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SML 603

BARATTA

PROGRESS REPORTS FOR THE PERIOD
1/7/71 TO 30/6/72

Submitted by

North Broken Hill Ltd
1972

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Enquiries: Customer Services
Ground Floor
101 Grenfell Street, Adelaide 5000

Telephone: (08) 8463 3000
Facsimile: (08) 8204 1880



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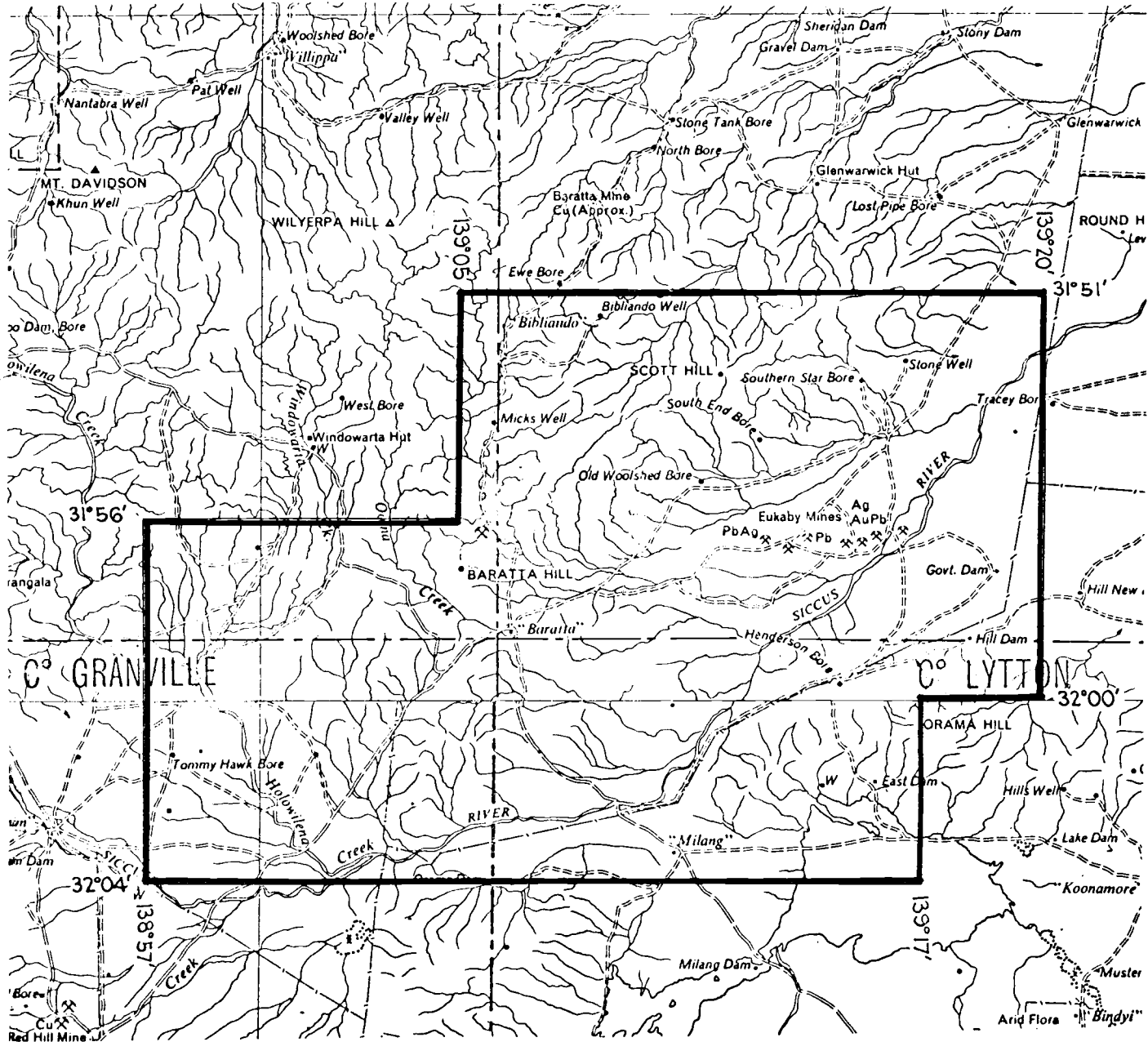
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A.W.G. WHITTLE & ASSOCIATES.

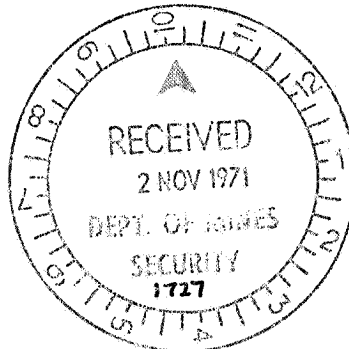
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PRELIMINARY EXAMINATION OF ROCK AND DRILL ~~END~~ CUTTINGS.

BARATTA PROJECT.

(O/N 835AN)



February 27, 1971.

PRELIMINARY EXAMINATION OF ROCK AND DRILL CORE CUTTINGS.

BARATTA PROJECT.

A number of rocks was selected from the periphery of the drilling area to obtain some data on facies characteristics. These were compared with rocks from mineralised areas at Eukaby and Baratta.

The facies range includes siltstones and slates with unusually high proportions of heavy mineral lamellae (pyrite, magnetite, pyrrhotite - now oxidised to limonite), tuffaceous greywackes and pellet dolomites. There is some indication that the heavy minerals may have a syngenetic biological origin, rather than a clastic one.

In areas some distance from known mineralisation there is evidence that epigenetic (or remobilised) hematite entered cleavages and planes of slippage in the slate facies; and that calcite or dolomite formed at numerous centres in both the slates and siltstones. In one example there is evidence of concurrent incipient B_2O_3 metasomatism in the simultaneous formation of carbonates, tourmaline and axinite at these centres. Since carbonates were involved at known centres of mineralisation, these factors could be important in exploration.

Criteria which should assist in ascertaining bedrock surfaces in drilling were ascertained by petrographic examination. These are listed in the report.

DESCRIPTIVE PETROLOGY.BT 203A. Interlaminated siltstone and shale/slate.

The rock is brown in colour because of the advanced oxidation of its heavy mineral components, and it is closely, regularly and rhythmically laminated.

The maximum thickness of individual lamellae is about 2mm. These lamellae are only of two types, viz. sericitic shale, and siltstone with a very high heavy mineral content which generally exceeds 30% of the bulk of the siltstone. These heavy minerals are mainly limonite, pseudomorphs of former opaque minerals (possibly pyrrhotite, pyrite and magnetite) but there are also a few grains of tourmaline and zircon.

The siltstone lamellae display graded bedding which is regular throughout the rock, and they also contain a small content of clastic mica. The shale lamellae consist principally of oriented sericite which provides the cleavage which is oriented approximately at 45° to the bedding. These lamellae are more correctly regarded as slate because of the induced cleavage.

BT 203B. Slate with thin siltstone and heavy mineral lamellae.

The facies is somewhat different in this rock since it is slate rather than shale, i.e. an extremely strong cleavage was developed in the rock because the sericite had recrystallised to rather coarser

muscovites. This rock also, is brown in colour because of the advanced oxidation of its heavy mineral components.

This slate is distinctive in that it includes numerous heavy mineral lamellae which contained only fine granular pyrrhotite, pyrite and subordinate magnetite. Small protected relics of these sulphides are retained.

The siltstone lamellae which are composed of quartz and relatively minor amounts of clastic?pyrite and magnetite, occur only at wide intervals.

The well-developed cleavage which is oriented at 35° - 40° to the bedding, provided planes of slippage so that microfaulting was common throughout the rock. The cleavage also provided access to solutions which deposited thin transcurrent films of micaceous hematite throughout most of the rock. There is no immediate genetic relationship between the clastic?indigenous pyrrhotite, pyrite and magnetite within the heavy mineral lamellae, and the cleavage-located hematite. The latter is epigenetic, and passes through the original heavy mineral lamellae.

BT 204. Dolomitic-sericitic-felspathic siltstone.

The rock is a complex of several gradational facies none of which is continuous enough to constitute in themselves specific lamellae. It is however clearly laminated because of the partial development of essentially quartzitic, calcareous and micaceous beds of 1-2mm. thickness.

These thicken, thin and lens out along strike over short distances. The major rock component is fine grained quartz of a size intermediate between that of siltstone and fine grained sandstone. Considerable amounts of feldspar, including plagioclase, are also components of those lamellae which are richest in quartz. These lamellae also contain small amounts of dolomite, as well as heavy minerals such as tourmaline, zircon, pyrite and leucoxene.

The sericite-rich lamellae contain minor quartz, but little or no dolomite or heavy mineral components. A cleavage was developed at a low angle to the bedding in the slate intercalations, and in many of them epigenetic hematite formed as numerous thin cleavage-controlled sheets of 0.2-0.4mm. thickness.

An unusual feature of the rock is the presence in some quartzitic lamellae, of minute framboidal pyrites of 5-10 microns diameter. These lamellae are those which contain considerable amounts of dolomite. Framboidal pyrite is generally developed during sedimentation by metal-secreting bacteria.

BT 205. Mineralised sericitic siltstone.

The siltstone consists principally of quartz and sericite amongst which, in proximity to the mineralising veinlets, there is some 10% finely crystallised evenly dispersed jarosite. Elsewhere 1-2% oxidised opaque mineral occurs in the siltstone. At intervals the content of sericite exceeded that of quartz and thin slate lamellae were developed.

The cleavage in these is approximately parallel to the bedding.

The mineralising veinlets consist of irregular and subparallel growths of subhedral quartz amongst which are limonitic pseudomorphs and poorly preserved boxworks from galena, and to a lesser extent of small euhedra of arsenopyrite. These veinlets were not confined to the rock cleavage or bedding, but for the most part they transected these structures at low angles. Small amounts of calcite exist as a gangue component in some of the quartz veinlets.

BT 206A. Sericitic siltstone - oxidised galena vein contact.

The host rock which consists of silt-grade quartz and sericite, is very similar to the sample BT 205. These two components are present in approximately equal amounts and are evenly mingled throughout. The orientation of the sericite produced a cleavage parallel to the bedding. Small clusters of very fine grained siderite which formed at close intervals throughout the host rock, appear to be epigenetic components related in origin to the enclosed quartz-galena vein.

The mineralising vein is several inches in thickness and is disposed exactly parallel with the cleavage of the host rock. The contact is sharp except for the gradually decreasing impregnation of the host rock cleavages by limonite over a distance of 2-3mm. beyond the contact.

There is a 1mm. selvedge of siderite along most of the vein contact. This merges with both limonitic cleavage boxwork developed from very coarse grained galena, and with very large elongate quartz subhedra.

The quartz, which is the main gangue mineral, crystallised at 30° - 60° to the vein contacts in conformity with the orientation of the edges of the large galena crystals. There is a mild degree of optical strain in the quartz crystals which indicates that the ore vein formed in a stressed environment. Although neither chalcopyrite nor pyrrhotite boxwork was developed in the gossan, small amounts of both these sulphides are contained as protected inclusions within the quartz gangue.

BT 206B. Sericitic siltstone.

This sample which was taken 20ft. away from the ore veins, is a similar facies to that which is the immediate ore host rock, viz. BT 206A. Although the rock is mainly sericitic siltstone it does contain thin sericite-rich slate type lamellae at intervals across its strike. The siltstone contained 5% fine granular clastic?opaque mineral all of which is now present as oxidised limonitic pseudomorphs.

Clusters, and partially formed crystals of calcite which occur at regular intervals throughout the whole of the rock, were probably epigenetic in origin as was the siderite in BT 206A. The rock has strong cleavage which is oriented with the bedding, and at intervals there are thin 0.2mm. oxidised ore veinlets within these structures. This feature, and the presence of the calcite clusters, mark the incipient stages of mineralisation.

BT 207. Metasomatized, chloritic sericitic slate.

The rock consists principally of extremely fine grained sericite and subordinate chlorite both of which are well oriented in parallelism, and thus constitute a slate. There is no indication of bedding in the rock.

Granular opaque mineral of less than 0.02mm. grain size is evenly dispersed and constitutes 2% of the rock. The distinctive white circular spots which range in diameter to a maximum of 2.0mm., and constitute 5-10% of the rock bulk, are evenly dispersed. These are sphericle clusters composed mainly of microcrystalline calcite or dolomite which formed at closely spaced centres, initially by the progressive impregnation of the interstitial spaces between the mica and chlorite flakes. Such aggregates may be seen in all stages of growth from clusters of a few microns diameter to others which are visible megascopically.

These clusters originated in either of two ways. They may represent the segregation at centres, under the influence of metamorphism and intergranular rock fluids, of carbonates which were originally evenly spread throughout the shale. They might also indicate the incipient stages of CO₂ metasomatism of the slate, and the progressive conversion of the chlorite component to dolomite. If the latter were the case, as it seems to have been, then there is a resemblance to the spotty carbonates present in the sericitic siltstones adjacent to the mineralised zones at Eukaby and Baratta.

A clue to a preference for one of these suggested origins is provided by the following facts. Within the largest and best developed of the carbonate clusters, little of the original mica and chlorite remains, i.e. these were actually replaced by the carbonates. Furthermore, in such clusters there are numbers of newly formed, minute, randomly oriented tourmaline crystals, which in some examples are accompanied by aggregates of axinite. It therefore seems that the spots were the centres of substantial CO_2 and feeble-incipient B_2O_3 metasomatism which respectively, have converted chlorite to dolomite (or magnesite), and sericite to tourmaline, $\pm$ axinite. Metasomatism involving CO_2 and B_2O_3 can be expected to have been initiated during regional metamorphism, or to have had an origin in acidic igneous rocks. These metasomatic phenomena might be an important peripheral guide to metal mineralisation; i.e. zones in which incipient metasomatism exists could be outermost zones of rock alteration. More highly altered, and possibly also mineralised core zones, might exist within these.

BT 208. Lithic felspathic greywacke - tuffaceous.

The rock is difficult to classify, but it is essentially a greywacke with a distinctly tuffaceous aspect.

It is a poorly sorted, irregularly granular sediment of quite coarse grain size. It is lithic in the sense that rock fragments are the most important components.

The rock contains 30% quartz as single, moderately well-rounded

grains which in effect, constitute the matrix medium of the rock since these are the finest clastic particles. The quartz grains exist in the spaces between much larger fragments of feldspars (orthoclase, microcline and plagioclase); of fine textured dolomite; of fine granoblastic quartzite; of flow-structured dacite; and of quartz-muscovite schist. The intergranular quartz is accompanied by finer fragmentary feldspars, and by fine grained opaque minerals and minor micas.

The fragments of dacitic lava which are abundant, often contain considerable amounts of original accessory opaque mineral. The absence of alteration in the feldspar components, the wide grain size range of the clastic components of the rock, and the absence of grain size sorting, indicate rapid deposition close to the source area. This area was characterised by the presence of schists, quartzites, dolomites and calc-alkaline acid intrusives or flows. Thus the greywacke is inherently tuffaceous.

BT 209. Pellet dolomite.

This is a fragmentary rock containing some 60% dolomite pellets which range in size from 1mm. to 1cm. These pellets are elongate, irregular or ovate in shape and exist at random orientation within a fine grained intergranular calcite medium. Most of the dolomite pellets contain small flakes of sericite. Some of the pellets contain magnesite as well as dolomite.

The determination of overburden - bedrock contacts.

Samples were selected from two drill holes with the object of ascertaining criteria which might help in the judgement of the position of bedrock during the drilling programme.

The useful criteria are the following. Overburden has an assemblage of cuttings which are heterogeneous in respect to both size and mineralogy. In proximity to the contact there is an increased amount of limonite staining, and of ferruginous fragments. At, and within bedrock the mineral, or rock type assemblage becomes homogeneous. The cuttings are either pale coloured, leached, non-ferruginised rock fragments of a specific facies; or they consist entirely of fine sand produced from leached incoherent rock.

Drill hole 264W x 88N.

A comparative examination of the cuttings indicated that the change from unconsolidated overburden to bedrock can be confidently placed at 60-75ft. The detail of individual samples is as follows.

In the 35-40ft. interval the cuttings consist of fines with sand, and with gravel fragment up to 1cm. in size. The latter are irregularly rounded in form, but commonly fractured and faceted by the drill. The fines are clays and silt. The sand size materials consist of rounded, irregular and angular grains of quartz, calcite, dolomite, chlorite, opaque minerals and muscovite. The gravel fragments include fine grained dolomite, rather coarser dolomite with abundant brown

chlorite, and both sericitic and dolomitic siltstone.

It would appear that these cuttings were not obtained from a single facies, but that they represent the mixed components of unconsolidated overburden.

In the 55-60ft. interval the cuttings are a similar mixture of fines, sands and fractured ovate or rounded gravel up to 1cm. in size. Apart from the clays and silt, rounded quartz of sand-grade size is the major component, while the gravel fragments comprise limonite-impregnated clusters of quartz grains, pieces of fine grained dolomite, siltstone, and ferruginous quartzite.

The heterogeneous nature of the cuttings indicates their derivation from unconsolidated overburden rather than from a specific rock horizon. However, the abundance of limonite-bonded sand grains suggests the presence of ferruginous duricrust which might rest upon the weathered surface bedrock.

In the 75-80ft., 90-95ft. and 105-110ft. horizons the cuttings consist principally of one specific rock facies, which leaves no doubt that bedrock exists at 75ft., and that it may also extend upwards towards the ferruginous laterite present at 55-60ft. The interface therefore exists somewhere between 60ft. and 75ft.

The cuttings in each of these three samples consist of fragments of completely kaolinised, originally sericitic slate in which there are minor silt-grade quartz, and opaque mineral components. The fines, and the sand size cuttings, consist of kaolin, and of kaolinised

sericitic slate fragments, respectively. The only difference between these samples is the presence of limonite staining of the fragments at 75-80ft., i.e. this is the brown coloured partly lateritised surface layer of slate which overlies the leached, paler kaolinised slate.

Drill Hole 264W x 104N.

The comparative examination of the cuttings suggests, but does not positively prove that sandstone bedrock is present at 90ft. The interface between this apparently incoherent bedrock, and the heterogeneous assemblage of overburden components, is marked by the disappearance of the coarser gravel component, and by the sudden appearance of consistent and simple mineralogy. There is also some suggestion of a ferruginised zone at the top of the bedrock because of the large content of limonite in the sample at 65-70ft.

In the 30-35ft. interval there are fines, sands and gravels. The fines are clays; the sands are mainly irregularly rounded quartz, fragments of feldspar crystals, limonite and calcite; while the gravels consist of dolomite and ferruginous sericitic siltstone. This heterogeneous assemblage suggests mixed unconsolidated overburden.

In the 50-55ft. interval the materials are similar to those above except for the additional presence of quartzite, and of dolomitic sandstone gravel fragments.

In the 65-70ft. interval there is a greatly increased content of fragmentary limonite, and a considerable reduction in the proportion

of gravel in the sample. Irregularly sized, rounded and irregularly shaped quartz of sand-grade sizing, is the main component. Among these are similar grains of limonite, feldspars, calcite and rounded tourmaline. All of these grains have the characteristics of single clastic particles; not of grains mechanically broken from rock. The few gravel particles consist of dolomite or of fine grained quartzite.

In the 90-95ft. and 105-110ft. intervals the sudden change in the physical character of the cuttings is consistent with a sharp change in mineralogy, and the loss of heterogeneity amongst the sample constituents. Both the samples are similar in that they consist principally of quartz with rather sutured peripheries, and of smaller numbers of feldspar grains. There are also a few slightly larger grains of ferruginous material, and of very sparse grains of dolomite. Since dolomitic particles are virtually absent at 105-110ft., those few at 90-95ft. were probably entrained from the upper levels of the hole.

The principal difference between the samples is one of grain size, i.e. the size is fine at 90-95ft., and consistently coarser at 105-110ft.

It is considered that both these samples were derived from incoherent (weathered and interstitially leached) respectively very fine, and fine grained sandstone bedrock.

The actual position of bedrock is possibly shallower and may be nearer 70ft. since in the 65-70ft. interval the high limonite content, and the limonite-bonded sand grains, suggests a lateritised weathered bedrock surface.

CONCLUSION AND RECOMMENDATION.

It is understood that the theoretical concept upon which this exploration programme is based, envisages the possibility that known centres of mineralisation might have been developed through the metamorphic remobilisation of trace metal components which were originally present in certain sedimentary horizons.

No black shale horizons were observed during the brief sampling programme, although it was noted from geochemical results that V_2O_5 was sometimes significantly high.

It is an important feature of certain facies that they contain abundant, originally richly pyritic, heavy mineral lamellae, as well as framboidal pyrites. The coarser grained greywacke facies contain significant proportions of tuffaceous components. It is therefore important to carry out further investigations of a sedimentary petrographic nature to cover all available facies variations, and to examine in detail any drill hole cuttings which are characterised by anomalously high V_2O_5 , P_2O_5 , carbon, U_3O_8 , or MnO_2 .

One factor which cannot be resolved at this stage, concerns the "heavy mineral lamellae". It is critical in the terms of the theoretical concept behind this programme, to decide whether these are clastic heavy mineral lamellae, or whether they resulted from the accumulation of heavy metal sulphides (mainly Fe) at certain horizons by the contemporaneous activity of anaerobic bacteria during sedimentation. The presence of framboidal pyrite in addition to that pyrite presently

represented as limonitic replicas, favours the latter. The form of these limonitic pseudomorphs suggests that the oxidised pyrite was at least subhedral, and since some magnetite (indicative also of a condition of low Eh) was also present with the pyrite, it is probable that these minerals formed in place, i.e. they were not clastic. A further aspect in favour of the latter interpretation is that it is uncommon to have numerous closely spaced "heavy mineral lamellae" composed mainly of sulphide and magnetite within a pelitic sediment.

The suggestion of regional metasomatism obtained in some of the rocks is also worthy of further consideration since this may not necessarily be a phenomenon of igneous origin, but may be one related to regional metamorphism. The spotty development of carbonates in the sericitic-chloritic slates is reported to be widespread in the area.

A.W.G. Whittle

A.W.G. Whittle & Associates,
Mineralogical Consultants.

February 27, 1971.

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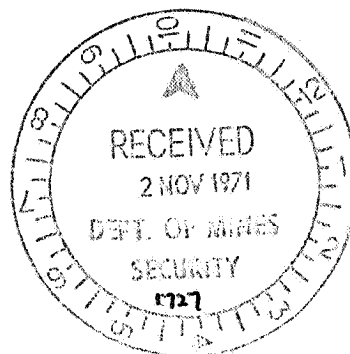
A.W.G. WHITTLE & ASSOCIATES.

MINERALOGICAL REPORT.

Report NBH/42.

DRILL HOLE CUTTINGS - BARATTA.

(O/N 848AN)



June 4, 1971.

DRILL HOLE CUTTINGS - BARATTA.CRA - DDH. - TY1. Bedrock chips.

The sample consists of fragments of very incoherent grey coloured material. The thin section of this material indicates that it is highly weathered grit or conglomeratic rock composed mainly of a heterogeneous assortment of particles of 0.5-6.0mm. in diameter.

The rock particles are of the following varieties.

fissile sericitic siltstone	-	major
fissile sericitic slate	-	common
fine grained limestone	-	common
relatively coarse grained quartz	-	common
limonite-impregnated siltstone	-	sparse
large perthitic feldspar grains	-	sparse

The particles are either irregularly rounded or elongate, and when elongate, they lie at random orientation within a fine grained matrix material.

The matrix consists of silt-grade quartz, muscovite, biotite, altered feldspars, chlorite and limonite. The micas conform in part to two opposed directions of orientation which intersect at 60°. These represent very weak primary and secondary cleavages within the matrix component.

The chips thus appear to represent an horizon of a weathered rudaceous deposit, the phenoclasts of which are composed mainly of argillaceous, calcareous and fine grained micaceous quartzitic rock.

These phenoclasts differ little from the matrix material, hence the rock is more or less a calcareous shale conglomerate, possibly of the intraformational type.

DRILL HOLE 124N x 480E.

Twelve samples of the cuttings from this hole were prepared as thin sections. These were examined for the purpose of acquiring some idea of their origin.

The lists of the fragmentary components at each of the depth intervals are indicative of the changing lithology through the sequence from 20 - 100ft. These changes relate mainly to the varying proportions of argillaceous, calcareous and fine grained arenaceous rock fragments (siltstones) represented in each of the cuttings. There are also granite and quartz porphyry fragments, as well as considerable amounts of very coarse, possibly vein-type quartz. Limonite which developed from pyrite is associated with the quartz, and is commonly also present in the rock fragments, especially the chloritic slate.

Although a fine sand fraction is present in most of these samples the nature of the fragments is strongly suggestive of their having been drilled from in-situ bedrock. This bedrock may be an alternating sequence of arenaceous slates, arenaceous limestones, micaceous siltstones and chloritic slates. It is also probable that there are thin fine grained granite and porphyry veins in these rocks, as well as pyritic quartz veins.

On the other hand, these cuttings may be the disaggregated fragments from an intraformational grit-conglomerate such as that described from TY1. There is a considerable similarity between the fragments enclosed in the incoherent rock in TY1, and the individual fragments represented in the cuttings from 124N x 480E. The proximity of these two holes in the field would decide on one or other of these alternatives.

20 - 25ft.

limonite-stained arenaceous slate	common
fine grained limestone	"
fine grained arenaceous limestone	"
coarse grained quartz individuals	"
coarse grained microcline individuals	"
fine grained granitic rock	sparse
limonite ± quartz inclusions	"
(Plus a subordinate fine sand component)	

25 - 30ft.

limonite-stained sericitic fine grained sandstone	major
fine grained limestone	common
fine grained arenaceous limestone	"
individual quartz fragments	"
fragments of medium grained granite	sparse
limonite ± quartz inclusions	"
felspathic sandstone with large limonite inclusions	"

(Plus a subordinate fine sand component)

30 - 35ft.

arenaceous fine grained limestone

major

(some have many plagioclase inclusions)

sericitic irregularly granular sandstone

common

(some with large limonite inclusions)

(Plus a subordinate fine sand component)

35 - 40ft.

sericitic fine grained sandstone

major

(many fragments are limonitic)

individual quartz fragments

sparse

(Plus a minor fine sand component)

45 - 50ft.

chloritic siltstone, mainly limonitic

major

fine grained arenaceous limestone

sparse

(plus a minor fine sand component)

50 - 55ft.

no sample

55 - 60ft.

arenaceous fine grained limestone

common

chloritic-sericitic siltstone

"

(some coarser felspar and quartz grains)
 individual fragments of microcline sparse
 (Plus a major fine sand component)

65 - 70ft.

coarsely arenaceous and feldspathic limestone major
 individual quartz grains (large) common
 quartz-porphyry (high opaque mineral content) present
 limonite with included quartz (oxidised vein material?) "
 limonite individuals sparse
 (Plus a major fine sand component)

70 - 75ft.

very coarsely arenaceous and feldspathic limestone major
 (some contain siltstone or schist fragments)
 sericitic siltstone common
 chloritic siltstone "
 (Plus an abundant fine sand component)

75 - 80ft.

chloritic-sericitic-feldspathic siltstone-greywacke common
 (some with large perthite and quartz grains)
 arenaceous limestone "
 individual quartz (large) sparse
 (Plus a major fine sand component)

80 - 85ft.

sericitic-chloritic-felspathic siltstone-greywacke common

(some with very large quartz fragments, and
some with elongate chloritic slate fragments)

arenaceous-micaceous-limonitic-limestone common

(Plus a major fine sand component)

85 - 90ft.

chloritic slate - fissile, very fine grained major

(contains coarse quartz grains and limonite
pseudomorphs of pyrite euhedra)

(Plus only minor sand fraction)

90 - 95ft.

no sample

95 - 100ft.

chloritic slate - fissile, very fine grained common

(contains coarse quartz grains and limonite
pseudomorphs of pyrite euhedra)

fine grained arenaceous limestone common

individual large quartz fragments present

(Plus only minor sand fraction).

A.W.G. Whittle

A.W.G. Whittle & Associates,
Mineralogical Consultants.

June 4, 1971.

SPECIMENS COLLECTED by ? on 12.5.71

0026

No. 12551 Drill Hole TY1 (CRA Exploration) micaceous siltstone - bedrock cuttings.

No. 12552 480E x 124N - Baratta. Set of drill cuttings.

0027

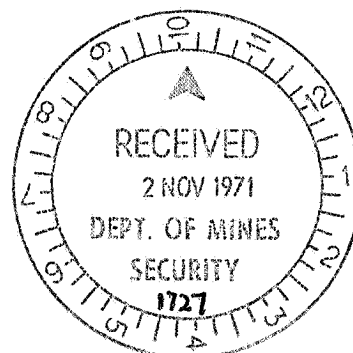
A.W.G. WHITTLE & ASSOCIATES.

MINERALOGICAL REPORT.

Report NBH/47.

EUKABY WORKINGS - BARATTA.

(O/N 866AN)



July 7, 1971.

EUKABY WORKINGS - BARATTA.

The rocks are all similar examples of an originally argillaceous siltstone facies which was converted metamorphically to low grade greenschist. The rocks were variably pyritic and possibly also pyrrhotitic, and some contain small amounts of volcanic derivatives in the form of devitrified glass.

There is some evidence that stratiform galena coexisted with the stratiform pyrite (or pyrrhotite), but in most cases galena was present in quartz veins. These veins, although epigenetic, display some features which suggest that they were developed in situ by metamorphic processes. There is for example, no evidence of any hydrothermal alteration in proximity to the veins.

EUW 2' - Oxidised stratiform sulphides in sericitic siltstone.

The rock is a fissile, closely laminated, highly sericitic siltstone which was formerly strongly pyritic. Through oxidation it is now brown in colour and strongly limonitic.

It is a fine and fairly evenly grained rock composed mainly of quartz and sericite with copious limonite pseudomorphs from pyrite, and small amounts of clastic tourmaline, sphene and zircon. Particles of devitrified volcanic glass are common among the quartz.

The lamellae consist of either dominant quartz with subordinate sericite, or of dominant sericite with subordinate quartz. The sericite in all lamellae is in common parallel orientation along the bedding

planes. The bulk of the sericite is an original clastic component, but some finer sericite is a product of clastic feldspar dissociation as the result of the mild metamorphic modification of the rock.

Granular pyrite of 0.03-0.1mm. grain size existed in all lamellae, but was especially abundant in those containing more clastic quartz than sericite.

Thin epigenetic quartz veins traversed the rock at a low angle to the bedding, but no apparent sulphide mineralisation was associated with these.

Secondary zinc or lead carbonate*, and less commonly anglesite, occur in many parts of the rock, either as halos of 5-10 microns thickness around granules of secondary limonite; or as thinner, rhythmically repeated shells alternating with similar limonitic ones to form ovoidal composite limonite-carbonate globules of 0.03-0.06mm. diameter, Fig. 1. To a lesser extent the carbonates exist alone without intergrown limonite, but in all cases both of the secondary carbonates and the anglesite with or without intergrown limonite and jarosite, exist amongst the numerous limonite pseudomorphs of pyrite. The minutely layered structure of the limonite-jarosite-cerussite ovoids is strongly suggestive of the melnikovite-pyrite structure which evolves from pyrrhotite through secondary marcasite and pyrite. It thus seems probable that base metal sulphides may have initially been minutely intergrown with pyrrhotite, rather than pyrite.

* The distinction between cerussite and smithsonite in microcrystalline material is virtually impossible by optical methods - this requires XRD or electron probe analysis.

No galena or marmatite boxworks are visible in the lead-oxysalt-limonite clusters. It is probable that either the grains were too small, or that they were single particles with anhedral form. The distribution of the lead-zinc-oxysalts and the limonite, suggests that fine grained stratiform marmatite and galena were distributed with pyrite or pyrrhotite in the bedding planes of the original sediment.

There is no apparent feature to account for the Cu value shown by analysis; however this may be complexed with jarosite in sub-microscopic habit.

EUW 9'. Oxidised-mineralised sericitic siltstone with stratiform sulphides.

The rock is essentially similar to EUW 2' in that it is a fissile, closely laminated sericitic siltstone with a cleavage parallel to the bedding. It contains tourmaline, zircon and sphene in minor amounts.

Stratiform granular pyrite, expressed as limonite pseudomorphs, was less abundant than in EUW 2'. On the other hand, there is a greater abundance of epigenetic vein quartz which is generally more sharply transgressive to the bedding. A further difference is the presence of limonite and jarosite with the vein quartz, indicating that this was sulphide-bearing. The sulphides also appear to have spread laterally into the bedding/cleavage planes of the rock in proximity to the transgressive veins.

Secondary anglesite with what appears to be cryptocrystalline

plumbo-jarosite, occurs in proximity to the transgressive veins where it is complexed with limonite. These minerals are also common in proximity to the limonite pseudomorphs of the few isolated, unusually large pyrite euhedra which were originally present in the siltstone.

Carbonates representing cerussite or smithsonite were not observed in this sample. This may be the result of the development of an environment high in (SO_4) as manifest in the presence of the jarosite. Thus, although the Pb value is readily accounted for, there is no indication of the habit of Zn or Cu in this sample.

There is a faint suggestion of isometric boxwork of the galena type in parts of the transgressive veins. Thus, some galena may have accompanied the quartz and pyrite, but the origin of these epigenetic veins is not clear - i.e. they may have been of exotic origin, or may simply represent veins produced in situ by metamorphic mobilisation of components already present in the sediments. There is no evidence in this, or in any of the other samples, of any form of rock modification adjacent to the veins. This would be a usual feature of hydrothermal veins.

EUW 22'. Oxidised-mineralised sericitic siltstone with stratiform sulphides.

The rock is again similar in most respects to those above but in this case, there is a copious distribution of the limonite pseudomorphs of stratiform sulphides. From their form and highly limonitic character,

these appear to have been anhedral to euhedral pyrites of 0.02-0.1mm. grain size.

Anglesite is common as single grains amongst the pyrite pseudomorphs, and with limited amounts of (plumbo?) jarosite it is also complexed with some of the limonite. Lead or zinc carbonate occurs more sparsely, but exists as minute crystals within some limonite clusters.

Numerous, completely oxidised quartz-sulphide veins exist both along, and at 70-90° to the bedding/cleavage of the siltstone. Although no well-defined boxwork structures exist in the veins, these contain both lead/zinc carbonate and anglesite in addition to limonite, and thus appear to have been quartz-pyrite-marmatite-galena veins.

The same remarks apply to these veins as in the case of those in EUW 9'.

EUE South Edge. Oxidised-mineralised sericitic siltstone with stratiform sulphides.

The rock is a fissile, closely laminated sericitic siltstone similar to those above with the limonite pseudomorphs of evenly disseminated, copious stratiform pyrite.

There are many veins in the rock, most of which are transcurrent in respect to the structure. These are quartz veins which contained considerable amounts of galena, as well as subordinate pyrite. The galena is represented as limonitic boxworks, the cells of which are

completely, or partly filled by carbonate, Fig. 2. Only minor anglesite is present in these. In view of the high Zn assays, this carbonate is probably smithsonite.

Cerussite or smithsonite, but little anglesite, are also complexed with some of the limonite pseudomorphs of the stratiform sulphides. Yellow microcrystalline jarosite is present in very narrow zones of shear which followed the rock cleavage.

Galena is thus considered to have been present in the rock in both stratiform and vein-type habit, but there is no evidence of the presence of original zinc sulphide.

EUE 18'. Oxidised-mineralised pyritic sericitic siltstone - tuffaceous.

This is oxidised pyritic sericitic siltstone of the same type as those above. It appears to have contained about 15% stratiform pyrite of 0.02-0.05mm. grain size. In addition to the major quartz and sericite, there are numbers of particles of brown devitrified volcanic glass, as well as tourmaline and zircon. The rock is at least slightly tuffaceous in type.

Quartz-pyrite-(galena-marmatite) veinlets of 1.5cm. maximum length were formed at frequent intervals in the cleavage planes of the rock. These are spaced less than 1cm. apart; they taper at either extremity, and rarely exceed 1mm. in thickness. All of these veinlets, or segregations as they may be, contain goethite cell structures in which copious carbonate, probably smithsonite crystallised. Anglesite and jarosite

of the vein and was continuous for its full length. The goethite boxwork structures are lined by microcrystalline anglesite while the centres of some cells contain carbonates, Fig. 3.

There were also very thin 0.5mm. transgressive oxidised pyrite veinlets which contained no gangue quartz and only minor galena, present now as anglesite. These passed through the major quartz-galena-pyrite veins and were thus of subsequent origin.

Small amounts of fine granular anglesite are present with the oxidised stratiform pyrite well away from the vein structures, and with no apparent connection with them. This might therefore represent former subordinate stratiform galena.

EUE, North Edge. Oxidised-mineralised pyritic sericitic siltstone.

This is a fissile sericite siltstone with laminations resulting from variations in the quartz/sericite ratios. It is generally similar to all other siltstones in this series, and contained in the various lamellae, highly variable amounts of stratiform pyrite.

It contained cleavage/bedding-oriented quartz-galena veins of 4mm. maximum thickness. The quartz is inequigranular and stressed, while the galena was relatively coarse grained (1-2mm.) and concentrated mainly in the core section of the veins. The galena oxidised to good isometric boxworks the cells of which were filled by carbonates of lead or zinc, Fig. 4. Subordinate pyrite was also contained in these veins.

A series of subsequent carbonate veins of an irregularly transgressive nature, possibly filling fractures, formed in the rock and passed through the quartz-sulphide veins.

There are numerous closely spaced zones of shear along the rock cleavage. Most of these were impregnated by the secondary carbonate, and by limited amounts of black manganese oxides. The rock was in these several ways, extensively permeated by the carbonates.

50' West of Eukaby Shaft (costean)

Oxidised-mineralised pyritic sericitic siltstone.

The rock is a folded, originally pyritic sericitic siltstone with variable cleavage - bedding relationships according to the folding. Oxidation and leaching of the pyrite was widespread, but it can be seen that pyrite of 0.02-0.05mm. grain size constituted a few % to about 20% of the various lamellae. A large proportion of the pyrite was euhedral. Lead and zinc oxysalts were not observed in association with the oxidised stratiform pyrite.

Veinlets composed mainly of stressed inequigranular quartz, and containing small amounts of euhedral pyrite, siderite, apatite, and minor galena, were emplaced in the rock. The pyrite in these veins was oxidised, but the galena was not. There is accordingly, no oxysalt present in the veins.

CRAIGES TRENCH at 24.6.71. Oxidised, weakly pyritic sericitic siltstone.

The rock is an evenly granular sericitic siltstone with good cleavage and closely spaced laminations. Much of the rock was non-pyritic: fine pyrite was confined to only a few thin lamellae which contained less than 10% of the sulphide. Clastic grains of brown devitrified volcanic glass are common in addition to the accessory tourmaline and zircon.

Cerussite or smithsonite were not observed in this rock. However, thin rims of highly refractive mineral which is moulded around some limonite particles, may be anglesite developed from galena associated with the pyrite.

There are no vein structures in the rock.

A.W.G. Whittle

A.W.G. Whittle & Associates,
Mineralogical Consultants.

July 7, 1971.

Fig. 1. EUW - 2' Trans. light x 810.

Rhythmically zoned sequences of limonite (black) and Pb/Zn carbonates (blotchy grey-white) constitute several globular bodies which are coalesced into an irregularly shaped mass 0.07mm. in its longest dimension. Quartz (clear white) and sericite (clear white flakes) enclose the mass. The black grain L.H.S. is a limonite pseudomorph of pyrite. These zoned globules may indicate former intricately intergrown base metal and iron sulphides.

Fig. 2. EUE - South Edge. Trans. light x 60.

A transcurrent quartz-galena vein (oriented N.W.-S.E.) in laminated pyritic siltstone (limonite pseudomorphs of pyrite - black, 0.02-0.05mm. grain size) with variations in pyrite content across the bedding (oriented N.-S.). The isometric form of the galena boxwork (black) in the centre of the vein quartz aggregate is manifest in many right angles. The cells of the boxwork contain carbonate (mottled grey-white).

39

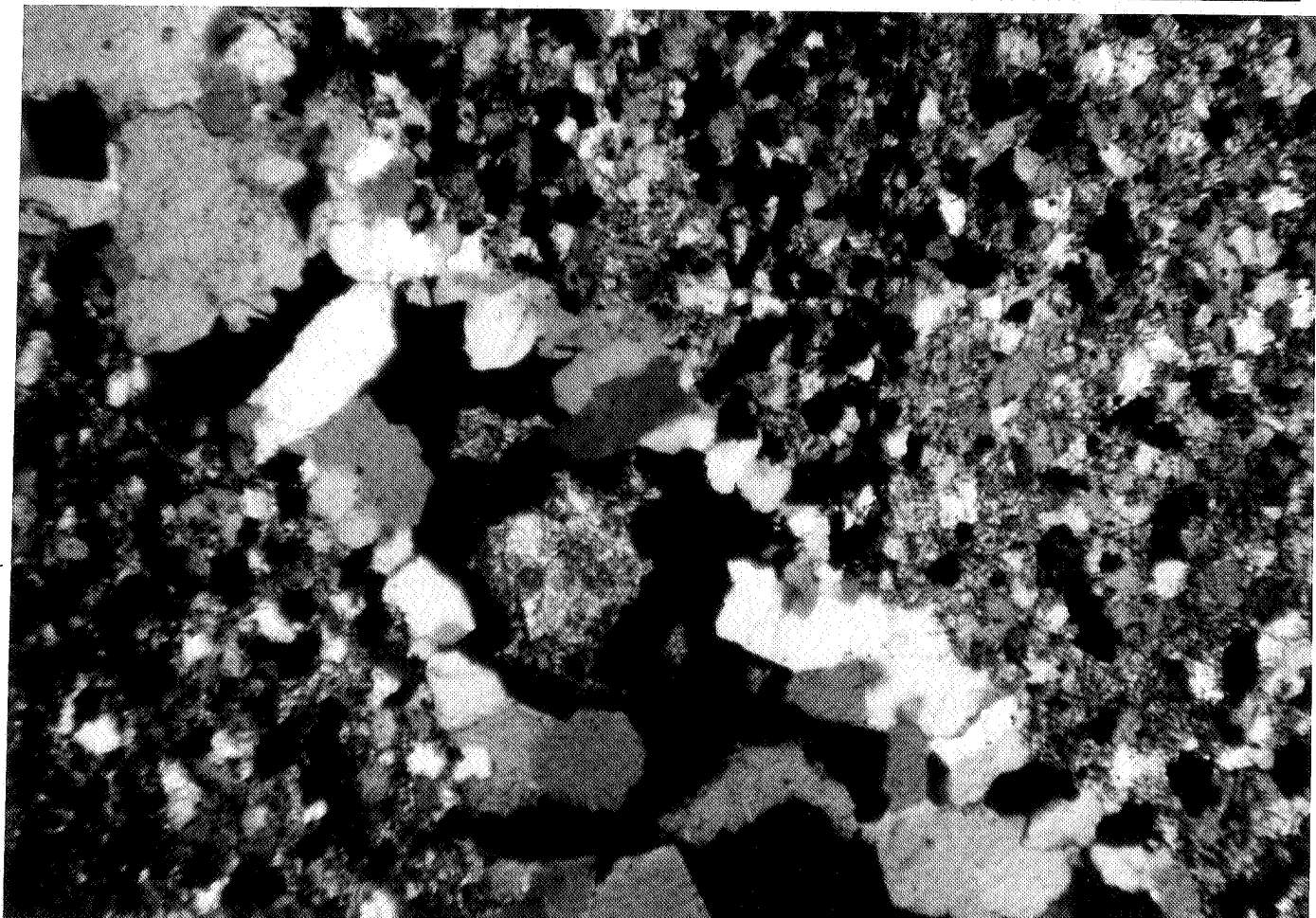
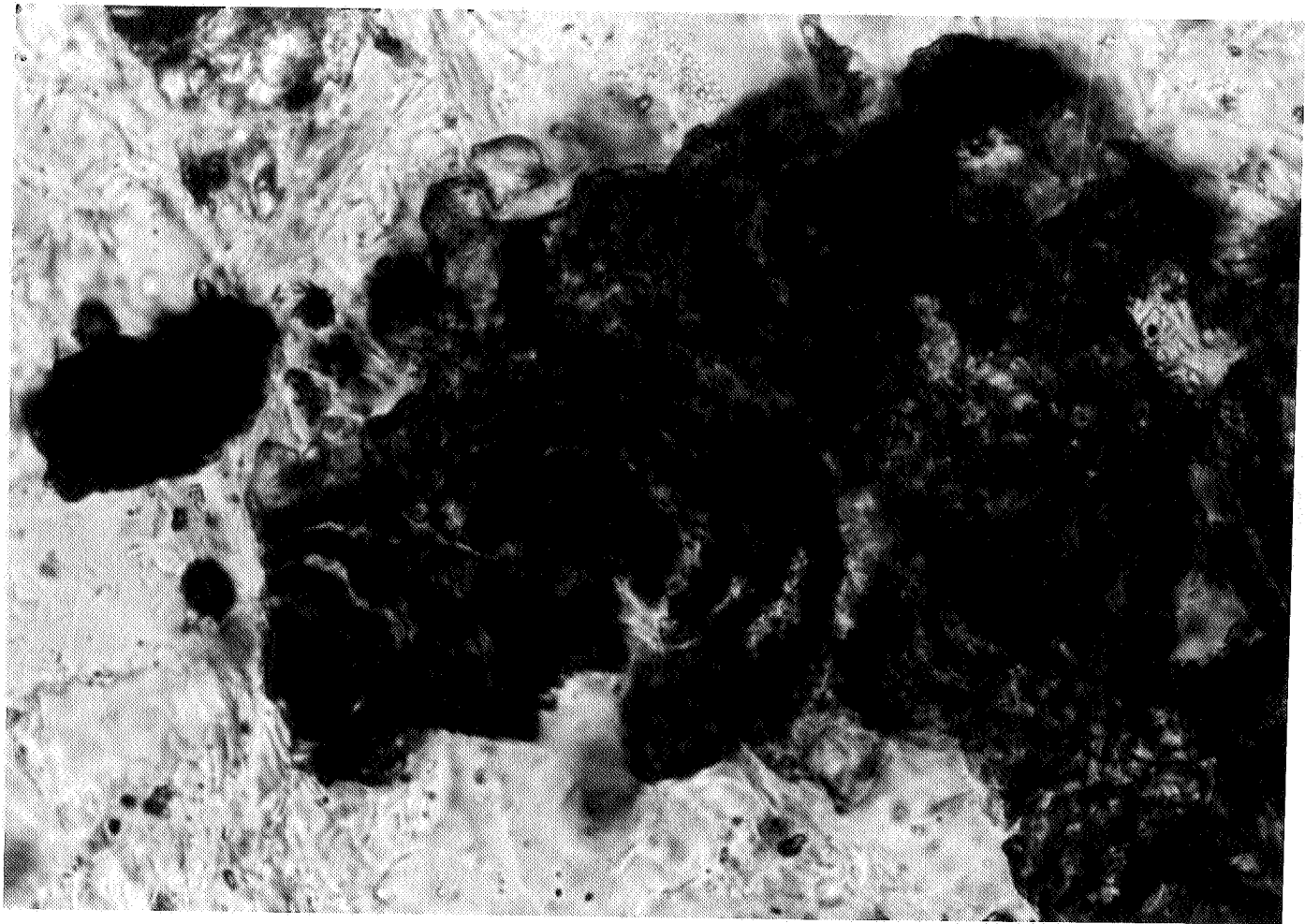


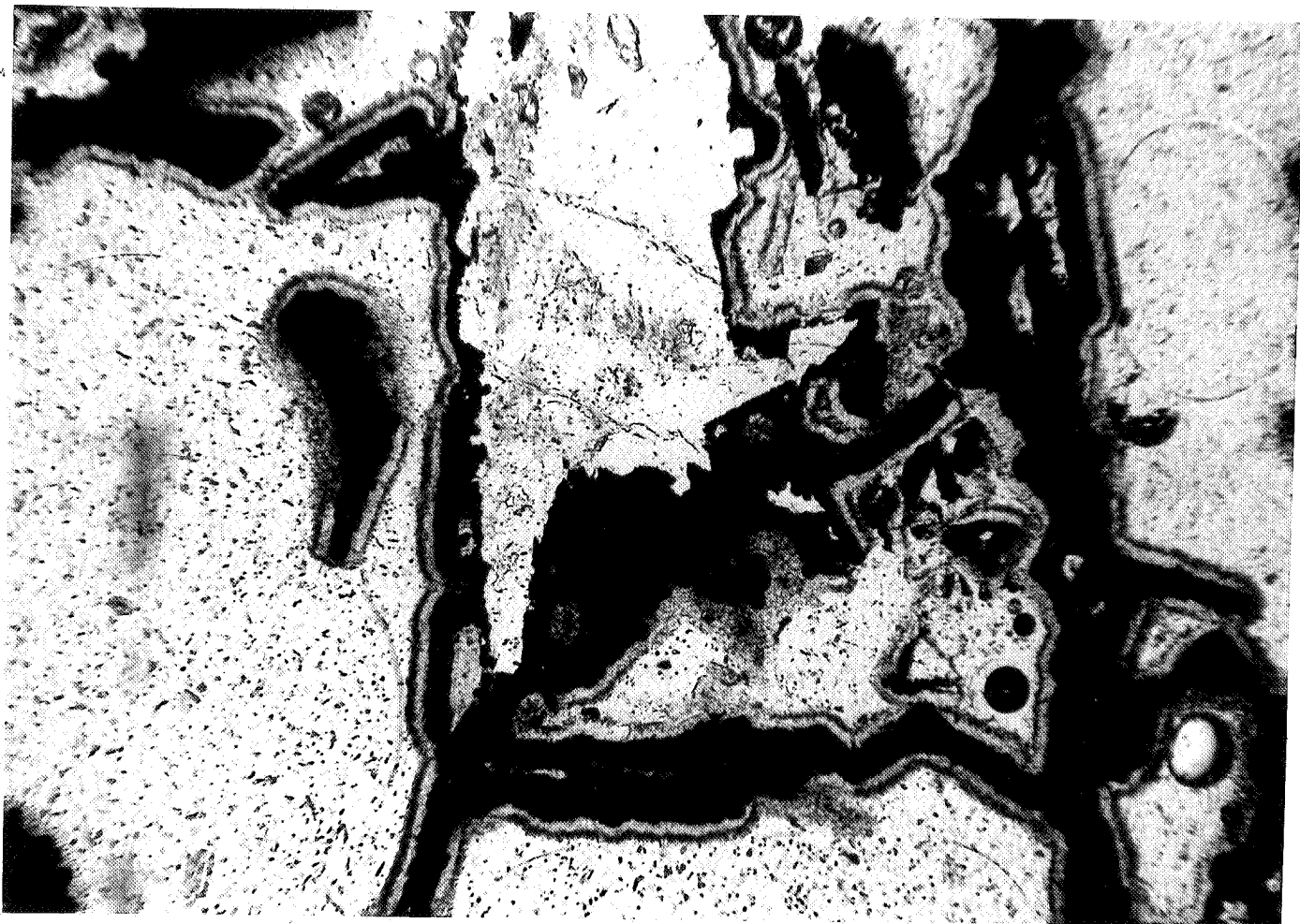
Fig. 3. ^{20'}
EUE - 2' N. of 18'. Trans. light x 60.

Portion of a galena boxwork in the centre of the vein quartz showing the isometric configuration of the cell walls (black goethite), and one (111) cleavage partition. The cells are void through leaching but microcrystalline anglesite (grey linings on goethite) formed at 90° to the cell wall surfaces.

Fig. 4. EUE, North Edge. Trans. light x 60.

Isometric galena boxwork with goethite cell walls (black) and with the cells filled by Pb/Zn carbonates (mottled grey, high relief). A thin carbonate vein filled a fracture in the surrounding vein quartz and passed through the boxwork.

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0041

A.W.G. WHITTLE & ASSOCIATES.

MINERALOGICAL REPORT.

Report NBH/56.

PERCUSSION DRILL CUTTINGS - EUKABY.

(O/N 868AN)



August 6, 1971.

PERCUSSION DRILL CUTTINGS - EUKABY.

The 10 samples of percussion cuttings were submitted for determination of the presence of economic minerals. Each of these samples was panned to provide a heavy mineral concentrate, and polished sections were made for the examination.

The economic minerals are listed below with remarks as to their relative abundance. Notes on the nature of the associated rock and mineral fragments are appended.

There are several discrepancies between the sample depths as noted in the order, and as shown on the sample bags. In the case of EU 16E x 14S, the shallow samples are much less oxidised than the deepest sample at 150-155ft.

EU - 16E x 10S.

<u>70-75'</u>	galena	... common
	galena-cerussite ⁺ anglesite	... "
	cerussite ⁺ anglesite.	... "

Amongst limonite, pyrite, quartz, calcite, and fine grained siliceous calcareous rock.

<u>100-105'</u>	galena	... very sparse
	galena-cerussite-limonite	... " "

Amongst abundant framboidal pyrite in siliceous calcareous rock, limonite, rutile, pyrite, quartz, silicates, calcite, fine grained calcareous rock, sphene.

<u>130-135'</u>	galena	... sparse
	galena-covellite-chalcocite	... "
	cerussite	... common

Amongst abundant framboidal pyrite in siliceous calcareous rock, limonite, rutile, pyrite, quartz, silicates, calcite, fine grained calcareous rock, sphene.

<u>155-160'</u>	cerussite	... present
-----------------	-----------	-------------

Amongst abundant framboidal pyrite in siliceous calcareous rock, quartz, silicates, fine grained calcareous rock, pyrite, limonite, rutile, sphene.

EU - 16E x 12S.

<u>105-110'</u>	galena	... copious
	galena-cerussite ⁺ anglesite	... "

Amongst highly abundant limonite, galena-cleavage boxworks, quartz, relic pyrite, sparse rock fragments containing oxidised and leached framboids.

<u>135-140'</u>	galena-cerussite	... minor
	sphalerite ⁺ pyrite	... "
	molybdenite	... "

Amongst abundant framboidal pyrite in fine grained calcareous siliceous rock, quartz, rutile, limonite, pyrite.

<u>140-145'</u>	no sample.	
<u>155-160'</u>	galena	... common
	galena-pyrite	... "
	sphalerite ⁺ pyrite	... "
	sphalerite ⁺ chalcopryrite	... "
	sphalerite ⁺ galena	... "
	cerussite	... "
	anglesite	... "

Amongst abundant framboidal pyrite in fine grained calcareous siliceous rock, quartz, rutile, sphene, oxidised pyritic quartz-, mica schist, martitised magnetite, pyrite, limonite.

EU - 16E x 14S.

<u>105-110'</u>	galena	... copious
	galena-cerussite	... "
	cerussite	... "
	sphalerite-pyrite	... sparse
	pyrite-galena framboids	... common*
	pyrite-sphalerite framboids	... common*

Amongst abundant framboidal pyrite in fine grained calcareous siliceous rock, sphene, rutile, pyrite, limonite.

* These are significant since they establish stratiform Fe-Pb-Zn sulphides of organic origin. The framboids are 0.1-0.2mm. diam. with base metal nuclei and pyritic outer shell. They occur together

in clusters in fine grained calcareous-micaceous-siltstone.

<u>140-145'</u>	galena	...	trace
(not listed)			

Amongst abundant framboidal pyrite in fine grained calcareous siliceous rock, goethite, rutile, sphene, pyrite.

150-155' leached galena cleavage boxwork ... sparse
sphalerite ... trace

Amongst highly oxidised and leached fine grained calcareous-siliceous rock with goethite and pseudomorphs of framboids, quartz, oxidised pyrite.

155-160' no sample.

Abel White

A.W.G. Whittle & Associates,
Mineralogical Consultants.

August 6, 1971.

0046

A.W.G. WHITTLE & ASSOCIATES.

MINERALOGICAL REPORT.

Report NBH/58.

BARATTA AND BOURKE.

(O/N 472AN)



August 12, 1971.

BARATTA AND BOURKE.

The four samples from Eukaby are similar highly dolomitic sericitic siltstones in only one of which could lead oxysalt be located.

Two gossanous rocks indicative of galena-pyrrhotite mineralisation were determined in the Julbou series. The nature of the incipient mineralisation in the sericitic quartzitic rocks in DD-MG1 is characteristic of that of the Cobar district. Under Cobar conditions, magnesia metasomatism is generally followed by potassic metasomatism in the fuller development of sulphide ore. This is manifest in the formation of biotite from the earlier chlorite, and of orthoclase with magnetite. Such criteria might constitute an exploration guide.

DESCRIPTIVE PETROLOGY.

Julbk 1. - 12641. Oxy-lead ore - Eukaby.

.04% Cu, 32.5% Pb, .13% Zn

The lead oxysalts are contained in a closely laminated strongly calcareous and sericitic siltstone of 0.05mm. average grain size. The shapes of the clastic grains are irregularly rounded or somewhat elongate, and the common orientation of the micas provides a weak schistosity. Quartz and dolomite are major components, sericite is abundant and tourmaline is minor. Secondary lead carbonate and anglesite are also present.

Refractive index measurements of the carbonate grains in much of

the rock indicate that these are not cerussite, but calcite and dolomite.

There are however, numbers of thin 0.02-0.05mm. limonite-stained, originally sulphide veins in the bedding and at slight angles to it. These are closely spaced. The oxidised sulphide was isometric in shape, and it was pseudomorphed by limonite and anglesite, hence it is regarded as having been mainly galena. Carbonate of high refractive index, which is sited within the rock in proximity to the margins of the veins, is cerussite.

The lead sulphate formed in place through the oxidation of introduced galena. However, lead oxysalt also spread laterally from the bedding-controlled sulphide veinlets as far as the high calcite-dolomite medium permitted, and finally crystallised as cerussite by replacement of the clastic Ca-Mg carbonate component of the rock.

Juleuk 2. - 12642.

Small 60' shaft amongst Eukaby workings.

Dolomitic-sericitic-felspathic siltstone.

This rock is a similar but more positively felspathic facies than that above. The main components are quartz and dolomite, but there is copious plagioclase as well as sericite, and several % clastic granular opaque mineral.

The rock is closely bedded with grain size variations, and with changes in the quartz/dolomite proportions. The cleavage is at 30°-40° to the bedding planes.

There are no sulphide vein structures in the rock, and refractive index measurements of the ground rock in immersion media revealed no carbonates of high index. It is concluded that it contains little or no cerussite or anglesite.

Juleuk 3. - 12643. From Eukaby Shaft about 100ft. deep.

Dolomitic-sericitic siltstone.

This rock is a strongly calcareous and sericitic siltstone with a lesser plagioclase content than No. 2. It is closely bedded by virtue of grain size variations, and the differences in the proportions of quartz, dolomite and sericite. The cleavage in this case is again at 30-40° to the bedding planes due to the parallel orientation of the sericite flakes.

Refractive index measurements of ground rock particles indicated that no carbonate with an index above 1.710 is present. This eliminates cerussite and also the sulphate anglesite.

This rock, as in the case of No. 2, contains several % of clastic opaque mineral, as well as tourmaline.

Juleuk 4. - 12644. Michailevs Borehole - 40ft.

Dolomitic-sericitic siltstone.

This rock is very similar to those above and it consists mainly of quartz, dolomite and sericite with minor feldspar and disseminated clastic opaque mineral. The advanced state of oxidation released

limonite which stained the carbonate mineral component.

The cleavage in the rock, as defined by the oriented sericite, is at 45° to the bedding planes.

The carbonate components cannot be identified in thin section, particularly in view of the limonite staining. However, by measurements made in refractive index mounts a wide selection of the carbonates present in finely ground rock, did not display an index above that which is normal for Ca-Mg carbonates.

There are no vein structures and no evidence of any lead oxysalts in the thin section. The presence of lead would best be established by assay.

Julbou 1. - 12645.

Doradilla Eastern Gossan.

Pyrrhotite-pyrite-galena gossan.

39% Cu, 07% Pb
005% Zn

Very coarse grained zoned and perfectly euhedral quartz is intergrown with brown and darker brown highly cellular limonite, and together these constitute the gossanous expression of former quartz-pyrite-pyrrhotite-galena vein material.

Much of the cellular structure which is visible megascopically is the form of irregular solution cavities, although some fine polygonal sponge and isometric cleavage boxwork may be distinguished by hand lens.

The better expression of boxwork has been obscured by the deposition in the voids of secondary limonite produced by the pyrite and pyrrhotite.

This limonite is present in the microcrystalline and colloform banded habits, but amongst it may be distinguished the intersecting relic linear patterns in goethite which define isometric galena cleavage boxwork. Separate areas of minutely cellular polygonal sponge boxwork outline former pyrrhotite grains of 1mm. size.

Confirmation of this interpretation exists in the associated gangue quartz in which were preserved from oxidation many minute grains of pyrite, pyrrhotite and galena.

.025% Cu, .24% Pb, .33% Zn

Julbou 2. - 12646. Doradilla Southern Lead Prospect (West)

False gossan - limonite as an open space filling.

The sample is fine grained highly stressed quartzite with a lineation structure. It is extensively fractured and embodies many transcurrent and conformable limonite veins.

The rock contained 5-10% commonly oriented biotite grains which have been more or less completely replaced by limonite.

The limonite which exists in the fracture system and extends along the bedding planes is exotic in origin, and does not constitute gossan formed in place. This is entirely an open space filling by microcrystalline, spherulitic and colloform banded limonite which was transported in the colloid phase to, and deposited progressively, in its present site. The source of the limonite is in adjacent or subjacent rock or vein material rich in pyrite or pyrrhotite.

A further feature of significance is the complete absence of any

gangue material within the fractures in the quartzite.

.02 % Cu, .23 % Pb, .33 % Zn

Julbou 3. - 12647. Doradilla Southern Lead Prospect (East).

Gossan derived from quartz-pyrite vein of low lead tenor.

A fine grained highly stressed, strongly lineated and brecciated, originally micaceous quartzite, is in contact with a wide, irregularly granular, highly stressed quartz vein. The contact, within the specimen is parallel to the foliation structure of the quartzite. The vein itself contains little limonite, but the adjoining rock contains large amounts.

The bulk of the limonite is sited within the foliation planes of the quartzite where it replaced the mica-rich foliae, but not those rich in quartz. This limonite is not in place, but was derived from a series of closely spaced thin veinlets which are mainly transcurrent in respect to the foliation, and which connect with the large quartz vein. There are also a number of thin conformable veins which connect with those of a transcurrent habit.

The conformable quartz veins contain minute protected specks of galena, but no boxworks. The relic galena thus represents their initial lead content. The transcurrent veins filled the numerous fractures in the breccia and consist only of microcrystalline limonite, without boxwork configuration, and is considered to have developed only from pyrite.

0053

MINES EXPLORATION PROPRIETARY LIMITED

No 12642

SPECIMEN — CATALOGUE

FIELD No. JULEUK 2 DATE 29 / 7 / 1971
 SECTION No. _____ Collected _____
 PROJECT EUKABY By P.S. FORWOOD
 LOCATION (Descriptive) _____

CO-ORDINATES E _____ W _____
 N _____ S _____

FIELD NAME SPOIL
 MODE OF OCCURRENCE FROM SMALL 60' DEEP SHAFT

MINES EXPLORATION PROPRIETARY LIMITED

No 12644

SPECIMEN — CATALOGUE

FIELD No. JULEUK 4 DATE 29 / 7 / 1971
 SECTION No. _____ Collected _____
 PROJECT EUKABY By P.S. FORWOOD
 LOCATION (Descriptive) MICHAILEVS BOREHOLE AT

40' DEPTH
 CO-ORDINATES E _____ W _____
 N _____ S _____

FIELD NAME _____
 MODE OF OCCURRENCE _____

MINES EXPLORATION PROPRIETARY LIMITED

No 12641

SPECIMEN — CATALOGUE

FIELD No. JULEUK 1 DATE 29 / 7 / 1971
 SECTION No. _____ Collected _____
 PROJECT EUKABY By J. MICHAILEVS
 LOCATION (Descriptive) _____

CO-ORDINATES E _____ W _____
 N _____ S _____

FIELD NAME OXY LEAD ORE
 MODE OF OCCURRENCE _____

MINES EXPLORATION PROPRIETARY LIMITED

No 12643

SPECIMEN — CATALOGUE

FIELD No. JULEUK 3 DATE 29 / 7 / 1971
 SECTION No. _____ Collected _____
 PROJECT EUKABY By P.S. FORWOOD
 LOCATION (Descriptive) _____

CO-ORDINATES E _____ W _____
 N _____ S _____

FIELD NAME SPOIL
 MODE OF OCCURRENCE FROM EUKABY SHAFT ABOUT
140' DEEP

0054

MINES EXPLORATION PROPRIETARY LIMITED

No 12645

SPECIMEN — CATALOGUE

FIELD No. JULBOU 1 DATE 27 / 7 / 1971
SECTION No. _____
PROJECT BOURKE Collected By P.S. FORWOOD
LOCATION (Descriptive) DORADILLA EASTERN
CO-ORDINATES E _____ W _____
N _____ S _____
FIELD NAME GOSSAN
MODE OF OCCURRENCE A 3' WIDE VEIN AMONGST
THE PORPHYRY.

MINES EXPLORATION PROPRIETARY LIMITED

No 12646

SPECIMEN — CATALOGUE

FIELD No. JULBOU 2 DATE 27 / 7 / 1971
SECTION No. _____
PROJECT BOURKE Collected By P.S. FORWOOD
LOCATION (Descriptive) DORADILLA SOUTHERN LEAD
PROSPECT. (WEST)
CO-ORDINATES E _____ W _____
N _____ S _____
FIELD NAME GOSSAN
MODE OF OCCURRENCE _____

MINES EXPLORATION PROPRIETARY LIMITED

No 12647

SPECIMEN — CATALOGUE

FIELD No. JULBOU 3 DATE 27 / 7 / 1971
SECTION No. _____
PROJECT BOURKE Collected By _____
LOCATION (Descriptive) DORADILLA SOUTHERN LEAD
PROSPECT (EAST)
CO-ORDINATES E _____ W _____
N _____ S _____
FIELD NAME _____
MODE OF OCCURRENCE _____

0055

MINES EXPLORATION PROPRIETARY LIMITED

No 12648

SPECIMEN — CATALOGUE

FIELD No. _____ DATE 28 / 7 / 1971
SECTION No. _____ Collected
PROJECT BOURKE By P.S. FORWOOD
LOCATION (Descriptive) D.D. MG1 AT 528'

CO-ORDINATES E _____ W _____
N _____ S _____
FIELD NAME _____
MODE OF OCCURRENCE _____

MINES EXPLORATION PROPRIETARY LIMITED

No 12649

SPECIMEN — CATALOGUE

FIELD No. _____ DATE 28 / 7 / 1971
SECTION No. _____ Collected
PROJECT BOURKE By P.S. FORWOOD
LOCATION (Descriptive) D.D. MG1 AT 553'

CO-ORDINATES E _____ W _____
N _____ S _____
FIELD NAME _____
MODE OF OCCURRENCE _____

MINES EXPLORATION PROPRIETARY LIMITED

No 12650

SPECIMEN — CATALOGUE

FIELD No. _____ DATE 28 / 7 / 1971
SECTION No. _____ Collected
PROJECT BOURKE By P.S. FORWOOD
LOCATION (Descriptive) D.D. MG1 AT 555'

CO-ORDINATES E _____ W _____
N _____ S _____
FIELD NAME _____
MODE OF OCCURRENCE _____

0056

A.W.G. WHITTLE & ASSOCIATES.

MINERALOGICAL REPORT.

Report NBH/63.

DDH. EU1 - BARATTA.

(O/N 1023AN)



September 15, 1971.

DDH. EU1 - BARATTA.SUMMARY.

Both thin and polished section studies were made on these three cores since it has been indicated that it is important to establish the presence or absence of fine grained epigenetic sulphides (including galena), within the host rock, and apart from the megascopically apparent vein structures.

The polished sections were examined meticulously at high magnification in oil immersion, and it is considered that the observations outlined below indicate that there was both pervasive and micro-vein mineralisation within the main body of the rock. The presence of pyrrhotite, pyrite and galena within the rock itself has been established through either boxworks, or relic sulphide particles. In the micro-vein structures there exists chalcophanite, a zinc-bearing manganese oxide, with polygonal boxwork from pyrrhotite, and with $\text{MnO}_2\text{-Fe}_2\text{O}_3$ replicas of an isometric mineral which might have been galena.

DESCRIPTIVE PETROLOGY.86ft. Quartz-siderite-galena vein.

The core displays a zoned structure in the vein material with galena at the centre. Coarsely crystallised siderite immediately encloses the galena, and a layered subhedral quartz aggregate exists

beyond the siderite.

Cerussite which formed from the oxidation of the galena is complexed with the siderite, and exists within the galena cleavage planes.

108ft. Oxidised-mineralised micaceous and feldspathic siltstone.

The core is brown in colour and it contains closely spaced thin quartz veins which are parallel to the rock cleavage. The host rock is a closely laminated sequence of thicker micaceous and slightly feldspathic siltstone beds, and of extremely thin highly micaceous slate lamellae.

The quartz veins are irregularly granular stressed assemblages of major quartz with preserved sulphides, goethite boxworks from sulphides, and secondary carbonate. The sulphide grains which survived oxidation because of their complete enclosure in individual quartz grains, are less than 0.06mm. in size and include pyrrhotite, sphalerite, galena and minor chalcopyrite. There are good goethitic cleavage boxworks from galena of 0.5-1.0mm. grain size, and these are enclosed in, or encrusted by cerussite. Polygonal sponge boxwork from somewhat finer grained pyrrhotite is also present, but none from sphalerite was seen.

The host rock contains in addition to quartz, muscovite and minor feldspar, sparse oriented graphite, plentiful leucoxene, rutile and opaque mineral, as well as some zircon. The nature and distribution

of the opaque mineral has some significance.

The most widespread and abundant are the goethitic polygonal sponge boxwork clusters developed from pyrrhotite of less than 0.06mm. grain size. These are most common in proximity to the quartz veins where they are sometimes accompanied by small galena cleavage boxworks - within the host rock. At isolated spots well away from the quartz veins, relic particles of galena 0.004-0.020mm. in size, are complexed with cerussite within the area of an original galena grain of 0.20mm. size. It is particularly important to note, that within the host rock, and away from the megascopically visible vein structures, there are numbers of wispy chalcophanite-pyrrhotite boxwork-sphalerite micro-vein structures within the rock cleavages. These structures do not exceed 0.03mm. thickness; and they consist mainly of flakey chalcophanite which encloses isometric mangiferous replicas of ?galena or ?pyrite, occasional preserved sphalerite, and minute pyrrhotite polygonal boxwork.

212ft. Oxidised-mineralised calcareous and micaceous siltstone.

This core exhibits both grey and brown zones which respectively represent unoxidised, and oxidised rock. The boundary between the zones is very sharp, i.e. there is no gradational zone of oxidation. This boundary is also co-incident with a facies change in the core; between a strongly calcareous, weakly micaceous siltstone, and a strongly micaceous, weakly calcareous siltstone.

The grey zone in the rock contains unaltered framboidal pyrites of 0.005mm. size, as individuals, or as small clusters of individuals. Leucoxene of coarser size is more abundant; there are sparse graphite particles of 5-10 microns length and sparse pyrite euhedra of 0.05mm. size.

The brown oxidised zone contains a great abundance of the limonite pseudomorphs of decomposed-leached micas and of leucoxene. There are also smaller amounts of variably oxidised framboidal pyrites. However, the main cause of the dark brown colour is the presence of numerous leached limonite shells of subhedral pyrite, and of thin oxidised pyrite veins.

It is therefore apparent, that within the strongly micaceous, and more fissile portions of the siltstone sequence minute vein-type and pervasive pyritic mineralisation took place. These facies therefore contained both framboidal syngenetic pyrite and epigenetic pyrite. No evidence of other sulphides was observed.

A.W.G. Whittle

A.W.G. Whittle & Associates,
Mineralogical Consultants.

September 15, 1971.

0061

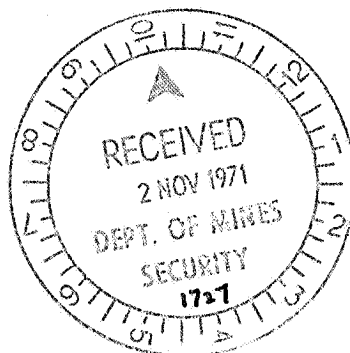
A.W.G. WHITTLE & ASSOCIATES.

MINERALOGICAL REPORT.

Report NBH/64.

DDH. EU1 - BARATTA.

(O/N 1025AN)



September 17, 1971.

DDH. EU1 - BARATTA.SUMMARY.

The sediments are essentially a siltstone facies which is weakly micaceous and felspathic, but strongly calcareous. Syngenetic framboidal pyrite exists in all samples, and is concentrated to some extent in thin discontinuous carbonaceous lamellae which sometimes contain a little graphite and traces of syngenetic sphalerite. Stratabound galena or chalcopryrite was not observed.

Mineralisation by sphalerite, galena, pyrite and chalcopryrite with traces of tetrahedrite occurred in veins with a quartz or quartz-calcite gangue medium. The exsolution relationship between sphalerite and chalcopryrite suggests a minimum vein formation temperature of 350°C.

DESCRIPTIVE PETROLOGY.

N.B. 725' - 730' assayed.

.005% Cu, .035% Pb, .050% Zn, <2ppm Ag

726ft. Interlaminated siltstone and calcareous siltstone.

The siltstone is thinly laminated by virtue of rapid facies changes from essentially quartzitic siltstone lamellae to highly calcareous siltstone lamellae. Both contain only a little muscovite and plagioclase feldspar, as well as small amounts of opaque minerals, zircon, tourmaline, rutile and leucoxene.

Relatively coarse grained calcite veins traversed the rock across its bedding in many places. Short off-shoots entered the bedding planes from these main transgressive veins. Only minor amounts of very fine pyrite or marcasite are contained in these veins.

Framboidal pyrite of 5-15microns diameter is the main opaque mineral. This is widespread and constitutes 1-2% of the sediment. Sparse graphite of less than 50 microns length is also present. Amongst the rutile and leucoxene there are sparse small irregularly shaped pyrite grains, as well as occasional isotropic grey grains which may be sphalerite of a syngenetic type.

N.B. 745'-750' assayed .005% Cu, .005% Pb, .030% Zn, <2 ppm Ag.
 746ft. Interlaminated siltstone and calcareous siltstone.

This rock contains the same closely spaced alternating facies as that at 726ft. The main difference is in the presence of thin, 0.05mm., wispy discontinuous lamellae of opaque mineral at very close intervals across the bedding. There are no calcite veins.

The wispy opaque mineral lamellae consist mainly of concentrations of framboidal pyrites which exist as single spheres of 5-20 microns diameter, or as larger clusters of spheres. Amongst these are sparse isotropic grains of probable sphalerite. These organic sulphides are contained within a dark coloured carbonaceous, but non-graphitic medium. Rather coarser clastic rutile and leucoxene are widely dispersed through the sediment.

N.B. 775'-780' assayed. .005% Cu, .200% Pb, .165% Zn, <2 p.p.m Ag.
 775ft. Mineralised interlaminated siltstone and limestone.

There are better facies contrasts in this core in that the siltstone lamellae are much less micaceous and commonly thicker, whereas the calcareous siltstone lamellae which were the feature of

the rocks above, are now represented by variably arenaceous, essentially limestone lamellae. Less than 1% fine silt-grade opaque mineral components are irregularly distributed, and in places are concentrated in thin discontinuous lamellae.

Stressed vein quartz with sulphides, entered the rock parallel to the bedding planes. The sulphide assemblage is major sphalerite with subordinate finer grained intergrown galena, lesser pyrite and exsolved chalcopryite. Trace amounts of tetrahedrite of 0.01-0.02mm. size exist at positions where chalcopryite and galena are in contact with sphalerite.

The disseminated opaque mineral of the rock is mainly framboidal pyrite of 5-15 microns diameter. Some of this is locally concentrated with carbonaceous matter to form the thin wispy lamellae. Leucoxene and rutile are widespread and bulk about 1% of the rock. Graphite is a very minor constituent, and there are indications of trace amounts of minute syngenetic zinc sulphide.

N.B. 780'-785' assayed .005% Cu, .055% Pb, .080% Zn, < 2 p.p.m. Ag.
783ft. Mineralised interlaminated siltstone and limestone.

The core is similar to that at 775ft. with thin alternating siltstone and calcareous lamellae at close, but irregular intervals. There is less than 1% disseminated opaque mineral, as well as a further small proportion of opaque mineral which is confined to thin wispy discontinuous lamellae of 0.05mm. thickness.

Zoned quartz-calcite-sulphide veins exist in the bedding planes.

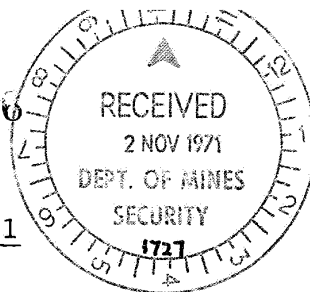
The sulphide occupies the centre of these veins, quartz the inner zones and calcite the outer zones. The sulphide section consists mainly of sphalerite which is in coarse grained simple granular intergrowth with copious galena, and lesser euhedral pyrite. All of the sphalerite contains oriented exsolved intergrowths of chalcopyrite.

The disseminated opaque mineral is mainly framboidal pyrite of 5-15 microns diameter. Leucoxenised ilmenite and rutile are rather more abundant and coarser grained than the pyrite. Minute isotropic grains of a grey mineral believed to be sphalerite exist amongst the framboidal pyrite, leucoxene and rutile; and in particular these occur in the thin wispy graphite-bearing carbonaceous lamellae noted above.

A.W.G. Whittle

A.W.G. Whittle & Associates,
Mineralogical Consultants.

September 17, 1971.



FOR THE QUARTER ENDED 30TH SEPTEMBER, 1971

S.M.L. 603, centered on the Eukaby Hill and Crusader Mining areas, north of Yunta, S.A., was granted on 1st July 1971. An option with Mr. Juris Michaillevs for the Eukaby Hill group of leases was obtained on 11th July. On 5th August an option was successfully negotiated with Craigie, Hall and Hall, owners of the Crusader group of leases. These two blocks of claims lie within S.M.L. 603, and while some of the work described was done on these claims, but it should be noted that the results are extremely relevant to the area of the S.M.L.

Initially, work concentrated on the Eukaby Hill prospect. A grid known as the Eukaby Hill grid was laid out. Datum for the grid is the North East corner of Gold Lease 2052. Line spacing is 400' and pegs are 200' apart. The baseline, bearing 75° magnetic, was later extended westwards through the Crusader leases. The baseline is now 20,400' long. A total of 123,000 line feet of pegging has been completed in the area.

A Gryphon rig drilled four percussion holes, totalling 649' of drilling, near the eastern edge of the Eukaby Hill claims. The co-ordinates and depths of the holes are as follows:

00N	10E	110 feet
9.5S	16E	173 feet
11.5S	16E	193 feet
13.5S	16E	173 feet

Assay results are enclosed.

Semi-detailed geological mapping of the Eukaby Hill and Crusader areas was carried out on a scale of 200' to the inch.

All outcrop in the mapped area at Eukaby Hill has been chip sampled at 50' intervals along with grid lines. Shaft dumps, also faces of pits and costeans in the grid area have been channel sampled. A total of 391 samples were despatched for assay.

Two diamond drill holes were completed during the quarter. Prior to July, channel sampling in two pits on the North East side of Eukaby Hill (pits designated EUW and EUE on maps) had revealed economically significant lead-zinc values over a strike width of 72'. D.D. EU1 was collared at grid co-ordinates 16.55S, 1.10W depressed at 50° in a direction 339° magnetic. It was planned to intersect the down-dip extension of the high assay values encountered in the Eukaby pits mentioned above. The drill hole was terminated at 816' in a closely bedded calcareous siltstone. Visible lead and zinc sulphides were confined to occasional minor quartz and calcite veins. Assay results are enclosed. The values are completely uneconomic, but the target zone is notably richer in veining.

D.D.EU2 was collared at grid co-ordinates 110.9W, 2.0S, depressed at 50° in a direction 335° magnetic. It was drilled beneath the main workings on the Crusader leases. The hole was terminated at 521' in pyritic, closely bedded calcareous siltstone. The assay results are enclosed. Again they are uneconomic, although one section contains more metal than the rest.

As a result of the geological mapping of the Eukaby Hill area, it has been proposed that the high lead-zinc values in EUW and EUE are structurally controlled and not bedded. It is thought that these pits are sited in the core of a West-South-Westerly plunging drag-fold. Here, the siltstones are schistose, highly cleaved, slightly overturned and intensely quartz-veined. D.D.EU3 has been planned to intersect the westerly strike plunge extension of this structure. It is sited at grid co-ordinates 20W, 11S, depressed at 50° in a direction 165° magnetic, and planned to 1000 feet.

All differing rock types intersected in the diamond drilling above have been petrologically examined, and reports are available. No new rock types have been found. However, many rocks contain microscopic pyrite which seems to have failed to give I.P. anomalies. Some fine-grained galena outside the transcurrent veins has been noted, but in values amounting to a fraction of a percent.

Perhaps the most noteworthy discovery so far is that the primary mineralization is SPHALERITE-GALENA, i.e. Baratta is a lead-silver-zinc field, not just a lead field, as was hitherto thought.

A.G. KING
Geologist

0068

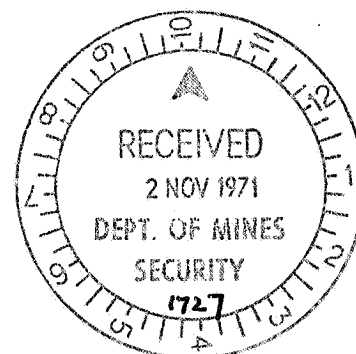
A.W.G. WHITTLE & ASSOCIATES.

MINERALOGICAL REPORT.

Report NBH/67.

DDH. EU1, EU2, - BARATTA; MOONTA ROCKS AND CUTTINGS.

(O/N 1027AN)



DISTRIBUTION:

Copies 1 & 2 - Melbourne.
Copy 3 - Moonta.
Copy 4 - P.O. Yunta.

October 17, 1971.

DDH. EU1, EU2, - BARATTA; MOONTA ROCKS AND CUTTINGS.SUMMARY:

Compared with earlier samples at both shallower and deeper positions in DDH. EU1, these three samples from intermediate depths (said to be the target zone), display no significant facies differences, and no significant differences in the contents of framboidal pyrite, rutile, leucoxene and graphite.

Two of these samples contain minute vein structures with either sphalerite or galena, but if anything, they display weaker mineralisation than the earlier samples. The only point of difference is the existence of very sparse linnaeite, some of which contains minute chalcopyrite inclusions; a re-examination of all earlier samples did not reveal linnaeite in any of them.

This incidence of linnaeite, however minute in its magnitude, may nevertheless be significant when the observations on EU2 are compared with those on EU1.

At 304ft. in EU2 there is a striking sulphide paragenesis which however is minute quantity-wise. There are no visible vein formations, but there is an apparent relationship between the development of magnesite at numerous centres, and the segregation of Cu-Pb-Zn-Fe-Co-Ni sulphides. Linnaeite seems to be the key mineral in these segregations: it should be noted that linnaeite is not confined to the ultrabasic nickeliferous paragenesis, but is found in both pneumatolytic and hydro-

thermal environments. In particular, linnaeite of hydrothermal origin exists in veins of the Pb-Zn type in many orebodies throughout the world.

The other point of difference between these two rocks and those of EU1 is the presence of galena, sphalerite and chalcopyrite as single or complexed individuals within the rock, well away from vein formations.

The association of Co with Cu-Pb-Zn is common enough, but just what the incidence of Ni means, is not immediately apparent. However, the evidence to date suggests that either magnesia metasomatism related to hydrothermal phenomena; or metal migration under metamorphic influence, may be important.

The discontinuity of the near-surface mineralisation in the Eukaby pits towards the target zone in EU1, may be due to phenomena of an unusual type - at present not at all clear.

DDH. EU1.

300ft. Faintly mineralised calcareous siltstone.

This is a fine banded intercalated sequence of thin calcareous siltstone lamellae of 0.3-0.6mm. thickness; and of variable arenaceous calcareous lamellae of similar thickness. The two facies alternate regularly across the rock.

These lamellae contain 1-2% framboidal pyrite of 5-10 microns size most of which show a tendency to concentration in short discontinuous layers. Slightly larger grains of rutile, apatite and

and sphene, totalling together less than 1% of the rock, occur with the framboidal pyrites. There are in addition, sparse grains of graphite, as well as small euhedra of linnaeite, some of which enclose minute chalcopyrite.

An occasional stressed quartz-calcite-sulphide vein of 0.8mm. thickness trends mainly with the bedding planes, crossing at intervals, but only for short distances. The sulphide particles are minute isotropic brown grains of 20-30 microns size: these are considered to be sphalerite.

467ft. Strongly calcareous siltstone.

The only difference between this and the rock above is in the greater proportion and thickness of the essentially calcareous lamellae. By comparison with the core at 300ft., this rock contains slightly greater amounts, but similar relative proportions of framboidal pyrite, rutile, apatite, sphene and graphite. Sparse euhedra of linnaeite were also noted, as in the rock above.

In this example there were no thin mineralising veinlets.

529ft. Faintly mineralised calcareous siltstone.

The same contrasting siltstone and calcareous lamellae are present in this rock, but the individual thicknesses and proportions are much more variable than in the samples above. However, there is no significant facies differences from a practical point of view; and at the same time,

there is little difference in the contents of framboidal pyrite, rutile, leucoxene and graphite.

Three contrasting varieties of microvein structures are present in this rock, viz.: sharply transgressive quartz-calcite veins 0.1mm. thick; slightly transgressive oxidised sulphide veins 0.06mm. thick; and conformable calcite-pyrite veins of 0.1mm. thickness. The sequence of formation of these veins was in the order: calcite-pyrite first; quartz-calcite second; oxidised sulphide third. This is established by the mutual intersections between these veins.

An examination was made of the oxidised sulphide vein in oil immersion at 1250 diameters magnification. This was found to be partly open and leached, and lined on either side by crustiform and microspherulitic clusters of goethite. However, at intervals along the vein, the structure is fully closed by goethite within which there are minute highly corroded grains of a soft white isotropic mineral considered to be the relics of larger galena grains. These relics range in size to a maximum of 0.016mm.

It appears that this vein contained an iron sulphide and galena, and that the iron sulphide was completely oxidised, while some of the galena still remained.

There is no shear, cleavage or bedding structure associated with the trend of this vein. It proceeded irregularly across the rock with parallel matching walls and it would therefore appear that the sulphides simply occupied a fracture. It seems probable that the sulphides were

mobile in the rock, perhaps through metamorphic influence; and that they lodged in open spaces such as fractures. The earlier formed calcite-pyrite vein displays no oxidation, hence it is most likely that the oxidised iron sulphide which was associated with the galena, was pyrrhotite. Pyrrhotite is much more mobile than pyrite, and it is also much more readily prone to oxidation. It is unlikely that there was much time disparity between the formation of the three different veins.

DDH. EU2.

164ft. Mineralised micaceous arenaceous limestone - Cu. Pb. Zn.

This is variably micaceous and arenaceous limestone in which repetitive bedding is manifest in the thin highly micaceous units. Silt-grade quartz is evenly dispersed through the rock except in the highly micaceous lamellae.

The mica provides a cleavage structure which is oriented at about 10° to the bedding planes.

There is only minor framboidal pyrite - much less than in the rocks from DDH. EU1. There is however, somewhat less than 1% minute subhedral pyrite which is generally coarser grained than the usual pyrite framboids. Disseminated rutile, leucoxene, sphene and graphite exist in similar habit and similar amounts to those in EU1 rocks.

The important feature is, that galena, chalcopyrite and sphalerite of less than 8 microns size exist singly, or as inclusions in the fine

subhedral pyrite at distances of up to 10.mm. beyond the vein structure discussed below.

The vein of 3mm. thickness follows neither bedding nor cleavage, but is inclined at 10-20° to these structures. It has matching walls, rather like those of a fracture filling, cf. EU1 - 529ft. The gangue components are quartz and a carbonate of relatively high refractive index, viz. dolomite or magnesite. Galena, chalcopyrite and sphalerite are contained in the vein: galena and sphalerite are the major sulphides with a grain size of up to 1.0mm. Most of the chalcopyrite is enclosed in the sphalerite, although there are several separate larger grains which enclose pyrite.

304ft. Magnesian metasomatism and sulphide segregation in micaceous arenaceous limestone. (Cu-Pb-Zn-Fe-Co-Ni)

The core consists of a micaceous arenaceous limestone similar to that above, with an even distribution of the silt-grade quartz, but with more strongly developed and thicker lamellae of mica. The cleavage is also more strongly developed than at 164ft., and it maintains the same 10° orientation in relation to the bedding planes.

There is again much less framboidal pyrite than in the rocks in EU1. In this rock there is 0.1% disseminated subhedral pyrite, chalcopyrite and sphalerite of less than 20 microns, as well as a little rutile, sphene and graphite. In addition there are significant amounts of segregated sulphides as detailed below.

There are numerous small porphyroblasts (0.3-0.5mm.) of magnesite

in process of development throughout the whole of the core. These represent progressive metamorphism, and the movement of more highly magnesian carbonate to numbers of centres of accumulation and recrystallisation, often around pyrite, or other sulphide grains.

There are no vein structures in this core but it nevertheless displays significant evidence of the incipient accumulation of a series of sulphides, often within, or near to the centres at which the magnesite accumulated. These localised accumulations are as follows, and although rather striking in their paragenesis, the total quantity is less than 1% of the rock bulk.

At wide centres there are euhedra of pyrite of several mm. size, often accompanied by small grains of linnaeite. At closer centres there are in clusters of 1-2mm. dimension, numbers of sulphides which exist individually, or as composite particles of 10-70 microns size. In these clusters the following assemblages were found:-

linnaeite-chalcopryrite; linnaeite-galena; pyrite-galena; chalcopryrite-sphalerite; linnaeite-galena-millerite; linnaeite-galena-chalcopryrite; linnaeite-chalcopryrite-pyrite-sphalerite-galena-pyrrhotite; minute pyrrhotite grains with micron size exsolved pentlandite lamellae.

"Dolomite" - Cairn Hill, west of Eukaby Hill.

Micaceous felspathic quartzite - subgreywacke.

This is not dolomite although it was somewhat clacareous prior to leaching. The main components are evenly granular angular grains of

quartz, plagioclase and micas, with 2-3% intergranular carbonate, and about 10% rhombic limonitic pseudomorphs of former carbonate, possibly siderite.

There is about 1% goethite pseudomorphs of former disseminated pyrite of 0.05-0.15mm. grain size, as well as a little rutile, zircon, ilmenite and graphite.

Unknown rock with mineralisation - Moonta line 400E.

Weakly mineralised silicified biotite microgranodiorite.

The sample is a complex hybrid rock formed by the extensive silicification, weak mineralisation, and alteration of a former biotite microgranodiorite.

As presently constituted, it consists of copious relatively coarse grained oligoclase and lesser finer grained microcline, with abundant biotite and chloritised biotite, all of which are irregularly dispersed through a finer grained quartz-felspathic medium. Numerous quartz veins criss-cross this intergrowth of silica and silicates, but they contain little ore mineral.

Less than 1% pyrite, and much smaller amounts of very fine chalcopyrite are sited randomly in the rock. Very fine grained sphene is abundant and is sited as clusters of numerous granules in the areas of chloritised biotite. Tourmaline crystals exist at random in similar clusters.

Auger cutting - Alford, line 525E X 508N.

meta-microgranodiorite.

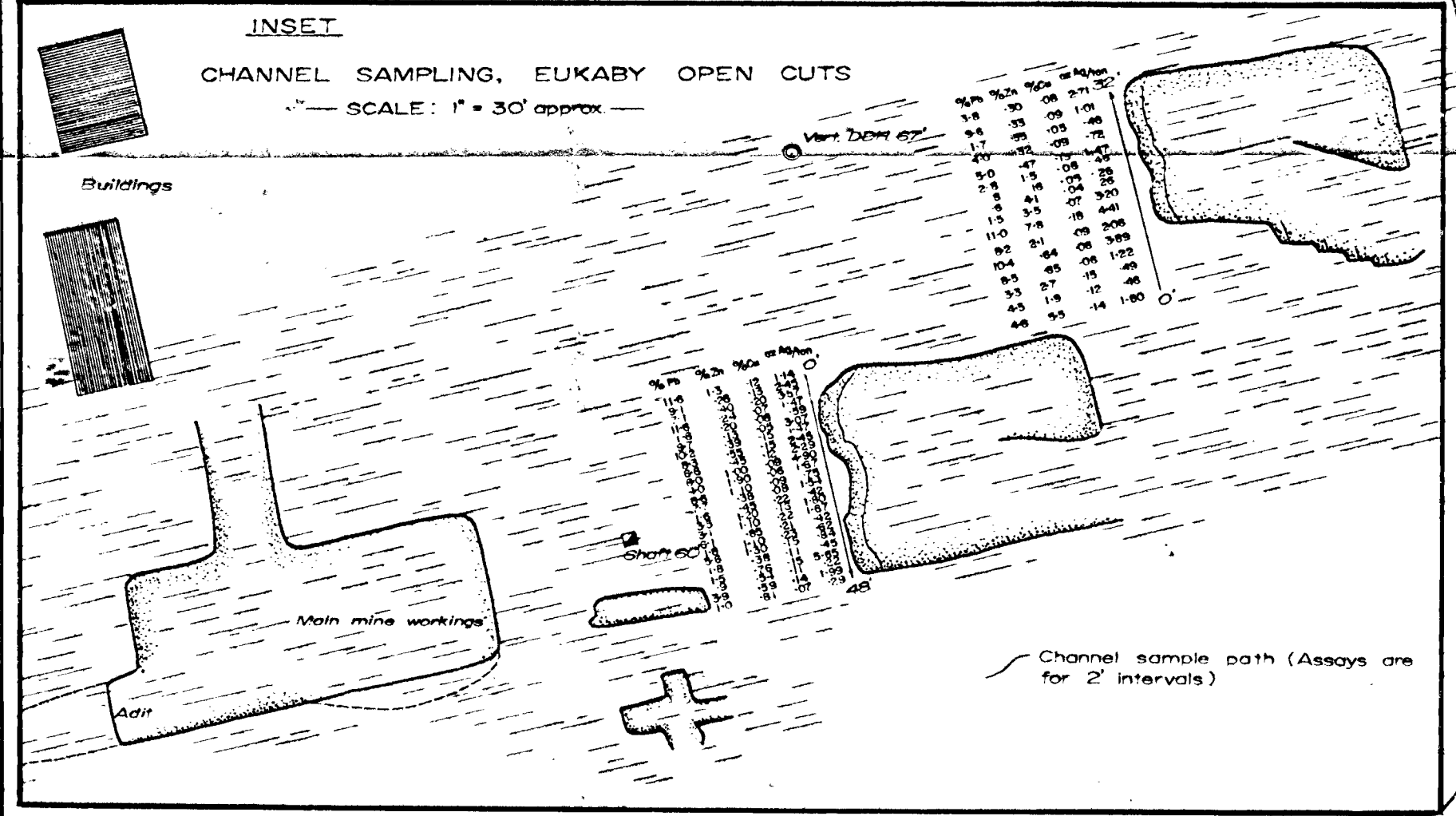
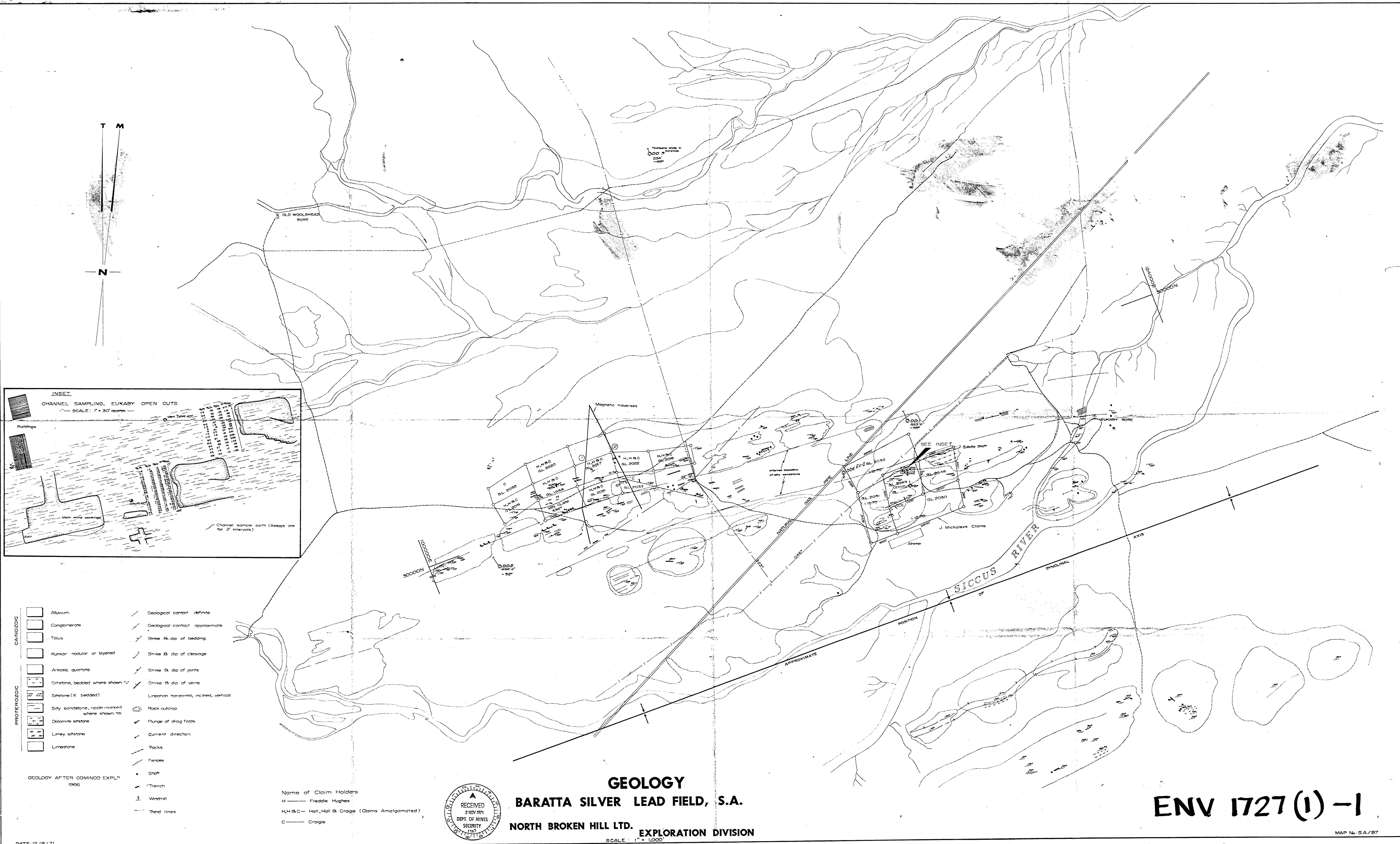
The rock chip consists of a strongly schistose, evenly fine grained aggregate of quartz, plagioclase and biotite, with subordinate orthoclase, muscovite, chlorite and some 10% euhedral martitised magnetite. There are minor amounts of tourmaline, apatite and zircon.

It would appear to be a schistose, meta-biotite-microgranodiorite which contained magnetite as the main accessory mineral.

A.W.G. Whittle

A.W.G Whittle & Associates,
Mineralogical Consultants.

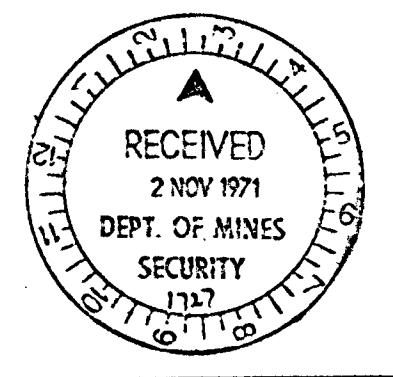
October 17, 1971.



- | | | | | |
|--------------------|--|---|--|--|
| CENOZOIC | | Alluvium | | Geological contact definite |
| | | Conglomerate | | Geological contact approximate |
| | | Talus | | Strike & dip of bedding |
| | | Kunkar nodular or layered | | Strike & dip of cleavage |
| PROTEROZOIC | | Arkosic quartzite | | Strike & dip of joints |
| | | Siltstone, bedded where shown | | Strike & dip of veins |
| | | Siltstone (X bedded) | | Lineation horizontal, inclined, vertical |
| | | Silty sandstone, rock marked where shown as | | Rock outcrop |
| | | Dolomite siltstone | | Plunge of drag folds |
| | | Limey siltstone | | Current direction |
| | | Limestone | | Tracks |
| | | | | Fences |
| | | | | Shaft |
| | | | | Trench |
| | | | | Windmill |
| | | | | Trend lines |

GEOLGY AFTER COMINGO EXPLN 1966

Name of Claim Holders
H — Freddie Hughes
H.H.B.C. — Hall, Hall & Craigie (Claims Amalgamated)
C — Craigie

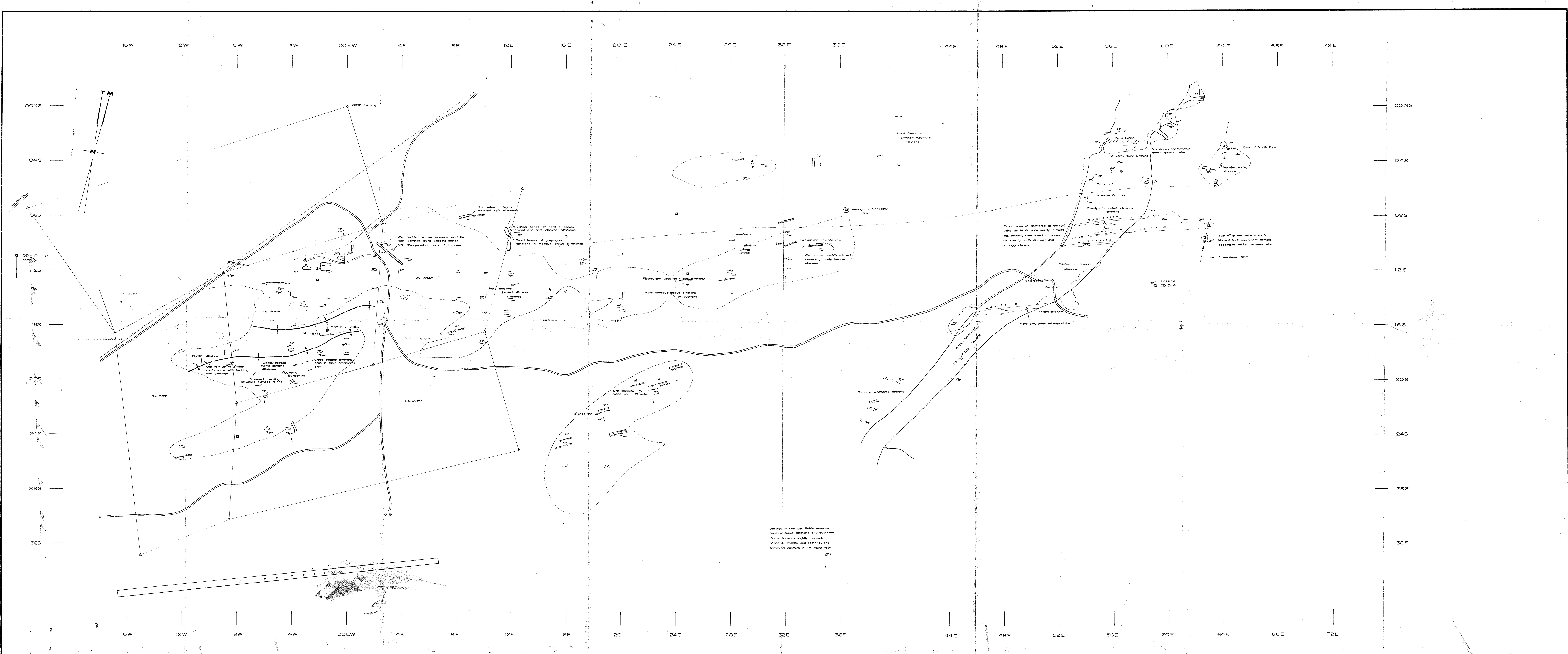


GEOLOGY
BARATTA SILVER LEAD FIELD, S.A.
NORTH BROKEN HILL LTD.
EXPLORATION DIVISION

SCALE 1" = 1,000'

ENV 1727 (1) -1

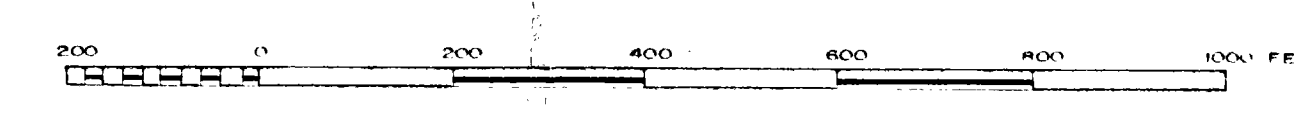
MAP No. SA/B7



GEOLOGY OF EUKABY HILL AREA

EUKABY AREA, S.M.L. 603

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION



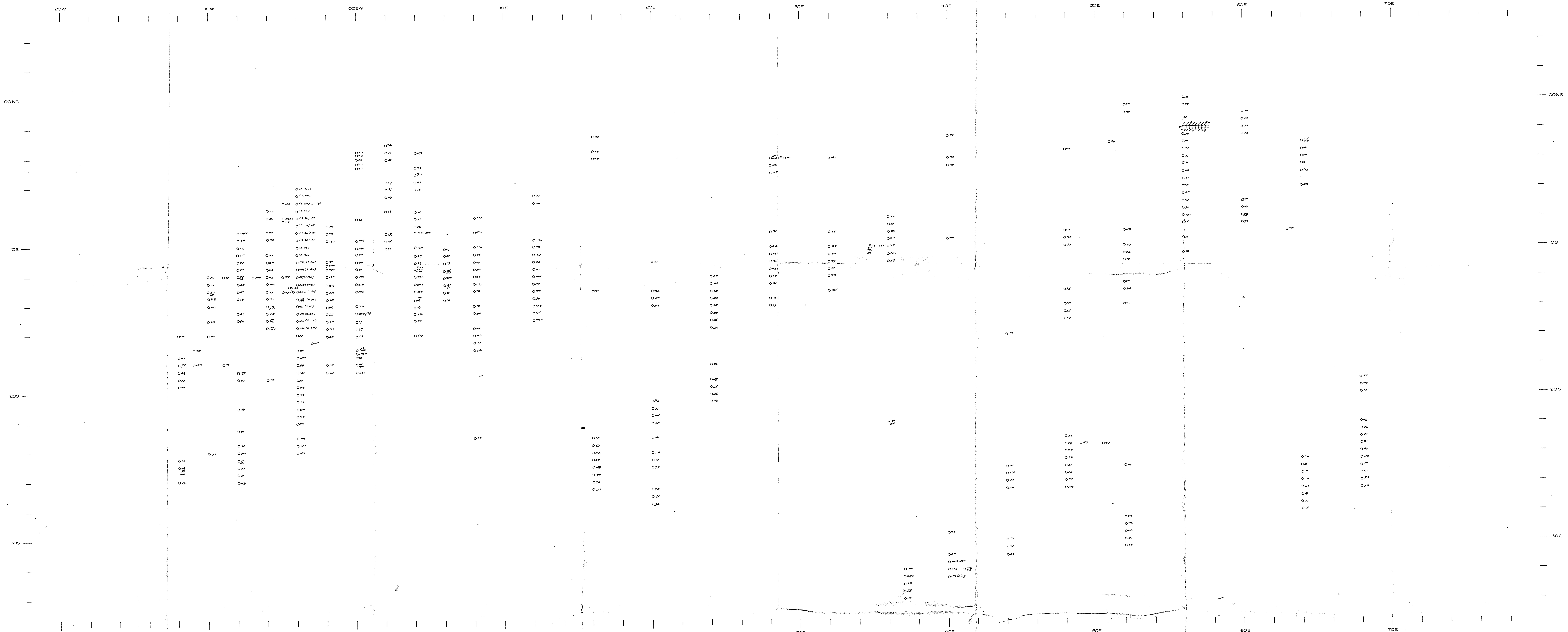
Scale 1" = 200' or 1:2400



LEGEND

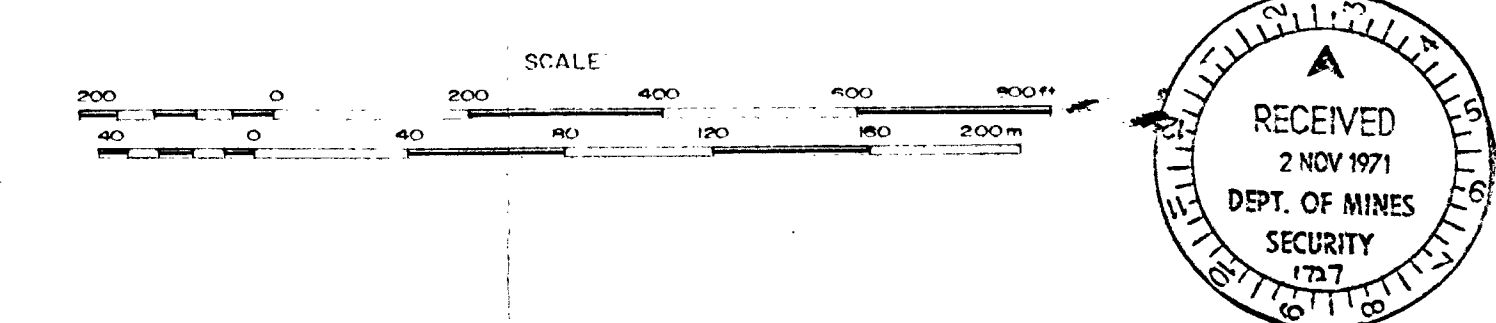
- Track
- Fence
- Building
- Shed
- Quartz vein with dip direction
- Zone of scattered pyrite cubes
- Zone of massive quartz hematite (goss) veins with associated strong cleavage and overturned bedding
- Outcrop of resistant quartz silstone or fine sandstone
- Harder siliceous, more massive and more resistant silstone often closer to quartzites. Usually found forming the crests of hills
- Silstone
- Silstone (Harder)
- Hard grey green microschist
- Lineation
- Axis of syncline
- Axis of anticline
- Bedding, strike and dip, vertical
- Cleavage, strike and dip, vertical
- Fracture, strike and dip, vertical
- Warping
- Grout drill hole
- Diamond drill hole
- Lease boundaries
- Trend-subs outcrop areas
- Lineation

ENV 1727 (1)-2



Cu RESULTS
ROCK CHIP SAMPLING
EUKABY HILL PROSPECT, S.M.L. 603, S.A.

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

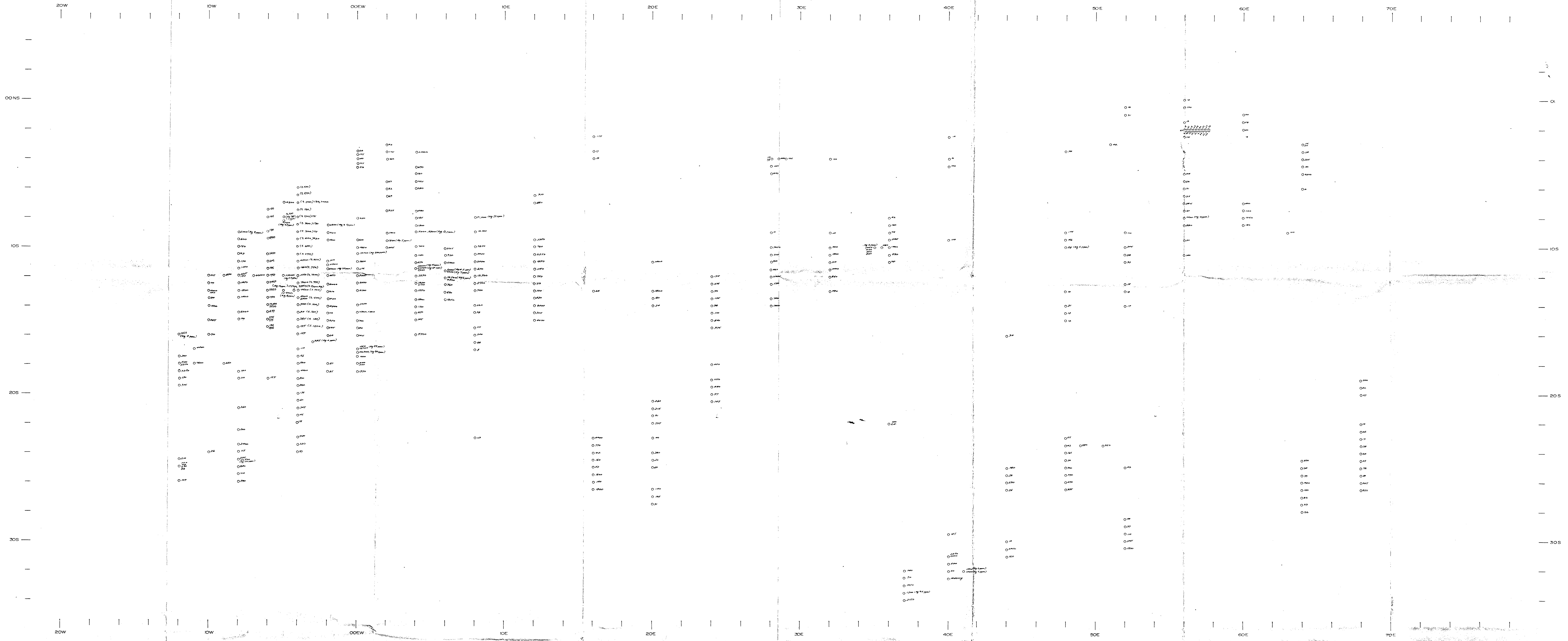


0.14 Rock chip sample location & value
mm Continuous 10' interval chip sampling
in river bed outcrop
0.1400 Soil sample location & value

COLOUR CODE
0 0 - 100
1 100 - 200
2 200 - 300
3 > 300

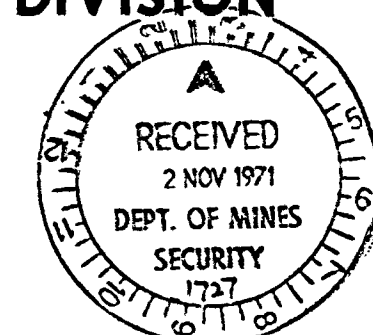
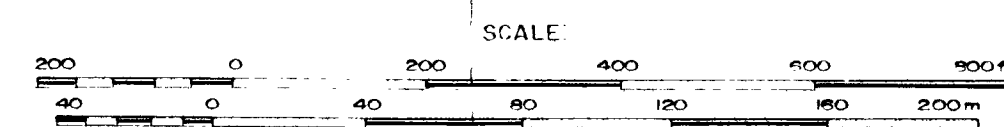
Refer to Geology map, Baratta area, 1:50,000 for location

ENV 1727 (4)-3



Pb RESULTS
ROCK CHIP SAMPLING
EUKABY HILL PROSPECT, S.M.L. 603, S.A.

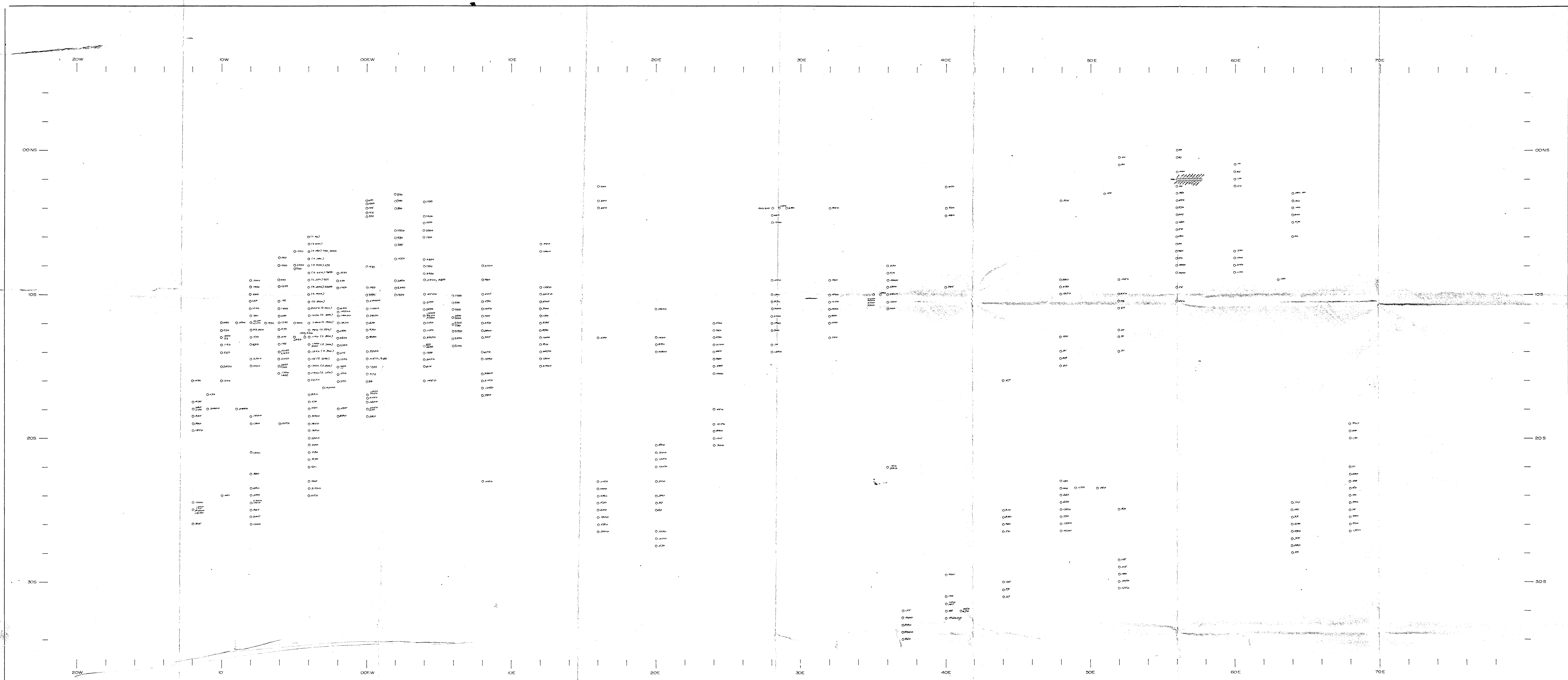
NORTH BROKEN HILL LTD. / EXPLORATION DIVISION



- o Rock chip sample location & value
Continuous interval chip sampling
in river bed outcrop
o Soil sample location & value
- COLOR CODE**
o 0 - 500
o 500 - 1000
o 1000 - 2000
o > 2000

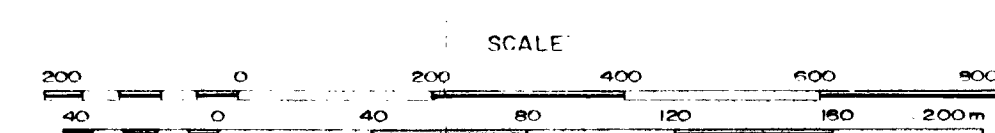
Refer to Geology map, Barossa area, 1:50,000 for location

ENV 1727 (4) - 4



Zn RESULTS
ROCK CHIP SAMPLING
EUKABY HILL PROSPECT, S.M.L. 603, S.A.

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION



○¹⁰ Rock chip sample location & value
Continuous 10' interval chip sampling
in river bed outcrop
○¹⁰⁰⁰ Soil sample location & value

COLOUR CODE

- 0 - 1000
- 1000 - 2000
- 2000 - 3000
- > 3000

Refer to Geology map, Barossa area, 1:50,000 for location

ENV 1727 (1) - 5

Map no. S.A. / B12b

CORE ASSAY
HISTOGRAM

DDH EU-1

Pb
1' = 1%

55.9 % Pb, 17.02 Ag, 10.2wt Au, 50.5 % Pb, 14.02 Ag, 4.22 wt Au

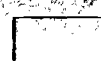
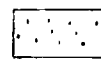
EUV PIT EU PIT

S

N

End of hole 826'

LEGEND

-  Siltstone
-  Pyrite
-  Lode Veins

DDH EU-1

EUKABY SILVER LEAD FIELD, S.A.

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

ENV 1727(1) -6



NB-SECTION LOOKS 240° MAG

ROCK CHIP SAMPLES HISTOGRAM



LEGEND

- Siltstone
- Pyrite
- Lode Veins

DDH EU-2

EUKABY SILVER LEAD FIELD, S.A.

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

ENV 1727 (1) -7



NB-SECTION LOOKS 243° MAG

III

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

0078
576 ST. KILDA ROAD, MELBOURNE, VIC. 3004

TELEPHONE: 51 6871

TELEGRAPHIC ADDRESS: "NORBROEX" MELBOURNE

SPECIAL MINING LEASE 603

REPORT FOR QUARTER ENDED 21ST JANUARY, 1972



SUMMARY

Two further diamond drill holes were completed. They tested the westerly strike and plunge extension of mineralization seen in pits and costeans at Eukaby Mines. Both intersected interesting, though sub-economic, quartz-calcite vein systems carrying galena, sphalerite and minor chalcopyrite.

More detailed geological mapping on a scale of 1" to 50' of the Eukaby Mines area confirmed the view that the mineralization is largely confined to minor fold structures. The parasitic nature of the fold structures is now in doubt.

Four hundred and eighty one (481) bedrock geochemical chip samples and costean chip-channel samples were collected and analysed.

DIAMOND DRILLING

Diamond drill hole D.D.EU3 commenced on the 16th October and was completed on 4th November at 642'4". It was sited at grid co-ordinates 20W 11S depressed at 50° with an azimuth of 165°.

It had been proposed that the mineralization seen in pits and costeans at the Eukaby Mines was structurally controlled. The most intensely quartz-calcite-sulphide veined rocks occurred in the cores of parasitic folds on the limb of the major syncline. The major syncline and associated minor folds were thought to plunge at a low angle to the west. D.D.EU3 was sited 1900' west of the Mines area and was planned to intersect the strike and plunge extension of this structure.

The hole was drilled in a closely bedded calcareous siltstone of the same type as that encountered in D.D.EU1 at Eukaby Mines and D.D.EU2 at the Crusader Mines. A mineralized zone was intersected from 370' to 450'.

The lead-zinc mineralization was confined to veins with a quartz-calcite gangue. The sulphide bearing veins were invariably conformable, or almost conformable, to the bedding. A second set of barren quartz veins sharply transgressive to the bedding could be distinguished. The core to bedding angles in the mineralized zone differed significantly to those in the sections. Assay results are enclosed.

This intersection, although sub-economic, was encouraging as it did appear to represent the strike extension of mineralization seen at Eukaby Mines. Drill hole D.D.EU4 was therefore sited to intersect the same lode system 1000' west of D.D.EU3.

D.D.EU4 was commenced on 11th November and completed on 2nd December at 901'. It was sited at grid co-ordinates 30W 19S depressed at 62° with an azimuth of 345°. The rock type was identical to that encountered in each of the three previous diamond drill holes, i.e. a grey, closely bedded calcareous siltstone. Two zones of quartz-calcite veining with associated lead and zinc sulphides were intersected, both coinciding with anomalous core to bedding angles. The second, most economically interesting zone occurred from 660' to 706' (see enclosed assay results). This intersection was similar to that seen in D.D.EU3 and is thought to represent the strike extension of the same vein system.

It would appear that this lode system, whilst being remarkably continuous, does not have the potential of becoming an economic mining proposition. Drilling operations have been suspended whilst alternative prospecting methods and types of ore target are considered.

GEOCHEMISTRY

Four hundred and eighty one (481) bedrock geochemical chip samples and costean chip-channel samples were collected during the period.

Previously, all outcrop in the Eukaby Hill area had been chip sampled at 50' intervals along lines 400' apart. During this period fill-in sampling around the Eukaby Mines area was completed at 25' intervals along lines 200' apart. Sampling was extended beyond the area of outcrop by hand augering and digging where alluvial cover was less than 3' deep. In addition, nearby trenches and costeans were chip channel sampled (see enclosed plan No. SA/B14).

An attempt was made to obtain bedrock geochemical information on the largely alluvium covered area to the west and north of Eukaby Mines. Lines 32W, 44W, 54W and 68W were sampled at 50' intervals. Only areas of shallow cover, where bedrock was less than 3' beneath surface, could be sampled. This resulted in limited coverage of the area. Results that were obtained were low giving no indication of mineralization in these areas.

The possibility and feasibility of using soil geochemistry and bio-geochemistry as prospecting tools in the alluvium covered areas of the S.M.L., is presently being investigated.

GEOLOGY

Geological mapping on a scale of 1" to 50' was carried out in the Eukaby Mines Area. More conclusive evidence for the predominantly structural control of mineralization in the area was formed. Most known occurrences of sulphide bearing veins can be correlated with minor fold structures. The parasitic nature of these folds as originally proposed is now in doubt.

The vein systems, of which there appear to be many, strike parallel to the host rock and are usually associated with steepening of, or slight overturning of, bedding. They are also associated with the imposition of schistosity to the rock. These zones may be regarded as being zones of East-West faulting or thrusting rather than simple parasitic monoclinial folds.



A.G. KING
Geologist.

AGK:jac

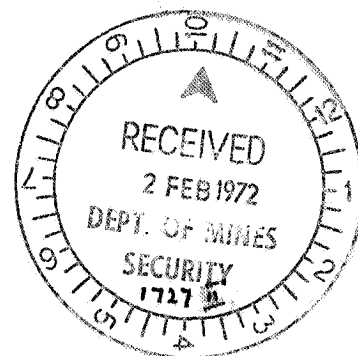
LIST OF ATTACHMENTS

1. Statement of Expenditure
2. Diamond Drill Logs and Assays for
D.D.H.EU3 and EU4.
3. Plans:
 - Total Pb & Zn rock chip results SA/312 1" = 200'
 - D.D.H.EU1 SA/B17 1" = 100'
 - D.D.H.EU2 SA/B9 1" = 100'
 - D.D.H.EU3 SA/B11 1" = 100'
 - D.D.H.EU4 SA/B15 1" = 100'
 - Geology of Eukaby Hill Area SA/B10 1" = 200'
 - Channel Sampling, Locations & Results SA/B14 1" = 50'
 - Detailed Geology SA/B16 1" = 50'
 - Detailed Geology of the Cross Crusader Workings
SA/B13 1" = 200'
 - I.P. & Geology Plan SA/B7 1" = 1000'

0082

EU 3 D.D.C. SPLITS

Sample No.	From	To	Depth	%Cu	%Pb	%Zn	Ag (ppm)
AA059946	533'	538'	5'	.005	.010	.035	2.0
47	538'	543'	5'	.005	.030	.050	"
48	543'	548'	5'	.005	.035	.070	"
49	548'	553'	5'	.005	.005	.025	"
50	553'	558'	5'	.005	.005	.020	"
51	558'	563'	5'	.005	.010	.020	"
52	563'	568'	5'	.005	.005	.010	"
53	568'	573'	5'	.005	.010	.040	"
54	573'	578'	5'	.005	.005	.010	"
55	578'	583'	5'	.005	.005	.005	"
56	583'	588'	5'	.005	.005	.005	"
57	588'	593'	5'	.005	.005	.015	"
58	593'	598'	5'	.005	.020	.020	"
59	598'	603'	5'	.005	.005	.010	"
AA059960	603'	608'	5'	.005	.015	.025	"
61	608'	613'	5'	.005	.005	.010	"
62	613'	618'	5'	.010	.260	.160	"
63	618'	623'	5'	.005	.015	.030	"
64	623'	628'	5'	.010	.025	.495	"
65	628'	633'	5'	.005	.035	.035	"
66	633'	638'	5'	.005	.080	.030	"
67	638'	643'	5'	.025	.300	.170	"
68	643'	648'	5'	.005	.005	.015	"
69	648'	653'	5'	.005	.005	.005	"
70	653'	658'	5'	.075	.080	.140	"
71	658'	662' 9" 4' 9"		.005	.005	.005	"



DIAMOND DRILL CORE

<u>Sample No.</u>	<u>From</u>	<u>To</u>	<u>Depth</u>	<u>%Cu</u>	<u>%Pb</u>	<u>%Zn</u>	<u>Ag (ppm)</u>
AA059804	281'	286'	5'	.005	.410	.240	2.0
05	286'	291'	5'	.005	.005	.015	2.0
06	291'	296'	5'	.010	.005	.010	2.0
07	296'	301'	5'	.005	.015	.055	2.0
08	301'	306'	5'	.005	.120	.105	2.0
09	306'	311'	5'	.005	.020	.040	2.0
10	311'	316'	5'	.005	.015	.035	2.0
11	316'	321'	5'	.005	.015	.025	2.0
12	321'	326'	5'	.005	.005	.020	2.0
13	326'	331'	5'	.005	.005	.005	2.0
14	331'	336'	5'	.010	.020	.125	2.0
15	336'	341'	5'	.005	.005	.015	2.0
16	341'	346'	5'	.005	.010	.015	2.0
17	346'	351'	5'	.005	.005	.020	2.0
18	351'	356'	5'	.005	.010	.080	2.0
19	356'	361'	5'	.010	.010	.005	2.0
AA059820	361'	366'	5'	.010	.095	.280	2.0
21	366'	371'	5'	.010	.055	.380	2.0
22	371'	376'	5'	.020	.035	1.200	2.0
23	376'	381'	5'	.010	.010	.025	2.0
24	381'	386'	5'	.005	.035	.445	68
25	386'	391'	5'	.020	6.250	3.200	2.0
26	391'	396'	5'	.015	.045	.465	2.0
27	396'	401'	5'	.010	.165	.500	2.0
28	401'	405'	5'	.005	.005	.005	2.0
29	406'	411'	5'	.005	1.200	.010	8
30	411'	416'	5'	.040	.550	.925	2.0
31	416'	421'	5'	.040	.250	.115	2.0
32	421'	426'	5'	.005	.205	.060	2.0
33	426'	431'	5'	.005	.040	.305	2.0
34	431'	436'	5'	.005	.250	1.025	2.0
35	436'	441'	5'	.025	3.950	3.450	40
36	441'	446'	5'	.015	1.400	1.500	10
37	446'	451'	5'	.005	.045	.060	2.0
38	451'	456'	5'	.005	.020	.030	2.0
39	456'	461'	5'	.005	.100	.080	2.0
AA059840	461'	466'	5'	.005	.035	.110	2.0
41	466'	471'	5'	.005	.010	.015	2.0
42	471'	476'	5'	.005	.210	.230	2.0
43	476'	481'	5'	.005	.005	.040	2.0
44	481'	483'6"	2'6"	.005	.005	.015	2.0

EU DDH NO. 3

BARATTA SCAN

0084

Sample No.	From	To	Depth	Cu(ppm)	Pb(ppm)	Zn(ppm)	Ag(ppm)
054708	70'	75'	5'	53	170	250	1.0
09	75'	80'	5'	25	40	140	"
10	80'	85'	5'	120	820	680	"
11	85'	90'	5'	16	39	110	0.5
12	90'	95'	5'	33	17	115	"
13	95'	100'	5'	20	19	38	"
14	100'	105'	5'	90	175	37	1.0
15	105'	110'	5'	29	19	115	1.0
16	110'	115'	5'	29	185	750	1.0
17	115'	120'	5'	18	710	1350	1.0
18	120'	125'	5'	140	1850	12000	10.5
19	125'	130'	5'	44	385	1650	1.5
054720	130'	135'	5'	42	30	160	0.5
21	135'	140'	5'	41	63	120	1.0
22	140'	145'	5'	49	34	150	0.5
23	145'	150'	5'	47	29	140	0.5
24	150'	155'	5'	53	75	255	1.0
25	155'	160'	5'	49	195	245	1.0
26	160'	165'	5'	52	1200	1250	1.5
27	165'	170'	5'	76	2200	1250	1.0
28	170'	175'	5'	44	530	660	0.5
29	175'	180'	5'	82	57	240	1.0
054730	180'	185'	5'	79	125	360	0.5
31	185'	190'	5'	105	110	275	1.0
32	190'	195'	5'	135	20	48	0.5
33	195'	200'	5'	105	17	40	0.5
34	200'	205'	5'	195	70	235	1.0
35	205'	210'	5'	250	17	39	1.0
36	210'	215'	5'	160	13	41	0.5
37	215'	220'	5'	165	51	85	1.0
38	220'	225'	5'	180	16	36	0.5
39	225'	230'	5'	195	10	27	0.5
054740	230'	235'	5'	215	12	26	1.0
41	235'	240'	5'	175	49	920	1.0
42	240'	245'	5'	200	13	54	1.0
43	245'	250'	5'	175	17	45	0.5
44	250'	255'	5'	170	22	37	1.0
45	255'	260'	5'	255	30	76	1.0
46	260'	265'	5'	180	88	980	1.0
47	265'	270'	5'	160	1850	320	2.5
48	270'	275'	5'	75	840	99	1.5
49	275'	281'	6'	51	19	50	0.5

0085

D.D.H. NO. EU4

BARATTA

Sample No.	From	To	Depth	%Cu	%Pb	%Zn	Ag (ppm)
AA060075	41'	46'	5'	.005	.005	.025	2.0
76	46'	51'	5'	.005	.005	.010	"
77	51'	56'	5'	.005	.010	.025	"
78	56'	61'	5'	.005	.045	.035	"
79	61'	66'	5'	.005	.080	.145	"
80	66'	71'	5'	.005	.005	.015	"
81	71'	76'	5'	.005	.005	.020	"
82	76'	81'	5'	.005	.005	.060	"
83	81'	86'	5'	.005	.010	.025	"
84	86'	91'	5'	.005	.010	.040	"
85	91'	96'	5'	.010	.275	.750	"
86	96'	101'	5'	.010	.200	.725	"
87	101'	106'	5'	.010	.200	.525	"
88	106'	111'	5'	.040	.445	1.400	"
89	111'	116'	5'	.010	.275	2.000	"
AA060090	116'	121'	5'	.060	1.200	3.250	6.0
91	121'	126'	5'	.010	.325	.065	2.0
92	126'	131'	5'	.025	2.300	.550	10.0
93	131'	136'	5'	.050	.365	.340	2.0
94	136'	141'	5'	.010	.070	.085	"
95	141'	146'	5'	.005	.045	.075	"
96	146'	151'	5'	.005	.020	.085	"
97	151'	156'	5'	.005	.650	.155	"
98	156'	161'	5'	.005	.010	.055	"
99	161'	166'	5'	.005	.020	.075	"
100	166'	171'	5'	.005	.030	.090	"
01	171	175' 6"	4' 6"	.005	.020	.050	"
AA060145	290'	295'	5'	.005	.040	.110	"
46	295'	300'	5'	.005	.015	.040	"
47	300'	305'	5'	.005	.025	.060	"
48	305'	310'	5'	.005	.025	.065	"
49	310'	315'	5'	.005	.040	.070	"
AA060150	315'	320'	5'	.005	.045	1.600	"
51	365'	370'	5'	.005	.005	.045	"
52	370'	375'	5'	.005	.005	.025	"
53	375'	380'	5'	.005	.005	.015	"
54	380'	385'	5'	.005	.130	.235	"
55	385'	390'	5'	.005	.100	.095	"
56	390'	395'	5'	.005	.015	.045	"
57	395'	400'	5'	.005	.020	.070	"
58	400'	405'	5'	.005	.020	.020	"
AA060102	410'	415'	5'	.005	.040	.055	"
03	415'	420'	5'	.005	.050	.045	"
04	420'	425'	5'	.005	.225	.025	"
05	425'	430'	5'	.005	.015	.030	"
06	430'	435'	5'	.005	.010	.035	"
07	435'	440'	5'	.005	.005	.035	"

0086

Sample No.	From	To	Depth	%Cu	%Pb	%Zn	Ag (ppm)
AA060108	440'	445'	5'	.005	.030	.065	2.0
09	445'	450'	5'	.005	.375	.550	"
10	450'	455'	5'	.010	.060	1.400	"
11	455'	460'	5'	.005	.045	.205	"
12	460'	465'	5'	.700	.060	.230	"
13	465'	470'	5'	.075	.005	.015	"
14	470'	475'	5'	.005	.010	.020	"
15	475'	480'	5'	.005	.005	.010	"
16	480'	485'	5'	.005	.015	.095	"
17	485'	490'	5'	.010	.030	.260	"
18	490'	495'	5'	.015	.215	2.650	"
19	495'	500'	5'	.010	.015	.075	"
20	500'	505'	5'	.005	.015	.015	"
AA060159	550'	555'	5'	.005	.005	.010	"
60	555'	560'	5'	.005	.015	.030	"
61	560'	565'	5'	.005	.010	.015	"
AA060121	628'	633'	5'	<.01	<.01	<.01	< 1
22	633'	638'	5'	<.01	.01	.02	< 1
23	638'	643'	5'	<.01	.03	.02	< 1
24	643'	648'	5'	.01	.04	.02	< 1
25	648'	653'	5'	<.01	.16	.02	< 1
26	653'	658'	5'	.01	.05	.12	< 1
27	658'	663'	5'	.04	2.34	.57	21
28	663'	668'	5'	.02	.07	.05	< 1
29	668'	673'	5'	.05	1.11	1.15	8
30	673'	678'	5'	.07	1.23	4.88	10
31	678'	683'	5'	.21	7.33	6.50	73
32	683'	688'	5'	.04	.91	1.94	7
33	688'	693'	5'	.02	.58	.23	1
34	693'	698'	5'	.07	1.25	1.65	14
35	698'	703'	5'	.18	3.54	2.79	37
36	703'	708'	5'	.11	2.72	.10	27
37	708'	713'	5'	<.01	.08	.03	< 1
38	713'	718'	5'	<.01	.01	.03	< 1
39	718'	723'	5'	<.01	.03	.07	< 1
40	723'	728'	5'	.005	.025	.035	2.0
41	728'	733'	5'	.015	.005	.020	"
42	733'	738'	5'	.005	.015	.060	"
43	738'	743'	5'	.005	.130	.125	"
44	743'	478'	5'	.015	.080	.085	"

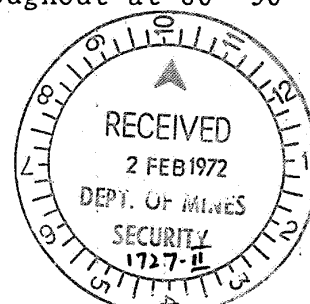
0087

STATE SOUTH AUSTRALIA AREA EUKABY - BARATTA

GRID EUKABY CO-ORDS 20W, 11S

R.L. BEARING (Mag) 165° DIP 50°

From'	To'	Recovery	CORE DESCRIPTION	C. to B. Angle
0'	70'		No core	
70'	124'		Pale brown oxidised closely bedded slightly calcareous siltstone. Bedding slightly wavy and lenticular consisting of brown/grey and white (more calcareous) bands up to 2 mm thick. Veining is both conformable and transgressive. Thin (mainly less than .2") quartz siderite veins occur mainly conformable to bedding. Thin calcite-quartz-siderite veins occur both conformable and transgressive to bedding. In addition irregular quartz blebs or veins occur after containing oriented zenoliths of host rock (suggesting replacement?). A vague cross cleavage is visible - may be crenulation cleavage - at 90°-80° to core. This cleavage disturbs veining where they intersect. However, it is difficult to tell whether the veining is post of pre cleavage. Transgressive veining is at 40° to core.	15°
124'	142'		Fresh grey rock with wavy lenticular bedding. Probably a calcareous siltstone with thin alternating bands of white calcareous material (limestone facies) and dark grey siltstone lamellar. Only very minor visible veining present in the form of thin (less than 2 mm) conformable barren calcite veining.	20°
142'	187'		Oxidised closely bedded calcareous siltstone as for 7'-124'. Veining consists of very rare, minor, barren conformable calcite.	20°
187'	236'		Fresh, grey, calcareous siltstone as for 124-142' with <u>very</u> minor veining.	25°
236'	240'		Siltstone as above but more intensely veined. Veins are very thin stringers (less than 2 mm) conformable with bedding. Consist of calcite with minor blebs of galena, sphalerite and very minor pyrite (?chalcopryite).	26°
240	370'		Barren, fresh, grey, calcareous, bedded, siltstone as for 124'-142'. Crenulation cleavage present throughout at 80°-90° to core.	25°-30°



STATE..... AREA..... 0088

GRID..... CO-ORDS.....

R.L..... BEARING (Mag)..... DIP.....

From'	To'	Recovery	CORE DESCRIPTION	C. to B. Angles°	
370'	450'		Main mineralized zone. Rock type is same as above. Core banding changes in this zone suggesting structural control of veining (probably a monocline is present). Veining is mainly conformable with bedding though small minor stringer from main veins do transgress bedding at random. All veins consist of quartz and calcite in structureless masses. Vein walls are sharp. Only one set of veining is visible evenly dispersed throughout the zone - on average one vein every 1½"-1" along core. Many carry irregular blebs of galena and sphalerite. Overall proportion of galena sphalerite (visual estimate) is 3:2. Most veins carry small quantities of both mineral, also minor pyrite and chalcopryrite. A few veins are larger, consisting of quartz calcite veins up to 1" across or irregular which may or may not be conformable. At 411' the core banding reaches 90° in a small zone of intense veining - this may represent the centre of the fold as it is at the mid-point of the mineralized zone - but is more likely to represent disturbance of bedding in a particularly well mineralized section. Crenulation cleavage at approximately 90° to core is present through out.	370'	40°
				381'	45°
				386'	60°
				391'	55°
				395'	60°
				405'	40°
				413'	78°
				422'	50°
				431'	45°
				452'	35°
				458'	20°
450	545'		Relatively mineralized closely bedded grey calcareous siltstone. Veins are thin, mainly calcite, and conformable. Most are barren of sulphide. 490' thin, slightly transgressive barren quartz/calcite vein. 493'6" thin transgressive barren quartz/calcite vein at 40° to core. 493'6" to 494'6" very thin hairline fractures run along the core - at approx. 2°-5° to core. 533'. A good example of a conformable calcite/quartz vein cut by crenulation cleavage. Where cleavage cuts vein the vein is folded. This vein carries a small bleb of galena and ?Sphalerite. In a small adjacent vein a galena bleb occurs at the point of intersection of cleavage and vein.	482'	30°
				520'	35°
				540'	32°

STATE..... AREA.....

0089

GRID..... CO-ORDS.....

R.L..... BEARING (Mag)..... DIP.....

From'	To'	Recovery	CORE DESCRIPTION	C. to B. Angle
450'	545'	cont.	542'8" - 545'. A quartz-calcite-limonite- ?sphalerite mass occurs. It is probably basically transgressive with conformable attached stringers. Core very broken.	546' 1 553' 1
545'	620'		No significant veining. Very minor limonite and pyrite occurs on fracture surfaces which follow bedding planes.	600' 2
620'	681'		As above, but a few small minor conformable quartz-calcite veinlets occur with minor galena and ?sphalerite mineralization. Rock type as before, core banding constant.	26°
			END OF HOLE.	
			<u>Dip Surveys</u> (etch tube)	
			340': 39°	
			611': 34°	

STATE SOUTH AUSTRALIA AREA BARATTA

GRID EUKABY CO-ORDS. 30W 19S

0090

R.L. BEARING (Mag) 345° DIP 62°

From'	To'	Recovery	CORE DESCRIPTION	C. to B. Angles
41'	92'	Full	Pale brown oxidised closely banded silt-stones with very minor veining. No visible sulphides present. At 80' a single qtz/calcite veinlet occurs at 5° to the core and another at 45° to the core. Other very minor veinlets present in this section are conformable to bedding.	60' 70° 80' 66°
92'	147'		Zone of intense qtz/calcite veining. Three types of veins are present: (a) conformable veins up to 1/2" wide carrying lead, zinc and minor pyrite and chalcopyrite. (b) small veinlets up to 1/4" wide but usually 1/10" wide. These are irregularly transgressive, carry minor sulphides and are sometimes seen to be attached to "(a)" type veins i.e. these are apophyses to the main veins. (c) fairly rare unmineralised qtz/calcite veins at 70° -75° to core (transgressive) but striking with the bedding. From 110' to 124' veining is extremely intense, veins are very thin but concentrated, bedding is flat. A prominent set of fractures (or a cleavage) occurs at 30° to the core, approx. at right angles to the core banding. These 'fractures' may be termed micro-faults as small displacements of up to 1/10", of veinlets and bedding, can be seen along them. The rock type is as above- partly oxidised and partly fresh grey siltstone. The silt stone is identical (to the naked eye) to that encountered in D.D.H's EU1, 2 and 3.	100' 50° 116' 0° 120' 40° 140' 70°
147'	422'		Fresh grey closely bedded siltstones slightly calcareous, with occasional brownish oxidised bands. Veining is rare. 2 main sets of veins are distinguishable. (a) thin veinlets up to 1/4" wide conformable to banding carrying occasional, very rare, small blebs of galena and sphalerite. (b) thin veinlets 1/4" wide at 30° to core. These may be micro faults as they displace bedding slightly. They also cut and displace (a) type veins? A cleavage is visible throughout at 0-5° to core. From 227' 6"-228': grey clay. The last zone of oxidised siltstone occurs at 295'.	160' 65° 180' 70° 205' 67° 220' 65° 240' 65° 260' 65°

Page 2.

STATE..... AREA.....

GRID..... CO-ORDS.....

R.L..... BEARING (Mag)..... DIP.....

0091

From'	To'	Recovery	CORE DESCRIPTION	C. to B. Angles°
			At 319' a 1-1/2" conformable sphalerite vein occurs, with very minor quartz.	280'70°
			At 319'4" a 1" qtz/calcite vein with no sulphide occurs.	300'70°
				320'70°
			From 373'-379' the crenulation cleavage is relatively prominent at 0°-10° to the core.	340'70°
				360'70°
				380'73°
422'	495'	Full	Zone of intense transgressive quartz veining. The dominant type of vein is transgressive qtz-siderite veins up to 1/2" thick with only very minor sulphide. The relative scarcity of Pb Zn and Py is characteristic of these transgressive veins. Veins are at 0°-5° to core.	400'75°
			A second set of conformable veining is also present, but these are rare. It is only the conformable veins which carry galena, sphalerite and pyrite. These are qtz-calcite veins.	420'70°
			The transgressive veins cut and displace the earlier, conformable veins.	460'74°
			From 461'6"-462'6" the rock is brecciated and consists of disoriented xenoliths of siltstone in quartz (with one chalcopyrite bleb and minor pyrite).	480'72°
			Similar brecciated zones occur at 484'-488' and 492'-495'.	500'77°
			NOTE: No significant change in core banding seen in this mineralised zone.	
495'	634'	"	Grey, closely bedded, typical siltstone with very minor conformable veinlets with no sulphide mineralisation.	520'74°
				630'80°
634'	642'	"	Rock type as above but moderately intense qtz/calcite conformable veining and some brecciation of host rock? No visible sulphide mineralisation.	
				650'80°
642'	660'	Good	As for 495'-634'.	
660'	706'	"	Main mineralised zone. Host rock as before. Veins fall into two groups: (a) conformable veins with sulphides-these are quartz/calcite veins. (b) barren transgressive veins- these are mainly quartz and are at 0°-5° to the core.	673'45°
				687'45°
				703'40°
			The conformable veins are the most important type. They vary in width up to 1-1/2". They carry blebs of galena and sphalerite in approximately equal quantities with minor pyrite and chalcopyrite.	708'80°
706'	901'2"	Good.	Normal closely bedded calcareous siltstone with scattered veining. Veins are mainly transgressive being 5°-20° to the core	300'85°

Page 3.

STATE..... AREA.....

0092

GRID..... CO-ORDS.....

R.L..... BEARING (Mag)..... DIP.....

From'	To'	Recovery	CORE DESCRIPTION	C. to B. Angles
			They are barren. Minor conformable veins also occur with small blebs of galena, sphalerite and pyrite.	
			748'-753' - 8 transgressive veinlets at 18° to the core occur. They are barren qtz.-calcite.	
			779' - a 1/4" conformable qtz/calcite vein bearing minor sphalerite.	
			781'-791' - slightly broken zone due to fracture at 30° to the core.	840'88
			805' - an irregular fracture at 30°-45° to the core with minor pyrite coating the surface and finely disseminated in the siltstone.	
			857' - 2 thin qtz/calcite veins with minor galena and sphalerite. Veins are conformable 1/8" wide and 1/2" wide.	860'88
			Conformable barren qtz/calcite veinlets occur at: 869' 872' 873' 877'..	
			888' - 4 thin transgressive veinlets occur at 20° to the core.	901'86
			END OF HOLE 901'2".	

DETAILED VEIN LOG OF D.D.EU4

0093

ABBREVIATIONS USED:

Qtz.	Quartz
Ga	Galena
Sp	Sphalerite
Cp	Chalcopyrite
T	Transgressive to bedding
Comf	Conformable to bedding

From Vein Log:

Main mineralized zone 648' to 713' (visual estimate)

<u>Depth</u>	<u>Pb</u>	<u>Zn</u>
648' to 653'	0.4%	0.1%
653' to 658'	0.2%	0.2%
658' to 663'	2.5%	0.2%
663' to 668'	-	-
668' to 673'	1.3%	0.4%
673' to 678'	3.3%	7.1%
678' to 683'	5.8%	3.4%
683' to 688'	1.3%	2.5%
688' to 693'	1.1%	0.7T
693' to 698'	1.1%	-
698' to 703'	4.6%	2.9%
703' to 708'	0.8%	-
708/ to 713'	-	0.4%

658' to 703' = 45' @ 2.3% Pb; 1.9% Zn
 673' to 683' = 10' @ 4.5% Pb; 5.2% Zn

VEIN LOG, D.D. EU4

by A.G. KING

See Code for abbreviations

Footage	No. of Veins	Total Width of veins (")	Minerals: Order of Abundance	Ores (Sulphides): Order of Abundance	Attitude of Veins: With respect to Banding
41' - 46'	0	-	-	-	-
46' - 51'	2	2-1/4"	Qtz. Siderite	-	T. at 70°
51' - 56'	0	-	-	-	-
56' - 61'	0	-	-	-	-
61' - 66'	1	1/8"	Qtz	-	T. at 70°
66' - 71'	0	-	-	-	-
71' - 76'	0	-	-	-	-
76' - 81'	1	1/16"	Qtz. Calcite Siderite	-	T. at 90°
81' - 86'	4	1/4"	Qtz. Siderite	-	1 T at 90°
86' - 91'	4	1/4"	" "	-	3 Conf.
91' - 96'	28	7"	" "	-	Conf.
96' - 101'	40	6"	" "	-	Conf. and irregular
101' - 106'	26	4"	" "	-	Conf. & minor T. at 70°
106' - 111'	24	3"	" "	-	Conf.
111' - 116'	28	4-1/2"	" "	-	Conf. minor irregular
116' - 121'	43	3"	" " calcite	Ga. 1/16"	Conf. Minor irregular
121' - 126'	47	8"	" "	Ga. 1/8" irreg. blebby	Conf. minor irregular
126' - 131'	39	3"	" "	Ga. 1-1/2" blebby in veins.	Conf.
131' - 136'	31	6"	" "	Ga. 1/2" irregular	Conf.
136' - 141'	8	1"	" "	-	Conf.
141' - 146'	7	1-1/8"	" "	Ga. 1/32" blebby	Conf.
146' - 151'	7	3/4"	Calcite	-	Conf. - T at 90°
151' - 156'	10	1/2"	Calcite	-	T. mainly 85°
156' - 161'	4	1/4"	Qtz. siderite & calcite	-	T. 80°
161' - 166'	3	1/8"	Qtz. Siderite	-	Conf. Calc. T. 80°
166' - 171'	0	0	-	-	Conf.
171' - 175'	6	1/4"	Calcite	-	-
175' - 180'	4	1/2"	Qtz. and Calcite	-	T. 80°
180' - 185'	4	1/4"	Calcite	-	T. Calc. Qtz. Conf.
185' - 190'	1	1/4"	Qtz. Siderite	-	T. 80°
190' - 195'	0	0	-	-	Conf.
195' - 200'	4	1/4"	Qtz. siderite	-	Conf.

0094

Footage	No. of Veins	Total Width of Veins (")	Minerals: Order of Abundance	Ores (Sulphides): Order of Abundance	Attitude of Veins: With respect to Banding
200' - 205'	1	1/8"	Qtz. Siderite	-	Conf.
205' - 210'	0	0	-	-	-
210' - 215'	0	0	-	-	-
215' - 220'	4	3/4"	Qtz. siderite	-	Conf.
220' - 225'	0	0	-	-	-
225' - 230'	0	0	-	-	-
230' - 235'	0	0	-	-	-
235' - 240'	4	3/4"	Qtz. Siderite	-	Conf.
240' - 245'	0	0	-	-	-
245' - 250'	0	0	-	-	-
250' - 255'	0	0	-	-	-
255' - 260'	0	0	-	-	-
260' - 265'	0	0	-	-	-
265' - 270'	2	1/8"	Qtz. siderite	-	Conf.
270' - 275'	4	1/2"	Qtz. siderite	-	Mainly conf.
275' - 280'	1	1/8"	Calcite	-	T. at 80°
280' - 285'	0	0	-	-	-
285' - 290'	6	1-3/4"	Qtz. siderite	-	Conf.
290' - 295'	14	2"	Qtz. siderite	-	Conf.
295' - 300'	0	0	-	-	-
300' - 305'	0	0	-	-	-
305' - 310'	1	1/8"	Qtz.	Sp. 1/32"	Conf.
310' - 315'	1	1/2"	Qtz.	Ga. trace	Conf.
315' - 320'	3	2"	Qtz.	Sp. 1-1/2"	Conf.
320' - 325'	4	1/2"	Qtz.	Ga. Sp. trace	Conf.
325' - 330'	0	0	-	-	-
330' - 335'	0	0	-	-	-
335' - 340'	0	0	-	-	-
340' - 345'	0	0	-	-	-
345' - 350'	0	0	-	-	-
350' - 355'	0	0	-	-	-
355' - 360'	0	0	-	-	-
360' - 365'	0	0	-	-	-
365' - 370'	0	0	-	-	-
370' - 375'	0	0	-	-	-
375' - 380'	0	0	-	-	-
380' - 385'	3	1/2"	Qtz.	-	Conf.
385' - 390'	3	1/2"	Qtz. siderite	Ga. 1/8"	Conf.

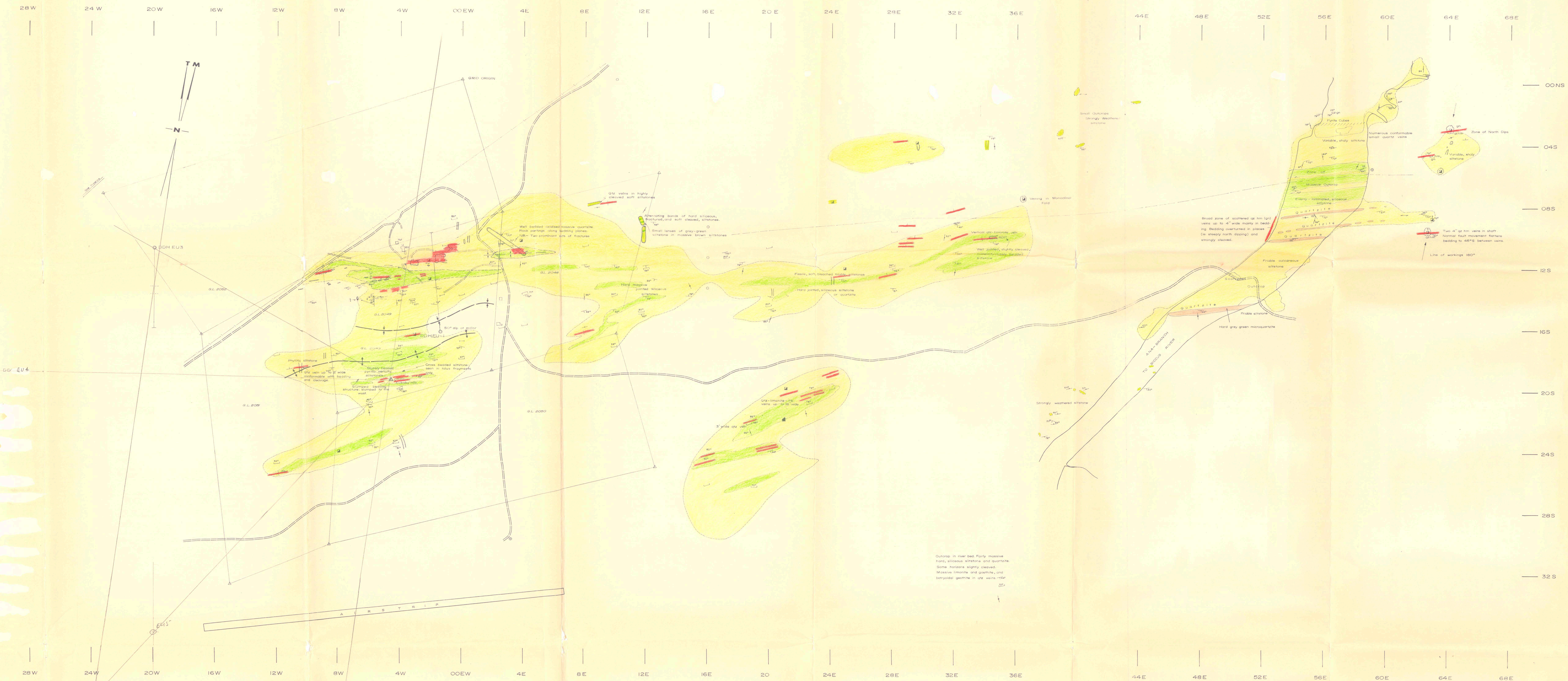
Footage	No. of Veins	Total Width of Veins (")	Minerals: Order of Abundance	Ores (sulphides): Order of Abundance	Attitude of Veins: With respect to Banding
390' - 395'	0	0	-	-	-
395' - 400'	0	0	-	-	-
400' - 405'	0	0	-	-	-
405' - 410'	0	0	-	-	-
410' - 415'	0	0	-	-	-
415' - 420'	5	1"	Qtz. siderite	-	Conf.
420' - 425'	27	3-1/2"	Qtz.	Ga. trace	Mainly T. minor Conf.
425' - 430'	9	8"	Qtz.	-	T 90°
430' - 435'	4	1/2"	Qtz.	-	T
435' - 440'	2	1/8"	"	-	T.
440' - 445'	4	6"	Qtz. siderite	'	T.
445' - 450'	4	18"	Qtz. siderite	Sp. 1/4" irreg. Ga. 1/2" blebby	T.
450' - 485'	2	3-1/2"	Qtz.	Ga. trace	T. 80°
455' - 460'	6	2-1/2"	Qtz.	Ga. 1/4"	T and Conf.
460' - 465'	15	5"	Qtz.	Cp. 1/4" Ga. & Sp 1/8"	Irreg. and T.
465' - 470'	7	2"	Qtz.	-	T.
470' - 475'	1	6"	Qtz.	-	T. at 85°
475' - 480'	5	1/4"	Qtz.	-	T.
480' - 485'	14	4"	Qtz. (milky & clear)	-	T. Conf. and irreg.
485' - 490'	22	9"	Qtz.	Cp (trace Sp. Ga	T. irreg.
490' - 495'	4	12"	Qtz.	Sp. Ga. Cp trace	T. irreg.
495' - 500'	0	0	-	-	-
500' - 505'	1	1/2"	Qtz. Calcite	-	Conf.
505' - 510'	1	1/4"	Qtz.	-	Conf.
510' - 515'	0	0	-	-	-
515' - 520'	0	0	-	-	-
520' - 525'	1	1/4"	Qtz.	Ga. Sp	-
525' - 530'	3	1/4"	Qtz.	Ga. 1/32"	Conf.
530' - 535'	1	1/4"	Qtz.	Cp. Sp.	Conf.
535' - 540'	1	1/8"	Qtz.	-	Conf.
540' - 545'	1	1/16"	Qtz.	Cp. Ga. Sp.	Conf.
545' - 550'	0	0	-	-	-
550' - 555'	1	1/2"	Qtz.	-	Conf.
555' - 560'	4	1/2"	Qtz.	Ga. 1/4" Cp. Sp	Conf.
560' - 565'	4	1/2"	Qtz.	-	Conf.
565' - 570'	0	0	-	-	-
570' - 575'	1	1/2"	Qtz.	-	Conf.

0960

Footage	No. of Veins	Total Width of Veins (")	Minerals: Order of Abundance	Ores (sulphides): Order of Abundance	Attitude of Veins: With respect to Banding
575' - 580'	7	1"	Qtz.	Ga. 1/8" Sp 1/8"	T. at 90° Conf.
580' - 585'	2	1/4"	Qtz.	Ga. Sp trace	Conf.
585' - 590'	6	3"	Qtz.	Ga. Sp. Cp. trace	Conf.
590' - 595'	4	3/4"	Qtz. minor calcite	Ga trace	Conf.
595' - 600'	1	1/8"	Qtz.	Sp. 1/16"	Conf.
600' - 605'	5	1/2"	Qtz.	Ga.Sp.Cp trace	Conf.
605' - 610'	2	3/8"	Qtz. Calcite	Cp trace	Conf.
610' - 615'	2	1/4"	Qtz. calcite	-	Conf.
615' - 620'	2	1/2"	Qtz. Calcite	-	Conf.
620' - 625'	2	1/2"	Qtz.	Ga.Sp. Trace	Conf.
625' - 628'	3	1"	Qtz.	Cp. Sp. trace	Conf.
628' - 633'	5	1-1/2"	Qtz. minor calcite	Cp. Ga. trace	Conf.
633' - 638'	15	10"	Qtz.	Py.Cp.Ga. trace	Conf. & irreg.
638' - 643'	15	7-1/2"	Qtz. minor calcite	-	Conf.
643' - 648'	4	1-1/4"	Qtz. & qtz. calcite	-	Conf.
648' - 653'	4	1/2"	Qtz.	Ga. 1/8" Sp 1/16" reg.	Conf.
653' - 658'	4	1/2"	Qtz.	Sp. 1/8" Ga.1/16"	Conf.
				Py Cp trace	Conf.
658' - 663'	8	3-1/2"	Qtz.	Ga 3/4" Sp 1/8" Py Cp trace regular	Conf. & irregular
663' - 668'	20	3-1/4"	Qtz.	Cp 1/16" Ga Sp trace	Conf.
668' - 673'	21	4	Qtz.	Ga 1/2" Sp 1/4" Cp trace	Conf.
673' - 678'	20	10-1/2"	Qtz.	Sp 5" Ga 1" Cp trace	Conf.
678' - 683'	46	14"	Qtz.	Ga 1-3/4" Sp 2-1/2"	Conf. & T. at 70° irreg.
				Cp 1/8"	
683' - 688'	57	13"	Qtz.	Ga 1/2" Sp 1-3/4"	Conf. irreg. T.
				Cp trace	Conf. irreg. T.
688' - 693'	47	12"	Qtz. & Qtz. siderite	Sp 1/2" Ga 3/8" Cp trace	Conf. irreg. T.
693' - 698'	57	18"	Qtz. siderite	Ga 3/8"	Conf. irreg. T.
698' - 703'	35	16"	Qtz.	Ga 1-3/8 irreg.	
				Sp 2" Cp 1/8" Py 1"	Conf. irreg. T.
703' - 708'	20	11-1/2"	Qtz. & qtz. siderite	Ga. 1/4" Cp trace	conformable
708' - 713'	5	1"	Qtz.	Sp 1/16"	Conf.
713' - 718'	1	1/8"	Calcite	-	T at 60°
718' - 723'	2	1/4"	Qtz. siderite & calcite	-	Conf. & T at 70°
723' - 728'	1	1/8"	Qtz.	-	Conf.
728' - 733'	9	1-1/2"	Qtz. calcite	-	T at 60°
733' - 738'	9	1-1/2"	Qtz./calcite/siderite	-	Conf. and T.

0097

Footage	No. of Veins	Total Width of Veins (")	Minerals: Order of Abundance	Ores (sulphides)" Order of Abundance	Attitude of Veins: With respect to Banding
738' - 743'	5	1"	Qtz./calcite/siderite	-	Conf. and T.
743' - 748'	8	5"	Qtz./calcite/siderite	-	Conf. and T.
748' - 753'	9	3-1/2"	Qtz./calcite/siderite	-	T at 70°
753' - 758'	-	-	-	-	-
758' - 763'	-	-	-	-	-
763' - 768'	3	1"	Qtz.	Trace Ga. Sp	Conf.
768' - 773'	-	-	-	-	-
773' - 778'	-	-	-	-	-
778' - 783'	5	1-1/4"	Qtz.	trace Sp	Conf.
783' - 788'	-	-	-	-	-
788' - 793'	-	-	-	-	-
793' - 798'	-	-	-	-	-
798' - 803'	-	-	-	-	-
803' - 808'	-	-	-	-	-
808' - 813'	2	1/4"	Qtz.	-	T at 70°
813' - 818'	1	1/8"	Qtz.	-	T at 70°
818' - 823'	-	-	-	-	-
823' - 828'	-	-	-	-	-
828' - 833'	-	-	-	-	-
833' - 838'	-	-	-	-	-
838' - 843'	-	-	-	-	-
843' - 848'	-	-	-	-	-
848' - 853'	-	-	-	-	-
853' - 858'	3	1"	Qtz/Qtz.calcite	Trace Zn	Conf. and & at 70°
858' - 863'	-	-	-	-	-
863' - 868'	-	-	-	-	-
868' - 873'	-	-	-	-	-
873' - 878'	4	4"	Qtz.	-	Conf.
878' - 883'	3	5-1/2"	Qtz.-siderite	-	Conf.
883' - 888'	4	1"	Qtz.-siderite	-	Conf. and T at 70°
888' - 893'	1	1/2"	Qtz.-siderite	-	Conf. and T. at 70°
893' - 989'	-	-	-	-	-
898' - 901'	-	-	-	-	-

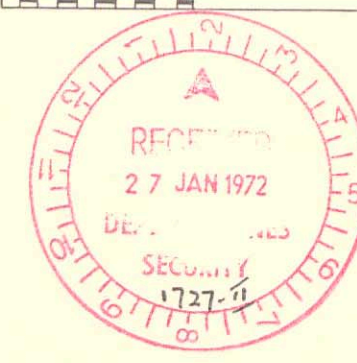


GEOLOGY OF EUKABY HILL AREA

EUKABY AREA, S.M.L. 603

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

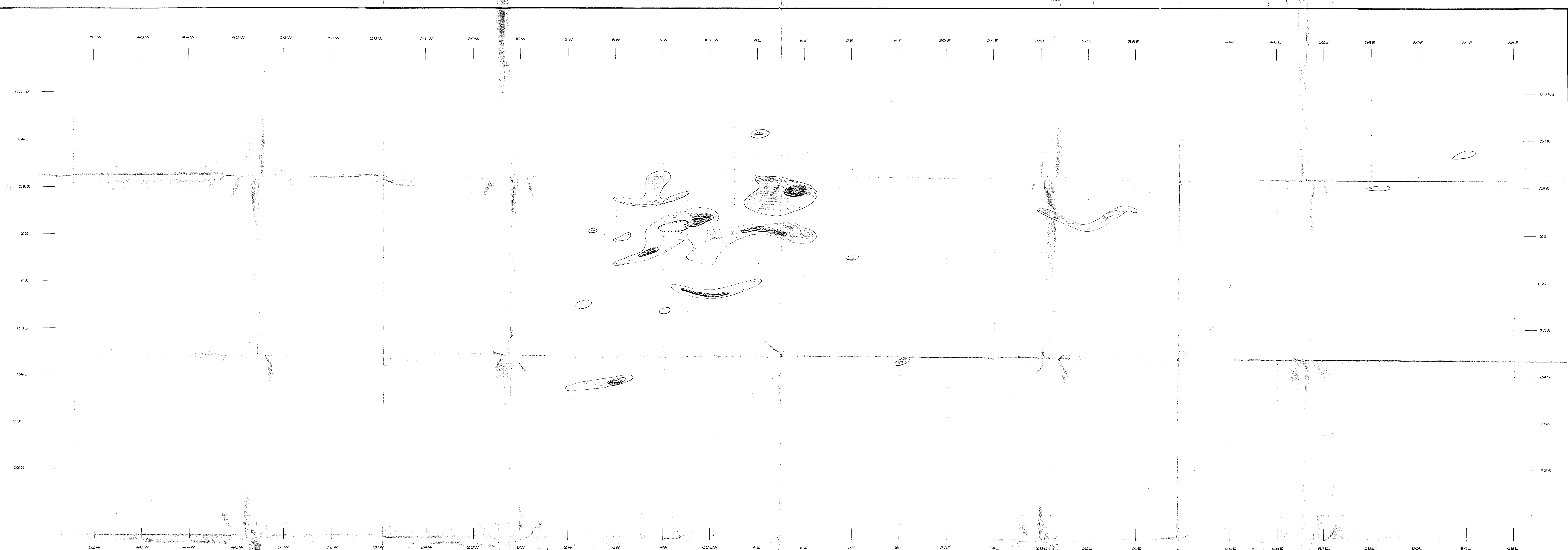
Scale: 1" = 200' or 1:2400



LEGEND

- | | |
|--|------------------------------------|
| Outcrop boundary and/or geological boundary | Track |
| Gradational geological boundary | Fence |
| Zone of scattered pyrite cubes | Building |
| Zone of intensive quartz hematite (galena) veining with associated strong cleavage and overturned bedding | Shaft |
| Quartz vein with dip direction | Pit, costean and dump |
| Siltstone - soft, friable, calcareous siltstones. (May be pyritic) | Bore |
| Siltstone - (harder) - more massive and more resistant siltstones, often closer to quartzites. Usually found forming the crests of hills | Axis of syncline |
| Hard grey green microquartzite | Bedding, strike and dip, vertical |
| | Cleavage, strike and dip, vertical |
| | Fracture, strike and dip, vertical |
| | Jointing |
| | Gyphion drill hole |
| | Diamond drill hole |
| | Lease boundaries |
| | Trend-sub outcrop areas |
| | Lineation |
- ABBREVIATIONS
- | | |
|-----|-----------|
| Mod | moderate |
| Sch | schiefer |
| Sst | siltstone |
| Qz | quartz |

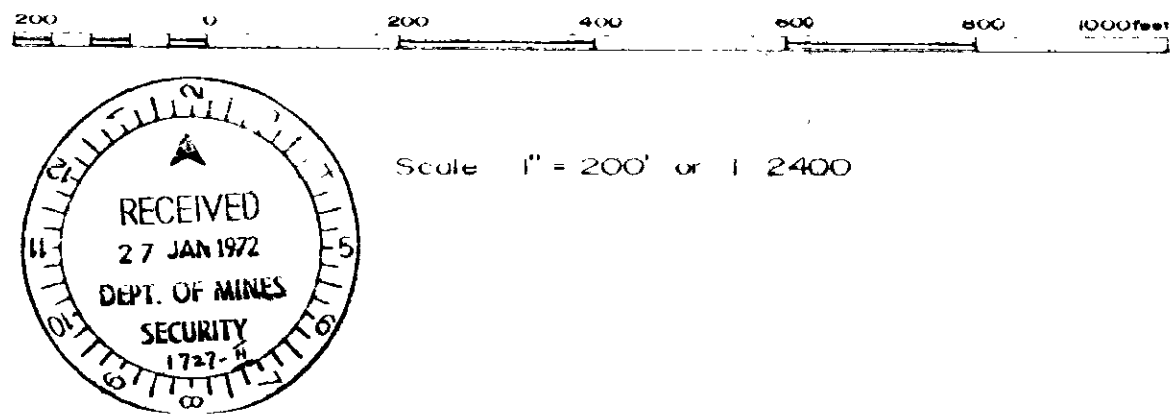
ENV 1727 (2) -1



TOTAL Pb AND Zn ROCK CHIP RESULTS

EUKABY AREA, S.M.L. 603

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

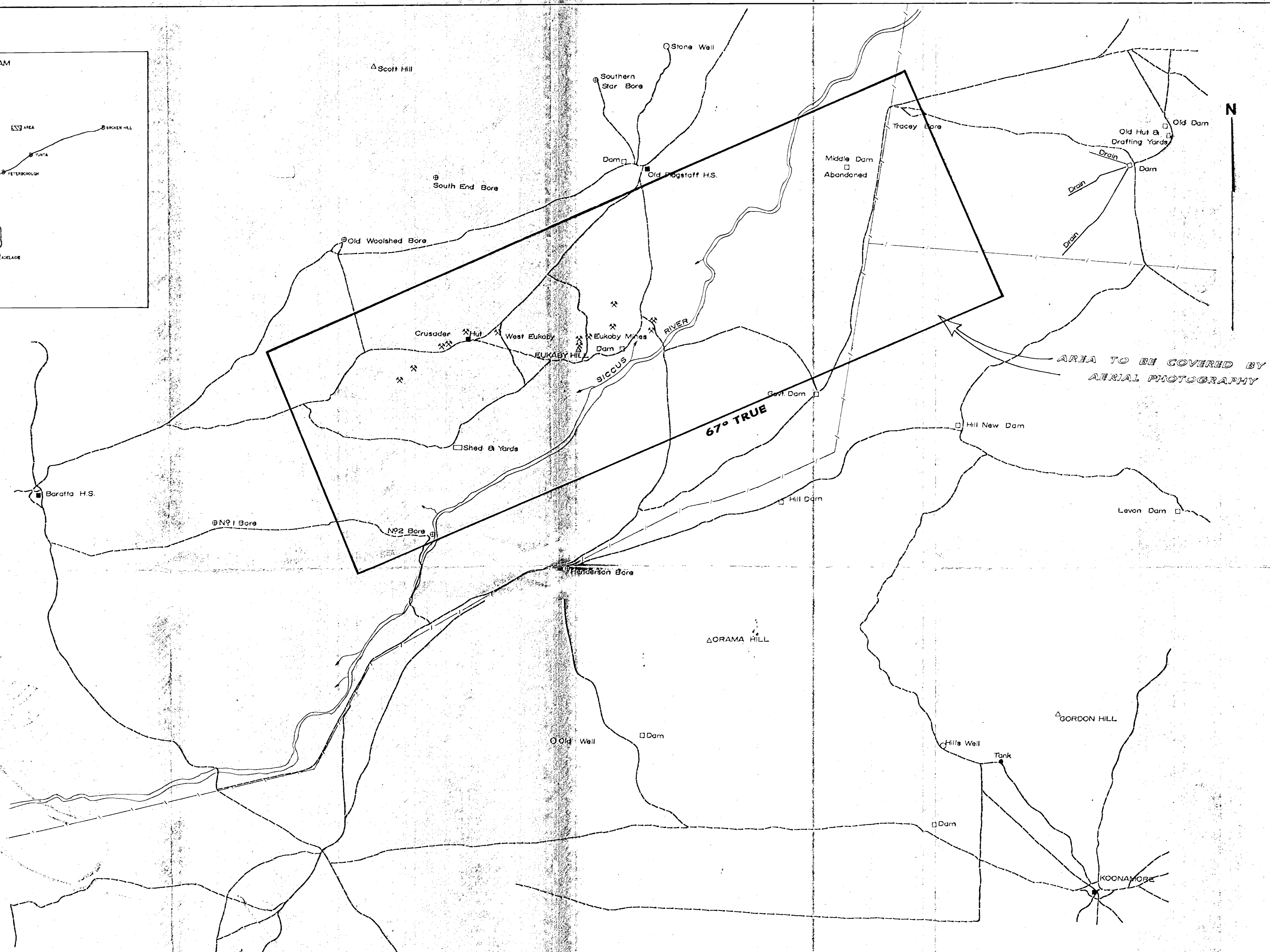
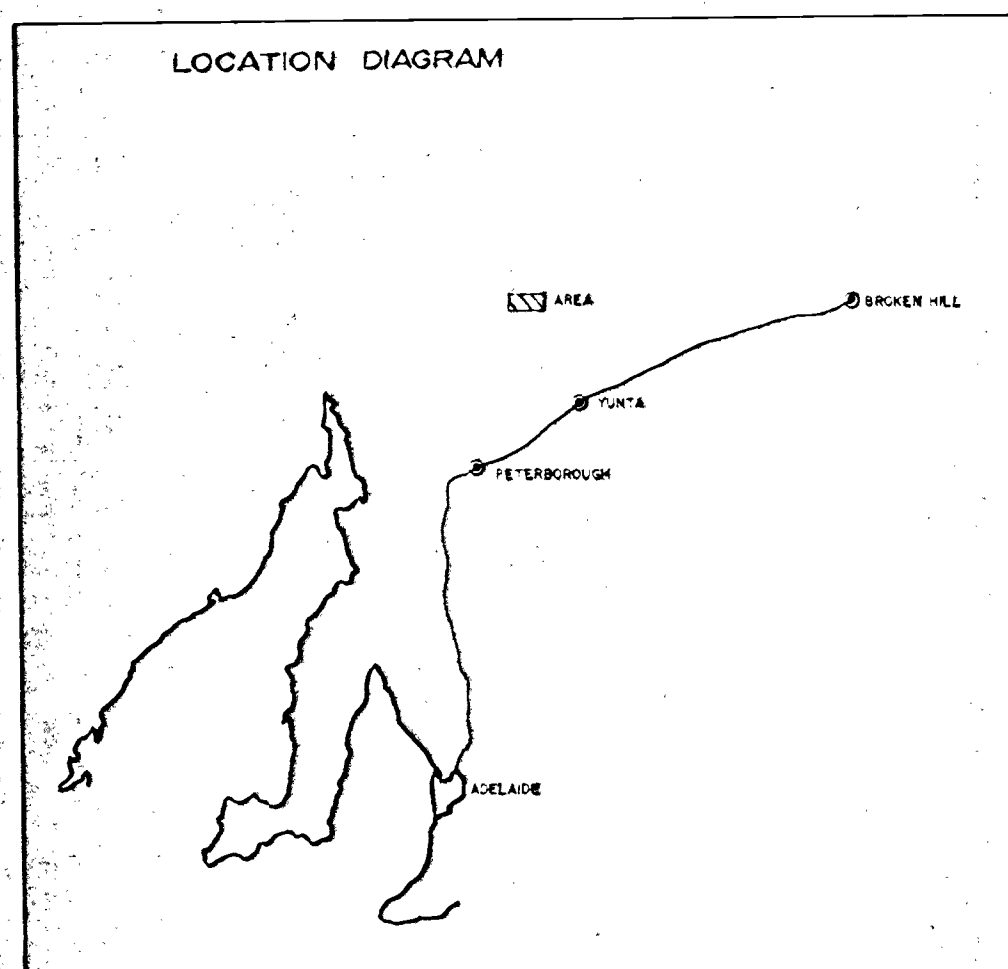


LEGEND
25% - 50% Pb & Zn
< 2.0% Pb & Zn
Sample point location by contour

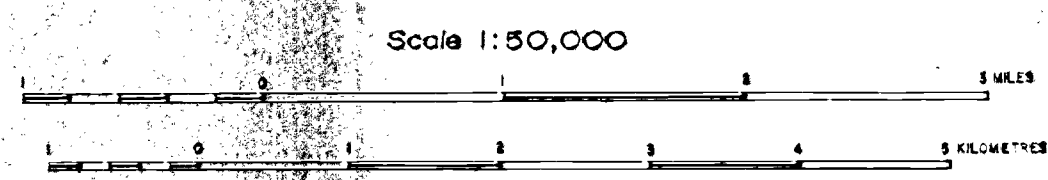
OVERLAYS MAP N° SA/B12

ENV 1727(2)-2

MAP N° SA/B12

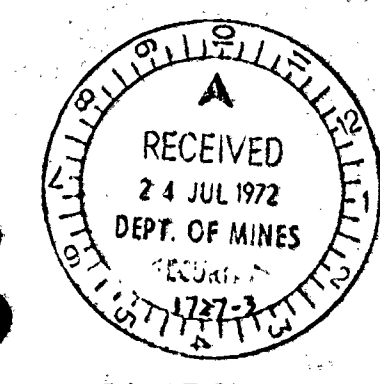


PROPOSED AERIAL PHOTOGRAPHY
EUKABY SILVER LEAD FIELD, S.A.
NORTH BROKEN HILL LTD./EXPLORATION DIVISION

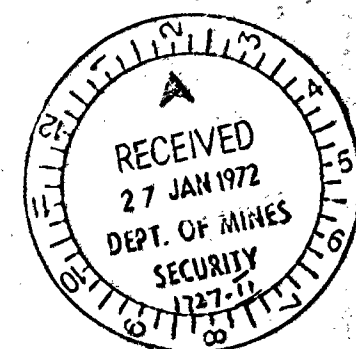
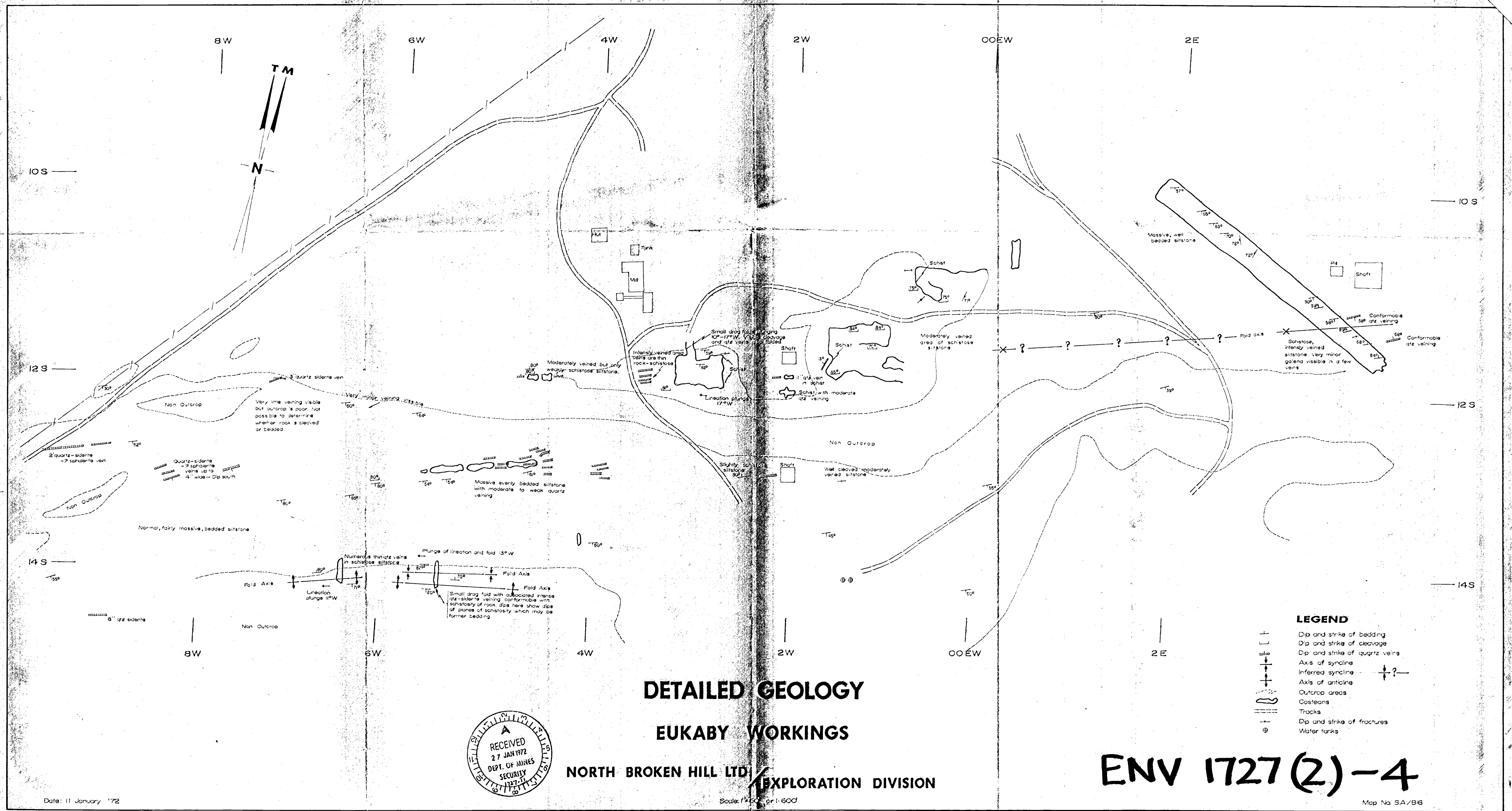


Date: 25/5/72

ENV 1727(2)-3



Map no. SA/B21



DETAILED GEOLOGY

EUKABY WORKINGS

NORTH BROKEN HILL LTD. EXPLORATION DIVISION

ENV 1727(2)-4

Pb
1" = 1%

DDH EU 1

5.69 % Pb, 17 oz Ag, 10 dwt Au. 5.0 % Pb, 14 oz Ag, 4.2 dwt Au

EUW PIT EVE PIT

80° Dip

S

N

CORE ASSAY
HISTOGRAM

QUARTZ VEINS
HISTOGRAM

ZN

SOUTHERN LODE

NORTHERN LODE

End of hole 826'

LEGEND

- Closely bedded siltstone consisting of alternating lamellae of grey quartzitic siltstone & white calcareous siltstone
- Pyrite
- Zone of relatively intense concordant veining
- Core Banding

DDH EU-1

ENV 1727(2)-6

EUKABY SILVER LEAD FIELD, S.A.

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

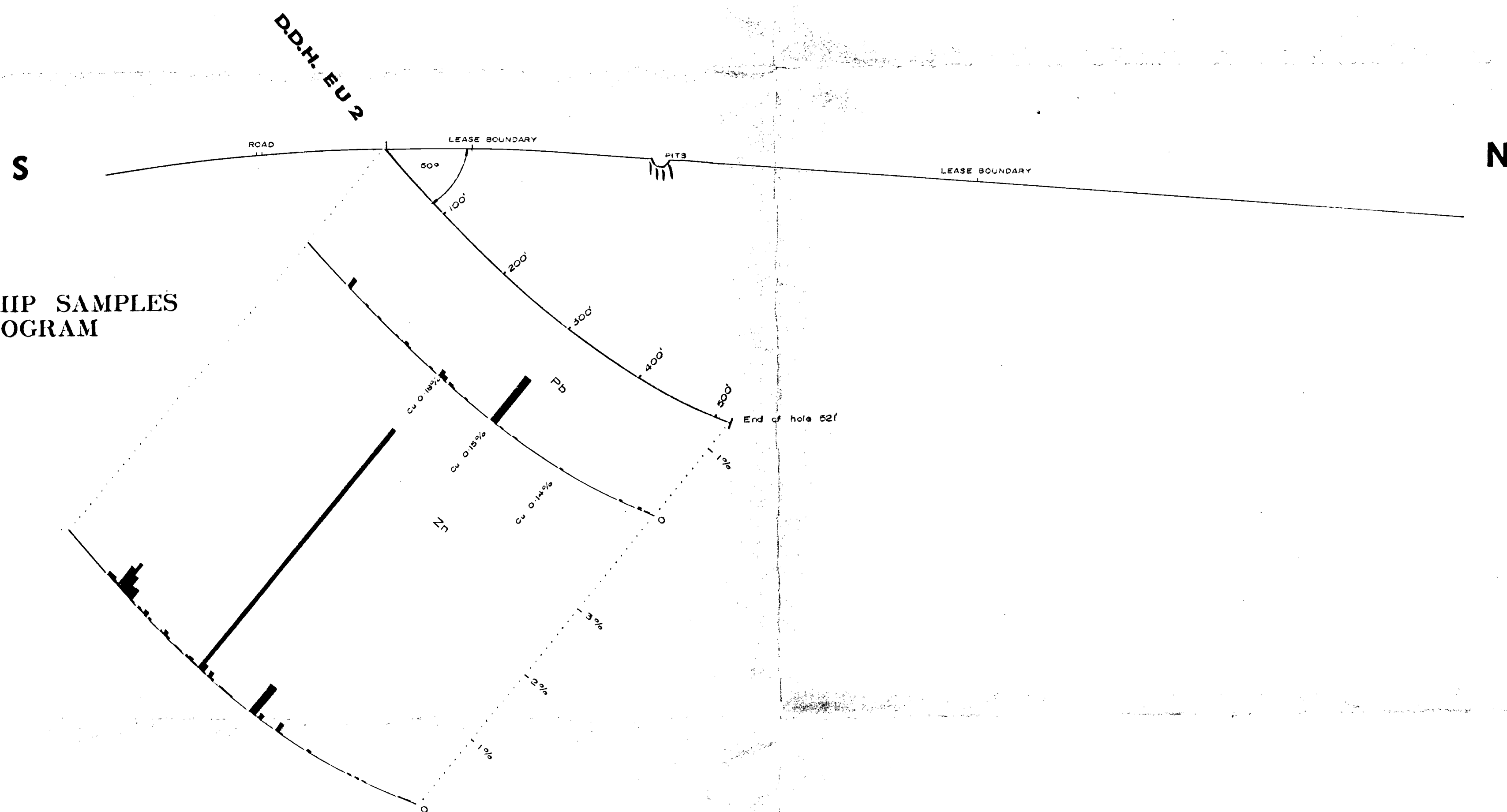
NB-SECTION LOOKS 240° MAG.

Scale: 1" = 100' or 1:1200

DATE: 7 / 1 / 1972



ROCK CHIP SAMPLES
HISTOGRAM



LEGEND

- Siltstone
- Pyrite
- Lode Veins

DDH EU-2 ENV 1727(2)-7

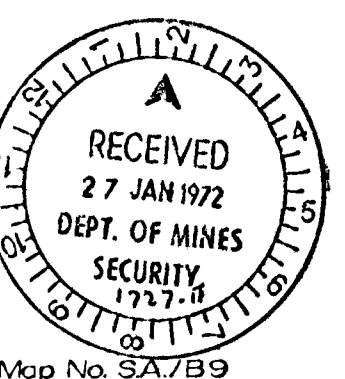
EUKABY SILVER LEAD FIELD, S.A.

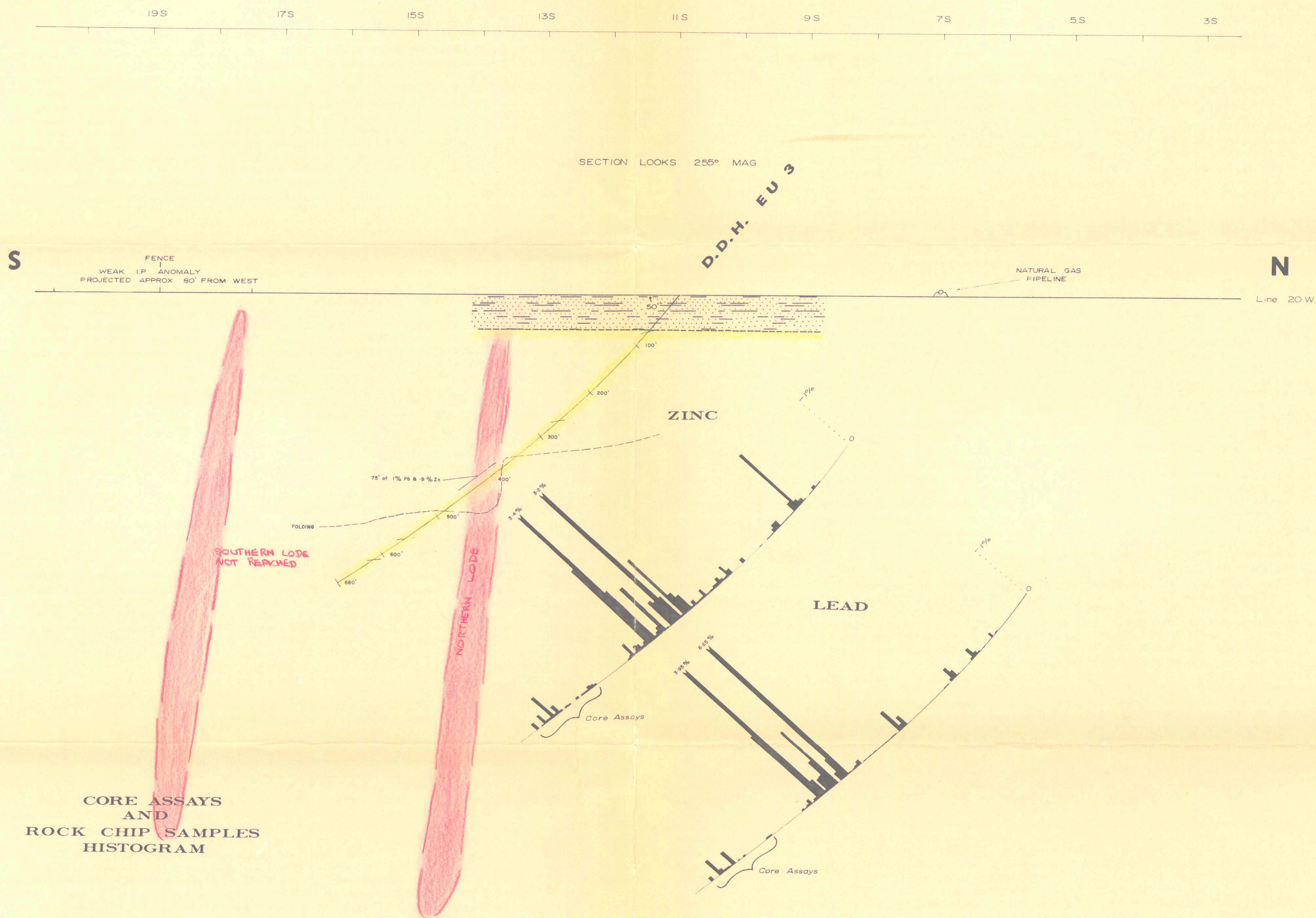
NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

NB-SECTION LOOKS 243° MAG.

Scale: 1"=100' or 1:1200

Date: 5/11/1971





CORE ASSAYS
AND
ROCK CHIP SAMPLES
HISTOGRAM

LEGEND

- Alluvium
- Closely bedded calcareous siltstone
- Pyrite
- Lode Veins
- Bedding Trends

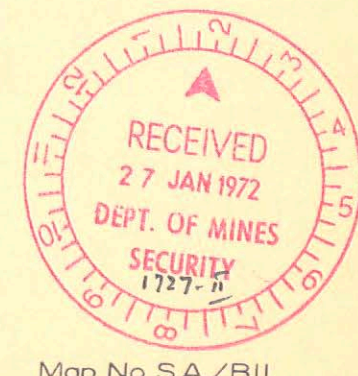
DDH EU-3

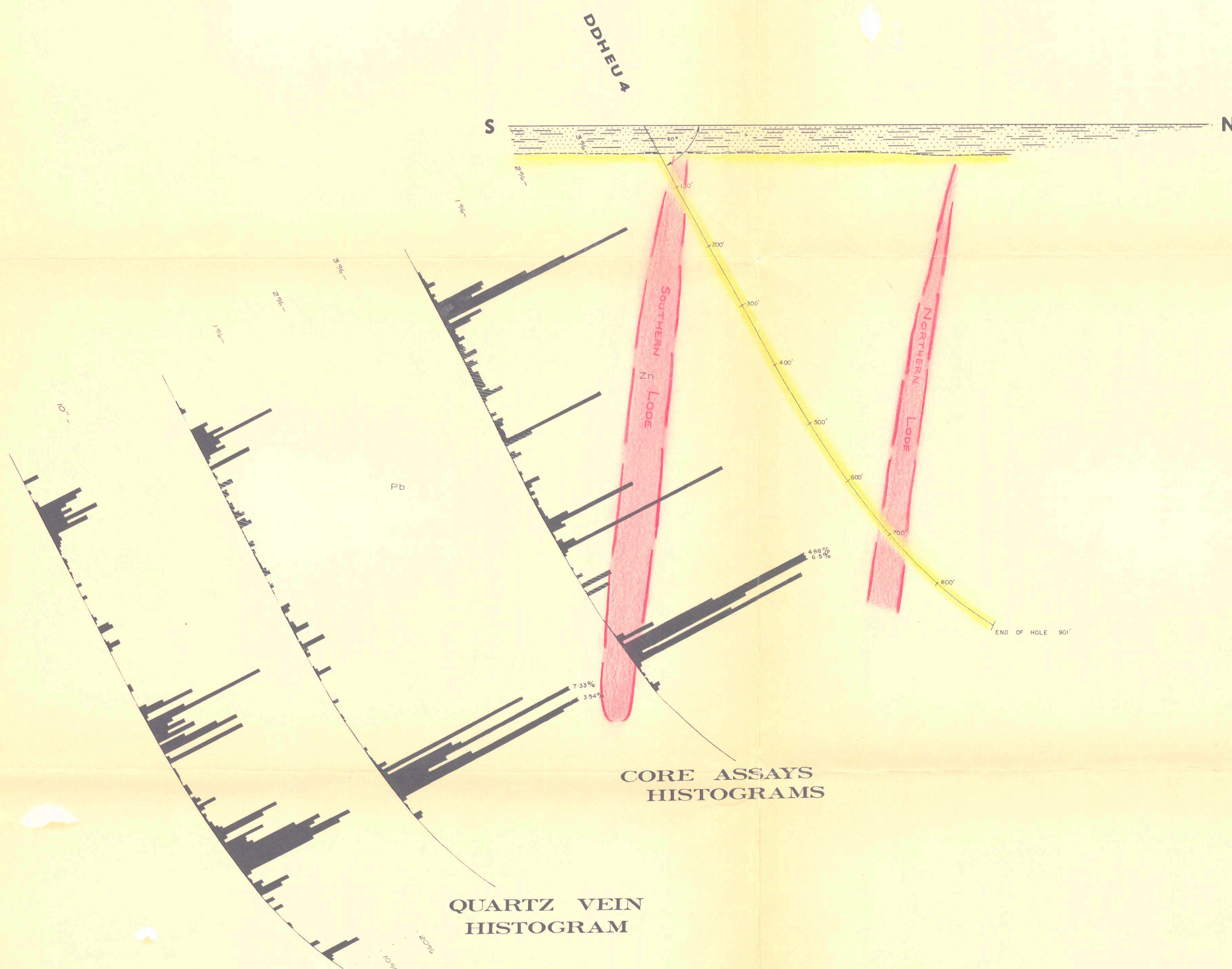
ENV 1727(2)-8

EUKABY SILVER LEAD FIELD, S.A.

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

Scale: 1"=100 or 1:1200





LEGEND

- Alluvium
- Siltstone
- Lode veins
- Rock chip samples (scan)
- Core samples

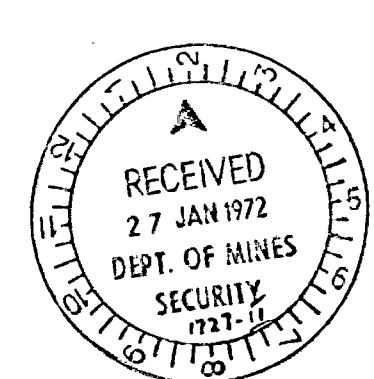
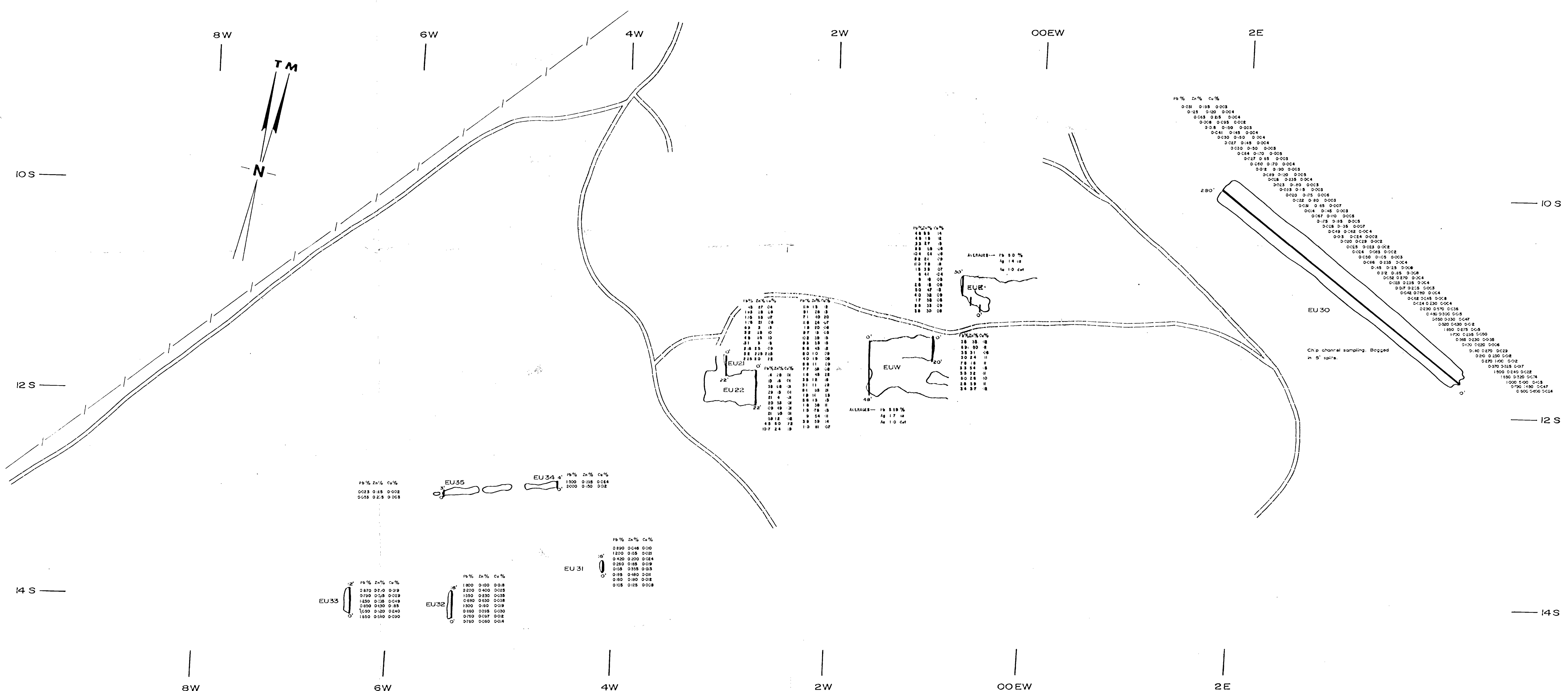
DDH EU-4 ENV 1727(2)-9

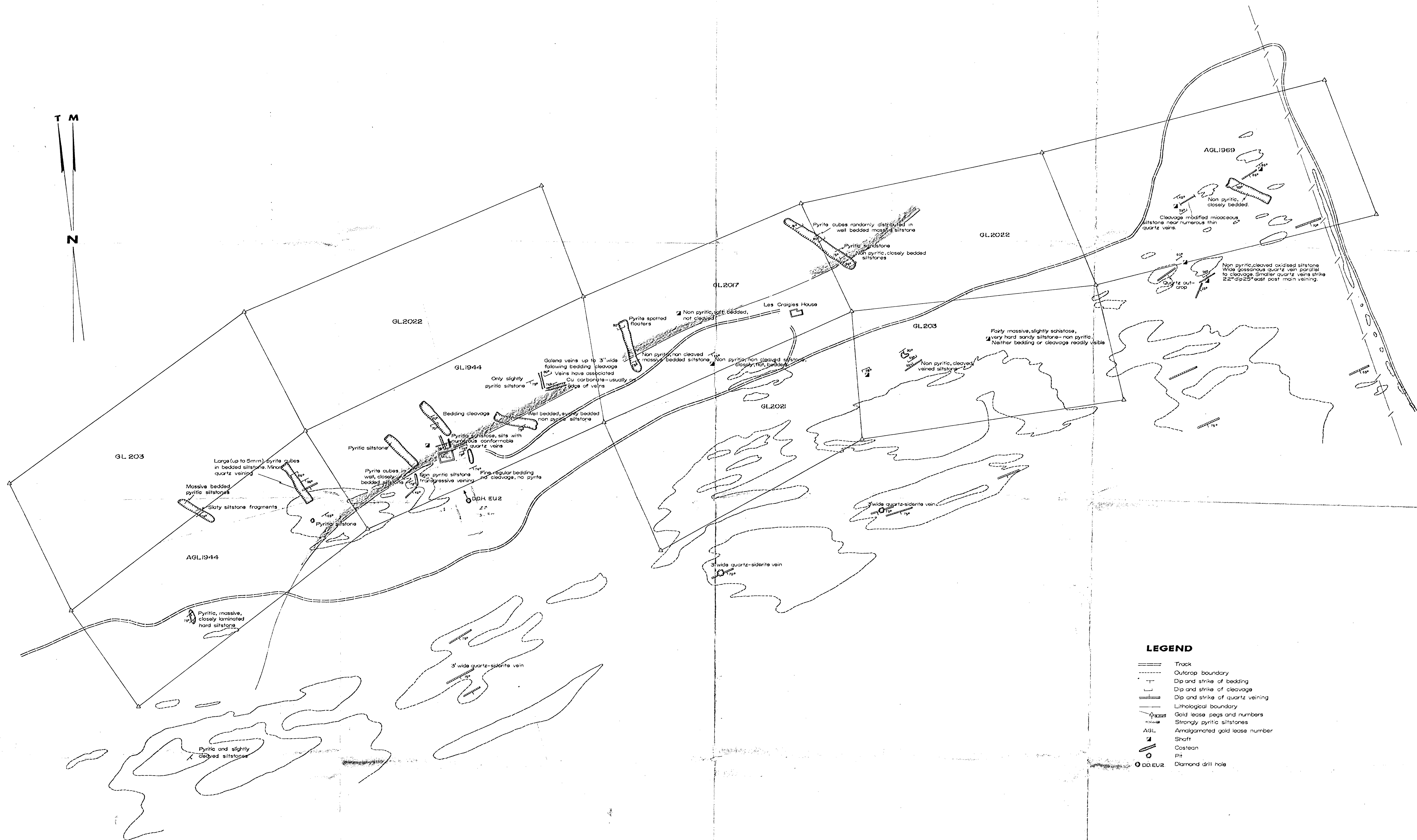
EUKABY SILVER LEAD FIELD, S.A.

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

NB:- SECTION LOOKS 255° MAG



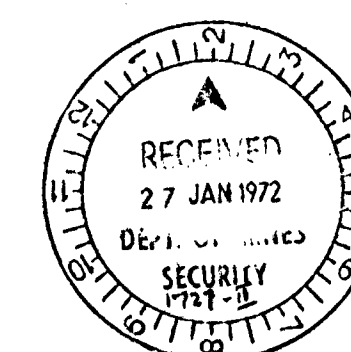




DETAILED GEOLOGY OF THE CROSS CRUSADER WORKINGS

EUKABY AREA, S.M.L. 603

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION



ENV 1727 (2) - 11

0099

576 ST. KILDA ROAD, MELBOURNE, VIC. 3004

TELEPHONE: 51 6871

TELEGRAPHIC ADDRESS: "WORBROEX" MELBOURNE

NORTH BROKEN HILL LTD. / EXPLORATION DIVISIONS.M.L. 603, EUKABY, S.A.REPORT FOR QUARTER ENDED 1ST APRIL, 1972**GENERAL**

Detailed geological mapping, rock geochemical sampling and test biogeochemical study was carried out. One diamond drill hole, 1064' long, was drilled. A theory of ore occurrence was formulated.

GEOLOGY

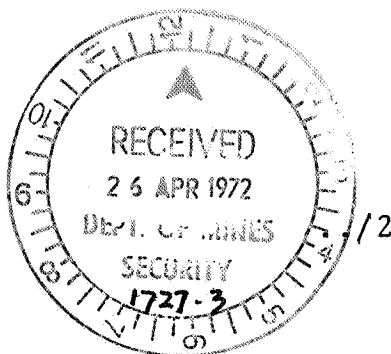
Detailed mapping at a scale of 1" = 200' was extended to cover all of the mineralized area of Eukaby and Cross-Crusader. Particular attention was paid to strikes and dips of bedding. Also, continuity of mineralized veins was carefully recorded.

Check mapping at a scale of 1" = 1000' was carried out on the more distant parts of the Eukaby syncline, to the east and south of the Siccus River.

A copy of the theory of ore occurrence at Baratta, by P.S. Forwood, is attached.

A quartz-etc. vein log of D.D.EU3 was made and plotted.

Since all basemetal mineralization is associated with quartz veins, semi-quantitative mapping on 1" = 200' scale of quartz float in the non-outcrop surrounds of the workings, has been undertaken.



GEOCHEMISTRY

Old costeans in the Cross-Crusader workings area were channel sampled in five foot intervals, and 112 samples sent for assay. This work repeats previous work by Enterprise Exploration, who. unfortunately, did not assay for zinc.

Sixteen more gossan and outcrop samples were collected and sent for assay.

Main geochemical work was a test biogeochemical program carried out by members of the North Mine geological staff. Their idea is to combine this with current studies in the Broken Hill district. The hope is that mineralization concealed by transported overburden will be absorbed in trace amounts into deep-rooted plants, and thus be detected as a surface anomaly by chemical analysis of plant material.

During the first visit by the North Mine personnel, shallow soil and foliage both were sampled, as follows, at 100' intervals:

Line 20W from 8S to 20S
Line 30W from 10S to 22S

A possible slight anomaly in zinc was detected, which made further work necessary. Results of the second phase of sampling have not been received, and thus no conclusions can be drawn. Results will be supplied in complete unit form, when the test program is complete.

GEOPHYSICS

No geophysical work was carried out. However, gravity work has been recommended. Accordingly, some line preparation was carried out, and specific gravities of various cores and rock outcrop samples were performed. A total of 61 sample were determined.

The results show that the only high S.G. values (over 2.8) are caused by mineralization. The main variation from normal (2.7) occurs in weathered or porous samples, whose S.Gs reach as low as 2.2. Detailed levelling and gravity surveys are scheduled for April 1972.

DRILLING

In spite of reduced exploration funds available, one further diamond drill hole was bored.

This was D.D.EU5, which was collared at 36S on line 20W, depressed at 50° in direction 345° magnetic. The hole was collared on 4th March 1972, and completed at 1064'6" on 30th March 1972. Detailed geochemistry and logs of the hole have not yet been completed. However, no significant mineralization was found.

Further drilling is expected to follow the gravity survey.



for P.S. FORWOOD
Exploration Geologist

Enclosures:

Expenditure statement.

Plans as follows:

- Map no. SA/B10 scale 1"=200'
 - "Detailed Geology Eukaby Area S.A. Sheet 1
- Map no. SA/B13, scale 1"=200'
 - "Detailed Geology Eukaby Area S.A. Sheet 2
- Map no. SA/B17 scale 1"=200'
 - "Semi quantitative distribution of Quartz Vein Float, Eukaby area, S.A.;" Sheet 1
- Map No. SA/B18 Scale 1"=200'
 - "Semi Quantitative Distribution of Quartz Vein Float, Eukaby Area, S.A.;" Sheet 2
- Map no. SA/B11 Scale 1"=100'
 - "D.D.H.EU3 and EU5, Eukaby Silver Lead Field, S.A."
- A Report by P.S. Forwood dated 3rd February 1972
 - "Baratta, S.A. 'Silver Lead' Field Geology"

PSF:jac

BARATTA, S.A. "SILVER LEAD" FIELD GEOLOGY

by P.S. Forwood

3rd February, 1972

1. GENERAL

This field, discovered in 1887, has always been known as a silver lead field. During its life, it has produced about 2000 tons of metallic lead, i.e. about two days of current production from the Broken Hill lode.

Most notable of the field is its size. Mineralization extends at least 4.3 miles (22,500') along strike; it disappears under cover to the east. Maximum observed spread of mineralization across strike is .63 miles (3,400 feet).

2. GEOLOGY

Regional geology is shown on the Parachilna 1:250,000 published State geological map. This indicates that the rocks are in the Umberatna (Adelaide System, Upper Proterozoic) Group, and in detail, somewhere between the Tindelpina Shale, which are carbonaceous, dolomitic, and pyritic shales, and the position of the Mt. Caernarvon Greywacke above. Johns (1969) calls the rocks "Tarcowie Siltstones". Drilling has revealed differences here.

The main mineralization is on the north limb of a syncline and probably not more than one mile north of the axis of the syncline.

This structure is like most of the Flinders Ranges in that the folds appear to be shallow rather than deep, isoclinal or contorted. However, severe and unusual deformation of another kind occurs, when diapirs of Willouran dolomite-siltstone breccia break through, chiefly at the cores of anticlines. The nearest such diapir is 7 miles west.

3. PREVIOUS WORK

Zinc Corporation, in 1960, performed minor mapping and bulldozed 2736 feet of costean. They sampled in 5 foot sections and assayed for Pb and Ag only. Their work was concentrated on the Cross-Crusader workings. Best value was 5' of 7.4% Pb, but it could not be repeated in nearby costeans or later diamond drill holes.

Cominco, in 1965-1967 investigated the mineralized zone using I.P. as a primary tool. They also used geochemistry, and tried to use auger drilling (but failed due to the unsuitability of the soil). Their main contribution was a generalized geological map 1" = 1000', showing the rock types, general structure, and distribution of mineralization. The map did not carry a workable classification of rock types, and it was unreliable in detail. However, a statistical plot of strikes and dips showed that the average predominating bedding direction was strike 63° magnetic, dip 61.5° S. The veins have an average strike of 60° magnetic, and an average dip of 66° S. Cleavage is hard to identify, but is quite different (strike 56.5° Magnetic, dip 56° N).

Cominco drilled three of the strongest I.P. anomalies, two in the vicinity of the old workings. All obtained widespread fine-grained disseminated pyrite which adequately explained the anomalies, and cast the first doubts on I.P. as a workable method at Baratta.

Minor work was carried out by Utah, Clutha and Lone Star, but no results have been recorded sufficiently well to be useful.

4. PRESENT WORK

The first favourable lead was the result of sampling of the faces of Michaillevs pits at Eukaby Hill in March 1971 by D. Christie. The assays were surprisingly high, so resampling was carried out and the results confirmed, viz 80' width at 5.3% Pb, 1.4 oz Ag/ton .8% Zn and 3.0 dwt Au/ton. A few high zinc values were recorded (up to 7.8% over 2 foot interval) but the significance of these was not noted at the time. (The existence of a zinc-rich piece of rock from Baratta had been rumoured at the S.A. Department of Mines, but no previous explorers were aware of the existence of primary zinc minerals with the silver lead mineralization).

Examination of the exposed pit faces did not reveal any obvious explanation of the high values, in fact some of the highest values came from buff-coloured oxidized siltstone. Lead carbonate deriving from the oxidation of very fine "syngenetic" particles of galena was suspected. *Sample and petrological description (Mrs Whitehead, Hurdell) passed on to Dr. Whittle JAB/4*

Petrological work was undertaken. Dr. Whittle's descriptions were inconclusive. In retrospect, it can be seen that the earlier work of Sylvia Whitehead was more reliable. She observed that the lead occurred as cerussite which replaced a previous carbonate, i.e. we were dealing with an enriched oxidized capping.

It was decided that the values in Michaillevs pits were special, and that diamond drilling below the oxidized zone was warranted.

Options involving four sets of leases were negotiated, and two holes were drilled, D.D.EU1 to 825', passing below Michaillevs pits at a vertical depth of 400', and D.D.EU2, to 521', passing below the denser part of Craigie's workings at a vertical depth of 200 feet. Neither hole intersected significant values, and no signs of fine-grained, bedded ("syngenetic") lead-zinc-iron sulphide assemblage was found.

Results at this stage would have justified termination of the project. However, a more careful and detailed geological study now bore fruit.

D.D.EU1, the hole below Michaillevs pits, intersected only 5' at .6% Pb and 1.3% Zn in the target zone. However, the target zone, from 525' to 595', featured irregular core banding, and a greater intensity of quartz-calcite veining. This 70' wide zone contains 6.6% by volume of vein material.

In the faces of Michaillevs pits, lineations with a strong pitch direction of about 11°W were observed. These lineations are the results of bedding plane kinks, intersections of bedding planes with minor faults etc. It was proposed that the mineralization would pitch flatly to the west, following this observed pitch direction; this would explain the non-persistence of mineralization in a vertical direction down to the position of D.D.EU1.

Accordingly, two holes were drilled to test this theory at distances of 2000' and 3000' west of the pits. Both achieved better results, interesting and encouraging, but sub-economic.

The first, D.D.EU3 was drilled to 680'. It intersected 60' at .9% Pb and .7% Zn at a vertical depth of 280'. A second target zone, expected at 830' hole depth, was not achieved due to excessive hole flattening.

The second hole, D.D.EU4 was drilled to 901'. It intersected 50' at 2.1% Pb and 2.0% Zn at a vertical depth of 590'.

These holes indicate a linear "pipe" of mineralization, pitching in the observed direction. Continuity of mineralization is strongly suggested, but not proved. It is supported by the intersection of a second zone of mineralization 400' to the south, in D.D.'s EU1 and EU4. D.D.EU3 failed to reach the line of this second zone.

Other work during the last half of 1972 consisted of detailed mapping at 1" = 200' scale, rock chip geochemistry, and face sampling of old costeans and pits. A grid, baseline bearing 75° magnetic, with origin at the northern corner of G.L. 2052, was established, with lines 400' apart and pegs 200' apart.

A very useful technique introduced by Alan Moon is the detailed vein logging. Introduced vein material is logged in cumulative style, in five foot intervals, e.g. on D.D.EU1, between 530 and 535', there is a total of 9" of vein material. This is plotted in histogram form, together with a histogram of the scan geochemistry of the core.

5. KEY DATA

So far we have established:

- i) The primary mineralization of the area is galena and sphalerite with minor copper and contained silver, plus trace pyrite, in a gangue of quartz calcite and siderite.
- ii) All mineralization is vein or fracture filling type.
- iii) Trace elements include Ni, Co, B, Au (from petrology). Tests for the other elements commonly expected in this type of deposit, viz, Cd, Bi, As, Sb have not yet been done.
- iv) Assuming all lead and zinc is contained in the veins, the vein-filling material, as sampled by D.D.EU4, assays 10.6% Pb, 3.4 oz Ag/ton, and 10.2% Zn. (This result is obtained by calculation of the 50 foot zone from 658' to 708', which assayed 2.1% Pb, .7 oz Ag/ton, and 2.0% Zn, and contained 105.75 inches of vein material, i.e 17.6

Similarly, the best 100 foot zone of D.D.EU3 contained 60 inches of vein material, i.e. 8.3% vein material. This vein material alone assayed about 11% Pb and 9% Zn.
- v) Surface mapping and examination indicates that no extensive continuous mineralized body exists at surface within the zone of outcrop.
- vi) Lead is the only metal to have remained in a conspicuous form at surface. Zinc is not obvious and in fact remained unknown until recently.
- vii) Topography does not appear to be controlled by quartz veins, but rather by variations in sedimentary rock types.
- viii) Mineralization (meaning veins of any type, galena, sphalerite, quartz, calcite, or mixtures) is predominantly, but not always, concordant with bedding. However, where veins occur, the bedding is almost always disturbed, and steeper than normal.
- ix) The deformation of bedding which provides the locus of mineral veins at Eukaby Hill, is not due to normal parasitic folding, but to some other mechanism.
- x) Mineralization appears to have continuity in an amazingly great length in one dimension only; This dimension is the pitch direction of the zones of deformation.

- xi) The host rocks are siltstones with thick grey and white laminae. They contain traces only of pyrite and calcareous material, and some graphitic layers are present. There is nothing to indicate any special sedimentary environment. However, a high background of Pb and Zn is indicated in these host rocks. For example, assays are available for D.D.EU1 from 73'6" to 785'. Only 245' of this core, as assayed in 5' intervals, did not assay more than 200 ppm Pb, and only 35 feet assayed less than 200 ppm Zn. Whittle reports microscopic sphalerite in a number of apparently unmineralized cores.
- xii) Similar mineralized veins occur in what appears to be the same stratigraphic position on the southern limb of the syncline. Thus, there could be a general stratigraphic control to the mineralization. However, the zone between the two mineralized limbs is completely soil-covered and mineralization could continue through the intervening sequence.
- xiii) Very severe structures of an unusual type occur in the Flinders Ranges nearby.

6. INTERPRETATION

I regard the unusual type of deformation, the probable extreme elongation of the mineralized bodies, and the clearly open-space filling type of mineralization, as the most important clues.

I interpret the structural deformation revealed in D.D.'s EU3 and EU4 as being caused by a flat overthrust.

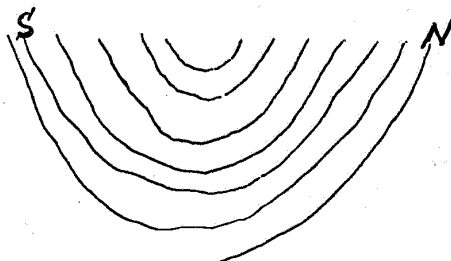


Figure 1.

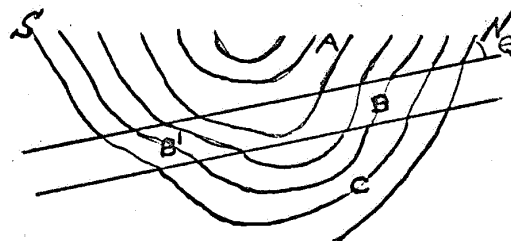


Figure 2.

A simple syncline, as shown in Figure 1, is deformed by the top block A (of Figure 2) being thrust sideways over the bottom Block C. Provided that the direction of thrust makes an angle of less than 90° with the bedding (angle θ of diagram) a zone of tension will occur in the Zone B'.

On the other side of the syncline a zone of compression will occur in Zone B¹. It may in turn generate minor transverse tension cracks.

The zone of tension at B will be expressed by

- a) rock flowage if the rocks are plastic, e.g. folded shale;
- or
- b) minor open spaces (tensional voids) with some rock flowage, possibly in the case of semi-competent rocks such as sandy siltstones;
- or
- c) major voids between bedding planes. This is most likely to happen where competent rocks such as quartzites occur.

In detail, the major voids described in (c) arise in a simple geometrical way.

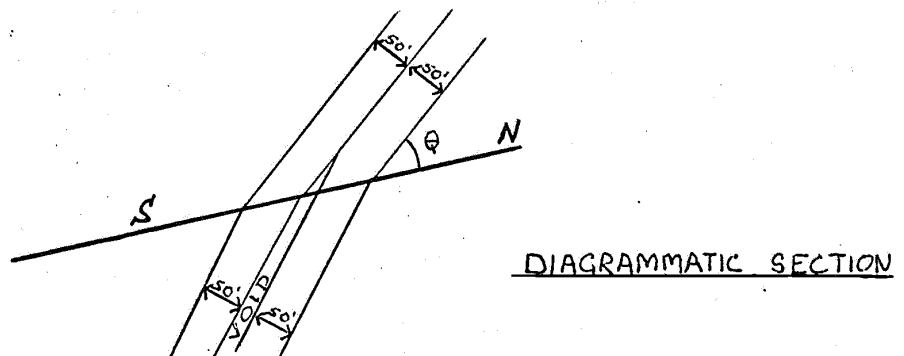


Figure 3.

Tension and the tendency to voids will always occur if the angle Q is less than 90° .

In a natural situation, we would expect combinations of the three effects to occur, giving something like this.

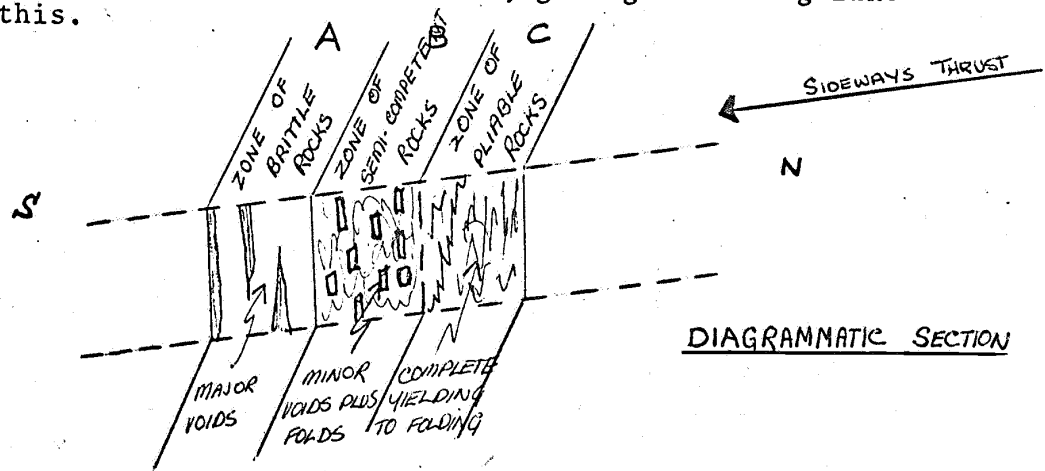


Figure 4.

Such deformation would be due to very large forces, with large blocks of rock masses moving, or trying to

move, over one another. The zone of action would therefore be long, causing very enlongate voids, i.e. voids with very long pitch length.

It can be seen in Figure 3, that a thrust moving a block at an angle of 40° to the bedding plane, can cause a void 20 feet wide in a 100' thick bed by the time a rotation of only 10° in the dip has occurred.

The diagnostic feature of this type of deformation is a wrong way "kink" in the bedding dip, Figure 5.

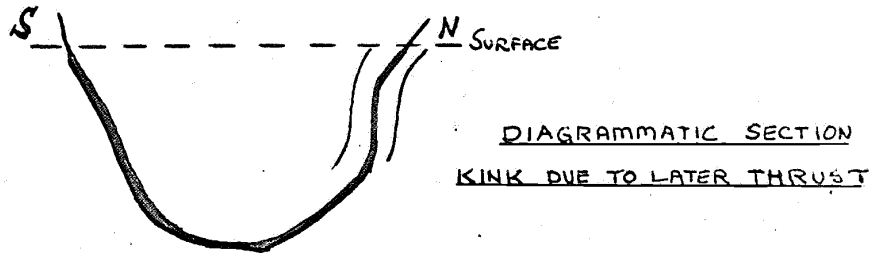


Figure 5.

This is the opposite to a parasitic fold, which is shown diagrammatically in Figure 6.

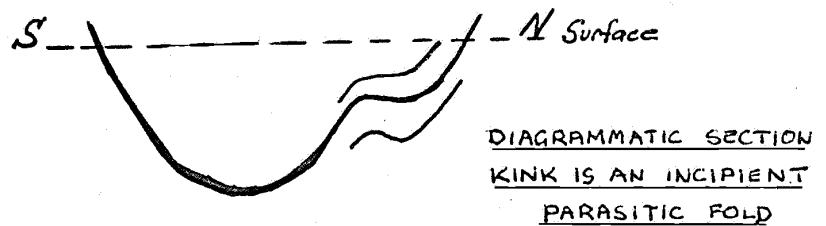


Figure 6.

If the plane or flat zone in which all this deformation is occurring, has a dip component in the strike direction of the beds, then a kink in the bedding strike will also occur. For example, if the kink shown diagrammatically in Figure 5 is caused by a planar deformation which dips away from our view (to the west) then it has a west pitch, and at some place towards us, to the east, it will have a surface expression, as shown in Figure 7.

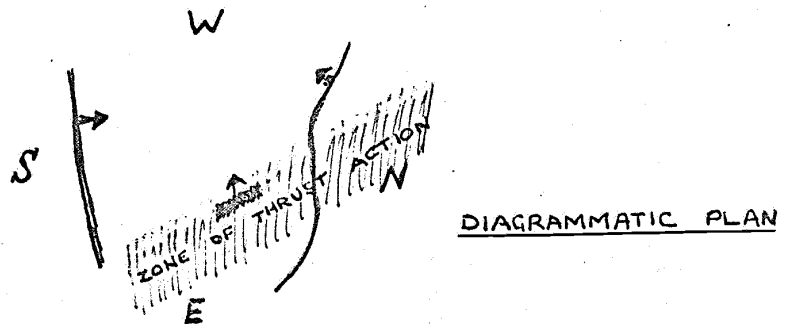


Figure 7.

7. APPLICATION TO BARATTA

I interpret that the vien mineralization seen outcropping at Baratta, as filling of voids caused by this "sideways thrust" mechanism. Veining occurs in zones of steeper than normal bedding.

Unfortunately, we do not appear to have any major veins (or now-filled voids) exposed in the area of outcrop.

The drill holes EU3 and EU4 do not indicate the classic desired situation shown in Figure 8 below.

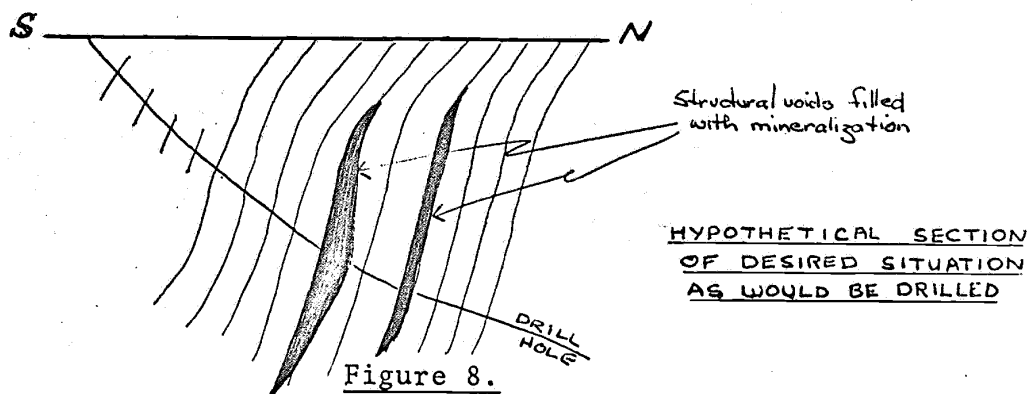


Figure 8.

Note that in this desired situation, the bedding and veins are parallel for a wide zone, but both are generally steeper than average for the area. The bedding does not suddenly steepen immediately adjacent to the zone of veining, which, unfortunately, is the situation in D.D.EU4 (Figure 9).

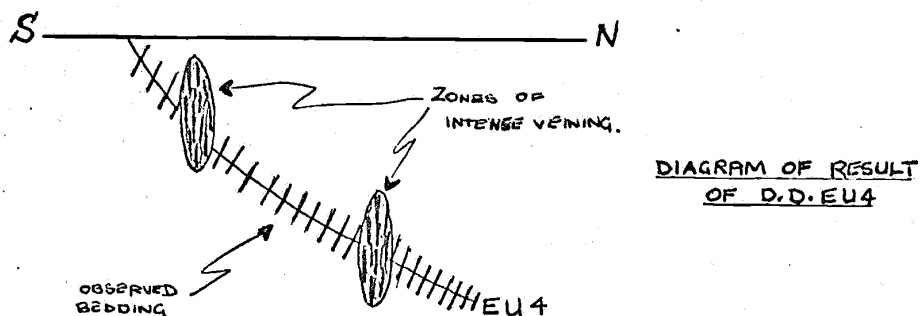


Figure 9.

Also D.D.EU4 did not intersect one, or two, or just a limited number of big veins. It intersected a lot of tiny veins. The grade of the vein-filling material is good, viz 10.6% Pb, 3.4 oz. Ag per ton, and 10.2% Zn. (Section 5(iv)).

What we are really looking for is a solid quartz calcite vein, twenty foot wide, carrying this average amount of lead and zinc.

8. ACTION

Taking the objective in section 7 above, what is there to give us hope that such a thing might exist, and what clues do we look for, to locate it.

My answer to the first is that I see very strong similarities to the Broken Hill ore situation. To see the similarities, it is first necessary to subtract the all post-ore phenomena from Broken Hill. This is difficult, and also involves individual interpretations as to what is "post-ore" at Broken Hill. However, as it is almost universally accepted (and I believe proved) that folding, metamorphism, and some intrusion has occurred at Broken Hill since the ore was formed, it is logical to try to subtract these added phenomena.

Having done this, I see (in cross section) a set of steep tabular orebodies set in bedding plane partings in a zone of steeper than average dips. The present Broken Hill structure is diagrammatically as shown in figure 10 below. It should be noted that even after the severe Willyama stage folding, the unusual non-parasitic kink shape shows through.

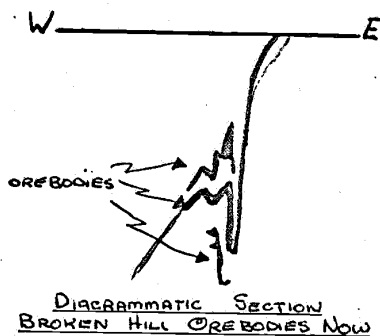


Figure 10.

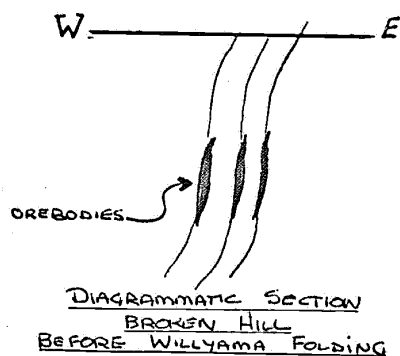


Figure 11.

The surrounding rocks are seen to be banded siltstones, with more siliceous rocks in the vicinity of the orebodies. Minor veinlets of sphalerite, galena and quartz are scattered over a large surrounding zone, but the aggregate quantity of this material outside the orebodies proper is insignificant.

The general analogy could be developed much further, but this is a story of its own.

For purposes of exploration, let us look specifically at "2 lens", or the "Northern Orebody" at Broken Hill.

Unravelling, it would be about 1200 feet from top to bottom, and only about 17 feet thick on average. It would contain galena, sphalerite, and minor chalcopyrite, with the very occasional trace of pyrite and arsenopyrite. Its grade would be about 11% Pb, 4 oz Ag per ton, and 10% Zn. Its gangue would be quartz and calcite, with some bustamite in places. Trace elements would be Bi, Cd, As, Au, Co, Ni, Sb

This body having a thickness 17 feet, and a depth of 1200 feet, is not a very significant size in longitudinal section, being only 2000 tons per sectional foot. However, its colossal length of 22,000 feet down its gentle southerly plunge makes it a 44 million ton orebody. It is this colossal length that makes it what it is.

Such an orebody, pitching at 20° , passing through the surface of the ground, would have an expression 3,500 feet long, and, of course, 17 feet wide. The volume of sulphide mineral within it is small, aggregating 3.5 feet wide.

Therefore, it would be a very poor target for spot vertical drilling - augering or percussion drilling - and also, I believe, a hopeless target for I.P. geophysics. Subsurface testing is only effectively done by means of angle diamond drill holes, at very wide longitudinal intervals.

Therefore, I argue that because such a desired concentration of mineralization does occur in a possibly similar structure at Broken Hill, it is also possible at Baratta.

Because of the bonanza nature of the Broken Hill lodes, it is imperative to take the optimistic view that a similar situation occurs at Baratta.

What clues can we glean to locate the right structure?

I believe that the Eukaby Hill situation investigated so far is the situation of Zone B rocks in Figure 4, namely semi-competent rocks such as siltstones which can be expected to give minor voids accommodated with minor folds.

The theoretical section, Figure 2, indicates that the southern limb of the syncline would be less favourable.

Possibly the northern limb of the syncline, close to the fold axis, where θ is smaller, would be more favourable in that a greater percentage of void exists here.

I believe a much more important factor is the competence of the rocks. A zone of quartzite may be all that is needed to give the required brittle openings. What happens to the hard micro-quartzites mapped in the Siccus River, immediately east of Eukaby Hill?

The main surface indication that can be sought is a gentle kink in strike, in a left hand sense. The zone we are looking for should have a consistent, if only small, steepening of dip, not a zone of minor steepenings and folds.

Such a kink in strike occurs at the southern slope of Eukaby Hill, and also at the eastern end of the Eukaby Ridge. Perhaps the consistent steeper dip required is under the alluvium near the airstrip. The hard micro-quartzites point in this direction, and the greatest density of quartz float mapped so far occurs in this area.

P. S. Forwood.

P.S. FORWOOD
Exploration Geologist

3rd February 1972

ADDENDUM

Since visiting the Baratta field on 10th February 1971, I add the following additions and modifications.

1. As pointed out by geologist Alan King, thrust planes can be observed with a north dip component, and a true dip north-west. This attitude for the major thrust plane/zone is preferable to the south-dipping zone shown in Figure 2.
2. The deformation and required void probably has a gradual beginning and end in the natural geological situation, rather than the sharp angular arrangement shown in Figure 4.

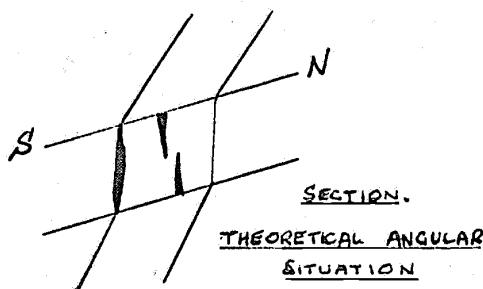


Figure 12

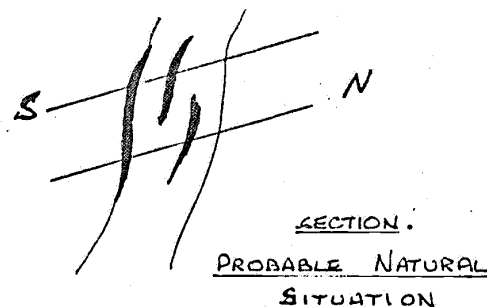


Figure 13.

3. No geology is exposed in the core of the regional syncline. However, the Siccus River adopts pronounced linear directions, which must be geologically controlled. One of these is 15° magnetic. It is, relatively, a "Debavay" direction. It probably is a meaningful component of the whole deformation, but I cannot see how it fits the rest of the pattern at this stage.

S.M.L. 603, EUKABY, S.A.

REPORT FOR QUARTER ENDED 30TH JUNE, 1972

(NOTE: S.M.L. 603 was replaced by S.M.L. 719
with slight revision of shape, on
22nd June, 1972)

GENERAL

Diamond drilling, core scanning, grid pegging, gravity geophysics plus associated levelling and reduction, and minor geological mapping were carried out. An average of three persons were employed in the area.

GEOLOGY

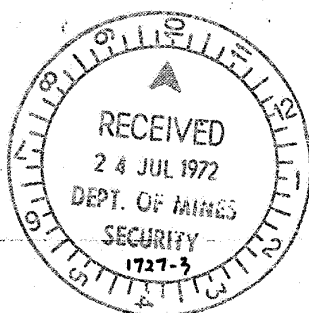
Minor geological mapping was carried out, as easterly and southerly extensions of previous mapping. Also, some previous mapping was checked in the light of recent structural implications.

All information is now shown on Map no. SA/B7, scale 1" = 1,000'. This map follows the general scope of a previous map by Cominco, but all geology in the mineralized area has been completely remapped in a much more accurate fashion.

SURVEYING

Four lines of the new North Broken Hill Limited grid were accurately surveyed and levelled, in preparation for a small gravity survey.

The lines surveyed were:



This hole found numerous traces of lead and zinc sulphide, but no major structural locus for a large body.

It was decided that further wild-cat drilling should be undertaken in the soil covered surrounds of the known mineral field, in order to gather some fresh clues to the structure of the area.

Accordingly, D.D.EU6 was collared at co-ordinate 130E, 23N, depressed 50° to the north (magnetic azimuth 245°). On 30th June the hole had reached 285 feet.

Line 92E from 30N to 60S
Line 20W from 30N to 100S
Line 64W from 00 to 68S
Line 132W from 00 to 80S

Levelling was carried out with an accuracy of less than .04 feet misclosure.

The baseline of the grid was extended to 270E, and lines were established at 130E, 220E and 20N. The old Toolaby grid was tied to the new grid. Aerial markers were established at the following co-ordinates in preparation for local colour aerial photography which has been contracted to Adastral of Sydney.

Aerial markers established at 00, 100E, at 00, 200E, at 00, 250E, at 130E, 50N, at 220E, 50N and at 220E, 100N.

GEOPHYSICS

The four lines specified under "Surveying" above were surveyed with a gravity meter. The unit and operator were loaned by Mines Exploration Pty. Ltd., who also carried out the reductions. Stations were read every 100 feet.

Modelling carried out by them shows that the area is amenable to prospecting by gravity provided a body not less than 20 feet wide under not more than 50 feet of overburden is present. The profiles included with this report show about 20 minor "pimples" which could be anomalies due to slightly lesser or deeper bodies.

No immediate additional geophysical work is planned at this stage.

DRILLING

D.D.EU5, which had been completed in the March 1972 quarter, was logged and geochemically scanned. A vein log of the hole remains to be produced.

PLANS

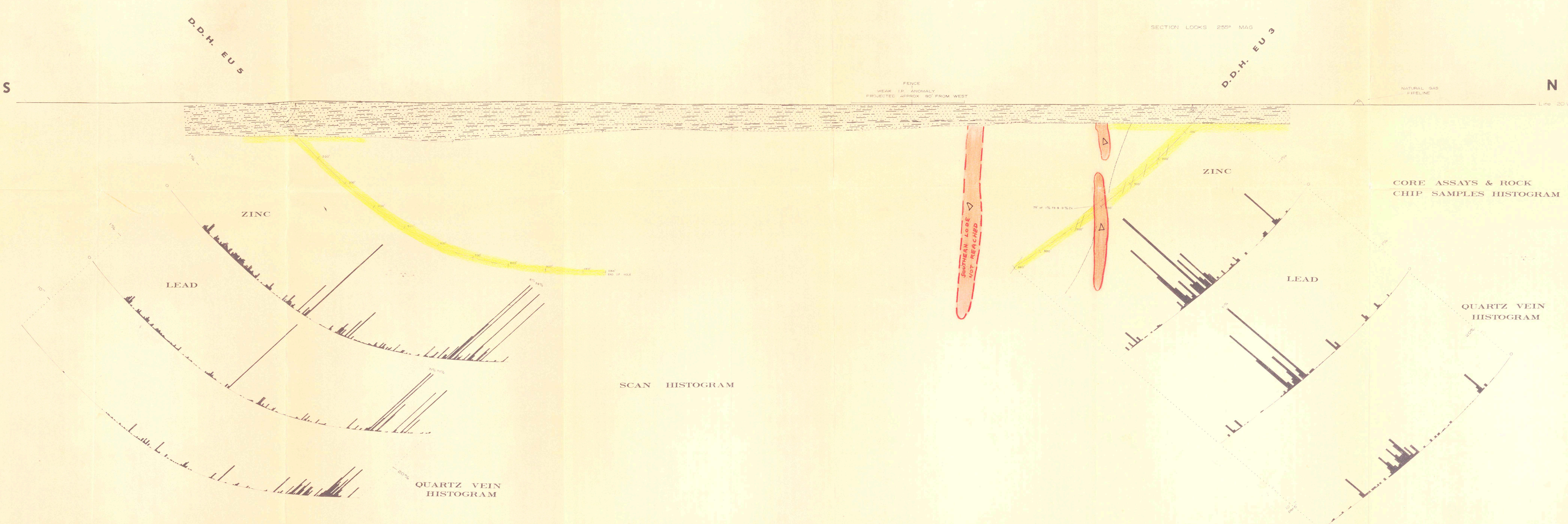
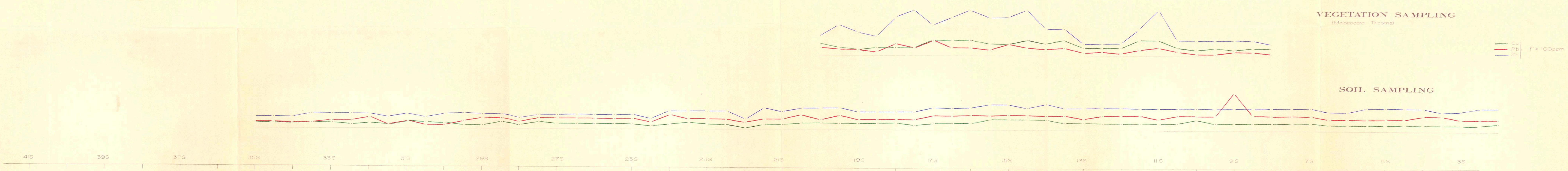
The following plans are enclosed, as part of this report:

SA/B15	D.D.H.EU4 Cross Section	1"=100'
SA/B11	D.D.H.EU5 Cross Section	1"=100'
SA/B20	D.D.H.EU6 Cross Section	1"=100'
SA/B7	Geology Baratta Silver Lead Field	1"=1000'
SA/19	Gravity Survey Profiles	1"=400'
SA/B21	Proposed Aerial Photography	1:50,000

P. S. Forwood

P.S. FORWOOD
Exploration Geologist

PSF:jac





SEMI QUANTITATIVE DISTRIBUTION OF VEIN-QUARTZ FLOAT
EUKABY AREA S.A.

NORTH BROKEN HILL LTD. EXPLORATION DIVISION

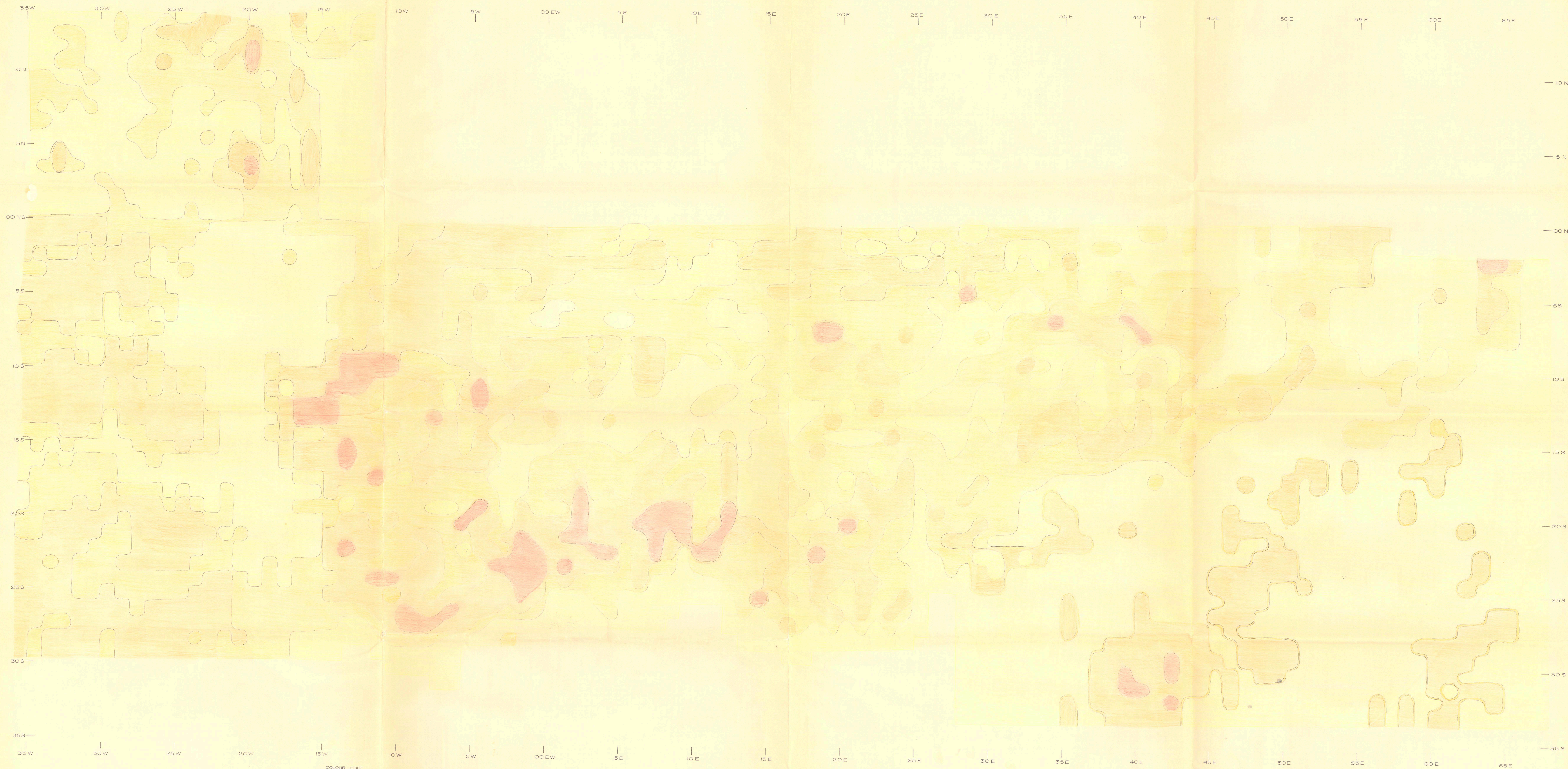
SHEET 1

SHEET RELATIONSHIP	
SHEET 1	SHEET 2

1727(III)-2

Scale: 1" = 200' or 2400

Map No. SA/B17

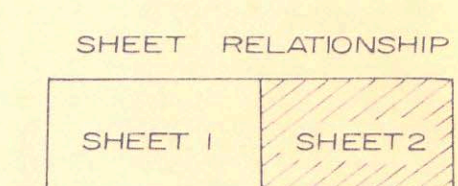


SEMI QUANTITATIVE DISTRIBUTION OF VEIN-QUARTZ FLOAT

EUKABY AREA S.A.

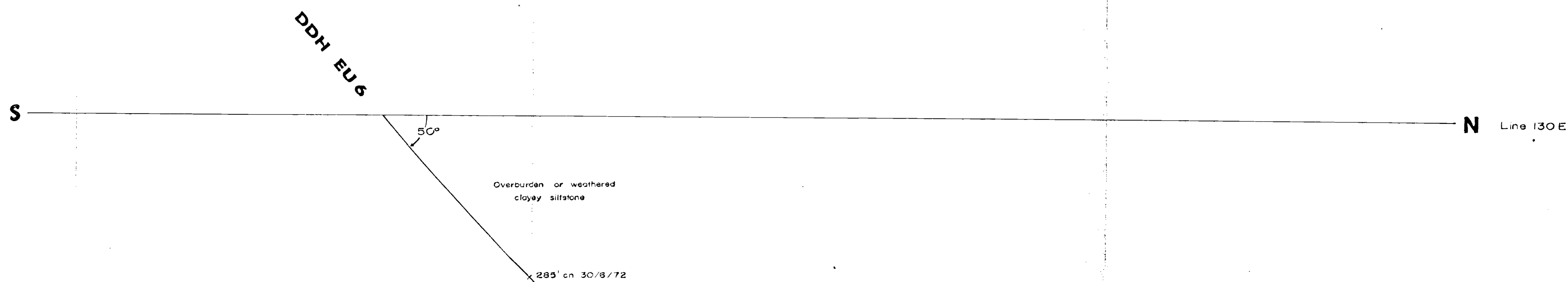
NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

SHEET 2



1727 (III)-3

19 N 21 N 23 N 25 N 27 N 29 N 31 N 33 N 35 N 37 N



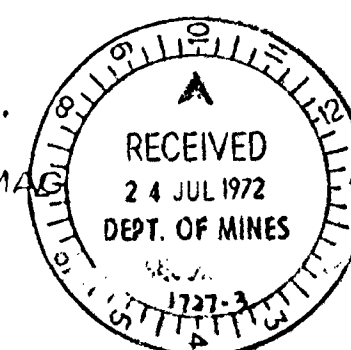
LEGEND

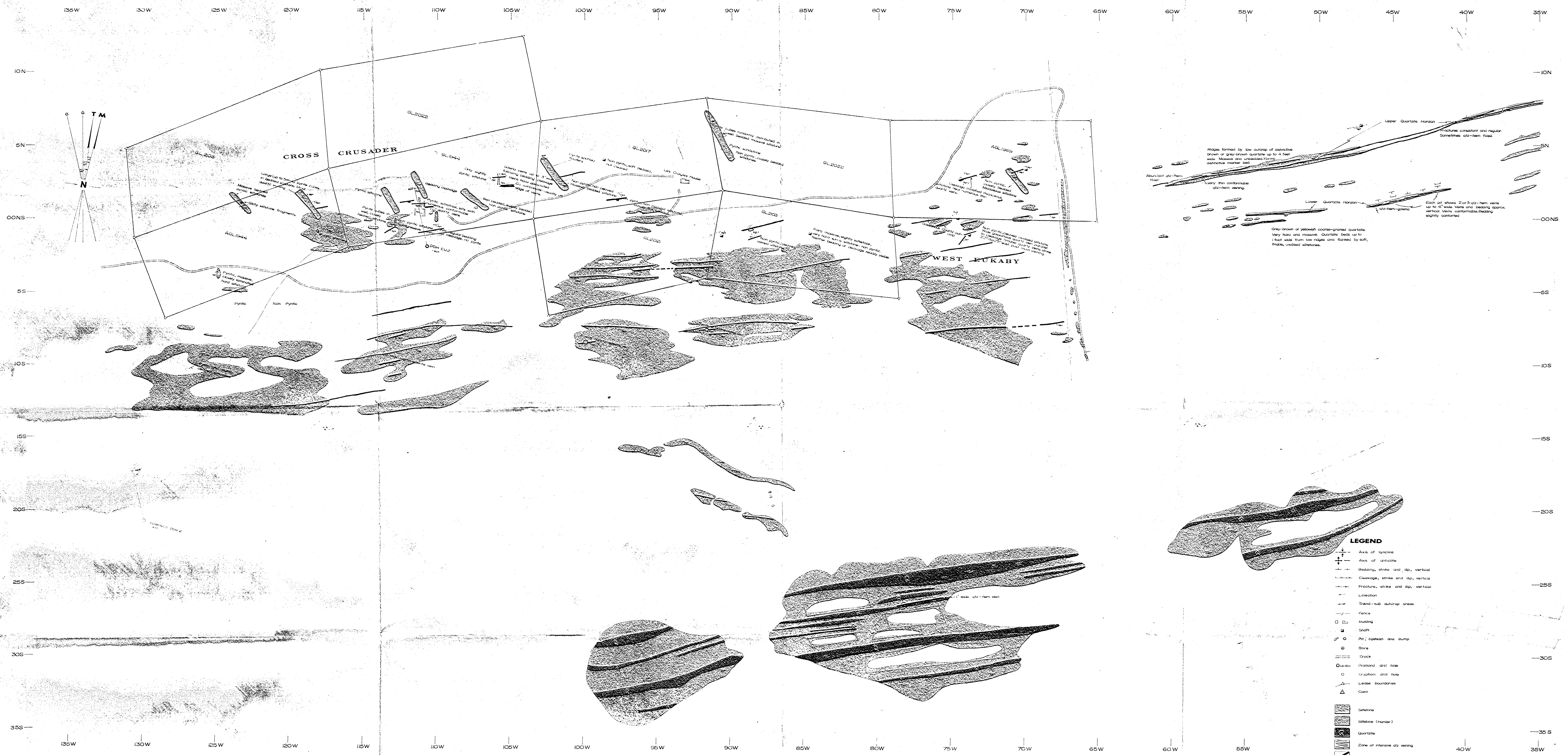
- ☐ Alluvium
- ☐ Siltstone
- ☐ Lode veins

DDH EU-6
EUKABY SILVER LEAD FIELD, S.A.

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

NB--SECTION LOCKS 255° MAG



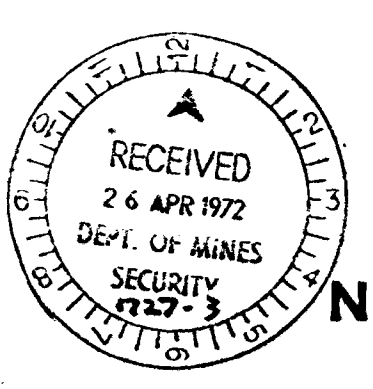


DETAILED GEOLOGY
EUKABY AREA S.A.

NORTH BROKEN HILL LTD. / EXPLORATION DIVISION

SHEET 1

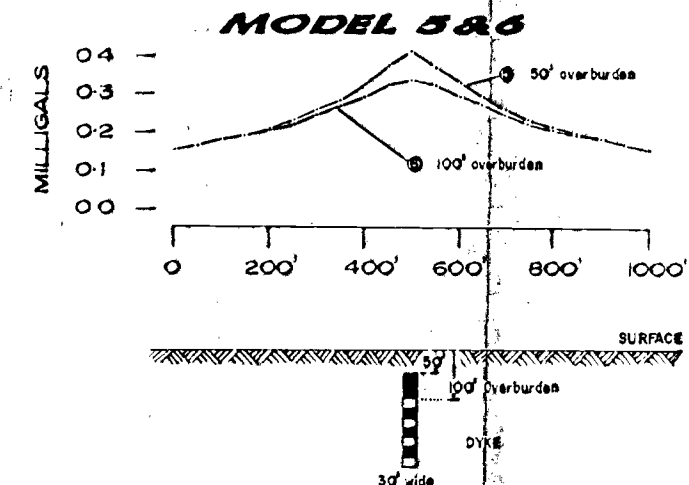
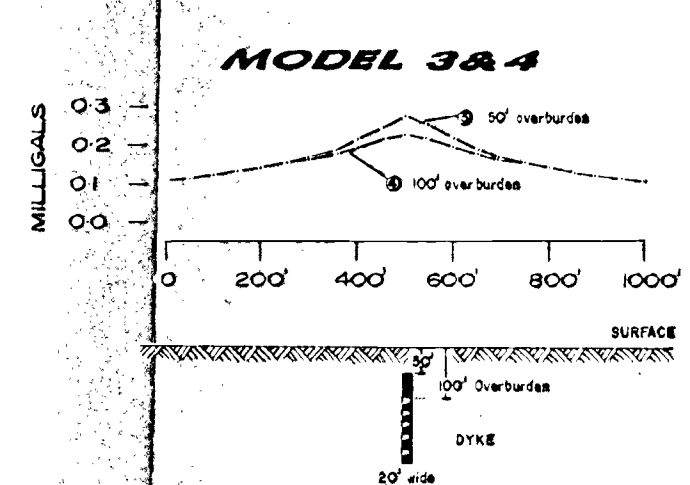
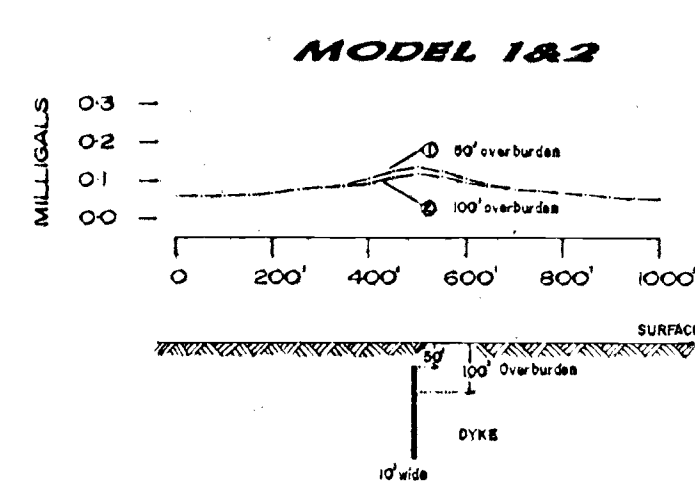
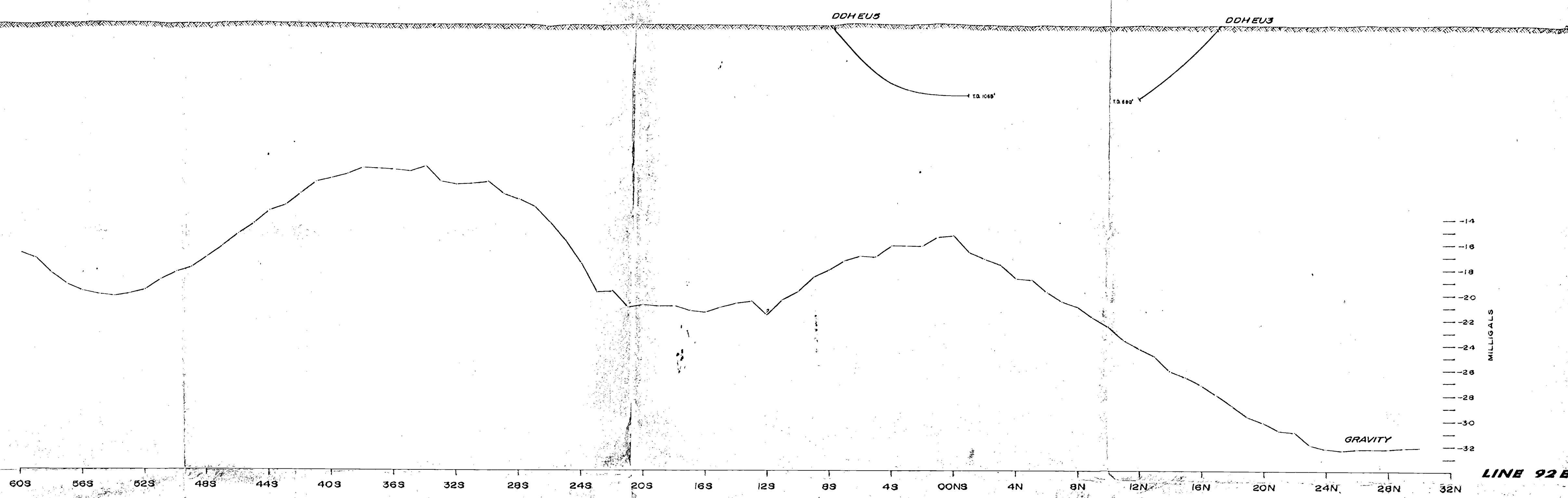
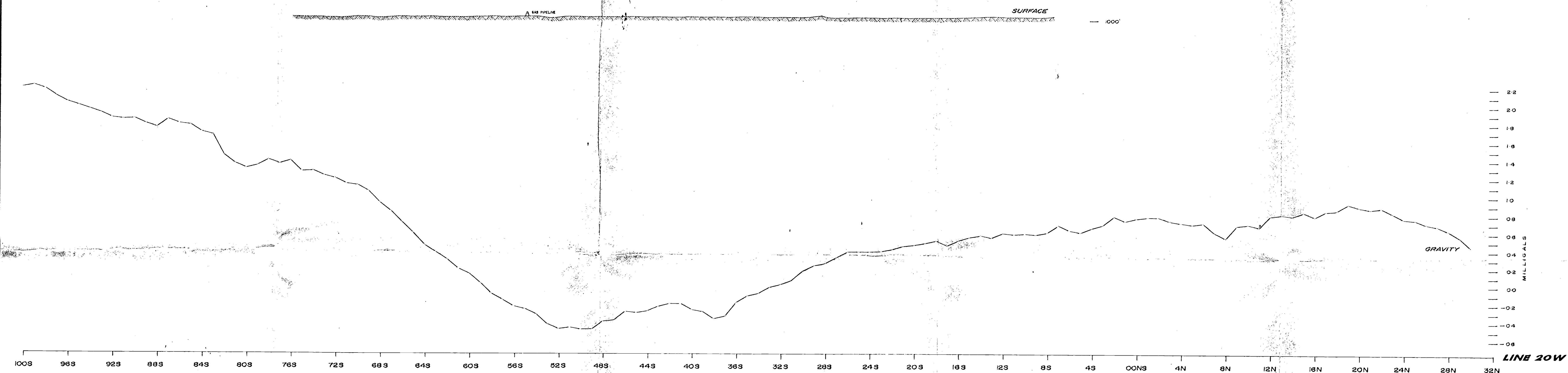
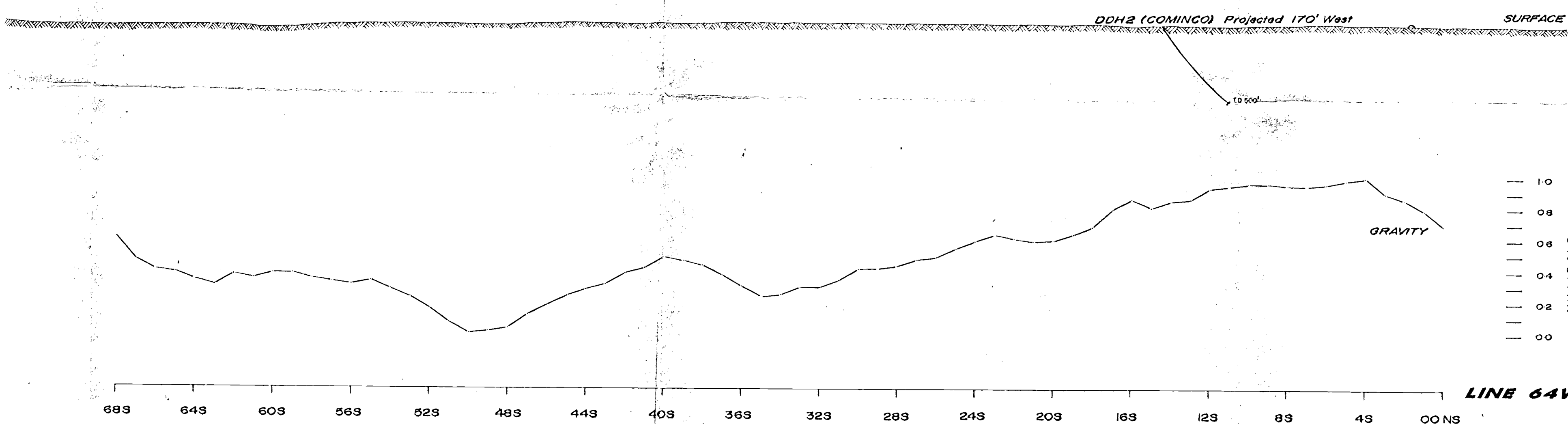
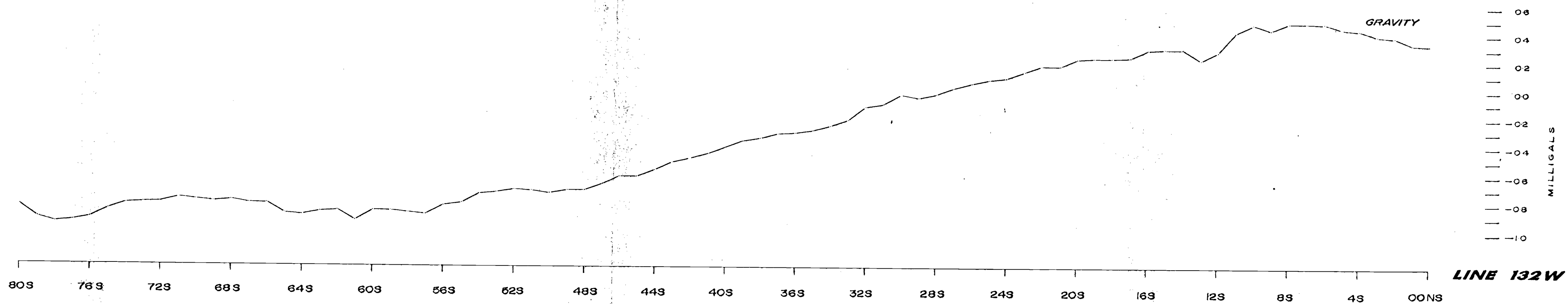
SHEET RELATIONSHIP	
SHEET 1	SHEET 2



1727 (III)-5 Scale 1" = 200' or 2400'

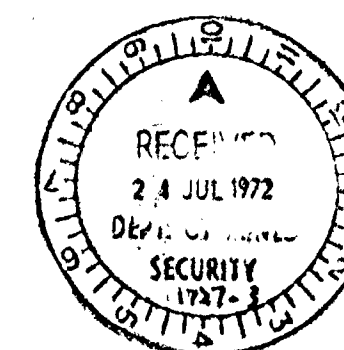
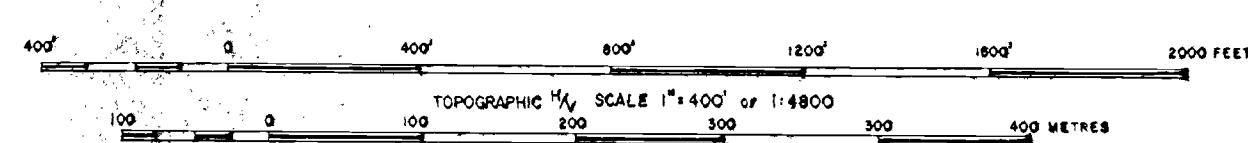
LEGEND

- Axis of syncline
- Axis of anticline
- Bedding, strike and dip, vertical
- Cleavage, strike and dip, vertical
- Fracture, strike and dip, vertical
- Lamination
- Trend-sub outcrop areas
- Fence
- Building
- Shaft
- Pit, copelan and dump
- Bore
- Druck
- Diamond drill hole
- Cryphon drill hole
- Lease boundaries
- Com
- Siltstone
- Siltstone (harder)
- Quartzite
- Zone of intensive qtz veining
- Quartz vein



- SOURCE: Vertical dyke of infinite strike, S.G. constant 0.9 gms/cc. Centred at 500' station of section, and striking perpendicular to section.
- ① 10' wide, 50' overburden
 - ② 10' wide, 100' overburden
 - ③ 20' wide, 50' overburden
 - ④ 20' wide, 100' overburden
 - ⑤ 30' wide, 50' overburden
 - ⑥ 30' wide, 100' overburden

GRAVITY SURVEY PROFILES **EUKABY AREA S.A.** **NORTH BROKEN HILL LTD. / EXPLORATION DIVISION**



1727(III)-6

Map No. 9A/B19