

**EXPLORATION
DEPARTMENT**

EXPLORATION LICENCE

EXPLORATION LICENCE 12/78

SCAMANDER, TASMANIA

REPORT FOR OCTOBER, 1979

79-1398



**THE BROKEN HILL PROPRIETARY
COMPANY LIMITED AUSTRALIA**

79-1398

123D

EXPLORATION LICENCE 12/78SCAMANDER, TASMANIAREPORT FOR OCTOBER, 19791. GENERAL

E.L. 12/78 of 276 square kilometres was granted to the B.H.P. Co. Ltd. on 26th September, 1978 and renewed for six months on 15th March, 1979. An application for renewal of the licence for a further six months was lodged on 15th September, 1979.

2. WORK COMPLETED2.1 Soil Sampling

Soil sampling of the grid at the North Scamander prospect was completed during the month. A total of 481 samples have been submitted to Australian Laboratory Services in Brisbane for analysis for tin, tungsten, copper, lead, zinc and silver.

2.2 Rock Chip Sampling

Eight rock chip samples from gossan outcrops and dumps around the recently located shaft at North Scamander were also despatched for assay.

2.3 Petrology

Petrological descriptions of eight samples submitted to AMDEL are attached. A considerable amount of secondary carbonate (possible siderite?) was found in some of the rocks. These rocks did not react to acid during routine logging.

2.4 Geophysics

During October, four IP dipole dipole traverses, one gradient array IP traverse and four Sirotem traverses were carried out within E.L. 12/78. Three aeromagnetic anomalies in the vicinity of North Scamander were followed-up with ground magnetics.

3. EXPENDITURE

Expenditure debited to E.L. 12/78 during October, 1979, was :

OPEN FILE

2.

Wages and Salaries	\$ 270
Fares and mobilisation	286
Geophysics	3,171
Surveying/Aerial Photographs	56

	\$3,783

Total expenditure to 31st October is \$60,853.

This report is submitted to the
Mines Department as required by
Schedule A of Exploration Licence
12/78.

002

123004

APPENDIX 1

NORTH SCAMANDER PROSPECT

SUMMARY OF PETROGRAPHIC DESCRIPTIONS

No.	Name	Est. Composition %	Notes
17	Quartzite breccia	Qtz : 75 Chl : 7 Zircon : tr Mag : 15-20 Cp : 1-2 Py : tr	chloritized, silicified bx; frags to several cm in chl-mag-cp matrix; minor geothite, hematite.
18	Quartzite breccia	Qtz : 75 Chl : 12 Carb : 4 Rutile : tr Galena :) Sphal : 5 Cp :)	magnetic but no magnetite in section; carbonate is probably Pb/Zn; cp in carb, less in sph. Sphal. dissem as well as in matrix.
19	Massive ironstone	Mag : 55 Sph : 20 Gal : 10 Carb : 10 Chl : 3 Qtz : 1	magnetite brecciated later introd. of Pb,Zn; carbonate and chlorite in matrix.
20	Sandstone/quartzite	Qtz : 70 Seric : 15 Carb : 10-15 Musc : tr Heavy Min : tr Opauques : 2	widely distributed fine carbonate said to be secondary; carbonate rich veinlets; po and sph in veinlets; minor cp and galena possible silicification, seticitization.
21	Quartzite breccia	Qtz : 75 Opauques : 10 Chlorite : 10 Carbonate : 3-5 Sec. : -1 Apatite : tr	1.5cm frags in a chl-carb-sulphide matrix; sl. argillaceous sandstone recryst, silicified chloritized; opaques mostly chalcopyrite, less sp, gal., minor magnetite.
22	Sandstone	Qtz : 75 Seric : 10-15 Carb : 7 Musc : tr Pyr : 5 H.M. : tr	altered sandstone, no chlorite minor carbonate; possible silic'n; all carb consid secondary.
23	Brecciated Sandstone	Qtz : 75 Chl : 7 Carb : 3-5 Opauques : 15 H.M. : tr	brecciated sst/qzite as above; carb, chl dissem; chl also in vnlt; magnetite with carbonate, minor cp, pyr, sphal.; poss. silic'n.
24	Argillaceous Sandstone	Qtz : 55 Seric : 25 Carb : 15-20 Chl : 2 Opauques : tr Musc : tr H.M. : tr	metam. argillaceous rock; more serite than others; abundant sec. carbonate in patches and in vnlt with chlorite; minor gal, sph, cp, mag, trace dissem pyrite.



The Australian
Mineral Development
Laboratories

1003
100 Street, Frewville,
South Australia 5063
Telephone Adelaide 79 1662
Telex AA 82520

Please address all
correspondence to
Box 114 Eastwood
SA 5063
In reply quote:

amdel

18 October 1979

GS 3/4/15/0

The Broken Hill Proprietary Co. Ltd.,
GPO Box 1140L,
HOBART, Tas. 7001.

Attention: R. Hine

REPORT GS 1337/80

YOUR REFERENCE:	T610/G250
MATERIAL:	24 rocks
LOCALITY:	Tasmania
IDENTIFICATION:	I-24
DATE RECEIVED:	18 September 1979
WORK REQUIRED:	Petrography and mineragraphy

Investigation and Report by: Dr Brian Steveson

Manager, Geological Services Division: Dr Keith J. Henley

Keith Henley

for Norton Jackson,
Managing Director.

cc BHP Exploration,
GPO Box 86A,
Melbourne, Vic.
Attention: Dr A. Goode,
Mr T. Hope

Plant: Osman Place
Thebarton S.A.
Telephone 43 8053
Research Laboratory: Perth

meo/44

Sample: 17; TS42217; PS28073

Rock Name:

Brecciated and chloritized sandstone

Hand Specimen:

This is a dense, dark rock and the cut surface shows fragments of a relatively pale grey material several centimetres in size. Between these is a fracture-filling, dark, metallic phase.

Thin Section:

An optical estimate of the constituents gives the following:

	<u>%</u>
Quartz	75
Opagues	15-20
Chlorite	7
Zircon	Trace

The sample consists of a sandstone or quartzite which forms equant fragments. Between these are secondary opaques and chlorite. The latter also occurs to a small extent in the sandstone.

The sandstone lithology consists of a more or less granular mosaic, largely of quartz. In many places there are quartz crystals 0.1 to 0.4 mm in size which pseudomorph original detrital grains in that they are equant and, in places, even rounded. These grains comprise approximately 50% of the rock. Between them there is finer-grained quartz material intergrown, in many places, with chlorite. This finer-grained material (average grain size less than 0.03 mm) is either recrystallized, fine-grained, original matrix or it has replaced the original material completely. The latter interpretation is probably more likely and it is thought that the sample has been not only chloritized but also silicified. As far as can be determined from the thin section, the original sandstone was a homogeneous lithology and probably relatively mature since there is evidence of rounding, and probably sorting of the grains. The only evidence of any non-quartz fragments is the presence of some fine-grained mosaics which may be quartz after original chert fragments. Within the sandstone chlorite forms patches and aggregates of flakes generally not more than 0.1 mm in size.

Between the fragments of sandstone is material consisting largely of opaques but also with a considerable amount of chlorite. Patches of chlorite here are up to about 0.5 mm in size and the chlorite is a characteristic pale green variety with anomalous interference colours. The chlorite generally occurs in rather complex and fine-grained intergrowths with the opaques, grading away to patches which are wholly either opaque or chlorite. As can be seen in the hand specimen many of the aggregates of the opaques are several millimetres in size and they have fairly fine-grained intergrowths where they abut against the sandstone. There is a tendency near the aggregates of opaques for the opaques to form in intergranular spaces between original quartz grains.

Polished Section:

It can be seen in the polished section that the principal phase is

005

magnetite and this forms the bulk of the large patches between the sandstone fragments. Associated with the magnetite and characteristically forming near the edges of the large aggregates, are crystals of chalcopyrite up to 0.15 mm in size. Chalcopyrite shows a little alteration and tends to be rimmed with goethitic material. Chalcopyrite probably comprises about 1-2% of the area of the polished section. Very minor components of the section are pyrite, goethite and hematite.

Sample: 18; TS42218; PS28074

Rock Name:

Silicified and chloritized sandstone

Hand Specimen:

The bulk of the rock is grey, aphanitic material tinged with green in places. On one part of the thin section, however, there are black fracture-filling aggregates and these, too, have dark green chloritic material. In general, therefore, the sample is similar to sample 17.

Thin Section:

An optical estimate of the constituents gives the following:

	<u>%</u>
Quartz	75
Chlorite	12
Opagues	10
Carbonate	4
?Rutile	Trace

The rock is essentially similar to sample 17, apart from the fact that this sample contains a little secondary carbonate.

The bulk of the rock is a more or less granular quartzite, probably representing a silicified type of sandstone. There are round to sub-round grains or pseudomorphs of grains commonly 0.2-0.4 mm in size. For the most part, however, these are not as well defined as in sample 17 and the rock has more of an equigranular texture with some variations in crystal size from place to place. In one part of the section, for example, there are quartz crystals as much as 0.8 mm in size closely associated with some less than 0.05. All the quartz shows somewhat undulose extinction and it has probably been recrystallized during a period of stress. There are sufficient rounded crystals/grains to indicate that the material is a sandstone which has probably been both metamorphosed and silicified.

There are small amounts of chlorite widely scattered throughout the sandstone and, in some cases, these occur in intergranular/intercrystal spaces and this texture, in itself, gives the rock the appearance of a sandstone. Most of the chlorite in fact occurs in fairly large aggregates where it is associated with the opaques and the carbonates. Clearly these three minerals have been introduced into the rock together. The chlorite is a green variety with greenish to rather characteristic yellow birefringence shades. The most common association between the three secondary minerals is that the opaques form the centre of the patches of secondary material and they are more or less surrounded successively by carbonate and then by chlorite and the chlorite extends out into the adjacent sandstone. In some places there are patches of carbonate in the sandstone, also, but, as indicated above, there is a strong spatial association between the opaques and the carbonate.

Polished Section:

The polished section contains part of a vein and opaque minerals are concentrated in this. No magnetite was seen in the polished section, even though the hand specimen is clearly quite magnetic. It therefore appears that, apart from the minerals described below, the sample also

007

contains some magnetite, probably in a similar paragenetic position and texture to the magnetite in sample 17. The polished section contains one elongate patch of sulphide minerals clearly associated with some kind of vein activity. The most abundant mineral in this vein is galena with subordinate amounts of sphalerite and a little chalcopyrite. The three minerals together probably comprise about 5% of the area of the polished section. Aggregates of galena are of the order of 1-2 mm in size, whereas the largest patch of sphalerite is about 0.3 mm. These two minerals occur together in rather complex, granular intergrowths extending out to larger aggregates. The chalcopyrite occurs partly as minute inclusions in sphalerite but mainly as discrete crystals ranging in size up to approximately 0.08 mm in size. Most of the chalcopyrite occurs with non-opaque minerals and only a small amount is enclosed in sphalerite.

Widely dispersed throughout the bulk of the rock are small amounts of sphalerite and a mineral tentatively identified as magnetite. There are also some patches of ?carbonate which enclose numerous, minute inclusions of chalcopyrite.

The sample is some kind of sandstone or quartzite which has probably been partly silicified. Subsequently, there has been the introduction of lead, zinc and copper sulphides associated with veins. Secondary minerals associated with these sulphides are chlorite (which is relatively abundant) and a smaller amount of carbonate. The carbonate tends to be spatially associated with the opaques and it is possible that it is either a zinc or lead carbonate rather than one of the commoner calcium or magnesium varieties.

Sample: 19; TS42219; PS28075

Rock Name:

Magnetite-rich rock

Hand Specimen:

This is a black, dense, metallic rock essentially massive and black in colour. The cut surface shows the presence of a brown mineral which is probably sphalerite.

Thin and Polished Sections:

An optical estimate of the constituents gives the following:

	<u>%</u>
Magnetite	55
Sphalerite	20
Galena	10
Carbonate	10
Chlorite	3
Quartz	1

The mineral proportions listed above are derived from both the thin and polished sections; the two sections will be described together since the sample contains so much opaque material.

Magnetite and sphalerite are difficult to distinguish in the polished section but where they occur together it can be seen that the sphalerite has a somewhat bluer colour than the magnetite. The magnetite also has a characteristic texture in that it forms crystals or aggregates of crystals about 0.1-0.3 mm in size and these are separated from each other by narrow veinlets or zones of non-opaque material (principally carbonate). Many fields of view in the polished section therefore consist of about 80% of magnetite with minor carbonate and trace amounts of galena and sphalerite. The texture of the magnetite therefore appears to be that of a brecciated material and the carbonate and the lead and zinc sulphides have been introduced subsequently. Sphalerite itself forms some relatively large patches as much as 1 mm in size and apart from a few inclusions of galena these tend to be notably clear in contrast to the remainder of the rock which is fine-grained. Sphalerite and galena generally occur together except in those places where galena is found in fractures between the magnetite. The largest aggregates and crystals of galena are, however, associated with the sphalerite and some of these are as much as 0.2 mm in size. Possibly about half of the galena occurs as distinctly smaller grains dispersed with the magnetite and the non-opaques.

The non-opaque minerals occur in a vein system which forms a network generally around the magnetite crystals. The most abundant mineral here is a carbonate and this forms crystals and elongate patches no more than 0.1 mm in size. The sphalerite can often be distinguished in the thin section and it forms more massive aggregates notably free from carbonate minerals. Chlorite occurs with the carbonate in places and there are aggregates of chlorite up to 0.3 mm in size. A little chlorite also occurs with the aggregates of sphalerite.

The rock consists very largely of magnetite and almost entirely of magnetite and sulphide minerals. To this extent, therefore, it is not possible to indicate the nature of the original rock since no

textures are preserved. The magnetite appears to have been brecciated and subsequently a carbonate mineral and chlorite have been introduced. To that extent, therefore, the sample is similar to the silicified and mineralized sandstones described above. In this rock there is fairly abundant sphalerite and galena.

Sample: 20; TS42220; PS28076

Rock Name:

Partly altered sandstone

Hand Specimen:

This is a grey, siliceous rock with a characteristic, irregular fracture. The sample is grey, apart from one place where there is a cross-cutting veinlet of a dark colour.

Thin Section:

An optical estimate of the constituents gives the following:

	<u>%</u>
Quartz	70
Sericite	15
Carbonate	10-15
Opagues and semi-opagues	2
Muscovite	Trace
Heavy minerals	Trace

The sample is a sandstone which now consists of remnants of detrital quartz separated by fine-grained quartz and sericitic material. Also present is secondary carbonate.

Quartz in the rock is present generally as equant crystals not more than 0.3 mm in size. Some of the grains about 0.2 mm in size have partial rounded outlines and are clearly pseudomorphs after original detrital grains, but much of the material is granular and interlocked and it is clear that the quartz has been largely recrystallized. Associated with the finer-grained quartz are patches of sphene and individual flakes of sericitic material. This, and fine-grained quartz, comprise probably at least 20-25% of the volume of the rock. Clearer patches of granular fine-grained quartz are probably derived from original chert fragments. A secondary component of this part of the rock is widely distributed carbonate which is present in inter-granular and inter-crystalline films associated with the sericite and also occurs as irregular, discrete crystals. The latter are generally not more than about 0.1 mm in overall dimension.

Most of the carbonate in the thin section occurs, however, in a cross-cutting veinlet which is 1-2 mm in width. This veinlet consists almost entirely of fine-grained carbonate in a granular mosaic. There are patches of opaques and sericitic material associated with the carbonate and in a few places a mineral tentatively indentified as chlorite. The veins clearly represent introduced material in the same way as the carbonate and chlorite in other rocks from this group.

There is a quartz vein in the thin section but this is only about 0.4 mm in width and it consists of clear, coarse-grained quartz aligned, in places, at right angles to the length of the vein. Some of the coarser-grained opaque material in the thin section is associated with this quartz veinlet.

011

Polished Section:

The polished section contains about 2-5% each of pyrrhotite and sphalerite and a somewhat smaller amount of chalcopyrite. Most of the sulphide is associated with the vein of carbonate and both pyrrhotite and sphalerite form rather porous aggregates up to about 0.5 mm in size. The two minerals are commonly closely associated with each other and pyrrhotite forms both discrete monomineralic aggregates and also occurs as granular intergrowths with the sphalerite and as inclusions within this mineral. There is a considerable amount of extremely fine-grained pyrrhotite widely distributed throughout the carbonate, also. Chalcopyrite is spatially associated with sphalerite and pyrrhotite (rather more with the latter than with the former) and generally does not form crystals or aggregates more than approximately 0.05 mm in size. The chalcopyrite does not form minute inclusions in sphalerite as in other samples in this collection and as is commonly seen in other samples with this sulphide assemblage.

In the remaining parts of the rock (i.e. those with abundant quartz) opaques are very widely distributed and generally consist of small aggregates of sphalerite and trace amounts of fine-grained pyrrhotite only. In one place where sphalerite occurs in a small, subsidiary vein system it contains minute inclusions of pyrrhotite and a mineral tentatively identified as galena.

This sample is probably a somewhat argillaceous sandstone which has been extensively altered. This has resulted in some recrystallization of quartz (and possibly silicification) and the alteration of original intergranular clay to sericitic material. The rock contains secondary carbonate, both widely distributed and in a broad vein system. Within this vein there is also a smaller amount of chlorite, pyrrhotite, sphalerite and chalcopyrite. The sulphide minerals are invariably associated with veins of either carbonate or quartz.

Sample: 21; TS42221; PS28077

Rock Name:

Mineralized and altered sandstone

Hand Specimen:

This is a dark grey rock showing a breccia-like texture. This is seen particularly on the cut surface where there are fragments up to about 1.5 cm in size. These are aphanitic and they occur in a mottled, darker matrix. The sample is speckled with fine-grained pyritic spots.

Thin Section:

An optical estimate of the constituents gives the following:

	<u>%</u>
Quartz	75
Opagues	10
Chlorite	10
Carbonate	3-5
Secondary minerals	1
Apatite	Trace

The sample is similar to others in this group in that it consists of a sandstone within which are minor amounts of carbonate and chlorite. The rock also contains abundant, large patches of carbonate, opaques and chlorite and the mineralization is clearly associated with veins and fracture-fillings of these secondary minerals.

The sandstone now consists very largely of quartz in a more or less granular mosaic. Remnants of original grains can still be seen and these are present as crystals ranging in size commonly up to about 0.25 mm. Such crystals show evidence of originally having been fairly well rounded grains. For the most part, however, the quartz forms an interlocked mosaic of equant but angular and irregular crystals. In some places there are almost approaches to a grano-blastic mosaic with simplified crystal boundaries and the development of triple-point junctions. The material is probably some kind of slightly argillaceous sandstone which has been partly recrystallized and, possibly, silicified. Within the blocks of sandstone there is widely scattered carbonate and chlorite generally forming very irregular and wispy aggregates not more than 0.1 mm in size. These aggregates may have replaced original argillaceous matrix but it is at least as likely that they represent secondary minerals introduced into the sandstone during, or soon after, a period of brecciation.

For the most part the secondary minerals chlorite, carbonate and opaques occur together in irregular but fairly large and contiguous aggregates and in places these are clearly spatially associated with vein or fracture fillings. In general, the opaques form in the centre of these aggregates of secondary minerals and the chlorite around the periphery. In many places the opaques form elongate crystals in ill-defined, radiating aggregates. Cross-cutting veinlets (probably somewhat later than the brecciation) generally contain carbonate and opaques rather than chlorite. One cross-cutting vein contains a distinctive aggregate of quartz crystals at the margin and a central core of chlorite and a brown secondary mineral which is probably some kind of iron-stained phyllosilicate or

013

chlorite. The presence of this vein indicates that there has been mobilization of quartz and it is consistent with silicification of the original sandstone.

Polished Section:

The principal opaque mineral is chalcopyrite and there are smaller amounts of sphalerite, galena and iron oxide. In the bulk of the polished section the principal opaque phase is chalcopyrite with minor sphalerite and these minerals occur widely and randomly distributed, but generally form crystals not more than about 0.05 mm in size. The bulk of the opaque minerals in the rock occur in a few places in vein systems. Here, there are aggregates of chalcopyrite more than 1 mm in size forming rather irregular but equant aggregates. For the most part the chalcopyrite appears to be associated with carbonate. Also present in this part of the section, however, are relatively small crystals of sphalerite and galena (not more than 0.05 mm in size usually). Spatially associated with the coarse-grained chalcopyrite is a zone of more finely disseminated material and this passes out to the bulk of the rock with only a few crystals of chalcopyrite. Magnetite is not abundant in the polished section although the hand specimen does react to a hand magnet. There are a few aggregates of fine-grained magnetite in which contiguous aggregates are not more than about 0.03 mm in diameter. Some fine-grained chalcopyrite is associated with the magnetite, but this is a minor mineral assemblage as compared with the abundance of sulphides in the vein system.

The sample is similar to others described immediately above and it is some kind of sandstone which has probably been silicified and mineralized with the intrusion of sulphide minerals, chlorite and a carbonate.

01A

Sample: 22; TS42222; PS28078

Rock Name:

Altered and mineralized sandstone

Hand Specimen:

This is a massive, siliceous rock with a grey colour. The sample shows none of the breccia-like textures observed in others in this collection. As far as can be determined the sample is massive and compact and it is speckled with spots of pyritic material.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Quartz	75
Sericite	10-15
Carbonate	7
Opagues	5
Muscovite	Trace
Heavy minerals	Trace

The sample is a homogeneous, massive sandstone which contains randomly distributed aggregates of opaque material.

The bulk of the rock consists of a somewhat altered and recrystallized sandstone in which there are relics of original grains embedded in fine-grained quartz and sericite probably derived from an original argillaceous matrix. It is not possible to say with certainty that the sample has undergone silicification, but it is possible that silica has been introduced into the rock and now forms part of the fine-grained intergranular material. The relics of quartz grains are 0.15-0.3 mm in size and many are extremely well rounded and equant in shape. Others appear, rather, to be pseudomorphs of such well rounded grains and there is a range towards equant but distinctly angular grains in a more or less granular and interlocked mosaic. This grades down to the fine-grained granular material in which quartz is intergrown with sericitic matter. As this description will indicate, the sample is therefore best regarded as being a recrystallized sandstone with a texture which, in effect, pseudomorphs the texture of original sandstone, although it is likely that all intergranular material (and possibly some of the grains) has been recrystallized. The fine-grained material has an average crystal size of the quartz probably of about 0.06 mm but there are fairly wide variations and some of the material is obscured by very fine-grained sericite. This latter mineral forms monominerallic patches which are ragged and commonly elongate; also present are films and very small aggregates of a few sericite flakes. A minor component of the sandstone is pseudomorphs after chert. These form very fine-grained siliceous patches commonly about 0.2 mm in size.

Dotted throughout the quartz and sericite are patches of a carbonate mineral. These patches are not generally more than about 0.3 mm in size and they invariably consist of ragged carbonate and there is a gradation down to a single carbonate crystal about 0.05-0.1 mm in size. The carbonate appears to have replaced material in the altered sandstone and is regarded as being totally a secondary mineral.

015

123017

Polished Section:

A characteristic feature of the rock is the presence of large spots of opaques. In the polished section it can be seen that these consist virtually entirely of pyrite and many are present as subhedral crystals 1-2 mm in size. In the remainder of the rock sulphides occur as very small crystals less than 0.02 mm in size and chalcopyrite and sphalerite are about equally abundant. Each of these minerals probably comprises less than 1% of the total volume of the sample. The minerals tend to occur together but there are no complex intergrowths. A little sphalerite occurs with the large aggregates of pyrite but, in general, the pyrite appears to have a somewhat different genesis from the finer-grained and more widely disseminated chalcopyrite and sphalerite.

This is an altered sandstone similar to those described above, apart from the fact that there is no chlorite in the rock and a smaller amount of carbonate.

016

Sample: 23; TS42223; PS28079

Rock Name:

Mineralized and altered sandstone

Hand Specimen:

This is a dark, essentially aphanitic rock with a breccia-like texture. Some of the intergranular material is dark and metallic-looking and shows considerable magnetism.

Thin Section:

An optical estimate of the constituents gives the following:

	<u>%</u>
Quartz	75
Opagues	15
Chlorite	7
Carbonate	3-5
Heavy minerals	Trace

The sample is very similar to many others in this collection in that it consists of a somewhat metamorphosed and recrystallized sandstone which has been brecciated and veined by an assemblage of opaques, carbonate and chlorite. The aggregates of secondary minerals generally show a central area of opaques with adjacent patches of carbonate and, beyond these, chloritic material. The chlorite also occurs throughout the altered sandstone in patches and discontinuous, thin veinlets. The sandstone itself contains pseudomorphs of original detrital grains generally about 0.2 mm in size. In some places crystals of this size form virtually the whole of the sandstone but elsewhere there is finer-grained intergranular material which, itself, consists wholly of quartz. In many places the sandstone shows more evidence of having been brecciated on a small scale than other rocks described above. Heavy minerals are present as a few subangular to subround grains mainly of zircon.

Polished Section:

The polished section contains part of a large aggregate of opaque material and this is very largely magnetite. The mineral forms contiguous aggregates more than 1 cm in size and these show evidence of extensive fracturing and brecciation with abundant carbonate material in fine fractures. A little chalcopryrite is associated with the magnetite but it comprises less than 1% of the total area of the polished section and forms crystals which are commonly not more than 0.02 mm in size and only rarely range up to about 0.05 mm.

In the bulk of the rock there are veins and patches of magnetite with associated chalcopryrite but other opaque phases are completely absent. In the thin section a little sphalerite was indentified by its deep red colour and isotropic character, but none of this mineral was specifically identified in the polished section. Fine-grained sphalerite would probably be difficult to identify if it were intergrown with the large aggregates of magnetite and it seems likely, therefore, that the rock contains less than 1% of this mineral, also. In brief, therefore, the sample is similar to others in this collection and it shows the secondary mineral assemblage magnetite, chlorite and carbonate with trace amounts of pyrite and sphalerite. The rock may also have undergone silicification and there has certainly been considerable recrystallization of quartz.

Sample: 24; TS42224; PS28080

Rock Name:

Altered and mineralized argillaceous sandstone

Hand Specimen:

This is a rather heterogeneous, aphanitic rock showing irregular colour variations in grey and green. Apart from a few veinlets the sample appears to be massive and fresh.

Thin Section:

An optical estimate of the constituents gives the following:

	<u>%</u>
Quartz	55
Sericite	25
Carbonate	15-20
Chlorite	2
Opagues	Trace
Muscovite	Trace
Heavy minerals	Trace

This sample is different from others in this collection in that it contains abundant sericite and within this quartz crystals tend to be isolated. This part of the rock is interpreted as being an argillaceous sandstone or sandy mudstone which has been recrystallized during alteration or metamorphism. The rock contains abundant secondary carbonate and small patches and veins of chlorite. In general, the rock is thought to belong to the same suite as the more siliceous samples described above but it was probably derived from a finer-grained and more argillaceous lithology.

Quartz forms crystals commonly ranging in size up to 0.15 mm. Some of these crystals are subround and equant and pseudomorph original detrital grains but others, particularly the smaller ones, tend to be more angular and irregular in shape. There is a complete gradation down to quartz which occurs in complex intergrowths with the sericite on a scale of less than 0.05 mm. The sericitic material appears to consist largely of phyllosilicate with a small to moderate amount of intergrown, fine-grained quartz. The sericite flakes have a random distributed and the material appears to be both massive and homogeneous in the area of the thin section. In one or two places there has been a slight coarsening of the sericite texture, but such patches are generally irregular and widely distributed. In some places, however, the sericite does appear to occur in irregular cross-cutting veinlets where it is associated with carbonate. Chlorite is a minor component of the rock and is generally confined either to veinlets or a few patches and elongate pods which are monominerallic. In one or two places there are chloritic veinlets and, extending perpendicularly away from the sides, is relatively coarse-grained sericitic material.

Carbonate is the most abundant secondary material and, apart from occurring in numerous veinlets, forms randomly distributed patches throughout the sericitic material. Commonly these patches are of the order of 0.1 mm in size and some completely enclose small crystals of quartz. The carbonate appears to be a notably refractive type

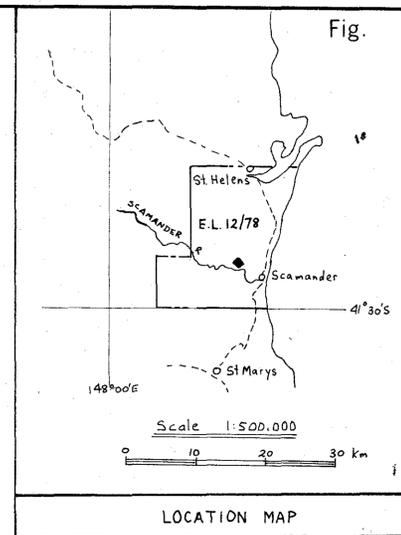
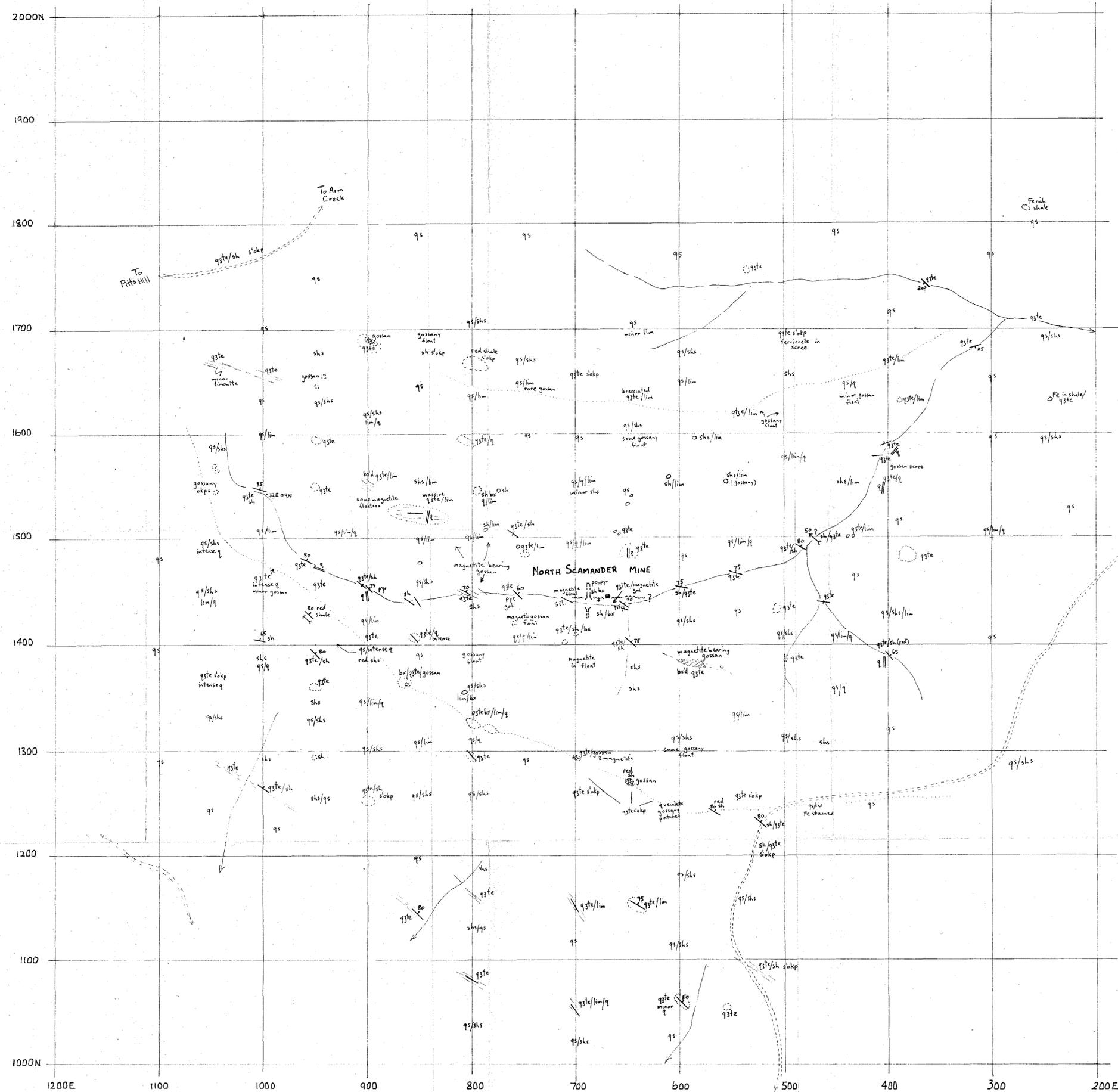
and may be siderite or dolomite rather than calcite.

At one end of the thin section the argillaceous sandstone is relatively free from secondary minerals (apart from those occurring in the veinlets) and in many respects has a somewhat finer-grained texture than the bulk of the material in the thin section described in the paragraphs above.

Polished Section:

In the polished section it can be seen that opaques are present in trace amounts only. Galena, sphalerite and chalcopryrite occur as very small, equant crystals associated with carbonate veinlets and, in separate veins, there is a small amount of oxidized magnetite. None of these opaque constituents comprises more than 0.5% of the sample and, in general, they tend to occur as very small grains embedded in the non-opaque phases.

In the bulk of the rock there are small amounts of pyrite and this mineral forms rather ragged aggregates and patches up to about 0.02 mm in size. In general, there are few intergrowths between the opaque phases and it appears that magnetite occurs in veinlets separate from those in which the sulphide minerals occur.



EXPLANATION

- q3te quartzite - Siluro-Devonian Mathinna Beds
 - sh shale
 - qs quartzite scree
 - shs shale scree
 - lim limonite
 - q quartz veinlets
 - bx breccia
 - py pyrrhotite
 - gal galena
- 70° dip & strike of strata
 / dip indeterminate
 // strike of veinlets.

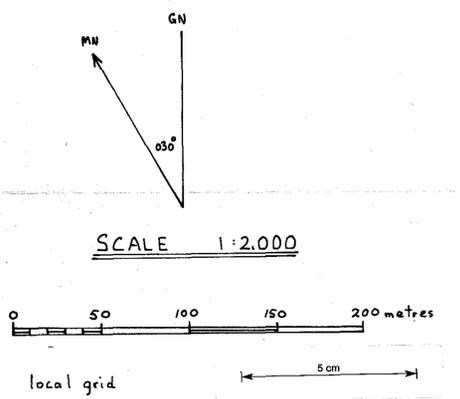


Fig. No. 123021
 To accompany Dated

THE BROKEN HILL PROPRIETARY CO. LTD.
 EXPLORATION DEPARTMENT

NORTH SCAMANDER MINE, E.L. 12/78
GEOLOGY 019
 79-1398

Drawn: R.H.	Date: 5-10-79	Centre: HOBART
Traced:	Project No: T 610	Drawing No: A1-
Checked:		
O.I.C.:		