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EXPLORATION LICENCE 12/78

SCAMANDER, TASMANIA

PROGRESS REPORT ON EXPLORATION

TO 15th SEPTEMBER, 1981

INCLUDING

REPORT FOR THE SIX MONTHS ENDED

15th SEPTEMBER, 1981

82 - 1680
Transparencies held in vertiplan.

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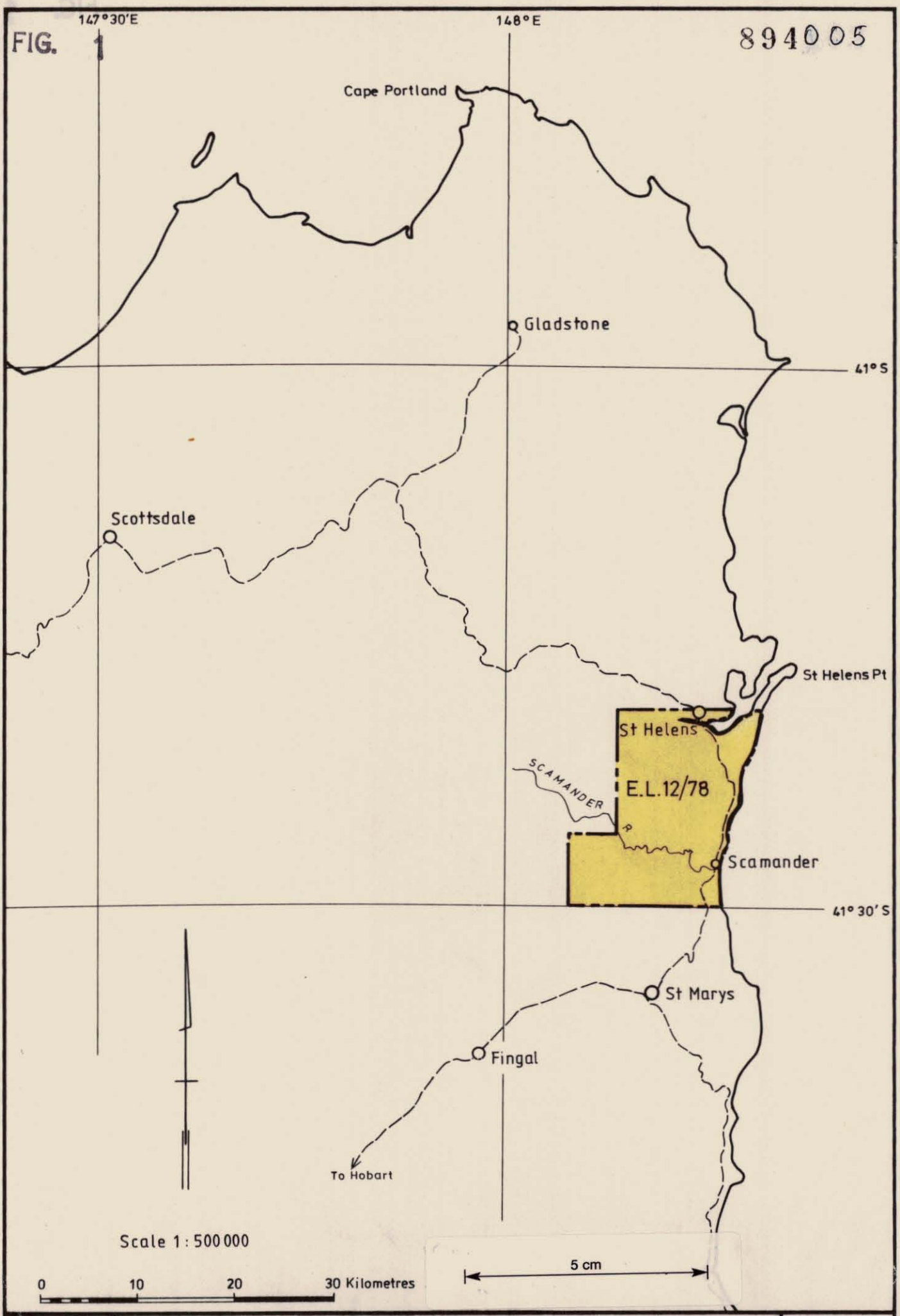
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FIG. 1

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Centre: Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD.	Project No:
Date: 2-2-79	E.L. 12/78 SCAMANDER, TAS. LOCATION MAP	Drawing No: A4-1975

1. GENERAL

EL 12/78 of 276 square kilometres was initially granted to The Broken Hill Proprietary Company Limited on 26th September, 1978.

2. EXPLORATION PHILOSOPHY AND OBJECTIVES

Exploration within Exploration Licence 12/78 is directed towards the discovery of hard rock tin deposits containing in excess of 5000 tonnes of contained tin.

Search techniques are essentially based on two deposit models:

a) Sheeted vein swarms - closely spaced mineralized fractures in competent rocks (Pyramid type), with or without massive sulphide mineralization (North Scamander type).

b) Greisen or altered granite - disseminated and/or vein style mineralization in a granite host rock.

3. ACCESS AND PHYSIOGRAPHY

The licence area lies largely within State Forest and is provided with an excellent network of all weather graded roads and fire trails.

Vegetation is for the most part, light, open eucalypt forest; dense undergrowth is generally restricted to river and stream courses. A large section of the licence area between the Scamander and Loila Tiers has been made over to Radiata pine plantation.

4. MINING HISTORY

Numerous tin, gold, copper, silver and tungsten prospects were opened up in the area in the late 1800's and early 1900's. Few progressed beyond the stage of exploratory workings and total metal production from the area has been low. Eighty-five tons of copper were won from the Orieco mine, 2.9 tons of tin from the Pyramid prospect and about 10,000 ounces of silver were recovered from a number of small silver mines in the district.

5. PREVIOUS EXPLORATION

Systematic exploration of the area dates back to 1959 when the area was included in an airborne magnetics - E.M. programme carried out by the Mt. Lyell and E.Z. Co's. Follow-up work by E.Z., and subsequent work by Austminex, Geophoto, B.H.P., Rio Tinto, C.G.F.A. and Scamander Mining is summarized briefly in Table 1. Work in the Pyramid prospect in EL 10/80 has been omitted.

cont./..

TABLE 1

SCAMANDER AREA - SUMMARY OF PREVIOUS EXPLORATION

COMPANY	YEAR	PROSPECT/AREA	WORK COMPLETED	RESULTS/COMMENTS
Lyell-E.Z.	1959-1962	Fingal-Scamander	-airborne magnetics, E.M. -follow-up anomaly 3/6,North Scamander -I.P., ground magnetics, McPhar R.E.M., rock sampling, 1 DD hole of 150' at North Scamander	-hole FP102 North Scamander intersected 6' of 1.5% Pb, 4.4% Zn, 0.1% Cu, 30 ppm Ag at 120' -no Sn analyses
B.H.P.	1965	North Scamander	-rock chip sampling, soil sampling	-dump samples returned values less than 0.01% Sn.
Austminex	1965	Scamander regional	-stream samples (Sn, Zn, cold ext. Cu, Mo, heavy metals)	-no significant anomalies outside known areas
Geophoto	1969	Scamander regional	-stream sampling (-20 mesh Mo, Bi; -80 mesh Cu, Pb, Zn, Ag) -airborne radiometric survey	-digitized data for Tl^{208}, Bi^{214}, K^{40} Pb, Zn, Mo, Ag, Bi
Geophoto	1970-1971	Constables Creek	-soil sampling (Mo, Bi, W, Sn) -5 DD holes -Cobra drill rock sampling	-narrow intersections low grade Sn (to 0.3%) W (to 0.2%), Bi (to 0.2%), to 70 ppm Mo
C.G.F.A.	1967	Loila Tier	-dug pits, costeans	-Sn, W mineralization similar to Pyramid
Rio Tinto	1957	Scamander Flats	-alluvial testing	
Geophoto	1971-1972	Lutwyche	-gridding, trenching, rock chip sampling (Mo, Bi, Sn, W) -4 DD holes (Cu, Mo, Bi, W, Sn)	-some high grade patches tungsten -narrow quartz veins
Geophoto	1970	South Pyramid	-trenching, rock chip samples (78)	-Sn range 0.05-1.18% Sn
Geophoto	1972	Wolfram Creek (Baden Powell?)	-gridding, soil sampling (Sn, W,Mo,Bi) -Cobra drill sampling	-soils consistently going 0.14% Sn
Scamander Mining		Orieco Mine	-regional mapping -rock sampling (Cu, Pb, Zn) -2 DD holes	-no Sn results; narrow massive sulphide intersections

6. GEOLOGY

Regional geological mapping was carried out (see Figure 2).

The oldest rocks in the area are the Siluro-Devonian Mathinna Beds, which comprise a monotonous sequence of bedded quartzites and slates. The quartzites have a lithic component and are usually graded. The Mathinna Beds have been folded about NNW trending axes to produce open folds of long wavelength. In some areas however, deformation has been more intense and overturned bedding has been recognized (e.g. Pyramid prospect; Scamander Tier area).

Thermal metamorphism adjacent to granitic intrusions is reflected in the development of spotted slates, which in the mapped area, rarely extend beyond 20-30 metres from the contacts.

Major faults and shear zones also trend NNW, although an important set of faults and fractures occupied by diorite dykes, and mineralization at the Pyramid prospect, trend NE.

The Mathinna Beds have been intruded by a suite of Upper Devonian granitic intrusives which form units of the southern part of the Blue Tier Batholith. The granitoids range in composition from hornblende biotite granodiorite to biotite granite and occur as large plutons in the northern part of the licence area. South of St. Helens, in the Scamander Tier area and the Cato's Road area, the granitoids occur as dykes from 50 metres to 1.5 kilometres in width.

The small, isolated body of granite at the Echo Mine in Constable's Creek appears to be close to the roof zone of a large pluton which is exposed one kilometre to the west. This has been confirmed by an interpretation of the airborne magnetic data which suggests that the intervening block of hornfelsed sediments is a slab with a shallow dipping lower contact.

The interpretation that much of the licence area is underlain by granite at shallow depth is also indirectly supported by the nature and distribution of mineralization throughout the area.

7. MINERALIZATION

Mineralization in the licence area varies in style from quartz and sulphide fissure vein fillings and sheeted veins in sedimentary rocks to fissure vein and greisen style deposits in granitic rocks. The main features of the deposits are summarized in Table 2.

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TABLE 2

SUMMARY OF MINES AND PROSPECTS

DEPOSIT	PRINCIPAL METALS	MINOR METALS	SULPHIDES/GANGUE	TYPE	HOST ROCKS
Stony Ford	Sn, Cu, Zn	As	Sph, Cp, chl, musc	Greisen	Granite
Silver Echo	Cu, Au, Co	Ag, As	po, qtz, chl, pyr, marc	Fissure vein	Mathinna Beds
Echo	Mo, W	Bi, Sn, Cu	qtz-musc, aspy, py	Greisen/vein	Granite
Loila Tier	Sn, As, Pb	W, Pb, Zn, Ag, Cu	qtz, aspy, chl, tm	Fissure vein	Mathinna Beds
Baden Powell Carsonde Beers Lutwyche	W, Mo " " " "	Bi, Sn, Cu " " " " " "	qtz, pyr " "	Fissure vein " " " "	Mathinna Beds " " " "
Cramps	Cu, Ag, As	Sn, Pb, Zn	qtz, aspy, py	Fissure vein	" "
Dunns	Ag, As, Cu	Sn, Pb, Zn, Au	aspy, py, marc	" "	" "
East/West Pinnacles	Sn	?	qtz	Sheeted vein?	" "
Pyramid	Sn, Ag	As, Cu, Pb, Zn, W	aspy, qtz, musc, py	Sheeted vein/ fissure vein	" "
Paul Beahr	Pb	Cu, Zn, Ag?, As	py, marc, aspy, po	Fissure vein	" "
Yarmouth	Ag, As		aspy, qtz, py, po	Fissure vein	Mathinna Beds
Orieco	Cu, (Ag?)	Sn, As, Zn	pyr, cp, aspy, marc, po	" "	" "
North Scamander	Zn, Pb, Ag	Cu, Sn, As	mag, chl, qtz, po marc	" "	" "
(Beulah (Scamander Bell	Ag, Pb, As	Zn	qtz, musc, pyr, aspy, po	Fissure vein/ Greisen	Granite

The regional metal zoning of deposits in the Scamander area has been documented since the early 1900's. The zoning is presumably due to variation in regional pressure and temperature gradients during mineral deposition. However, the classification of the deposits into tungsten, tin, copper and silver-lead zones is an oversimplification, and there are other factors involved in determining the ultimate make up of each deposit that remain to be elucidated.

At present the main zone of interest in the licence area is a narrow belt 6-7 kilometres long extending south east from the Baden Powell (W-Mo) deposit through the Pyramid tin prospect to the North Scamander (Zn, Pb, Ag) prospect. A parallel structure, coinciding with a magnetic anomaly, is currently under investigation in the Cramps area some two to three kilometres north of Pyramid Hill.

8. SUMMARY OF WORK COMPLETED

1. Literature survey and review of available data.
2. Regional geological mapping at 1:40,000 scale (see Section 6 and Figure 2).
3. Airborne magnetic surveying (see Section 11.2).
4. Stream sampling (north west and south east corners of licence area) and follow-up of anomalies (see Section 10).
5. Rock chip sampling (abandoned mines, gossans, iron-stones) (see Section 10).
6. Dighem II E.M. survey (Pyramid - North Scamander area) (see Section 11.2).
7. Ground magnetic follow-up; preliminary Dighem follow-up (see Section 11.3).
8. Evaluation of North Scamander prospect including gridding, soil sampling, detailed mapping, detailed ground magnetics, Sirotem - I.P. surveys, 3 diamond drill holes (600m), 4 percussion holes (170m), downhole geophysical logging (see Sections 10, 11 and 12).
9. Preliminary evaluation of the Yarmouth prospect including soil augering, mapping, rock chip sampling (see Section 10).

cont./..

9. SUMMARY OF WORK IN PROGRESS

1. Infill stream sampling (south west corner).

2. Evaluation of North Scamander prospect by drilling.

3. Evaluation of Cramp's prospect by gridding, soil sampling, ground magnetics, mapping.

4. Rock chip sampling various abandoned mines.

10. GEOCHEMISTRY

10.1 North Scamander Prospect

Soil samples were collected at 25 metre and 50 metre intervals on 50 metre spaced lines over the grid area of 1000 x 700 metres. Samples were sieved to minus 80 mesh and analysed for tin, copper, lead, zinc and silver. Tin in soil values at plus 300 ppm defined three anomalies centred on 700W 1400N, 750W 1650N and 450W 1550N respectively. Tin and lead are more widely dispersed about the old workings whereas copper and zinc anomalies are essentially confined to the area adjacent to the old workings.

10.2 North Scamander Extended Grid Area

Soil sampling was carried out at 50 metre intervals on 200 metre spaced lines between the North Scamander prospect and the Great Pyramid prospect. Samples were sieved to minus 80 mesh and analysed for copper, lead, zinc, silver, arsenic and tin; some overlap with results from the adjacent South Orieco area was achieved.

Poorly exposed Mathinna Beds sandstone and shale showing locally strong silicification crop out across the entire area and some quartz veining with associated small patches of gossan is present. The old workings of the Ringarooma prospect are located on a mineralized shear zone at 2250W 1850N.

Large areas with tin in excess of 100 ppm in the minus 80 mesh soil fraction were outlined. The highest value of 595 ppm tin at 1850W 1850N is supported by values in the range 250 to 445 ppm. This anomaly covers an area of approximately 200 x 200 m. Most anomalous values were recorded from soil close to the crest of the ridge connecting Pyramid and Pitt's Hills. Spot highs were located on other lines (e.g. line 1450W at 1850N).

Arsenic values peaked at 145 ppm but most are less than 10 ppm. A very low order anomaly associated with the Ringarooma prospect (to 25 ppm) was outlined.

cont./..

A large low order lead anomaly (+100 - 370 ppm) was outlined on line 1850W which extends down the ridge to the Ringarooma prospect near 2150W.

No significant copper or zinc anomalies were detected although some spot high values to 290 ppm copper and 350 ppm zinc were reported.

10.3 South Orieco Area

A programme of ridge soil sampling at 50 metre intervals, rock chip sampling and mapping over an area corresponding with a broad magnetic high over an area to the south of the Orieco mine was carried out. Soil samples were sieved out to minus 80 mesh and analysed for copper, lead, zinc, silver, molybdenum, arsenic and tin; rock chip samples were analysed for copper, lead, zinc, silver, molybdenum, gold and tin.

Poorly exposed Mathinna Beds sandstones, siltstones and shales crop out through the area sampled and small patches of gossan associated with shear zones are present.

Tin in soil values peak at 445 ppm and in general rock chip values are higher than in surrounding soils. Significant soil anomalies are confined to the Ringarooma prospect and the ridge between Pitts Hill and the Pyramid Mine where sampling overlapped with that on the North Scamander extended grid. Spot high values in rocks (to 3500 ppm) in the remainder of the area are not supported by sizeable soil anomalies. Arsenic in soil values range from less than 1 to 45 ppm and some spot highs greater than 5 ppm occur on some lines. The only significant anomalies are on the ridge line as described above. Low copper and zinc values were recorded in the soils, the highest being 70 ppm copper and 60 ppm zinc; some low order anomalous values in rock chips were obtained (to 6380 ppm copper and to 1200 ppm zinc).

Rock chip samples are anomalous in lead up to 2800 ppm, and like tin, lead values are higher in rocks than nearby soil samples.

All gold values fall in the range less than 3 to 20 ppb and all silver values fall in the range 1 to 2 ppm with spot highs to 4 ppm.

10.4 Yarmouth Area

A limited programme of soil augering was undertaken on three lines in the vicinity of the Yarmouth prospect, where several magnetic anomalies of unexplained origin had been detected. Weakly anomalous values for tin and arsenic were recorded but the programme was largely inconclusive due to the depth of Tertiary overburden present.

cont./..

Quartzite and siltstone are exposed in patches along Yarmouth and Reedy Creeks. Sediments in this area are locally silicified and possibly hornfelsed. Petrological reports indicate that there has been tourmalinization of the rocks in the vicinity of the old Yarmouth mine, where sulphides in quartz and silicified sandstone have been exposed by mining from a shaft in the creek bed. The most abundant sulphide is arsenopyrite, which forms bungs in quartz or fine grains in quartz-chlorite stringers. Minor amounts of galena and pyrite are also present. The host rocks are quartzites and slates with a 320° strike and a 70° NE dip.

Small patches of "gossan" similar to those occurring throughout other parts of the district are also present.

10.5 Nevada - Wolfram Creek Area

A stream and rock chip sampling programme over areas of granite exposure in the north west corner of EL 12/78 was carried out in the search for Anchor style mineralization.

Stream samples were sieved out to minus 80 mesh and analysed for copper, lead, zinc, silver, molybdenum, arsenic, tin and tungsten.

Two main granite phases are present in the area intruding Mathinna Beds sediments. The principal granite phase is a coarse grained biotite adamellite which is presumably intruded by a felsic granite body with biotite, tourmaline and muscovite. Small amounts of pyrite, arsenopyrite, molybdenite and galena (?) occur in quartz ± tourmaline veins through the area.

a) Nevada Creek Area - Rock Chips:

Tin: most values in rocks are less than or equal to 10 ppm, with spot highs of 70 ppm (NWR 74) and 45 ppm (NWR 83).

Arsenic: values range up to 230 ppm (NWR 12) but most are less than 10 ppm.

Molybdenum: most values are less than 5 ppm, some values in granitic rocks are weakly anomalous (10-15 ppm).

Copper/Lead/Zinc: all copper values are less than or equal to 10 ppm; lead values are less than 30 ppm, as are most zinc values; one result of 4 ppm silver (NWR 81) was recorded.

cont./..

b) Nevada Creek Area - Stream Samples:

Tin: most values in granite terrain are less than or equal to 50 ppm; weakly anomalous tin (100-375 ppm) was recorded in four samples from the upper reaches of Launceston Creek; anomalous tin in the range 125-1400 ppm was recorded from the upper reaches of Constable Creek.

Arsenic: most values are less than 15 ppm and values peak at 100 ppm; several tributaries in the upper reaches of Constable Creek are anomalous at greater than 30 ppm.

Lead: most values are less than or equal to 40 ppm with some values in the range of 40 and 90 ppm.

Silver: values are anomalous to a peak of 8 ppm in samples from the upper Constable Creek area.

Copper: background values in the granite are less than 10 ppm although some streams draining Mathinna Beds carry up to 40 ppm close to the granite contact; a very weak anomaly (to 15 ppm) was outlined in the upper reaches of Constable Creek.

Molybdenum: most values are less than or equal to 5 ppm; values are weakly anomalous in the upper reaches of Launceston Creek (to 10 ppm).

Zinc: most values are less than or equal to 30 ppm; weak anomalies to 70 ppm, in the upper reaches of Constable Creek, were recorded.

c) Southern Area - Rock Chips:

Tin: anomalies were recorded in quartz vein samples NWR 7 and NWR 8 (1700 ppm, 2200 ppm) collected from veins in Mathinna Beds close to granite contacts; gossanous rocks associated with metasediment inclusions in granite (NWR 16, 17) returned values of 665 ppm and 495 ppm respectively; one sample (NWR 19) in granite at the head of Wolfram Creek contains 50 ppm tin; elsewhere granitic samples fall in the range 5 to 20 ppm tin.

Arsenic: values in granitic rocks are generally in the range 1 - 2 ppm; NWR 19 (40 ppm arsenic) is the only anomalous result other than the quartz-iron veins in the Mathinna Beds which contain up to 340 ppm arsenic.

Molybdenum: most values are less than or equal to 10 ppm except in quartz veins at the Baden Powell prospect (to 150 ppm) and in veins/gossans close to known centres of tungsten-molybdenum mineralization in the Mathinna Beds.

cont./..

Lead: most values are less than 20 ppm in granite areas.

Zinc: most values are less than 30 ppm; no significant anomalies were outlined.

d) Southern Area - Stream Samples:

Tin: a 550 ppm anomaly was recorded in the headwaters of Wolfram Creek; this is the only significant result in the granitic terrain with other values falling in the range 15 to 95 ppm. A low order anomaly (135 ppm) was recorded in streams draining the Loila Tier prospect.

Tungsten: most values are less than or equal to 10 ppm; values of 40 and 100 ppm respectively were recorded in streams draining the Baden Powell and Lutwyche quartz-molybdenum-tungsten vein systems in the Mathinna Beds; a low order anomaly (30 ppm W) corresponds with the tin anomaly in the upper reaches of Wolfram Creek.

Arsenic: arsenic anomalies were recorded in several areas including the streams draining the Loila Tier prospect (75 ppm), those draining the tungsten prospects (105 ppm), and in the headwaters of Wolfram Creek (165 ppm); creeks draining the granite normally contain 3 - 30 ppm arsenic.

Copper: values in streams draining granite terrain range from 5 to 15 ppm; values are higher in streams draining adjacent metasediments (20 - 90 ppm) and weakly anomalous in streams draining the Loila Tier prospect (40 - 55 ppm).

Zinc: values range between 10 to 30 ppm in the granite terrain with the exception of a 90 ppm anomaly in the headwaters of Wolfram Creek; weak anomalies were recorded in streams draining the Loila Tier prospect (80 ppm) and the Baden Powell prospect (70 ppm).

Lead: an anomaly of 200 - 260 ppm corresponds with the high tin result in the headwaters of Wolfram Creek; values in granite terrain generally range from 2 to 70 ppm; values in streams draining sediments are generally higher.

10.6 Rock Chip Samples

Results of rock chip sampling of gossans, ironstones, sulphides in dumps and altered host rocks for various prospects in the licence area are summarized in Table 3. Sample locations and results are plotted on Figures 7 to 10.

cont./..

11. GEOPHYSICS

11.1 General

Various geophysical surveys were conducted by BHP on EL 12/78.

Maps showing the basic data are presented for the airborne surveys (Figures 11-16) and a location map is presented for the ground surveys (Figure 12).

The basic ground data is still at the compilation stage and will be presented in a future report.

11.2 Airborne Surveys

11.2.1 Magnetic Survey

A helicopter borne magnetic survey of some 1200 line kilometres was carried out by GEOEX for BHP in mid 1979. East west lines were flown 300 metres apart at a mean sensor terrain clearance of 90 metres.

The aims of the survey were to provide information to assist geological mapping and to detect any magnetic or pyrrhotite associated mineralization.

A contour map (Figure 11) at 1:50,000 scale and 5nT contour interval was produced from the digitally recorded data by BHP's exploration computing section.

The data shows that the exposed granitic intrusives are non-magnetic while many discrete and generally low amphitude (less than 100nT) anomalies are widely distributed through the areas mapped as Mathinna Beds. Several of these anomalous zones are in close (geographic) association with mapped occurrences of mineralization including tin, copper, molybdenum and tungsten.

The NE trending linear anomalies appear, from field observations, to be due to basic igneous dykes.

Complimentary NW trends are evident in the negatives as strong lineations in the contour pattern and these trends often parallel mapped shear zones.

Two notable discrete magnetic anomalies occur in coincidence with mineralization. A broad and seemingly deep (around 400 metres) oblong anomaly lies on the NE side of the Great Pyramid tin mineralization. The source of this anomaly has not yet been established.

cont./..

A high amphitude (300 nT) sub-linear feature coincides with the North Scamander mineralization; magnetite and pyrrhotite in drill core adequately explain the anomaly.

The numerous other discrete magnetic anomalies are, at this stage, not explained,and follow-up work is in progress to establish their sources and to outline any associations they may have with mineralization.

11.2.2 Dighem II Survey

A Dighem II helicopter borne electromagnetic survey was flown by Dighem Ltd. for BHP in early 1980. The survey was centred on the North Scamander - Great Pyramid areas and was designed to detect conductive geological horizons, in particular sulphide mineralization, and, to a lesser degree map the near surface resistivities in the area.

115 line kilometres were flown on 18 EW lines. The survey location with respect to the aero-magnetics is shown in Figure 12.

A brief report on the survey was supplied by the contractor. As this report includes work from other exploration areas, it will be submitted separately and referred to in future reports on those areas. Figures 13, 14, 15 and 16 are the interpretation plans supplied by the contractor.

In general the results are disappointing as the North Scamander mineralization (suspected and later confirmed to be a good conductor) showed no significant response. No high priority targets were evident from the EM survey.

11.3 Ground Geophysics

11.3.1 Magnetics

Reconnaissance ground traverses were conducted over 17 selected aeromagnetic anomalies, to define their positions and depths. The traverse locations are shown in Figure 12. Compilation and interpretation of this data is still in progress.

In three areas of particular interest (Great Pyramid, North Scamander and Cramps) detailed (10 metre along line sampling) ground magnetics were recorded. Compilation of these surveys is not yet complete.

cont./..

All of the ground magnetic surveys were carried out using proton precession magnetometers reading total magnetic field with a sensitivity of ±/nT.

11.3.2 Electrical and Electromagnetic Surveys on the North Scamander Grid

The grid at North Scamander (see Figure 12) has been the subject of various electrical surveys both surface and downhole. Figure 17 shows the location of the surveys and anomalous zones.

IP SURVEY

Three lines of 800 metre length using 100 metre dipole-dipole geometry were conducted in late 1979 by BHP's geophysical field crew. A McPhar P660 frequency domain IP unit was used and the operating frequencies were 0.3 and 2.5 Hertz.

The data showed a linear resistivity low coincident with a weakly defined PFE anomaly in the central part of the North Scamander grid. Anomalous PFE's were also recorded at the southern end of the grid.

SIROTEM SURVEY

Four lines of Sirotem (transient EM) were surveyed using 100 metre square coincident loop geometry.

A very strong anomaly is evident on all lines indicating a narrow and steeply dipping conductor.

SP SURVEY

Self Potential, measured relative to the northerly end of each line (1625N), was mapped on lines 500W, 600W, 700W and 800W.

Strong SP negatives were observed on each line coinciding with the anomalous IP and Sirotem zones.

MISE À LA MASSE IP SURVEY

Profiles of changeability were read using a mise à la masse current set up and potential electrodes in "gradient mode" separated by 25 metres. Apparent changeability anomalies are shown in Figure 17.

cont./..

12. DRILLING

Three diamond drillholes totalling 600 metres and four percussion drill holes totalling 170 metres were completed at the North Scamander prospect. A report on this drilling including locations, logs, sections, petrology and assays, is in Appendix 3.

13. SUMMARY OF PROPOSED WORK

1. Further evaluation of the North Scamander prospect by deep diamond drilling;

2. Evaluation of the Cramp's prospect by diamond dirlling;

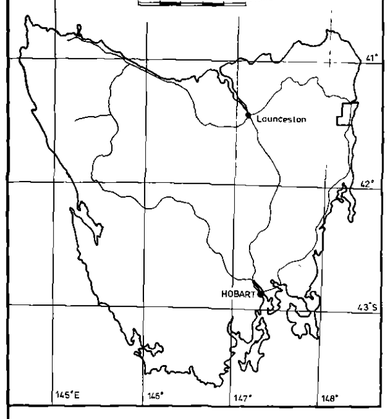
3. Evaluation of the Yarmouth anomaly by open-hole drilling;

4. Evaluation of the Echo prospect by soil sampling, mapping and drilling.

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

TASMANIA
LOCALITY MAP
EL 12/78

0 20 40 60 80 100 Kms



595 000m E

600 000m E

605 000m E

5425 000m N

5420 000m N

5415 000m N

5410 000m N

5405 000m N

595 000m E

STONEY FORD

MEDEAS COVE

Medeas Cove Road

STIEGLITZ

GEORGES BAY

St Helens Point

BEAUTY BAY

ST HELENS

Ferntree Falls

Darlington

Trailgate

Stephens Creek

MT ECHO

SILVER ECHO Ag Pb

ECHO Ag Pb

Cascades

Boggy Creek

Brookes Hill

Basin

HIGHWAY

Little Basin

Jacks Lagoon

Onion Creek

Dianas Basin

Beach

Dianas

Cuckers Road

Quiring

Creek

Road

Tu

Sm

Dg14

Dg12

Dg5

LOILA TIER

BADEN POWELL Ag Pb W

LARSON DE BEERS W Mo

LUTWYCHE W Mo

CRAMPS Ag Pb

LOILA PINNACLE W Mo

WEST PINNACLE Pb Ag

ORIECO HILL

DUNNS Pb Ag

EAST PINNACLE

ORIECO Cu

PYRAMID Sn

TERINGAROOMA Cu

PAUL BEAHR Pb Ag

PITT HILL

NORTH SCAMANDER TPC Ag Pb

Upper Scamander

SCAMANDER RIVER

Wolfram Road

Fingerpost

Fosters

Wolfram

Scamander Tier

Tier Road

PADDYS ISLAND

YARMOUTH Pb Ag

Freshwater

Brouncers

TASMAN SEA

Wrinklers Lagoon

BELUAH Pb Ag

SCAMANDER

SCAMANDER Pb Ag

Doyles Mudflat

Henderson Lagoon

Steels Beach

Tasman Highway

Yellow Creek

Fairs Dam

BLACK TOMMYS HILL

Scamander Forest Drive

AVENUE

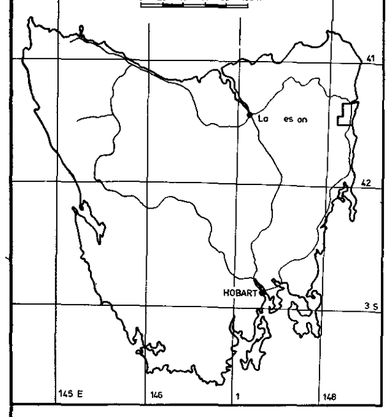
Firebreak

Pss

Pss

Pss

TASMANIA
LOCALITY MAP
EL 12/78
0 20 40 60 80 100 K



59 000 E
600 000m E
605 000m E
5425 000m N
5420 000m N
5415 000m N
5410 000m N
5405 000m N
550 000 E

STIEGLITZ
MEDEAS COVE
Medeas Cove Road
GEORGES BAY
St Helens Pt
BEAUTY BA
ST HELENS
Jocks Lagoon
Onion Creek
Boggy Creek
Dian Bas
Beach
Erackers Creek
Roo Creek
Road
Heedy Creek
TASMAN
Beaumont
Freshwater Creek
PADDYS ISLAND
TASMAN SEA
Upp S m nder
SCAMANDER RIVER
SCAMANDER
SCAMANDER R ISB
Henderson Lago
HIGHWAY
Constable Creek
Fitzgerald Creek
LO LA INNACLE
MT ECHO
Ferni ee F ll
Lamington Stieglitz Creek
Medeas Creek
Shoulder Road
Scamander Tier
Rocky Creek
Walls
Falcon
Ralphys Ridge
Boundary Creek
Mc KAY
BI AC T S

5 cm
N
SCALE 1 40 000
0 1 2 3 Kms

Revisions

THE BROKEN HILL PROPRIETARY CO LTD
EXPLORATION DEPARTMENT

EL 12 78 SCAMANDER TAS

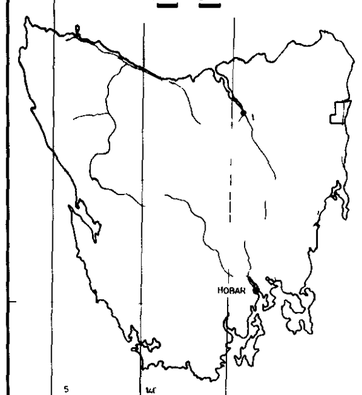
STREAM SAMPLE LOCATIONS

Drawn R.H.	Date 15 10 81	Centre Hobart
Traced J.H. Allen	Project No T 610	Drawing No 12/78-62
Checked O I C		

Better maps in
74-1377
80-1444

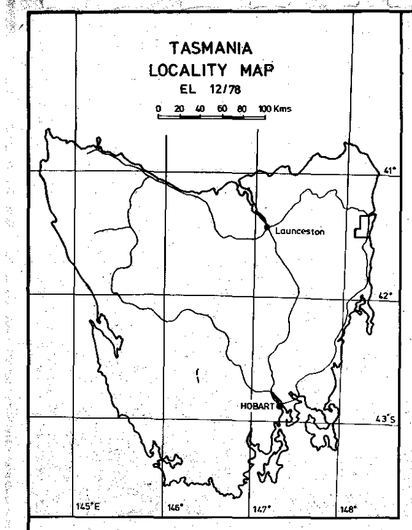
894021

TASMANIA
LOCALITY MAP
EL 12/78



59 E
60 mE
605 000mE
5425 000mN
5420 000mN
5415 000 N
5410 000mN
5405 000 N
6 E

STIEGLITZ
MEDI
GEORGES BAY
ST HELENS
Nephin
Cone
Road
Creek
Beach
Bay
Creek
Creek
Creek



595 000m E

600 000m E

5425 000m N

5420 000m N

5415 000m N

5410 000m N

5405 000m N

595 000m E

STIEGLITZ

MEDEAS COVE

Medeas Cove Road

GEORGES BAY

St Helens Point

BEAUTY BAY

ST. HELENS

Jacks Lagoon

Ferntree Falls

CMT ECHO

Boggy Creek

Brooker Hill

Little Basin

Binns Creek

Dianas Basin

Dianas Beach

PADDYS ISLAND

TASMAN HIGHWAY

TASMAN SEA

LOILA PINNACLE

Upper Scamander

SCAMANDER RIVER

SCAMANDER

Henderson Lagoon

BLACK TOMMYS HILL

Firebreak

Revisions:

THE BROKEN HILL PROPRIETARY CO LTD
EXPLORATION DEPARTMENT

EL 12 78 , SCAMANDER , TAS.

STREAM SAMPLE RESULTS

As, Mo, W, Au.

Drawn: R.H	Date: 30 - 9 - 81	Centre: Hobart
Traced: J.H. + Hilary		
Checked: O.I.C.	Project No: T 610	Drawing No: 12/78-64.

894023

NW7 / 105/10/20/– Minus 80 mesh stream sample location As /Mo/W/Au where available; dash equals no result (As, Mo, W results in ppm; Au in ppb)

1103 / 10/-/-/x Minus 40 mesh stream sample location As/Mo/W/Au where available; cross equals below limit of detection (0·5ppm for Au).

N

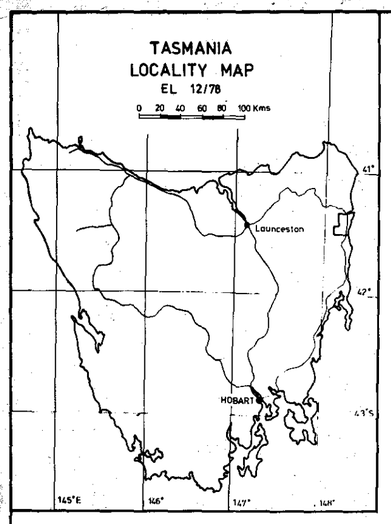
SCALE 1:40,000

5 cm

0 1 2 3 Kms

TASMANIA
LOCALITY MAP
EL 12/78

0 20 40 60 80 100 Kms



595 000m E

600 000m E

5425 000m N

5420 000m N

5415 000m N

5410 000m N

5405 000m N

59 000m E

MEDEAS COVE

STIEGLITZ

GEORGES BAY

BEAUTY BAY

ST HELENS

ST HELENS Point

Medeas Cove Road

Jacks Lagoon

Brooks Hill

Ile Aroon

Banas Room

PADDYS ISLAND

TASMAN SEA

MT ECHO

Ferntree Falls

Launceston Creek

Coastal Creek

Flagstaff Creek

Hoopy Creek

Onion Creek

Fern mount Creek

Boobyalla Creek

Tasman Beach

Boobyalla Beach

Coastal Road

Upper Scamander

SCAMANDER R.

Scamander Road

SCAMANDER

Dayles Mudflat

Tasman Highway

Henderson Lagoon

Sloops Beach

BLACK TOMMYS HILL

Firetower

Scamander Creek

Scamander Beach

Scamander Avenue

Lagoon Creek

Coastal Creek

Boobyalla Creek

Boobyalla Beach

Fern mount Creek

Tasman Beach

Sloops Beach

Minus 40 mesh stream sample locations.
Cu/Pb/Zn/Ag results in ppm.

Minus 80 mesh stream sample locations.
Results as above.

N

SCALE 1:40,000

5 cm

0 1 2 3 Kms

Revisions:

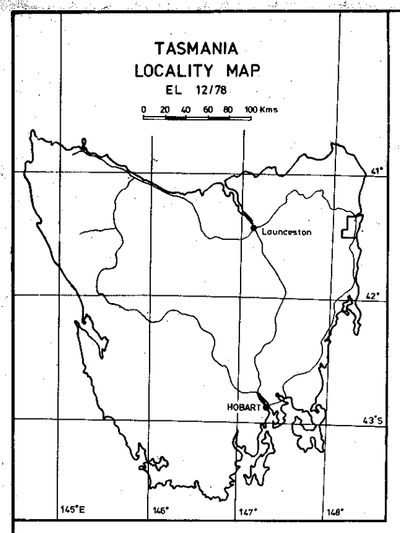
THE BROKEN HILL PROPRIETARY CO LTD
EXPLORATION DEPARTMENT

EL 12 78, SCAMANDER, TAS.

STREAM SAMPLE RESULTS
Cu /Pb /Zn /Ag

Drawn: R.H.	Date: 15 10 81	Centre: Hobart	
Traced: J.N. Hilary			
Checked:		Project No.: T 610	Drawing No.: 12/78 - 65
O.I.C.			

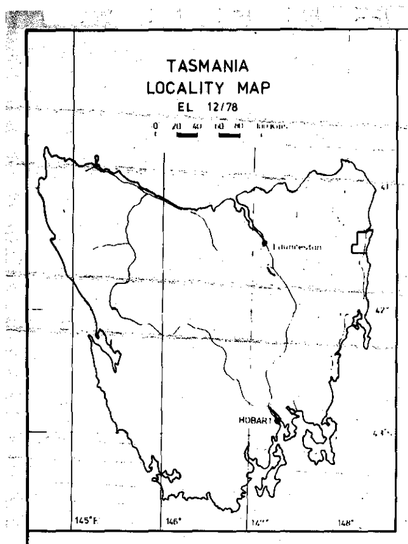
894024



595 000m E
600 000m E
605 000m E
5425 000m N
5420 000m N
5415 000m N
5410 000m N
5405 000m N
590 000m E

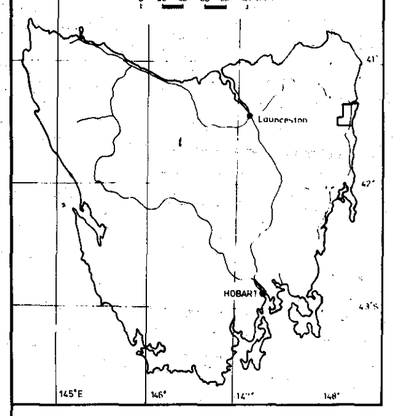
MEDEAS COVE
Muggs Cove Road
GEORGES BAY
STIEGLITZ
St Helens Point
BEAUTY BAY
ST. HELENS
Jacks Lagoon
Onion Creek
Boggy Creek
Brookes Hill
Basin Creek
HIGHWAY
Little Basin
Dianas Basin
Beach
Dianas
Crackers Road
Arm Creek
Alps Road
Dark Hollow Creek
PADDYS ISLAND
Reedy Creek
Eastern Creek
Yarmouth Road
Main Creek
TASMAN
Freshwater Creek
Coach Creek
Beaumaris
Wrinklers Creek
Wrinklers Lagoon
TASMAN SEA
SCAMANDER
Dayles Mudflat
Henderson Lagoon
Steels Beach
Ferntree Falls
Lottah
Ironstone Creek
Legerwood
MT ECHO
Coaltown
Hodgmans
Cornwall
Brandum Creek
Jeffreys Creek
Gardens
Cascade Creek
Cascade Road
Cascade
Gully
Creek
Basin
Road
Avenue
Scamander River
Upper Scamander
Lower Scamander
Scamander Avenue
Tregarron
Lottah Creek
Gully Creek
Mountain Creek
Fingerpost
Waste Creek
Jubilee Creek
Pulpit Rock
Boulder Creek
Firetower
LOILA PINNACLE
ORIECU HILL
PITTS HILL
BLACK TIER HILL
Wolfrom Creek
Fitzgerald Creek
Eastern Ridge
Eastern Creek
Wolfrom Road
Scamander Tier
Scamander Reserve Forest
Scamander Forest Drive
Scamander Reserve Road
Scamander Tier Road
Upper Scamander Road
Scamander River
Upper Scamander River
Scamander Avenue
Scamander Tier
Scamander Reserve

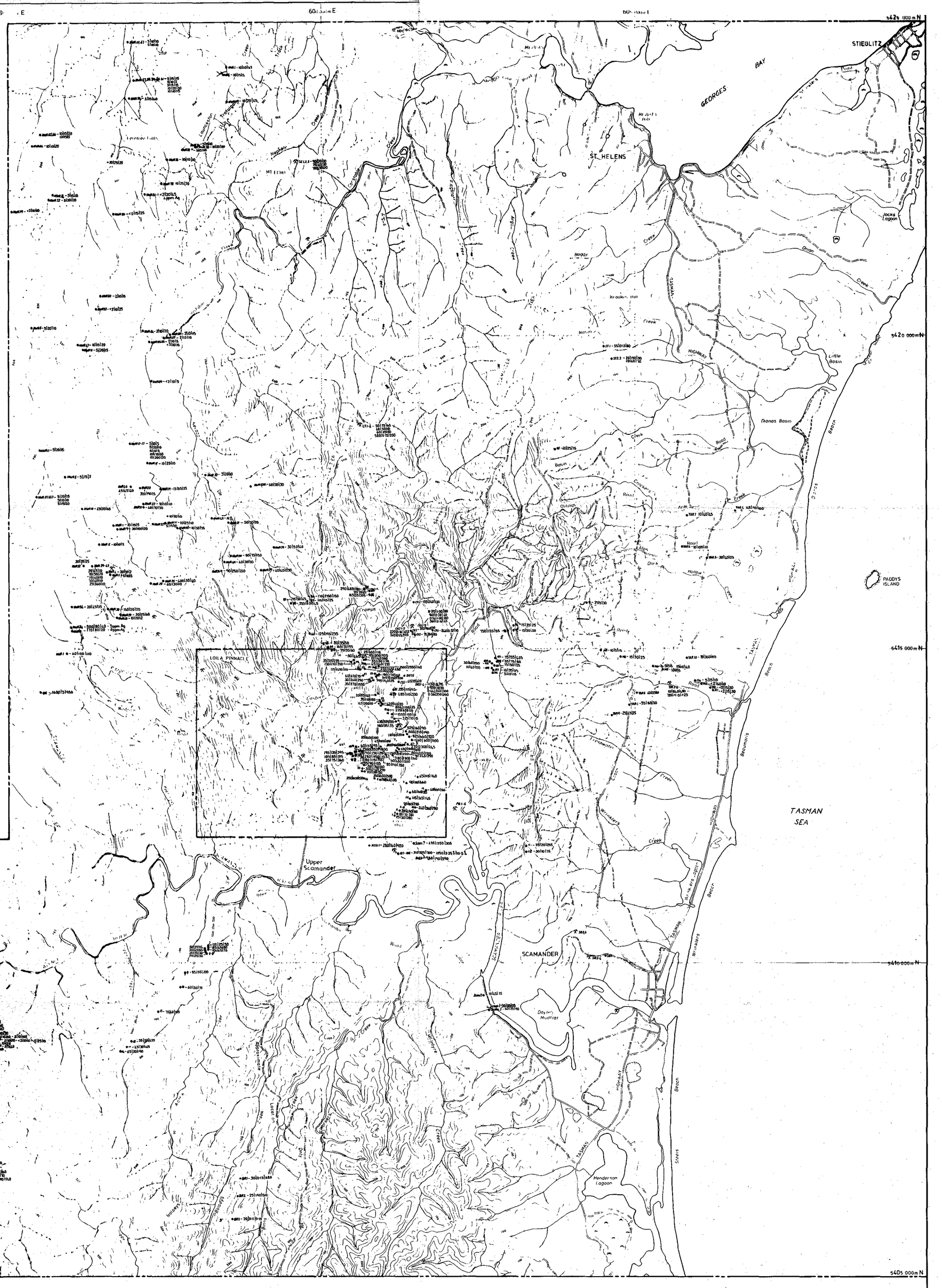
TASMANIA
LOCALITY MAP
EL 12/78



59° E
60° E
5428 000mN
5420 000mN
5415 000mN
5410 000mN
5405 000mN
STIEGLITZ
GEORGES BAY
ST. HELENS
Point
St Helens
Jacks Lagoon
Onion Creek
Brookes Hill
Basin
HIGHWAY
Little Basin
Diana Basin
Beach
Road
Crookers
Arm
Dark Hollow
Creek
PADDYS ISLAND
TASMAN SEA
Jeanneret Falls
Trafalgar
Creek
MT LEGH
Newbys
Creek
Lagoon
Creek
Fingerpost
Road
Eastern
Tributary
LOILA PINNACLE
ORFEUS HILL
Upper Scamander
SCAMANDER
RIVER
AVENUE
BLACK TIMBER HILL
Cranus
Creek
Approximate Limit of Tin Anomaly
Ridge
Spurs
Beach
Dolphin Mudflat
Henderson Lagoon
Winnaleys
Creek
Winnaleys Lookout
Beach
Stieglitz
Road
Fairmount
Creek
Fingerpost
Road
Scamander
Road
Scamander
Creek
Tributary
Eastern
Tributary
Western
Tributary
Creek
Creek
Creek

TASMANIA
LOCALITY MAP
EL 12/78





Revisions.			
Drawn	R.H.H.	Date: 10-10-81	Centre: Hobart
Traced	Lee Alley		
Checked		Project No: T 610	Drawing No: 12/78-68
O.I.C.			

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

EL 12 78 . SCAMANDER . TAS.

ROCK CHIP SAMPLE RESULTS
Cu / Pb / Zn

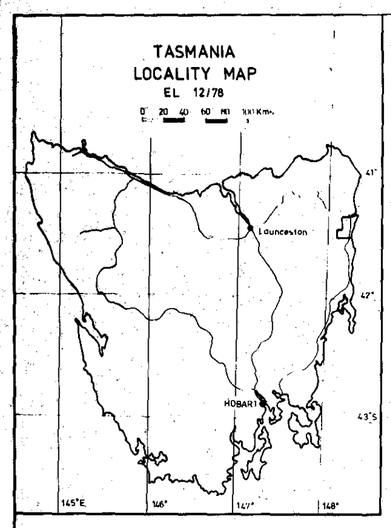
894027

N

SCALE 1:40,000

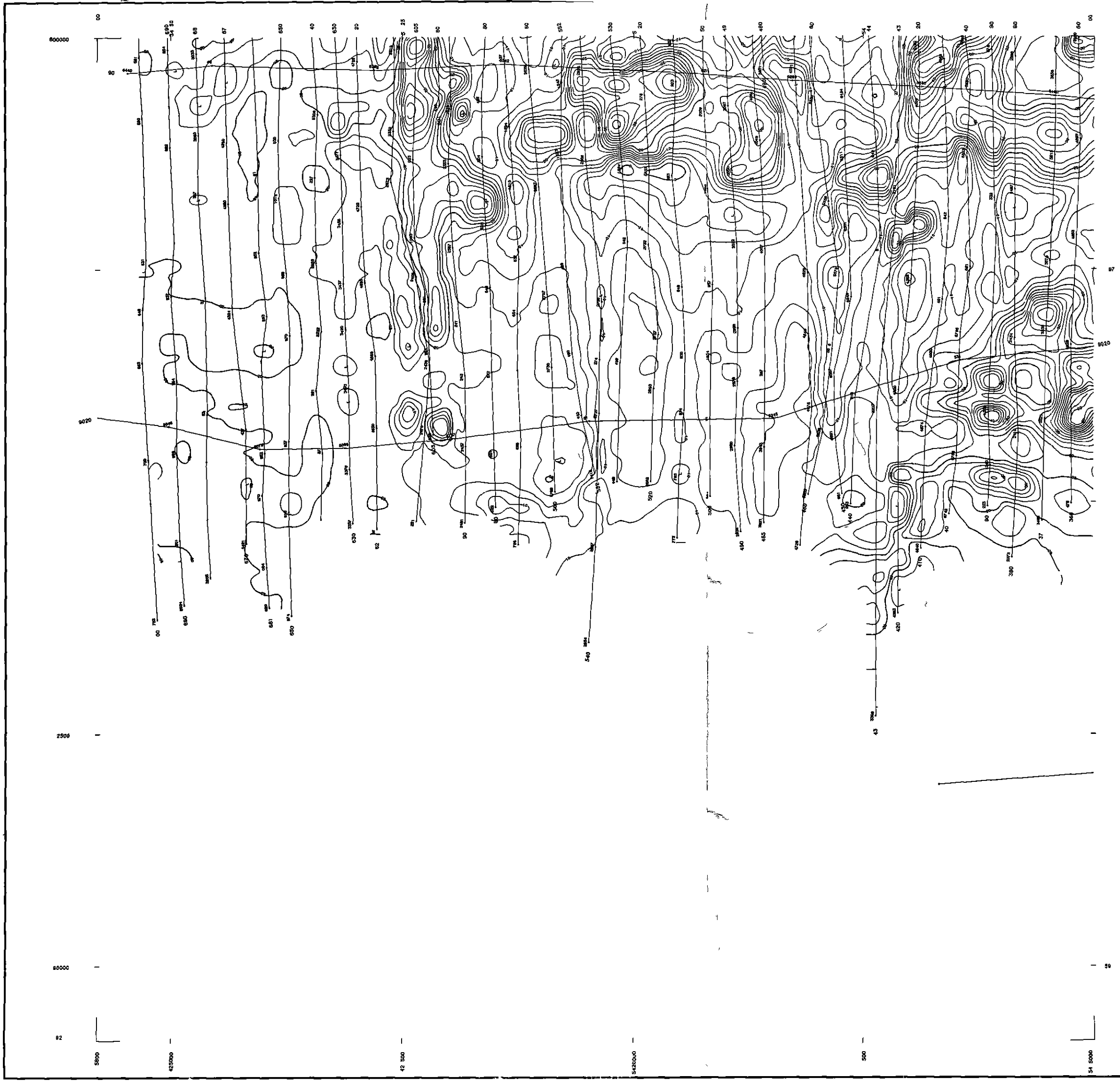
0 1 2 3 Kms

5 cm

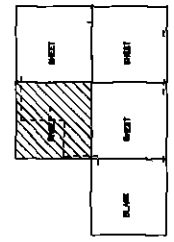


594 000m E
600 000m E
605 000m E
5425 000m N
5420 000m N
5415 000m N
5410 000m N
5405 000m N
590 000m E
STIEGLITZ
GEORGES BAY
MEDEAS COVE
Medeas Cove Road
St Helens Point
BEAUTY BAY
ST. HELENS
Jacks Lagoon
Onion Creek
Boggy Creek
Brooks Hill
TASMAN HIGHWAY
Little Basin
Thanas Basin
Beach
Arm
Dans Hollow Creek
Reedy
Yarmouth
Freshwater Creek
Brunnaris
Wrinklers Lagoon
PADDYS ISLAND
TASMAN SEA
Ferntree Falls
Launceston
Tasmania
Nepstale Creek
MT ECHO
Contrade
Flagstaff Creek
Ridge
Ramps
Tombille Creek
LOILA PINNACLE
Eastern Creek
Fitzgerald Creek
Western Creek
SCAMANDER TIER
Upper Scamander
SCAMANDER
Scamander River
Ansons Bay
Jeanneret Beach
Ansons Bay Road
Jeanneret Creek
Mt Nicholas
Mt Nicholas Creek
Lagoon Creek
Dolly Creek
Bolgers Rivulet
Bolgers Creek
Bolgers Beach
Jeanneret Beach
Henderson Lagoon
Stieglitz Creek
Stieglitz Beach
Jayem Mudflat
Tasmanian Beach
Tasmanian Creek
Tasmanian Road
Tasmanian Highway
Tasmanian Arm
Tasmanian Hollow
Tasmanian Point
Tasmanian Bay
Tasmanian Cove
Tasmanian Basin
Tasmanian Lagoon

FIG. 1.14



5 cm



AL 1 40000

DETAILS OF PROCESSING
PR ESSE BY BHP EXPL R TION OA ERWELL
MESH 00 1
S N 700
C NTOUR INTERVA 2 5 T

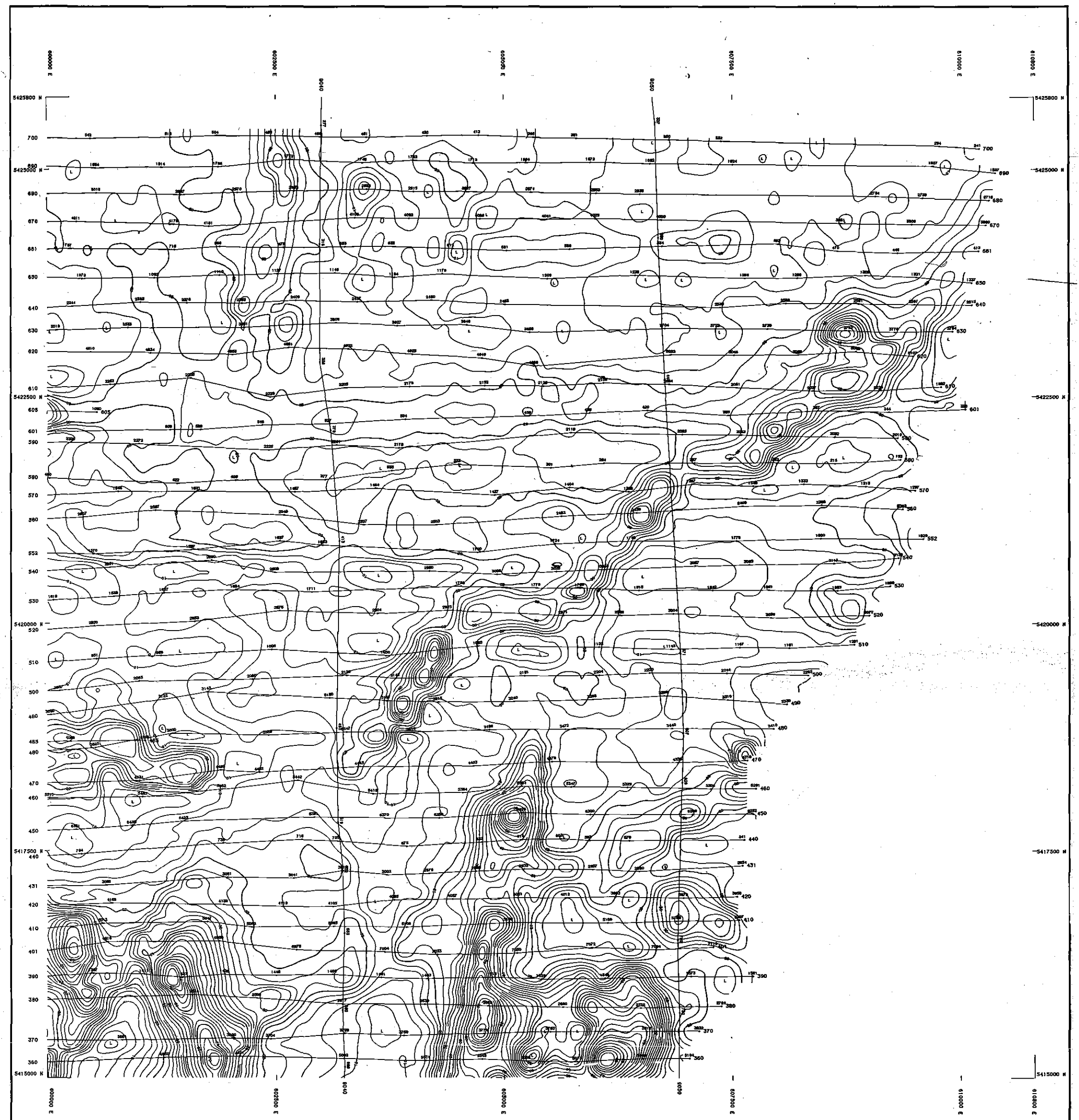
DETAILS OF SURVEY
FLO N BY
DAT
1 250 00 SHEET SC ANDER
ANG ZONE 55
LI E SPACING 300
S RVEY EIGHT 9
MA NET METER
OMPT SCATTERIN RATI LPHA 0 50
OPTION SCATTERI G RATIO BETA 0 0
O PT M SCATTERIN RATI GAMMA 0 5

Z

894029

THE BROKEN HILL PROPRIETRY CO LTD
EXPLORATION DEPT
SCAMANDER TAS
TOTAL M GNETIC INTENSITY CONTOURS
SHEET 1

AC		RE
CH CKED		A1



SCALE 1:40 000

0 400 800 1200 1600 2000 METRES

DETAILS OF SURVEY

FLOWN BY : -
DATE : -
1:250.000 SHEET : SCAMANDER
AMG ZONE : 55.

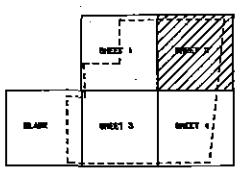
LINE SPACING : 300m
SURVEY HEIGHT : 90m
MAGNETOMETER : -

COMPTON SCATTERING RATIO ALPHA : 0.50
COMPTON SCATTERING RATIO BETA : 0.50
COMPTON SCATTERING RATIO GAMMA : 0.50

DETAILS OF PROCESSING

PROCESSED BY BHP EXPLORATION : CAMBERWELL
MESH : (100,100)
SCAN : 700
CONTOUR INTERVAL : 2.5 nT

5 cm



N

89 40 30

THE BROKEN HILL PROPRIETRY CO.LTD.
EXPLORATION DEPT

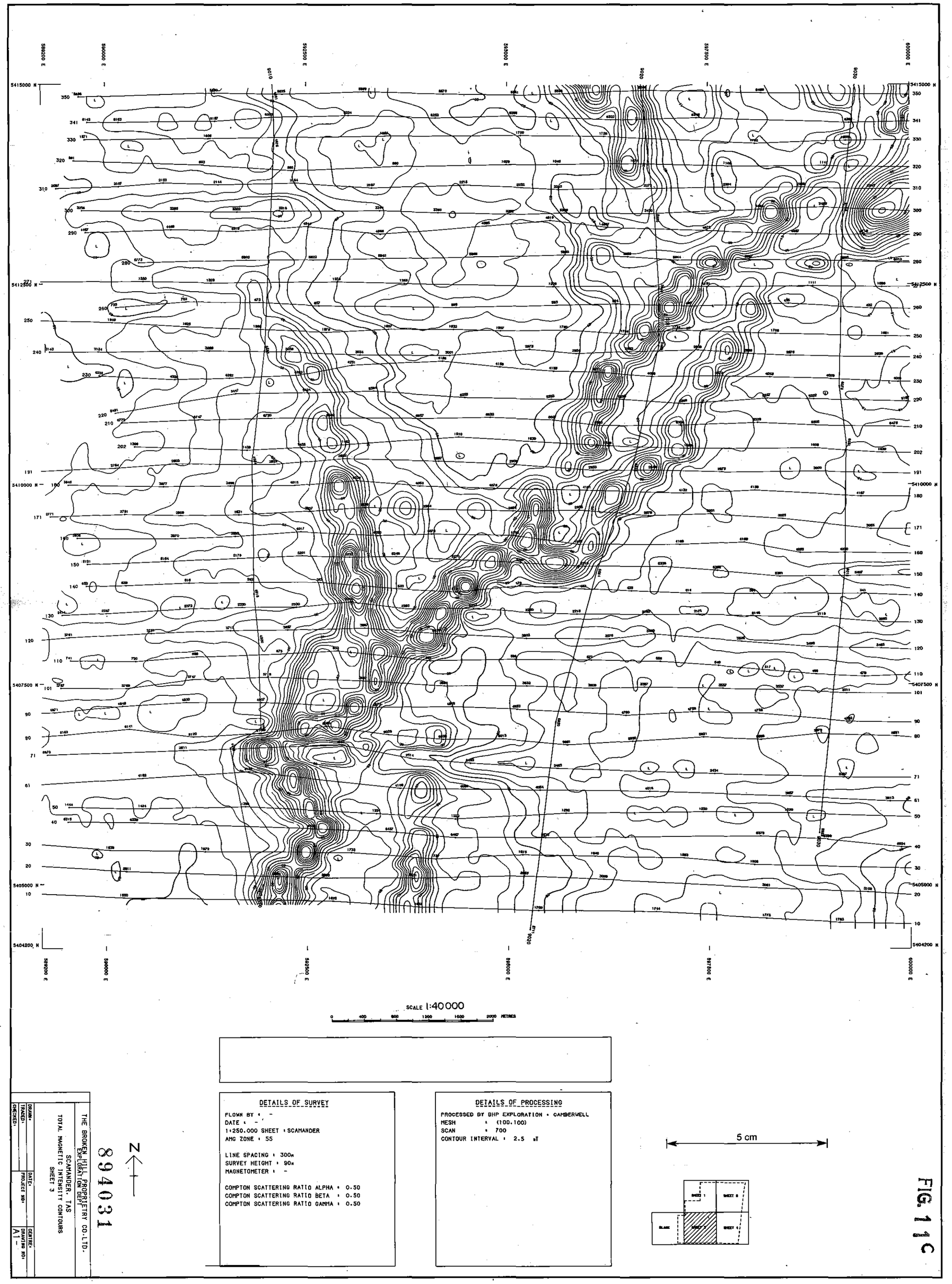
SCAMANDER, TAS

TOTAL MAGNETIC INTENSITY CONTOURS

SHEET 2

DRAWN: | DATE: | CENTRE:
TRACED: | PROJECT NO: | DRAWING NO: A1 -
CHECKED:

FIG. 11B



DETAILS OF SURVEY

FLOWN BY : -
DATE : -
1:250,000 SHEET : SCAMANDER
AMG ZONE : 55

LINE SPACING : 300m
SURVEY HEIGHT : 90m
MAGNETOMETER : -

COMPTON SCATTERING RATIO ALPHA : 0.50
COMPTON SCATTERING RATIO BETA : 0.50
COMPTON SCATTERING RATIO GAMMA : 0.50

DETAILS OF PROCESSING

PROCESSED BY BHP EXPLORATION : CAMBERWELL
MESH : (100,100)
SCAN : 700
CONTOUR INTERVAL : 2.5 nT

5 cm

THE BROKEN HILL PROPRIETARY CO.LTD.
EXPLORATION DEPT.

SCAMANDER, TAS

TOTAL MAGNETIC INTENSITY CONTOURS
SHEET 3

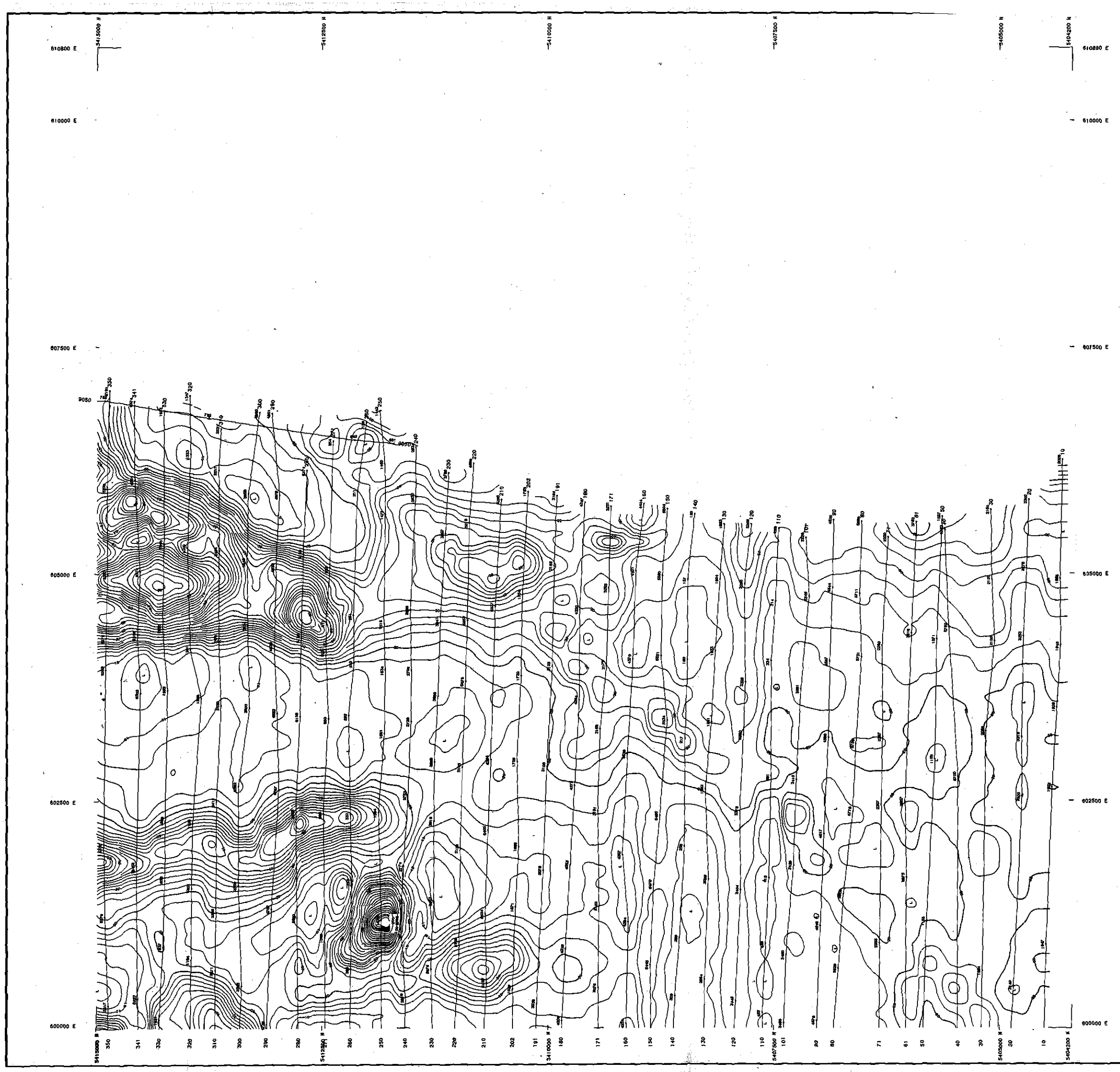
DRAWN:
TRACED:
CHECKED:
DATE:
PROJECT NO:
CENTRE:
DRAWING NO: A1 -

N

8940 31

FIG. 11C

FIG. 11D



DETAILS OF PROCESSING

PROCESSED BY BHP EXPLORATION - CAMBERWELL
MESH - (100,100)
SCAN - 700
CONTOUR INTERVAL - 2.5 nT

DETAILS OF SURVEY

FLOWN BY - -
DATE - -
1:250,000 SHEET - SCAMANDER
AMG ZONE - 55

LINE SPACING - 300m
SURVEY HEIGHT - 90m
MAGNETOMETER - -

COMPTON SCATTERING RATIO ALPHA - 0.50
COMPTON SCATTERING RATIO BETA - 0.50
COMPTON SCATTERING RATIO GAMMA - 0.50

Z

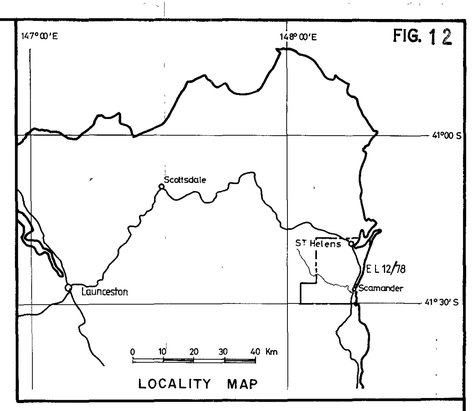
894032

THE BROKEN HILL PROPRIETARY CO.LTD.
EXPLORATION DEPT

SCAMANDER, TAS
TOTAL MAGNETIC INTENSITY CONTOURS
SHEET 1

DRAWN:	DATE:	CENTRE:
TRACED:	PROJECT NO:	DRAWING NO:
CHECKED:		A1 -

FIG. 12



148° 10' E

5425000 N

5420000 N

5415000 N

5410000 N

5405000 E

590000 E

595000 E

600000 E

605000 E

610000 E

41° 20'S

41° 30'S

St Helens

GEORGES BAY

Launceston Creek

Constable Creek

Goodwins Creek

Scamander River

Scamander

Waterhouse Creek

Binns Creek

AVENUE

DIANAS BASIN

AREA 1-1

AREA 1-2

AREA 1-6

AREA 1-7

AREA 2-1

AREA 2-2

AREA 2-3

AREA 2-4

AREA 2-5

AREA 2-6

AREA 2-7

AREA 2-8

AREA 2-9

AREA 2-10

AREA 2-11

AREA 2-12

CRAMPS GRID

GREAT PYRAMID GRID

NORTH SCAMANDER RIVER GRID

E.L.12/78

LEGEND

AREA 1-7 — Ground magnetic traverse (25m interval readings).

CRAMPS GRID — Established grid area.

Airborne EM (DIGHEM) survey area.

B H P Survey
Flying height 90 metres
Line spacing 300 metres

5 cm

Scale 1:50 000

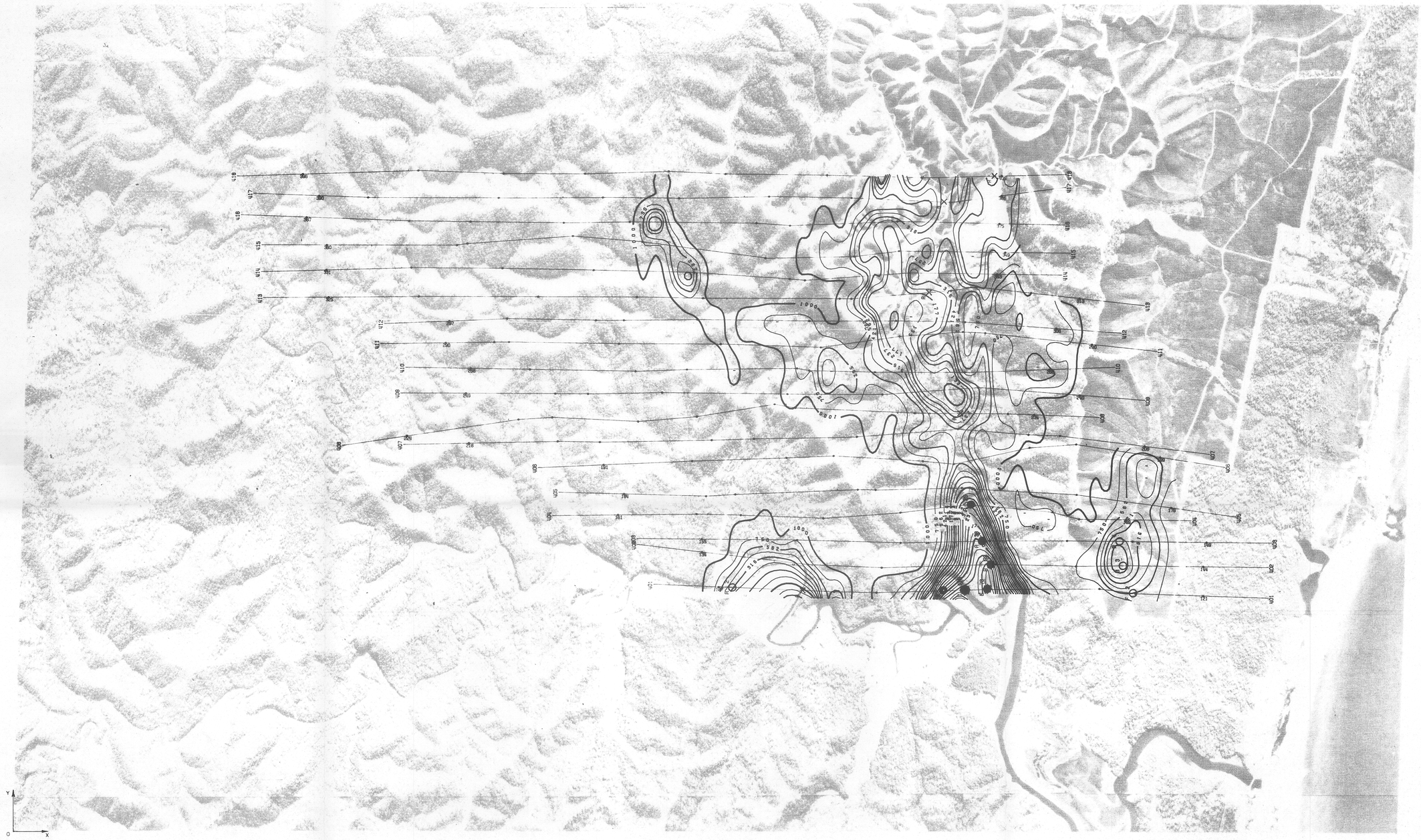
0 1 2 3 4 5 Kilometres

894033

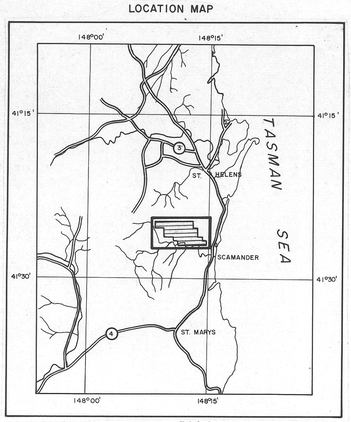
THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

E.L. 12/78 — SCAMANDER, TAS.
RESIDUAL MAGNETIC INTENSITY CONTOURS AND LOCATION OF DETAILED GEOPHYSICAL SURVEYS

Drawn P Hillsdon	Date 16-12-81	Centre Melbourne
Traced	Project T610 - 7	Drawing No: A1-1899c
Checked		



LOCATION MAP



Scale 1:500,000

DIGHEM^{II} SURVEY

SCAMANDER, TASMANIA

RESISTIVITY

FOR

BROKEN HILL PROPRIETARY CO. LTD.

SCALE 1:20,000

2 0 1 2 Kilometres

1/2 0 1/2 1 Miles

5 cm

Flight line

Fiducials and numbers

LEGEND

Contours in ohm - m at eight intervals per decade

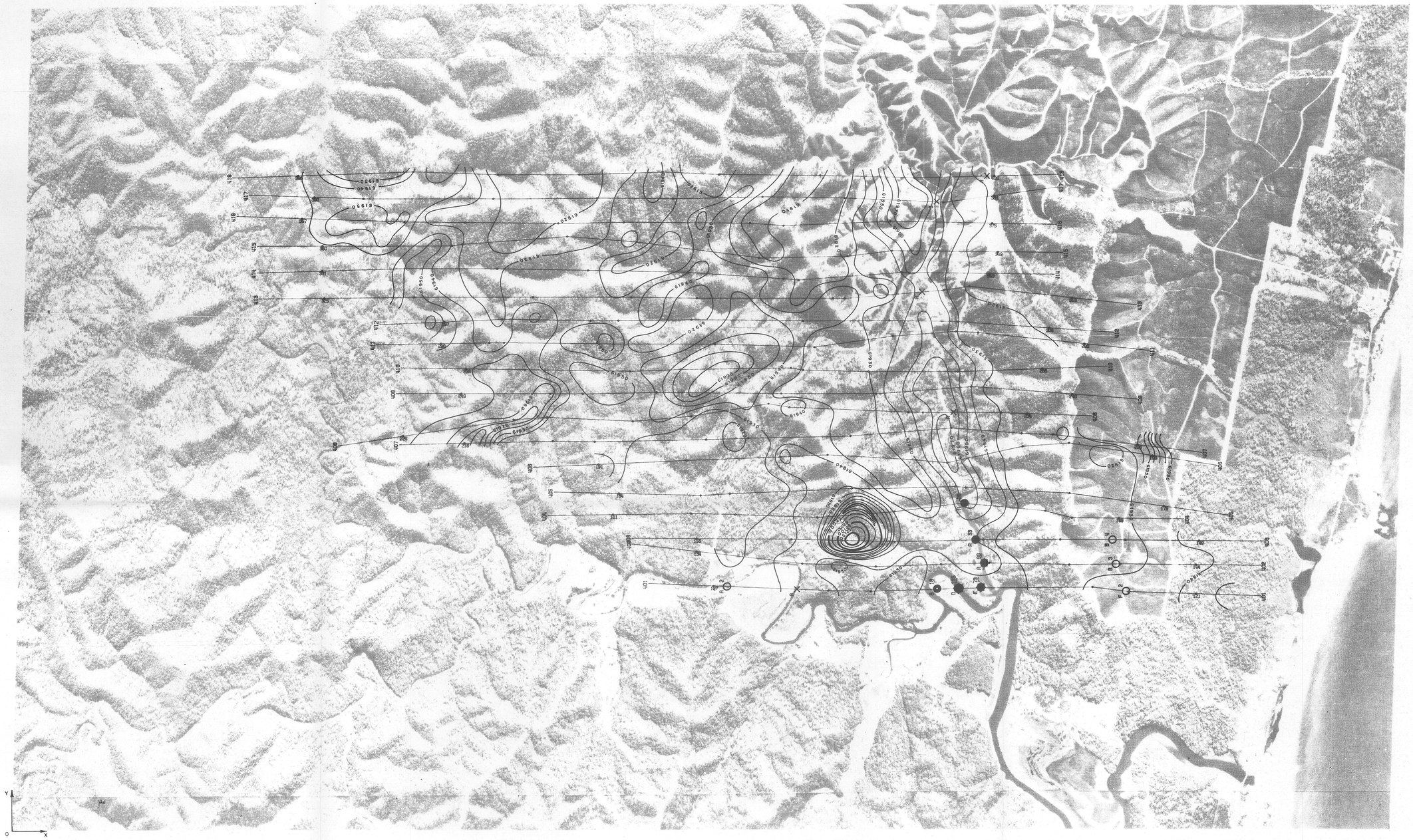
100
75
56
42
31
23
17
13
10

Note

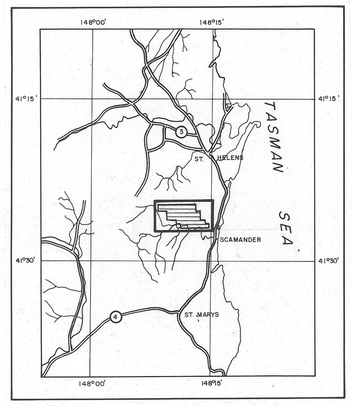
The numbers face in the direction of increasing value

REGISTERED PROFESSIONAL ENGINEER
D. C. FRASER
PROVINCE OF ONTARIO

894034



LOCATION MAP



Scale 1: 500,000

REGISTERED PROFESSIONAL ENGINEER
D. C. FRASER
PROVINCE OF ONTARIO

DIGHEM^{II} SURVEY

SCAMANDER, TASMANIA

MAGNETICS

FOR

BROKEN HILL PROPRIETARY CO. LTD.

SCALE 1 : 20,000

1 0 1 2 Kilometres

1/2 0 1/2 1 Miles

5 cm

Flight line

Fiducials and numbers

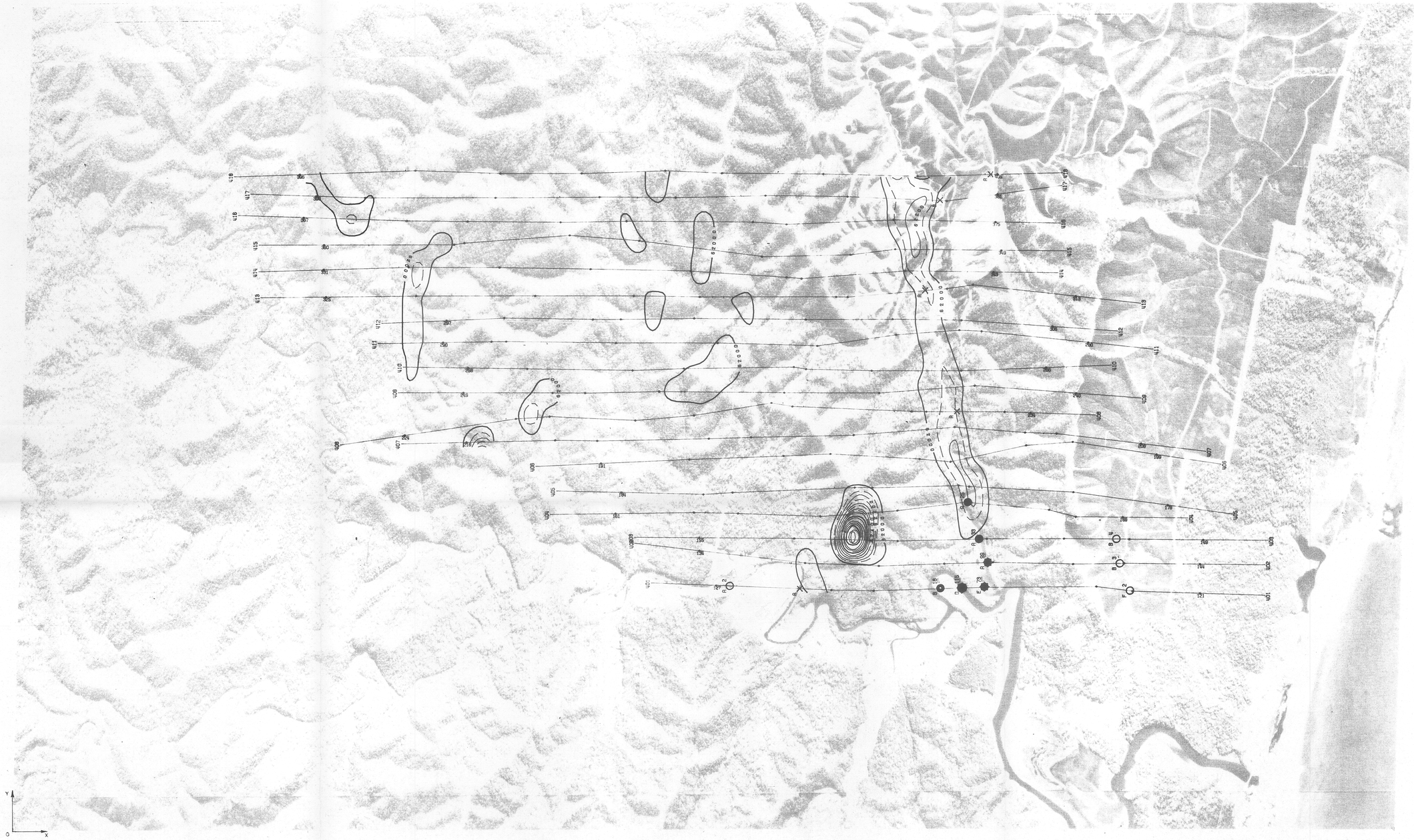
ISOMAGNETIC LINES
(total field)

100 ..... 100 gammas

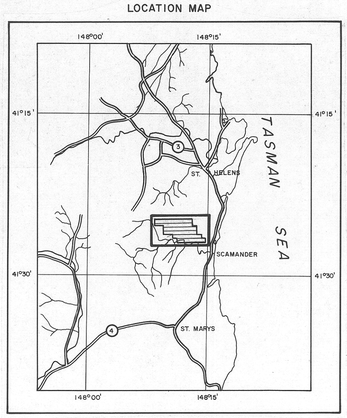
10 ..... 10 gammas

Magnetic Inclination within the survey area: 72°

894035



LOCATION MAP



Scale 1:500,000

REGISTERED PROFESSIONAL ENGINEER
D. C. FRASER
PROVINCE OF ONTARIO

DIGHEM II SURVEY

SCAMANDER, TASMANIA

ENHANCED MAGNETICS

FOR

BROKEN HILL PROPRIETARY CO. LTD.

SCALE 1:20,000

2 Kilometres

1 Miles

5 cm

Flight line

Fiducials and numbers

ISOMAGNETIC LINES

(enhanced field)

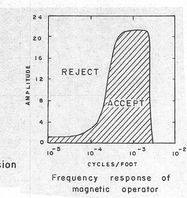
5000 ..... 5000 gammas

1000 ..... 1000 gammas

..... 200 gammas

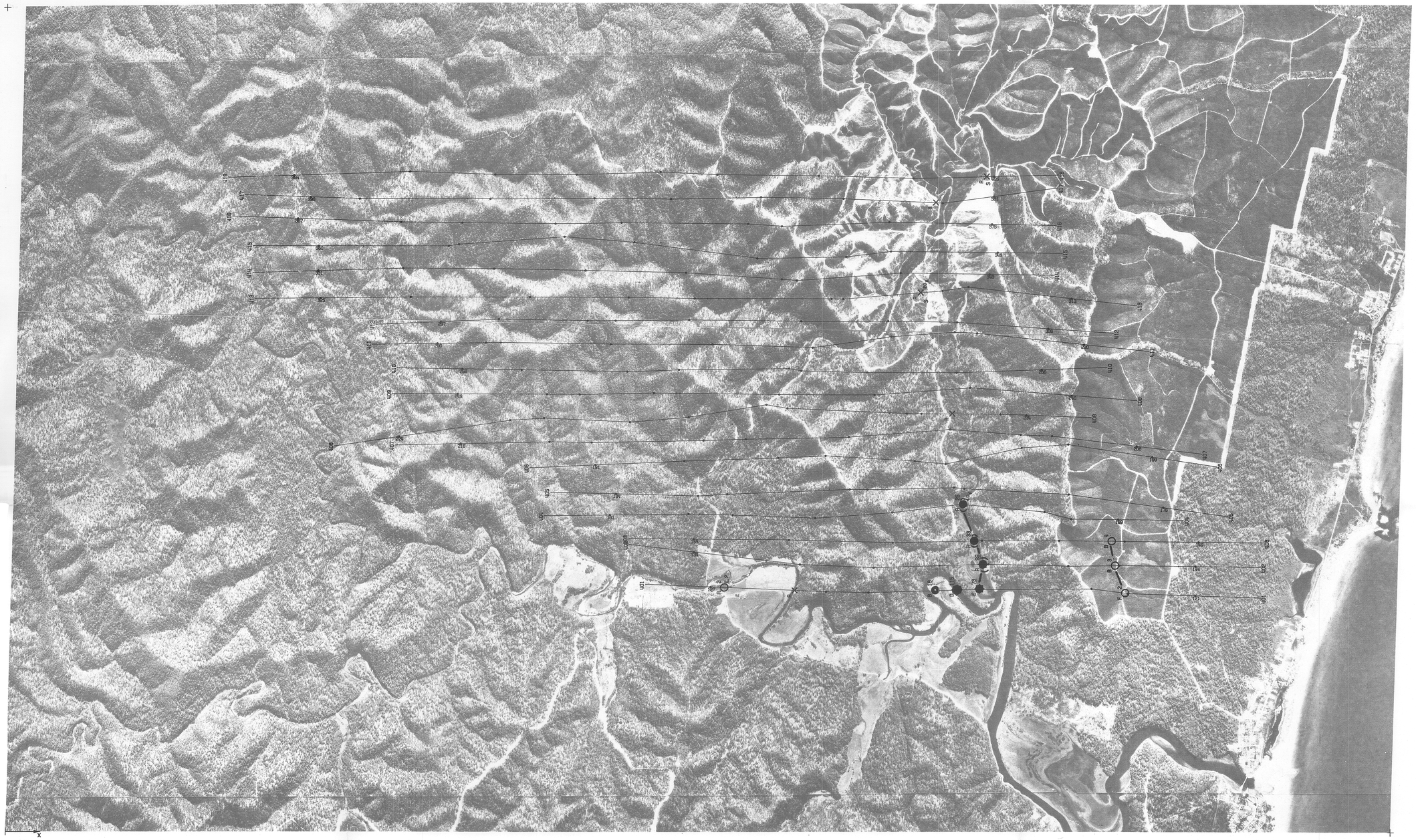
..... 100 gammas

..... magnetic depression

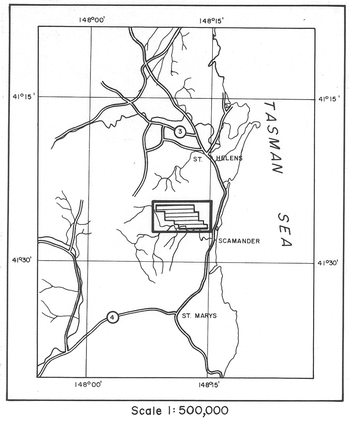


Frequency response of magnetic operator

894036



LOCATION MAP



Scale 1:500,000

REGISTERED PROFESSIONAL ENGINEER
D.C. FRASER
PROVINCE OF ONTARIO

DIGHEM II SURVEY

SCAMANDER, TASMANIA

ELECTROMAGNETICS

FOR

BROKEN HILL PROPRIETARY CO. LTD.

SCALE 1:20,000

1 0 1 2 Kilometres

1/2 0 1/2 1 Miles

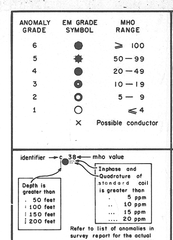
5 cm

Flight line

Fiducials and numbers

ANOMALY GRADE	EM GRADE SYMBOL	MHO RANGE
6	●	≥ 100
5	✱	50 — 99
4	●	20 — 49
3	◎	10 — 19
2	○	5 — 9
1	○	≤ 4
	×	Possible conductor

DIGHEM anomalies are divided into six grades of conductivity – thickness product. This product in mhos is the reciprocal of resistance in ohms. The mho is a measure of conductance, and is a geologic parameter. Most swamps yield Grade 1 anomalies but highly conducting clays can give Grade 2 anomalies. The multi-coil anomaly shapes often allow surface conductors to be recognized, and these are indicated by the letter S on this map. The remaining Grade 1 and 2 anomalies could be weak bedrock conductors. The higher grades indicate increasingly higher conductances. Examples: The ore bodies at the Magusi River comp yield Grade 4 anomalies, while Mattabi and Whistle give Grade 5. Graphite and sulphides can span all grades but, in this survey area, field work may show that the different grades indicate different types of conductors.



Refer to list of anomalies in survey report for the actual ppm values for all coils, and for conductor depths.

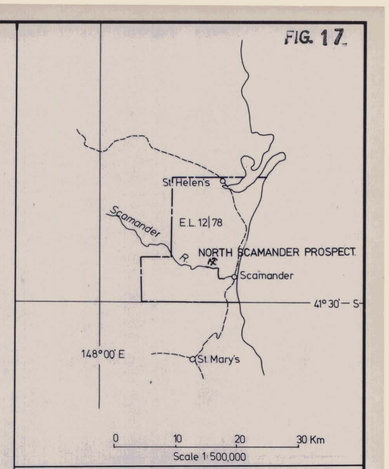
The actual mho value is plotted beside the EM grade symbol. The letter is the anomaly identifier. The horizontal rows of dots indicate anomaly amplitude on the flight record, and the vertical column gives the estimated depth. This depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or conductive overburden effects.

	Conductor axis
S	Probable surface response
S?	Possible surface response
L	Probable line (power, telephone, pipe, or fence)
L?	Possible line
?	Questionable anomaly
>10	Apparent thickness >10 m
Dip	
100γ	Direct magnetic correlation of 100 gammas

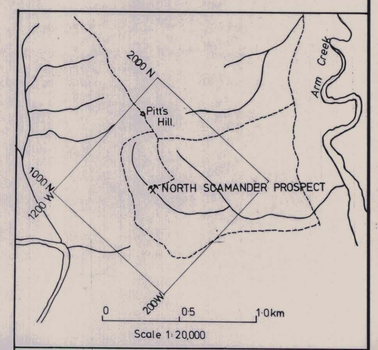
DIGHEM maps are designed to provide a correct impression of conductor quality by means of the conductance grade symbols. The symbols can stand alone with geology when planning a followup program. The actual mho values are plotted for those who wish quantitative data. The anomaly ppm and depth are indicated by inconspicuous dots which should not distract from the conductor patterns, while being helpful to those who wish this information. The map provides an interpretation of all conductors in terms of length, strike direction, conductance and depth. The accuracy is comparable to an interpretation from a ground EM survey having the same line spacing.

894037

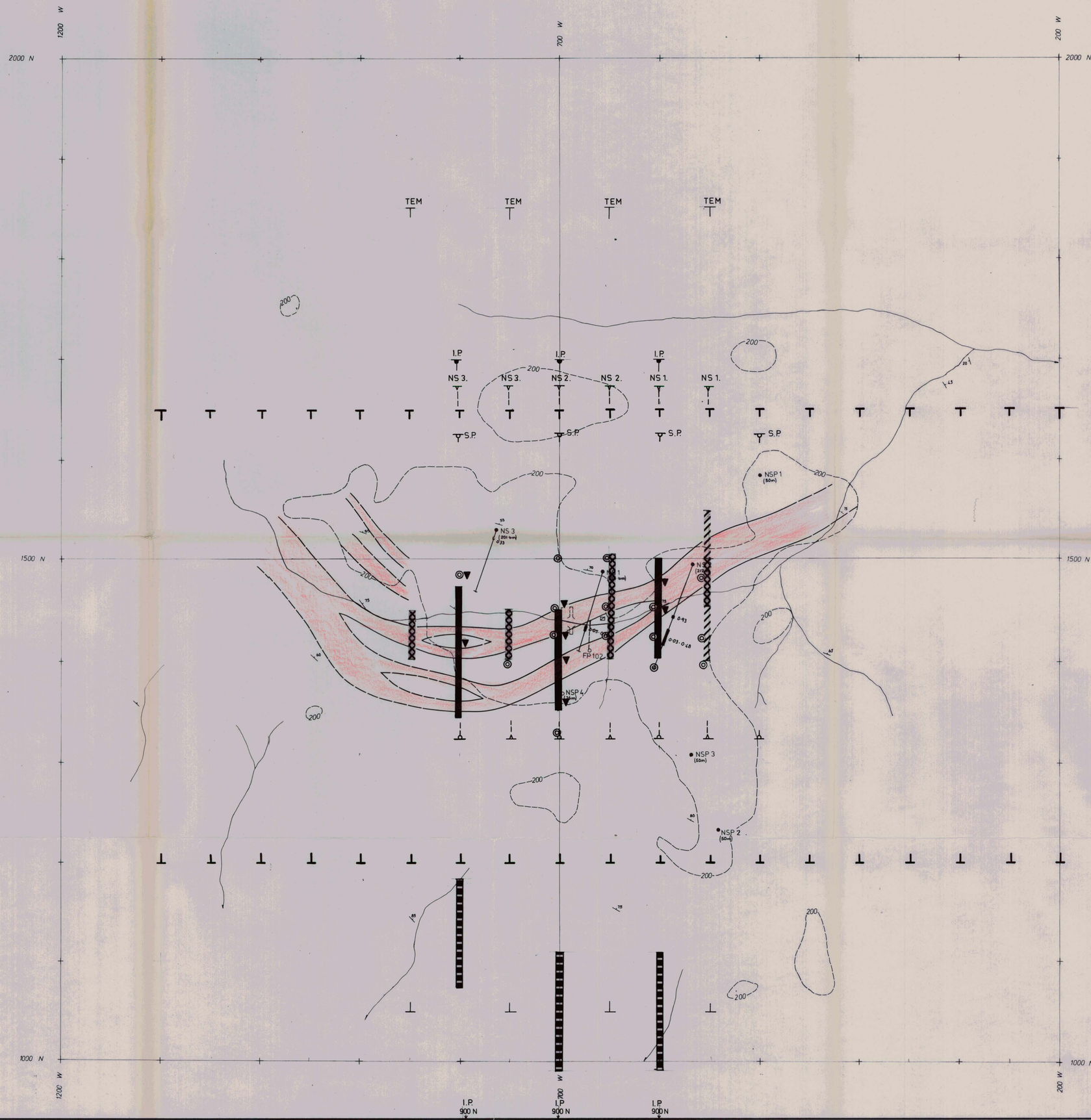
FIG. 17.



LOCALITY MAP



LOCATION MAP



LEGEND

- •NS BHP Diamond Drillhole.
- •NSP BHP Percussion Drillhole.
- ○FP E.Z. Diamond Drillhole.
- Adit.
- Shaft.
- 200 ppm Sn in soil contour.
- 0.33 Sn grades in mineralized intercepts (%)

Ground magnetic anomaly – 50m spacing 10m. interval.

I.P. anomaly – 100m dipole-dipole frequency domain n=4

T.E.M. (SIROTEM) anomaly – 100 square coincident loops – 50 m reading intervals.

Self Potential anomaly – 5m reading interval fixed base mode.

MISE A LA MASSE – chargeability anomaly
NS 1.–175m chargeability read at 25m intervals.
NS 2–140m " " " " "
NS 3.–185m " " " " "

M N

5 cm

Scale 1:2000

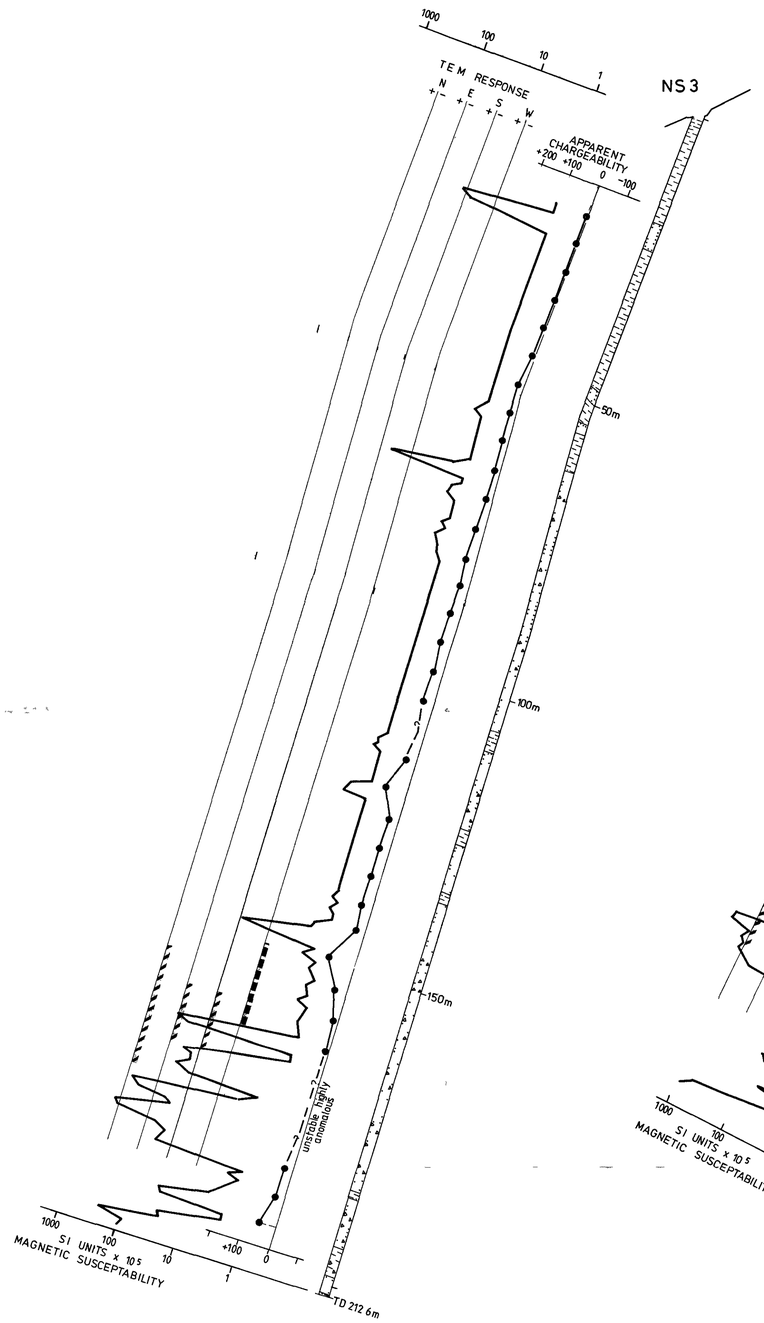
0 50 100 150 200m

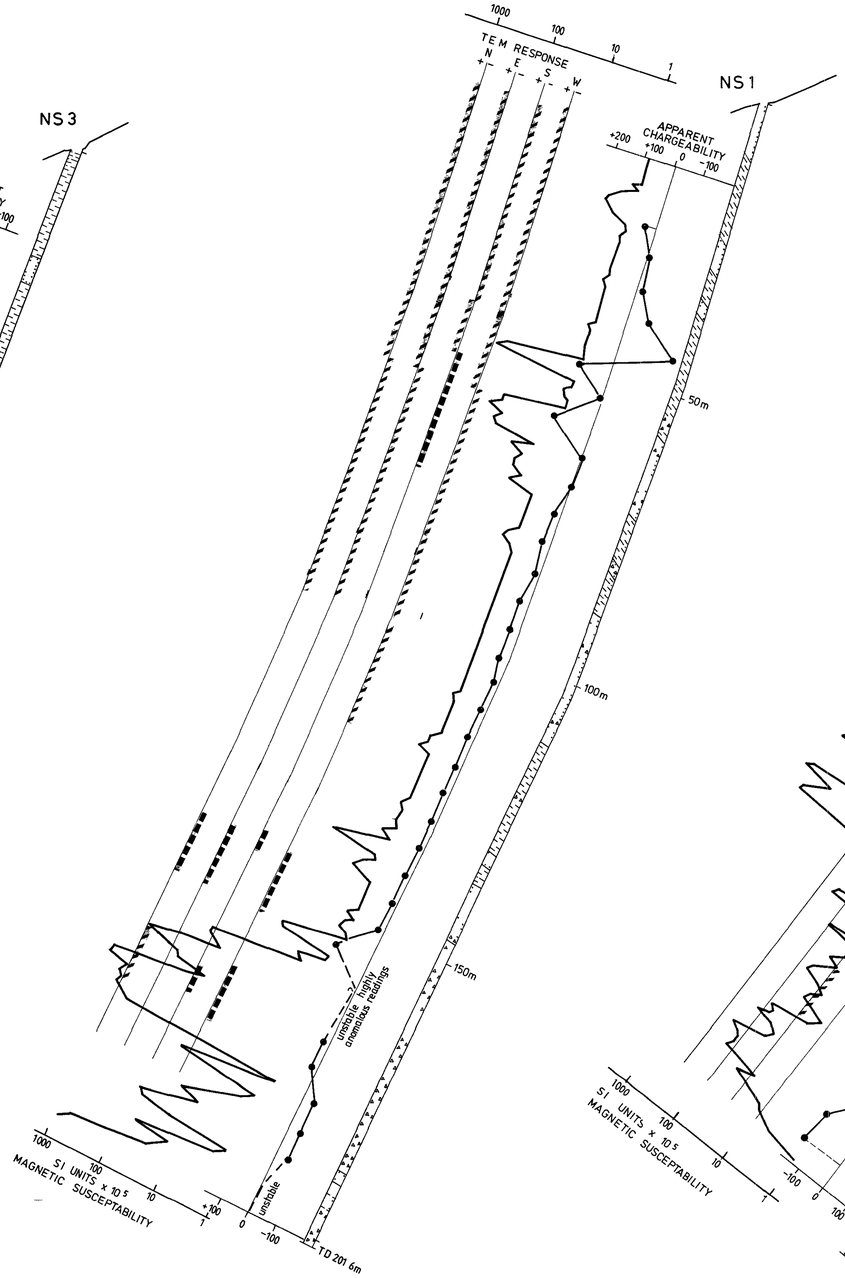
894038

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

E.L. 12/78 SCAMANDER, TASMANIA.
NORTH SCAMANDER PROSPECT
GEOPHYSICAL EXPLORATION RESULTS

Revisions:	Drawn: R.H	Date: 15-9-81	Centre: Hobart.
	Traced: Hilary	Project No.: T 610	Drawing No.: A1-
	Checked:		







Geophysics

Magnetic susceptability readings taken with Geoinstruments hand held Susc Meter on whole core samples at 1m intervals

T E M Response- positive and negative responses indicated for each Transmit loop Loops centred on drill hole and laid as 100m x 100m squares in 4 quadrants

Geology

Breccia

Shale siltstone

Quartzite

5 cm

VERT SCALE 1 500

0 10 20 30 40 50 60 Metres

Sharp peak

Broad zone

LOOP LAYOUT

Grid north

N W E S

drill hole

894039

THE BROKEN HILL PROPRIETARY CO LTD
EXPLORATION DEPARTMENT

E L 12 78 SCAMANDER, TAS
NORTH SCAMANDER PROSPECT
GEOPHYSICAL DOWNHOLE LOGS
D D H NS 1 - 3

Revisions			
	Drawn R H	Date Nov 1981	Centre Melbourne
	Traced G B	Project N°	Drawing N° A1- 1943
	Checked		

APPENDIX 1

Geochemical Results

894041

SCAMANDER E.L. 12/78

GEOCHEMICAL RESULTS

SS - Stream Samples - 40*
PG - Rock Chip Samples

repeated from 791377

Sample No.	Sn	Cu	Pb	Zn	Ag	Au	As
SS 1001	25	45	60	145	x	x	6.7
SS 1002	40	35	40	90	x	x	6.7
SS 1003	30	30	40	55	x	x	8.3
SS 1004	45	45	110	75	x	x	4.2
SS 1005	55	45	45	35	0.5	x	10.0
SS 1006	20	25	5	20	0.5	x	3.3
SS 1007	25	40	60	85	x	x	1.7
SS 1008	20	30	30	55	x	x	3.3
SS 1009	20	30	30	60	0.5	x	1.7
SS 1010	20	25	25	25	x	x	1.7
SS 1011	30	30	20	25	x	x	20.0
SS 1012	15	35	50	15	x	x	3.3
SS 1013	10	55	10	55	x	x	17.8
SS 1014	25	20	30	20	x	x	1.7
SS 1015	160	30	100	35	0.5	x	1.7
SS 1016	2600	510	65	185	4.5	x	61.8
SS 1017	920	540	560	80	55.0	x	6053
SS 1018	370	235	50	155	1.5	x	142
SS 1019	15	30	10	20	1.0	x	10.0
SS 1020	6	32	20	20	1	x	14
SS 1021	10	20	15	45	1.0	x	6.7
SS 1022	25	25	20	75	0.5	x	6.7
SS 1023	30	35	60	115	x	x	3.3
SS 1024	30	30	20	75	0.5	x	50.0
SS 1025	50	35	25	75	x	x	39.5
SS 1026	30	35	45	130	1.0	x	42.1
SS 1027	40	30	20	65	1.0	x	36.8
SS 1028	40	25	25	85	1.0	x	22.2
SS 1029	20	35	15	55	1.0	x	44.7
SS 1030	-	15	10	30	1.0	x	1.7
SS 1031	10	15	10	30	0.5	x	3.3
SS 1032	x	15	5	50	x	x	1.7

894042

Sample No	Sn	Cu	Pb	Zn	Ag	Au	As
SS 1033	x	15	5	45	0.5	x	1.7
SS 1034	x	15	5	50	x	x	1.7
SS 1035	x	15	5	50	0.5	x	x
SS 1036	x	30	10	65	0.5	x	1.7
SS 1037	3	15	5	50	0.5	x	1.7
SS 1038	25	20	20	35	x	x	5.0
SS 1039	20	40	30	60	0.5	x	22.2
SS 1040	48	42	19	60	1	x	44
SS 1041	40	35	25	70	0.5	x	15.5
SS 1042	25	50	20	75	1.5	x	20.0
SS 1043	40	20	15	45	x	x	7.0
SS 1044	10	30	25	85	1.0	x	18.0
SS 1045	90	25	25	80	1.0	x	22.0
SS 1046	10	25	25	70	1.0	x	16.0
SS 1047	25	50	30	55	1.0	x	24.0
SS 1048	10	30	30	80	1.0	x	22.0
SS 1049	15	25	30	70	1.0	x	4.0
SS 1050	3	35	35	100	1.5	x	8.0
SS 1051	45	40	40	85	0.1	x	20.0
SS 1052	30	70	30	85	1.0	x	61.4
SS 1053	30	45	15	40	1.0	x	14.0
SS 1054	15	55	15	60	1.0	x	54.5
SS 1055	25	60	20	65	1.0	x	47.7
SS 1056	60	80	15	90	0.5	x	26.0
SS 1057	20	65	15	65	1.0	x	54.5
SS 1058	20	80	25	90	0.5	x	34.0
SS 1059	25	85	30	65	2.0	x	104
SS 1060	22	45	22	35	1	x	120
SS 1061	25	70	20	60	1.5	x	89.5
SS 1062	85	60	135	140	1.5	x	12.0
SS 1063	25	90	20	100	x	x	18.0
SS 1064	x	20	10	35	0.5	x	4.0
SS 1065	x	30	20	70	x	x	5.0
SS 1066	x	30	20	50	x	x	6.0
SS 1067	4	20	10	55	0.5	x	2.0

894043

Sample No	Sn	Cu	Pb	Zn	Ag	Au	As	Ba	Mn
SS 1068	x	20	10	55	x	x	4.0		
SS 1069	25	70	35	140	x	x	12.0		
SS 1070	x	15	5	30	1.0	x	2.0		
SS 1071	x	20	15	40	x	x	4.0		
SS 1072	x	20	10	30	x	x	x		
SS 1073	70	30	110	105	x	x	4.0		
SS 1074	x	30	155	30	1.0	x	6.0		
SS 1075	130	30	65	40	1.0	x	8.0		
SS 1076	410	35	50	135	0.5	x	16.0		
SS 1077	250	15	20	20	0.5	x	2.0		
SS 1078	140	35	120	65	1.0	x	5.0		
SS 1079	290	60	135	95	x	x	12.0		
SS 1080	14	28	32	65	1	x	2		
SS 1081	40	35	45	90	1.0	x	4.0		
SS 1082	170	45	40	50	0.5	x	4.0		
SS 1083	60	40	45	75	1.0	x	1.0		
SS 1084	110	20	80	20	x	x	1.0		
SS 1085	45	50	40	145	x	x	12.5		
SS 1086	35	50	20	25	x	x	x		
SS 1087	130	100	365	630	1.5	x	15.5		
SS 1088	45	25	50	35	x	x	2.5		
SS 1089	730	40	140	130	1.0	x	7.5		
SS 1090	2800	40	40	140	0.5	x	12.5		
SS 1091	85	30	110	35	1.0	x	5.0		
SS 1092	240	50	190	260	1.5	x	7.5		
SS 1093	400	40	75	250	x	x	20		
SS 1094	35	35	55	110	x	x	23		
SS 1095	40	45	65	260	0.5	x	23		
SS 1096	50	35	60	135	0.5		6		
SS 1097	35	45	40	140	0.5		27		
SS 1098	45	35	20	90			12		
SS 1099									
SS 1100	65	20	75	200	1		6	330	1250
SS 1101	100	35	75	230	1.0		21		
SS 1102	150	40	80	225	0.5		23		
SS 1103	9	20	15	30			4		
SS 1104	3	15	15	40			5		
SS 1105		15	15	30			4		

894044

Sample No.	Sn	Cu	Pb	Zn	Ag	Au	As	Ba	Mn
BS 1106		20	15	35	0.5		5		
BS 1107	5	20	20	40			3		
BS 1108	4	15	10	30					
BS 1109		10	15	30			4		
BS 1110		20	10	45			2		
BS 1111		15	10	30			4		
BS 1112	3	15	10	20	0.5				
BS 1113	5	25	20	65	0.5		2		
BS 1114	4	15	10	40			1		
BS 1115	3	25	20	65			2		
BS 1116		15	15	35			2		
BS 1117		15	10	20			5		
BS 1118	7	10	10	30			4		
BS 1119	5	20	10	20					
BS 1120	4	5	10	28	1		6	280	230
BS 1121	7	20	20	55			2		
BS 1122	4	15	10	30			1		
BS 1123	3	15	15	40					
BS 1124	4	15	10	20			2		
BS 1125	3	15	10	45			4		
BS 1126	4	10	5	10					
BS 1127		15	15	25					
BS 1128	6	15	15	35					
BS 1129	5	15	10	25			1		
BS 1130		20	15	20	0.5				
BS 1131	4	15	10	30	0.5				
BS 1132	5	10	5	10			4		
BS 1133	40	15	15	15	1.0		2		
BS 1134	3	5	10	20	0.5				
BS 1135		15	15	50					
BS 1136	4	10	10	40			3		
BS 1137	x	15	15	55			5		
BS 1138	5	15	20	50			5		
BS 1139	3	15	20	55			2		
BS 1140	4	2	9	20	1		2	430	130
BS 1141	4	15	10	35			4		
BS 1142	6	10	10	30			5		
BS 1143		10	5	25			1		
BS 1144		5	5	5					

Sample No.	Sn	Cu	Pb	Zn	Ag	Au	As	As*
PG 1	7	35	35	35	x	0.05	60	80
PG 2	x	30	35	25	x	x	105	110
PG 3	4	160	45	35	x	x	70	80
PG 4	x	85	45	80	x	x	35	55
PG 5	x	115	25	50	x	x	15	25
PG 6	x	30	65	80	x	x	90	90
PG 7	7	20	20	30	x	x	25	25
PG 8	5	25	25	30	x	x	30	25
PG 9	6	85	55	200	x	x	95	90
PG 10	4	60	30	75	x	x	30	30
PG 11	30	75	40	105	x	x	45	35
PG 12	8	55	50	445	x	x	25	25
PG 13	x	45	30	140	x	x	5	x
PG 14	6	65	30	190	x	x	25	25
PG 15	500	180	85	35	x	x	5	x
PG 16	200	435	520	20	1.0	x	200	240
PG 17	180	325	70	15	0.5	x	95	95
PG 18	160	1250	155	10	1.5	x	170	150
PG 19	140	225	635	10	x	x	390	410
PG 20	460	800	1100	35	1	0.05	410	x
PG 21	120	420	115	20	8.0	x	65	70
PG 22	160	145	200	15	0.5	x	100	130
PG 23	15	35	110	450	x	x	40	35
PG 24	40	20	85	145	x	x	14	10
PG 25	90	30	270	1550	x	x	60	70
PG 26	10	30	240	290	x	x	x	25
PG 27	35	60	670	75	x	x	30	30
PG 28	160	115	1450	110	x	x	20	25
PG 29	60	130	170	350	x	x	95	100
PG 30	10	35	315	235	x	x	95	130
PG 31	80	50	465	125	1.0	x	50	70
PG 32	9	50	45	150	x	x	15	25
PG 33	5	30	20	55	x	x	10	4
PG 34	7	25	30	60	x	x	7	3
PG 35	3	45	20	25	x	x	15	7
PG 36	x	40	20	125	x	x	15	20
PG 37	4	65	30	145	x	x	25	15

* re-analysis

Sample No.	Sn	Cu	Pb	Zn	Ag	Au	As	As*
PG 38	x	50	40	85	x	x	25	30
PG 39	x	75	25	220	x	x	10	5
PG 40	4	28	30	75	1	x	10	
PG 41	x	70	95	50	x	x	25	30
PG 42	x	130	55	460	x	x	40	50
PG 43	4	50	25	70	x	x	5	x
PG 44	3	200	80	240	x	x	95	95
PG 45	x	30	130	55	x	x	14	
PG 46	x	25	105	150	x	x	46	
PG 47	35	1450	115	235	x	x	200	
PG 48	50	235	115	150	x	x	545	
PG 49	100	310	45	40	1.0	x	68	
PG 50	20	485	110	330	x	x	720	
PG 51	45	335	115	90	x	x	455	
PG 52	60	185	170	140	0.5	x	72	
PG 53	100	165	5150	200	4.5	x	59	
PG 54	65	195	140	25	0.5	x	7	
PG 55	620	1500	2550	160	10.0	x	20	
PG 56	390	220	145	450	1.0	x	20	
PG 57	90	110	195	130	x	x	88	
PG 58	20	45	240	255	x	x	13	
PG 59	5	55	130	170	x	x	72	
PG 60	4	22	140	180	1	0.05	6	
PG 61	180	95	300	295	x	x	50	
PG 62	180	25	600	110	x	x	13	
PG 63	15	75	55	60	x	x	84	
PG 64	10	165	70	95	x	x	88	
PG 65	25	80	35	50	x	x	455	
PG 66	10	125	195	235	x	x	229	
PG 67	2700	525	160	90	x	x	133	
PG 68	320	500	210	190	x	x	54	
PG 69	45	825	660	320	x	x	229	
PG 70	25	460	600	1100	x	x	73	
PG 71	40	270	2300	245	x	x	77	
PG 72	100	300	350	1800	x	x	114	
PG 73	65	170	130	280	x	x	10	
PG 74	25	150	125	220	x	x	7	
PG 75	110	90	240	255	1.0	x	47.8	

* re-analysis

Sample No.	Sn	Cu	Pb	Zn	Ag	Au	As	As*
PG 76	110	280	1150	195	1.0	x	25	
PG 77	140	180	115	110	1.5	x	20	
PG 78	55	35	90	135	1.0	x	13.3	
PG 79	7700	195	135	395	0.5	x	50	
PG 80	42	32	280	290	1	0.05	95	
PG 81	350	105	85	215	x	x	21.7	
PG 82	800	35	75	360	x	x	28.3	
PG 83	30	70	70	45	x	x	97.4	
PG 84	15	165	55	325	x	x	97.4	
PG 85	2800	390	4850	80	1.0	x	3043	
PG 86	110	170	2150	150	0.5	x	216	
PG 87	15	115	95	25	x	x	87.2	
PG 88	10	355	80	545	x	x	97.4	
PG 89	6	215	30	45	x	x	43.5	
PG 90	6	40	25	75	x	x	20.0	
PG 91	5	25	5	30	x	x	13.3	
PG 92	6	30	10	75	x	x	5.0	
PG 93	3	35	20	255	x	x	11.7	
PG 94	10	15	35	25	x	x	13.3	
PG 95	10	15	35	20	x	x	5.0	
PG 96	25	750	120	55	0.5	x	15	
PG 97	5	75	55	405	0.5	x	13.3	
PG 98	5	55	75	80	1.5	x	5	
PG 99	3	30	60	200	x	x	10.0	
PG 100	4	30	55	150	1	x	15	
PG 101	6	15	50	25	0.5	x	3.3	
PG 102	10	10	40	25	1.0	x	5	
PG 103	10	10	35	25	2.0	0.05	10.0	
PG 104	x	5	10	15	x	x	1.7	
PG 105	15	1600	5	950	1.0	x	28.3	
PG 106	100	980	190	590	18.5	x	43.5	
PG 107	920	310	225	700	10.5	x	3.3	
PG 108	1900	1050	3.35%	10.5%	88.0	x	1000	
PG 109	1700	1.4%	2250	5250	320	0.03	12.5%	
PG 110	25	170	180	250	6.0	x	1000	

* re-analysis

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Sample No.	Sn	Cu	Pb	Zn	Ag	Au	As	
SCAM 1	9	30	85	25	x	x	33	Bed sulphides ORIECO
SCAM 2	4	70	45	75	x	x	34	Loc 1 Bedded sulph.
SCAM 3	7	60	35	90	x	x	30	Loc 1 Bedded sulph.
SCAM 4	490	515	545	1250	x	x	17	North Scamander
SCAM 5	15	60	215	155	x	x	8	North Scamander
SCAM 6	190	35	310	215	x	x	7	North Scamander
SCAM 7	3350	435	1250	305	x	x	20	North Scamander
SCAM 8	690	220	720	365	x	x	53	Stream - North Scamander
SCAM 9	30	35	60	60	x	x	3	Stream - Loc 1

CONSULTING CHEMISTS & ANALYSTS

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44 BALACLAVA ST., WOOLLOONGABBA 4102
Phone (07) 391 6986 A/H 355 0776
TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 69K CLIENT B H P CO LTD - EXPLORATION DEPT
ORDER No.: 000603 AREA: DATE RECEIVED: 9.10.79
SAMPLE TYPE: SOIL STM SED No.: 115 DATE COMPLETED 30.10.79
ATTENTION: R HINE

NORTH SCAMANDER PROSPECT, -80 mesh soils

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm	W ppm	Ni ppm	Co ppm	Cr ppm	As ppm
1.8	20	20	70	1	5	<10	200W	1050N		
1.9	5	30	10	1	<5	<10	225W	"		
1.10	5	25	10	1	<5	<10		"		
1.11	10	25	15	1	5	<10				
1.12	5	35	10	1	5	<10				
1.13	10	25	20	1	5	<10				
1.14	15	55	20	1	60	<10				
1.15	10	50	10	1	95	<10				
1.16	20	75	20	1	80	<10				
1.17	10	65	10	1	25	<10				
1.18	5	60	10	1	50	<10				
1.19	5	30	10	1	55	<10				
1.20	10	45	10	1	60	<10				
1.21	5	35	10	1	65	<10				
1.22	15	115	10	2	95	<10				
1.23	5	45	10	1	60	<10				
1.24	5	25	10	1	40	<10				
1.25	5	90	10	1	85	<10				
1.26	10	45	10	1	105	<10				
1.27	SAMPLE NOT RECEIVED									
1.28	5	20	10	1	65	<10				
1.29	2	15	10	1	55	<10				
1.30	10	165	10	1	85	<10				
1.31	15	60	15	1	110	<10				

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METHODS: Cu Pb Zn Ag Ni Co Cr Method 1
As Method 5B Sn W Method 9B (XRF)

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 69K CLIENT B.H.P. CO LTD
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm	W ppm				
2.10	2	35	10	1	5	<10	200W	107SN		
2.11	5	15	10	1	<5	<10				
2.12	5	25	10	1	<5	<10				
2.13	2	40	10	1	<5	<10				
2.14	2	40	10	<1	<5	<10				
2.15	5	60	10	1	10	<10				
2.16	5	40	10	1	20	<10				
2.17	20	180	30	1	150	<10				
2.18	20	220	40	1	245	<10				
2.19	10	60	10	1	95	<10				
2.20	5	90	10	1	150	10				
2.21	10	140	10	1	370	<10				
2.22	10	85	10	1	60	<10				
2.23	5	80	10	1	125	<10				
2.24	5	175	10	1	105	<10				
2.25	2	30	10	1	50	10				
2.26	2	15	10	1	25	<10				
2.27	5	30	5	1	45	<10				
2.28	5	20	10	1	65	<10				
2.29	15	35	10	1	65	<10				
2.30	10	35	10	1	75	<10				
2.31	10	35	15	1	70	<10				
3.10	2	20	5	1	5	<10				
3.11	< 2	35	5	1	5	<10				
3.12	2	45	10	1	5	<10				
3.13	5	40	10	1	5	<10				
3.14	2	95	10	1	15	<10				
3.15	15	70	20	2	10	<10				
3.16	10	35	10	1	<5	<10				
3.17	15	55	20	1	15	20				

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 69K CLIENT B H P CO LTD

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm	W ppm
3.18	35	350	20	1	380	<10
3.19	5	125	10	1	180	10
3.20	5	120	15	1	80	<10
3.21	5	70	15	1	40	10
3.22.	2	50	15	1	65	<10
3.23	10	110	10	1	85	<10
3.24	10	115	10	1	100	<10
3.25	10	65	10	1	85	10
3.26	5	15	10	1	25	<10
3.27	10	30	10	1	30	10
3.28	5	25	10	1	50	<10
3.29	10	30	10	1	60	<10
3.30	10	25	10	1	70	20
3.31	15	80	20	1	90	10
4.10	5	20	10	1	<5	20
4.11	5	105	10	1	<5	<10
4.12	2	75	10	1	5	<10
4.13	5	30	10	1	<5	20
4.14	2	70	10	1	10	<10
4.15	5	55	10	1	<5	<10
4.16	5	75	15	1	<5	<10
4.17	15	55	15	1	15	<10
4.18	10	240	20	1	570	10
4.19	2	80	10	1	115	<10
4.20	2	85	15	1	130	<10
4.21	5	70	20	1	65	<10
4.22	2	25	10	1	20	<10
4.23	2	20	10	1	35	<10
4.24	5	40	10	1	70	<10
4.25	5	55	10	1	50	<10

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METHODS.

CONSULTING CHEMISTS & ANALYSTS

894052

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 69K CLIENT B.H.P. CO LTD

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm	W ppm
4.26	10	25	10	1	70	< 10
4.27	5	35	10	1	75	< 10
4.28	10	25	10	1	65	10
4.29	15	10	10	1	35	< 10
4.30	10	80	10	< 1	90	< 10
4.31	20	35	15	< 1	50	< 10
5.10	2	15	10	< 1	< 5	< 10
5.11	2	25	10	1	< 5	10
5.12	2	55	10	1	20	< 10
5.13	2	10	10	1	5	< 10
5.14	5	110	10	1	10	< 10
5.15	5	80	10	1	5	< 10
5.16	5	35	15	1	< 5	< 10
5.17	10	30	10	1	10	< 10
5.18	30	320	50	2	205	10
5.19	10	165	20	1	155	< 10
6.10	2	30	10	1	25	< 10
6.11	5	15	10	1	< 5	< 10
6.12	2	40	10	1	10	< 10
6.13	5	55	10	1	10	< 10
6.14	15	190	15	1	25	< 10
6.15	15	155	25	1	10	< 10
6.16	5	50	10	2	10	< 10
6.17	5	30	10	1	10	10
6.18	10	175	30	1	5	< 10
6.19	5	130	15	1	120	< 10

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 196K CLIENT B.H.P. CO. LTD. - EXPLORATION DEPARTMENT
ORDER No.: T 610/500 AREA: DATE RECEIVED: 25.10.7
SAMPLE TYPE: SOIL No.: 360 DATE COMPLETED: 21.11.7
ATTENTION: DR. R. HINE

SAMPLE No.	Sn ppm	W ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm
5-20	65	10	5	50	10	-1
21	60	-10	5	65	10	-1
22	50	-10	5	50	10	-1
23	50	-10	5	45	10	-1
24	40	-10	5	60	10	-1
25	120	-10	15	115	10	-1
26	75	-10	15	80	10	-1
27	85	-10	10	45	10	-1
28	45	-10	10	50	5	-1
29	30	10	15	30	10	-1
5-30	25	-10	25	35	10	-1
31	55	-10	25	65	10	-1
32	45	-10	30	45	15	-1
33	40	-10	10	25	5	-1
34	35	-10	20	40	5	-1
35	90	-10	20	150	10	-1
36	45	-10	30	55	15	1
6-20	60	-10	5	45	10	-1
21	65	-10	5	60	10	-1
22	55	-10	5	45	5	-1
23	45	-10	10	45	10	-1
24	40	-10	5	55	10	-1
25	45	-10	10	70	10	-1
26	45	-10	10	105	5	1
27	70	-10	15	50	10	-1
28	50	-10	15	70	5	-1
29	60	-10	10	45	5	-1
6-30	25	-10	10	35	2	-1
31	25	-10	15	35	2	-1
6-32	45	-10	30	125	10	1

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METHODS: Cu, Pb, Zn, Ag BY METHOD 1
Sn, W BY METHOD 9-A (X.R.F.)

894054

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 196K CLIENT B.H.P. CO. LTD. - EXPLORATION DEPARTMENT
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Sn ppm	W ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm
6-33	40	-10	10	25	5	-1
34	25	-10	10	30	2	1
35	20	-10	10	35	10	-1
36	20	-10	15	30	10	-1
7-14	20	-10	15	100	15	-1
15	15	10	10	70	10	-1
16	20	-10	15	110	10	-1
17	5	-10	10	50	10	-1
18	5	-10	15	55	10	-1
19	25	-10	15	140	30	-1
7-20	105	-10	10	105	10	-1
21	170	-10	10	200	10	-1
22	225	-10	10	220	15	-1
23	695	-10	15	380	30	-1
24	90	10	10	80	10	-1
25	30	-10	5	100	5	-1
26	35	-10	5	25	5	-1
27	20	-10	10	35	2	-1
28	25	10	10	45	5	-1
29	20	-10	15	40	5	-1
7-30	35	-10	10	25	2	-1
31	65	-10	10	60	2	-1
32	55	-10	15	105	10	-1
33	45	10	15	45	5	-1
34	60	-10	15	80	5	-1
35	40	10	25	80	10	-1
36	-5	-10	30	60	5	-1
8-14	35	-10	5	95	5	-1
15	10	-10	10	45	10	-1
8-16	5	-10	25	170	20	1

NATA

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METHODS:

894055

OFFICE & LABORATORY
44 BALACLAVA ST., WOOLLOONGABBA 4102
Phone (07) 391 6986 & 391 6355 0776
TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 196K CLIENT B.H.P. CO. LTD. - EXPLORATION DEPARTMENT
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Sn ppm	W ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm
8-17	15	10	10	70	2	-1
18	-5	-10	10	50	2	-1
19	10	-10	5	70	10	-1
8-20	55	-10	5	180	10	-1
21	65	10	5	60	10	-1
22	505	-10	15	540	50	-1
23	40	-10	10	60	15	-1
24	220	-10	5	40	10	-1
25	50	-10	15	90	15	-1
26	20	-10	5	30	5	-1
27	30	-10	5	40	2	-1
28	35	-10	5	20	2	-1
29	30	-10	10	30	10	-1
8-30	70	10	5	15	2	-1
31	80	-10	10	50	5	-1
32	105	-10	10	45	5	-1
33	35	-10	5	20	5	-1
34	45	-10	15	35	10	-1
35	30	-10	10	25	10	-1
36	55	-10	15	45	15	-1
9-14	70	-10	5	80	5	-1
15	205	10	5	95	10	-1
16	15	-10	10	140	10	-1
17	45	-10	45	380	15	1
18	-5	-10	15	75	15	-1
19	35	-10	10	80	20	-1
9-20	35	-10	5	60	10	-1
21	510	10	15	340	15	-1
22	480	-10	10	350	15	-1
9-23	110	-10	10	80	15	-1

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894056

OFFICE & LABORATORY
44 BALACLAVA ST., WOOLLOONGABBA 4102
Phone (071 391 6988 A/H 355 0776
TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 196K CLIENT B.H.P. CO. LTD. - EXPLORATION DEPARTMENT
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Sn ppm	W ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm
9-24	65	-10	10	40	10	-1
25	135	-10	10	70	10	1
26	95	-10	10	30	10	-1
27	75	-10	10	55	10	-1
28	215	10	5	85	2	-1
29	125	-10	10	35	5	-1
9-30	155	-10	20	70	10	-1
31	85	-10	15	80	10	-1
32	115	-10	15	70	10	-1
33	40	-10	10	30	10	-1
34	30	-10	10	20	5	-1
35	35	-10	15	30	10	-1
36	50	-10	20	40	10	-1
10-14	15	-10	5	30	5	-1
15	50	-10	10	50	5	-1
16	110	10	5	70	10	-1
17	30	-10	10	65	10	-1
18	20	-10	15	90	10	-1
19	35	-10	15	55	15	-1
10-20	185	10	10	70	15	-1
21	290	-10	10	80	15	-1
22	840	-10	10	170	10	-1
23	180	-10	10	110	15	-1
24	80	-10	10	40	10	-1
25	90	-10	10	35	10	-1
26	170	-10	10	40	15	-1
27	100	-10	10	30	10	-1
28	665	-10	10	75	10	-1
29	205	-10	10	70	10	-1
10-30	265	-10	15	145	10	-1

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894057

OFFICE & LABORATORY
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Phone (07) 391 6986 A/H 355 0776
TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 196K CLIENT B.H.P. CO. LTD. - EXPLORATION DEPARTMENT
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Sn ppm	W ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm
10-31	150	10	20	130	10	-1
32	110	-10	10	70	10	-1
11-14	10	-10	5	15	5	-1
15	45	-10	5	20	-2	-1
16	135	-10	10	95	10	-1
17	15	-10	5	35	10	-1
18	5	-10	15	50	20	-1
19	15	-10	15	45	15	-1
11-20	120	-10	10	40	15	-1
21	390	-10	10	15	10	-1
22	385	-10	20	180	20	-1
23	890	-10	15	105	15	-1
24	140	-10	10	55	10	-1
25	130	-10	10	40	5	-1
26	130	10	15	30	10	-1
27	115	-10	10	30	5	-1
28	115	-10	10	25	5	-1
29	60	-10	15	45	15	-1
11-30	135	-10	20	50	10	-1
31	90	-10	15	35	5	-1
32	80	-10	15	120	10	-1
12-14	5	-10	5	35	2	-1
15	40	-10	5	25	-2	-1
16	60	-10	10	40	2	-1
17	25	10	2	25	-2	-1
18	50	-10	5	85	5	-1
19	5	-10	10	60	15	-1
12-20	185	-10	5	40	10	-1
21	305	-10	2	70	10	-1
12-22	315	-10	5	50	10	-1

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METHODS:

894058

OFFICE & LABORATORY
44 BALACLAVA ST., WOOLLOONGABBA 4102
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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 196K CLIENT B.H.P. CO. LTD. - EXPLORATION DEPARTMENT
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Sn ppm	W ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm
12-23	205	-10	2	65	10	-1
24	405	-10	-2	55	5	1
25	85	10	15	90	15	1
26	180	-10	10	40	10	1
27	90	-10	10	50	10	1
28	170	-10	-2	20	2	-1
29	135	-10	-2	35	10	-1
12-30	140	-10	5	70	10	-1
31	50	-10	10	80	10	-1
32	85	-10	2	150	5	-1
13-14	10	-10	-2	20	10	-1
15	85	-10	-2	50	5	-1
16	55	-10	2	45	5	-1
17	55	-10	5	110	10	-1
18	40	-10	5	95	10	1
19	20	-10	10	50	15	1
13-20	20	-10	10	40	10	-1
21	215	-10	15	90	15	1
22	320	-10	10	130	15	-1
23	180	-10	20	125	10	1
24	230	-10	15	80	5	-1
25	200	10	10	75	10	1
26	135	-10	15	75	10	1
27	80	-10	15	45	10	-1
28	150	-10	10	30	10	-1
29	120	-10	5	70	10	-1
13-30	105	-10	10	40	15	-1
31	105	-10	5	55	10	-1
32	75	-10	15	50	15	-1
14-14	-5	-10	2	45	10	-1

METHODS

ALS

OFFICE & LABORATORY
44 BALACLAVA ST., WOOLLOONGABBA 4102
Phone (07) 391 6866 A/H 355 0776
TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 196K CLIENT B.H.P. CO. LTD. - EXPLORATION DEPARTMENT

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Sn ppm	W ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm
14-15	10	-10	2	70	10	-1
16	25	-10	2	20	10	-1
17	120	-10	5	170	10	-1
18	30	-10	5	70	5	-1
19	65	-10	5	30	5	-1
14-20	15	-10	10	40	10	-1
21	95	-10	10	85	15	1
22	280	-10	5	55	10	1
23	345	-10	15	140	20	1
24	340	-10	20	150	10	1
25	360	-10	15	130	10	1
26	170	-10	20	160	15	1
27	195	-10	50	105	25	1
28	265	-10	180	205	40	2
29	365	-10	95	140	30	1
14-30	450	-10	45	130	20	-1
31	300	10	80	190	30	1
32	160	-10	110	105	40	1
15-14	-5	-10	5	30	10	1
15	25	-10	2	50	10	-1
16	30	-10	10	85	20	-1
17	85	-10	5	95	10	1
18	15	10	5	40	15	-1
19	45	-10	10	90	10	-1
15-20	90	10	15	50	10	-1
21	55	-10	10	40	5	-1
22	130	-10	10	70	15	-1
23	280	-10	20	85	10	1
24	560	-10	20	190	15	1
15-25	445	-10	20	220	10	1

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METHODS:

CONSULTING CHEMISTS & ANALYSTS

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 196K CLIENT B.H.P. CO. LTD. - EXPLORATION DEPARTMENT
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Sn ppm	W ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm
15-26	515	-10	380	660	40	6
27	410	-10	105	265	30	2
28	400	-10	55	170	45	1
29	330	-10	65	105	30	1
15-30	305	-10	145	210	35	1
31	185	-10	65	250	25	-1
32	220	-10	45	120	40	1
16-14	-5	-10	-2	30	10	1
15	50	-10	2	140	15	1
16	15	-10	-2	60	10	1
17	60	-10	5	95	10	1
18	25	-10	10	85	20	1
19	155	10	10	90	15	1
16-20	315	-10	5	80	10	1
21	130	-10	2	60	20	-1
22	175	-10	5	55	20	1
23	225	-10	15	90	20	1
24	420	-10	50	230	30	2
25	470	-10	105	370	45	2
26	715	-10	120	420	65	3
27	335	-10	155	660	860	3
28	250	-10	200	310	130	6
29	345	-10	190	340	80	3
16-30	135	10	90	340	55	2
31	355	-10	130	340	80	2
32	230	-10	45	150	40	1
17-14	-5	-10	-2	25	2	-1
15	35	-10	-2	55	10	-1
16	145	-10	5	70	10	1
17-17	35	-10	5	60	10	1

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METHODS:

CONSULTING CHEMISTS & ANALYSTS

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 196K CLIENT B.H.P. CO. LTD. - EXPLORATION DEPARTMENT
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Sn ppm	W ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm
17-18	35	-10	5	60	10	1
19	285	-10	2	60	15	1
17-20	190	-10	-2	30	10	1
21	140	-10	5	30	5	1
22	270	-10	10	125	10	1
23	200	-10	15	150	10	1
24	300	-10	70	400	30	2
25	345	-10	15	340	100	2
26	150	-10	25	410	110	3
27	205	-10	25	370	210	4
28	345	-10	25	430	290	3
29	380	-10	30	380	350	3
17-30	210	10	50	460	480	3
31	235	-10	125	640	500	5
32	165	-10	55	390	130	2
18-14	5	10	2	45	20	-1
15	40	-10	-2	45	5	-1
16	90	10	2	40	10	-1
17	50	-10	5	95	25	1
18	15	-10	2	40	20	1
19	15	-10	15	65	40	1
18-20	SAMPLE NOT RECEIVED					
21	450	-10	15	480	45	2
22	175	10	30	620	60	4
23	215	10	10	520	50	1
24	255	-10	10	520	95	3
25	105	-10	15	340	70	2
26	190	-10	5	350	80	1
27	370	-10	15	580	155	3
18-28	380	-10	5	260	140	2

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METHODS:

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 196K CLIENT B.H.P. CO. LTD. EXPLORATION DEPARTMENT
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Sn ppm	W ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm
18-29	580	-10	5	175	70	1
18-30	395	20	10	250	70	1
31	395	-10	65	500	330	2
32	375	-10	10	190	60	1
19-14	-5	-10	-2	25	10	1
15	120	-10	2	70	20	1
16	80	-10	-2	50	10	1
17	110	-10	2	110	10	1
18	65	-10	2	60	10	-1
19	10	-10	5	45	15	1
19-20	310	10	2	150	35	1
21	310	10	5	230	25	1
22	240	10	10	460	40	1
23	225	-10	2	330	40	1
24	285	-10	5	390	45	1
25	135	-10	-2	170	20	-1
26	50	10	5	310	45	1
27	105	10	2	500	80	1
28	185	-10	2	240	50	1
29	530	-10	10	370	160	1
19-30	510	-10	5	300	70	-1
31	390	-10	2	70	10	-1
32	820	-10	15	400	90	1
20-14	-5	-10	-2	20	2	1
15	-5	-10	-2	30	10	1
16	90	-10	5	60	10	1
17	90	-10	5	180	10	1
18	805	-10	15	340	20	1
19	300	10	15	250	15	-1
20-20	240	10	2	300	10	1

CONSULTING CHEMISTS & ANALYSTS

894063

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 196K CLIENT B.H.P. CO. LTD. - EXPLORATION DEPARTMENT
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Sn ppm	W ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm
20-21	140	-10	5	290	20	1
22	125	10	-2	60	5	-1
23	155	-10	-2	70	5	-1
24	45	-10	-2	105	10	1
25	60	-10	5	60	10	1
26	35	-10	10	90	30	1
27	165	-10	5	195	20	1
28	150	-10	5	85	10	-1
29	385	-10	5	310	20	-1
20-30	320	10	5	45	5	-1
31	355	-10	5	260	50	-1
32	355	10	-2	70	5	-1
21-14	-5	-10	5	20	-5	-1
15	15	-10	2	40	5	1
16	155	-10	5	95	10	1
17	0.16%	-10	15	800	30	1
18	605	-10	10	260	20	1
19	355	10	5	140	10	-1
21-20	230	-10	5	125	10	-1
21	190	10	2	215	10	1
22	35	-10	15	210	30	1
23	20	10	5	55	10	-1
24	60	-10	10	195	30	1
25	60	10	5	70	20	1
26	40	-10	10	95	20	1
27	130	10	5	230	20	1
28	160	-10	2	90	20	-1
29	505	10	5	200	20	-1
21-30	400	-10	5	50	20	-1
21-31	210	-10	10	265	90	1

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METHODS:

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: 196K CLIENT B.H.P. CO. LTD. - EXPLORATION DEPARTMENT
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Sn ppm	W ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm
21-32	320	-10	5	110	15	-1
23-14	5	-10	10	55	10	-1
16	10	10	15	420	20	-1
18	15	-10	5	180	10	1
23-20	205	-10	10	340	15	1
22	20	-10	-2	65	10	-1
24	25	-10	5	260	20	1
26	135	-10	10	300	30	1
28	150	-10	2	60	20	-1
30	110	-10	5	105	35	-1
32	150	-10	5	160	15	-1
25-14	15	10	5	45	10	-1
16	30	-10	10	105	10	-1
18	20	20	5	35	10	-1
25-20	45	10	10	60	15	1
22	130	10	5	110	10	-1
24	145	-10	5	155	10	-1
26	252	20	5	110	10	-1
28	368	-10	5	70	10	-1
25-30	614	-10	5	290	10	-1
32	112	-10	10	140	20	-1
27-14	15	20	20	80	30	-1
16	30	20	20	280	20	1
18	45	10	20	480	20	1
27-20	405	-10	15	280	20	1
22	155	-10	20	280	40	1
24	185	-10	10	145	15	-1
26	125	-10	15	90	20	-1
28	120	-10	20	165	20	-1
27-30	145	-10	20	215	25	-1
27-32	155	-10	10	75	10	-1

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: M 109 CLIENT: B.H.P. CO. LTD.
ORDER No.: Z 010/500 AREA: TASMANIA DATE RECEIVED: 14.12.79
SAMPLE TYPE: SOIL No.: 219 DATE COMPLETED: 26.2.80
ATTENTION: DR. R. HINE

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm
10-32	25	35	10	1	65
33	15	15	10	1	45
34	10	15	20	2	40
35	15	35	10	2	50
36	10	15	10	1	30
37	15	15	15	1	35
38	15	15	15	1	55
39	30	15	15	2	45
10-40	30	35	10	2	75
41	10	15	15	2	55
42	15	15	15	1	65
43	40	5	15	1	75
44	10	5	10	1	20
11-32	10	80	15	2	120
33	5	60	15	1	55
34	10	25	10	2	30
35	5	5	15	2	40
36	5	25	15	2	35
37	20	35	20	2	35
38	10	15	20	2	30
39	70	35	160	1	45
11-40	10	25	20	-1	55
41	25	25	15	1	45
42	15	15	20	-1	40
43	15	50	25	1	55
44	55	-1	35	1	30
12-32	10	15	15	-1	50
33	15	75	30	-1	130
34	5	5	20	2	45
12-35	5	5	10	1	25

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METHODS: Sn BY METHOD XRF 1-A
Cu, Pb, Zn, Ag BY METHOD 101-B

894066
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Phone 07 391 6966 A/H ... 0776
TELEX ALSE ... 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: M 109 CLIENT: B.H.P. CO. LTD.

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm
12-36	20	2	10	1	45
37	10	15	10	1	35
38	10	15	25	1	50
39	-5	5	15	1	65
12-40	15	40	10	2	75
41	30	35	10	1	70
42	35	60	20	1	60
43	40	35	20	2	90
44	40	35	20	1	65
13-32	20	65	10	1	80
33	125	190	20	1	90
34	20	50	10	1	75
35	25	40	10	1	80
36	35	70	10	1	95
37	25	70	10	1	145
38	65	170	10	-1	265
39	25	110	20	1	105
13-40	30	65	10	-1	50
41	20	30	10	1	50
42	60	30	15	-1	35
43	30	20	10	1	55
13-44	30	30	15	-1	55
14-32	115	170	35	2	190
33	40	50	25	1	115
34	30	40	20	1	100
35	40	35	10	-1	185
36	35	50	10	1	115
37	[illegible]	15	50	1	125
38	95	110	25	-1	95
39	70	100	25	1	70
14-40	70	130	15	1	60
41	40	80	10	-1	75

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METHODS:

CONSULTING CHEMISTS & ANALYSTS

894062

OFFICE & LABORATORY
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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: M 109 CLIENT B.H.P. CO. LTD.

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm
14-42	20	25	10	-1	135
14-43	25	20	20	1	95
44	45	25	15	-1	75
15-32	70	140	45	1	70
33	55	120	40	-1	25
34	30	35	25	-1	65
35	30	50	20	-1	35
36	60	50	20	-1	40
37	60	80	30	1	75
38	50	95	20	-1	100
39	140	115	40	1	75
15-40	40	30	15	-1	70
41	80	60	20	1	150
42	40	20	10	-1	60
43	45	20	10	1	50
44	30	20	10	-1	85
16-32	160	600	120	1	250
33	130	440	35	1	230
34	50	125	25	1	110
35	70	75	45	1	60
36	30	50	25	1	55
37	50	40	25	-1	45
38	95	90	40	1	60
39	45	45	25	-1	85
16-40	50	60	20	1	75
41	65	50	15	1	70
42	25	20	10	1	50
43	30	20	15	1	85
44	15	15	10	-1	105
17-32	55	490	260	2	180
17-33	60	380	300	2	295

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METHODS:

CONSULTING CHEMISTS & ANALYSTS

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: M 109 CLIENT B.H.P. CO. LTD.

ORDER No.: AREA: DATE RECEIVED

SAMPLE TYPE: No.: DATE COMPLETED

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm
17-34	65	300	190	1	145
35	140	320	170	1	120
36	60	135	40	1	130
37	70	60	60	1	105
38	60	65	20	1	80
39	20	25	15	1	55
17-40	105	40	20	1	65
41	95	40	15	1	85
42	20	20	10	-1	60
43	60	40	15	-1	55
44	35	15	10	-1	135
18-32	30	420	140	1	605
33	50	390	180	1	425
34	80	450	270	1	145
35	50	640	120	1	215
36	95	360	170	1	140
37	65	240	145	1	130
38	25	70	40	1	115
39	20	40	10	-1	120
18-40	10	40	10	-1	70
41	15	25	15	-1	55
42	25	25	10	-1	65
43	25	25	5	-1	65
44	30	20	10	-1	75
19-32	50	420	230	1	310
33	40	200	250	1	540
34	40	310	220	1	285
19-35	50	520	95	1	230
36	15	125	35	1	345
19-37	30	105	30	1	180

CONSULTING CHEMISTS & ANALYSTS

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: M 109 CLIENT B.H.P. CO. LTD.

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm
19-38	20	65	40	-1	150
39	50	100	90	-1	125
19-40	20	35	15	-1	120
41	10	15	10	-1	85
42	50	50	20	-1	105
43	20	20	10	-1	115
44	30	20	10	-1	85
20-32	20	310	100	1	340
33	15	165	40	1	385
34	20	600	80	1	235
35	15	220	40	1	430
36	25	180	40	-1	210
37	35	100	45	1	200
38	45	95	65	1	180
39	40	110	70	1	140
20-40	45	175	45	1	185
41	20	30	20	-1	120
42	40	40	20	1	150
43	75	75	30	1	115
44	35	30	15	-1	100
21-32	5	85	10	-1	390
34	10	200	15	-1	450
36	20	210	30	-1	315
38	40	140	60	1	215
40	70	140	70	1	125
41	60	125	60	1	145
42	25	45	20	-1	120
43	55	40	10	1	145
21-44	40	35	15	1	85

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CONSULTING CHEMISTS & ANALYSTS

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: M 109 CLIENT B.H.P. CO. LTD.

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm
22-18	15	400	20	1	0.32%
19	20	640	20	1	0.28%
22-20	10	175	5	1	0.30%
21	10	240	15	1	170
22	10	40	10	-1	70
23	10	90	10	1	55
24	15	130	25	1	50
25	10	45	10	1	115
26	10	190	20	1	130
27	INSUFFICIENT SAMPLE				95
28	5	75	10	1	330
29	5	340	20	1	160
22-30	2	125	10	1	210
31	2	70	10	-1	120
32	5	160	35	1	370
33	15	440	65	1	220
34	5	185	20	1	375
35	5	170	20	1	185
36	5	470	15	1	420
37	5	75	10	1	170
38	10	95	20	1	175
39	5	95	15	1	110
22-40	15	110	20	1	105
41	50	90	40	1	125
42	50	60	30	1	90
43	60	95	25	1	110
44	55	45	30	1	60
25-32	10	195	25	1	115
33	10	290	20	1	135
25-34	5	70	15	1	55

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894071

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: M 109 CLIENT B.H.P. CO. LTD.

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm
25-35	----	SAMPLE NOT RECEIVED	----		
36	5	35	10	1	120
37	2	60	5	-1	85
38	15	80	15	1	125
39	20	130	35	1	115
25-40	15	70	20	1	125
41	10	110	10	1	100
42	25	110	25	1	120
43	40	65	25	1	90
44	10	30	15	-1	90
29-16	5	40	10	-1	20
17	5	40	10	-1	10
18	5	50	15	-1	15
19	5	20	5	-1	10
29-20	10	100	15	1	55
21	10	85	10	-1	70
22	20	135	10	-1	115
23	15	95	10	1	70
24	10	50	10	1	105
25	20	60	10	1	50
26	95	190	30	2	115
27	70	210	30	2	120
28	25	100	25	1	60
29	40	150	30	1	175
29-30	30	150	25	1	115
31	25	110	20	1	175
32	80	200	35	2	185
33	35	180	20	1	110
34	10	20	10	1	45
29-35	30	50	35	1	35

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METHODS

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: M 109 CLIENT B.H.P. CO. LTD.
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm
29-36	10	35	20	1	35
37	5	20	15	1	30
38	10	50	10	1	95
39	5	75	10	1	225
29-40	10	160	10	1	80
41	10	55	5	1	80
42	5	45	5	2	75
43	10	190	15	2	80
29-44	25	170	10	3	105

This Laboratory is registered by METHVEN

894073

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION
ORDER No.: Z 010/500 AREA: TASMANIA DATE RECEIVED: 23-1-80
SAMPLE TYPE: ROCK/SOIL/STR.SED. No.: 410 DATE COMPLETED: 6-3-80
ATTENTION: Dr. R. HINE

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mo ppm	As ppm	Au ppb	Sn ppm
CH 1	45	115	740	2	5		5	15
2	90	800	660	2	5		10	15
3	60	720	130	2	2		5	-5
4	20	80	280	2	5		15	10
5	20	490	80	2	5		10	40
6	10	70	80	2	10		10	5
7	15	30	280	1	2		5	50
8	280	140	120	2	2		5	270
9	350	600	580	3	5		10	650
CH 10	100	130	150	2	2		15	0.12%
11	85	170	780	2	2		10	290
12	60	680	0.12%	2	2		15	965
13	380	0.28%	160	2	5		5	0.35%
14	80	420	200	2	2		15	30
15	230	0.12%	600	3	5		10	5
16	110	80	20	1	2		3	15
17	300	960	260	2	10		5	0.12%
18	240	360	280	2	5		3	80
19	40	100	50	1	10		3	5
CH 20	45	0.11%	100	2	2		3	25
21	85	0.16%	200	1	10		-3	80
22	150	760	60	2	2		15	15
23	155	410	260	2	5		15	70
24	320	600	520	4	5		10	0.78%
25	20	125	120	1	10		15	155
26	300	140	290	2	5		15	0.46%
27	0.12%	300	460	3	10		20	80
28	115	165	145	2	5		10	-5
Ridge 1 S1	5	15	10	-1	2	10		-5
S2	10	15	10	1	2	2		-5

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METHODS: Cu Pb Zn Ag by method 1 ; Mo by method 2 ; As by method 5 B ; Sn W by method XRF 1A ; Au by method 120 A

CONSULTING CHEMISTS & ANALYSTS

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894074

LABORATORY REPORT

BATCH No.: A 108 CLIENT: B.H.P. EXPLORATION

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mo ppm	As ppm	Sn ppm
RIDGE 1 S3	10	15	10	1	2	2	5
4	5	20	5	1	5	2	5
5	5	15	5	-1	2	-1	10
6	10	30	5	1	5	14	30
7	5	35	5	-1	2	-1	35
8	2	40	5	1	-2	-1	30
9	5	60	10	1	10	2	15
S10	5	20	5	1	2	-1	5
11	5	80	10	1	2	-1	15
12	5	65	10	1	10	18	50
13	10	180	25	1	2	20	75
14	5	75	5	-1	2	6	15
15	5	35	10	1	5	7	-5
16	2	25	2	1	2	2	10
17A	5	180	20	1	2	8	70
17B	2	25	5	-1	2	6	10
18	10	110	30	2	2	16	35
19	5	40	10	1	2	12	35
S20	5	20	10	1	2	6	15
21	10	20	10	1	5	10	15
22	5	20	10	-1	10	2	15
23	5	20	10	1	2	6	-5
24	5	15	5	-1	10	3	45
25	5	15	10	-1	2	2	30
26	5	10	5	-1	10	2	15
27	5	40	2	-1	2	3	55
29A	25	210	10	1	5	3	170
29B	40	380	15	1	2	3	130
S30	10	30	10	-1	10	1	45
31	15	40	10	1	2	3	60
RIDGE 1-S32	25	55	15	1	5	12	70

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METHODS:

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mo ppm	As ppm	Sn ppm
RIDGE 1 S33	35	60	10	1	2	3	110
34	10	20	5	1	10	4	140
35	10	15	10	1	2	2	95
36	25	150	30	2	10	14	365
37	20	60	15	1	5	12	415
38	30	75	30	2	5	30	135
39	20	50	10	1	10	14	110
S40	20	25	15	1	2	6	205
41	20	40	20	1	5	6	220
42	10	35	10	1	2	20	125
43	10	50	15	1	10	3	80
44	30	85	30	1	5	10	125
45	30	80	10	1	5	12	445
46	10	60	30	1	5	2	330
47	10	110	15	1	2	2	210
48	10	55	20	1	5	2	35
49	70	160	35	2	2	45	155
S50	10	90	25	1	5	2	30
51	10	90	10	1	5	2	135
52	10	90	5	1	2	-1	120
53	15	30	10	1	5	-1	55
54	20	90	60	1	2	-1	90
55	10	60	10	1	2	-1	10
56	10	90	30	1	2	1	160
57	5	15	10	1	5	-1	5
58	15	115	30	1	5	2	40
59	5	20	5	1	5	1	5
S60	5	15	2	1	2	-1	5
61	5	40	10	1	5	2	-5
RIDGE 1 S62	5	30	5	-1	2	2	30

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METHODS:

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mo ppm	As ppm	Sn ppm			
RIDGE 1 S63	5	20	5	1	5	2	15			
64	10	20	5	1	2	-1	75			
65	10	190	5	-1	5	2	55			
66	10	45	5	-1	2	-1	45			
67	10	35	10	1	5	2	100			
68	10	20	5	1	2	1	130			
69	10	15	5	1	2	2	40			
RIDGE 1 S70	10	15	15	1	2	2	55			
RIDGE 2 S1	5	15	10	-1	2	2	5			
2	5	10	5	-1	2	1	-5			
3	5	20	10	-1	2	3	5			
4	5	15	5	-1	2	1	45			
5	5	30	5	1	2	1	25			
6	10	120	10	-1	5	7	100			
7	10	30	10	-1	2	1	20			
8	10	20	10	-1	5	-1	15			
9	5	15	10	-1	2	1	-5			
10	10	10	10	-1	5	-1	10			
11	15	15	35	1	5	2	-5			
S12	20	30	90	1	5	7	45			
RIDGE 3 S1	5	30	10	1	2	-1	65			
2	5	10	5	1	2	-1	30			
3	10	15	10	1	2	1	15			
4	15	20	10	1	2	2	20			
5	10	40	20	1	5	2	25			
6	15	40	10	-1	5	4	15			
7	10	50	40	1	5	5	-5			
8	10	15	10	-1	5	-1	10			
9	5	10	10	-1	2	-1	10			
RIDGE 3 S10	5	15	10	-1	2	-1	10			

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mo ppm	As ppm	Sn ppm	W ppm		
RIDGE 3 S11	2	10	5	-1	5	-1	25			
12	5	15	5	1	5	1	30			
13	5	10	5	-1	2	2	10			
14	15	15	10	1	5	20	-5			
RIDGE 4 S1	5	70	10	1	2	1	10			
2	5	15	10	1	2	1	-5			
3	15	55	20	1	2	3	15			
4	10	200	20	1	5	4	185			
5	10	100	10	1	2	2	25			
6	5	165	25	1	2	5	15			
7	NO SAMPLE									
RIDGE 5 S1	10	75	15	1	5	2	185			
S2	5	30	10	1	5	2	10			
RIDGE 6 S1	10	250	35	1	2	5	75			
2	15	300	80	1	5	7	295			
3	5	150	20	-1	2	2	175			
4	5	110	10	-1	5	2	135			
5	10	60	15	1	2	7	35			
6	30	240	40	1	2	8	105			
7	15	50	35	1	5	25	30			
8	15	35	20	1	5	7	20			
S9 DATA BASE NOS	30	50	25	1	10	14	5			
NW1 7201	10	20	30	1	5	3	10	-10		
2	15	60	55	-1	5	25	5	-10		
3	25	30	50	1	10	40	15	-10		
4	10	20	30	1	10	14	5	-10		
5	30	25	45	1	10	30	70	100		
6	35	30	30	1	5	14	10	-10		
7	15	25	70	1	5	6	15	-10		
NW8 7208	30	40	55	1	10	45	60	40		

Strong Sediments

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No. DATA FILE	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mo ppm	As ppm	Sn ppm	W ppm		
NW 9 7209	10	25	45	-1	5	2	25	-10		
10	20	60	50	1	10	105	105	20		
11	20	50	40	1	5	65	45	30		
12	85	40	45	1	5	105	40	10		
13	90	65	40	1	10	75	85	-10		
14	10	65	20	1	5	3	5	10		
15	20	55	50	1	10	75	20	-10		
16	10	50	30	1	10	25	50	-10		
17	5	70	15	1	5	10	60	-10		
18	5	20	10	-1	5	16	25	10		
19	15	260	90	2	5	165	35	30		
NW 20	15	200	40	2	10	155	550	-10		
21	10	70	15	1	5	85	40	-10		
22	10	20	10	1	5	3	5	-10		
23	15	25	30	1	5	2	10	-10		
24	70	55	50	6	10	80	5	-10		
25	25	30	80	1	5	12	10	-10		
26	20	20	45	1	5	4	-5	-10		
27	10	20	15	-1	10	-1	-5	-10		
28	15	20	30	-1	5	3	15	-10		
29	25	20	40	1	5	7	10	-10		
NW 30	40	30	40	1	5	35	10	-10		
31	10	15	15	1	2	2	-5	10		
32	20	25	40	1	5	6	5	-10		
33	15	15	40	1	5	5	70	-10		
34	10	30	30	1	5	10	15	-10	NOT ON MAP	
35	40	40	50	2	5	55	15	-10		
36	15	25	20	1	5	10	25	-10		
37	30	40	60	1	5	30	135	-10		
NW 38 7238	55	30	80	1	5	65	20	-10		

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No. (DATA BASE NOS)	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mo ppm	As ppm	Sn ppm	W ppm		
NW 39 7239	35	30	50	1	5	70	10	-10		
40	45	30	60	1	10	75	15	-10		
41	40	15	65	1	10	50	120	-10		
42	30	30	60	1	10	40	65	-10		
43	30	40	100	2	10	40	16	-10		
44	5	50	30	1	5	30	20	20		
45	10	270	30	2	5	12	20	-10		
46	5	25	15	1	5	9	45	30		
47	10	110	20	1	5	20	30	20		
48	15	20	25	1	2	20	95	-10		
49	5	15	15	1	5	18	15	-10		
NW 50	5	40	15	1	5	3	20	-10		
51	10	60	20	1	5	2	50	-10		
52	15	35	50	2	5	18	195	-10		
53	30	50	110	1	10	30	70	-10		
54	5	30	10	-1	5	30	15	-10		
55	15	40	10	1	5	12	5	-10	NOT ON MAP	
56	5	40	10	-1	5	6	35	-10		
57	10	70	20	-1	5	6	15	10		
58	10	20	15	-1	5	2	35	-10		
59	5	20	10	-1	5	2	75	-10		
NW 60	5	15	10	-1	10	-1	-5	-10		
61	10	40	20	1	5	3	35	-10		
62	10	50	30	1	5	9	55	-10		
63	10	20	15	-1	10	4	375	-10		
64	5	50	20	-1	5	3	102	-10		
65	5	75	15	1	10	-1	25	10		
66	10	45	30	1	10	16	45	10		
67	5	10	5	-1	5	1	20	-10		
NW 68 7268	2	30	20	1	10	14	115	-10		

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LABORATORY REPORT

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No. (DATA BASE Nos)	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mo ppm	As ppm	Sn ppm	W ppm		
NW 69 7269	5	50	35	1	10	40	95	-10		
70	5	40	20	1	5	9	105	-10		
71	5	40	20	1	5	3	5	-10		
72	5	60	20	1	5	3	10	-10		
73	2	50	15	1	5	3	15	-10		
74	2	20	10	-1	5	7	15	-10		
75	2	30	10	1	2	7	30	-10	NOT ON MAP	
76	10	55	20	2	2	2	5	-10		
77	5	60	10	1	2	9	-5	-10		
NW 78 7278	5	40	25	1	5	7	20	-10		
NWR 1	60	100	110	2	5	85	-5		GD	
2	170	80	20	6	5	200	145		Q-FG	
3	5	10	5	-1	20	4	-5		Q	
4	20	10	2	-1	150	3	40		Q-FG	
5	5	15	2	-1	10	1	5		Q-FG	M-P
6	10	10	2	-1	15	2	10		"	
7	5	10	10	-1	5	2	0.17%		"	
8	10	15	5	-1	20	180	0.22%		"	Im
9	30	100	20	2	10	80	-5		FG	
10	45	30	65	1	10	210	10		GD	
11	5	20	15	-1	5	2	5		GR	
12	5	20	15	-1	10	230	15		FGR	
13A	5	10	5	-1	10	2	40		GR	
13B	5	20	10	-1	10	1	-5		GR	
15	5	10	5	-1	5	2	10		GD-FG	
16	10	170	10	-1	10	340	665		GD	
17	10	200	30	-1	10	230	495		GD-FG	
18	10	20	10	-1	2	25	10		GR	
19	15	55	35	-1	2	40	50		GR	
NWR 20	320	90	5	3	10	250	10		Q-M	Im

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METHODS:

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mo ppm	As ppm	Sn ppm	W ppm	
NWR 21	40	70	30	2	10	210	-5		GO-Sst
22	10	10	10	-1	5	18	10		Q-tm
23	5	15	10	-1	2	6	10		GR
24	10	25	10	-1	2	8	15		..
25	10	50	35	1	5	18	10		..
26	400	30	40	2	10	230	190		GO
27	5	20	15	-1	2	2	-5		GR
28	60	30	10	2	60	230	5		Q-Fe-tm
29	30	25	60	1	2	10	5		Sst-Fe
NWR 30	150	20	20	1	2	3	55		Q-tm
31	10	20	2	1	25	9	15		..
33A	5	20	10	-1	2	2	5		GR
33B	60	70	30	2	5	45	10		GO
****** 35	50	50	20	2	10	230	5		GO
36	90	250	210	3	5	210	5		GO
37	40	40	250	3	2	55	-5		GO
38	30	50	40	2	5	60	-5		GO
39	20	45	10	1	20	18	10	Basalt	Q-mo
NWR 40	70	50	20	-1	30	40	70	Basalt	Q-tm-Fe
41	15	40	10	1	5	9	5		Q
42	70	40	10	-1	100	35	60		..
43	25	360	10	2	10	18	-5		..
44	10	20	10	-1	10	2	20		GR (mud)
45	NO SAMPLE		----------						
46	45	45	40	2	5	18	10		Q-Fe
47	10	15	20	-1	2	10	5		GR
48	NO SAMPLE		----------						
49	40	30	30	2	10	40	-5		GO
NWR 50	80	75	150	3	5	120	-5		GO
****** NWR 34	500	80	40	5	-2	330	70		Q-Fe

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mo ppm	As ppm	Sn ppm			
NWR 51	10	20	10	-1	5	3	-5	GR (house)		
52	30	35	25	2	2	55	5	Ssi-Fe magnetic		
53	5	15	20	1	10	2	10	GR		
54	20	45	35	2	2	45	-5	GD		
55	5	20	10	-1	2	12	10	GR		
56	5	15	60	1	10	3	-5	GR		
57	5	15	15	1	10	2	-5	GR		
58	5	10	5	-1	5	2	5	GR		
59	5	15	15	-1	5	2	10	GR (house)		
NWR 60	10	20	30	1	2	10	20	SH- Li-ey		
61	10	10	15	-1	10	2	5	GR (house)		
62	5	10	10	-1	2	2	-5	GR (house)		
63	5	10	10	-1	2	2	5	..		
64	10	10	20	-1	10	2	-5	GR		
65	10	15	20	1	2	1	-5	..		
66	10	15	5	-1	2	2	-5	GR (house)		
67	10	10	10	-1	10	2	-5	GR (house)		
68	10	15	5	1	2	2	30	FEL		
69	10	20	45	1	10	2	-5	GR		
NWR 70	10	20	80	1	5	2	5	..		
71	5	15	10	-1	10	2	-5	GR (house)		
72	5	15	10	-1	5	2	-5	.. ..		
73	5	30	20	-1	10	2	-5	GR		
74	5	15	10	-1	5	12	70	Q-Ls		
75	10	25	30	-1	15	18	5	GR-Ls-mst.		
76	10	10	10	-1	2	1	10	GR		
1250W/1150N	10	10	5	-1		2	45			
1200	70	90	20	2		25	55			
1250	30	40	10	1		10	45			
1250W/1300N	20	30	5	-1		2	50			

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	As ppm	Sn ppm
1250W/1350N	165	70	10	-1	30	35
1400	60	60	30	-1	30	40
1450	60	90	15	-1	30	65
1500	120	170	50	1	35	90
1550	20	30	5	-1	7	50
1600	50	25	10	1	9	45
1650	25	30	10	-1	3	65
1700	290	280	30	2	30	110
1750	NOT SAMPLE					
1800	40	75	5	-1	2	115
1850	25	30	15	-1	1	35
1900	25	110	15	1	2	130
1950	30	130	15	1	4	90
2000	20	30	15	1	2	50
2050	20	30	15	1	3	55
2100	40	60	30	2	12	25
1250W/2150N	30	55	45	1	12	35
1450W/1150N	15	15	5	-1	2	50
1200	10	10	5	-1	-1	40
1250	80	90	25	1	9	50
1300	15	20	5	1	-1	20
1350	10	10	5	-1	-1	85
1400	35	50	10	1	6	90
1450	100	110	25	1	10	110
1500	45	75	30	1	5	55
1550	50	90	20	1	3	120
1600	25	55	10	-1	2	95
1650	25	40	10	-1	5	75
1700	50	55	15	-1	9	285
1450W/1750	30	40	15	1	2	115

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	As ppm	Sn ppm
1450W/1800N	40	50	30	-1	6	115
1850	NO SAMPLE					
1900	20	130	20	1	9	245
1950	10	30	10	1	2	145
2000	10	30	10	1	-1	230
2050	20	60	15	1	3	105
1650W/1150N	10	20	15	1	2	10
1200	5	15	5	-1	-1	15
1250	60	125	40	1	18	70
1300	35	55	25	1	8	10
1350	10	20	5	-1	1	85
1400	10	30	5	-1	-1	175
1450	10	30	10	1	4	60
1500	15	70	10	1	2	60
1550	10	25	10	1	1	40
1600	50	130	15	1	10	100
1650	95	190	25	2	9	240
1700	55	130	50	1	18	140
1750	40	105	60	1	9	145
1800	35	95	40	1	3	120
1850	25	75	30	1	2	90
1900	NO SAMPLE					
1950	10	40	10	1	1	165
2000	15	110	30	1	2	75
2050	10	60	10	-1	-1	350
2100	25	150	30	-1	3	85
2150	5	35	10	-1	-1	65
1850W/1150N	5	15	5	-1	-1	25
1200	5	15	2	-1	-1	30
1850W/1250N	5	10	2	-1	-1	25

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION
ORDER No.: AREA: DATE RECEIVED:
SAMPLE TYPE: No.: DATE COMPLETED:
ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	As ppm	Sn ppm				
1850W/1300N	5	15	5	1	1	40				
1350	2	15	5	1	2	70				
1400	15	60	30	1	14	90				
1450	10	30	10	-1	2	125				
1500	10	50	10	1	3	160				
1550	10	50	10	1	2	90				
1600	10	30	15	2	5	50				
1650	15	35	20	1	4	115				
1700	20	150	15	1	5	150				
1750	15	160	25	1	7	160				
1800	20	160	35	1	7	310				
1850	20	240	25	1	8	595				
1900	30	370	50	1	9	250				
1950	30	240	35	1	7	280				
2000	15	80	20	-1	1	155				
2050	15	70	20	-1	2	90				
2100	25	180	60	1	14	65				
2150	20	120	60	1	4	55				
2050W/1150N	5	10	10	-1	1	145				
1200	15	25	20	-1	10	145				
1250	10	25	30	-1	14	250				
1300	10	15	10	-1	4	50				
1350	50	160	350	1	35	40				
1400	15	50	85	1	12	110				
1450	5	50	80	1	7	120				
1500	5	10	20	-1	1	135				
1550	2	25	25	-1	2	135				
1600	20	75	50	1	9	65				
1650	10	40	45	1	3	55				
2050W/1700N	10	75	20	1	7	95				

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METHODS:

CONSULTING CHEMISTS & ANALYSTS

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R. W. YERBURY
DIRECTOR

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TELEX ALSEV 42344

LABORATORY REPORT

BATCH No.: A 108 CLIENT B.H.P. EXPLORATION

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	As ppm	Sn ppm
2050N/1750W	10	170	15	2	14	140
1800	5	70	10	1	6	25
1850	10	55	10	1	2	50
1900	NO SAMPLE					
1950	5	20	10	-1	-1	45
2000	10	95	15	1	5	165
2050	20	180	25	1	12	156
2100	10	65	15	1	2	140
2250W/1150N	10	10	10	-1	2	10
1200	5	5	10	-1	2	15
1250	15	30	35	1	6	30
1300	30	65	50	1	14	160
1350	20	75	40	1	14	70
1400	15	35	25	1	5	150
1450	260	145	40	2	145	60
1500	30	40	60	1	20	75
1600	45	50	100	2	16	15
1650	55	60	80	1	40	40
1700	170	260	210	2	20	80
1750	10	45	20	1	10	15
1800	15	30	20	-1	7	25
1850	10	65	10	1	7	80
1900	10	55	10	1	12	460
2050	15	70	20	-1	3	130
2100	15	55	20	1	4	75
2250W/2150N	30	60	25	1	6	150

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METHODS:

Australian Laboratory Services PTY. LTD.

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LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: B 122 CLIENT: B.H.P. COMPANY LIMITED

ORDER No.: 000611 AREA: TASMANIA DATE RECEIVED: 20.2.

SAMPLE TYPE: ROCK, SEDIMENTS No.: 60 DATE COMPLETED: 31.3.

ATTENTION: DR. R. HINE/DR. A. GOODE

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm	W ppm	Mo ppm	As ppm	Au ppb	
NWR/76A	5	10	30	1	-5	-10	2	6	10	GR
77	-2	10	45	2	10	-10	5	5	10	GR
78	-2	10	10	1	10	-10	5	10	10	QFP
79	-2	15	25	-1	-5	-10	5	4	10	GR
NWR/80	-2	15	25	1	10	-10	-2	4	10	..
81	-2	20	45	4	5	-10	5	2	20	..
82	2	10	15	1	-5	-10	-2	-1	10	..
83	-2	10	25	1	45	-10	5	1	20	..
84	2	10	20	2	-5	-10	5	1	15	..
85	2	10	5	1	5	-10	10	2	15	..
86	-2	10	10	1	10	-10	2	-1	25	..
87	2	10	10	1	10	-10	5	1	20	Q
88	2	10	15	2	5	-10	5	1	20	
NWR/89	-2	10	5	1	10	-10	10	1	20	GR
M/1	-2	15	30	2	-5	-10	10	1	15	..
2	-2	15	30	1	5	-10	10	-1	25	PDK
3	-2	60	10	1	5	20	2	135	15	..
4	5	15	10	3	10	-10	5	25	10	GR
5	5	10	5	1	20	-10	10	8	10	..
6	5	5	5	2	20	-10	10	2	10	..
7	15	10	40	5	-5	-10	10	2	10	MS
8	15	30	25	5	5	-10	5	8	15	SH
9	10	5	15	1	-5	-10	10	3	25	SH
M/10	2	5	40	2	-5	-10	5	50	25	GR
11	-2	10	15	-1	-5	-10	15	8	15	..
12	2	10	20	3	10	-10	10	-1	15	..
13	5	10	105	4	-5	-10	-2	-1	15	DIT
14	-2	10	10	1	10	-10	2	-1	15	PDK
15	5	25	10	3	10	-10	5	5	10	API
M/16	30	10	60	5	-5	-10	2	9	15	DIT

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LABORATORY REPORT

- 2 -

R. W. YERBURY
DIRECTOR

BATCH No.: B 122 CLIENT: B.H.P. COMPANY LIMITED

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No. (DATA POINT NOS)	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm	W ppm	Mo ppm	As ppm	Au ppb	
M/17	-2	10	30	1	5	-10	2	20	10	Dio
18	10	20	65	5	5	-10	-2	4	10	..
19	5	20	60	4	-5	-10	5	14	10	..
M/20	5	25	75	5	-5	-10	2	55	10	Go
21	-2	10	5	1	15	-10	5	12	10	Qtz
22	15	65	60	5	5	-10	2	155	10	Go
NW/79 7279	-2	20	35	2	50	-10		30	15	
80	SAMPLE NOT RECEIVED									
81	2	65	30	2	-5	-10		6	25	
82 7282	SAMPLE NOT RECEIVED									
83 A 7283	-2	20	15	2	40	-10		6	5	
84 7284	10	30	5	1	40	-10		13	10	
85 7285	5	15	5	-1	35	-10		3	10	
86 A 7286	10	25	20	2	40	-10		20	5	
87	10	35	40	2	80	-10		30	5	
88	15	30	30	3	135	-10		55	5	
89	10	20	20	4	0.14%	-10		14	5	
NW/90	10	20	15	1	485	-10		30	5	
91	15	90	70	1	I.S.	I.S.		50	20	
92	15	40	55	3	60	10		60	20	
93	25	40	50	2	115	10		12	15	
94	40	30	70	2	30	-10		100	5	
95	10	20	25	8	125	-10		10	10	
96	10	15	10	3	20	-10		6	10	
97	5	5	5	1	-5	-10		5	5	
98	5	65	5	2	5	10		7	5	
99 7299	10	20	45	2	20	10		6	3	
NW/100 7300	10	20	35	3	10	-10		60	5	
101 7301	10	15	15	4	5	10		14	5	
102	25	55	25	2	10	10	5	70	15	Next SW MAP

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TELEX ALSEV 42344

LABORATORY REPORT

R. W. YERBURY
DIRECTOR

BATCH No.: B 122 CLIENT B.H.P. COMPANY LIMITED

ORDER No.: AREA: DATE RECEIVED:

SAMPLE TYPE: No.: DATE COMPLETED:

ATTENTION:

SAMPLE No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Sn ppm	W ppm	Mo ppm	As ppm	Au ppb
NW/ 83B	25	30	30	5	10	10	-2	12	15
NW/ 86B	5	25	25	3	15	10	5	6	10

This Laboratory is registered by METHODS:

[redacted] LABORATORY REPORT [redacted]

TELEX [redacted]

Batch No.: D176 Client: BHP COMPANY LIMITED, Area Contact: DR. R. MINE
Address: P.O. BOX 559 Address: G.P.O. BOX 1140 L,
Date Received 30/04/81 CAMBERWELL MELBURN VIC.
Date Completed 27/05/81 VIC

Order No.: 1610 - 000646 Sample Type: ROCK, STR.SED. No. of Samples: 16

SAMPLE NO.	Cu	Pb	Zn	Ag	Ni	Co	Cr	Mo	As	Au	BLEN
	M	M	M	M	M	M	M	M	M	M	UNI
	1	1	1	1	1	1	1	2	5-P	120	METH
FR 1	20	130	110	2	65	50	95	10	70	<0.1	
FR 2	20	110	70	2	50	50	65	5	90	<0.1	
FR 3	15	75	45	2	40	40	40	5	85	<0.1	
FR 4	40	100	100	4	85	85	45	10	125	<0.1	
FR 5	40	80	75	3	60	60	90	10	160	<0.1	
CR 1	840	0.32 %	70	7	35	60	90	5	0.40 %	<0.1	
CR 2	155	240	130	4	40	40	45	5	0.11 %	<0.1	
CRS 1	220	0.16 %	65	>25 26	25	45	145	10	160	<0.1	
CRS 2	540	0.24 %	125	>25 63	35	60	170	5	670	<0.1	
DNS 1	>1.0 13 %	0.24 %	95	>25 192	70	150	75	5	25.1 %	0.1	
DNS 2	0.92 %	0.28 %	70	>25 128	80	190	95	2	31.7 %	0.1	
DNS 3	0.44 %	360	300	>25 65	65	65	80	5	2.64 %	<0.1	
DNS 4	0.56 %	350	200	>25 107	55	50	75	5	6.48 %	0.1	
DNS 5	0.28 %	450	230	>25 121	45	50	55	5	2.48 %	0.3	
DNS 6	>1.0 340 %	130	15	>25 197	45	130	40	5	17.4 %	0.2	
FRS 1 - 40mesh sieve	90	80	95	4	70	50	65	10	580	0.1	

UNITS LEGEND ----- M - Parts per million b - Parts per billion % - percent
G - Grams A - Absorbance

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LABORATORY REPORT

TELEX AU26V 42344

Batch No.: D196-1 Client: BHP COMPANY LIMITED, Attn: MR. R. WINE
Address: P.O. BOX 559 Address: G.P.O. BOX 1140 L,
Date Received 30/04/81 CAMBERWELL HOBART TAS.
Date Completed 27/05/81 VIC

Order No.: T610 - 000646 Sample Type: ROCK, STR.SED. No. of Samples: 16

SAMPLE NO.	Sn ppm XRF 1A	W ppm XRF 1A
FR 1	<5	<10
FR 2	5	<10
FR 3	<5	<10
FR 4	10	<10
FR 5	<5	<10
CR 1	0.19 %	<10
CR 2	130	<10
CRS 1	520	<10
CRS 2	545	<10
DNS 1	0.11 %	40
DNS 2	880	60
DNS 3	0.18 %	<10
DNS 4	0.23 %	10
DNS 5	0.24 %	20
DNS 6	0.29 %	10
FRS 1	15	<10

ppm = Parts per million % = percent

8906

[redacted] REPORT [redacted]

TELEX AUREV 42344

Batch No.: D196R
Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. K. BINNS
Address: C.P.O. BOX 1140 L,
HOBART TAS.

Date Received 30/04/81
Date Completed 27/05/81

Order No.: T610 - 000646
Sample Type: ROCK, STR.SED.
No. of Samples: 8

SAMPLE NO.	Cu	Ag	EL
	%	M	UN
	101-B	101-B	ME
CRS 1		26	
CRS 2		63	
DNS 1	1.13	192	
DNS 2		128	
DNS 3		65	
DNS 4		107	
DNS 5		121	
DNS 6	3.10	197	

UNITS LEGEND ----- M - Parts per million b - Parts per billion Z - percent
g - Grams a - Absorbance

8940923

COMEX

[redacted]

atch No.: G219 Client: BHP COMPANY LIMITED, Area Contact: DR. R. HINE

Address: P.O. BOX 559 Address: C.P.O. BOX 1140 L,

ate Received 30/07/81 CAMBERWELL HOBART TAS. 7001

ate Completed 19/10/81 VIC 3124

rder No.: T610 / 005059 Sample Type: ROCK No. of Samples: 16

AMPLE NO.	Cu	Pb	Zn	Ag	Ni	Co	Cr	Mo	As	Sb	ELEMENT
	m	m	m	m	m	m	m	m	m	m	UNITS
	1	1	1	1	1	1	1	2	5-8	8	METHODS
R 6	25	45	55	1	20	15	40	10	40	<10	
R 7	20	30	30	1	15	15	20	15	260	<10	
R 1	65	30	65	1	50	20	65	5	12	<10	
R 2	75	40	190	2	110	35	50	2	90	<10	
T 1	55	0.13	% 80	2	20	20	35	5	30	<10	
T 2	20	150	30	2	40	30	35	5	240	<10	
T 3	20	60	70	2	30	20	70	<2	75	<10	
ED 1	680	40	360	3	10	20	20	2	5	<10	
T 1	50	75	60	1	10	10	20	2	25	<10	
T 2	40	50	10	1	10	10	30	5	100	<10	
T 3	60	35	50	2	20	10	25	<2	18	<10	
E 1	90	20	10	1	10	10	220	<2	14	<10	
E 2	75	40	30	1	10	15	30	<2	25	<10	
E 3	700	50	20	9	380	320	120	5	55	<10	
YN A1-1	15	20	15	1	30	15	30	2	3	<10	
T 4	580	0.72	% 200	>25%	20	20	160	5	2.0	% <10	

8940

NITS LEGEND ----- m - Parts per million b - Parts per billion % - percent

g - Grams a - Absorbance

Signature: [signature]

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Batch No.: G219-1 Client: BHP COMPANY LIMITED, Area Contact: DR. R. HINE

Address: P.O. BOX 559 Address: G.P.O. BOX 1140 L,

Date Received 30/07/81 CAMBERWELL HOBART TAS.

Date Completed 19/10/81 VIC 3124

Order No.: T610 / 005059 Sample Type: ROCK No. of Samples: 16.

SAMPLE NO.	Au b 120-A	Sn m XRF 1A	W m XRF 1A	ELEM UNI METH
FR 6	10	5	15	
FR 7	165	25	<10	
CR 1	10	5	<10	
CR 2	5	<5	<10	
ST 1	10	95	<10	
ST 2	5	5	<10	
ST 3	5	<5	<10	
MED 1	10	0.71 %	<10	
LT 1	5	95	<10	
LT 2	5	15	<10	
LT 3	3	5	<10	
SE 1	5	<5	<10	
SE 2	10	<5	<10	
SE 3	3.4 m	10	<10	
WYN A1-1	50	<5	<10	
LT 4	55	0.19 %	310	

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent

g - Grams a - Absorbance

Signature: G. Dunn

8940694

[redacted] LABORATORY REPORT [redacted]

Ph 07 3525577
TELEX ALSEY 42344

Batch No.: H168 Client: BHP COMPANY LIMITED, Area Contact: DR. R. HINE
Address: P.O. BOX 559 Address: G.P.O. BOX 1140 L,
Date Received 20/08/81 CAMBERWELL HOBART TAS. 7
Date Completed 16/10/81 VIC 3124

Order No.: 005063 Sample Type: ROCK,CORE No. of Samples: 16

SAMPLE NO.	Cu	Pb	Zn	Ag	Mo	As	Sb	Au	Sn	W	ELEM
	m	m	m	m	m	m	m	m	m	m	UNI
	1	1	1	1	2	5-8	XRF 1A	120	XRF 1A	XRF 1A	METH
BR 1	30	0.13 %	680	3	<2	40	<4	<0.1	5	<10	
BR 2	25	190	510	2	10	35	<4	<0.1	<5	<10	
BR 3	20	0.11 %	0.13 %	2	10	4	<4	<0.1	5	<10	

894095

[redacted] LABORATORY REPORT [redacted]

[redacted] A/H 353 2830
TELEX AL88V 42364

Batch No.: A143 Client: BHP COMPANY LIMITED, Area Contact: DR. R. HINE
Address: P.O. BOX 559 Address: C.P.O. BOX 1140 L,
Date Received 29/01/81 CAMBERWELL HOBART TAS 7001
Date Completed 12/02/81 VIC
Order No.: T610/500 000633 Sample Type: SOIL,ROCK,S/S No. of Samples: 93

SAMPLE NO.		Cu	Pb	Zn	Ag	As	Au	Sn	W
		M	M	M	M	M	M	M	M
		1	1	1	1	5-B	120	XRF-1A	XRF-1A
ARM 1	Soil - Arm Ck	15	30	20	1	3	0.1	<5	<10
ARM 2	East Bank	15	20	15	1	<1	<0.1	<5	<10
ARM 3	(NW→SE)	20	40	40	1	6	0.1	<5	<10
ARM 4		20	40	20	2	6	<0.1	<5	<10
ARM 5		20	30	20	1	2	0.1	<5	<10
ARM 6		20	30	20	1	2	<0.1	<5	<10
ARM 7		20	45	30	2	6	<0.1	<5	<10
ARM 8		20	50	20	2	9	<0.1	<5	<10
ARM 9		20	20	10	1	<1	<0.1	<5	<10
ARM 10		20	30	20	1	<1	<0.1	<5	<10
ARM 11		20	20	10	<1	2	<0.1	<5	<10
ARM 12		20	30	20	1	3	<0.1	<5	10
ARM 13		30	40	50	1	10	<0.1	<5	10
ARM 14		20	30	20	1	2	<0.1	5	<10
ARM 15		25	35	30	1	3	<0.1	<5	<10
ARM 16		20	20	10	<1	<1	<0.1	5	10
ARM 17		20	20	10	<1	<1	<0.1	5	<10
ARM 18		20	20	5	<1	<1	<0.1	5	<10
ARM 19		20	20	10	<1	3	<0.1	25	<10
ARM 20		20	30	15	<1	6	0.1	<5	<10
ARM 21		30	20	10	<1	3	<0.1	<5	<10
ARM 22		25	30	35	1	3	<0.1	<5	<10
ARM 23		30	30	20	2	3	<0.1	<5	<10
ARM 24		40	30	15	1	3	0.1	<5	10
ARM 25		35	30	20	1	9	0.1	<5	10
ARM 26		30	25	10	1	10	<0.1	10	10
ARM 27	Rock; black fine	30	45	65	1	2	0.1	5	<10
ARM 28	" "	20	45	25	<1	3	<0.1	<5	<10
YEM 1	-40 mesh soil	10	55	15	<1	9	<0.1	<5	<10
YEM 2	Skyline Tier	10	25	10	<1	<1	<0.1	<5	<10
	E.M. follow-up								

UNITS LEGEND ----- M - Parts per million B - Parts per billion % - percent

8940956

[redacted] TELEX [redacted]

Batch No.: A143 Client: BHP COMPANY LIMITED, Area Contact: DR. R. HINE
Address: P.O. BOX 559 Address: G.P.O. BOX 1140 L,
Date Received 29/01/81 CAMBERWELL HOBART TAS 7001
Date Completed 12/02/81 VIC

Order No.: T610/500 D00633 Sample Type: SOIL,ROCK,S/S No. of Samples: 53

SAMPLE NO.	Cu	Pb	Zn	Ag	As	Au	Sn	W
	M	M	M	M	M	M	M	M
	1	1	1	1	5-B	120	XRF-1A	XRF-1A
YEM 3 Traverse	10	20	10	<1	<1	<0.1	<5	<10
YEM 4 1	10	25	10	<1	3	<0.1	<5	<10
YEM 5	15	50	35	1	12	<0.1	<5	<10
YEM 6	10	20	10	1	1	<0.1	<5	<10
YEM 7	15	30	15	1	3	<0.1	<5	<10
YEM 8 Traverse	15	25	10	1	2	<0.1	<5	<10
YEM 9 2	15	20	10	<1	1	<0.1	<5	<10
YEM 10	15	20	10	1	2	<0.1	<5	<10
YEM 11	20	30	15	1	6	<0.1	<5	<10
YEM 12	20	25	10	1	3	<0.1	<5	<10
YEM 13 Traverse	10	35	20	1	3	<0.1	<5	<10
YEM 14 3	10	45	20	1	3	0.1	<5	<10
YEM 15	10	35	15	1	3	<0.1	5	<10
YEM 16	20	45	30	1	3	<0.1	<5	<10
CPC 1	10	20	10	1	1	<0.1	435	<10
CPC 2 Parsons Creek block	10	20	10	<1	1	<0.1	155	<10
CPC 3	10	20	10	<1	1	<0.1	0.16 %	<10
CPC 4	10	25	15	1	11	<0.1	0.31 %	<10
CPC 5 cc1 - 40 mesh streams	200	40	110	1	10	<0.1	140	10
CPC 6 2	20	35	25	<1	5	<0.1	70	10
CPC 7 3	20	30	35	1	3	<0.1	515	<10
CPC 8 4	20	30	30	1	12	<0.1	50	<10
CPC 9 5	45	45	80	1	2	<0.1	65	<10

P - parts per million b - Parts per billion % - percent

80468

YARMOUTH GRID - SOIL AUGER SAMPLE LOCATIONS

NORTH	EAST	YS NOS	DEPTH M	DESCRIPTION
2350	1500	1	.05	orange clay
2400	1500	2	.50	15cm topsoil sample in orange clay
2450	1500	3	.20	orange clay
2500	1500	4	.30	orange clay
2500	1450	5	.40	orange clay
2500	1400	6	.30	orange clay
2500	1350	7	.30	orange clay
2500	1300	8	.30	orange clay
2500	1250	9	.35	orange clay
2500	1200	10	.30	orange clay
2500	1150	11	.30	orange clay
2500	1100	12	.30	orange clay
2500	1050	13	.10	grey topsoil covering bedrock (Mathinna)
2500	1000	14	.10	grey topsoil covering bedrock (Mathinna)
2500	950	15	.35	orange clay
2500	900	16	.20	Mathinna topsoil
2500	850	17	.30	orange clay
2500	800	18	.15	orange clay
2500	750	19	.05	topsoil overlying bedrock
2500	700	20	.12	orange clay
2500	650	21	.25	orange clay
2500	600	22	.65	orange clay
2500	550	23	.45	orange clay
2500	500	24	.40	orange clay
2500	1550	25	.05	orange-grey topsoil
2500	1550	26	.30	orange clay
2500	1550	27	1.50	orange and white clay
2500	1550	28	2.00	orange and white clay
2500	1550	29	3.00	white clay
2500	1600	30	.30	orange clay
2500	1650	31	.35	orange clay
2500	1700	32	.45	orange clay
2500	1750	33	.55	orange clay
2500	1800	34	.70	orange clay
2500	1850	35	.60	orange clay

NORTH	EAST	YS NOS	DEPTH M	DESCRIPTION
2500	1900	36	1.20	orange clay
2550	1700	37	.20	orange clay
2600	1700	38	.90	orange clay and topsoil
2650	1700	39	.40	grey weathered Mathinna (W.M.) topsoil
2700	1700	40	.80	orange clay (W.M.)
2750	1700	41	.40	orange clay (W.M.)
2800	1700	42	.95	orange clay (W.M.)
2850	1700	43	.50	orange clay (W.M.)
2900	1700	44	.40	orange clay (W.M.)
2950	1700	45	.80	sandy clay - (Bedrock granite not reached)
3000	1700	46	1.00	orange clay (W.M.)
3000	1700	47	1.20	bedrock hit sample white and orange clay
3050	1700	48	.50	orange clay
3100	1700	49	.70	orange clay
3150	1700	50	1.20	red and yellow sandy clay
2550	1650	51	.30	soil weathered Mathinna
2600	1650	52	.25	soil weathered Mathinna
2650	1650	53	.15	soil weathered Mathinna
2700	1650	54	1.00	orange and white clay
2750	1650	55	.30	orange clay
2800	1650	56	.30	orange clay
2850	1650	57	1.60	white sandy clay
2900	1650	58	1.50	orange clay
2950	1650	59	.40	orange clay
3000	1650	60	.30	soil weathered Mathinna
3050	1650	61	.30	clay c̄ some soil
3100	1650	62	.40	sandy soil (W.M.)
3150	1650	63	.40	orange clay
3200	1650	64	.30	orange clay
3250	1650	65	.92	red and yellow clay
3250	1650	66	2.00	white clay
3300	1650	67	.50	orange clay
3350	1650	68	.60	orange clay
3400	1650	69	.65	orange sand
3450	1650	70	.65	sand and clay (orange)
3500	1650	71	.65	sand and clay (orange)

[redacted] Batch No.: [redacted] FILE [redacted] Client: BHP COMPANY LIMITED, Area Contact: DR. RICK MINE,
Address: P.O. BOX 589 Address: G.P.O. BOX 1668 L,
Date Received 17/06/80 CAMBERWELL HOBART, TAS. 7001
Date Completed 09/07/80 VIC

Order No.: T658 / T618 Sample Type: ROCK, SOIL No. of Samples: 421

SAMPLE NO.	Cu	Pb	Zn	Ni	Co	Cr	As	Sn	Sb	Br
	m	m	m	m	m	m	m	m	m	m
	1	1	1	1	1	1	5-B	XRF 1A	XRF 1A	XRF 1A

YARMOUTH GRID — SOIL AUGER RESULTS

YS	1	10	20	10		9	5	
YS	2	10	15	10		10	5	
YS	3	10	20	10		9	15	
YS	4	10	20	5		5	10	
YS	5	5	10	5		4	15	
YS	6	5	15	5		6	15	
YS	7	5	15	5		3	10	
YS	8	80	30	15		90	10	
YS	9	10	20	5		10	15	
YS	10	20	30	10		14	35	
YS	11	5	10	5		5	20	

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Registered by Association of Testing Authorities

Signature: G. Dunn

0044689

Batch No.: F127 Client: BHP COMPANY LIMITED, Area Contact: DR. RICK HINE.
Address: P.O. BOX 552 ADDRESS: G.P.O. BOX 1160 L.
Date Received 17/06/88 CAMBERWELL HOBART, TAS. 700
Date Completed 09/07/88 VIC

Order No.: T650 / T610 Sample Type: ROCK, SOIL No. of Samples: 121

SAMPLE NO.	Cu	Pb	Zn	Ni	Co	Cr	As	Sn	Rb	Sr
	m	m	m	m	m	m	m	m	m	m
	1	1	1	1	1	1	5-B	XRF 1A	XRF 1A	XRF 1A
YS 12	10	30	10				7	10		
YS 13	5	10	5				2	15		
YS 14	5	20	5				2	25		
YS 15	10	20	30				4	10		
YS 16	5	10	5				2	15		
YS 17	5	25	5				7	25		
YS 18	5	40	5				10	25		
YS 19	5	10	5				5	10		
YS 20	10	20	5				16	285		
YS 21	10	45	10				20	80		
YS 22	10	50	5				10	40		
YS 23	10	30	10				9	30		
YS 24	5	40	10				12	35		
YS 25	5	20	5				6	10		
YS 26	2	20	10				8	25		
YS 27	5	20	10				8	15		
YS 28	10	25	10				8	10		
YS 29	20	40	15				7	10		
YS 30	10	25	10				30	15		
YS 31	5	30	10				6	5		
YS 32	15	30	20				6	10		
YS 33	2	35	15				12	15		
YS 34	5	20	10				6	5		
YS 35	2	30	10				14	20		
YS 36	2	20	10				10	10		
YS 37	2	20	10				9	15		
YS 38	5	20	10				6	10		
YS 39	2	20	10				5	30		
YS 40	25	30	10				7	10		
YS 41	10	35	10				10	15		

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: G. Brown

8 of 12

Batch No.: F127 Client: BHP COMPANY LIMITED, Area Contact: DR. RICK MINE,
Address: P.O. BOX 559 Address: G.P.O. BOX 1140 L,
Date Received 17/06/80 CAMBERWELL HOBART, TAS. 7001
Date Completed 09/07/80 VIC

Order No.: T658 / T618 Sample Type: ROCK, SOIL No. of Samples: 121

SAMPLE NO.	Cu	Pb	Zn	Ni	Co	Cr	As	Sn	Rb	Sr
	p	p	p	p	p	p	p	p	p	p
	i	i	i	i	i	i	5-B	XRF 1A	XRF 1A	XRF 1A
YS 42	2	40	20				6	10		
YS 43	20	40	30				9	10		
YS 44	10	35	35				12	20		
YS 45	10	50	30				12	5		
YS 46	145	135	65				40	20		
YS 47	230	440	100				50	30		
YS 48	60	90	50				160	15		
YS 49	15	40	20				12	10		
YS 50	10	40	10				5	5		
YS 51	5	15	15				7	5		
YS 52	5	15	10				4	<5		
YS 53	2	10	5				2	10		
YS 54	2	25	10				9	10		
YS 55	2	30	10				6	10		
YS 56	35	40	60				7	10		
YS 57	5	30	15				2	10		
YS 58	10	65	30				2	15		
YS 59	15	30	30				2	5		
YS 60	5	20	10				10	15		
YS 61	5	10	5				1	5		
YS 62	5	10	10				1	5		
YS 63	2	15	5				4	5		
YS 64	2	30	10				10	10		
YS 65	2	55	10				16	5		
YS 66	2	25	5				2	<5		
YS 67	5	40	10				12	15		
YS 68	2	35	10				20	10		
YS 69	10	40	10				14	15		
YS 70	5	30	10				9	15		
YS 71	5	35	15				20	5		

UNITS LEGEND ----- p - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

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[redacted]

[redacted] TELEX [redacted]

Batch No.: F127-1 Client: BHP COMPANY LIMITED, Area Contact: DR. RICK HINE,
Address: P.O. BOX 550 Address: G.P.O. BOX 1140 L,
Date Received 09/07/88 CAMBERWELL HOBART, TAS. 700
Date Completed 09/07/88 VIC

Order No.: T658 / T618 Sample Type: SOIL No. of Samples: 71

SAMPLE NO.	Ag
	p
	1
YS 1	1
YS 2	1
YS 3	1
YS 4	2
YS 5	1
YS 6	2
YS 7	2
YS 8	2
YS 9	1
YS 10	2
YS 11	1
YS 12	2
YS 13	1
YS 14	1
YS 15	2
YS 16	1
YS 17	2
YS 18	2
YS 19	1
YS 20	2
YS 21	2
YS 22	3
YS 23	4
YS 24	2
YS 25	1
YS 26	2
YS 27	2
YS 28	2
YS 29	2
YS 30	1

UNITS LEGEND ----- p - Parts per million b - Parts per billion % - percent

8641093

[redacted]

Batch No.: F127-1 Client: BHP COMPANY LIMITED, Area Contact: DR. RICK HINE.
Address: P.O. BOX 559 Address: G.P.O. BOX 1148 L
Date Received 09/07/88 CANBERWELL HOBART, TAS. 70
Date Completed 09/07/88 VIC

Order No.: T658 / T618 Sample Type: SOIL No. of Samples: 71

SAMPLE NO.	Ag
	M
	1
YS 31	1
YS 32	2
YS 33	3
YS 34	1
YS 35	2
YS 36	2
YS 37	1
YS 38	1
YS 39	1
YS 40	1
YS 41	2
YS 42	1
YS 43	3
YS 44	2
YS 45	3
YS 46	2
YS 47	2
YS 48	2
YS 49	2
YS 50	1
YS 51	1
YS 52	<1
YS 53	<1
YS 54	1
YS 55	2
YS 56	2
YS 57	2
YS 58	2
YS 59	2
YS 60	1

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent

Computer Resources Company

Batch No.: F127-1

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HOBART, TAS. 7001.

Date Received 09/07/88
Date Completed 09/07/88

Order No.: T650 / T610

Sample Type: SOIL

No. of Samples: 71

SAMPLE NO.	Ag m 1
YS 61	<1
YS 62	<1
YS 63	1
YS 64	2
YS 65	3
YS 66	1
YS 67	3
YS 68	3
YS 69	3
YS 70	2
YS 71	3

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

This laboratory is registered by the National Association of Testing

Signature:

8941103

		Cu	Pb	Zn	Ag	As	Sb	Au	Sn	W	Ba	Ni	Co	Mo
YAR	1	55	80	20	3	42	1	5	20	<10	x	15	20	10
	2	50	840	480	7	x	x	x	15	<10	x			
	3	720	>1.0%	>1.0%	>25	x	x	x	<5	<10	x			
	4	145	90	100	4	x	x	x	5	<10	x			
	5	30	40	25	3	x	x	x	70	<10	x			
	6	10	105	10	2	x	x	x	<5	<10	x			
	7	10	40	45	<1	x	x	x	10	<10	x			
	8	40	55	10	2	25	3	5	<5	<10	180			
	9	25	45	25	<1	40	3	3	<5	<10	20			
	10	70	360	85	<1	.14%	3	5	40	<10	500			

x = no result; Au in ppb

[redacted] TELEX [redacted] SEV 42344 [redacted]

Batch No.: H058 Client: BHP COMPANY LIMITED, Area Contact: DR. R. HINE
Address: P.O. BOX 559 Address: G.P.O. BOX 1140 L,
Date Received 07/08/81 CAMBERWELL HOBART TAS. 7
Date Completed 16/10/81 VIC 3124

Order No.: 005061 Sample Type: ROCK No. of Samples: 9

SAMPLE NO.	Cu	Pb	Zn	Ag	Ni	Co	Mo	As	Sb	Au	ELEM
	m	m	m	m	m	m	m	m	m	b	UNI
	1	1	1	1	1	1	2	5-B	XRF 1A	120-A	METH
NSG 1	280	160	920	3	45	40	5	90	<4	20	
CG 1	45	75	420	3	50	40	10	50	<4	10	
CG 2	70	80	85	2	20	25	10	35	<4	20	
CG 3	310	960	50	2	25	30	10	95	<4	10	
CG 4	0.20 %	>1.00 %	80	>25 32	20	40	2	0.74 %	<4	30	
CG 5	940	0.38 %	40	>25 98	10	30	2	1.32 %	4	80	
CG 6	0.16 %	>1.00 %	100	>25 76	20	30	2	0.08 %	<4	25	
CG 7	560	0.16 %	45	>25 31	15	15	<2	0.32 %	<4	10	
CG 8	200	0.12 %	50	>25 65	10	10	5	480	<4	20	

8941107

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A.J. Finlayson.

ph 07 3525577
TELEX [redacted] ALSE [redacted] 42344

Batch No.: H858-1 Client: BHP COMPANY LIMITED, Area Contact: DR. R. HINE
Address: P.O. BOX 559 Address: G.P.O. BOX 1140 L,
Date Received 07/08/81 CAMBERWELL HOBART TAS. 7
Date Completed 16/10/81 VIC 3124

Order No.: 005061 Sample Type: ROCK No. of Samples: 9

SAMPLE NO.	Sn m XRF 1A	W m XRF 1A	ELEM UNI METH
NSG 1	55	<10	
CG 1	10	<10	
CG 2	45	<10	
CG 3	35	<10	
CG 4	0.12 %	<10	
CG 5	170	10	
CG 6	875	10	
CG 7	115	<10	
CG 8	230	<10	

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: [signature]

894108

This history is registered by

Batch No.: H058R

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC 3124

Area Contact: DR. R. HINE
Address: G.P.O. BOX 1140 L,
HOBART TAS.

Date Received 07/08/81
Date Completed 16/10/81

Order No.: 005061

Sample Type: ROCK

No. of Samples: 5

SAMPLE NO.	Pb % 101-B	Ag m 101-B	EL U ME
CG 4	1.21	32	
CG 5		98	
CG 6	2.12	76	
CG 7		31	
CG 8		65	

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A.F. Finlayson

89410 9

APPENDIX 2

Petrological Reports

894111

EXPLORATION DEPARTMENT
Petrology Section

Clayton, Victoria 3168
P.O. Box 264, Clayton
Telephone 560-7066

Memo to: DR. A. GOODE

Date 30.1.80
Our Ref: DS:AW
Your Ref:
File: M520
Date:

Subject: RECONNAISSANCE SAMPLES FROM TASMANIA

A. North Scamander Prospect, Scamander, NE Tasmania

The six samples supplied (MRL11,473A-F) come from the Lower Devonian-Tremadocian-Cambrian(?) Mathinna Beds. The rocks are poorly sorted, texturally immature siltstones and sandstones which have undergone varying degrees of hydrothermal alteration producing either sphalerite-galena-chalco pyrite, hematite-ilmenite, or magnetite-bearing mineral assemblages, generally with accompanying chloritization of the sediments. Evidence for subsequent "carbonation" is frequently observed.

MRL 11,473A

This sample is of a poorly sorted immature siltstone cut by an irregular network of magnetite veinlets and patches. The siltstone comprises angular quartz grains, recrystallized in parts, in a fine grained quartz-chlorite matrix. Rutile and zircon and calcite are accessory phases. Occasional small muscovite flakes occur throughout.

Magnetite is the major vein component, commonly as subhedral cuboids, however in places it is severely martitised. Geothite is commonly associated with the magnetite-hematite veins, together with large flakes of chlorite and sideritic calcite. The Fe-rich calcite also occurs in microveinlets sometimes with fine chlorite flakes. Blebs of galena occur in the magnetite and disseminated pyrite, chalcopyrite and ilmenite are found in the sedimentary matrix.

The magnetite is of hydrothermal origin, indicated by its veined mode of occurrence and the galena inclusions. Chloritization and partial recrystallization of the siltstone probably accompanied magnetite formation. The sideritic calcite is derived from the breakdown of the iron phases during an influx of permeating carbonate fluids.

MRL 11,473B

This rock is essentially the same as MRL11,473A except that it contains more magnetite and chlorite. It is a silty sandstone made up on angular quartz in a quartz-chlorite matrix. Irregular magnetite-chlorite-Fe-calcite veinlets are common. Hematite and goethite are not as abundant as in MRL 11,473A. Galena occurs in the magnetite and disseminated sulphides occur in the matrix.

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MRL 11,473C

The specimen submitted comprises poorly sorted,angular, sand sized quartz in a silty quartz-clay matrix. Accessory minerals are mainly opaques - fine subhedral magnetite and rare subhedral pyrite - and fine flakes of museovite. Small patches of fine grained calcite occur throughout the sample. Limonite staining is uncommon. Quartz microveinlets crosscut the rock. No sedimentary structures-bedding, laminating, etc., - occur in the sample.

MRL 11,473D

The sample is a weathered chloritized siltstone with minor mineralization. The sediment comprises angular, deformed, recrystallized quartz grains in a very fine grained recrystallized quartz-chlorite matrix. Muscovite is an accessory phase found as large flakes surrounded by clusters of small muscovite flakes. Calcite occurs infrequently in the matrix, but is abundant in the opaque-bearing portions of the rock.

Sphalerite and goethite are the most abundant opaque phases; sphalerite occurring as subhedral grains usually surrounded by amorphous geothite. Hematite commonly occurs as intergrowths with goethite. Pyrite and chalcopyrite occur as small (10-15μm) disseminated grains and blebs but tend to be concentrated in and around sphalerite and goethite. Rarely chalcopyrite occurs as anhedral grains up to 300μm in size. Galena occurs as small blebs within sphalerite but more commonly as irregular grains up to 500μm displaying the characteristic triangular pits.

The overall appearance of the rock in this section suggests that it is brecciated; consistent with the strained quartz grains, the recrystallized matrix and an abundance of chlorite. Brecciation may have been accompanied by hydrothermal activity producing the sphalerite-galena-chalcopyrite mineralization. The abundant geothite results from the breakdown of iron-bearing sulphides*, with the iron-rich calcite being possibly derived from the geothite.

MRL 11,473E

The sample is a muddy fine grained sandstone comprising angular quartz grains in a fine grained quartz-sericite matrix. Small patches of micritic calcite commonly occur within the matrix material. Scattered throughout the rock are muscovite flakes. Opaques are uncommon and comprise very fine grained pyrite, galena, chalcopyrite and magnetite.

The rock is undeformed and not recrystallized, and is cut by coarse quartz microveinlets often with coarser micritic calcite nearby.

MRL 11,473F

The rock consists essentially of fine grained chlorite and muscovite with lesser amounts of angular quartz and is cut by an irregular network of opaque patches and veins. It could be classified as a severely chloritized silty mudstone. The opaques comprise deformed and fractured hematite-ilmenite intergrowths with minor amounts of secondary geothite. Limonite staining is abundant throughout the specimen.

* The geothite could be derived from hydrothermal(?) hematite.

APPENDIX 3

North Scamander Prospect

Report on Drilling

NORTH SCAMANDER PROSPECT
REPORT ON DRILLING
JULY TO SEPTEMBER, 1980

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3. PERCUSSION DRILLING

4. CONCLUSIONS

5. RECOMMENDATIONS

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1. INTRODUCTION

This report covers data obtained from a programme of three diamond and four percussion holes drilled at the North Scamander prospect between 3 July, 1980 and 15 September, 1980.

2. DIAMOND DRILLING

The diamond drilling programme consisted of three holes of 201.6m (NS1), 212.0m (NS2) and 201.6m (NS3) respectively.

Hole NS1 was drilled to test magnetic, E.M., and tin-in-soil anomalies coinciding with the site of two short adits and a shallow shaft in North Scamander Creek. The hole penetrated a sequence of interbedded slates and quartzites with sulphide stringers and mineralized breccia zones. All facings were up-hole suggesting the absence of small scale tight folding in the sequence. Pyrite and pyrrhotite were the predominant sulphides in the stringers with generally sub-ordinate sphalerite, galena and minor chalcopyrite. A broad increase in the pyrrhotite to pyrite was observed downhole from about 120-130m. Most stringers were oriented 90° or parallel to bedding, so that a high proportion of stringers were parallel or sub-parallel to the long core axis. A breccia zone consisting of chloritized quartzite fragments in a chlorite, magnetite, sulphide matrix was intersected between 164 and 180m. Tin values in this zone ranged from 0.05 to 0.2% with up to 2% Zn, 0.4% Cu, 0.3% Pb and 52 ppm Ag.

Hole NS2 was drilled to test tin-in-soil and rock anomalies along strike from NS1. A magnetite bearing gossan at the surface had previously assayed up to 1% Sn. The hole intersected a series of quartzites and slates with sulphide stringers and mineralized breccia zones similar to those in NS1. No identifiable marker beds were recognised by visual logging. All facings were up-hole with bedding varying from 45 to 85° to the long core axis. A thin magnetite - chlorite breccia zone at 109-112m assayed up to 0.93% Sn. A similar breccia zone with pyrrhotite, sphalerite and galena at 136-170m assayed from 0.03 to 0.48% Sn. Pb, Zn and Sn values were cut-off sharply below 170m where there was a marked increase in background Cu values. A similar relationship was apparent in NS1. Significant results are listed in Table 1.

Table 1.

Summary of Results - NS2

Interval	Length (m)	Sn%	W%	Pb%	Zn%	Cu%	Ag (ppm)
42.4-44.3	1.9	0.17	0.014	0.16	2.86	0.02	14
108.14-117.5	9.36	0.22	<.01	0.38	1.54	0.05	12
137.79-142.42	4.63	0.09	0.049	0.95	8.24	0.06	20
148.90-158.05	9.15	0.20	<.01	0.63	1.99	0.10	37

.../2

All gold values were less than 0.1 ppm and most W values were less than 10 ppm. Some W values to 650 ppm were recorded. All Bi values were less than 0.012%.

Hole NS3 was drilled to test a tin soil anomaly to the north of NS1. This hole did not intersect massive mineralization of the type found in NS1 and NS2. All facings in the quartzite/slate sequence were up-hole with bedding generally varying between 45° and 70° to the long core axis. Stringers of quartz, sulphide, carbonate (ankerite-siderite) with lesser chlorite, magnetite and muscovite were present throughout. These differed from the stringers in the other holes in that they generally contained more muscovite, carbonate, quartz and sphalerite and less chlorite and pyrrhotite (to 170m at least). The best tin intersection was 1.5m of 0.33% Sn between 22.95 and 24.45m. Sn values did not exceed 0.05% below 30m. Traces of Cu (10-860 ppm, Pb (55-2600 ppm) and minor Zn (30-9800 ppm) and Ag (1-10 ppm) were recorded throughout. All tungsten values were less than 10 ppm. Disseminated carbonate (ankerite-siderite) was present in a number of the samples submitted for petrographic description, a feature not displayed by rocks from the other holes where pervasive alteration was mainly in the form of chloritization and silicification.

3. PERCUSSION DRILLING

Four short percussion holes (NSP 1 to 4) were drilled to depths of 50m, 50m, 50m and 26m respectively. Only one hole, NSP4, reached the water table. The holes were drilled on soil geochemical anomalies with a view to determining bedrock geochemistry. Trace to minor amounts of Sn, Cu, Pb, Zn, Ag and As were present in each hole. The highest Sn value obtained was 785 ppm and the highest Ag value was 13 ppm. The Sn-in soil anomalies appear to have been the result of dispersion of values from widely spaced narrow veins rather than a stockwork or swarm of closely spaced veinlets.

4. CONCLUSIONS

Insufficient structural information has been obtained from the three diamond holes to adequately define the size and attitude of the magnetite-chlorite-sulphide breccia body.

The geochemical anomalies tested by NS3 are probably due to narrow veins and are offset from the magnetic anomaly. It is likely that NS3 was not drilled deep enough to intersect the northern strike extension of the mineralized body. The nature of the alteration in this hole is apparently consistent with this interpretation.

.../3

A preliminary interpretation indicates that the main body intersected in NS2 is approximately 10m wide, and dips 80° NE, thus being broadly concordant with the enclosing strata. Other mineralized breccias in the hole, 5 to 10m wide, have no discernible outcrop expression and may pinch out or bifurcate at depth.

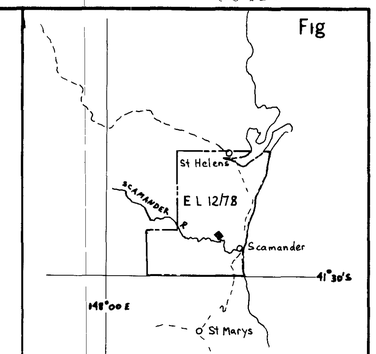
The main breccia body intersected in NS1 also appears to be about 10m wide but dips 80° SW and is apparently discordant.

Preliminary results suggest that a relatively rapid change in mineralization character from Pb-Zn-Ag dominated to Cu-Sn dominated may be expected at depth.

5. RECOMMENDATIONS

Further diamond drilling is required to define the attitude and strike extent of the mineralized bodies.

A detailed programme can be drawn up once a full evaluation of ground magnetic and downhole geophysical logs have been made.



LOCATION MAP

1200W 1100 1000 900 800 700 600 500 400 300 200

2000N 1900 1800 1700 1600 1500 1400 1300 1200 1100 1000N

T Arm Creek

NS1 NS2 NS3 NS4

NSP1 NSP2 NSP3 NSP4

FP102

T Pyramid Rd

ground level (gn float)

gn float

gn outcrop

3 seam (coal) Rd of bo

T Arm Rd

EXPLANATION

- qtc, sh — quartzite, shale — } Silver Dream Mathinna Beds
- gn — gossan — limonite-magnetite bearing rocks
- bedding — facing determined
- bedding — facing not determined
- shear zone
- NS1 — diamond drillhole location
- NSPM — percussion drillhole location
- FP102 — location of collar of EZ Co drillhole

MN GN 030°

SCALE 1 2000

0 50 100 150 200 metres

local grid 5 cm

Fig No
To accompany
Dated

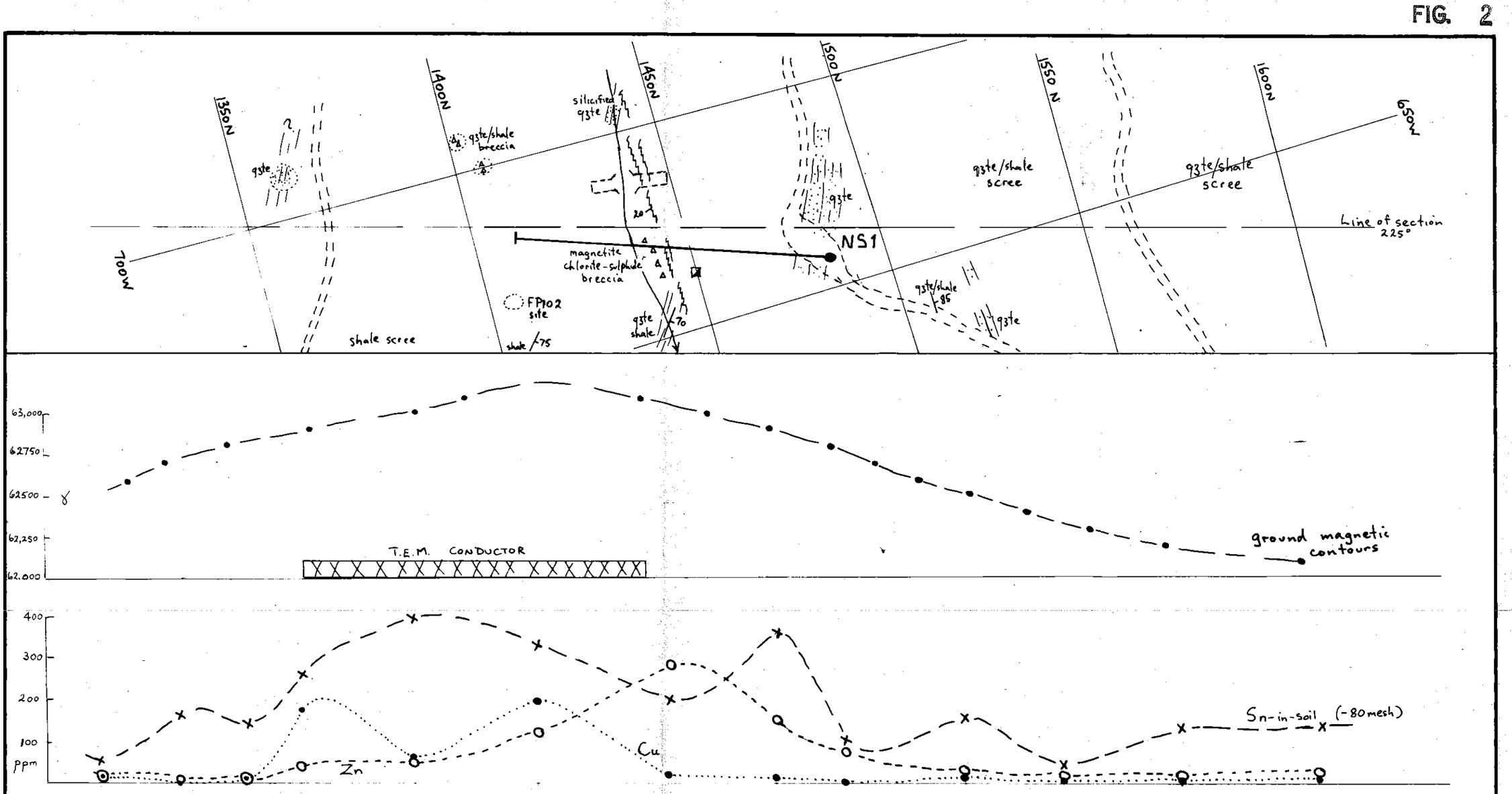
THE BROKEN HILL PROPRIETARY CO LTD
EXPLORATION DEPARTMENT

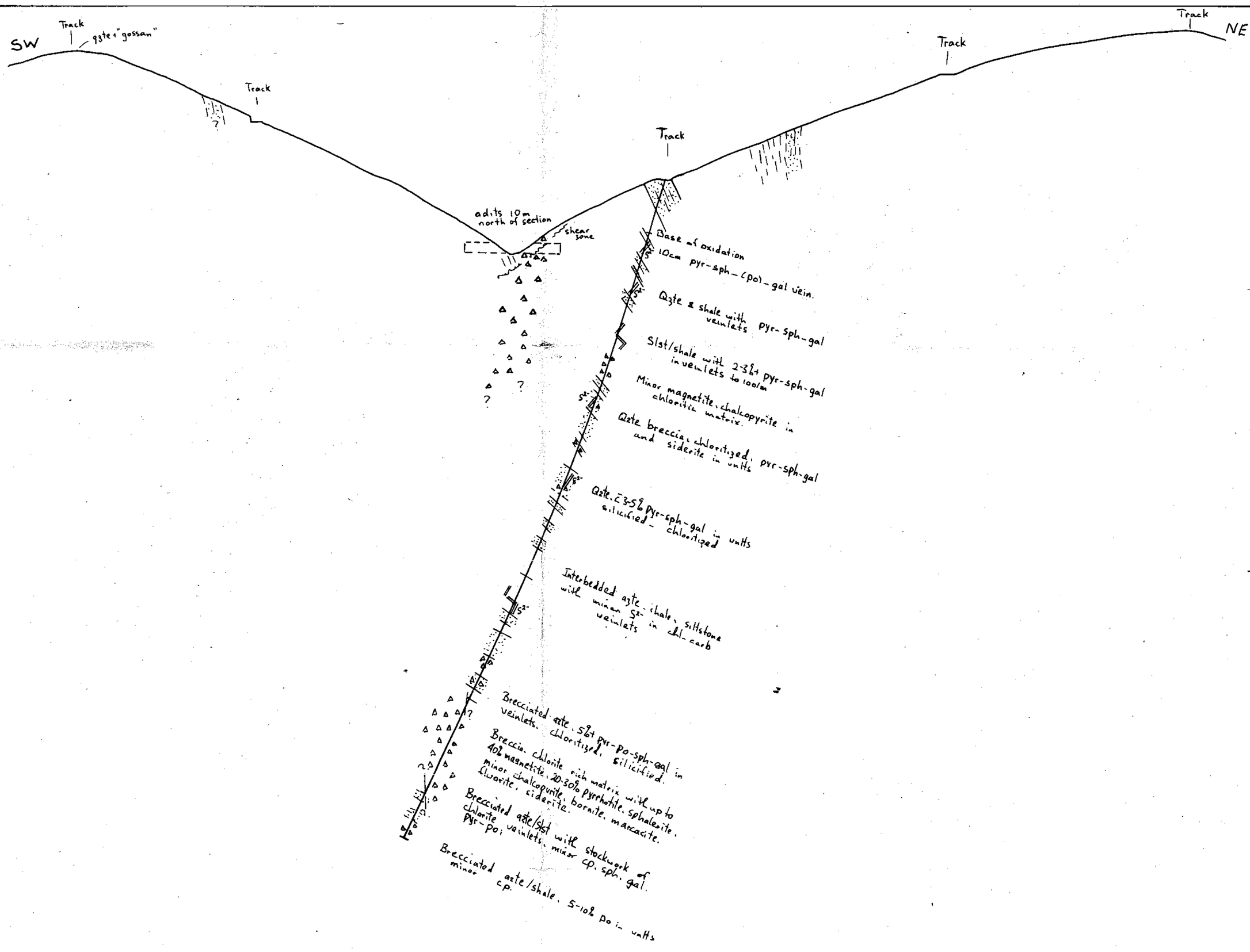
NORTH SCAMANDER MINE, EL12/78
GEOLOGY

Drawn R H	Date 12 8 81	Centre Hobart	
Traced		Project No T610	Drawing No A1-12/78-60
Checked			
OIC			

Revisions

FIG. 2





5 cm

SCALE 1:1.000

V = H

0 50 100 150 metres

Topographic profile surveyed by tape and clinometer

894121

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EXPLORATION DEPARTMENT

EL 12/78. SCAMANDER. TAS.

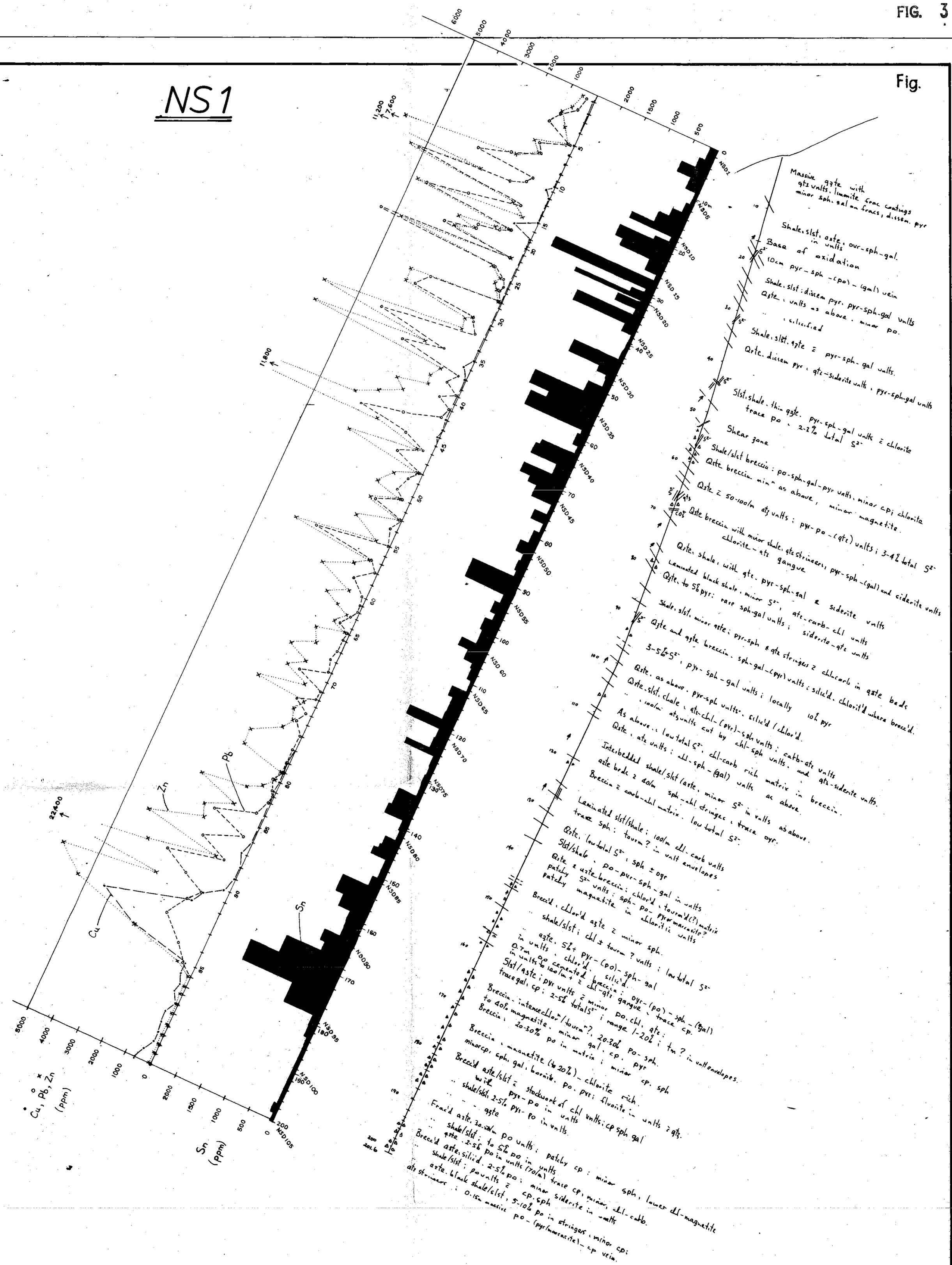
Drillhole NS1 – SECTION
North Scamander Prospect

Drawn: R.H.	Date: 14-8-80	Centre: Hobart
Traced:	Project No: T610	Drawing No: A2-12/78-36
Checked:		

Revisions:

NS 1

Fig.



SCALE 1 : 500

0 10 20 30 40 50 metres

Abbreviations: qzte – quartzite; slst – siltstone; bx – breccia; po – pyrrhotite; pyr – pyrite; sph – sphalerite; cp – chalcopyrite; gal – galena; mag – magnetite; chl – chlorite; tm – tourmaline.

5 cm

- 894122

Fig. No. .....
To accompany .....
Dated .....

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EXPLORATION DEPARTMENT

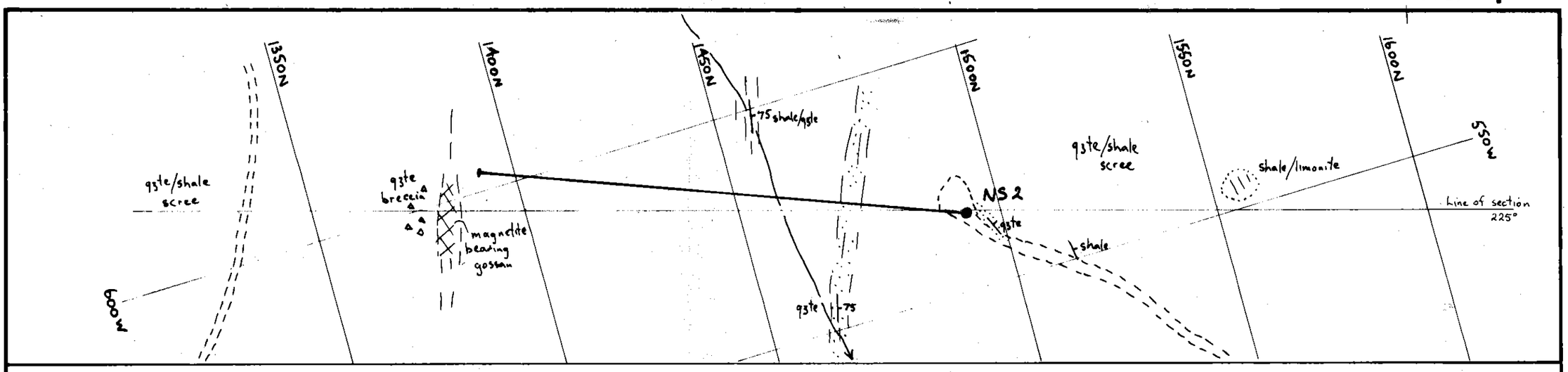
EL 12/78, NORTH SCAMANDER PROSPECT

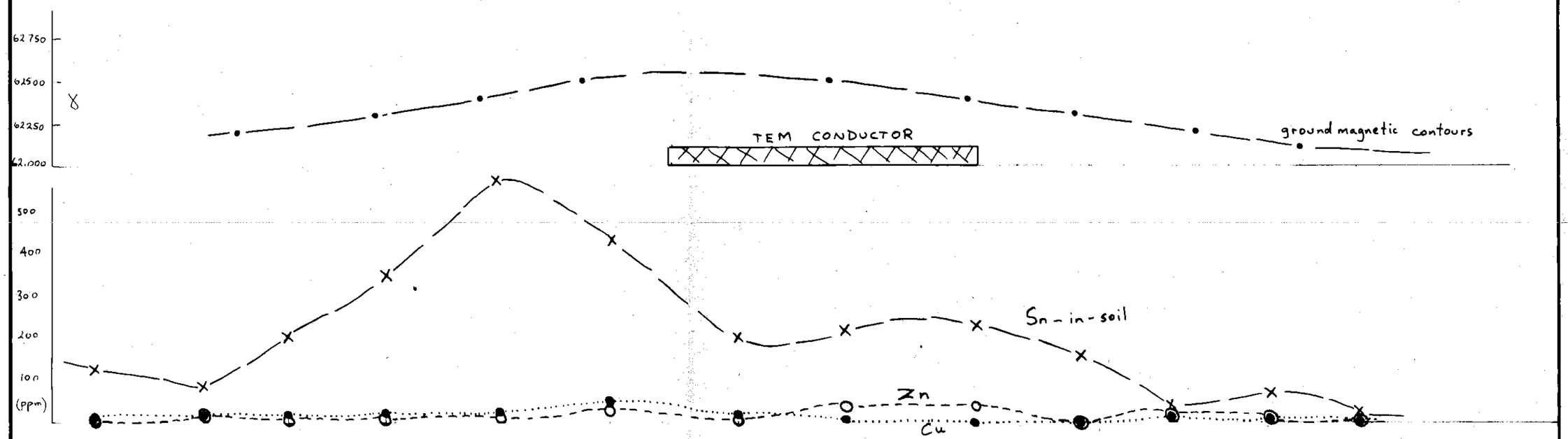
DRILLHOLE NS 1 SUMMARY LOG

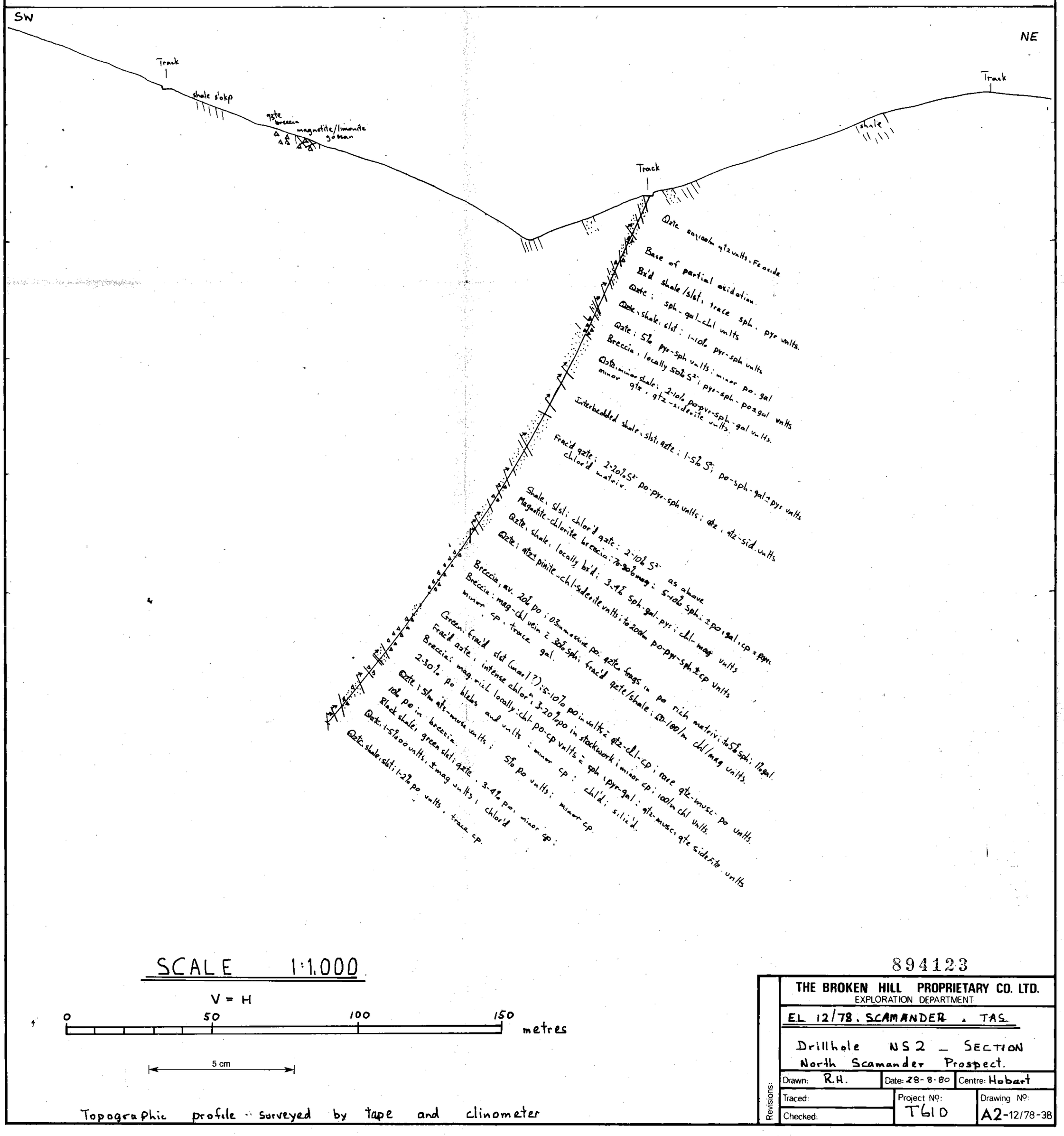
Drawn: R.H.	Date:	Centre: HOBART
Traced:	Project No.: T610	Drawing No.: A2-12/78-37
Checked:		

Revisions:

FIG. 4







SCALE 1:1.000

V = H

0 50 100 150 metres

5 cm

Topographic profile surveyed by tape and clinometer

894123

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EXPLORATION DEPARTMENT

EL 12/78, SCAMANDER, TAS.

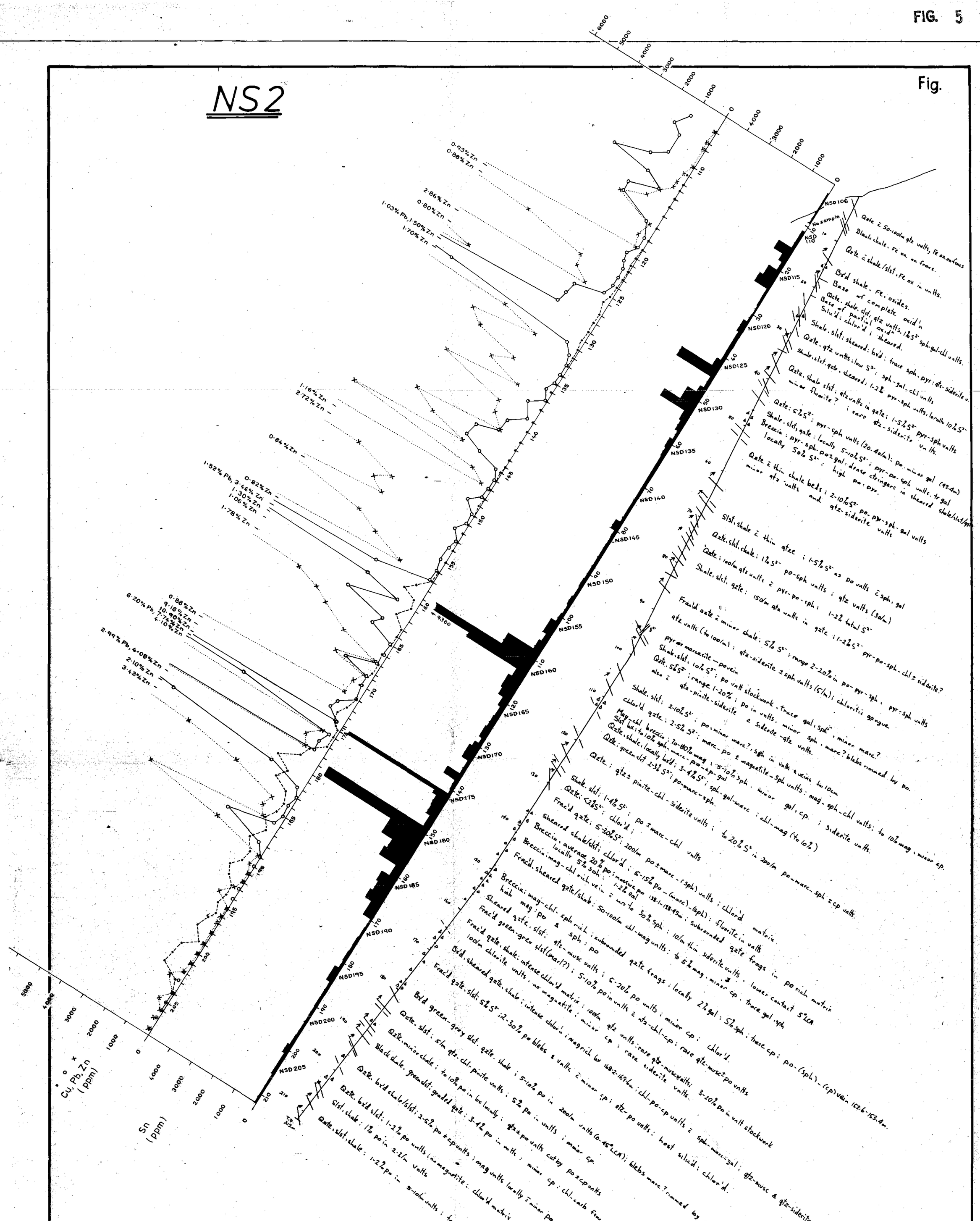
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North Scamander Prospect.

Drawn: R.H.	Date: 28-8-80	Centre: Hobart
Traced:	Project No: T610	Drawing No: A2-12/78-38
Checked:		

Revisions:

NS2

Fig.



SCALE 1:500

0 10 20 30 40 50 metres

5 cm

894124

Fig. No. .....
To accompany .....
Dated .....

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EXPLORATION DEPARTMENT

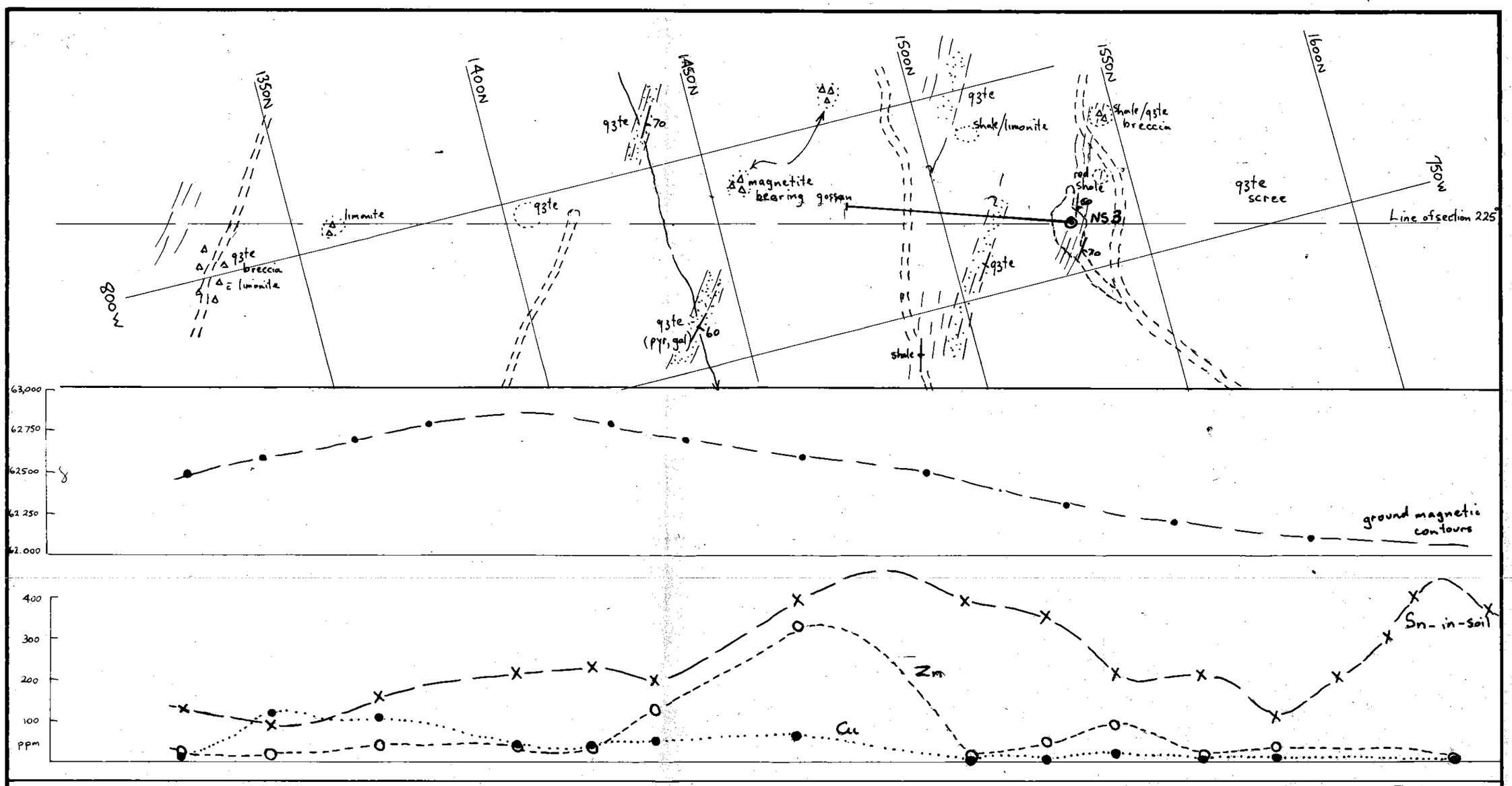
EL 12/78, NORTH SCAMANDER PROSPECT

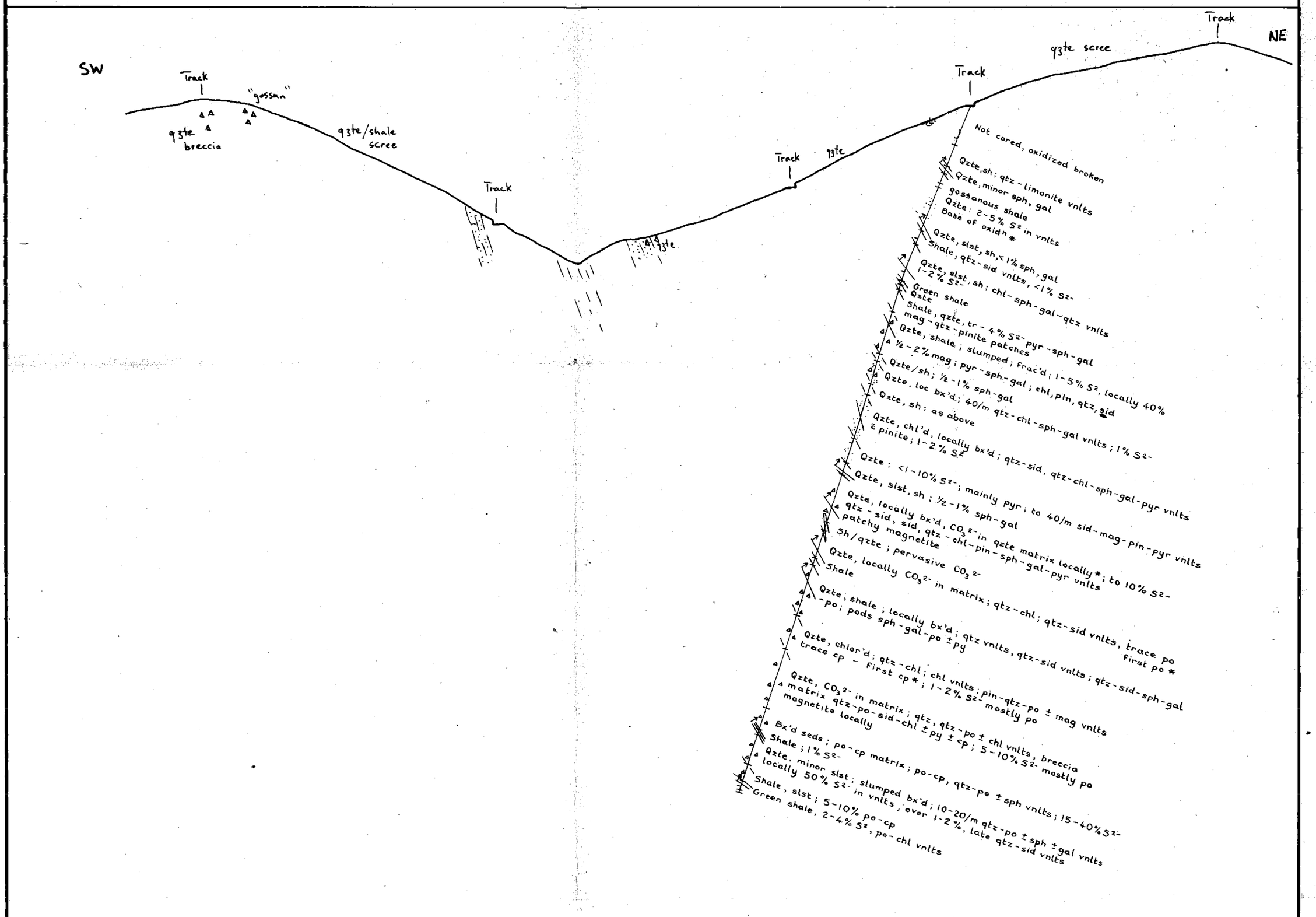
DRILLHOLE NS2 SUMMARY LOG

Drawn: R.H.	Date:	Centre: HOBART
Traced:	Project No.: T610	Drawing No.: A2-12/78-39
Checked:		

Revisions:

FIG. 6





SCALE 1:1,000

V = H

0 50 100 150 metres

5 cm

Topographic profile surveyed by tape and clinometer

894125

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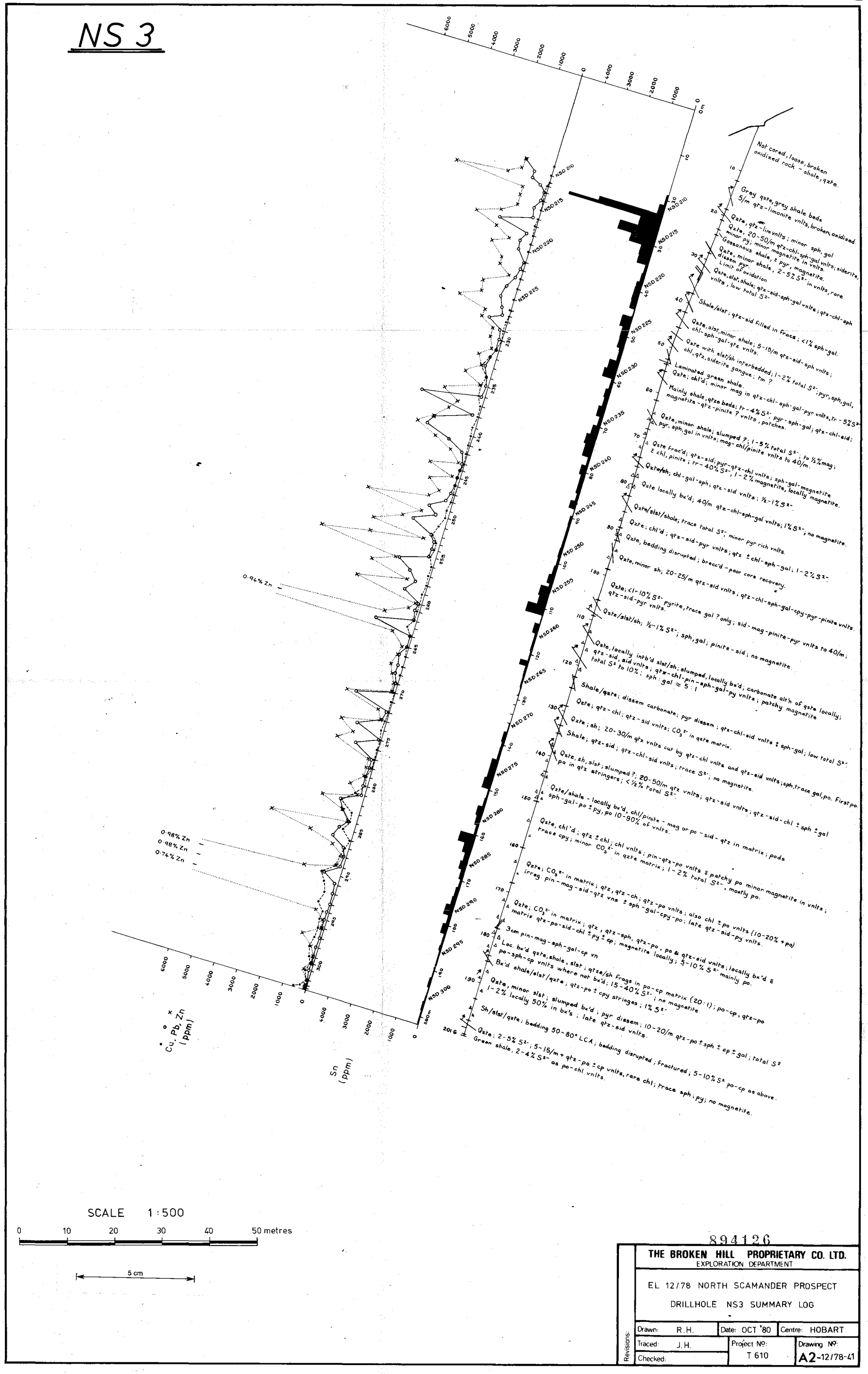
EL 12/78, SCAMANDER, TAS

Drillhole NS3 - SECTION
North Scamander Prospect

Drawn: R.H.	Date:	Centre: Hobart
Traced:	Project No: T610	Drawing No: A2-12/78-40
Checked:		

Revisions:

NS 3



SCALE 1:500

0 10 20 30 40 50 metres

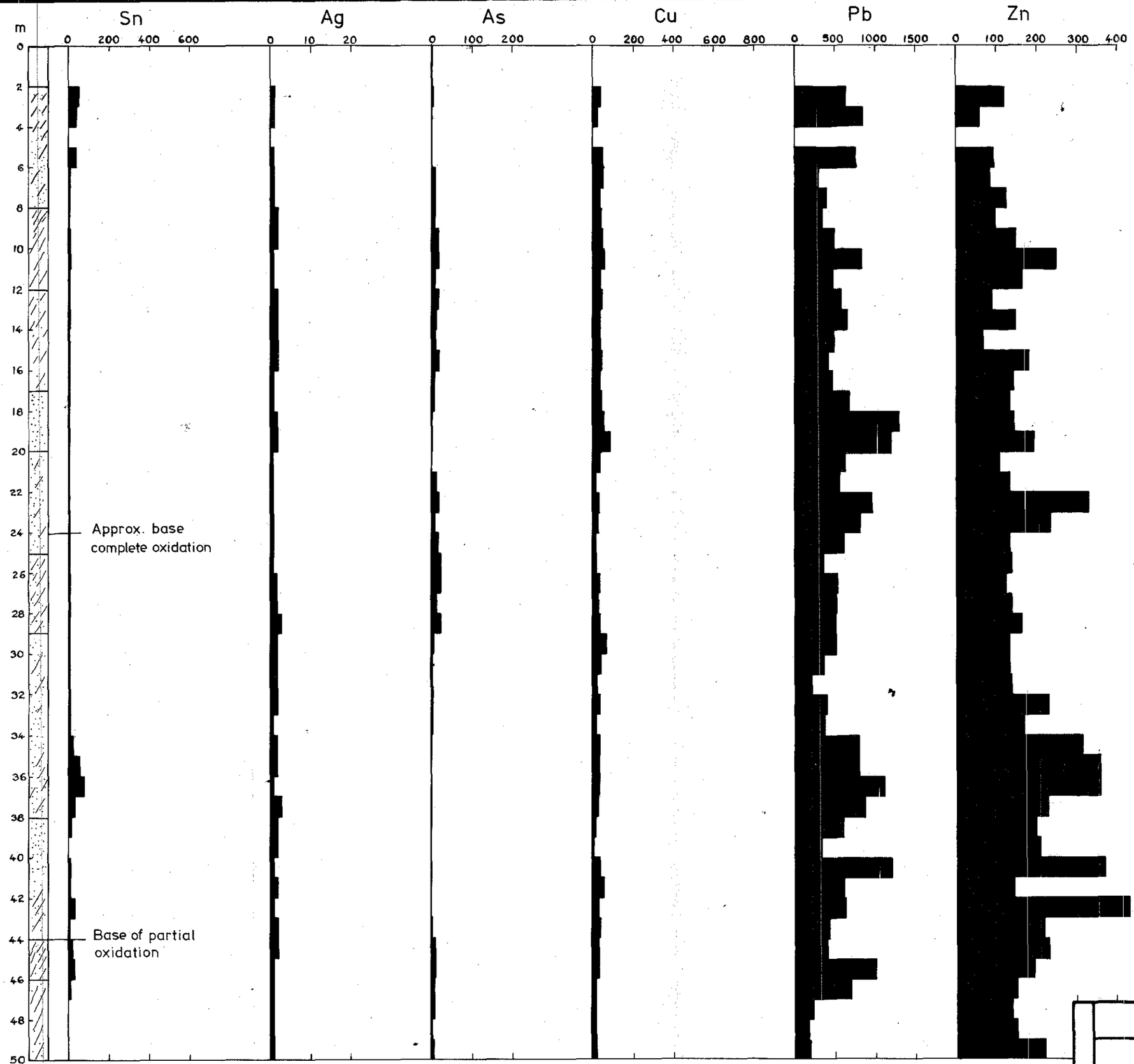
5 cm

894126

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	EL 12/78 NORTH SCAMANDER PROSPECT
	DRILLHOLE NS3 SUMMARY LOG
Drawn: R.H.	Date: OCT '80 — Centre: HOBART
Traced: J.H.	Project No: T 610 — Drawing No: A2-12/78-41
Checked:	

Revisions:

FIG. 8



HOLE Nº: NSP 1

894127

5 cm

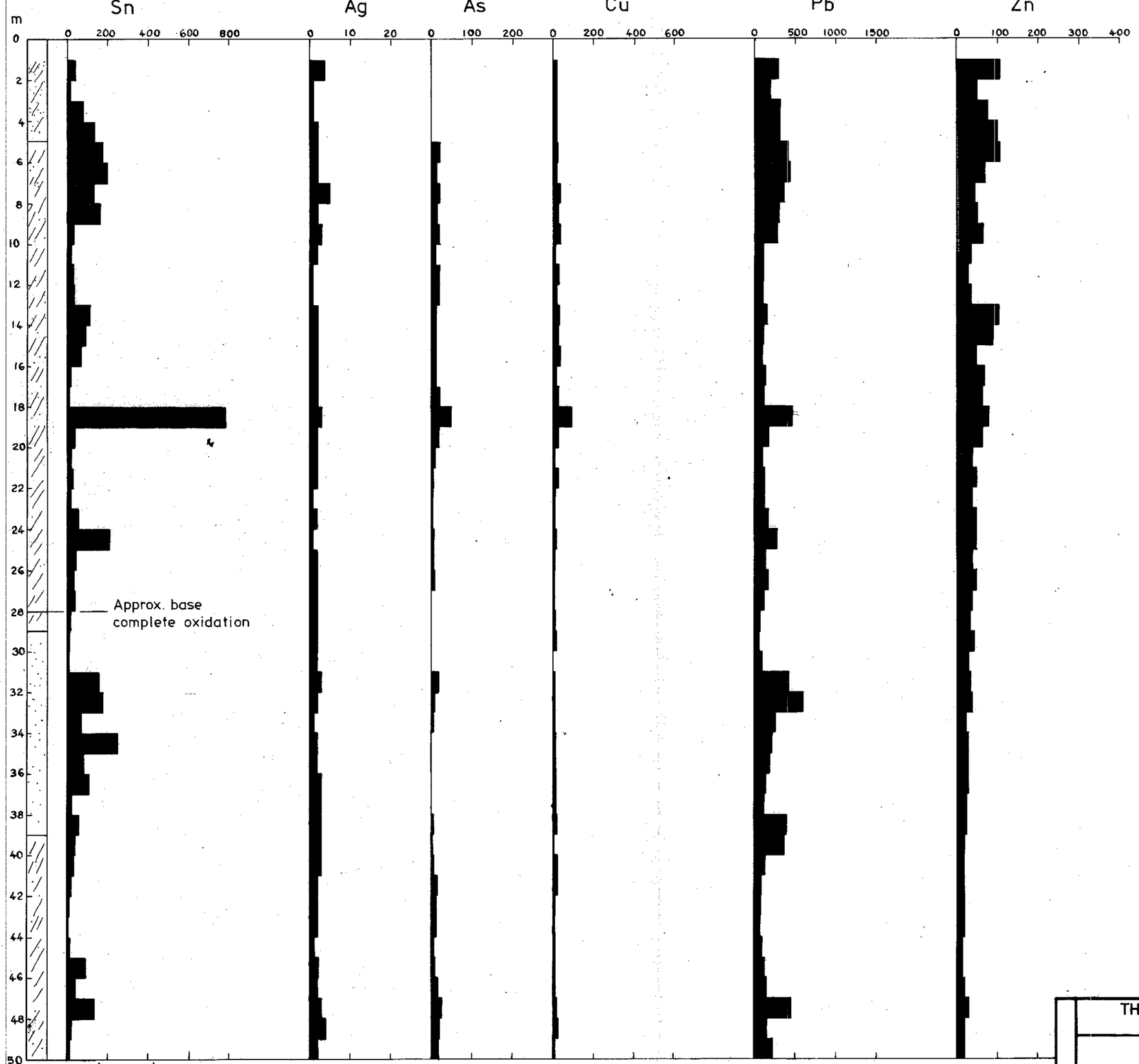
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EL 12/78 SCAMANDER
NORTH SCAMANDER PROSPECT
PERCUSSION DRILLHOLE RESULTS

Prepared by : R.H.		Centre : HOBART	
Date : 9-1-81		Project No. T 610	Drawing No. A3_12/78-56
Drawn : J.E.H.			

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FIG. 9



HOLE Nº: NSP 2

894128

5 cm

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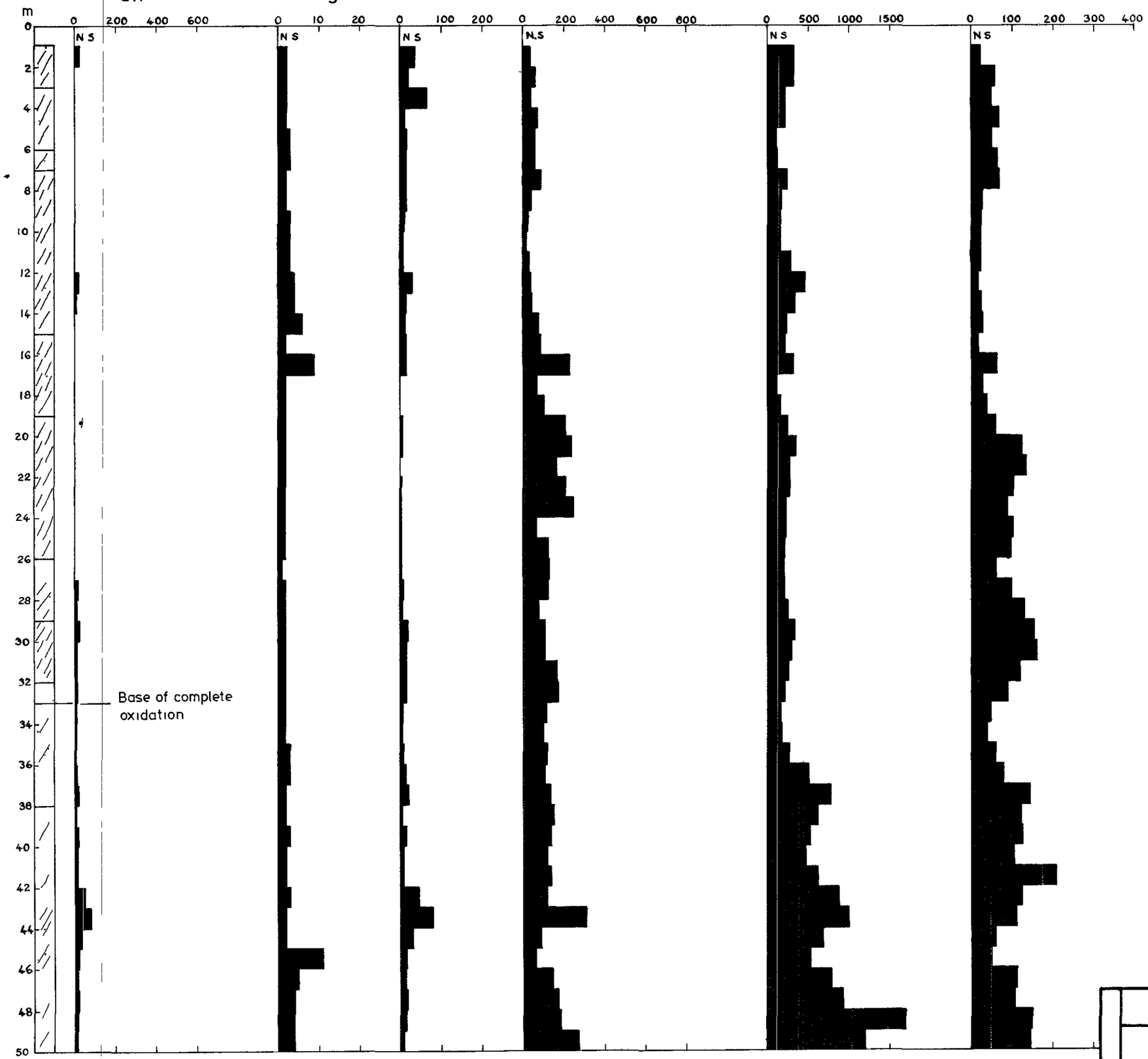
EL 12/78 SCAMANDER
NORTH SCAMANDER PROSPECT
PERCUSSION DRILLHOLE RESULTS

Prepared by : R.H.		Centre : HOBART	
Date : 9-1-81		Project No. T610	Drawing No. A3_12/78-57
Drawn : J.E.H.			

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FIG 10

HOLE N° NSP 3



891129

5 cm

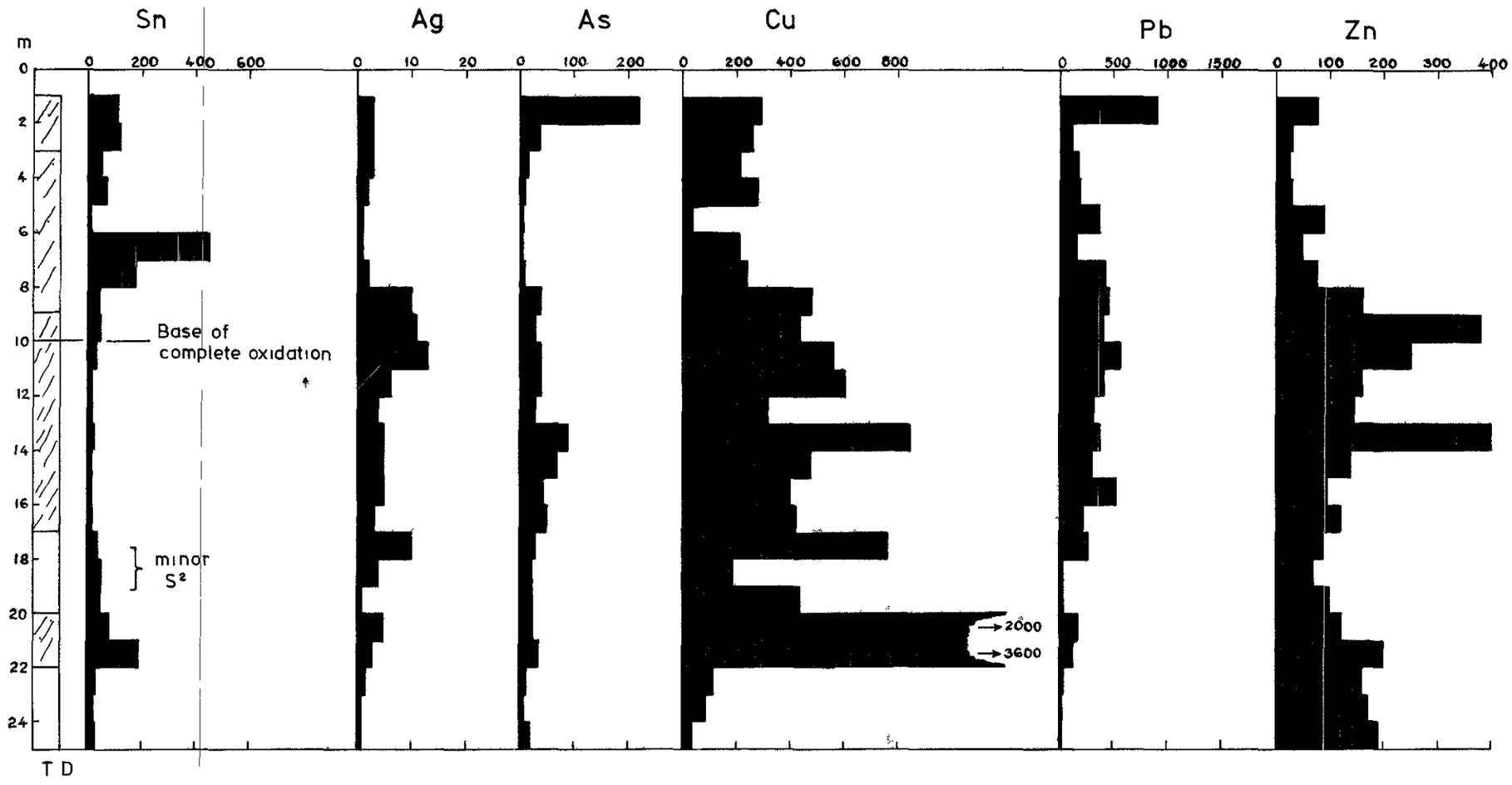
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EL 12/78 SCAMANDER
NORTH SCAMANDER PROSPECT
PERCUSSION DRILLHOLE RESULTS

Prepared by	R H	Centre	HOBART
Date	9 1 81	Project No	Drawing No
Drawn	J.E.H.	T610	A3–12/78 58

Revisions:

FIG 11



HOLE N° NSP 4

894130

5 cm

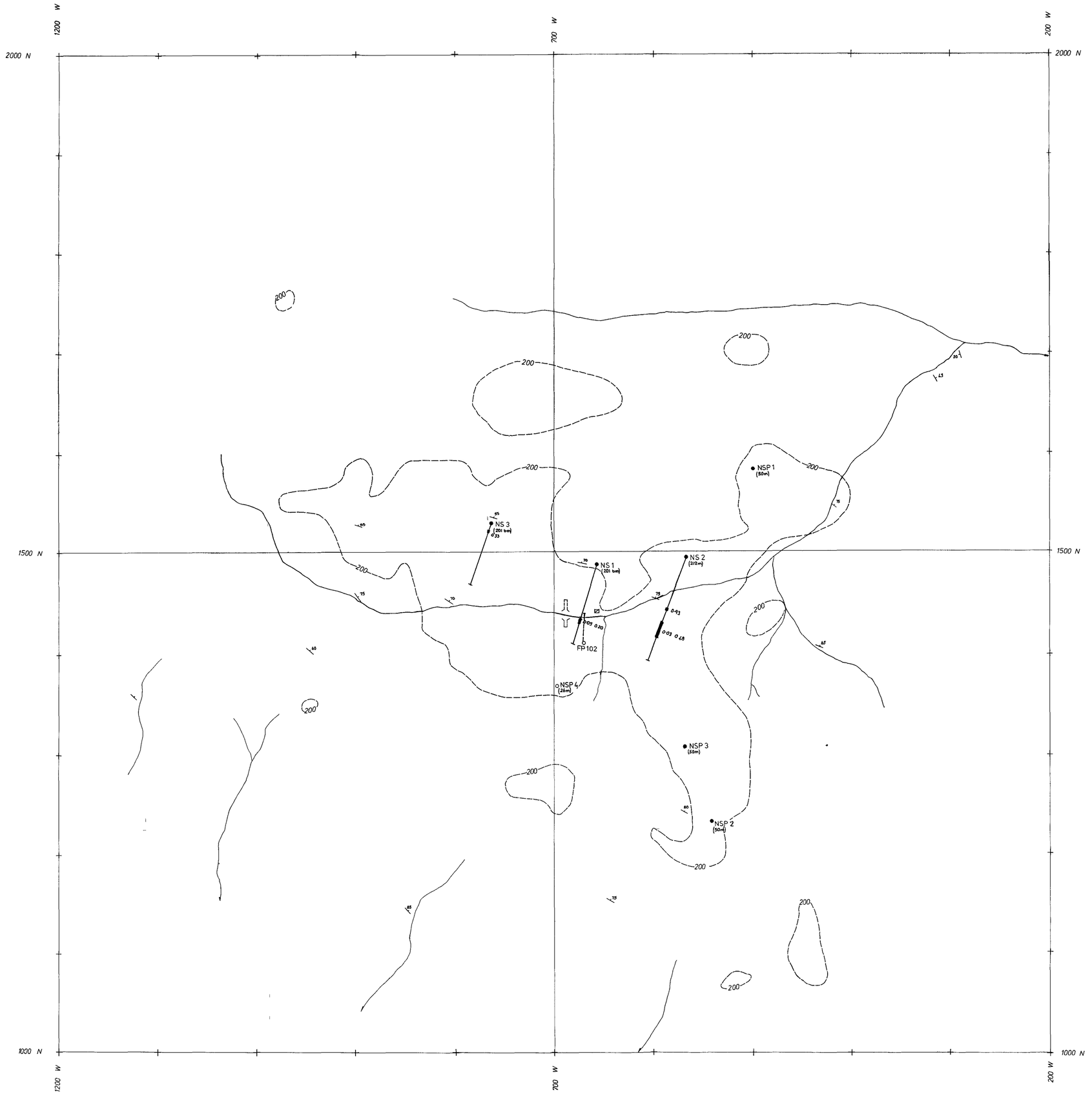
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EXPLORATION DEPARTMENT

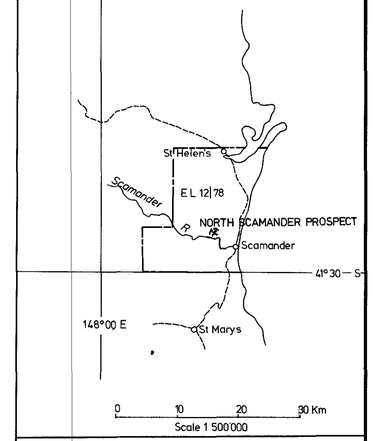
EL 12/78 SCAMANDER
NORTH SCAMANDER PROSPECT
PERCUSSION DRILLHOLE RESULTS

Prepared by	R H	Centre	HOBART
Date	9 1 - 81	Project No	Drawing No
Drawn	J E H	T 610	A3 - 12/78 59

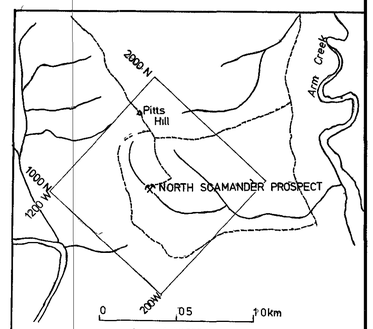
Revisions:

Fig 12.





LOCALITY MAP



LOCATION MAP

LEGEND

- •NS BHP Diamond Drillhole
- •NSP BHP Percussion Drillhole
- ◦FP EZ Diamond Drillhole
- Adit
- Shaft
- 200 ppm Sn in soil contour
- 0.33 Sn grades in mineralized intercepts (%)

MN

5 cm

Scale 1:2000

0 50 100 150 200m

894131

THE BROKEN HILL PROPRIETARY CO LTD
EXPLORATION DEPARTMENT

EL 12/78 SCAMANDER TASMANIA
NORTH SCAMANDER PROSPECT
EXPLORATION RESULTS

Drawn R.H	Date 15 9 81	Centre Hobart
Traced Hilary	Project No T 610	Drawing No A1-
Checked		

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894132

Appendix 1

DRILLHOLE REPORT - NS1

NORTH SCAMANDER PROSPECT,

EL 12/78, TASMANIA

894133

Location:	657W 1487N (local grid)		
Depression:	74° at collar	Commenced:	3 July 1980
Bearing:	228°	Completed:	30 July 1980
R.L.:	N.D.	Rig:	Jacro Top Drive
Depth:	201.60m	Driller:	A Walker, I McCallum
Surveys:	50m (70°), 100m (65°)	Depth of Oxidation:	16.4m
	150m(65°); 200m (65°)	Depth of Water Table:	
		Core Size:	N.Q.

Nature of Target:

Magnetite - sulphide body in fractured sequence of Mathinna Beds quartzites, siltstones and slates.

Reasons for Drilling:

To test magnetic/E.M. and soil geochemical anomalies coinciding with old workings at the North Seamander prospect.

Technical Data:

Overburden and fill 0.75m, Casing 2.9m NW; no water return from 4m, hole cemented to 18.9m, partial water return to 146m, no water return 146m.

Interval (m) NS1 CORE LOG

0-2.60 Not cored, grey quartzite; minor limonite, pyrite. Hard, grey

2.60-9.08 massive quartzite with locally up to 3% dissem pyr cubes (1-2mm), intersected by 4-8/m+ fractures with limonite coatings with goeth/ MnO2; mostly 20-60° LCA; 2cm wide qtz vnlt at 6.5m, 80° LCA, open space filling, pyrite-limonite rich selvadges some dissem pyr in quartz, quartz vnlt swarm at 5.7m, 45° LCA offsets up to 1cm on pyrite ± sph, gal mineralized microfractures, qtz vnlts carry some dissem pyrite, magnetic phases not detected, carbonate not detected. Generally v hard (silicified), locally 50/m m vnlts qtz and open tension gashes c̄ qtz-(galena-sph). Completely oxid'd sulph vnlt at 8.03m (45° LCA), ditto 8.7m 60° LCA; wide variation in vnlt orientation most less than 45° LCA.

9.08-9.50 Finely laminated dark grey shale and lt grey-green siltstone with bedding lamination 30° LCA, lower vnlt density than above, up to 3cm wide qzite beds towards end of unit, mfracs with clay in shale wider to 1-2mm quartz vnlts in qzite; these latter 0-20° LCA; dissem pyrite.

9.50-9.93 Quartzite with interbedded shale; shale bands to 2cm wide also c̄ siltstone, v low sulphide content, some thin sulphide vnlts (<1mm) parallel to shale bands at 40° LCA some v thin qtz vnlts in qzite, minor v fine dissem pyrite.

9.93-11.40 Interbedded dark grey shale (1mm to 10mm), siltstone and quartzite (up to 2cm) light grey, bedding to CLA is 45° , all beds contain v fine dissem pyrite. Grading and scouring suggest beds young uphole,



way up.

some beds offset on v fine mfracs filled c̄ qtz 2-3mm oxidized vnlt (sulphides → limonite) at 10.65m 45° LCA.

11.40-14.95 Mostly sugar textured grey quartzite, v hard; minor shale bands 40° LCA; these locally disrupted by mineralized mfracs; oxidation of sulphides locally (eg 13.2m), 3m qtz vnlt 85° LCA (13.2m), 2m qtz vnlt in tension gash 45° LCA with dissem galena in vnlt and pyrite blebs near margins, slickensides & brecciated 12.4m, over 15cm zone, v minor offsets of qtz on thin shale bands, most qtz vnlts perp to bedding 1-2% dissem pyrite blebs, pyrite stringers with minor sphalerite and galena (0-20° LCA) density locally 50/m+; 13m qtz vnlts offset on pyrite± sph/gal stringers up to several cm; galena noted in qtz frequently, no carbonate detected, no magnetic phases detected.

14.95-17.05 Interbedded quartzite and shale; qzte beds 40cm max, shale beds to 10cm, v fine dissem pyrite in shale qzite, bedding is 40° LCA, 15.8m core-bedding angle steepens to ~20° LCA some brecciation (transposition?)

Base of partial oxidation 16.4m evident; sphalerite-galena-pyrite in stringers 0-20° LCA, thin discont ~15m-15.3m; at 16.75m a 4mm wide vuggy pyrite-sph stringer at 40° LCA is truncated by a fracture at 20° LCA, extensive silic^{n}. v weakly reactive carbonate on fracs at 16.95m, no magnetic phases detected.

.../2

17.05-17.55 Mostly quartzite with minor shale more extensively brecciated and veined than above; esp 17.4-17.5m were irreg pyr-sph minor galena stringers to 5mm wide cut hard sili'd rock c disrupted bedding 50/m+ sulphide min'd mfracs. (pyr:sph=10:1 to 5:1, sph:gal=10:1) irreg stringers 0-45° LCA.

17.55-17.75 Mostly shale and interbedded siltstone with v fine dissem pyrite, pyrite in thin stringers to shale bands also 90° to bedding.

17.75-19.30 Grey quartzite with minor shale bands; LCA to bedding ~40° some shear along shale bands, at 17.9 and 18.9 prominent pyrite-sphalerite stringers 40-45° LCA to 0.8cm wide, contain minor galena, vuggy. qtz-brown carbonate (siderite?) stringer 20° LCA at 18.7m, thin pyrite-sph stringers mostly 0-10° LCA also this section, similar stringers of sulphide 19.1m (15° LCA), carbonate vnlt 80° LCA at 19.15m.

19.30-19.90 Section in quartzite including massive sulphide vein; upper contact is 45° LCA, lower contact 30° LCA and is parallel to bedding in shale immediately below; section 19.55 to 19.75 is mostly qzite c vein narrowing to 1cm locally where vein apparently dips to drillhole - overall vein is to bedding and is apparently 10cm thick, vein consists of pyrite and sphalerite in ratio 4:1 with v minor pyrrhotite and minor galena, texture is spongy; sulphides lens out in blebs parallel to dip of vein qzite is grey green and is possibly chloritized.

19.90-23.32 Interbedded shale, siltstone/qzite, dark grey to pale green, hard with dissem, v fine pyrite, cut by anastomosing pyrite-galena-sph vnlts 0-20° LCA; slight bedding disruption on min'd fractures; veinlets also parallel to bedding particularly on shale contacts, core to bedding is 30° LCA (20.2m), 35° (20.5m), 55° at (21.9m), 45° at 23.1m; 1cm pyrite veinlet at 22.06m 45° LCA with stringers of pyr-sph-gal 20-30° LCA leading up through more competent underlying beds.

23.32-25.65 Grey, v hard quartzite, massive, v minor shale bands 24.57 and 25.24, cut by quartz veinlets 30-60° LCA and later pyrite (sph-gal) vnlts <10-30 LCA and final stage l brown carbonate vnlts (80° LCA) rare, 20cm siltstone bed to 25.65m; small pod of pyrrhotite in irregular veinlet 2mm wide with minor galena at 25.45m.

25.65-26.80 Interbedded dark grey shale, siltstone minor qzite, bedding 40-45° LCA locally disrupted by shearing/slumping?, 5mm wide galena-sphalerite veinlet at 26.2m 45° LCA with chlorite parallel to shale bands; shale beds 1-2mm to 10mm; siltstone to 4-5cm+; rare 1-2mm irregular pyrrhotite-sphal veinlets 0-20° LCA overall low veinlet density.

26.80-29.00 Massive grey quartzite, silicified?, cut by quartz-pyrite-sphalerite galena veinlet with patchy siderite selvadges and minor cp at 5-10° LCA over 27.6-27.8m, sulphide-qtz stringers in stockwork elsewhere through interval with higher chalcopyrite content than previously, early set of qtz veins about 30° LCA with minor sulphide as above offset on mfracs filled with sulphides, grainsize finer over interval 28-29m with fall off in veinlet density and total sulphide content, minor pyrrhotite in vnlts locally; rare thin carbonate veinlets (siderite), 40-60° LCA.

29.00-29.52 *Interbedded siltstone, shale and quartzite, bedding 45° LCA shale bands 5-10mm, siltstone/quartzite 0.5-15cm; pyrite-sphalerite-galena-chlorite-carbonate veinlets sporadic, 45° LCA in shale bands 2-5/m usually less than 5mm thick, eg 29.02m.*

29.52-30.60 *Quartzite/siltstone with minor thin shale beds, 45° LCA; hard dark grey; cut by early set of quartz veinlets (1-2mm up to 50/m), these 45° LCA 90° to bedding, offset on mfracs and sulphide min'd in veinlets (pyr-chl-gal-sph?) cut in turn by late stage 1-2mm carbonate-qtz vnlts at 70° LCA, sulphide vnlts v irregular 20-45° LCA.*

30.60-31.28 *Dark grey interbedded siltstone and shale c̄ minor qzite; bedding 40-45° LCA, slickensides & shear 30.85-30.95 m chlorite-carbonate alteration, qtz vnlt displaced, similar shear at 31.28m v narrow, sulphide veinlets in pods to 5mm pyrite-sph-galena with carbonate, v rare pyrrhotite, v fine dissem pyrite prominent in fine grained units, vnlts thicker in coarser units.*

31.28-31.71 *Grey, massive quartzite/siltstone with abundant v fine dissem pyrite; c̄ qtz veinlets at 30° LCA cut at 90° by chlorite-sulphide stringers at 40° LCA, some galena and siderite in qtz.*

31.71-33.64 *Dark grey siltstone/quartzite with interbedded shale; bedding 45° LCA; cut by qtz vnlts 20° LCA ~5/m; thin brown carbonate-qtz vnlts 70-80° LCA; and sulphide vnlts as above; at 33.12 chl-gal-sphalerite in vnlt to shale band, breccia is developed in 1-2cm wide zone (33.1m); sulphide-chl feeder vnlts 0-20° LCA below breccia zone.*

33.64-34.28 *Mainly dark grey siltstone, bedding 50° LCA, thin carb vnlts 50-70° LCA; v low qtz and sulphide vnlt content.*

34.28-36.45 *Dark grey quartzite with minor interbedded siltstone, dissem cubic pyrite in qzite in unusually large gns to 5mm, also v fine dissem gns; 1cm wide qtz-siderite vnlt at 34.8m 90° LCA, others narrower to 70° LCA, open space filling, thin quartz-carbonate vnlts have minor galena; siderite on selvadges; pyrite blebs developed on v tight mfracs with minor sphalerite.*

36.45-39.28 *Interbedded siltstone and shale with thin quartzite band at 37.8m; v low vnlt density this section, v poorly mineralized; bedding 50-60° LCA; irreg pyrite-sph-qtz-chl-gal stringers best developed in qzite (0-20° LCA); some bedding offset on these mfracs.*

39.28-39.52 *Quartzite bed, brecciated lower contact, no significant mineralization.*

39.52-46.79 *Interbedded siltstone, shale and quartzite; bedding average 50-55° LCA; some mineralization in vnlts to bedding (gal-sph-chl); sporadic pyr-sph-gal-chl vnlts at 44.2, 44.4, 45.4-45.6 0-5° LCA, these latter to 5mm, no pyrrhotite detected, bedding offset brecciated locally c̄ minor sulphide mineralization (eg 45.75m) galena-sph-chl admixture in disrupted shale band.*

46.79-47.20 *Mostly massive quartzite, 1 qtz vnlt 1-2mm c̄ minor sphalerite 10° LCA, no other significant mineralization.*

47.20-51.05 *Bedded siltstone, shale, minor qzite; scour indicates core is facing up-hole; bedding is 55° LCA chlorite-sph-pyr vnlt at 48m is 20° LCA, disrupts bedding, no veinlets above this zone. Core to bedding 50° at 48.7m, stringers of sulphide mineralization dispersed through section*

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especially around 50.6m pyrite-sphal-(galena) in chlorite-carb(?) quartz gangue; bedding disrupted by shearing at 49.7m shears cemented with chlorite sulphide matrix - vnlts 5-15° LCA or parallel to bedding; no carbonate detected by acid, no magnetic phases detected, bedding orientation apparently rotates below the mineralized fracture zone at 50.6m however angle remains at 50° LCA.

51.05-51.92 Mostly silstone and shale with minor quartzite beds extensive brecciation of units 51.2-51.7m breccia matrix is admixture of chlorite-pyrite-sphalerite-galena and qtz of v patchy distribution veinlets and shears at low angles to LCA; locally higher gal:sph ratio; total sulphide 2-3%? v minor pyrrhotite locally associated with pyrite blebs; no magnetite in matrix of breccia; bedding in 60° LCA in shale at 51.8m.

51.92-53.89 Brecciated quartzite with v minor thin brecciated 1cm shale bands at 52.3, 53.0 at 53.3m, bedding 60° LCA, 52.4m well developed set of sulphide stringers at 20° LCA transect bedding, 1-3mm thick with pods to 5mm; 30-60/m density, composed of pyrite, sphalerite, galena, pyrrhotite (20:4:1:trace) with milky qtz locally, milky qtz may be from early set of qtz stringers 1-2mm 30/m, v wispy (30-70° LCA) fine brown carbonate stringers 70-80° LCA 4-5/m to 1mm cross cut other veinlets; total sulphide content is locally +5%.

53.89-55.06 Brecciated shale unit; v fine grained, hard, <u>light brown</u> rock with streaky shale and qzite with wispy m vnlts of chlorite average 0-10° LCA; pods of sulphide to 5mm along vnlts and cross fractures mostly pyrrhotite, sphalerite, galena with trace chalcopyrite and pyrite, gangue contains chlorite, qtz, musc? and brown carbonate?

55.06-57.76 Brecciated shale and siltstone grey to dark grey, with bedding evident 55.06-55.5m; below this shearing/brecciation is stronger - core still retains hardness; bedding to LCA is 35° at 55.2m; v fine dissem pyrite in shale, pyrrhotite rich vnlt <1 to 4mm thick at 55.3m parallel to bedding in shale; thin brown carb? vnlts crosscut core locally; generally low sulphide content compared to interval above 55.06-55.5; 100/m pyr-sph-gal stringers at 0-10° LCA at 55.9m (1-2mm thick) gangue rich in chlorite as above. Grades to brecciated siltst/qzte 56-57.7m with locally intense bx'n; matrix rich in chlorite, sphal, gal (minor), <u>magnetite</u> (minor) as small 2-3mm+ irregular pods, chlorite is the main matrix phase (55.9-56.7m); minor irreg pyrrhotite in stringers in brecciated shale unit at 56.9m.

57.76-59.11 Brecciated quartzite, contact with above unit faulted 25° LCA; minor thin shale units (2-5mm) are brecciated and streaked into healed fractures (irreg 45° LCA); cut by 50-100/m irreg qtz stringers (max 2mm) bulk 45-70° LCA, these offset on S^{2-} bearing mfracs (0-30° LCA); low S^{2-} content overall; 50-100/m pyr-po-chl $\pm$ sph $\pm$ gal stringers 0-10° LCA over last 0.2m of section.

59.11-59.45 Sheared/brecciated shale bed, faulted upper and lower contacts 20° LCA; pyrite-po (3:1)-chl-carb? stringer (4mm) in centre of section to contacts sheared, spongy sulphide, unit originally probably only 4cm thick?

59.45-59.82 Brecciated qzte as for 57.76-59.11.

59.82-60.11 Brecciated/sheared shale as for 59.11-59.45, 2-5% pyrrhotite in stringers, 20° LCA, 100/m locally.

60.11-60.93 Brecciated qzte as above; with vuggy pyrite stringers 30° LCA to 5mm (50/m) at 60.4m these low in po; with minor chlorite; pyrroh stringers 0-20° LCA v irreg, 1-2mm in last 0.2m of section, minor pods sphalerite through section, some v thin late stage carb vnlts 70-80° LCA (less than 15/m).

60.93-61.40 Sheared shale/qzite with pyr-po-chl mineralization shearing and vnlts irreg but generally 0-10° LCA faulted upper and lower contacts.

61.40-63.05 Quartzite; grey med gnd; cut by 50-100/m wispy quartz stringers, 20-70° LCA; also by later(?) pyrite ± pyrrhotite and pyrrhotite stringers locally with qtz and chlorite 0-70° LCA; variable po:pyr; 50/m +; 3-4% total S^2, some pods sphalerite locally.

63.05-63.35 Brecciated/sheared shale band; bedding (?) 20° LCA pyrite irreg stringers and pods sphalerite.

63.35-63.93 Qzte, dark grey-green as for 61.4-63.05, lower S^2 content.

63.93-71.15 Brecciated qzte with minor shale; dark grey qtzite and shale, locally laminated but bedding mostly extensively disrupted; early set of qtz vnlts in qzite (eg 69.2m) 30-50/m+, mostly 30-50° LCA; shattered qtze at 67.4m in 10cm zone qtz rich matrix with ½-2cm angular qzte frags; later S^2 vnlts 0-45° LCA, v irregular, vuggy (spongy S^2); dom S^2 is pyrite, then sphalerite (pyr:sph = 10:1), minor galena locally; chloritiz^n locally intense (eg 70.6m) where sheared shale/qzte is invaded by irreg pods/stringers of pyr-sph-galena in chlorite/fspar? gangue; rare late stage light brown-yellow carb (siderite?) vnlts cross cut earlier vns (these 1-2mm 30-80° LCA).

71.15-76.91 Quartzite and interbedded shale; dominantly qzte, shale bands 5-15cm, flame structures and grading to base of qtzite beds; facings uphole (top), bedding 55-60° LCA, qtz vnlts 1-2mm, 10-25° LCA virtually restricted to qzite beds; offset on sulphide-chl filled mfracs (0-20° LCA); pyrite-sphalerite (chlorite-fspar-carb?) stringers as above or to thin shale bands at qzte/shale contacts; qzite is markedly fspathic 72.7-76.9m; v thin widely spaced carbonate vnlts (siderite?) as above cut other structures; rare qtz-brown carb vnlts 70° LCA (eg at 76.7m) may be related to former faulted contact to unit below? - sheared at least.

76.91-78.80 Finely laminated dark grey shale, siltstone with some thin (1-2mm) graded qzite beds (young uphole) bedding 50° LCA although is locally extensively sheared (eg 77.9-78.4m); mfracs filled c̄ network of qtz-carbonate stringers mostly 90° to bedding, 100-150/m locally; chlorite rich vnlts locally with minor sulphides, trace dissem pyrite in shales.

78.80-81.33 Qzte with minor shale; top 0.3m brecciated shale and qzte with chl-carb-pyr vnlt swarm 10° LCA; grades down into brecciated qzte/slst locally with abundant fine qtz stringers 10-20° LCA, assoc'd c̄ v fine chloritite, silica, some small pods pyr-sph-galena trace dissem pyr, carbonate coated mfracs c̄ slickensides 45° LCA 20/m; lower 2m of unit consists dom qzte with network of fine qtz stringers up to 3mm mostly 20° LCA 100/m locally; these offset on mfracs and sulphide-qtz-chl vnlts at 30° LCA mainly pyrite, sphal (marmatite) and minor galena; pyrrhotite not noted cut by rare late stage qtz-carb (l yellow brown)

vnlts at 45° LCA - locally up to 5% pyrite mostly in vnlts.

81.33-83.58 Mostly finely laminated shale and siltstone with qzite beds 2-15cm locally; bedding 70-75° LCA locally disrupted by faulting/shearing; qtz-chl-pyr-sph vnlt to 5mm at 10° LCA (~81.9m) in qzite bed; intense development of qtz stringers v irregular also in qzte beds; shale cut by thin irreg chl-carb vnlts and brecciated; gen v low sulphide in shale (some v fine dissem pyrite probably syngenetic) often faulted (breccia) contacts betwen qzte and shale.

83.58-84.15 Qzte, as above ~100/m qtz stringers some with chl-carb-sph-pyr, 5-30° LCA.

84.15-84.59 Mostly shale as above (bedding to LCA 65°).

84.59-84.92 Qzte as for 83.58-84.15; 2-3% pyrite in stringers 20-90° LCA, 15-20/m 1-2mm thick also qtz stringers as above.

84.92-88.06 Interbedded shale, siltstone and minor qzte; bedding 70-80° LCA; virtually all mineralization is within qzte units; these up to 10cm thick (6 in interval); some pyrite vnlts 80° LCA on shale qzte contacts (these rare), qtz stringers in coarse parts (young uphole) of qzte units (0-10° LCA) carry patches of pyr-sphal and have chl-carb rich selvadges - pass up into shale bands as thinner chl-carb stringers; slickensides common in shale bands, vnlts are irregular but most are at low angles to LCA. Traces galena in S^{2-} vnlts; some qtz-chl-carb stringers offset on v fine pyrite filled mfracs.

88.06-91.77 Qzte, with minor siltstone/shale; 89.5m core is rich in fine gnd chlorite, dissem?, as well as in vnlts with sphalerite (marmatite), galena, trace chalcopyrite, with fine l yellow brown carbonate (0-45° LCA) v low pyrite content of vnlts is unusual, possibly due to finer gnsize of the unit rel to qztes above, rare thin lt brown carb vnlts 65° LCA regular (1-2mm), core is more broken than for other qzte beds above.

91.77-95.80 Brecciated qzte; fine grained grey silicified, locally true breccia with qzte frags in siliceous-carb-pyrite matrix, elsewhere strong fracturing c open spaces developed on fracs, locally up to 10% pyrite as gns coating fracs or in thicker vnlts various orient' to 15° LCA with pods of sphal (marm), galena, pyrite developed locally; overall 3-5%+ sulphides pyr:sph = 15:1 (v approx); more sph in last 0.5m of section.

95.80-97.35 Laminated shale and siltstone, bedding 70° LCA; v weakly mineralized, minor pyr in vnlts (2-3mm) to bedding; some sphal in chl-carb filled v irreg mfracs, trace only sphalerite.

97.35-99.94 Quartzite, locally brecciated as for 91.77-95.80 esp first 0.5m; med fine gnd grey qzte; possibly silic'd chl'd matrix, cut by swarm of chl-carb-qtz stringers mostly 20° LCA, these with pyrite-sphalerite locally 5:1 to 10:1 (pyr:sph); late stage thin (qtz) brown carb vnlts at 65-70° LCA rare, chlorite stringers 50-100/m, no pyrrhotite detected carbonate not reactive to acid.

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99.94-102.46 *Interbedded qzte, slst, shale; qzte dominant, core to bedding 75° LCA, flame structures and graded qzte beds indicate beds facing up-hole; qtz-chl-(pyr)-(sph) vnlts in qtze units as for intervals above (0-20° LCA) breccia zones or vnlts parallel to core locally, late stage qtz-carb vnlts as above.*

102.46-104.12 *Massive grey qzte; cut by 50-100/m v irreg 1-2mm qtz stringers (15-30° LCA), also by chl-sph-qtz vnlts as above (these rarer); minor pyrite, carb joint coating.*

104.12-104.29 *Fine gnd lt grey-brown siltstone, finely laminated; core to bedding 80° LCA; chl-carb vnlts 45° LCA v irregular (X1).*

104.29-105.33 *Massive grey qzite, qtz stringers 1-2mm 45-60° LCA 100/m-75/m no sulphides, cut by thin chl-sphal stringers mostly 20-45° LCA (100/m?) wispy, irreg 2mm max, later qtz carb vnlt 70° LCA as above.*

105.33-106.20 *Laminated shale and siltstone, bedding 75° LCA, bedding locally disrupted on mfracs; v low sulphide content, some late qtz-l brown-yell carb vnlts as above 70° LCA.*

106.20-106.69 *Brecciated qzte; chlorite rich matrix with lesser carb? pyrite, trace sphalerite (marmatite) late stage carb vnlts as above; no magnetic phases detected.*

106.69-107.05 *Qzte with qtz, chl, carb stringers as for 104.29-105.33.*

107.05-108.63 *Laminated shale and slst with minor qtze, brecciated and sheared upper 0.2m of interval, bedding to LCA is 80° ; some brecciation at top of 5cm qzte bed (107.9m); barren c exception zone of carb-chl-sph (marm) stringers, 100/m in echelon swarm ~10° LCA cut out at overlying qzte unit where 100/m qtz stringers 0-10° LCA occur (108.3-108.6m).*

108.63-108.85 *Breccia, angular shale and qzte frags to 2cm rotated in light yellow-green carb(?) chl rich matrix, also stockwork type vnlts as described in unit above.*

108.85-109.22 *Laminated shale and siltstone; bedding 80-85° LCA; disrupted on mfracs and vnlts of carb with minor chl and marmatite as above, vnlts terminate against qzte unit below.*

109.22-110.72 *Quartzite; cut by 30-100/m qtz stringers with chl-marmatite-galena; minor shale at 110.5m bedding 80°LCA, trace only mineralization all sphal in vnlt.*

110.72-111.41 *Laminated dark grey siltst and black shale; bedding 75-80° LCA; minor developments of vnlts only as for 108.85-109.22.*

111.41-116.54 *Quartzite with interbedded slst/sh, shaly bands at 112.8m, 113.5m, 113.9m, 114.8m, 115.5m, 115.8 these 15-20cm wide; bedding 80-85° LCA, facings uphole marm-chl-carb-qtz stringers in qzte as above 10-45° LCA, 40/m?, late qtz carb vnlts 70° LCA rare; some qtz stringers in qzte 0° LCA; shale bands essent barren.*

116.54-117.08 *Shale/slst with interb qzte, 80° bedding to LCA, trace marmatite in chl vnlts; v low total S^{2-}; pyrite rare brecciated at 117m, carb-coated mfracs.*

117.08-117.97 Grey qzte c̄ qtz and rare marm-chl stringers as for units above; these latter 0-45° LCA, low total S^{2-}, early qtz stringers offset on chl vnlts.

117.97-120.01 Interbedded shale/slst/qzte locally strong brecciation, bedding 80-90° LCA consid disruption, vnlt composition as above; min'd vnlts chl-carb-qtz-marmatite v low pyrite, low total S^{2-}.

120.01-120.69 Brecciated shale/slst/qzte "unit", bedding in shale is 45° at top of interval, could be rotation due to faulting; carbonate/chlorite in matrix of brecciated zones; some vnlts/shear planes 10° LCA.

120.69-124.04 Interbedded shale/slst c̄ minor qzte; core to bedding 65° varies locally to 35° due to shearing? or possibly minor folding, facings uphole?; 30/m 20-30° late? qtz-carb (white) stringers, v low total sulphide.

124.04-124.95 Qzte, with minor qtz-chl-marmatite pyrite stringers, no po; 0-20° LCA; rich in chlorite, cross cut earlier qtz stringers.

124.95-130.27 Laminated grey brown slst, black shale, grey qzte; bedding 70-80° LCA: extensive disruption of bedding near 125.3m by shearing or minor folding?; further down facings up hole; network of chl-carb stringers parallel to LCA, 100/m locally, discontinuous esp at bedding planes, carry v fine pyrite, locally richer in qtz and have assoc'd pods of chl-sphalerite; black envelopes (v fine tourmaline?) up to 5mm surround most of the vnlts in the shale and slst beds; minor galena c̄ sphalerite locally; variable veinlet density overall.

130.27-133.21 Mostly grey qzte c̄ some thin interbedded shale; locally brecciated; 1cm wide vein at 131.0m 30° LCA consists of chl (pale green?) - (carb) - qtz, no sulphides, small pod of magnetite assoc'd c̄ chl and pyrite in veinlet/breccia, 0-20° LCA, at 130-7m marmatite is the predom S^{2-} throughout interval; low total S^{2-}; some 60° LCA late qtz-brown-yellow carb vnlts as above.

133.21-136.37 Laminated shale/slst, core to bedding 80-85°; some fine qzte units 5-20cm to base of section locally brecciated (eg 10cm zone 136.2m) with bedding offset on m vnlts; bedding lamination 60° LCA at 136.3m, vnlts: po-pyr-marm-galena c̄ chl-(qtz)-carb? gangue 1-2mm+, as locally 50/m+ stringers 0-20° LCA mostly less 10° LCA; mostly in coarser gnd slst and qzte units; musc-qtz-carb(?)± 1m vnlts (eg 134m) mostly 1-2mm 40° LCA some with black envelopes extending out along bedding planes in fine lt brown shale - tourmalinization? as for interval - 130.27 locally 30-50/m; relation of vnlt types to rock types well exemplified here.

136.37-144.30 Massive qzte and qzte breccia; fine-med gnd pale grey, stockwork of chloritite stringers 1-3mm wide to 100/m locally; these with minor marmatite and pyrite, 5-20° LCA on average; locally breccia matrix filled c̄ qtz-tm-(musc) as stringers qtz-fspar?-carb? to 5mm, 45° LCA, av, 20/m; coarse pod of marcasite?/pyrite at 138.9m gns to 10mm as matrix of breccia with chl-, patchy magnetite in vnlts at 142.2 with traces po, pyr; qtz-fspar-musc?-chl vnlts to 4mm 25-15° LCA at 142.4m; disrupted by brecciation; host and matrix chloritized? also possibly tourmalin'd; traces marm locally, low total S^{2-}.

144.30-145.12 *Laminated shale and qzte as for 133.21-136.37; brecciated at 144.4 with 1-2% marmatite assoc'd with chl/tm stringers and matrix cement; core to bedding is 90° LCA, qzte bed at end of unit c̄ 1 qtz-fspar vnlt c̄ minor galena 25° LCA.*

145.12-146.50 *Brecciated qzte; more massive top 0.5m, rest is strongly brecciated, dark grey-green colour, qtz-fspar (ab) musc vnlts to 3mm (10/m, 10-40° LCA) cut thin marmatite stringers top of interval; in rest of section these cut by fractures and m vnlt f c̄ chl-tm? - marmatite; v low sulphide content overall; non-magnetic; no reaction to acid slickensides level on some fract surfaces; overall brecciated, chloritized qzte.*

146.50-149.27 *Brecciated shale/slst, v fine gnd, grey-green; bedding is 65° + LCA where not brecciated; rock is extensively fractured (fault breccia) and invaded by network of dark green-black chlorite ± tm? stringers; these poor in S^{2-}; overall v low S^{2-}; no magnetic phases present.*

149.27-150.15 *Brecciated siltstone essentially as above; cut by prom set of fine chl rich stringers 45° LCA 50-70/m at 149.4m; traces pyr-po locally, trace sphalerite assoc'd c̄ rare pyrite rich stringers; trace galena; v fine black tm? accomp chl in matrix/vnlts; some med gnd tm assoc'd c̄ one qtz-ab-tm stringers (150.15m).*

150.15-155.50 *Brecciated qzte, grey to grey-green, locally mylonized and re-cemented with chl-(tm?) rich fill, elsewhere highly fract'd and cut by chl rich stringers, qtz stringers and late qtz-cab stringers; 100/m+ pyr-(po)-marm-(gal) stringers, average 10-15° LCA; total S^{2-} locally 5%+ matrix v fine, dark green to black (chl-tm? rich), may have had some shaly beds locally these now completely mylonized; vague discont qtz stringers locally suggest early silic^{n}, these brecciated, some unfract'd qtz-ab± gal ± tm vnlts to 3mm at 45° LCA (<10/m); some late carb? vnlts 65-75° LCA, (<10/m), 6mm qtz-pinite?-(gal) unit 45° LCA at 154.7m poss assoc'd c̄ qtz stringers (not cut by marm vnlts); marm-pyr stringers 100/m+ 30-40° LCA ± near end of interval.*

155.50-157.75 *Laminated grey slst and black shale, bedding 80° LCA where not disrupted by faulting; top 70cm of interval consists of pyrrhotite cemented brecciated with up to 20-30° po locally; minor pyrite in pods to 1cm; traces cp galena, sphalerite in po mantles rotated angular fragments and forms irreg stringers c̄ chl-tm cutting frags; total S^{2-} falls off below 156.25 to 2-5% mostly po again c̄ pyr, gal, sph; 8cm qzte band at 156.49 is not as strongly brecciated and contains po-marm-(gal) in stringers close to 0° LCA,*
157.1-157.7 po to 3mm in stringers and as vnlts parallel to bedding; stringers are mostly 0-10° LCA 50/m, total S^{2-} 1-2% approx; marm-gal rel abundant in po (po:marm:gal = 20:4:1).

157.75-163.04 *Siltstone with some coarser beds (qzte), fine gnd grey green, mostly massive, some brecciation locally; 2-3mm pyrite stringers 30° LCA at 159.1 at 159.3m; with minor po, marm, po-chl±qtz stringers c̄ marm v fine locally 50-70/m to 45° LCA, sulphide stringers often c̄ v fine black selvadges 1-2mm (tourmal'd envelopes?); traces galena-cp locally. some rare cp rich patches in the po stringers same for pyrite, total S^{2-} v variable over interval range 1-20% (average 2-5%).*

163.04-167.03 Breccia - mostly qtze possibly c̄ some admixed shale/slst originally, original texture virtually obliterated by min^n/alt^n, alteration is essentially intense $chlorit^n$ and possibly $tourm^n$, mineralization consists of po, magnetite, sphalerite, galena, pyrite and rare chalcopyrite; locally 20-30%+ sulphides po-marmatite predom; locally 40%+ magnetite core is unbroken for most part; rare pods of pyr to 1.5cm often coroded? and mantled by po wispy, irreg indistinct qtz vnlts locally; late stage? thin carb? vnlts 70-80° LCA (2-3/m) coat some fract surfaces; average total S^{2-} ~10-15%+

167.03-170.46 Breccia - mostly fine slst-qzte; fine lt brn-grn; po rich matrix throughout; 20-30% po locally more, pyrite in some intervals (to5%) minor chalcopyrite (some big patches) gen wispy patches 2-6mm; sphalerite patchy distribution also; magnetite virtually absent, other major matrix phase is chlorite; no carbonate detected; silst frags gen less than 1cm, angular.

170.96-178.45 Breccia - magnetite/chlorite rich, low total S^{2-} overall,
chalcopyrite: patchily distributed through intersection esp 173-174m gen assoc'd with magnetite, average 1-2%;
galena: in 4-5mm vnlt as coarse gns at 173.3m 25-30°LCA (2/m) c̄ qtz, cp, chl, l yell-bn carbonate; trace overall,
bornite: rich patch at 174.3m, forms in m vnlts over 5-10cm section (5% bornite); traces assoc'd with magnetite 173.6-174.6 and elsewhere.
magnetite: massive locally and in stringers enclosing rock fragments average 10-20%; assoc'd with fine chlorite in breccia matrix.
pyrite: trace overall, coats mfracs/joints locally,
sphalerite: patchily distributed, most abundant around 172.3m 1-2% dissem in magn and as fine stringers.
pyrrhotite: essentially restricted to stringers in breccia in interval 171.05-171.15.

- some pyrite in m vnlts and stringers 171.15-171.5m
- strongly chloritized matrix; fragments also probably chloritized in part,
- bright green mineral with pale green streak on slickensides joint of 177.2m
- faulted lower contact to unit c̄ fractures c̄ open spaces large vugs to several cm lined c̄ rock xtal and carbonate?/amorphous pale green coatings.

178.45-180.61 Brecciated qzte and slst with stockwork of chlorite vnlts 0-20° LCA mostly 20° ; trace only magnetite, minor dissem cp, marm, gal assoc'd with chlorite rich stringers; rare qtz ± carb? vnlts 80° LCA+ (1-2/m) offset on fractures; some cavities as above lined with brown-green amorphous mineral; some frac surfaces with black (carbonaceous?) coatings; slickensides; 1-2% pyrite usually coats fracs.

180.61-182.55 Brecciated qzte with higher S^{2} content than above cut by network of fine pyr-po filled stringers dom 30° LCA; 100-150/m; these carry minor cp, marm, galena; chlorite is main gangue mineral; some fracs as above c̄ pyr-carb?-chl-black coatings; some minor shale, sheared locally.

182.55-184.10 *Sheared and brecciated siltstone/shale; black coatings on frac surfaces common, pyr-po stringers with minor sph as above, 50-100/m; 3-5%+ total S^{2-}; black fine stringers 30° LCA offset by S^{2-} filled vnlts.*

184.10-185.48 *Mixture of brecciated/mineralized qzte and siltstone with up to 5% S^{2-} in stockwork of stringers 1-2mm some up to 5mm; mostly po minor pods pyr (po:pyr = 4:1+) 5-30° LCA dom, black coatings on shear planes as above; chlorite content lower than above; some coarse pyrite cubes in vugs surrounded by po;*

185.48-188.04 *Mainly brecc'd slst/shale as above c minor qzte, mineralization as above though lower vnlt density and S^{2-} content; rare qtz vnlts to 3mm c po (2/m, 30-60° LCA).*

188.04-190.04 *Qzte; frac'd with S^{2-} vnlts; 30-80/m 1-2mm po stringers (0-35° LCA) with odd patches cp; mostly 30° LCA; traces marmatite; brecciated locally c streaked out shale/slst beds; host looks silic'd c discont wispy qtz vnlts cut by S^{2-} stringers; v low chlorite/magnetite; some frac surfaces coated with cream-lt brown carbonate? not reactive to acid (rhombic xtals locally v fine).*

190.04-192.60 *Interbedded, fract'd slst/black shale/qzte; bedding 40° LCA at top of interval; facing uphole main S^{2-} is po to 5% as stringers some of which coat fractures others follow bedding locally; qzte bed 191.50-191.90 has 50-70/m qtz stringer with dissem po; fine black coated hairline fracs esp in slst/shale units.*

192.60-193.98 *Fractured qzte; 2-5% po and minor cp in stringers as above; mostly ~ 15°LCA; 70/m; wispy qtz stringers as in qzte above; 20° LCA to 100/m but v discont,*
qtz vnlt at 193.1m to 8mm thick; 30-20° LCA with po core surrounded by irreg blebs of cp; minor chl, carb? in gangue of vnlt; irreg carb coated fracs 0-10° LCA 50/m+ as in above intervals.

193.98-194.85 *Fractured slst/shale; po stringers c qtz, chl 10-45° LCA often on dislocated bedding planes 30-45° LCA; total ~1-2%+ po; black coating on slickensides common (~45° LCA).*

194.85-196.25 *Qzte breccia c 2-5% po in stringers as above; pervasive silic^{n} and develop of qtz in wispy stringers with po; sulphide stringers predom 30° LCA minor thin CO_3^{2-} vnlts.*

196.25-198.04 *Brecciated shale/slst with faulted contacts, upper one 40° LCA partly occupied by po in 4mm stringer, slickensides coated c chl-carbonaceous? films, some small rare pods cp; trace marm? assoc'd c po in stringers.*

198.04-201.60 *Brecciated qzte, shale (black) and slst (lt green-brown) with sheared contacts between beds at 30° LCA 5-10% po all in stringers (15-60° LCA) or irregular pods and blebs to 1-2cm across some of which enclose coarse/marcasite? pyrite aggregates; patchily distributed cp assoc'd c po; 15cm patch of virtually massive po-(marc? pyr) at 197.8m with traces cp; black shale and slst at 198.6 has up to 20% po as irreg blebs/stringers to 1cm wide parallel or 90° to bedding (50° LCA - but severely disrupted); mostly brecciated qzte 199.0-201.6m c qtz stringers 30-80° LCA 40/m v fine irreg CO_3^{2-} vnlts locally in qtze.*

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Termination of Drilling *30/7/80*

Surveys:	*50m*	*etch angle*	*75°*	*corrected dip*	*70°*
	100m	*etch angle*	*70°*	*corrected dip*	*64°*
	150m	*etch angle*	*70°*	*corrected dip*	*64°*
	200m	*etch angle*	*70°*	*corrected dip*	*64°*

HOLE NS1 CORE RECOVERY

Commenced: 3 July 1980
Completed: 30 July 1980

Box No.	Interval (m)	Calculated	Measured	Recovery %
1*	2.60-3.86	1.26	1.24	98.4
	3.86-6.68	2.82	2.77	98.2
	6.68-7.93	1.25	1.21	96.8
	7.93-8.33	0.40	0.45	112.5
	8.33-8.78	0.45	0.41	91.1
	8.78-			
2*	-11.10	2.32	2.18	94.0
	11.10-13.53	2.43	2.39	98.4
	13.53-14.80	1.27	1.30	102.4
	14.80-14.90	0.10	0.10	100.0
	14.90-16.57	1.67	1.66	99.4
	16.57-17.00	0.43	0.43	100.0
	17.00-			
3*	-18.35	1.35	1.38	102.2
	18.35-18.90	0.55	0.50	90.9
	18.90-21.57	2.67	2.72	101.9
	21.57-24.57	3.00	2.94	98.0
	24.57-			
4*	-27.10	2.53	2.52	99.6
	27.10-28.43	1.33	1.34	100.8
	28.43-28.58	0.15	0.13	86.7
	28.58-28.88	0.30	0.29	96.7
	28.88-30.30	1.42	1.45	102.1
	30.30-30.50	0.20	0.18	90.0
	30.50-30.80	0.30	0.31	103.3
	30.80-			
5*	-33.0	2.20	2.17	98.6
	33.0-36.0	3.00	3.03	101.0
	36.0-39.0	3.00	3.02	100.7
	39.0-			
6*	-41.0	2.00	1.98	99.0
	41.0-41.3	0.30	0.28	93.3
	41.3-42.65	1.35	1.37	101.5
	42.65-43.0	0.35	0.34	97.1
	43.0-45.65	2.65	2.63	99.3
	45.65-46.12	0.47	0.47	100.0
	46.12-			
7*	-48.70	2.58	2.56	99.2
	48.70-51.70	3.00	2.98	99.3
	51.70-53.42	1.72	1.74	101.2
	53.42-54.65	1.23	1.23	100.0
	54.65-			
8*	-57.65	3.00	2.99	99.7
	57.65-60.65	3.00	3.00	100.0
	60.65-62.15	1.50	1.52	101.3
	62.15-63.25	1.10	1.08	98.2
	63.25-			

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Box No.	Interval (m)	Calculated	Measured	Recovery %
9*	-66.25	3.00	3.00	100.0
	66.25-67.72	1.47	1.47	100.0
	67.72-68.82	1.10	1.04	99.6
	68.82-69.70	0.88	0.88	100.0
10*	69.70-72.70	3.00	2.96	98.7
	72.70-75.65	2.95	2.93	99.3
	75.65-78.70	3.05	3.02	99.0
11*	78.70-81.70	3.00	2.97	99.0
	81.70-83.70	2.00	2.03	101.5
	83.70-86.30	2.60	2.69	103.5
	86.3-			
12*	-88.7	2.40	2.19	91.3
	88.7-89.7	1.00	1.20	120.0
	89.7-89.95	0.25	0.24	96.0
	89.95-92.34	2.39	2.39	100.0
	92.34-94.10	1.76	1.56	88.6
13*	94.10-96.65	2.55	2.31	90.6
	96.65-97.50	0.85	1.00	117.7
	97.50-98.03	0.53	0.57	107.6
	98.03-99.65	1.62	1.63	100.6
	99.65-			
14*	-102.65	3.00	3.04	101.3
	102.65-104.65	2.00	2.01	100.5
	104.65-105.85	1.20	1.21	100.8
	105.85-108.85	3.00	2.94	98.0
	108.85-			
15*	-111.85	3.00	3.00	100.0
	111.85-114.65	2.80	2.80	100.0
	114.65-			
16*	-117.65	3.00	2.97	99.0
	117.65-119.30	1.65	1.62	98.2
	119.30-120.85	1.55	1.54	99.4
	120.85-123.85	3.00	3.04	101.3
	123.85-			
17*	-126.85	3.00	2.99	99.7
	126.85-129.85	3.00	3.00	100.0
	129.85-132.85	3.00	2.99	99.7
	132.85-			
18	-135.85	3.00	2.98	99.3
	135.85-138.20	2.35	2.32	98.7
	138.20-141.30	3.10	3.12	100.7
	141.30-			
19	-144.30	3.00	2.96	98.7
	144.3-146.80	2.50	2.52	100.8
	146.80-149.15	2.35	2.28	97.0
	149.15-			
20*	-150.15	1.00	1.02	102.0
	150.15-153.15	3.00	3.01	100.3
	153.15-156.25	3.10	3.10	100.0
	156.25-			
21*	-159.35	3.10	3.13	101.0
	159.35-160.54	1.19	1.15	96.6
	160.54-162.60	2.06	2.07	100.5
	162.60-			

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Box No.	Interval (m)	Calculated	Measured	Recovery %
22*	-165.60	3.00	3.01	100.3
	165.60-168.60	3.00	3.02	100.7
	168.60-171.60	3.00	3.00	100.0
	171.60-172.32	0.72	0.70	97.2
	172.32-			
23*	-174.60	2.28	2.22	97.4
	174.60-177.60	3.00	3.02	100.7
	177.60-179.60	2.00	2.00	100.0
	179.60-			
24*	-182.70	3.10	3.12	100.7
	182.70-184.05	1.35	1.30	96.3
	184.02-184.99	0.97	0.96	99.0
	184.99-186.60	1.61	1.59	98.9
	186.60-			
25*	-189.60	3.00	3.00	100.0
	189.60-191.50	1.90	1.55 - lost 0.33 top of run	81.6
	191.50-192.50	1.00	1.02	102.0
	192.50-195.50	3.00	2.99	99.7
	195.50-			
26*	-196.06	0.56	0.53	94.6
	196.06-198.60	2.54	2.61	102.8
	198.60-201.60	3.00	3.02	100.7
	(T.D.) TOTAL	199.03	197.84	Average 99.4%

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NS1

ASSAY DATA

Sample No.		Interval (m)	Length	Recovery %
NSD	1	0.00-2.60	2.60	Not cored
	2	2.60-4.60	2.00	98
	3	4.60-6.60	2.00	98
	4	6.60-9.08	2.48	100
	5	9.08-11.40	2.32	94
	6	11.40-13.40	2.00	98
	7	13.40-14.95	1.55	100
	8	14.95-17.05	2.10	100
	9	17.05-17.75	0.70	100
	10	17.75-19.30	1.55	97
	11	19.30-19.90	0.60	100
	12	19.90-21.90	2.00	100
	13	21.90-23.32	1.42	100
	14	23.32-25.65	2.33	100
	15	25.65-26.80	1.15	100
	16	26.80-29.00	2.20	100
	17	29.00-29.52	0.52	100
	18	29.52-30.60	1.08	100
	19	30.60-31.28	0.68	100
	20	31.28-31.71	0.43	100
	21	31.71-33.64	1.93	100
	22	33.64-34.28	0.64	100
	23	34.28-36.45	2.17	100
	24	36.45-38.00	1.55	100
	25	38.00-39.28	1.28	100
	26	39.28-39.52	0.24	100
	27	39.52-41.52	2.00	100
	28	41.52-43.52	2.00	100
	29	43.52-45.52	2.00	100
	30	45.52-46.79	1.27	100
	31	46.79-47.20	0.41	100
	32	47.20-49.20	2.00	100
	33	49.20-51.05	1.85	100
	34	51.05-53.89	2.84	100
	35	53.89-55.06	1.17	100
	36	55.06-57.76	2.70	100
	37	57.76-59.11	1.35	100
	38	59.11-61.40	2.29	100
	39	61.40-63.05	1.65	99
	40	63.05-63.93	0.88	100
	41	63.93-65.93	2.00	100
	42	65.93-67.93	2.00	100
	43	67.93-69.93	2.00	100
	44	69.93-71.15	1.22	99
	45	71.15-73.15	2.00	99
	46	73.15-75.15	2.00	99
	47	75.15-76.91	1.76	99
	48	76.91-78.80	1.89	99
	49	78.80-81.33	2.53	99
	50	81.33-83.58	2.25	100
	51	83.58-84.92	1.34	100

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Sample No.	Interval (m)	Length	Recovery %
NSD 52	84.92-86.92	2.00	94
53	86.92-88.06	1.14	91
54	88.06-91.77	3.71	100
55	91.77-93.77	2.00	100
56	93.77-95.80	2.03	90
57	95.80-97.35	1.55	100
58	97.35-99.94	2.59	100
59	99.94-102.46	2.52	100
60	102.46-104.12	1.66	100
61	104.12-106.20	2.08	100
62	106.20-107.05	0.85	98
63	107.05-109.22	2.17	100
64	109.22-110.72	1.50	100
65	110.72-111.41	0.69	100
66	111.41-113.41	2.00	100
67	113.41-116.54	3.13	99
68	116.54-117.97	1.43	99
69	117.97-120.01	2.04	98
70	120.01-122.01	2.00	100
71	122.01-124.04	2.03	100
72	124.04-124.95	0.91	100
73	124.95-126.95	2.00	100
74	126.95-128.95	2.00	100
75	128.95-130.27	1.32	100
76	130.27-133.21	2.94	100
77	133.21-136.37	3.16	99
78	136.37-138.37	2.00	99
79	138.37-140.37	2.00	100
80	140.37-142.37	2.00	99
81	142.37-144.30	1.93	99
82	144.30-145.12	0.82	100
83	145.12-146.50	1.38	100
84	146.50-150.15	3.65	100
85	150.15-152.15	2.00	100
86	152.15-155.50	3.35	100
87	155.50-157.75	2.25	100
88	157.75-159.75	2.00	100
89	159.75-163.04	3.29	99
90	163.04-165.04	2.00	100
91	165.04-167.03	1.99	100
92	167.03-170.46	3.43	100
93	170.46-174.46	4.00	97
94	174.46-178.45	3.99	100
95	178.45-180.61	2.16	100
96	180.61-182.55	1.94	100
97	182.55-184.10	1.55	96
98	184.10-186.10	2.00	99
99	186.10-188.04	1.94	100
100	188.04-190.04	2.00	100
101	190.04-192.60	2.56	92
102	192.60-194.85	2.25	100
103	194.85-196.25	1.40	98
104	196.25-198.04	1.79	100
105	198.04-201.60	3.56	100

Appendix 2

DRILLHOLE REPORT - NS2

NORTH SCAMANDER PROSPECT

EL 12/78, TASMANIA

894152

Location:	567W 1492N (local NS Grid)		
Depression:	64° at collar	Commenced:	6 August 1980
Bearing:	230°	Completed:	16 August 1980
R.L.:	N.D.	Rig:	Jacro Top Drive
Depths:	212.0m	Drillers:	A Walker, I McCallum
Surveys:	100m (57°); 150m (50°)	Depth of Oxidation:	24.0m
	200m (53°)	Depth of Water Table:	
		Core Size:	NQ

Nature of Target:

Magnetite - sulphide body in fractured sequence of Mathinna Beds quartzites, siltstones and slates.

Reasons for Drilling:

To test magnetic/E.M. and Sn-in-rock geochemical anomalies along strike from structures drilled in NS1.

Technical Data:

Overburden, loose and broken rock to 18m; 12m NW casing (left in hole); cemented to 21m.

NS2 CORE LOG

Interval	
0.00-2.13	Not cored.
2.13-5.60	Pale grey qzte, red and yellow limonite staining, pervasive locally; 50-100/m wispy, discont qtz vnlts to 3mm, mostly 10-30° LCA with orange limonite after carb? or S^{2-}; hairlike Fe ox coated mfracs numerous, complete oxid^{n}; some brecciated/oxidized shale bands locally; core is broken all sticks <25m.
5.60-6.91	Black shale, dark grey slst, finely laminated; mostly broken and sheared, some thin bleached envelopes about Fe oxide filled vnlts/m vnlts; complete oxidation; bedding is 40° LCA where not dislocated by fracs.
6.91-14.90	Mostly grey qtz, interbedded black shale, grey slst; bedding 60-65° LCA (13.7m); 60° LCA (14.2m); facings uphole; most S^{2-} oxidized to orange/red limonite; trace pyr in hard qzte (13.0m), cut by 50-100/m wispy qtz vnlts as above; locally 4-5mm wide "gossanous" vnlts in fracs (20° LCA).
14.90-16.47	Mostly brecciated shale with limonite; some broken qzte in run, complete oxidation; broken core.
16.47-17.95	Fractured qzte c qtz vnlts, complete oxidation; intense qtz vnlts mostly 0-20° LCA and with orange limonite; minor fractured shale; limonite coated fracs 0-80° LCA mostly 0-20? 17.95 is base of complete oxidation; minor oxid^{n} on some fracture surfaces persists to 21.76m.
17.95-24.04	Interbedded dark grey qzte and siltstone with sheared shale bands; laced with irreg wispy qtz vnlt mostly 20-45° LCA, offset on fracs, 100/m+ locally; minor sph-gal-qtz-(chl) vnlts ~20° LCA offset qtz vnlts; bedding 30° LCA shearing between units present, facing uphole? poor grading; minor pyrite in vnlts c sph/gal; Fe-ox coated fracs (5/m) often on thin carb-qtz vnlts at 60-80° LCA; low total S^{2-} (less 1%); qtz vnlts 150/m 23.2-24.04m mostly 75° LCA or 15° LCA offset on chl-qtz-(sph) vnlts at 0-10° LCA, silic'd/chloritized matrix.
24.04-27.75	Shale, siltstone, minor qzte; locally bedded (30° LCA) facings inlet; mostly sheared and brecciated (mylonite?) numerous shear planes predom 30° LCA, laced c v. irreg set of lt brown qtz-siderite vnlts, 1mm thick, minor S^{2-} mineralization; trace sphalerite rare 3-4m qtz vnlts fractured and broken, c trace pyrite; these with pinite locally (30° LCA, <5/m); v. low S^{2-} overall.
27.75-31.35	Massive qzte with minor shale/slst bands; pale grey, early set of irreg qtz vnlts 1-2mm+ with indistinct margins - mostly 30-45° LCA, large ones c carb(?), pinite, minor pyrite; offset on fracs up to 2cm; chloritic m vnlts c trace sph-gal cut former (~ 50/m) bedding 60° LCA, facing uphole(?); 1cm shale band c qtz-carb vnlt parallel; qtz-carb vnlts late stage 5/m 45-80° LCA (mostly 45°), 203mm, qtz cores no sulphides; overall v. low S^{2-} content this interval.

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31.35-34.25 *Interbedded, sheared shale, slst and qzte, bedding is 45° LCA at 31.45m, 45° at 32.4 facing uphole (scour and grading); near 90° at 32.95m, sheared and c kink folds?, facing uphole at top of interval; 50/m pyrite stringers parallel to bedding to 3-4mm, minor sphal in top of interval fall off to 10-20/m to 33.3m occupy irreg mfracs 0-20° LCA or along bedding; 3cm qtz vein 30° LCA at 32.7m with 20% pinite or chlorite, minor fspar (albite?) and up to 10% pyrite near margins as coarse aggregates; chloritic-sph rich envelopes, 33.3 to 33.7 is fractured qzte c 10% S^{2-} sph-pyr (2:1) in vnlts to 5mm 45-50° LCA mostly c patchy lt brown carbonate; 33.7 to 34.25 as for top of interval with S^{2-} dropping off to 1-2% pyr±sph in vnlts as above.*

34.25-34.70 *Hard, fractured black shale c 2-5% S^{2-} total; pyr-sph (3:1) as irreg fracture fillings, some vugs, 5-30° LCA early network of v. fine qtz-pyrite vnlts offset by later vnlts; bedding 30-40° LCA offset/ disrupted.*

34.70-42.40 *Interbedded qzte, shale, slst; qtze beds to 40cm; bedding 45° LCA 36.3m uphole? facing; 55° at 37.4m facing uphole, 65° at 39.3; 45° at 40.6m uphole facing; qtz vnlts to 50/m predom 30-45° LCA in qzte beds, some with pyrite-(sph) mostly barren; pyr-sph (1-3%) mostly in fine stringers 5-30° LCA or parallel to bedding some thicker vnlts and stringer "zones" to 2cm thick c vuggy areas, trace blue-grey, dull lustre, glauconite? assoc'd c pyrite locally; pale green fluorite? in vnlts c qtz ~38.0m, also possibly a gangue phase in S^{2-} vnlts through interval, 2-3/m late (qtz) ± brown carbonate vnlts ~80° LCA c minor pyrite; overall most S^{2-} in qzte beds (70% of interval is qzte), 1-5% total S^{2-}; fine tm? in vnlts 38.2m-38.9m.*

42.40-44.30 *Mostly dark grey qzte, with minor frac'd/sheared shale including 3cm wide sph-pyr vein from 43.8-44.3m; med gnd qzte is fspathic sheared contact c slst 42.7m 30° LCA, brecciated 43.0-43.5m; 20-40/m pyr-sph vnlts 45° LCA to 5° LCA with minor po, galena; larger vein pyr-sph 3:2, no galena, vuggy and with trace of blue-grey clay? mineral; vein is unusual in that cuts sharp qtz-carb-pyr vnlt; 5% total S^{2-}; po comes in approx 43.4m as vnlt phase.*

44.30-46.93 *Mostly shale, siltst and qzte sheared and mineral'd as above bedding 30° LCA at 45.6m disrupted on fracs, brecciated elsewhere; network of v. fine black tm? - lt brown carb vnlts esp in shaly beds 0-45° LCA follow bedding locally, ~50/m; pyr-sph-po in vnlts 0-30° LCA or following bedding; more po 46.4-46.9m variable pyr:po ratio 5:1 to 2:1, traces galena assoc'd c po aggregates; locally 5-10% S^{2-} 1-2% sph; some vugs assoc'd c pyr vns.*

46.93-48.32 *Mineralized breccia; host shale/slst minor qzte; no recognizable bedding; "matrix" network of pyr-sph-po ± galena stringers c chl/tm and crushed rock; dark matrix, light grey subrounded fragments to 2-3mm across most <1cm; total S^{2-} 5-10%; vuggy locally throughgoing S^{2-} stringers 15-20° LCA v. irreg; pyr:po~5:1 po+pyr:sph~ 10:1; no qtz vnlts.*

48.32-51.35 Mineralized breccia; mostly qzte c̄ minor shale, 48.3-49.1 ~2% sulphides, pyr-po-sph-(gal) in network of stringers low angle to LCA; 49.1-51.35 up to 20% po-sph-pyr-(gal) in irreg stringers to 45° LCA and also matrix filling, pyr:po ~1:4; 50.9-51.35 up to 50% po + sph, galena (minor) as matrix to breccia* c̄ rotated banded shales frag; sheared lower contact 10° LCA; 51.0m unidentified bladed xtals; H2, white streak- gypsum?, blue tinge; as frac coating, some late stage through going carb? vnlts v. thin rare, wispy set of <1mm qtz vnlts in qtze virtually obliterated by S^{2-} min * could also be 5° LCA + 3cm thick vein.

51.35-51.54 Laminated shale/slst with minor qzte; minor fold 51.3m?, 30-45° LCA most bedding; facing indeterminate, 2-5%+ po in stringers to 3mm 0-60° LCA most ~45° many follow bedding 100/m+ locally; offset bedding, minor gal-sph assoc'd c̄ po, v. minor pyrite; po:pyr = 10:1+.

51.54-52.75 Mineralized qzte, overall 5-10% S^{2-} in stringers and pods to 1cm across except at 52.4m where 50% S^{2-} in breccia matrix, po-sph-(gal)-(cp) most abundant S^{2-}; thin CO_3^{2-} vnlts parallel to LCA (10-20/m?) crosscut S^{2-} stringers, gypsum? as above, large pyr blebs to 1cm diam with vuggy reaction? haloes marked by po.

52.75-66.36 Qzte with minor 5-10cm shale bands at 61.3m (bedding 60° LCA) 63.05m (bedding 70° LCA uphole facing), 65m (bedding 80° LCA facing uphole); sporadic network of S^{2-} throughout falls off below 59.4m; thin wispy qtz vnlts 5-10/m mostly barren, po-pyr-sph-gal in stringers po:pyr >5:1, 5-45° LCA, <1-4mm thick most ~45° LCA; total S^{2-} 2-5% or less, cross cutting 4-10mm qtz-siderite-(pyr)-(sph)-(gal) vnlts 45-60° LCA up to 10/m, earlier qtz vnlts offset on min'd mfracs carb vnlt network v. fine in shale band at 61.3m, chl-marm vnlts below this; 2-3mm qtz-carb vnlts 0-5° LCA 50/m+ (61.5-62.5); more sph rel to po and chl in vnlts below 63m; possibly chloritized matrix of qzte.

66.36-66.68 Interbedded slst/shale, green-grey, bedding 65° LCA, facing uphole, well developed grading in coarse units, minor po in stringers 1-2% total S^{2-}.

66.68-67.69 Qzte, minor shale with po-pyr-sph stringers 0-80° LCA; thin late stage irreg carb vnlts 10-20° LCA, total S^{2-} 2-5%.

67.69-69.25 Shale/slst minor qzte, bedding 60° LCA facing uphole; po-sph-chl-(gal) in network of vnlts 15-60° LCA, thin carb vnlts parallel to bedding plane, 2-4% total S^{2-}.

69.25-74.58 Interbedded qzte, shale, siltstone, well devel grading scour locally, facing uphole, bedding 35° LCA (71.0m), 50° (72m), 45° (74m), to 30/m wispy qtz vnlts in qzte c̄ indistinct margins 30° LCA barren or with later mfrac'd (?) sph-po 20/m po rich stringers in top 1.5m of interval falls off below this, mainly po-sph, minor pyr, trace galena. overall ~1% total S^{2-}.

74.58-76.07 Qzte, grey, laced c̄ 100/m qtz vnlts, these c̄ pyr-sph-po mineralization mostly 30-60° LCA; 1-2% total S^{2-}, some thin qtz-carb vnlts 0° LCA in qtze but not shale bed, bedding 55°LCA, uphole facing.

76.07-77.96 Interbedded shale, qzte, slst, bedding 55° LCA at 77m 20cm qtze bed 77.1-77.3m c 150/m qtz vnlts mostly 30° LCA but irreg network; po dominated vnlt network as above, c sph.

77.96-81.4 Dark grey to black laminated shale and slst c v. minor qzte; bedding 65° LCA (79.4m), 70° (80.4m), 60° (81.4m) all facings uphole; 5-15/m pyr± po -sph stringers c chl-carb?, mostly 50° LCA; 1-2% total S^{2-} rare thin carb vnlts, no qtz vnlts; py>po.

81.4-82.95 Alternating qzte and shale; bedding 50° LCA at 82m 85° LCA at 82.5m, 70° (84.2m), 70° (85.2m); all facings uphole, brecciated/sheared parallel to bedding last 0.5m of section; qtz vnlts to 50/m in qzte units only; 1-2% total S^{2-} all in stringers of pyr-po-sph, c chl-carb some c black envelopes (v. fine chl or tm?), qtz stringers 90° to bedding S^{2-} stringers 0-45° LCA or parallel to bedding.

82.95-95.30 Massive and fractured, mineralized qzte with minor shale beds (5-10cm at 0.5 to 1.5m spacing); S^{2-} in stringers to 1cm wide dom po-pyr-sph with chl gangue, magnetite-chl-sph vn at 87.9m chl-magnetite in vnlt; pyr-sph veinlet 88.2m c large vugs; 89.0-90.4m po rich section locally 20% po in mass of anastomosing stringers, trace pyr, sph po:sph (5:1 to 10:1);
qzte has chloritized matrix(?); late(?) 2mm carb vnlt parallel to bedding in shale band at 90.1m c sph; scour and fill uphole facings, grading well devel locally bedding 75-90° LCA in general; vuggy coarse aggregate of pyr + po at 92.2m; most m po stringers c in 15° LCA; original qzte texture locally obliterated by min'n; 5% total S^{2-}, range 2-20%; 1cm wide vuggy pyr-po vein* at 94.3m 20° LCA, prominent qtz vnlts 5-15° LCA 94.8-95.3m 100/m c po; cut by rare thin qtz-siderite vnlts c sph 60° LCA (5/m); * pyr c reaction rims?

95.30-97.05 Mostly laminated shale/slst c two qzte beds of 30cm each, bedding 55° LCA, facing uphole; overall ~10% po in network of vnlts to 1cm thick 30-45° LCA and parallel to bedding; trace gal-sph assoc'd c po, minor pyrite in blebs ass'd c po, some aggregates c vuggy rims surrounded by po.

97.05-104.04 Qzte with minor slst/shale bands, bedding 30-40° LCA, facing uphole, flame structures - scour, grading; total 5% S^{2-}(?) range 1-20%; mostly po in stringers to 3cm thick; veins locally brecciated; sph rest most abundant to po, pyrite as rare aggregate 1-2cm across surrounded by vugs and po (may be marcasite?) eg 103.6m po stringer density up to 200/m 5-30° LCA, min 20/m, 5mm qtz-pinite-siderite vnlt c po, sph (~98.6m) 15° LCA, sulphides could be superimposed; rare thin siderite-qtz vnlts (70° LCA, <1/m).

104.04-108.14 Laminated shale/slst and interbedded qzte; bedding 50-55° LCA; facing uphole; sheared - kink folds(?) 106m; 2-10% total S^{2-} as po in vnlts; v. irreg, 1mm-10mm, 5-45° LCA or parallel to bedding, trace sph, rare pyr blebs as above; 10cm S^{2-} bleb at 107.7m consists of coarsely xtaline marcasite aggregates in vugs surrounded by po.

108.14-110.50 Dark grey green fractured qzte, c minor shale; apparent intense chloritz of matrix; 2-5% total S^{2-}, marc-po- ± magnetite vnlts c sph as above; magnetite-chl±sph stringers becoming prominent 110-110.5m; locally 10%+ magnetite in pods c sph-gal to 2cm across 10-20/m thin siderite vnlts 110-110.5m; irreg cp aggregates assoc'd c magnetite 110.2m.

110.50-111.71 *Mag rich lode 70-80% mag 5-10% sph minor galena and chalcopyrite; chloritic matrix 20 per metre thin carb vnlts 25-70° LCA 40 per metre 1-10mm wide chlorite/carbonate vnlts 60-70° LCA c vugs; very fine network chlorite vnlts c sph. Bx'd locally host fine quartzite c chlorite-mag-sphalerite, minor chalop in matrix, galena and chalcop in vnlts c chlorite 50° LCA 10 per metre.*

111.71-113.03 *Laminated fine siltstone and qztite brecciated and minz'd c locally 10% marc and minor po c sph and gal in vnlts. Network numerous LSA 111.8m 2cm wide chlorite-carbonate? vein 25° LCA c coarse pods sph gal and pyr trace cp locally 1cm offsets on bedding at 112.46m.*

113.03-117.50 *Interbedded fine qzite and black shales strongly fractured locally vx'd; 3-4% total sulphides mainly sph gal and marc rich patches sph locally throughout interval and chloritized host rocks throughout 40 per metre fine x-cutting carb vnlts mostly 60° LCA locally 5-10% mag; also qzte units c network fine chlorite vnlts.*

117.50-119.19 *Interbedded qzite light grey/green siltstone c 2-3% S_2- and vnlts mainly po minor pyr gal and sph. Traces fine black mineral in micro vnlts locally bedding 55° LCA facing uphole. S_2- vnlts parallel bedding or predominantly 30° LCA perpend to bedding in qzite beds.*

119.19-125.71 *Massive qzite c minor shale bands dark grey silicified? bedding 55° LCA facing uphole. Fractured upper .4m of interval c 3-4% sph in vnlts c chlorite minor po gal late carb vnlts as above; chloritized matrix. Remainder c 40-40 per metre wispy 1-3mm quartz + chl, pin and siderite. 30° LCA. Offset on sulphide mfracs c chlorite, sphalerite minor po and marcasite; 40 per metre S_2- stringers 0-20° LCA. Some larger marc, po veinlets vuggy c marc blebs rimmed by po to 1cm wide - e.g. 123.50-124.0m. Core here 20% sulphide c numerous 200 per metre, irregular microfracs c po/marc c stringers fine black mineral have carb vnlts as above, chloritized matrix, mag free trace chalcopyrite locally, sulphide veins predom 0-5° LCA.*

125.72-128.01 *Interbedded shale slst and qzte fractured and bx;d c po stringers bedding 65° LCA facing uphole range 1-4% S_2- all in stringers v. irreg mostly po minor marcasite on pyr c chl locally bedding offset to several cm on heated mfracs.*

128.01-129.35 *Med grained grey-green qzte total S_2- less than 2% chl'zed matrix and chl in stringers, no mag to 20 per metres; fine siderite vnlts 45-60° LCA. Slickensides on chl/carbonate fracture at 129.1m c gal sphalerite.*

129.35-130.38 *Interbedded black shale in qzte bedding 40° LCA locally offset on mfracs 1cm facing uphole, 3-5% po marc in vnlts; most <4mm; fine network 0-60° LCA to 2 per metre thin siderite vnlts as above chl stringers locally 45° LCA.*

130/.38-136.37 *Fractured mineralized qzite 5-30% sulphides in metwork stringers 0-45° LCA. Mostly 0-20° po rich section from 130.4-133.4m; c marc or pyr stringers to 2cm across; marc nodules as above. Vnlt density 200 per metre + siderite + or - qzt 1-2mm vnlts mostly 45-60° LCA 15-20 per m; low sphalerite content chl'zed matrix.*

136.37-137.79 *Interbedded shale siltstone qzte strongly fractured and sheared. Direction of shear 0-10° LCA 5-15% po minor marc as above minor sphal assoc c po stringers. Ch'izn assoc c shearing. Some fluorite in fracs? bedding orientation indeterminate.*

137.79-141.40 *Breccia po rich average 20% po but includes massive po (138.12m-138.45m); mostly consists ½ to 2cm qzte frags. angular to sub-rounded in po rich matrix. Locally some fine siltstone carbonaceous? replaced by po. Locally 5% + sph 1-2% gal; locally 40% sph. Overall po to sph 3:1.*

141.40-142.42 *Mag/chl rich breccia vein host rock texture obliterated. Locally 30% + sphalerite; 10 per metre fine siderite vein as above through going locally massive magnetite well exposed lower contact 5° LCA.*

142.42-148.90 *Fractured and sheared interbedded qzite and shale mostly qzte shale bands strongly sheared matrix chloritized silicified? network wispy qzt vnlts in qzite beds intensely broken on healed fracs; locally 50-100 per metre chlorite-mag filled microfracs irreg pods of magnetite to 5%. Generally low sulphide minor po stockwork 144.4-144.9m in qzte traces chalcopyrite late stage thin brown carbonate vnlts as above. Dominant shear planes 5-45° LCA; 10cm mag-vein 148.2m c 1-2% chalco intense chlor'zn 30° LCA; qzte/chlorite/siderite vein in sheared rock at 148.4m; minor tm? Trace galena in qzt/siderite vnlts. Trace sph.*

148.90-154.15 *Breccia mag/chlorite/sphalerite rich qzte sub-rounded frags; generally less ½cm in mag/chl rich matrix locally 90% mag. Patchy stringers galena and sphalerite locally 2% galena 5% sphalerite +; traces chalco pyr assoc c mag some small vugs on chlorite-filled shears mostly 10-20° LCA. Some late x-cutting qzt/siderite vnlts c marcosite 20-70° LCA generally 60-70, 10 per metre. Po rich patch 152.6-153.4 po in vein 10° LCA c sphalerite and chalco locally 5% chalco plus marcosite Prominent shears 40° LCA at 153.2m c bands sphalerite-po-chalco in chlorite rich matrix, 4cm wide mag rich vein 45° LCA at 153.55m. Overall high mag to sulphide ratio. Sphalerite >po.*

154.15-156.05 *Sheared and brecciated qztite and siltstone c shale locally. No recognizable bedding shearing intense 5-20% po in stringer network. Shears predom 35° LCA. Trace to 1% chalco locally chl'zed matrix in qzte. Irreg qzt muscovite veinlets 5-20° LCA 155.6m c patchy po and chalco. Fine grain muscovite rich selvages. Traces chalco no visible cassiterite. Also some chlorite in these veins. Minor sph. No mag detected.*

156.05-160.57 *Fractured and Bx'd dominantly fine grained light green-grey siltstone and fine qzte poss calcareous. Bedding lightly disrupted dominant shears 10-45° LCA c network of po stringers discontinuous <1 to 15mm multiple orientations. Overall 5%-10% po minor qzt chlor and chalco locally. Qtz-muscovite stringers, rare, as above c dark grey envelopes c po 5-20° LCA.*

160.57-164.60 *Fractured qzte c minor interbedded shale strongly sheared and bx'd. Matrix locally intensely chloritized; qzte c 100 per metre 1-2mm qzt vnlts; rare qzt chlorit muscovite vnlts 0° LCA pinch cut in shaley units. 3-20% po in stockwork as above; c chlorite and minor chalco marcosite blebs to 2cm in vugs rimmed by po. Siderite coated fracs rare 30° LCA chloritiz'n intense in last metre of interval. c minor po and chalco mag not detected.*

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Irreg chlorite stringers abundant this zone - over 100 per metre. Pervasive chl'zn of frags in matrix.

164.6-169.8 — *Bx'd sheared qzte and shale intensely chlor'd mag rich breccia 168.2-169.6m; trace mag, remainder of interval predom shears 40° LCA 165.4 metres and chlorite carbonate? qtz sph + galena marcosite more abundant 166.1-167.7m; mostly as irreg pods or stringers assoc c chlorite and po minor chalco. Marcosite to po 1:2. Irreg pods chlorite enclosing frags in shaley beds; 1cm qtz-siderite-chlorite vein at 165.6m 5-10° LCA c minor galena. Qtz-siderite-marcosite veinlet 1cm at 166.3m 45° LCA cut$ chlorite rich vein some wispy qzt-muscovite vnlts as above. Increase sphalerite and chalco content in mag rich section. Intense chl'izn some core loss in mag rich section. Locally po and chalco infilling breccia matrix. Bright green chlorite? and carbonate on some fracture surfaces.*

169.8-177.44 — *Fractured qzte and siltstone locally brecciated. Mostly qzte. Siltstone units bx'd 2-30% po overall 5% po in blebs and fine stringers <1mm to 10mm + patchy blebs chalco assoc c po <1% chalco; qtzite silicified c minor chlorite. Irreg qtz po vnlts offset on microfracs filled c chlorite and po; most vnlts <45° LCA. Traces dissem fine *black mineral. Tends to be more po in pale green siltstone beds as for 156.05-160.57.*

177.44-181.11 — *Mostly bx'd green/grey siltstone c grey qzite and some laminated black shale. Bedding 65° LCA at 181m offset on sulphide filled mfracs facing uphole. 5-10% po in irreg stringers as above 200 per metre irreg 1-2mm stringers. Mostly <45° LCA some 0° LCA wispy qtz veins in qzte beds only mostly c bx'd contacts; minor marcosite surrounded by po as above blebs and fine ntwk v. fine chl/tourmaline in siltstone units. 0-30° LCA. Hairlike stringers on 1-2cm breccia veins c po. Minor to trace chalco/sphalerite. Generally lower S_2- than above interval.*

181.11-184.20 — *Qzte with minor interbedded, brecciated green-grey slst, facing uphole bedding approx 70-80° LCA, dislocated; 10/m 2-4mm qtz-po vnlts c pinite? or chlorite (5/m?) 20-40° LCA; ~5% po in stringers and blebs, <1 to 3mm c minor cp; predom 40° LCA 100/m irreg discont; chl in matrix and stringers c po;*

184.20-185.03 — *Laminated green grey shale and slst; bedding 80° LCA, facing uphole; 3-5% po in stringers to 100/m, <1 to 3mm; c trace cp, minor marcasite; mostly as pods along curved fracs 0-20° LCA; with chlorite gangue.*

185.03-189.95 — *Qzte c interbedded and locally brecciated shale bands as above; bedding 75° LCA at 189.2m facing uphole; min'n essentially as above; wispy qtz vnlts c minor po in qtz cut by po ± cp vnlts 0-25° LCA to 8mm; discont; early set of po vnlts offset on partly po filled mfracs; 10-15mm pyr-(qtz)-(chl) veinlet at 187.3m 15° LCA assoc'd c sheared shale 10cm pod of red massive po at 188.4m with po in breccia stockwork. 5-10% 188.4-187.8m.*

189.95-194.50 — *Interbedded black shale, green grey slst and graded qzte; bedding 75° LCA (190.4m); 75° LCA (191.6m); 60° LCA (194.4m); all facings uphole; mineralization variable - overall 3-4% po, in stringers, locally 10-15% po (eg 191.9-192.3m in qzte) 2-4mm frac'd qtz vnlts 60° LCA gen, to 20/m+; po vnlts to 150/m to 10mm wide (gen 1-3mm) most 30-60° LCA; minor cp in stringers c po; chl-(carb?) coats fracs locally; most S^2- in lower part of interval.*

194.50-198.67 *Dark grey-green qzte ± brecciated shale/slst units; to 40/m 1-12mm qtz vnlts, offset on fracs; predom 30-40° LCA = minor pyr±po, chloritic selvadges; 2-5% po in vnlt stockwork as above; po free 194.7-195.5 and 196.5-198.0m with 20-40/m 1-3mm discon, magnetite stringers ± assoc'd chlorite, - these cut qtz vnlts; trace cp assoc'd ± po, 5/m thin siderite vnlts 45-70° LCA, v. minor po-pyr assoc'd ± magnetite stringers; 5-30° LCA offset on chlorite filled fracs.*

198.67-204.25 *Dark grey qzte, with minor brecciated slst trace po, chlorite vnlts 20-50° LCA, 1-2mm, 15-20/m, locally 100/m in stockwork; qtz-po vnlts cut by former 0-30° LCA (<40/m), blackened haloes about vnlts in brecciated slst 202.4m with qtz-carb? m vnlt stockwork; no magnetite detected; minor total S^{2-} 1-2%, chloritized qzte matrix.*

204.25-205.30 *Interbedded grey green slst and black shale; bedding 50° LCA, facing uphole; 1% po overall in vnlts parallel or 90° to bedding; 1-3mm ± minor qtz; vnlt density 2-5/m.*

205.30-212.0 *Interbedded qzte (graded), slst and shale, bedding 60° LCA (206.4m), 60° (210.2m); 45° (211.4m) facings uphole - flame structures; grading; 5-10/m 1-3mm qtz vnlts ± indistinct margins in qtze, 1-2% po in 5-10/m stringers ± qtz and trace cp locally; some po vnlts parallel to bedding in shaly units, low total S^{2-}, low vnlt density, no extensive alteration; core wedging on smooth (chlorite?) fracs; 45° LCA; 30 and 20° LCA - 3 sets at 212m - ± S^{2-} slickensides.*

Termination of drilling 212.0m.

NS2

CORE RECOVERY

Box	Interval	Calculated	Measured		%
1*	2.13-3.58	1.45	1.29)		89.0
	3.58-4.10	0.52	0.49)	Broken	94.2
	4.10-5.10	1.00	0.89)	oxid'd	89.0
	5.10-5.37	0.27	0.29)	rock	107.4
	5.37-5.96	0.59	0.49)		83.1
	5.96-7.91	1.95	1.80)		92.3
	7.91-12.35		W/D		Wash drill
	12.35-12.70	0.35	0.40)		114.3
	12.70-12.95	0.25	0.22)		88.0
	12.95-13.20	0.25	0.27)		108.0
	13.20-13.50	0.30	0.30)		100.0
	13.50-13.90	0.40	0.34)	Soft	85.0
2*	13.90-14.10	0.20	0.23)	broken	115.0
	14.10-15.0	0.90	0.76)	rock	84.4
	15.0-15.85	0.85	0.91)		107.1
	15.85-16.65	0.80	0.64)		80.0
	16.65-17.17	0.52	0.62)		119.2
	17.17-18.10	0.93	0.92)		98.9
	18.10-21.10	3.00	2.94		98.0
	21.10-				
3*	-21.4	0.30	0.32		106.7
	21.40-21.76	0.36	0.36		100.0
	21.76-22.09	0.33	0.31		93.9
	22.09-23.20	1.11	1.13		101.8
	23.20-24.40	1.20	1.20		100.0
	24.40-27.40	3.00	2.96		98.7
	27.4-				
4*	-30.4	3.00	3.03		101.0
	30.4-32.00	1.60	1.62		101.3
	32.00-33.40	1.40	1.36		97.1
	33.40-34.65	1.25	1.21		96.8
	34.65-36.40	1.75	1.83		104.6
	36.40-				
5*	-39.40	3.00	3.03		101.0
	39.40-42.40	3.00	2.97		99.0
6*	42.40-45.40	3.00	3.00		100.0
	45.40-48.40	3.00	3.04		101.3
	48.40-51.40	3.00	2.99		99.7
	51.40-				
7*	-54.40	3.00	3.04		101.3
	54.40-57.40	3.00	3.00		100.0
	57.40-60.40	3.00	2.95		98.3
	60.40-				
8*	-63.40	3.00	3.05		101.7
	63.40-66.40	3.00	2.98		99.3
	66.40-				
9*	-69.40	3.00	2.88		96.0
	69.40-72.20	2.80	2.98		106.4
	72.20-				
10*	-75.30	3.10	3.12		100.7
	75.30-78.35	3.05	3.03		99.3
	78.35-				
11*	-81.40	3.05	3.05		100.0
	81.40-84.40	3.00	2.98		99.3
	84.40-				

.../2

Box	Interval	Calculated	Measured	%	
12*	-87.40	3.00	3.00	100.0	
	87.40-90.40	3.00	3.02	100.7	
	90.40-				
13*	-93.40	3.00	3.00	100.0	
	93.40-96.40	3.00	3.00	100.0	
	96.40-				
14*	-99.40	3.00	3.01	100.3	
	99.40-102.40	3.00	2.96	98.7	
	102.40-103.90	1.50	1.57	104.7	
	103.90-				
15*	-105.40	1.50	1.44	96.0	
	105.40-108.40	3.00	3.00	100.0	
	108.40-				
16*	-111.40	3.00	3.00	100.0	
	111.40-114.40	3.00	3.02	100.7	
	114.40-				
17*	-117.40	3.00	2.96	98.7	
	117.40-120.40	3.00	3.01	100.3	
	120.4-				
18*	-123.25	2.85	2.85	100.0	
	123.25-123.35	0.10	0.11	110.0	
	123.35-123.50	0.15	0.15	100.0	
	123.50-126.40	2.90	2.86	98.6	
	126.40-				
19*	-129.40	3.00	3.06	102.0	
	129.40-132.40	3.00	3.00	100.0	
	132.40-135.40	3.00	3.00	100.0	
	135.40-				
20*	-138.40	3.00	3.00	100.0	
	138.40-141.40	3.00	2.99	99.7	
	141.40-				
21*	-144.40	3.00	2.92	97.3	
	144.40-147.40	3.00	3.08	102.7	
	147.40-148.90	1.50	1.46	97.3	
	148.90-150.05	1.15	1.11	96.5	
	150.05-				
22*	-153.15	3.10	3.12	100.7	
	153.15-156.25	3.10	3.15	101.6	
	156.25-159.30	3.05	3.07	100.7	
	159.30-				
23*	-162.40	3.10	3.08	99.4	
	162.40-165.40	3.00	2.98	99.3	
	165.40-166.10	0.70	0.70	100.0	
				broken ground 165.4-166.3	
	166.10-				
24*	-168.40	2.30	2.30	100.0	
	168.40-171.40	3.00	2.98	99.3	
	171.40-174.40	3.00	2.62	87.3	
				- lost core in v. hard qzte	
	174.40-			- lost core top of run	
25*	-177.40	3.00	2.99	99.7	
	177.40-180.40	3.00	3.00	100.0	
	180.40-183.40	3.00	3.02	100.7	
	183.40-				
26*	-186.40	3.00	2.95	98.3	
	186.40-189.40	3.00	3.13	104.3	
	189.40-				

.../3

Box	Interval	Calculated	Measured	%
27*	-192.40	3.00	2.98	99.3
	192.40-195.40	3.00	3.05	101.7
	195.40-198.40	3.00	3.00	100.0
	198.40-			
28*	-201.40	3.00	3.00	100.0
	201.40-204.40	3.00	3.05	101.7
	204.40-205.30	0.90	0.87	96.7
	205.30-207.40	2.10	2.15	102.4
	207.40-			
29*	-210.40	3.00	2.98	99.3
	210.40-212.00	1.60	1.58	98.8
		Total 205.43*	204.55	Av 99.6

T.D. 16/8/80 *excludes W/D

NS2

SURVEYS

Depth (m)	Acid Etch Angle	Depression
Collar	-	64°
100	65°	57°
150	58°	50°
200	61°?	53°

NS2

ASSAY DATA

Sample No.	Interval	Length (m)	Recovery %
NSD 106	2.13-5.60	3.47	91
107	5.60-6.91	1.31	93
108	6.91-8.91	2.00	92
109	8.9-10.9	2.00	0.0 no sample
110	10.9-12.9	2.00	18
111	12.9-14.9	2.00	
112	14.9-16.5	1.60	100
113	16.5-18.0	1.50	99
114	18.0-20.0	2.00	99
115	20.0-22.0	2.00	100
116	22.0-24.04	2.04	100
117	24.04-27.75	3.71	99
118	27.75-29.75	2.00	100
119	29.75-31.35	1.60	100
120	31.35-34.25	2.90	99
121	34.25-34.7	0.45	97
122	34.7-36.7	2.00	100
123	36.7-38.7	2.00	100
124	38.7-40.7	2.00	100
125	40.7-42.4	1.70	99
126	42.4-44.3	1.90	100
127	44.3-46.9	2.60	100
128	46.9-48.3	1.40	100
129	48.3-51.3	3.00	100
130	51.3-52.75	1.45	100
131	52.75-54.75	2.00	100
132	54.75-56.75	2.00	100
133	56.75-58.75	2.00	99
134	58.75-60.75	2.00	98
135	60.75-62.75	2.00	100
136	62.75-64.75	2.00	100
137	64.75-66.36	1.61	99
138	66.36-69.25	2.89	96
139	69.25-71.25	2.00	100
140	71.25-74.58	3.33	100
141	74.58-76.07	1.49	100
142	76.07-77.96	1.89	99
143	77.96-79.96	2.00	100
144	79.96-81.40	1.44	100
145	81.40-82.95	1.55	100
146	82.95-84.95	2.00	100
147	84.95-86.95	2.00	100
148	86.95-88.95	2.00	100
149	88.95-90.95	2.00	100
150	90.95-92.95	2.00	100
151	92.95-95.30	2.35	100
152	95.30-97.05	1.75	100
153	97.05-99.05	2.00	100
154	99.05-101.05	2.00	99
155	101.05-104.04	2.99	100

.../2

Sample No.	Interval	Length (m)	Recovery %
NSD 156	104.04-106.04	2.00	98
157	106.04-108.14	2.10	100
158	108.14-110.50	2.36	99
159	110.50-111.71	1.21	100
160	111.71-113.03	1.32	100
161	113.03-115.03	2.00	100
162	115.03-117.50	2.47	99
163	117.50-119.19	1.69	100
164	119.19-121.19	2.00	100
165	121.19-123.19	2.00	100
166	123.19-125.71	2.52	100
167	125.71-128.01	2.30	100
168	128.01-129.35	1.34	100
169	129.35-130.38	1.03	100
170	130.38-133.38	3.00	100
171	133.38-136.37	2.99	100
172	136.37-137.79	1.42	100
173	137.79-139.79	2.00	100
174*	139.79-140.79	1.00	100
175	141.40-142.42	1.02	100
176	142.42-144.42	2.00	100
177	144.42-146.42	2.00	100
178	146.42-148.90	2.48	100
179	148.90-150.90	2.00	97
180	150.90-152.90	2.00	100
181	152.90-154.15	1.25	100
182	154.15-156.05	1.90	100
183	156.05-158.05	2.00	100
184	158.05-160.57	2.52	100
185	160.57-162.57	2.00	99
186	162.57-164.60	2.03	99
187	164.60-166.60	2.00	100
188	166.60-169.80	3.20	100
189	169.80-171.80	2.00	99
190	171.80-173.80	2.00	87
191	173.80-175.80	2.00	93
192	175.80-177.44	1.64	100
193	177.44-179.44	2.00	100
194	179.44-181.11	1.67	100
195	181.11-184.20	3.09	100
196	184.20-185.03	0.83	100
197	185.03-187.03	2.00	100
198	187.03-189.95	2.92	100
199	189.95-191.95	2.00	100
200	191.95-194.50	2.55	100
201	194.50-196.50	2.00	100
202	196.50-198.67	2.17	100
203	198.67-200.67	2.00	100
204	200.67-204.25	3.58	100
205	204.25-205.30	1.05	97
206	205.30-207.30	2.00	100
207	207.30-209.30	2.00	99
208	209.30-212.00	2.70	99
*209A	140-79-141.40	0.61	100

Appendix 3

DRILLHOLE REPORT - NS3

NORTH SCAMANDER PROSPECT,

EL12/78, TASMANIA

Location:	*762W 1533N*		
Depression:	*69°*	*Commenced:*	*20 August 1980*
Bearing:	*229°*	*Completed:*	*6 September 1980*
R.L.:	*N.D.*	*Rig:*	*Jacro Top Drive*
Depth:	*201.6m*	*Drillers:*	*A Walker, I McCallum*
Surveys:	*50m (74°), 100m (73°);*	*Depth of Oxidation:*	*21m*
	150m (73°), 200m (72°).	*Depth of Water Table:*	*-24m*
		Core Size:	*NQ.*

Nature of Target:

As for NS1 and 2.

Reasons for Drilling:

To test Sn-in-Soil anomaly to north of NS1.

NS3 CORE LOG

0-12.20 Not cored, loose, broken rock.

12.20-18.80* Grey qzte c occasional dark grey sh interbeds, bedding at 35° to LCA. Up hole facings. Qtz-limonite vnlts, rarely vuggy, 5+/m, in various orientations, mainly 50-60° to LCA, perp to bedding, fracs 1-2mm in qzte, <1mm in shale. Minor shearing along shaley beds; qtz-limonite vnlts offset. Fine (<1mm) qtz vnlts 40° to LCA, offset by later 1-2mm qtz-chl-lim vnlts, ∦ to LCA approx 20° , below 16.7m. Generally broken oxidized rock. Barren.

18.80-20.95 Qzte c v. minor sh interbeds, bedding 60° to LCA. Flame structures indicate uphole younging. Qtz-limonite stringers, ~20° to core axis. Irregular, occasionally vuggy qtz-chl-sph-ga vnlt, 10° to LCA, 1-2mm wide cuts thin qtz vnlts, 20-30° to LCA at 19.1m. Irregular, patchy sph-ga in qtz-chl (pinite?) vnlt (sph:ga 10:1), 1-5mm wide. Minor brecciation and later qtz infilling of fracs trending 10-20° to LCA. No magnetite detected, total S^{2-} - trace.

20.95-23.1 Grey qzte cut by 20-50/m qtz-chl-sph-ga vnlts (sph:ga ≃10:1 to 5:1), 1-4mm wide, 20° LCA. These xcut by qtz-sid-sph-ga vnlts, 1-3mm, oriented 40-70° to core axis. CO_3^{2-} bearing vnlts more common c depth. Trace py increasing in abundance c depth in both qzte and qtz vnlts below 21.0m; sporadic and rare in qzte to 22.2m, cubic, 1-2mm in qzte. First appears in vnlts at 22.3m. Large qtz-chl-py-sph-magnetite vein at 22.9m. Qtz-sid-chl-tm? vnlt at 22.0m. V. low total sulphide. Magnetite only in vein.

23.1-24.3 Gossanous, severely oxidized dark grey-black shaley(?) rock, cut by pyritic stringers 80-90° to LCA. Patchy magnetite. Broken rock at 24.15m. Qtz vnlts and stringers above and below broken zone, vuggy in places.

24.3-28.5 Grey qzte c v. minor shale at 27.25m; bedding 50° to LCA. Rare, disseminated py xstals in qzte, patchy chl(?) alteration. Thin anastomosing qtz-sid vnlts run parallel and sub-parallel to core axis; v. weakly mineralized - sph+ga. Most vnlts x fractured. 3 and 6mm wide qtz-sid-ga-sph (ga:sph 1:1) vnlts at 25.15 and 27.90m, both at 40° to LCA. Patchy qtz-chl-mag, c trace cpy, sph and rare ga (cpy:sph 1:1). Total S^{2-} in patches, 2-5%. Brecciated appearance to patches. Sid bearing vnlts post date larger qtz-sph-ga vnlts approx parallel to core axis.

28.5-37.65 Interbedded grey qzte/slst/sh, bedding 60° to LCA decreasing to 50-45° at bottom of interval, flame structures indicate younging up hole. Shale interbeds v. common at top of interval, decreasing c depth. Qtz-sid-sph-ga vnlts in shale are sub-parallel to parallel c core axis or are parallel to bedding. In qzte, vnlts are parallel or sub-parallel (10-20° to LCA) to core axis. With increasing depth, qtz-chl-sph vnlts occur, 35-40° to LCA. These vnlts post date qtz-sid-sph vnlts. One vein, qtz-chl-sph-ga (sph:ga 1:1), 2cm wide at 33.5m, 40° to LCA. Six qtz-sid-sph-ga veins, 3-7mm, 40-50° to LCA occur at 30.45, 31.3, 32.8, 33.4, 34.65 and 36.6m. Rare, disseminated py in qzte. Some mineralized vnlts in qzte are discontinuous through shaley horizons. Ga-sph mineralization thin shale beds at 37.4m. Low total sulphide; no magnetite detected.

*N.B. Intervals: 12.56-13.28m, 13.78-16.70m, 17.00-18.20m and 18.45-18.80m were not cored; broken, loose, oxidized rock.

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37.65-39.1 *Interbedded shale/grey-green siltstone; bedding ∠ to LCA is 50°, decreasing to 40° c depth. Facings imply uphole younging. Strong development of microfracs, 20-30° LCA, occasionally infilled by qtz-sid. Vnlts weakly developed, 10-20° to LCA, qtz-sid c trace sulphide. Sph-ga mineralization restricted to 2-10mm vns, parallel to bedding at 38.3, 38.55, 38.65, 38.8m, c a qtz-chl-tm? gangue assemblage; sph:ga 15:1 to 10:1. S^{2-} in vnlts auges 10-30%, v. low total sulphide in interval.*

39.1-42.0 *Grey qzte c minor sh/slst horizons; bedding 40° to LCA. Qtz-sid vnlts have two distinct styles and orientations: irregular, discontinuous, 5-15° to LCA, 5-10/m, continuous, 15-30/m, 40-50° to LCA. Both sets apparently barren above 40.0m. Mineralization between 39.1 and 40.0m restricted to vnlts parallel to bedding, as for previous interval (37.65-39.1). Below 40.0m, vnlts are irregular and anastomosing rarely vuggy; sph-ga mineralization visible in irregular discontinuous stringers c qtz-sid-chl host; sph:ga 15:1. No magnetite detected; total sulphide <1%.*

42.0-45.5 *Interbedded qzte/slst c minor sh; bedding 60° to LCA. Intermixing (slumping?) of qzte and slst widespread, up hole younging indicated by flame structures and sole marks. Qtz-sid-sph vnlts, 5-15+/m, 30° LCA generally discont through shaley units (as at 43.45 and 43.55m). Sph-ga mineralization in qtz-chl-sid vnlts occurs at lower levels of interval. Vnlt density increases c depth as qzte predominates. 5-10mm shale unit at 43.45m hosts sph-ga-chl mineralization (sph:ga 5:1, 2% total sulphide in shale unit). Below 45.3m vnlts are more irregular, ∠'s to core axis vary, 10-60° , and sph-ga mineralization is more common. However total S^{2-} is v. low, no magnetite detected.*

45.5-48.0 *Mainly grey qzte c v. thin interbeds of grey-green shale, 70° to LCA. Thin stringers and vnlts of qtz and qtz-sid±sph, x cut and are cut by chl vnlts. Mineralized vnlts are irregular and parallel or sub-parallel to LCA, rarely up to 50° to core axis. Qtz-sid units at 47.0m implies up hole younging. Bedding angle to core axis is 50°. Trace chl in qtz-sid vnlts c mineralization. V. low total S^{2-}; no magnetite detected.*

48.0-50.55 *Grey qzte, shale and siltstone interbeds; bedding 60° to LCA; graded and cross bedding indicate up hole facing. Abdt microfracturing and later infilling by qtz-sid-py-sph-ga paragenesis. Vnlts tend to be irregular, angle to core axis varies between 10 and 45° . Slumping and soft sed deformations apparent in places (i.e. 50.1-50.2m). Py-sph-ga (20:10:1) in microfracs and infilling along bedding surfaces. Py disseminated throughout qzte. Chl in some sub vertical (parallel to LCA) vnlts. Irregular mineralized fracs often offset at bedding surfaces (shearing along surfaces?). No detectable magnetite; total sulphide approx 2%.*

50.55-52.75 *Grey qzte-siltstone occasionally interbedded (30° to LCA) c green-grey shale, weakly brecciated and network fractured. Mainly qtz-chl-sid fractures, 10-50° to LCA. Anastomose qtz-chl-sid-sph-ga vnlts up to 3mm. Py in some fractures and vnlts, especially those parallel to bedding. Sph:ga approx 15 to 20:1. Shearing and brecciation in green shale units (51.0, 51.2 and 52.1m). Abdt chl and tm(?) along bedding surfaces and fractures. Sideritic vnlts, 5-10/m, 55° to LCA, x fractured and offset in shale units. Abdt anastomosing chl vnlts in qzte c minor sph and sid. No magnetite, total sulphide 1-2%.*

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52.75-53.2 *Green-grey shaley unit c̄ gradational contact into qzte at base; sharp upper contact c̄ overlying qzte. Finely laminated, 80-90° to LCA, cut by thin qtz-chl-sph vnlts at 50-60° to LCA. Minor py in some vnlts. Fracture/vnlt intensity <5-10/m. No magnetite detected; v. low total sulphide.*

53.2-55.2 *Grey qzte, minor incipient chltzn along anastomose fractures. Qtz-sid vnlts, 1-5mm, 50-80° to LCA. Irregular stringers and patches of qtz-chl-sph-ga-sid at 53.8, 54.7, 54.9m. Minor brecciation of grey-brown qzte at 54.9m. Magnetite in qtz-chl-sph-ga c̄ trace py assemblage. Minor shale; bedding 50° to LCA. Qtz±chl vnlts, 20-30° to LCA, sporadic 15-20/m. Sulphide content up to 5% in places, total S^{2-} v. low.*

55.2-55.8 *Green-grey shale c̄ graded qzte interbeds; bedding at 60° to core axis; up hole younging. Chl-qtz vnlts, 1-2mm, 10-20° to LCA, locally abdt in siltstone-qzte horizons. Minor brecciation and/or slumping at 55.5 and 55.7m c̄ irregular qtz-chl-sph-ga-py (sph:ga:py 10:1:1) vnlts, sub-parallel to bedding. Rare siderite-qtz vnlts, <1-1mm, 10-40° LCA. No magnetite detected; v. low total sulphide.*

55.8-61.4 *Interbedded grey shale/slst/qzte, younging up hole; bedding to LCA approx 50°; sole markings and graded bedding common; qzte predom towards base of interval. Minor slumping? at 55.9 and 56.3m. Qtz-chl±sph±ga vnlts 10-30° to LCA, low S^{2-} content. Abdt irregular chltic alterations, esp in shaley units. Disseminated py throughout interval, more abdt below 58.6m, Qtz-chl-py-sph-ga vnlts common, mineralization irregular to patchy. 15-20% py; vnlts 10-40° to LCA, rarely parallel to bedding. Mineralization apparently post dates microfracs in silty-shaley units. Dark grey sh grades into green-grey shale at approx 60.7m. Abdt py-sph in qtz-chl vnlts, network of vnlts. Magnetite in qtz-pinite(?) diffuse vnlts and patches (at 61.35m). Total sulphide approx 2-4% - mainly py. Magnetite detected below 61.3m.*

61.4-67.8 *Grey qzte c̄ v. minor interbeds of green-grey shale/siltstone; locally brecciated (slumped?) and fractured throughout; bedding ∢ to LCA ~40-50°. Magnetite-chl (pinite?) assemblage commonly found in breccias; rarely along mineralized fractures. Dominant frac orientation, 40-50° to LCA; generally qtz-sid-py-sph-ga, up to 50% S^{2-} in some; py:sph:ga: 20:2:1, locally 20:5:3, fine pinite(?)-mag-qtz vnlts x cut qzte; generally 15-25/m, rarely up to 40/m, no definite age relationships between vnlt types - implying "syn-tectonic" mineralization(?). Local cpy in breccia (64.5m). Magnetite absent from shaley units; v. low S^{2-} content; qtz-sid vnlts generally more irregular "network-like", locally displaced at shale/qzte bedding surfaces. Total sulphide in interval ~1%, locally 5%; magnetite content ~.5%, higher than previous intervals.*

67.8-74.0 *Fractured qzte; 2 main frac orientations, 10-20° to LCA, 2-7mm, and 40-60° to LCA, (1-3mm). More vertical fractures may post-date more horizontal fractures; mainly qtz-sid giving way to py-qtz-chl locally, rarely to py vnlts. Anastomisingly fractured, pyrite dominated; locally brecciated c̄ qtz-pinite-mag infilling (62.5, 71.6m); sph-ga locally associated c̄ py vnlts. Two 7mm qtz-sid vnlts at 60-70° to LCA. Mag-pinite qtz-sph horizon, 8-10mm, at 71.1m, at 60° to LCA. Py:sph:ga ratios, v. high:low:v. low-trace; total S^{2-}, mainly py 4-5%, locally up to 40%, total magnetite 1-2%, locally high (10%) occurrences.*

74.0-76.4 *Interbedded qzte/grey-green shale; minor slumping; uphole facings; network of fractures mainly qtz-sid c̄ minor chl + sph and trace ga; pyritic in places; vnlts vary from 20-65° to LCA; 30-40/m; minor incipient chltzn (halo) around some sph-ga mineralized fractures. Vnlts more abundant in qzte of shale. Bedding approx 60° to LCA; microfracturing parallel to bedding surfaces; 2cm wide qtz-sid vnlt, locally vuggy, at 75.0m; pyrite mineralization immediately below vnlt; v. thin py vnlts sporadic along bedding surfaces. No magnetite detected; total S^{2-} .5-1% overall, locally v. low.*

76.4-82.4 *Locally brecciated grey qzte c̄ anastomising vnlts, 1-5mm, 40/m+ of qtz-chl-ga-sph c̄ minor sid. Dominant qtz-sid vnlt orientation is 45° to LCA; most mineralized vnlts (sph-ga) tend to be more vertical, (0 LCA) 30° to LCA. Sulphide mineralization sporadic in occurrence in vnlts; generally ga sph, c̄ ga in greater abundance than in previous intervals. Minor pyritic qtz-sid vnlts, at high ∢ to LCA. Younging uphole indicated by graded bedding into green-grey shale unit at 79.6m. Most mineralized vnlts are microfractured, offset and some later infilled by qtz-sid vnlts. Some locally vuggy qtz vnlts. Overall sph:ga:1:1, minor py, total S^{2-}, approx 1%; no magnetite detected.*

82.4-86.15 *Interbedded dark grey shale/siltstone/qzte c̄ qzte dominating, and grey-green shale appearing, towards bottom of interval; uphole younging, weakly fractured, 10-20/m; cut by generally regular (parallel) qtz-sid vnlts, 60-70° to LCA, rarely 20°; v. minor sph c̄ trace ga in short sub-parallel stringers, 10° to LCA. Bedding ∢ to LCA is 45-50°. Occasional 3-5mm qtz-sid-chl-sph-py-ga vnlts in qzte beds, sph:py≈1:1. Mineralization rarely in small irregular patches, often offset at bedding surfaces (84.4m). V. minor, locally rich, py in vnlts. No magnetite detected, total S^{2-} low.*

86.15-89.60 *Grey qzte c̄ local chltzn, fractured ~20-40/m+; qtz-sid vnlts, 1-4mm, locally vuggy, generally 35-60° to LCA; pyritic mineralization commonly along these vnlts; also disseminated through qzte-sporadic. More irregular qtz-chl or chl vnlts carrying sph-ga-rarely py at angles of 10-20° to LCA; rarely at 30-40° to LCA. Total sulphide ~1-2%, mainly py c̄ minor sph and trace ga; sph:ga 15-20:1 rarely 5:1. No magnetite detected.*

89.60-92.20 *Grey qzte c̄ minor interbeds of green grey shale, locally disrupted. Bedding 30° to LCA. Severely fractured, generally 30-50/m+, c̄ anastomosing qtz-chl and qtz-sid-chl vnlts, 1-3mm, generally 20-40° to LCA. Minor S^{2-} mineralization in vnlts, ~5-15% (of vnlt); mainly py, however sph dominant in some vnlts; py:sph and sph:ga ≈high. Local brecciation c̄ minor sulphides associated. Total sulphide ~1%, no magnetite detected. V. poor core recovery 91.0-92.20m, loose, broken rock.*

92.20-93.05 *Loose, broken rock; mainly qzte c̄ minor grey-green shale. No mineralization or magnetite. Sludge and fragments obtained from 15cm interval 92.2.-92.35m. Rock fragments and chips suggest chlitic and qtz-chl vnlts present - possible at low ang to LCA (10-20°). Bedding ang to LCA ~60° (??).*

93.05-98.7 *Mainly grey qzte c̄ rare interbedded grey-green shale, bedding 20° to LCA. Anastomose qtz-sid vnlts cut qzte, generally 40-50° to LCA, avge density 20-25/m, locally 40/m+. Qtz-pinite-sid-py stringers at 5-15° to LCA, rarely c̄ sph and trace ga. Locally brecciated c̄ infilling qtz-chl-py ± sph ± ga and local occurrences of cpy; py dominant sulphide.*

98.7-105.25 *Grey qzte cut by abundant irregular stringers and vnlts of qtz-py, sid-pinite-py and sid-mag-pinite-py. Vnlt density v. high, generally 40/m+; anastomose vnlts; two dominant vnlt directions: fine qtz-sid± py vnlts 50-70° to LCA, py-qtz vnlts 20-40° to LCA. Irregular stringers of py-qtz-sid, 1-5mm, parallel to sub-parallel to core axis (0-15° to LCA). Occasional mag-pinite-sid vns (4-8mm), 65° ∢ to LCA; these apparently post-date qtz-py-sid vnlts. In general, however, vnlt timing relationships are unclear. Total S^{2-} is approx 5-10% however below 102.7m (102.7 - 105.2m), S^{2-} auges <1%. Py only sulphide definitely observed, trace ga?*

105.25-109.3 *Interbedded sh/slt/qzte; qzte dominant at top of interval, decreasing to shale dominant; locally brecciated and bedding occasionally lensoidal however flame structures and sole marks indicate uphole younging; bedding angle to core axis is 45° increasing to 70° c depth. Abdt qtz-sid vnlts, 1-3mm, 40 to 70° angle to LCA, where qzte-shale locally brecciated, these vnlts infill carrying sph and ga. Local qtz-chl, or chl vnlts and stringers, generally low in abundance, at low ang to core axis, 5-10° rarely 20°+; generally barren although trace py or sph/ga observed. Incipient carbonate alt^{n} in qzte. 1-1½cm vn of qtz-pinite-sid-ga-sph at 108.65m, 55° to LCA. Pinite becoming more obvious in vnlts below approx 106.7m, especially in mineralized vnlts and stringers. No magnetite detected; total S^{2-} low, ½-1%; sph:ga 1:1 to 2:1.*

109.3-122.5 *Mainly grey qzte, locally interbedded c shale dark grey slt; shale/slt units commonly deformed (slumping?) and locally brecciated; facings indicate uphole younging; bedding erractic between 40 and 50° to LCA, Minor incipient carbonate alteration of qzte, also sparse disseminated py in qzte. Network of qtz-sid or sid vnlts, <1-2mm, generally 30-50° to core axis - sub-parallel to bedding surfaces. Abdt stringers 5-30° to LCA, 2-8mm, of qtz-chl-pinite-sph-ga-py, usually irregularly dispersed, mineralization commonly restricted to vnlts in qzte beds - vnlts at their widest, sph:ga:py≈20:5:1; best minlzn tends to occur in areas of slumping and/or brecciation. Pinite common in vnlts in this interval, magnetite-pinite-sid-qtz-py-sph-ga vnlts x cut core at 40° to core axis, vnlts-stringers of this type, 3-8mm wide. Magnetite occurrences are sporadic and patchy between 118.6 and 119.9m. Minor chl observed in vnlts below 120m especially in veinlets in shaley horizons. Long continuous fracture (fault?) parallel to LCA between 120.4 and 121.7m; minor brecciation associated, sph:ga mineralization in qtz-chl-carb filling at 120.5-120.6m and c py at 121.4-121.6m. Abdt sph, trace ga in qtz-chl vnlts, 10-20° to LCA. Mineralized vnlts (stringers) cut by later qtz-siderite vnlts ie at 122.2m, at angles of 30-35° to the core axis. Small fault? between 122.3-122.7m. Total sulphides moderately high, up to 10% - mainly sph c minor ga (sph:ga≈5:1) and trace py, best mineralization observed this far. Sporadic magnetite occurrences.*

122.5-124.9 *Interbedded grey-brown shale/qzte; shale dominant at top, qzte dominate at base of interval. Bedding angle to LCA is approx 20-30°, erratic bedding surfaces poss due to slumping. Carbonate disseminated throughout qzte and shale matrices, sporadic py xstal, 1-3mm, in qzte. Sporadic (low density) vnlts and stringers of qtz-chl±sid, 20-40° to LCA, <1-2mm. V. minor localized occurrences of sph-ga-py in stringers, sub-parallel to core axis. Locally brecciated, particularly in qzte between 124.3 to 124.9m; anastomising qtz-sid and qtz-chl vnlts and stringers, sometimes sulphide bearing; generally 40° to LCA, rarely 60°+. Sph-ga (sph:ga 20:1 to 10:1) scattered along vnlts; two large, 4-7mm, qtz-sid vnlts post dating brecciation, cut core at 124.75 and 124.8m. No magnetite detected, v. low total S^{2-}.*

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124.9-129.0 *Grey to pale brown qzte cut by anastomising qtz-chl and qtz-sid vnlts; qtz-chl vnlts, <1-1.5mm, 30-50° to LCA, also as irregular stringers at low angles to LCA (5-15°), qtz-sid vnlts, ≈1mm, 50-60° to LCA and post date qtz-chl vnlts and stringers. Carbonate present in qzte matrix. Minor sph:ga mineralization in qtz-sid-pinite stringers, 20-30° to LCA; sph:ga 2:1 to 1:2. v. low total sulphide and no magnetite detected.*

129.0-133.1 *Grey qzte c̄ minor 5-20cm grey sh interbeds; bedding 45° to LCA, uphole facing. Most bedding surfaces irregular implying some soft sed deformation. 1-3mm py xstals sporadically scattered throughout qzte. Core cut by numerous 20-30/m qtz vnlts, occasionally fractured, 40-50° to LCA. Qtz vnlts cuty by qtz-chl stringers, 10-20° to LCA, rarely 40°+, in turn post dated by qtz-sid vnlts, 1-2mm, 60-80° to LCA. Sph-py mineralization restricted to the qtz-chl±sid stringers; sph:py 5:1 c̄ trace ga and po. v. low sulphide in interval; no magnetite detected.*

133.1-135.1 *Interbedded dark grey sh/slst/qzte - shale dominant, graded bedding indicates younging uphole; bedding angle to core axis is 35-50°; qtz-sid vnlts parallel and sub-parallel to bedding, 10-20/m, rarely offset by fractures. Occasional qtz-chl-sid vnlts, 1mm, parallel to bedding surfaces. Some vnlts, 10-20° to LCA, truncated and/or offset at qzte/sh bedding surface, implying movement along surfaces. Qtz-py vns, 3-7mm, at 133.3 and 134.1m, c̄ sid selvidges. V. sporadic occurrences of sph or ga along thin qtz-chl stringers, 20-30° to LCA, v. low S^{2-}, no magnetite detected.*

135.1-143.3 *Interbedded qzte/sh/slst, locally brecciated and/or slumped. Bedding varies between 30-50° to LCA, facings imply uphole younging. Abdt fracturing and veining especially in qzte beds. Thin qtz vnlts, <1-2mm, 30-60° to LCA, anastomose in places, 20-50/m+, x fractured and offset by later qtz-sid vnlts, 50-70° to LCA, and qtz-chl vnlts and stringers, 30-50° to LCA. Sparse disseminated euhedral py xstals, 1-2mm, in qzte sph-ga mineralization in qtz-sid±chl and trace py vnlts; sph-ga content v. low. Po becoming more frequent in the irregular qtz stringers, rarely c trace ga. In general total sph:ga:po≈2:1:2 but varies locally from 5:1:0 to 0:0:1. Total S^{2-} content ≤0.5%, no magnetite detected.*

143.3-149.9 *Brecciated qzte c̄ v. minor sh/slst interbeds, also brecciated; angular to sub-rounded qzte fragments in a commonly shaley, chlitic matrix. Breccia infilling comprises mainly chl and/or pinite c̄ minor sid-qtz± magnetite, or po, + py, S^{2-} content generally low. Local development of small S^{2-} rich patches of sph-ga-py or po, sph:ga:py 2:1:5. In severely fractured areas, anastomising qtz-sid-pinite vnlts c̄ varying angles to LCA (10-80°) x cut core often c̄ po, avging 10%, rarely 90%, of vnlt. Local preferential development of qtz-sid vnlts parallel or sub-parallel to LCA. Mineralization sporadic but may auger up to 3% of core interval, minor magnetite detected. Interval possesses two main areas of brecciation 143.3-145.3m and 147.6-150.1m. A 1-2cm wide barren qtz-sid vnlt at 148.9m, 75° to LCA and itself fractured and offset.*

149.9-160.0 *Grey qzte c̄ minor chl alteration, and one shaley interbeded, 15cm at 153.1m. The qzte is cut by numerous qtz-chl or chl stringers and vnlts at 10-30° to core axis, rarely 40°+, larger stringers sub-parallel to LCA, comprise pinite qtz c̄ minor chl and po; po occurrences sporadic although frequent in irregular siringers and patches i.e. at 156.2m. Occasional, 4-8mm, qtz-pinite-py±sid vnlts c̄ rare po and cpy (at 159.7m), 25-30° to LCA. One pinite-sid-qtz-mag-ga vn at 155.55m. Minor carbonate in qzte matrix. Magnetite only detected in one vein; total sulphide*

<1-2%, mainly po c trace ga, sph and cpy. Vnlt density low, <25/m, rarely 40+/m. Occasional qtz-sid-py vnlts, 1-1½mm, at 70-80° to LCA.

160.0-167.65 Grey qzte c incipient CO_3^{2-} alt^n in matrix; cut by 1-4mm qtz, qtz-chl or qtz-po vnlts, 20-40° to LCA, these vnlts fractured and offset by later chl or chl-po vnlts, 1-2mm, 20-30° to LCA, rarely containing pinite and/or siderite, po up to 80% in some vnlts, generally 10-20%. Wide irregular pinite - magnetite - siderite - qtz vns, 10-40° to LCA carry sph-ga-cpy mineralization (sph:ga:cpy≈5:3:1), sometimes 30% of vein mtl, rare po adjacent to vn-stringer but not in the vein. Local development of irregular pinite-qtz-po±ga±cpy stringers, at 10-20° to LCA; trace sph associated. Total sulphides in core interval 3-4%, with locally rich 10-20% S^{2-} areas. Vnlt paragenesis:qtz±po vnlts post-dated by pinite-qtz-po and chl-qtz vnlts, in turn post dated by occasional qtz-siderite-py vnlts, 1-2mm, at 70-80° to LCA.

167.65-178.0 Grey qzte c rare disseminated py xstals and incipient carbonate altn of matrix. Qzte cut by anastomosing vnlts and stringers of qtz, qtz-sph, qtz-po, po and qtz-sid. Dominant orientations:vnlts 40-50° to LCA, 20-50+/m, and stringers 0-20° to LCA, 5-10+/m. Po dominant sulphide, varying from 10-90% in vnlts, avging 30-40%, minor sph and/or ga commonly associated, po:sph≈v. high, sph:ga≈1:1 to 2:1, trace py also in vnlts and stringers. Qzte locally brecciated, c qtz-po-sid-chl matrix±py±cpy. Chl and/or pinite generally only occurring in breccias. One, 3cm, pinite-mag-sph-ga-cpy vn at 176.5m, 30° to LCA, sph:ga:cpy≈ × 10:5:1. 1-2mm qtz-sid±py vnlts, 60° to LCA, post-date po bearing vnlts and stringers. Magnetite only detected in one vein; total sulphides ~5-10%, locally 15%, mainly po.

178.0-184.2 Locally brecciated qzte-sh/slst interbeds, qzte dominant, angular to subrounded qzte fragments intermixed c shale fragments, c a po-cpy infilling, po:cpy 20:1. In non-brecciated areas a network of po-cpy, qtz-po and po-sph-cpy vnlts and stringers exists, vnlt density often >80/m. Qtz vnlts, 45-60° to LCA, predate po mineralization. Dominant po vnlt orientation is 30-40° to core axis. Sph more obvious in larger areas of po especially in zones of brecciation, po:sph≈5:1 to 10:1. Po mineralization cuty by qtz-sid vnlt, 70° to LCA. No magnetite detected; total sulphides ≈15-20%, locally 40%, c sph+ga+cpy ≤1%.

184.2-185.3 Disrupted and deformed sh/slst/qzte interbeds, bedding at 40-60°(??) to LCA, uphole younging. Irregular development of stringers and vnlts, mainly sub-parallel to core axis, filled c qtz-po±cpy. Minor siderite in vnlts and disseminated throughout silty units. Locally rich py bearing vns. Mineralization appears to post date deformation of interbeds and predates qtz-siderite vnlts, 60-80° to LCA. No magnetite detected; low total S^{2-} ~1%. Dominant fracture orientation, 5-15° to LCA, c minor vnlts parallel and sub-parallel to bedding.

185.3-193.55 Grey qzte c interbedded slst grading into shale, locally slumped and brecciated. Facings indicate younging uphole (ie flame structures at 191.1m). Euhedral py disseminated through qzte. Bedding angle to LCA is 50° at 187.7m; 85° at 188.5, 75° at 190.75, 60° at 193.5m. Qtz-po vnlts at 20-35° to LCA, 10-20/m; sporadic occurrences of sph c the po, sph:po~1:10. Sulphide mineralization occurs mainly as irregular, angular patches in areas of irregular veining and/or brecciation, Po dominant S^{2-} c minor cpy, sph and trace ga, commonly associated c a qtz±chl±sid. gangue assemblage; minor py in some areas; no magnetite detected. Total sulphides generally <1-2%, up to 50-60% in breccias. Mineralization post dated by thin 1-2mm qtz-siderite vnlts at high angles (60-70°) to core axis.

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193.55-198.5 *Interbedded sh/slst/qzte c̄ sparse disseminated py xstals. Bedding varies between 50-80° to LCA, due to severe deformation - both soft sed "bending" and fracturing. Discontinuous po-qtz-cpy stringers trend at 45-60° to LCA, parallel and perpendicular to bedding, most mineralization occurs in angular disrupted patches of qzte, less commonly in shaley horizons. Large, 1cm, vn of po-cpy c̄ qzte fragments at 194.7m, at 70° to core axis. No magnetite detected. Total sulphides, mainly po c̄ minor cpy and py, ≈5-10%. Fine carbonate disseminated in sediments.*

198.5-201.4 *Grey qzte c̄ v. minor shale interbeds, bedding 70° to LCA, facings indicate uphole younging. Fine carbonate throughout qzte and shale matrix. Generally low density veining, 5-15/m, rarely 40+/m, po-qtz± cpy vnlts, occasionally anastomose, 30-50° to LCA, rarely 70°+. Po predominant, also trace sph, py and rare chl in vnlts. Locally brecciated and cut by thin, <1mm, qtz-sid vnlts, at 60-70° to LCA. Total S^{2-} between 2-5%; no magnetite detected.*

201.4-201.6 *Green shale, bedding contact c̄ overlying qzte is at 30° to LCA. Po-chl vnlts at 20-30° cut shale, minor cpy in vnlts; irregular discontinuous vertical (parallel to LCA) stringers of po. No magnetite detected; total sulphides approximately 2-4%.*

201.6 *End of hole.*

NS3

BOX	SAMPLE INTERVAL	ESTIMATED	MEASURED	% RECOVERY
1*	12.20-12.56	.36	.37	102.8
	12.56-13.28 - Rock roller			
	13.28-13.78	.50	.47	94.0
	13.78-16.70 - Rock roller			
	16.70-17.00	.30	.22	73.3
	17.00-18.20 - Rock roller			
	18.20-18.45	.25	.20	80.0
	18.45-18.80 - Rock roller			
	18.80-19.40	.60	.84	140.0?
	19.40-20.05	.65	.63	96.9
	20.05-21.6	1.55	1.37	88.4
	21.60-			
2*	24.10	2.50	1.26	50.4
	24.10-24.45	.35	.32	91.4
	24.45-24.73	.28	.30	107.1
	24.73-27.25	2.52	2.51	99.6
	27.25-27.80	.55	.56	101.8
	27.80-			
3*	30.15	2.35	2.36	100.4
	30.15-30.50	.35	.38	108.6
	30.50-31.30	.80	.76	95.0
	31.30-33.60	2.30	2.23	97.0
	33.60-			
4*	36.10	2.50	2.54	101.6
	36.10-38.10	2.00	1.94	97.1
	38.10-39.60	1.50	1.50	100.0
	39.60-			
5*	41.24	1.64	1.61	98.2
	41.24-42.50	1.26	1.20	95.2
	42.50-43.95	1.45	1.43	98.6
	43.95-45.60	1.65	1.67	101.2
	45.60-			
6*	48.60	3.00	3.01	100.3
	48.60-51.60	3.00	3.02	100.7
	51.60-			
7*	54.60	3.00	2.98	99.3
	54.60-57.60	3.00	3.00	100.0
	57.60-			
8*	60.60	3.00	3.00	100.0
	60.60-63.60	3.00	2.96	98.7
	63.60-			
9*	66.60	3.00	3.00	100.0
	66.60-69.60	3.00	2.99	99.7
	69.60-			

BOX	SAMPLE INTERVAL	ESTIMATED	MEASURED	% RECOVERY
10	72.6	3.00	2.96	98.7
	72.60-75.45	2.85	2.81	98.6
	75.45-			
11	75.60	.15	.31	100.0
	75.60-77.80	2.20	2.07	
	77.80-78.20	.40	.50	125.0
	78.20-78.50	.30	.26	88.7
	78.50-78.90	.40	.41	102.5
	78.90-			
12	81.60	2.70	2.67	98.9
	81.60-84.60	3.00	3.00	100.0
	84.60-			
13	87.60	3.00	3.00	100.0
	87.60-88.30	.70	.68	97.1
	88.30-90.60	2.30	2.30	100.0
	90.60-91.20	.60	.55	91.7
	91.20-92.10	.90	.95	105.6
	92.10-92.40	.30	.22	73.3
	92.40-92.65	.25	.22	92.7
	92.65-			
14	93.05	.40	.38	95.0
	93.05-94.85	1.80	1.60	88.9
	94.85-96.30	1.45	1.80	124.1
	96.30-96.80	.50	.52	104.0
	96.80-97.90	1.10	1.21	110.0
	97.90-			
15	99.20	1.30	1.28	98.5
	99.20-102.30	3.10	3.06	98.7
	102.30-			
16	104.50	2.20	2.29	104.1
	104.50-105.20	.70	.70	100.0
	105.20-106.00	.80	.76	95.0
	106.00-107.50	1.50	1.59	106.0
	107.50-108.60	1.10	1.10	100.0
	108.60-			
17	110.17	1.57	1.58	100.6
	110.17-111.60	1.43	1.46	102.1
	111.60-114.60	3.00	3.00	100.0
	114.60-			
18	117.60	3.00	3.00	100.0
	117.60-120.60	3.00	3.00	100.0
	120.60-			
19	123.60	3.00	3.01	100.3
	123.60-126.60	3.00	3.00	100.0
	126.60-			

BOX	SAMPLE INTERVAL	ESTIMATED	MEASURED	% RECOVERY
20	129.40	2.80	2.83	101.1
	129.40-132.50	3.10	3.10	100.0
	132.50-			
21	133.60	1.10	1.20	109.1
	133.60-135.60	2.00	1.85	92.5
	135.60-138.23	2.63	2.33	88.6
	138.23-138.93	.70	.43	61.4
	138.93-139.20	.27	.57	211.1
	139.20-			
22	140.54	1.34	1.04	77.6
	140.54-141.34	.80	.76	95.0
	141.34-144.34	3.00	2.98	99.3
	144.34-144.70	.36	.42	116.7
	144.70-			
23	147.60	2.90	2.92	100.7
	147.60-150.60	3.00	3.05	101.7
	150.60-			
24	153.60	3.00	2.98	99.3
	153.60-156.60	3.00	3.03	101.0
	156.60-			
25	159.60	3.00	2.97	99.0
	159.60-162.60	3.00	3.05	101.7
	162.60-			
26	165.60	3.00	3.00	100.0
	165.60-168.60	3.00	3.00	100.0
	168.60-			
27	171.60	3.00	3.05	101.7
	171.60-174.60	3.00	3.05	101.7
	174.60-			
28	177.60	3.00	3.00	100.0
	177.60-180.60	3.00	3.00	100.0
	180.60-			
29	183.60	3.00	2.98	99.3
	183.60-186.60	3.00	3.05	101.7
	186.60-			
30	189.60	3.00	2.97	99.0
	189.60-192.60	3.00	3.05	101.7
	192.60-193.06	.46	.46	100.0
	193.06-			
31	195.6	2.54	2.54	98.4
	195.60-198.6	3.00	3.08	102.7
	198.60-			
32	201.6	3.00	2.97	99.0
END OF NS3	TOTAL Cored Interval	184.21	182.51	99.1

NS3

Sample No.	Interval (m)	Length (m)	Recovery %
NSD 209	18.80-20.95	2.15	92
210	20.95-22.95	2.00	50
211	22.95-23.90	0.95	50
212	23.90-24.45	0.55	91
213	24.45-26.35	1.90	100
214	26.35-28.35	2.00	100
215	28.35-30.20	1.85	100
216	30.20-32.20	2.00	96
217	32.20-34.10	1.90	100
218	34.10-36.00	1.90	100
219	36.00-37.85	1.85	97
220	37.85-39.50	1.65	100
221	39.50-42.00	2.50	97
222	42.00-43.80	1.80	99
223	43.80-45.50	1.70	100
224	45.50-48.00	2.50	100
225	48.00-50.55	2.55	100
226	50.55-52.75	2.20	100
227	52.75-53.20	0.45	99
228	53.20-55.20	2.00	99
229	55.20-57.20	2.00	100
230	57.20-59.20	2.00	100
231	59.20-61.40	2.20	100
232	61.40-63.40	2.00	100
233	63.40-65.60	2.20	100
234	65.60-67.80	2.20	100
235	67.80-69.90	2.10	100
236	69.90-71.90	2.00	100
237	71.90-74.00	2.10	99
238	74.00-76.40	2.40	99
239	76.40-78.40	2.00	100
240	78.40-80.40	2.00	95
241	80.40-82.40	2.00	100
242	82.40-84.40	2.00	100
243	84.40-86.15	1.75	100
244	86.15-88.00	1.85	98
245	88.00-89.60	1.60	100
246	89.60-91.50	1.90	96
247	91.50-93.05	1.55	94
248	93.05-95.00	1.95	100
249	95.00-96.70	1.70	100
250	96.70-98.50	1.80	100
251	98.50-100.50	2.00	100
252	100.50-102.40	1.90	100
253	102.40-104.30	1.90	100
254	104.30-105.25	0.95	100
255	105.25-107.25	2.00	100
256	107.25-109.30	2.05	100
257	109.30-111.30	2.00	100
258	111.30-113.30	2.00	100
259	113.30-115.30	2.00	100
260	115.30-117.30	2.00	100
261	117.30-119.30	2.00	100
262	119.30-121.30	2.00	100
263	121.30-122.50	1.20	100
264	122.50-124.90	2.40	100

Sample No.	Interval (m)	Length (m)	Recovery %
NSD 265	124.90-126.90	2.00	100
266	126.90-129.00	2.10	100
267	129.00-131.10	2.10	100
268	131.10-133.10	2.00	100
269	133.10-135.10	2.00	95
270	135.10-137.10	2.00	95
271	137.10-139.20	2.10	95
272	139.20-141.34	1.14	95
273	141.34-143.30	1.96	95
274	143.30-145.40	2.10	95
275	145.40-147.60	2.20	100
276	147.60-149.90	2.30	100
277	149.90-151.90	2.00	100
278	151.90-153.90	2.00	99
279	153.90-155.90	2.00	100
280	155.90-157.90	2.00	100
281	157.90-160.00	2.10	100
282	160.00-162.00	2.00	100
283	162.00-164.00	2.00	100
284	164.00-166.00	2.00	100
285	166.00-167.65	1.65	100
286	167.65-169.65	2.00	100
287	169.65-171.65	2.00	100
288	171.65-173.65	2.00	100
289	173.65-175.65	2.00	100
290	175.65-177.90	2.25	100
291	177.90-179.90	2.00	100
292	179.90-181.90	2.00	100
293	181.90-184.20	2.30	100
294	184.20-185.30	1.10	100
295	185.30-187.30	2.00	100
296	187.30-189.30	2.00	100
297	189.30-191.30	2.00	100
298	191.30-193.55	2.25	100
299	193.55-195.40	1.85	100
300	195.40-196.70	1.30	100
301	196.70-198.50	1.80	100
302	198.50-200.30	1.80	100
303	200.30-201.40	1.10	100
304	201.40-201.60	0.20	100

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Appendix 4

PERCUSSION DRILLHOLE

REPORTS - NSP1-4

- NORTH SCAMANDER PROSPECT

Hole No:	NSP1	2	3	4
Location:	500W 1585N	540W 1230N	570W 1310N	695W 1370N
Depression:	Vertical	Vertical	Vertical	Vertical
Depth:	50m	50m	50m	26m
R.L.:	ND	ND	ND	ND
Commenced/Completed:	11-12/9/80	13/9/80	14/9/80	15/9/80
Depth of Oxidation:	43m	~50m	>50m	~17m
Depth of Water Table:	-	-	-	25m

CHIP SAMPLE LOGS

HOLE NO.	SAMPLE NO.	DEPTH (M)	DESCRIPTION
1	NSP 1	2-3	ox, red sst, cream/red shale, non-mag.
	2	3-4	ox, red sst, cream/red shale.
	3	4-5	ox, red sst, red shale, non-mag.
	4	5-6	ox, red sst, red shale.
	5	6-7	ox, cream shale/red sst, non-mag.
	6	7-8	ox, cream shale/red sst.
	7	8-9	ox, cream, red shale, red sst, non-mag.
	8	9-10	ox, cream, red shale.
	9	10-11	ox, cream, red shale.
	10	11-12	ox, cream, red shale.
	11	12-13	ox, red shale, qtz, minor sst, non-mag.
	12	13-14	ox, red shale, minor sst.
	13	14-15	ox, red shale, minor sst.
	14	15-16	ox, red shale, minor sst.
	15	16-17	ox, red shale, qtz, minor sst.
	16	17-18	ox, red sst, shale, non-mag.
	17	18-19	ox, red sst, shale.
	18	19-20	ox, mostly red sst, non-mag.
	19	20-21	ox, red sst/shale.
	20	21-22	ox, red sst/shale.
	21	22-23	ox, mostly red sst, minor shale; some black Feox.
	22	23-24	ox, mostly red sst, minor shale.
	23	24-25	approx base complete ox.
	24	25-26	ox, red-grey sh/sst.
	25	26-27	ox, red-grey shale/sst, minor qtz.
	26	27-28	
	27	28-29	
	28	29-30	ox, red-green grey sst, non-mag.
	29	30-31	ox, red-green grey sst, shale, non-mag.

.../2

HOLE NO.	SAMPLE NO.	DEPTH (M)	DESCRIPTION
1	30	31-32	red-green grey sst, shale.
	31	32-33	ox, grey green-red sst, minor shale.
	32	33-34	ox, grey green-red sst, minor shale, no S^{2-} seen.
	33	34-35	Grey/(red) sst, as above.
	34	35-36	Grey-red sst, no qtz, no S^{2-}, non-mag.
	35	36-37	
	36	37-38	Grey-red sst (50/50), minor red shale, no S^{2-}.
	37	38-39	Grey-green sst, minor red sst, non-mag, no shale.
	38	39-40	As above.
	39	40-41	As above, more red sst, minor shale.
	40	41-42	As above, less red shale.
	41	42-43	As above, 50/50 red/grey sst, no qtz or S^{2-}.
	42	43-44	- Base of partial oxidation?
	43	44-45	Mostly dk grey shale, grey slst, no qtz or S^{2-}.
	44	45-46	As above, some lt grey slst, Feox coatings-contam?
	45	46-47	Mixed grey sh/sst, no S^{2-} seen.
	46	47-48	Mixed grey sh/sst, no S^{2-} seen.
	47	48-49	Grey sst, no qtz, no S^{2-} seen.
	48	49-50	Grey slst, shale, sst, no qtz, no S^{2} seen.
		T.D.	
2	49	1-2	ox, red and cream shale, minor sst.
	50	2-3	ox, red/cream sst/shale, orange-yellow limonite.
	51	3-4	ox, red/cream sst/shale, orange-yellow limonite.
	52	4-5	
	53	5-6	ox, mostly red/cream shale/sst.

.../3

HOLE NO.	SAMPLE NO.	DEPTH (M)	DESCRIPTION
2	54	6-7	
	55	7-8	ox, cream (minor red) shale, minor sst, no qtz.
	56	8-9	
	57	9-10	ox, cream/red shale, minor sst.
	58	10-11	
	59	11-12	ox, cream shale, v. minor limonite.
	60	12-13	As above.
	61	13-14	ox, mostly cream shale, minor red sst, limonite.
	62	14-15	ox, as above.
	63	15-16	ox, as above.
	64	16-17	ox.
	65	17-18	ox, cream/pink shale, 60/40, no qtz.
	66	18-19	ox, mostly pink/cream shale, minor red sst.
	67	19-20	ox, 80% cream shale, red pink shale.
	68	20-21	ox, 90% cream/grey shale, minor pink shale.
	69	21-22	ox, as above.
	70	22-23	ox, as above, more pink shale.
	71	23-24	ox, as above.
	72	24-25	ox, 50/50 red-pink/cream grey shale.
	73	25-26	
	74	26-27	ox, as above, some black Fe ox mfracs.
	75	27-28	As above. - Approx base complete oxidation.
	76	28-29	ox, pink-grey shale.
	77	29-30	ox, grey to pink slst, harder than above.
	78	30-31	ox, grey to pink slst, or fine sst, limonite.
	79	31-32	ox, as above.
	80	32-33	ox, 80% grey slst/sst, minor vein qtz, red limonite.

.../4

HOLE NO.	SAMPLE NO.	DEPTH (M)	DESCRIPTION
2	81	33-34	ox, as above, lower limonite (5%)
	82	34-35	Grey sst/slst, minor qtz, limonite(2%).
	83	35-36	Grey sst/slst, minor limonite frac coatings.
	84	36-37	As above, pink lim coats fracs.
	85	37-38	As above.
	86	38-39	As above, sl more limonite.
	87	39-40	90% lt grey shale, minor limonite.
	88	40-41	As above.
	89	41-42	As above, grey-cream, 5% limonite.
	90	42-43	As above.
	91	43-44	As above, 5% pink-maroon limonite.
	92	44-45	As above.
	93	45-46	As above.
	94	46-47	Lt grey-green shale, tr only limonite.
	95	47-48	Lt grey shale/slst, minor limonite.
	96	48-49	Lt grey shale, minor limonite.
	97	49-50	Lt grey shale, v. low limonite (<1%).
		T.D.	near base of partial oxidation.
3	NSP98	1-2	ox, shale/sst, non-magnetic.
	99	2-3	ox, shale/sst, shale dom, non-mganetic, pink Fe ox.
	100	3-4	ox, pink-grey cream shale, minor sst.
	101	4-5	ox, as above.
	102	5-6	ox, as above.
	103	6-7	ox, grey-pink sst dom less shale.
	104	7-8	ox, cream to brown shale, minor sst.
	105	8-9	ox, 90% cream-brown/grey shale, minor Fe ox.
	106	9-10	ox, as above.
	107	10-11	ox, as above.

.../5

HOLE NO.	SAMPLE NO.	DEPTH (M)	DESCRIPTION
3	108	11-12	ox, as above.
	109	12-13	ox, as above, sl more limonite.
	110	13-14	ox, pink to maroon shale, minor cream shale.
	111	14-15	ox, as above, minor yellow shale.
	112	15-16	ox, maroon shale/sst 70:30?
	113	16-17	ox, brown-maroon shale, minor sst.
	114	17-18	ox, cream sst/shale 80:20.
	115	18-19	ox, cream-grey sst, minor shale, yellow Feox.
	116	19-20	ox, 90% yellow-brown clay (shale).
	117	20-21	ox, as above.
	118	21-22	ox, as above - shale.
	119	22-23	ox, as above.
	120	23-24	ox, as above, brown-yellow shale.
	121	24-25	ox, as above.
	122	25-26	ox, as above.
	123	26-27	ox, mostly brown sst, shale minor.
	124	27-28	ox, as above, to 40% brown shale.
	125	28-29	ox, brown slst/sh, minor vein qtz.
	126	29-30	ox, 90% red-brown shale.
	127	30-31	ox, as above.
	128	31-32	ox, as above.
	129	32-33	ox, mostly fine red-brown sst, minor sh. - base of complete oxidation.
	130	33-34	ox, as above, minor grey-green shale.
	131	34-35	ox, as above, v. minor shale, Fe ox on joint.
	132	35-36	ox, 70% red sst, 30% grey-green sst.
	133	36-37	ox, 90% red sst.
	134	37-38	ox, as above, minor shale.
	135	38-39	ox, 70% red sst, 30% brown-red slst/sh.
	136	39-40	ox, as above.

.../6

HOLE NO.	SAMPLE NO.	DEPTH (M)	DESCRIPTION
3	137	40-41	ox, as above, minor red shale.
	138	41-42	ox, as above, 20% cream-grey and red shale.
	139	42-43	ox, as above, 20% cream shale.
	140	43-44	ox, as above, 40% shale, non-mag.
	141	44-45	ox, 60% cream to green shale, 40% red slst/sst.
	142	45-46	ox, 70% grey-green fine slst/sh, hard, tr qtz.
	143	46-47	ox, 80% red hard fine sst/slst, 20% grey slst.
	144	47-48	ox, as above, minor red shale.
	145	48-49	ox, as above.
	146	49-50	ox, as above.
		T.D.	
4	147	1-2	ox, mixed red sst, red-brown shale.
	148	2-3	ox, as above.
	149	3-4	Mostly hard, brown-red slst, minor shale.
	150	4-5	ox, as above, brown-red slst/shale.
	151	5-6	ox, red brown to pink sst, minor shale.
	152	6-7	Partially ox'd, 80%+ fine grey-gn qzte, Fe ox on joints.
	153	7-8	As above, no S^{2-}, Fe ox on joints.
	154	8-9	As above, minor shale, red sst.
	155	9-10	Mostly grey to red-brown shale minor red slst.
			- base of complete oxidation.
	156	10-11	Grey shale, Fe ox stains on joints.
	157	11-12	As above, trace only Fe ox.
	158	12-13	As above, hard slst, no S^{2-} seen.
	159	13-14	As above, more bleached and Fe ox stained.
	160	14-15	Grey to green slst/shale, minor Fe ox cream shale.

.../7

HOLE NO.	SAMPLE NO.	DEPTH (M)	DESCRIPTION
4	161	15-16	As above.
	162	16-17	As above, no S^{2-}.
	163	17-18	Hard green-grey sst/slst, minor py, gal? minor Fe ox in qtz vnlt.
	164	18-19	As above
	165	19-20	As above, minor Fe ox
	166	20-21	Grey-green shale and slst, minor Fe ox on joints.
	167	21-22	As above, minor pyrite visible.
	168	22-23	Hard, gy gn slst/sst, v. minor Fe ox.
	169	23-24	As above, trace Fe ox, minor pyrite.
	170	24-25	As above, trace pyr, grey clay minor.
	NSP171 (wet sample)	25-26	No duplicate.
		T.D.	- poor sample return below water table.

APPENDIX 5

PETROGRAPHIC DESCRIPTIONS

894192

EXPLORATION DEPARTMENT
Petrology Section

Clayton, Victoria 3168
P.O. Box 274, Clayton
Telephone 560-7066

Memo to: MR. RICK HINE, HOBART OFFICE

Date 31/10/80
Our Ref: DJG:DS
Your Ref:
File: M.552
Date:

Subject: E1/15 - IDENTIFICATION OF PALE BLUE FIBROUS MINERAL FROM DDH NS 2, NORTH SCAMANDER PROSPECT, TASMANIA

The transparent pale blue fibrous to platy mineral in NS 2, 34.65m (MRL 12512) and NS 2, 39.4m (MRL 12513) has been identified as the hydrous iron phosphate, vivianite by XRD and SEM.*

Minor pyrite, pyrrhotite, siderite and a trace of possible chalcopyrite were detected by XRD.

Vivianite has been recorded elsewhere in the world as a secondary mineral in metalliferous veins or as an alteration product of primary phosphate minerals.

D.J. GILBERT
Petrologist

C.J. ALENSON
Technician

c.c. Mr. J. Harms)
Dr. J. Smit) Exploration, Camberwell
Dr. A. Goode)
Mrs. D. Jenkinson - Library, Camberwell

* Confirmed by XRD where the following lines with intensities in brackets, were recorded:
6.70 (100), 2.69 (67), 3.19 (53), 2.31 (27), 1.68 (10). Major Fe, P were detected by SEM.

894193

Pontifex & Associates Pty. Ltd.

TEL. 332 6744
A.H. 31 3816

26 KENSINGTON ROAD, ROSE PARK
SOUTH AUSTRALIA

P.O. BOX 91, NORWOOD
SOUTH AUSTRALIA 5067

MINERALOGICAL REPORT NO. 3188

6th February, 1981

TO:	Mr. R. Hine, C/o BHP Exploration Office, B.H.P. Co. Ltd., G.P.O. Box 114, HOBART. TAS. 7001
COPY TO:	Dr. A.D.T. Goode, Exploration Dept., B.H.P. Co. Ltd., P.O. Box 559, CAMBERWELL. VIC. 3124
COPY TO:	Mr. D.J. Gilbert, B.H.P. Co. Ltd., Melbourne Research Laboratories, P.O. Box 264, CLAYTON. VIC. 3168
YOUR REFERENCE:	Letter from D.J. Gilbert 19/12/80 File No. PM9.
MATERIAL:	Rock samples (37)
IDENTIFICATION:	MRL 12,653 to 12,689 including: PPT Series (7) MST Series (6) NS-3 Series (16) HP Series (8)
WORK REQUESTED:	Preparation of thin and polished sections as specified, brief description of all sections.
SAMPLES & SECTIONS:	Returned to D. Gilbert at M.R.L., Clayton, address above.

PONTIFEX & ASSOCIATES PTY. LTD.

COMMENTS, NS - 3 Series (22.1 to 197.6 m)

These 16 core samples were examined in thin and polished section as requested, and obviously maximum information will be gained by systematically checking through the descriptions. Brief summary comments follow.

1. Lithology

Virtually all samples (except 'shales' at 27.9 and 197.6) represent essentially the same, low grade metamorphosed sedimentary facies, identified as 'sandstone' in this report.

This facies is generally dominated by a vaguely bedded fairly compact and somewhat unsorted aggregate of single crystal quartz grains, minor cherty and sericitic lithic fragments, all with a grain size range from very fine to coarse sand. The grains are variably subangular to rounded, with no features diagnostic of a specific identifiable source rock.

Intergranular matrix consist of fine sericite, extremely fine quartz, lesser and more localised chlorite; these are partly low grade metamorphosed pelitic detritus, partly secondary ('hydrothermal'), particularly the silicified rock 69.5.

Accessory small grains of carbonate (ankerite ?) and of titaniferous oxides (leucoxenitic bub including rutile) are commonly disseminated. Trace fine graphite occurs 27.9 and 197.6.

Some rocks are moderately stressed and fractured mainly in the lower part of the hole (below 152.0), although 119.7 appears to be a breccia.

cont...

Comments NS - 3 Series cont...

2. Mineralisation

Sulphide mineralisation occurs throughout in generally minor (<10%) to sparse extent, almost invariably in veins, stringers; rarely more concentrated invading shears and/or breccias in the lower part of the hole. Rare disseminated pyrite occurs at 22.1, disseminated pyrrhotite at 197.6, and rare authigenic euhedral pyrite occurs in the host rock, independently of veins in several samples.

The mineral assemblage in the veins is manifest by various combinations and abundances of quartz, carbonate (? ankerite), very fine chlorite, coarser decussate chlorite, muscovite/sericite; (rare albite (in 170.7), and titaniferous phases (31.0).

"Ore-minerals" are most commonly sphalerite lesser pyrite and galena, trace chalcopyrite, down to 119.7.

At 119.7 secondary pyrite/marcasite pseudomorphs after pyrrhotite occur and below this to the bottom of the hole pyrrhotite is probably the most widespread sulphide, but accompanied by generally minor sphalerite, much lesser chalcopyrite, trace galena; and locally pyrite.

The most mineralised sample is at 176.5 where the sheared host rock, also sheared and granulated magnetite are invaded by veins of pyrrhotite and base metal sulphides; also at 181.7 which is a breccia invaded by a network of coarse pyrrhotite sphalerite, trace chalcopyrite.

Magnetite occurs only at 176.5, where it formed before the sulphides, possibly from a genetically different source.

NS - 3, 22.1 : lowgrade metamorphosed, fine to medium grained,
MRL 12,666 weakly lithic quartz sandstone, with an extensive mainly sericitic matrix;
minor disseminated pyrite and 'ankerite';
minor veins of quartz-ankerite carrying minor sphalerite, lesser galena, trace chalcopyrite, stringers of quartz-sphalerite.

This is a massive, homogeneous rock composed largely (50%) of a rather loose-packed aggregate of subangular to subrounded quartz grains ranging in size from about 0.1 to 0.5 mm.

Minor fairly discrete 'grains' of clay-sericite (? 15%) are difficult to resolve from the ubiquitous intergranular matrix of the same composition (30%). These clay-sericite 'grains' may be altered lithic detritus or possibly altered felspars.

Accessory detrital muscovite, and possibly detrital biotite, are present. Minor highly irregular, small (0.2 mm) patches of ankeritic-carbonate 'cement' are scattered, more abundant in some areas than in others.

Accessory, small (0.2 mm) euhedral crystals of pyrite (1 - 2%) are disseminated. Several veins of fairly coarse, ankeritic carbonate also contain subordinate quartz. A stringer of quartz-sphalerite cuts across, and is presumably later than the coarser veins, however irregular grains of sphalerite and less galena also occur in the coarse 'ankerite' veins. Trace, minute exsolution blebs of chalcopyrite occur in sphalerite.

NS - 3, 27.9 : lowgrade metamorphosed pelitic siltstone, accessory
MRL 12,667 dispersed fine TiO_2's, ankerite, graphite;
veins of coarse ankerite, quartz and rare coarse
sphalerite.

This is a thin-bedded to laminated compact, homogeneous, lowgrade metamorphosed sediment composed of intimately mixed, quartz silt and pelitic detritus in similar abundance. The pelitic component forms a ubiquitous extremely fine matrix to the slightly coarser quartz grains.

Minute (0.03 mm) titaniferous granules (? 3%), trace granules of ankerite and authigenic tourmaline and trace fine graphite are disseminated, more or less along the bedding.

A vein and several supplementary stringers of coarse ankerite + minor quartz cut across the bedding. A single crystal of sphalerite ± trace minute pyrite occurs in one vein.

NS - 3, 31.0 : massive, medium grained (lithic), chloritic and
MRL 12,668 sericitic quartz sandstone, scattered ankerite;
ankerite ± quartz veins;
patchy quartz-chlorite-sphalerite + associated
fine muscovite, TiO's, trace galena pyrite chalcopyrite.

This grey, massive, fine grained lowgrade metamorphosed sediment is petrographically, essentially the same as NS - 3, 22.1, with the minor exceptions that slightly more irregular ankerite grains (7-10%) are disseminated and minor chlorite forms part of the sericitic-lithic grains and matrix.

This acts as host rock to two types of grains:-

1. veins of ankerite + minor fine pyramidal quartz, but without sulphide.

2. more extensive mineralisation filling irregular fractures, composed of irregular quartz mosaic, crowded with patches of spherulitic-chlorite ± fine muscovite and fibrous-titaniferous material including ± rutile; minor ankerite and fine decussate chlorite; also irregular coarse sphalerite. Trace extremely fine pyrite, galena and lesser chalcopyrite accompanies sphalerite.

NS - 3, 35.7 : massive to thin bedded, medium grained, (lithic) sericitic quartz sandstone, spotted with ankerite; veins of ankerite, chlorite carrying accessory sphalerite and lesser galena, trace pyrite.
MRL 12,669

This is a thin bedded sequence of mainly sericitic fine quartz sandstone, with accessory small spots of ankerite and of titaniferous oxides, very similar to 22.1 and 31.0.

Minor ill-defined interbeds become more sericitic and approach the composition of 27.9.

Highly irregular veins of ankerite, subordinate fine decussate chlorite, and lesser associated very fine muscovite cut the rock at random.

In the thin section these veins carry trace fine sphalerite. In the selectively chosen polished section the same veins carry more abundant, (but minor), coarser sphalerite with trace very fine inclusions of galena. Lesser fine galena and trace pyrite also occurs independently in carbonate.

NS - 3, 50.6 : massive to vaguely thin bedded, (lithic and weakly
MRL 12,670 chloritic) sericitic quartz sandstone;
veins of quartz, chlorite, lesser sphalerite, trace
pyrite and galena.

This is essentially the same facies as in NS - 3 rocks described above. A fairly compact, vaguely bedded aggregate of subangular to subrounded quartz grains, up to 0.5 mm, and very minor sericitic/siliceous/chloritic lithic detritus in this size range, have a ubiquitous matrix of lowgrade metamorphic sericite mixed with fine quartz and accessory chlorite.

Accessory detrital muscovite, zircon, semi-opaque titaniferous spots, also rare spots of ankerite are all disseminated.

Several veins of fairly coarse, largely prismatic quartz, together with cryptocrystalline quartz and minor fine chlorite, carry accessory fine ankerite, sphalerite and pyrite. One vein consisting of an equal amount of quartz and decussate chlorite contains slightly more (albeit minor) sphalerite, lesser pyrite and galena.

NS - 3, 69.5 : silicified quartz sandstone;
MRL 12,671 stringers of quartz ankeritic-carbonate chalcopyrite;
veins of carbonate decussate muscovite, quartz, pyrite.

This sandstone contains less sericitic matrix, but more extensive extremely fine intergranular (secondary) quartz than in most NS - 3 samples above. The detrital quartz grains tend to be subrounded to rounded (although with some subangular). These grains form a fairly compact aggregate, which is further consolidated by the intergranular quartz. Accessory fine titaniferous granules are disseminated.

Numerous stringers of quartz and/or ankeritic-carbonate and minor muscovite appear to be barren of sulphides. Wider veins consist variably of coarse carbonate + accessory chalcopyrite; also of ankerite quartz and essential decussate muscovite/sericite, carrying fairly coarse pyrite.

NS - 3, 94.2 : massive (very weakly lithic and chloritic) sericitic
MRL 12,672 quartz sandstone, accessory scattered ankeritic-carbonate;
veins of quartz, chlorite, lesser carbonate trace sphalerite;
trace pyrite disseminated.

This rock is so similar to 50.6 that a separate description is not warrented, (although it does contain slightly more (5-7%) scattered fine ankerite (as well as titaniferous granules).

Irregular veins are generally dominated by quartz, commonly fine prismatic/columnar traversing the full width of the vein. Subordinate chlorite in the veins is variably extremely fine spherulitic/vermicular, to decussate and bladed partly lining the veins. Minor carbonate occurs in veins, but may branch off as stringers.

Trace fine sphalerite occurs in the veins.

Trace fine pyrite appears to be disseminated, but may be indirectly related to the veins.

NS - 3, 100.7 : vaguely bedded very fine to coarse quartz sandstone,
MRL 12,673 intergranular ankeritic-carbonate (meta) quartz
lesser chlorite;
veins of carbonate quartz, muscovite pyrite;
trace chlorite, chalcopyrite.

This rock has less sericitic matrix than in most above, and grains are fairly commonly rounded. It consists mainly of a compact, bedded aggregate of quartz grains to 1 mm in maximum dimension. Fine, turbid, ankeritic carbonate (7-10%), equally fine turbid chlorite (5%) and extremely fine secondary quartz mosaic (7-10%) are widespread through intergranular areas.

The aggregate is locally stressed, with elongation of the aggregate.

Numerous irregular veins consist of variable amounts of ankeritic-carbonate, fine decussate muscovite, quite coarse quartz and generally euhedral pyrite; only accessory fine chlorite, and very fine chalcopyrite.

Several stringers of pyrite are present.

NS - 3, 119.7 : ? breccia of sandstone, with intergranular areas,
MRL 12,674 and patchy diffuse ? interfragmental matrix, of fine silica chlorite trace carbonate;
veins of carbonate chlorite sphalerite, lesser quartz, chalcopyrite, euhedral-zoned pyrite and marcasite after pyrrhotite and trace galena.

This is a fairly heterogeneous host rock to numerous veins, due to fairly extensive secondary silicification, which may in fact take advantage of dislocation within the original sediment.

Irregular domains of fine to medium quartz sandstone to 3 mm across (? relict breccia fragments), contain fairly extensive intergranular fine secondary quartz and chlorite, much less carbonate and sericite.

These domains occur within a matrix of ultrafine quartz crowded with fine chlorite (which apparently pervades the original ? breccia).

Relatively more discrete veins of fine chlorite, ankeritic-carbonate and lesser quite coarse quartz, also carry fairly abundant sphalerite (most closely associated with carbonate). The sphalerite carries fine exsolved chalcopyrite, small patches of chalcopyrite, also coarse euhedral pyrite (zoned and with inclusions); and lesser marcasite/secondary pyrite after pyrrhotite.

Trace fine galena accompanies sphalerite.

NS - 3, 152.0 : strongly sericitic (chloritic and silicified), unsorted fine to coarse quartz sandstone incorporating (? breccia) slivers of shale); veins of chlorite ± quartz sphalerite, trace carbonate, pyrite pyrrhotite, galena, chalcopyrite.
MRL 12,675

An extremely fine siliceous, sericitic matrix is more extensive in this rock than in most others described above. Variably angular to rounded, detrital quartz grains (40-50%) to 0.7 mm, are rather unsorted, but vaguely bedded through a matrix of weakly schistose sericite and minor chlorite within extremely fine (meta) quartz mosaic.

Minor lithic detritus is tentatively interpreted, but ill-defined because it has essentially the same composition as the matrix.

This facies incorporates slivers of shale (? part of a sedimentary or tectonic breccia).

Random veins and stringers are dominated by chlorite, but with minor vein quartz, sphalerite, lesser carbonate and small blebby grains of pyrrhotite, lesser galena and chalcopyrite.

NS - 3, 170.7 : unsorted, fine to coarse, and weakly lithic quartz sandstone;
MRL 12,676 extensive (chloritic) siliceous and sericitic matrix;
numerous gash-like veins of pyrrhotite;
accessory chlorite, quartz, (albite), chalcopyrite lesser sphalerite and galena.

This rock is virtually the same as 152.0, and thus also somewhat distinguished from most other NS - 3 core by virtue of the extensive siliceous/sericite matrix. Minor small clasts of cherty and sericitic composition are scattered through the aggregate.

Abundant, small to large gash-like veins of mineralisation throughout the core consist mainly of fairly coarse pyrrhotite. Associated gangue minerals are quartz, with minor decussate vaguely fine bladed chlorite, and relatively concentrated fine sericite along the margins of the sulphide. Abnormally coarse (1-2 mm) crystals of albite occur with chlorite in one quartz vein.

Rare, small 0.05 to 0.5 mm grains of sphalerite galena and chalcopyrite occur locally within some of the coarser pyrrhotite.

NS - 3, 172.6 : host rock the same as at 170.7, + irregular
MRL 12,677 lenses of silty sericitic shale, containing coarse massive aggregate of pyrrhotite, with accessory chalcopyrite and sphalerite; minor quartz-pyrrhotite veinlets.

Most of this sample consists of a very coarse, massive aggregate of pyrrhotite. This carries accessory, small (0.2 mm) inclusions of chalcopyrite and trace associated sphalerite. Trace (<1%), very small (0.05 mm) grains of ? pentlandite are also scattered as inclusions in the pyrrhotite.

The host rock to this massive pyrrhotite, together with subsidiary quartz-pyrrhotite veinlets is essentially the same as at 170.7, but does also incorporate patches or irregular lenses of silty sericitic shale with minor small skeletal grains of carbonate (rather like 27.9).

NS - 3, 173.7 : same lithology as 170.7, but weakly shear-
MRL 12,678 stressed quartz veins ± minor carbonate and sericite, carry pyrrhotite ± trace chalcopyrite; rare coarse authigenic pyrite crystals.

This rock has essentially the same composition and texture as 170.7, with fine to medium quartz grains and minor cherty and sericitic small clasts set within an extensive matrix dominated by extremely fine sericite and (meta) quartz.

This aggregate appears to have been stressed and several quartz sulphide veins have consequently slightly recrystallised along the shear direction. Minor carbonate and sericite in those veins are also slightly sheared out.

Fine sulphides in the quartz veins are dominantly pyrrhotite, trace associated, very fine chalcopyrite.

Several large, euhedral (and poikiloblastic) pyrite crystals occur independently of the veins, i.e. essentially authigenic.

NS - 3, 176.5 : sheared granulated, massive aggregate of magnetite
MRL 12.679 and remnants of host sediment similar to 170.7; invaded, partly replaced, and now intergrown with chlorite carbonate, also veins of chalcopyrite, pyrrhotite, sphalerite lesser galena.

This rock has a combined wavy-shear and fairly finely granulated texture developed within a 'mineralisation assemblage', in contact with and invading a host rock very similar to 170.7.

The 'mineralisation assemblage' consists mainly of crude layers and trains of fine granular magnetite. Crude foliae and stringers filling fractures between the granular magnetite apparently invading and replacing it, consists of quite coarse, dark sea-green, decussate chlorite, mixed with subordinate, extremely fine and somewhat turbid carbonate. These components also tend to penetrate intergranular areas in the host sediment.

Discontinuous patchy veins of coarse pyrrhotite chalcopyrite and pyrrhotite, lesser fine galena (commonly as inclusions in chalcopyrite and pyrrhotite).

NS - 3, 181.7 : probable breccia, of facies essentially the same
MRL 12,680 at least as the 10 m above in this hole;
extensively mineralised by a network of coarse
pyrrhotite, sphalerite trace exsolved chalcopyrite.

The lithology of this sample is essentially the same as that at 170.7 through to 176.5. It is host to a random network of sulphide mineralisation the texture of which indicates that the rock was probably brecciated, prior to mineralisation.

This network is dominated by pyrrhotite which forms a composite aggregate with subordinate sphalerite. Trace minute grains of exsolved chalcopyrite occur in the sphalerite.

NS - 3, 197.6 : sericitic shale, locally silty to fine sandy,
MRL 12,681 very fine pyrrhotite and trace graphite along
cleavage in some beds;
fractures filled by veins of fine crystalline
pyrrhotite.

This rock consists of a homogeneous sericitic shale, with minor laminations, lenses and tongues along the bedding of a similar composition, but carrying minor quartz silt and fine sand, and/or very dark grey due to minor graphite.

Abundant, extremely fine (0.03 to 0.2 mm) 'flakes' of pyrrhotite occur in parts of some beds, more or less along a primary (S_1) cleavage but partly reoriented along a weak S_2 direction. Small (0.5 mm) poikiloblastic spots of carbonate (3-5%) occur locally.

Several simple, but intersecting fractures have been penetrated by veins of massive fine crystalline pyrrhotite, with a very thin rim of microcrystalline vein quartz.

894212

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29th April, 1981

REPORT CMS 81/3/42

YOUR REFERENCE:	Letter dated 20.3.1981
DATE RECEIVED:	24th March, 1981
SAMPLE NOS.:	DDH NS 1 - 13 T.S. 12 P.S.
SUBMITTED BY:	D.J. Gilbert
WORK REQUESTED:	Petrology/Mineralogy

Copy to:
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REPORT CMS 81/3/42

DDH NS 1

Thirteen thin-sections and twelve polished sections were received for examination and description; the absence of hand specimens precluded other tests and studies and thus inevitably affected the quality of the results.

The descriptions are given in the accompanying tables, with separate descriptions for petrology and ore-microscopy, since meterages were not always the same for thin- and polished section samples.

Summary

The host rocksfor the mineralisation consist of a series of lithologically related sandstones, siltstones and shales; they are well-indurated, with recrystallization of matrix/cement, but with clastic textures clearly preserved. A few contain carbonaceous matter, and rocks such as 198.7 m are typical of "black shale" sequences, but on the whole the lithology is bland and featureless. Some stress is evident in most rocks and a few are brecciated.

Mineralisation is epigenetic, occurring in crosscutting veins and patches postdating the dynamic metamorphism. It is typically hydrothermal in terms of its sulphide and accompanying gangue assemblages. Significant amounts of fine cassiterite ("needle-tin") occur in one intersection (55.9 m); the mode of occurrence suggests low temperature/energy conditions prevailing; this is supported by the presence of low-Fe sphalerite, and suggests that cassiterite mineralisation could be better (more widespread, coarser) nearer the source of mineralisation.

H.W. Fander, M. Sc.

TABLE 3

Central Mineralogical Services

ple No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
DDH NS 1 35.6 m	Mineralised Argillaceous Sandstone. Subrounded/ rounded quartz grains, minor feldspar; sericite-quartz matrix-cement, sulphide-quartz-carbonate-chlorite veins.	Fairly poorly-sorted/ sized, vaguely bedded; silt- to fine-sand sizes.	Small polkiloblastic carbonate patches (?siderite). Detrital heavy minerals.	Rock is indurated, but not meta= morphosed; not affected by mineralisation (see separate descriptions of sulphides).
54.65 m	Brecciated, Indurated Siltstone. Rock grades from a coarser micaceous, quartzose silt to a finer, recrystallized, clay-rich siltstone.	Graded bedding; blocky fracturing postdating induration.	Small carbonate patches throughout. Chlorite fracture-fillings.	Possibly incipiently metamorphosed; featureless rock. Carbonate spots probably diagenetic.
55.9 m	Mineralised Quartzite. Subangular, fine sand-sized quartz grains, well-cemented, partly recrystallized; interstitial sericite. Chlorite-sulphide-cassiterite-carbonate veins.	Well-sorted/sized, well- indurated fabric; minor fracturing.	Small muscovite flakes associated with veins. Detrital heavy mineral grains.	Cassiterite as small, matted needles 10-20 μ across, 20-100 μ long, as radiating groups embedded in chlorite, carbonate.
76.2 m	Mineralised Orthoquartzite. Well-rounded, closely-packed quartz grains cemented by quartz, minor sericite. Veins of quartz-chlorite-carbonate-sphalerite.	Quite well-sorted/sized, well-indurated; grains are all stressed.	Traces of galena in veins. Detrital heavy minerals.	Well-indurated, incipiently dynamically metamorphosed, postdated by veining/mineralisation.
109.0 m	Brecciated Siltstone. Mostly coarse quartzose siltstone with fine interstitial sericite, chlorite, all brecciated. Contorted carbonaceous shale fragments.	Extensive fracturing, but little movement/ displacement. Indurated.	Quartz-sericite veins with traces of pyrite, sphalerite and chlorite masses.	Well-indurated, with similar lithology to rocks above. Veins postdate fracturing; sericite is pseudomorphous after ?feldspar.
121.2 m	Shale. Dominantly illite-sericite-chlorite (recrystallized clays); clastic micas and quartz; extensive quartz-chlorite-muscovite veining with sphalerite traces.	Very uniform, fine fabric; silt-size grains; incipient schistosity. Fractured.	Small carbonate patches (pre-vein). Ultrafine leucoxene throughout.	Well-indurated, possibly phyllitic; brittle fracturing and veining. Same vein assemblage as above.
163.3 m	Mineralised Argillaceous Sandstone. Rounded quartz grains in matrix/cement of fine quartz, sericite; sulphides as fine and coarse masses, irregular veins.	Moderately/poorly-sorted/sized; no bedding detected. Cp. 35.6 m.	Quartz, muscovite, with sulphides; chert and sericitised feldspar grains.	Very similar lithology to 35.6 m. Sulphide veins are quite irregular, forming networks, widening to larger patches.
165.9 m	Sericite-Quartzite. Rounded quartz grains in quartzose, sericitic matrix/cement; sericitised feldspar grains; chlorite-carbonate-sphalerite veinlets.	All grains stressed. Poorly sorted, but distinctly bedded. Fractured.	Rounded, detrital zircon. Films, grains of carbonaceous matter.	Lithology as above, though more indurated and weakly but pervasively dynamically metamorphosed.
168.35 m	Mineralised Argillaceous Sandstone. Rounded, sand-sized quartz grains set in fine sericite-quartz; many sulphide veins and ragged patches.	Poorly-sorted/sized with schistose, argillaceous lenses. Stressed fractured.	Very minor quartz, chlorite; associated with sulphides.	Similar lithology, but moreargillaceous, hence tending to be schistose in parts. Only marginally metamorphosed.

894214

Central Mineralogical Services

ple No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
DH NS 1 172.16 m	Mineralised Siltstone Breccia. Extensively fractured, veined micaceous siltstone; massive magnetite veins with chlorite, coarse sphalerite and adjacent chloritised rock.	Thoroughly brecciated. Some clastic textures preserved despite chloritisation.	Carbonate patches with atoll textures. A few muscovite flakes.	Very little host-rock represented in T.S., but lithology is similar to 109 m. Sphalerite is pale, despite abundant magnetite.
173.0 m	Mineralised Quartzite-Breccia. Fragments of sericitic quartzite and siltstone; extensive veining by quartz-chlorite-sulphides-fluorite-albite-magnetite.	Sand- to silt-size grains, clastic textures preserved. Breccia fabric.	Traces of carbonate associated with veins. Contorted shale fragments.	Confused fabric, but lithologies are similar to the others. Sphalerite is a pale greenish-yellow colour, low in Fe.
184.3 m	Mineralised Argillaceous Sandstone. Well-rounded quartz grains, sericitised feldspar; fine quartz-sericite matrix/cement. Irregular sulphide patches, veins; healed fractures.	Well-sorted/sized, fine-sand-sized grains, distinctly bedded; fractured.	Detrital micas and heavy minerals (zircon, tourmaline).	Sulphide veins virtually without gangue except for minor quartz, and are very irregular.
198.7 m	*Mineralised Shale.* Fine recrystallized clay with minor carbon, passing into black argillaceous siltstone, all contorted and penetrated by sulphide veins.	Finely banded; plastically deformed, also brecciated. Fine-grained.	Sulphide veins have quartz-muscovite selvedges. Carbonate spots.	Typical black shale lithology, but sulphides are epigenetic, though perhaps originally syngenetic.

894215

Sample No.	Mineralogy of Sulphides (and other Opaque Minerals)
DDH NS 1 19.4 m	Major pyrite, sphalerite; very minor pyrrhotite, arsenopyrite; trace chalcopyrite, galena. Sphalerite contains many small, but irregular inclusions of pyrrhotite, galena, chalcopyrite, and occurs as coarse masses.
35.6 m	Major sphalerite, pyrite; minor galena; very minor pyrrhotite; trace chalcopyrite; galena occurs as masses up to 2 mm and as very small inclusions in pyrite. Sphalerite as above. Most pyrite contains numerous galena inclusions from 5 μ upwards.
55.9 m	Irregular patches, veins of sphalerite, galena, pyrrhotite; traces of pyrite, chalcopyrite (< 50 μ). Shapeless magnetite patches. Cassiterite as small radiating needles, but clusters are compact, up to 1 mm across; intergrown with, and embedded in, sulphides (sphalerite, galena).
81.35 m	Dominantly coarse pyrite, and pyritised pyrrhotite; traces of sphalerite embedded in pyrite; traces of chalcopyrite.
163.3 m	Mainly fresh pyrrhotite, as patches, veins; complexly intergrown with sphalerite, galena, and minor chalcopyrite up to 200 μ; incipient replacement of pyrrhotite by marcasite.
167.8 m	Mainly granular/polygonal pyrhotite forming coarse aggregates, with embedded fine (mostly < 100 μ) galena, sphalerite. Coarse pyrite crystals with fine galena inclusions (mainly around margins); small arsenopyrite euhedra. A few patches of chalcopyrite, up to 1 mm across.
168.35 m	Networks of pyrrhotite veins with associated traces of chalcopyrite and marcasite; scattered small platy ilmenite crystals; minor trace of sphalerite.
172.16 m	Massive fine-grained magnetite is dominant; sphalerite veins; chalcopyrite patches in magnetite from < 5 μ to 1-2 mm, with carbonate and sphalerite; minor trace of galena. Sphalerite is low-Fe variety.
173.0 m	Mainly fine magnetite (?colloform origin) with coarser patches; coarse sphalerite with small (< 10 μ) and large (to 1 mm) chalcopyrite inclusions; irregular galena patches, andfinely-granular magnetite intergrowths.
184.3 m	Veins and patches of coarse pyrrhotite and large pyrite crystals; minor associated sphalerite and traces of fine chalcopyrite (up to 200 μ, but mostly < 50 μ).
191.42 m	Mostly massive pyrrhotite, partly replaced by pyrite, with scattered arsenopyrite crystals; chalcopyrite occasionally fairly coarse (up to 1-2 mm).
198.7 m	Veins, coarse patches of granular pyrrhotite; minor embedded chalcopyrite and traces of sphalerite (pale, Fe-poor variety).

894216

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HOBART OFFICE

14.4.1981
WHR:KM:DK

E/15 - THE PETROLOGY OF SAMPLES FROM
DDH NS2 NORTH SCAMANDER PROSPECT TAS.

M576

SECTIONS EXAMINED

The following sections were microscopically examined:

Thin sections

Drill Hole		MRL. No.
NS1	77-2	12925
NS1	142-30	12926
MS2	49-50	12927
NS2	59-60	12928
NS2	65-26	12930
NS2	151-35	12931
NS2	156-10	12932
NS2	166-70	12933
NS2	192-15	12934

Polished Sections

NS1	197-9	12935
NS2	49-5	12936
NS2	89-55	12937
NS2	110-7	12938
NS2	139-35	12930
NS2	151-35	12931
NS2	156-10	12932
NS2	192-15	12934

Introduction

Ten thin sections and eight polished sections from the North Scamander prospect were optically examined in an attempt to locate any cassiterite, to describe its form and association and to interpret the paragenesis of the mineralisation.

Where necessary, optical examination was supplemented with S.E.M. and XRD techniques in order to confirm important phases and to identify minerals not readily recognisable by microscopy.

The mineralogy and textural relations are summarised below and an interpretation of the paragenesis postulated. Detailed information concerning the mineralogy and texture of individual sections is included in the appendix.

Host Rock Mineralogy and Texture

With the exception of NS2 139-35 and NS2 156-10, the host rocks of the thin sections are quartzites and share a range of common features. The differences in matrix composition, grainsize, severity of deformation and alteration are minor and do not detract from the overall impression of similarity. The quartzites are composed of irregular angular quartz grains of variable size, set in a matrix containing sericite, chlorite and fine grained quartz. Both large quartz grains and fine matrix quartz are highly strained and usually display indistinct, curved or slightly lobate boundaries. The matrix quartz seems to be a recrystallisation product and the texture of the quartzite is highly reminiscent of the "Mortar Texture" described and depicted by SPRY (1979, Plate xxx). Chlorite and/or sericite is present in the matrix in variable quantities, usually as an alignment of platy minerals along certain directed quartz grain boundaries giving a wavy or braided foliation.

In NS2 49-50, the quartz array adopts a slight dimensional preferred orientation. The other sections do not display this property to any noticeable degree.

Maximum size of quartz grains varies, the largest grains measuring 800μm in diameter (section NS1 142-30). In other sections the maximum grain size may be as little as 200μm.

Accessory minerals include zircon, rutile tourmaline, ilmenite and muscovite. Globular aggregates of a granular carbonate, possibly siderite are present in many sections.

Section NS2 151-35 (sheared and altered quartzite) contains a highly sheared fine grained band which is rich in oriented sericite and fine-grained quartz. A distinct lenticular texture has developed and the foliation appears to have been molded around and squeezed between quartzitic blocks and fragments (Plate 1b). This band probably represents the sheared equivalent of a pelitic band originally similar in texture to the slate in Section NS2 156-10.

Section NS2 139-35 (mineralised protomylonite) comprises three types of blocks or fragments set in a fine matrix composed of varying amounts of recrystallised quartz, sericite and chlorite. The matrix textures are frequently obscured by the abundant formation of sphalerite and opaques in the matrix. Highly sericitic areas have a phyllitic texture, which displays lenticular structure and is molded around blocks of more competent material.

Three types of fragments appear:

Type I — Coarse sericitic quartzite - variable sized quartz grains, maximum 500μm. Similar texture to previously described quartzite.

Type II — Fine sericitic quartzite - fairly uniformly sized quartz grains, maximum 50μm, sericite-quartz matrix.

Type III — Slate - rich in sericite and characterised by fine grain size and distinct foliation. The foliation directions of neighbouring fragments show no obvious relation.

This section represents the most highly brecciated rock examined and, according to the classification favoured by Spry, should be termed a protomylonite (10 - 50% crushed matrix, foliated).

NS2 156-10 is dominated by a strongly foliated slate. This foliation is folded into fairly broad open crenulations throughout the section. In apparently more highly sheared areas lenticular structures are developed.

Vein Mineralogy and Texture

The suite of minerals associated with veins transecting the host rocks includes quartz, muscovite, chlorite, carbonate, sphalerite, cassiterite and opaques. Among the opaques are the minerals pyrrhotite, magnetite, arsenopyrite, pyrite, galena, chalcopyrite and marcasite.

Vein quartz may be distinguished from that in the host by its larger size (up to 4mm in 166-70 but more usually 0.5 to 1.5mm) and its tendency to grow into the vein in a series of elongate parallel crystals ("columnar impingement texture" - Spry, 1969). These quartz grains frequently show euhedral terminations or hexagonal sections when bounded by carbonate. Undulose or patchy extinction occurs in many grains though it is not always displayed.

Chlorite commonly occurs in veins as coarse or fine patches with a radiating or fan shaped texture. Vermicular chlorite is intergrown with carbonate in section NS2 166-70 (Plate 1c). A third variety tentatively identified as pennine, occurs as small pale green plates within quartz-muscovite veins (section NS1 77-2) and is characterised by anomolous "ultra blue" extinction colours.

Coarse muscovite is uncommon in these sections but does occur in veins with quartz and sericite (NS1 77-2) or with quartz and chlorite (NS2 156-10) as unoriented plates and books or in occasional radiating patches.

The carbonate associated with, and interstitial to, ore mineralization was identified as siderite by XRD (NS1 197-9) and was shown to contain high Fe, minor Mg, Mn and trace Ca by SEM (NS2 110-7). Vein carbonate (NS2 110-7) was optically tested and found to have an RI $\omega = 1.78$ suggesting it too is siderite.

Vein carbonate assumes a different form to that shown by the granular, globular aggregates common in the host quartzites and slates. In the veins it tends to occur as high relief brownish pleochroic patches often displaying poikioblastic characteristics. When associated with ore minerals it tends to fill interstices and form a thin crystalline high relief band at the edge of some sphalerite-opaque bands. Section NS2 156-10 prominently shows several veins of carbonate transecting, but not displacing the main ore mineral banding. It follows that at least part of the carbonate was introduced (or re-mobilized) very late in the formation of these rocks, postdating the main phase of mineralization and tectonism.

Cassiterite

Cassiterite was optically detected in sections NS2 49-50 and NS2 110.7 and confirmed by SEM. Section NS2 49-50 shows traces of cassiterite in gauge patches within, or closely associated with, the sulphide band, or more rarely, within the sulphide itself.

The low-moderate reflectivity, subhedral square to elongate sections with rounded corners, pale internal reflections and simple twinning are distinctive (Plate 2a). The maximum (elongation) dimension ranges to approximately 100μm but is generally much lower.

A greater concentration of cassiterite occurs in the magnetite band and associated carbonate patches in section NS2 110-7. Certain carbonate patches are particularly rich (Plate 2b). The grains are widely distributed throughout the section occurring either singly or in tight clusters up to 0.5mm in length. Individual crystals usually display a square or elongate section, often with rounded corners, and attain a maximum length of approximately 100μm though the majority are much smaller (10 - 60 μm).

Sulphides and Other Opaques

The mode of occurrence and abundance of sulphide minerals, and magnetite, rutile, ilmenite and graphite is summarised below:

MINERAL	ABUNDANCE	OCCURRENCE
Pyrrhotite	Dominant in many sections.	Coarse polygonal crystalline arrays where dominant, interstitial where minor, occasionally shows dimensional preferred orientation and deformation lamellae.
Sphalerite	Subdominant in many sections.	In patches, monommerallic aggregates and interstitial to pyrrhotite.
Magnetite	Dominant in NS2 110-7 common in NS2 151-35, minor in NS1 197-9, not detected in others.	Small subhedral to anhedral grains or, in NS2 110-7, as tight aggregate.
Arseno-pyrite	Usually minor or absent but abundant in NS2 49-30.	Often euhedral with rhomboid or rectangular sections (Plates 2, c, d).
Pyrite	Abundant in NS1 197-9 minor in NS2 49-50, NS2 110-7. Not detected in others.	Large crystals with some euhedral forms in NS1 197-9, euhedra in calcite vein in NS2 110-7, as probable alteration of pyrrhotite, associated with marcasite in NS2 49-50.
Galena	Usually trace or minor but abundant in NS2 49-50.	Usually interstitial.
Chalco-pyrite	Trace or minor.	Usually interstitial or as blebs on sphalerite grain boundaries.

Marcasite	Trace or minor - Sections NS2 49-50 and 89-55 only.	As alteration lamellae replacing pyrrhotite (Plate 2d).
Ilmenite	Trace NS2 151-35 NS2 156-10	In matrix of Sections NS2 151-35 and 156-10 as subhedral laths or remnants, at times deformed and fractured, elsewhere shows preferred orientation.
Rutile	Trace NS1 197-9, NS2 49-50, 192-15.	In matrix as irregular to elongate crystals showing brownish internal reflections and twinning.
Graphite	Trace NS2 156-10	Minute pale yellow anisotropic flakes in phyllitic band.

Paragenesis

The major deformative, cataclastic and metamorphic events in the history of these rocks appear to have preceded the emplacement of the vein minerals, the cassiterite and sulphides. The host rocks show abundant evidence for deformation and recrystallisation including:

Fine matrix crystals of strained quartz in quartzite - possible mortar texture.

Strained large quartz grains, and some dimensional preferred orientation.

Brecciation of the quartzite and production of protomylonite.

Shearing of pelitic layers and production of lenticular structures.

Preferred orientation and fracturing of matrix ilmenite and graphite.

The sulphides and vein minerals show little evidence of such strong tectonism. Quartz in the veins, while showing some undulose extinction, appears to be less strained than matrix quartz. Indeed a number of grains appear unstrained. Muscovite and chlorite plates in the veins are randomly oriented while those in the matrix are often aligned to produce a foliation. The strain effects in vein quartz and the dimensional preferred orientation, deformation lamellae and microfaulting in pyrrhotite do not appear to be extensively developed and are probably due to mild tectonism post dating ore emplacement.

Following brecciation, emplacement of quartz, chlorite cassiterite, magnetite, sulphides and possibly some of the carbonate occurred. Zoning within the veins and the presence of euhedral quartz suggests the quartz was an early formed phase and was followed by chlorite. Cassiterite retains its euhedral shape when surrounded by magnetite (as it does in most circumstances) and appears to be the earliest formed ore mineral.

Magnetite probably followed cassiterite or crystallised simultaneously with it, and certainly preceded pyrite. Arsenopyrite which nearly always shows some crystal shape and typically has euhedral outlines, is not closely associated with magnetite, therefore the order of crystallisation cannot be determined. In association with other sulphides its euhedral nature suggests arsenopyrite was the first formed sulphide. Embayment and replacement by other sulphides, particularly by sphalerite (Plate 2c) confirm this hypothesis.

Pyrite also commonly shows euhedral or subhedral outlines. In NS1 197-9 pyrite is euhedral against pyrrhotite, in NS2 49-5 it shows good crystal shape when associated with marcasite lamellae in pyrrhotite, and in NS2 110-7 much of the pyrite found in a carbonate vein is again euhedral. Pyrite thus appears to have been formed at several stages in the history of the deposit. Since pyrite preceded pyrrhotite in NS1 197-9, occurs together with marcasite replacing pyrrhotite in NS2 49-5 and formed contemporaneously with late stage carbonate in NS2 110-7 at least two, probably three, episodes of pyrite formation are indicated. The marcasite-pyrite lamellar structure may have formed at anytime postdating the pyrrhotite and preceding late stage fracturing and carbonate emplacement.

Pyrrhotite and sphalerite probably formed at about the same time. Each appears interstitially where the other dominates and both often show euhedral form towards chalcopyrite and nearly always toward galena. Both appear to be euhedral toward the other in the same section, suggesting they formed largely contemporaneously.

Chalcopyrite and galena occur interstitially to sphalerite and pyrrhotite and appear to succeed them. Chalcopyrite seems to have preceded galena, and may have overlapped with sphalerite and pyrrhotite to some extent.

Most of the carbonate appears to be closely associated with the ore minerals and was probably emplaced along with those minerals. However late stage sparry carbonate veins do occur. These contain only minor quantities of sulphides other than pyrite, are not microfaulted and crosscut the major ore bands. The small amounts of magnetite, sphalerite galena that are found within them appear to have been spalled off the vein walls. The pyrite however has developed an euhedral shape and seemingly preceded the complete filling of the vein.

In general the texture, mineralogy and paragenetic succession of the ore minerals appears to be compatible with a ? pneumatolytic vein origin.

Paragenesis - conclusions

1: The major tectonic events produced a deformation, cataclasis and partial recrystallization of the host rocks and at least in some places, formed a tectonic breccia succeptible to invasion by mineralizing fluids.

2: The major tectonism preceded emplacement of the vein minerals and sulphides. The graphite, ilmenite and probably rutile were present in the host rock during this tectonic phase.

3: Vein and ore minerals appear to have been emplaced in the order:

i Quartz, cassiterite, magnetite;
ii Arsenopyrite, pyrite, chlorite (?);
iii Pyrrhotite, sphalerite;
iv Marcasite - pyrite (?);
v Chalcopyrite (?);
vi Galena;
vii Pyrite, marcasite-pyrite (?) carbonate
(Species on the same line either crystallised simultaneously, overlapped, or appear to have formed at approximately the same time but show no textural evidence which might enable sequence to be determined.)

4: Following the emplacement of the major sulphide minerals a period of mild tectonism produced strained vein quartz, localised preferred orientation and microfaulting in pyrrhotite.

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Petrologist.

cc:

Mrs. D. Jenkinson.

PLATE 1 - THIN SECTIONS

a: NS2 139-35 x 30 x polars.
Three types of fragment in breccia:
Type 1 quartzite;Lower ($Tl_/$)
Type 2 quartzite;Upper left ($Tll_/$)
Type 3 Slate ; 2 fragments near centre (sl)
Sphalerite and opaques form black filling around the fragments.

b: NS2 151-35 x 30 plane light.
Folded foliation in phyllitic layers. The foliation is molded around the more competent fragments of quartzite. Dark patches are sphalerite and opaques.

c: NS2 65-25 x 125 x polars.
Vermicular chlorite with carbonate (grey, carb) in quartz (white, cloudy).

d: NS2 166-70 x 30 plane light.
Radiating chlorite (fibrous appearance) with euhedral quartz (cloudy, white). Carbonate (dark grey, finely textured) fills cavity between them.



a



b



c



d

PLATE 2 - POLISHED SECTIONS

a: NS2 110-7 x 500 plane light
Cassiterite (c) (mid-grey) elongate and square sections in gangue (dark grey) and densely aggregated magnetite (m) (lighter grey).

b: NS2 110-7 x 200 plane light
Cassiterite (light grey) (c) clustered in a gangue vein (darker grey). Surrounded by magnetite (m) (white).

c: NS2 139-35 x 200 plane light
Embayed arsenopyrite (white) being replaced by sphalerite. Appears zoned with respect to inclusion content.

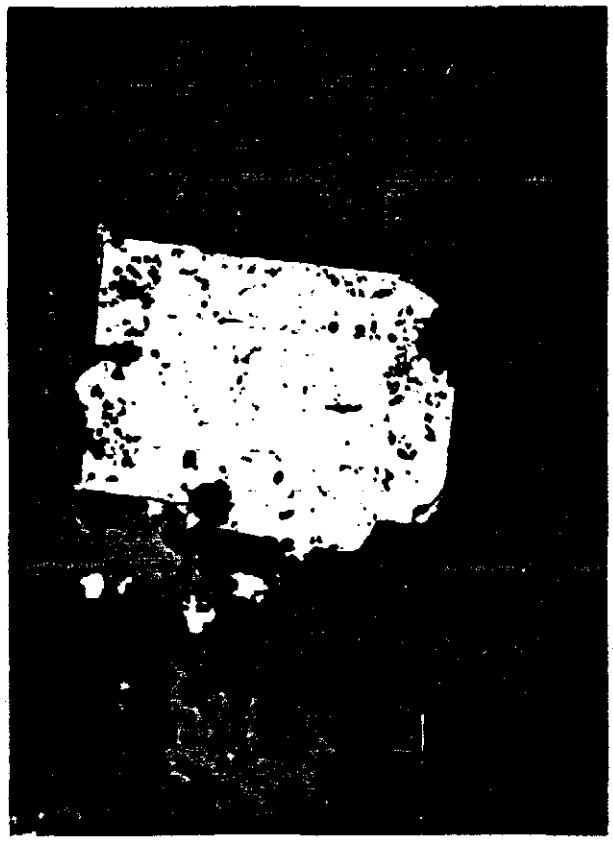
d: NS2 49-5 x 200 plane light.
Marcasite lamellae (ma) and square sections of pyrite (py) (both white) formed as alteration of pyrrhotite (po) (mid-grey). Rhomb shaped sections of Arsenopyrite (a) (white) in gangue (black) and sphalerite (sp) (dark grey).



a



b



c



d

REFERENCES CITED

1: Ramdohr Dr. P. (1969) The Ore Minerals and their Intergrowths. Pergamon Press Oxford (1969).

2: Spry, A. (1969) Metamorphic Textures, Pergamon Press, Oxford (1969).

APPENDIX

Thin Sections

Field No. NSl 77-2 MRL 12925. Rock type: Sericitic Quartzite.

Mineralogy: Quartz - dominant
Sericite - subdominant
Opaques carbonate, muscovite - minor
Chlorite, tourmaline, zircon, sphalerite - trace.

Comments

The section comprises a quartz rich background intersected by numerous quartz-muscovite veins and lenses.

The quartz rich background consists of tightly intergrown heteroblastic quartz to 200μm in size. The quartz grains are xenomophic and strained and have curved, slightly lobate or indistinct boundaries. Little or no evidence of relict grain boundaries or diagenetic quartz overgrowths is seen and the dominant texture appears to be due to recrystallization. Fine unoriented sericite is present as an intergranular phase and is locally accompanied by small amounts of chlorite. Carbonate is present as highly pleochroic globular aggregates. Accessories include, opaques, zircon, muscovite and tourmaline.

The veins and lenses appear subparallel in this section and are filled with unoriented muscovite and large frequently strain-free quartz up to 500μm in size. The muscovite occurs as plates to 200μm in lengthwise section or as finer grained clusters. Carbonate occurs as granular clusters and stringers near the edges of the veins and more rarely, as more coarsely crystalline (200μm) masses within the vein. Other minerals more rarely found include sphalerite, opaques and a chlorite which frequently shows the "ultra blue" extinction characteristic of pennine (optical determination only).

Field No. NSl 142-30, MRL 12926. Rock type: Quartzite

Mineralogy: Quartz - dominant
Sericite- subdominant
Chlorite, carbonate, opaques - minor
Sphalerite, zircon - trace.

The section comprises a background of variably sized quartz grains with intergranular sericite and patchy carbonate intersected by a few thin chloritic veins.

The main body of the section consists of variably sized quartz grains (up to 800μm) set in a finely crystalline quartz matrix which also contains sericite and minor chlorite. Both fine and coarse quartz is highly strained. The quartz grain boundaries are diffuse, lobate or curved and the section has a tightly interlocking texture. Considerable recrystallization seems to have occurred. Zircon, patchy carbonate, opaques and chlorite are minor components of the host rock.

The veins consist mainly of chlorite and carbonate with minor opaques and quartz and a trace of sphalerite and muscovite. The chlorite has a radiating or parquet-like texture and the carbonate occurs in coarsely crystalline patches. Much of this quartz in these veins is not strained indicating post deformation vein emplacement.

Field No. NS2 49-50, MRL 12927. Rock Type: Sericitic quartzite (mineralised)

894230

Mineralogy: Quartz - dominant
Sericite - sub-dominant;
Opaques - dominant in mineralised pod, minor elsewhere
Sphalerite- minor
Tourmaline, carbonate, zircon, muscovite - trace.

Comments

The host rock is texturally similar to the background of NS1 142-30 though the quartz grains of this section appear to have a slight dimensional preferred orientation, and carbonate is almost absent.

Dense opaques and sphalerite have formed a pod or vein 7mm thick in one part of the section. Minor quartz grains in the vein, some of which are euhedral, are unstrained. The sphalerite occurs as bands or stringers within the dense opaque material. Carbonate occurs in patches near the edge of the pod and in several thin veinlets transecting it. Some opaques and sphalerite also occur in the host close to the main pod as irregular patches and veinlets.

Field No. NS2 59-60, MRL 12928. Rock type: Sericitic Quartzite

Mineralogy: Quartz - dominant
Chlorite - subdominant
Sericite, muscovite, opaques, carbonate, sphalerite - minor
Zircon, opaques - trace.

Comments

The section consists of a quartz rich host transected by chlorite veins.

The host comprises xenomorphic irregular quartz grains ranging in size up to 300μm set in a matrix of finely crystalline quartz, sericite, chlorite or carbonate. Both granular and matrix quartz are strained, the coarser grains also showing a weak dimensional preferred orientation. Small amounts of fine zircon and opaques are scattered throughout the host.

The crosscutting veins consist of about 90% chlorite with minor amounts of sphalerite, carbonate opaques and quartz (often unstrained). Numerous tiny zircons within the chlorite vein are surrounded by dark haloes.

Field No. NS2 65-25, MRL 12929. Rock Type: Sericitic Quartzite

Mineralogy: Quartz - dominant
Chlorite, sericite - co-subdominant
Carbonate, opaques - minor
Zircon, sphalerite - trace

Comments

The section consists of a quartz rich host traversed by a thick quartz-chlorite-carbonate vein and several minor veinlets containing mainly quartz.

The host is very similar in composition and texture to the sericitic portions of NS2 59-60 though the dimensional preferred orientation is in this case lacking.

Large quartz grains up to 500μm in length and showing "columnar impingement texture" (Spry, 1969) dominate the veins. With the exception of a few individuals all these crystals are strained. Carbonate and associated vermicular chlorite occur in large patches in the major vein (see Plate 1c). Chlorite in the other veins tends to occur as radiating growths.

Field No. NS2 139-35, MRL 12930. Rock Type: Mineralised protomylonite.

Mineralogy: Quartz - dominant in host.
Sericite - subdominant in host.
Sphalerite- dominant in veins.
Opaques - subdominant in veins.
Chlorite, carbonate - minor.
Zircon - trace.

Comments

The section has a brecciated appearance consisting of angular to subrounded fragments surrounded by sericitic and sphaleritic matrix. The fragments may be classified into three types (see Plate 1a):

1:Type 1/ Coarse sericitic Quartzite - containing quartz grains up to 500μm in a sericite-quartz matrix with texture similar to the host in NS2 65-25.

2:Type 11/ Fine Sericitic Quartzite - containing fairly uniformly sized fine quartz (up to 200μm) tightly packed into an interlocking texture. The minor interstitial sericite which is found is unoriented. It is texturally similar to, but sometimes finer than, the host in section 77-2.

3: Pelitic (slate) fragments. These are rich in sericite with some chlorite and contain minor quartz and zircon. The micaceous minerals here show distinct preferred orientation and the fragments are foliated.

The section is comprised of approximately:

50% vein/matrix.
30% Pelitic fragments (slate).
15% fine Quartzite (Type 1/).
5% Coarse Quartzite (Type 11/).

These fragments are scattered throughout the matrix apparently at random, the slates showing variable schistosity orientation. The blocks vary in size, the largest being approximately 1cm in diameter.

The matrix consists of sphalerite opaques and minor chlorite together with locally variable quantities of sericite and quartz which seems at least partly derived from the original rock. Other quartz grains however are unstrained and are probably post deformation growths.

Highly sheared phyllite-like lenses of material mineralogically similar to the slate fragments appear in one part of the section. These appear to be sheared and molded around the more coherent quartzitic fragments and are probably highly deformed equivalents of the slatey fragments. This is supported by the observation of similar incipient phyllitic texture at the edges of several of the slatey fragments.

Field No. NS2 151-35, MRL 12931. Rock Type: Sheared and altered Quartzite.

Mineralogy: Quartz - dominant.
Sericite - subdominant.
Sphalerite, chlorite, opaques, carbonate - minor.
Muscovite, zircon - trace.

Comments

The section shows a high degree of textural variability. Highly recrystallised quartzite with very variable grain size and an apparent mortar texture comprises a large portion of the section. Several blocks or fragments texturally similar to the Type I fragments of 139-35 are present as less highly recrystallised remnants.

A highly sheared sericitic band with distinct lenticular structure traverses the section and is molded around and squeezed between the quartzitic blocks and fragments (Plate 1b). This band exhibits many of the characteristics of phyllite-mylonite (phyllonite) (Spry, 1969). Granular carbonate is present along fractures and as small globular patches throughout the phyllonitic portions.

All previously described textural types are cut by veins of chlorite, sphalerite and opaques up to 1.5mm thick. These veins locally swell into larger irregular patches up to 5mm in diameter.

Several thin veins of well crystallised sparry carbonate cut across the preexisting banding and veining.

Field No. NS2 156-10, MRL 12932. Rock Type: Slate.

Mineralogy: Quartz - subdominant.
Sericite - dominant.
Opaques, sphalerite, chlorite, muscovite - minor.

Comments

The section consists of two distinct textural types. A slate dominates, comprising some 95% of the section. The remaining 5% comprises a quartzite similar to Type I of 139-35.

The slate shows a strong foliation which is, in places, folded into fairly broad and open crenulations. In apparently more highly sheared areas, lenticular structures are developed. The slate is traversed by several veins containing columnar quartz and minor muscovite. Opaques occur as fine grains scattered throughout the shale and as patches and lenses usually in or near quartz-muscovite veins. In places the opaques dominate the vein mineral assemblage. Sphalerite, in minor quantities, is often associated with the opaques.

Field No. NS2 166-70, MRL 12933. Rock Type: Quartzite.

Mineralogy: Quartz - dominant.
Chlorite - subdominant.
Sphalerite, opaques, sericite, carbonate - minor.
Zircon - trace.

Comments

Texturally the rock is similar to many of the coarser quartzites described previously. This example however contains considerably less sericite in the matrix. Small amounts of chlorite are present instead. The rock consists of large and intermediate sized strained angular quartz grains, set in a fine grained recrystallised quartz matrix and shows textural similarities to the "mortar texture" described and depicted by Spry (1969).

Veins and of chlorite with a fine parquet-like texture traverse the section. Minor quantities of carbonate, sphalerite and opaques are present in these veins. Coarse fibrous chlorite is found in one other vein which contains coarse quartz (<4mm) and carbonate, but is devoid of opaques or sphalerite. The quartz though often euhedral towards carbonate (see Plate 1d) is highly strained.

Field No. NS2 192-15, MRL 12934. Rock Type: Quartzite.

Mineralogy: Quartz - dominant.
Sericite - subdominant.
Opaques, chlorite - minor.
Zircon, muscovite - trace.

Comments

The quartzite in this section contains frequent large (up to 600μm) subrounded to sub-angular grains of quartz set in a finely crystalline quartz - sericite matrix. Both coarse and fine quartz grains are strained.

Veins of opaques ranging in thickness from wispy filaments a few microns thick to dense lenses some 3mm thick, traverse the section. Minor chlorite is associated with the opaques.

POLISHED SECTIONS

Field No. NS1 197-9, MRL 12935.

Minerology: Ore Minerals and opaques - 95%
Siliceous and Carbonate gangue - 5%.

Pyrrhotite - dominant.
Pyrite - subdominant.
Magnetite - minor.
Chalcopyrite, Arsenopyrite, galena, rutile - trace.
Carbonate (in matrix) is siderite (confirmed by XRD).

Comments

The section is composed of relatively large discrete areas dominated by pyrrhotite or pyrite, with little mixing or intergrowth of the two. When they are intergrown the pyrite always encloses pyrrhotite. The converse is not found in this section. Elsewhere, pyrite frequently shows euhedral shape towards pyrrhotite suggesting it crystallised earlier.

The pyrite itself displays two major textural variations and occurs as large individual crystals showing optical continuity over several millimeters. Type I shows euhedral shape against pyrrhotite and contains inclusions of pyrrhotite, chalcopyrite and occasional small magnetite grains. It generally has a smooth well crystallised appearance complicated only by the previously described inclusions and by partly healed gangue filled cracks and fissures which form prominent linear features within the otherwise uniform pyrite megacrysts. Type II has a distinctly poikioblastic character and contains numerous inclusions of gangue and magnetite up to 60µm in diameter, giving the pyrite a porous appearance. No pyrrhotite or chalcopyrite inclusions were found and healed cracks are less abundant. The observation that the two types are in optical continuity suggests that this textural variation represents an original mineralogical and textural difference. Type II pyrite appears to be replacing magnetite while the euhedral shape against pyrrhotite shown by Type I suggests it grew into a cavity or easily replaced host.

Arsenopyrite only occurs in a few gangue lenses and is found as euhedral or subhedral very faint yellow rhombs and rectangles of high reflectance.

Occasional grains of rutile occur in the gangue.

Field No. NS2 49-5 MRL 12936

Mineralogy: Ore minerals and opaques - 40%
Siliceous and carbonate gangue - 60%

Pyrrhotite - dominant.
Galena, sphalerite, arsenopyrite - co-subdominant.
Marcasite, chalcopyrite, pyrite, rutile, carbonate - minor.
Cassiterite - trace.

Comments

The carbonate present was identified as siderite by S.E.M.. The sections consist of a band of sulphide ore minerals up to 1cm thick irregularly bounded by gangue on either side. Minor patches and wispy veins of ore minerals appear within the gangue.

The microscopic texture of the sulphide band is dominated by a granoblastic array of equant pyrrhotite grains. Swarms of pale yellow lenses of marcasite, lying in parallel (Plate 2d), locally replace pyrrhotite and form two continuous bands traversing the section. Subsequent movement along fractures cutting these lenses has distinctly displaced their opposite extensions. The sense of the displacement is consistent for all fractures examined.

Pyrite generally occurs in close association with lamellar marcasite within the pyrrhotite and is found as subhedral grains crystallising alongside the lamellae of marcasite. Ramdohr (1969 pp 592-597) describes an apparently similar aggregate of marcasite pyrite attributing its origin to a chemical alteration of the pyrrhotite. Ramdohr's observation that these lamellae originate from fractures in the pyrrhotite is supported by studies of this section.

Arsenopyrite euhedra, interstitial galena and sphalerite occur in minor quantities associated with the pyrrhotite, but codominate in other bands where the pyrrhotite content is much reduced. Here fine (<50μm) pale yellow rhombic and rectangular sections of arsenopyrite cluster into tight aggregates or remain as individuals dispersed through the galena-sphalerite matrix. Chalcopyrite occurs mainly as tiny blebs within masses of sphalerite and seemingly delineates the boundaries of individual sphalerite grains.

Cassiterite is restricted to the sulphide band where it occurs as individual isolated grains, rounded subhedral in form and is usually found in gangue pockets or more rarely within the sulphide itself. The size ranges from a few microns to a maximum of approximately 100μm. The low-moderate reflectivity, shape, internal reflections and twinning are distinctive.

Rutile occurs in the matrix as moderate-high lustre twinned grains with red/brown internal reflections.

Field No. NS2 89-55 MRL 12937

Mineralogy: Ore minerals and opaques - 95%+
Siliceous and carbonate gangue - 5%-

Pyrrhotite - dominant.
Sphalerite - minor.
Galena, Chalcopyrite, marcasite - trace.

Comments

The section is composed almost entirely of sulphides which enclose occasional patches of gangue mineral several millimeters in diameter.

Pyrrhotite forms an evenly granular array of equant crystals and is by far the most abundant sulphide in this section. Marcasite occurs as small lenses, either singly or in clusters in the pyrrhotite. This mode of occurrence is similar to that described for section NS2 49-5 but in this case the lenses are much less abundant.

Sphalerite, galena and chalcopyrite are chiefly interstitial minerals though sphalerite dominates a small patch of mineralization. Stringers of very fine chalcopyrite blebs frequently delineate grain boundaries in sphalerite rich areas.

Carbonate filled fissures cut accross pyrrhotite grains but do not seem to displace grain boundaries and seem to be late stage features.

Field No. NS2 110-7. MRL 12938

Mineralogy: Opaques - 80%
Siliceous and carbonate gangue - 20%

Magnetite - dominant.
Sphalerite - subdominant.
Galena, cassiterite, pyrite - minor.
Chalcopyrite - trace.

The carbonate in a transgressive vein is siderite (optics, XRD).

Magnetite, interspersed with patches of sphalerite and wispy lacelike veinlets of carbonate, dominates the section, usually forming a massive aggregate. Individual subhedral, anhedral crystals and lamellar aggregates are less common. Galena occurs interstitially throughout the section while chalcopyrite is mainly restricted to the sphalerite patches where it forms blebs on grain boundaries and, at times, larger interstitial fillings. Pyrite forms patches up to 200µm in diameter within a siderite vein which transects the section.

Clusters and individual cassiterite grains are widely distributed throughout the magnetite-sphalerite-carbonate association comprising the section. Individual grains tend to be euhedral or subhedral and attain a maximum length about 100µm though the vast majority fall in the 10 to 60µm size range. There seems to be a tendancy for both clustered grains and individuals to favour areas of finely intergrown magnetite and gangue or gangue pockets within magnetite rather than the massive magnetite itself (Plate 2b). The carbonate vein appears free of cassiterite but contains euhedral pyrite and small amounts of galena, sphalerite and chalcopyrite which appears to have been spalled off the vein wall.

Field No. NS2 139-35 MRL 12930

Mineralogy: Opaques and ore minerals - 50%
Siliceous and carbonate gangue - 50%

Sphalerite - dominant.
Galena, pyrrhotite - subdominant.
Arsenopyrite - minor.
Chalcopyrite, - trace.

The section is characterised by a high content of angular fragments of gangue material set in and surrounded by a sulphide rich matrix.

Sphalerite, galena, and pyrrhotite each achieve dominance in limited areas throughout the matrix. The two subordinate species then fill the interstices and frequently assume more or less globular forms. Where dominant, pyrrhotite forms a coarse array of equant grains up to

300μm in diameter. Chalcopyrite is present in small quantities and appears interstitially in pyrrhotite and as small blebs along sphalerite grain boundaries.

Arsenopyrite is an early formed species distinguished by its pale yellow colour and tendency to form euhedral or subhedral crystals, in both sulphide and gangue environments (Plate 2c). Some embayment and replacement by later formed sphalerite can be seen on the Plate.

Field No. NS2 151-35 MRL 12931

Mineralogy: Ore minerals and opaques - 30%
Gangue silicates and carbonate - 70%

Sphalerite - dominant.
Magnetite - subdominant.
Chalcopyrite, ilmenite, galena - minor.

The opaques and sulphides form irregular patches, lensoid veins and fine wispy veinlets penetrating the silicate gangue and, in places, enclosing portions of it.

Microscopic examination shows these veins and patches to be principally massive sphalerite with minor interstitial galena and chalcopyrite. Chalcopyrite also forms thin stringers of blebs which delineate the boundaries of individual sphalerite crystals. Fine (<20μm) anhedral magnetite forms granular intergrowths with the gangue bordering the major sphalerite concentrations. Individual magnetite grains, often of larger size and with better shape, occur within the sphalerite (carbonate also occurs in close association with the sulphide vein both as crosscutting veins and as gangue near the boundary.)

Patches of chalcopyrite up to 0.7mm in size (maximum dimension) are found in a small area of gangue. These are not closely associated with other sulphides or opaques.

Ilmenite occurs as elongate highly anisotropic grains with rectangular section. They show variable states of preservation, some being euhedral while many are embayed or in extreme cases, consist of a group of remnant granules which more or less outline the original crystal. In highly deformed areas these ilmenite crystals are on occasion fractured or bent.

Carbonate filled veins transecting the sulphide vein do not appear to significantly displace allignment of the vein boundaries. Some "spalling" of the sphalerite into the vein is observed but cataclastic structures are largely absent.

Field No. NS2 156-10 MRL 12932

Mineralogy: Ore minerals and opaques - 40%
Gangue silicates and carbonates - 60%

Pyrrhotite - dominant.
Sphalerite, Chalcopyrite - co-subdominant.
Ilmenite, galena - minor.
Graphite - trace.

The sulphides have an irregular to lensoid patchy distribution in the gangue. The patches are often joined by oriented veinlets and extensions which give a moderately well developed lineation to the polished surface.

Microscopic examination of the pyrrhotite rich areas reveals two distinct textural types. Massive pyrrhotite shows a granoblastic array of equant, fairly uniformly sized crystals up to 0.7mm in diameter. Interstitial infillings are uncommon but galena has formed in certain sites. Contacts between pyrrhotite and platy chlorite occasionally have a spikey appearance where pyrrhotite is deposited between the plates of chlorite as thin needles.

The second textural type resembles a eutectic intergrowth of pyrrhotite and gangue. On closer inspection the gangue is dominantly vermicular chlorite with pyrrhotite filling the interstices.

Sphalerite and chalcopyrite occur as irregular patches and are often closely associated. Chalcopyrite also fills veinlets within the gangue and pyrrhotite.

Ilmenite is a minor constituent of the gangue rich areas commonly occurring as subhedral or anhedrdal elongate sections, often as deeply embayed or granular relicts. In more schistose bands the ilmenite shows a distinct preferred orientation.

Traces of graphite occur as minute anisotropic yellow flakes in the phyllitic band.

Field No. NS2 192-15 MRL 12934

Mineralogy: Ore minerals and opaques - 40%
Gangue silicates and carbonate - 60%

Pyrrhotite - dominant.
Chalcopyrite - subdomonant.
Sphalerite - minor.
Rutile - trace.

The ore minerals and opaques in this section are largely confined to major veins (up to 5mm thick) and fine wispy veinlets which traverse the section.

The pyrrhotite forms arrays of coarse, irregular and often elongate crystals with sutured, lobate terminations. Lamellar twinning is not uncommon. Chalcopyrite occurs in discrete irregular patches within the vein and more rarely as interstitial infilling in pyrrhotite. Sphalerite forms in asssociation with the chalcopyrite patches but generally does not occur in association with pyrrhotite.

The small subhedral or anhedral crystals occurring in the gangue and showing moderate to high reflectivity (R = 21), twinning and reddish brown internal reflections were identified optically as rutile.

MR. R. HINE,
HOBART OFFICE

14.4.1981
WHR:KM:DK

E/15 - THE PETROLOGY OF SAMPLES FROM
DDH NS2 NORTH SCAMANDER PROSPECT TAS.

M576

SECTIONS EXAMINED

The following sections were microscopically examined:

Thin sections

Drill Hole		MRL. No.
NS1	77-2	12925
NS1	142-30	12926
MS2	49-50	12927
NS2	59-60	12928
NS2	65-26	12930
NS2	151-35	12931
NS2	156-10	12932
NS2	166-70	12933
NS2	192-15	12934

Polished Sections

NS1	197-9	12935
NS2	49-5	12936
NS2	89-55	12937
NS2	110-7	12938
NS2	139-35	12930
NS2	151-35	12931
NS2	156-10	12932
NS2	192-15	12934

Introduction

Ten thin sections and eight polished sections from the North Scamander prospect were optically examined in an attempt to locate any cassiterite, to describe its form and association and to interpret the paragenesis of the mineralisation.

Where necessary, optical examination was supplemented with S.E.M. and XRD techniques in order to confirm important phases and to identify minerals not readily recognisable by microscopy.

The mineralogy and textural relations are summarised below and an interpretation of the paragenesis postulated. Detailed information concerning the mineralogy and texture of individual sections is included in the appendix.

Host Rock Mineralogy and Texture

With the exception of NS2 139-35 and NS2 156-10, the host rocks of the thin sections are quartzites and share a range of common features. The differences in matrix composition, grainsize, severity of deformation and alteration are minor and do not detract from the overall impression of similarity. The quartzites are composed of irregular angular quartz grains of variable size, set in a matrix containing sericite, chlorite and fine grained quartz. Both large quartz grains and fine matrix quartz are highly strained and usually display indistinct, curved or slightly lobate boundaries. The matrix quartz seems to be a recrystallisation product and the texture of the quartzite is highly reminiscent of the "Mortar Texture" described and depicted by SPRY (1979, Plate xxx). Chlorite and/or sericite is present in the matrix in variable quantities, usually as an alignment of platy minerals along certain directed quartz grain boundaries giving a wavy or braided foliation.

In NS2 49-50, the quartz array adopts a slight dimensional preferred orientation. The other sections do not display this property to any noticeable degree.

Maximum size of quartz grains varies, the largest grains measuring 800μm in diameter (section NS1 142-30). In other sections the maximum grain size may be as little as 200μm.

Accessory minerals include zircon, rutile tourmaline, ilmenite and muscovite. Globular aggregates of a granular carbonate, possibly siderite are present in many sections.

Section NS2 151-35 (sheared and altered quartzite) contains a highly sheared fine grained band which is rich in oriented sericite and fine-grained quartz. A distinct lenticular texture has developed and the foliation appears to have been molded around and squeezed between quartzitic blocks and fragments (Plate 1b). This band probably represents the sheared equivalent of a pelitic band originally similar in texture to the slate in Section NS2 156-10.

Section NS2 139-35 (mineralised protomylonite) comprises three types of blocks or fragments set in a fine matrix composed of varying amounts of recrystallised quartz, sericite and chlorite. The matrix textures are frequently obscured by the abundant formation of sphalerite and opaques in the matrix. Highly sericitic areas have a phyllitic texture, which displays lenticular structure and is molded around blocks of more competent material.

Three types of fragments appear:

Type I — Coarse sericitic quartzite - variable sized quartz grains, maximum 500μm. Similar texture to previously described quartzite.

Type II — Fine sericitic quartzite - fairly uniformly sized quartz grains, maximum 50μm, sericite-quartz matrix.

Type III — Slate - rich in sericite and characterised by fine grain size and distinct foliation. The foliation directions of neighbouring fragments show no obvious relation.

This section represents the most highly brecciated rock examined and, according to the classification favoured by Spry, should be termed a protomylonite (10 - 50% crushed matrix, foliated).

NS2 156-10 is dominated by a strongly foliated slate. This foliation is folded into fairly broad open crenulations throughout the section. In apparently more highly sheared areas lenticular structures are developed.

Vein Mineralogy and Texture

The suite of minerals associated with veins transecting the host rocks includes quartz, muscovite, chlorite, carbonate, sphalerite, cassiterite and opaques. Among the opaques are the minerals pyrrhotite, magnetite, arsenopyrite, pyrite, galena, chalcopyrite and marcasite.

Vein quartz may be distinguished from that in the host by its larger size (up to 4mm in 166-70 but more usually 0.5 to 1.5mm) and its tendency to grow into the vein in a series of elongate parallel crystals ("columnar impingement texture" - Spry, 1969). These quartz grains frequently show euhedral terminations or hexagonal sections when bounded by carbonate. Undulose or patchy extinction occurs in many grains though it is not always displayed.

Chlorite commonly occurs in veins as coarse or fine patches with a radiating or fan shaped texture. Vermicular chlorite is intergrown with carbonate in section NS2 166-70 (Plate 1c). A third variety tentatively identified as pennine, occurs as small pale green plates within quartz-muscovite veins (section NS1 77-2) and is characterised by anomolous "ultra blue" extinction colours.

Coarse muscovite is uncommon in these sections but does occur in veins with quartz and sericite (NS1 77-2) or with quartz and chlorite (NS2 156-10) as unoriented plates and books or in occasional radiating patches.

The carbonate associated with, and interstitial to, ore mineralization was identified as siderite by XRD (NS1 197-9) and was shown to contain high Fe, minor Mg, Mn and trace Ca by SEM (NS2 110-7). Vein carbonate (NS2 110-7) was optically tested and found to have an RI ω = 1.78 suggesting it too is siderite.

Vein carbonate assumes a different form to that shown by the granular, globular aggregates common in the host quartzites and slates. In the veins it tends to occur as high relief brownish pleochroic patches often displaying poikioblastic characteristics. When associated with ore minerals it tends to fill interstices and form a thin crystalline high relief band at the edge of some sphalerite-opaque bands. Section NS2 156-10 prominently shows several veins of carbonate transecting, but not displacing the main ore mineral banding. It follows that at least part of the carbonate was introduced (or re-mobilized) very late in the formation of these rocks, postdating the main phase of mineralization and tectonism.

Cassiterite

Cassiterite was optically detected in sections NS2 49-50 and NS2 110.7 and confirmed by SEM. Section NS2 49-50 shows traces of cassiterite in gauge patches within, or closely associated with, the sulphide band, or more rarely, within the sulphide itself.

The low-moderate reflectivity, subhedral square to elongate sections with rounded corners, pale internal reflections and simple twinning are distinctive (Plate 2a). The maximum (elongation) dimension ranges to approximately 100μm but is generally much lower.

A greater concentration of cassiterite occurs in the magnetite band and associated carbonate patches in section NS2 110-7. Certain carbonate patches are particularly rich (Plate 2b). The grains are widely distributed throughout the section occurring either singly or in tight clusters up to 0.5mm in length. Individual crystals usually display a square or elongate section, often with rounded corners, and attain a maximum length of approximately 100μm though the majority are much smaller (10 - 60 μm).

Sulphides and Other Opaques

The mode of occurrence and abundance of sulphide minerals, and magnetite, rutile, ilmenite and graphite is summarised below:

MINERAL	ABUNDANCE	OCCURRENCE
Pyrrhotite	Dominant in many sections.	Coarse polygonal crystalline arrays where dominant, interstitial where minor, occasionally shows dimensional preferred orientation and deformation lamellae.
Sphalerite	Subdominant in many sections.	In patches, monommerallic aggregates and interstitial to pyrrhotite.
Magnetite	Dominant in NS2 110-7 common in NS2 151-35, minor in NS1 197-9, not detected in others.	Small subhedral to anhedral grains or, in NS2 110-7, as tight aggregate.
Arseno-pyrite	Usually minor or absent but abundant in NS2 49-30.	Often euhedral with rhomboid or rectangular sections (Plates 2, c, d).
Pyrite	Abundant in NS1 197-9 minor in NS2 49-50, NS2 110-7. Not detected in others.	Large crystals with some euhedral forms in NS1 197-9, euhedra in calcite vein in NS2 110-7, as probable alteration of pyrrhotite, associated with marcasite in NS2 49-50.
Galena	Usually trace or minor but abundant in NS2 49-50.	Usually interstitial.
Chalco-pyrite	Trace or minor.	Usually interstitial or as blebs on sphalerite grain boundaries.

Marcasite	Trace or minor - Sections NS2 49-50 and 89-55 only.	As alteration lamellae replacing pyrrhotite (Plate 2d).
Ilmenite	Trace NS2 151-35 NS2 156-10	In matrix of Sections NS2 151-35 and 156-10 as subhedral laths or remnants, at times deformed and fractured, elsewhere shows preferred orientation.
Rutile	Trace NS1 197-9, NS2 49-50, 192-15.	In matrix as irregular to elongate crystals showing brownish internal reflections and twinning.
Graphite	Trace NS2 156-10	Minute pale yellow anisotropic flakes in phyllitic band.

Paragenesis

The major deformative, cataclastic and metamorphic events in the history of these rocks appear to have preceded the emplacement of the vein minerals, the cassiterite and sulphides. The host rocks show abundant evidence for deformation and recrystallisation including:

Fine matrix crystals of strained quartz in quartzite - possible mortar texture.

Strained large quartz grains, and some dimensional preferred orientation.

Brecciation of the quartzite and production of protomylonite.

Shearing of pelitic layers and production of lenticular structures.

Preferred orientation and fracturing of matrix ilmenite and graphite.

The sulphides and vein minerals show little evidence of such strong tectonism. Quartz in the veins, while showing some undulose extinction, appears to be less strained than matrix quartz. Indeed a number of grains appear unstrained. Muscovite and chlorite plates in the veins are randomly oriented while those in the matrix are often aligned to produce a foliation. The strain effects in vein quartz and the dimensional preferred orientation, deformation lamellae and microfaulting in pyrrhotite do not appear to be extensively developed and are probably due to mild tectonism post dating ore emplacement.

Following brecciation, emplacement of quartz, chlorite cassiterite, magnetite, sulphides and possibly some of the carbonate occurred. Zoning within the veins and the presence of euhedral quartz suggests the quartz was an early formed phase and was followed by chlorite. Cassiterite retains its euhedral shape when surrounded by magnetite (as it does in most circumstances) and appears to be the earliest formed ore mineral.

Magnetite probably followed cassiterite or crystallised simultaneously with it, and certainly preceded pyrite. Arsenopyrite which nearly always shows some crystal shape and typically has euhedral outlines, is not closely associated with magnetite, therefore the order of crystallisation cannot be determined. In association with other sulphides its euhedral nature suggests arsenopyrite was the first formed sulphide. Embayment and replacement by other sulphides, particularly by sphalerite (Plate 2c) confirm this hypothesis.

Pyrite also commonly shows euhedral or subhedral outlines. In NS1 197-9 pyrite is euhedral against pyrrhotite, in NS2 49-5 it shows good crystal shape when associated with marcasite lamellae in pyrrhotite, and in NS2 110-7 much of the pyrite found in a carbonate vein is again euhedral. Pyrite thus appears to have been formed at several stages in the history of the deposit. Since pyrite preceded pyrrhotite in NS1 197-9, occurs together with marcasite replacing pyrrhotite in NS2 49-5 and formed contemporaneously with late stage carbonate in NS2 110-7 at least two, probably three, episodes of pyrite formation are indicated. The marcasite-pyrite lamellar structure may have formed at anytime postdating the pyrrhotite and preceding late stage fracturing and carbonate emplacement.

Pyrrhotite and sphalerite probably formed at about the same time. Each appears interstitially where the other dominates and both often show euhedral form towards chalcopyrite and nearly always toward galena. Both appear to be euhedral toward the other in the same section, suggesting they formed largely contemporaneously.

Chalcopyrite and galena occur interstitially to sphalerite and pyrrhotite and appear to succeed them. Chalcopyrite seems to have preceded galena, and may have overlapped with sphalerite and pyrrhotite to some extent.

Most of the carbonate appears to be closely associated with the ore minerals and was probably emplaced along with those minerals. However late stage sparry carbonate veins do occur. These contain only minor quantities of sulphides other than pyrite, are not microfaulted and crosscut the major ore bands. The small amounts of magnetite, sphalerite galena that are found within them appear to have been spalled off the vein walls. The pyrite however has developed an euhedral shape and seemingly preceded the complete filling of the vein.

In general the texture, mineralogy and paragenetic succession of the ore minerals appears to be compatible with a pneumatolytic vein origin.

Paragenesis - conclusions

1: The major tectonic events produced a deformation, cataclasis and partial recrystallization of the host rocks and at least in some places, formed a tectonic breccia succeptible to invasion by mineralizing fluids.

2: The major tectonism preceded emplacement of the vein minerals and sulphides. The graphite, ilmenite and probably rutile were present in the host rock during this tectonic phase.

3: Vein and ore minerals appear to have been emplaced in the order:

i Quartz, cassiterite, magnetite;
ii Arsenopyrite, pyrite, chlorite (?);
iii Pyrrhotite, sphalerite;
iv Marcasite - pyrite (?);
v Chalcopyrite (?);
vi Galena;
vii Pyrite, marcasite-pyrite (?) carbonate

(Species on the same line either crystallised simultaneously, overlapped, or appear to have formed at approximately the same time but show no textural evidence which might enable sequence to be determined.)

4: Following the emplacement of the major sulphide minerals a period of mild tectonism produced strained vein quartz, localised preferred orientation and microfaulting in pyrrhotite.

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Petrologist.

cc:

Mrs. D. Jenkinson.

PLATE 1 - THIN SECTIONS

a: NS2 139-35 x 30 x polars.
Three types of fragment in breccia:
Type 1 quartzite;Lower (Tl)
Type 2 quartzite;Upper left (Tll)
Type 3 Slate ; 2 fragments near centre (sl)
Sphalerite and opaques form black filling around the fragments.

b: NS2 151-35 x 30 plane light.
Folded foliation in phyllitic layers. The foliation is molded around the more competent fragments of quartzite. Dark patches are sphalerite and opaques.

c: NS2 65-25 x 125 x polars.
Vermicular chlorite with carbonate (grey, carb) in quartz (white, cloudy).

d: NS2 166-70 x 30 plane light.
Radiating chlorite (fibrous appearance) with euhedral quartz (cloudy, white). Carbonate (dark grey, finely textured) fills cavity between them.



a



b



c



d

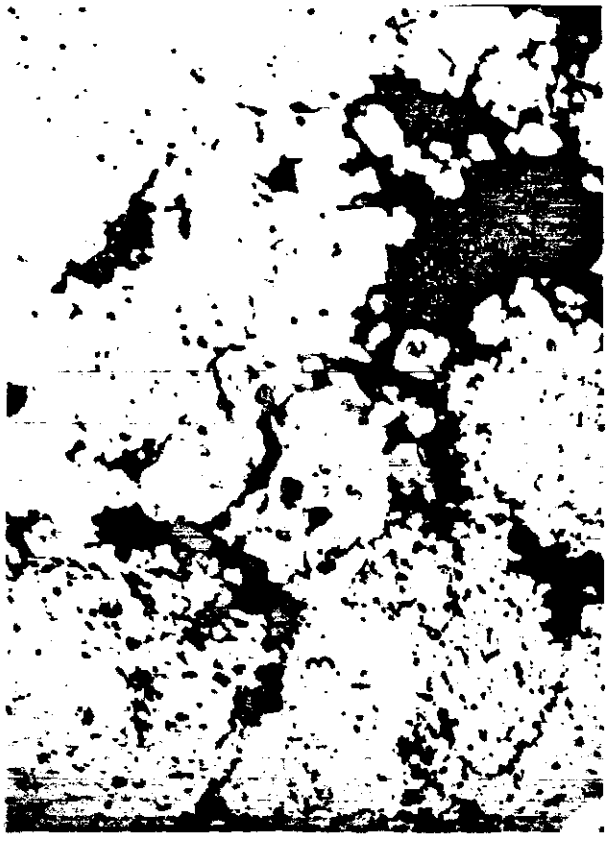
PLATE 2 - POLISHED SECTIONS

a: NS2 110-7 x 500 plane light
Cassiterite (c) (mid-grey) elongate and square sections in gangue (dark grey) and densely aggregated magnetite (m) (lighter grey).

b: NS2 110-7 x 200 plane light
Cassiterite (light grey) (c) clustered in a gangue vein (darker grey). Surrounded by magnetite (m) (white).

c: NS2 139-35 x 200 plane light
Embayed arsenopyrite (white) being replaced by sphalerite. Appears zoned with respect to inclusion content.

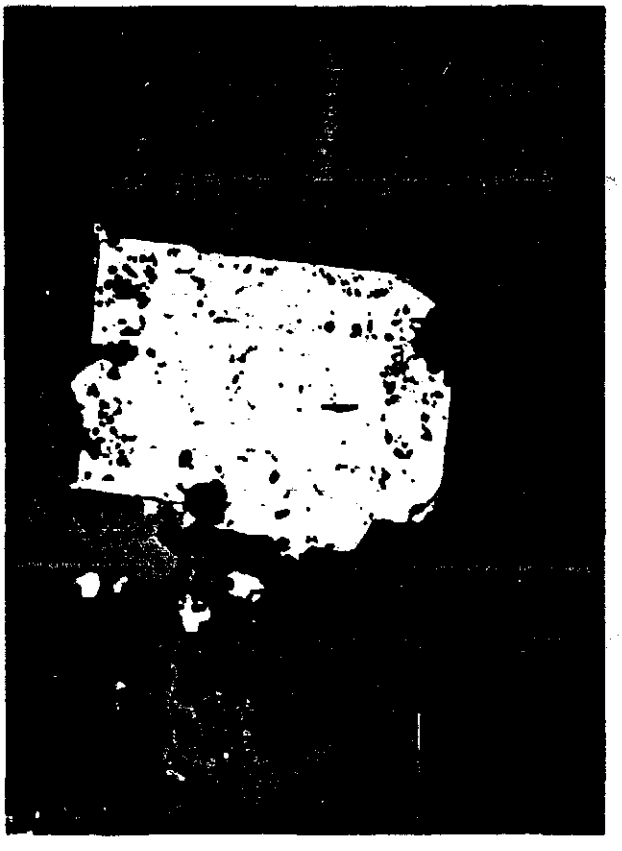
d: NS2 49-5 x 200 plane light.
Marcasite lamellae (ma) and square sections of pyrite (py) (both white) formed as alteration of pyrrhotite (po) (mid-grey). Rhomb shaped sections of Arsenopyrite (a) (white) in gangue (black) and sphalerite (sp) (dark grey).



a



b



c



d

REFERENCES CITED

1: Ramdohr Dr. P. (1969) The Ore Minerals and their Intergrowths. Pergamon Press Oxford (1969).

2: Spry, A. (1969) Metamorphic Textures, Pergamon Press, Oxford (1969).

APPENDIX

Thin Sections

Field No. NSl 77-2 MRL 12925. Rock type: Sericitic Quartzite.

Mineralogy: Quartz - dominant
Sericite - subdominant
Opaques carbonate, muscovite - minor
Chlorite, tourmaline, zircon, sphalerite - trace.

Comments

The section comprises a quartz rich background intersected by numerous quartz-muscovite veins and lenses.

The quartz rich background consists of tightly intergrown heteroblastic quartz to 200μm in size. The quartz grains are xenomophic and strained and have curved, slightly lobate or indistinct boundaries. Little or no evidence of relict grain boundaries or diagenetic quartz overgrowths is seen and the dominant texture appears to be due to recrystallization. Fine unoriented sericite is present as an intergranular phase and is locally accompanied by small amounts of chlorite. Carbonate is present as highly pleochroic globular aggregates. Accessories include, opaques, zircon, muscovite and tourmaline.

The veins and lenses appear subparallel in this section and are filled with unoriented muscovite and large frequently strain-free quartz up to 500μm in size. The muscovite occurs as plates to 200μm in lengthwise section or as finer grained clusters. Carbonate occurs as granular clusters and stringers near the edges of the veins and more rarely, as more coarsely crystalline (200μm) masses within the vein. Other minerals more rarely found include sphalerite, opaques and a chlorite which frequently shows the "ultra blue" extinction characteristic of pennine (optical determination only).

Field No. NSl 142-30, MRL 12926. Rock type: Quartzite

Mineralogy: Quartz - dominant
Sericite- subdominant
Chlorite, carbonate, opaques - minor
Sphalerite, zircon - trace.

The section comprises a background of variably sized quartz grains with intergranular sericite and patchy carbonate intersected by a few thin chloritic veins.

The main body of the section consists of variably sized quartz grains (up to 800μm) set in a finely crystalline quartz matrix which also contains sericite and minor chlorite. Both fine and coarse quartz is highly strained. The quartz grain boundaries are diffuse, lobate or curved and the section has a tightly interlocking texture. Considerable recrystallization seems to have occurred. Zircon, patchy carbonate, opaques and chlorite are minor components of the host rock.

The veins consist mainly of chlorite and carbonate with minor opaques and quartz and a trace of sphalerite and muscovite. The chlorite has a radiating or parquet-like texture and the carbonate occurs in coarsely crystalline patches. Much of this quartz in these veins is not strained indicating post deformation vein emplacement.

Field No. NS2 49-50, MRL 12927. Rock Type: Sericitic quartzite (mineralised)

Mineralogy: Quartz - dominant
Sericite - sub-dominant;
Opaques - dominant in mineralised pod, minor elsewhere
Sphalerite- minor
Tourmaline, carbonate, zircon, muscovite - trace.

Comments

The host rock is texturally similar to the background of NS1 142-30 though the quartz grains of this section appear to have a slight dimensional preferred orientation, and carbonate is almost absent.

Dense opaques and sphalerite have formed a pod or vein 7mm thick in one part of the section. Minor quartz grains in the vein, some of which are euhedral, are unstrained. The sphalerite occurs as bands or stringers within the dense opaque material. Carbonate occurs in patches near the edge of the pod and in several thin veinlets transecting it. Some opaques and sphalerite also occur in the host close to the main pod as irregular patches and veinlets.

Field No. NS2 59-60, MRL 12928. Rock type: Sericitic Quartzite

Mineralogy: Quartz - dominant
Chlorite - subdominant
Sericite, muscovite, opaques, carbonate, sphalerite - minor
Zircon, opaques - trace.

Comments

The section consists of a quartz rich host transected by chlorite veins.

The host comprises xenomorphic irregular quartz grains ranging in size up to 300µm set in a matrix of finely crystalline quartz, sericite, chlorite or carbonate. Both granular and matrix quartz are strained, the coarser grains also showing a weak dimensional preferred orientation. Small amounts of fine zircon and opaques are scattered throughout the host.

The crosscutting veins consist of about 90% chlorite with minor amounts of sphalerite, carbonate opaques and quartz (often unstrained). Numerous tiny zircons within the chlorite vein are surrounded by dark haloes.

Field No. NS2 65-25, MRL 12929. Rock Type: Sericitic Quartzite

Mineralogy: Quartz - dominant
Chlorite, sericite - co-subdominant
Carbonate, opaques - minor
Zircon, sphalerite - trace

Comments

The section consists of a quartz rich host traversed by a thick quartz-chlorite-carbonate vein and several minor veinlets containing mainly quartz.

The host is very similar in composition and texture to the sericitic portions of NS2 59-60 though the dimensional preferred orientation is in this case lacking.

Large quartz grains up to 500μm in length and showing "columnar impingement texture" (Spry, 1969) dominate the veins. With the exception of a few individuals all these crystals are strained. Carbonate and associated vermicular chlorite occur in large patches in the major vein (see Plate 1c). Chlorite in the other veins tends to occur as radiating growths.

Field No. NS2 139-35, MRL 12930. Rock Type: Mineralised protomylonite.

Mineralogy: Quartz - dominant in host.
Sericite - subdominant in host.
Sphalerite- dominant in veins.
Opaques - subdominant in veins.
Chlorite, carbonate - minor.
Zircon - trace.

Comments

The section has a brecciated appearance consisting of angular to subrounded fragments surrounded by sericitic and sphaleritic matrix. The fragments may be classified into three types (see Plate 1a):

1:Type 1/ Coarse sericitic Quartzite - containing quartz grains up to 500μm in a sericite-quartz matrix with texture similar to the host in NS2 65-25.

2:Type 11/ Fine Sericitic Quartzite - containing fairly uniformly sized fine quartz (up to 200μm) tightly packed into an interlocking texture. The minor interstitial sericite which is found is unoriented. It is texturally similar to, but sometimes finer than, the host in section 77-2.

3: Pelitic (slate) fragments. These are rich in sericite with some chlorite and contain minor quartz and zircon. The micaceous minerals here show distinct preferred orientation and the fragments are foliated.

The section is comprised of approximately:

50% vein/matrix.
30% Pelitic fragments (slate).
15% fine Quartzite (Type 1/).
5% Coarse Quartzite (Type 11/).

These fragments are scattered throughout the matrix apparently at random, the slates showing variable schistosity orientation. The blocks vary in size, the largest being approximately 1cm in diameter.

The matrix consists of sphalerite opaques and minor chlorite together with locally variable quantities of sericite and quartz which seems at least partly derived from the original rock. Other quartz grains however are unstrained and are probably post deformation growths.

Highly sheared phyllite-like lenses of material mineralogically similar to the slate fragments appear in one part of the section. These appear to be sheared and molded around the more coherent quartzitic fragments and are probably highly deformed equivalents of the slatey fragments. This is supported by the observation of similar incipient phyllitic texture at the edges of several of the slatey fragments.

Field No. NS2 151-35, MRL 12931. Rock Type: Sheared and altered Quartzite.

Mineralogy: Quartz - dominant.
Sericite - subdominant.
Sphalerite, chlorite, opaques, carbonate - minor.
Muscovite, zircon - trace.

Comments

The section shows a high degree of textural variability. Highly recrystallised quartzite with very variable grain size and an apparent mortar texture comprises a large portion of the section. Several blocks or fragments texturally similar to the Type I fragments of 139-35 are present as less highly recrystallised remnants.

A highly sheared sericitic band with distinct lenticular structure traverses the section and is molded around and squeezed between the quartzitic blocks and fragments (Plate 1b). This band exhibits many of the characteristics of phyllite-mylonite (phyllonite) (Spry, 1969). Granular carbonate is present along fractures and as small globular patches throughout the phyllonitic portions.

All previously described textural types are cut by veins of chlorite, sphalerite and opaques up to 1.5mm thick. These veins locally swell into larger irregular patches up to 5mm in diameter.

Several thin veins of well crystallised sparry carbonate cut across the preexisting banding and veining.

Field No. NS2 156-10, MRL 12932. Rock Type: Slate.

Mineralogy: Quartz - subdominant.
Sericite - dominant.
Opaques, sphalerite, chlorite, muscovite - minor.

Comments

The section consists of two distinct textural types. A slate dominates, comprising some 95% of the section. The remaining 5% comprises a quartzite similar to Type I of 139-35.

The slate shows a strong foliation which is, in places, folded into fairly broad and open crenulations. In apparently more highly sheared areas, lenticular structures are developed. The slate is traversed by several veins containing columnar quartz and minor muscovite. Opaques occur as fine grains scattered throughout the shale and as patches and lenses usually in or near quartz-muscovite veins. In places the opaques dominate the vein mineral assemblage. Sphalerite, in minor quantities, is often associated with the opaques.

Field No. NS2 166-70, MRL 12933. Rock Type: Quartzite.

Mineralogy: Quartz - dominant.
Chlorite - subdominant.
Sphalerite, opaques, sericite, carbonate - minor.
Zircon - trace.

Comments

Texturally the rock is similar to many of the coarser quartzites described previously. This example however contains considerably less sericite in the matrix. Small amounts of chlorite are present instead. The rock consists of large and intermediate sized strained angular quartz grains, set in a fine grained recrystallised quartz matrix and shows textural similarities to the "mortar texture" described and depicted by Spry (1969).

Veins and of chlorite with a fine parquet-like texture traverse the section. Minor quantities of carbonate, sphalerite and opaques are present in these veins. Coarse fibrous chlorite is found in one other vein which contains coarse quartz (<4mm) and carbonate, but is devoid of opaques or sphalerite. The quartz though often euhedral towards carbonate (see Plate 1d) is highly strained.

Field No. NS2 192-15, MRL 12934. Rock Type: Quartzite.

Mineralogy: Quartz - dominant.
Sericite - subdominant.
Opaques, chlorite - minor.
Zircon, muscovite - trace.

Comments

The quartzite in this section contains frequent large (up to 600μm) subrounded to sub-angular grains of quartz set in a finely crystalline quartz - sericite matrix. Both coarse and fine quartz grains are strained.

Veins of opaques ranging in thickness from wispy filaments a few microns thick to dense lenses some 3mm thick, traverse the section. Minor chlorite is associated with the opaques.

POLISHED SECTIONS

Field No. NS1 197-9, MRL 12935.

Minerology: Ore Minerals and opaques - 95%
Siliceous and Carbonate gangue - 5%.

Pyrrhotite - dominant.
Pyrite - subdominant.
Magnetite - minor.
Chalcopyrite, Arsenopyrite, galena, rutile - trace.
Carbonate (in matrix) is siderite (confirmed by XRD).

Comments

The section is composed of relatively large discrete areas dominated by pyrrhotite or pyrite, with little mixing or intergrowth of the two. When they are intergrown the pyrite always encloses pyrrhotite. The converse is not found in this section. Elsewhere, pyrite frequently shows euhedral shape towards pyrrhotite suggesting it crystallised earlier.

The pyrite itself displays two major textural variations and occurs as large individual crystals showing optical continuity over several millimeters. Type I shows euhedral shape against pyrrhotite and contains inclusions of pyrrhotite, chalcopyrite and occasional small magnetite grains. It generally has a smooth well crystallised appearance complicated only by the previously described inclusions and by partly healed gangue filled cracks and fissures which form prominent linear features within the otherwise uniform pyrite megacrysts. Type II has a distinctly poikioblastic character and contains numerous inclusions of gangue and magnetite up to 60µm in diameter, giving the pyrite a porous appearance. No pyrrhotite or chalcopyrite inclusions were found and healed cracks are less abundant. The observation that the two types are in optical continuity suggests that this textural variation represents an original mineralogical and textural difference. Type II pyrite appears to be replacing magnetite while the euhedral shape against pyrrhotite shown by Type I suggests it grew into a cavity or easily replaced host.

Arsenopyrite only occurs in a few gangue lenses and is found as euhedral or subhedral very faint yellow rhombs and rectangles of high reflectance.

Occasional grains of rutile occur in the gangue.

Field No. NS2 49-5 MRL 12936

Mineralogy: Ore minerals and opaques - 40%
Siliceous and carbonate gangue - 60%

Pyrrhotite - dominant.
Galena, sphalerite, arsenopyrite - co-subdominant.
Marcasite, chalcopyrite, pyrite, rutile, carbonate - minor.
Cassiterite - trace.

Comments

The carbonate present was identified as siderite by S.E.M.. The sections consist of a band of sulphide ore minerals up to 1cm thick irregularly bounded by gangue on either side. Minor patches and wispy veins of ore minerals appear within the gangue.

The microscopic texture of the sulphide band is dominated by a granoblastic array of equant pyrrhotite grains. Swarms of pale yellow lenses of marcasite, lying in parallel (Plate 2d), locally replace pyrrhotite and form two continuous bands traversing the section. Subsequent movement along fractures cutting these lenses has distinctly displaced their opposite extensions. The sense of the displacement is consistent for all fractures examined.

Pyrite generally occurs in close association with lamellar marcasite within the pyrrhotite and is found as subhedral grains crystallising alongside the lamellae of marcasite. Ramdohr (1969 pp 592-597) describes an apparently similar aggregate of marcasite pyrite attributing its origin to a chemical alteration of the pyrrhotite. Ramdohr's observation that these lamellae originate from fractures in the pyrrhotite is supported by studies of this section.

Arsenopyrite euhedra, interstitial galena and sphalerite occur in minor quantities associated with the pyrrhotite, but codominate in other bands where the pyrrhotite content is much reduced. Here fine (<50µm) pale yellow rhombic and rectangular sections of arsenopyrite cluster into tight aggregates or remain as individuals dispersed through the galena-sphalerite matrix. Chalcopyrite occurs mainly as tiny blebs within masses of sphalerite and seemingly delineates the boundaries of individual sphalerite grains.

Cassiterite is restricted to the sulphide band where it occurs as individual isolated grains, rounded subhedral in form and is usually found in gangue pockets or more rarely within the sulphide itself. The size ranges from a few microns to a maximum of approximately 100µm. The low-moderate reflectivity, shape, internal reflections and twinning are distinctive.

Rutile occurs in the matrix as moderate-high lustre twinned grains with red/brown internal reflections.

Field No. NS2 89-55 MRL 12937

Mineralogy: Ore minerals and opaques - 95%+
Siliceous and carbonate gangue - 5%-

Pyrrhotite - dominant.
Sphalerite - minor.
Galena, Chalcopyrite, marcasite - trace.

Comments

The section is composed almost entirely of sulphides which enclose occasional patches of gangue mineral several millimeters in diameter.

Pyrrhotite forms an evenly granular array of equant crystals and is by far the most abundant sulphide in this section. Marcasite occurs as small lenses, either singly or in clusters in the pyrrhotite. This mode of occurrence is similar to that described for section NS2 49-5 but in this case the lenses are much less abundant.

Sphalerite, galena and chalcopyrite are chiefly interstitial minerals though sphalerite dominates a small patch of mineralization. Stringers of very fine chalcopyrite blebs frequently delineate grain boundaries in sphalerite rich areas.

Carbonate filled fissures cut accross pyrrhotite grains but do not seem to displace grain boundaries and seem to be late stage features.

Field No. NS2 110-7. MRL 12938

Mineralogy: Opaques - 80%
Siliceous and carbonate gangue - 20%

Magnetite - dominant.
Sphalerite - subdominant.
Galena, cassiterite, pyrite - minor.
Chalcopyrite - trace.

The carbonate in a transgressive vein is siderite (optics, XRD).

Magnetite, interspersed with patches of sphalerite and wispy lacelike veinlets of carbonate, dominates the section, usually forming a massive aggregate. Individual subhedral, anhedral crystals and lamellar aggregates are less common. Galena occurs interstitially throughout the section while chalcopyrite is mainly restricted to the sphalerite patches where it forms blebs on grain boundaries and, at times, larger interstitial fillings. Pyrite forms patches up to 200µm in diameter within a siderite vein which transects the section.

Clusters and individual cassiterite grains are widely distributed throughout the magnetite-sphalerite-carbonate association comprising the section. Individual grains tend to be euhedral or subhedral and attain a maximum length about 100µm though the vast majority fall in the 10 to 60µm size range. There seems to be a tendancy for both clustered grains and individuals to favour areas of finely intergrown magnetite and gangue or gangue pockets within magnetite rather than the massive magnetite itself (Plate 2b). The carbonate vein appears free of cassiterite but contains euhedral pyrite and small amounts of galena, sphalerite and chalcopyrite which appears to have been spalled off the vein wall.

Field No. NS2 139-35 MRL 12930

Mineralogy: Opaques and ore minerals - 50%
Siliceous and carbonate gangue - 50%

Sphalerite - dominant.
Galena, pyrrhotite - subdominant.
Arsenopyrite - minor.
Chalcopyrite, - trace.

The section is characterised by a high content of angular fragments of gangue material set in and surrounded by a sulphide rich matrix.

Sphalerite, galena, and pyrrhotite each achieve dominance in limited areas throughout the matrix. The two subordinate species then fill the interstices and frequently assume more or less globular forms. Where dominant, pyrrhotite forms a coarse array of equant grains up to

300μm in diameter. Chalcopyrite is present in small quantities and appears interstitially in pyrrhotite and as small blebs along sphalerite grain boundaries.

Arsenopyrite is an early formed species distinguished by its pale yellow colour and tendency to form euhedral or subhedral crystals, in both sulphide and gangue environments (Plate 2c). Some embayment and replacement by later formed sphalerite can be seen on the Plate.

Field No. NS2 151-35 MRL 12931

Mineralogy: Ore minerals and opaques - 30%
Gangue silicates and carbonate - 70%

Sphalerite - dominant.
Magnetite - subdominant.
Chalcopyrite, ilmenite, galena - minor.

The opaques and sulphides form irregular patches, lensoid veins and fine wispy veinlets penetrating the silicate gangue and, in places, enclosing portions of it.

Microscopic examination shows these veins and patches to be principally massive sphalerite with minor interstitial galena and chalcopyrite. Chalcopyrite also forms thin stringers of blebs which delineate the boundaries of individual sphalerite crystals. Fine (<20μm) anhedral magnetite forms granular intergrowths with the gangue bordering the major sphalerite concentrations. Individual magnetite grains, often of larger size and with better shape, occur within the sphalerite (carbonate also occurs in close association with the sulphide vein both as crosscutting veins and as gangue near the boundary.)

Patches of chalcopyrite up to 0.7mm in size (maximum dimension) are found in a small area of gangue. These are not closely associated with other sulphides or opaques.

Ilmenite occurs as elongate highly anisotropic grains with rectangular section. They show variable states of preservation, some being euhedral while many are embayed or in extreme cases, consist of a group of remnant granules which more or less outline the original crystal. In highly deformed areas these ilmenite crystals are on occasion fractured or bent.

Carbonate filled veins transecting the sulphide vein do not appear to significantly displace allignment of the vein boundaries. Some "spalling" of the sphalerite into the vein is observed but cataclastic structures are largely absent.

Field No. NS2 156-10 MRL 12932

Mineralogy: Ore minerals and opaques - 40%
Gangue silicates and carbonates - 60%

Pyrrhotite - dominant.
Sphalerite, Chalcopyrite - co-subdominant.
Ilmenite, galena - minor.
Graphite - trace.

The sulphides have an irregular to lensoid patchy distribution in the gangue. The patches are often joined by oriented veinlets and extensions which give a moderately well developed lineation to the polished surface.

Microscopic examination of the pyrrhotite rich areas reveals two distinct textural types. Massive pyrrhotite shows a granoblastic array of equant, fairly uniformly sized crystals up to 0.7mm in diameter. Interstitial infillings are uncommon but galena has formed in certain sites. Contacts between pyrrhotite and platy chlorite occasionally have a spikey appearance where pyrrhotite is deposited between the plates of chlorite as thin needles.

The second textural type resembles a eutectic intergrowth of pyrrhotite and gangue. On closer inspection the gangue is dominantly vermicular chlorite with pyrrhotite filling the interstices.

Sphalerite and chalcopyrite occur as irregular patches and are often closely associated. Chalcopyrite also fills veinlets within the gangue and pyrrhotite.

Ilmenite is a minor constituent of the gangue rich areas commonly occurring as subhedral or anhedrdal elongate sections, often as deeply embayed or granular relicts. In more schistose bands the ilmenite shows a distinct preferred orientation.

Traces of graphite occur as minute anisotropic yellow flakes in the phyllitic band.

Field No. NS2 192-15 MRL 12934

Mineralogy: Ore minerals and opaques - 40%
Gangue silicates and carbonate - 60%

Pyrrhotite - dominant.
Chalcopyrite - subdomonant.
Sphalerite - minor.
Rutile - trace.

The ore minerals and opaques in this section are largely confined to major veins (up to 5mm thick) and fine wispy veinlets which traverse the section.

The pyrrhotite forms arrays of coarse, irregular and often elongate crystals with sutured, lobate terminations. Lamellar twinning is not uncommon. Chalcopyrite occurs in discrete irregular patches within the vein and more rarely as interstitial infilling in pyrrhotite. Sphalerite forms in asssociation with the chalcopyrite patches but generally does not occur in association with pyrrhotite.

The small subhedral or anhedral crystals occurring in the gangue and showing moderate to high reflectivity (R = 21), twinning and reddish brown internal reflections were identified optically as rutile.

APPENDIX 6

ASSAY DATA

AUSTRALIAN LABORATORY SERVICES PTY. LTD.

CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 355 0776
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: G274 Client: BHP COMPANY LIMITED, Area Contact: DR. RICK HINE,
Address: P.O. BOX 559 Address: G.P.O. BOX 1140 L,
Date Received 28/07/80 CAMBERWELL HOBART, TAS, 7001.
Date Completed 26/08/80 VIC

Order No.: T610/500 Sample Type: DRILL CORE No. of Samples: 33

SAMPLE NO.	Cu m i	Pb m i	Zn m i	Ag m i	Co m i	Bi m i	Cd m i	As m 5-A	Au b 120-A	Sn m XRF 1A
NSD 1	10	350	490	2	15	15	3	8		130
NSD 2	<2	400	640	3	15	15	8	8		260
NSD 3	20	920	960	3	15	15	14	10		555
NSD 4	20	0.12 %	600	6	15	20	33	10		270
NSD 5	15	170	250	2	30	20	4	25		30
NSD 6	20	0.12 %	0.14 %	4	20	15	35	20		145
NSD 7	15	960	0.10 %	3	15	10	19	30		325
NSD 8	5	0.20 %	0.14 %	4	25	25	12	12		630
NSD 9	65	0.32 %	0.52 %	13	30	20	40	7		0.10 %
NSD 10	35	760	0.76 %	6	20	20	90	3		110
NSD 11	320	0.10 %	>1 (a2)	% >25(32)	110	65	0.18	% 935		410
NSD 12	35	0.16 %	0.28 %	8	30	30	29	160		0.11 %
NSD 13	45	0.52 %	0.56 %	21	35	30	44	20		955
NSD 14	15	840	0.12 %	5	25	20	10	5		310
NSD 15	40	0.28 %	600	5	35	30	6	16		95
NSD 16	840	0.44 %	0.48 %	)25 (3a)	30	20	31	3		0.21 %
NSD 17	10	800	840	3	25	20	8	8		165
NSD 18	10	0.12 %	0.14 %	4	25	20	11	4		400
NSD 19	15	0.20 %	0.28 %	5	40	25	22	9		0.15 %
NSD 20	20	0.20 %	0.20 %	3	15	15	19	2		155
NSD 21	10	0.32 %	0.28 %	8	30	25	23	16		600
NSD 22	5	400	400	3	35	30	4	18		180
NSD 23	55	0.56 %	0.48 %	16	25	20	37	40		0.13 %
NSD 24	20	760	920	3	35	25	7	14		220
NSD 25	30	300	400	3	35	25	4	14		40
NSD 26	10	180	480	1	20	20	4	5		30
NSD 27	15	210	290	2	35	25	4	12		55
NSD 28	15	95	120	2	35	25	2	9		65
NSD 29	45	0.28 %	0.36 %	9	40	25	16	25		995
NSD 30	30	0.32 %	0.36 %	7	40	25	17	25		330

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

8941264

AUSTRALIAN LABORATORY SERVICES PTY. LTD.
CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 355 0776
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: G274-1
Date Received 28/07/80
Date Completed 26/08/80

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HOBART. TAS. 7001.

Order No.: T610/500

Sample Type: DRILL CORE

No. of Samples: 33

SAMPLE NO.	W m XRF 1A
NSD 1	30
NSD 2	<10
NSD 3	<10
NSD 4	<10
NSD 5	<10
NSD 6	<10
NSD 7	<10
NSD 8	<10
NSD 9	<10
NSD 10	30
NSD 11	710
NSD 12	<10
NSD 13	<10
NSD 14	<10
NSD 15	<10
NSD 16	<10
NSD 17	<10
NSD 18	<10
NSD 19	<10
NSD 20	<10
NSD 21	<10
NSD 22	<10
NSD 23	<10
NSD 24	<10
NSD 25	<10
NSD 26	<10
NSD 27	<10
NSD 28	<10
NSD 29	<10
NSD 30	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

894265

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CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
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LABORATORY REPORT

Batch No.: G274R
Date Received 26/08/80
Date Completed 26/08/80

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact:
Address:

Order No.: T610/500DRILL CORE Sample Type: No. of Samples: 2

SAMPLE NO.	Zn m 101-B	Ag m 101-B
NSD 11	11.2	32
NSD 16		30

UNITS LEGEND ——— m = Parts per million b = Parts per billion % = percent
g = Grams a = Absorbance

Signature:

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[redacted] LABORATORY SERVICES PTY. LTD.

CONSULTING CHEMISTS & ANALYSTS

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WOOLLOONGABBA Q 4102
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LABORATORY REPORT

Batch No.: G274
Date Received 28/07/80
Date Completed 26/08/80

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HOBART. TAS. 7001.

Order No.: T610/500

Sample Type: DRILL CORE

No. of Samples: 33

SAMPLE NO.	Cu	Pb	Zn	Ag	Co	Bi	Cd	As	Au	Sn
	m	m	m	m	m	m	m	m	b	m
	1	1	1	1	1	1	1	5-A	120-A	XRF 1A
NSD 31	10	720	760	3	20	15	6	4		145
NSD 32	25	640	0.10	% 3	30	15	7	5		115
NSD 33	10	400	920	2	20	20	8	5		405

UNITS LEGEND ——— m – Parts per million b – Parts per billion % – percent
g – Grams a – Absorbance

Signature: [redacted]

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CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
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Date Completed 26/08/80

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Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HOBART. TAS. 7001.

Order No.: T610/500

Sample Type: DRILL CORE

No. of Samples: 33

SAMPLE NO.	W m XRF 1A
NSD 31	<10
NSD 32	<10
NSD 33	<10

UNITS LEGEND ——— m – Parts per million b – Parts per billion % – percent
g – Grams a – Absorbance

Signature:

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CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
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Ph (07) 391 6799
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TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: H010
Date Received 01/08/80
Date Completed 26/08/80

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HOBART. TAS. 7001.

Order No.: T610/500

Sample Type: DRILL CORE

No. of Samples: 21

SAMPLE NO.	Cu m 1	Pb m 1	Zn m 1	Ag m 1	Co m 1	Bi m 1	Cd m 1	As m S-B	Au m 120	Sn m XRF 1A
NSD 34	65	0.40 %	0.64 %	6	30	15	45	4		0.14 %
NSD 35	30	0.12 %	0.20 %	2	30	20	21	4		0.10 %
NSD 36	330	0.28 %	0.64 %	10	35	20	55	4		0.13 %
NSD 37	15	270	0.10 %	1	15	10	12	<1		110
NSD 38	45	600	0.13 %	3	25	20	17	2		180
NSD 39	25	140	0.12 %	2	20	10	15	<1		70
NSD 40	30	600	0.24 %	3	25	15	21	3		705
NSD 41	40	110	0.20 %	2	25	10	23	<1		790
NSD 42	60	200	0.28 %	3	25	10	27	1		300
NSD 43	50	0.16 %	0.36 %	3	25	15	37	2		850
NSD 44	75	0.32 %	>1.0%	7	40	25	75	3		650
NSD 45	30	0.12 %	0.24 %	4	30	15	19	2		465
NSD 46	15	310	520	2	25	15	4	7		65
NSD 47	20	0.12 %	0.32 %	3	20	10	26	2		295
NSD 48	25	90	150	2	35	15	2	16		20
NSD 49	20	400	0.20 %	2	25	10	16	12		155
NSD 50	25	600	0.14 %	3	35	20	13	14		290
NSD 51	20	270	380	2	25	15	4	8		125
NSD 52	15	0.12 %	0.14 %	3	30	15	11	12		175
NSD 53	<2	55	135	1	25	15	2	3		130
NSD 54	25	200	0.16 %	2	25	10	17	2		975

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

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LABORATORY REPORT

Batch No.: H010-1
Date Received 01/08/80
Date Completed 26/08/80

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HOBART. TAS. 7001.

Order No.: T610/500

Sample Type: DRILL CORE

No. of Samples: 21

SAMPLE NO.	W m XRF 1A
NSD 34	<10
NSD 35	<10
NSD 36	10
NSD 37	<10
NSD 38	<10
NSD 39	<10
NSD 40	<10
NSD 41	<10
NSD 42	<10
NSD 43	10
NSD 44	10
NSD 45	<10
NSD 46	<10
NSD 47	<10
NSD 48	<10
NSD 49	<10
NSD 50	<10
NSD 51	<10
NSD 52	<10
NSD 53	<10
NSD 54	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

894270

CONSULTING CHEMISTS & ANALYSTS

OPSEAL LABORATORIES
44 Baloclava Street
WOOLLOONGABBA Q 4102
PH (07) 391 6777
A/H 391 0776
TELEX AA SET 42349

LABORATORY REPORT

Batch No.: H122 | Client: BHP COMPANY LIMITED, | Area Contact: DR. RICK HINC.
Address: P.O. BOX 559 | Address: G.P.O. BOX 1140 L.
Date Received 15/08/80 | CAMBERWELL | HOBART, TAS. 7001.
Date Completed 12/09/80 | VIC

Order No.: T610/500 000620 | Sample Type: DRILL CORE | No. of Samples: 51

SAMPLE NO.	Cu ppm 1	Pb ppm 1	Zn ppm 1	Ag ppm 1	Bi ppm 1	Co ppm 1	Cd ppm 1	As ppm S-B	Au ppb 120	Sb ppm XRF 16
NSD 55	10	90	580	1	15	10	7	7		140
NSD 56	50	0.20 %	0.36 %	5	10	15	35	35		265
NSD 57	15	380	400	2	20	20	5	12		165
NSD 58	10	65	940	1	15	10	11	14		300
NSD 59	25	720	0.20 %	3	20	20	17	14		250
NSD 60	10	150	620	1	15	10	7	8		515
NSD 61	15	85	0.14 %	1	15	15	13	10		320
NSD 62	15	70	840	1	15	15	9	14		175
NSD 63	10	210	360	1	20	20	4	12		125
NSD 64	10	480	680	1	20	15	7	8		55
NSD 65	15	70	145	1	20	20	6	20		55
NSD 66	10	110	0.12 %	1	15	10	12	8		360
NSD 67	10	160	980	1	15	15	12	8		240
NSD 68	15	210	0.18 %	1	20	15	17	16		275
NSD 69	10	140	0.10 %	1	20	15	12	14		940
NSD 70	10	0.11 %	0.16 %	2	20	20	16	8		315
NSD 71	10	70	680	1	20	15	8	9		265
NSD 72	40	100	0.24 %	1	15	10	26	7		720
NSD 73	10	760	440	2	20	20	5	12		125
NSD 74	10	200	640	1	20	20	5	16		120
NSD 75	10	400	520	2	20	20	5	9		140
NSD 76	40	50	780	1	20	15	10	6		120
NSD 77	30	110	0.18 %	1	15	15	22	12		390
NSD 78	90	100	0.18 %	2	20	15	21	65		570
NSD 79	50	100	130	1	20	15	2	65		165
NSD 80	60	350	220	2	20	20	3	18		130
NSD 81	90	150	580	2	20	15	9	5		310
NSD 82	5	35	0.10 %	1	20	15	13	6		370
NSD 83	30	60	0.28 %	1	15	10	35	9		175
NSD 84	20	390	0.12 %	1	15	15	12	10		150

UNITS LEGEND: p = Parts per million; b = Parts per billion; % = percent; g = Grams; a = Absorbance

Signature:

89427?1

CONSULTING CHEMISTS & ASSAYERS

ULTRA LABORATORIES
44 Baloclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6722
A/H 355 0776
TELEX AUSEV 42344

LABORATORY REPORT

Batch No.: H122 Client: BHP COMPANY LIMITED, Area Contact: DR. RICK HINE.
Address: P.O. BOX 559 Address: C.S.I.R.O. BOX 1140 L.
Date Received 15/08/80 CAMBERWELL HOBART. TAS. 7001.
Date Completed 12/09/80 VIC

Order No.: T610/500 000620 Sample Type: DRILL CORE No. of Samples: 51

SAMPLE NO.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Bi ppm	Co ppm	Cd ppm	As ppm	Au ppb	Sn ppm
	1	1	1	1	1	1	1	5-B	120	XRF 10
NSD 85	20	0.18 %	0.22 %	3	15	15	25	6		220
NSD 86	30	400	0.20 %	2	20	15	25	6		750
NSD 87	210	0.18 %	0.40 %	9	25	30	35	4		590
NSD 88	20	640	0.10 %	3	20	15	10	14		340
NSD 89	65	0.28 %	0.36 % (3.24)	5	15	20	35	25		365
NSD 90	220	0.18 %	>1.0 %	4	30	20	180	25		610
NSD 91	920	960	0.28 %	14	40	30	35	60		525
NSD 92	0.12 %	0.13 %	0.64 %	>25 (35)	65	45	90	120		0.12 %
NSD 93	0.34 %	0.18 %	0.54 %	>25 (52)	75	50	75	250		0.16 %
NSD 94	0.20 %	960	0.28 %	24	45	45	18	105		745
NSD 95	400	480	700	5	25	25	12	18		155
NSD 96	390	50	85	2	20	15	3	16		120
NSD 97	260	40	80	2	20	15	2	10		75
NSD 98	370	50	75	2	20	20	2	40		50
NSD 99	120	30	55	1	15	10	2	6		30
NSD 100	350	30	50	1	20	15	2	300		40
NSD 101	310	30	40	1	20	15	2	6		55
NSD 102	250	30	40	1	20	10	2	9		45
NSD 103	260	30	40	1	15	10	2	140		55
NSD 104	480	45	40	2	25	40	3	900		110
NSD 105	640	40	80	2	25	30	4	650		75

UNITS LEGEND ---- p = Parts per million b = Parts per billion % = percent
g = Grams a = Absorbance

Signature: ...

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CONSULTING CHEMISTS & ANALYSTS

44 Belaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6233
A/H 355 0776
TELEX ALSEC 42344

LABORATORY REPORT

Batch No.: H122-1 Client: BHP COMPANY LIMITED, Area Contact: DR. RICK [illegible]
Address: P.O. BOX 559 Address: G.P.O. BOX 1140 L
Date Received 15/08/80 CAMBERWELL HOBART, TAS. 7001.
Date Completed 12/09/80 VIC

Order No.: T610/500 000620 Sample Type: DRILL CORE No. of Samples: 51

SAMPLE NO.	W M XRF IA
NSD 55	<10
NSD 56	<10
NSD 57	<10
NSD 58	<10
NSD 59	<10
NSD 60	<10
NSD 61	<10
NSD 62	<10
NSD 63	10
NSD 64	<10
NSD 65	<10
NSD 66	<10
NSD 67	<10
NSD 68	<10
NSD 69	<10
NSD 70	<10
NSD 71	<10
NSD 72	<10
NSD 73	<10
NSD 74	<10
NSD 75	<10
NSD 76	<10
NSD 77	10
NSD 78	<10
NSD 79	<10
NSD 80	<10
NSD 81	<10
NSD 82	<10
NSD 83	<10
NSD 84	<10

UNITS LEGEND ----- p - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: [illegible]

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CONSULTING CHEMISTS & ANALYSTS

34 Delacombe Street
MOONAH, TASMANIA 7009
Ph (03) 371 6755
A/H 355 0776
TELEX AUSEV 4234

LABORATORY REPORT

Batch No.: H122-1
Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1748 T,
HOBART., TAS. 7001.

Date Received 15/08/80
Date Completed 12/09/80

Order No.: T610/500 000620
Sample Type: DRILL CORE
No. of Samples: 51

SAMPLE NO.	W n XRF 1A
NSD 85	<10
NSD 86	<10
NSD 87	10
NSD 88	<10
NSD 89	<10
NSD 90	80
NSD 91	<10
NSD 92	<10
NSD 93	<10
NSD 94	<10
NSD 95	<10
NSD 96	<10
NSD 97	<10
NSD 98	<10
NSD 99	<10
NSD 100	<10
NSD 101	<10
NSD 102	<10
NSD 103	<10
NSD 104	<10
NSD 105	<10

UNITS LEGEND ---- n = Parts per million b = Parts per billion % = percent
g = Grams a = Absorbance

Signature:

8942774

CONSULTING CHEMISTS & [illegible]

[illegible]
44 Bolaclava Street
WOOLLONGABBA Q [illegible]
Ph (07) 391 6755
A/H 355 0776
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: H122R
Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact:
Address:

Date Received 12/09/80
Date Completed 12/09/80

Order No.: T610/500 000620
Sample Type: DRILL CORE
No. of Samples: 3

SAMPLE NO.	Ag	Zn
	M	%
	101-B	101-B
NSD 90		7.24
NSD 92	35	
NSD 93	52	

UNITS LEGEND ——— m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: [illegible]

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AUSTRALIAN LABORATORY SERVICES PTY. LTD.

CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: J001
Date Received 01/09/80
Date Completed 09/10/80
Order No.: T610/500

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Sample Type: DRILL CORE

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HOBART. TAS. 7001.

No. of Samples: 41

SAMPLE NO.	Cu m i	Pb m i	Zn m i	Ag m i	Co m i	Bi m i	Cd m i	As m 5-8	Au m 120	Sn m XRF 1A
NSD 106	20	0.12 %	65	1	5	15	1	10	<0.1	15
NSD 107	45	0.16 %	90	2	10	15	2	18	<0.1	20
NSD 108	15	0.12 %	70	3	10	25	2	18	<0.1	35
NSD 109	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
NSD 110	15	0.12 %	55	2	5	20	1	5	<0.1	70
NSD 111	100	0.18 %	230	6	10	20	4	16	<0.1	135
NSD 112	30	0.32 %	340	>25 44	15	25	3	30	<0.1	715
NSD 113	15	0.15 %	330	7	15	20	6	30	<0.1	310
NSD 114	10	740	680	6	20	25	9	25	<0.1	125
NSD 115	30	0.19 %	0.10 %	9	20	20	35	25	<0.1	500
NSD 116	30	0.19 %	0.20 %	5	15	20	40	18	<0.1	650
NSD 117	20	520	330	3	20	30	13	40	<0.1	75
NSD 118	5	220	420	1	10	20	14	18	<0.1	40
NSD 119	10	230	290	2	15	20	4	9	<0.1	85
NSD 120	80	520	0.96 %	11	20	30	140	60	<0.1	215
NSD 121	130	420	0.88 %	11	25	40	130	2	<0.1	105
NSD 122	65	280	0.46 %	13	25	30	65	7	<0.1	125
NSD 123	50	240	0.20 %	5	15	25	25	3	<0.1	120
NSD 124	100	270	0.19 %	4	25	30	25	6	<0.1	125
NSD 125	180	410	0.13 % 96	6	20	40	18	3	<0.1	290
NSD 126	220	0.16 %	>1.0 96	% 14	20	40	580	5	<0.1	0.17 %
NSD 127	125	0.17 %	0.80	% 13	20	40	110	5	<0.1	105
NSD 128	155	0.18 %	0.58 50	% 17	25	40	70	360	<0.1	260
NSD 129	135	>1.0 103	% >1.0 76 50	% >25	25	50	95	340	<0.1	630
NSD 130	175	0.62	% >1.0	% >25 43	35	60	135	700	<0.1	0.14 %
NSD 131	75	600	0.34 %	8	20	30	30	120	<0.1	290
NSD 132	55	250	0.18 %	4	10	20	25	12	<0.1	195
NSD 133	45	130	0.44 %	2	10	20	80	5	<0.1	80
NSD 134	55	155	0.38 %	3	10	30	60	3	<0.1	215
NSD 135	65	160	0.20 %	3	10	30	25	25	<0.1	145

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A. J. Finlayson

Computer Research Company

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CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: J001
Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HUBART, TAS. 7001.

Date Received 01/09/80
Date Completed 09/10/80

Order No.: T610/500
Sample Type: DRILL CORE
No. of Samples: 41

SAMPLE NO.		Cu	Pb	Zn	Ag	Co	Bi	Cd	As	Au	Sn
		m	m	m	m	m	m	m	m	m	m
		1	1	1	1	1	1	1	5-B	120	XRF 1A
NSD 136	63.8	30	330	0.28 %	2	15	25	35	8	<0.1	65
NSD 137	65.6	10	130	0.13 %	2	15	30	18	12	<0.1	70
NSD 138	67.9	30	640	0.44 %	4	20	35	20	8	<0.1	85
NSD 139	70.3	10	350	0.16 %	2	15	30	17	1	<0.1	80
NSD 140	72.9	15	980	0.15 %	3	20	30	11	6	<0.1	65
NSD 141	75.3	10	0.10 %	960	3	10	20	12	1	<0.1	80
NSD 142	77.0	20	0.19 %	0.46 %	8.70	20	30	40	3	<0.1	85
NSD 143	79.0	40	0.20 %	0.36 %	>25	20	40	25	2	<0.1	305
NSD 144	81.7	20	0.12 %	0.20 %	10	20	40	21	4	<0.1	95
NSD 145	83.2	50	280	0.68 %	6	30	40	85	18	<0.1	85
NSD 146	84.9	20	125	0.11 %	3	20	40	16	4	<0.1	80

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A J Finlayson

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AUSTRALIAN LABORATORY SERVICES PTY. LTD.

CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: J001-1
Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HOBART. TAS. 7001.

Date Received 01/09/80
Date Completed 09/10/80

Order No.: T610/500
Sample Type: DRILL CORE
No. of Samples: 41

SAMPLE NO.	W m XRF 1A
NSD 106	<10
NSD 107	<10
NSD 108	<10
NSD 109	N.R.
NSD 110	<10
NSD 111	<10
NSD 112	<10
NSD 113	10
NSD 114	<10
NSD 115	<10
NSD 116	<10
NSD 117	<10
NSD 118	<10
NSD 119	<10
NSD 120	30
NSD 121	20
NSD 122	<10
NSD 123	<10
NSD 124	<10
NSD 125	<10
NSD 126	140
NSD 127	10
NSD 128	<10
NSD 129	70
NSD 130	50
NSD 131	<10
NSD 132	<10
NSD 133	20
NSD 134	<10
NSD 135	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A F Runkayson.

Computer Resources Company

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AUSTRALIAN LABORATORY SERVICES PTY. LTD.

CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: J001-1
Date Received 01/09/80
Date Completed 09/10/80

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HOBART. TAS. 7001.

Order No.: T610/500

Sample Type: DRILL CORE

No. of Samples: 41

SAMPLE NO.	W m XRF 1A
NSD 136	<10
NSD 137	<10
NSD 138	<10
NSD 139	<10
NSD 140	<10
NSD 141	<10
NSD 142	10
NSD 143	10
NSD 144	<10
NSD 145	20
NSD 146	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A. F. Finlayson

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CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
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Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: J001R
Date Received 09/10/80
Date Completed 09/10/80
Order No.: T610/500

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact:
Address:

Sample Type: DRILL CORE

No. of Samples: 5

SAMPLE NO.	Pb % 101-B	Zn % 101-B	Ag m 101-B
NSD 112			44
NSD 126		2.86	
NSD 129	1.03	1.50	50
NSD 130		1.70	43
NSD 143			70

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A. F. Finlayson

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CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: J001R
Date Received 09/10/80
Date Completed 09/10/80

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact:
Address:

Order No.: T610/500

Sample Type: DRILL CORE

No. of Samples: 5

SAMPLE NO.	Pb % 101-B	Zn % 101-B	Ag m 101-B
NSD 112			44
NSD 126		2.86	
NSD 129	1.03	1.50	50
NSD 130		1.70	43
NSD 143			70

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A. F. Finlayson

Gangue Resources Company

894281

AUSTRALIAN LABORATORY SERVICES PTY. LTD.

CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: J111
Date Received 10/09/80
Date Completed 10/11/80

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L.
HOBART. TAS. 7001.

Order No.: T610/TS00 - 000622 Sample Type: DRILL CORE No. of Samples: 63

SAMPLE NO.	Cu	Pb	Zn	Co	Bi	Cd	As	Au	Sn	W
	m	m	m	m	m	m	m	m	m	m
	1	1	1	1	1	1	S-B	120	XRF 1A	XRF 1A
NSD 147	30	165	520	20	20	9	8	<0.1	120	<10
NSD 148	60	250	>1.0 %	15	25	155	1	<0.1	135	<10
NSD 149	115	600	>1.0 %	20	35	430	1	<0.1	125	80
NSD 150	50	185	0.54 %	10	20	70	1	<0.1	125	<10
NSD 151	30	120	0.36 %	10	20	55	2	<0.1	105	<10
NSD 152	50	420	0.42 %	20	25	50	1	<0.1	175	<10
NSD 153	20	90	0.36 %	5	15	45	1	<0.1	85	<10
NSD 154	60	225	0.84 %	20	20	95	2	<0.1	170	<10
NSD 155	40	275	0.40 %	10	10	40	1	<0.1	370	<10
NSD 156	85	100	0.30 %	20	30	45	2	<0.1	205	<10
NSD 157	115	190	0.16 %	20	20	22	2	<0.1	340	<10
NSD 158	580	0.24 %	0.82 %	20	20	60	3	<0.1	0.15 %	<10
NSD 159	920	>1.0 %	>1.0 %	30	45	200	6	<0.1	0.93 %	20
NSD 160	315	0.24 %	>1.0 %	25	45	95	16	<0.1	0.28 %	<10
NSD 161	210	840	>1.0 %	20	35	100	4	<0.1	425	<10
NSD 162	600	0.28 %	>1.0 %	25	50	180	8	<0.1	590	10
NSD 163	90	960	0.48 %	15	20	50	1	<0.1	505	<10
NSD 164	70	0.12 %	0.38 %	10	30	40	2	<0.1	260	<10
NSD 165	90	145	0.32 %	10	30	55	1	<0.1	160	<10
NSD 166	210	150	0.20 %	10	20	40	1	<0.1	230	<10
NSD 167	110	185	260	15	35	6	2	<0.1	240	<10
NSD 168	140	0.14 %	0.19 %	10	30	20	1	<0.1	125	<10
NSD 169	200	240	360	15	35	7	2	<0.1	295	<10
NSD 170	390	290	640	15	40	9	1	<0.1	405	<10
NSD 171	140	150	680	10	30	12	2	<0.1	175	<10
NSD 172	295	720	0.88 %	25	50	120	5	<0.1	680	<10
NSD 173	480	840	>1.0 %	25	70	0.18 %	600	<0.1	165	590
NSD 174	400	320	>1.0 %	25	70	0.24 %	200	<0.1	110	650
NSD 175	90	0.44 %	>1.0 %	35	100	800	30	<0.1	630	60
NSD 176	120	290	600	15	30	11	4	<0.1	485	<10

UNITS LEGEND ---- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

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AUSTRALIAN LABORATORY SERVICES PTY. LTD.

CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY:
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: J111
Date Received 10/09/80
Date Completed 10/11/80

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK MINE.
Address: G.P.O. BOX 1140 L,
HOBART. TAS. 7001.

Order No.: T610/T500 - 000622 Sample Type: DRILL CORE No. of Samples: 63

SAMPLE NO.	Cu m 1	Pb m 1	Zn m 1	Co m 1	Bi m 1	Cd m 1	As m 5-B	Au m 120	Sn m XRF 1A	W m XRF 1A
NSD 177	170	480	0.11 %	15	40	14	6	<0.1	410	<10
NSD 178	620	440	840	20	40	8	4	<0.1	275	<10
NSD 179	800	>1.0 %	>1.0 %	45	120	350	10	<0.1	0.46 %	30
NSD 180	0.16 %	0.64 %	>1.0 %	35	75	210	25	<0.1	0.15 %	<10
NSD 181	920	0.17 %	>1.0 %	30	115	440	85	<0.1	0.15 %	80
NSD 182	0.12 %	265	0.52 %	30	95	55	400	<0.1	0.10 %	<10
NSD 183	580	84	0.28 %	15	35	28	10	<0.1	0.11 %	<10
NSD 184	370	180	830	15	30	11	4	<0.1	375	<10
NSD 185	410	135	0.10 %	20	20	16	340	<0.1	660	<10
NSD 186	700	225	760	20	35	13	65	<0.1	595	<10
NSD 187	400	0.21 %	0.57 %	20	25	70	16	<0.1	705	<10
NSD 188	800	385	0.23 %	20	35	35	50	<0.1	395	<10
NSD 189	460	45	100	60	30	4	0.36 %	<0.1	80	<10
NSD 190	560	50	200	15	20	6	620	<0.1	100	<10
NSD 191	840	50	45	15	20	3	80	<0.1	110	<10
NSD 192	620	30	35	10	10	3	100	<0.1	95	<10
NSD 193	380	45	205	20	20	5	480	<0.1	125	<10
NSD 194	360	75	640	30	20	12	0.32 %	<0.1	125	<10
NSD 195	450	35	20	10	15	2	110	<0.1	280	<10
NSD 196	305	65	75	15	20	3	25	<0.1	110	<10
NSD 197	455	40	25	20	25	3	470	<0.1	105	<10
NSD 198	660	40	15	20	25	3	80	<0.1	90	<10
NSD 199	265	35	20	10	20	3	20	<0.1	95	<10
NSD 200	800	40	30	25	20	3	55	<0.1	120	<10
NSD 201	900	70	40	35	25	3	180	<0.1	95	<10
NSD 202	0.10 %	105	145	30	20	4	90	<0.1	125	<10
NSD 203	250	80	600	5	20	10	10	<0.1	205	<10
NSD 204	100	40	60	10	20	2	8	<0.1	110	<10
NSD 205	75	50	440	25	20	8	16	<0.1	75	<10
NSD 206	30	40	95	10	20	2	12	<0.1	60	<10

UNITS LEGEND ——— m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

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CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: J111
Date Received 10/09/80
Date Completed 10/11/80

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HOBART. TAS. 7001.

Order No.: T610/T500 - 000622 Sample Type: DRILL CORE No. of Samples: 63

SAMPLE NO.	Cu	Pb	Zn	Co	Bi	Cd	As	Au	Sn	W
	M	M	M	M	M	M	M	M	M	M
	1	1	1	1	1	1	5-B	120	XRF 1A	XRF 1A
NSD 207	135	60	140	15	20	3	3	<0.1	65	<10
NSD 208	100	55	130	10	15	3	5	<0.1	80	<10
NSD 209A	275	>1.0 (6.10)	% >1.0 (7.74)	% 35	90	740	14	<0.1	0.47	% 430

UNITS LEGEND ----- M - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

Compact Numeric Company

8942284

AUSTRALIAN LABORATORY SERVICES PTY. LTD.

CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: J111R
Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC
Area Contact:
Address:

Date Received 24/10/80
Date Completed 24/10/80

Order No.: T610/TS00 - 000622 Sample Type: DRILL CORE No. of Samples: 13

SAMPLE NO.		Pb	Zn
		%	%
		101-B	101-B
NSD 148	NS2		1.16
SND 149			2.72
NSD 159		1.52	3.46
NSD 160			1.30
NSD 161			1.06
NSD 162			1.78
NSD 173	137.5-139.5 (2.0)		9.18
NSD 174	139.5-140.4 (1.0)		10.9
NSD 175	140.4-142.4 (1.0)		4.10
NSD 179	148.9-150.9 (2.0)	2.99	4.08
NSD 180	150.9-152.9 (2.0)		2.10
NSD 181	152.9-154.2 (1.3)		3.42
NSD 205	18.9-21.0	6.20	7.74

UNITS LEGEND ------ m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

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Computer Operations Company

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CONSULTING CHEMISTS & ANALYSTS

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A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: K347 Client: BHP COMPANY LIMITED, Area Contact:
Address: P.O. BOX 559 Address:
Date Received 31/10/80 CAMBERWELL
Date Completed 11/12/80 VIC

Order No.: TLX, 31-10-80 Sample Type: PULPS EX J111 No. of Samples: 63

SAMPLE NO.	Ag m 1
(EX J111) NSD147	2
(EX J111) NSD148	6
(EX J111) NSD149	14
(EX J111) NSD150	5
(EX J111) NSD151	4
(EX J111) NSD152	5
(EX J111) NSD153	4
(EX J111) NSD154	4
(EX J111) NSD155	4
(EX J111) NSD156	6
(EX J111) NSD157	5
(EX J111) NSD158	11
(EX J111) NSD159	>25 28
(EX J111) NSD160	8
(EX J111) NSD161	6
(EX J111) NSD162	12
(EX J111) NSD163	3
(EX J111) NSD164	3
(EX J111) NSD165	3
(EX J111) NSD166	3
(EX J111) NSD167	3
(EX J111) NSD168	5
(EX J111) NSD169	3
(EX J111) NSD170	6
(EX J111) NSD171	2
(EX J111) NSD172	10
(EX J111) NSD173	9
(EX J111) NSD174	>25 31
(EX J111) NSD175	>25 40
(EX J111) NSD176	3

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A J Finlayson

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OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: K347 Client: BHP COMPANY LIMITED, Area Contact:
Address: P.O. BOX 559 Address:
Date Received 31/10/80 CAMBERWELL
Date Completed 11/12/80 VIC

Order No.: TLX, 31-10-80 Sample Type: PULPS EX J111 No. of Samples: 63

SAMPLE NO.	Ag m 1
(EX J111) NSD177	3
(EX J111) NSD178	6
(EX J111) NSD179	>25 64
(EX J111) NSD180	>25 34
(EX J111) NSD181	>25 50
(EX J111) NSD182	>25 30
(EX J111) NSD183	12
(EX J111) NSD184	8
(EX J111) NSD185	5
(EX J111) NSD186	12
(EX J111) NSD187	10
(EX J111) NSD188	10
(EX J111) NSD189	2
(EX J111) NSD190	2
(EX J111) NSD191	2
(EX J111) NSD192	2
(EX J111) NSD193	2
(EX J111) NSD194	3
(EX J111) NSD195	2
(EX J111) NSD196	3
(EX J111) NSD197	2
(EX J111) NSD198	3
(EX J111) NSD199	3
(EX J111) NSD200	3
(EX J111) NSD201	5
(EX J111) NSD202	5
(EX J111) NSD203	2
(EX J111) NSD204	2
(EX J111) NSD205	2
(EX J111) NSD206	2

209

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A. J. Dunlop

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CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: K347 Client: BHP COMPANY LIMITED, Area Contact:
Address: P.O. BOX 559 Address:
Date Received 31/10/80 CAMBERWELL
Date Completed 11/12/80 VIC

Order No.: TLX. 31-10-80 Sample Type: PULPS EX J111 No. of Samples: 63

SAMPLE NO.	Ag m 1
(EX J111) NSD207	2
(EX J111) NSD208	2
(EX J111) NSD209	)25 62

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: [signature]

894288

CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: K347R
Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC
Area Contact:
Address:
Date Received 11/12/80
Date Completed 11/12/80
Order No.: TLX 31-10-80
Sample Type: PULPS EX J111
No. of Samples: 8

SAMPLE NO.	Ag m 101-B
(EX J111) NSD159	28
(EX J111) NSD174	31
(EX J111) NSD175	40
(EX J111) NSD179	64
(EX J111) NSD180	34
(EX J111) NSD181	50
(EX J111) NSD182	30
(EX J111) NSD209	62

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A. J. Finlayson

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Company Accounts Company

CONSULTING CHEMISTS & ANALYSTS

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44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2030
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: K007 — Client: BHP COMPANY LIMITED, — Area Contact: DR. RICK HINE.
Address: P.O. BOX 559 — Address: G.P.O. BOX 1140 L,
Date Received 01/10/80 — CAMBERWELL — HUBART. TAS. 7001.
Date Completed 08/12/80 — VIC

Order No.: T610/500 - 000624 — Sample Type: DRILL CORE — No. of Samples: 35

SAMPLE NO.	Cu m 1	Pb m 1	Zn m 1	Ag m 1	As m S-B	Sn m XRF 1A	W m XRF 1A
NSD 209	20	0.12 %	0.12 %	3	14	95	<10
NSD 210	15	760	0.13 %	2	8	270	<10
NSD 211	10	760	0.18 %	2	10	0.28 %	<10
NSD 212	70	370	0.40 %	3	100	0.41 %	<10
NSD 213	55	60	0.10 %	1	10	915	<10
NSD 214	20	160	0.10 %	1	16	0.17 %	<10
NSD 215	10	350	0.10 %	1	25	0.11 %	<10
NSD 216	20	290	0.16 %	1	40	565	<10
NSD 217	20	0.16 %	0.26 %	2	14	550	<10
NSD 218	20	330	0.16 %	1	16	120	<10
NSD 219	10	520	940	2	14	180	<10
NSD 220	10	460	0.16 %	2	25	250	<10
NSD 221	20	90	0.10 %	1	10	295	<10
NSD 222	15	170	0.10 %	2	20	260	<10
NSD 223	15	230	500	2	12	50	<10
NSD 224	10	510	0.15 %	2	6	430	<10
NSD 225	30	600	0.14 %	2	10	310	<10
NSD 226	60	410	0.22 %	3	6	270	<10
NSD 227	20	330	0.10 %	2	20	175	<10
NSD 228	50	800	0.11 %	2	5	145	<10
NSD 229	50	210	540	2	8	410	<10
NSD 230	10	100	500	2	8	535	<10
NSD 231	110	120	340	2	8	120	<10
NSD 232	320	300	800	3	4	195	<10
NSD 233	520	400	520	3	10	175	<10
NSD 234	165	230	0.11 %	2	30	330	<10
NSD 235	310	125	340	3	260	160	<10
NSD 236	260	0.26 %	0.27 %	7	70	300	<10
NSD 237	50	175	0.10 %	1	20	440	<10
NSD 238	30	340	0.13 %	1	45	390	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A J Finlayson

894290

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CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: K007
Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HOBART. TAS. 7001.

Date Received 01/10/80
Date Completed 08/12/80

Order No.: T610/500 - 000624
Sample Type: DRILL CORE
No. of Samples: 35

SAMPLE NO.	Cu ppm 1	Pb ppm 1	Zn ppm 1	Ag ppm 1	As ppm 5-8	Sn ppm XRF 1A	W ppm XRF 1A
NSD 239	145	0.18 %	0.18 %	4	16	165	<10
NSD 240	65	0.20 %	0.24 %	3	45	265	<10
NSD 241	30	940	0.15 %	1	40	190	<10
NSD 242	30	230	740	2	10	190	<10
NSD 243	10	90	240	1	25	110	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

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AUSTRALIAN LABORATORY SERVICES PTY. LTD.

CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
44 Balaclava Street
WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: K078 Client: BHP COMPANY LIMITED, Area Contact: DR. RICK HINE.
Address: P.O. BOX 559 Address: G.P.O. BOX 1140 L,
Date Received 07/10/80 CAMBERWELL HOBART. TAS. 7001.
Date Completed 11/12/80 VIC

Order No.: T610 - 000625 Sample Type: DRILL CORE No. of Samples: 61

SAMPLE NO.	Cu m i	Pb m i	Zn m i	Ag m i	As m S-B	Sn m XRF 1A	W m XRF 1A
NSD 244	70	135	0.14 %	1	18	225	<10
NSD 245	110	115	300	2	100	60	<10
NSD 246	125	120	0.12 %	2	35	125	<10
NSD 247	25	220	540	2	40	95	<10
NSD 248	25	330	0.10 %	1	30	95	<10
NSD 249	145	920	0.36 %	2	75	145	<10
NSD 250	95	560	0.11 %	2	30	145	<10
NSD 251	220	0.14 %	0.18 %	4	85	130	<10
NSD 252	400	440	0.30 %	4	500	170	<10
NSD 253	180	230	720	3	65	260	<10
NSD 254	150	260	0.30 %	2	18	155	<10
NSD 255	240	270	0.50 %	3	14	455	<10
NSD 256	55	0.15 %	0.16 %	3	16	395	<10
NSD 257	95	920	0.26 %	3	10	735	<10
NSD 258	45	560	900	2	40	70	<10
NSD 259	105	880	0.30 %	3	18	230	<10
NSD 260	60	130	240	1	5	115	<10
NSD 261	105	195	460	2	8	120	<10
NSD 262	105	165	0.14 %	2	9	120	<10
NSD 263	320	0.17 %	0.94 %	6	9	385	<10
NSD 264	65	100	740	2	30	105	<10
NSD 265	30	70	230	2	12	70	<10
NSD 266	20	280	285	1	14	40	<10
NSD 267	20	220	480	2	16	25	<10
NSD 268	20	240	340	2	20	30	<10
NSD 269	25	120	180	2	40	30	<10
NSD 270	20	125	150	2	18	55	<10
NSD 271	45	0.16 %	0.20 %	3	14	170	<10
NSD 272	35	100	520	2	14	85	<10
NSD 273	35	210	210	2	12	90	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature:

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Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: K078 Client: BHP COMPANY LIMITED, Area Contact: DR. RICK HINE.
Address: P.O. BOX 559 Address: G.P.O. BOX 1140 L,
Date Received 07/10/80 CAMBERWELL HOBART. TAS. 7001.
Date Completed 11/12/80 VIC

Order No.: T610 - 000625 Sample Type: DRILL CORE No. of Samples: 61

SAMPLE NO.	Cu m i	Pb m i	Zn m i	Ag m i	As m 5-B	Sn m XRF 1A	W m XRF 1A
NSD 274	85	0.12 %	0.19 %	4	6	240	<10
NSD 275	50	125	0.13 %	2	3	235	<10
NSD 276	55	0.10 %	0.18 %	3	14	385	<10
NSD 277	40	175	280	1	4	70	<10
NSD 278	25	85	290	2	4	115	<10
NSD 279	190	200	235	2	2	270	<10
NSD 280	90	170	740	2	2	210	<10
NSD 281	400	145	240	2	3	120	<10
NSD 282	860	880	0.17 %	4	3	640	<10
NSD 283	300	720	720	3	3	390	<10
NSD 284	250	330	350	2	8	220	<10
NSD 285	430	640	0.36 %	5	8	350	<10
NSD 286	50	800	0.18 %	2	8	185	<10
NSD 287	180	220	680	2	4	120	<10
NSD 288	230	125	185	2	55	160	<10
NSD 289	325	155	290	3	30	200	<10
NSD 290	800	720	0.16 %	10	40	345	<10
NSD 291	600	150	0.98 %	5	0.15 %	150	<10
NSD 292	430	110	0.98 %	4	85	235	<10
NSD 293	580	70	0.74 %	2	45	70	<10
NSD 294	255	100	560	3	300	90	<10
NSD 295	295	100	165	2	14	75	<10
NSD 296	215	95	75	2	6	40	<10
NSD 297	260	75	800	2	10	70	<10
NSD 298	380	110	380	3	50	95	<10
NSD 299	250	60	65	2	12	80	<10
NSD 300	150	55	30	2	12	65	<10
NSD 301	240	95	310	3	10	85	<10
NSD 302	110	55	40	1	5	45	<10
NSD 303	280	60	50	1	35	70	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A J Finlayson

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CONSULTING CHEMISTS & ANALYSTS

OFFICE & LABORATORY
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WOOLLOONGABBA Q 4102
Ph (07) 391 6799
A/H 353 2830
TELEX ALSEV 42344

LABORATORY REPORT

Batch No.: K078
Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140 L,
HOBART. TAS. 7001.

Date Received 07/10/80
Date Completed 11/12/80

Order No.: T610 - 000625
Sample Type: DRILL CORE
No. of Samples: 61

SAMPLE NO.	Cu	Pb	Zn	Ag	As	Sn	W
	M	M	M	M	M	M	M
	1	1	1	1	5-B	XRF 1A	XRF 1A
NSD 304	580	60	30	2	2	65	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: C. J. Finlayson.

Company Secretary Program

89429

[redacted] TELEX [redacted]

Batch No.: J304

Date Received 30/09/80
Date Completed 01/12/80

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK [redacted]
Address: G.P.O. BOX [redacted]
HOBART, TAS. [redacted]

Order No.: T610 / 000623

Sample Type: PERC.DRILL CHIPS

No. of Samples: [redacted]

SAMPLE NO.		m	Cu m 1	Pb m 1	Zn m 1	Ag m 1	As m 5-B	Sn m XRF 1A	W m XRF 1A
NSP	1	2-3	40	620	120	1	4	50	<10
NSP	2	-4	30	840	60	1	4	40	<10
NSP	3	-5	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
NSP	4	-6	50	760	95	1	4	40	<10
NSP	5	-7	50	300	85	1	10	5	<10
NSP	6	-8	35	400	125	1	12	5	<10
NSP	7	-9	40	360	100	2	10	15	<10
NSP	8	-10	50	500	150	2	20	15	<10
NSP	9	-11	60	820	250	1	20	10	<10
NSP	10	-12	40	480	165	1	12	5	<10
NSP	11	-13	50	580	90	2	20	10	<10
NSP	12	-14	40	660	150	2	14	15	<10
NSP	13	-15	40	480	70	2	12	5	<10
NSP	14	-16	45	420	180	2	20	5	<10
NSP	15	-17	40	480	145	1	8	<5	<10
NSP	16	-18	45	680	135	1	8	<5	<10
NSP	17	-19	60	0.13 %	145	2	6	5	<10
NSP	18	-20	90	0.12 %	195	2	6	<5	<10
NSP	19	-21	40	640	110	1	6	<5	<10
NSP	20	-22	20	560	135	1	12	<5	<10
NSP	21	23	35	960	330	1	20	5	<10
NSP	22	-24	30	820	235	1	8	5	<10
NSP	23	-25	20	620	135	1	20	5	<10
NSP	24	-26	25	360	140	1	25	<5	<10
NSP	25	-27	40	540	125	2	25	10	<10
NSP	26	-28	35	540	140	2	16	5	<10
NSP	27	-29	40	520	165	3	25	<5	<10
NSP	28	-30	70	540	135	2	10	10	<10
NSP	29	-31	45	360	135	2	6	5	<10
NSP	30	31-32	25	220	140	2	5	5	<10

UNITS LEGEND ------ m - Parts per million b - Parts per billion % - percent

894295

Batch No.: J304

Client: BHP COMPANY
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE.
Address: G.P.O. BOX 1140
HOBART. TAS.

Date Received 30/09/80
Date Completed 01/12/80

Order No.: T610 / 000623 Sample Type: PERC.DRILL CHIPS No. of Samples: 172

SAMPLE NO.		m	Cu m 1	Pb m 1	Zn m 1	Ag m 1	As m 5-B	Sn m XRF 1A	W m XRF 1A
NSP	31	32-33	40	400	230	2	5	10	<10
NSP	32	-34	25	380	170	1	5	10	<10
NSP	33	-35	40	800	315	2	3	25	<10
NSP	34	-36	35	800	360	2	<1	60	10
NSP	35	-37	35	0.11 %	360	1	1	70	<10
NSP	36	-38	30	860	230	3	1	35	<10
NSP	37	-39	20	600	200	2	<1	15	<10
NSP	38	-40	10	340	210	2	1	5	<10
NSP	39	-41	40	0.13 %	370	1	1	15	<10
NSP	40	-42	55	600	145	2	2	15	<10
NSP	41	-43	35	620	430	1	2	30	<10
NSP	42	-44	40	420	220	2	6	10	<10
NSP	43	-45	30	380	230	2	10	15	<10
NSP	44	-46	30	0.10 %	195	1	10	25	<10
NSP	45	-47	20	680	150	1	8	10	<10
NSP	46	-48	20	220	140	1	10	5	<10
NSP	47	-49	15	160	150	1	2	5	<10
NSP	48	49-50	20	180	220	1	8	<5	<10
NSP	49	1-2	20	300	105	4	2	40	<10
NSP	50		20	200	50	1	2	15	<10
NSP	51		20	320	75	1	1	80	<10
NSP	52		20	320	100	2	1	130	<10
NSP	53		25	420	105	2	20	175	<10
NSP	54		20	440	70	2	14	195	<10
NSP	55		40	360	45	5	20	130	<10
NSP	56		30	300	50	2	16	165	<10
NSP	57		40	280	65	3	20	35	<10
NSP	58		10	120	35	2	10	20	<10
NSP	59		30	120	30	1	20	30	<10
NSP	60	12-13	20	120	35	1	20	35	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

Signature: A J Davidson

894296

[redacted] TELEX [redacted]

Batch No.: J304

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HINE
Address: C.P.O. BOX [redacted]
HOBART, [redacted]

Date Received 30/09/80
Date Completed 01/12/80

Order No.: T610 / 000623

Sample Type: PERC.DRILL CHIPS

No. of Samples: 172

SAMPLE NO.		Cu m 1	Pb m 1	Zn m 1	Ag m 1	As m 5-B	Sn m XRF 1A	W m XRF 1A
NSP 61	13-14	35	155	105	2	12	110	<10
NSP 62	-	30	120	90	2	12	95	<10
NSP 63	-	40	110	50	2	12	70	<10
NSP 64	-	20	145	70	2	12	20	<10
NSP 65	-	30	135	65	2	20	10	<10
NSP 66	-	95	460	80	3	50	785	<10
NSP 67	-	30	170	65	2	20	40	<10
NSP 68	-	10	100	40	2	10	20	<10
NSP 69	-	30	120	50	2	5	25	<10
NSP 70	-	10	120	40	1	4	20	<10
NSP 71	-	10	170	50	2	5	55	<10
NSP 72	-	15	290	50	1	8	210	<10
NSP 73	-	10	145	40	2	8	45	<10
NSP 74	-	10	160	50	2	10	35	<10
NSP 75	-	10	120	40	2	2	40	<10
NSP 76	-	15	75	35	2	2	15	<10
NSP 77	-	20	65	45	2	2	10	<10
NSP 78	-	5	100	30	2	2	10	<10
NSP 79	-	15	430	35	3	20	160	<10
NSP 80	-	15	600	40	2	10	175	<10
NSP 81	-	10	250	25	1	6	75	<10
NSP 82	-	15	210	30	2	2	250	<10
NSP 83	-	15	195	30	2	1	80	<10
NSP 84	-	15	145	30	3	1	110	<10
NSP 85	-	15	120	25	3	2	25	<10
NSP 86	-	20	400	25	3	5	60	<10
NSP 87	-	5	370	20	3	4	40	<10
NSP 88	-	20	140	20	3	6	35	<10
NSP 89	-	25	95	20	2	16	20	<10
NSP 90	42-43	10	80	20	2	12	10	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent

894297

[redacted] TELEX [redacted]

Batch No.: J304
Date Received 30/09/80
Date Completed 01/12/80

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR. RICK HIRE
Address: C.P.O. BOX [redacted]
HOBART. TAS.

Order No.: T610 / 000623
Sample Type: PERC.DRILL CHIPS
No. of Samples: 172

SAMPLE NO.		Cu m 1	Pb m 1	Zn m 1	Ag m 1	As m 5-B	Sn m XRF 1A	W m XRF 1A
NSP 91	43-44	10	75	20	2	12	5	10
NSP 92		10	95	15	1	6	10	<10
NSP 93		10	125	15	2	10	90	<10
NSP 94		10	150	20	2	16	40	10
NSP 95		20	450	30	3	25	135	10
NSP 96		25	150	20	4	20	25	<10
NSP 97	49-50	10	210	20	2	20	10	<10
NSP 98	1-2	35	280	25	2	35	20	<10
NSP 99	-	60	270	60	2	20	5	<10
NSP 100	-	40	220	50	2	65	5	<10
NSP 101	-	70	230	70	2	10	5	<10
NSP 102	-	60	110	50	3	15	<5	<10
NSP 103	-	60	125	65	3	15	5	<10
NSP 104	-	90	250	70	2	15	5	<10
NSP 105	-	40	175	30	2	15	<5	<10
NSP 106	-	25	170	25	3	10	<5	<10
NSP 107	-	20	170	25	3	8	5	<10
NSP 108	-	35	290	25	3	8	5	10
NSP 109	-	40	470	20	4	30	20	<10
NSP 110	-	45	345	25	4	16	10	<10
NSP 111	-	80	250	30	6	12	5	<10
NSP 112	-	90	230	20	2	16	<5	<10
NSP 113	-	230	320	65	9	16	5	<10
NSP 114	-	70	130	30	2	2	<5	<10
NSP 115	-	105	160	40	2	2	<5	<10
NSP 116	-	210	250	60	2	8	5	<10
NSP 117	-	240	350	125	2	6	<5	<10
NSP 118	-	165	280	135	2	1	<5	10
NSP 119	-	210	280	105	2	4	5	<10
NSP 120	23-24	245	240	90	2	2	<5	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent

894298

Batch No.: J304

Client: BHP COMPANY LIMITED,
Address: P.O. BOX 559
CAMBERWELL
VIC

Area Contact: DR./RICE [illegible]
Address: G.P.O. BOX [illegible]
HOBART, TAS

Date Received 30/09/80
Date Completed 01/12/80

Order No.: T610 / 000623

Sample Type: PERC.DRILL CHIPS

No. of Samples: 12

SAMPLE NO.		Cu m 1	Pb m 1	Zn m 1	Ag m 1	As m S-B	Sn m XRF 1A	W m XRF 1A
NSP 121	24-25	70	240	105	2	4	<5	<10
NSP 122	-	125	220	100	2	4	10	<10
NSP 123	-	130	210	65	1	4	10	<10
NSP 124	-	125	210	100	2	10	5	<10
NSP 125	-	80	260	130	2	8	<5	<10
NSP 126	-	110	350	155	2	20	<5	<10
NSP 127	-	110	300	160	2	16	<5	<10
NSP 128	-	170	270	120	2	14	<5	<10
NSP 129	-	175	220	90	2	14	5	<10
NSP 130	-	115	165	50	2	8	<5	<10
NSP 131	-	100	180	40	2	6	10	<10
NSP 132	-	120	280	60	3	9	5	<10
NSP 133	-	110	510	80	3	16	25	<10
NSP 134	-	140	780	145	2	20	90	<10
NSP 135	-	150	640	120	2	5	220	<10
NSP 136	-	140	540	125	3	14	110	<10
NSP 137	-	120	480	105	2	8	85	<10
NSP 138	-	140	620	210	2	8	95	<10
NSP 139	-	120	880	125	3	45	150	<10
NSP 140	-	310	0.10 %	110	2	80	170	<10
NSP 141	-	85	680	60	2	30	65	<10
NSP 142	-	60	530	50	11	16	55	<10
NSP 143	-	145	780	110	5	12	25	<10
NSP 144	-	170	940	105	4	18	35	<10
NSP 145	-	180	0.17 %	150	4	15	45	<10
NSP 146	49-50	270	0.12 %	145	4	10	20	<10
NSP 147	1-2	290	900	75	3	220	110	<10
NSP 148	-	260	115	30	3	35	120	<10
NSP 149	-	210	170	25	3	15	50	<10
NSP 150	-	280	190	30	2	10	75	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

89299

[redacted] TELEX [redacted]

Batch No.: J304 Client: BHP COMPANY LIMITED, Area Contact: DR. RICK [redacted]
Address: P.O. BOX 559 Address: G.P.O. BOX [redacted]
CAMBERWELL HOBART, TAS.
Date Received 30/09/80 VIC
Date Completed 01/12/80

Order No.: T610 / 000623 Sample Type: PERC.DRILL CHIPS No. of Samples: 17

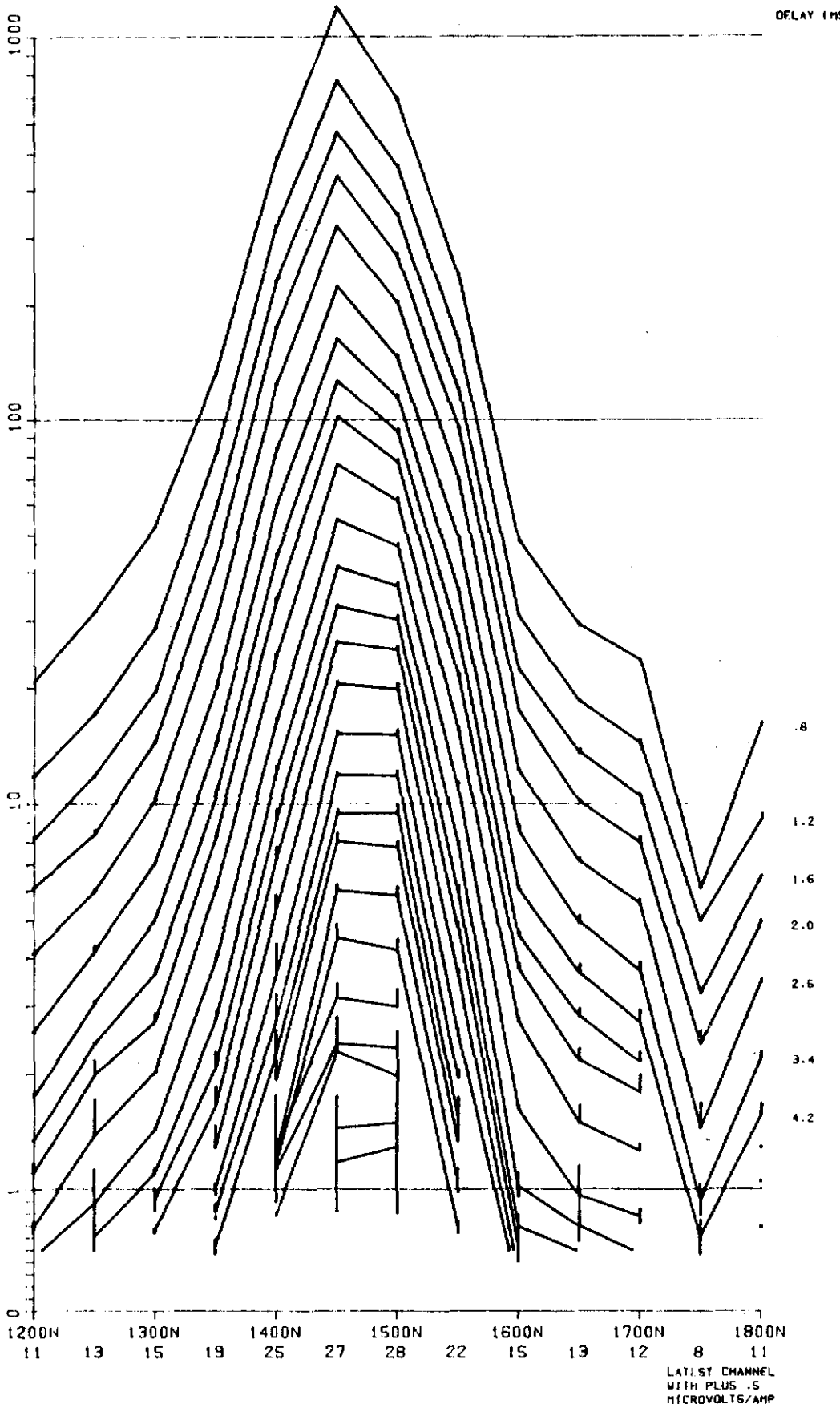
SAMPLE NO.		Cu m 1	Pb m 1	Zn m 1	Ag m 1	As m 5-B	Sn m XRF 1A	W m XRF 1A
NSP 151	5-6 m	40	370	90	1	6	10	<10
NSP 152		215	155	50	1	4	455	<10
NSP 153		240	420	75	2	8	180	<10
NSP 154		480	460	160	10	40	45	<10
NSP 155		440	410	380	11	30	50	<10
NSP 156		560	560	250	13	40	35	<10
NSP 157		600	410	160	6	40	20	<10
NSP 158		320	320	145	4	30	20	<10
NSP 159		840	380	400	5	90	25	<10
NSP 160		480	300	140	5	70	15	<10
NSP 161		400	530	95	5	45	15	<10
NSP 162		420	210	120	3	50	15	<10
NSP 163		760	260	90	10	30	40	<10
NSP 164		190	45	70	4	25	55	<10
NSP 165		440	40	100	1	25	50	<10
NSP 166		0.20	% 170	120	5	25	80	<10
NSP 167		0.36	% 130	200	3	35	195	<10
NSP 168		120	40	160	2	12	35	<10
NSP 169		90	25	170	1	8	25	<10
NSP 170	24-25	40	25	190	1	20	30	<10
NSP 171		N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
NSP 9A		60	740	220	1	20	5	<10

UNITS LEGEND ----- m - Parts per million b - Parts per billion % - percent
g - Grams a - Absorbance

894300

Appendix 4

894301



INSTRUMENT :SIROTEM
LOOP DETAILS:COINCIDENT 100M LOOP
READING INTERVAL 50M

SCALE: 1:5000
DATE : 27.10.1979
MAP : SK 55-4

THE BROKEN HILL PROPRIETARY CO. LTD.

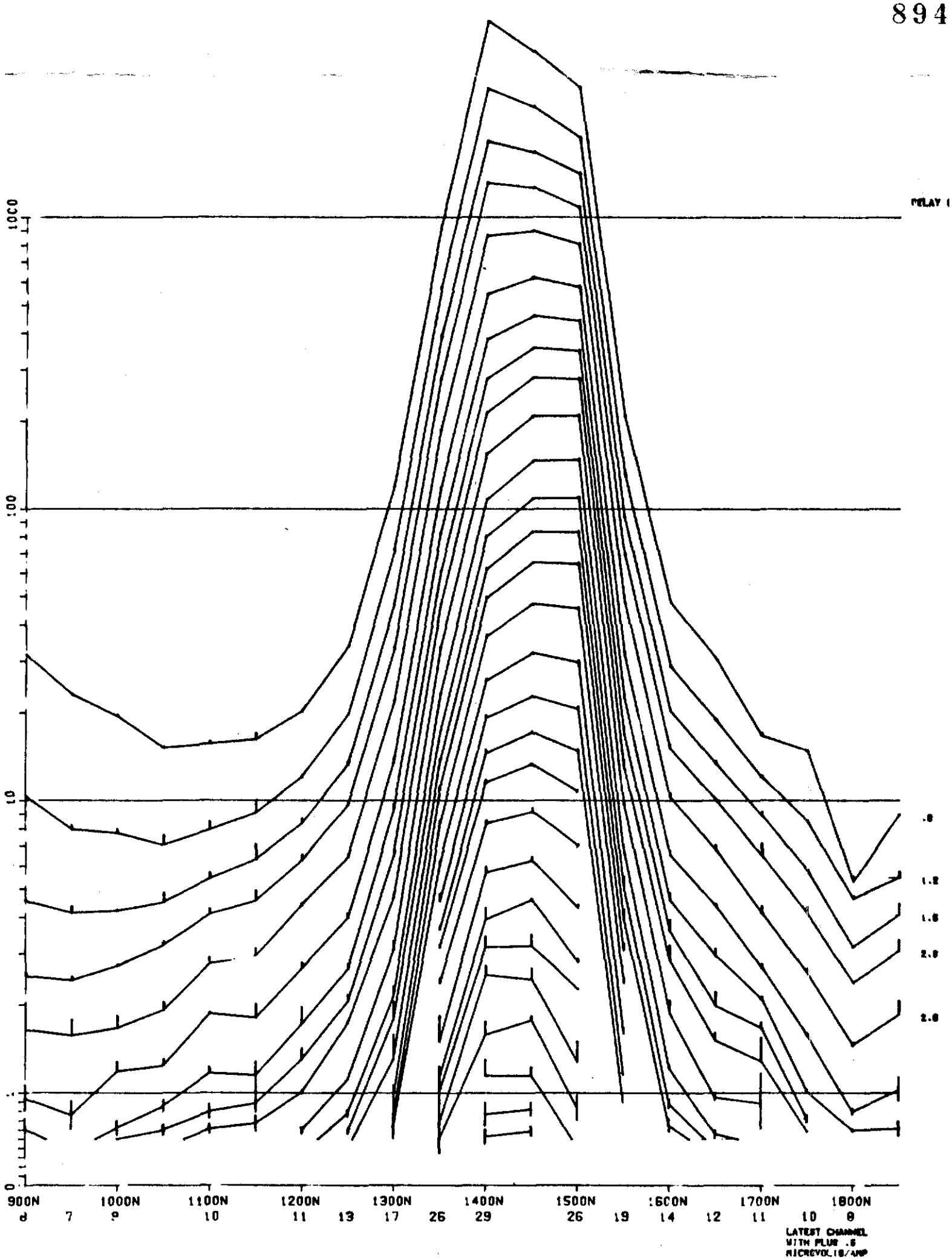
SCAMANDER EL 12/78 TASMANIA

TRANSIENT E.M. PROFILE

LINE 550E. PROSPECT NTH. SCAMANDER MINE

5 cm

894302



INSTRUMENT :SIROTEM
LOOP DETAILS:COINCIDENT 100M LOOP
READING INTERVAL 50M

SCALE: 1:5000
DATE : 28.10.1979
MAP : SK 55-4

THE BROKEN HILL PROPRIETARY CO. LTD.

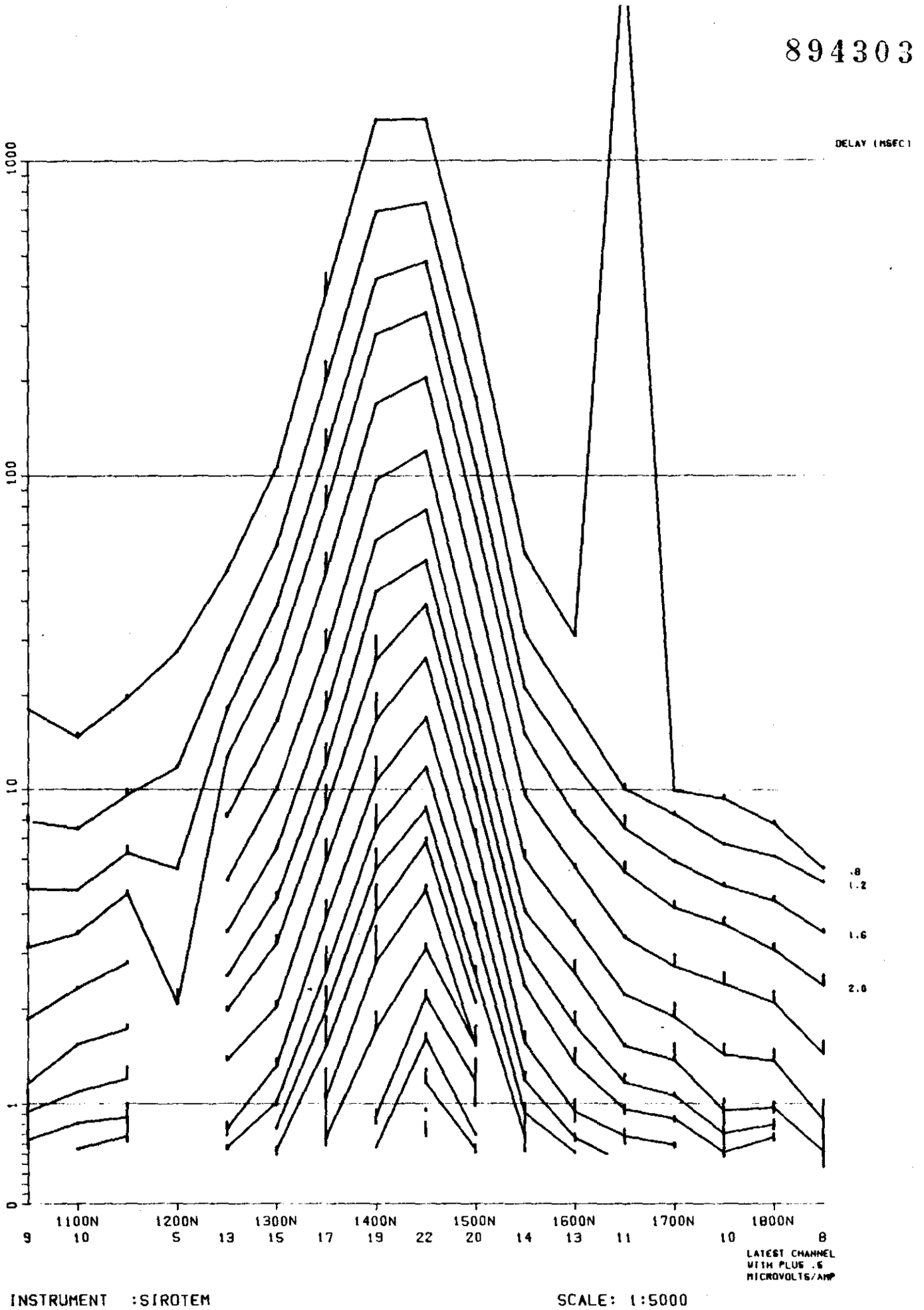
5 cm

SCAMANDER EL 12/78 TASMANIA

TRANSIENT E.M. PROFILE

LINE 650E. PROSPECT NTH. SCAMANDER MINE

894303



INSTRUMENT :SIROTEM
LOOP DETAILS:COINCIDENT 100M LOOP
READING INTERVAL 50M

SCALE: 1:5000
DATE : 29.10.1979
MAP : SK 55-4

THE BROKEN HILL PROPRIETARY CO. LTD.

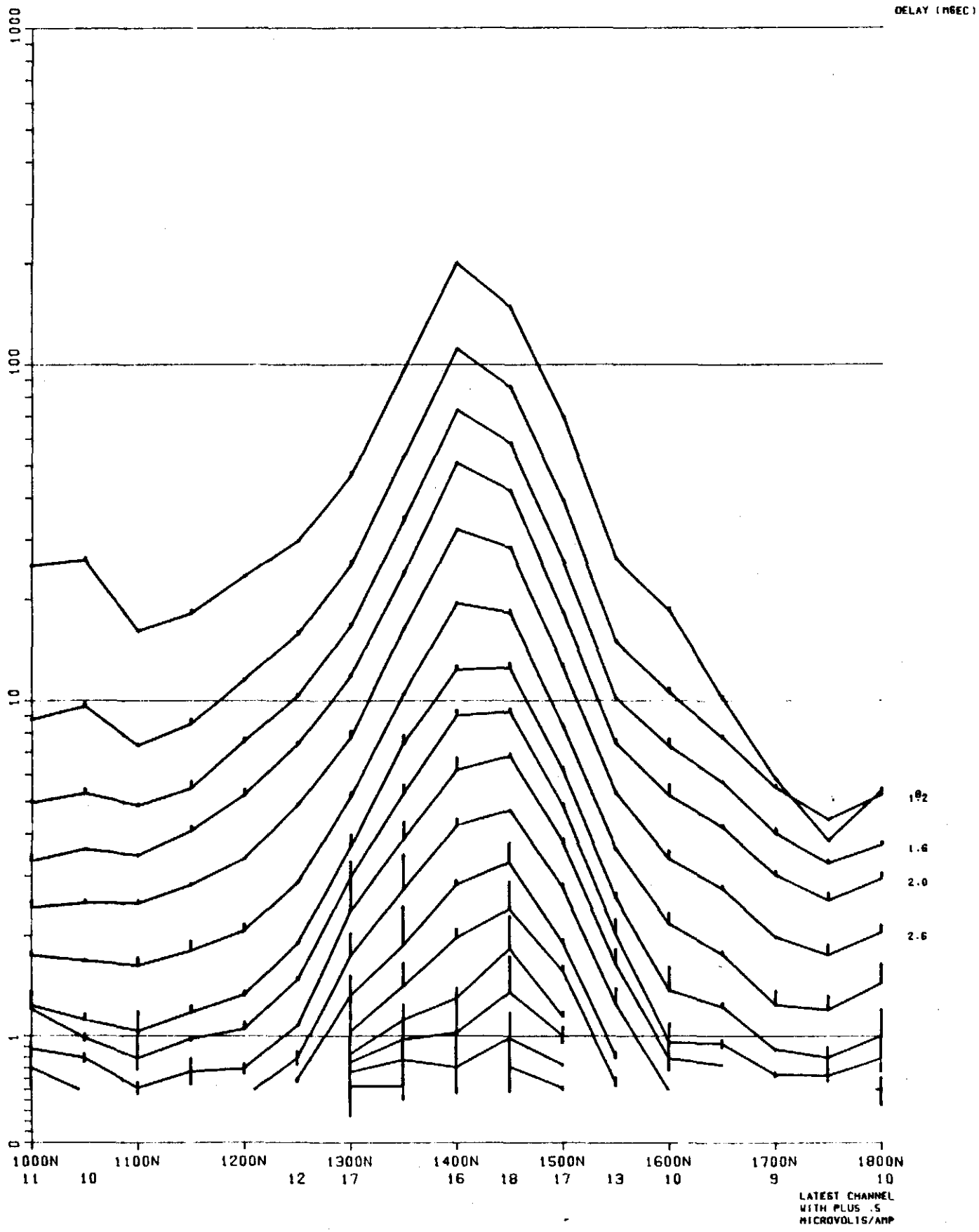
SCAMANDER EL 12/78 TASMANIA

TRANSIENT E.M. PROFILE

L INF 750E. PROSPECT NTH. SCAMANDER MINE

5 cm

894304



INSTRUMENT :SIROTEM
LOOP DETAILS:COINCIDENT 100M LOOP
READING INTERVAL 50M

SCALE: 1:5000
DATE : 30.10.1979
MAP : SK 55-4

THE BROKEN HILL PROPRIETARY CO. LTD.

SCAMANDER EL 12/78 TASMANIA

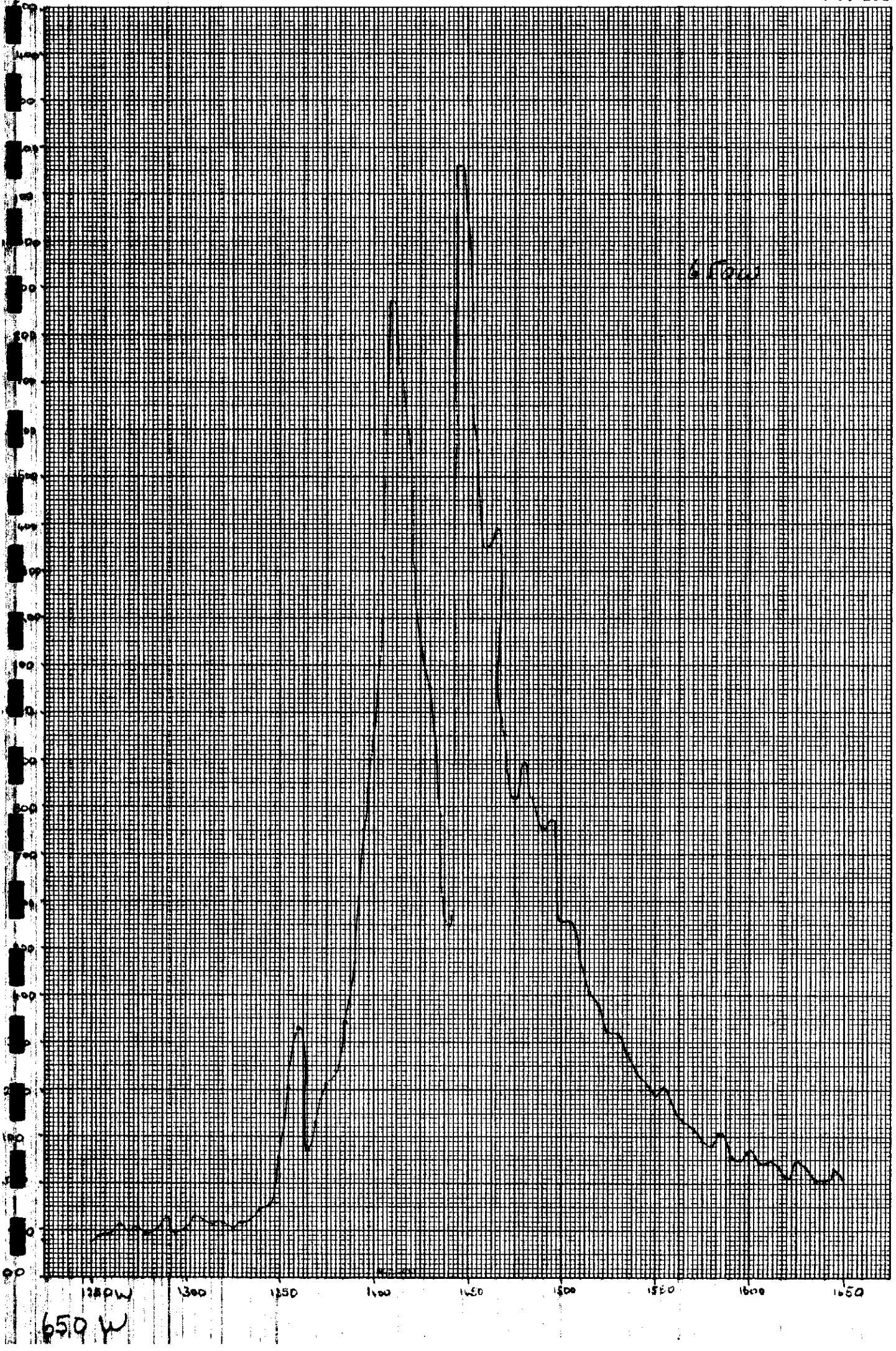
TRANSIENT E.M. PROFILE

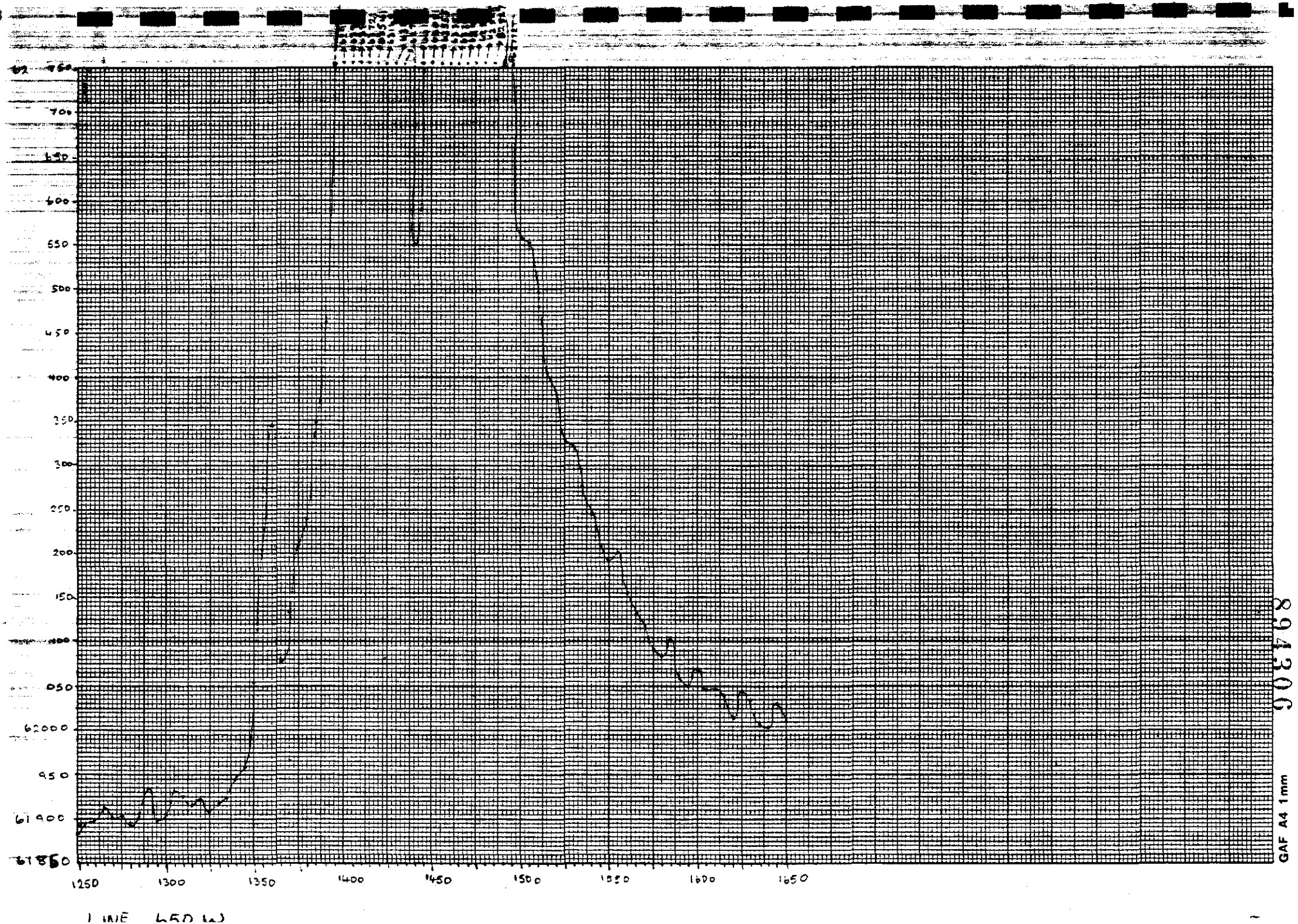
LINE 850E. PROSPECT NTH. SCAMANDER MINE

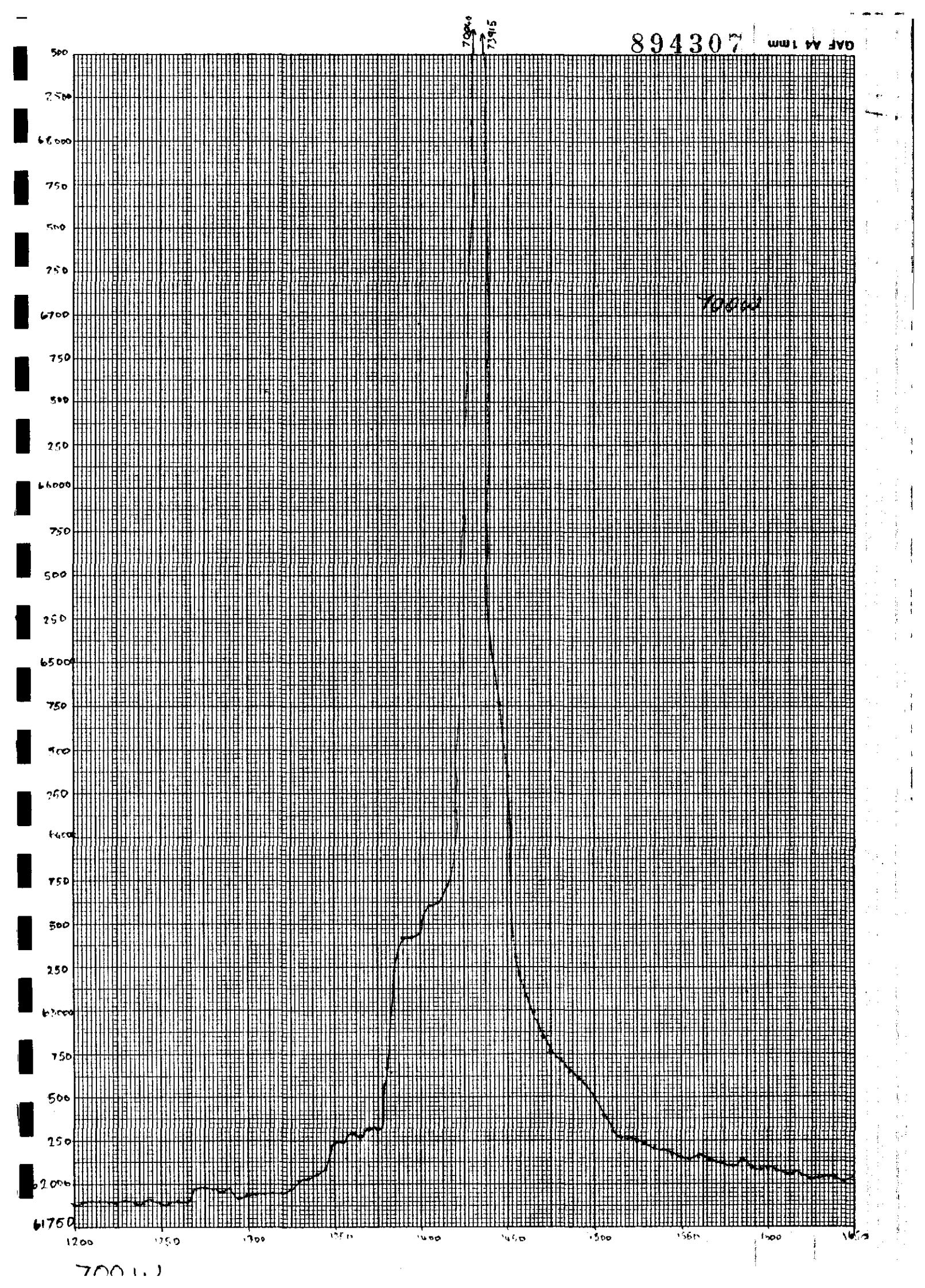
5 cm

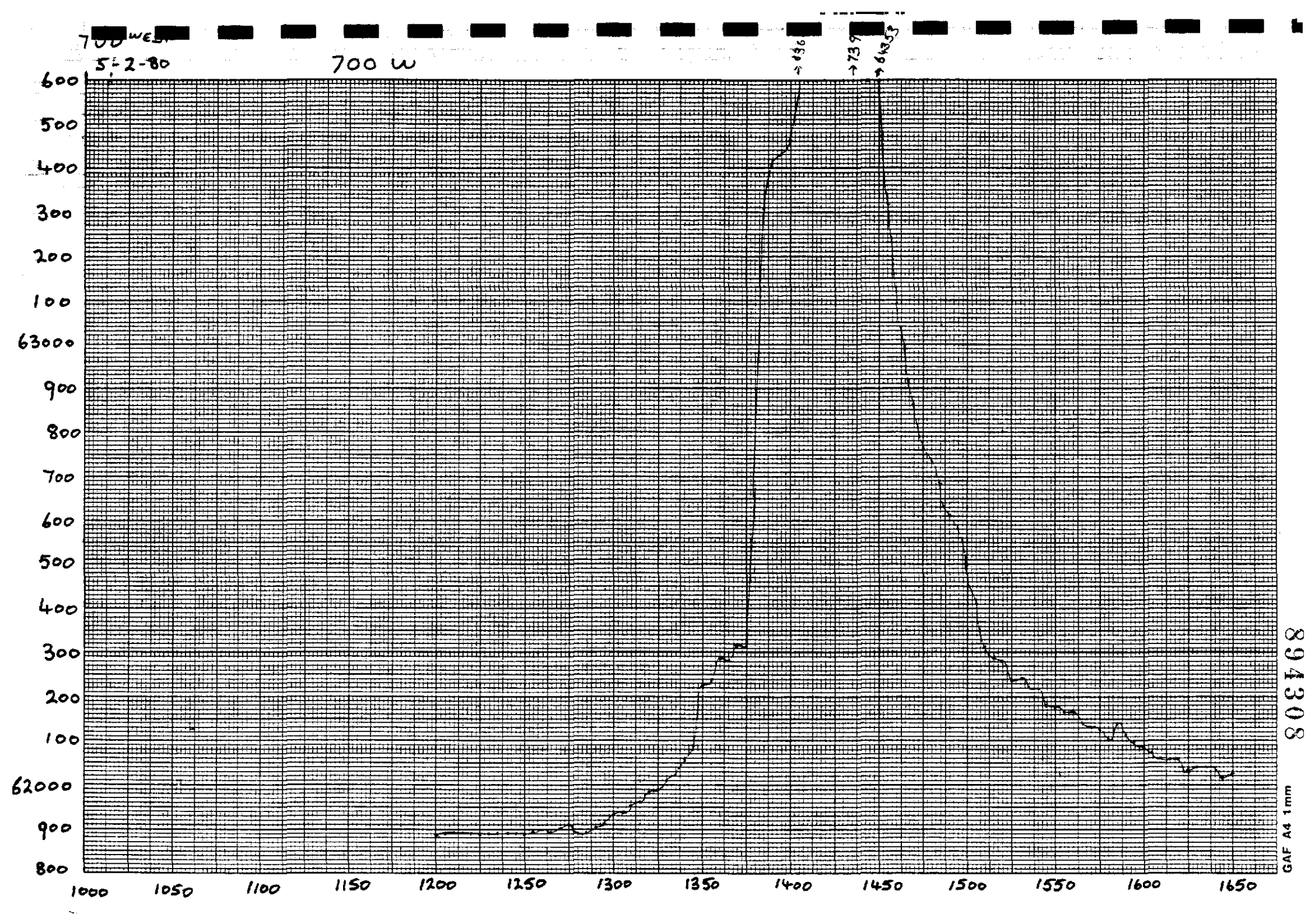
894305

GAF A4 1mm

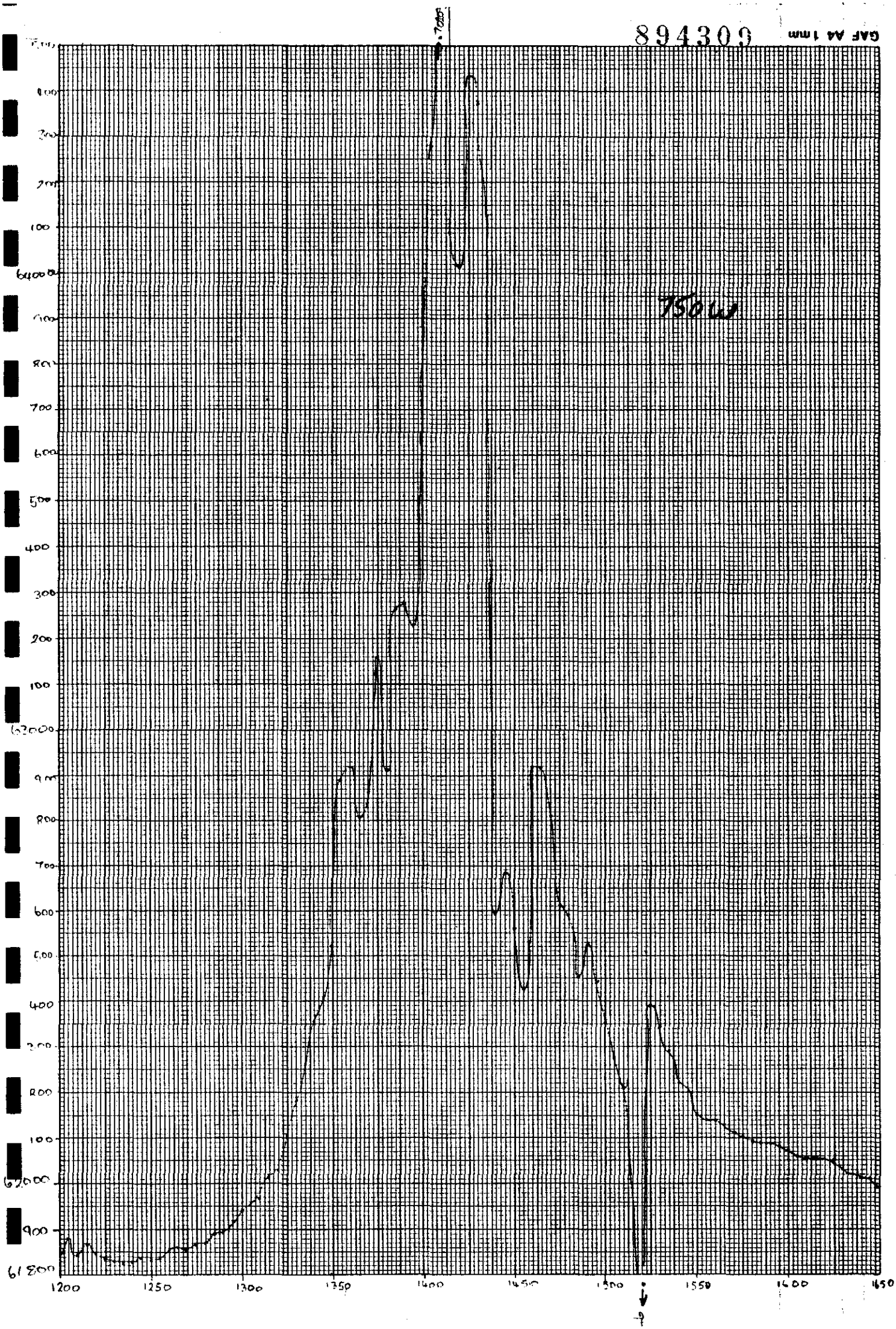


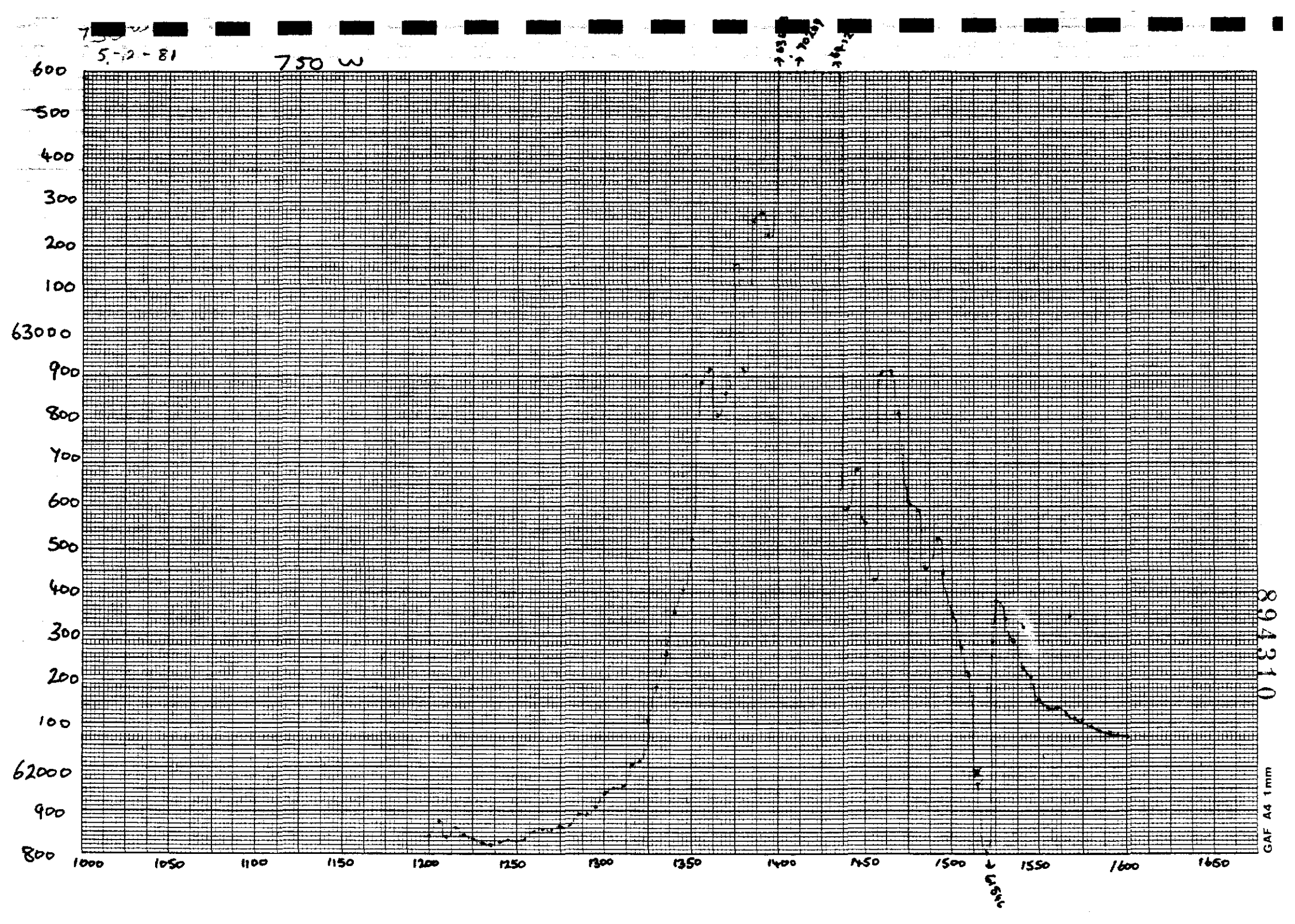

700
650
600
550
500
450
400
350
300
250
200
150
100
050
62000
950
61900
61850
1250
1300
1350
1400
1450
1500
1550
1600
1650
LINE 650 (W)
GAF A4 1mm

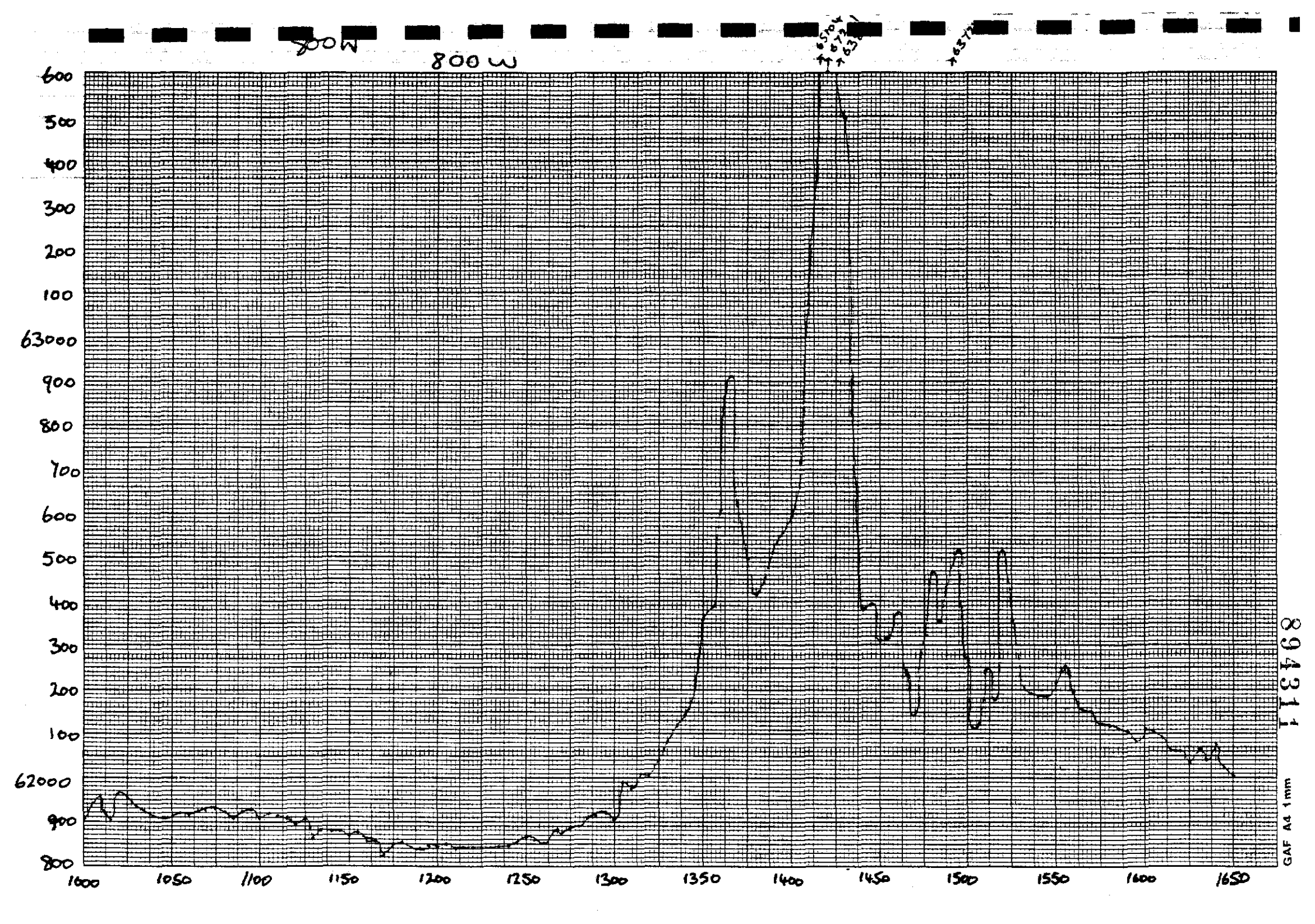

894307
GAF A4 1mm
73915
500
250
66000
750
500
250
6700
750
500
250
66000
750
500
250
65000
750
500
250
64000
750
500
250
63000
750
500
250
62000
61750
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
700 (.)

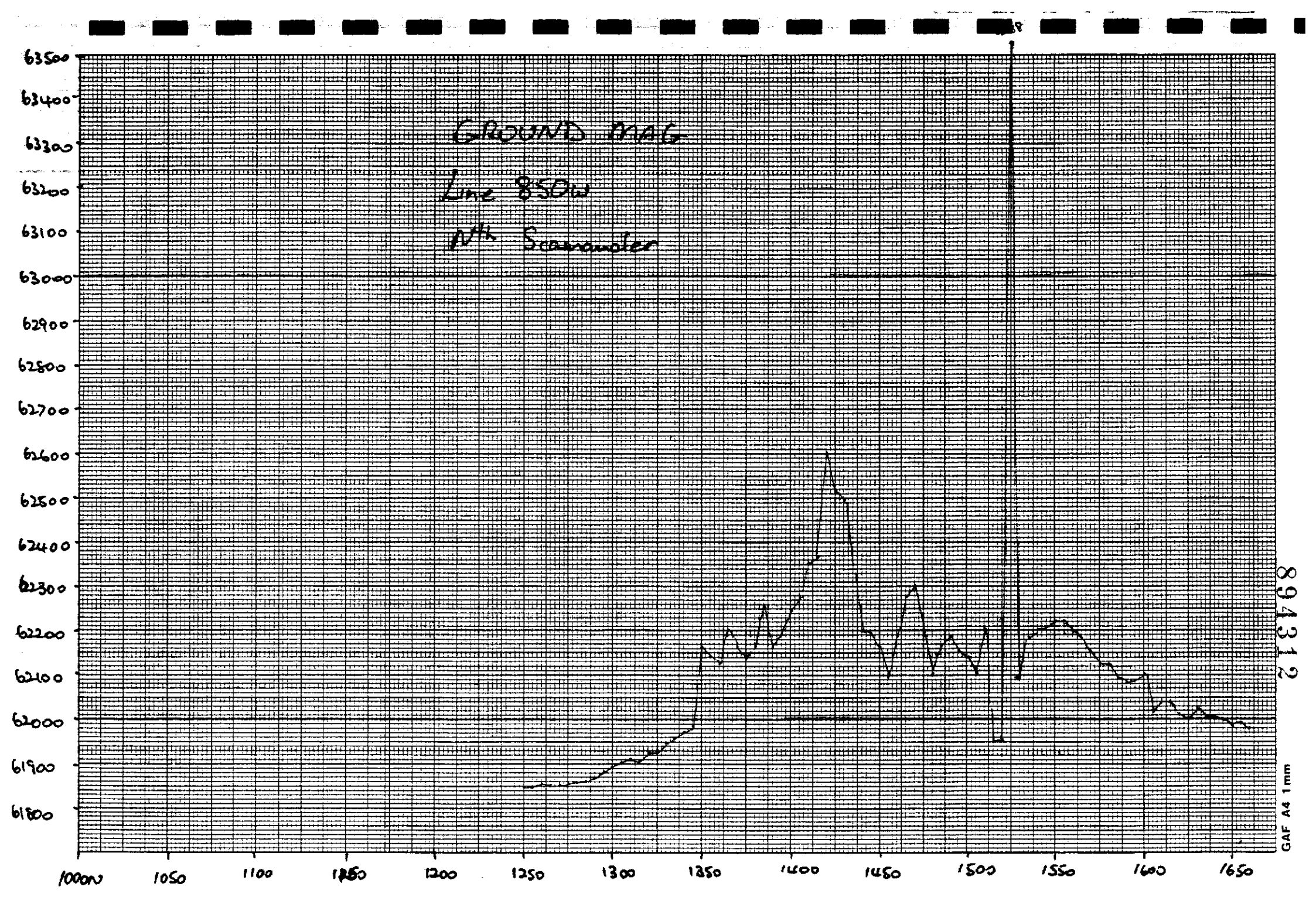

700 WEST
5-2-80
700 W
600
500
400
300
200
100
63000
900
800
700
600
500
400
300
200
100
62000
900
800
1000
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
GAF A4 1mm
894308

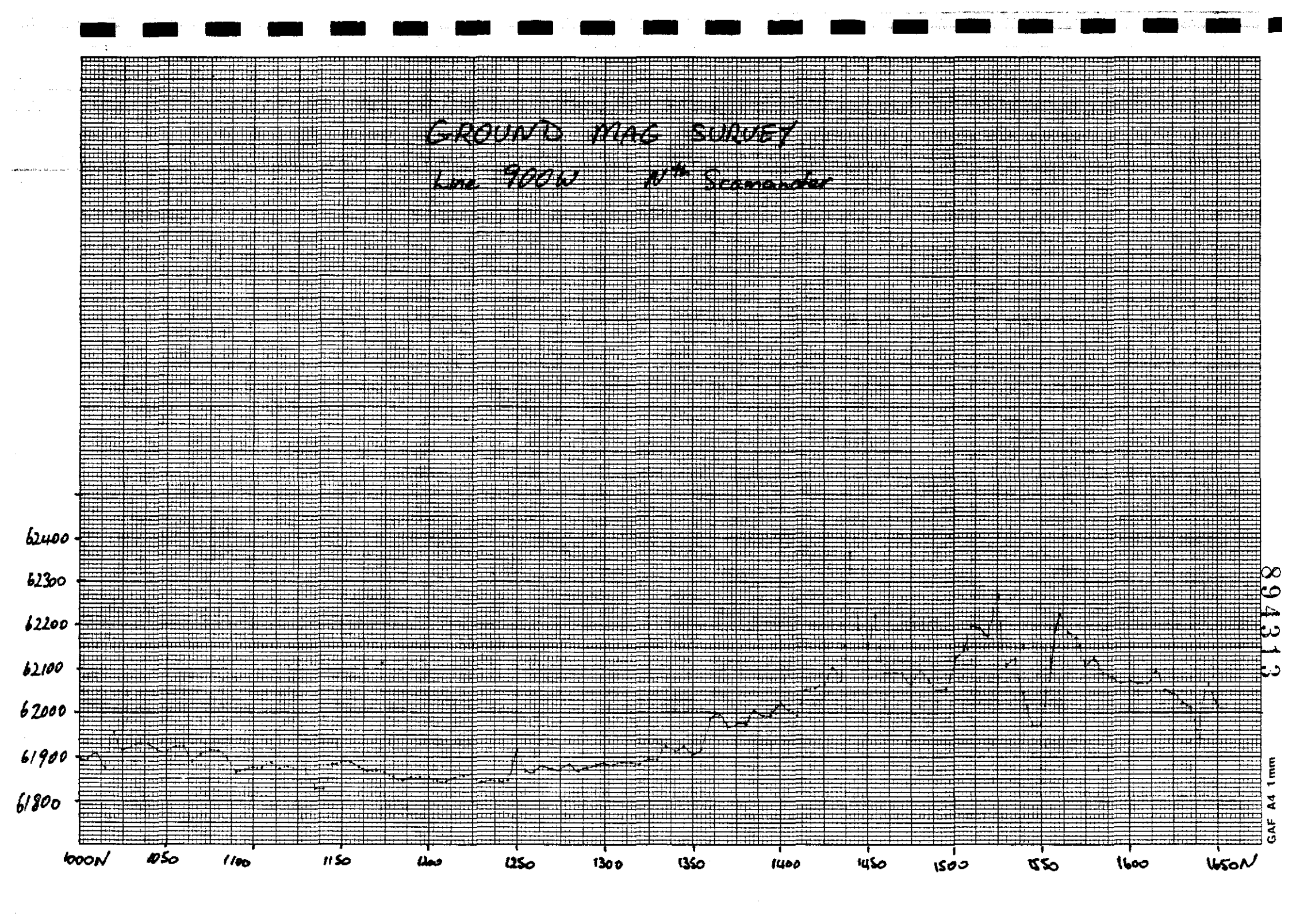
894309




5-12-81
750 W
600
500
400
300
200
100
63000
900
800
700
600
500
400
300
200
100
62000
900
800
1000
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
89310
GAF A4 1mm


800 W
600
500
400
300
200
100
63000
900
800
700
600
500
400
300
200
100
62000
900
800
1000
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
89431
GAF A4 1mm


GROUND MAG
Line 850W
Mk Scanmodler
63500
63400
63300
63200
63100
63000
62900
62800
62700
62600
62500
62400
62300
62200
62100
62000
61900
61800
1000N
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
89413 12
GAF A4 1 mm

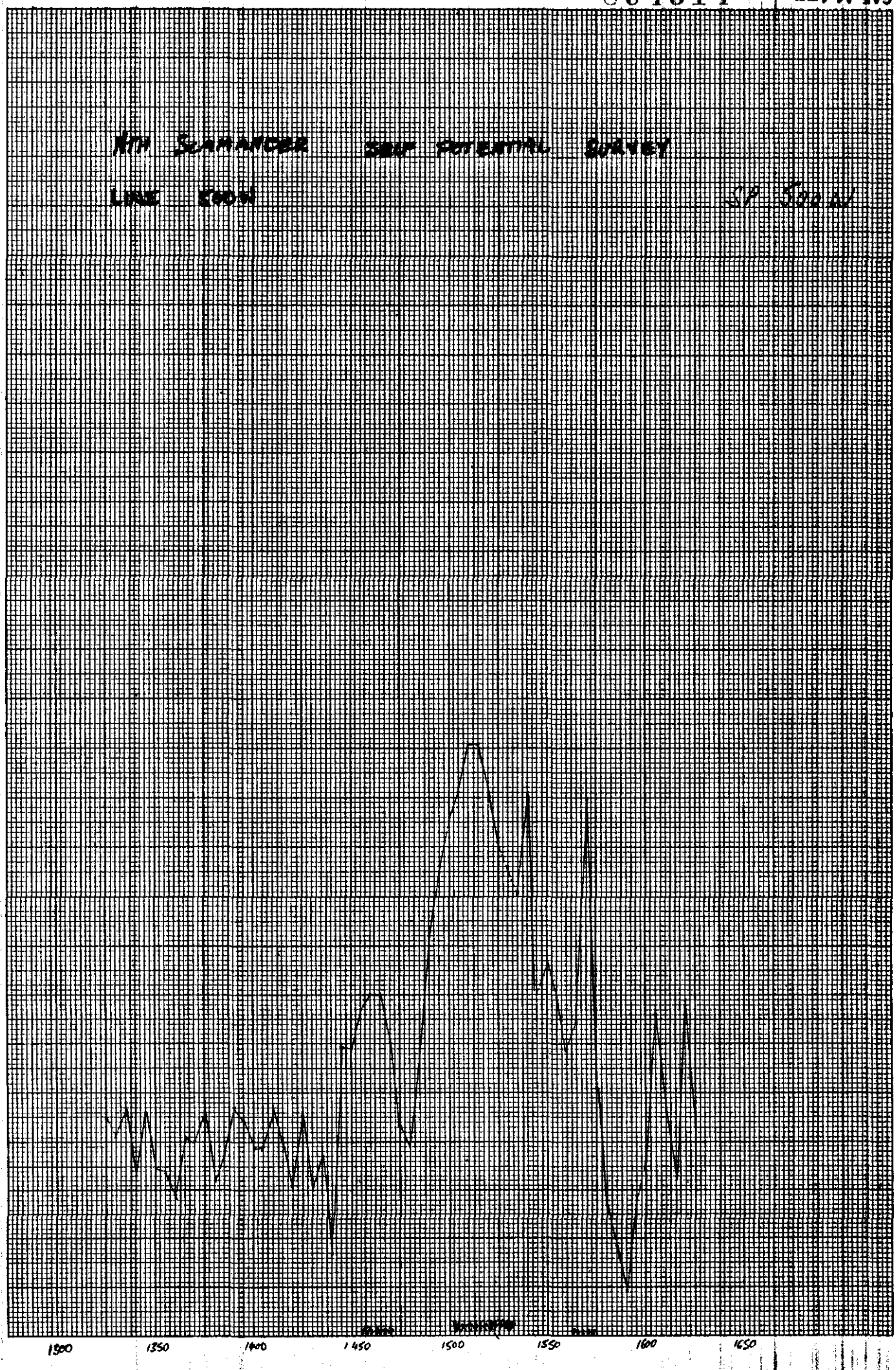

GROUND MAG SURVEY
Line 900W 10th Scamander
62400
62300
62200
62100
62000
61900
61800
1000N
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650N
GAF A4 1mm

894314

MT SCANNER SELF POTENTIAL SURVEY

LINE 2500N

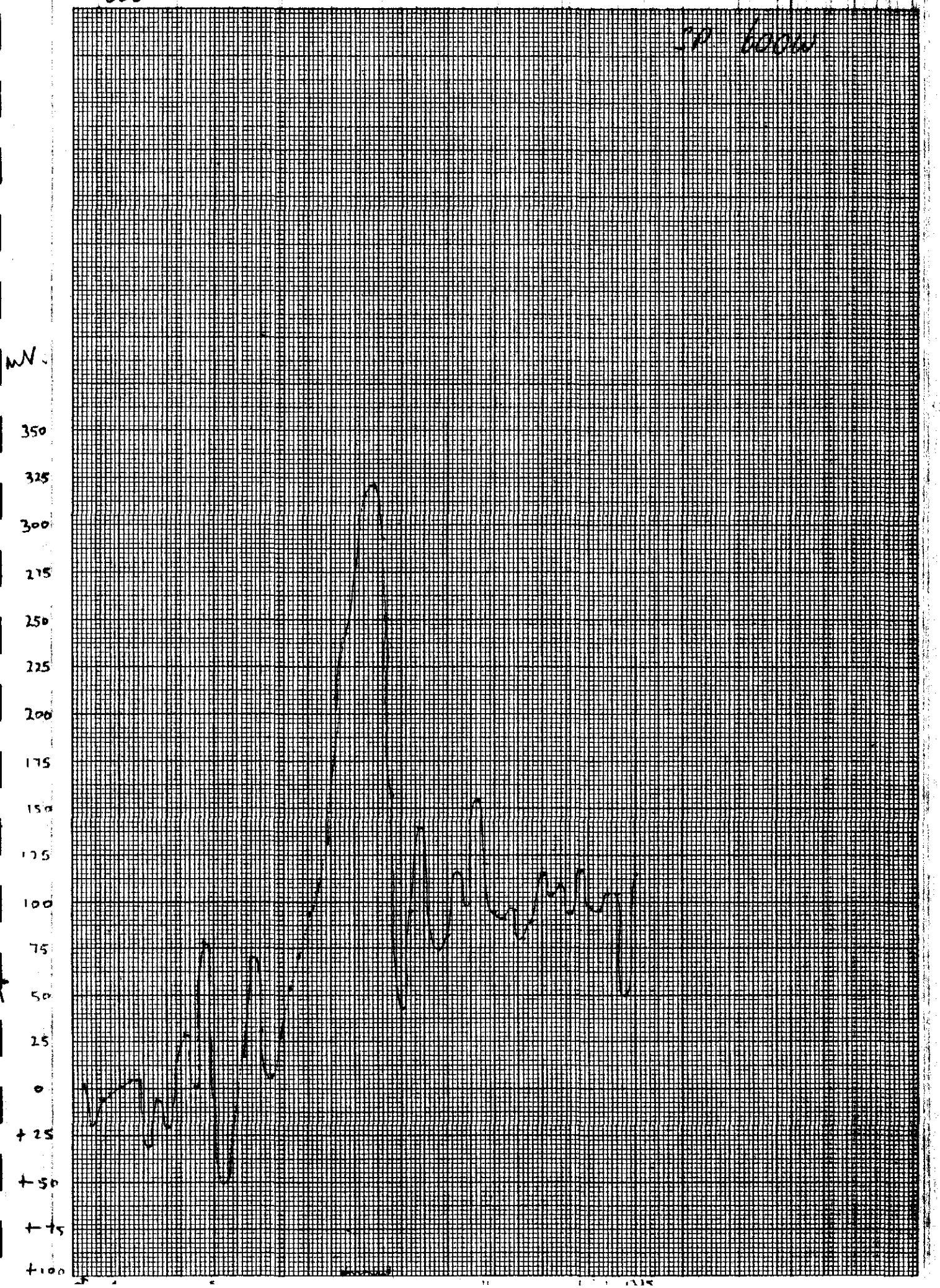
SP 5.22 MV



600W SELF POTENTIAL 11-2-81

894315

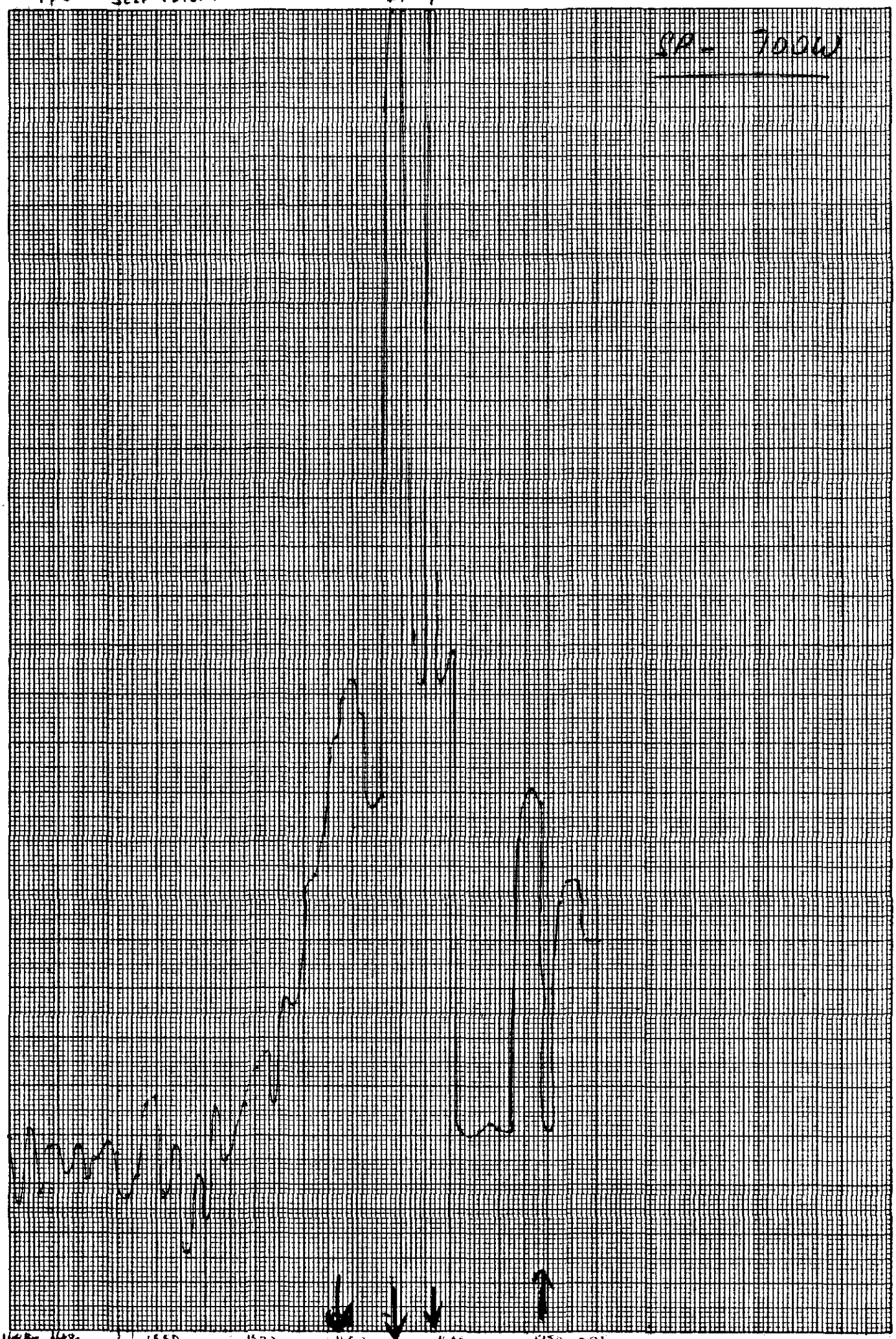
-ve bottom



894316

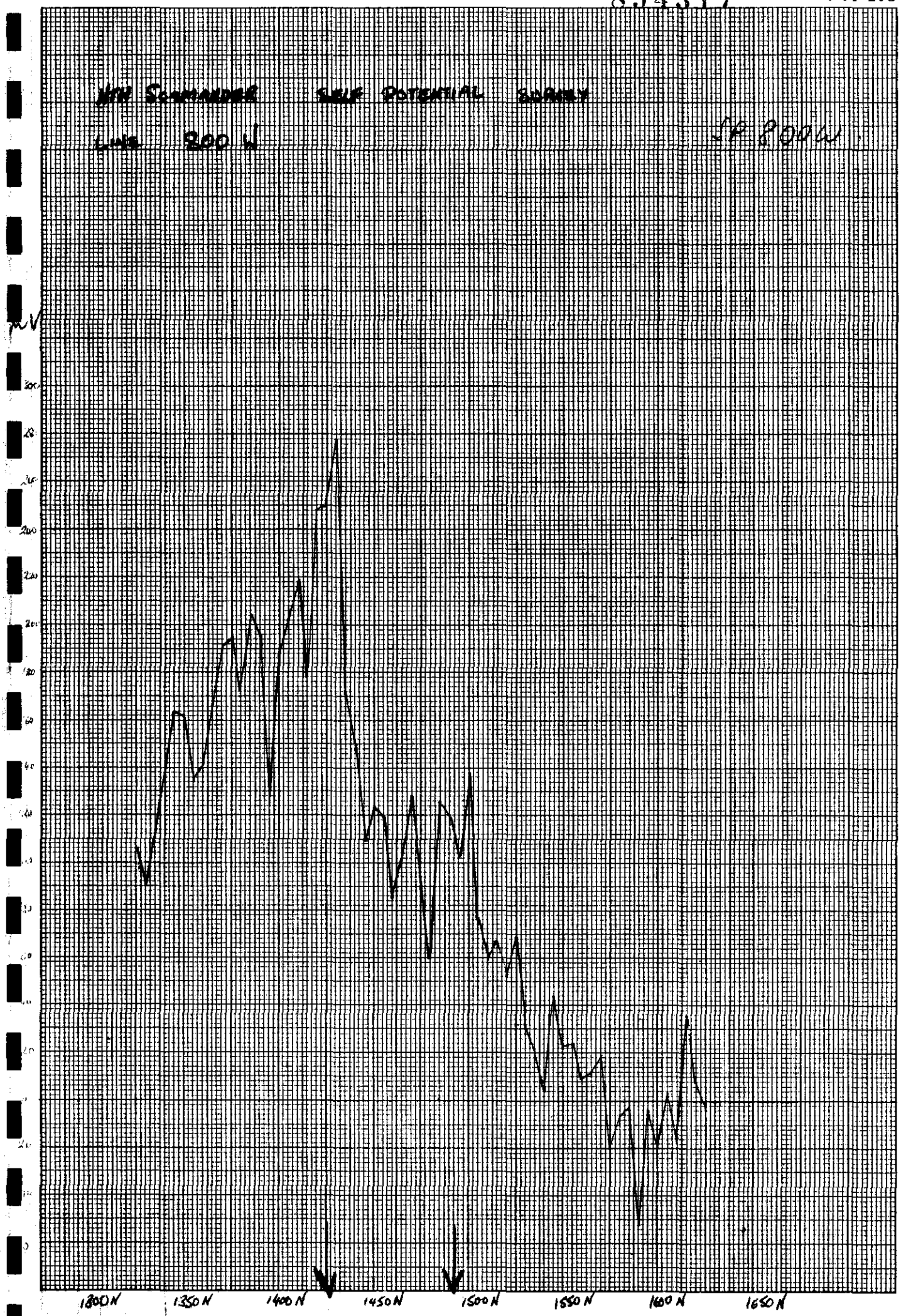
7POW SELF POTENTIAL 11 2·81

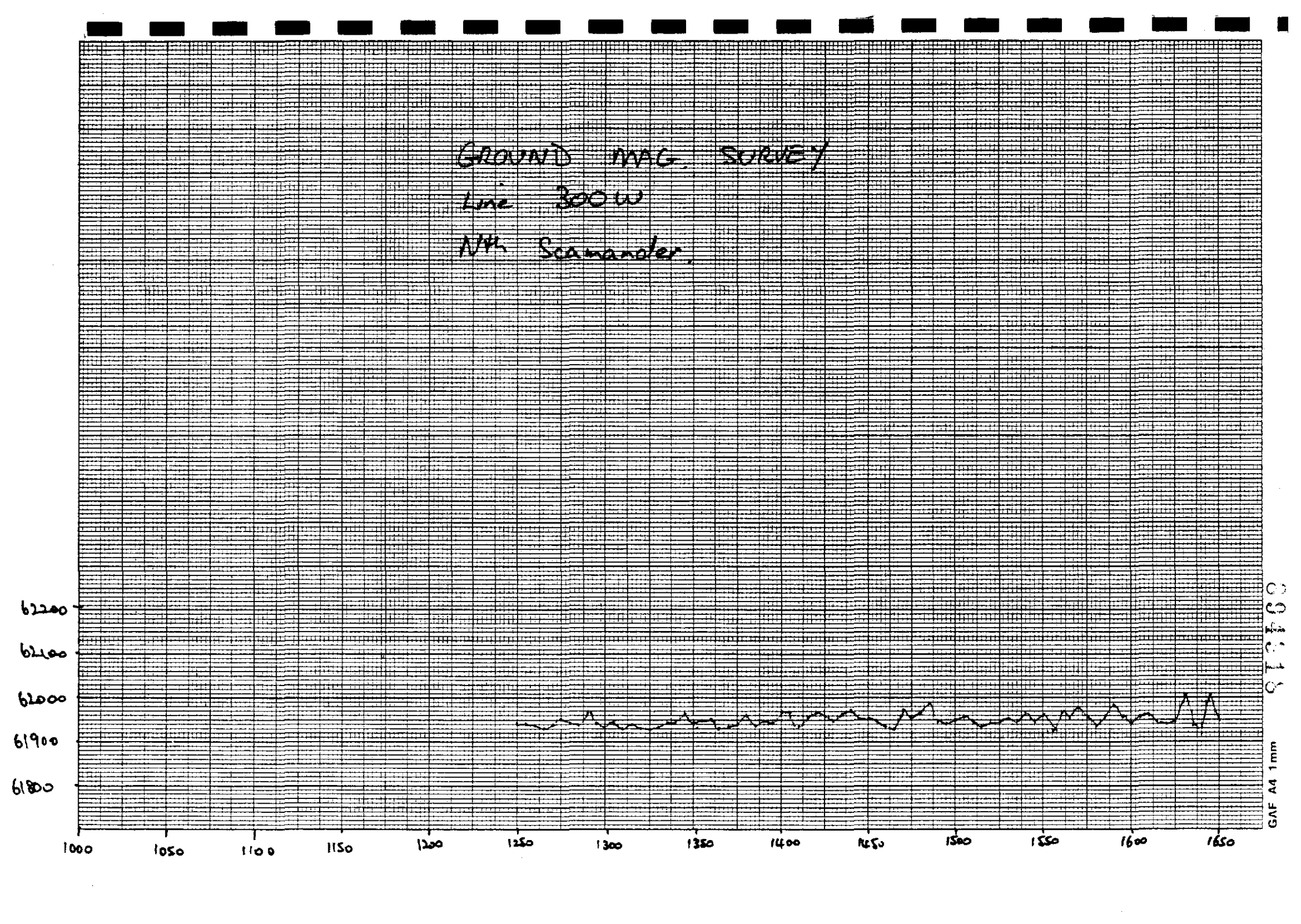
SP - 700W

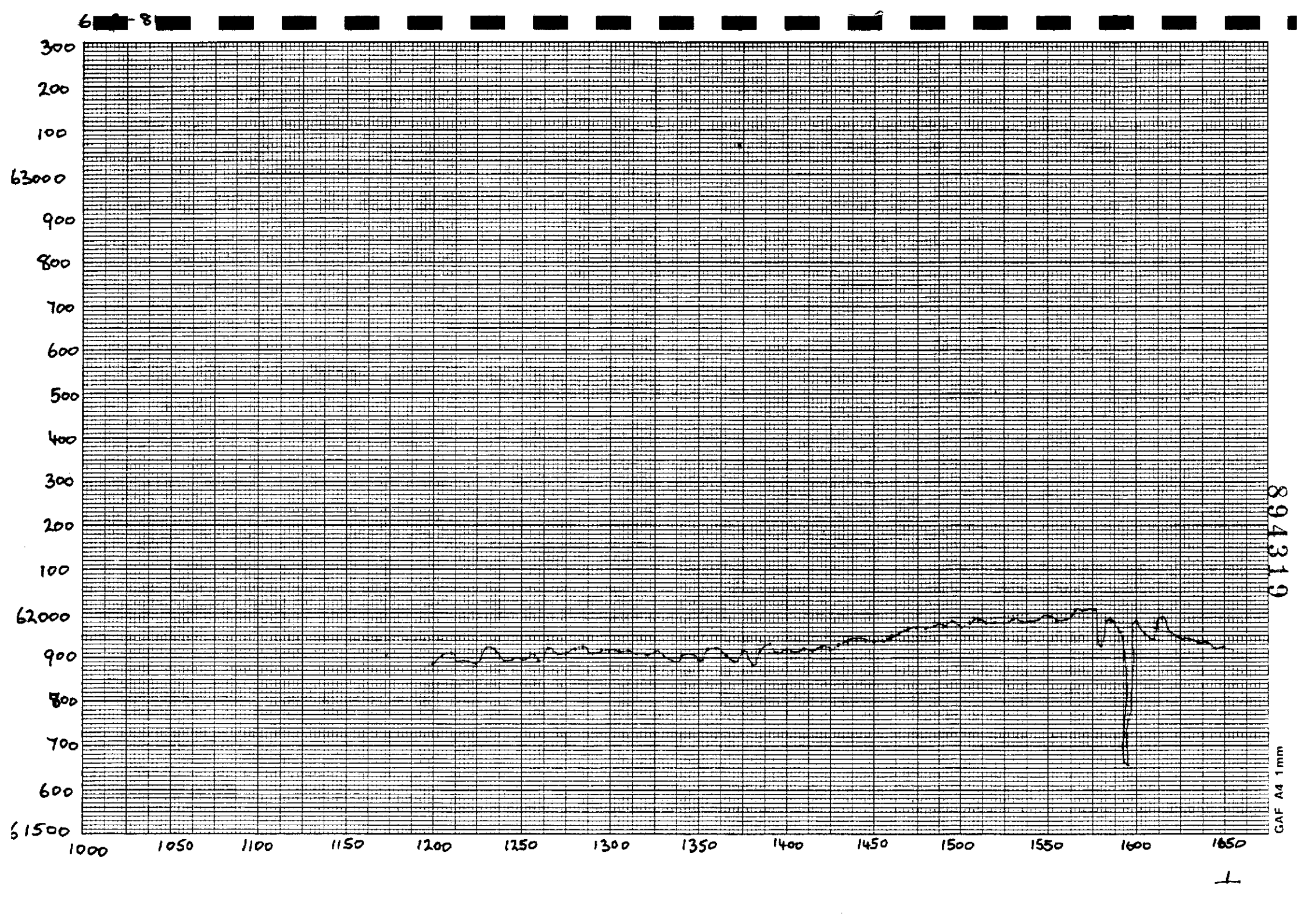


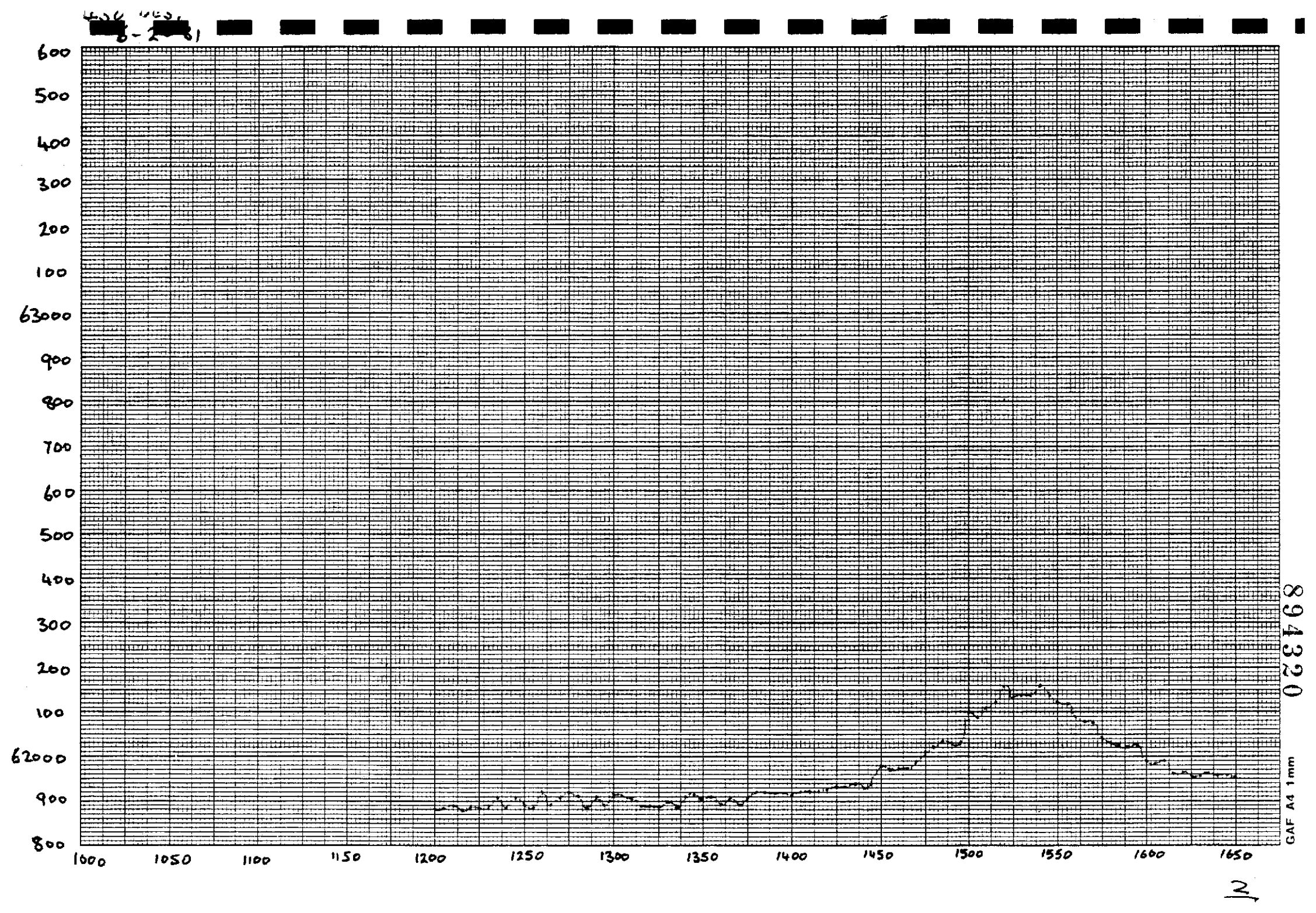
894317

GAF A4 1mm

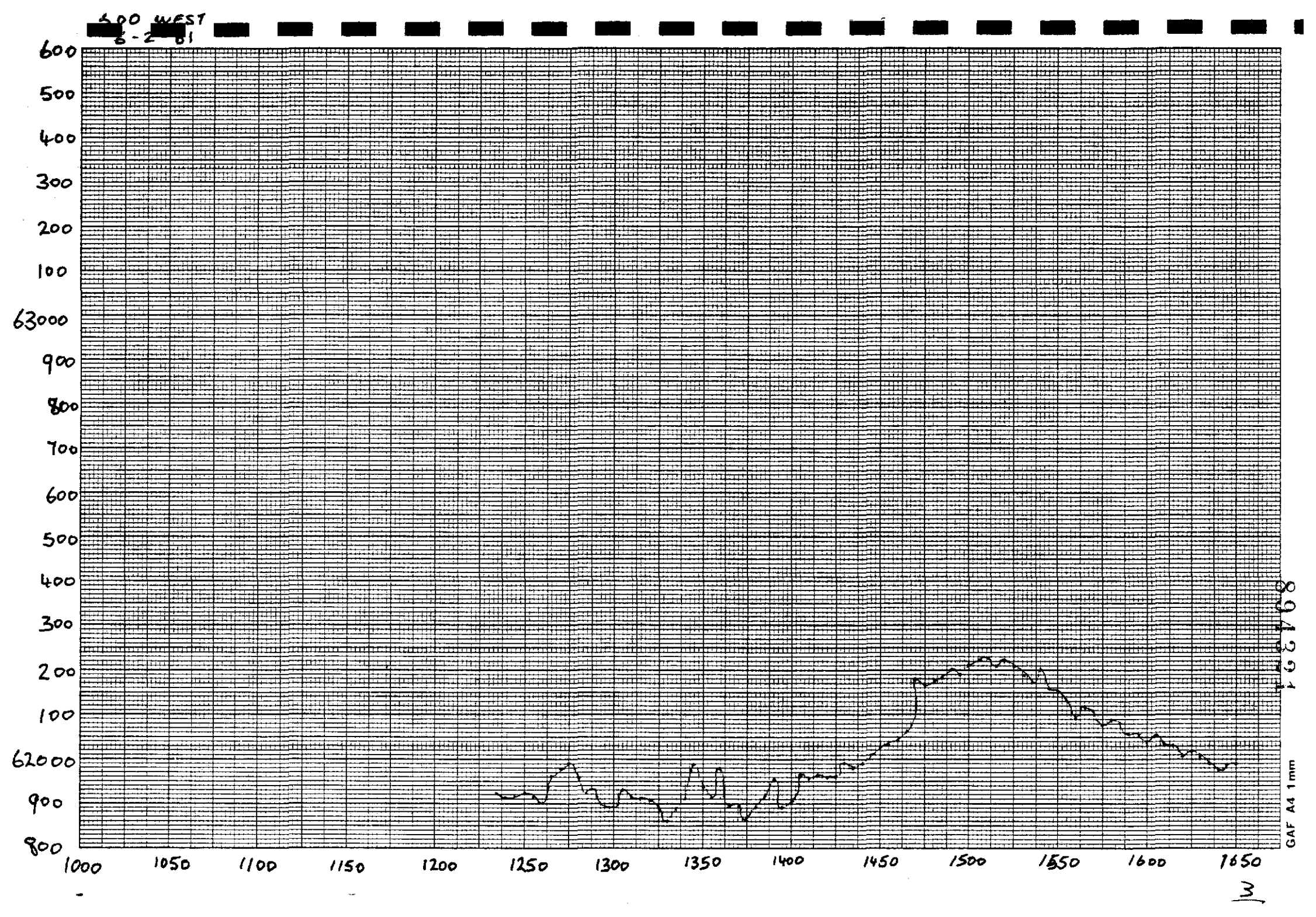


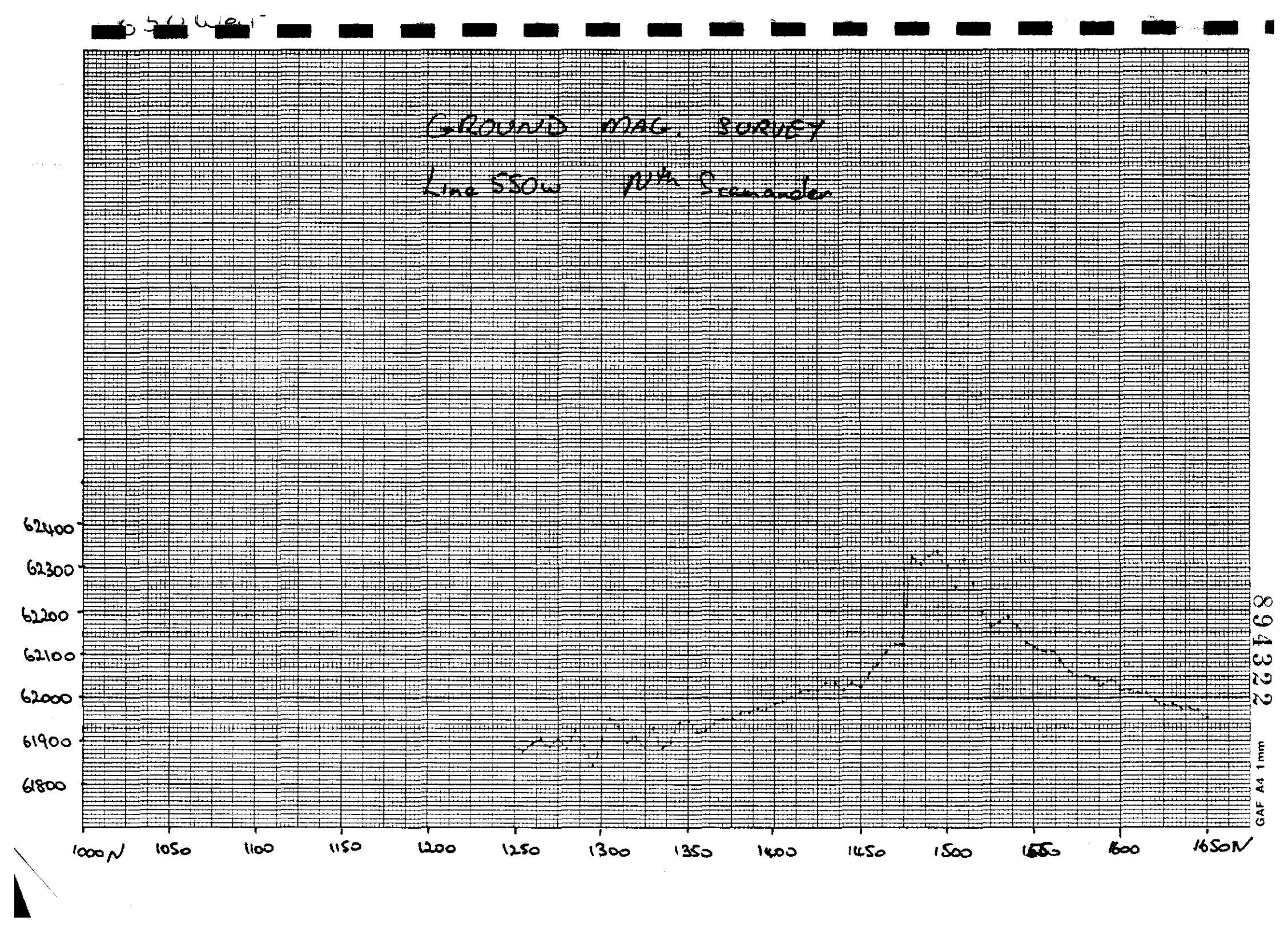

GROUND MAG. SURVEY
Line 300 W
NW Scamander.
62200
62100
62000
61900
61800
1000
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
GAF A4 1mm

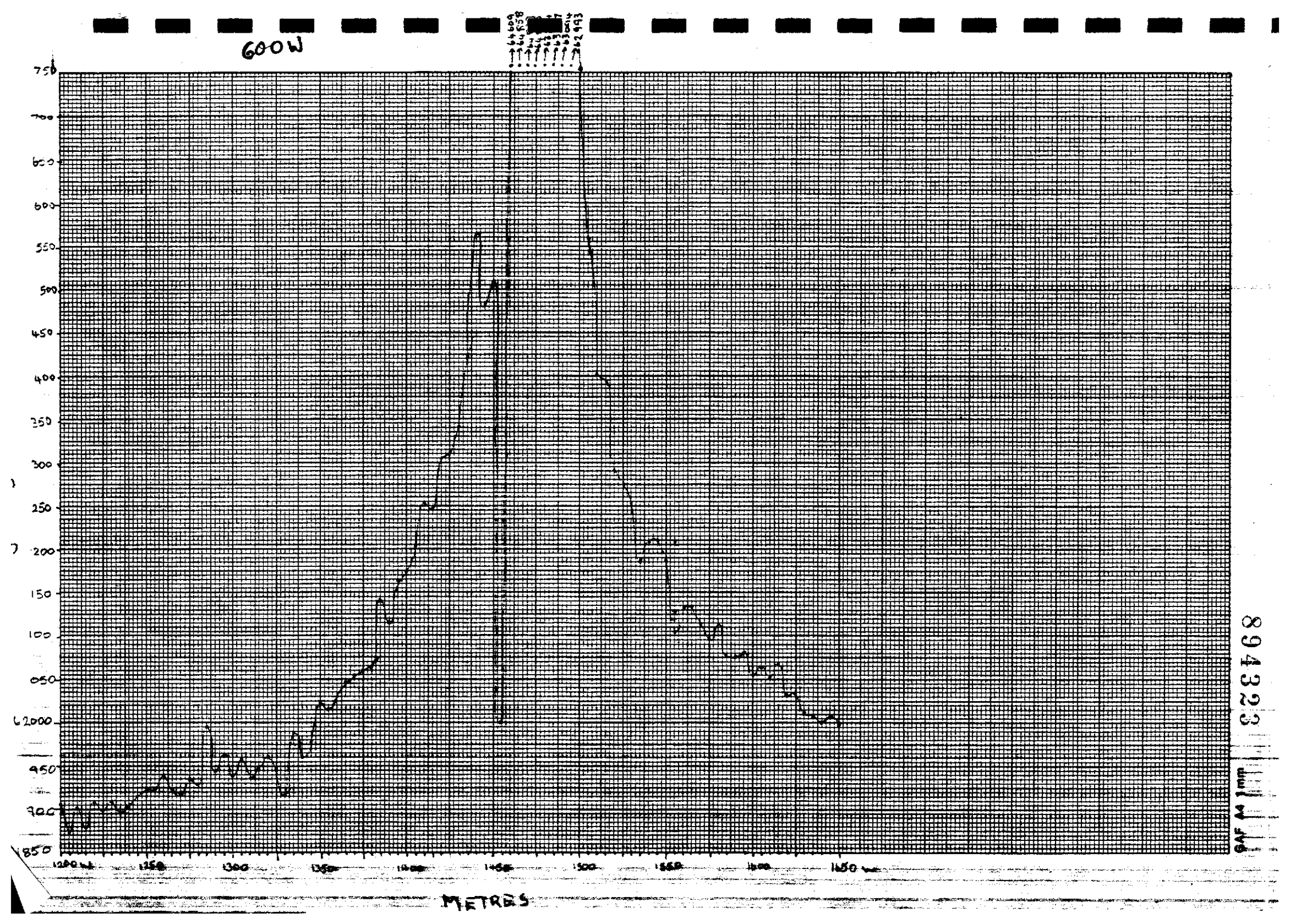

300
200
100
63000
900
800
700
600
500
400
300
200
100
62000
900
800
700
600
61500
1000
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
894319
GAF A4 1mm


600
500
400
300
200
100
63000
900
800
700
600
500
400
300
200
100
62000
900
800
1000
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
894320
GAF A4 1mm

2


600 WEST
[redacted]-2 01
600
500
400
300
200
100
63000
900
800
700
600
500
400
300
200
100
62000
900
800
1000
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
GAF A4 1mm
3


GROUND MAG. SURVEY
Line 550W N/A Scrambler
62400
62300
62200
62100
62000
61900
61800
1000N
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650N
GAF A4 1mm

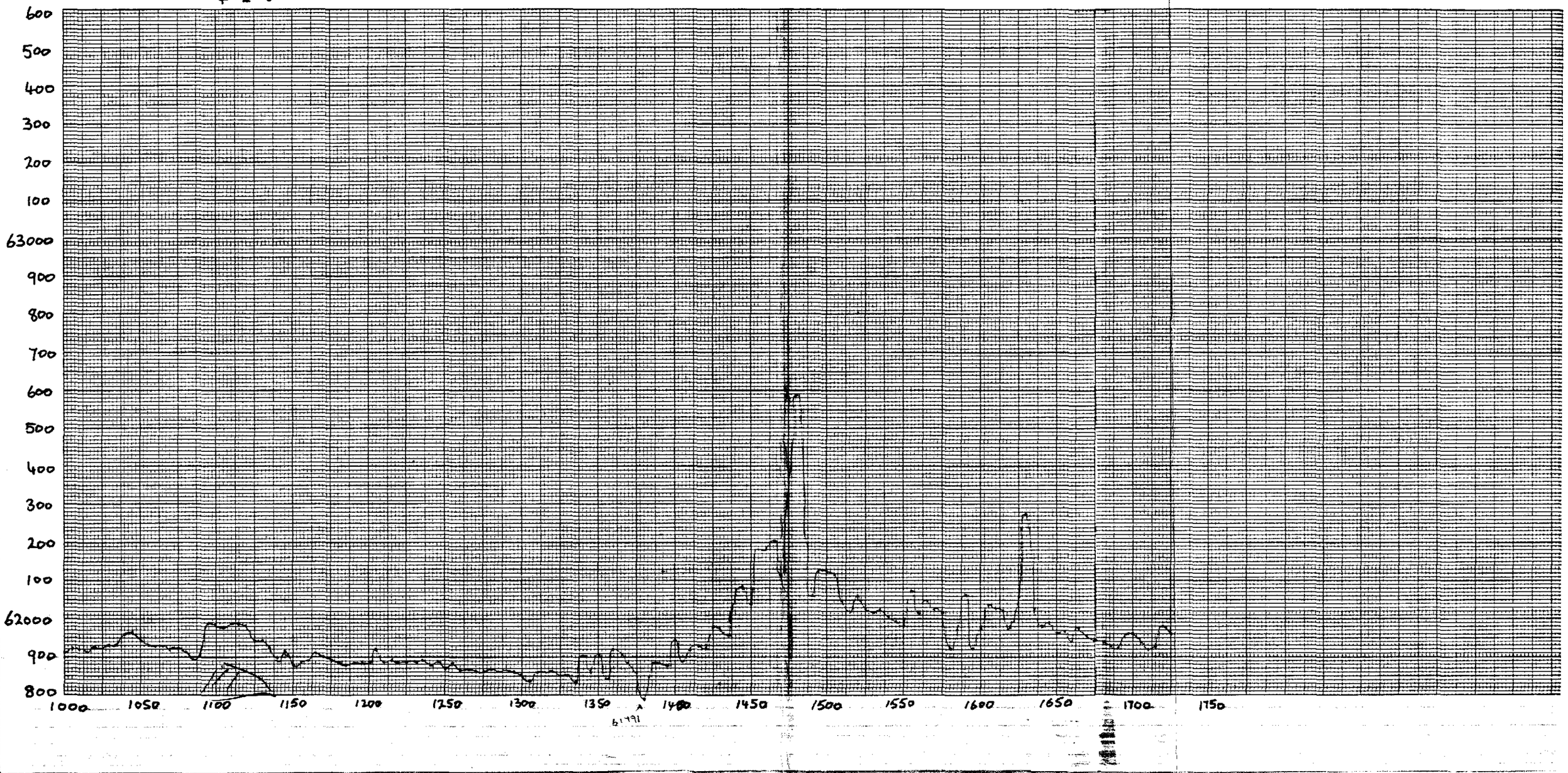

600W
750
700
650
600
550
500
450
400
350
300
250
200
150
100
050
62000
950
900
850
METRES
GAF M 1mm
894323

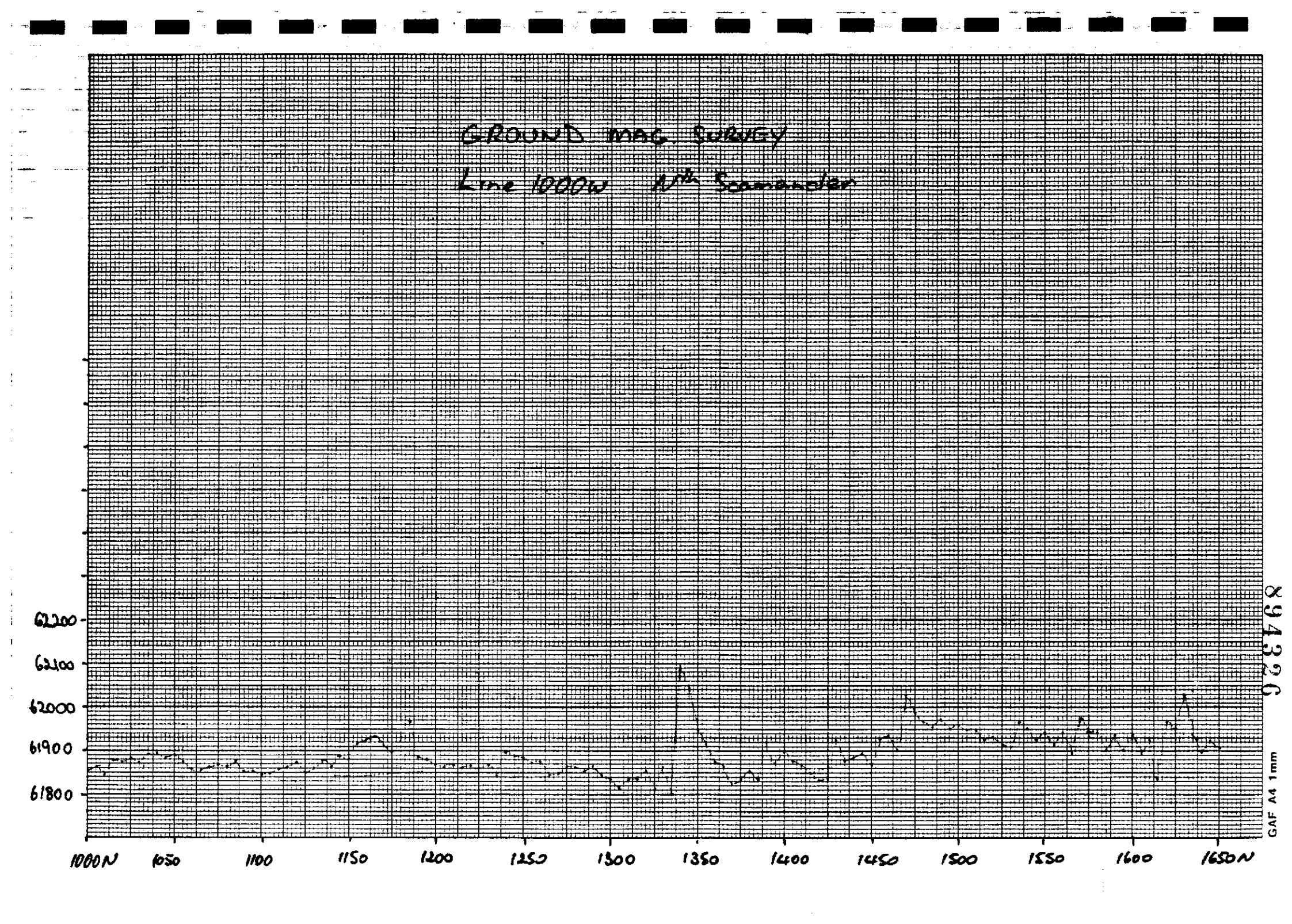
894324

GAF A4 1mm

894325

950 WEST 4-2-81

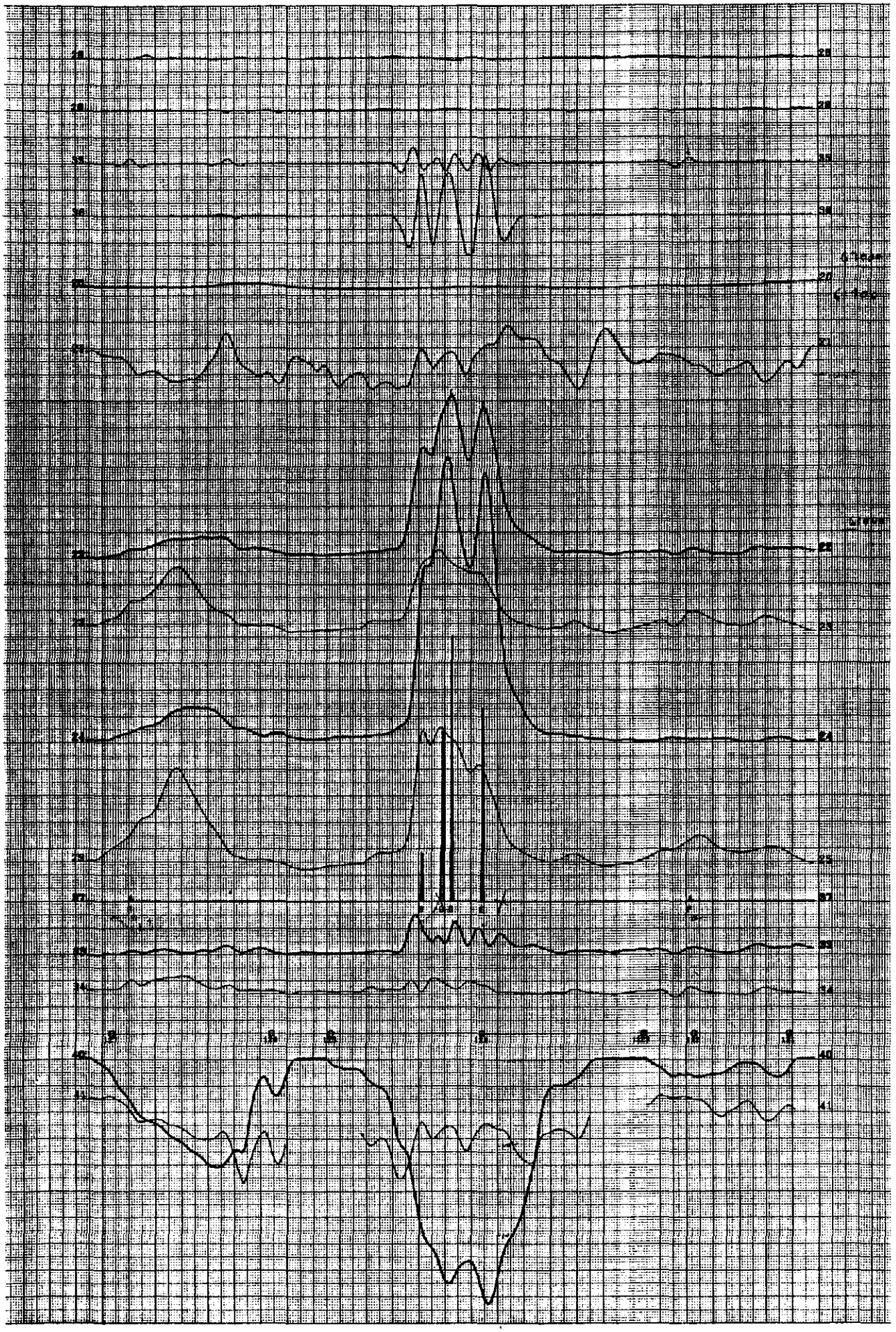



GROUND MAG. SURVEY
Line 1000W 10th Scale
62200
62100
62000
61900
61800
1000N
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650N
GAF A4 1mm

89436

GRID N/S - SURVEY
LINE 10SOW - 7th SURVEY
2200
2100
2000
1990
1980
1000 N
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650 N
Scale 1:25m.
GAF A4 1mm

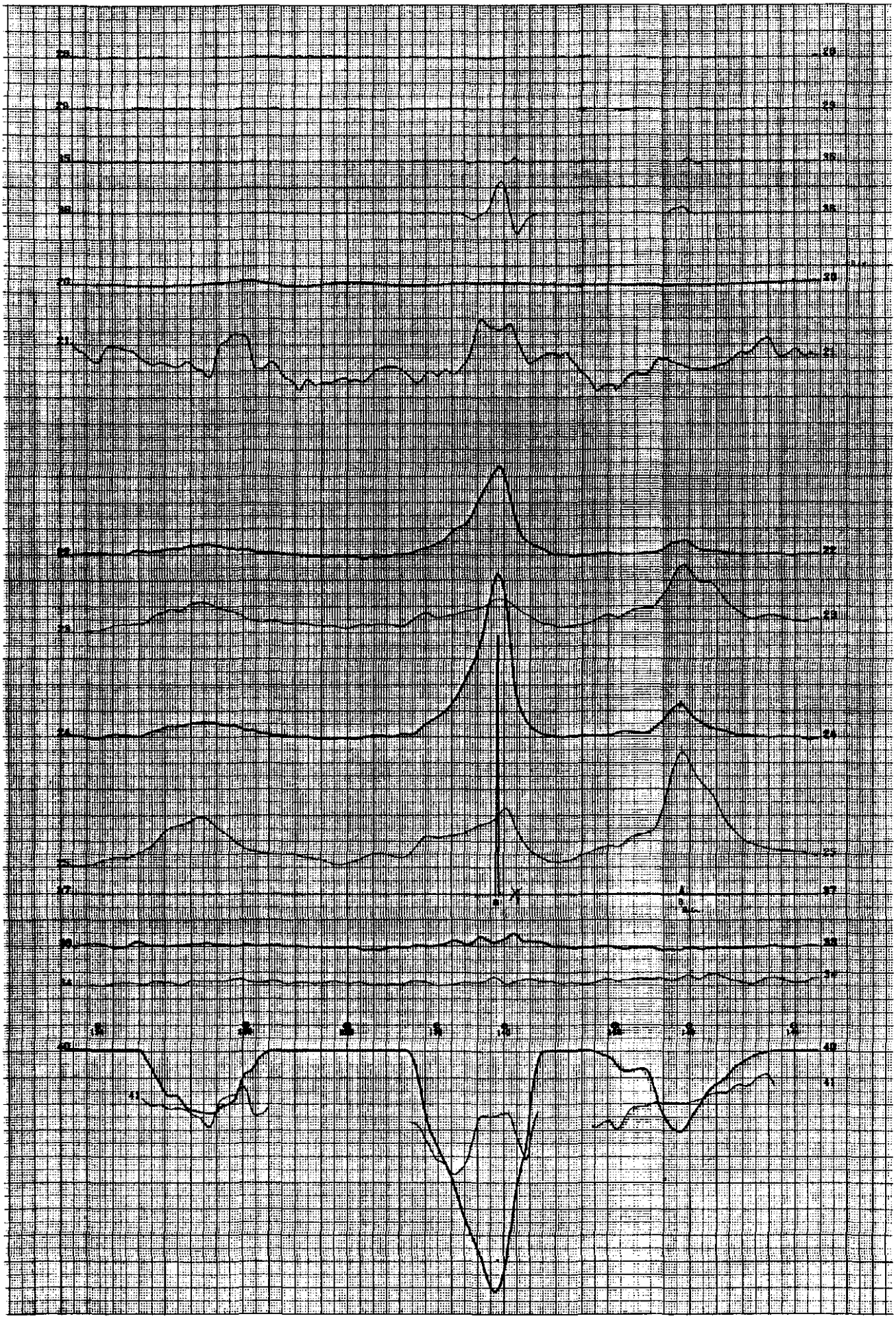
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LINE -401

LINE -401

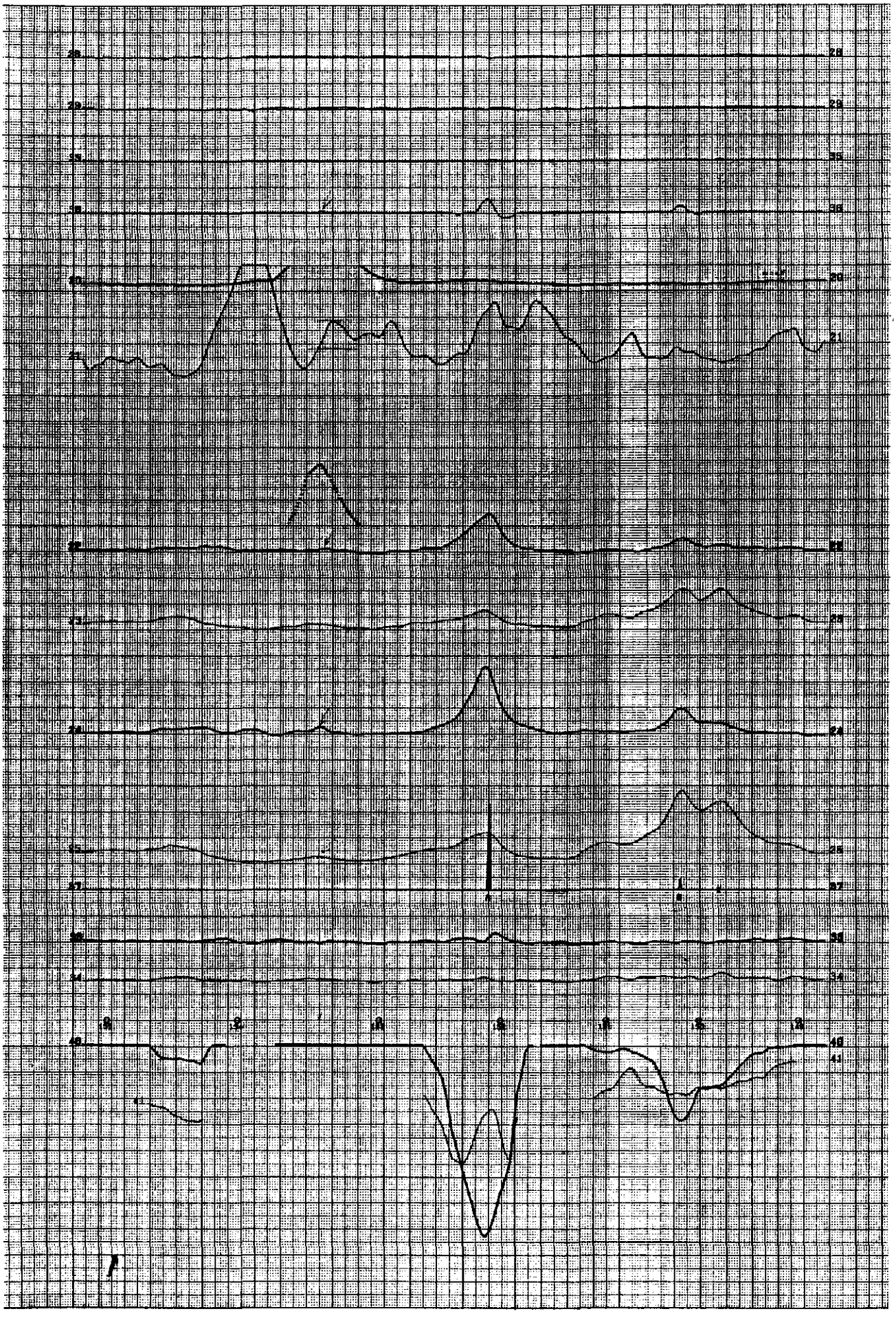
894329



LINE 402

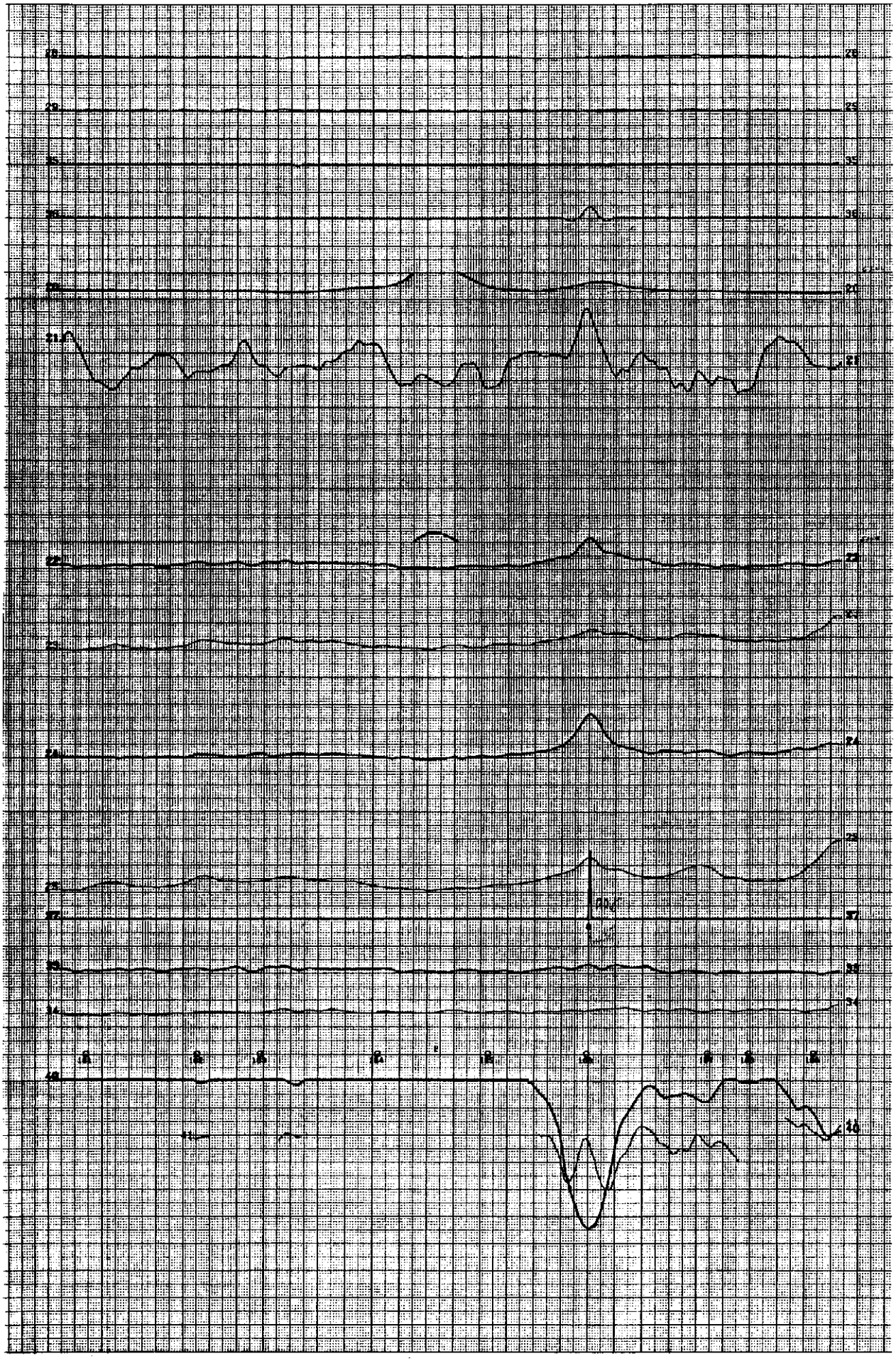
LINE 402

894330



LINE -403

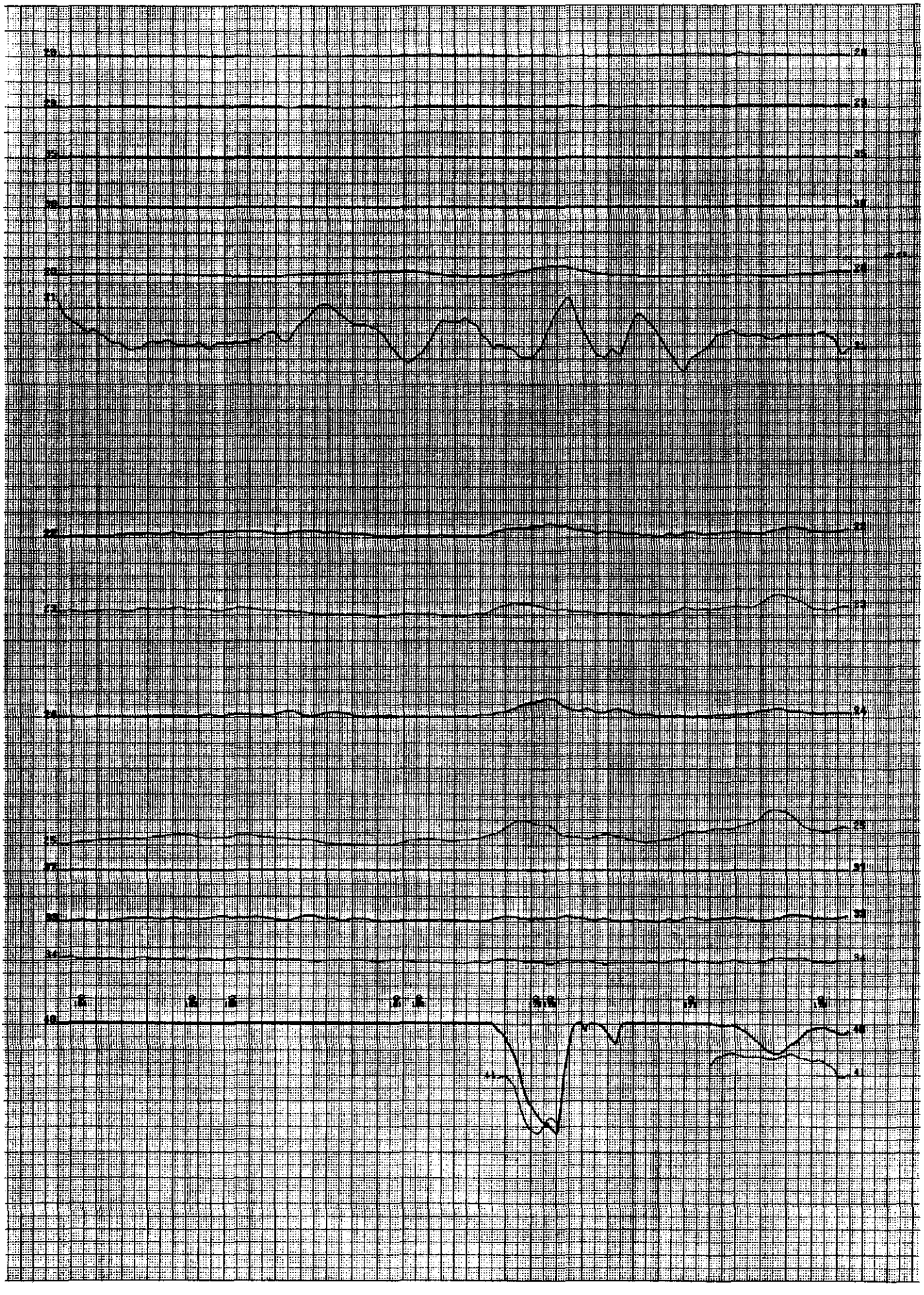
LINE -403



LINE 404

LINE 404

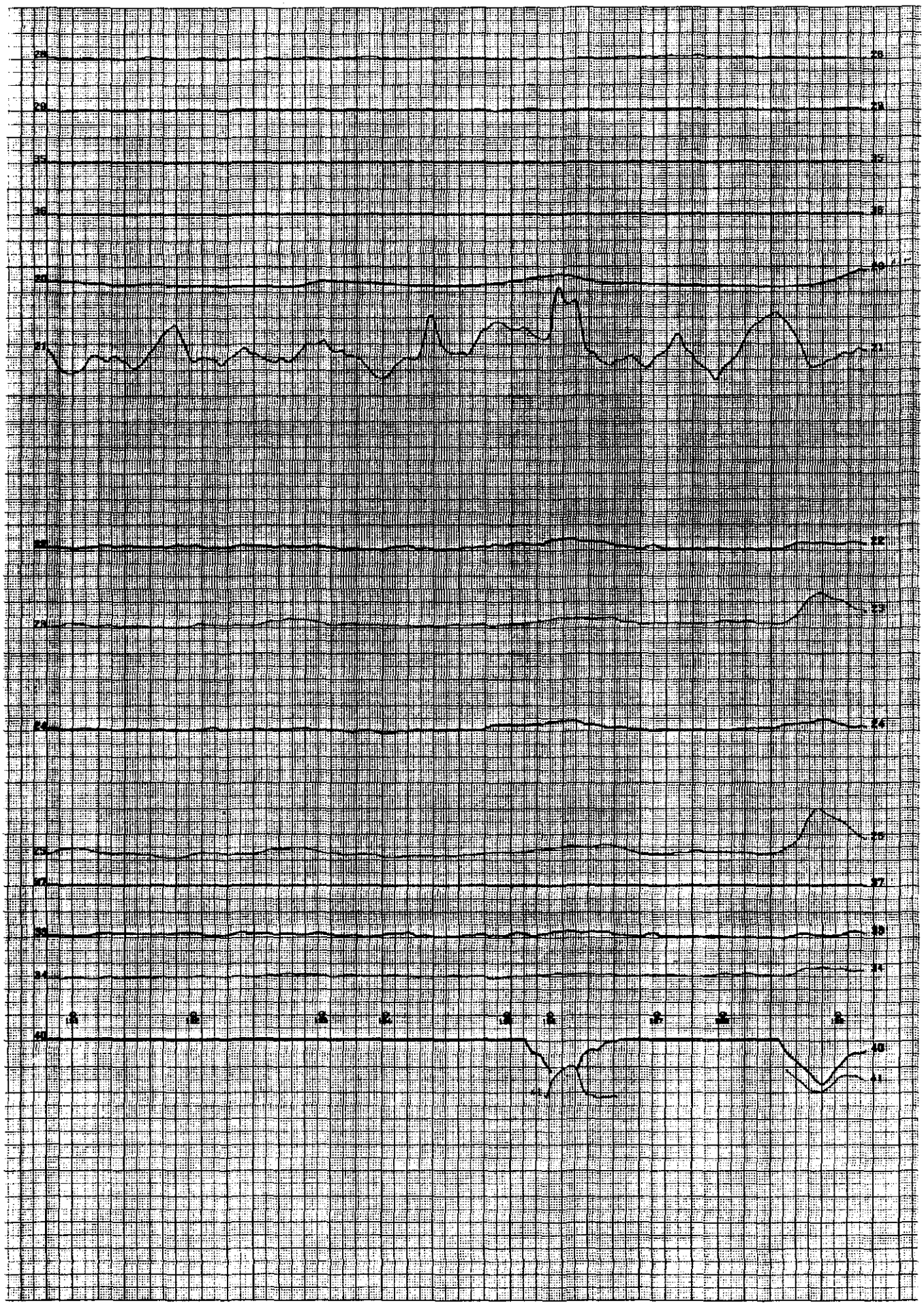
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LINE -405

LINE -405

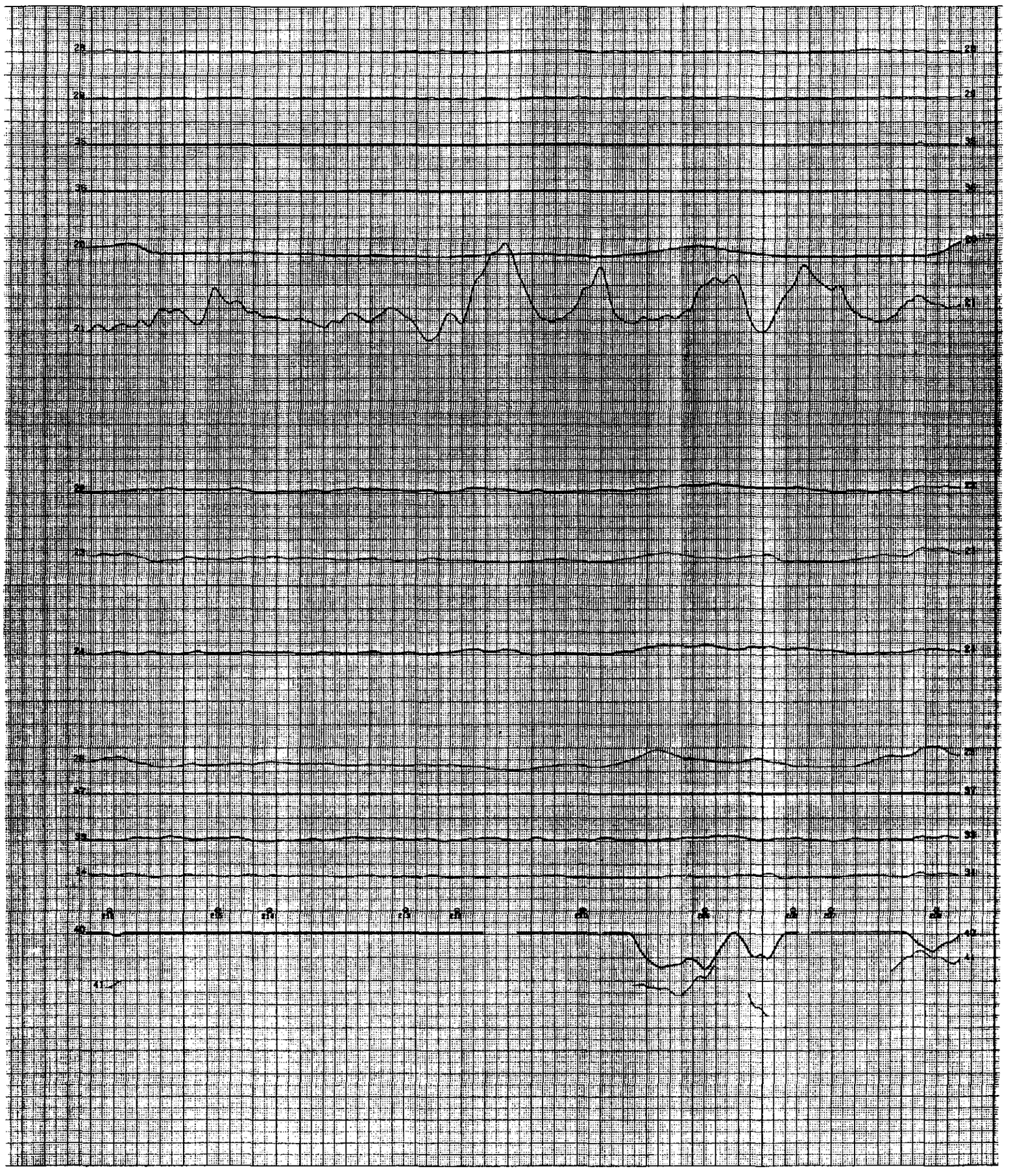
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LINE 406

LINE 406

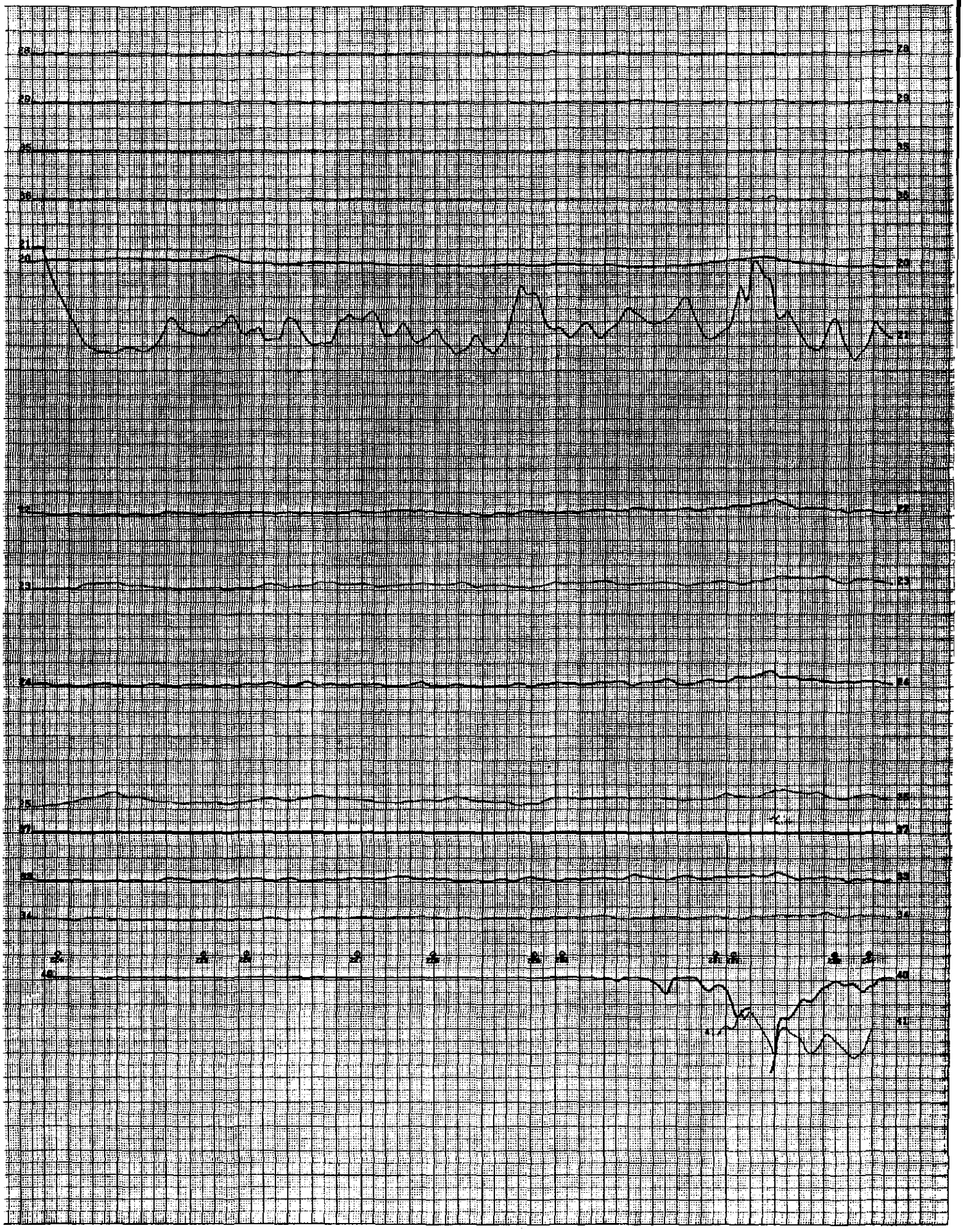
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LINE -407

LINE -407

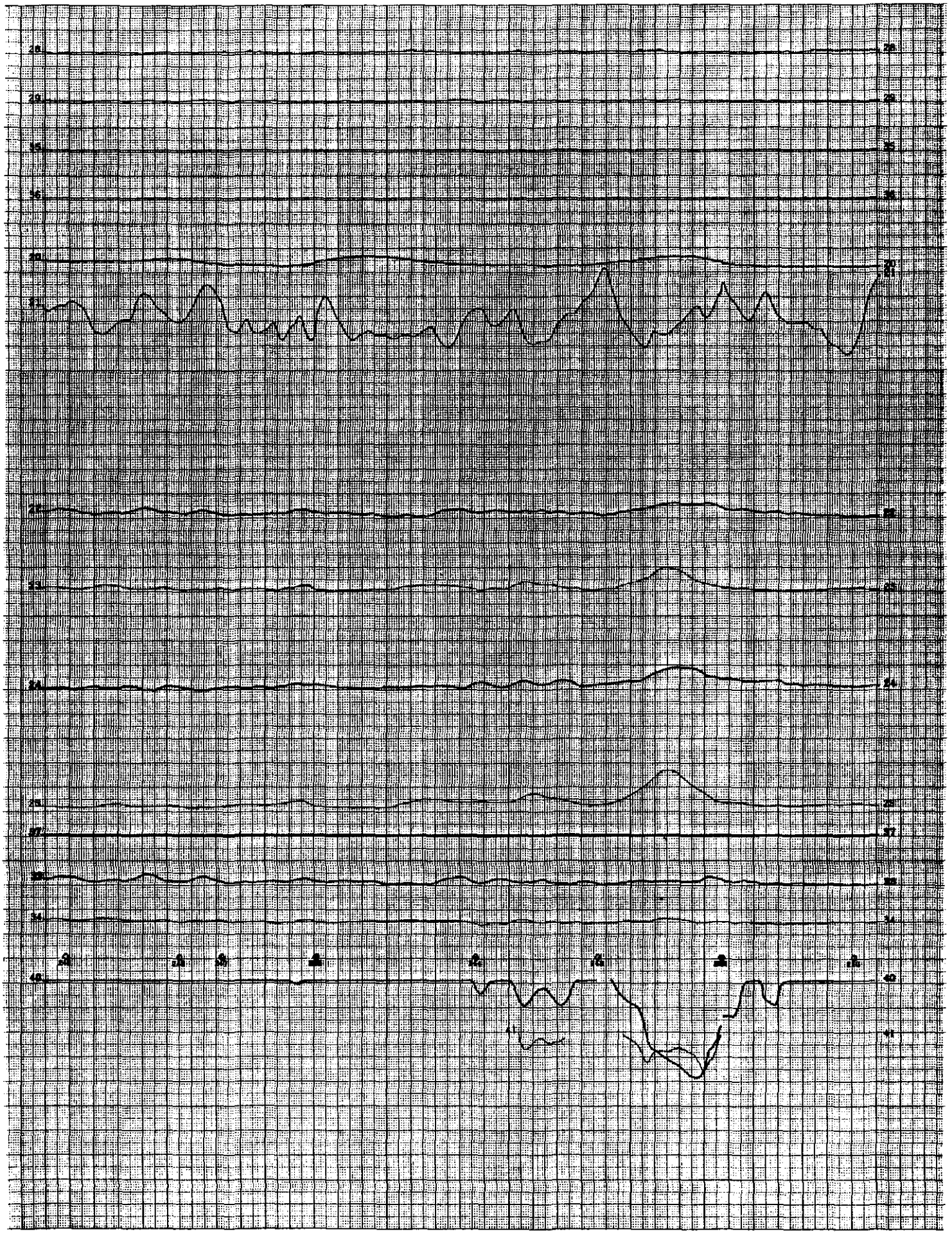
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LINE 408

LINE 408

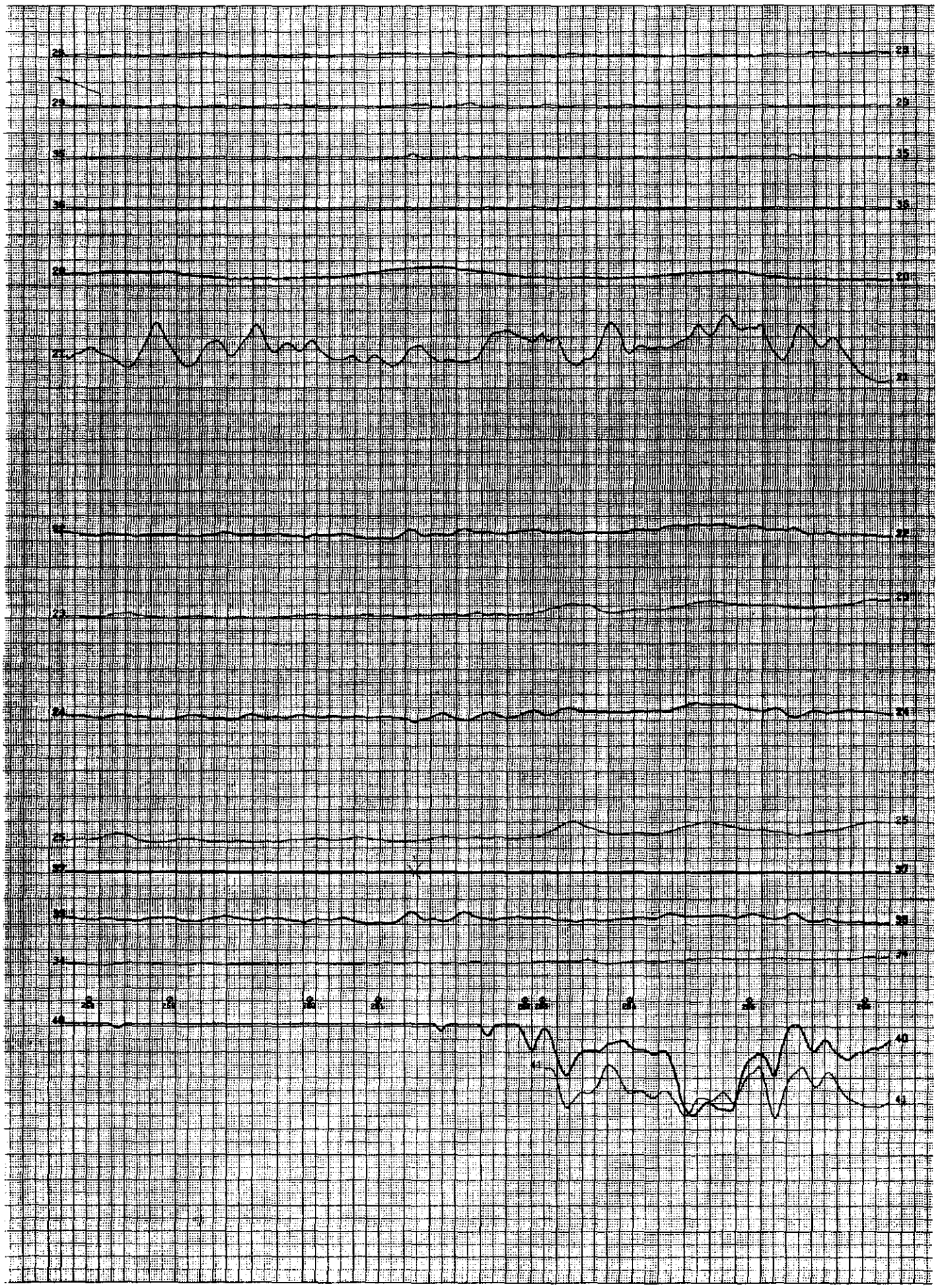
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LINE -409

LINE -409

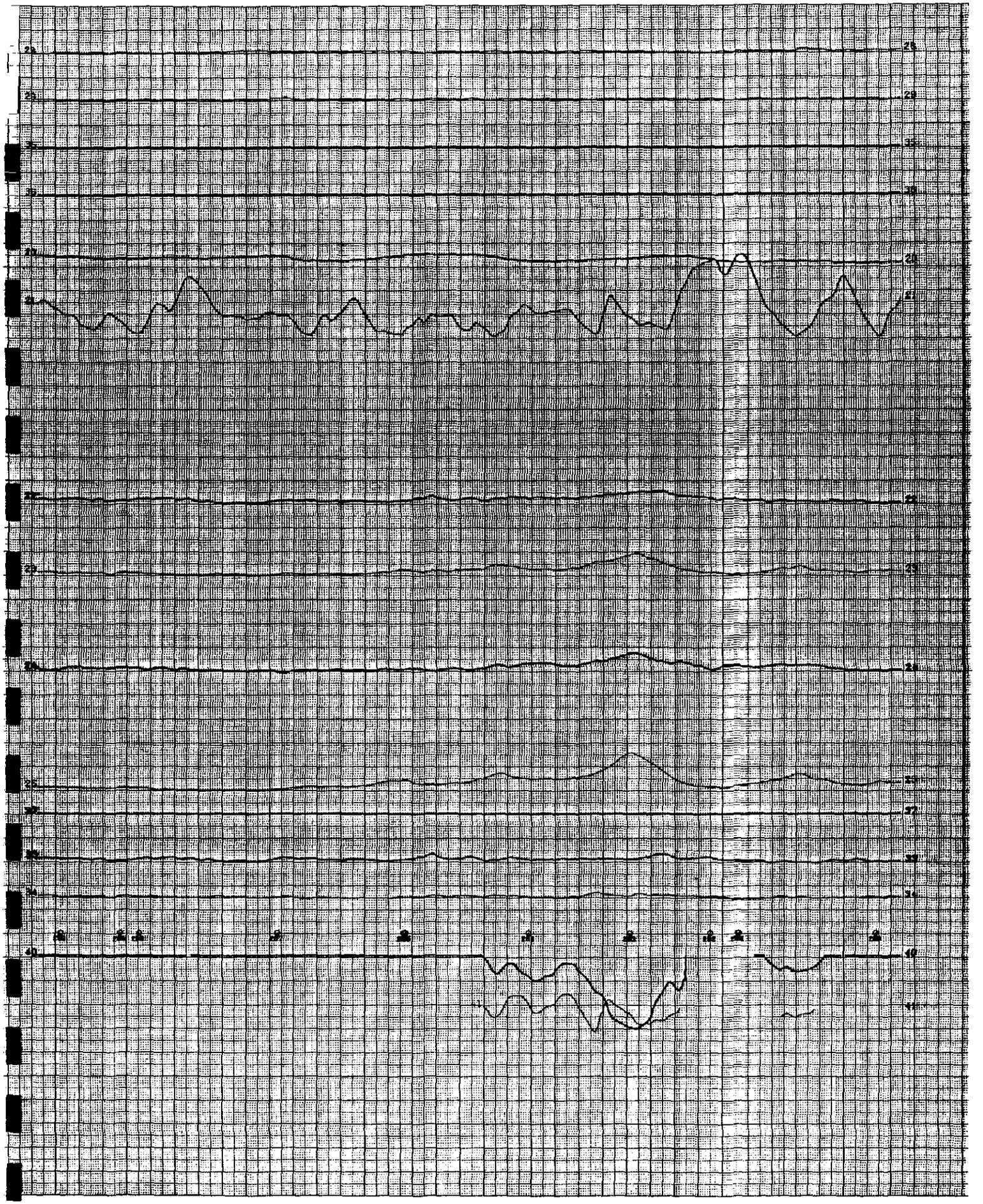
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LINE 410

LINE 410

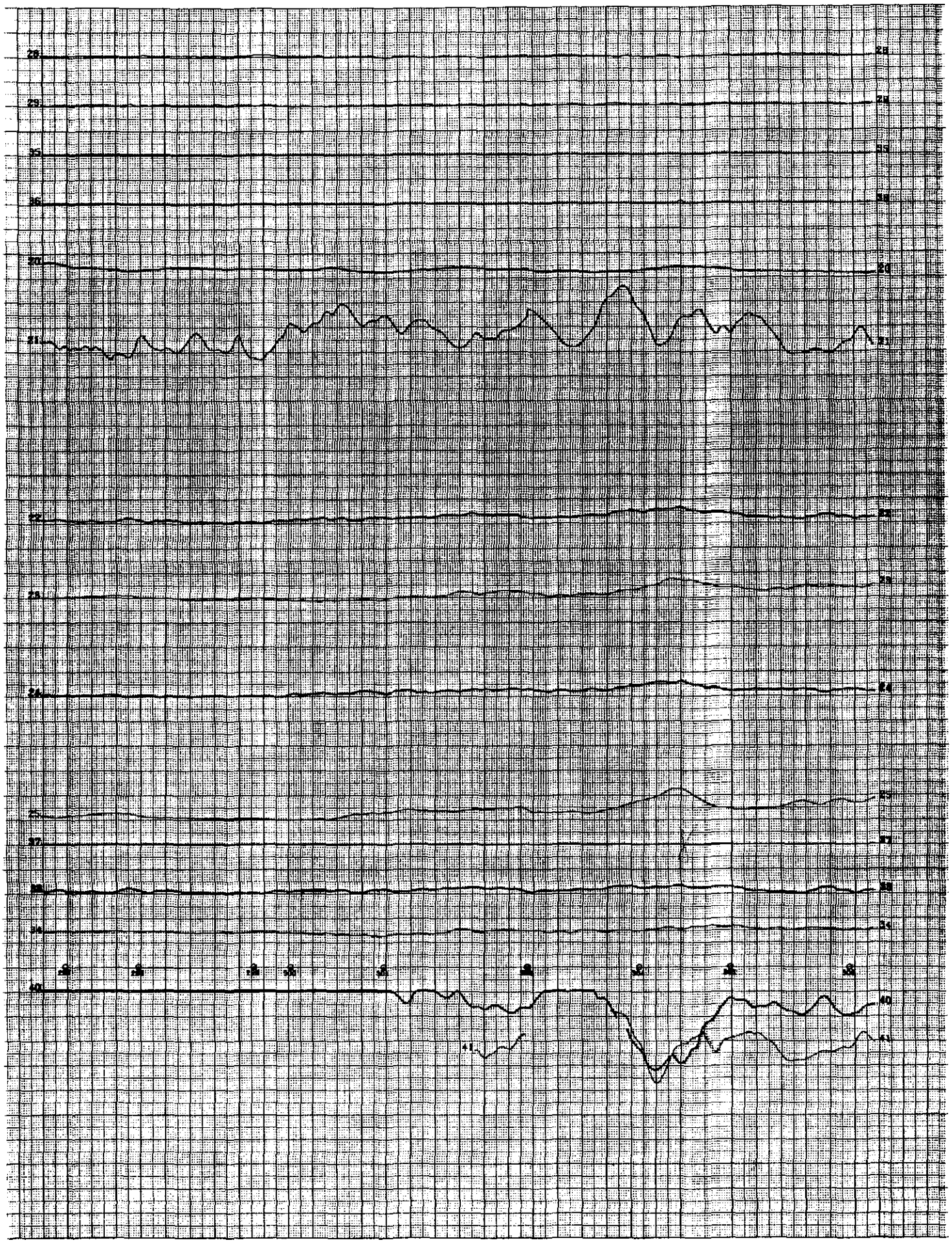
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LINE -411

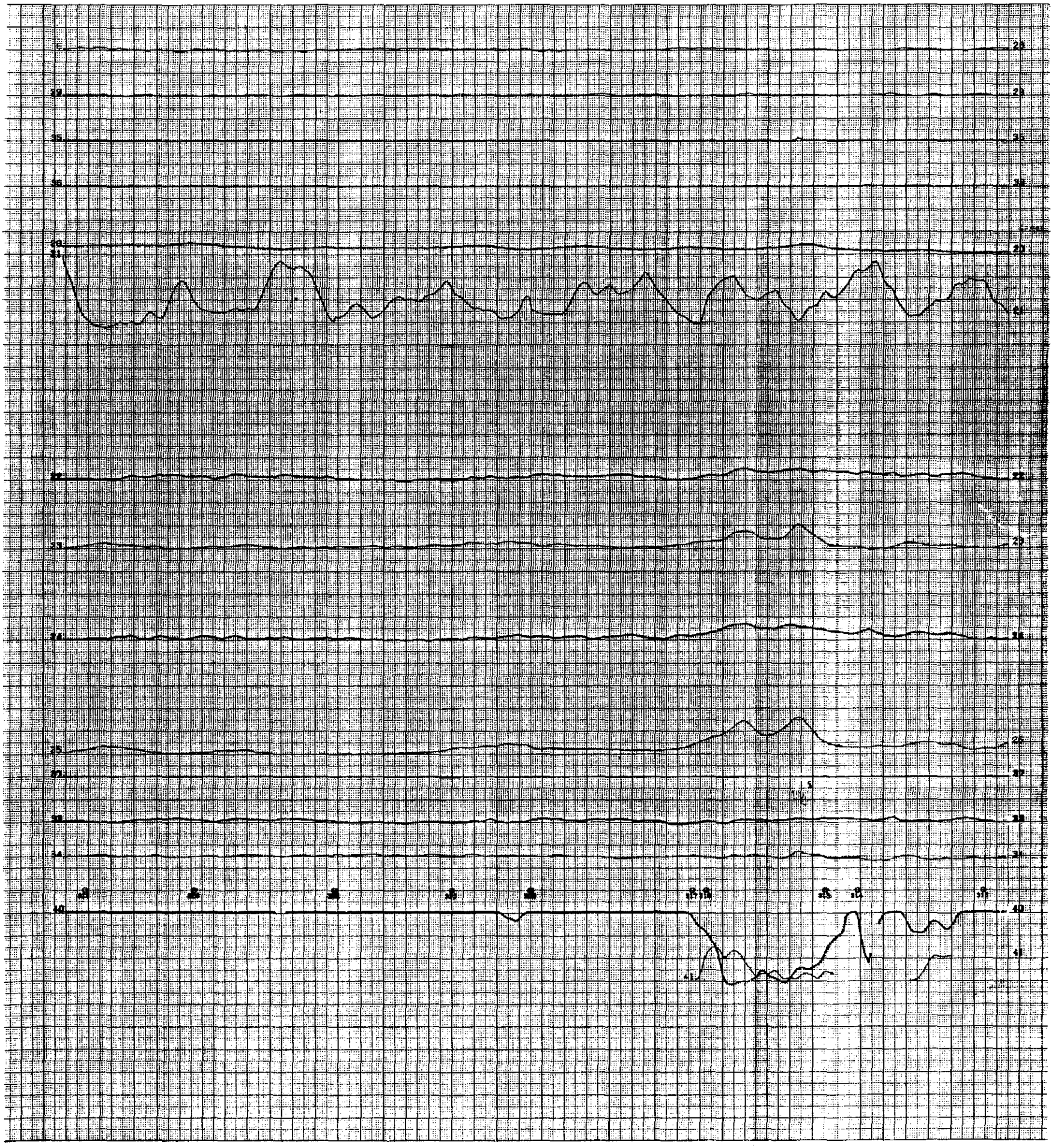
LINE -411

894339

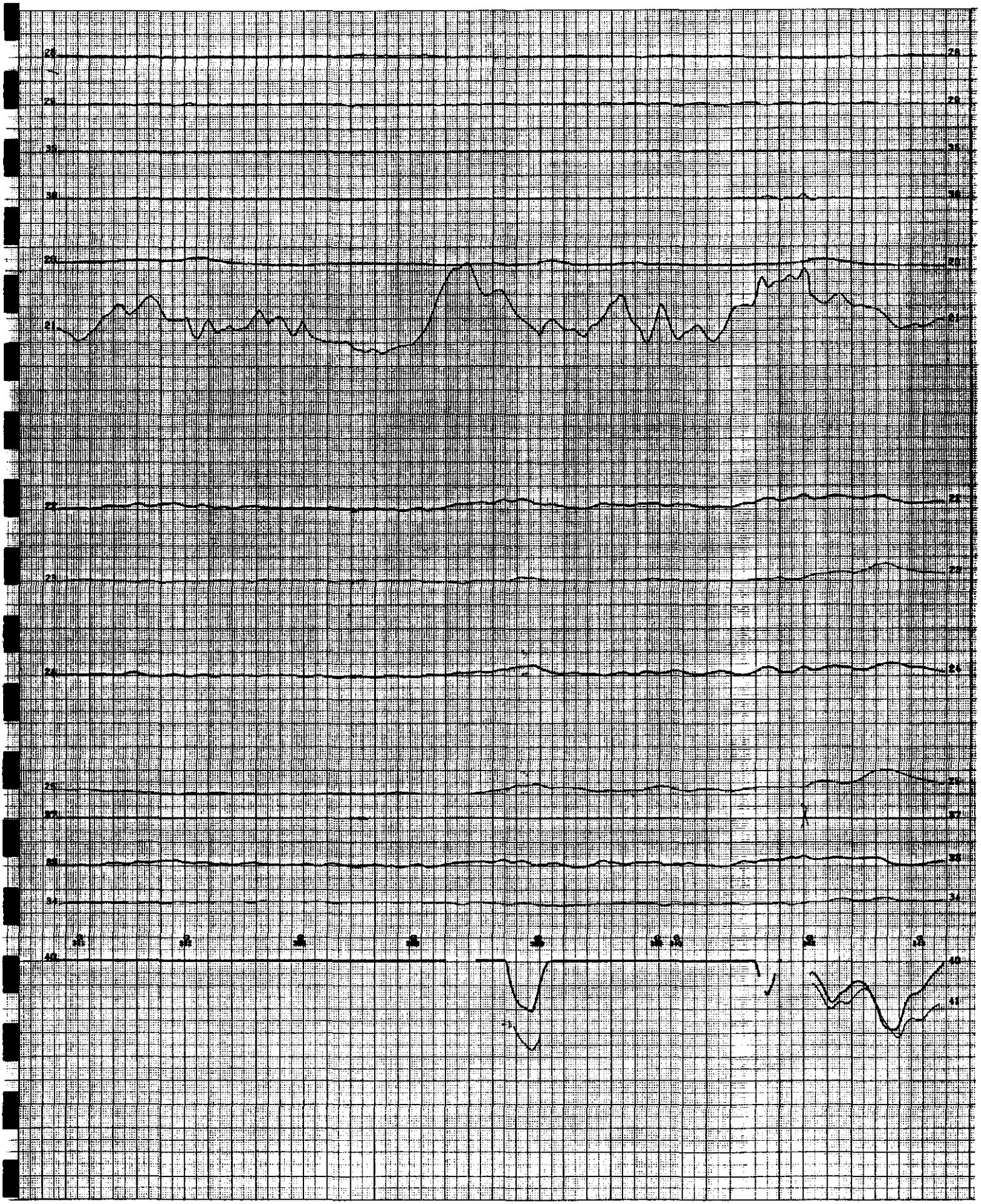


LINE 412

LINE 412


LINE -413
LINE -413

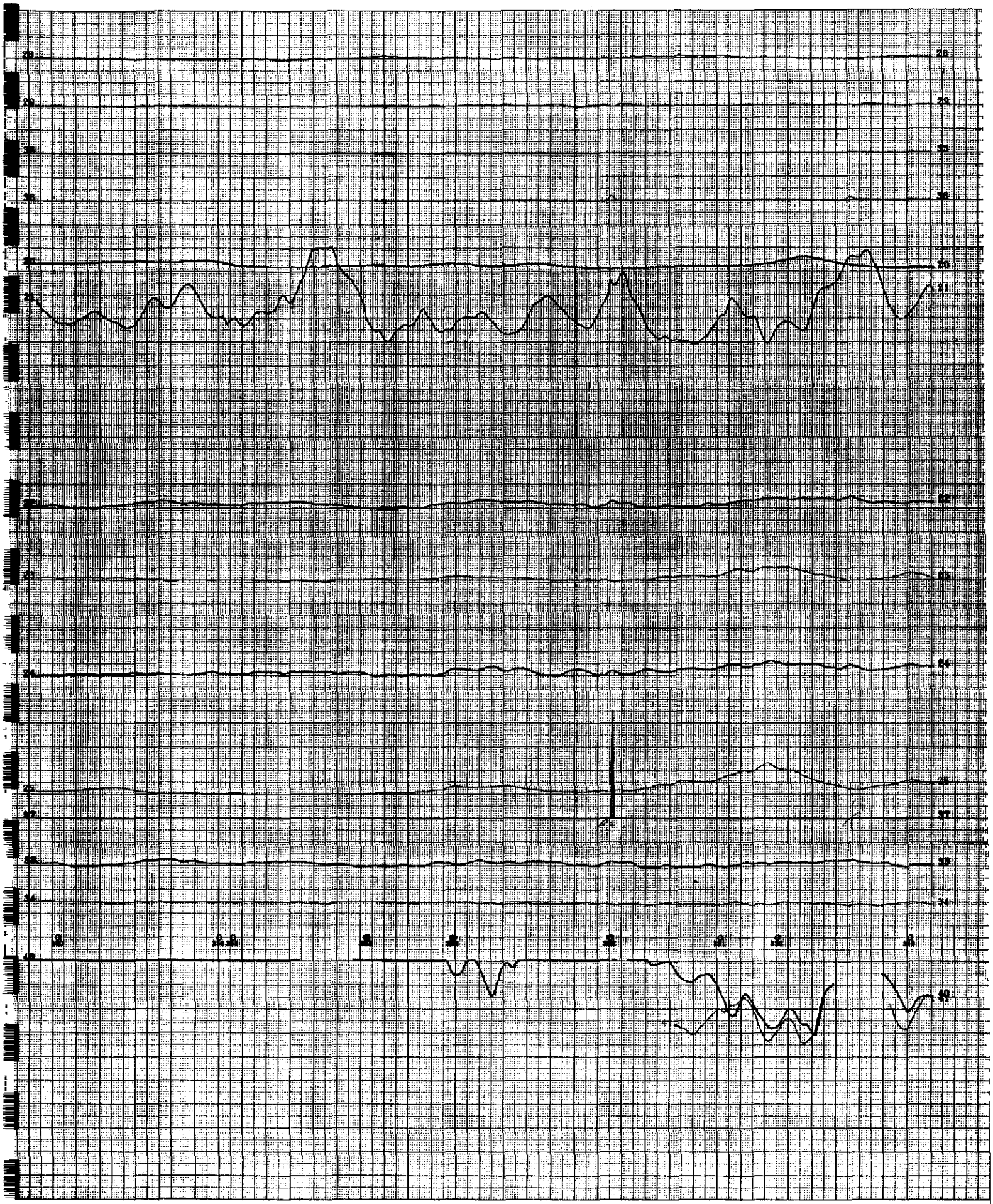
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LINE 414

LINE 414

894342



LINE -415

LINE -415

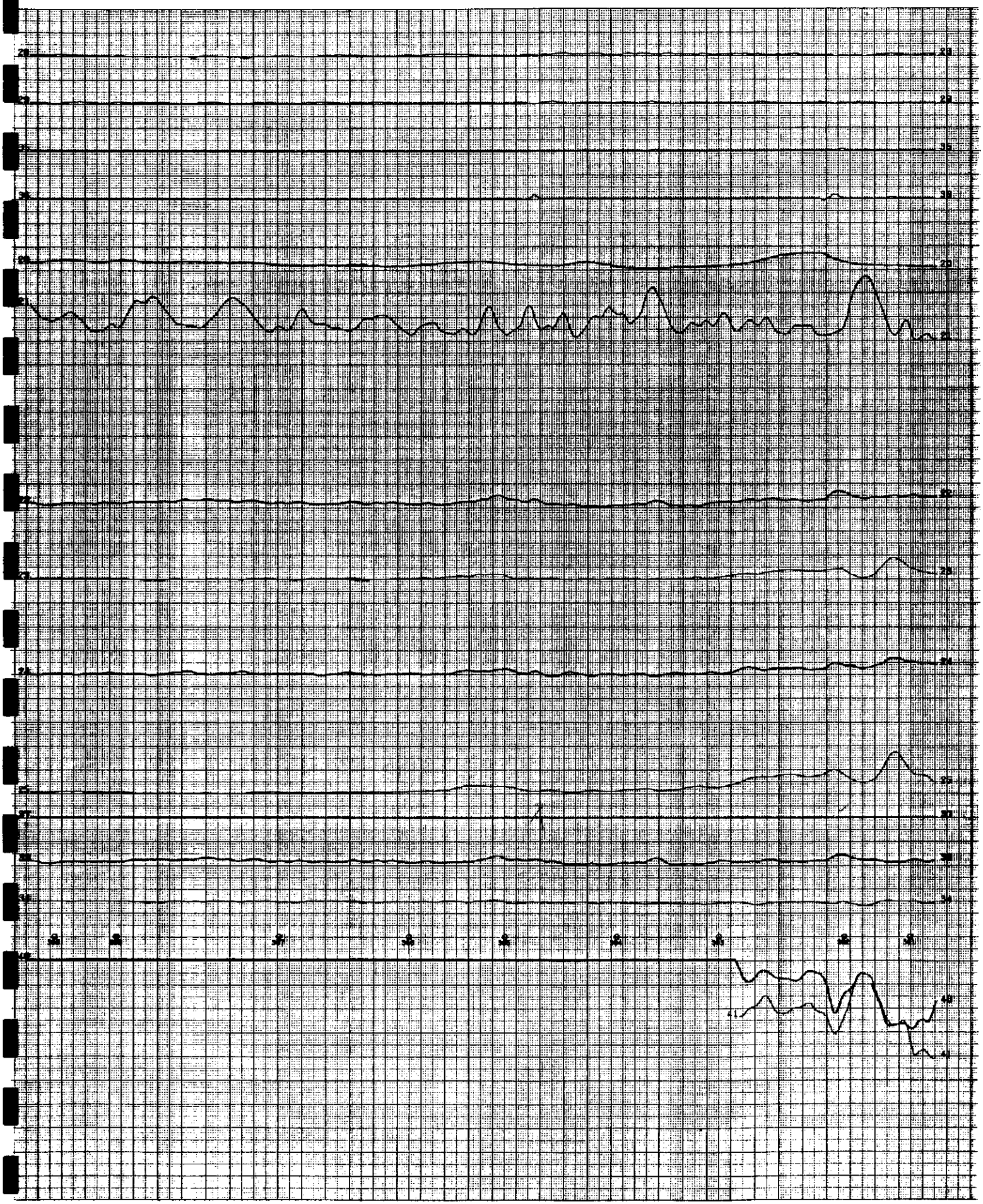
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LINE 416

LINE 416

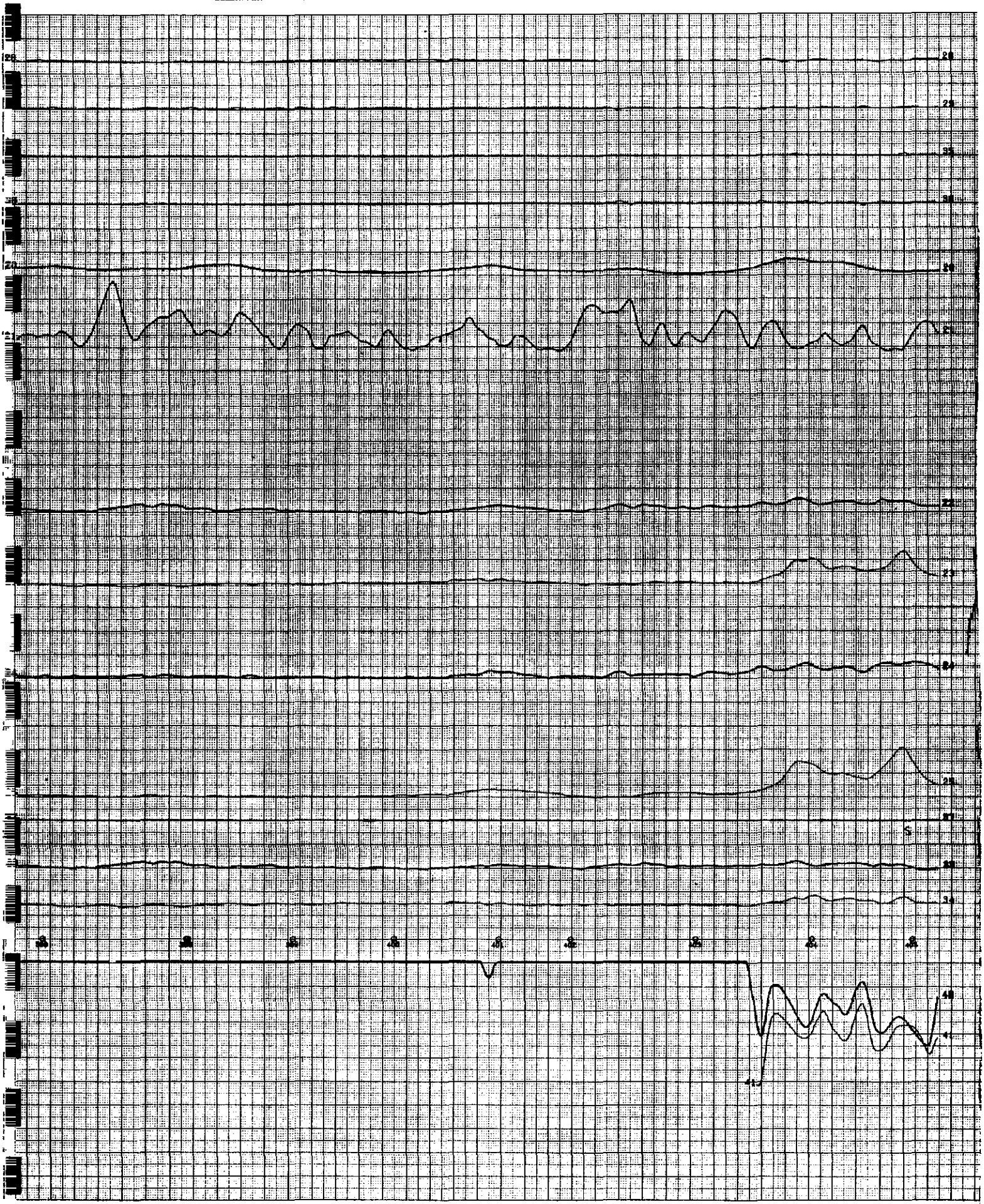
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LINE -417

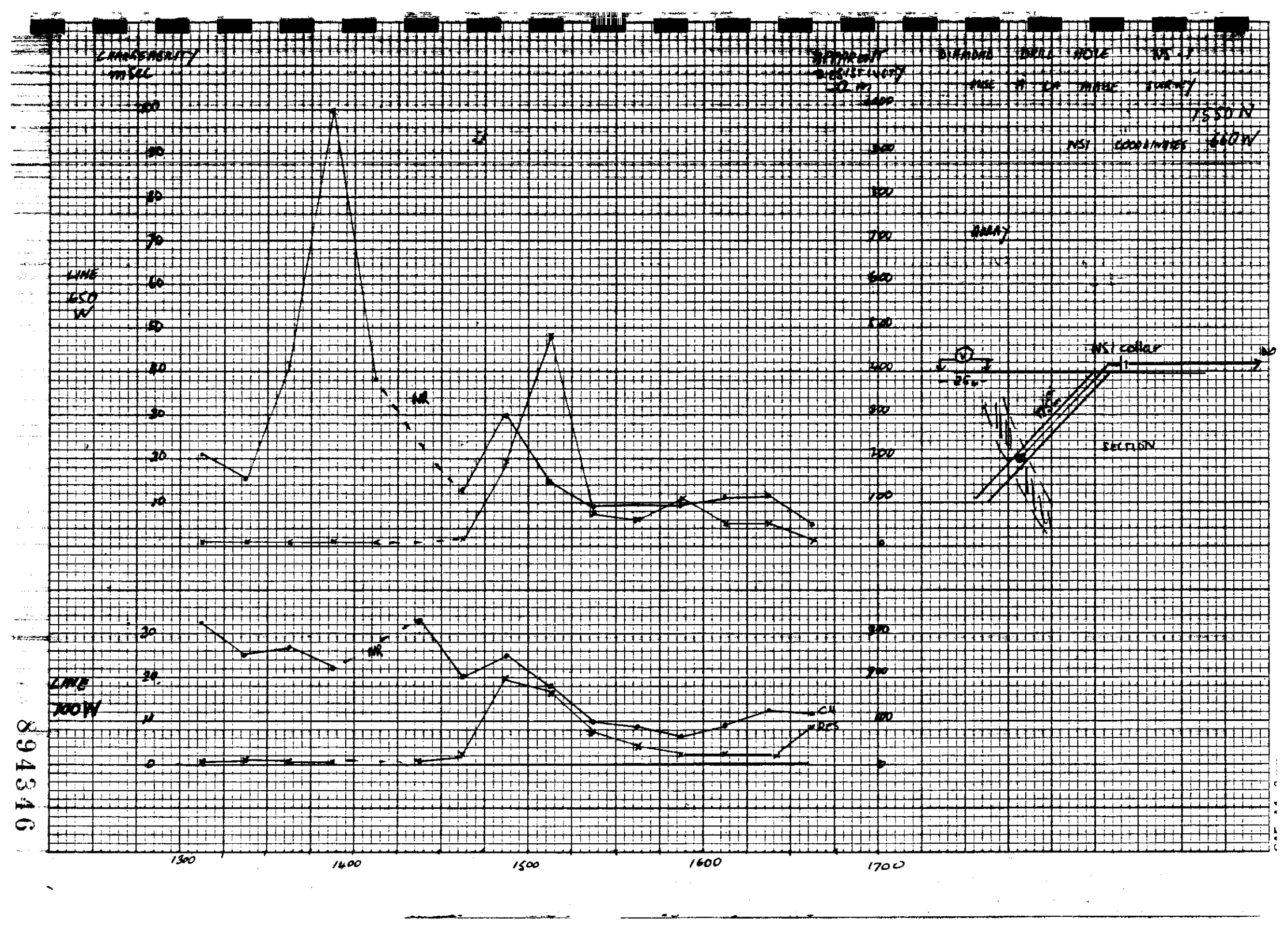
LINE -417

894345



LINE 418

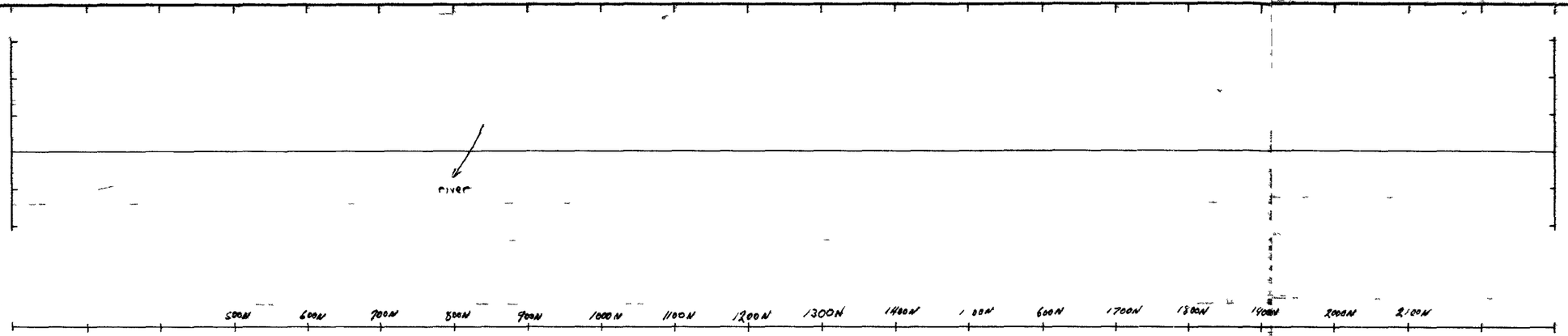
LINE 418


CHARGEABILITY
msec
LINE
650
W
LINE
700W
DIAMOND DRILL HOLE
NS1 collar
SECTION
1300
1400
1500
1600
1700

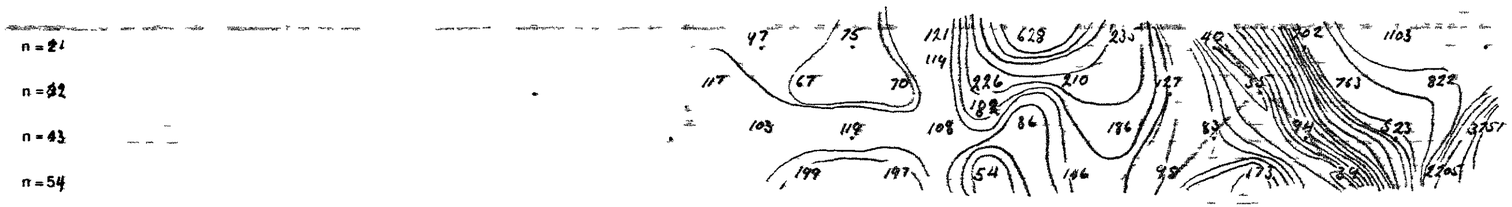
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894347

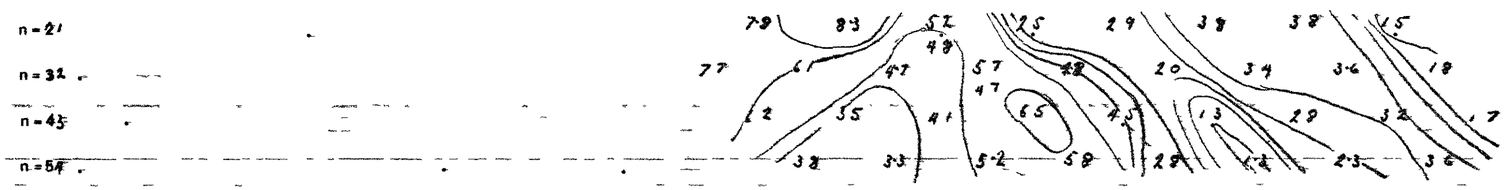
INDUCED POLARIZATION AND RESISTIVITY SURVEY



ρ_a (Ωm)



F E (%)



Mfa

n = 21
n = 32
n = 43
n = 54

IP anomaly ——— - - - -

Contour interval Logarithmic

Linear graph scale 2 cms = 100 M

Dipole size 100M

Reference

Approved

Date 20-10-79

IP Unit M PHAR P660

Frequency 2.5 x 0.3

Current 02,044,056

Field Sheet

Line: 800E

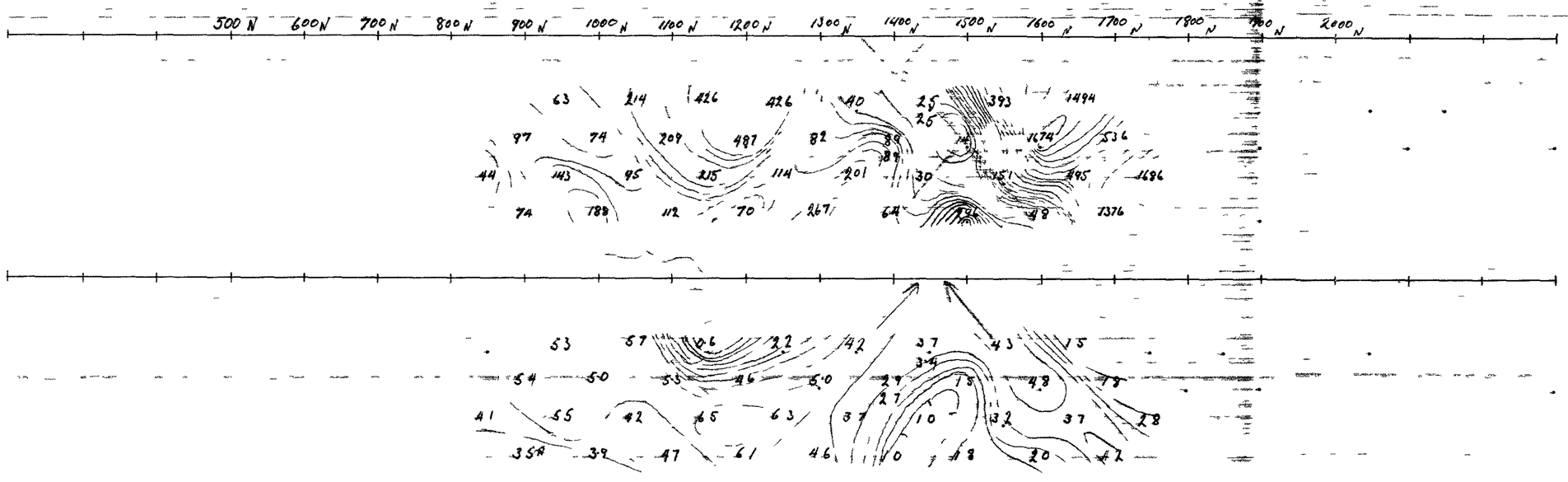
Locality MT SAMANDER MINE

5 cm

THE BROKEN HILL PROPRIETARY CO. LTD.

894348

INDUCED POLARIZATION AND RESISTIVITY SURVEY



ρ_a (Ωm)

F E (%)

Mfa

I P anomaly

Contour interval Logarithmic

Linear graph scale 2cms = 100m

Dipole size 100m

Reference

Approved

Date 19-10-79

I P Unit M.PHAR P660

Frequency 2.5 x 0.3

Current

Field Sheet

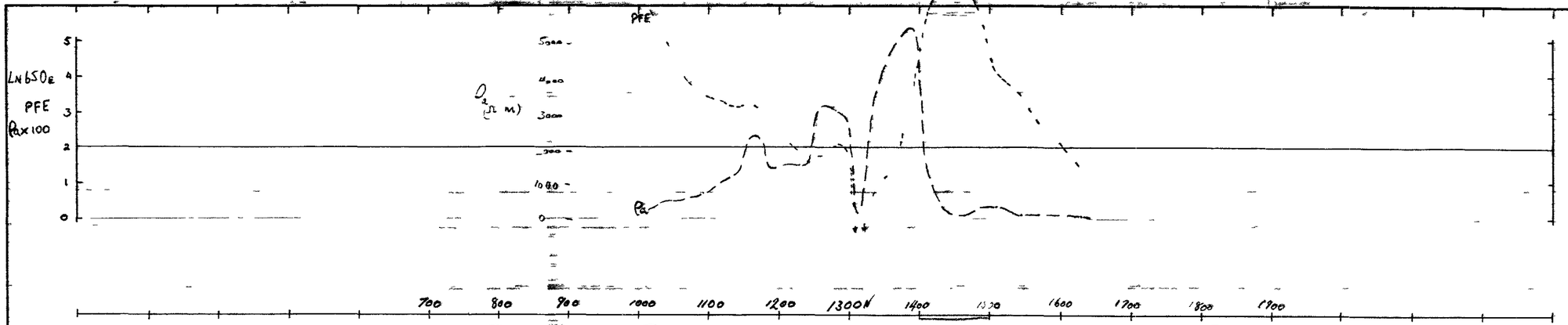
Line 700E

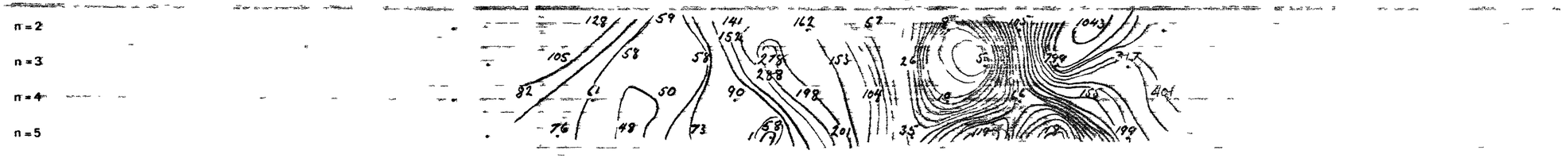
Locality MT SCALANDER MINE

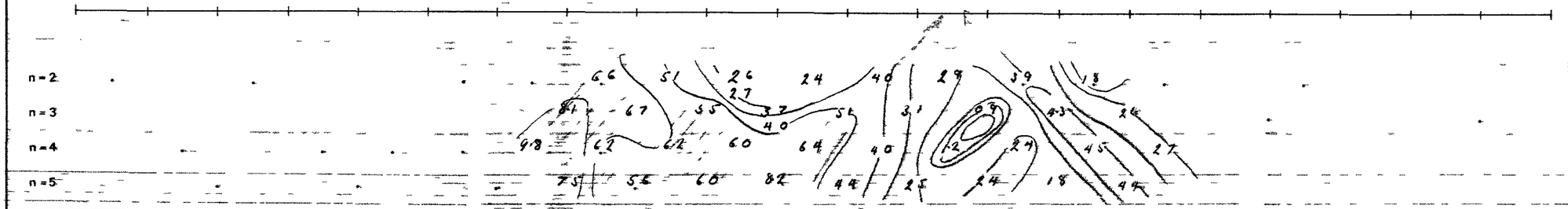
THE BROKEN HILL PROPRIETARY CO. LTD

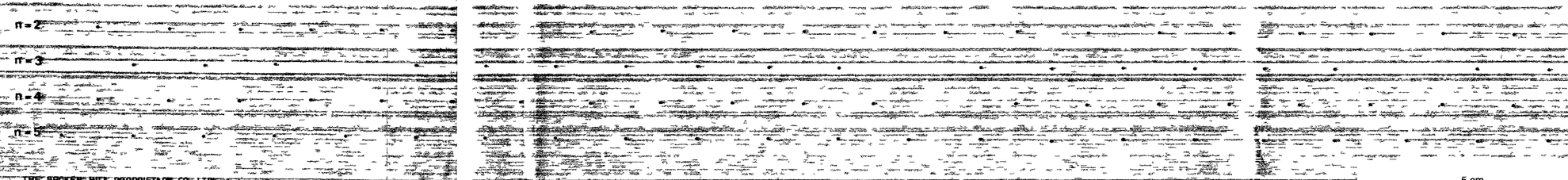
894349

INDUCED POLARIZATION AND RESISTIVITY SURVEY









IP anomaly ——— - - -

Contour interval Logarithmic

Linear graph scale 2cms = 100m

Dipole size 100m

Reference

Approved

Date 26-10-79

IP Unit M'PHAR P660

Frequency 0.3-2.5

Current 0.5 AMPS

Field Sheet

Line 600E

Locality NTH. SCAMANDER MINE

5 cm

THE BROKEN HILL PROPRIETARY CO. LTD.