0	0	.09	.009		
530		✓ ✓ ✓	Heavy ch & ser. Chpy & mo present in strong sulfide mtzn. Sphalerite having slightly green cast.	10	10	J-72			.12	.03		[illegible]
540		✓ ✓ ✓	do.	10	10	J-73	0	0	.18	.031		.39
550		✓ ✓	do. Easy drilling through ore zone, exceptionally soft at about 565'	10	10	J-74			.31	.056		2.12
560		✓ ✓ ✓	Ore washed out in cleaning hole from 520-590'; sample no. J-88 also complete spectrochemical analysis.	10	10	J-88) J-75	 0	 0	2.62 .45	.13 .106	.01	7.9 1.08
570		✓ ✓ ✓	567-569 No. J-77	10	10	J-77 J-76	.005	.3	1.29 .43	.12 .095		1.39 2.18
580		✓ ✓	Strong sericite below about 570'	10	10	J-78			.65	.095		1.2
590		✓ ✓ ✓	Decreasing mtzn beg. about 575'. Strong chloritization, some fine hematite.	10	10	J-79	.005	.19	.72	.180		1.74
600		✓ ✓	Est. sulfides 1%, chpy to moly about 1:1	10	10	J-80			.15	.048		.62
610		✓ ✓	Considerable biotite, minor mtzn. More granitic than qtz. monz.	10	10	J-81	0	0	.06	.015		.14
620		✓ ✓	do.	10	10	J-18[illegible]			.17			
630		✓ ✓	Qtz. Monz.: Some sulfides of chpy, py and mo. Sericitic.	10	10	J-18[illegible]			.06	.011		.10
		✓ ✓ ✓	Increasing sericite and hematite.	10	10	J-82			.04	.003		

J-85	Drillers Sample from sump before converting to mud	0	.17	[illegible]	[illegible]	2.88
J-86	Hanks Sample " "	.005	.13	[illegible]	[illegible]	2.22
J-87	" From drain ditch to sump.	0	.11	[illegible]	.078	2.24

DIRECTION		HOLE NO	J-3
INCLINATION		PROPERTY	
STARTED		LOCATION	
COMPLETED		COLLAR COORD. N. / E.	
DEPTH		COLLAR ELEV.	
LOGGED BY		SHEET 5 OF 8	
DRILLER		HOLE SIZE	

SCALE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (ft)	Sample No.	Au	Ag	Cu	Mo	Zn
650		Qtz. Monz.: Some granitic material. Good mtzn beg. at 641'. Sulfides ~~Sericitized.~~	2 8	2 8	J-84 J-89	 0	 .13	.19 .71	 .074	 4.1
660		J-83 from around collar at beg. of shift Qtz. Monz.: With granitic and diabase ~~material. Moderate chlorite.~~	 10	 10	(J-83 J-90	 0	 .04	.61 .10	.097) .065	 2.5
670		Qtz. Monz.: Mtzn. Est. total sulfides at over 2%. Hematite. Sand-sized particles	10	10	J-91	0	0	.28	.050	1.6
680		do.	10	10	J-92	0	.15	.37	.23	1.5
690		do. Thin diabase dikes.	10	10	J-93	0	0	.19	.078	.7
700		do.	10	10	J-94	0	0	.26	.080	1.0
710		do. Total sulfides 1% or less. Dropped cone. Feldspars partially ~~kaolinized.~~	10	10	J-98			.07	.022	
720		do. Minor cu oxides & moly.	10	10	J-99			.04	.011	
730		Total sulfides less than .5%; hematite and mtzn diabase.	10	10	J-100			.05	.016	
740		do.								
750		do.	10	10	J-101			.06	.026	
760		do.								
770		do.	10	10	J-102	0	0	.08	.016	
780		do. Increasing diabase and sulfides.								
790		do.	10	10	J-103			.08	.015	
		Increasing sulfides and cu oxides below 790' & between 800-810'.	10	10	J-104	0	0	.11	.015	.2

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	

SCALE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No)	Au	Ag	Cu	Mo	Zn
810		Same as above.	10	10	J-96	0	0	.10	.105	
820		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	
830		Small specks of copper oxide. Hematite and decreasing chlorite.	10	10	J-97			.20	.028	
840		do. Mtzn does not appear to increase with ~~diabase content.~~	10	10	J-105			.19	.025	.2
850	842	Decreasing Mtzn. Pred. biotite over chlorite.	10	10	J-106	0	0	.12	.018	.1
860		do.								
870		do. Total sulfides est. @ .8%	10	10	J-107			.10	.014	.17
880		Qtz. Monz.: Some diabase. Biotite & ch, Sulfides less than 1%. Specks of oxide.	10	10	J-108			.12	.019	.16
890		Homogeneous unit from 870-960', except for increasing diabase at about 938'.	10	10	J-109			.10	.045	.14
900		do.	10	10	J-110			.11	.011	
910		do.	10	10	J-111	0	0	.09	.018	
920		do.	10	10	J-112			.10	.015	
930		do.	10	10	J-113			.08	.014	
940		do.	10	10	J-114			.08	.017	
950		do.	10	10	J-115			.09	.027	
		do. Silightly more sulfides; inc. diabase.	10	10	J-116	0	0	.10	.043	.49

DIRECTION		HOLE NO	J-3
INCLINATION		PROPERTY	
STARTED		LOCATION	
COMPLETED		COLLAR COORD. N.	E.
DEPTH		COLLAR ELEV.	
LOGGED BY		SHEET	7 OF 8
DRILLER		HOLE SIZE	

SCALE

Depth	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample (m)	ASSAYS		Cu	Mo	
	963	~~Qtz. Monz.; Some diabase. Twisted of at 540'.~~	3	3	J-11	–	–	.08	.033	—
970		Diabase: A little qtz. monz. with py, ~~chpy and moly, sericitized.~~	10	10	J-11			.20	.105	
980		Qtz. Monz.: Diabase dikes. Est. sulfides .75%; py, chpy, mo. and occasional ~~fragment of copper oxide.~~								
990		do.								
1000		~~Mtzn may be occurring on or near monz~~ diabase contacts. do.								
1010		do. Increasing diabase.	10	10	J-11			.11	.008	
1020		~~Diabase & Qtz. Monz.: minor sulfides.~~								
1030		do.								
1040		do.	10	10	J-12			.06	.0025	
1050		~~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	
1060		do. Sulfides and traces of copper oxides.								
1070		Minor diabase. Equal amounts of biotite and chlorite.								
1080		do. Partial kaolinization of feldspars.	10	10	J-12			.05	.008	
1090		do.								
1100		do.								
1110		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	
		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	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample (no)	Cu	Mo
1130	✓✓✓	Qtz. Monz.: Minor diabase. Pronounced pink ortho. xls with traces of py & chpy; about 3% magnetite.	10	10	J-12[illegible]	.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[illegible]	.06	.007
1160	✓✓✓	do.	10	10	J-12[illegible]	.05	.001
	✓	do.					
1170	1165 TD						

James 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 Whitley 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	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (lb)	Assays Cu
10	Hole started in Qtz. Monz., 9 5/8'' hole to 20' and permanently cased.				
20	Qtz. Monz.: Surface weathering. Pronounced pink feldspars. Little or no ch, no sulfides				
30	do.	10	10	J-127	.03
40	Base of intense surface weathering at about 32'. Some ser, mostly biotite with limited ch; no sulfides detected.				
50	Qtz. Monz. & Diabase: Diabase dike carrying cu oxides and sulfides	10	10	J-128	.07
60	Qtz. Monz.: Slightly weathered, minor ch, traces of copper oxides.				
70	do.				
80	do. Considerable biotite & magnetite.				
90	do.				
100	do. Minor sulfides, Water starting near 90'.				
110	Qtz. Monz.: Prevailing lime-green coloration of feldspars.	10	10	J-129	.04
120	do. 107-117' Soft drilling (water course).				
130	Diabase & Qtz. Monz.: Minor sulfides mostly of pyrite.				
140	Diabase: Pyritized (Est. 1%), some chpy and a few Qtz. Monz. fragments.	10	10	J-130	.05
150	do.				
	do.				

DIRECTION		HOLE NO	J-4
INCLINATION		PROPERTY	
STARTED		LOCATION	
COMPLETED		COLLAR COORD. N. E.	
DEPTH		COLLAR ELEV.	
LOGGED BY		SHEET 2 OF 3	
DRILLER		HOLE SIZE	

SCALE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Cu
170		Qtz. Monz.: Few pyritized diabase fragments.				
180		do.				
190		Diabase & Qtz. Monz.: Less than .5% sulfides with traces of cpy.	10	10	J-131	.09
200		do.				
210		Decreasing diabase. do.				
220		do.				
230		do.				
240		Qtz. Monz.: Est. 3-5% magnetite. Minor py & cpy. Increase water 221-240', Sludge samples starting at 230'.				
250		do. Considerable biotite.				
260		Slightly more sulfides, chlorite & ser. Few scattered diabase fragments.				
270		do.	10	10	J-132	.02
280		do.				
290		do.				
300		do. Possibly some sphalerite.				
310		do.				
		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	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (no.)	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[illegible]			.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[illegible]	0	.04	.05	.001
410	Minor diabase. Sulfides on or near diabase-monz. contacts. Moderately chloritized.							
420	do.	10	10	J-13[illegible]			.02	
426 TD								

Johnson Claims
Pinal County
Arizona
SCALE 1'' = 20'

DIRECTION Vertical
INCLINATION –
STARTED 12-13-68
COMPLETED 12-21-68
DEPTH 1244'
LOGGED BY T. L. Hanks
DRILLER Whatley Drilling co.

HOLE NO J-6
PROPERTY A. H. Johnson
LOCATION NE¼ Sec. 17, 1S, 13E
COLLAR COORD. N. 7288 E. 8860
COLLAR ELEV. 2246'
SHEET 1 OF 8
HOLE SIZE 6¼'' Hammer bit to 110[illegible]' 6¾'' [illegible] 1104-12[illegible]'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (#)	Assays Cu	
0–10		Hole collared in qtz. monz. 9 5/8'' hole to 10' and cased with 8 5/8'' pipe.					
10–20		Qtz. Monz.: Considerable biotite, minor ch, a few specks of sulfides. Epidote,-magnetite.	10	10	J-169	.01	
20–30		do.					
30–40		do. Surfact water starting at about 30'. Epidote.					
40–50		do.					
50–60		do.					
60–65		do.					
65–75		Diabase: Dark gray to black, micro-xln & slightly pyritized.					
75–85		do.	10	10	J-170	.01	
85–95		do.					
95–105		do.					
105–115		do.					
115–125		do.					
125–135		do.					
135–145		~~Qtz. Monz.~~: Pink orthoclase xls with associated sulfides; traces chpy.	10	10	J-171	.02	
145–155		do. some diabase					
155–165		Qtz. Monz.: Highly altered (ser), about 2% sulfides. Sand-sized part., moly.	10	10	J-172	.01	.013

J-6

DIRECTION	HOLE NO J-6
INCLINATION	PROPERTY
STARTED	LOCATION
COMPLETED	COLLAR COORD. N. E.
DEPTH	COLLAR ELEV.
LOGGED BY	SHEET 3 OF 8
DRILLER	HOLE SIZE

SCALE

Depth	Log	Rock Type and Description	Interval	Recovery	Sample	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

DIRECTION ______ HOLE NO ______
INCLINATION ______ PROPERTY ______
STARTED ______ LOCATION ______
COMPLETED ______ COLLAR COORD. N. ______ E. ______
DEPTH ______ COLLAR ELEV. ______
LOGGED BY ______ SHEET 2 OF 8
DRILLER ______ HOLE SIZE ______

SCALE ______

Depth	Pyrite	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	Assays Cu	Assays 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					
240			to be more sericitic than holes No. 1-5. 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

HOLE NO J-6
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 8
HOLE SIZE

SCALE

Depth	Py & Cpy	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (no)	Assays Cu
490			Qtz. Monz.: Sulfides, epidote and minor ch. Total sulfides est at less than .5%.				
500			do.				
510			Diabase: Black, micro-xln, mtsm 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. Monz.: Light colored, few ortho. xls, 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.				

DIRECTION	
INCLINATION	
STARTED	
COMPLETED	
DEPTH	
LOGGED BY	
DRILLER	
HOLE NO	J-6
PROPERTY	
LOCATION	
COLLAR COORD. N. / E.	
COLLAR ELEV.	
SHEET	5 OF 8
HOLE SIZE	
SCALE	

Depth	Contact	Rock Type and Description	Interval (m)	Recovery (%)	Sample (m)	Cu	Mo
650	652	Qtz. Monz: Moderate to strong ser. Less than .5% sulfides. Epidote.					
660		Diabase: Medium-xln, pyritized, some chny.	10	10	J-187	.03	
670		do. Fragment of qtz. monz. Sulfides seem to decrease to 717'. 3-5% magnetite.	10	10	J-188	.05	
680		do.					
690		do.					
700		do.					
710		do.	10	10	J-189	.05	
720	717	do.	10	10	J-190	.04	.003
730		Qtz. Monz.: Good sulfide mtzn. Limited ch & ser. About 1% total sulfides. Sand-sized particles.					
740		do.					
750		do.					
760		do. Varying amounts of ser & ch.					
770		do.					
780		do.	10	10	J-191	.06	
790		do.					
800	798	do.					
		Diabase:					

	DIRECTION	HOLE NO J-6
	INCLINATION	PROPERTY
	STARTED	LOCATION
	COMPLETED	COLLAR COORD. N. ____ E. ____
SCALE	DEPTH	COLLAR ELEV.
	LOGGED BY	SHEET 6 OF 8
	DRILLER	HOLE SIZE

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

	DIRECTION	HOLE NO J-6
	INCLINATION	PROPERTY
	STARTED	LOCATION
	COMPLETED	COLLAR COORD. N. E.
SCALE	DEPTH	COLLAR ELEV.
	LOGGED BY	SHEET 7 OF 8
	DRILLER	HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (ft)	Sample No	Assays Cu	Assays Mo
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-202	.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-20[illegible]	.01	
1090	✓ ✓	do.					
1100	✓ ✓	do.	10	10	J-20[illegible]	.01	.001
1110	✓ ✓	do.					
	✓ ✓	Sand-sized fragments, less ser & sulfides.					

SCALE	DIRECTION	HOLE NO. J-6
	INCLINATION	PROPERTY
	STARTED	LOCATION
	COMPLETED	COLLAR COORD. N. E.
	DEPTH	COLLAR ELEV.
	LOGGED BY	SHEET 8 OF 8
	DRILLER	HOLE SIZE

Depth	Log		Rock Type and Description	Interval (ft)	Recovery (ft)	Sample (No.)	Au	Ag	Cu	Mo	Zn
1130	✓✓✓		Qtz. Monz.: Sand-sized fragments. Biotite, some ser & ch. Minor sulfides; magnetite								
1140	✓✓✓✓		Slightly more ser & sulfides.	10	10	J-205			.03		
1150	✓✓✓		do. Moly coated & fracture-lined qtz.	10	10	J-206	0	0	.02	.005	.02
1160	✓✓✓		do.								
1170	✓✓		Qtz. Monz.: Ser & some ch. Sulfides .5% or less. Particles of chpy & moly. Hole caving somewhere above.								
1180	✓✓✓		do. Increase in water.								
1190	✓✓	1184'	Converted to drilling with water and rock bit.								
1200	✓✓✓✓		do. Strong ser & est. 1% sulfides, traces of moly								
1210	✓✓		do.								
1220	✓✓✓		do. Chpy increasing 1212-1217'.	10	10	J-207			.06		
1230	✓✓✓		Qtz. Monz.: Minor diabase, sulfides, moderate ser.								
1240	✓✓		do.	10	10	J-208			.03	.002	
1244 TD	✓✓		do.								

Johnson C[illegible]
Pinal County
Arizona

SCALE 1" = [illegible]

DIRECTION Vertical
INCLINATION –
STARTED [illegible]-69
COMPLETED [illegible]-69
DEPTH 58[illegible]'
LOGGED BY T. [illegible] Hanks
DRILLER Whatley Drilling Co.

HOLE NO J-7
PROPERTY Johnson Claims
LOCATION [illegible] Sec. 8, [illegible]
COLLAR COORD N 8060 E 8032
COLLAR ELEV. 2290
SHEET 1 OF 4
HOLE SIZE 6 3/4" Hammer bit 14-[illegible]' / [illegible]" Rock bit [illegible]

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (lbs)	Assays Cu	Assays Mo
10		Hole collared in quartz monzonite porph. 9 5/8" rock bit to 14', cased with 14' 8 5/8" surface pipe.					
20		(14') 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 cpy 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	

DIRECTION	
INCLINATION	
STARTED	
COMPLETED	
DEPTH	
LOGGED BY	
DRILLER	
HOLE NO	J-7
PROPERTY	
LOCATION	
COLLAR COORD. N. / E.	
COLLAR ELEV.	
SHEET 2 OF 4	
HOLE SIZE	

SCALE

Depth	Py	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample (No.)			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
330 340		Qtz. Monz.: Moderately chloritized, traces of py. Some of the ortho. xls have sulfides scattered through them or on cleavage 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.	10	10	J-215	<.01	
430		Only few sulfides. do.					
440		do.					
450		Slight increase in pyrite. do.					
460		do.					
470		do.					
478		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 (ft)	Recovery (%)	Sample (No.)	ASSAYS	Cu	Mo
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, biotitc sulfides less than .5%. Extremely hard from 495 to 531'. (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	HOLE NO	J-8
INCLINATION	-	PROPERTY	Johnson Claims
STARTED	1-2?-69	LOCATION	SW¼SW¼ Sec. 9, 4S, 13E
COMPLETED	2-1-69	COLLAR COORD.	N. 8270 E. 10,105
DEPTH	972'	COLLAR ELEV.	2295
LOGGED BY	T. L. Hanks	SHEET	1 OF 6
DRILLER	Whatley Drilling Co.	HOLE SIZE	6?' Ham. Bit to 762' ~~Rock Bits to 972'~~

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (no.)	ASSAYS Cu
10		Hole collared in weathered QTz. Monz. 9 5/8'' rock bit to 20' & cased. ~~Small s-w ... streaks NW of collar.~~				
20		Weathered Qtz. Monz.: Considerable magnetite and iron oxides.				
30		do. sericite	10	10	J-218	.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-219	.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	Interval (ft)	Recovery (%)	Sample No.	Au	Ag	Cu	Mo	Zn
170		Qtz. Monz.: Increasing pyrite with xls to 1/8'' dia. Some chpy and ser.	10	10	-[illegible]			.01	<.001	.01
180		About 178' sulfides of py, chpy and sphalerite (1-2%). Minor 2-nd ortho.	10	10	-[illegible]	0	0	.04	<.001	.4[illegible]
		do. Heavy oxides 183-85.	5	5	-[illegible]		.03	.01	<.001	.31
190		do. Decreasing sulfides	5	5	-[illegible]			<.01	<.001	.06
200		Qtz. Monz.: About 20% limonite, some ser and minor sulfides.								
210		do. Iron oxidized water 180-203'								
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	-22[illegible]			.01		
240		do.								
250		do.								
260		do.								
270		do.	10	10	-225			<.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	J-8
PROPERTY	
LOCATION	
COLLAR COORD. N.	E.
COLLAR ELEV.	
SHEET	3 OF 6
HOLE SIZE	

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (ft)	Sample (no.)	Assays				
								Cu		
		Qtz. Monz.: Minor iron oxides & sulfides (py & chpy), sericite. Magnetite.								
330		do.								
340		do. Biotized granite; much like thin zones ~~near diabase dike contacts as seen at~~								
350		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								
390		~~flakes of chpy; some sericite.~~ do.								
400		do.								
410		do.	10	10	J-22[illegible]			.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		~~texture.~~ do.								
470		do. Hematite; slightly more sulfides.								

J-8

DIRECTION	
INCLINATION	
STARTED	
COMPLETED	
DEPTH	
LOGGED BY	
DRILLER	
SCALE	
HOLE NO	J-8
PROPERTY	
LOCATION	
COLLAR COORD. N. / E.	
COLLAR ELEV.	
SHEET 4 OF 6	
HOLE SIZE	

Depth	Log	Rock Type and Description	Interval (m)	Recovery (m)	Sample (m)	ASSAYS		Cu	Mo	Zn
490		Qtz. Monz.: Partial alteration of biotite to ch. Traces of sulfides & ser, epidote. Cpy & Mo assoc. with some of the quartz fragments.								
500		do.								
510		do. Cpy on orthoclase.	10	10	J-227			.02	.001	.0[illegible]
520		do.								
530		Partial chloritization. Cpy veinlets in dk pink ortho. Micaceous iron oxides.								
540		do.								
550		do.								
560		Minor sulfides and traces of micaceous iron oxides.								
570		do. Few pink feldspars; generally white & gray with cpy and bornite showings.								
580		Slight increase in overal sulfides. Ch and ser showings.	10	10	J-228			.04		
590		do. (Composite of No. 229 & 230 0 Cu) (" " 231 & 232 less than .003 Cu)								
600		do.								
610		do. Cpy traces.								
620		do. Pyrite mainly in biotized zones around feldspar crystals.								
630		do.								
		do.	10	10	J-2[illegible]			.03		

Direction	
Inclination	
Started	
Completed	
Depth	
Logged by	
Driller	
Hole No.	J-8
Property	
Location	
Collar Coord. N.	E.
Collar Elev.	
Sheet	5 of [illegible]
Hole Size	

Scale

Depth	Log	Rock Type and Description	[illegible] (ft)	[illegible] (ft)	[illegible] (no)	Au	Ag	Cu	Mo	Zn
650	✓✓	Qt?. Monz.: Minor sulfides, slightly ser. Chpy as veinlets on or within dk pink ortho. Micaceous iron oxides.								
660	✓✓	Sulfides begin increasing about 580' were there are approx. .5% to this interval where there is slightly								
670	✓✓	over 1%. Traces of chpy and mic. iron oxides, some hematite.								
680	✓✓	do.								
690	✓✓	do.	10	10	J-230			.04		
700	✓✓	do. Ins. in water.								
710	✓✓	do.	10	10	J-23?			.03		
720	✓✓	do.								
730	✓✓	do.	10	10	J-23?			.02		
	✓	Sulfides 1-3%; hole caving at about 660' and 160-230' (Iron oxides)								
740	✓		4	4	J-233			.01	.001	
750	✓✓	Extremely fine sulfides, some chpy, ser. mic. iron oxides and sphalerite. Minor diabase.	10	10	J-234	0	0	.06	.001	.1?
760	✓✓	do.	10	10	J-235			.07	.001	.5?
770	✓✓	do.	10	10	J-236			.06	.001	
780	✓✓	do. 1-2% sulfides.								
790	✓✓	do. 1% sulfides.								
	✓✓	do.	10	10	J-237			.03		

DIRECTION		HOLE NO	J-8
INCLINATION		PROPERTY	
STARTED		LOCATION	
COMPLETED		COLLAR COORD. N. E.	
DEPTH		COLLAR ELEV.	
LOGGED BY		SHEET 6 OF 6	
DRILLER		HOLE SIZE	

SCALE

Depth	Recovery	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No)	ASSAYS		Cu		
810			Qtz. Monz.: Extremely fine particles; some ortho (secondary) & mo traces.								
820			Thin diabase dike. Qtz, sulfides, ch and some moly. (Rock bit with drilling ~~mud starting at 812')~~								
830			do. Part. alt of biotite	10	10	J-238			.04		
840			do. Increase in ser and ortho, less diabase								
850			do.								
860			Minor sulfides and diabase and kaolinization. Total sulfides est at less than 1%.								
870			do.								
880			do.								
890			About 3% of the fragments are made up of diabase, some chlorite.								
900			do.								
910			Minor diabase, ser and ch. Some clay alt.								
920			Sulfides and secondary ortho. Inc. calcite content.								
930			do.								
940			do.	10	10	J-239			.04		
950			do.								
960			do.								
972 T.D.			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 to below

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (ft)	Sample No.	Assays Cu	Mo
0–20		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. Alluvial Wash: Sulfides in outcrop near ~~collar.~~					
20–30		do.					
30–40	38	do. Bedrock at about 38'					
40–50	41	Qtz. Monz.: Predominantly a light-gray, few pronounced ortho fragments. Minor ~~sulfides. Shows of copper oxides.~~					
50–60		Little alteration. Traces of sulfides, ~~fine grained biotite; partial alt. to ch~~	10	10	J-240	.01	
60–70		do.					
70–80		Part. alt feld; moderate chlorite. Rust stained joints and fractures. ~~Traces of sulfides & ser, inc. with~~ depth. Epidote traces.					
80–90		do.					
90–100		do.					
100–110		do.					
110–120		do.					
120–130	129	Moderate ch & ser, some secondary ortho. Inc. chpy and mo beg. at 129'.	10	10	J-241	.01	.001
130–140		do.	10	10	J-242	.03	
140–150	144	do.	10	10	J-243	.01	
150–155	155	Diabase: Dk gray to black; py, chpy and some epidote. do.	5	5	J-244	.02	
155–		Minor qtz. mon.. Pyritized					

J-9

DIRECTION	HOLE NO
INCLINATION	PROPERTY
STARTED	LOCATION
COMPLETED	COLLAR COORD. N. ___ E. ___
DEPTH	COLLAR ELEV.
LOGGED BY	SHEET 2 OF 10
DRILLER	HOLE SIZE

SCALE

Depth	Log	Contact	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	Cu	Mo
			Diabase: Pyritized, some qtz. monz.					
170		168	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			do.	5	5	J-247	.01	
240		244	Diabase: Py and chpy, est total-1%.	5	5	J-248	.01	
250				5	5	J-249	.04	.001
			do.					
260		257	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.					

SCALE	
DIRECTION	
INCLINATION	
STARTED	
COMPLETED	
DEPTH	
LOGGED BY	
DRILLER	
HOLE NO	J-9
PROPERTY	
LOCATION	
COLLAR COORD. N.	E.
COLLAR ELEV.	
SHEET	3 OF 10
HOLE SIZE	

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	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	.04
360		Diabase dikes from a few inched 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	.01
420						
430		Diabase and Qtz. Monz.: Sulfides in dia. Ch and very few ortho frag.; gypsum & some calcite.	10	10	J-252	.03
440		do.				
450		do.	10	10	J-253	.05
460		do.				
470	465	Diabase & Qtz. Monz.: pyritized, cpy in dark pink ortho and qts. Traces of epidote.				
		do.				

DIRECTION	
INCLINATION	
STARTED	
COMPLETED	
DEPTH	
LOGGED BY	
DRILLER	
HOLE NO.	
PROPERTY	
LOCATION	
COLLAR COORD. N.	E.
COLLAR ELEV.	
SHEET 4	OF 10
HOLE SIZE	

SCALE

Depth	Log	Rock Type and Description	[illegible]	[illegible]	[illegible]	ASSAYS Cu
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	.02
530		do.				
540		do. (Hammer bit not properly working due to				
550		large volume of water. Hole drilled below 538' with rock bits.)				
560		do.				
570		do.				
580		Begining about 570' rock becomes a darker greenish-gray with more chlorite.				
590		do.				
600		do. Slightly more chpy	10	10	J-255	.03
610		Qtz. Monz.: Same as above except with a few frag of py & chpy bearing diabase.				
620		do.				
630		do.				
		do.				

J-9

	DIRECTION
	INCLINATION
	STARTED
	COMPLETED
SCALE 1" = 40'	DEPTH
	LOGGED BY
	DRILLER

HOLE NO	J-9
PROPERTY	
LOCATION	
COLLAR COORD. N.	E.
COLLAR ELEV.	
SHEET 5	OF 10
HOLE SIZE	

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (ft)	Sample (ft)	ASSAYS Cu
650		Qtz. Monz.: Few scattered frag of py & cpy 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	J-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	J-257	.01
830						
840						
850		Qtz. Monz.: Gradual increase in ch & sulfides. Prevailing greenish-gray. Minute flakes of py & cpy in ortho particles. Continued minor showings of clay alteration. Sulfides est at slightly more than 1%.	10	10	J-258	<.01
860						
870						
880						
890						
900						
910		Less chlorite; same as above				
920			10	10	J-259	.04
930		Diabase and minor Qtz. Monz.: Moderately pyritized with showings of cpy; 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	Rock Type and Description	Interval (ft)	Recovery (ft)	Sample (no.)	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-260	.01
1030					
1040					
1050					
1060	Do.				
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-261	.01
1120					
1130					
1140					
1150					
1160					
1170					
1180					
1190					
1200					
1210					
1220					
1230					
1240	Diabase & Qtz. Monz.: Pyritized; slight overall sulfide increase. (Five foot samples 1250-1290').				
1250					
1260		5	5	J-262	.01
1270	Diabase, qtz. monz. same as above.				

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	

SCALE 1'' = 40'

Depth	Log	Rock Type and Description	[illegible]	[illegible]	[illegible]	Assays		Cu	Mo	
1290		Qtz. Monz.: Moderate chlorite and clay alteration only traces of sulfides. Some cpy 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										
1550		Inc. Diabase, flakes of mo in quartz.	10	10	J-26			.001		
1560		Same as above.								
1570										
1580										
1590										

SCALE 1" = 40'

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 (ft)	Recovery (%)	Sample (no)	ASSAYS				
1610	✓✓	Qtz. Mon..: 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' Return of clay alteration. Chpy seen on dark pink orthoclase particles.								
1820	✓✓									
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	J-26[illegible]			.03		
1910	✓									
	✓✓	Qtz. Monz.; Same as above.								

DIRECTION		HOLE NO	J-9
INCLINATION		PROPERTY	
STARTED		LOCATION	
COMPLETED		COLLAR COORD. N.	E.
DEPTH		COLLAR ELEV.	
LOGGED BY		SHEET 9	OF 10
DRILLER		HOLE SIZE	

SCALE 1" = 40'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (no.)	Cu	Mo
1930	✓✓	Qtz. Monz.: Few pyritized diabase particles.		10	J-266	.03	.001
1940	✓✓	Moderate chlorite & sericite. Total					
1950	✓✓	sulfides are approximately .5% with traces of chalcopyrite. 3-5%					
1960	✓✓	magnetite. Clay alteration is about 15% of the returns. Nearly 1/3					
1970	✓✓	of the cuttings are made up mostly of mafic minerals; this decreases					
1980	✓✓	below 1980'					
1990	✓✓						
2000	✓✓						
2010	✓✓						
2020	✓✓						
2030	✓✓	More mafic material.					
2040	✓✓						
2050	✓	Qtz. Monz. & Diabase: Diabase is pyritized					
2060	✓	and includes showings of chpy; biotite	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. Some pyritiezed diabase.	10	10	J-270	.01
2260	✓ ✓					
2270	✓					
2280	✓					
2290	✓					
2300	✓	Qtz. Monz.: Considerable diabase which is carrying considerable py and traces of chpy.				
2310	✓					
2320 T.D.	✓		10	10	J-271	.05

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

Location: 1260' FSL & 60' FWL of Section 9, T 4 S, R 13 E, PINAL CO., ARIZONA

Depth	Rock Type	Description	Cu	Mo	Cueq
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	Pegn	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	Pegn	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	Pegn	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	Mdb	gran aa			
975		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	Pegn	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	Tqdp	qtz diorite phpy dike, mo in seams, dissem cpy, py 1%	.258		
1005		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	Pegn	gran, py stringers, tr bt	.106		
1070		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		gran, 10% diab; 1157: diab, 5% orth, tr ep			
1160	Mdb	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	Mdb	diab 95% w/tr py			
1265		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	Pegn	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	Mdb	diabase @ 1376 w/stgrs qtz & tr py, cpy	.140	.004	
1380		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	Pegm	gran 25% chlor, 20% orth, 55% qtz, tr py, cpy			
1530		aa tr py, cpy, 0.5% sulf			

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

Location 1260 FSL & 60 FWL of Section 9, T 4 S, R 13 E, PINAL CO, ARIZONA

[illegible]

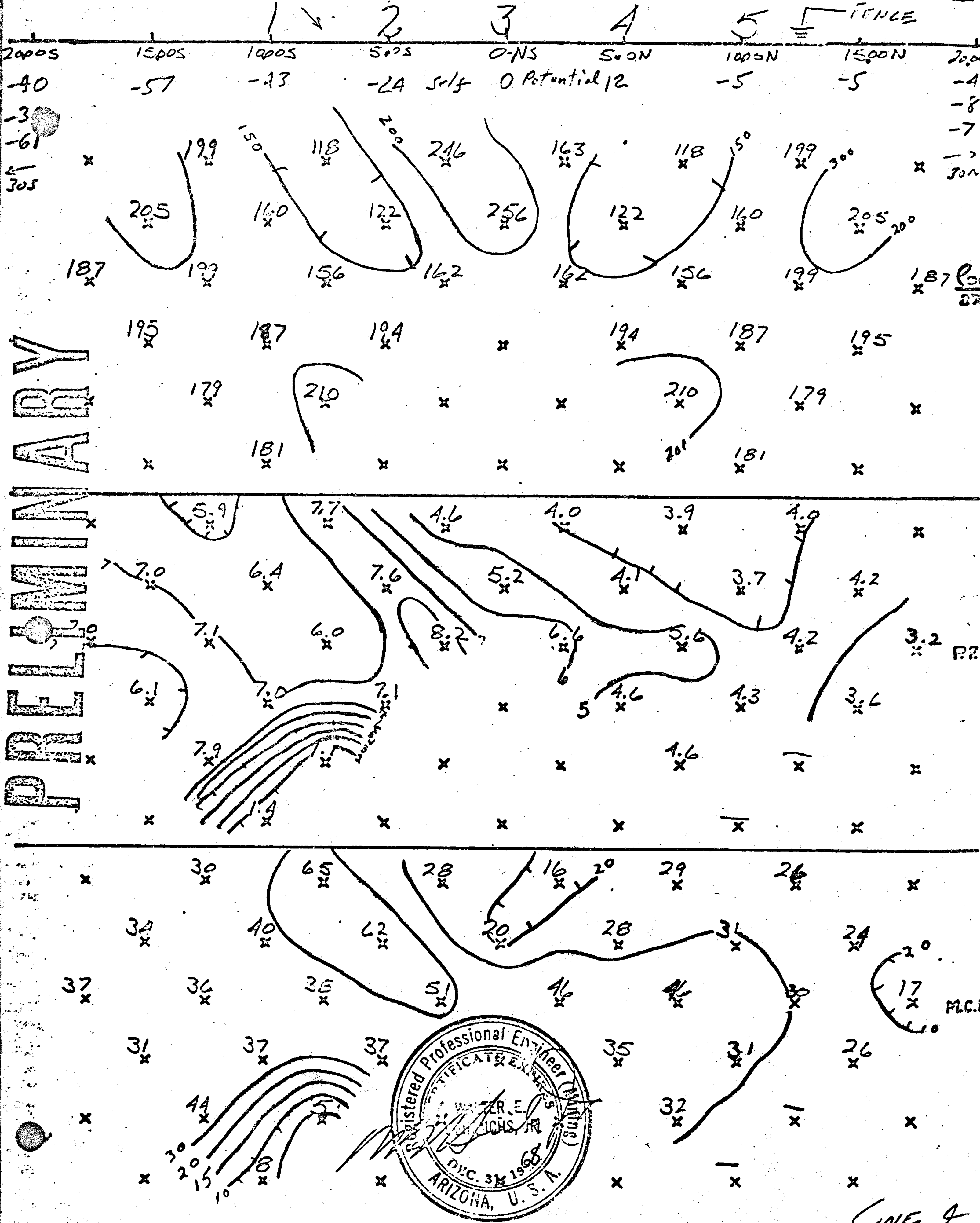
Depth	Rock Type	Description	Cu	Mo	Cu eq
0–710	[illegible]	[illegible]			
710		dior, ≈2% py as stringers, tr ep	.028		
715		dior, tr py stringers, < 1% cpy	.015		
720		dior, < 1% py & ep	.022		
725		dior, < 1% sph, tr py & mo	.016		
730	Td	dior, < 1% mo, < 1% py	.024		
735		dior, < 2% orth, tr py & mo	.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	Pєgn	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	.150		
845		gran, bi mostly alt chl, < 1% py, tr spec, tr ep	.130		
850		gran, bi & orth alt chl, < 1% py, tr ep	.090		
855		gran, ~10% fresh orth, < 1% py, tr ep, tr mo, tr cc	.040		
860		gran, < 1% py, tr mo; sl sides, py veins, chl, mo	.070		
865		gran, < 1% py, tr mo	.060		
870		gran, < 1% py, tr spec	.070		
875		gran, bi fresh, < 1% py, tr ep, spec	.260	%Mo ↓	
880	Td	dior, bi, ptly alt chl, < 1% py, tr bn, tr mo, tr cpy, tr spec	.162	.025	.287
885		gran w/ 1% py, tr mo, 1% spec	.141	.016	.221
890		gran, 1% py, 1% spec, tr mo	.192	.010	.242
895		gran, 2% sul, spec, py	.141	.010	.191
900		gran, micro-fract w/mo + spec, 1% py	.050	.010	.100
905		gran, mo + spec, m veins & micro fract, 1% py	.084	.010	.134
910		gran, 1% mo & spec, 1% py (no fines)	.092	.010	.142
915		gran, 2% sul, tr mo, py, cc	.088	.012	.148
920		gran, 2% sul, tr mo, spec, py	.504	.017	.585
925	Pєgn	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	Mdb	gran aa	.080	.003	.095
975		gran to 971, diabase alt to biotite & chlor to 975	.130		
980	Tqdp	aa	.35?		
985	Pєgn	diorite porph dike @ 981-985 qtz, amph, biot & epid. plag feld 5%	.24?		
990		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	Tqdp	qtz diorite phpy dike, mo in seams, dissem cpy, py 1%	.258		
1005		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	.003	.066
1020		gran aa tr mo, cpy	.044	.001	.049
1025		gran w/dissem cpy, py, tr mo (tot sul 1%) gran: 25% orth, 65% qtz, 10% chlor & spec	.100		
1030		gran, dec sul, tr py, cpy	.110		
1035		gran aa, tr py, mo, cpy, spec	.180		
1040		gran: 20% orth, 60% qtz, 20% chlor & spec, w/tr py, cpy	.150		
1045		gran aa, tr py, cpy; 1048: gran, fresh 40% orth	.190		
1050		gran, fresh 40% orth, tr py	.078	.004	.098
1055		gran, 1% py, Fe stain, fract., 5% dior, 20% plag	.218		
1060		gran, 1% py, tr mo	.060		
1065	Pєgn	gran, py stringers, tr bt	.106		
1070		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	.830
1090		gran, 1% py & cpy, mud, tr Fe color	.133	.019	.238
1095		gran, tr bt, 1% py, cpy	.214	.015	.260
1100		gran, 1% py & cpy	.080		
1105		gran, tr py, cpy & mo, light chl, heavy mud	.100		
1110		gran, tr ep & py, light scattered Fe stain, tr ep	.150		
1115		gran, cpy stringers, 1% py & cpy	.120		
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	.220		
1140		gran, tr py & chl	.200		
1145		gran, tr py, cpy; 1149: diab, tr ep	.120		
1150		gran, 5% diab, tr py, fresh, 35% orth	.140		
1155	Mdb	gran, 10% diab; 1157: diab, 5% orth, tr ep	.090		
1160		diab, 10% orth, tr ep; 1161: gran, 30% orth, 10% diab, tr ep	.240	.016	.320
1165		gran, 20% diab, 1% py	.131	.008	.171
1170		gran, 40% orth, 1% py, tr ep, heavy mud	.220		
1175	Tdp	dior, py stringers, 20% orth	.210		
1180		dior, py stringers, 5% diab, 15% orth, mud; 1182: 1% py & cpy, mud	.122	.019	.220
1185		tr py, 1% cpy, mud	.165		
1190		gran, tr py, tr ep, tr diab	.100		
1195		gran, 1% py, some m veins, tr cpy, tr ep	.090		
1200		gran, tr py, tr mo	.488	.007	.523
1205		gran, 20% diab, tr py	.230		
1210	Mdb	diab 60%, 1% py, tr gran	.150		
1215		gran 50%, tr py	.100		
1220		gran, chl 5%, tr py	.110		
1225		gran, orth 5%, a few diab frags, 1% py	.110		
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	.150		
1245		gran, chl 20%, tr py, tr spec	.050		
1250	Mdb	diab 70%, tr ep	.170		
1255		gran, chl 10%, tr py	.280		
1260		diab 95% w/tr py	.200		
1265	Mdb	diab 40%, tr py; 1268, 1269: heavy mud - 1% py	.131		
1270		diab & gran - 2% py, tr mo	.250		
1275		diab, 40% qtz	.080		
1280		gran, 40% orth, tr py, cpy, 10% diab	.262		
1285		gran, tr py cpy	.216	.004	.236
1290		gran, tr py, 40% orth	.140		
1295		gran, tr lim & py, 1% bt	.070		
1300		gran, tr py & chl,	.050		
1305		gran, tr py & chl	.180		
1310		gran, py stringers	.150		
1315		gran, tr py, chl fract.	.190		
1320		gran, tr chl, barren	.280		
1325	Pєgn	gran 30% orth, 55% qtz, 15% chlor, 1% py, tr cpy, spec	.180		
1330		gran aa 1% py, tr cpy, mo	.254	.016	.334
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	.150		
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	.116
1365		aa dec 0.5% sulf, tr cpy, py, mo	.100		
1370		gran 35% orth, 20% chlor, 45% qtz, tr py, cpy, mag	.100		
1375	Mdb	diabase @ 1376 w/stgrs qtz & tr py, cpy	.140	.004	.160
1380		diabase 1% py, cpy in stgrs dissem	.150	.004	.120
1385		diab to 86 gran to 90 1% py, cpy, gran w/30% chl	.626	.011	.680
1390	Mdb	stgr diab @ 90 gran 90.5 to 95, 65% qtz, 20% orth, 15% chl w/tr mo, py, cpy	.200	.010	.250
1395		gran 20% qtz, 20% orth, 10% chl, tr py	.110		
1400		gran aa tr py, cpy	.070		
1405		aa	.100		
1410		gran w/20% orth, 20% chl, 60% qtz, 0.5% py, tr cpy	.150		
1415		aa	.069		
1420		gran aa tr py, cpy, mo	.100		
1425		gran 30% chl, 20% orth, 50% qtz, tr py	.190		
1430		gran aa	.080		
1435		gran less alt than above biot alt to chlor, 10% chl, 25% or, 65% qtz	.080		
1440		gran tr py, cpy	.150		
1445		aa	.120		
1450		barren gran, tr py	.130		
1455		gran 35% orth, 15% chl, 50% qtz, 0.5% py, cpy, tr mo	.230		
1460		aa tr mo, py, cpy	.110		
1465		gran 40% orth, 20% chl, 40% qtz, tr py	.080		
1470		aa	.130		
1475		aa	.090		
1480		gran 25% orth, 20% chl, 55% qtz, tr mo, py, cpy		.017	.195
1485		aa tr py, cpy	.120	.012	.180
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	.103		
1515		aa	.087		
1520		gran 1% sulf all py, tr cpy, mo aa	.168	.004	.188
1525	Pєgm	gran 25% chlor, 20% orth, 55% qtz, tr py, cpy	.150		
1530		aa tr py, cpy, 0.5% sulf	.231		
1535		gran 15% chlor, 20% orth, 65% qtz, tr mo, cpy, py	.167		
1540		aa 0.5% sulf, py, cpy	.132		
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	.125
1560		aa tr sulf	.050	.002	.060
1565		gran 1% sulf, py, cpy, mo	.160		
1570		gran 25% chlor, 25% orth, 50% qtz 1% py, tr cpy, mo	.106		
1575		gran aa tr py, cpy	.195	.005	.220
1580		gran aa 1% py, tr cpy	.178	.007	.213
1585		gran 20% chlor, 30% orth, 50% qtz, 1% sulf - py, cpy mo	.160		
1590		aa	.245		
1595		gran tr py	.180		
1600		gran 70% qtz, 10% chlor, 20% orth, tr py, cpy	.203		
1605		aa	.100		
1610		gran aa tr py	.299	.005	.324
1615		gran aa tr py, cpy	.304	.004	.324
1620		aa			
1625					

TD 1625

KELVIN PROSPECT – HOLE No. 1	TD 1400'	Mar. 5, 1970			
		Location: 125' FSL & 300' FEL of Section 8, T 4 S, R 13 E, PINAL CO., ARIZONA	ASSAY DATA		
Depth	Rock Type	Description	Cu	Mo	Cu eq
0	Qal	Alluvium: Med-crs frags granite, diabase, diorite, quartz			
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	.067
125		orth, qtz, hvly chloritized gran, comp of orth, qtz	.027	.010	.077
130		aa chlor stgrs crs cutg orth	.418	.040	.618
135		gran to 138 gran w/dissem py, cpy, mo to 140, sml cpy rimmed w/Mo. 1% Sul.	.800	.069	1.150
140		Mo, cpy 1% in gran as dissem on feld & in qtz, ct diabase dike @144	.097	.010	.147
145	Db	black diabase dike w/stgrs qtz, cpy, Py	.058	.010	.108
150		diabase to 153, ct w/gran to 155 hvly chloritized qtz, orth	.064	.023	.1[illegible]
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			
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			
550		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 Fe stain			
580		Monz, 10% bi, 5% chl			
585		Gran, tr Fe stain			
590		Monz, [illegible] 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/tr Fe stain, <1% bt, tr py			
630		Monz w/tr py & Fe			
635		Monz w/tr py, cp, Fe stain			
640		Monz w/2% bt, Fe stain, light chl.			
645		Monz w/2% bt			
650		Monz w/Fe stain			
655		Monz, Fe stains abundant			
660		Monz, chl bt			
665		Monz w/pipe dope, Fe stain			
670	Tm	Monz w/mostly tr Fe stain			
675		Monz w/Fe stain, chl bt			
680		Monz w/chl bt, tr Fe stain			
685		Monz w/Fe stain, chl bt			
690		Monz / tr Fe stain			
695		Monz w/almost no fresh bt			
700		Monz w/almost no fresh bt			
705		Monz w/almost no fresh bt			
710		Monz w/partly chl bt, tr Fe stain			
720		Monz w/chl bt tr py	[illegible]	[illegible]	[illegible]
725		Monz w/tr Fe stain	[illegible]	[illegible]	[illegible]
730		Monz w/chl bt	[illegible]	[illegible]	[illegible]
735		Monz w/chl bt	[illegible]	[illegible]	[illegible]
740		Monz w/tr py, cp, sil & alt, feld boundaries indistinct	[illegible]	[illegible]	[illegible]
745		Monz w/1% cp & py	[illegible]	[illegible]	[illegible]
750		Monz w/tr py, Fe stain	[illegible]	[illegible]	[illegible]
755		Monz w/tr py, 1% cp & op (mo obvious)	[illegible]	[illegible]	[illegible]
760		Monz w/1% mo, cp, py	[illegible]	[illegible]	[illegible]
765		Monz w/1% Mo, Cp, py, no Fe	[illegible]	[illegible]	[illegible]
770		Monz w/1% py, tr cp & Mo	[illegible]	[illegible]	[illegible]
775		Monz w/1% py & cp, tr Mo	[illegible]	[illegible]	[illegible]
780		Monz w/1% py & cp, tr Mo	[illegible]	[illegible]	[illegible]
785		Monz w/1% py & cp	[illegible]	[illegible]	[illegible]
790		Monz w/partly chl bt, <1% py	[illegible]	[illegible]	[illegible]
795		Monz w/tr py, fresh & chl bt	[illegible]	[illegible]	[illegible]
800		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					

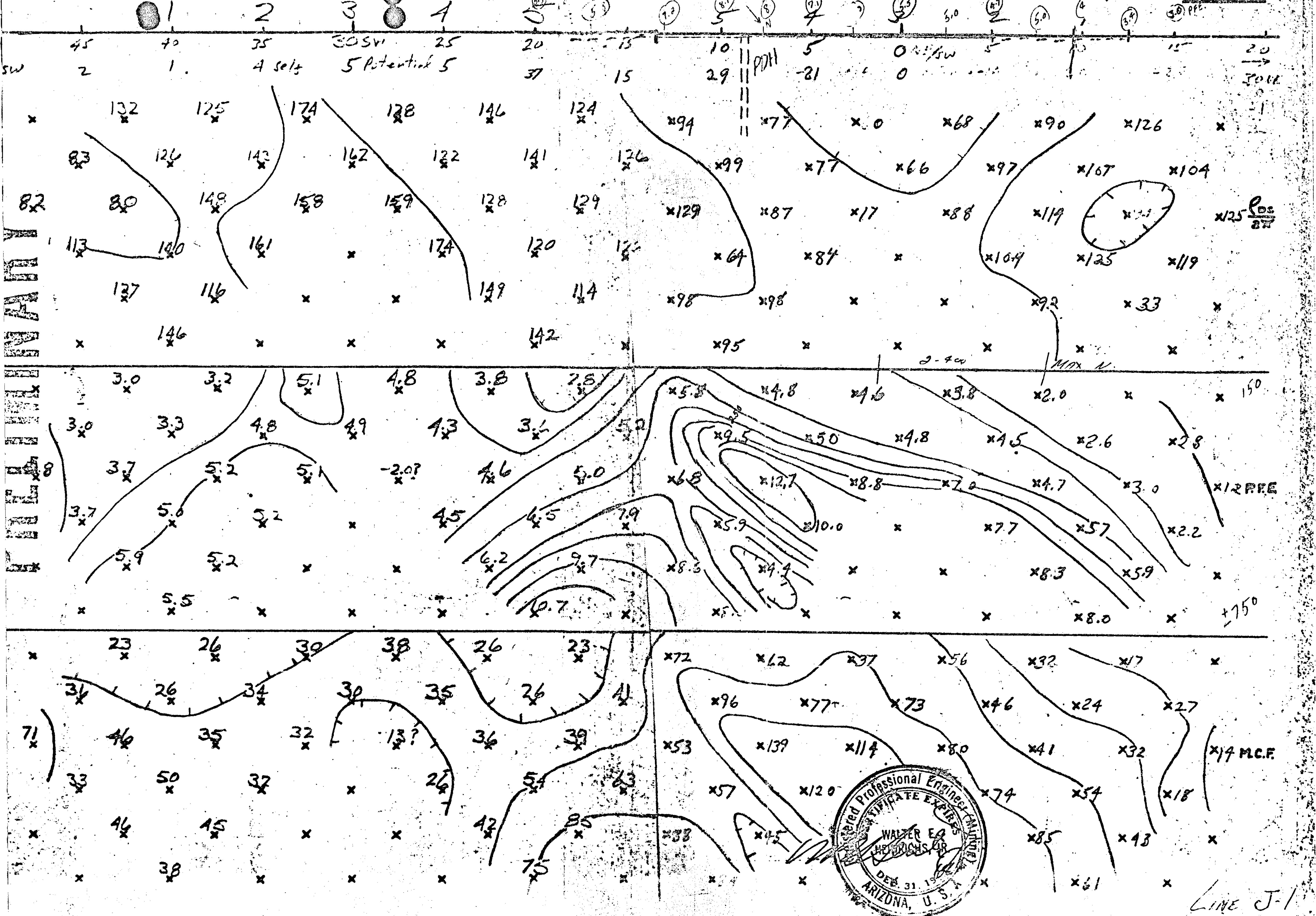
TD 1400' granite
6-5/8 casing @ 52' Temp Abd.

HEINRICHS GEOEX. IND-GEO POLARIZATION SECTIONAL DATA PLOT, LOOKING WEST



AREA Johnson - Yancs LINE 4 Sp/a = 500' SCALE: 1" = 2 DATE: 23-

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING ___ GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING WNW



A Johnson-Hanks LINE J-1 Sec 2 a = 500 SCALE: 1" = ___ DATE 24 ___ LINE J-1 a = 500' SCALE: 1" = 500'

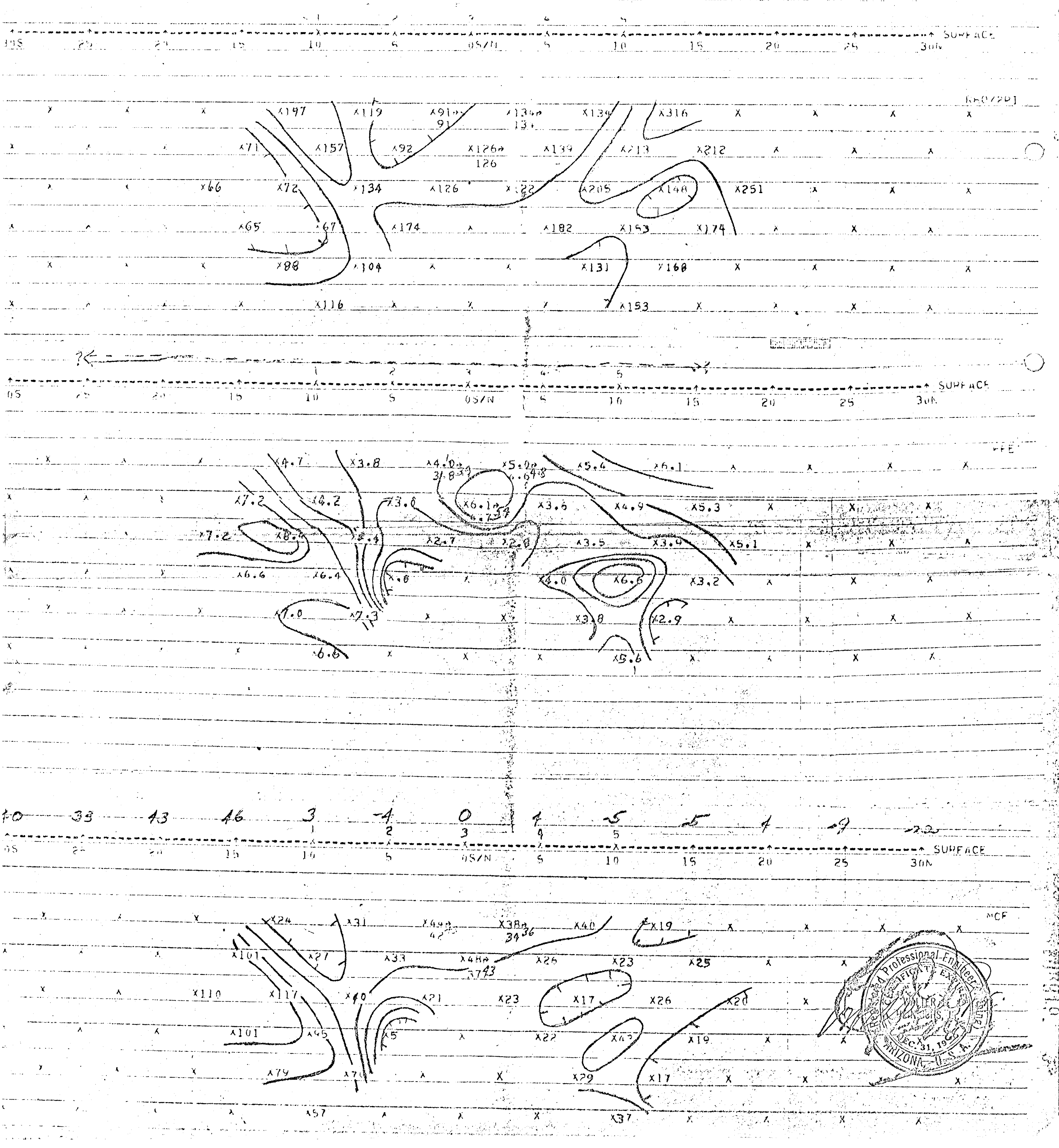
TO RECONSTRUCT MAP ALIGN

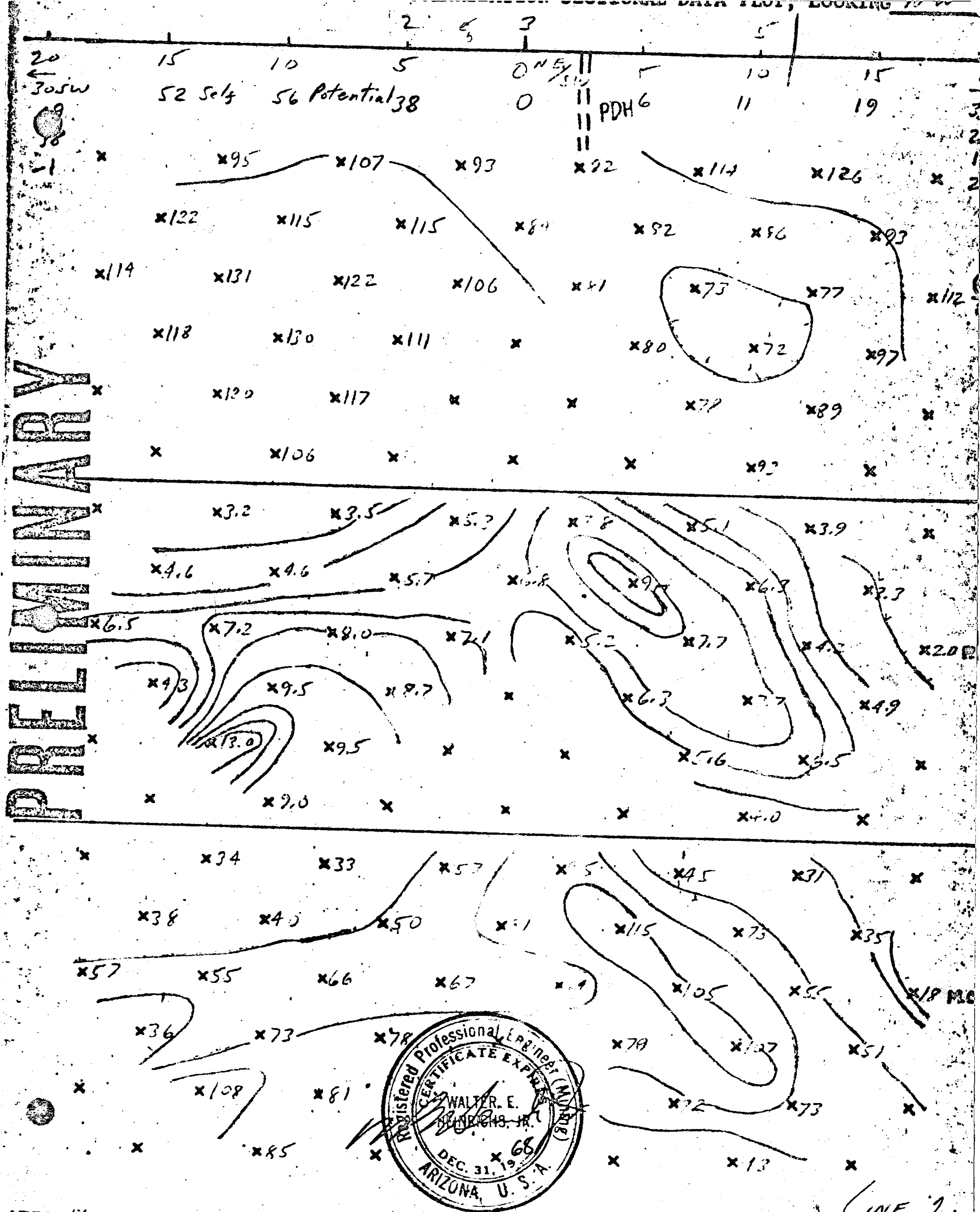
PHOTOS AS SHOWN BELOW

6	5	4
3	2	1

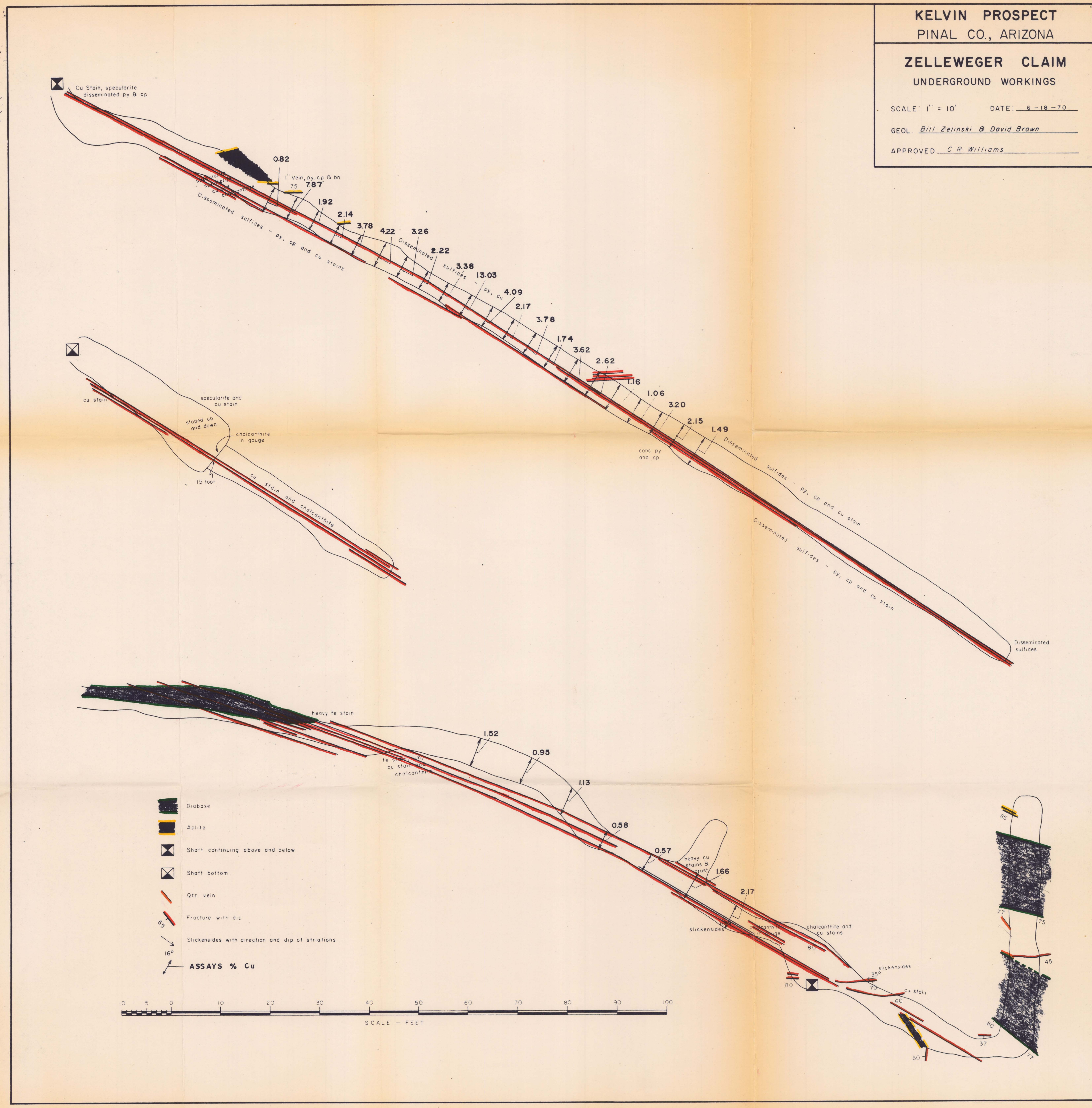
LINE 3B

HEINRICHS GEOEX 6298-68 LINE 3A SPD 1 LOOKING [illegible] 10-4-68 A= 500 FEET



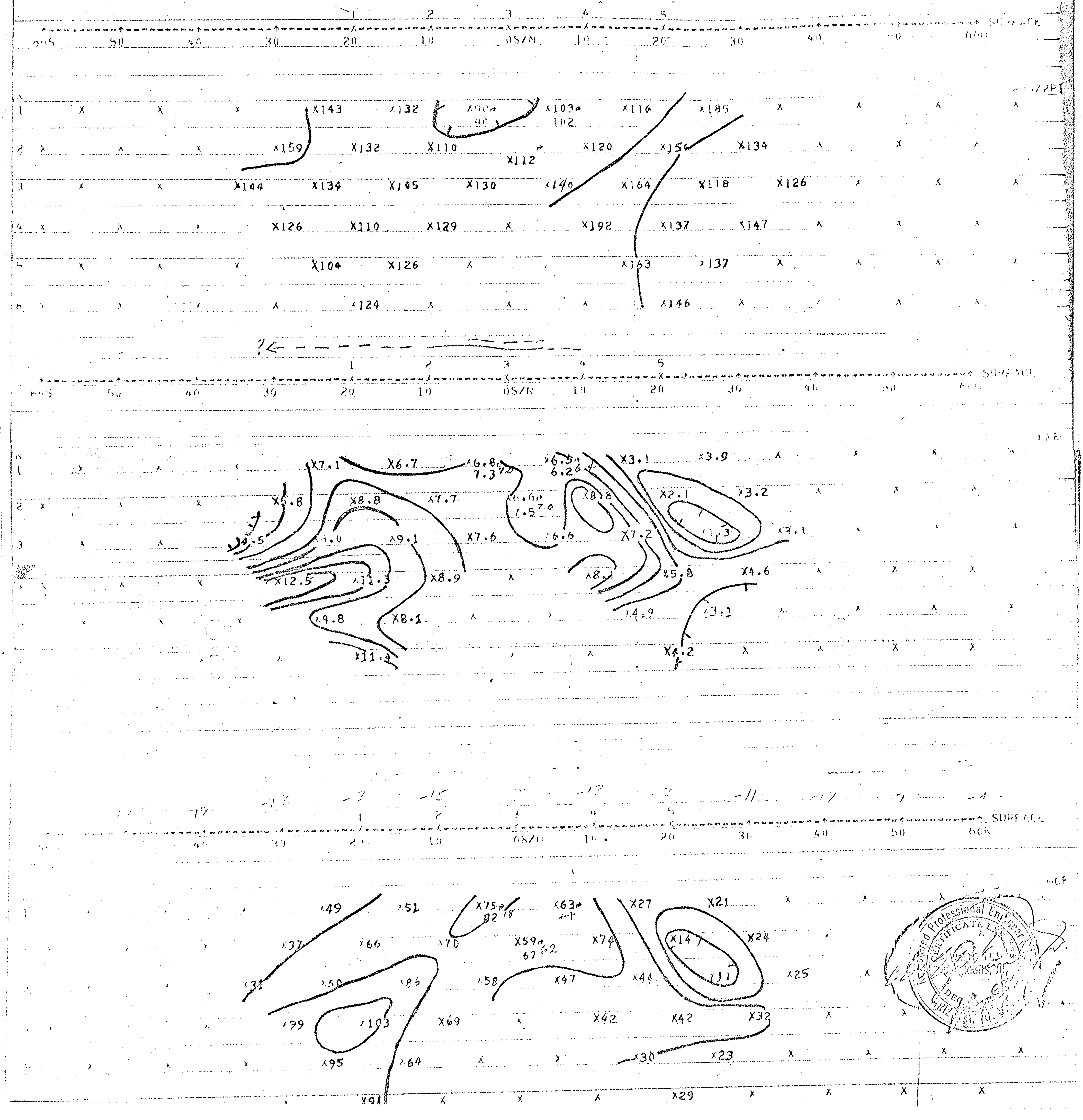


AREA FRANKS - JOHNSON LINE J-2 a = 500' SCALE: 1" = 500' DATE: Aug. 6

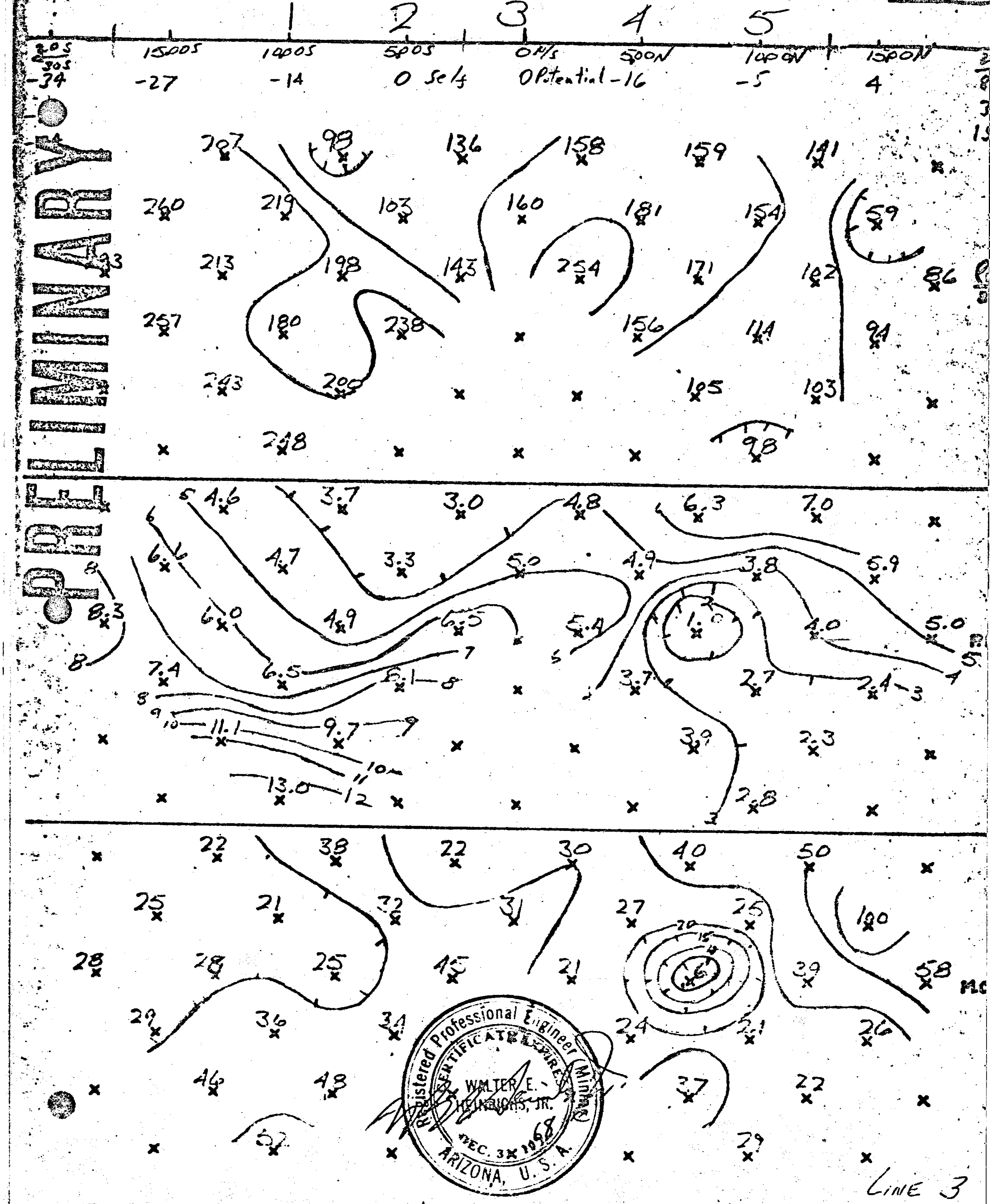


KELVIN PROSPECT
PINAL CO., ARIZONA
ZELLEWEGER CLAIM
UNDERGROUND WORKINGS
SCALE: 1" = 10'
DATE: 6-18-70
GEOL. Bill Zelinski & David Brown
APPROVED C R Williams
Cu Stain, specularite disseminated py & cp
0.82
1" Vein, py, cp & bn
75
7.87
1.92
2.14
3.78
4.22
3.26
2.22
3.38
13.03
4.09
2.17
3.78
1.74
3.62
2.62
1.16
1.06
3.20
2.15
1.49
Disseminated sulfides - py, cp and cu stains
Disseminated sulfides - py, cu
conc py and cp
Disseminated sulfides - py, cp and cu stain
Disseminated sulfides - py, cp and cu stain
Disseminated sulfides
cu stain
specularite and cu stain
stoped up and down
chalcanthite in gouge
15 foot
cu stain and chalcanthite
heavy fe stain
1.52
0.95
1.13
0.58
0.57
1.66
2.17
heavy cu stains & crust
slickensides
chalcanthite and cu stains
slickensides
cu stain
Diabase
Aplite
Shaft continuing above and below
Shaft bottom
Qtz vein
Fracture with dip
Slickensides with direction and dip of striations
ASSAYS % Cu
SCALE - FEET

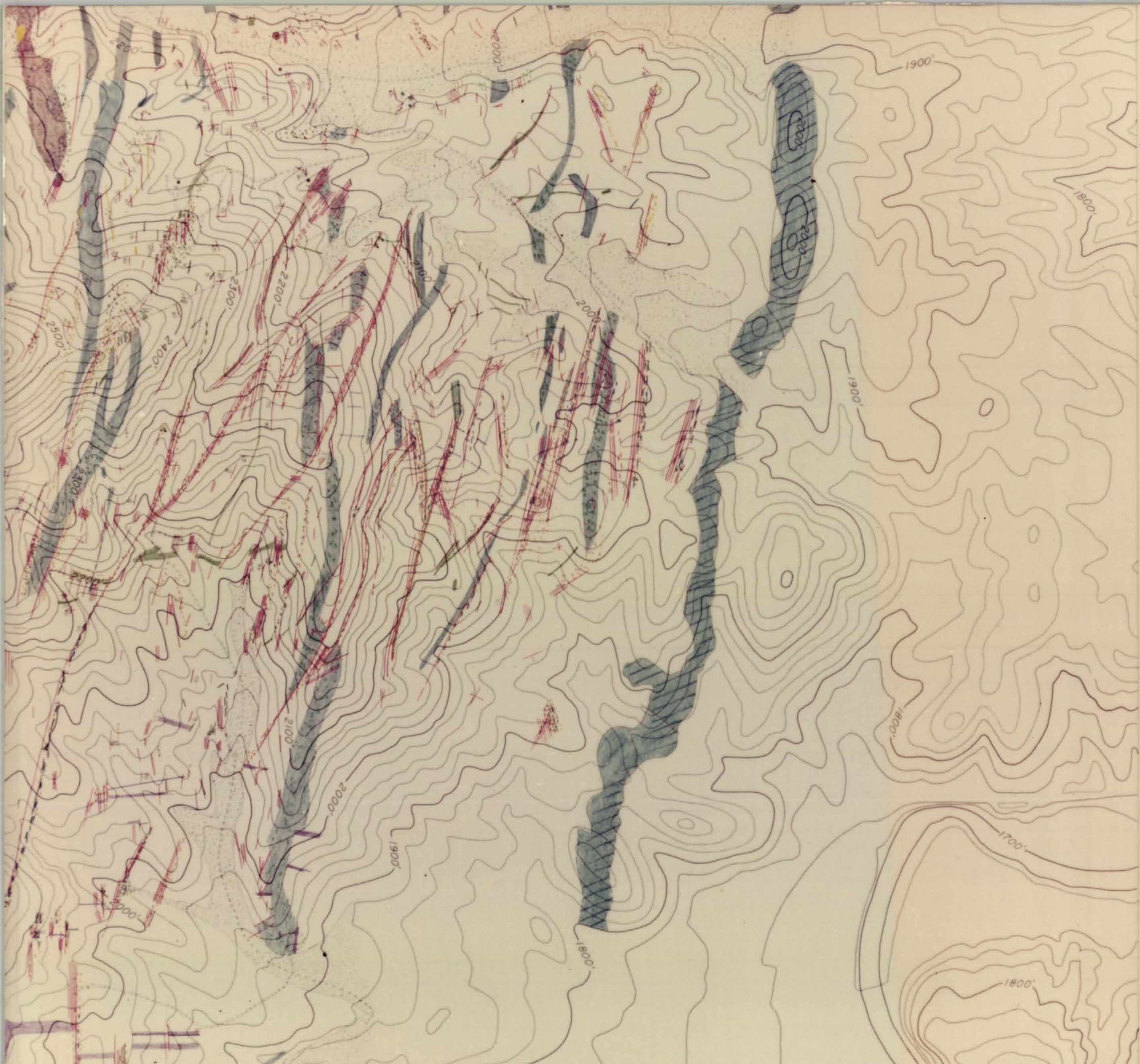
HEINRICHS GEOEX 8290-68 LINE 1 SPD 3 LOOKING 10-2-68 a= 1000 FEET *SPREAD 3*



HEINRICHS GEOEX. IN[illegible]CED POLARIZATION SECTIONA[illegible] DATA PLOT, LOOKING WEST



AREA Johnson – LINE SCALE DATE



1900'
1800'
2000'
2100'
2200'
2300'
2400'
2500'
1700'

2500'
2600'
2700'
2400'
2300'
2200'

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

SCALE (feet)

TIPPERARY RESOURCES CORPORATION

500 W. ILLINOIS MIDLAND, TEXAS

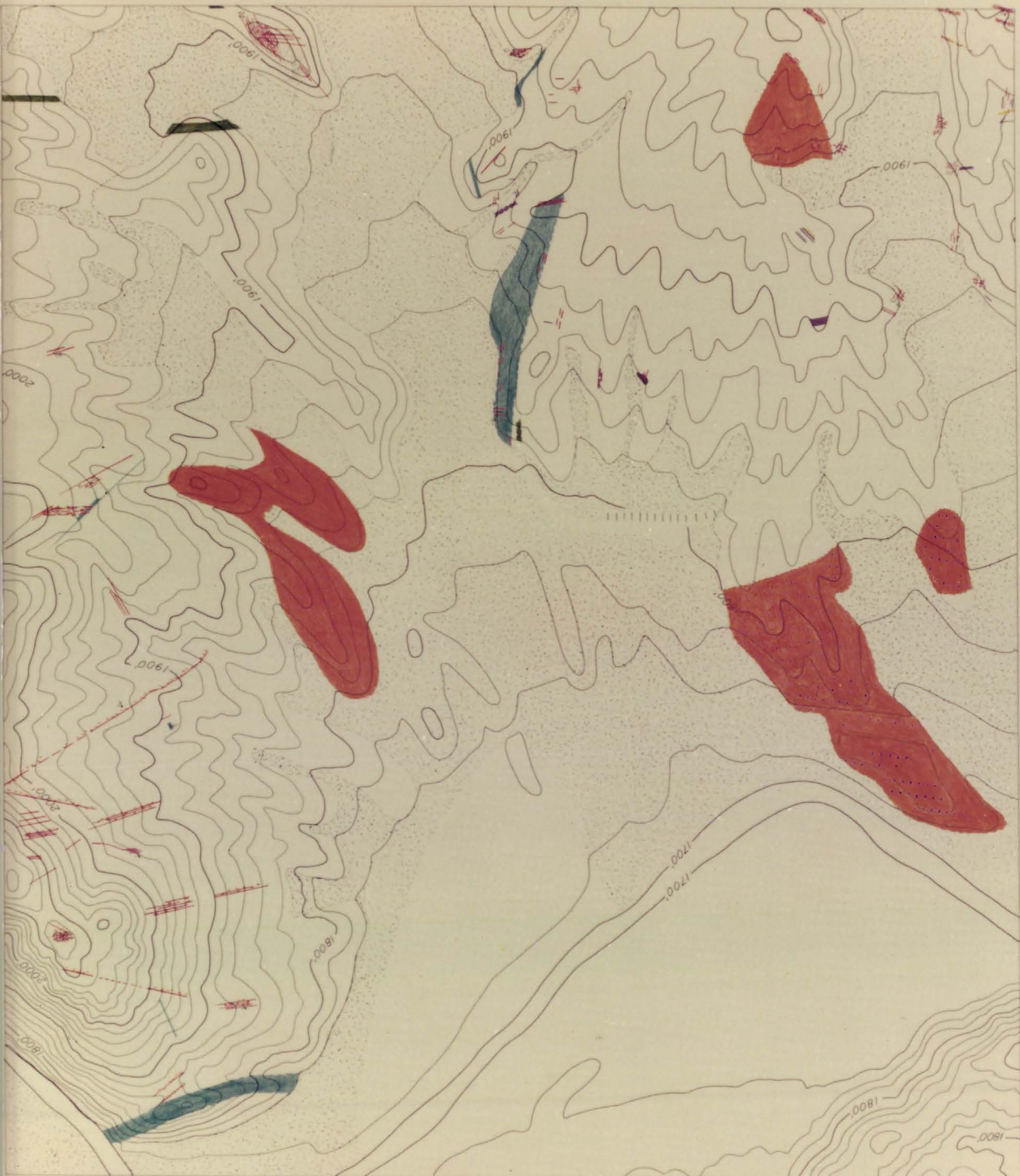
GEOLOGY OF THE KELVIN PROSPECT

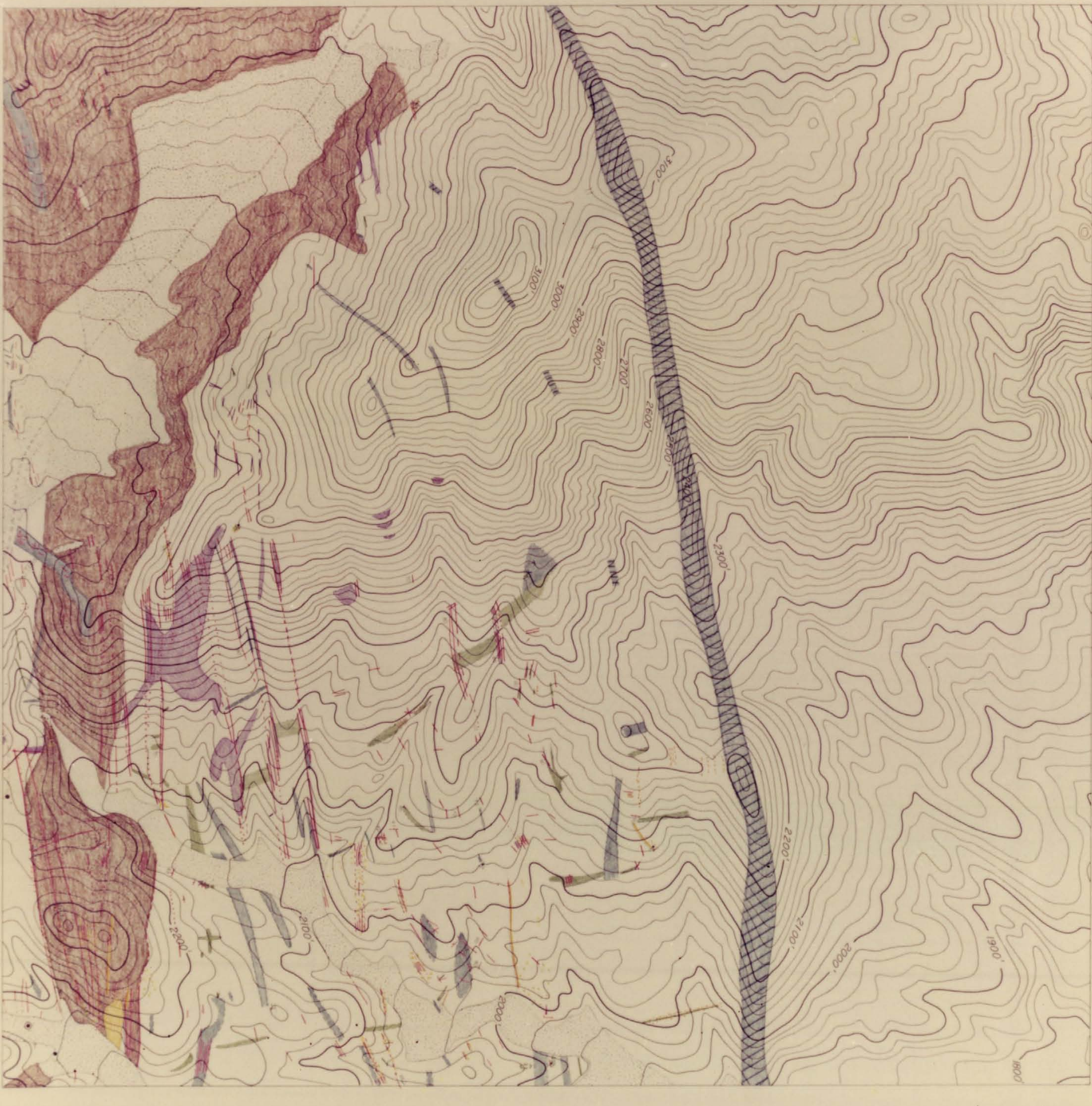
T-4-S, R-13-E

PINAL COUNTY, ARIZONA

Geologists Bill Zelinski & David Brown June 18, 1970

Approved C. R. Williams Drwn By GEH


1900
2000
1800
1700



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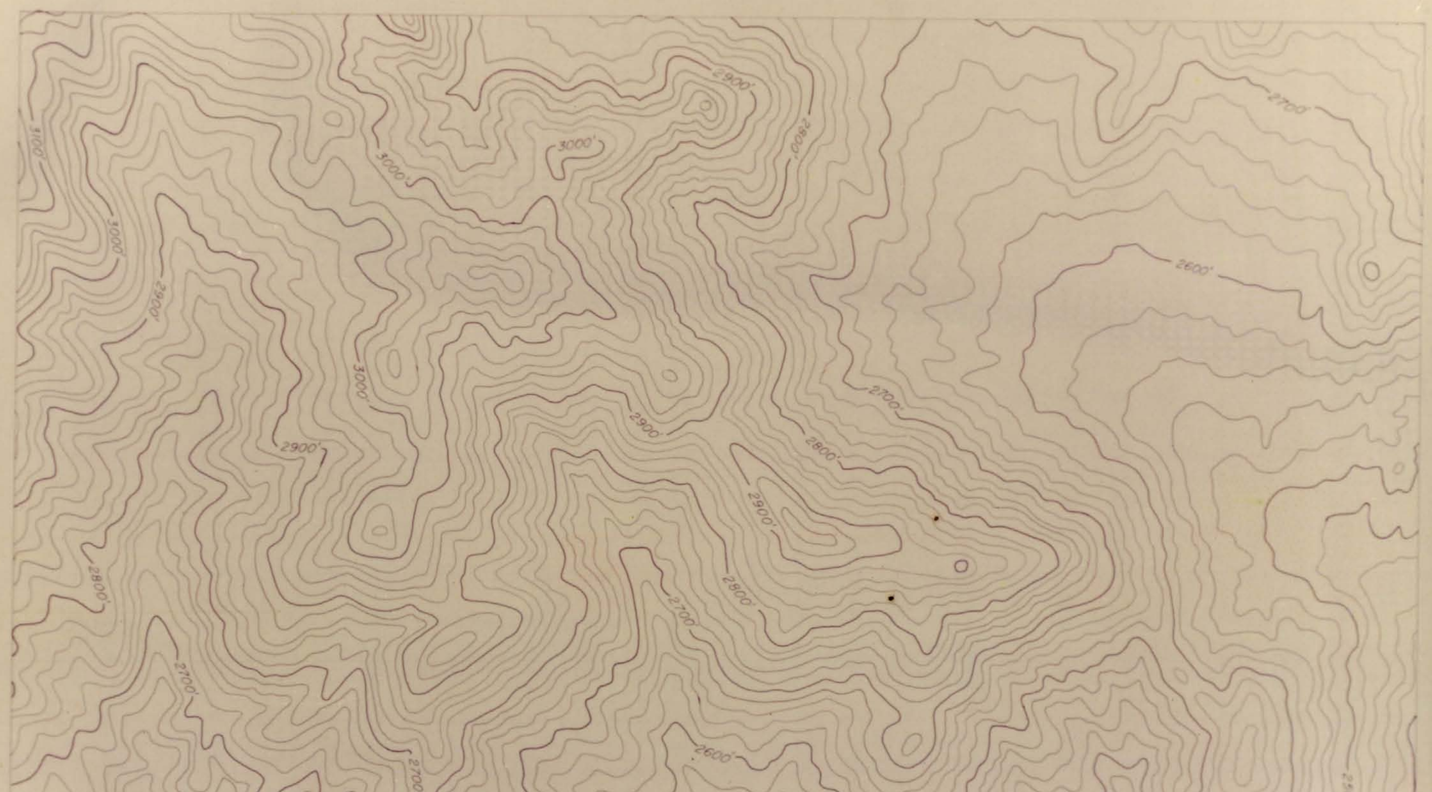

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VOLUME II

TIPPERARY RESOURCES CORPORATION

KELVIN GEOPHYSICAL REPORT

INDUCED POLARIZATION SURVEY

OF THE

KELVIN AREA, PINAL COUNTY, ARIZONA

T4S, R13E, Sec 8, 9

RARE METALS

FOR

TIPPERARY RESOURCES CORPORATION

MAY 1970

BY

HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964 TUCSON, ARIZONA 85703
PHONE: 623-0578 Area Code: 602

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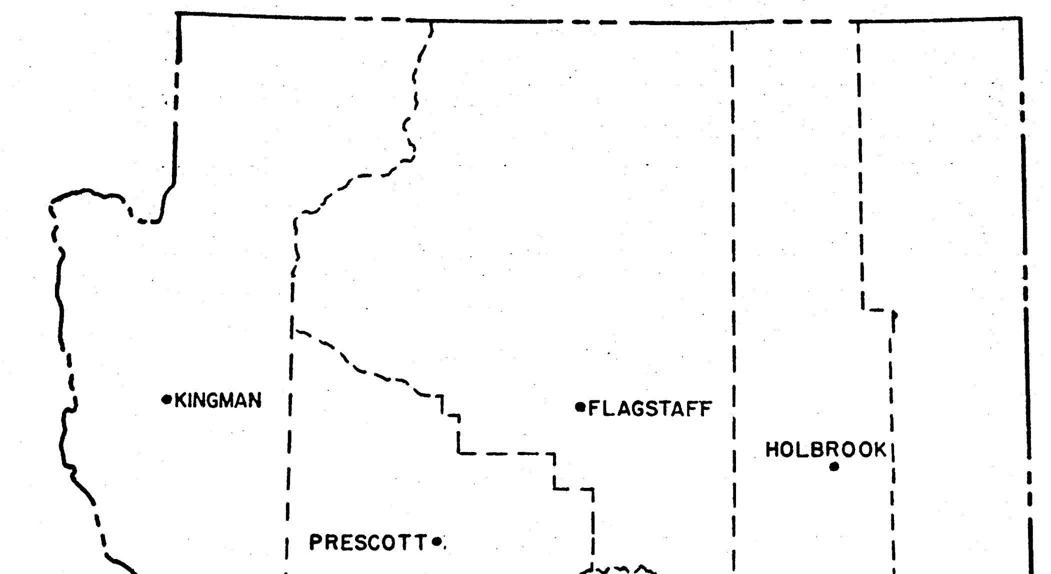
GENERAL LOCATION
of
THE KELVIN AREA
FOR
TIPPERARY RESOURCES CORPORATION

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 OE/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 OE/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 OE/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 OE/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^{o}. 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.

<u>Line 30W (Spread 1, a = 1000'):</u>

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 ON/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.

<u>Line 40W (Spread 1, a = 1000'):</u>

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.

<u>Line 50W (Spread 1, a = 1000'):</u>

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

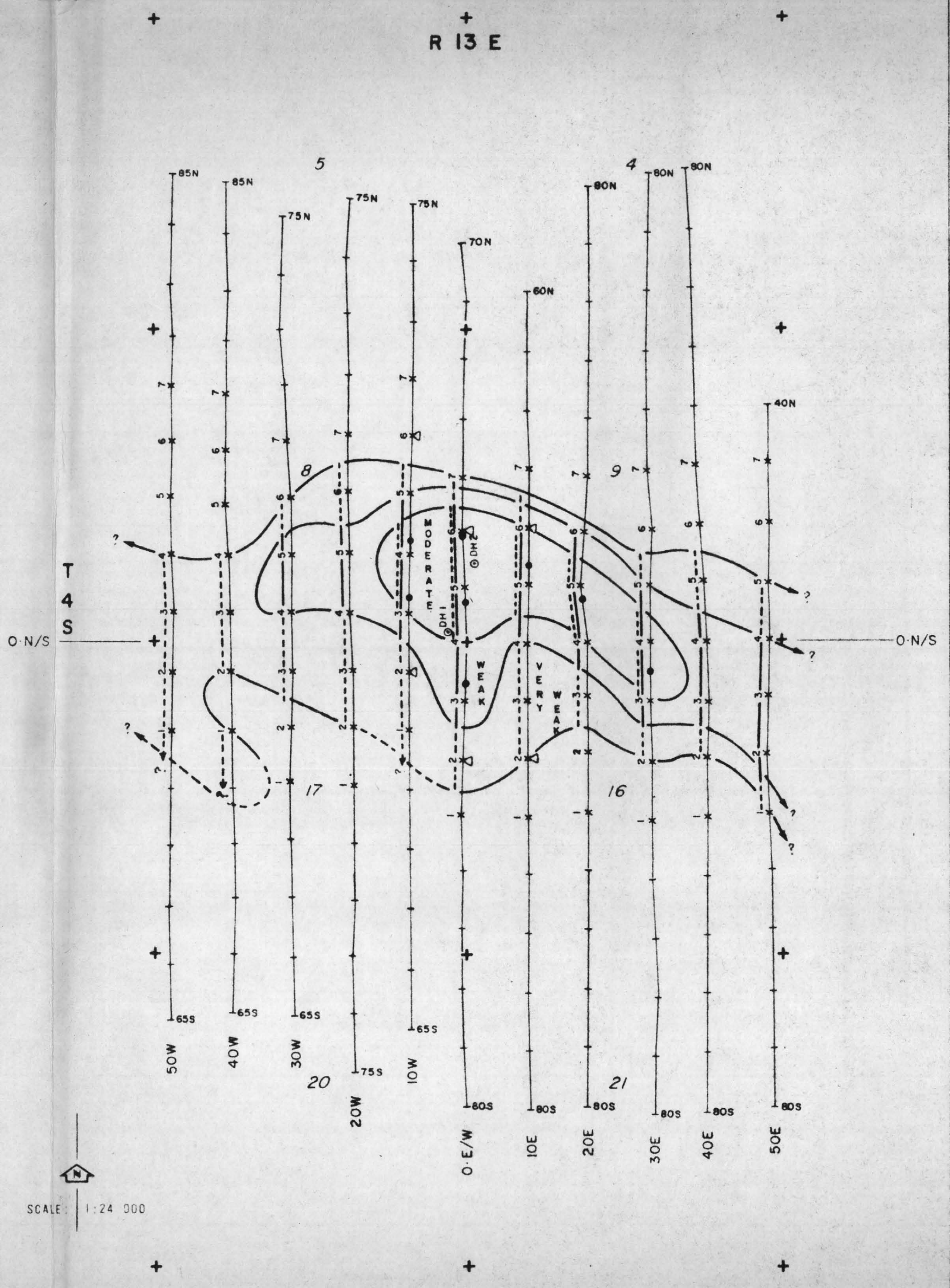
Chris S. Ludwig
Senior Geophysicist

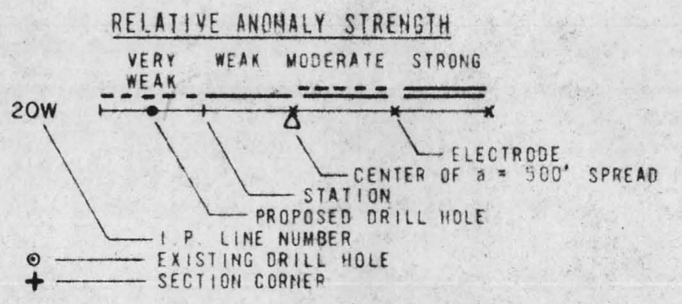
APPROVED:
Walter E. Heinrichs, Jr.
President

May 22, 1970
Tucson, Arizona

516-70
MAY 1970

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





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

Moderate - Red
Weak - Orange
Very Weak - Yellow

1" = 2000'

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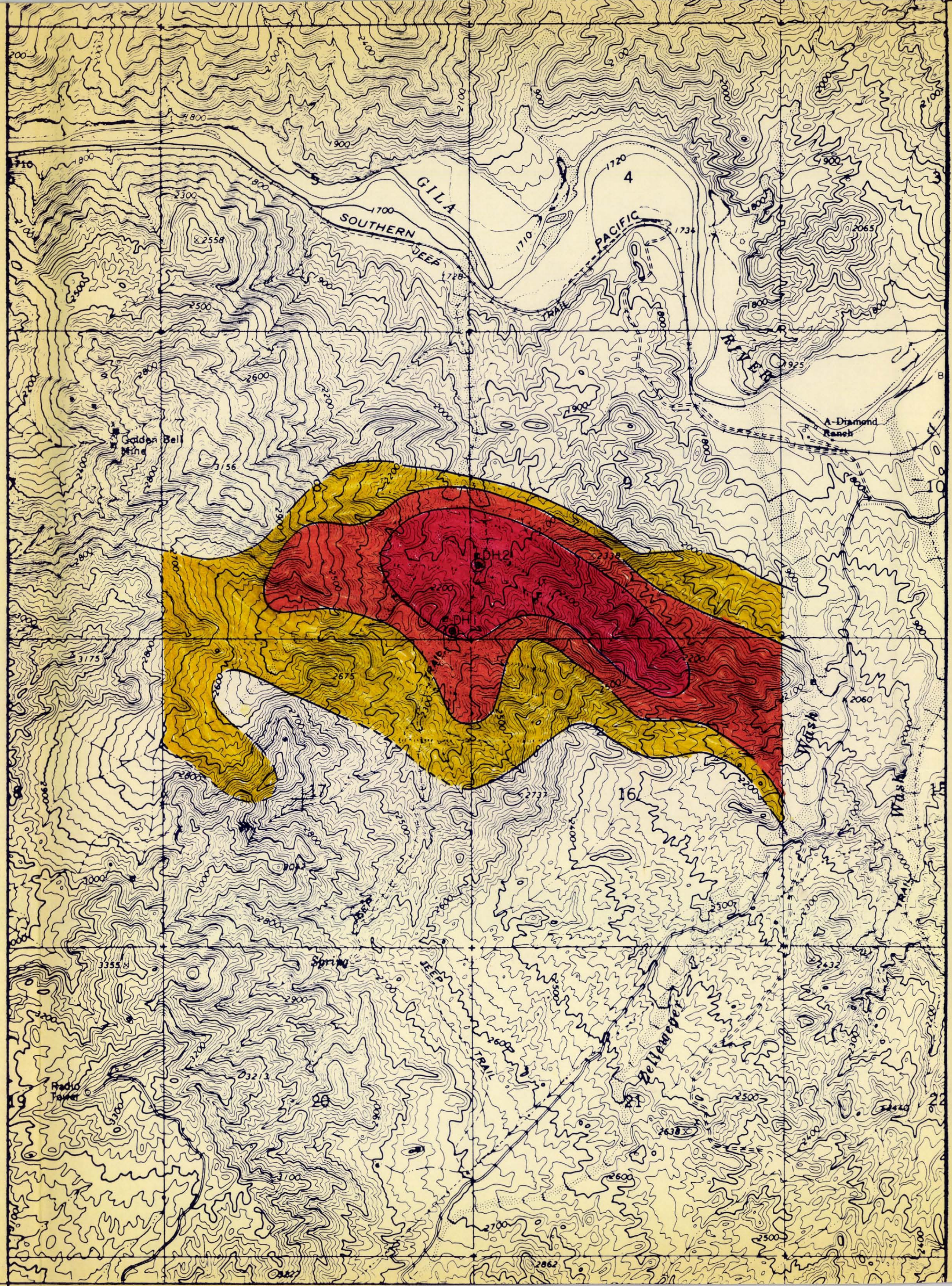
MAY 1970

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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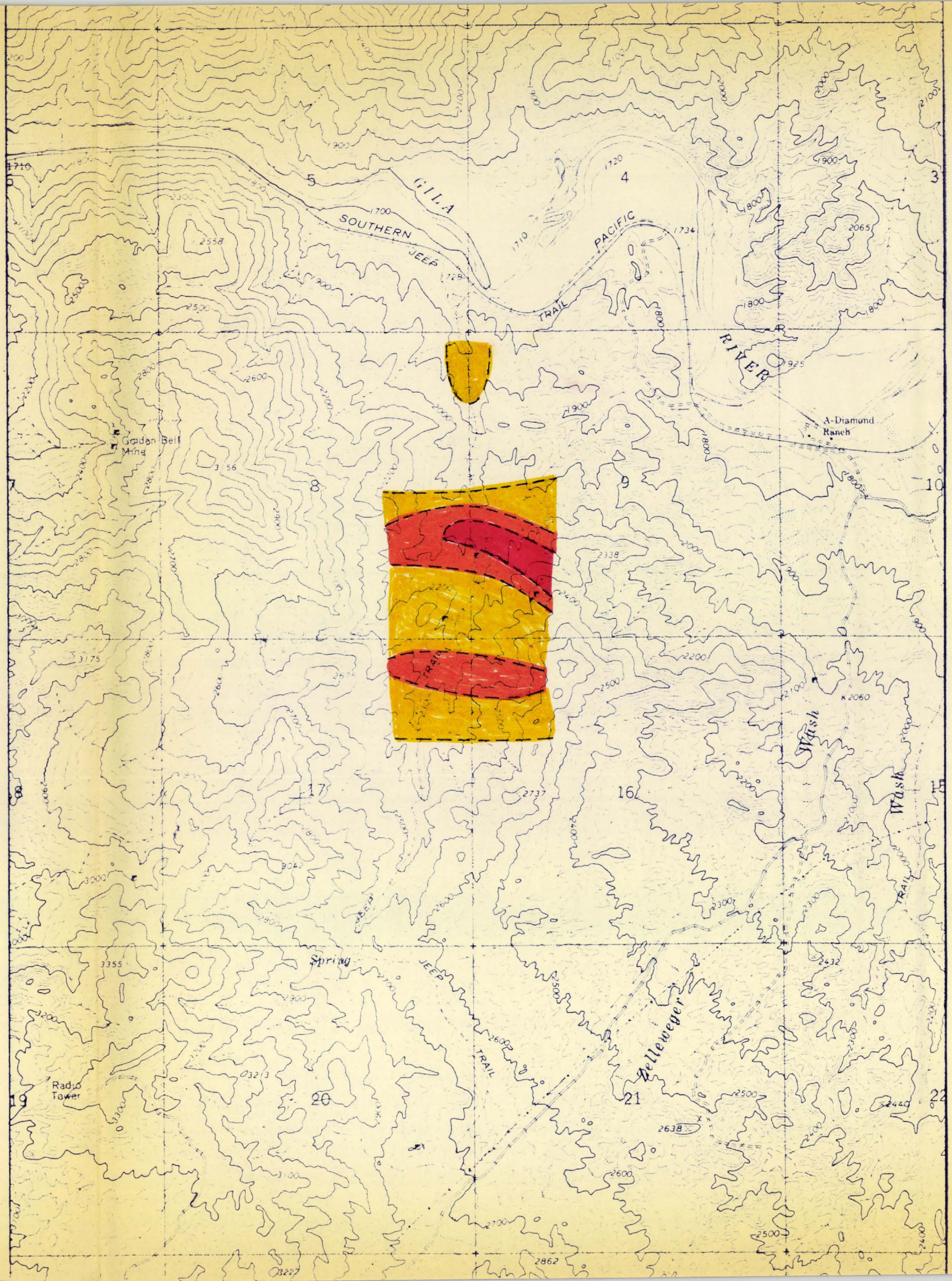

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MODERATE
WEAK
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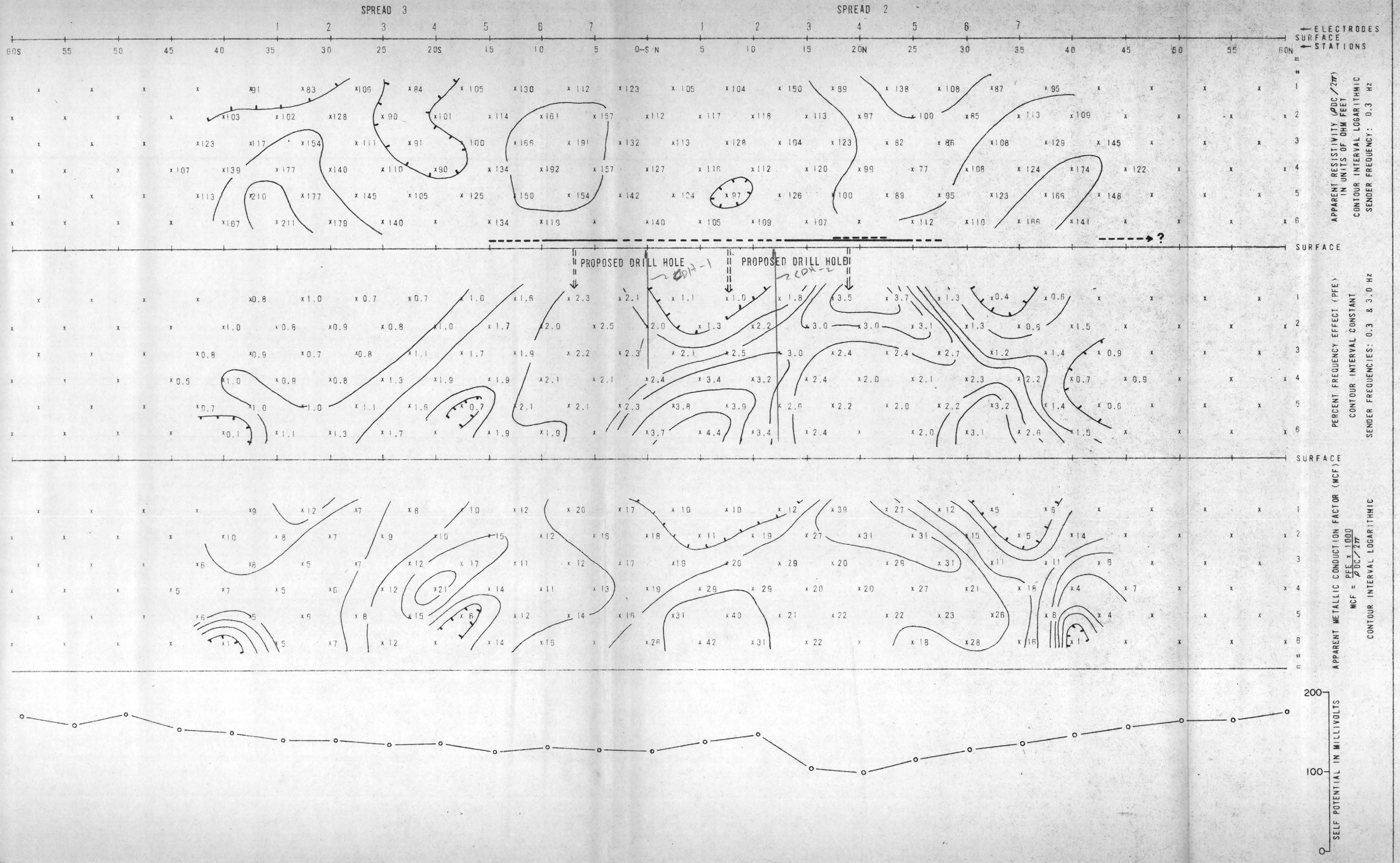


516-70

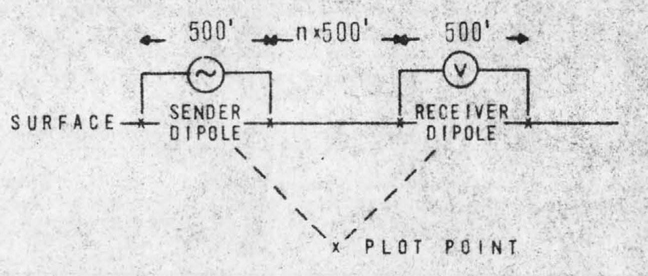
LINE NO.
0 E/W
SPREAD(S)
2 & 3

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

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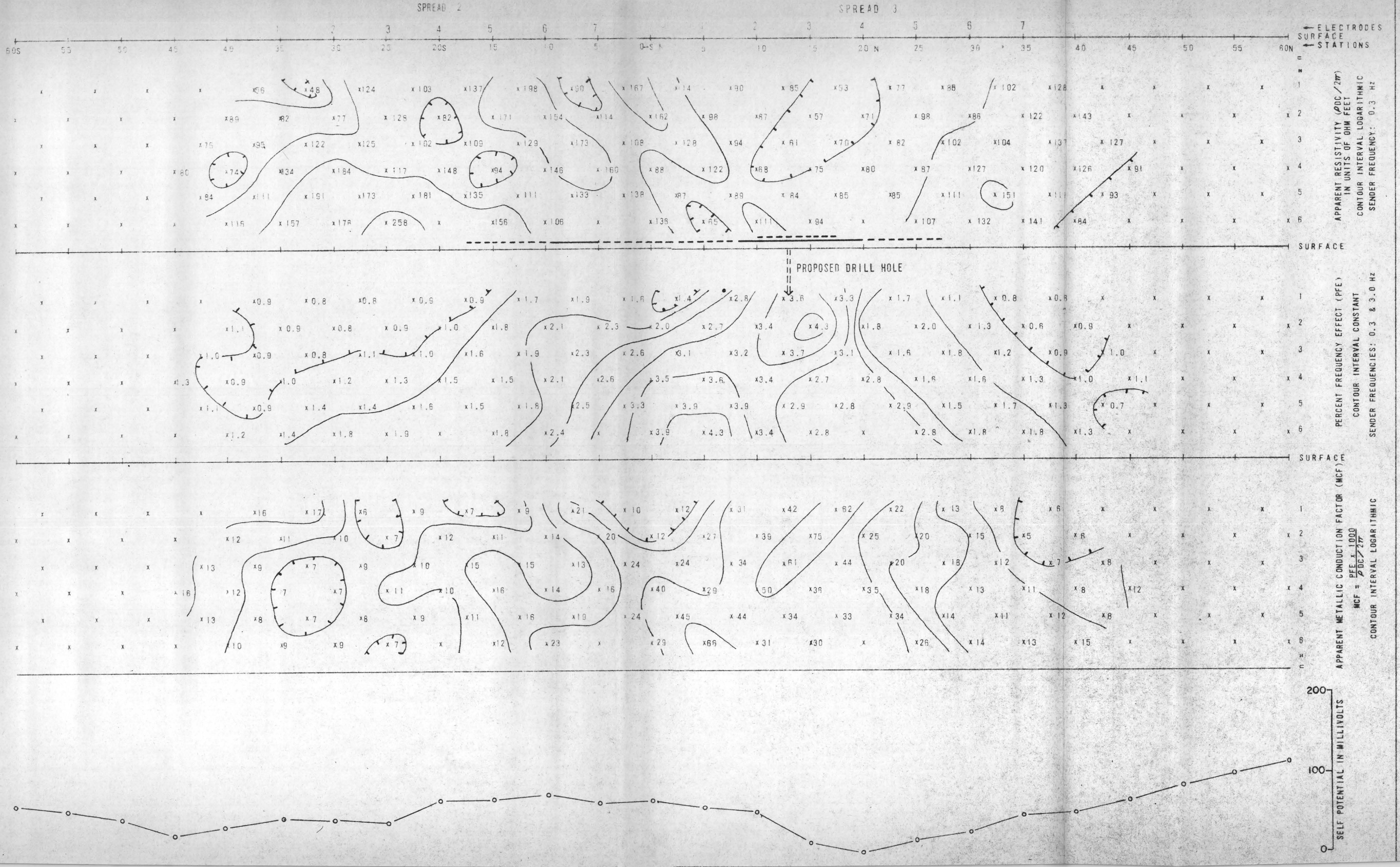


516-70

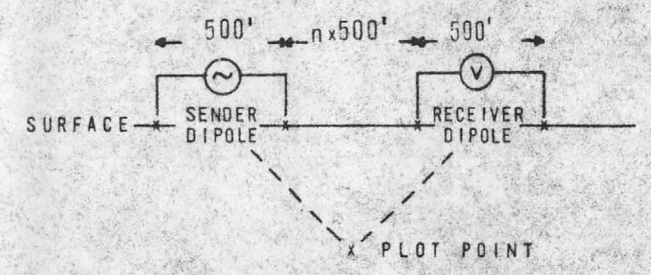
LINE NO. 10E
SPREAD(S) 2&3

INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



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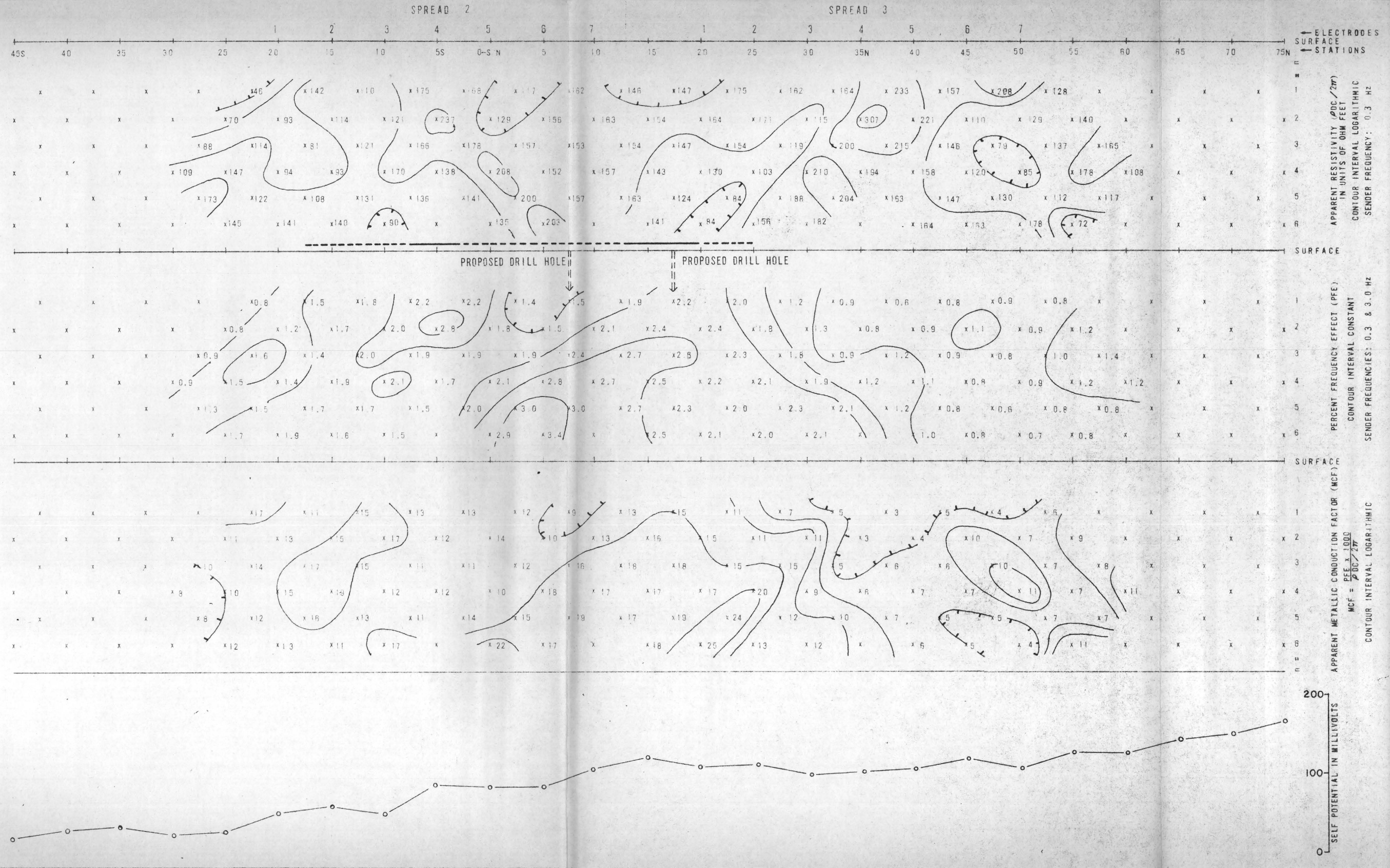


516-70

LINE NO. 10W

SPREAD(S) 2 & 3

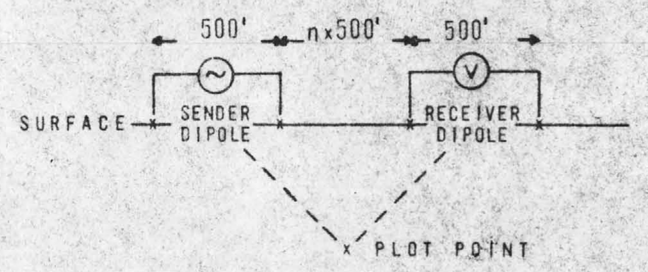
INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for

TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



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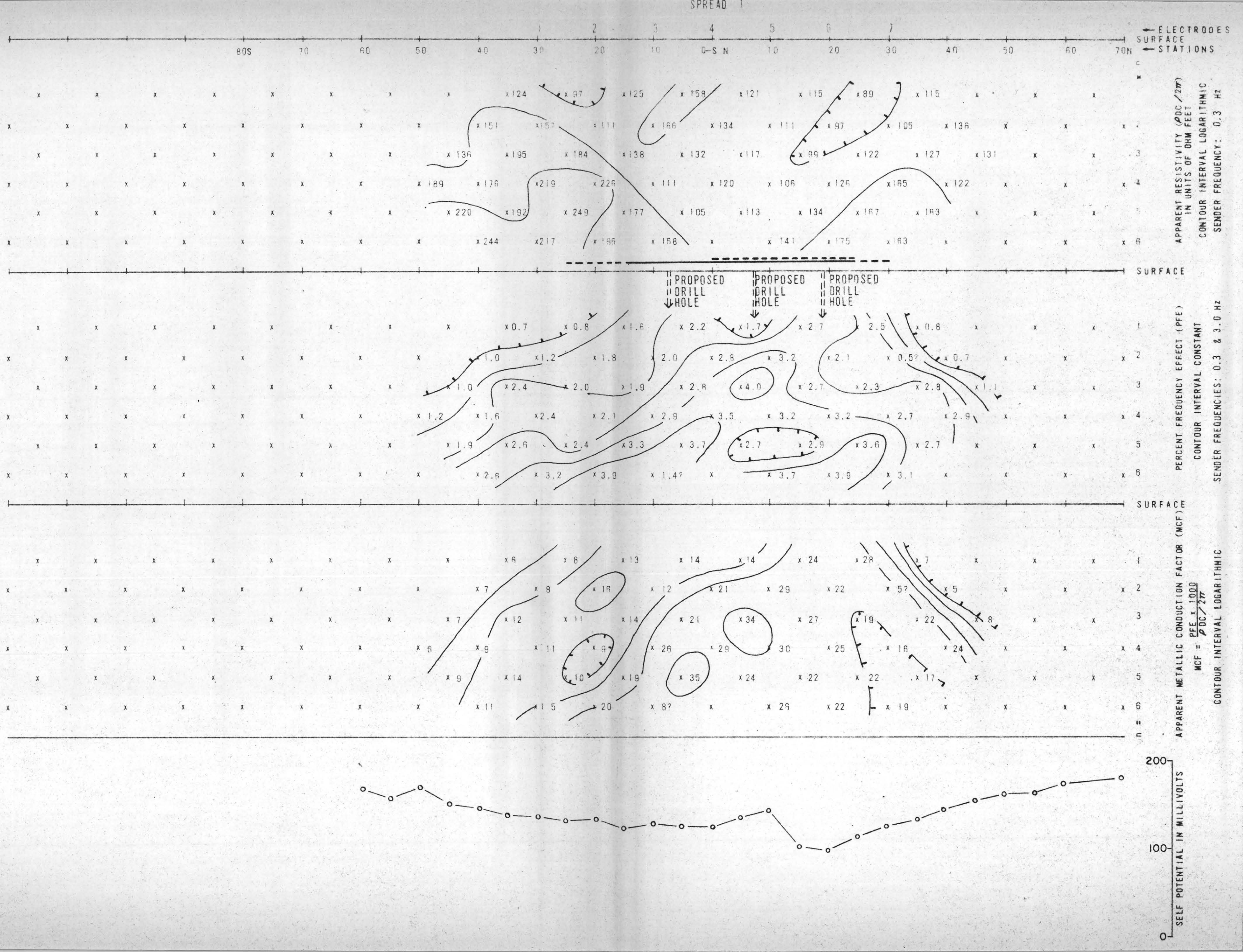


LINE NO.
0 E/W
SPREAD(S)
1

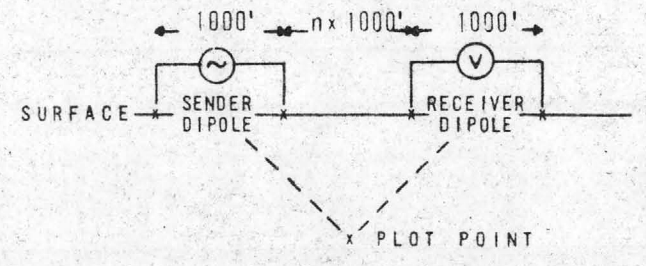
INDUCED POLARIZATION TRAVERSE
SECTIONAL DATA SHEET
for

TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



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DATE
MARCH 1970

HEINRICHS
GEOEXPLORATION COMPANY
GEOPHYSICAL ENGINEERS
AUSTRALIA
(SYDNEY)
39 Hume Street
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U.S.A.
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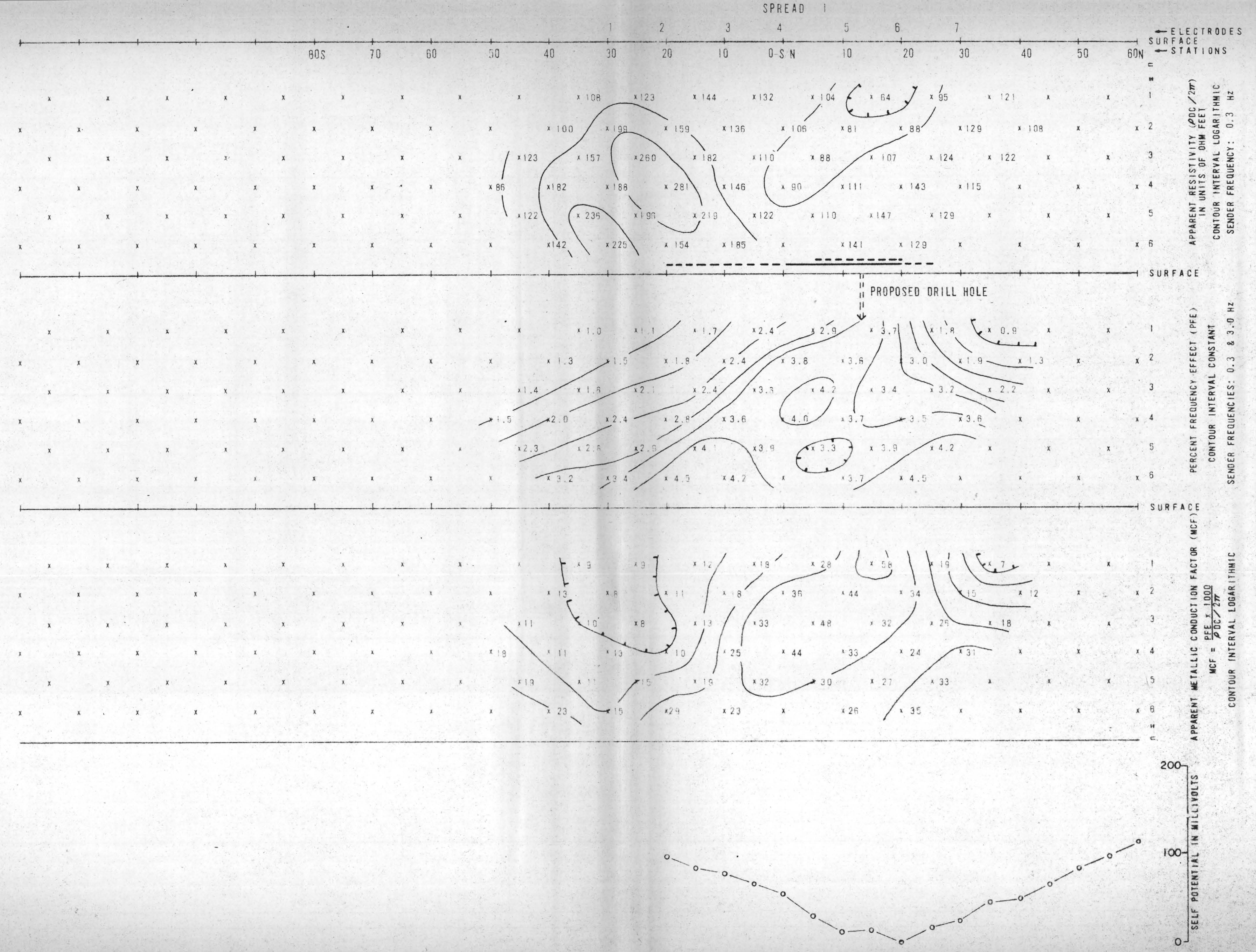
Tucson, Arizona 85703
Phone: (602) 623-0578
Cable: GEOEX, Tucson



5-6-70

LINE NO.
10E
SPREAD(S)
1

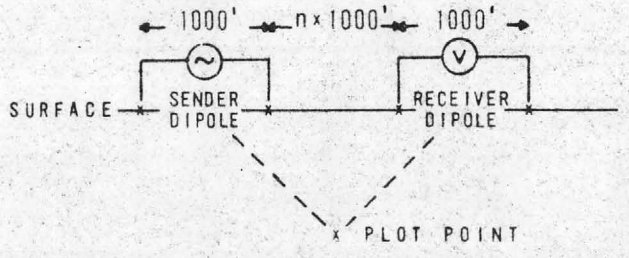
INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for

TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



AREA
KELVIN

LOOKING
WEST

DATE
MARCH 1970

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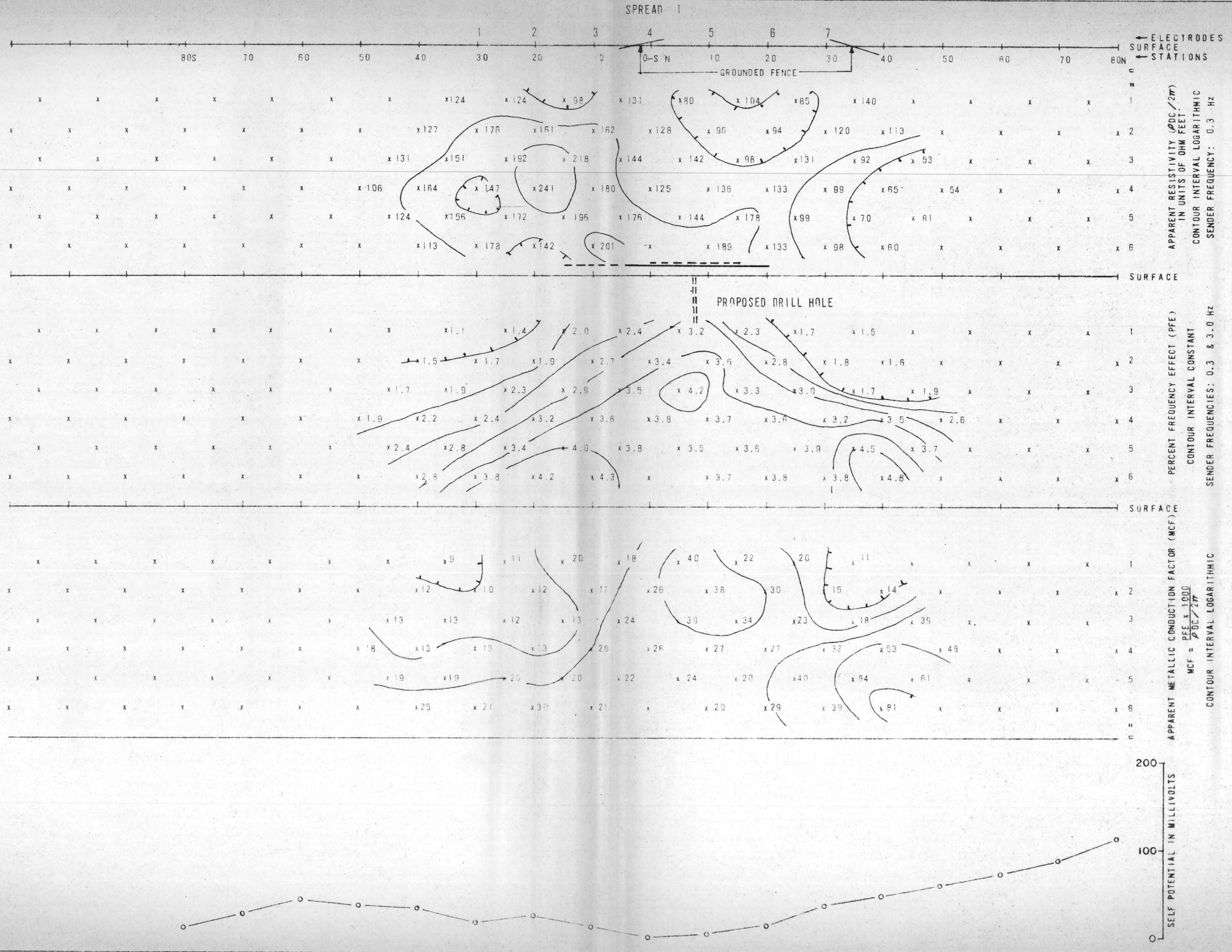


LINE NO. 20E
SPREAD(S) 1

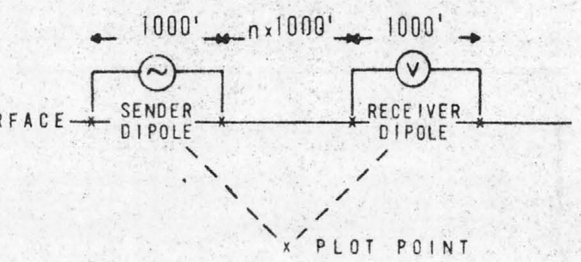
INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for

TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



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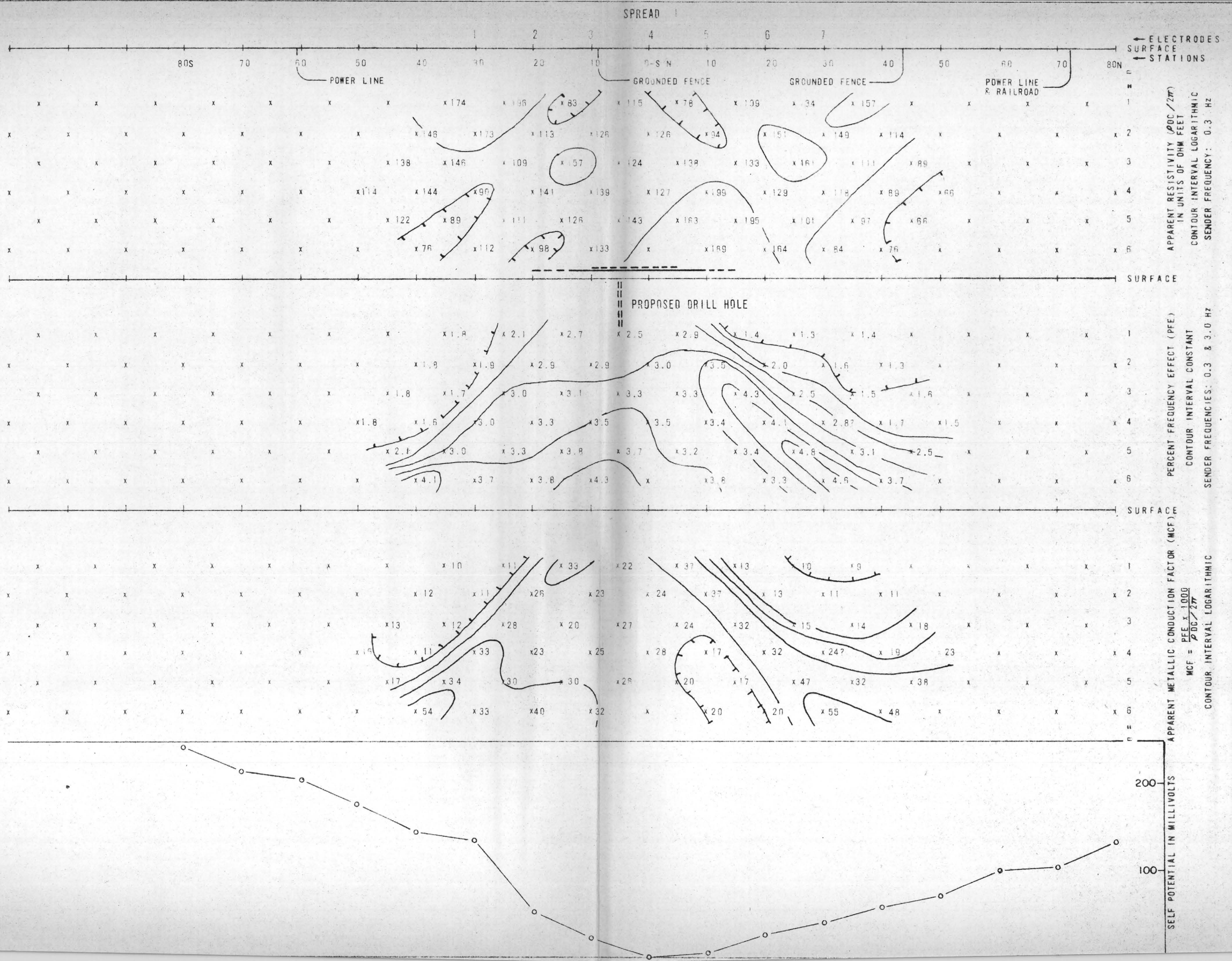


516-70

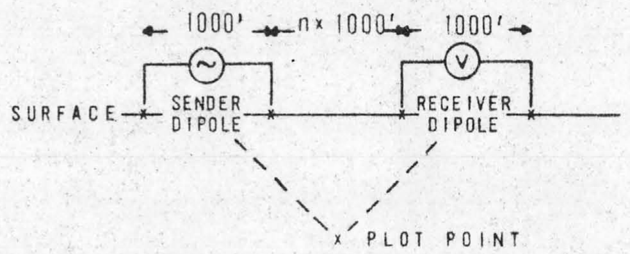
LINE NO.
30E
SPREAD(S)
I

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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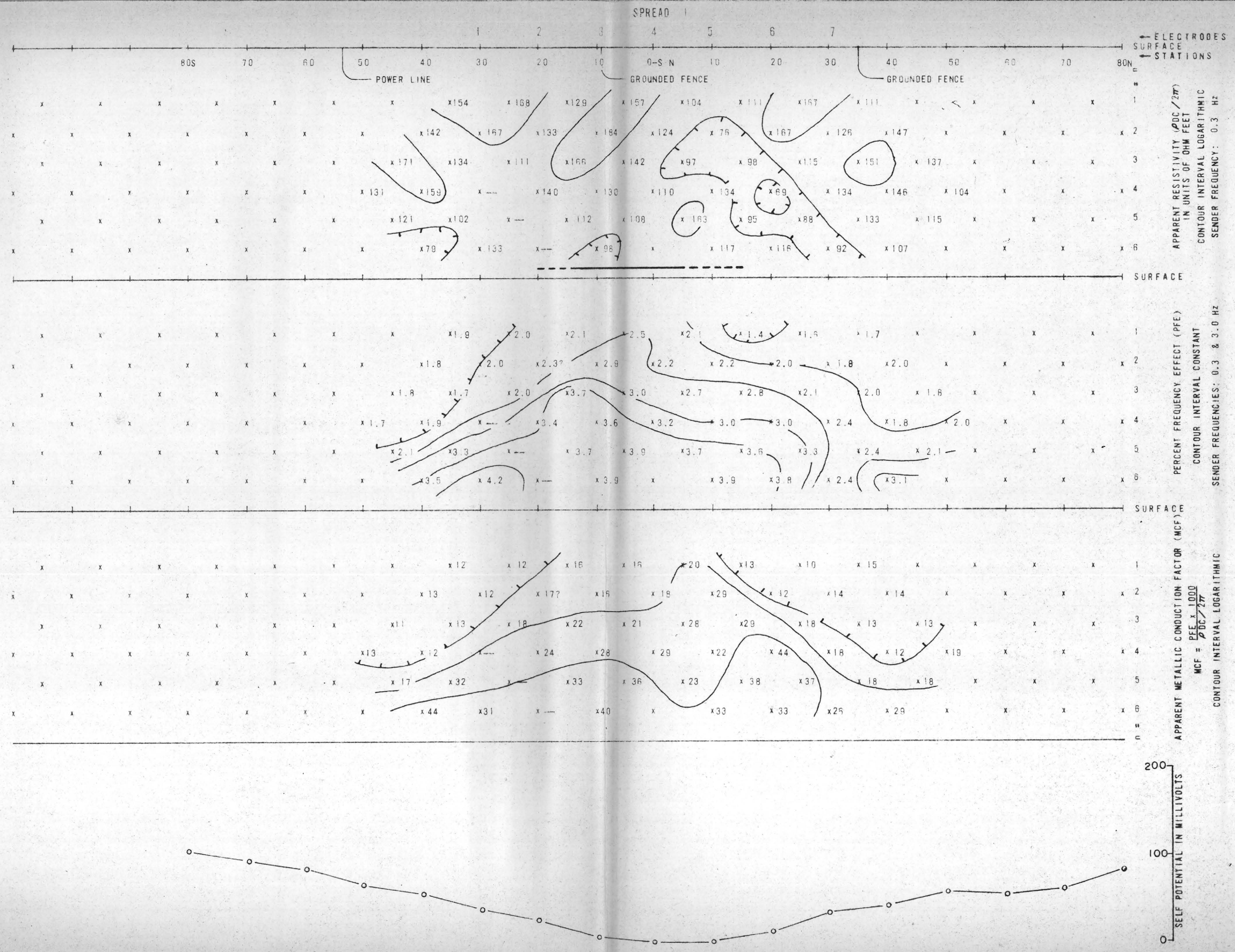

LINE NO: 40E
SPREAD(S) 1

INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for

TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY

1000' — n×1000' — 1000'

SURFACE — SENDER DIPOLE — RECEIVER DIPOLE

PLOT POINT

AREA
KELVIN

LOOKING
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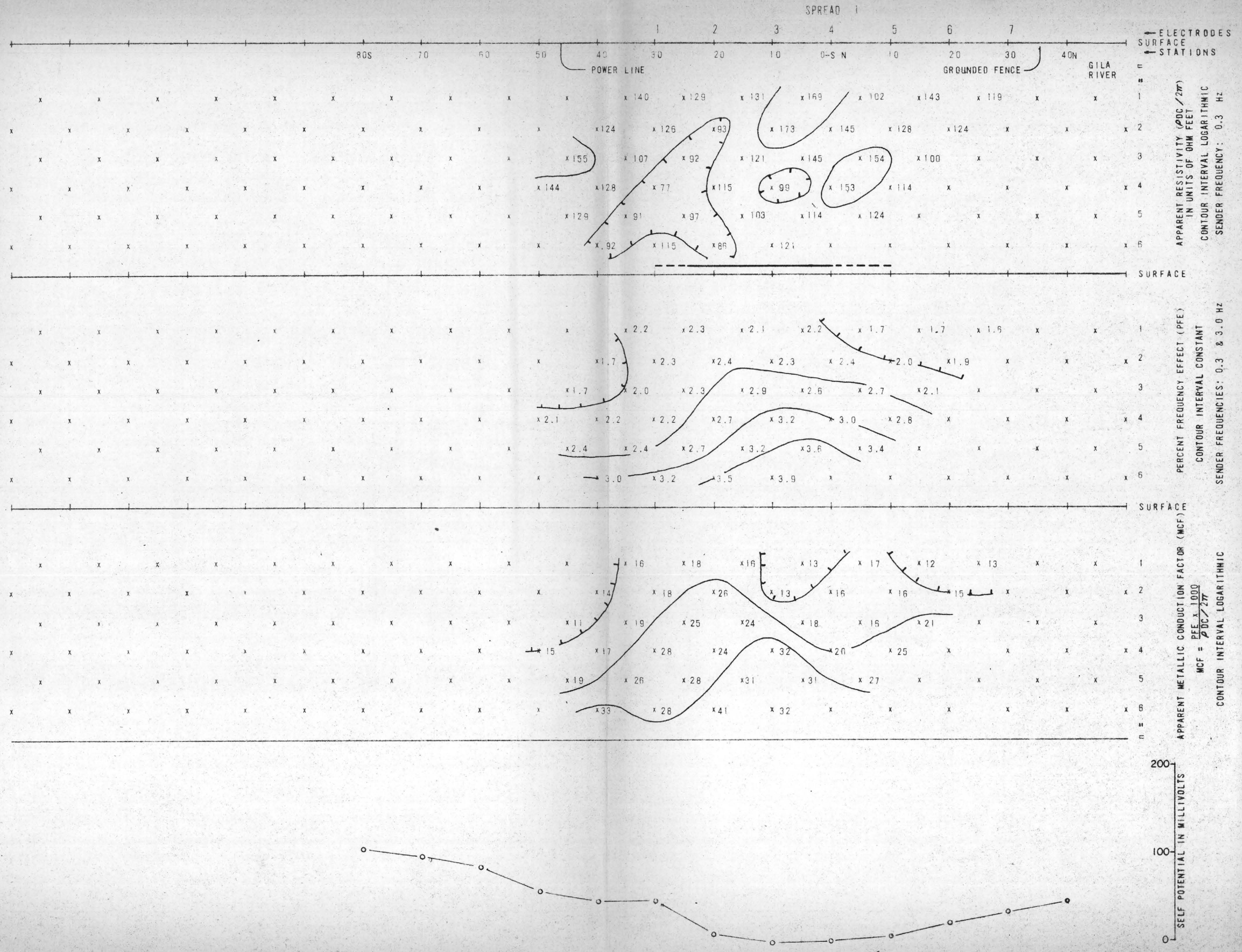


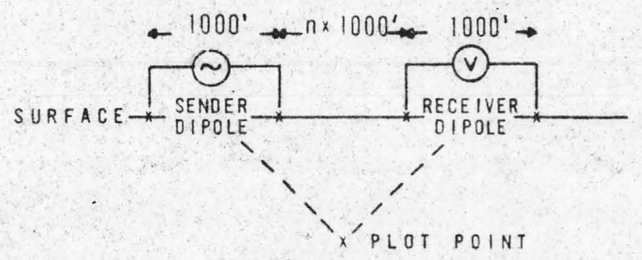
LINE NO.
50E
SPREAD(S)
1

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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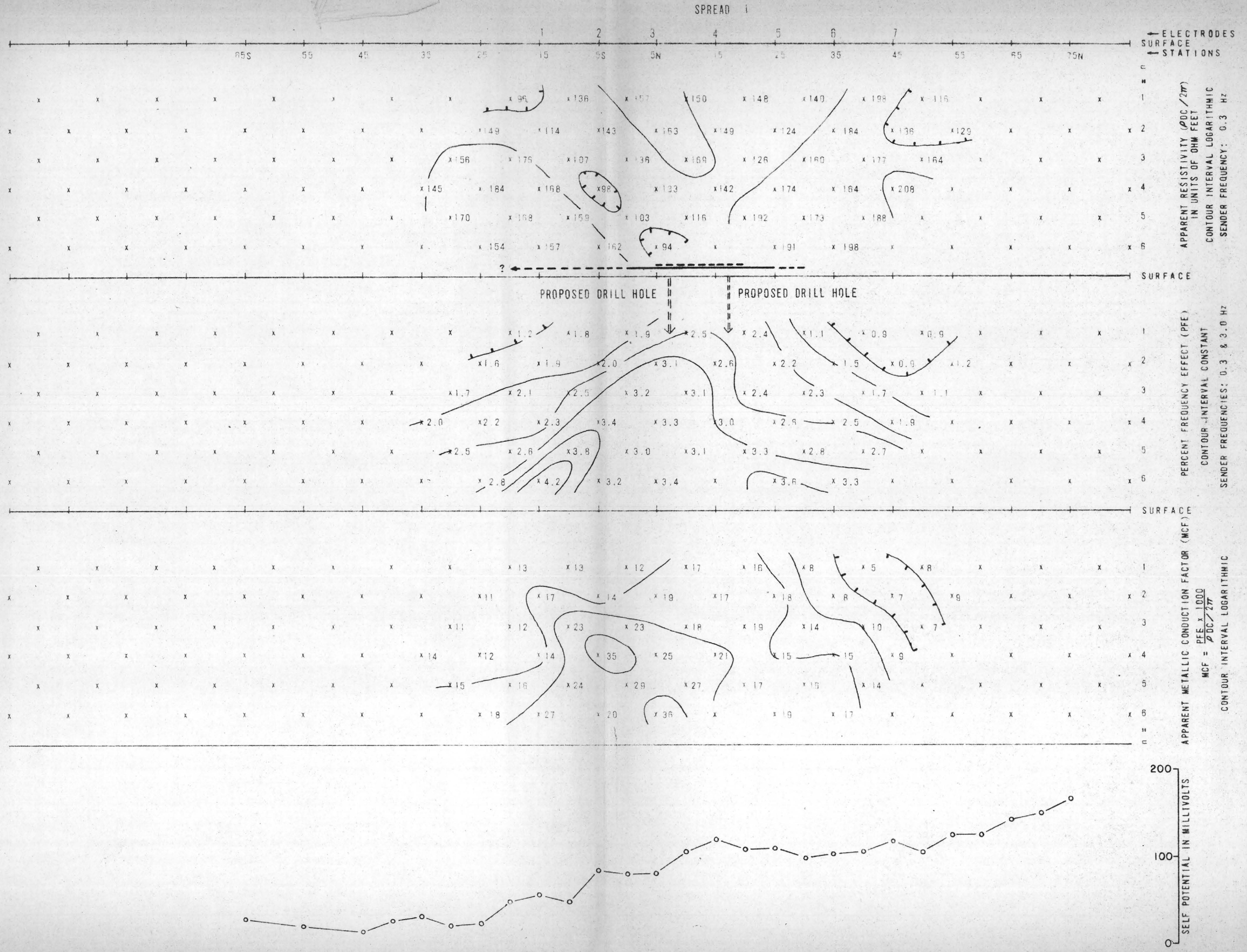

LINE NO. 10W
SPREAD(S) 1

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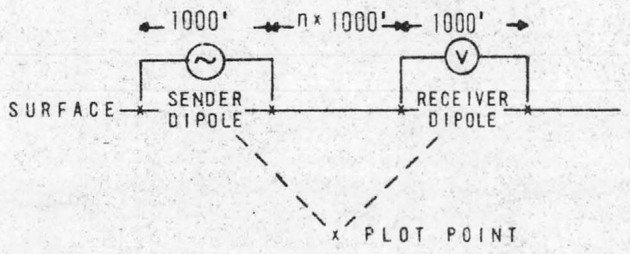
RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



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LINE NO.
20W
SPREAD(S)
1

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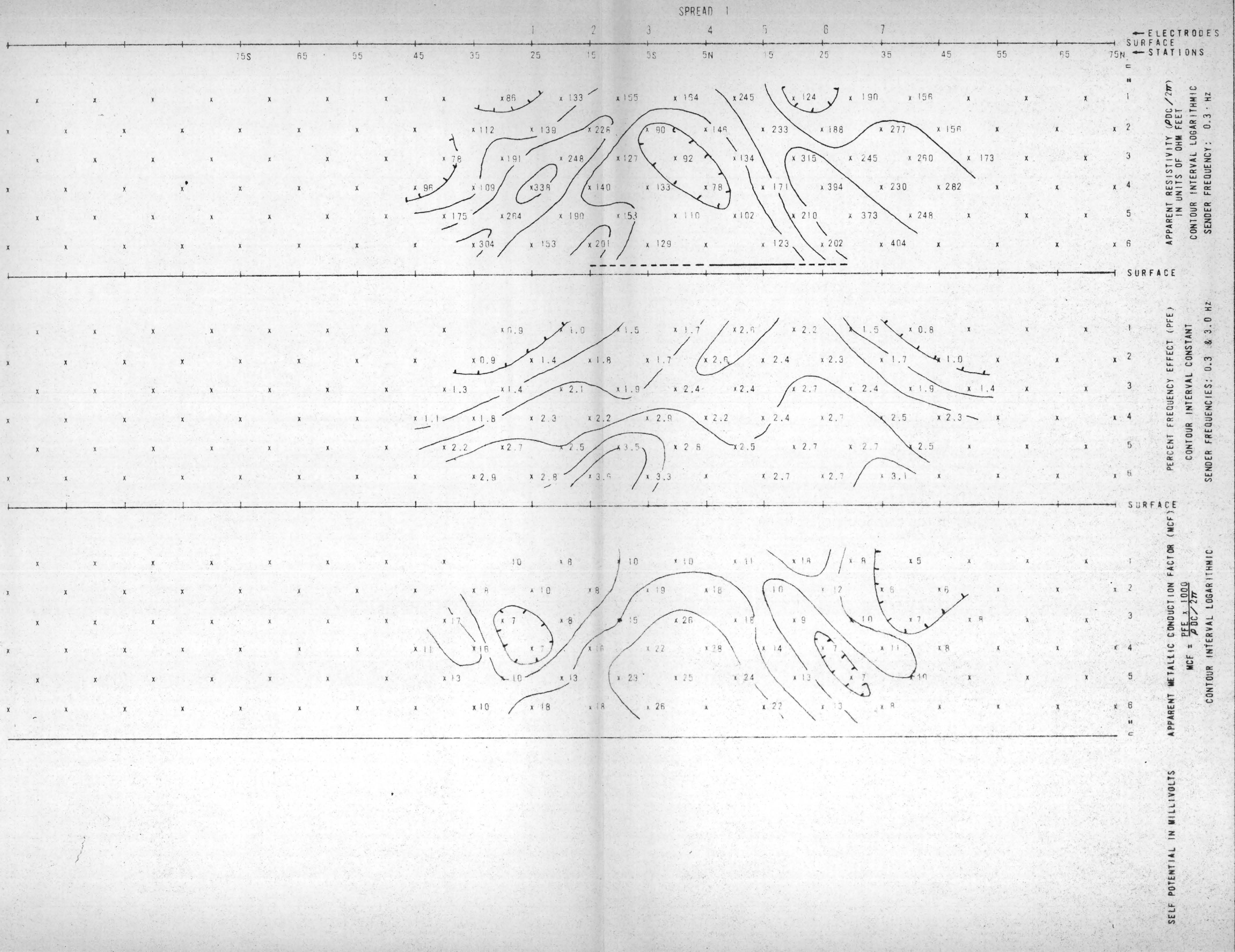
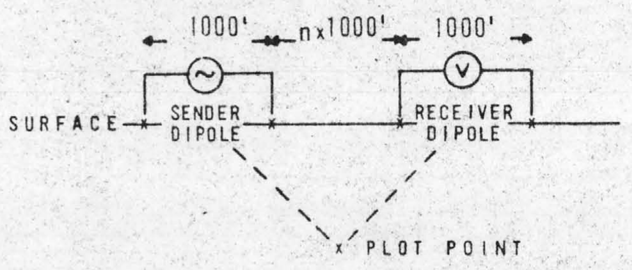


RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



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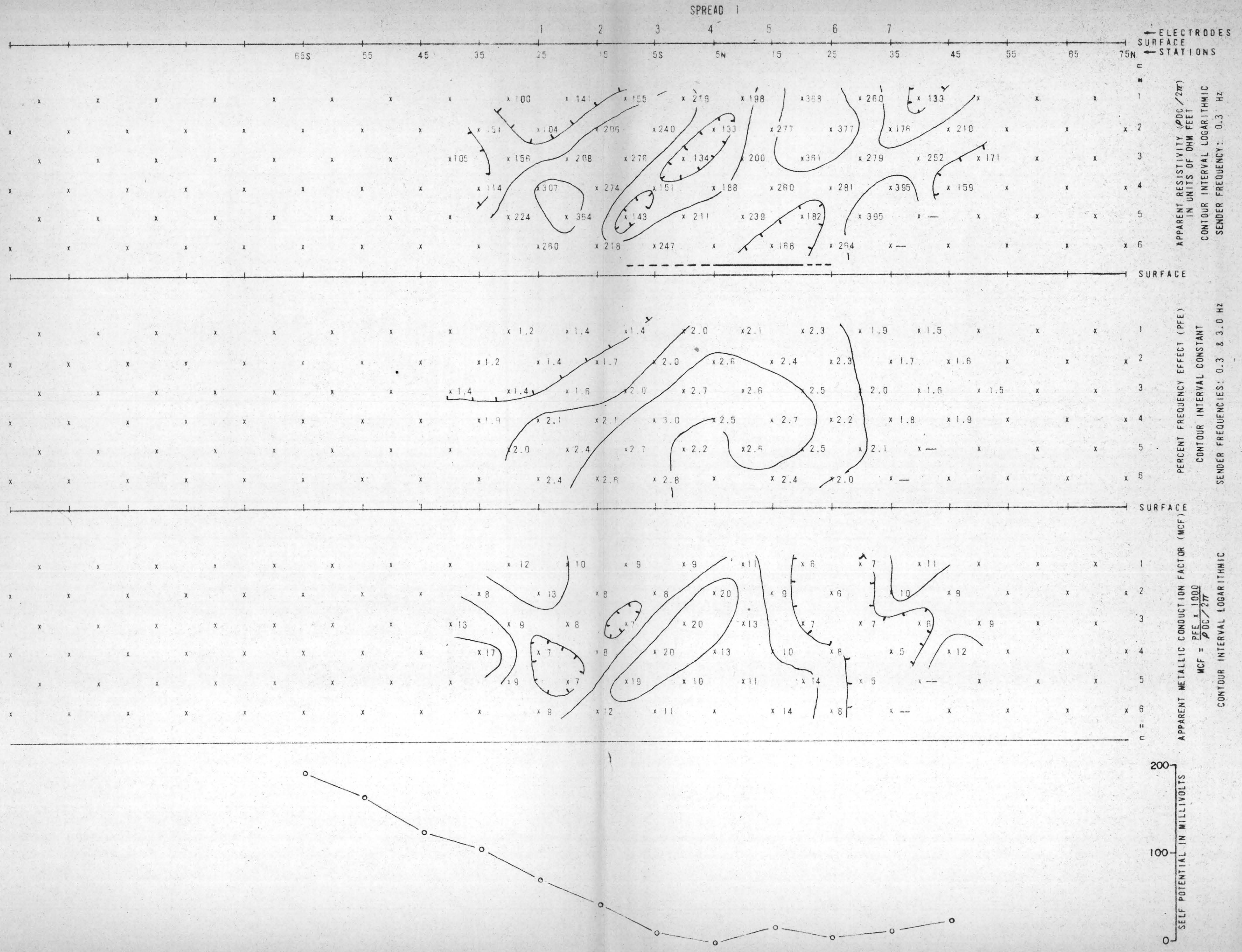


516-70

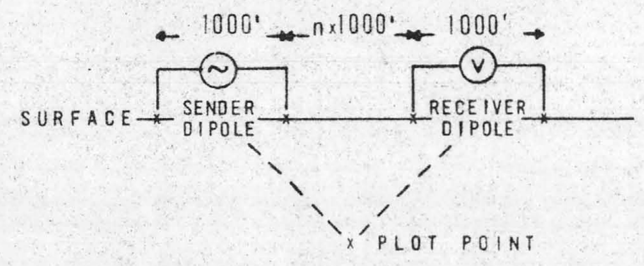
LINE NO. 30W
SPREAD(S) 1

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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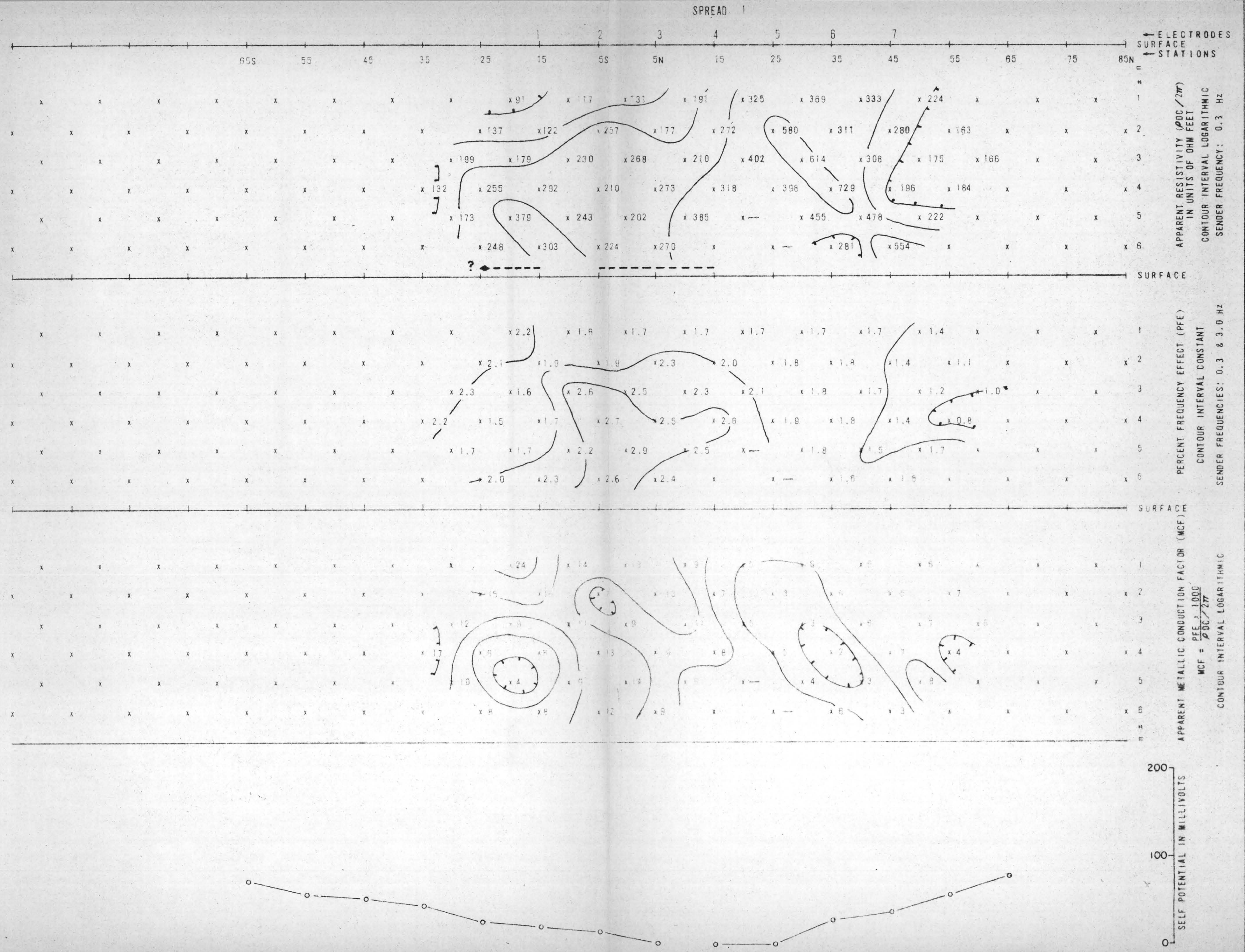


516-70

LINE NO. 40W

SPREAD(S) 1

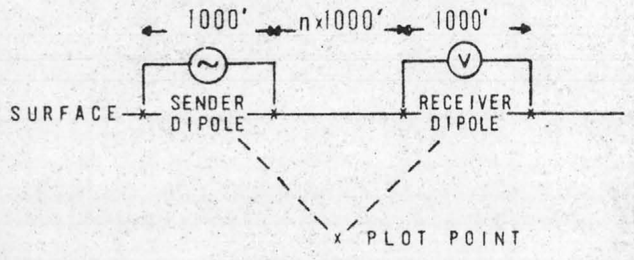
INDUCED POLARIZATION TRAVERSE
SECTIONAL DATA SHEET
for

TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



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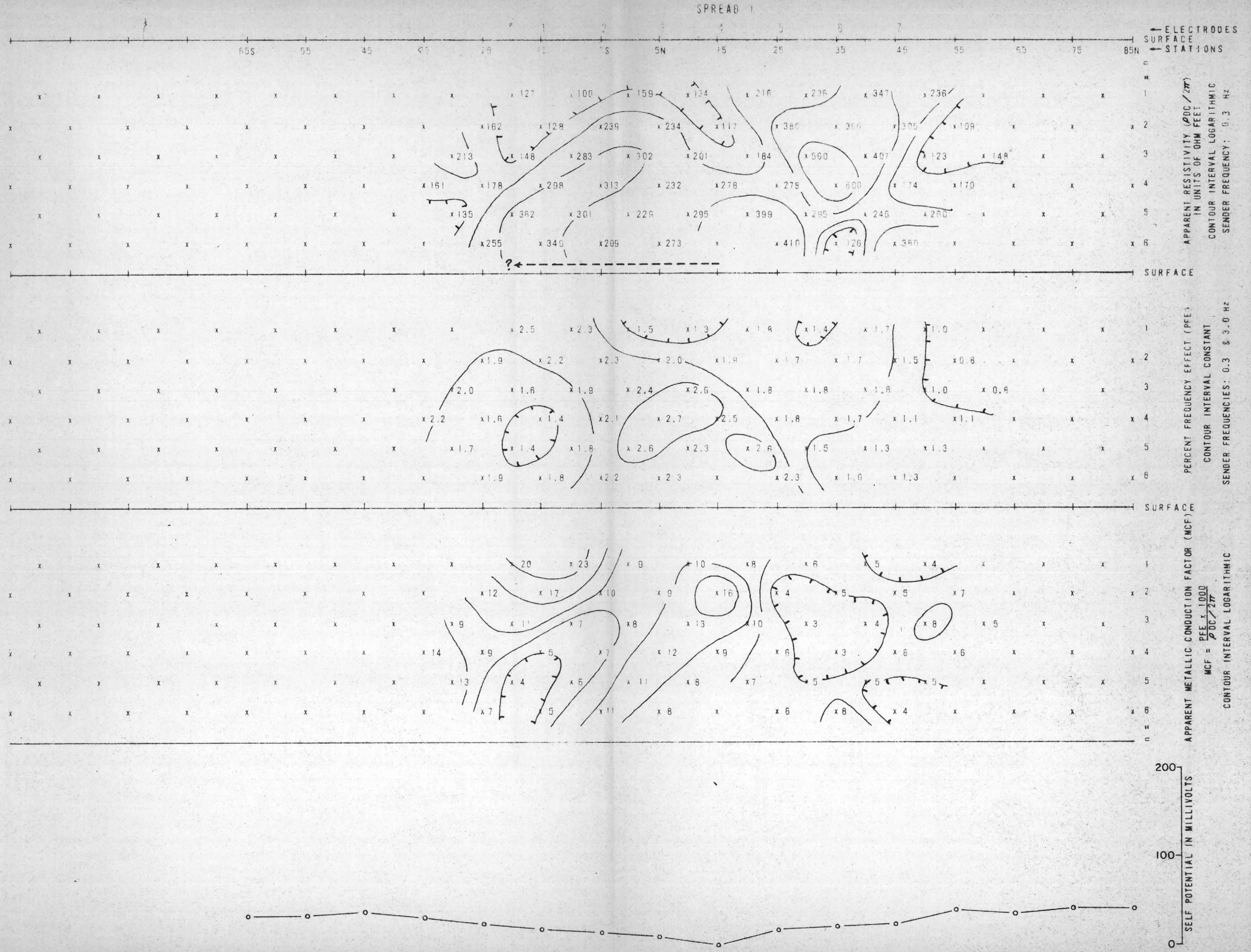


516-70

LINE NO.
50W
SPREAD(S)
1

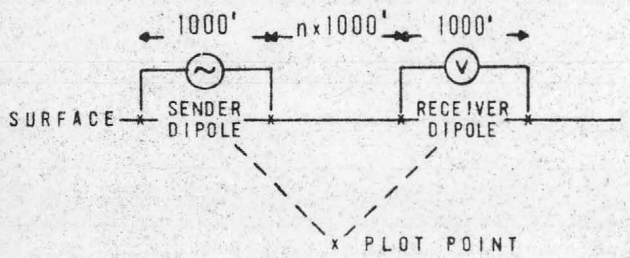
INDUCED POLARIZATION TRAVERSE SECTIONAL DATA SHEET for

TIPPERARY RESOURCES CORPORATION

RELATIVE ANOMALY STRENGTH

VERY WEAK WEAK MODERATE STRONG

DIPOLE DIPOLE ELECTRODE ARRAY



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