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PROJECT A-78-60

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PROGRESS REPORT

JUNE 1979 TO JUNE 1980

ZEEHAN PROJECT

EXPLORATION LICENCE 4/78

TASMANIA

B. ROXBURGH, P. JONES

AUGUST 1980

REPORT 179

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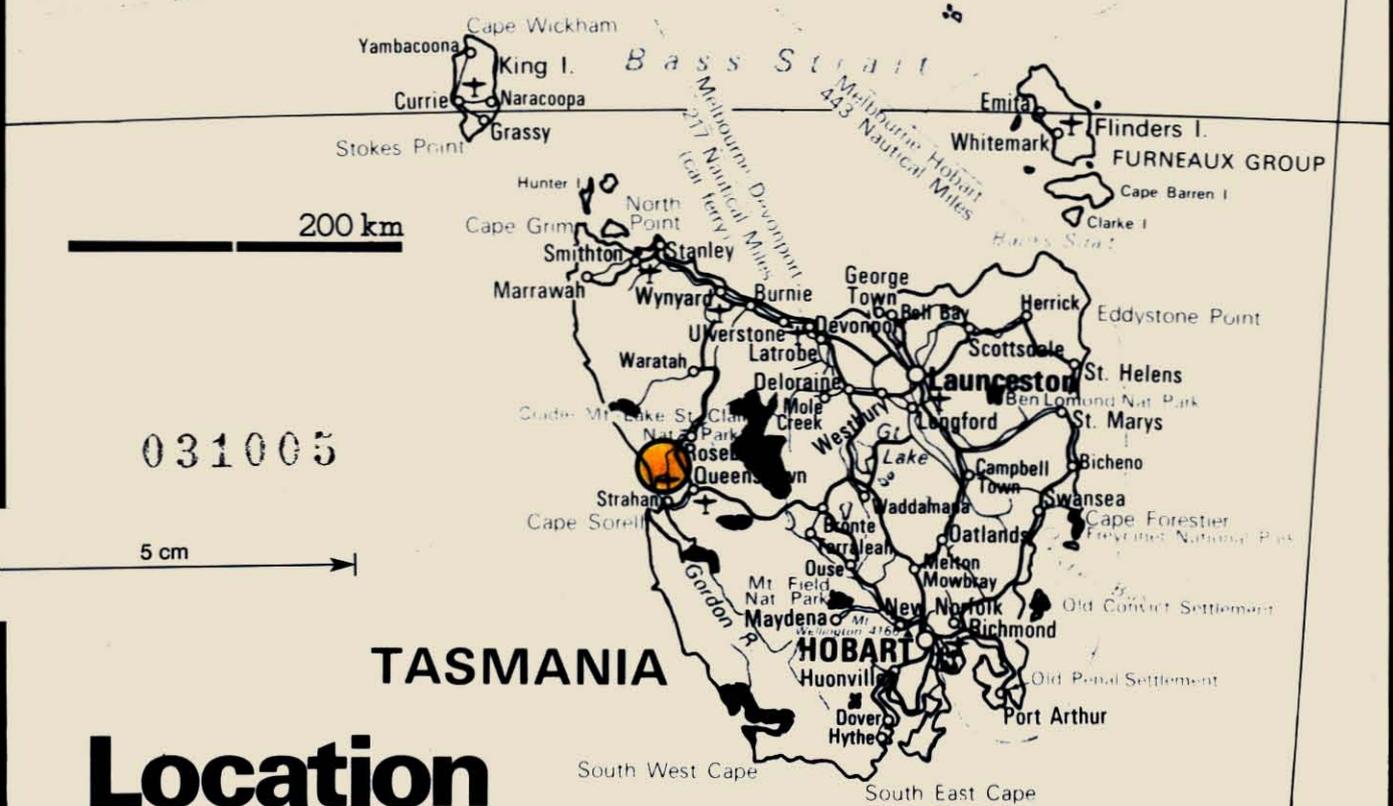
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SUMMARY AND CONCLUSIONS

Exploration Licence 4/78 was granted to Amoco Minerals Australia Company for a period of six months from June 14, 1978 with further six month renewals subject to Mines Department approval. The tenement embraces potential shale or carbonate hosted, basemetal prospects.

Intensive, small scale, mining was undertaken around the turn of the century for silver-lead veins. The carbonate hosted mines within the Amoco tenement were relatively poor in silver compared to the deposits in basement rocks resulting in lower production. More recent exploration by Zeehan Explorations and Tenneco has been restricted to isolated areas within the prospective zone.

Precambrian basement sediments are overlain by Cambrian sediments which are localized within graben structures. These are in turn overlain by Lower Ordovician conglomerate. Transgressive upon these units are Ordovician to Devonian basinal units including sandstones, dolomitic shales and limestones.

Significant galena-sphalerite mineralization has been encountered on the Oceana prospect within the Gordon Limestone. Gangue minerals are dolomite and siderite. Petrographic work to date suggests a syngenetic origin for the basemetal sulfides which in some cases have been remobilized into fracture systems or other favorable host structures.

Grids extended during the period include the Oceana, Austral and Myrtle and a new grid of six radial lines has been staked at the Baura prospect.

Hydraulic auger sampling using a Jacko 200 auger mounted on a Bombadier vehicle has commenced on the Oceana prospect. This equipment will penetrate the thick gravels in the valley.

A number of attempts were made to run dipole-dipole induced polarization (Scintrex) and Pulse Electromagnetics over the known mineralized areas at Oceana. However, the surveys failed to delineate specific drill targets and were therefore abandoned. Mise-a-la-masse and down hole EM surveys were planned at the Oceana but were abandoned due to caving holes.

Amoco conducted a seven hole diamond drilling program on targets outlined during the previous twelve months. Four holes were drilled on the Oceana and three on the Austral prospect.

At the Oceana prospect two holes, ZT-79-2 and ZT-80-4 encountered significant basemetal mineralization. Drillholes ZT-80-3 and 5 cut minor basemetal mineralization. The three holes drilled at the Austral encountered low grade (1-3%) lead-zinc

mineralization. Two holes drilled around the flux quarry intercepted the target zone above the base of oxidation which is locally in excess of 250 meters.

Further drilling at the Austral and the Oceana prospects is recommended to test for extensions of mineralization outlined to date.

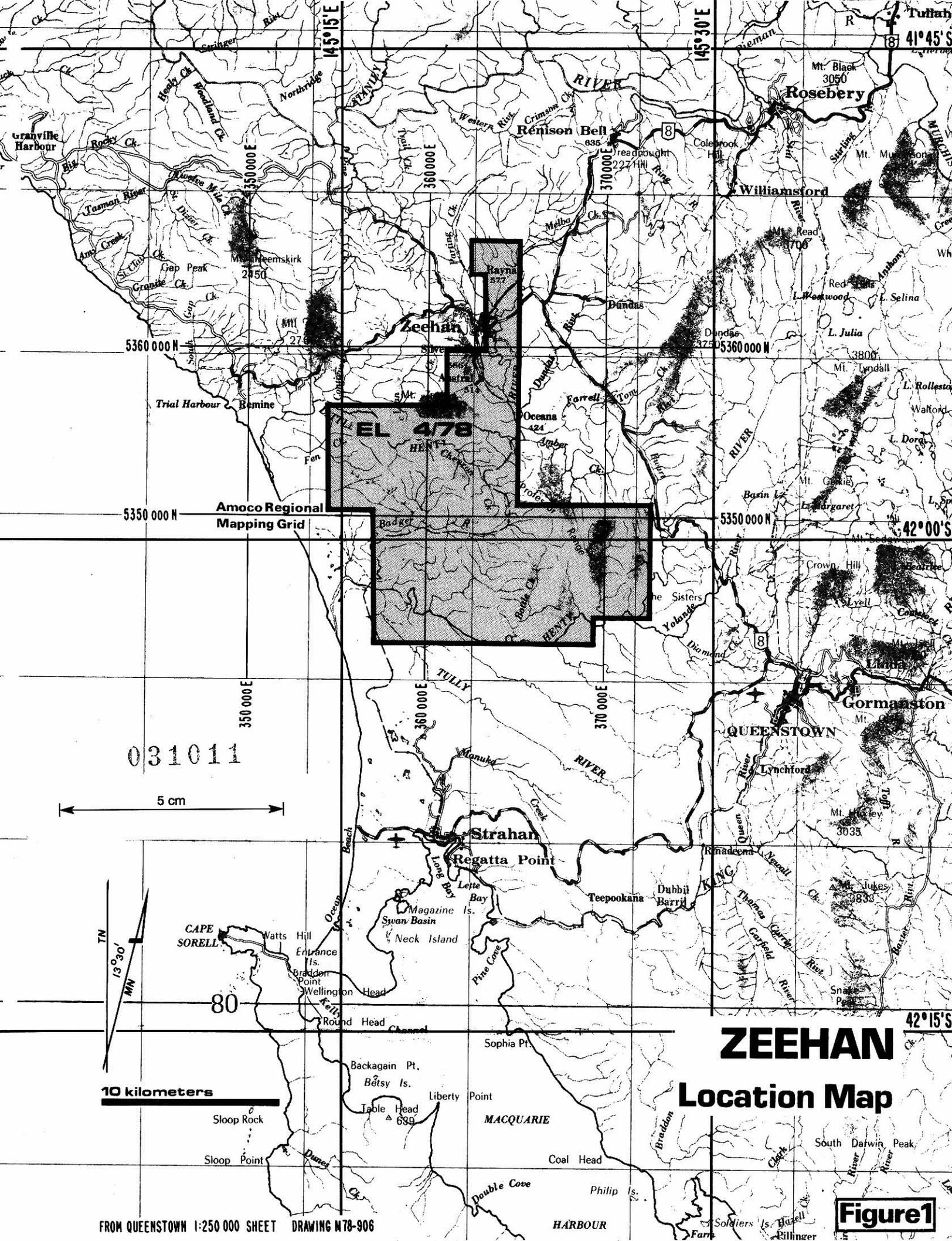
RECOMMENDATIONS

It is recommended the proposed program be implemented.

LOCATION AND ACCESS

Exploration Licence No 4/78 is located immediately south of the town of Zeehan which has a population of approximately 2000 (Figure 1). The Emu Bay Railway and a sealed road connect Zeehan with the port of Burnie, located 140 kilometers to the north. Access within the tenement is relatively good for western Tasmania, as a number of tracks are located along the dolomites which form topographic lows.

Zeehan is the service city for the Renison Tin Mine, and no difficulties would be anticipated with respect to power, water and transport should a mine be developed. The area has an annual rainfall of 250 centimeters.



ZEEHAN Location Map

Figure 1

FROM QUEENSTOWN 1:250 000 SHEET DRAWING M78-906

OWNERSHIP AND LAND STATUS

Exploration Licence 4/78 (EL 4/78) has an area of approximately 208 square kilometers, and was granted to Amoco Minerals for the period of 6 months from June 14, 1978. Renewal of the tenement for further periods of six months is dependent on Mines Department approval of exploration activities and proposed programs. At the renewal period commencing January 14, 1980, a small claim, the "Oceana Pyramid" which embraced the southern portion of the Oceana prospect was documented as being included within Exploration Licence 4/78. This was effected by agreement with Mr. S. Clark, the previous holder of the claim.

Seven pre-existing mining leases are present within the tenement. (Enclosure 1). Lease No. 60M/77 held by Electrolytic Zinc is designed to embrace the slag dump from the old Zeehan smelters. The two leases granted to Renison Ltd are for the purposes of

extracting materials required for road surfacing and filling work within the mine environs situated to the north of EL 4/78. Two leases granted to Mr. Mooney (38M/77 & 39M/77) are designed to embrace slag dumps from the Oonah Tin Mine. Two small leases held by Tasmanian Mineral Developments cover the the Queensberry deposit, situated 1.5 kilometers north of the southern boundary of the tenement.

HISTORY AND EXPLORATION TO DATE

Most of the major mines in the Zeehan area were operational prior to 1890. The Spray Mine (Enclosure 1) which was discovered in 1898 is the only notable exception.

There is a direct relationship between the life of each mine and its silver content. The carbonate hosted mines within the Amoco tenement were relatively poor in silver compared to the deposits in basement rocks resulting in lower production. A table listing the silver-lead production is enclosed (Table 1).

Recent exploration within the Amoco area was conducted by Zeehan Explorations (North Broken Hill & Broken Hill South joint venture) between 1946 and 1951. This included geophysical surveys (conducted by the Bureau of Mineral Resources at the Oceana Mine) and diamond drilling. Data examined to date are

TABLE 1 - LEAD-SILVER PRODUCTION FROM MINES WITHIN AND ADJACENT TO THE AMOCO TENEMENT

| MINE | AGE | LEAD (TONNES) | SILVER (KG) |
|--|---|---|---------------------------|
| SPRAY NUBEENA | Precambrian to Cambrian | 450 | 1,850 |
| MAXIM MONTAGUE WATT & McAULIFFES AUSTRAL | Upper Cambrian to Lower Ordovician | 60 117 254 812 + 52 zinc | 283 42 1,417 935 |
| OCEANA ZEEHAN BELL SOUTH KING | Upper Ordovician to Devonian | 15,382 + 13 zinc 610 5,080 + 4 copper | 17,433 780 9,922 |

TABLE 2 - PREVIOUS EXPLORATION

| MINE | YEAR | RESULTS |
|----------------|----------------|--|
| Zeehan Bell | 1947 | 6 inclined holes 100 - 157 meters in length. Best intersections being 13% Pb, 12.9% Zn, 130 g/t Ag over one meter. No other information. |
| South King | 1947 | Four boreholes. The best intersection being 0.5 meters 47.5% Pb, 5% Zn and 530 g/t Ag. |
| Austral Valley | 1947 - 1950 | 3 vertical and inclined holes near the flux quarry. Best assay being 5 meters of 13% Pb in limestone. |
| Oceana | 1947 - 1950 | Diamond drilling conducted - data currently under evaluation |
| | 1954 - 1960 | 128,000 tons ore produced (11% Pb cut-off used) - zone of 5.5% Pb outlined by further diamond drilling. Mine closed due to water inflow and falling lead prices. |

restricted to a summary of Zeehan Exploration's program and are outlined in Table 2. On the basis of this exploration, the Oceana Mine was re-opened in 1954. Average recovered grades were 11.63% lead and 136 g/t silver. A further sub-economic zone grading 5.5% lead and having a width of approximately 11 meters was outlined north of the mine. The mine was closed in 1960 due to falling metal prices and water inflow (11 million liters/day pumped from the mine).

Recently, reports and detailed drill logs pertaining to Zeehan Explorations program were received from North Broken Hill Limited. These data will be evaluated and documented in the next annual report.

A very limited helicopter borne electromagnetic survey (Turair) was conducted by Tenneco about 1970. This was followed-up by reconnaissance IP surveys, SP surveys and limited soil sampling.

There has been no recent systematic exploration within the Amoco tenement for a shale or carbonate hosted basemetal deposit.

REGIONAL GEOLOGY

Large blocks of Precambrian sediments form the basement complexes of both northwest and central Tasmania. These are overlain by Cambrian volcanics and marine sediments which host the Rosebery-Hercules, Mt. Lyell and MacIntosh (Que River) orebodies.

Overlying these rocks is a sequence of Cambrian to Devonian basinal sediments. This sequence hosts the Renison and Cleveland orebodies.

The above units were intruded by granites during the Devonian and Carboniferous times which introduced the tin mineralization. During the Jurassic and Tertiary periods, the sequence was blanketed by basic volcanics. Recent fluvial and Pleistocene glacial erosion have produced the present topography.

Major folding and block faulting are particularly evident in the Zeehan region. Uplift and folding accompanied accumulation of thick piles of sediment and volcanic material in various troughs during the Cambrian period. The Ordovician was marked by the onset of terrestrial and shallow marine sedimentation (the Owen Conglomerate, Moina Sandstone, and Gordon Limestone). The major deformation accompanied the Paleozoic Tabberaberan orogeny and large northwest trending fold structures were formed.

GEOLOGY OF THE TENEMENT

The basement complex is comprised of Precambrian schists, quartzites, shales, spilitic or keratophyric lavas, and pyroclastics and forms a stable craton to the northwest of the tenement. The Lower Cambrian units such as the Crimson Creek Formation, are predominantly quartzitic, shallow water sediments including argillites, grits and tuffs. Cambrian sedimentation appears confined to fault bounded blocks or graben structures.

The Ordovician to Devonian strata of the Zeehan Basin occur within a series of synclinal structures with north, northwest axial trends. The quartzose Owen Conglomerate at Mt. Zeehan, was deposited within a graben structure in the Lower Ordovician period and is transgressively overlain by grey micaceous siltstones and shales. It is the time equivalent of the Moina Sandstone which was deposited in the Zeehan Basin. The Moina

Sandstone is disconformably overlain by basinal sediments including the Ordovician Gordon Limestone. The disconformity is marked by a white sheared, well sorted conglomerate generally one to two meters in width. Siluro-Devonian sediments within the basin are fossiliferous marine quartzites and dolomitic to pyritic shales.

The western portion of the tenement has been blanketed by Permian glacials, lacustrine sediments and Jurassic dolerite flows.

Extensive Tertiary and Quaternary deposits blanket much of the prospective dolomite and shale units.

The Zeehan area has been intensely disturbed by the Paleozoic Tabberaberan orogeny which caused major northwest folding and faulting. East and northwest trending fault systems are considered to have been contemporaneous. North-northeast striking faults are thought to have developed in post Permian times and are not common within the Amoco area.

A colored geologic map of the tenement and surrounding area was included in the previous progress report for the period July 1978 to July 1979. (Amoco Report 151, Enclosure 1)

MINERALIZATION

Significant basemetal mineralization has been identified within the Gordon Limestone unit. Galena-sphalerite-silver occurs both in fine grained primary and very coarse grained secondary remobilized mineralization styles.

Petrographic work of drill core from ZT-79-2 (Lowder and Whittle, Appendices 3 & 4) has shown that much of the disseminated sulfide and siderite ankerite gangue is of syngenetic origin. The sulfides present in this hole may be syndiagenetic, having been exhaled into constantly slumping breccia flows. Some of the mineralization, however appears to have been remobilized into fracture systems.

Petrographic work on samples from the mineralized section within ZT-80-4 has shown the rocks have undergone moderate deformation

and thermal recrystallization. This, along with auto-brecciation textures observed in the mineralization, suggest replacement type mineralization quite dissimilar to that observed in ZT-79-2.

WORK CONDUCTED BY AMOCO

Work conducted during the period June 1979 to June 1980 included gridding, geochemical surveys and dipole-dipole IP, airborne Dighem, ground Pulse Electromagnetic (PEM) geophysical surveys and seven diamond holes were drilled on the Oceana and Austral prospects.

Gridding

The Oceana, Austral and Maxim Prospects were regridded with their baselines surveyed and staked with metal pickets every one hundred meters. The regridding was necessary to repair bushfire damage from the summer season.

At Oceana, a further three 400 meter lines were staked, at 50 meter intervals from 2700N to 2900N to close moderate tenor soil geochemical anomalies in the southern portion of the grid

(Appendix 7). A further 800 meter long line, 3900N, was also gridded to the north of the Oceana Valley. Infill lines were staked over the mineralized areas at 50 meter spacings and at 50 meter intervals along line. The Oceana baseline presently extends from line 2700N to 3900N.

The Austral grid now incorporates the old Maxim grid and extends to line 3000N covering the Crimson Creek and the Gordon limestone sequences.

Six 800 meter long lines were staked immediately south of the existing Myrtle grid to close a moderate tenor geochemical anomaly (Appendix 8).

At the Baura prospect (Enclosure 1) eight line kilometers of radial lines were staked at 300 meters along line, over an anomalous section of the Gordon Limestone which was outlined by the original geochemical survey.

Geochemistry

Soil samples were taken from the 'B' horizon at 50 meter intervals along grid lines at Oceana and Myrtle prospects. Samples were sent to Pilbara Laboratories in Perth where the -80 mesh fraction was analysed for copper, lead, zinc and silver. Analysis for basemetals was by AAS after hydrochloric acid digestion.

A further coincident lead-zinc anomaly was delineated on line 2800N on the Oceana Prospect proximal to the south Oceana workings (Appendix 7). An hydraulic augur sampling program using a Jacro 200 auger mounted in a Bombadier commenced recently. This equipment will penetrate the thick talus which blankets much of the Oceana valley.

Nebulous lead and zinc anomalies were delineated on the extensions of the Myrtle grid. A strong lead-zinc anomaly occurs

on the eastern flank of the Myrtle grid on the southern two lines (Appendix 8). The anomaly is located near the prospective contact between the Gordon Limestone and the underlying Moira Sandstone (similar to anomalies on the Austral and Grieve prospects).

No sampling was conducted on the Baura grid.

Geophysics

Geophysical surveys included three lines of 100 meter dipole-dipole induced polarization and one line of 200 meter dipole-dipole IP (Appendix 5). Also ten lines (each three kilometers in length) of DIGHEM helicopter-borne EM and ten lines of fixed transmitter PEM (each 400 meters in length) were conducted.

IP Results:

Lines 3200N, 3500N and 3700N at the Oceana prospect were surveyed with 100 meter dipole-dipole time domain IP and line 3700N was re-surveyed with 200 meter dipoles. The IP results failed to delineate the mineralization encountered in drillholes.

Line 3200N: Two moderately chargeable zones (>30mS) are apparent. Between 1500E and 1600E is a surficial response with very shallow indicated depth extent. Between 1250E and 1350E is a deeper (approximately 50m) response which also has limited depth extent. The resistivity section on this line is featureless except for a contact at approximately 1575E with high resistivity values to the east.

Line 3500N: A near surface zone of moderate chargeability (>30mS) lies between 1300E and 1460E. This zone has a limited depth extent. Resistivity values indicate a minor surficial resistivity low (200 ohm-m) which is probably indicative of the swampy conditions.

Line 3700N: The continuation of the chargeable zone of line

3500N lies between 1450E and 1600E. The limited depth extent of this zone is particularly evident on the 200 meter dipole section. A large 35 millisecond chargeability high is located east of 1200E at a true depth of about 150 meters. This corresponds to a very high resistivity zone and may be indicative of pyritic basement rocks.

With the exception of the deep western anomaly of line 3700N all the chargeable zones appear to have limited depth extent and may be due to clays within the weathered dolomite or disseminated mineralization. There are no indications of massive mineralization.

DIGHEM Results:

No bedrock conductors were revealed in this survey which covered the Oceana Valley, the north end of the Austral Valley and the Maxim Valley. Surficial apparent resistivity lows are shown in valleys indicative of swamp conditions. Apparent resistivities are consistent with the surficial lows of the Oceana IP survey. A comprehensive report of this survey will be presented with the next annual report.

PEM Results:

The PEM survey showed a completely flat response on the Oceana prospect and only minor (noise) responses in the Austral prospect (Appendix 6).

The drilled mineralization at Oceana area appears to be unresponsive to electrical or electromagnetic geophysical methods. This may be due to a short strike length, lenticular nature or lack of continuity in electrical properties.

Diamond Drilling

Oceana Prospect:

Four holes totalling 1471 meters were drilled, two of which, ZT-79-2 & ZT-80-4, intersected encouraging lead-zinc mineralization. Drilling details and assay results are summarized (Table 3). Drillhole locations are plotted on Enclosure 2 and drill section and logs are included (Appendix 1).

- ZT-79-2 was sited approximately 200 meters north from the old Oceana Mine to test a strong geochemical anomaly as well as a shallow gradient array chargeability response without associated soil geochemistry. The hole was terminated at 235.9 meters in dolomite after passing through the two target zones. Two major zones of mineralization were encountered coinciding with both the observed IP and geochemical responses.

The uppermost intersection from 103 to 118 meters (assaying 33.3% Pb + 19.2% Zn + 337g/t Ag) comprised massive galena and sphalerite in a clay gangue. This section lacked any iron sulfide component. The lowermost sulfide intersection from 204 to 218 meters (assaying 8.5% Pb + 3.0% Zn + 57g/t Ag) was disseminated and vein like in character within a siderite ankerite gangue. Both intercepts have hangingwall and footwall dolomitic sedimentary breccias. Lower grade mineralization surrounding the higher grade intercepts is disseminated and occurs within silicified siderite ankerite veined dolomites.

- ZT-80-3 was sited to test three gradient array chargeability anomalies, one of which had a coincident geochemical response. The hole was terminated at 399.7 meters in interbedded limestones and dolomites having cut a one meter section of stringer type galena-sphalerite mineralization within a breccia cemented by calcite. The hole also passed through a large thickness of sedimentary slump breccias as in holes ZT-79-2, ZT-80-4 & 5. The hole deviated strongly to the south (125 meters south of the collar) and may not have fully tested the mineralized horizon.

TABLE 3- OCEANA PROSPECT - SUMMARY OF DIAMOND DRILLING

| HOLE NO | COORDINATES | BEARING | DECLINATION | DEPTH (m) | COORDINATES AZIMUTH DEFLECTION (at terminal depth) | RESULTS * including |
|---------|-------------|---------|-------------|--------------|---|--|
| ZT-79-2 | 3700N:1500E | 270°G | -60° | 235.90 | Unknown (Acid) | 65-218 = 153m @ 5.10% Pb + 3.50% Zn + 41.7 g/t Ag *65-96 = 31m @ 0.66% Pb + 3.28% Zn + 1.9 g/t Ag 96-122 = 26m @ 22.26% Pb + 11.69% Zn + 203.4 g/t Ag *103-118 = 15m @ 33.29% Pb + 19.22% Zn + 336.7 g/t Ag 122-204 = 82m @ 0.68% Pb + 1.01% Zn + 3 g/t Ag *204-218 = 14m @ 8.37% Pb + 2.95% Zn + 56.7 g/t Ag |
| ZT-80-3 | 3200N:1515E | 270°G | -60° | 399.70 | 3075N-1335E | 237-238 = 1m @ 8.25% Pb + 0.39% Zn + 73.6 g/t Ag |
| ZT-80-4 | 3420N:1490E | 270°G | -66° | 360.30 | 3370N-1350E | 247-258 = 11m @ 12.00% Pb + 4% Zn + 89 g/t Ag *250-258 = 8m @ 15.00% Pb + 5.40% Zn + 113 g/t Ag 302-307 = 5m @ 22.30% Pb + 1.99% Zn + 323 g/t Ag *304-307 = 3m @ 36% Pb + 3.2% Zn + 530 g/t Ag |
| ZT-80-5 | 3600N:1590E | 270°G | -65° | 475.30 | 3530N-1350E | No visible mineralization |

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Oceana prospect looking south, with drillhole ZT-79-2 in foreground with the old Oceana Mine workings at left.



Austral prospect looking southeast, showing drillhole ZT-79A-1 and the abandoned Austral dumps and smelter.

underlying the breccia sequence.

- ZT-80-4 was sited to test the southern extension of the known Oceana mineralization at depth. No chargeability anomaly was associated with the target zone. The hole was terminated at 360.3 in limestones having cut a large thickness of sedimentary breccias overlying two zones of siderite veined galena sphalerite mineralization. These two zones correspond to the southern strike extent of the two lodes worked in the Oceana Mine. Petrographic work on mineralized and unmineralized samples from within the ore zone has shown the rocks to have undergone moderate deformation and thermal recrystallization.
- ZT-80-5 was collared to test a coincident IP and geochemical anomaly east of the Oceana Mine as well as to intersect the mineralization encountered in ZT-79-2 and ZT-80-4 at greater depth. The hole passed through unmineralized limestones, dolomites, sedimentary slump breccias, minor shales and calcareous sandstones and was terminated at 475.3 meters. The hole may have passed beneath the IP target zone and may also have failed to penetrate the deeper target zone. A massive unit of sedimentary slump breccias is evident high in the sequence which correlates with those observed in holes ZT-79-2, ZT-80-3 and 4. It appears, however from mine records that the mineralized zones are step faulted westward by low angle thrust faults and these may have displaced the target zone to the west of the drilled section at depth.

Austral Prospect:

Three holes totalling 868 meters were drilled, all of which intersected low grade lead-zinc mineralization. Hole locations are shown (Enclosure 2) and drill sections and logs included (Appendix 2). A summary of the drilling and assay results is also included (Table 4).

TABLE 4 - AUSTRAL PROSPECT - SUMMARY OF DIAMOND DRILLING

| HOLE NO | COORDINATES | BEARING | DECLINATION | DEPTH (m) | COORDINATES AZIMUTH DEFLECTION (at terminal depth) | RESULTS * including |
|----------|-------------|---------|-------------|--------------|---|--|
| ZT-79A-1 | 1800N:1225E | 270°G | -50° | 163 | Unknown (acid) | 76-82 = 6m @ 1.06% Pb + 1.66% Zn + 1.6 g/t Ag 130-143 = 13m @ 2.61% Pb + 0.62% Zn + 13.8 g/t Ag |
| ZT-80A-2 | 1850N:1300E | 270°G | -60° | 331 | 1850N-1135E | 40-46 = 6m @ 0.69% Pb + 1.62% Zn 5.8 g/t Ag 284-299 = 15m @ 0.80% Pb + 0.86% Zn + 4.8 g/t Ag *284-290 = 6m @ 1.44% Pb + 0.64% Zn + 5.1 g/t Ag and 294-299 = 5m @ 0.29% Pb + 1.40% Zn + 3.8 g/t Ag |
| ZT-80A-3 | 1610N:1300E | 270°G | -55° | 373.50 | 1535N-1097E | 294-296 = 2m @ 0.42% Pb + 2.05% Zn + 15.5 g/t Ag 341-355 = 14m @ 0.86% Pb + 0.23% Zn + 4.4 g/t Ag *347-351 = 4m @ 2.25% Pb + 0.28% Zn + 9 g/t Ag |

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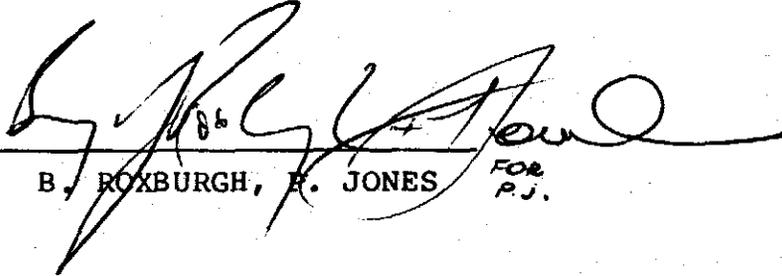
- ZT-79-1 was sited to test a large ironstone having associated anomalous basemetal geochemistry with a coincident chargeability response. The hole was terminated in dolomitic siltstones having encountered an oxidised sequence of ferruginous limestones, siltstones, sandstones, sandstone breccias and ferruginous shales. The target zone was encountered between 130 and 143 meters; (13 meters assaying 2.61% Pb + 0.62% Zn + 13.8g/t Ag) and was comprised of a massive hematite-limonite-goethite breccia.
- ZT-80A-2 was collared to test the down dip extension of the oxidised, massive ironstone horizon intersected in drillhole ZT-79-1. The hole was terminated prematurely due to badly caving ground within fractured sandstones after passing through two zones of low grade lead-zinc mineralization. The target zone was intersected between 284 and 294 meters and consisted of oxidised ironstone breccias within a clay gangue.
- ZT-80A-3 was sited to test a coincident gradient array chargeability/geochemical anomaly some 200 meters south of the flux quarry ironstone and a weak gradient array chargeability response coincident with minor workings near the basal contact of the Gordon limestone. The first target zone proved to be unmineralized calcareous shales, limestones and dolomites interbedded with minor dolomitic sandstones. The latter target was comprised of two zones of minor basemetal sulfide mineralization between 294 to 296 and 341 to 355. Both zones had either a siderite or siderite ankerite gangue with pervasive fine grained galena and sphalerite throughout. This hole was terminated above the basal marker conglomerate due to bad drilling conditions in dolomitic fine grained fractured sandstones.

PROPOSED PROGRAM

Gridding and geochemical surveys will be conducted over anomalies outlined by the previous reconnaissance program. A bedrock auger sampling program designed to overcome the presence of Quaternary gravels at the Oceana and Austral prospects and other areas within the tenement will continue. Targets outlined will be drilled. The Austral and Oceana grids will be geologically mapped in greater detail.

Further holes will be diamond drilled to delineate the lateral and down dip extensions of the mineralization intersected in holes ZT-79-2 and ZT-80-4.

SIGNED

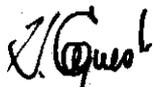

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AMOCO MINERALS AUSTRALIA COMPANY

EXPENDITURE FROM SEPTEMBER 1, 1979 TO JUNE 30, 1980

EXPLORATION LICENCE 4/78

| | |
|-----------------------------------|---------------------|
| Salaries & Benefits | 42,042.60 |
| Drafting | 2,827.57 |
| Cookery | 5,693.64 |
| Field Supplies | 10,432.07 |
| Field Office Rent | 1,354.09 |
| Freight | 7,991.18 |
| Travel | 6,135.87 |
| Communications | 2,095.12 |
| Geophysics | 7,113.57 |
| Drilling | 170,944.56 |
| Contractors/Consultants | 8,040.37 |
| Assays | 15,096.96 |
| Equipment Rental | 11,210.91 |
| Equipment Operation & Maintenance | 4,483.45 |
| Aircraft Charter | 735.00 |
| Legal | 110.00 |
| Clerical Services | <u>1,439.65</u> |
| | 297,746.61 |
| Overhead | <u>87,601.40</u> |
| | <u>\$385,348.01</u> |

T.J. CONQUEST
Accountant

APPENDIX 1

OCEANA PROSPECT - DRILL SECTIONS & LOGS

1350E

1400E

1450E

1500E

1550E

SW

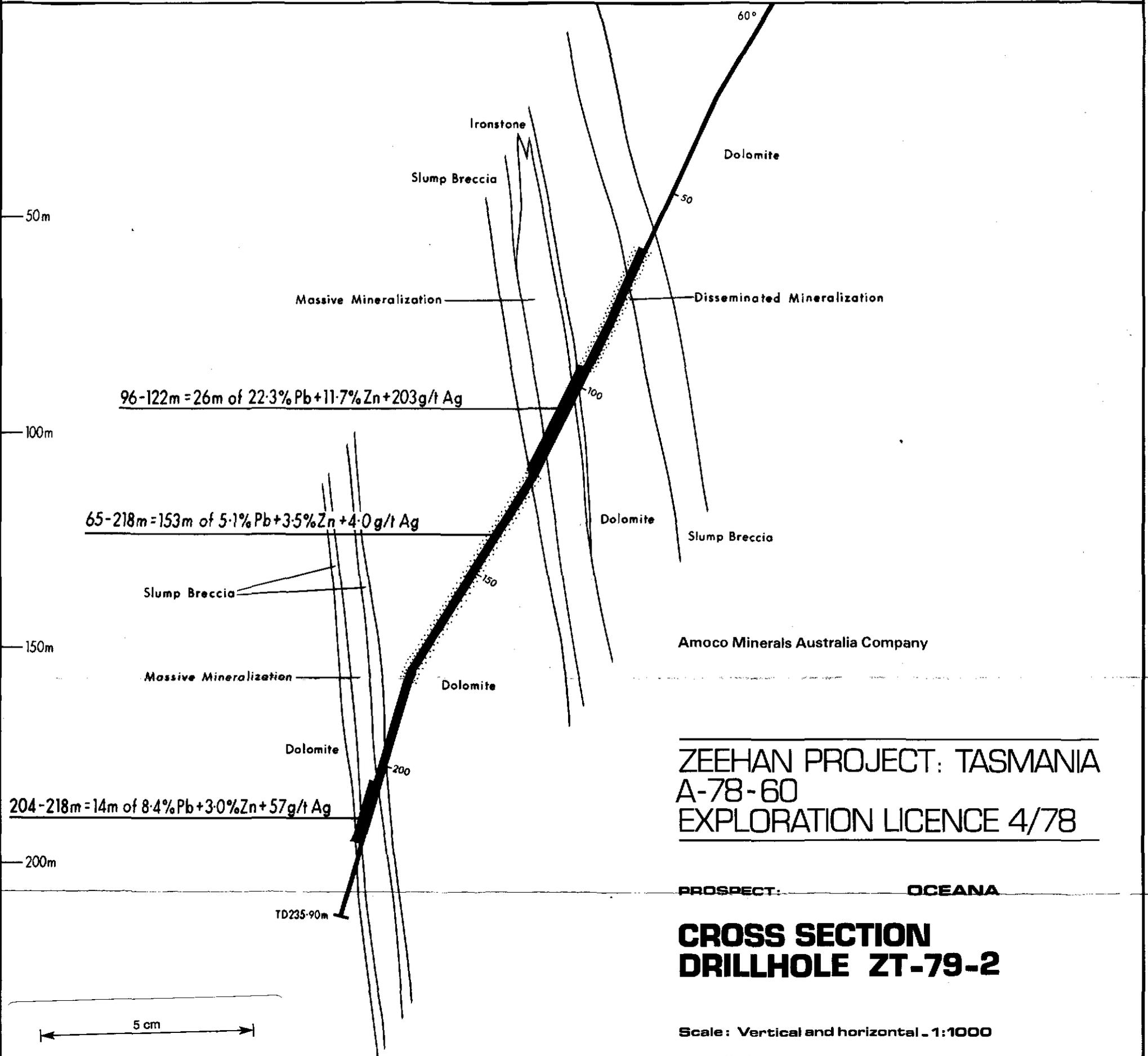
NE

Bearing 37°T

ZT-79-2

3700N-1500E
185m ASL (approx.)

3200 N



Amoco Minerals Australia Company

ZEEHAN PROJECT: TASMANIA
A-78-60
EXPLORATION LICENCE 4/78

PROSPECT: OCEANA

**CROSS SECTION
DRILLHOLE ZT-79-2**

Scale: Vertical and horizontal - 1:1000

DRAWING M80-1472



Amoco Minerals Australia Company

DRILL LOG

HOLE No. ZT-79-2

PAGE 1 OF 5

| PROJECT ZEEHAN - TAS No. A7860 | | | | ELEVATION meters | COMMENCED 28 Nov 1979 | BORE HOLE SURVEY | | | INSTRUMENT | | | | | |
|--------------------------------|--------|---|---------------------------------------|--------------------------|----------------------------|------------------|--------|---------|------------|-----------|---------|-----------|------|---------|
| PROSPECT OCEANA VALLEY | | | | DIP COLLAR 60° GRID WEST | COMPLETED 22 Dec 1979 | Depth (m) | Dip | Bearing | Depth (m) | Dip | Bearing | Depth (m) | Dip | Bearing |
| CO-ORDINATES 3700* 1500 | | | | CORE SIZE HQ, NQ, BQ | TOTAL LENGTH 235.90 meters | 0 | 60 | - | 190 | 57 | - | | | |
| BEARING TN MN 270 GN | | | | LOGGED BY PAJONES | | 50 | 60 | - | 200 | 73 | - | | | |
| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | | | |
| From | To | | | | From | To | Length | Cu | Pb | Zn | As | Cd | Hg | |
| 0 | 25.00 | TRICONE DRILLING. Silty Dolomites. | | 21247 | 25 | 26 | 1 | 22 | 317 | 3956 | <0.5 | | | |
| | | | | 21248 | 26 | 27 | 1 | 17 | 390 | 3664 | 0.5 | | | |
| 25.00 | 40.50 | SILTY DOLOMITE - completely weathered, mottled gray olive/brown. | | 21249 | 27 | 28 | 1 | 17 | 342 | 3074 | <0.5 | | | |
| | | | | 21250 | 28 | 29 | 1 | 19 | 268 | 3405 | <0.5 | | | |
| | | | | 21251 | 29 | 30 | 1 | 16 | 148 | 3941 | <0.5 | | | |
| 40.50 | 45.00 | DOLOMITE - black, carbonaceous, silty dolomite, completely weathered. | | 21252 | 30 | 31 | 1 | 16 | 500 | 5300 | 3.6 | | | |
| | | | | 21253 | 31 | 32 | 1 | 15 | 600 | 6500 | 6.3 | | | |
| | | | | 21254 | 32 | 33 | 1 | NO | LOGS | RECOVERED | | | | |
| 45.00 | 47.00 | DOLOMITE - interbedded with silicified gray siltstone. | | 21255 | 33 | 34 | 1 | 14 | 256 | 3385 | <0.5 | | | |
| | | | | 21256 | 34 | 35 | 1 | 17 | 52 | 2178 | <0.5 | | | |
| 47.00 | 61.00 | DOLOMITE - mottled gray/black, silty fossiliferous & completely weathered, with minor silicified beds (at 60.6m) | | 21257 | 35 | 36 | 1 | 18 | 50 | 2579 | <0.5 | | | |
| | | | | 21258 | 36 | 37 | 1 | 29 | 57 | 2678 | <0.5 | | | |
| | | | | 21259 | 37 | 38 | 1 | 10 | 35 | 3490 | <0.5 | | | |
| 61.00 | 75.50 | DOLOMITE BRECCIA - Sedimentary Breccia, completely weathered, black to gray, wuggy, heavily siderite veined, Breccia fragments of silicified siltstone & dolomite zone with heavy water inflows. | | 21260 | 38 | 39 | 1 | 11 | 176 | 3793 | <0.5 | | | |
| | | | | 21261 | 39 | 40 | 1 | 15 | 125 | 2648 | <0.5 | | | |
| | | | | 21262 | 40 | 41 | 1 | 20 | 63 | 3543 | <0.5 | | | |
| | | | | 21263 | 41 | 42 | 1 | 7 | 400 | 4900 | <1.0 | | | |
| | | | | 21264 | 42 | 43 | 1 | 8 | 119 | 2704 | <0.5 | | | |
| 75.50 | 85.00 | SILTY DOLOMITE - gray olive brown, mottled, weakly siderite veined. | | 21265 | 43 | 44 | 1 | 5 | 91 | 1062 | 0.5 | | | |
| (HQ to 81.00m) | | | | 21266 | 44 | 45 | 1 | 3 | 64 | 2359 | <0.5 | | | |
| | | | | 21267 | 45 | 46 | 1 | 5 | 37 | 2414 | <0.5 | | | |
| 85.00 | 86.50 | DOLOMITE BRECCIA - black to dark gray sedimentary breccia? containing angular & sub rounded fragments. Extremely finely disseminated Pb/Zn mineralization. impossible to estimate grade. highly weathered. | Disseminated Pb-Zn 5% ?? combined. | 21268 | 46 | 47 | 1 | 4 | 40 | 3460 | <0.5 | | | |
| | | | | 21269 | 47 | 48 | 1 | 5 | 89 | 4300 | 3.1 | | | |
| | | | | 21270 | 48 | 49 | 1 | 6 | 61 | 2835 | 3.0 | | | |
| | | | | 21271 | 49 | 50 | 1 | 9 | 65 | 2150 | 2.7 | | | |
| | | | | 21272 | 50 | 51 | 1 | 6 | 62 | 3000 | 2.9 | | | |
| 86.50 | 91.60 | SILTY DOLOMITE - gray olive brown, mottled & completely weathered. | | 21273 | 51 | 52 | 1 | 5 | 500 | 5300 | 6.9 | | | |
| | | | | 21274 | 52 | 53 | 1 | 6 | 91 | 4260 | 3.0 | | | |
| | | | | 21275 | 53 | 54 | 1 | <5 | 300 | 3800 | 8.7 | | | |
| 91.60 | 92.00 | BRECCIA - gray, weathered. Contains rounded fragments of dolomite & silicified siltstones. Highly weathered. | | 21276 | 54 | 55 | 1 | 8 | 95 | 4190 | 2.6 | | | |
| | | | | 21277 | 55 | 56 | 1 | 13 | 254 | 4950 | 2.5 | | | |
| | | | | 21278 | 56 | 57 | 1 | 25 | 79 | 3910 | 2.5 | | | |
| 92.00 | 95.90 | CALCMICRITE - gray, massive, very dense, dolomitic muddy micrite? fossiliferous in part. | | 21279 | 57 | 58 | 1 | 11 | 1000 | 4200 | 8.7 | | | |
| | | | | 21280 | 58 | 59 | 1 | 6 | 800 | 6000 | 9.1 | | | |
| 95.90 | 99.10 | BRECCIA - dark gray to black, sub rounded to angular breccia, heavily mineralized with finely disseminated Pb-Zn. Fragments predominantly light gray dolomite & siltstones with minor gray to black silty dolomite. Minor siderite veinlets. Rock highly weathered & very clayey still. | Disseminated Pb-Zn | 21281 | 59 | 60 | 1 | <5 | 7400 | 3.99 | <1.0 | 204 | 9 | |
| | | | | 21282 | 60 | 61 | 1 | 6 | 2100 | 9100 | 10.8 | 53 | 2.8 | |
| | | | | 21283 | 61 | 62 | 1 | 7 | 1700 | 1.32 | 15.2 | 38 | 2.8 | |
| | | | | 21284 | 62 | 63 | 1 | 5 | 2800 | 1.08 | <1.0 | 24 | 0.5 | |
| | | | | 21285 | 63 | 64 | 1 | <5 | 2000 | 1.05 | <1.0 | 39 | 0.1 | |
| | | | | 21286 | 64 | 65 | 1 | 10 | 5400 | 3900 | 2.1 | 67 | 0.1 | |
| | | | | 21287 | 65 | 66 | 1 | 5 | 1.800 | 13.41 | 11.3 | 1240 | 0.2 | |
| | | | | 21288 | 66 | 67 | 1 | <5 | 1.26 | 5.44 | 1.5 | 638 | <0.1 | |
| 99.10 | 100.30 | CLAYSTONE - black, extremely weathered, highly mineralized disseminated Pb-Zn, minor siderite veined, and occasionally brecciated (tectonic ??). | Disseminated Pb-Zn 2-10% combined. | 21289 | 67 | 68 | 1 | 5 | 8800 | 4.82 | 2.7 | 420 | <0.1 | |
| | | | | 21290 | 68 | 69 | 1 | <5 | 1500 | 1.82 | 7.9 | 34 | <0.1 | |
| | | | | 21291 | 69 | 70 | 1 | 5 | 6800 | 3.58 | 2.2 | 148 | <0.1 | |

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Amoco Minerals Australia Company

DRILL LOG

HOLE No. ZT-79-2

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| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | | | | H ₂ O |
|----------------|--------|---|---|---------------|----------|-----|--------|--------|-------|-------|------|------|-----|--|------------------|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | Cd | Sn | | |
| 100.30 | 104.00 | IRONSTONE - clayey, highly leached but containing minor disseminated relic galena. Disseminated cerussite also present. High grade lead zone from 103.50 to 103.70 of cerussite &/or anglesite? | Disseminated PbS ₄ cerussite ≈ 5% | 21292 * | 70 | 71 | 1 | <5 | 7200 | 3.62 | 2.1 | 210 | | | 20.1 |
| | | | | 21293 * | 71 | 72 | 1 | <5 | 2800 | 2.01 | <1.0 | 56 | <5 | | 20.1 |
| | | | | 21294 * | 72 | 73 | 1 | <5 | 8700 | 3.56 | <1.0 | 312 | 10 | | 20.1 |
| | | | | 21295 * | 73 | 74 | 1 | <5 | 4900 | 3.10 | <1.0 | 202 | <5 | | 20.1 |
| | | | | 21296 * | 74 | 75 | 1 | 6 | 5600 | 3.49 | <1.0 | 274 | <5 | | 20.1 |
| | | | | 21297 * | 75 | 76 | 1 | 12 | 7600 | 3.46 | <1.0 | 248 | 10 | | 20.1 |
| 104.00 | 107.00 | MASSIVE Pb-Zn SULPHIDE - coarse grained, very weathered, with considerable clay matrix. Possible high water witness. | Massive galena & sphalerite. ≈ 25% combined PbZn | 21298 * | 76 | 77 | 1 | 6 | 5200 | 2.23 | <1.0 | 146 | 9 | | 20.1 |
| | | | | 21299 * | 77 | 78 | 1 | 10 | 3200 | 1.98 | <1.0 | 90 | <5 | | 20.1 |
| | | | | 21300 * | 78 | 79 | 1 | 10 | 1300 | 1.59 | <1.0 | 43 | 16 | | 20.1 |
| | | | | 21303 * | 79 | 80 | 1 | 9 | 3200 | 2.53 | 1.7 | 129 | <5 | | 20.1 |
| 107.00 | 111.00 | SEMI MASSIVE & OXIDISED Pb-Zn SULPHIDE - in a ferruginous, orange-yellow claystone. High grade cerussite from 107.00 to 107.30m. More cerussite from 108.60 to 108.70m. | Semi Massive galena & sphalerite. Cerussite 107.00-107.30 108.60-108.70 | 21304 * | 80 | 81 | 1 | 10 | 500 | 1.66 | 1.3 | 45 | <5 | | 20.1 |
| | | | | 21305 * | 81 | 82 | 1 | 10 | 1500 | 1.08 | 3.3 | 36 | 7 | | 20.1 |
| | | | | 21306 * | 82 | 83 | 1 | 9 | 1300 | 1.77 | <1.0 | 82 | <5 | | 20.1 |
| | | | | 21307 * | 83 | 84 | 1 | 11 | 2100 | 2.83 | 1.4 | 74 | <5 | | 20.1 |
| | | | | 21308 * | 84 | 85 | 1 | 17 | 1.12 | 4.05 | 2.7 | 554 | <5 | | 20.1 |
| 111.00 | 117.00 | MASSIVE Pb-Zn SULPHIDE - coarse grained, showing annealing textures, with minor zones of black mineralized clay. Ore quite ugly, occasionally well banded (indicating near vertical dip) and the zone making a lot of water. | Massive galena & sphalerite, banded. ≈ 20% Pb & 20% Zn. | 21309 * | 85 | 86 | 1 | 15 | 2.44 | 2.71 | 4.2 | 705 | <5 | | 20.1 |
| | | | | 21310 * | 86 | 87 | 1 | 9 | 6700 | 2.44 | <1.0 | 161 | <5 | | 20.1 |
| | | | | 21311 * | 87 | 88 | 1 | 9 | 4600 | 2.57 | 2.0 | 162 | <5 | | 20.1 |
| | | | | 21312 * | 88 | 89 | 1 | 8 | 7.00 | 2.61 | <1.0 | 205 | <5 | | 20.1 |
| | | | | 21313 * | 89 | 90 | 1 | 10 | 4900 | 1.97 | 3.8 | 104 | <5 | | 20.1 |
| | | | | 21314 * | 90 | 91 | 1 | 10 | 5000 | 1.03 | 4.6 | 96 | <5 | | 20.1 |
| 117.00 | 121.20 | CLAYSTONE - yellow orange & ferruginous with disseminated galena and cerussite. | Disseminated ga and cerussite ≈ 5% | 21315 * | 91 | 92 | 1 | 9 | 4500 | 1.83 | <1.0 | 132 | <5 | | 20.1 |
| | | | | 21316 * | 92 | 93 | 1 | 9 | 5700 | 2.98 | <1.0 | 203 | <5 | | 20.1 |
| | | | | 21317 * | 93 | 94 | 1 | 6 | 5200 | 5.95 | <1.0 | 305 | <5 | | 20.1 |
| 121.20 | 126.50 | BRECCIA - black to grey angular breccia (tectonic?) with minor silicified siltstone interbeds. Breccia weakly mineralized containing both galena/sphalerite fragments and galena disseminations. Highly mineralized zone from 126.00 to 126.50 of ≈ 15% Pb/Zn. Lot of siderite fragments in breccia as well as veining. | Disseminated Pb/Zn ≈ 5%. High grade Pb/Zn 126.00 to 126.50 ≈ 15%. | 21318 * | 94 | 95 | 1 | 7 | 6900 | 4.87 | 2.1 | 315 | <5 | | 20.1 |
| | | | | 21319 * | 95 | 96 | 1 | 11 | 1.60 | 4.08 | 2.7 | 555 | <5 | | 20.1 |
| | | | | 21320 * | 96 | 97 | 1 | 28 | 8.25 | 4.05 | 5.9 | 2360 | <5 | | 0.3 |
| | | | | 21321 * | 97 | 98 | 1 | 35 | 8.05 | 3.73 | 10.2 | 995 | 31 | | 0.4 |
| | | | | 21322 * | 98 | 99 | 1 | 83 | 10.60 | 2600 | 11.3 | 90 | 26 | | 20.1 |
| | | | | 21323 * | 99 | 100 | 1 | 86 | 14.40 | 4000 | 25.3 | 130 | 34 | | 0.2 |
| | | | | 21324 * | 100 | 101 | 1 | 89 | 2.53 | 8000 | 95.0 | 27 | 107 | | 3.8 |
| | | | | 21325 * | 101 | 102 | 1 | 77 | 1.80 | 1.02 | 11.1 | 14 | 17 | | 1.0 |
| 126.50 | 134.00 | SILTY DOLOMITE - very soft grey to olive brown, bedded and/or slumped (& brecciated) silty dolomite. Bedding indicates vertical or steeply west dipping attitudes. | | 21326 * | 102 | 103 | 1 | 204 | 2.03 | 1.06 | 13.8 | 7 | 36 | | 20.1 |
| | | | | 21327 * | 103 | 104 | 1 | 16A | 47.70 | 1.15 | 418 | 80 | 38 | | 4.0 |
| | | | | 21328 * | 104 | 105 | 1 | 450 | 24.60 | 32.60 | 404 | 2500 | 123 | | 6.0 |
| | | | | 21329 * | 105 | 106 | 1 | 521 | 41.90 | 18.00 | 450 | 1600 | 79 | | 9.0 |
| 134.00 | 173.50 | SUPERIOR DOLOMITE (SILTSTONE?) - heavily siderite veined (very coarse grained dolomite crystals), grey, crystalline, ugly and brecciated. 4% disseminated pale pink/brown sphalerite. Ground extensively broken and fractured, poor recoveries in general. 1.5m core from 154.5 to 156.00. Moderate grade Pb/Zn ≈ 5% from 151.00 to 152.00 also 166.00 to 167.00 averaging ≈ 7% combined Pb/Zn. | 151.00 - 152.00 ≈ 5% Pb/Zn 166.00 - 167.00 ≈ 7% Pb/Zn Lot of disseminated sphalerite. | 21330 * | 106 | 107 | 1 | 246 | 36.30 | 25.50 | 247 | 2050 | 137 | | 11.0 |
| | | | | 21331 * | 107 | 108 | 1 | 181 | 24.20 | 4.13 | 187 | 265 | 58 | | 3.6 |
| | | | | 21332 * | 108 | 109 | 1 | 149 | 2.51 | 7.00 | 36.4 | 16 | 26 | | 0.5 |
| | | | | 21333 * | 109 | 110 | 1 | 644 | 31.10 | 13.75 | 21.4 | 1050 | 48 | | 35.0 |
| | | | | 21334 * | 110 | 111 | 1 | 644 | 2.68 | 11.69 | 1219 | 750 | 59 | | 71.0 |
| | | | | 21335 * | 111 | 112 | 1 | 487 | 23.10 | 39.90 | 191 | 900 | 148 | | 11.0 |
| | | | | 21336 * | 112 | 113 | 1 | 405 | 41.90 | 32.10 | 242 | 2200 | 45 | | 4.6 |
| | | | | 21337 * | 113 | 114 | 1 | 241 | 43.70 | 31.30 | 252 | 2550 | 200 | | 5.8 |
| | | | | 21338 * | 114 | 115 | 1 | 494 | 47.20 | 21.40 | 339 | 1500 | 45 | | 5.2 |
| | | | | 21339 * | 115 | 116 | 1 | 488 | 47.40 | 23.50 | 458 | 1900 | 72 | | 5.1 |
| | | | | 21340 * | 116 | 117 | 1 | 313 | 56.60 | 14.90 | 524 | 1100 | 55 | | 4.1 |
| | | | | 21341 * | 117 | 118 | 1 | 159 | 18.50 | 17.80 | 61.2 | 1000 | 32 | | 12.0 |
| | | | | 21342 * | 118 | 119 | 1 | 88 | 7.75 | 5300 | 10.3 | 15 | 50 | | 0.7 |
| 176.00 | 191.00 | SILICIFIED DOLOMITE (SILTSTONE?) - coarsely crystalline dolomite with minor fine grained sections. Core extensively brecciated and broken. Heavily | | 21343 * | 119 | 120 | 1 | 115 | 5.47 | 3800 | 9.5 | 5 | 68 | | 0.2 |
| (NQ to 191.00) | | | | 21344 * | 120 | 121 | 1 | 89 | 4.63 | 3600 | 9.5 | 11 | - | | - |
| | | | | 21345 * | 121 | 122 | 1 | 55 | 13.80 | 2.93 | 36.0 | 138 | - | | - |
| | | | | 21346 * | 122 | 123 | 1 | 20 | 1.48 | 1.79 | 6.4 | 136 | - | | - |



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DRILL LOG

HOLE No.

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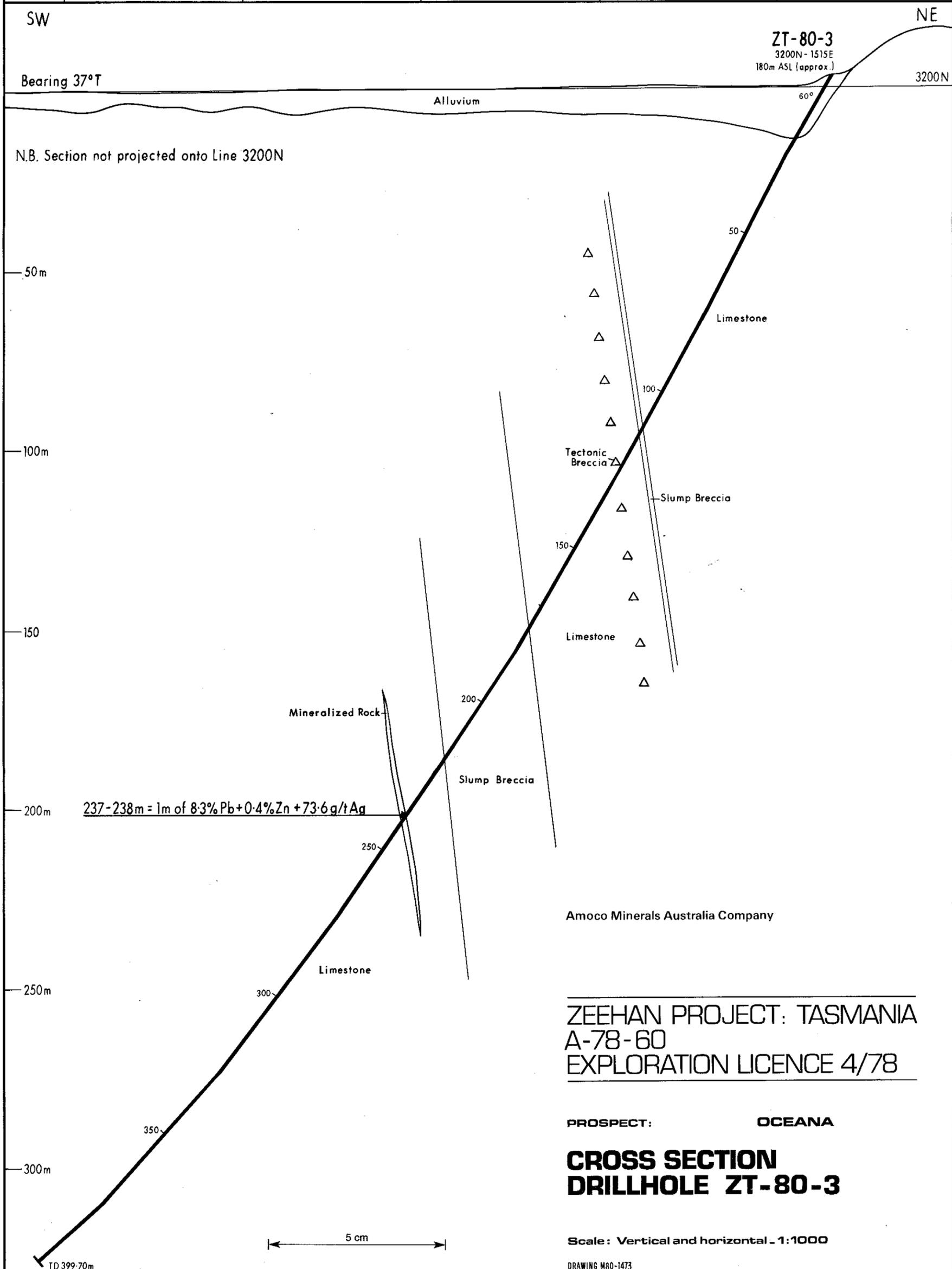
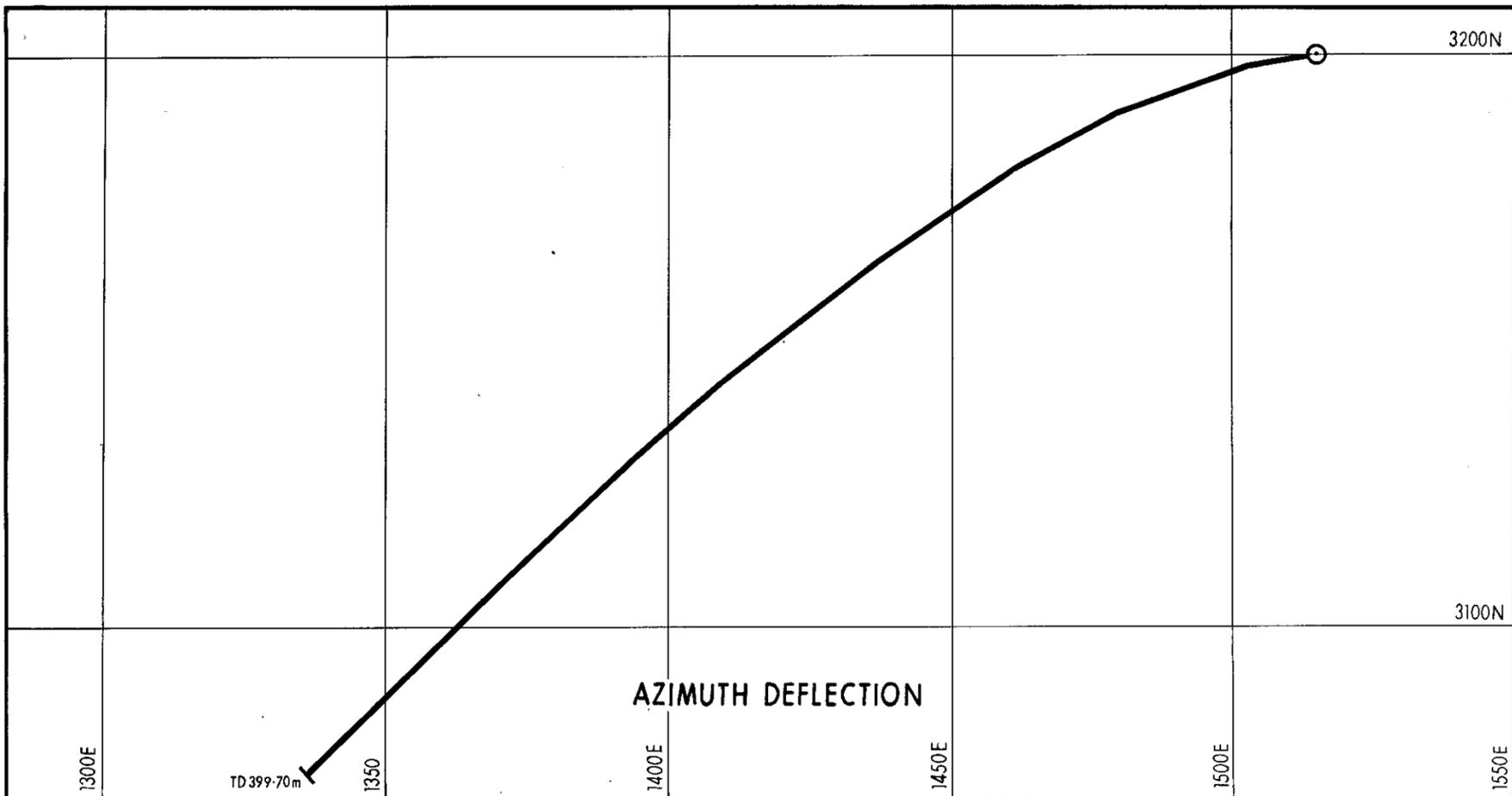
| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | |
|--------------|--------|---|--------------------------------------|---------------|----------|-----|--------|------------------|-------|------|------|-----|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | Cd |
| | cont. | siderite veined, grey with minor black dolomitic siltstone interbeds. In general poor recoveries. 185.70 to 185.80 = 15% Zn coarse grained, pale brown. | 185.70-185.80 15% Zn | 21347 | 123 | 124 | 1 | 12 | 1.26 | 1.32 | 3.2 | 113 |
| | | | | 21348 | 124 | 125 | 1 | 28 | 2.23 | 1.53 | 8.0 | 116 |
| | | | | 21349 | 125 | 126 | 1 | 17 | 1.73 | 2.80 | 4.7 | 188 |
| | | | | 21350 | 126 | 127 | 1 | 69 | 13.40 | 2.23 | 40.0 | 119 |
| 199.00 | 202.00 | BRECCIA - grey, silty dolomite breccia (slump breccia?) both rounded and sub angular fragments, minor siderite. | | 21351 | 127 | 128 | 1 | 5 | 1.24 | 2.06 | 2.7 | 118 |
| | | | | 21352 | 128 | 129 | 1 | 15 | 1.86 | 2.24 | 6.4 | 134 |
| | | | | 21353 | 129 | 130 | 1 | 10 | 0.95 | 0.96 | 1.9 | - |
| | | | | 21354 | 130 | 131 | 1 | <5 | 0.53 | 1.08 | 1.3 | - |
| 202.00 | 218.00 | SILICIFIED DOLOMITE BRECCIA - grey, in part brecciated, bedded, very intensely siderite veined and moderately mineralized. Bedding 45° to c.a. 203.50m 75% to c.a. at 202.60m. Mineralization 204.50 - 218 ~ 10% Pb/Zn combined mainly as coarse grained disseminations in sideritic zones or as thick veins or accumulations 213.00 - 218.00 cavern. | 204.50 - 218.00 ~ 10% Pb/Zn combined | 21355 | 131 | 132 | 1 | 6 | 0.42 | 1.08 | 1.6 | - |
| | | | | 21356 | 132 | 133 | 1 | 7 | 0.49 | 1.14 | 1.5 | - |
| | | | | 21357 | 132 | 134 | 1 | 7 | 0.50 | 1.24 | 2.2 | - |
| | | | | 21358 | 134 | 135 | 1 | 16 | 0.46 | 1.00 | 1.9 | - |
| | | | | 21359 | 135 | 136 | 1 | 33 | 0.38 | 1.68 | 1.9 | - |
| | | | | 21360 | 136 | 137 | 1 | 22 | 0.28 | 0.92 | 1.6 | - |
| | | | | 21361 | 137 | 138 | 1 | 12 | 3100 | 3530 | 1.9 | - |
| | | | | 21362 | 138 | 139 | 1 | <5 | 2600 | 1080 | 1.5 | - |
| 218.00 | 229.00 | SILTY DOLOMITE - grey to dark grey, slumped, intensely siderite veined from 218.00 to 21.00. Bedding indicating dip 85° E. Poor core recoveries. | | 21363 | 139 | 140 | 1 | 19 | 0.32 | 1.30 | 1.8 | - |
| | | | | 21364 | 140 | 141 | 1 | 79 | 1.75 | 360 | 8.8 | 229 |
| | | | | 21365 | 141 | 142 | 1 | 18 | 7400 | 5000 | 2.8 | - |
| | | | | 21366 | 142 | 143 | 1 | 13 | 9000 | 4900 | 4.2 | - |
| | | | | 21367 | 143 | 144 | 1 | 10 | 1.31 | 0.25 | 4.6 | - |
| 229.00 | 235.90 | SILICIFIED DOLOMITE (SILTSTONE) - intensely siderite veined, grey, crystalline, massive but intensely fractured. Very poor core recoveries. End of hole due to bad ground, no core recoveries, and casing ground. | | 21368 | 144 | 145 | 1 | <5 | 0.13 | 0.08 | 0.8 | - |
| | | | | 21369 | 145 | 146 | 1 | <5 | 2400 | 1430 | 1.3 | - |
| END OF HOLE. | | | | 21370 | 146 | 147 | 1 | <5 | 850 | 2000 | <0.5 | - |
| | | | | 21371 | 147 | 148 | 1 | 11 | 3400 | 9400 | 1.9 | - |
| | | | | 21372 | 148 | 149 | 1 | 9 | 4000 | 7300 | 2.4 | - |
| | | | | 21373 | 149 | 150 | 1 | 15 | 0.95 | 0.86 | 1.7 | - |
| | | | | 21374 | 150 | 151 | 1 | 14 | 9000 | 4740 | 5.4 | - |
| | | | | 21375 | 151 | 152 | 1 | 36 | 0.28 | 2.90 | 1.5 | - |
| | | | | 21376 | 152 | 153 | 1 | 130 | 0.57 | 2.30 | 2.7 | - |
| | | | | 21377 | 153 | 154 | 1 | 6 | 1700 | 2720 | 3.0 | - |
| | | | | 21378 | 154 | 155 | 1 | 9 | 3470 | 4860 | 3.2 | - |
| | | | | 21379 | 155 | 156 | 1 | NO CORE RECOVERY | | | | |
| | | | | 21380 | 156 | 157 | 1 | 22 | 0.22 | 0.81 | 1.1 | - |
| | | | | 21381 | 157 | 158 | 1 | 11 | 1920 | 2990 | 1.2 | - |
| | | | | 21382 | 158 | 159 | 1 | 49 | 9300 | 2.73 | 4.5 | 169 |
| | | | | 21383 | 159 | 160 | 1 | 27 | 1.76 | 6900 | 6.3 | 51 |
| | | | | 21384 | 160 | 161 | 1 | 8 | 1900 | 3800 | 1.3 | 22 |
| | | | | 21385 | 161 | 162 | 1 | 21 | 8500 | 1.02 | 2.9 | 63 |
| | | | | 21386 | 162 | 163 | 1 | 8 | 1.09 | 3400 | 3.7 | 22 |
| | | | | 21387 | 163 | 164 | 1 | 86 | 3100 | 3.47 | 2.4 | 137 |
| | | | | 21388 | 164 | 165 | 1 | NO CORE RECOVERY | | | | |
| | | | | 21389 | 165 | 166 | 1 | NO CORE RECOVERY | | | | |
| | | | | 21390 | 166 | 167 | 1 | 143 | 2.75 | 5.80 | 10.0 | 224 |
| | | | | 21391 | 167 | 168 | 1 | 22 | 0.14 | 0.94 | 1.0 | - |
| | | | | 21392 | 168 | 169 | 1 | 18 | 0.08 | 1.10 | 1.1 | - |
| | | | | 21393 | 169 | 170 | 1 | 7 | 0.09 | 0.84 | 0.6 | - |
| | | | | 21394 | 170 | 171 | 1 | 5 | 0.14 | 0.94 | 0.5 | - |
| | | | | 21395 | 171 | 172 | 1 | 12 | 0.07 | 1.10 | 0.9 | - |
| | | | | 21396 | 172 | 173 | 1 | 26 | 0.07 | 1.90 | 1.1 | - |
| | | | | 21397 | 173 | 174 | 1 | 19 | 0.25 | 0.94 | 1.4 | - |
| | | | | 21398 | 174 | 175 | 1 | 9 | 1670 | 2640 | 1.4 | - |
| | | | | 21399 | 175 | 176 | 1 | 17 | 4050 | 9700 | 2.7 | - |

DRILL LOG

HOLE No.

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| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | | | | |
|----------|----|-------------|------------------|---------------|----------|-----|--------|-------------------|-------|------|-------|-----|----|------|----|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | Co | Sn | Hg | Sb |
| | | | | 21400 | 176 | 177 | 1.00 | 16 | 4780 | 9500 | 3.0 | | | | |
| | | | | 21406 | 177 | 178 | 1.00 | 73 | 0.45 | 2.70 | 2.0 | | | | |
| | | | | 21407 | 178 | 179 | 1.00 | 10 | 1900 | 2330 | 2.6 | | | | |
| | | | | 21408 | 179 | 180 | 1.00 | 16 | 4200 | 3850 | 3.0 | | | | |
| | | | | 21409 | 180 | 181 | 1.00 | 9 | 8900 | 3520 | 4.6 | | | | |
| | | | | 21410 | 181 | 182 | 1.00 | 8 | 2940 | 2340 | 2.0 | | | | |
| | | | | 21411 | 182 | 183 | 1.00 | 10 | 2.00 | 0.19 | 4.9 | | | | |
| | | | | 21412 | 183 | 184 | 1.00 | 6 | 2360 | 2810 | 2.5 | | | | |
| | | | | 21413 | 184 | 185 | 1.00 | 28 | 3760 | 8200 | 3.7 | | | | |
| | | | | 21414 | 185 | 186 | 1.00 | 46 | 0.39 | 2.50 | 2.7 | | | | |
| | | | | 21415 | 186 | 187 | 1.00 | 8 | 3070 | 3040 | 2.4 | | | | |
| | | | | 21416 | 187 | 188 | 1.00 | 6 | 2990 | 1580 | 2.3 | | | | |
| | | | | 21417 | 188 | 189 | 1.00 | 5 | 3970 | 1560 | 3.0 | | | | |
| | | | | 21424 | 189 | 190 | 1.00 | 11 | 2230 | 3540 | 3.4 | 25 | | | |
| | | | | 21425 | 190 | 191 | 1.00 | 13 | 0.18 | 1.13 | 1.2 | 45 | | | |
| | | | | 21426 | 191 | 192 | 1.00 | 10 | 0.11 | 1.07 | 1.2 | 19 | | | |
| | | | | 21427 | 192 | 193 | 1.00 | 16 | 0.23 | 1.17 | 1.2 | 60 | | | |
| | | | | 21428 | 193 | 194 | 1.00 | 11 | 2360 | 7850 | 1.5 | 42 | | | |
| | | | | 21429 | 194 | 195 | 1.00 | 14 | 3760 | 4620 | 1.7 | 28 | | | |
| | | | | 21430 | 195 | 196 | 1.00 | 20 | 4200 | 8000 | 2.8 | 46 | | | |
| | | | | 21431 | 196 | 197 | 1.00 | 21 | 1760 | 9000 | 1.7 | 61 | | | |
| | | | | 21432 | 197 | 198 | 1.00 | 9 | 7600 | 4930 | 3.4 | 16 | | | |
| | | | | 21433 | 198 | 199 | 1.00 | NO CORE RECOVERY. | | | | | | | |
| | | | | 21434 | 199 | 200 | 1.00 | 21 | 379 | 6760 | 1.1 | <5 | | | |
| | | | | 21435 | 200 | 201 | 1.00 | 34 | 298 | 6450 | 1.0 | 6 | | | |
| | | | | 21436 | 201 | 202 | 1.00 | 16 | 210 | 5050 | <0.5 | <5 | | | |
| | | | | 21437 | 202 | 203 | 1.00 | 10 | 1160 | 4330 | 0.6 | 24 | | | |
| | | | | 21438 | 203 | 204 | 1.00 | 29 | 1340 | 7500 | 1.6 | 42 | | | |
| | | | | 21439 | 204 | 205 | 1.00 | 71 | 4.44 | 3.01 | 32.2 | 176 | 30 | 1.5 | 22 |
| | | | | 21440 | 205 | 206 | 1.00 | 64 | 17.90 | 4500 | 79.1 | 24 | <5 | 2.2 | 27 |
| | | | | 21441 | 206 | 207 | 1.00 | 43 | 5.89 | 2500 | 46.0 | 11 | 5 | 0.3 | 5 |
| | | | | 21442 | 207 | 208 | 1.00 | 7 | 1.10 | 5300 | 18.3 | 13 | 12 | <0.1 | <2 |
| | | | | 21443 | 208 | 209 | 1.00 | 36 | 20.50 | 4000 | 80.5 | 19 | 5 | 3.6 | <2 |
| | | | | 21444 | 209 | 210 | 1.00 | 52 | 34.90 | 4.91 | 301.0 | 198 | 32 | 0.9 | <2 |
| | | | | 21445 | 210 | 211 | 1.00 | 18 | 2.87 | 8800 | 22.4 | 37 | 15 | 0.5 | <2 |
| | | | | 21446 | 211 | 212 | 1.00 | 27 | 1.19 | 2.37 | 7.6 | 123 | 17 | 0.8 | <2 |
| | | | | 21447 | 212 | 213 | 1.00 | 7 | 2350 | 3850 | 0.8 | - | - | - | - |
| | | | | 21448 | 213 | 214 | 1.00 | NO CORE RECOVERY. | | | | | | | |
| | | | | 21449 | 214 | 215 | 1.00 | 15 | 5.54 | 5500 | 14.9 | 20 | 17 | 0.4 | <2 |



Amoco Minerals Australia Company

ZEEHAN PROJECT: TASMANIA
A-78-60
EXPLORATION LICENCE 4/78

PROSPECT: OCEANA

**CROSS SECTION
DRILLHOLE ZT-80-3**

Scale: Vertical and horizontal - 1:1000

DRAWING M80-1473



Amoco Minerals Australia Company

DRILL LOG

HOLE No. ZT-80-3

PAGE 2 OF 8

| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | |
|----------|--------|--|---|---------------|----------|-----|--------|--------|-----|------|------|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag |
| 87.00 | 104.00 | SOFT SEDIMENT SWAMPED LIMESTONE: dark grey calcilitic with minor interbeds of stumped black carbonaceous laminated & pyritic dolomite. Bedding 153-50m 25° to e.a. | Pink masses on foliation? plane. | 22065 | 64 | 65 | 1 | <5 | 354 | 615 | 1 |
| | | | | 22066 | 65 | 66 | 1 | <5 | 121 | 1320 | <1 |
| | | | | 22067 | 66 | 67 | 1 | <5 | 104 | 5000 | <1 |
| | | | | 22068 | 67 | 68 | 1 | <5 | 87 | 420 | <1 |
| | | | | 22069 | 68 | 69 | 1 | <5 | 64 | 155 | <1 |
| 104.00 | 110.50 | CALCULITE/DOLomite 50:50; Pyrite carbonaceous black laminar dolomites interbedded with fine grained, dark grey, crystalline, massive, calcilitic. Bedding 37° at 108m. | Bedded and disseminated fine grained pyrite. ≈ 20% of Dolomite. | 22070 | 69 | 70 | 1 | <5 | 92 | 182 | <1 |
| | | | | 22071 | 70 | 71 | 1 | <5 | 154 | 672 | <1 |
| | | | | 22072 | 71 | 72 | 1 | <5 | 85 | 1540 | <1 |
| | | | | 22073 | 72 | 73 | 1 | <5 | 81 | 417 | <1 |
| | | | | 22074 | 73 | 74 | 1 | <5 | 75 | 190 | <1 |
| | | | | 22075 | 74 | 75 | 1 | <5 | 112 | 575 | <1 |
| 110.50 | 112.50 | BRECCIA: Sedimentary breccia containing abundant rounded, colliform textured pebbles (large diameter calcites). Fragments of fissile material (subrounded) in carbonate matrix. | | 22076 | 75 | 76 | 1 | <5 | 85 | 222 | <1 |
| | | | | 22077 | 76 | 77 | 1 | <5 | 68 | 232 | <1 |
| | | | | 22078 | 77 | 78 | 1 | <5 | 64 | 234 | <1 |
| | | | | 22079 | 78 | 79 | 1 | <5 | 70 | 189 | <1 |
| | | | | 22080 | 79 | 80 | 1 | <5 | 69 | 262 | <1 |
| 112.50 | 123.00 | LIMESTONE (80:20) massive, dark grey, with shaly fossiliferous bands prominent, calcilitic interbedded with carbonaceous weakly pyritic shaly dolomites. Minor carbonate veining (calcite). Bedding 40° to e.a. at 121 metres. The fissile dolomite interbeds increase in abundance down hole. | Trace pyrite in carbonaceous dolomites. | 22081 | 80 | 81 | 1 | <5 | 88 | 405 | <1 |
| | | | | 22082 | 81 | 82 | 1 | <5 | 190 | 434 | 1 |
| | | | | 22083 | 82 | 83 | 1 | <5 | 221 | 864 | <1 |
| | | | | 22084 | 83 | 84 | 1 | <5 | 80 | 1550 | <1 |
| | | | | 22085 | 84 | 85 | 1 | <5 | 174 | 1600 | <1 |
| | | | | 22086 | 85 | 86 | 1 | <5 | 386 | 1570 | <1 |
| | | | | 22087 | 86 | 87 | 1 | <5 | 531 | 884 | <1 |
| | | | | 22088 | 87 | 88 | 1 | <5 | 353 | 882 | <1 |
| 123.00 | 128.50 | TECTONIC BRECCIA Bedded calcilitic and black carbonaceous dolomites brecciated and hosted with an inclusion of carbonate cement. Fragments very angular, poorly sorted & in general less than 5cm in length. Strong calcite veining also (perpendicular to bedding). Trace sphalerite associated with with calcite veining. Very minor galena also present generally with minor siderite. | Trace sphalerite, galena with minor siderite. | 22089 | 88 | 89 | 1 | <5 | 96 | 433 | <1 |
| | | | | 22090 | 89 | 90 | 1 | <5 | 102 | 439 | <1 |
| | | | | 21498 | 90 | 91 | 1 | <5 | 108 | 343 | <0.5 |
| | | | | 21499 | 91 | 92 | 1 | <5 | 86 | 436 | <0.5 |
| | | | | 21500 | 92 | 93 | 1 | <5 | 89 | 425 | <0.5 |
| | | | | 21951 | 93 | 94 | 1 | <5 | 98 | 383 | <0.5 |
| | | | | 21952 | 94 | 95 | 1 | <5 | 57 | 374 | <0.5 |
| | | | | 21953 | 95 | 96 | 1 | <5 | 30 | 192 | <0.5 |
| | | | | 21954 | 96 | 97 | 1 | <5 | 27 | 73 | <0.5 |
| | | | | 21955 | 97 | 98 | 1 | <5 | 23 | 34 | <0.5 |
| 128.50 | 154.00 | SWAMPED LIMESTONE: Dark grey, finely bedded, waxy calcite veined calcilitic with shaly fossiliferous beds (generally <5cm in width) interbedded with carbonated (stumped, lead coated?) black, pyritic, carbonaceous laminated dolomite. Beds are generally 1-2cm in width. Bedding 27° to e.a. at 130.50m; 25° to e.a. at 148.50m. Calcite veining 133.50m - 134.00m moderate to strong (breccia). Cavity 153.00 to 154.00 filled with black muds (NO CORE RECOVERY). | | 21956 | 98 | 99 | 1 | <5 | 21 | 26 | <0.5 |
| | | | | 21957 | 99 | 100 | 1 | <5 | 19 | 79 | <0.5 |
| | | | | 21958 | 100 | 101 | 1 | <5 | 20 | 66 | <0.5 |
| | | | | 21959 | 101 | 102 | 1 | <5 | 12 | 41 | <0.5 |
| | | | | 21960 | 102 | 103 | 1 | 5 | 9 | 22 | <0.5 |
| | | | | 21961 | 103 | 104 | 1 | <5 | 11 | 19 | <0.5 |
| | | | | 21962 | 104 | 105 | 1 | 5 | 18 | 31 | <0.5 |
| | | | | 21963 | 105 | 106 | 1 | 6 | 22 | 21 | <0.5 |
| | | | | 21964 | 106 | 107 | 1 | 5 | 30 | 22 | <0.5 |
| | | | | 21965 | 107 | 108 | 1 | 6 | 9 | 13 | <0.5 |
| | | | | 21966 | 108 | 109 | 1 | 5 | 14 | 15 | <0.5 |
| 154.00 | 157.00 | BRECCIATED LIMESTONE: Strongly calcite veined, micro faulted, brecciated & cavernous limestone with minor carbonaceous black dolomites (≈ 10%). Cavity 154.50 - 155.00 (NO CORE RECOVERY). | | 21967 | 109 | 110 | 1 | 5 | 14 | 83 | <0.5 |
| | | | | 21968 | 110 | 111 | 1 | 5 | 15 | 31 | <0.5 |
| | | | | 21969 | 111 | 112 | 1 | <5 | 17 | 54 | <0.5 |
| | | | | 21970 | 112 | 113 | 1 | <5 | 13 | 26 | <0.5 |
| | | | | 21971 | 113 | 114 | 1 | <5 | 12 | 17 | <0.5 |
| | | | | 21972 | 114 | 115 | 1 | <5 | 14 | 28 | <0.5 |
| | | | | 21973 | 115 | 116 | 1 | <5 | 12 | 37 | <0.5 |
| | | | | 21974 | 116 | 117 | 1 | <5 | 19 | 19 | <0.5 |



| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | |
|----------|--------|--|---------------------|---------------|----------|-----|--------|--------|------|-----------|------|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag |
| 159.00 | 170.20 | LIMESTONE: massive, gray interbedded fossiliferous (pisoliths, shell fragments & other debris) and non-fossiliferous calcinites, calcarenites and minor carbonaceous black dolomites. Moderate calcite veining and brecciation. Sequence rhythmically bedded. Bedding 43° to c.a. at 160.70 metres. | | 21975 | 117 | 118 | 1 | <5 | 10 | 15 | <0.5 |
| | | | | 21976 | 118 | 119 | 1 | <5 | 20 | 51 | <0.5 |
| | | | | 21977 | 119 | 120 | 1 | <5 | 50 | 212 | <0.5 |
| | | | | 21978 | 120 | 121 | 1 | <5 | 59 | 203 | <0.5 |
| | | | | 21979 | 121 | 122 | 1 | <5 | 90 | 277 | <0.5 |
| | | | | 21980 | 122 | 123 | 1 | <5 | 72 | 222 | 2.6 |
| | | | | 21981 | 123 | 124 | 1 | <5 | 31 | 70 | 2.8 |
| 170.20 | 175.90 | LIMESTONE/DOLomite: Foliated (laminated?) dark grey to black interbedded muddy calcinites and pyritic carbonaceous shaly dolomites. Minor calcite veining. Bedding 40° to c.a. at 175.50. | | 21982 | 124 | 125 | 1 | <5 | 26 | 72 | 2.4 |
| | | | | 21983 | 125 | 126 | 1 | <5 | 45 | 84 | 2.6 |
| | | | | 21984 | 126 | 127 | 1 | <5 | 43 | 103 | 2.4 |
| | | | | 21985 | 127 | 128 | 1 | 5 | 114 | 1130 | 2.3 |
| | | | | 21986 | 128 | 129 | 1 | <5 | 171 | 710 | 2.5 |
| | | | | 21987 | 129 | 130 | 1 | <5 | 102 | 620 | 2.8 |
| 175.90 | 181.10 | PIROLITHIC LIMESTONE: large pisoliths in arenaceous carbonate matrix along with fragments of colonial corals (bryozoa) possibly slumped into place, interbedded with soft sediment slumped, carbonaceous black pyritic dolomites and black calcinites & calcarenites. Minor calcite veining (coloured pink by hematite staining??). | | 21988 | 130 | 131 | 1 | <5 | 88 | 398 | 2.5 |
| | | | | 21989 | 131 | 132 | 1 | <5 | 49 | 183 | 2.4 |
| | | | | 21990 | 132 | 133 | 1 | <5 | 61 | 252 | 2.3 |
| | | | | 21991 | 133 | 134 | 1 | <5 | 408 | 1760 | 2.5 |
| | | | | 21992 | 134 | 135 | 1 | <5 | 100 | 540 | 2.4 |
| | | | | 21993 | 135 | 136 | 1 | <5 | 320 | 970 | 2.4 |
| | | | | 21994 | 136 | 137 | 1 | <5 | 79 | 378 | 2.7 |
| | | | | 21995 | 137 | 138 | 1 | <5 | 166 | 540 | 2.8 |
| 181.10 | 182.70 | SHALEY DOLOMITE: fissile and well laminated, pyritic (minor cross bedding?) and weakly calcite veined. Bedding 37° to c.a. at 181.50m. | Disseminated pyrite | 21996 | 138 | 139 | 1 | <5 | 102 | 500 | 2.8 |
| | | | | 21997 | 139 | 140 | 1 | <5 | 61 | 435 | 2.5 |
| | | | | 21998 | 140 | 141 | 1 | <5 | 35 | 110 | 2.3 |
| | | | | 21999 | 141 | 142 | 1 | <5 | 100 | 265 | 2.5 |
| 182.70 | 186.00 | SILTY DOLOMITE: laminated, massive, silty black/dark grey dolomite with thin interbeds of limestone; non-fossiliferous & grey. | | 22000 | 142 | 143 | 1 | <5 | 78 | 395 | 2.7 |
| | | | | 21508 | 143 | 144 | 1 | <5 | 28 | 71 | <0.5 |
| | | | | 21509 | 144 | 145 | 1 | <5 | 23 | 53 | <0.5 |
| | | | | 21510 | 145 | 146 | 1 | 5 | 18 | 34 | <0.5 |
| 186.00 | 218.50 | FOSSIL BRECCIA: Possibly slumped debris from reefal environment close to edge of basin. Fossil fragments include bryozoa (up to 7cm across) & other detrital colonial corals, algal balls - pisoliths, (up to 3cm in width) as well as minor shell fragments in sparry or micritic cement. Unit becomes less fossiliferous down hole with calcinites and dolomites predominant. Possibly emplaced by turbidity currents and/or slumping. Moderate calcite veining, minor brecciation 218.50m to 213.50m. Bedding 198 m - 30° to c.a. | | 21511 | 146 | 147 | 1 | <5 | 14 | 23 | <0.5 |
| | | | | 21512 | 147 | 148 | 1 | 5 | 11 | 15 | <0.5 |
| | | | | 21513 | 148 | 149 | 1 | 6 | 20 | 19 | <0.5 |
| | | | | 21514 | 149 | 150 | 1 | 6 | 17 | 14 | <0.5 |
| | | | | 21515 | 150 | 151 | 1 | 5 | 18 | 44 | <0.5 |
| | | | | 21516 | 151 | 152 | 1 | 5 | 33 | 40 | <0.5 |
| | | | | 21517 | 152 | 153 | 1 | <5 | 46 | 48 | <0.5 |
| | | | | 21518 | 153 | 154 | 1 | NO | CORE | RECOVERY. | |
| | | | | 21519 | 154 | 155 | 1 | <5 | 94 | 164 | <0.5 |
| | | | | 21520 | 155 | 156 | 1 | <5 | 24 | 109 | <0.5 |
| | | | | 21521 | 156 | 157 | 1 | <5 | 28 | 79 | <0.5 |
| | | | | 21522 | 157 | 158 | 1 | <5 | 17 | 40 | <0.5 |
| 218.50 | 235.30 | SLUMPED LIMESTONE: gray, massive, crudely bedded, micritic limestone, gradually becoming more fossiliferous towards the base of the unit (increasing shell fragments and minor coral fragments). Moderate calcite veining, very little carbonaceous dolomite present, darker, siltier matrix for limestone (foliated micrite?). Bedding 235m - 45° to c.a. | | 21523 | 158 | 159 | 1 | <5 | 18 | 22 | <0.5 |
| | | | | 21524 | 159 | 160 | 1 | <5 | 26 | 219 | <0.5 |
| | | | | 21525 | 160 | 161 | 1 | <5 | 15 | 67 | <0.5 |
| | | | | 21526 | 161 | 162 | 1 | <5 | 12 | 20 | <0.5 |
| | | | | 21527 | 162 | 163 | 1 | <5 | 12 | 15 | <0.5 |
| | | | | 21528 | 163 | 164 | 1 | <5 | 25 | 66 | <0.5 |
| | | | | 21529 | 164 | 165 | 1 | <5 | 14 | 38 | <0.5 |
| | | | | 21530 | 165 | 166 | 1 | <5 | 12 | 34 | <0.5 |
| | | | | 21531 | 166 | 167 | 1 | <5 | 11 | 11 | <0.5 |
| | | | | 21532 | 167 | 168 | 1 | <5 | 10 | 290 | <0.5 |
| | | | | 21533 | 168 | 169 | 1 | <5 | 12 | 55 | <0.5 |
| | | | | 21534 | 169 | 170 | 1 | 7 | 18 | 22 | <0.5 |



Amoco Minerals Australia Company

031046

DRILL LOG

HOLE No. ZT-80-3

PAGE 4 OF 8

| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | |
|----------|--------|---|---|-----------------------------------|----------|-----|--------|--------|------|------|------|
| From | To | | | | From | To | Length | Ca | Pb | Zn | Ag |
| 235.30 | 238.20 | FOSSILIFEROUS LIMESTONE / DOLOMITE BRECCIA. Highly brecciated (tectonic?), calcite veined, mineralized interbedded limestone and dolomite. Vein like galena mineralization in siderite/calcite gangue. Core very broken, Recovery 80% | 5-7% Galena from 237-238m in siderite gangue | 21535 | 170 | 171 | 1 | 5 | 10 | 20 | <0.5 |
| | | | | 21536 | 171 | 172 | 1 | 7 | 14 | 13 | <0.5 |
| | | | | 21537 | 172 | 173 | 1 | 9 | 12 | 15 | <0.5 |
| | | | | 21538 | 173 | 174 | 1 | 5 | 11 | 16 | <0.5 |
| | | | | 21539 | 174 | 175 | 1 | 5 | 13 | 58 | <0.5 |
| | | | | 21540 | 175 | 176 | 1 | 5 | 20 | 4 | <0.5 |
| 238.20 | 239.50 | BEDDED DOLOMITE / LIMESTONE. Well bedded, finely laminar black dolomite and dark grey laminated limestone. Bedding 65° to ca 239.30m. Calcite veining perpendicular to bedding. Veining weak to moderate and increasing down hole. | | 21541 | 176 | 177 | 1 | <5 | 19 | 24 | <0.5 |
| | | | 21542 | 177 | 178 | 1 | <5 | 18 | 16 | <0.5 | |
| | | | 21543 | 178 | 179 | 1 | <5 | 24 | 4 | <0.5 | |
| | | | 21544 | 179 | 180 | 1 | <5 | 22 | 8 | <0.5 | |
| | | | 21545 | 180 | 181 | 1 | 7 | 22 | 9 | <0.5 | |
| | | | 21546 | 181 | 182 | 1 | 7 | 17 | 10 | <0.5 | |
| 239.50 | 280.00 | INTERBEDDED LIMESTONE / DOLOMITE. Generally massive, stumped, grey limestone grading down hole, into an interbedded sequence of limestone & dolomite. Fine appear to be rhythmically bedded. Fossil content (mainly shelly debris) increasing down hole. Minor zone of breccias (breccias < 5cm wide with calcite cement). Bed of light grey calcarenite from 270.50m to 281.40 (Massive or very fossiliferous). Graded bedding in the rhythmic sequence indicates sequence right way up. Bedding 40° to ca at 262m; 45° to ca at 278m 35° to ca at 278m. Very little calcite veining present in latter part of unit. Moderate to strong 237.50 to 247.50m. Dolomite (very dark & possibly silty) near the base of the unit is approximately 40% of the total volume. Rock from 276 to 279.50 possibly stumped (very blocky) containing rounded & sub angular fragments in laminar (coarsely) sequence. | | 21547 | 182 | 183 | 1 | <5 | 14 | 10 | <0.5 |
| | | | 21548 | 183 | 184 | 1 | <5 | 21 | 19 | <0.5 | |
| | | | 21549 | 184 | 185 | 1 | 5 | 9 | 11 | <0.5 | |
| | | | 21550 | 185 | 186 | 1 | 5 | 15 | 4 | <0.5 | |
| | | | 21551 | 186 | 187 | 1 | <5 | 12 | 11 | <0.5 | |
| | | | 21552 | 187 | 188 | 1 | <5 | 16 | 9 | <0.5 | |
| | | | 21553 | 188 | 189 | 1 | <5 | <5 | 11 | <0.5 | |
| | | | 21554 | 189 | 190 | 1 | 9 | <5 | 7 | <0.5 | |
| | | | 21555 | 190 | 191 | 1 | 7 | 12 | 5 | <0.5 | |
| | | | 21556 | 191 | 192 | 1 | 5 | 14 | 7 | <0.5 | |
| | | | 21557 | 192 | 193 | 1 | <5 | 13 | <5 | <0.5 | |
| | | | 21558 | 193 | 194 | 1 | <5 | 10 | 9 | <0.5 | |
| | | | 21559 | 194 | 195 | 1 | 6 | 14 | 10 | <0.5 | |
| | | | 21560 | 195 | 196 | 1 | <5 | 12 | 10 | <0.5 | |
| | | | 21561 | 196 | 197 | 1 | <5 | 9 | 9 | <0.5 | |
| | | | 21562 | 197 | 198 | 1 | <5 | 12 | 7 | <0.5 | |
| | | | 21563 | 198 | 199 | 1 | <5 | <5 | 9 | <0.5 | |
| | | | 21564 | 199 | 200 | 1 | <5 | <5 | <5 | <0.5 | |
| | | | 21565 | 200 | 201 | 1 | <5 | 11 | 36 | <0.5 | |
| 280.00 | 283.40 | | LIMESTONE: white to light grey, calcarenite containing pyritic veinlets parallel to grade bedding (generally veinlets < 2mm in width). Shell fragments in limestone as well as pisolites and shells. Unit becomes fossil breccia near the base. | Veinlet pyrite, veins < 2mm width | 21566 | 201 | 202 | 1 | <5 | 14 | 46 |
| | | 21567 | | | 202 | 203 | 1 | <5 | 11 | 18 | <0.5 |
| | | 21568 | | | 203 | 204 | 1 | <5 | <5 | 30 | <0.5 |
| | | 21569 | | | 204 | 205 | 1 | <5 | <5 | 13 | <0.5 |
| | | 21570 | | | 205 | 206 | 1 | <5 | 14 | 40 | <0.5 |
| | | 21571 | | | 206 | 207 | 1 | <5 | 26 | 25 | <0.5 |
| 283.40 | 286.50 | SHALY DOLOMITE: Fossil shaly dolomites, dark grey to black, brecciated, moderately calcite veined, moderately pyritic 2-3% as disseminations with coarse blebs present in minor amounts. Minor grey limestone present as thin interbeds. Bedding 40° to ca at 284.50m. | 2-3% pyrite disseminated in Dolomite | 21572 | 207 | 208 | 1 | <5 | 9 | 10 | <0.5 |
| | | | | 21573 | 208 | 209 | 1 | <5 | 10 | 10 | <0.5 |
| | | | | 21574 | 209 | 210 | 1 | <5 | 9 | 17 | <0.5 |
| | | | | 21575 | 210 | 211 | 1 | <5 | 10 | 21 | <0.5 |
| | | | | 21642 | 211 | 212 | 1 | <5 | 39 | 22 | <0.5 |
| | | | | 21643 | 212 | 213 | 1 | <5 | 30 | 81 | <0.5 |
| | | 21644 | 213 | 214 | 1 | <5 | 46 | 28 | <0.5 | | |
| 286.50 | 292.80 | LIMESTONE: Predominantly (≈ 75%) crudely bedded, soft sediment stumped (lead coated?), grey, massive limestone with thin (< 5cm) interbeds of black carbonaceous pyritic dolomite limestone has minor fossil debris (shells). Minor calcite veining and very minor pyritic blebs present. Bedding 45° to ca at 289.50m. Cavity 290m to 291m. | | 21645 | 214 | 215 | 1 | <5 | 51 | 66 | <0.5 |
| | | | 21646 | 215 | 216 | 1 | <5 | 42 | 47 | <0.5 | |
| | | | 21647 | 216 | 217 | 1 | <5 | 38 | 26 | <0.5 | |
| | | | 21648 | 217 | 218 | 1 | <5 | 46 | 161 | <0.5 | |
| | | | 21649 | 218 | 219 | 1 | <5 | 59 | 223 | <0.5 | |
| | | | 21650 | 219 | 220 | 1 | <5 | 209 | 292 | <0.5 | |
| | | | 21651 | 220 | 221 | 1 | <5 | 74 | 184 | <0.5 | |
| | | | 21652 | 221 | 222 | 1 | <5 | 43 | 42 | <0.5 | |
| | | 21653 | 222 | 223 | 1 | <5 | 51 | 142 | <0.5 | | |



Amoco Minerals Australia Company

DRILL LOG

HOLE No. ZT-80-3

PAGE 5 OF 8

| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | Length | ASSAYS | | | |
|----------|--------|--|---------------------------------|---------------|----------|-----|--------|--------|------|------|------|
| From | To | | | | From | To | | Ca | Pb | Zn | As |
| 292.80 | 295.00 | SOFT SEDIMENT SLUMPED LIMESTONE: Porous friable limestone, grey-brown in colour with part of the carbonate matrix dissolved giving arenaceous (pervasive) texture. Weakly pyritic, moderately calcite veined, minor brecciation. Cox badly broken with recesses approximating 85%. | trace pyrite | 21654 | 223 | 224 | 1 | <5 | 55 | 217 | <0.5 |
| | | | | 21655 | 224 | 225 | 1 | <5 | 45 | 102 | <0.5 |
| | | | | 21576 | 225 | 226 | 1 | <5 | 54 | 70 | <0.5 |
| | | | | 21577 | 226 | 227 | 1 | <5 | 43 | 52 | <0.5 |
| | | | | 21578 | 227 | 228 | 1 | <5 | 40 | 29 | <0.5 |
| | | | | 21579 | 228 | 229 | 1 | <5 | 42 | 53 | <0.5 |
| | | | | 21580 | 229 | 230 | 1 | <5 | 34 | 55 | <0.5 |
| 295.00 | 317.20 | BEDDED DOLOMITE: Black, very laminar, carbonaceous, moderately pyritic dolomite interbedded with dark grey, coarsely laminar (load casted?) massive muddy limestone. Minor calcite veining. Sections of core consisting entirely of shelly debris and pisolites in a micritic matrix. Minor sedimentary breccias generally < 5cm width. Bedding 42° to cc at 298.00m and 46° at 317m. | Minor pyrite | 21656 | 230 | 231 | 1 | <5 | 30 | 14 | <0.5 |
| | | | | 21657 | 231 | 232 | 1 | <5 | 33 | 41 | <0.5 |
| | | | | 21658 | 232 | 233 | 1 | <5 | 35 | 35 | <0.5 |
| | | | | 21659 | 233 | 234 | 1 | <5 | 57 | 156 | <0.5 |
| | | | | 21660 | 234 | 235 | 1 | <5 | 78 | 258 | <0.5 |
| | | | | 21661 | 235 | 236 | 1 | <5 | 114 | 314 | <0.5 |
| | | | | 21662 | 236 | 237 | 1 | <5 | 211 | 273 | <0.5 |
| | | | | 21663 | 237 | 238 | 1 | 20 | 8.25 | 3900 | 73.6 |
| | | | | 21664 | 238 | 239 | 1 | 8 | 200 | 399 | <0.5 |
| | | | | 21665 | 239 | 240 | 1 | <5 | 115 | 304 | <0.5 |
| 317.20 | 318.00 | CALCARENITE: white, massive crystalline calcarenite | | 21666 | 240 | 241 | 1 | <5 | 207 | 617 | <0.5 |
| START | 30.00 | ing at 322.50 metres. | | 21667 | 241 | 242 | 1 | <5 | 74 | 164 | <0.5 |
| 318.00 | 334.50 | SOFT SEDIMENT SLUMPED LIMESTONE: grey, massive, weakly calcite veined calcitite with thin interbeds of dark grey dolomite. Bedding 45° to c.a at 329m. Calcitite contains numerous thin horizons of fossil debris (broken shells of corals etc). Large calcite vein 325.60 - 325.95. Pygmatically folded, black carbonaceous rock present in minor amounts generally approximating an attitude perpendicular to bedding. | | 21668 | 242 | 243 | 1 | <5 | 44 | 88 | <0.5 |
| | | | 21669 | 243 | 244 | 1 | <5 | 130 | 450 | <0.5 | |
| | | | 21670 | 244 | 245 | 1 | <5 | 105 | 207 | <0.5 | |
| | | | 21671 | 245 | 246 | 1 | | | | | |
| | | | | | 246 | 247 | 1 | | | | |
| | | | | | 247 | 248 | 1 | | | | |
| | | | | | 248 | 249 | 1 | | | | |
| | | | | | 249 | 250 | 1 | | | | |
| | | | | | 250 | 251 | 1 | | | | |
| | | | | | 251 | 252 | 1 | | | | |
| 334.50 | 355.50 | LIMESTONE / DOLOMITE (60:40): Dark grey weakly laminated, fossiliferous in part, calcarenite and calcitite interbedded with black, very laminar, carbonaceous, very pyritic (disconformable and bedded) shaly dolomite. Rock foliated? Weakly calcite veined, load casted. Minor sedimentary structures observed; flame structures, graded bedding. Carbonaceous calcite vein with slight brecciation 349m. | Disseminated & bedded pyrite 2% | 252 | 253 | 254 | 1 | | | | |
| | | | | 253 | 254 | 255 | 1 | | | | |
| | | | | 254 | 255 | 256 | 1 | | | | |
| | | | | 255 | 256 | 257 | 1 | | | | |
| | | | | 256 | 257 | 258 | 1 | | | | |
| | | | | 257 | 258 | 259 | 1 | | | | |
| | | | | 258 | 259 | 260 | 1 | | | | |
| | | | | 259 | 260 | 261 | 1 | | | | |
| | | | | 260 | 261 | 262 | 1 | | | | |
| | | | | 261 | 262 | 263 | 1 | | | | |
| 355.50 | 386.10 | MUDDY LIMESTONE: dark grey to black massive (weakly foliated?) moderately to weakly fossiliferous load casted calcitite with rare interbeds of black dolomite (generally < 2cm thick). Minor calcite veining. Becoming more foliated and possibly shalyer down hole. Bedding 55° to cc at 356m; 50° to cc at 375m. | | 262 | 263 | 264 | 1 | | | | |
| | | | 263 | 264 | 265 | 1 | | | | | |
| | | | 264 | 265 | 266 | 1 | | | | | |
| | | | 265 | 266 | 267 | 1 | | | | | |
| | | | 266 | 267 | 268 | 1 | | | | | |
| | | | 267 | 268 | 269 | 1 | | | | | |
| | | | 268 | 269 | 270 | 1 | | | | | |
| | | | 269 | 270 | 271 | 1 | | | | | |
| | | | 270 | 271 | 272 | 1 | | | | | |
| | | | 271 | 272 | 273 | 1 | | | | | |
| 386.10 | 387.40 | BRECCIA. Tectonic angular breccia with calcite and dolomite fragments in a calcite carbonaceous cement. | | 272 | 273 | 274 | 1 | | | | |
| | | | 273 | 274 | 275 | 1 | | | | | |
| | | | 274 | 275 | 276 | 1 | | | | | |
| | | | 275 | 276 | 277 | 1 | | | | | |
| | | | 276 | 277 | 278 | 1 | | | | | |



Amoco Minerals Australia Company

031049

DRILL LOG

HOLE No. ZT-80-3

PAGE 7 OF 8

| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | | | |
|----------|----|-------------|------------------|---------------|----------|-----|--------|--------|--|--|--|--|--|--|
| From | To | | | | From | To | Length | | | | | | | |
| | | | | | 329 | 330 | / | | | | | | | |
| | | | | | 330 | 331 | / | | | | | | | |
| | | | | | 331 | 332 | / | | | | | | | |
| | | | | | 332 | 333 | / | | | | | | | |
| | | | | | 333 | 334 | / | | | | | | | |
| | | | | | 334 | 335 | / | | | | | | | |
| | | | | | 335 | 336 | / | | | | | | | |
| | | | | | 336 | 337 | / | | | | | | | |
| | | | | | 337 | 338 | / | | | | | | | |
| | | | | | 338 | 339 | / | | | | | | | |
| | | | | | 339 | 340 | / | | | | | | | |
| | | | | | 340 | 341 | / | | | | | | | |
| | | | | | 341 | 342 | / | | | | | | | |
| | | | | | 342 | 343 | / | | | | | | | |
| | | | | | 343 | 344 | / | | | | | | | |
| | | | | | 344 | 345 | / | | | | | | | |
| | | | | | 345 | 346 | / | | | | | | | |
| | | | | | 346 | 347 | / | | | | | | | |
| | | | | | 347 | 348 | / | | | | | | | |
| | | | | | 348 | 349 | / | | | | | | | |
| | | | | | 349 | 350 | / | | | | | | | |
| | | | | | 350 | 351 | / | | | | | | | |
| | | | | | 351 | 352 | / | | | | | | | |
| | | | | | 352 | 353 | / | | | | | | | |
| | | | | | 353 | 354 | / | | | | | | | |
| | | | | | 354 | 355 | / | | | | | | | |
| | | | | | 355 | 356 | / | | | | | | | |
| | | | | | 356 | 357 | / | | | | | | | |
| | | | | | 357 | 358 | / | | | | | | | |
| | | | | | 358 | 359 | / | | | | | | | |
| | | | | | 359 | 360 | / | | | | | | | |
| | | | | | 360 | 361 | / | | | | | | | |
| | | | | | 361 | 362 | / | | | | | | | |
| | | | | | 362 | 363 | / | | | | | | | |
| | | | | | 363 | 364 | / | | | | | | | |
| | | | | | 364 | 365 | / | | | | | | | |
| | | | | | 365 | 366 | / | | | | | | | |
| | | | | | 366 | 367 | / | | | | | | | |
| | | | | | 367 | 368 | / | | | | | | | |
| | | | | | 368 | 369 | / | | | | | | | |
| | | | | | 369 | 370 | / | | | | | | | |
| | | | | | 370 | 371 | / | | | | | | | |
| | | | | | 371 | 372 | / | | | | | | | |
| | | | | | 372 | 373 | / | | | | | | | |
| | | | | | 373 | 374 | / | | | | | | | |
| | | | | | 374 | 375 | / | | | | | | | |
| | | | | | 375 | 376 | / | | | | | | | |
| | | | | | 376 | 377 | / | | | | | | | |
| | | | | | 377 | 378 | / | | | | | | | |
| | | | | | 378 | 379 | / | | | | | | | |
| | | | | | 379 | 380 | / | | | | | | | |
| | | | | | 380 | 381 | / | | | | | | | |
| | | | | | 381 | 382 | / | | | | | | | |



Amoco Minerals Australia Company

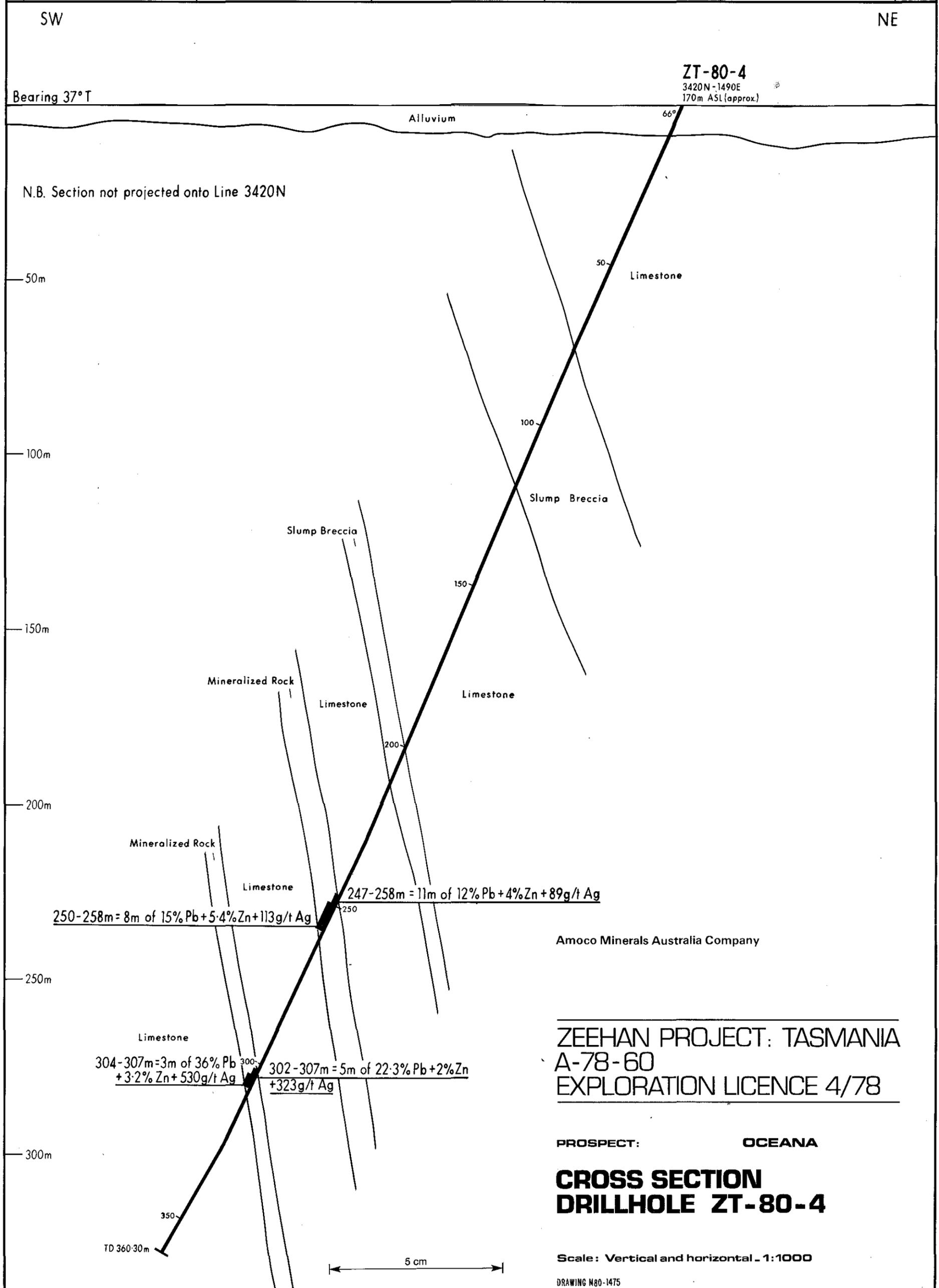
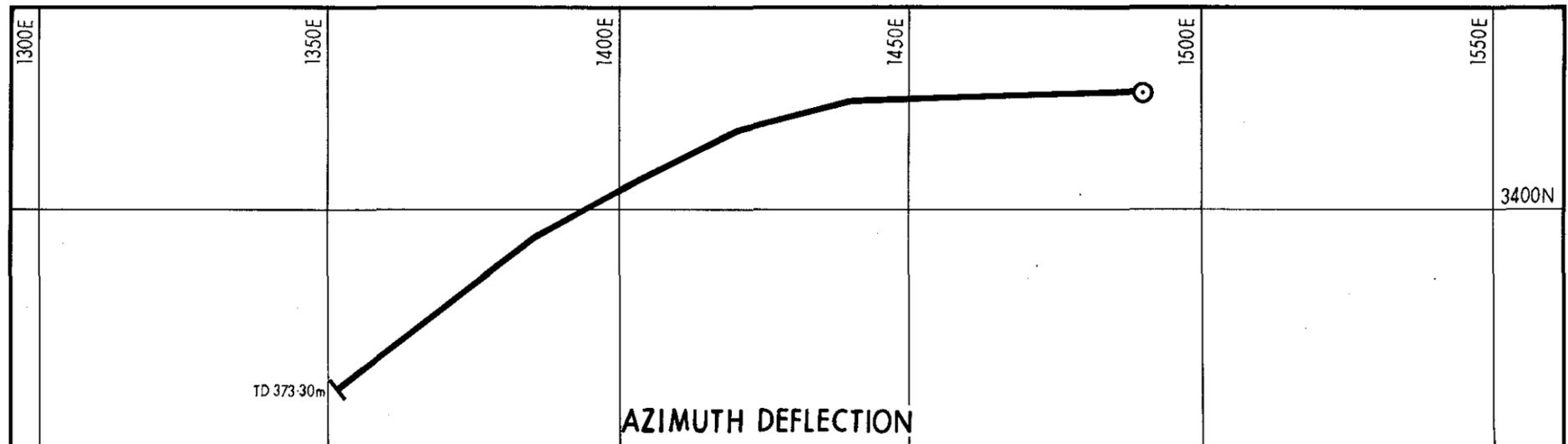
031050

DRILL LOG

HOLE No. ZT-80-3

PAGE 5 OF 8

| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | | | |
|----------|----|-------------|------------------|---------------|----------|-----|--------|--------|----|----|----|--|--|--|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | | | |
| | | | | | 382 | 383 | 1 | | | | | | | |
| | | | | | 383 | 384 | 1 | | | | | | | |
| | | | | | 384 | 385 | 1 | | | | | | | |
| | | | | | 385 | 386 | 1 | | | | | | | |
| | | | | | 386 | 387 | 1 | | | | | | | |
| | | | | | 387 | 388 | 1 | | | | | | | |
| | | | | | 388 | 389 | 1 | | | | | | | |
| | | | | | 389 | 390 | 1 | | | | | | | |
| | | | | | 390 | 391 | 1 | | | | | | | |
| | | | | | 391 | 392 | 1 | | | | | | | |
| | | | | | 392 | 393 | 1 | | | | | | | |
| | | | | | 393 | 394 | 1 | | | | | | | |
| | | | | | 394 | 395 | 1 | | | | | | | |
| | | | | | 395 | 396 | 1 | | | | | | | |
| | | | | | 396 | 397 | 1 | | | | | | | |
| | | | | | 397 | 398 | 1 | | | | | | | |
| | | | | | 398 | 399 | 1 | | | | | | | |
| | | | | | 399 | 400 | 1 | | | | | | | |





| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | |
|----------|--------|--|--|---------------|----------|-----|--------|--------|----|----|----|--|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | |
| 250.50 | 254.00 | SEMI-MASSIVE SIDERITE / GALNA / SPHALERITE MINERALIZATION. Brecciated fragments of grey calcilites? in yellow-green siderite / ankerite breccia (matrix to mineralization). Mineralization very irregular with very high grade sections of core interspersed throughout low grade zones. Approx. 15% Pb 5% Zn. Veinlets and blebs of massive. Core extensively broken - but good recoveries. | Approximately 15% Pb and 5% Zn. | | 160 | 161 | 1 | | | | | |
| | | | | | 161 | 162 | 1 | | | | | |
| | | | | | 162 | 163 | 1 | | | | | |
| | | | | | 163 | 164 | 1 | | | | | |
| | | | | | 164 | 165 | 1 | | | | | |
| | | | | | 165 | 166 | 1 | | | | | |
| | | | | | 166 | 167 | 1 | | | | | |
| | | | | | 167 | 168 | 1 | | | | | |
| | | | | | 168 | 169 | 1 | | | | | |
| | | | | | 169 | 170 | 1 | | | | | |
| 254.00 | 258.50 | BRECCIA: Mineralized siderite/ankerite yellow green breccia grading approximately 5% Pb/Zn. | 5% Pb/Zn as disseminations and veinlets. | | 170 | 171 | 1 | | | | | |
| | | | | | 171 | 172 | 1 | | | | | |
| | | | | | 172 | 173 | 1 | | | | | |
| 258.50 | 274.00 | CALCULITE: grey brecciated, moderately to strongly calcite veined, lead coated, massive calcilitite. Minor finely disseminated sphalerite. 261.90 to 262.10 calcite breccia; large twinned calcite crystals with 7% pyrite as fine grained disseminations. | minor sphalerite as disseminations. | | 173 | 174 | 1 | | | | | |
| | | | | | 174 | 175 | 1 | | | | | |
| | | | | | 175 | 176 | 1 | | | | | |
| | | | | | 176 | 177 | 1 | | | | | |
| | | | | | 177 | 178 | 1 | | | | | |
| | | | | | 178 | 179 | 1 | | | | | |
| 274.00 | 280.00 | TECTONIC BRECCIA: with calcite cement, fragments comprised of very angular pieces of calcilitites. | | | 179 | 180 | 1 | | | | | |
| | | | | | 180 | 181 | 1 | | | | | |
| | | | | | 181 | 182 | 1 | | | | | |
| | | | | | 182 | 183 | 1 | | | | | |
| | | | | | 183 | 184 | 1 | | | | | |
| | | | | | 184 | 185 | 1 | | | | | |
| | | | | | 185 | 186 | 1 | | | | | |
| | | | | | 186 | 187 | 1 | | | | | |
| | | | | | 187 | 188 | 1 | | | | | |
| | | | | | 188 | 189 | 1 | | | | | |
| 280.00 | 288.20 | SEDIMENTARY BRECCIA: large and small limestone fragments, fossil debris (oolites, pisolites & minor coral fragments) with moderate calcite veining. Fragments generally subrounded - slump brecciated. | | | 189 | 190 | 1 | | | | | |
| | | | | | 190 | 191 | 1 | | | | | |
| | | | | | 191 | 192 | 1 | | | | | |
| | | | | | 192 | 193 | 1 | | | | | |
| | | | | | 193 | 194 | 1 | | | | | |
| | | | | | 194 | 195 | 1 | | | | | |
| | | | | | 195 | 196 | 1 | | | | | |
| | | | | | 196 | 197 | 1 | | | | | |
| | | | | | 197 | 198 | 1 | | | | | |
| | | | | | 198 | 199 | 1 | | | | | |
| 288.20 | 291.10 | BRECCIA: yellow-green, siderite/ankerite weakly mineralized breccia. 1-2% Pb/Zn mineralization as disseminations. Minor vugs present, generally siderite lined. | 1-2% Pb/Zn mineralization as disseminations. | | 199 | 200 | 1 | | | | | |
| | | | | | 200 | 201 | 1 | | | | | |
| | | | | | 201 | 202 | 1 | | | | | |
| | | | | | 202 | 203 | 1 | | | | | |
| | | | | | 203 | 204 | 1 | | | | | |
| | | | | | 204 | 205 | 1 | | | | | |
| | | | | | 205 | 206 | 1 | | | | | |
| | | | | | 206 | 207 | 1 | | | | | |
| | | | | | 207 | 208 | 1 | | | | | |
| | | | | | 208 | 209 | 1 | | | | | |
| 291.10 | 294.00 | BRECCIATED LIMESTONE: Calcite/siderite veined, grey, brecciated fossiliferous limestone. Minor, dark grey interbeds of silty, carbonaceous dolomite. Minor disseminated sphalerite. | Disseminated minor sphalerite. | | 209 | 210 | 1 | | | | | |
| | | | | | 210 | 211 | 1 | | | | | |
| | | | | | 211 | 212 | 1 | | | | | |
| | | | | | 212 | 213 | 1 | | | | | |
| | | | | | 213 | 214 | 1 | | | | | |
| | | | | | 214 | 215 | 1 | | | | | |
| | | | | | 215 | 216 | 1 | | | | | |
| | | | | | 216 | 217 | 1 | | | | | |
| | | | | | 217 | 218 | 1 | | | | | |
| | | | | | 218 | 219 | 1 | | | | | |
| 294.00 | 297.80 | BRECCIA: weakly Pb/Zn mineralized, yellow green, massive siderite/ankerite breccia. ~2% Pb/Zn. Possible fine spy inclusions with galena in siderite lined vugs? | 2% Pb/Zn as disseminations. | | 219 | 220 | 1 | | | | | |
| | | | | | 220 | 221 | 1 | | | | | |
| | | | | | 221 | 222 | 1 | | | | | |
| | | | | | 222 | 223 | 1 | | | | | |
| | | | | | 223 | 224 | 1 | | | | | |
| | | | | | 224 | 225 | 1 | | | | | |
| | | | | | 225 | 226 | 1 | | | | | |
| | | | | | 226 | 227 | 1 | | | | | |
| | | | | | 227 | 228 | 1 | | | | | |
| | | | | | 228 | 229 | 1 | | | | | |
| 297.80 | 298.80 | LIMESTONE: lead coated?, interbedded limestone and and dark grey silty siderite veined dolomite. | | | 229 | 230 | 1 | | | | | |
| | | | | | 230 | 231 | 1 | | | | | |
| | | | | | 231 | 232 | 1 | | | | | |
| | | | | | 232 | 233 | 1 | | | | | |
| | | | | | 233 | 234 | 1 | | | | | |
| | | | | | 234 | 235 | 1 | | | | | |
| | | | | | 235 | 236 | 1 | | | | | |
| | | | | | 236 | 237 | 1 | | | | | |
| | | | | | 237 | 238 | 1 | | | | | |
| | | | | | 238 | 239 | 1 | | | | | |



| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | |
|----------|--------|--|------------------|---------------|----------|-----|--------|--------|-------|------|--------|--|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | |
| 355.00 | 358.80 | LIMESTONE: light grey, massive, non fossiliferous, sandy calcarenite (foliated?). Moderately calcite veined, minor brecciation. | | 21620 | 266 | 267 | / | | | | | |
| | | | | 21621 | 267 | 268 | / | | | | | |
| | | | | 21622 | 268 | 269 | / | | | | | |
| | | | | 21623 | 269 | 270 | / | | | | | |
| 358.80 | 360.30 | Fossiliferous LIMESTONE: light grey, very fossiliferous, massive limestone with minor thin interbeds of black disturbed dolomite. Rock moderately calcite veined. Lot of oolitic fossil debris and possible stromatolites (concolute textured concretionary growth). Cavity 359.80 - 360.20 m. | | 21624 | 270 | 271 | / | | | | | |
| | | | | 21625 | 271 | 272 | / | | | | | |
| | | | | 21626 | 272 | 273 | / | | | | | |
| | | | | 21627 | 273 | 274 | / | | | | | |
| | | | | 21628 | 274 | 275 | / | | | | | |
| | | | | 21629 | 275 | 276 | / | | | | | |
| | | | | 21630 | 276 | 277 | / | | | | | |
| END OF | HOLE | 360.30 metres. | | 21631 | 277 | 278 | / | | | | | |
| | | | | 21632 | 278 | 279 | / | | | | | |
| | | | | 21633 | 279 | 280 | / | | | | | |
| | | * Hole making water. | | 21634 | 280 | 281 | / | | | | | |
| | | | | 21635 | 281 | 282 | / | | | | | |
| | | | | 21636 | 282 | 283 | / | | | | | |
| | | | | 21637 | 283 | 284 | / | | | | | |
| | | | | 21638 | 284 | 285 | / | | | | | |
| | | | | 21639 | 285 | 286 | / | | | | | |
| | | | | 21640 | 286 | 287 | / | | | | | |
| | | | | 21641 | 287 | 288 | / | | | | | |
| | | | | 21593 | 288 | 289 | / | 4 | 7410 | 919 | 4.3 | |
| | | | | 21594 | 289 | 290 | / | 11 | 1-19 | 0-08 | 9.2 | |
| | | | | 21595 | 290 | 291 | / | 21 | 1-38 | 0-18 | 11.9 | |
| | | | | 21596 | 291 | 292 | / | 5 | 4930 | 982 | 3.2 | |
| | | | | 21597 | 292 | 293 | / | 4 | 1030 | 1568 | 0.8 | |
| | | | | 21598 | 293 | 294 | / | 3 | 830 | 546 | 0.7 | |
| | | | | 21599 | 294 | 295 | / | 9 | 6240 | 1250 | 5.2 | |
| | | | | 21600 | 295 | 296 | / | 17 | 7400 | 4490 | 6.2 | |
| | | | | 21601 | 296 | 297 | / | 35 | 1-81 | 0-15 | 20.7 | |
| | | | | 21602 | 297 | 298 | / | 25 | 1-48 | 0-25 | 14.8 | |
| | | | | 21603 | 298 | 299 | / | 6 | 2440 | 4540 | 2.5 | |
| | | | | 21604 | 299 | 300 | / | 14 | 1-82 | 0-23 | 13.0 | |
| | | | | 21605 | 300 | 301 | / | 10 | 2510 | 584 | 3.1 | |
| | | | | 21606 | 301 | 302 | / | 7 | 2240 | 941 | 2.6 | |
| | | | | 21607 | 302 | 303 | / | 19 | 1-32 | 0-14 | 11.4 | |
| | | | | 21608 | 303 | 304 | / | 17 | 2-18 | 0-11 | 15.7 | |
| | | | | 21609 | 304 | 305 | / | 42 | 12-90 | 0-47 | 72.0 | |
| | | | | 21610 | 305 | 306 | / | 427 | 8-70 | 3-90 | 1040.0 | |
| | | | | 21611 | 306 | 307 | / | 486 | 36-40 | 5-30 | 477.0 | |
| | | | | 21612 | 307 | 308 | / | 6 | 5580 | 629 | 4.9 | |
| | | | | | 308 | 309 | / | | | | | |
| | | | | | 309 | 310 | / | | | | | |
| | | | | | 310 | 311 | / | | | | | |
| | | | | | 311 | 312 | / | | | | | |
| | | | | | 312 | 313 | / | | | | | |
| | | | | | 313 | 314 | / | | | | | |
| | | | | | 314 | 315 | / | | | | | |
| | | | | | 315 | 316 | / | | | | | |
| | | | | | 316 | 317 | / | | | | | |
| | | | | | 317 | 318 | / | | | | | |
| | | | | | 318 | 319 | / | | | | | |

031058



Amoco Minerals Australia Company

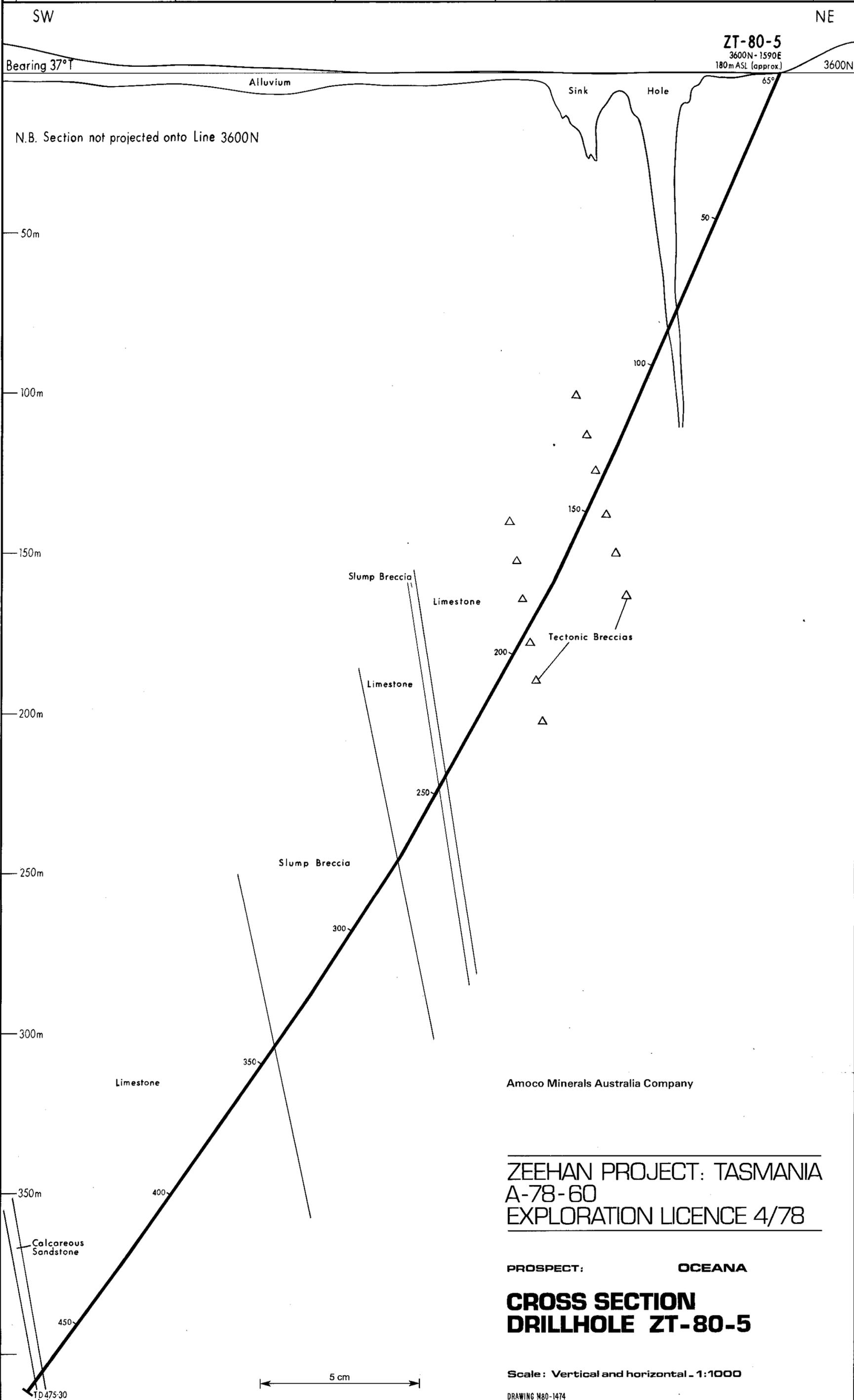
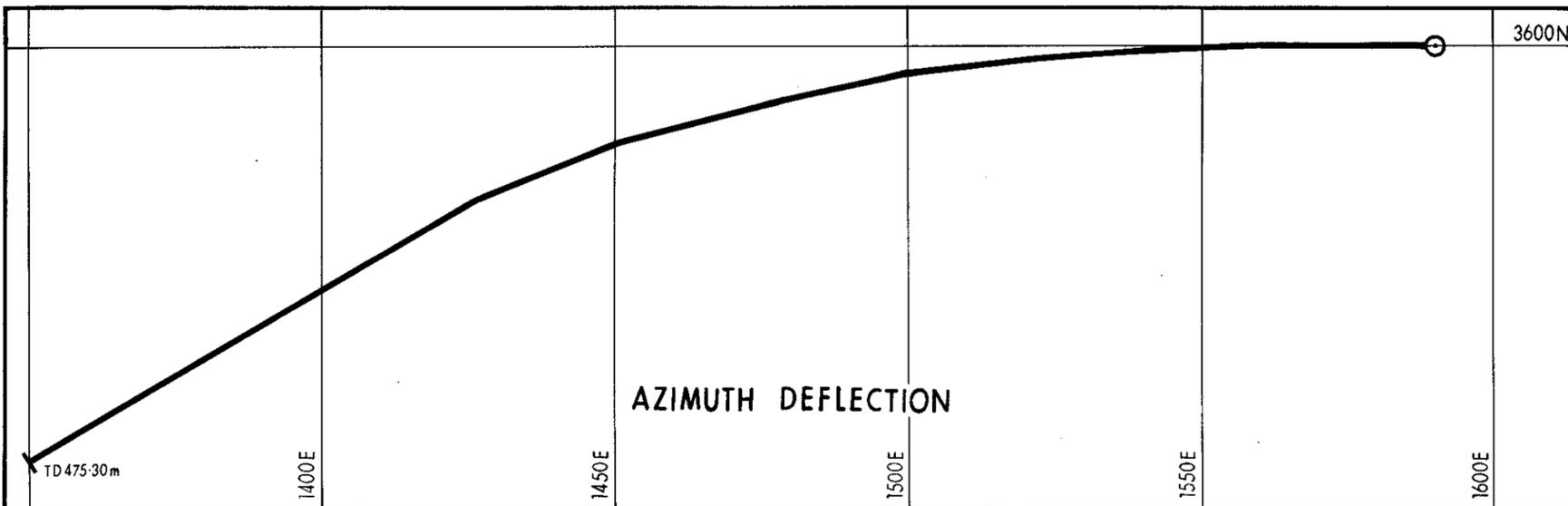
DRILL LOG

HOLE No.

ZT-80-4

PAGE 7 OF 7

| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | |
|----------|----|-------------|------------------|---------------|-------------|-----|----------------|--------|----|----|----|--|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | |
| | | | | | 319 | 320 | 1 | | | | | |
| | | | | | 320 | 321 | 1 | | | | | |
| | | | | | 321 | 322 | 1 | | | | | |
| | | | | | 322 | 323 | 1 | | | | | |
| | | | | | 323 | 324 | 1 | | | | | |
| | | | | | 324 | 325 | 1 | | | | | |
| | | | | | 325 | 326 | 1 | | | | | |
| | | | | | 326 | 327 | 1 | | | | | |
| | | | | | 327 | 328 | 1 | | | | | |
| | | | | | 328 | 329 | 1 | | | | | |
| | | | | | 329 | 330 | 1 | | | | | |
| | | | | | 330 | 331 | 1 | | | | | |
| | | | | | 331 | 332 | 1 | | | | | |
| | | | | | 332 | 333 | 1 | | | | | |
| | | | | | 333 | 334 | 1 | | | | | |
| | | | | | 334 | 335 | 1 | | | | | |
| | | | | | 335 | 336 | 1 | | | | | |
| | | | | | 336 | 337 | 1 | | | | | |
| | | | | | 337 | 338 | 1 | | | | | |
| | | | | | 338 | 339 | 1 | | | | | |
| | | | | | 339 | 340 | 1 | | | | | |
| | | | | | 340 | 341 | 1 | | | | | |
| | | | | | 341 | 342 | 1 | | | | | |
| | | | | | 342 | 343 | 1 | | | | | |
| | | | | | 343 | 344 | 1 | | | | | |
| | | | | | 344 | 345 | 1 | | | | | |
| | | | | | 345 | 346 | 1 | | | | | |
| | | | | | 346 | 347 | 1 | | | | | |
| | | | | | 347 | 348 | 1 | | | | | |
| | | | | | 348 | 349 | 1 | | | | | |
| | | | | | 349 | 350 | 1 | | | | | |
| | | | | | 350 | 351 | 1 | | | | | |
| | | | | | 351 | 352 | 1 | | | | | |
| | | | | | 352 | 353 | 1 | | | | | |
| | | | | | 353 | 354 | 1 | | | | | |
| | | | | | 354 | 355 | 1 | | | | | |
| | | | | | 355 | 356 | 1 | | | | | |
| | | | | | 356 | 357 | 1 | | | | | |
| | | | | | 357 | 358 | 1 | | | | | |
| | | | | | 358 | 359 | 1 | | | | | |
| | | | | | 359 | 360 | 1 | | | | | |
| | | | | | 360 | 361 | 1 | | | | | |
| | | | | | END OF HOLE | | 360.30 metres. | | | | | |



Amoco Minerals Australia Company

ZEEHAN PROJECT: TASMANIA
 A-78-60
 EXPLORATION LICENCE 4/78

PROSPECT: OCEANA

**CROSS SECTION
 DRILLHOLE ZT-80-5**

Scale: Vertical and horizontal - 1:1000

DRAWING M80-1474



Amoco Minerals Australia Company

031060

DRILL LOG

HOLE No. ZT-80-5

PAGE 1 OF 9

| PROJECT ZEEHAN - TAS No. 7860 | | | | ELEVATION meters | COMMENCED 29 FEB 1980 | BORE HOLE SURVEY | | | INSTRUMENT EASTMAN CAMERA | | | | | |
|-------------------------------|-------|---|------------------|---------------------------|----------------------------|------------------|--------|---------|---------------------------|-----|---------|-----------|-----|---------|
| PROSPECT OCEANA | | | | DIP COLLAR 65° GW | COMPLETED | Depth (m) | Dip | Bearing | Depth (m) | Dip | Bearing | Depth (m) | Dip | Bearing |
| CO-ORDINATES 3600 mN 1590 mE | | | | CORE SIZE HQ, NQ | TOTAL LENGTH 475.30 meters | 100 | 67° | 215° | 250 | 61° | 205° | 400 | 55 | 187° |
| BEARING 228 TN 217 MN 270 GN | | | | LOGGED BY PHILIP A. JONES | | 150 | 65° | 213° | 300 | 57° | 202° | 450 | 54 | 187° |
| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | | | |
| From | To | | | | From | To | Length | Ca | Pb | Zn | Ag | | | |
| 0.00 | 12.00 | TRICONE: Chocolate Brown, completely weathered Dolomite. | | | 12.00 | 13.00 | 1 | | | | | | | |
| | | | | | 13 | 14 | 1 | | | | | | | |
| 12.00 | 14.20 | DOLOMITE: chocolate brown, very weathered, cavernous silty dolomite. | | | 14 | 15 | 1 | | | | | | | |
| | | | | | 15 | 16 | 1 | | | | | | | |
| | | | | | 16 | 17 | 1 | | | | | | | |
| 14.20 | 15.50 | LIMESTONE: dark grey, massive, load casted calcilutite? with black carbonaceous interbeds of dolomite. | | | 17 | 18 | 1 | | | | | | | |
| | | | | | 18 | 19 | 1 | | | | | | | |
| | | | | | 19 | 20 | 1 | | | | | | | |
| | | | | | 20 | 21 | 1 | | | | | | | |
| 15.50 | 18.50 | DOLOMITE: Chocolate brown, very weathered silty dolomite. Poor recoveries through broken soft ground. | | | 21 | 22 | 1 | | | | | | | |
| | | | | | 22 | 23 | 1 | | | | | | | |
| | | | | | 23 | 24 | 1 | | | | | | | |
| 18.50 | 32.00 | DOLOMITE / LIMESTONE: black, foliated, load casted, carbonaceous and laminar dolomite interbedded with dark grey massive, slumped? cavernous occasionally fossiliferous calcilutites (oolitic). Minor calcite veining. Bedding 30° to ca at 21.50m; 50° to ca. 30m. Cavities: 22.50-23.30m; 24.00-24.40 m. | | | 24 | 25 | 1 | | | | | | | |
| | | | | | 25 | 26 | 1 | | | | | | | |
| | | | | | 26 | 27 | 1 | | | | | | | |
| | | | | | 27 | 28 | 1 | | | | | | | |
| | | | | | 28 | 29 | 1 | | | | | | | |
| | | | | | 29 | 30 | 1 | | | | | | | |
| | | | | | 30 | 31 | 1 | | | | | | | |
| 32.00 | 36.50 | LIMESTONE: generally light grey, massive but occasionally very laminar, fossiliferous (very Oolitic) calcarenites with minor interbeds of grey unfossiliferous load casted calcilutites and black carbonaceous dolomite. Interbeds generally < 3cm in width. Moderate calcite veining. Bedding 45° to ca at 35m. Cavity 32.70-34.00 m. Minor zones of brecciation - calcite healed. | | | 31 | 32 | 1 | | | | | | | |
| | | | | | 32 | 33 | 1 | | | | | | | |
| | | | | | 33 | 34 | 1 | | | | | | | |
| | | | | | 34 | 35 | 1 | | | | | | | |
| | | | | | 35 | 36 | 1 | | | | | | | |
| | | | | | 36 | 37 | 1 | | | | | | | |
| | | | | | 37 | 38 | 1 | | | | | | | |
| | | | | | 38 | 39 | 1 | | | | | | | |
| | | | | | 39 | 40 | 1 | | | | | | | |
| 36.50 | 59.00 | DOLOMITE / CALCILUTITE / CALCARENITE: Interbedded black laminar, thin bedded, pyritic dolomites rhythmically intercalated with dark grey massive, unfossiliferous calcilutites and grey waxy shelly calcarenites. Minor calcite veining and brecciation. Fossil beds generally 1 to 5 cm in width. Minor load casting. Cavity 36.80 to 40.00. Bedding 45° to ca at 48.70m; 40° to ca at 55.50m. | | | 40 | 41 | 1 | | | | | | | |
| | | | | | 41 | 42 | 1 | | | | | | | |
| | | | | | 42 | 43 | 1 | | | | | | | |
| | | | | | 43 | 44 | 1 | | | | | | | |
| | | | | | 44 | 45 | 1 | | | | | | | |
| | | | | | 45 | 46 | 1 | | | | | | | |
| | | | | | 46 | 47 | 1 | | | | | | | |
| | | | | | 47 | 48 | 1 | | | | | | | |
| | | | | | 48 | 49 | 1 | | | | | | | |
| 59.00 | 79.70 | DOLOMITE / CALCILUTITE: interbedded black massive, silty dolomites and dark grey massive calcilutites. Minor shelly calcarenites present in thin beds. Dark waxy calcite veined, mostly brecciated in part, and slumped (possibly load casted). Minor siderite. Rock quite broken also has tendency to spall on karing. Bedding 30° to ca at 65m. | | | 49 | 50 | 1 | | | | | | | |
| | | | | | 50 | 51 | 1 | | | | | | | |
| | | | | | 51 | 52 | 1 | | | | | | | |
| | | | | | 52 | 53 | 1 | | | | | | | |
| | | | | | 53 | 54 | 1 | | | | | | | |
| | | | | | 54 | 55 | 1 | | | | | | | |
| | | | | | 55 | 56 | 1 | | | | | | | |
| | | | | | 56 | 57 | 1 | | | | | | | |



| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | | | |
|----------|--------|--|------------------|---------------|----------|-----|--------|--------|----|----|----|--|--|--|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | | | |
| 284.80 | 285.20 | SAND FILLED CAVITY : probably honeycombed fossil breccia. | | | 163 | 164 | 1 | | | | | | | |
| 285.20 | 290.00 | FOSSIL BRECCIA : very weathered, porous and honeycombed, cavernous shelly fossil breccia. | | | 164 | 165 | 1 | | | | | | | |
| 290.00 | 343.00 | SLUMPED BRECCIA : grey to dark grey fossiliferous slump breccia. Moderately to strongly calcite veined, in part honeycombed and soft breccia composed of calcite and dolomite fragments in a dark grey to black dolomitic matrix, further healed by calcite. Fragments generally angular to subangular. Lot of coralline fragments as well as oolitic and shelly horizons. Sections of most less brecciated giving more of a slumped appearance. Numerous cavities present: 300-302 m; 320-330.70; 337.50-339.50 m (partial recovery); 341.10-343.00 | | | 165 | 166 | 1 | | | | | | | |
| | | | | | 166 | 167 | 1 | | | | | | | |
| | | | | | 167 | 168 | 1 | | | | | | | |
| | | | | | 168 | 169 | 1 | | | | | | | |
| | | | | | 169 | 170 | 1 | | | | | | | |
| | | | | | 170 | 171 | 1 | | | | | | | |
| | | | | | 171 | 172 | 1 | | | | | | | |
| | | | | | 172 | 173 | 1 | | | | | | | |
| | | | | | 173 | 174 | 1 | | | | | | | |
| | | | | | 174 | 175 | 1 | | | | | | | |
| | | | | | 175 | 176 | 1 | | | | | | | |
| | | | | | 176 | 177 | 1 | | | | | | | |
| | | | | | 177 | 178 | 1 | | | | | | | |
| | | | | | 178 | 179 | 1 | | | | | | | |
| 343.00 | 348.20 | LAMINAR LIMESTONE : tectonic brecciated, light grey, extremely laminar limestone (muddy?), moderately calcite veined & foliated. Cavity 245.50-348.20 m. | | | 179 | 180 | 1 | | | | | | | |
| | | | | | 180 | 181 | 1 | | | | | | | |
| | | | | | 181 | 182 | 1 | | | | | | | |
| | | | | | 182 | 183 | 1 | | | | | | | |
| 348.20 | 377.00 | SLUMPED CALCULITES : light grey, pelloidal in part, slumped, weakly fossiliferous and moderately calcite veined calculites interbedded with minor, thin, dark grey calculites. Sequence very cavernous and honeycombed. Cavities 350-350.70 m; 353.80-355.80; 359-364.20; 368-371; 371.80-372.40; 375-374.20 m. Cavities due to honeycombed fossiliferous (shelly) limestone (highly weathered & very soft) poor recoveries! | Minor pyrite. | | 183 | 184 | 1 | | | | | | | |
| | | | | | 184 | 185 | 1 | | | | | | | |
| | | | | | 185 | 186 | 1 | | | | | | | |
| | | | | | 186 | 187 | 1 | | | | | | | |
| | | | | | 187 | 188 | 1 | | | | | | | |
| | | | | | 188 | 189 | 1 | | | | | | | |
| | | | | | 189 | 190 | 1 | | | | | | | |
| | | | | | 190 | 191 | 1 | | | | | | | |
| | | | | | 191 | 192 | 1 | | | | | | | |
| 377.00 | 433.00 | DOLOMITE : dark grey to black, silty, pelloidal, dolomite. Very foliated, broken ground, soft giving poor recoveries. Minor fossiliferous horizons. Core weakly calcite veined. Rock very cavernous. Minor zones of soft sediment slumping in fossiliferous calculites. Thin, heavily calcite healed tectonic breccias prevalent. Minor clay rich zones. Bedding parallel to sea at 392.50; 40° to sea at 408 m; 30° to sea at 408 m. Light grey laminar silty limestone? giving good bedding indication 45° to sea at 425. Minor blebby pyrite with dark silty dolomites. | | | 192 | 193 | 1 | | | | | | | |
| | | | | | 193 | 194 | 1 | | | | | | | |
| | | | | | 194 | 195 | 1 | | | | | | | |
| | | | | | 195 | 196 | 1 | | | | | | | |
| | | | | | 196 | 197 | 1 | | | | | | | |
| | | | | | 197 | 198 | 1 | | | | | | | |
| | | | | | 198 | 199 | 1 | | | | | | | |
| | | | | | 199 | 200 | 1 | | | | | | | |
| | | | | | 200 | 201 | 1 | | | | | | | |
| | | | | | 201 | 202 | 1 | | | | | | | |
| | | | | | 202 | 203 | 1 | | | | | | | |
| | | | | | 203 | 204 | 1 | | | | | | | |
| 433.00 | 434.00 | LIMESTONE : light grey extremely fossiliferous (shelly) calcarenite / calcarenite. Minor calcite veining. Rock massive & quite hard. | | | 204 | 205 | 1 | | | | | | | |
| | | | | | 205 | 206 | 1 | | | | | | | |
| | | | | | 206 | 207 | 1 | | | | | | | |
| | | | | | 207 | 208 | 1 | | | | | | | |
| 434.00 | 438.00 | DOLOMITE : very pyritic, black, silty, carbonaceous pelloidal (in part) dolomite. Rock cross bedded? and very laminar. Rock very soft, weakly broken. | | | 208 | 209 | 1 | | | | | | | |
| | | | | | 209 | 210 | 1 | | | | | | | |
| | | | | | 210 | 211 | 1 | | | | | | | |
| | | | | | 211 | 212 | 1 | | | | | | | |
| | | | | | 212 | 213 | 1 | | | | | | | |
| | | | | | 213 | 214 | 1 | | | | | | | |
| | | | | | 214 | 215 | 1 | | | | | | | |
| | | | | | 215 | 216 | 1 | | | | | | | |



| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | | |
|----------|----|-------------|------------------|---------------|----------|-----|--------|--------|----|----|----|--|--|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | | |
| | | | | | 269 | 270 | / | | | | | | |
| | | | | | 270 | 271 | / | | | | | | |
| | | | | | 271 | 272 | / | | | | | | |
| | | | | | 272 | 273 | / | | | | | | |
| | | | | | 273 | 274 | / | | | | | | |
| | | | | | 274 | 275 | / | | | | | | |
| | | | | | 275 | 276 | / | | | | | | |
| | | | | | 276 | 277 | / | | | | | | |
| | | | | | 277 | 278 | / | | | | | | |
| | | | | | 278 | 279 | / | | | | | | |
| | | | | | 279 | 280 | / | | | | | | |
| | | | | | 280 | 281 | / | | | | | | |
| | | | | | 281 | 282 | / | | | | | | |
| | | | | | 282 | 283 | / | | | | | | |
| | | | | | 283 | 284 | / | | | | | | |
| | | | | | 284 | 285 | / | | | | | | |
| | | | | | 285 | 286 | / | | | | | | |
| | | | | | 286 | 287 | / | | | | | | |
| | | | | | 287 | 288 | / | | | | | | |
| | | | | | 288 | 289 | / | | | | | | |
| | | | | | 289 | 290 | / | | | | | | |
| | | | | | 290 | 291 | / | | | | | | |
| | | | | | 291 | 292 | / | | | | | | |
| | | | | | 292 | 293 | / | | | | | | |
| | | | | | 293 | 294 | / | | | | | | |
| | | | | | 294 | 295 | / | | | | | | |
| | | | | | 295 | 296 | / | | | | | | |
| | | | | | 296 | 297 | / | | | | | | |
| | | | | | 297 | 298 | / | | | | | | |
| | | | | | 298 | 299 | / | | | | | | |
| | | | | | 299 | 300 | / | | | | | | |
| | | | | | 300 | 301 | / | | | | | | |
| | | | | | 301 | 302 | / | | | | | | |
| | | | | | 302 | 303 | / | | | | | | |
| | | | | | 303 | 304 | / | | | | | | |
| | | | | | 304 | 305 | / | | | | | | |
| | | | | | 305 | 306 | / | | | | | | |
| | | | | | 306 | 307 | / | | | | | | |
| | | | | | 307 | 308 | / | | | | | | |
| | | | | | 308 | 309 | / | | | | | | |
| | | | | | 309 | 310 | / | | | | | | |
| | | | | | 310 | 311 | / | | | | | | |
| | | | | | 311 | 312 | / | | | | | | |
| | | | | | 312 | 313 | / | | | | | | |
| | | | | | 313 | 314 | / | | | | | | |
| | | | | | 314 | 315 | / | | | | | | |
| | | | | | 315 | 316 | / | | | | | | |
| | | | | | 316 | 317 | / | | | | | | |
| | | | | | 317 | 318 | / | | | | | | |
| | | | | | 318 | 319 | / | | | | | | |
| | | | | | 319 | 320 | / | | | | | | |
| | | | | | 320 | 321 | / | | | | | | |
| | | | | | 321 | 322 | / | | | | | | |

031066



Amoco Minerals Australia Company

DRILL LOG

HOLE No.

ZT- 80- 5

PAGE 7 OF 9

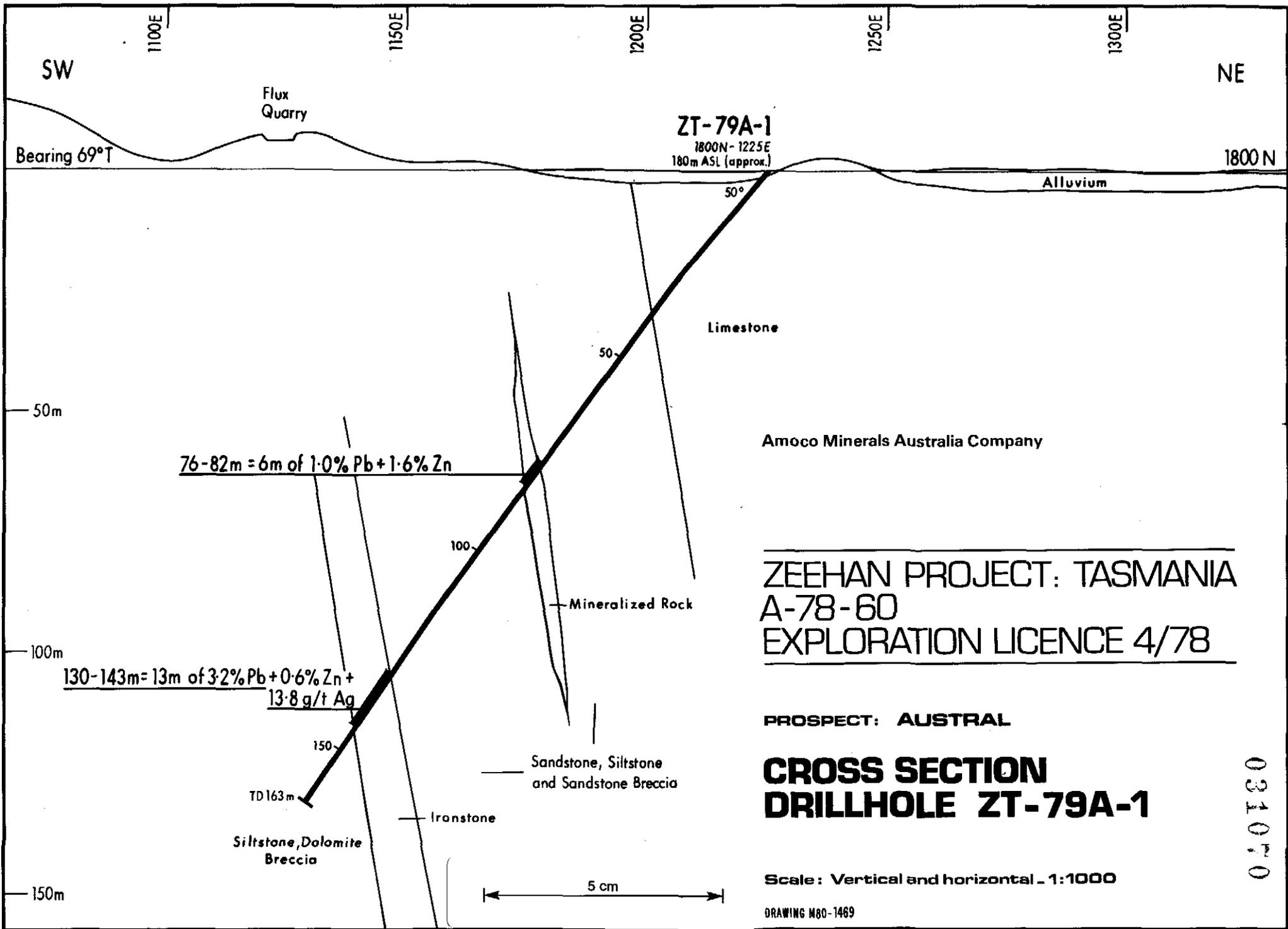
| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | | |
|----------|----|-------------|------------------|---------------|----------|-----|--------|--------|----|----|----|--|--|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | | |
| | | | | | 322 | 323 | / | | | | | | |
| | | | | | 323 | 324 | / | | | | | | |
| | | | | | 324 | 325 | / | | | | | | |
| | | | | | 325 | 326 | / | | | | | | |
| | | | | | 326 | 327 | / | | | | | | |
| | | | | | 327 | 328 | / | | | | | | |
| | | | | | 328 | 329 | / | | | | | | |
| | | | | | 329 | 330 | / | | | | | | |
| | | | | | 330 | 331 | / | | | | | | |
| | | | | | 331 | 332 | / | | | | | | |
| | | | | | 332 | 333 | / | | | | | | |
| | | | | | 333 | 334 | / | | | | | | |
| | | | | | 334 | 335 | / | | | | | | |
| | | | | | 335 | 336 | / | | | | | | |
| | | | | | 336 | 337 | / | | | | | | |
| | | | | | 337 | 338 | / | | | | | | |
| | | | | | 338 | 339 | / | | | | | | |
| | | | | | 339 | 340 | / | | | | | | |
| | | | | | 340 | 341 | / | | | | | | |
| | | | | | 341 | 342 | / | | | | | | |
| | | | | | 342 | 343 | / | | | | | | |
| | | | | | 343 | 344 | / | | | | | | |
| | | | | | 344 | 345 | / | | | | | | |
| | | | | | 345 | 346 | / | | | | | | |
| | | | | | 346 | 347 | / | | | | | | |
| | | | | | 347 | 348 | / | | | | | | |
| | | | | | 348 | 349 | / | | | | | | |
| | | | | | 349 | 350 | / | | | | | | |
| | | | | | 350 | 351 | / | | | | | | |
| | | | | | 351 | 352 | / | | | | | | |
| | | | | | 352 | 353 | / | | | | | | |
| | | | | | 353 | 354 | / | | | | | | |
| | | | | | 354 | 355 | / | | | | | | |
| | | | | | 355 | 356 | / | | | | | | |
| | | | | | 356 | 357 | / | | | | | | |
| | | | | | 357 | 358 | / | | | | | | |
| | | | | | 358 | 359 | / | | | | | | |
| | | | | | 359 | 360 | / | | | | | | |
| | | | | | 360 | 361 | / | | | | | | |
| | | | | | 361 | 362 | / | | | | | | |
| | | | | | 362 | 363 | / | | | | | | |
| | | | | | 363 | 364 | / | | | | | | |
| | | | | | 364 | 365 | / | | | | | | |
| | | | | | 365 | 366 | / | | | | | | |
| | | | | | 366 | 367 | / | | | | | | |
| | | | | | 367 | 368 | / | | | | | | |
| | | | | | 368 | 369 | / | | | | | | |
| | | | | | 369 | 370 | / | | | | | | |
| | | | | | 370 | 371 | / | | | | | | |
| | | | | | 371 | 372 | / | | | | | | |
| | | | | | 372 | 373 | / | | | | | | |
| | | | | | 373 | 374 | / | | | | | | |
| | | | | | 374 | 375 | / | | | | | | |



| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | | |
|----------|----|-------------|------------------|---------------|----------|-----|--------|--------|----|----|----|--|--|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | | |
| | | | | | 375 | 376 | 1 | | | | | | |
| | | | | | 376 | 377 | 1 | | | | | | |
| | | | | | 377 | 378 | 1 | | | | | | |
| | | | | | 378 | 379 | 1 | | | | | | |
| | | | | | 379 | 380 | 1 | | | | | | |
| | | | | | 380 | 381 | 1 | | | | | | |
| | | | | | 381 | 382 | 1 | | | | | | |
| | | | | | 382 | 383 | 1 | | | | | | |
| | | | | | 383 | 384 | 1 | | | | | | |
| | | | | | 384 | 385 | 1 | | | | | | |
| | | | | | 385 | 386 | 1 | | | | | | |
| | | | | | 386 | 387 | 1 | | | | | | |
| | | | | | 387 | 388 | 1 | | | | | | |
| | | | | | 388 | 389 | 1 | | | | | | |
| | | | | | 389 | 390 | 1 | | | | | | |
| | | | | | 390 | 391 | 1 | | | | | | |
| | | | | | 391 | 392 | 1 | | | | | | |
| | | | | | 392 | 393 | 1 | | | | | | |
| | | | | | 393 | 394 | 1 | | | | | | |
| | | | | | 394 | 395 | 1 | | | | | | |
| | | | | | 395 | 396 | 1 | | | | | | |
| | | | | | 396 | 397 | 1 | | | | | | |
| | | | | | 397 | 398 | 1 | | | | | | |
| | | | | | 398 | 399 | 1 | | | | | | |
| | | | | | 399 | 400 | 1 | | | | | | |
| | | | | | 400 | 401 | 1 | | | | | | |
| | | | | | 401 | 402 | 1 | | | | | | |
| | | | | | 402 | 403 | 1 | | | | | | |
| | | | | | 403 | 404 | 1 | | | | | | |
| | | | | | 404 | 405 | 1 | | | | | | |
| | | | | | 405 | 406 | 1 | | | | | | |
| | | | | | 406 | 407 | 1 | | | | | | |
| | | | | | 407 | 408 | 1 | | | | | | |
| | | | | | 408 | 409 | 1 | | | | | | |
| | | | | | 409 | 410 | 1 | | | | | | |
| | | | | | 410 | 411 | 1 | | | | | | |
| | | | | | 411 | 412 | 1 | | | | | | |
| | | | | | 412 | 413 | 1 | | | | | | |
| | | | | | 413 | 414 | 1 | | | | | | |
| | | | | | 414 | 415 | 1 | | | | | | |
| | | | | | 415 | 416 | 1 | | | | | | |
| | | | | | 416 | 417 | 1 | | | | | | |
| | | | | | 417 | 418 | 1 | | | | | | |
| | | | | | 418 | 419 | 1 | | | | | | |
| | | | | | 419 | 420 | 1 | | | | | | |
| | | | | | 420 | 421 | 1 | | | | | | |
| | | | | | 421 | 422 | 1 | | | | | | |
| | | | | | 422 | 423 | 1 | | | | | | |
| | | | | | 423 | 424 | 1 | | | | | | |
| | | | | | 424 | 425 | 1 | | | | | | |
| | | | | | 425 | 426 | 1 | | | | | | |
| | | | | | 426 | 427 | 1 | | | | | | |
| | | | | | 427 | 428 | 1 | | | | | | |

APPENDIX 2

AUSTRAL PROSPECT - DRILL SECTIONS & LOGS



ZEEHAN PROJECT: TASMANIA
A-78-60
EXPLORATION LICENCE 4/78

PROSPECT: AUSTRAL

**CROSS SECTION
DRILLHOLE ZT-79A-1**

031070



Amoco Minerals Australia Company

DRILL LOG HOLE No. ZT-79-1 PAGE 1 OF 3

| | | | | | | | | | | | |
|---------------------------------------|--------------------------|-------------------------|------------------|-----|---------|------------|-----|---------|------------|-----|---------|
| PROJECT ZEEHAN - TAS. No. A7860 | ELEVATION meters | COMMENCED 14 Nov '79 | BORE HOLE SURVEY | | | INSTRUMENT | | | ACID (HCL) | | |
| PROSPECT AUSTRAL VALLEY - FLUX QUARRY | DIP COLLAR 50° GRID WEST | COMPLETED 26 Nov '79 | Depth (m) | Dip | Bearing | Depth (m) | Dip | Bearing | Depth (m) | Dip | Bearing |
| CO-ORDINATES 1800 1225 | CORE SIZE HQ, NA | TOTAL LENGTH 6.3 meters | 100 m | 54° | - | | | | | | |
| BEARING 251° TN MN GN | LOGGED BY PHILIP JONES. | | 140 m | 55° | - | | | | | | |

| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | | |
|----------------|-------|--|--|---------------|----------|-------|--------|--------|------|------------|------|--|--|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | | |
| 0.00 | 13.00 | TRICONE DRILLING Sand/Gravels to 2.5m. Black/grey dolomites & siltstones from 2.5m to 13.00m | | | | | | | | | | | |
| *START HQ CORE | | | | 21129 | 13.00 | 14.00 | 1.00 | <5 | 59 | 510 | 0.5 | | |
| 13.00 | 19.00 | SILTSTONE - massive, fine grained, siliceous? matrix, grey to dark grey, extremely fractured, occasionally veined & highly, minor horizons of fossil debris. | | 21130 | 14.00 | 15.00 | 1.00 | <5 | 22 | 600 | <0.5 | | |
| | | | | 21131 | 15.00 | 16.00 | 1.00 | <5 | 14 | 1320 | 0.6 | | |
| | | | | 21132 | 16.00 | 17.00 | 1.00 | <5 | 5 | 228 | 0.5 | | |
| 19.00 | 20.90 | CONGLOMERATE - dark grey, silicified, very soft & light with minor leached pyritic concretions?? POOR CORE RECOVERY DUE TO SILENTNESS. | | 21133 | 17.00 | 18.00 | 1.00 | <5 | 14 | 514 | <0.5 | | |
| | | | | 21134 | 18.00 | 19.00 | 1.00 | 6 | 11 | 424 | 0.6 | | |
| | | | | 21135 | 19.00 | 20.00 | 1.00 | 7 | 10 | 620 | 0.6 | | |
| 20.90 | 38.30 | LIMESTONE - grey, very weathered, foliated, calcite veined & clayey. High zone at 27.30-28.70 Bedding attitudes 60° to ca at 32.5m 45° to ca at 36.7m | | 21136 | 20.00 | 21.00 | 1.00 | <5 | 30 | 530 | 0.5 | | |
| | | | | 21137 | 21.00 | 22.00 | 1.00 | <5 | 73 | 1470 | 0.9 | | |
| | | | | 21138 | 22.00 | 23.00 | 1.00 | <5 | 16 | 233 | 0.7 | | |
| | | | | 21139 | 23.00 | 24.00 | 1.00 | <5 | 16 | 68 | <0.5 | | |
| | | | | 21140 | 24.00 | 25.00 | 1.00 | <5 | 13 | 66 | <0.5 | | |
| 38.30 | 47.00 | CLAYSTONE - Dark grey, grey and yellow massive silty clays containing occasional fragments of very weathered fossiliferous siltstones. | | 21141 | 25.00 | 26.00 | 1.00 | <5 | 18 | 37 | <0.5 | | |
| | | | | 21142 | 26.00 | 27.00 | 1.00 | <5 | 38 | 193 | 0.5 | | |
| | | | | 21143 | 27.00 | 28.00 | 1.00 | <5 | 49 | 150 | 0.5 | | |
| 47.00 | 53.00 | SANDSTONE - Fine grained sandstones & massive siltstones, very fossiliferous (shell fragments), grey, weakly bedded, & occasionally brecciated (50.00m) Bedding attitudes 25° to ca at 48.4m | Trace pyrite 51.60m | 21144 | 28.00 | 29.00 | 1.00 | <5 | 95 | 730 | 0.7 | | |
| | | | | 21154 | 29.00 | 30.00 | 1.00 | <5 | 34 | 2400 | <0.5 | | |
| 50.40 | 50.40 | HO → NA Coring Bedding from 47.00m to 48.00m | | 21155 | 30.00 | 31.00 | 1.00 | <5 | 8 | 1020 | <0.5 | | |
| | | | | 21156 | 31.00 | 32.00 | 1.00 | <5 | 7 | 193 | <0.5 | | |
| | | | | 21157 | 32.00 | 33.00 | 1.00 | <5 | 6 | 58 | <0.5 | | |
| 53.00 | 58.60 | CHERT BRECCIA - grey, massive, crystalline, occasionally highly & fractured sedimentary breccia. Fragments generally rounded dark grey crystalline chert or siltstone. Fragments up to 50mm in length. | | 21181 | 33.00 | 34.00 | 1.00 | <5 | 3 | 39 | <0.5 | | |
| | | | | 21182 | 34.00 | 35.00 | 1.00 | <5 | 20 | 155 | <0.5 | | |
| | | | | 21183 | 35.00 | 36.00 | 1.00 | <5 | 21 | 128 | <0.5 | | |
| | | | | 21184 | 36.00 | 37.00 | 1.00 | 5 | 23 | 244 | <0.6 | | |
| 58.60 | 60.00 | CONGLOMERATE - Grey, silicified, very soft & light grey fossil debris composed mainly of broken shells. Very poor core recovery. | | 21185 | 37.00 | 38.00 | 1.00 | <5 | 16 | 46 | <0.5 | | |
| | | | | 21186 | 38.00 | 39.00 | 1.00 | <5 | 5 | 77 | <0.5 | | |
| | | | | 21187 | 39.00 | 40.00 | 1.00 | 7 | 59 | 740 | <0.5 | | |
| 60.00 | 63.00 | SILTSTONE - Very hard, massive but extensively fractured grey to beige in colour. 50% recovery. | | 21188 | 40.00 | 41.00 | 1.00 | 5 | 89 | 570 | <0.5 | | |
| | | | | 21189 | 41.00 | 42.00 | 1.00 | 10 | 151 | 1000 | 1.2 | | |
| 63.00 | 64.20 | CLAYSTONE - Mottled grey and yellow clays, silty and sandy component. | | 21190 | 42.00 | 43.00 | 1.00 | 5 | 228 | 1870 | 0.6 | | |
| | | | | 21191 | 43.00 | 44.00 | 1.00 | 20 | 252 | 3954 | 3.0 | | |
| 64.20 | 69.00 | SILTSTONE - Fossiliferous in part, grey/yellow, very hard, but containing clayey zones and intervals of intense fracturing giving rise to poor recoveries overall. Bedding attitude 35° to ca at 64.90m. | | 21192 | 44.00 | 45.00 | 1.00 | 16 | 417 | 2664 | 2.6 | | |
| | | | | 21193 | 45.00 | 46.00 | 1.00 | NO | CORE | RECOVERED. | | | |
| | | | | 21224 | 46.00 | 47.00 | 1.00 | 9 | 32 | 1410 | <0.5 | | |
| | | | | 21225 | 47.00 | 48.00 | 1.00 | 15 | 45 | 1800 | <0.5 | | |
| 69.00 | 81.00 | CLAYSTONE - Grey to black, mottled clays, minor fragments of weathered, dense fine sandstone, massive & silicified siltstone, very dense & heavy containing a 2% diss pyrite. Black, very disturbed pyritic clays (shales??) occur from 75.50m to 76.00m. Pyrite disseminated as well as in nodular accumulations. | Minor Disseminated py in siltstones 75.5 - 76.5 & 10% diss py | 21226 | 48.00 | 49.00 | 1.00 | <5 | 41 | 1720 | <0.5 | | |
| | | | | 21227 | 49.00 | 50.00 | 1.00 | <5 | 41 | 1240 | <0.5 | | |
| | | | | 21228 | 50.00 | 51.00 | 1.00 | <5 | 16 | 1140 | <0.5 | | |
| | | | | 21229 | 51.00 | 52.00 | 1.00 | <5 | 300 | 1.16% | <0.5 | | |
| | | | | 21230 | 52.00 | 53.00 | 1.00 | <5 | 8 | 1430 | <0.5 | | |
| | | | | 21231 | 53.00 | 54.00 | 1.00 | <5 | 59 | 1880 | <0.5 | | |
| | | | | 21232 | 54.00 | 55.00 | 1.00 | <5 | 28 | 1530 | <0.5 | | |

031072



Amoco Minerals Australia Company

DRILL LOG

HOLE No. ZT-79-1

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| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | |
|----------|--------|--|---|---------------|----------|-----|--------|-------------------|-------|-------|------|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag |
| 81.00 | 85.00 | SANDSTONE BRECCIA - Crystalline, fine to medium grained, honey brown, foliated in part, w/ky ferruginous sandstone tectonic breccias and minor interbeds of light grey claystones (pugh??) | 35% pyrite 81.00-81.40 as matrix to Breccia. | 21233 | 55 | 56 | 1.00 | <5 | 41 | 2600 | <0.3 |
| | | Between 81.00 & 81.40 sulphide (pyrite ~ 35%) cemented breccia. Minor manganese staining. Pyrite has oxidized surface (envelope) concretions goethite?? | | 21234 | 56 | 57 | 1.00 | NO CORE RECOVERED | | | |
| | | | | 21235 | 57 | 58 | 1.00 | 7 | 129 | 2210 | 0.6 |
| | | | | 21236 | 58 | 59 | 1.00 | <5 | 131 | 1150 | 20.5 |
| | | | | 21237 | 59 | 60 | 1.00 | 5 | 181 | 1610 | <0.5 |
| | | | | 21238 | 60 | 61 | 1.00 | <5 | 96 | 1800 | <0.5 |
| | | | | 21239 | 61 | 62 | 1.00 | <5 | 400 | 6600 | <0.5 |
| 85.00 | 94.70 | SANDSTONE BRECCIA - Honey brown, sugary (clayey quartz filled) siliceous sandstone tectonic breccia. Weakly ferruginous or manganese stained. Some vugs containing white and pink crystals or concretions accumulations probably zirconite?? | 1-2% iron oxides occurring as disseminations and smears along fractures | 21240 | 62 | 63 | 1.00 | <5 | 109 | 3550 | <0.5 |
| | | Breccia fragments up to 4cm in length - very angular. Mineralization from 93.20 - 94.70 1-2% pyrite almost completely oxidized. Associated concretions goethite ~ 7% (massive in part) | | 21241 | 63 | 64 | 1.00 | 17 | 1000 | 1.66% | <0.5 |
| | | | | 21242 | 64 | 65 | 1.00 | 12 | 500 | 2.15% | 3.3 |
| | | | | 21243 | 65 | 66 | 1.00 | <5 | 400 | 2.14% | <0.5 |
| | | | | 21244 | 66 | 67 | 1.00 | <5 | 400 | 0.44% | <0.5 |
| | | | | 21245 | 67 | 68 | 1.00 | <5 | 113 | 4550 | <0.5 |
| | | | | 21246 | 68 | 69 | 1.00 | <5 | 55 | 2890 | <0.5 |
| | | | | 21245 | 69 | 70 | 1.00 | 11 | 900 | 1.21% | 8.1 |
| | | | | 21096 | 70 | 71 | 1.00 | 29 | 700 | 5600 | 8.7 |
| 94.70 | 101.50 | CLAYSTONE - Manganese stained, silty to gritty, mottled light grey or yellow containing thin quartz veinlets | | 21097 | 71 | 72 | 1.00 | 20 | 1030 | 4400 | 2.2 |
| | | | | 21098 | 72 | 73 | 1.00 | 18 | 1500 | 9500 | 3.1 |
| 101.50 | 107.00 | FERRUGINOUS CLAYSTONE - Deeply weathered, bright orange ochre brown coloured, massive textureless fat clays. Minor silt content. Weakly to moderately ferruginous. | | 21099 | 73 | 74 | 1.00 | 13 | 1500 | 1.55% | 2.7 |
| | | | | 21100 | 74 | 75 | 1.00 | 24 | 1476 | 3500 | 4.9 |
| | | | | 21101 | 75 | 76 | 1.00 | 33 | 989 | 2400 | 4.2 |
| 107.00 | 107.80 | IRONSTONE - Concretionary goethite with clayey matrix massive, heavy & moderately fractured. | | 21102 | 76 | 77 | 1.00 | 26 | 106% | 1.61% | 3.1 |
| | | | | 21103 | 77 | 78 | 1.00 | 11 | 6200 | 1.74% | <0.5 |
| 107.80 | 110.00 | FERRUGINOUS CLAYSTONE - Orange, ochre brown coloured, bedded ?? fat clays. Bedding attitudes in plastic clays disturbed by drill rotation. | | 21104 | 78 | 79 | 1.00 | 9 | 2.96% | 3.39% | 6.5 |
| | | | | 21105 | 79 | 80 | 1.00 | 13 | 4300 | 9900 | <0.5 |
| | | | | 21106 | 80 | 81 | 1.00 | NO CORE RECOVERY | | | |
| 110.00 | 112.00 | CLAYSTONE - mottled pink to yellow, plastic, silty clays, with grey white mottling texture. | | 21107 | 81 | 82 | 1.00 | 8 | 1.34% | 2.22% | <0.5 |
| | | | | 21108 | 82 | 83 | 1.00 | 13 | 2000 | 7300 | 3.9 |
| 112.00 | 129.00 | CLAYSTONE - Mottled pale ochre/brown to orange/brown sandy and silty, ferruginous clays. Undisturbed bedding 50° to ca at 120.00m. Minor thin interstratified of sandy or gritty veinstone. | | 21109 | 83 | 84 | 1.00 | 6 | 1523 | 8200 | 2.5 |
| | | | | 21110 | 84 | 85 | 1.00 | 10 | 885 | 1300 | 1.3 |
| | | | | 21111 | 85 | 86 | 1.00 | 11 | 1110 | 1800 | 2.0 |
| | | | | 21112 | 86 | 87 | 1.00 | 16 | 2700 | 4100 | 3.3 |
| 129.00 | 143.40 | IRONSTONE BRECCIA - Massive, concretionary, dark brown in part brecciated, ironstone. Minor ferruginous, clayey interbeds. White rhombic crystals (not calcite) very evident in vugs & on fracture surfaces. | | 21113 | 87 | 88 | 1.00 | 13 | 2093 | 4800 | 0.8 |
| | | | | 21114 | 88 | 89 | 1.00 | 7 | 1200 | 6000 | 4.2 |
| | | | | 21115 | 89 | 90 | 1.00 | 6 | 1445 | 2300 | 1.9 |
| | | | | 21116 | 90 | 91 | 1.00 | 14 | 2195 | 4700 | 13.2 |
| 143.40 | 148.80 | DOLOMITIC SILTSTONE BRECCIAS - Grey, waxy, slump brecciated, massive or very dense rock with interbeds of black, fat, blocky weakly laminated clays (shales) forming part zones. Non clayey rock very competent & fresh. | | 21117 | 91 | 92 | 1.00 | 122 | 1400 | 6700 | <0.5 |
| | | | | 21118 | 92 | 93 | 1.00 | 12 | 2530 | 2550 | 2.4 |
| | | | | 21119 | 93 | 94 | 1.00 | 7 | 1.81% | 7200 | 5.3 |
| | | | | 21200 | 94 | 95 | 1.00 | 11 | 8600 | 600 | 2.6 |
| | | | | 2121 | 95 | 96 | 1.00 | 5 | 2790 | 586 | 0.8 |
| 148.80 | 149.20 | CLAYEY IRONSTONE - orange brown, brecciated ferruginous clayey ironstone pit. | | 2122 | 96 | 97 | 1.00 | 9 | 2660 | 568 | 2.4 |
| | | | | 2123 | 97 | 98 | 1.00 | 11 | 1090 | 209 | 3.3 |
| 149.20 | 150.20 | DOLOMITE BRECCIA/CLAYEY SILTSTONE - grey waxy, massive and heavy fresh dolomite breccia interbedded with bedded thin grey to fawn brown silty clays (siltstone) Bedding 40° to ca at 149.80m. | | 2124 | 98 | 99 | 1.00 | 9 | 950 | 190 | 4.2 |
| | | | | 2125 | 99 | 100 | 1.00 | 9 | 750 | 198 | 0.8 |
| | | | | 2126 | 100 | 101 | 1.00 | 13 | 1370 | 127 | 6.1 |
| | | | | 2127 | 101 | 102 | 1.00 | 16 | 5500 | 600 | <0.5 |
| 150.20 | 151.20 | CLAYEY IRONSTONE - Bedded ferruginous white to yellow clays and banded, gritty, concretionary ironstones. Minor thin quartz veinlets cutting core axis. Bedding 151m - 25° to ca. Core very oxidized. | | 2128 | 102 | 103 | 1.00 | 16 | 2420 | 2016 | 1.3 |
| | | | | 21145 | 103 | 104 | 1.00 | 23 | 1420 | 2970 | 1.4 |
| | | | | 21146 | 104 | 105 | 1.00 | 41 | 2080 | 2950 | 0.9 |
| | | | | 21147 | 105 | 106 | 1.00 | 14 | 1160 | 2290 | 0.8 |
| | | | | 21148 | 106 | 107 | 1.00 | 10 | 1010 | 1334 | 0.4 |
| | | | | 21149 | 107 | 108 | 1.00 | 15 | 1450 | 3530 | 0.9 |



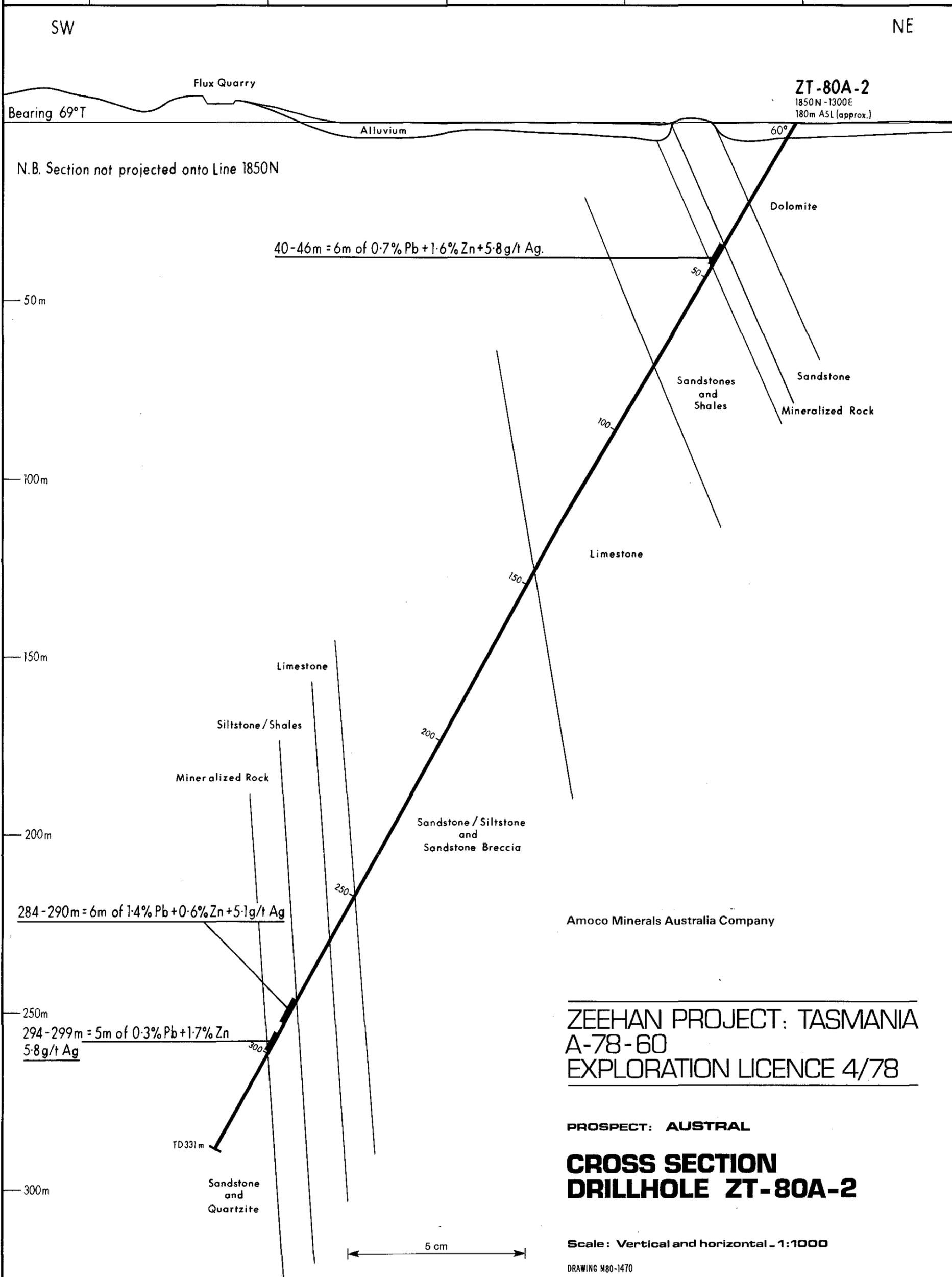
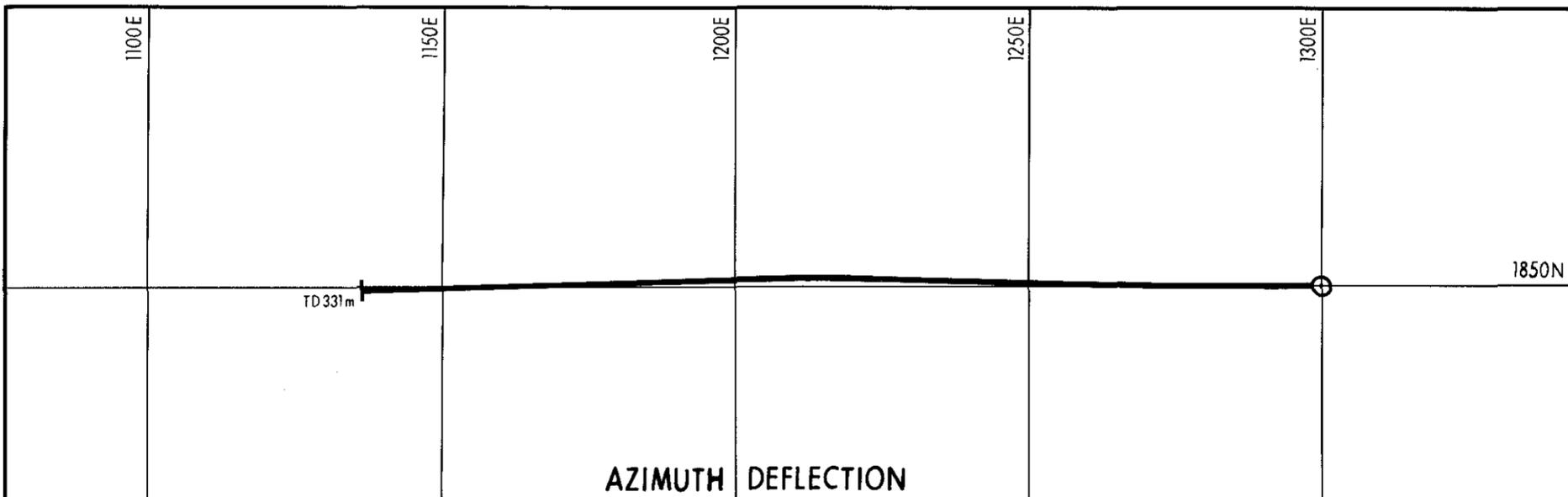
Amoco Minerals Australia Company

DRILL LOG

HOLE No. ZT-79-1

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| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | |
|-------------|--------|--|-------------------------|---------------|----------|-----|--------|--------|------|------|------|------|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag | |
| 151.20 | 154.40 | SILTSTONE - Bedded, clayey, white to orange brown, friable, extremely oxidized & possibly micaceous. | | 21150 | 108 | 109 | 1.00 | 9 | 1340 | 2770 | 0.6 | |
| | | | | 21151 | 109 | 110 | 1.00 | 13 | 1870 | 4060 | 0.5 | |
| | | | | 21152 | 110 | 111 | 1.00 | 7 | 550 | 1068 | 0.5 | |
| 154.40 | 163.00 | SILTSTONE - Massive, dark grey, very heavy (dense) slightly in part, brecciated (mechanical) interbedded with black, fine grained, sandstone which is clayey, very soft and weathers to form a black silty/sandy clay with no bedding attitudes. Fractures in the hard siltstone & ss to ca. | | 21153 | 111 | 112 | 1.00 | 7 | 310 | 461 | 0.6 | |
| | | | | 21158 | 112 | 113 | 1.00 | 12 | 850 | 1756 | 0.8 | |
| END OF HOLE | | | | 21159 | 113 | 114 | 1.00 | 9 | 730 | 1581 | 1.0 | |
| | | | | 21160 | 114 | 115 | 1.00 | 12 | 2400 | 7900 | 6.6 | |
| | | | | 21161 | 115 | 116 | 1.00 | 15 | 2600 | 6600 | <0.5 | |
| | | | | 21162 | 116 | 117 | 1.00 | 12 | 1730 | 4710 | 2.4 | |
| | | | END OF HOLE 163 metres. | | 21163 | 117 | 118 | 1.00 | 16 | 1600 | 3250 | 1.0 |
| | | | | | 21164 | 118 | 119 | 1.00 | 21 | 2100 | 4900 | 1.3 |
| | | | | | 21165 | 119 | 120 | 1.00 | 6 | 770 | 1540 | 1.1 |
| | | | | | 21166 | 120 | 121 | 1.00 | 31 | 1200 | 2740 | 1.9 |
| | | | | | 21167 | 121 | 122 | 1.00 | 8 | 1080 | 2980 | 1.7 |
| | | | | | 21168 | 122 | 123 | 1.00 | 9 | 1800 | 5000 | <0.5 |
| | | | | | 21169 | 123 | 124 | 1.00 | 6 | 2400 | 7700 | <0.5 |
| | | | | | 21170 | 124 | 125 | 1.00 | 14 | 2900 | 8100 | <0.5 |
| | | | | | 21171 | 125 | 126 | 1.00 | 18 | 2200 | 4280 | 2.5 |
| | | | | 21172 | 126 | 127 | 1.00 | 12 | 2620 | 3860 | 3.2 | |
| | | | | 21173 | 127 | 128 | 1.00 | 15 | 2860 | 3500 | 4.8 | |
| | | | | 21174 | 128 | 129 | 1.00 | 18 | 2320 | 4280 | 2.7 | |
| | | | | 21175 | 129 | 130 | 1.00 | 31 | 8700 | 6300 | 1.8 | |
| | | | | 21176 | 130 | 131 | 1.00 | 61 | 2.42 | 8500 | 10.9 | |
| | | | | 21177 | 131 | 132 | 1.00 | 57 | 3.06 | 7800 | 23.5 | |
| | | | | 21178 | 132 | 133 | 1.00 | 44 | 3.69 | 8600 | 12.7 | |
| | | | | 21179 | 133 | 134 | 1.00 | 31 | 1.72 | 7100 | 3.3 | |
| | | | | 21180 | 134 | 135 | 1.00 | 63 | 2.80 | 8100 | 2.8 | |
| | | | | 21194 | 135 | 136 | 1.00 | 64 | 2.23 | 5600 | 23.2 | |
| | | | | 21195 | 136 | 137 | 1.00 | 65 | 2.33 | 5400 | 25.3 | |
| | | | | 21196 | 137 | 138 | 1.00 | 59 | 2.48 | 5800 | 5.3 | |
| | | | | 21197 | 138 | 139 | 1.00 | 59 | 2.87 | 4900 | 22.6 | |
| | | | | 21198 | 139 | 140 | 1.00 | 75 | 1.79 | 4600 | 4.0 | |
| | | | | 21199 | 140 | 141 | 1.00 | 149 | 3.73 | 4700 | 19.7 | |
| | | | | 21200 | 141 | 142 | 1.00 | 225 | 3.08 | 5200 | 11.4 | |
| | | | | 21201 | 142 | 143 | 1.00 | 63 | 1.78 | 4000 | 15.2 | |
| | | | | 21202 | 143 | 144 | 1.00 | 14 | 1680 | 4620 | 1.7 | |
| | | | | 21203 | 144 | 145 | 1.00 | 7 | 1500 | 5100 | 4.9 | |
| | | | | 21204 | 145 | 146 | 1.00 | 13 | 3600 | 1.00 | <0.5 | |
| | | | | 21205 | 146 | 147 | 1.00 | 8 | 870 | 4930 | 1.2 | |
| | | | | 21206 | 147 | 148 | 1.00 | 25 | 2660 | 2960 | 1.7 | |
| | | | | 21207 | 148 | 149 | 1.00 | 10 | 4220 | 4030 | 4.8 | |
| | | | | 21208 | 149 | 150 | 1.00 | 16 | 3485 | 2080 | 8.1 | |
| | | | | 21209 | 150 | 151 | 1.00 | 16 | 3040 | 2720 | 23.0 | |
| | | | | 21210 | 151 | 152 | 1.00 | 17 | 3765 | 3650 | 24.0 | |
| | | | | 21211 | 152 | 153 | 1.00 | 25 | 910 | 1600 | 7.1 | |
| | | | | 21212 | 153 | 154 | 1.00 | 11 | 540 | 2070 | 5.8 | |
| | | | | 21213 | 154 | 155 | 1.00 | 20 | 595 | 2845 | 7.7 | |
| | | | | 21214 | 155 | 156 | 1.00 | 14 | 300 | 4900 | 6.7 | |
| | | | | 21215 | 156 | 157 | 1.00 | 14 | 600 | 7100 | 1.0 | |
| | | | | 21216 | 157 | 158 | 1.00 | 17 | 400 | 1.01 | 7.0 | |
| | | | | 21217 | 158 | 159 | 1.00 | 11 | 300 | 1.02 | 6.1 | |
| | | | | 21218 | 159 | 160 | 1.00 | 12 | 200 | 5200 | 5.2 | |
| | | | | 21219 | 160 | 161 | 1.00 | 9 | 200 | 7000 | 11.7 | |
| | | | | 21220 | 161 | 162 | 1.00 | 6 | 200 | 1.16 | 12.2 | |
| | | | | 21221 | 162 | 163 | 1.00 | 7 | 200 | 1.10 | 11.3 | |





Amoco Minerals Australia Company

031075

DRILL LOG

HOLE No. ZT-80A-2

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| PROJECT ZEEHAN-TAS No. R79-60-B | | ELEVATION meters | COMMENCED 14/3/80 | BORE HOLE SURVEY | | | INSTRUMENT | | | | |
|---------------------------------|-------|--|---|------------------|----------|---------|------------|----------------|----------------|----------------|----------------|
| PROSPECT AUSTRAL - Flux Quarry. | | DIP COLLAR 60° GW | COMPLETED 8/4/80 | Depth (m) | Dip | Bearing | Depth (m) | Dip | Bearing | | |
| CO-ORDINATES 1850 mN 1300 mE | | CORE SIZE HQ, NQ | TOTAL LENGTH 331 meters | 100 | 60° | 241° | 250 | 61.5 | 239 | | |
| BEARING 251° TN 240° MN 270° GN | | LOGGED BY P.A. JONES. | | 150 | 61° | 241 | 300 | 61.5 | 239 | | |
| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | |
| From | To | | | | From | To | Length | G _g | P _g | Z _g | A _g |
| 0.00 | 5.00 | Tricone - Alluvial quartzite & conglomeratic gravels | | 21682 | 5 | 6 | 1 | 18 | 2680 | 1550 | 1.2 |
| | | | | 21683 | 6 | 7 | 1 | 34 | 720 | 9520 | <1.0 |
| 5.00 | 6.40 | DOLomite: Completely weathered brown/black carbonaceous silty dolomite. | | 21684 | 7 | 8 | 1 | <5 | 243 | 9460 | 1.1 |
| | | | | 21685 | 8 | 9 | 1 | <5 | 144 | 7580 | <0.5 |
| | | | | 21686 | 9 | 10 | 1 | <5 | 186 | 6950 | <0.5 |
| 6.40 | 7.50 | DOLomite: Blue grey to brown, siderite veined, highly weathered clayey silty dolomites. Minor disseminated sphalerite associated with siderite. | Minor disseminated sphalerite. | 21687 | 10 | 11 | 1 | <5 | 846 | 3490 | 0.5 |
| | | | | 21688 | 11 | 12 | 1 | <5 | 225 | 7940 | <0.5 |
| | | | | 21689 | 12 | 13 | 1 | <5 | 501 | 7280 | <0.5 |
| | | | | 21690 | 13 | 14 | 1 | 13 | 305 | 3670 | 1.3 |
| 7.50 | 26.00 | SIDERITE/ANKERITE ROCK: massive, hard and dense, grey, weakly siderite veined ankerite rock interbedded with minor silty dolomites, grey to black of weakly mineralized. Massive, mineralized ankerite/siderite rough breccia from 9.00 to 11.00 metres. Minor Pb/Zn and pyritic mineralization. | Minor Pb/Zn and pyritic mineralization associated with siderite remaining in breccia. | 21691 | 14 | 15 | 1 | NO | CORE | RECOVERY | |
| | | | | 21692 | 15 | 16 | 1 | <5 | 368 | 3970 | 0.8 |
| | | | | 21693 | 16 | 17 | 1 | 8 | 240 | 8850 | 1.5 |
| | | | | 21694 | 17 | 18 | 1 | <5 | 383 | 3770 | 0.9 |
| | | | | 21695 | 18 | 19 | 1 | 5 | 82 | 985 | <0.5 |
| | | | | 21696 | 19 | 20 | 1 | 5 | 72 | 940 | <0.5 |
| 26.00 | 39.00 | SANDSTONE: Poorly sorted, white to light grey, speckled coarse grained arkosic sandstone. Large quartz phenocrysts present. Ground badly broken. | | 21697 | 20 | 21 | 1 | <5 | 93 | 1230 | 0.5 |
| | | | | 21698 | 21 | 22 | 1 | <5 | 370 | 1530 | 0.8 |
| | | | | 21699 | 22 | 23 | 1 | 5 | 2800 | 6720 | 4.1 |
| | | | | 21700 | 23 | 24 | 1 | <5 | 1250 | 5880 | 2.5 |
| | | | | 21701 | 24 | 25 | 1 | <5 | 259 | 1870 | 0.8 |
| | | TRICONE 26.10 m to 24.50 NO SLUDGE SAMPLES. | | 21702 | 25 | 26 | 1 | 5 | 107 | 1440 | 1.0 |
| | | | | - | 26 | 27 | 1 | | | | |
| 39.00 | 46.00 | Ankerite Siderite Mineralized Breccia: massive, dense yellow/grey/green, rough, Pb/Zn mineralized breccia. 40-42m ± 2% Pb/Zn combined. 42-45m ± 5% Pb/Zn combined. Zone very weathered but mineralized material hard and resistant. Poor recoveries in some badly broken areas. Lot of accessory pyrite to mineralization. | Pb/Zn 2% 40-42m Pb/Zn 5% 42-45m 5% pyrite | - | 27 | 28 | 1 | " | | | " |
| | | | | - | 28 | 29 | 1 | " | | | " |
| | | | | - | 29 | 30 | 1 | " | | | " |
| | | | | - | 30 | 31 | 1 | " | | | " |
| | | | | - | 31 | 32 | 1 | " | | | " |
| | | | | - | 32 | 33 | 1 | " | | | " |
| | | | | - | 33 | 34 | 1 | " | | | " |
| | | | | - | 34 | 35 | 1 | " | | | " |
| 46.00 | 48.00 | DOLomite: Black to olive green silty, completely weathered dolomite very minor calcite veining. | | 21703 | 35 | 36 | 1 | <5 | 476 | 3510 | 1.0 |
| | | | | 21704 | 36 | 37 | 1 | 9 | 66 | 1160 | <0.5 |
| | | | | 21705 | 37 | 38 | 1 | <5 | 58 | 1180 | <0.5 |
| 48.00 | 50.20 | COQUINA: silicified, grey, very light, fossiliferous (coralline fragments as well as shelly debris) coquina. | | 21706 | 38 | 39 | 1 | 19 | 330 | 9260 | <1.0 |
| | | | | 21671 | 39 | 40 | 1 | <5 | 700 | 2300 | 4.8 |
| | | | | 21672 | 40 | 41 | 1 | <5 | 1767 | 1087 | 13.7 |
| 50.20 | 51.50 | SILTSTONE: weathered, grey, clayey, weakly calcite veined siltstone. Ground very broken. Poor core recoveries. | | 21673 | 41 | 42 | 1 | <5 | 3200 | 6500 | 3.4 |
| | | | | 21674 | 42 | 43 | 1 | <5 | 1347 | 7300 | 8.8 |
| | | | | 21675 | 43 | 44 | 1 | <5 | 5000 | 9300 | 3.6 |
| | | | | 21676 | 44 | 45 | 1 | 13 | 1300 | 4977 | 3.7 |
| 51.50 | 63.00 | SANDSTONE: grey/brown, medium to coarse grained arkosic sandstone containing thin black clayey interbeds (shales?). Core completely weathered, ground badly broken, poor recoveries ~ 25%. Cavity 54.50 m - 57.50 m. | | 21677 | 45 | 46 | 1 | <5 | 600 | 1387 | 1.5 |
| | | | | 21678 | 46 | 47 | 1 | NO | CORE | RECOVERY | |
| | | | | 21679 | 47 | 48 | 1 | <5 | 1200 | 4500 | 2.3 |
| | | | | 21680 | 48 | 49 | 1 | <5 | 300 | 900 | <0.5 |
| | | | | 21681 | 49 | 50 | 1 | <5 | 200 | 800 | <0.5 |



| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | |
|----------|--------|--|--|---------------|----------|-----|--------|--------|------|----------|------|
| From | To | | | | From | To | Length | Ca | Pb | Zn | Ag |
| 63.00 | 78.50 | CLAYSTONE: mottled, black/gray and minor orange/yellow, massive silty fat clays - decomposed dolomite? Very fine grained pyrite present as disseminations. | Pyrite as fine disseminations. | 21707 | 50 | 51 | 1 | 11 | 1240 | 4470 | 1.8 |
| | | | | 21708 | 51 | 52 | 1 | 11 | 1830 | 3860 | 1.9 |
| | | | | 21709 | 52 | 53 | 1 | 13 | 2490 | 6210 | 2.8 |
| | | | | 21710 | 53 | 54 | 1 | 10 | 1170 | 4780 | 1.8 |
| 78.50 | 82.30 | DOLOMITE BRECCIA: Dark gray, silty, soft sediment slump brecciated Dolomite. Minor fine grained disseminated pyrite. Minor siderite. Core extensively weathered and broken & 50% recovery. | Pyrite as fine disseminations. | 21711 | 54 | 55 | 1 | 17 | 1550 | 5560 | 3.2 |
| | | | | 21712 | 55 | 56 | 1 | NO | CORE | RECOVERY | |
| | | | | 21713 | 56 | 57 | 1 | NO | CORE | RECOVERY | |
| | | | | 21714 | 57 | 58 | 1 | 8 | 250 | 1650 | 0.6 |
| | | | | 21715 | 58 | 59 | 1 | 5 | 203 | 1580 | 0.6 |
| 82.30 | 91.40 | CALCULITE: slumped gray calcutites, highly foliated, very broken, minor calcite veining (minor siderite). Some zones decomposed to fat silty clays. | | 21716 | 59 | 60 | 1 | <5 | 743 | 2080 | 1.0 |
| | | | | 21717 | 60 | 61 | 1 | <5 | 1059 | 2430 | 1.2 |
| | | | | 21718 | 61 | 62 | 1 | 6 | 1540 | 6510 | 1.5 |
| | | | | 21719 | 62 | 63 | 1 | <5 | 268 | 6350 | <0.5 |
| 91.40 | 145.40 | CALCULITE: Interbedded, light grey and grey foliated calcutites and very fossiliferous (shelly) thin bedded calcutites. Minor, black, dolomitic thin interbeds present. Black shaly limestone, extremely weathered from 100.90m to 101.40m. Numerous zones throughout sequence are completely weathered giving rise to silty clays with solid rock fragments. Minor calcite veining in general. Vein 101.70-101.90 contains 2% sphalerite. (red/brown in colour). Core badly fractured and broken from 106 to 121 metres. Core extensively foliated and microfaulted from 129m to 135 metres. Calcite healed breccias (tectonic) 106-107; 131.20-131.40. Bedding 47° to ca at 92.50m; 46° to ca at 128m. Cavities 140.70m - 141.50; 141.70 - 145.40. | Calcite vein 2% sphalerite 101.70 - 101.90m. | 21720 | 63 | 64 | 1 | 10 | 1460 | 8050 | 0.9 |
| | | | | 21721 | 64 | 65 | 1 | 14 | 1930 | 1250 | <1.0 |
| | | | | 21722 | 65 | 66 | 1 | 8 | 3430 | 9320 | 2.5 |
| | | | | 21723 | 66 | 67 | 1 | 8 | 706 | 4750 | 0.8 |
| | | | | 21724 | 67 | 68 | 2 | 40 | 1182 | 1.18 | 2.2 |
| | | | | 21725 | 68 | 69 | | | | | |
| | | | | 21725 | 69 | 70 | 2 | 14 | 304 | 3700 | <0.5 |
| | | | | 21726 | 70 | 71 | | | | | |
| | | | | 21726 | 71 | 72 | 2 | 22 | 128 | 1530 | <0.5 |
| | | | | 21727 | 72 | 73 | | | | | |
| | | | | 21727 | 73 | 74 | 2 | 24 | 192 | 1630 | <0.5 |
| | | | | 21728 | 74 | 75 | | | | | |
| | | | | 21728 | 75 | 76 | 2 | 14 | 80 | 2440 | <0.5 |
| | | | | 21729 | 76 | 77 | | | | | |
| | | | | 21729 | 77 | 78 | 2 | <5 | 340 | 1.18 | <0.5 |
| | | | | 21730 | 78 | 79 | | | | | |
| 145.40 | 182.20 | SILTSTONE/SHALE: laminated clayey silty shales interbedded with completely weather laminar shales (massive grey/black clays). Pyrite up to 5% in sections of core. Zone extremely cavernous and honeycombed giving poor recoveries overall & 20%. Some cavities possibly pyrite lined or filled. Cavities: 147.20-156.50; 157.20-160.70; 170-172; honey-combed & porous 172-175.70m; cavity 179.80-182.20m. Minor silicified coquina core & 182 metres. Mineralized (Pb/Zn) siderite/siderite rock 180-181 probably caused from above. Bedding 30° at 147 metres. | Massive pyrite possibly lining cavities? | 21730 | 79 | 80 | 2 | 14 | 186 | 2700 | <0.5 |
| | | | | 21731 | 80 | 81 | 2 | 10 | 216 | 2020 | <0.5 |
| | | | | 21739 | 81 | 82 | | | | | |
| | | | | 21739 | 82 | 83 | | | | | |
| | | | | 21739 | 83 | 84 | 1 | 7 | 85 | 246 | <0.1 |
| | | | | 21740 | 84 | 85 | 1 | 5 | 35 | 114 | <0.1 |
| | | | | 21741 | 85 | 86 | 1 | <5 | 30 | 92 | <0.1 |
| | | | | 21742 | 86 | 87 | 1 | 5 | 26 | 48 | <0.1 |
| | | | | 21743 | 87 | 88 | 1 | 5 | 26 | 23 | <0.1 |
| | | | | 21744 | 88 | 89 | 1 | 6 | 105 | 79 | <0.1 |
| | | | | 21745 | 89 | 90 | 1 | 7 | 56 | 103 | <0.1 |
| | | | | 21746 | 90 | 91 | 1 | 8 | 35 | 73 | <0.1 |
| | | | | 21747 | 91 | 92 | 1 | 5 | 218 | 2740 | <0.1 |
| | | | | 21748 | 92 | 93 | 1 | 5 | 28 | 112 | <0.1 |
| | | | | 21749 | 93 | 94 | 1 | 6 | 30 | 65 | <0.1 |
| | | | | 21750 | 94 | 95 | 1 | <5 | 34 | 99 | <0.1 |
| | | | | 21751 | 95 | 96 | 1 | 5 | 25 | 135 | <0.1 |
| | | | | 21752 | 96 | 97 | 1 | 5 | 36 | 131 | <0.1 |
| 182.20 | 185.60 | CALCARENITE: massive grey, well sorted, medium grained, weakly calcite veined calcarenite, becoming finer grained and laminated towards the base of the sequence. | | 21753 | 97 | 98 | 1 | 5 | 38 | 168 | <0.1 |
| | | | | 21754 | 98 | 99 | 1 | 6 | 35 | 94 | <0.1 |
| | | | | 21755 | 99 | 100 | 1 | <5 | 34 | 164 | <0.1 |
| | | | | 21756 | 100 | 101 | 1 | 9 | 349 | 4630 | <0.1 |
| | | | | 21757 | 101 | 102 | 1 | 6 | 740 | 1680 | <0.1 |
| | | | | 21758 | 102 | 103 | 1 | 10 | 500 | 5080 | <0.1 |
| 185.60 | 191.00 | SANDSTONE: brecciated, Quartz and calcite veined grey and dark grey, very weathered, soft clayey sandstone in a dark grey dolomite matrix. Cavity 187.00-190.70 metres. | | 21758 | 102 | 103 | 1 | 10 | 500 | 5080 | <0.1 |



| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | |
|----------|--------|--|---|---------------|----------|-----|--------|----------------|------|-------------------|------|
| From | To | | | | From | To | Length | G _n | Zn | As | Ag |
| 191.00 | 196.30 | SANDSTONE: coarsely laminar, medium to coarse grained grey/white quartzose sandstone. Ground very broken with recoveries around 30%. Bedding 37° to ca at 194.50 metres. | | 21759 | 103 | 104 | 1 | 7 | 117 | 411 | <0.1 |
| | | | | 21760 | 104 | 105 | 1 | <5 | 481 | 454 | <0.1 |
| | | | | 21761 | 105 | 106 | 1 | <5 | 127 | 707 | <0.1 |
| | | | | 21762 | 106 | 107 | 1 | <5 | 356 | 1068 | <0.1 |
| | | | | 21763 | 107 | 108 | 1 | 5 | 377 | 1360 | <0.1 |
| 196.30 | 197.50 | SANDSTONE BRECCIA: completely weathered soft grey, sediment slump brecciated sandstone with black silty dolomite matrix. Sandstone fragments medium grained and well sorted. | | 21764 | 108 | 109 | 1 | <5 | 165 | 680 | <0.1 |
| | | | | 21765 | 109 | 110 | 1 | 6 | 225 | 513 | <0.1 |
| | | | | 21766 | 110 | 111 | 1 | <5 | 139 | 467 | <0.1 |
| | | | | 21767 | 111 | 112 | 1 | <5 | 71 | 219 | <0.1 |
| | | | | 21768 | 112 | 113 | 1 | 6 | 74 | 362 | <0.1 |
| 197.50 | 199.50 | SANDSTONE: grey/white, medium grained, well sorted quartzose sandstone. Minor quartz veinlets. Bedding 35° to ca at 197.50m. | | 21769 | 113 | 114 | 1 | 6 | 34 | 35 | <0.1 |
| | | | | 21770 | 114 | 115 | 1 | 7 | 35 | 63 | <0.1 |
| | | | | 21771 | 115 | 116 | 1 | <5 | 31 | 73 | <0.1 |
| | | | | 21772 | 116 | 117 | 1 | 5 | 29 | 414 | <0.1 |
| 199.50 | 201.70 | SANDSTONE BRECCIA: black, soft sediment slump brecciated, medium grained sandstone with carbonaceous and silty dolomite matrix. Minor pyrite. | Minor pyrite as blebs or fine disseminations. | 21773 | 117 | 118 | 1 | 6 | 40 | 208 | <0.1 |
| | | | | 21774 | 118 | 119 | 1 | 6 | 38 | 58 | <0.1 |
| | | | | 21775 | 119 | 120 | 1 | 5 | 36 | 140 | <0.1 |
| | | | | 21776 | 120 | 121 | 1 | 6 | 48 | 657 | <0.1 |
| 201.70 | 203.40 | SANDSTONE: coarse grained, poorly sorted, fossiliferous porous and ugly grey sandstone. | | 21777 | 121 | 122 | 1 | 5 | 34 | 44 | <0.1 |
| | | | | 21778 | 122 | 123 | 1 | 7 | 35 | 71 | <0.1 |
| | | | | 21779 | 123 | 124 | 1 | 8 | 45 | 390 | <0.1 |
| 203.40 | 206.00 | SANDSTONE: grey/white, medium grained, well sorted massive in part ugly sandstone. | | 21780 | 124 | 125 | 1 | 21 | 341 | 2780 | <0.1 |
| | | | | 21781 | 125 | 126 | 1 | 5 | 39 | 611 | <0.1 |
| | | | | 21782 | 126 | 127 | 1 | 8 | 282 | 2190 | <0.1 |
| 206.00 | 211.10 | SANDSTONE BRECCIA: slump brecciated, interbedded grey, quartzose, medium grained sandstone and very laminar, black, pyritic silty dolomites (laminations highly contorted due to slumping). Pyrite as thin beds parallel to contorted bedding planes. | Pyrite 2-3% | 21783 | 127 | 128 | 1 | <5 | 48 | 922 | <0.1 |
| | | | | 21784 | 128 | 129 | 1 | 6 | 45 | 118 | <0.1 |
| | | | | 21785 | 129 | 130 | 1 | 8 | 38 | 40 | <0.1 |
| | | | | 21809 | 130 | 131 | 1 | 5 | 60 | 37 | 2.1 |
| | | | | 21810 | 131 | 132 | 1 | <5 | 49 | 22 | 1.7 |
| | | | | 21811 | 132 | 133 | 1 | <5 | 45 | 44 | 1.5 |
| 211.10 | 213.00 | SANDSTONE: finely laminar, pyritic, grey, well sorted, porous and weakly ugly sandstone. Crystalline pyrite vein ~ 1cm in width parallel to bedding plane. Bedding 40° to ca at 212.50 metres. Firmness in sandstone may be due to leaching of pyrite! | Vein pyrite 1cm width at 211.80 metres | 21812 | 133 | 134 | 1 | <5 | 46 | 25 | 1.6 |
| | | | | 21813 | 134 | 135 | 1 | 5 | 49 | 44 | 1.7 |
| | | | | 21814 | 135 | 136 | 1 | 6 | 25 | 20 | 2.1 |
| | | | | 21815 | 136 | 137 | 1 | 6 | 30 | 76 | 1.6 |
| | | | | 21816 | 137 | 138 | 1 | 5 | 31 | 101 | 1.5 |
| | | | | 21817 | 138 | 139 | 1 | 6 | 48 | 60 | 1.6 |
| 213.00 | 227.00 | SANDSTONE: interbedded grey and dark grey, fine to coarse grained, in part fossiliferous sandstones. Minor pyrite blebs present. Core generally massive with no bedding. Minor qtz veining. Sandstone very quartzose. Sections of core ugly or very porous (highly weathered). | Minor pyrite. | 21818 | 139 | 140 | 1 | <5 | 45 | 21 | 1.6 |
| | | | | 21819 | 140 | 141 | 1 | <5 | 45 | 47 | 1.8 |
| | | | | - | 141 | 142 | 1 | NO | CORE | RECOVERY (Cavity) | |
| | | | | - | 142 | 143 | 1 | " | " | " | |
| | | | | - | 143 | 144 | 1 | " | " | " | |
| | | | | - | 144 | 145 | 1 | " | " | " | |
| | | | | - | 145 | 146 | 1 | " | " | " | |
| 227.00 | 228.90 | DOLOMITIC SILTSTONE BRECCIA: black, slump brecciated, dolomitic siltstone. Extremely weathered, clayey and very soft, with minor qtz veining. Fragments in breccia up to 3cm across. | | 21820 | 146 | 147 | 1 | 14 | 27 | 145 | 1.9 |
| | | | | - | 147 | 148 | 1 | NO | CORE | RECOVERY (Cavity) | |
| | | | | - | 148 | 149 | 1 | " | " | " | |
| | | | | - | 149 | 150 | 1 | " | " | " | |
| 228.90 | 238.60 | BRECCIA: mottled grey/white/black slump brecciated siltstone/fine grained sandstone. Extremely weathered & clayey. Minor quartz and calcite veining. Matrix possibly black dolomitic siltstone. Pyrite in part. Breccia fragments generally 1-2.5cm across. (well sorted!) | Minor disseminated pyrite. | - | 150 | 151 | 1 | " | " | " | |
| | | | | - | 151 | 152 | 1 | " | " | " | |
| | | | | - | 152 | 153 | 1 | " | " | " | |
| | | | | - | 153 | 154 | 1 | " | " | " | |
| | | | | - | 154 | 155 | 1 | " | " | " | |
| | | | | - | 155 | 156 | 1 | " | " | " | |



| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | |
|----------|--------|---|---|---------------|----------|-----|--------|--------|------|----------|-----|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag |
| 238.00 | 246.00 | DOLOMITIC SILTSTONE BRECCIA: Black, completely weathered, pyritic, dense, slump brecciated dolomitic siltstone. Fragments sub angular to rounded. | Minor pyrite | 21821 | 156 | 157 | 1 | 27 | 37 | 90 | 2.1 |
| | | | | - | 157 | 158 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 158 | 159 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 159 | 160 | 1 | NO | CORE | RECOVERY | |
| 246.00 | 250.00 | SANDSTONE / SILTSTONE: grey, massive, fine grained sandstone / siltstone. Badly broken ground gives rise to extremely weathered zones in an otherwise competent sequence. Minor fine grained pyrite as disseminations. | Minor disseminated pyrite. | 21822 | 160 | 161 | 1 | <5 | 34 | 457 | 1.9 |
| | | | | 21823 | 161 | 162 | 1 | <5 | 19 | 142 | 2.5 |
| | | | | - | 162 | 163 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 163 | 164 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 164 | 165 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 165 | 166 | 1 | NO | CORE | RECOVERY | |
| 250.00 | 262.50 | LIMESTONE: dark grey, brecciated and very foliated, extremely weathered silty limestone with minor dark grey to black silty dolomites. Minor calcite veining. Abundant fine grained pyrite. Limestones & dolomites occasionally completely decomposed to silty black clays. No bedding. | 2% pyrite as fine disseminations. | - | 166 | 167 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 167 | 168 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 168 | 169 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 169 | 170 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 170 | 171 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 171 | 172 | 1 | NO | CORE | RECOVERY | |
| | | | | 21824 | 172 | 173 | 1 | 7 | 29 | 59 | 2.2 |
| 262.50 | 265.10 | LIMESTONE ??: Completely weathered dark grey limestone, manifest now by dark grey to black, massive, fat silty clays. Completely weathered white calcite veins present. | | 21825 | 173 | 174 | 1 | <5 | 41 | 38 | 1.6 |
| | | | | - | 174 | 175 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 175 | 176 | 1 | NO | CORE | RECOVERY | |
| | | | | 21826 | 176 | 177 | 1 | 29 | 6160 | 490 | 5.8 |
| 265.10 | 275.90 | SILTSTONE: fine grained, well sorted, grey, massive, very broken and puggy siltstone. Pugh zones composed of clayey silts, black & massive. Minor qtz veining. Cavity 267.70 - 268.80 m. Rock in general very weathered. | | - | 177 | 178 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 178 | 179 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 179 | 180 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 180 | 181 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 181 | 182 | 1 | NO | CORE | RECOVERY | |
| 275.90 | 284.00 | CLAYSTONE: Orange/olive brown/white sandy and silty clays. Minor mottling. Completely weathered and oxidised sandstones and siltstone; minor shales. | | 21827 | 182 | 183 | 1 | <5 | 53 | 92 | 1.7 |
| | | | | 21828 | 183 | 184 | 1 | <5 | 45 | 146 | 1.9 |
| | | | | 21829 | 184 | 185 | 1 | 15 | 52 | 134 | 2.3 |
| | | | | 21830 | 185 | 186 | 1 | 16 | 50 | 123 | 1.9 |
| 284.00 | 293.50 | IRONSTONE BRECCIA: yellow/orange, vuggy, very porous sandy, extremely weathered, puggy, hematite breccia. Pugh zones of silty or sandy yellow to white weakly ferruginous clays. Recovers through badly broken ground to 60%. | | 21831 | 186 | 187 | 1 | 17 | 88 | 4470 | 2.0 |
| | | | | - | 187 | 188 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 188 | 189 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 189 | 190 | 1 | NO | CORE | RECOVERY | |
| | | | | 21832 | 190 | 191 | 1 | <5 | 65 | 206 | 1.9 |
| | | | | 21833 | 191 | 192 | 1 | <5 | 17 | 227 | 2.2 |
| 293.50 | 297.50 | SILTSTONE BRECCIA: Grey (greenish yellow), massive, very dense, vuggy (quartz lined) silty, puggy siltstone slump? breccia. Pugh zones major component of rock and are generally black to dark grey silty clays. More resistant sections of core, less weathered siltstone breccia, up to 20-30 cm in length. Angular to sub angular fragments in breccia generally 2 cm in width. Minor disseminated galena & sphalerite. Very fine grained. Cavity 296.70 - 297.20 m. | Very fine grained, minor galena & sphalerite. | - | 192 | 193 | 1 | NO | CORE | RECOVERY | |
| | | | | 21834 | 193 | 194 | 1 | <5 | 13 | 47 | 1.8 |
| | | | | 21835 | 194 | 195 | 1 | <5 | 12 | 43 | 2.0 |
| | | | | 21836 | 195 | 196 | 1 | <5 | 11 | 32 | 2.1 |
| | | | | 21837 | 196 | 197 | 1 | <5 | 18 | 24 | 1.9 |
| | | | | 21838 | 197 | 198 | 1 | <5 | 16 | 40 | 1.7 |
| | | | | 21839 | 198 | 199 | 1 | <5 | 15 | 22 | 1.4 |
| | | | | 21840 | 199 | 200 | 1 | 7 | 23 | 34 | 1.6 |
| | | | | 21841 | 200 | 201 | 1 | 6 | 26 | 36 | 1.5 |
| | | | | 21842 | 201 | 202 | 1 | <5 | 17 | 20 | 1.7 |
| | | | | 21843 | 202 | 203 | 1 | <5 | 15 | 43 | 2.2 |
| 297.50 | 306.00 | Fine grained SANDSTONE / SILTSTONE: Moderately sorted, light grey, quartz veined, massive, dense quartzose, fine grained sandstone / siltstone. Major proportion of rock sandy puggy clays - completely weathered sections of core. Minor well bedded, pyritic siltstones (30m) Bedding 32° to c.a. at 301 m. | Bedded minor pyrite in siltstone (laminar) | 21844 | 203 | 204 | 1 | <5 | 62 | 342 | 2.1 |
| | | | | 21845 | 204 | 205 | 1 | <5 | 61 | 230 | 1.8 |
| | | | | 21846 | 205 | 206 | 1 | <5 | 26 | 92 | 2.1 |
| | | | | 21847 | 206 | 207 | 1 | <5 | 62 | 311 | 2.0 |
| | | | | 21848 | 207 | 208 | 1 | 9 | 40 | 350 | 2.1 |
| | | | | 21849 | 208 | 209 | 1 | 12 | 25 | 38 | 1.6 |



| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | Length | ASSAYS | | | |
|----------|---------|---|--|---------------|----------|-----|--------|--------|------|----------|-----|
| From | To | | | | From | To | | Ca | Pb | Zn | Ag |
| 306.00 | 311.00 | QUARTZITE: pink to cream, silicified, fine grained, brecciated?, clay veined sandstone. Rock very massive but badly broken. | | 21850 | 209 | 210 | 1 | 6 | 23 | 50 | 1.9 |
| | | | | 21851 | 210 | 211 | 1 | <5 | 29 | 29 | 2.1 |
| | | | | 21852 | 211 | 212 | 1 | <5 | 21 | 437 | 2.2 |
| | | | | 21853 | 212 | 213 | 1 | <5 | 15 | 238 | 1.9 |
| 311.00 | 319.80 | SANDSTONE: medium to coarse grained, very weathered, grey, foliated sandstone. Poor core recoveries in generally soft porous sandstones. | | 21854 | 213 | 214 | 1 | <5 | 10 | 20 | 2.2 |
| | | | | 21855 | 214 | 215 | 1 | <5 | 50 | 24 | 2.0 |
| | | | | 21856 | 215 | 216 | 1 | 5 | 8 | 48 | 1.8 |
| | | | | 21857 | 216 | 217 | 1 | <5 | 10 | 63 | 1.6 |
| 319.80 | 323.70 | SANDSTONE: cream to pink/white, medium grained, foliated, weathered, very soft, porous clayey sandstone. | | 21858 | 217 | 218 | 1 | <5 | <5 | 60 | 2.0 |
| | | | | 21859 | 218 | 219 | 1 | <5 | <5 | 22 | 1.3 |
| | | | | 21860 | 219 | 220 | 1 | <5 | 16 | 74 | 1.7 |
| | | | | 21861 | 220 | 221 | 1 | 14 | 50 | 177 | 2.0 |
| 323.70 | 331.00 | SANDSTONE: grey, foliated slumped? weakly siderite veined, medium grained sandstone with minor siltstone interbeds. Trace of galena and sphalerite within siderite veinlets. Poor core recoveries in soft ground \approx 25%. | Trace galena, sphalerite in thin veinlets. | 21862 | 221 | 222 | 1 | 11 | 60 | 170 | 1.9 |
| | | | | 21863 | 222 | 223 | 1 | <5 | 46 | 47 | 1.7 |
| | | | | 21864 | 223 | 224 | 1 | <5 | 40 | 34 | 1.6 |
| E.O.H. | 331.00m | | | 21865 | 224 | 225 | 1 | <5 | 7 | 604 | 1.8 |
| | | | | 21866 | 225 | 226 | 1 | <5 | 12 | 54 | 1.5 |
| | | | | 21867 | 226 | 227 | 1 | <5 | 7 | 77 | 1.4 |
| | | | | 21868 | 227 | 228 | 1 | <5 | 30 | 160 | 1.9 |
| | | | | 21869 | 228 | 229 | 1 | 5 | 15 | 47 | 1.6 |
| | | | | - | 229 | 230 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 230 | 231 | 1 | NO | CORE | RECOVERY | |
| | | | | 21870 | 231 | 232 | 1 | <5 | <5 | 26 | 1.7 |
| | | | | 21871 | 232 | 233 | 1 | <5 | <5 | 37 | 1.8 |
| | | | | 21872 | 233 | 234 | 1 | 6 | 18 | 158 | 1.5 |
| | | | | 21873 | 234 | 235 | 1 | 15 | <5 | 45 | 1.8 |
| | | | | 21874 | 235 | 236 | 1 | 5 | 21 | 26 | 1.6 |
| | | | | 21875 | 236 | 237 | 1 | <5 | 27 | 245 | 2.7 |
| | | | | 21876 | 237 | 238 | 1 | <5 | 18 | 127 | 2.3 |
| | | | | 21877 | 238 | 239 | 1 | 11 | 35 | 1826 | 2.9 |
| | | | | 21878 | 239 | 240 | 1 | 37 | 145 | 1315 | 3.0 |
| | | | | 21879 | 240 | 241 | 1 | 6 | 75 | 1864 | 2.4 |
| | | | | 21880 | 241 | 242 | 1 | 10 | 52 | 328 | 2.7 |
| | | | | 21881 | 242 | 243 | 1 | 11 | 52 | 197 | 2.5 |
| | | | | 21882 | 243 | 244 | 1 | 11 | 65 | 824 | 2.9 |
| | | | | 21883 | 244 | 245 | 1 | 16 | 48 | 135 | 2.8 |
| | | | | 21884 | 245 | 246 | 1 | 7 | 31 | 164 | 3.1 |
| | | | | 21885 | 246 | 247 | 1 | <5 | 27 | 136 | 2.7 |
| | | | | 21886 | 247 | 248 | 1 | 14 | 75 | 324 | 3.3 |
| | | | | 21887 | 248 | 249 | 1 | <5 | 32 | 845 | 2.8 |
| | | | | 21888 | 249 | 250 | 1 | <5 | 197 | 2790 | 3.0 |
| | | | | 21889 | 250 | 251 | 1 | <5 | 33 | 95 | 2.7 |
| | | | | 21890 | 251 | 252 | 1 | <5 | 28 | 41 | 2.5 |
| | | | | 21891 | 252 | 253 | 1 | <5 | 34 | 74 | 2.7 |
| | | | | 21892 | 253 | 254 | 1 | <5 | 129 | 430 | 3.2 |
| | | | | 21893 | 254 | 255 | 1 | 5 | 42 | 369 | 2.8 |
| | | | | 21894 | 255 | 256 | 1 | 10 | 106 | 1604 | 3.2 |
| | | | | 21895 | 256 | 257 | 1 | <5 | 118 | 656 | 2.6 |
| | | | | 21896 | 257 | 258 | 1 | 16 | 360 | 847 | 3.0 |
| | | | | 21897 | 258 | 259 | 1 | <5 | 180 | 603 | 2.9 |
| | | | | 21898 | 259 | 260 | 1 | <5 | 107 | 475 | 2.6 |
| | | | | 21899 | 260 | 261 | 1 | <5 | 40 | 290 | 2.6 |
| | | | | 21900 | 261 | 262 | 1 | <5 | 25 | 88 | 2.8 |



| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | |
|----------|----|-------------|------------------|---------------|----------|-----|--------|--------|-------|-----------|------|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag |
| | | | | 21901 | 262 | 263 | 1 | 10 | 180 | 692 | 3.3 |
| | | | | 21902 | 263 | 264 | 1 | 17 | 125 | 155 | 3.2 |
| | | | | 21903 | 264 | 265 | 1 | 17 | 157 | 563 | 3.6 |
| | | | | 21904 | 265 | 266 | 1 | 9 | 270 | 1236 | 3.4 |
| | | | | 21905 | 266 | 267 | 1 | <5 | 121 | 994 | 2.9 |
| | | | | 21906 | 267 | 268 | 1 | <5 | 72 | 468 | 3.3 |
| | | | | - | 268 | 269 | 1 | NO | CORE | RECOVERY. | |
| | | | | 21907 | 269 | 270 | 1 | <5 | 106 | 2620 | 2.8 |
| | | | | 21908 | 270 | 271 | 1 | <5 | 109 | 902 | 3.1 |
| | | | | 21909 | 271 | 272 | 1 | <5 | 51 | 921 | 3.4 |
| | | | | 21910 | 272 | 273 | 1 | <5 | 47 | 2600 | 3.2 |
| | | | | - | 273 | 274 | 1 | NO | CORE | RECOVERY. | |
| | | | | - | 274 | 275 | 1 | NO | CORE | RECOVERY. | |
| | | | | 21911 | 275 | 276 | 1 | 16 | 2110 | 9450 | 4.4 |
| | | | | 21986 | 276 | 277 | 1 | 28 | 717 | 2780 | 2.8 |
| | | | | 21987 | 277 | 278 | 1 | 33 | 3660 | 2100 | 15.5 |
| | | | | 21988 | 278 | 279 | 1 | 29 | 3720 | 3690 | 9.6 |
| | | | | 21989 | 279 | 280 | 1 | 23 | 1440 | 1905 | 10.2 |
| | | | | 21990 | 280 | 281 | 1 | 20 | 1570 | 2020 | 9.6 |
| | | | | 21991 | 281 | 282 | 1 | 15 | 1270 | 1317 | 1.4 |
| | | | | 21992 | 282 | 283 | 1 | 14 | 1440 | 1938 | 1.8 |
| | | | | 21993 | 283 | 284 | 1 | 12 | 913 | 1015 | 1.5 |
| | | | | 21994 | 284 | 285 | 1 | 22 | 1.71% | 7400 | 9 |
| | | | | 21995 | 285 | 286 | 1 | 30 | 1.42 | 5900 | 9 |
| | | | | 21996 | 286 | 287 | 1 | 31 | 9210 | 3980 | 0.4 |
| | | | | 21997 | 287 | 288 | 1 | 54 | 1.69 | 7500 | 4 |
| | | | | 21998 | 288 | 289 | 1 | 102 | 1.75 | 7200 | 5 |
| | | | | 21999 | 289 | 290 | 1 | 98 | 1.16 | 6600 | 3 |
| | | | | 21800 | 290 | 291 | 1 | 406 | 6610 | 6340 | 0.4 |
| | | | | 21801 | 291 | 292 | 1 | 614 | 4390 | 4610 | 1.1 |
| | | | | 21802 | 292 | 293 | 1 | 502 | 5360 | 4120 | 20.1 |
| | | | | 21803 | 293 | 294 | 1 | 645 | 2920 | 5260 | 0.8 |
| | | | | 21804 | 294 | 295 | 1 | 12 | 3900 | 1.45 | 5 |
| | | | | 21805 | 295 | 296 | 1 | <5 | 5200 | 2.18 | 2 |
| | | | | 21806 | 296 | 297 | 1 | <5 | 2600 | 1.81 | 2 |
| | | | | 21807 | 297 | 298 | 2 | <5 | 4000 | 3.12 | 20 |
| | | | | - | 298 | 299 | | | | | |
| | | | | 21908 | 299 | 300 | 1 | 30 | 3800 | 7120 | 1.2 |
| | | | | 21912 | 300 | 301 | 1 | 76 | 3820 | 1790 | 3.5 |
| | | | | 21913 | 301 | 302 | 1 | 89 | 1680 | 3850 | 2.3 |
| | | | | 21914 | 302 | 303 | 1 | 50 | 588 | 1250 | 1.9 |
| | | | | 21915 | 303 | 304 | 1 | 6 | 626 | 522 | 1.7 |
| | | | | 21916 | 304 | 305 | 1 | <5 | 404 | 867 | 2.4 |
| | | | | 21917 | 305 | 306 | 1 | <5 | 349 | 660 | 2.2 |
| | | | | 21918 | 306 | 307 | 1 | 24 | 319 | 674 | 3.2 |
| | | | | 21919 | 307 | 308 | 1 | 30 | 314 | 629 | 3.6 |
| | | | | 21920 | 308 | 309 | 1 | 29 | 217 | 326 | 3.8 |
| | | | | 21921 | 309 | 310 | 1 | 19 | 105 | 172 | 1.4 |
| | | | | 21922 | 310 | 311 | 1 | <5 | 45 | 115 | 1.4 |
| | | | | 21923 | 311 | 312 | 1 | <5 | 62 | 181 | 1.9 |
| | | | | 21924 | 312 | 313 | 1 | 17 | 131 | 590 | 2.0 |
| | | | | 21925 | 313 | 314 | 1 | <5 | 368 | 727 | 2.1 |
| | | | | 21926 | 314 | 315 | 1 | <5 | 98 | 326 | 1.7 |

031081



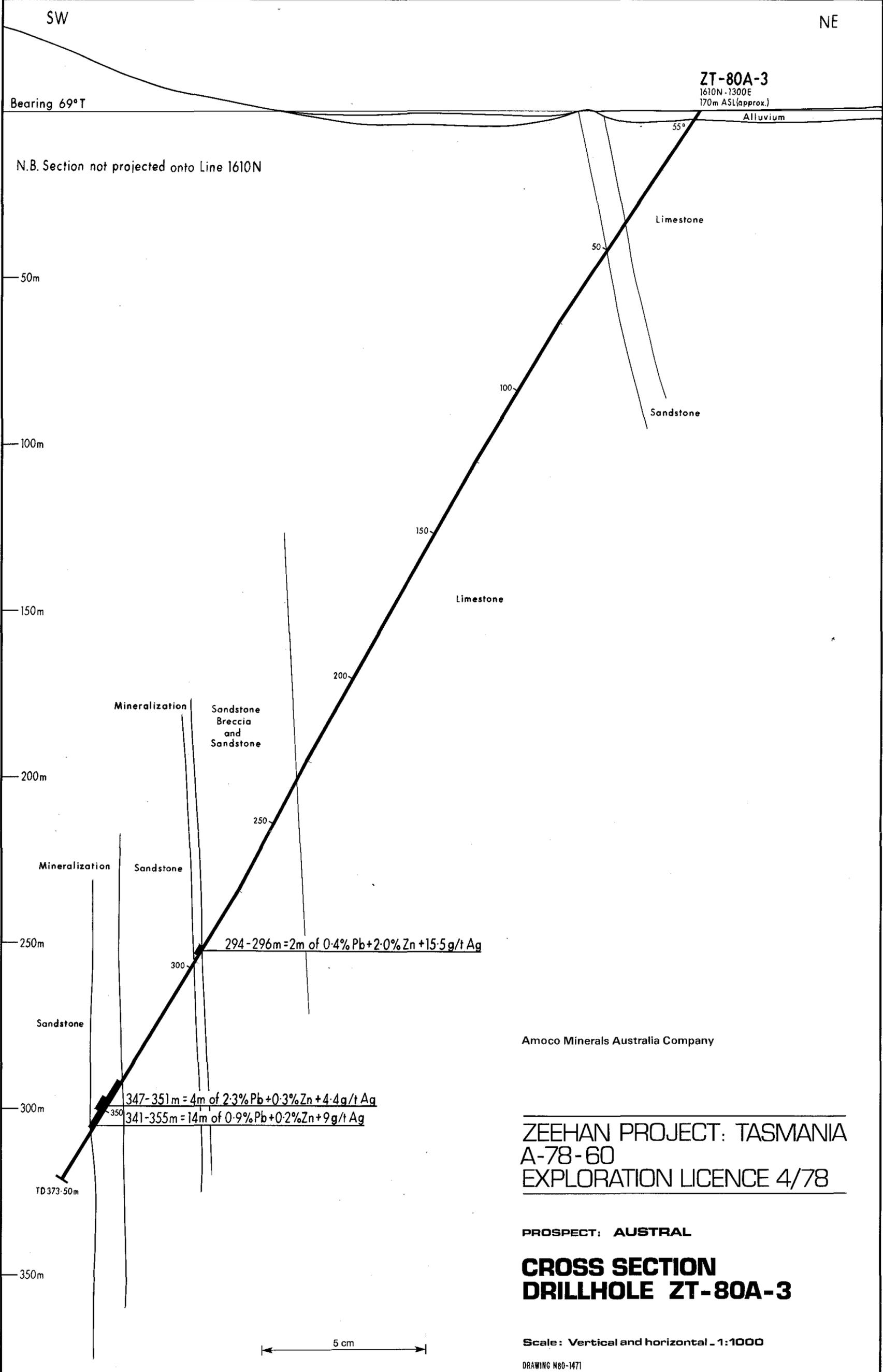
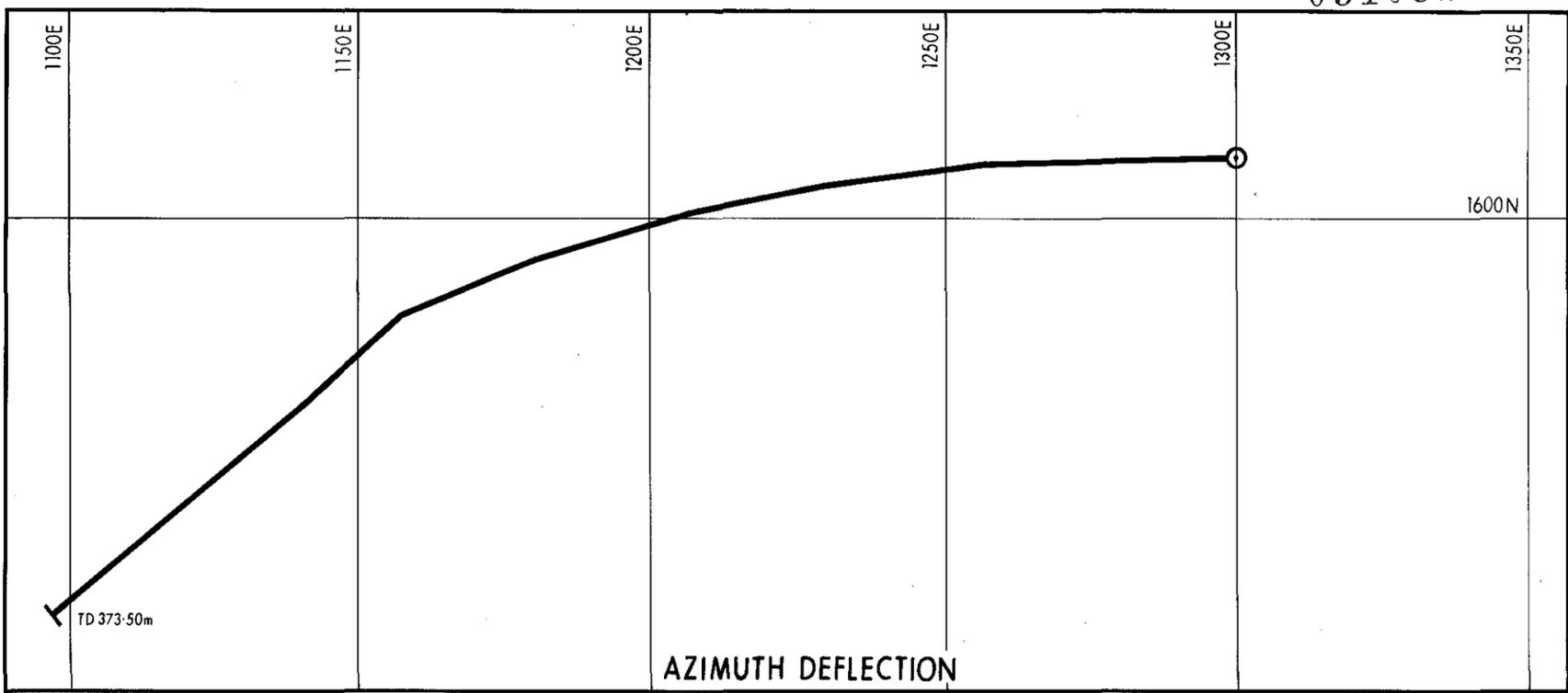
Amoco Minerals Australia Company

DRILL LOG

HOLE No. ZT-80A-2

PAGE 7 OF 7

| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | |
|----------|----|-------------|------------------|---------------|----------|--------|--------|--------|------|----------|-----|
| From | To | | | | From | To | Length | Cu | Pb | Zn | Ag |
| | | | | 21927 | 315 | 316 | 1 | 15 | 1450 | 3160 | 2.9 |
| | | | | - | 316 | 317 | 1 | NO | CORE | RECOVERY | |
| | | | | 21928 | 317 | 318 | 1 | 13 | 79 | 374 | 2.1 |
| | | | | 21929 | 318 | 319 | 1 | 16 | 42 | 194 | 1.9 |
| | | | | 21930 | 319 | 320 | 1 | <5 | 79 | 445 | 2.3 |
| | | | | 21931 | 320 | 321 | 1 | <5 | 107 | 516 | 2.0 |
| | | | | 21932 | 321 | 322 | 1 | <5 | 17 | 67 | 1.6 |
| | | | | 21939 | 322 | 323 | 1 | <5 | 329 | 1112 | 2.2 |
| | | | | 21940 | 323 | 324 | 1 | <5 | 729 | 175 | 2.6 |
| | | | | 21941 | 324 | 325 | 1 | <5 | 1000 | 1332 | 2.6 |
| | | | | 21942 | 325 | 326 | 1 | 48 | 170 | 338 | 4.1 |
| | | | | 21943 | 326 | 327 | 1 | <5 | 94 | 225 | 2.1 |
| | | | | 21944 | 327 | 328 | 1 | 37 | 82 | 329 | 1.9 |
| | | | | 21945 | 328 | 329 | 1 | <5 | 59 | 140 | 2.1 |
| | | | | - | 329 | 330 | 1 | NO | CORE | RECOVERY | |
| | | | | - | 330 | 331 | 1 | NO | CORE | RECOVERY | |
| | | | | END OF HOLE | 331 | metres | | | | | |





| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | | |
|----------|--------|---|-----------------------------------|---------------|----------|----|--------|--------|----------|-----------|----|--|
| From | To | | | | From | To | Length | Ca | Pb | Zn | Ag | |
| 81.00 | 94.50 | CALCLUTITE: grey, slumped, in part pelletal, foliated weakly fossiliferous and moderately calcite veined cavernous calcutite. Minor thin (<2cm) dark grey carbonaceous dolomite interbeds. Cavity 89.5 - 90.80m. Bedding 45° to ca at 87m. | | 22005 | 60 | 61 | 1 | 7 | 894 | 6310 | 2 | |
| | | | | 22006 | 61 | 62 | 1 | <5 | 289 | 2620 | 1 | |
| | | | | 22007 | 62 | 63 | 1 | 7 | 437 | 3070 | <1 | |
| | | | | 22008 | 63 | 64 | 1 | 6 | 844 | 2270 | <1 | |
| | | | | 22009 | 64 | 65 | 1 | <5 | 8700 | 2230 | 4 | |
| | | | | 22010 | 65 | 66 | 1 | <5 | 597 | 3350 | 2 | |
| 94.50 | 105.00 | DOLOMITE: dark grey to black, silty, heavily calcite veined, very soft and broken cavernous dolomite. Cavity 99-102m. Minor push zones. Core very foliated with calcite veins oriented // to ca and sheared out remnants of bedding are oriented sub // to the c.a. Minor breccia zones prevalent (tectonic). | | 22011 | 66 | 67 | 1 | 8 | 319 | 6220 | 1 | |
| | | | | - | 67 | 68 | 1 | NO | CORE | RECOVERY. | | |
| | | | | 22012 | 68 | 69 | 1 | <5 | 88 | 648 | 1 | |
| | | | | 22013 | 69 | 70 | 1 | <5 | 106 | 740 | 1 | |
| | | | | - | 70 | 71 | 1 | NO | CORE | RECOVERY | | |
| | | | | - | 71 | 72 | 1 | " | " | " | " | |
| | | | 22014 | 72 | 73 | 1 | <5 | 80 | 2470 | 1 | | |
| | | | | 73 | 74 | 1 | NO | CORE | RECOVERY | | | |
| 105.00 | 134.00 | CALCLUTITE: pale grey, very foliated (sub // to ca) weakly calcite veined, occasionally pelletal, cavernous (generally push filled) compact rock. Cavities: 107-107.90, 109.50-111.10, 116.10-118.20, 121.80-122.60. No accurate bedding although massive but foliated sequence. | | 22015 | 74 | 75 | 1 | <5 | 25 | 2680 | 1 | |
| | | | | - | 75 | 76 | 1 | NO | CORE | RECOVERY | | |
| | | | | 22016 | 76 | 77 | 1 | <5 | 1269 | 4050 | 1 | |
| | | | | 22017 | 77 | 78 | 1 | 6 | 224 | 671 | 1 | |
| | | | | 22018 | 78 | 79 | 1 | 11 | 212 | 1840 | 1 | |
| | | | | - | 79 | 80 | 1 | NO | CORE | RECOVERY | | |
| | | | - | 80 | 81 | 1 | " | " | " | " | | |
| 134.00 | 145.00 | INTERBEDDED CALCLUTITE/DOLOMITE: light grey non-fossiliferous and fossiliferous, foliated and weakly calcite veined calcutites and calcarenites with interbeds of dark grey silty dolomites from 5-20cm in width. The Dolomite is pyritic and carbonaceous. Bedding 32° to ca at 140m. Microfolding and foliation distort bedding attitudes. | Fine grained disseminated pyrite. | 22019 | 81 | 82 | 1 | 6 | 36 | 280 | 1 | |
| | | | | | 82 | 83 | 1 | | | | | |
| | | | | | 83 | 84 | 1 | | | | | |
| | | | | | 84 | 85 | 1 | | | | | |
| | | | | | 85 | 86 | 1 | | | | | |
| | | | | | 86 | 87 | 1 | | | | | |
| | | | | | 87 | 88 | 1 | | | | | |
| | | | | | 88 | 89 | 1 | | | | | |
| | | | | | 89 | 90 | 1 | | | | | |
| | | | | | 90 | 91 | 1 | | | | | |
| 145.00 | 160.00 | BRECCIATED CALCLUTITE: moderately to strongly calcite veined, brecciated, grey, foliated calcutites with minor interbeds of fossiliferous calcarenites and black carbonaceous dolomites (generally <2 cm in width). | | 91 | 92 | 1 | | | | | | |
| | | | | 92 | 93 | 1 | | | | | | |
| | | | | 93 | 94 | 1 | | | | | | |
| | | | | 94 | 95 | 1 | | | | | | |
| | | | | 95 | 96 | 1 | | | | | | |
| | | | | 96 | 97 | 1 | | | | | | |
| 160.00 | 168.00 | LIMESTONE: white to light grey, massive to laminar, sparry and micritic limestone possibly containing abundant but extremely fine grained pyrite disseminations. Core weakly calcite veined. Cavities 162-163.20, 164-164.50m. Bedding 38° to ca W. So. Massive limestone has tectonically folded and foliated very thin carbonaceous layers present approximately 0.5mm thick. | | 97 | 98 | 1 | | | | | | |
| | | | | 98 | 99 | 1 | | | | | | |
| | | | | 99 | 100 | 1 | | | | | | |
| | | | | 100 | 101 | 1 | | | | | | |
| | | | | 101 | 102 | 1 | | | | | | |
| | | | | 102 | 103 | 1 | | | | | | |
| | | | | 103 | 104 | 1 | | | | | | |
| | | | | 104 | 105 | 1 | | | | | | |
| | | | | 105 | 106 | 1 | | | | | | |
| | | | | 106 | 107 | 1 | | | | | | |
| | | | | 107 | 108 | 1 | | | | | | |
| | | | | 108 | 109 | 1 | | | | | | |
| | | | 109 | 110 | 1 | | | | | | | |
| | | | 110 | 111 | 1 | | | | | | | |
| | | | 111 | 112 | 1 | | | | | | | |
| | | | 112 | 113 | 1 | | | | | | | |

031088



Amoco Minerals Australia Company

DRILL LOG

HOLE No. ZT-80A-3

PAGE 6 OF 7

| METERAGE | | DESCRIPTION | MINERALIZATION % | SAMPLE NUMBER | METERAGE | | | ASSAYS | | | |
|----------|----|-------------|------------------|---------------|----------|-----|--------|--------|------|------|----|
| From | To | | | | From | To | Length | Cu | Zn | Ag | |
| | | | | | 272 | 273 | / | | | | |
| | | | | | 273 | 274 | / | | | | |
| | | | | | 274 | 275 | / | | | | |
| | | | | | 275 | 276 | / | | | | |
| | | | | | 276 | 277 | / | | | | |
| | | | | | 277 | 278 | / | | | | |
| | | | | | 278 | 279 | / | | | | |
| | | | | | 279 | 280 | / | | | | |
| | | | | | 280 | 281 | / | | | | |
| | | | | | 281 | 282 | / | | | | |
| | | | | | 282 | 283 | / | | | | |
| | | | | | 283 | 284 | / | | | | |
| | | | | | 284 | 285 | / | | | | |
| | | | | | 285 | 286 | / | | | | |
| | | | | | 286 | 287 | / | | | | |
| | | | | | 287 | 288 | / | | | | |
| | | | | | 288 | 289 | / | | | | |
| | | | | | 289 | 290 | / | | | | |
| | | | | | 290 | 291 | / | | | | |
| | | | | | 291 | 292 | / | | | | |
| | | | | 22091 | 292 | 293 | / | 12 | 498 | 3640 | 1 |
| | | | | 22092 | 293 | 294 | / | 7 | 535 | 3050 | 1 |
| | | | | 22093 | 294 | 295 | / | 33 | 0.45 | 2.73 | 23 |
| | | | | 22094 | 295 | 296 | / | 12 | 0.29 | 1.37 | 8 |
| | | | | | 296 | 297 | / | | | | |
| | | | | | 297 | 298 | / | | | | |
| | | | | | 298 | 299 | / | | | | |
| | | | | | 299 | 300 | / | | | | |
| | | | | | 300 | 301 | / | | | | |
| | | | | | 301 | 302 | / | | | | |
| | | | | | 302 | 303 | / | | | | |
| | | | | | 303 | 304 | / | | | | |
| | | | | | 304 | 305 | / | | | | |
| | | | | | 305 | 306 | / | | | | |
| | | | | | 306 | 307 | / | | | | |
| | | | | | 307 | 308 | / | | | | |
| | | | | | 308 | 309 | / | | | | |
| | | | | | 309 | 310 | / | | | | |
| | | | | | 310 | 311 | / | | | | |
| | | | | | 311 | 312 | / | | | | |
| | | | | | 312 | 313 | / | | | | |
| | | | | | 313 | 314 | / | | | | |
| | | | | | 314 | 315 | / | | | | |
| | | | | | 315 | 316 | / | | | | |
| | | | | | 316 | 317 | / | | | | |
| | | | | | 317 | 318 | / | | | | |
| | | | | | 318 | 319 | / | | | | |
| | | | | | 319 | 320 | / | | | | |
| | | | | | 320 | 321 | / | | | | |
| | | | | | 321 | 322 | / | | | | |
| | | | | | 322 | 323 | / | | | | |
| | | | | | 323 | 324 | / | | | | |
| | | | | | 324 | 325 | / | | | | |

APPENDIX 3

PETROLOGICAL REPORT - G.G. LOWDER

Lowder Geoscience
Ore Petrology and Exploration Research

031091

PETROGRAPHIC EXAMINATION OF
TEN DRILL CORE SAMPLES
FROM TASMANIA

Report No.: 80/54

21st May, 1980

For: Amoco Minerals Australia Company



G. G. LOWDER
Consulting Petrologist

Sample No. 22107

Rock Type Fine calcarenite/dolomitic, carbonaceous limestone composite

Hand Specimen A fine grained, mostly grey carbonate rock, with lighter and darker coloured masses. These different coloured areas tend to have irregular contacts and graphite is developed along those contacts. The lighter coloured part of the sample effervesces strongly in dilute HCl, whereas the darker material shows distinct but weaker effervescence.

Thin Section Two different types of carbonate rock are represented in the section. One corresponds to the lighter coloured, strongly effervescing part of the hand specimen, while the other corresponds to the darker, less calcite-rich part of the hand specimen. The lighter coloured part of the rock consists of calcarenite in which fairly uniform, subrounded to rounded, detrital grains of cloudy calcite are set in a matrix of finely granular clear calcite. The cloudy detrital grains are themselves very finely granular and many are cryptocrystalline. Most are somewhat elongate in shape and there is a distinct preferred orientation of these grains, indicating primary sedimentary bedding. Average size of these calcarenite grains is of the order of 0.2 mm. Some of them may consist of fossil fragments, especially the more elongate ones, but the others probably represent reworked micritic limestone. Some fossil fragments do occur in this part of the sample and are represented by elongate or curved and spicule-shaped bodies of granular carbonate, generally substantially larger than the arenaceous grains. Although well bedded and clearly the dominant constituent, the detrital calcite grains are not tightly packed and the clear matrix carbonate is also a major component. It is distinctly clearer than the detrital carbonate and displays a grain size of the order of 0.01 - 0.03 mm. An irregular vein of graphite cuts across the bedding direction, and there are numerous very thin veins of clear calcite cutting both bedding and each other. Minor components in this part of the rock include granular titaniferous material, occasional small quartz grains, which are comparable with the detrital calcite grains, and occasional tiny opaque grains that may comprise sulphide but are really too small for positive identification.

The darker part of the sample contrasts quite strongly with the light coloured in terms of texture. It contains numerous rather densely packed, distinctly rhombic crystals of carbonate, set in a matrix

rich in carbonaceous ^{matter.} The carbonate rhombs are fairly uniform in size and average about 0.1 mm. They display a light brownish cloudiness and most are obviously single crystals. Weaker effervescence of this part of the hand specimen implies a dolomite composition for these carbonate rhombs. The precise nature of the matrix enclosing and filling interstices between these rhombs is obscured by the relatively abundant carbonaceous matter. However, there does appear to be a substantial component of calcite, essentially similar to that in the other part of the sample. Small quartz grains also occur sporadically throughout this part of the rock and there are occasional flakes of muscovite. A number of veins of clear calcite cut across the rock and there are a few bodies of calcite that may represent fossil fragments. Graphite is strongly developed along most of the contact between the two lithological types but in one part of the section the seams and stringers of graphite cut into the dolomitic rock and the contact between the two rock types is not graphitic. However, where this occurs the lighter coloured rock is not as arenaceous as elsewhere and is itself separated from the calcarenite by seams and stringers of graphite.

This sample may be described as a composite of fine, somewhat fossiliferous calcarenite and dolomitised limestone. The dolomite is undoubtedly a diagenetic product and it seems to have favoured an originally more carbonaceous phase of the limestone.

Sample No. 22108

Rock Type Partly recrystallised micritic and argillaceous limestone, with syngenetic pyrite.

Hand Specimen A grey, distinctly laminated rock, in which individual layers range up to about 4 mm in width. The layers show some pinching and swelling but are fairly uniform in thickness. There is a rather strong effervescence in HCl.

Thin Section Although this rock is very carbonate-rich and most of that carbonate appears to be calcite, there is also a substantial component of non-calcareous, clastic material. The principal components of the rock are clear rhombs of calcite, rather cloudy micritic carbonate and sericite. These components are mixed in various proportions in different layers and this variation is responsible for the colour lamination visible in hand specimens. Some layers are very rich in the calcite rhombs, and in these cases the calcite averages about 0.1 mm in size and is lightly to densely

packed in a matrix of micrite. In other layers, the micritic carbonate predominates and calcite rhombs are only sparsely scattered through it. Sericite is a major component of some layers, mainly those containing calcite rhombs. The sericite is distinctly foliated, inclined at 20° to the layering. This sericite represents a clastic argillaceous component. Quartz is a rather common minor component, especially in some layers and it seems to show a preference for the micritic limestone. Most of this quartz is probably of detrital origin and other clastic components consist of occasional flakes of muscovite and rare heavy mineral grains, such as tourmaline and zircon. In some layers clear calcite occurs in irregular, relatively coarse grained masses in which the crystals are characterised by strong development of twinning. This obviously constitutes remobilised carbonate. Another minor but important constituent of the rock is pyrite, which occurs quite widely as tiny cubic crystals, both disseminated individually and collected into aggregates and stringers. The pyrite crystals are mostly very small, rarely exceeding 0.05 mm. However, some of the clusters are as large as 0.3 mm in size. Where the pyrite occurs in stringers or loose trains of granules these are conformable with the layering and the sulphide shows a clear preference for certain layers compared ^{with} adjacent ones. In the sericitic limestone the trains of pyrite are parallel to the compositional layering rather than to the sericitic foliation, which is inclined to the layering at about 20°. These features strongly favour a syngenetic origin for the pyrite.

This sample consists of micritic limestone, interlayered with argillaceous limestone and which contains syngenetic pyrite as well as a substantial component of recrystallised carbonate. The recrystallised material is represented by the calcite rhombs as well as by the more irregular coarse grained material. It is noteworthy that in spite of minor but significant syngenetic pyrite, the rock lacks carbonaceous material. Its grey colour in hand specimen is apparently the result of ^a combination of cloudy micritic calcite and sericite derived from primary clay.

Sample No. 22109

Rock Type Reworked fragments of fossiliferous limestone enclosed in carbonaceous micritic limestone host.

Hand Specimen A coarse grained fragmental rock with irregular,

commonly angular bodies of lighter coloured carbonate enclosed in a fine grained dark grey carbonate matrix. Both the lighter and darker parts of the rock effervesce rather strongly ⁱⁿ/HCl.

Thin Section In spite of the rather variable and obviously fragmental nature of this rock in hand specimen, there are essentially only two lithologies. One consists of fossiliferous micritic limestone and this occurs as fragments within a carbonaceous limestone host. The fossiliferous limestone is somewhat cloudy but is not generally carbonaceous, with graphite occurring only along veins or stringers that may in part represent incipient fractures. Biogenic material includes large fragments of coralline matter, displaying well defined cellular structure, porous fragments of ?bryozoan origin and shelly fragments, including small complete shells. The fossils are generally composed of relatively clear carbonate and are inclosed in very fine or cryptocrystalline micritic carbonate. A number of subparallel veins of clear carbonate cut through the fossiliferous limestone fragments. There are also a few minute grains of sulphide.

The host rock is very carbonaceous but it also incorporates numerous small, clear calcite rhombs and many elongated or irregular patches of clear calcite. The carbonaceous/^{matter}tends to be concentrated into interconnected, strongly parallel stringers, and much of the clear carbonate in this rock is oriented/^{parallel}to those stringers. The carbonaceous matter occurs within a very fine grained carbonate material, essentially cryptocrystalline micrite. Other components, such as sericite, may be important but their possible presence is obscured by the abundant graphite. A few grains of quartz occur within this part of the rock and there are occasional detrital flakes of muscovite. A number of smaller fossil fragments do occur within the carbonaceous limestone but they are not as prominent nor as numerous as in the lighter coloured, non-carbonaceous limestone.

This sample consists of a composite of reworked, fossil fragmental limestone enclosed in a very carbonaceous, mainly micritic limestone host. The abundance of fossiliferous material in the lighter coloured rock implies close proximity to a reef structure and the occurrence of this limestone as fragments in a carbonaceous host suggests reworking of reef limestone into a chemically reducing back-reef environment.

Sample No. 22110

Rock Type Fossil fragmental limestone

Hand Specimen A light grey, relatively coarse grained and coarsely fragmental limestone. There is very strong effervescence in HCl.

Thin Section Although substantial recrystallisation has taken place in this rock and there are a number of cross-cutting veins, biogenetic origin for the rock is clearly defined as there are numerous fragments of fossiliferous material. Some of the fossil fragments are like those in the previous sample but the biogenic material is much more abundant and generally occurs in larger pieces than in the previous case. There are very few recognisable complete fossils and most of the fragments consist of porous or cellular coralline or bryozoan material. These fragments are commonly rather elongate in shape and show a distinct though not universal preferred orientation that represents primary sedimentary bedding. The fossil fragments are quite densely packed and are tightly cemented by coarse grained clear calcite, which generally shows very strongly developed twinning. In addition to the fossil fragments the rock contains a few clasts of micritic limestone, characterised by extremely fine grain size and cloudy appearance. Most of the carbonate in the section is clear or only lightly clouded and in the case of fossil fragments the structure is commonly displayed by a combination of clearer and more cloudy carbonate. The section displays no recognisable compositional or grain size layering.

Other components of the rock are quite few but there are occasional sandy quartz grains, which are of the order of 1 mm in size and show substantial reaction and partial replacement by carbonate around their margins. Graphite is developed in a number of places as irregular veins or stringers that are clearly of post consolidation origin. They show no relationship to bedding and their precise mode of formation is uncertain. A very minor fine clastic component is represented by occasional flakes of muscovite and these tend to be best developed where detrital quartz is most abundant. Tiny cubes and anhedral granules of opaque matter are quite abundantly scattered through the rock and much of this material seems to consist of pyrite. However, the minute size of most of these opaque grains (commonly below 0.01 mm) makes precise identification difficult without polished section.

Origin of this rock as reworked fossiliferous material is obvious. Most of the fossil fragments appear to consist of coralline material and they range up to about 5 mm in size. Although they are commonly very elongate their outlines are mostly quite well rounded and this implies reworking by wave action. The sample is therefore described as fossil-fragmental limestone derived by reworking of a nearby reef. Minor micritic limestone and quartz clastic material have been incorporated with the biogenic fragments and the presence of graphite as irregular veins is probably a diagenetic feature. The fine sulphide, on the other hand, is likely to be of syngenetic origin. The absence of clearly syngenetic graphite in this rock may be an indication of deposition in an open fore-reef environment.

Sample No. 22111

Rock Type Mineralised, complex recrystallised carbonate rock

Hand Specimen A coarsely mottled and somewhat fragmental rock with a large mass of white or light grey calcite and numerous irregular light brown bodies of more dolomitic composition. This is indicated by strong effervescence in the case of the white part of the sample and much weaker effervescence in the case of the brownish material. Sulphide mineralisation occurs in a dark carbonate host between the white and brown varieties.

Polished Thin Section Carbonate occurs in several forms in this section and most of it is in recrystallised or other secondary form. The light coloured part of the hand specimen consists of a granular mosaic of calcite, most of it fairly fine grained (below 0.5 mm) but some of it very coarse grained and quite spary in nature. All of this carbonate but especially the coarse grained material shows strong development of shadowy extinction, indicating deformation. Twinning is very well developed in the finer mosaic but is not so prominent in the very coarse grained, spary calcite. In section the coarse grained calcite is distinctly brownish and contrasts with the finer grained material which, apart from some cloudiness due to twinning, is clear. Quartz is a minor component in this part of the rock.

The remainder of the sample is much more variable in character. That part of the section which corresponds to the brownish areas in hand specimen contains irregular bodies^{of} very cloudy and partly hematite-dusted carbonate, which is possibly dolomite or siderite rather than calcite

(these areas do not effervesce in the hand specimen). There are also bodies of rhombic carbonate which is quite brownish in colour in section and corresponds to the darker areas in the hand specimen. This dark colour is due to an abundance of graphite filling the interstices between the carbonate rock. Weak effervescence in this part of the sample suggests that the carbonate rhombs here consist of dolomite. Enclosing and flooding between these irregular bodies there is a large amount of clear carbonate which shows strong shadowy extinction and commonly displays a somewhat concentric structure. It is of medium grain size and strong effervescence indicates calcite composition.

In the mineralised part of the rock the carbonate is mostly micritic and quite cloudy in nature but there are some coarser grained and rhombic crystals of clearer colour. Irregular veins of calcite are also present. The sulphide mineralisation is present partly as very fine to dusty material and partly as more massive, irregular aggregates. These tend to be interconnected in a skeletal or spongy manner. Examination of the section in reflected light shows that the opaque matter consists very dominantly of galena but there are a few grains and small spongy masses of pyrite. Sphalerite also occurs to a limited extent, generally intergrown with the galena. Pyrite is somewhat more abundant in the less mineralised parts of the sample, including both the very light coloured part and the brownish material. A small amount of sphalerite is associated with pyrite in these areas but galena seems to be largely confined to the dark areas.

This is a complex carbonate rock which has undergone much modification and major recrystallisation of the original carbonate sediment. Although the sulphide mineralisation developed may ultimately be of syngenetic origin its present form is very much that of remobilised sulphide and this is consistent with the evidence of recrystallisation expressed elsewhere in the sample.

Sample No. 22112

Rock Type Carbonate-altered, slumped, argillaceous quartz sandstone and carbonaceous shale

Hand Specimen The sample contains light grey, sandy siliceous pods which are enclosed in a fine grained, grey carbonate matrix. The pods tend to be elongate in shape and are aligned roughly parallel. Some of the

Pods appear to consist of contorted lenses. Several white calcite veins cut the sample and graphite is prominent on fractures.

Thin Section

This rock differs from all of those before it in this group because it is essentially a quartz sandstone with a carbonate cement. Sandy quartz grains, constitute about 50% of the rock and are set in a matrix of foliated granular carbonate. Quartz grain size ranges from 0.1 mm up to 3 mm but most grains are between 0.2 and 1 mm in size. In shape the grains range from subangular to well rounded. Strain extinction is commonly developed in the quartz grains but its intensity varies and this is probably an inherited feature, in the quartz/^{already}at the time of deposition as a sediment. A few of the quartz grains consist of recrystallised aggregate and there are a number of grains which comprise spherulitic masses of quartz, reminiscent of silicified acid volcanic groundmass. Furthermore, some of the cherty fragments could be silicified cryptofelsite. The only other obviously clastic components in this rock consist of occasional quartz mica lithic fragments and some of these incorporate tourmaline.

Most of the remainder of the sample consists of carbonate. Strong effervescence in the hand specimen confirms that this carbonate is largely calcite and it has an usual mode of occurrence. The mineral forms strongly parallel, rather prismatic crystals which fill interstices and other spaces between the sandgrains, with a well developed preferred orientation and a distinctive foliated mosaic. In some places this carbonate mosaic is not quite as dense as elsewhere and it is possible to recognise foliated argillic material which seems to act as a matrix to the granular carbonate; where the carbonate is more massive, as it is in most of the section, it appears that the carbonate has formed by replacement of the earlier argillic material. Carbonate also occurs as replacement of primary detrital quartz grains, at least to some extent, as there are ⁱⁿseveral places veins of calcite which extend across otherwise unaltered detrital quartz grains. Carbonaceous material is generally lacking from this sandy rock but it does occur in several irregular stringers or masses of carbonate that appear to represent shaly lenses in the original rock. These correspond to the darker parts of the hand specimen and consist of micritic carbonate, with scattered rhombs of calcite and a matrix of clay and graphite. In a few places the argillic material becomes dominant but generally the fine grained carbonate predominates. A prominent vein of relatively coarse grained, strongly twinned brownish carbonate cuts across the section.

This is a hybrid rock which contains both clastic and chemical sediment components. The clastic component originally consisted very largely of quartz, with traces of heavy minerals, and a matrix that appears to have been rather argillic. The presence of lenticular bodies of more argillic matter in the section suggests that the original clastic sediment underwent some penecontemporaneous slumping, with the sandy layers of the original sediment breaking up into lenticular or elliptical pods. The carbonate was probably precipitated later as a diagenetic product. Subsequent remobilisation produced the coarse grained veins. The original sediment was thus probably a laminated quartz sandstone and carbonaceous siltstone. The great dominance of quartz in the sandstone indicates substantial maturity as a sediment and the carbonaceous/^{nature}of the shale indicates quiet conditions of deposition. There is no evidence therefore that this sample was deposited in reasonable proximity to a limestone reef. The presence of possible acid volcanic debris is of uncertain significance.

Sample No. 22113

Rock Type Graphitic argillaceous limestone

Hand Specimen A grey, fine grained, carbonaceous rock, with prominent graphite on fractures. Strong effervescence in HCl indicates that calcite is a major component. A vague lamination or lenticular layering is visible and there are a number of discrete, lighter coloured lenses or pods.

Thin Section This rock is generally rather uniform and is quite fine grained. Carbonate is the dominant constituent and includes both micritic material and discrete rhombs of calcite. In some parts of the section the carbonate is mostly clear and there is only very minor carbonaceous material. These areas tend to be lenticular in shape and correspond to the lighter coloured pods visible in hand specimen. In most of the section, however, carbonaceous material is abundant and forms strongly parallel lenticular or stringer-like masses. These wrap around and are concentrated between rhombs of carbonate and are intergrown with a fine grained matrix which seems to consist of a mixture of sericite and micritic carbonate. In most of the section the sericite is rather difficult to distinguish from the fine carbonate, but it becomes more obvious in the thinner parts near the edge of the section. The sericite itself seems to be quite well foliated, essentially parallel to the layering defined by the carbonaceous matter.

Quartz is a minor component, occurring as small grains scattered sporadically throughout. All of these phases are quite fine grained, generally below 0.07 mm in size. There are in addition irregular to lenticular bodies of somewhat coarser grained, clear to brownish recrystallised carbonate. Originally detrital muscovite flakes occur quite commonly throughout the rock and are invariably oriented parallel to the bedding direction indicated by the carbonaceous stringers. Some fine sulphide occurs as disseminations throughout the section but the grain size is generally too fine for its ready recognition in thin section, especially where the carbonaceous material is abundant. Nevertheless, it certainly appears that this sulphide is a syngenetic component and it occasionally forms larger cubes, of the order of 0.05 mm in size.

The rock has a hybrid origin, as it contains components of clastic origin as well as chemical sediment. The clastic material was mostly clay when deposited and is now represented by sericite. The chemical component includes substantial calcite and later dolomitisation may also have occurred. The rather abundant carbonaceous matter is closely associated with the presence of argillaceous material. The pods of cleaner carbonate may represent penecontemporaneous slumping, or they may be the product of more massive diagenetic alteration. The rock may be described as graphitic argillaceous limestone.

Sample No. 22114

Rock Type Fine quartz sandstone

Hand Specimen A brown, very siliceous rock which is mottled by cross-cutting white quartz veins. There is no effervescence in HCl.

Thin Section This sample contrasts with all of the previous ones in this group because it contains only a small proportion of carbonate. Quartz is by far the dominant constituent and original clastic, sandy texture has undergone substantial modification as a result of authigenic overgrowth. In some areas the detrital grains are still clearly defined because the cement is not siliceous, but in much of the section the original clastic quartz grains have been cemented by authigenic quartz and as a result the clastic texture has been converted to a more or less granular mosaic. Grain size of the original quartz sediment was generally

rather fine, mostly below 0.3 mm and sorting is rather good. Rounding is not so well developed and most grains could be described as subangular to subrounded, although there has probably been some modification as a result of diagenetic activity. Many of the grains are somewhat elongate in shape and these tend to be aligned parallel; this structure undoubtedly reflects primary bedding but there is no discrete grain size or compositional layering. The detrital quartz grains show commonly strong but variable strain extinction and this is probably inherited from the parent rock.

Detrital heavy mineral grains are rather common in this rock and consist mainly of zircon and tourmaline. Rutile also occurs in a number of places but appears to be partly of secondary origin. Detrital mica flakes are also quite common and consist of muscovite. Other clastic components include grains of cherty material and lithic fragments that comprise quartz and fine mica. Some of the cherty/could be of acid volcanic origin but there are no spherulitic grains like those in Sample 22112. Opaque grains are quite commonly scattered through the rock and although most appear to consist of clastic heavy mineral grains, there are a few discrete crystals of pyrite.

Although there is no effervescence in the hand specimen this rock does contain fairly conspicuous carbonate, which occurs as a cementing material throughout much of the section. However, it is by no means continuous and in some parts of the section the cement was originally argillic and is now composed of sericite, while elsewhere authigenic quartz has cemented the detrital grains. Where carbonate does occur it tends to be distinctly brownish to reddish in colour, with high relief and distinct pleochroism. These properties make calcite unlikely and lack of effervescence confirms this, but the true identity of the carbonate is uncertain, although dolomite or iron carbonate is quite likely. Several thin, discontinuous veins of carbonate penetrate the section and there are a number of quartz veins, including relatively coarse, granular types as well as more finely granular veins that may represent incipient shear zones. The rock may be described as quartz sandstone which incorporates a conspicuous detrital heavy mineral component and is cemented by quartz, carbonate and clay (now sericite). It is a mature sediment and the relatively good sorting and massive character suggests fairly deep water deposition. The heavy mineral assemblage favours a granitic provenance.

Sample No. 22115

Rock Type Impure calcarenite

Hand Specimen A grey, partly rather coarse grained and distinctly fragmental rock. Graphite is visible on some fractures and there is strong effervescence in HCl.

Thin Section This is an arenaceous carbonate rock which contains abundant sandy carbonate grains, derived from both chemical and biogenetic parent material, together with clastic quartz grains in a fine carbonate matrix. In some parts of the section the sandy grain size is fairly uniform but generally it is quite variable and ranges up to about 2 or 3 mm. Most clastic grains, however, are below 1 mm in size. The detrital carbonate grains are mostly quite well rounded and this applies to both micritic clasts and to fossil fragments. Detrital quartz grains are not quite as well rounded and most are in the subangular to subrounded category. However, the shape of quartz grains have been modified by post depositional reaction and replacement by carbonate around their margins. The micritic carbonate fragments are mostly rather cloudy and are somewhat more abundant than fossil fragments. The latter includes both cloudy and clear types and they are commonly of larger size than the micritic limestone fragments. Most of the biogenic material is rather finely cellular in structure and is probably bryozoan or coralline material. Many of the carbonate clasts are somewhat elongate in shape and these are quite strongly aligned, indicating bedding. The orientation of this bedding is fairly uniform throughout the section so that although the rock has a somewhat brecciated appearance there cannot have been much rotation between adjacent fragments. Strain extinction is generally present in the quartz clasts but is variable in intensity and ranges from mild to extreme, with some grains comprising recrystallised aggregate. Some of the quartz crystals are cut by veins of carbonate and many show serrated margins due to replacement by carbonate around both margins. Occasional grains of mica and tourmaline are incorporated with the quartz grains in the calcarenite host. Throughout the rock the cementing material is clear calcite which shows strong twinning.

The section also contains a number of areasⁱⁿ which the clastic carbonate grains appear to be lacking and quartz grains are mixed with rhombs of carbonate, generally clear, and there is much cryptocrystalline

cloudy carbonate as a matrix. These areas also incorporate significant carbonaceous matter around grain margins. It is not clear whether these areas represent recrystallised calcarenite or whether they were originally more micritic limestone which has undergone recrystallisation. The latter is perhaps favoured by the presence of carbonaceous matter which suggests also an original argillaceous component. Quartz tends to be more abundant in these areas and is thus consistent with a more dominantly clastic component. These carbonaceous areas probably consist of lithic fragments incorporated into the calcarenite mud, or else they are products of some penecontemporaneous slumping of more argillaceous and micritic material originally interbedded with the calcarenite. A small amount of pyrite is associated with the carbonaceous matter and also occurs sporadically within the calcarenite. A trace of sphalerite was also noted. These sulphides appear to be essentially syngenetic, especially as they are quite closely related to the presence of carbonaceous matter.

The dominant lithology represented in this rock is calcarenite in which the clastic debris is of both calcareous and terrigenous origin. The calcareous/^{material}predominates and includes both chemical and biogenic fragments. Relatively good rounding of the calcareous fragments indicates significant reworking but relatively poor sorting of the fragments implies rather short distance of transport. A likely environment of deposition is therefore in close proximity to a reef where rounding was affected by wave action but transport was relatively short and did not allow thorough sorting. The rock may be described as impure calcarenite with fossil fragmental, micritic and terrigenous clastic components.

Sample No. 22116

Rock Type Mineralised and altered, carbonaceous and ?fossil-
fragmental limestone.

Hand Specimen The rock has a rather striking appearance, with light coloured, vaguely cellular or biogenic material enclosed in finer grained and much darker rock. There is no effervescence in HCl.

Polished Thin Section Strong recrystallisation has affected this rock and its original texture is substantially modified as a result. It consists very dominantly of carbonate but in view of the lack of effervescence in HCl

this carbonate clearly does not include calcite. Grain size of the carbonate is somewhat variable but is generally fairly fine, below 0.5 mm and averaging 0.1 mm. Some of the carbonate is more or less clear but most of it is distinctly brownish and pleochroic. Almost all of the carbonate displays a very distinctive wavy or shadowy extinction, like that seen in Sample 22111. This could be due to deformation of the rock but there is no substantial development of deformation twinning and the shadowy extinction may be simply the product of recrystallisation. There is no significant difference in the nature of the carbonate between the lighter coloured and darker coloured parts of the sample but the colour variation is due to the presence of carbonaceous matter along grain boundaries in the darker parts of the rock. The carbonaceous material appears to have been substantially remobilised and concentrated into grain boundaries as a result of recrystallisation and the coarse cellular structure visible in the hand specimen may be a relict of biogenic origin but recrystallisation has destroyed any original fine texture.

A subordinate but quite conspicuous terrigenous component is present in this rock, mainly in the form of sandy quartz grains which range up to about 2 mm in size. These are generally subrounded in shape but many show clear evidence of partial replacement by carbonate. Some of the grains consist of recrystallised aggregate and most others show rather/^{strong}strain extinction. Tourmaline also occurs sparingly as a detrital component. No bedding or other primary structures remain recognisable in this rock.

A small amount of sulphide is present in this rock and is rather more conspicuous than in the previous sample because it forms aggregates up to almost 1 mm across. These tend to be concentrated in what appear to have been open spaces within the cores of more coarsely recrystallised and clearer carbonate and similar cavities occur elsewhere without sulphide or only partly filled by sulphide. Both opaque sulphide and sphalerite are present and the sphalerite is of pale yellow colour, with some reddish patches. In reflected light it is apparent that the sphalerite is accompanied principally by galena, which not only occurs in aggregates but is also present in narrow, discontinuous veinlets. A trace of pyrite is associated with the galena and sphalerite, and small grains of chalcopyrite are not uncommon. Many of the sulphide grains which are disseminated throughout this rock are extremely minute, of the order 1 to 10 μ m. The very fine grain size of much of this sulphide favours syngenetic origin, especially where it is associated with carbonaceous matter, but the coarser grained aggregates and

veins of galena/sphalerite have clearly undergone local remobilisation. Pyrite is more widespread than the other sulphides in dusty form, but some galena and chalcopyrite and possibly some sphalerite does occur in this form.

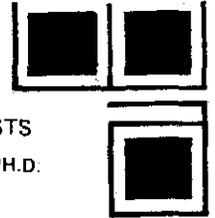
Origin and depositional environment of this rock have been obscured by thorough recrystallisation. Nevertheless the structure of the lighter coloured or yellowish areas visible in hand specimen strongly favours a biogenic origin for those parts of the sample. At the same time, the preservation of substantial carbonaceous matter in the remainder of the rock implies affinity with the carbonaceous limestone described earlier. It seems likely therefore that the rock originally consisted of fossil-fragmental material incorporated in a carbonaceous micrite host. A significant terrigenous component is represented by the grains of quartz and tourmaline that are scattered through the rock. These grains are present both in the carbonaceous areas and in the lighter coloured areas which are thought to be of biogenic origin, so this raises some doubt as to the precise nature of those coarsely cellular or concentric structures. Although optical properties are not truly diagnostic it is quite possible that the carbonate in this rock consists of siderite. There is undoubtedly some significance in the association of thoroughly recrystallised and chemically modified carbonate with lead-zinc sulphide mineralisation, especially as the same relationship was noted in Sample 22111. Although the sulphide is essentially syngenetic it has undergone at least local remobilisation and may have been introduced into the rock during diagenetic alteration rather than in the earlier primary depositional stage. The rock may be described as mineralised, altered, carbonaceous and ?fossil-fragmental limestone.

APPENDIX 4

PETROLOGICAL REPORT - A.W.G. WHITTLE

031108

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MINERALOGICAL REPORT

AMOC 1/80

SAMPLES 21401 - 21405, TASMANIA.

Phil Jones (letter : no order number) 18.12.79.

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SAMPLES 21401 - 21405 Tasmania

The report was prepared from observations on the thin and polished sections of five drill core samples which were submitted by Mr F. Jones. Comments as requested, are embodied in the descriptions.

21401, 91-92m Interformational ankerite - carbonaceous
ZT-79-2 ankerite breccia with syngenetic sulphides.

(91.65) The sedimentary host rock has the structure of an interformational breccia. The irregularly shaped ankeritic fragments have a wide range of sizes; and they are separated from each other by a very dark coloured amorphous carbonaceous-ankeritic medium.

The mode of distribution of galena and sphalerite is very irregular. In what appeared to be an average section through the core sample, only minor amounts of these sulphides were intersected.

Fine grained euhedral, as well as framboidal pyrite of a few microns - 0.03 mm sizes, are fairly evenly dispersed through both the ankerite fragments, and the highly carbonaceous ankeritic medium.

Partly oxidised galena, sphalerite and framboidal pyrite coexist with dolomite and silica within incompletely filled elongate and lobulate cavities in parts of the dark carbonaceous-ankeritic medium. The galena and the sphalerite have colloform texture; while most of the dolomite and silica are in minutely crystalline aggregates. Together, the galena,

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dolomite, silica and sphalerite coexist as open space fillings in the cavities within the sedimentary breccia. These minerals appear to have formed by precipitation from mobile solutions within the sediment; together with groups of framboidal pyrites. While most of the dolomite is fine grained, there are a few single crystals of 0.2 - 0.4 mm size.

The bulk fabric of the sediment is the brecciated ankerite. Its texture is defined by closely spaced rounded, polygonal and subhedral ankerite grains of about 0.1 mm size. Such grains preserve in full, the characteristic of chemically precipitated carbonates. Through most of the ankeritic fabric, these ankerite grains are separated by thin films of black amorphous material, and occasional anisotropic hydrocarbon.

Most of the interfragmentary material is black carbonaceous material with occasional anisotropic hydrocarbon. The total of this within the core sample is about 20%. The cavity fillings are mainly within this material.

The textural evidence points to the probability that the light coloured dolomite, the less prominent silica, and the sulphides, formed during the period of sedimentation; but after the development of the interformational breccia. This was in effect, penecontemporaneous dolomitisation with minor silicification, and the growth to larger sizes, of sulphides (and some of the dolomite), which were concentrated from the surrounding host rock.

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21402, 125-126m**ZT-79-2****(125.05)**Slump and interformational brecciation in carbonaceous ankerite, with contemporaneous dolomitisation and sulphide redistribution.

The structure in the core combines slump and interformational features. There were along what appear to be bedding, many elongate solution cavities which were almost completely filled by dolomite crystal clusters, localised quartz clusters, and some sulphides.

The slumped and brecciated host rock fragments are mainly dark grey carbonaceous ankerite. Amongst these, there are lobulate fragments of black highly carbonaceous ankerite, which contains a larger pyrite content than the less carbonaceous ankerite.

Most of the pyrite in this rock is present as fine irregularly disseminated euhedra of a few microns - 0.1 mm grain size. Framboids are sparsely distributed.

The distribution of galena and sphalerite is highly irregular; and these sulphides are very much coarser than the pyrite, especially where they are complexed with the dolomite cavity fillings.

The galena and sphalerite occur separately or together, as elongate clusters, and as vein-like open space fillings. In all forms, the sulphides are surrounded by aggregates of fine grained dolomite and minor quartz. In this habit, the galena has grain sizes of up to 1.0 mm, and the sphalerite up to 0.4 mm. The lengths of the galena veins is several cm.

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In thin fractures of about 1 mm thickness through the carbonaceous ankerite fragments, there are additional continuous open space fillings by galena alone.

Galena of 0.15 mm maximum size, and sphalerite of less than 0.02 mm size, exist at random sites within the fragments of carbonaceous ankerite. These finer sulphide grains are at their inherent sites amongst the fine pyrite in the host rock; whereas the coarser galena and sphalerite located in the cavities, was precipitated slowly with dolomite from solutions migrating through the rock. This coarser galena and sphalerite was however, indigenous (i.e. syngenetic) within the ankerite; but was progressively concentrated into the open spaces amongst the fragments of the host rock.

The textural characteristics of the carbonaceous ankerite medium, and of the black carbonaceous material, are comparable with those in the rock at 91 - 92 m. The phenomenon of post-slump cavity filling is tantamount to penecontemporaneous dolomitisation in an ankeritic chemically formed carbonaceous sediment.

21403, 124-125m. Fractured-brecciated carbonaceous ankerite
ZT-79-2 with penecontemporaneous dolomitisation
(124.30m) and sulphide redistribution.

Most of the core is the dark coloured carbonaceous ankerite host rock; and this displays much fracturing and partial brecciation. There was widespread open space filling by light coloured dolomite and by associated galena and sphalerite; as in the former sample.

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The dark carbonaceous host rock contains disseminated fine syngenetic pyrite of a few microns grain size, as well as galena and sphalerite of coarser sizes. The maximum size of the latter is 0.15 mm at sites where carbonaceous material is most abundant. Rarely, the galena is associated with the syngenetic pyrite; but in general at inherent sites, the pyrite, galena and sphalerite exist as separate grains.

Larger proportions of coarser galena and sphalerite than are present in the host rock, are associated with the light coloured dolomite. The sizes of this mobilised and redeposited galena and sphalerite vary respectively, up to 1.2 mm and 0.3 mm. Both exist separately as clusters intergrown with and surrounded by dolomite open space fillings; and to a lesser extent as thin veinlets through the dolomite crystal aggregates.

By and large, the textural, structural and compositional features of this core, are comparable with those of the foregoing samples.

21404, 133-134 m. Intercalated carbonaceous ankerite and
ZT-79-2 carbonaceous horizons with syngenetic sulphides.
 (133.50)

A non-fractured, non-brecciated slump folded structure is the feature of this core sample. The bedding is clearly manifest in the thin and folded, wholly carbonaceous lamellae which are present at close irregular intervals between the thicker moderately carbonaceous ankerite horizons. Very small fillings by lighter coloured carbonates exist at wide intervals along the slumped interfaces.

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Migratory lead and zinc sulphides are not present in this rock. In an average cross section through the core, the bulk of sphalerite is much greater than that of galena. The sphalerite is principally confined to the thin wholly carbonaceous lamellae where, at a maximum grain size of 0.15 mm, continuous strings of granules of sphalerite constitute 5 - 10% of the bulk of these thin lamellae.

Most of the sphalerite in the wholly carbonaceous lamellae contains numerous 5 - 10 micron inclusions of syngenetic pyrite, and in some cases, small numbers of galena and carbonate inclusions of 10 - 20 microns size.

In the dark moderately carbonaceous ankerite beds, 5 - 7% fine euhedral, as well as framboidal pyrites, exist in roughly stratiform distributions. Associated with the pyrite, but more irregularly dispersed, there are less than 0.5% sphalerite grains of 0.06 mm maximum size, and about 0.2% galena grains of smaller size.

21405, 163-164m. Slowly crystallised, chemically formed
carbonaceous highly sphaleritic ankerite,
ZT- 79-2
(163.95) with carbonaceous fragments.

The texture of the carbonates in this core is principally subhedral; hence general crystallisation appears to have occurred by slow progressive precipitation in a marine environment.

Carbonaceous material, and a great abundance of sphalerite, as well as sparse quartz silt, are widely dispersed

-7-

amongst the intergrowths of the ankerite crystals. Elongate, irregularly folded, and apparently slump-brecciated fragments of thin very highly carbonaceous lamellae are randomly distributed in rough parallelism amongst the moderately carbonaceous ankeritic rock.

Amongst the crystallised carbonate intergrowths there are 10 - 15% irregularly polygonal sphalerite grains of 0.05 - 0.5 mm size. Some exist as inclusions within carbonate grains; others exist in intergranular sites amongst the carbonates; while others coexist with the carbonaceous material within the carbonate aggregates. All components appear to have formed together by chemical precipitation in an aqueous medium.

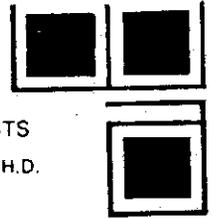
In addition to copious sphalerite, there are at random sites, clusters of several galena grains of 0.1 - 0.2 mm size. The total of galena in this habit is about 0.5%. A similar proportion of galena is made up of minute galena inclusions in some of the sphalerites; and of thin galena selvages upon some sphalerite grains. There is 1% irregularly disseminated fine pyrite of a few microns size, as well as sparse euhedral pyrite crystals 0.05 mm size.

In the highly carbonaceous slump brecciated fragments amongst the bulk mass of carbonaceous ankerite, the fine pyrite is more abundant; there is 1 - 2% sphalerites of 0.01 - 0.03 mm size; and occasionally there are clusters of galena grains of 0.5 - 1.0 mm size.

..... *H. W. G. Whittle* G. WHITTLE
24.1.80.

031116

A. W. G. WHITTLE & ASSOCIATES



CONSULTING MINERALOGISTS
ALICK W. G. WHITTLE, M.SC., PH.D.

P.O. BOX 102
STANSBURY, S.A. 5582
PHONE (088) 52 4281

MINERALOGICAL REPORT

AMOCO 2/80

Samples 21501 - 21506, Tasmania.

P. Jones, O.N. E 6258

8/2/80.

DISTRIBUTION

Copy 1 Mr P. Jones
 Amoco Minerals
 C/O Crocoite Caravan Park
 ZEEHAN Tas. 7469.

Copy 2 The Supervising Geologist
 Amoco Minerals Australia Company
 P.O. Box 949
 NORTH SYDNEY 2060.

21501 - 21506 : Tasmania.

The report was prepared from observations on the polished thin sections of samples which were submitted by Mr Phil Jones.

Comments in respect to the sulphide and gangue components, and their grain sizes, are embodied in the descriptions.

The samples exhibit evidence for complete recrystallisation of the sulphides, and some of the associated gangue. There may also have been some concentration and separate segregation of the sulphides by virtue of metamorphic mobilisation. In some samples there are sheared-brecciated fragments of chloritic-sericitic shale, of chloritised felsic volcanic material, and of dolomite. This suggests a syngenetic origin for the sulphides in a volcanogenic sedimentary sequence.

21501 Completely oxidised, secondary mineral-impregnated,
ZT-79-1 sheared-brecciated chloritic shale and dolomite.

(136.40m) The fully oxidised core sample retains none of the original lead and zinc, sulphides. These are manifest in secondary carbonates, in yellow-brown jarosites, and in colloform banded goethite. There are no boxwork structures from these sulphides; but rhombic carbonates, marcasite and pyrrhotite boxworks are present in some parts of the core.

Elongate separated fragments of both chloritic shale/slate,

-2-

and of a fine grained ankeritic dolomite, exist amongst the secondary metal oxysalts and goethite. The original host rock may have been a brecciated-sheared sequence of chloritic shale and dolomite.

The rhombic carbonate, marcasite and pyrrhotite boxwork exist together in elongate clusters which extend parallel with the mode of orientation of the remnants of the host rock. Black colloform goethite exists amongst and around these boxwork structures.

The secondary cerussite and smithsonite, together with the jarosite minerals, filled fractures, and other open space along the shears in the brecciated host rock. These fractures and shears exist around and within the limonite-impregnated complex of host rock fragments, carbonate and iron sulphide boxwork. It is probable that sphalerite and galena boxwork did not form because of the reactivity with the coarse carbonate gangue (manifest in boxwork), and the finer carbonate host rock. The iron sulphide boxwork formed preferentially because of its greater abundance, and the highly acidic nature of ferrous and ferric sulphates.

Amongst the very fine grained secondary jarosite clusters, it is probable that both plumbojarosite, and argentojarosite are present. At the fine grain size, these cannot be separately distinguished from the common jarosite.

The mineralisation appears to have involved the iron sulphides and carbonate gangue, together with galena and sphalerite.

-3-

21502
 TAS CROWN
 (N^m Cavavan
 Park)

Sheared-brecciated-recrystallised-boudinaged
 banded quartz-ankerite-galena-sphalerite ore, with
 fine pyrite and tetrahedrite.

The sample displays partial oxidation of the sulphides; and the presence of a few scattered small galena and sphalerite boxworks. These are associated with limonite-stained cerussite and smithsonite.

In the transverse section through the ore, there is a discontinuous foliation structure between the thicker masses of the sulphides, and the thinner intergrowths of ankerite. The carbonate foliae appear to have been brecciated; while the stressed-recrystallised sulphides appear to have been boudinaged amongst the disconnected portions of these foliae. The carbonates within these foliae are associated with a small amount of quartz; and both the quartz and ankerite, have been recrystallised.

In grain boundary junctions; along cleavages; and in fractures through the carbonate and quartz intergrowths, there are numerous thin veinlets, films and selvages of galena; but little of the sphalerite was redistributed in this way. Most of the sphalerite in the ankerite-quartz foliae is in the form of irregularly shaped and elongate aggregates of 0.2 x 0.2 - several mm x 0.5 mm sizes. Some galena and fine pyrite are enclosed in the sphalerite.

The bulk of the sulphides is within relatively thick foliae which consist mainly of galena. The mass of galena incorporates stressed-fractured-brecciated foliae of sphalerite of 2 mm thickness; and numerous elongate individual fragments of

-4-

sphalerite. These have a wide size range.

The galena also encloses irregularly scattered ankerite and quartz fragments which are generally less than 0.5 mm in size.

There are within the galena, 1 - 2% pyrite grains of a few microns - 0.2 mm size; and more numerous tetrahedrite grains of 0.01 - 0.03 mm size. Both the pyrite and tetrahedrite granules are dispersed in parallel-disposed strings of granules, and in elongate clusters through the galena.

The grain size of the galena is not apparent, except from occasional cleavage manifestations. The galena appears to have recrystallised into extensive masses of anhedral of less than 0.1 mm grain size.

The copper content arises in part from sparse minute chalcopyrite grains; but mainly from the tetrahedrite granules. The latter are the source for the silver. The cadmium is most probably a substitution component in the sphalerite.

21503. Stressed-recrystallised banded galena-sphalerite ore,
with fine pyrite, jamesonite, argentite, stannite,
native bismuth.
 ZT-79-2
 100-120

This sample contains amongst separate foliae of galena and sphalerite, less than 1% of each of very fine ankerite and quartz. Small amounts of galena exist in the sphalerite foliae; and sphalerite within the galena bands. The junction between the bands is very irregular because of interpenetration which

-5-

resulted from stress and complete recrystallisation.

The galena bands consist principally of strongly contorted crystals of 1 - 3 mm sizes. The intergrowths of the stressed galena anhedral incorporate about 5 - 10% sphalerite grains of 0.01 - 0.5 mm size. These are strung out along the banded structure with finer pyrite, sparse gangue, minute 1 - 10 micron elongate particles of an anisotropic sulphosalt, and occasional stannites of 0.05 - 0.08 mm size. The latter exists along the contacts of the sphalerite inclusions within the galena.

The sulphosalt particles occur locally in swarms within the galena. This sulphosalt appears to be jamesonite, although the particles are rather too minute to allow a positive identification. Within the swarms of jamesonite there are elongate 0.05 - 0.15 mm long grains of argentite, and occasional native bismuth of less than 0.02 mm size.

The zinc-rich bands consist of prominent polygonal zonally-textured crystals of sphalerite of 0.1 - 0.5 mm size. In grain boundary junctions amongst these, there are galena, sparse fine pyrite and occasional quartz and ankerite grains. Vein-like extensions of galena from the galena bands, extend into the sphalerite bands.

-6-

21504 Massive stressed-recrystallised galena, with
ZT-79-2 sphalerite, fine pyrite and jamesonite.

100-120 The massive-structured intergrowth of highly contorted galena crystals incorporates parallel-aligned single fragments and elongate aggregates of sphalerite, sparse fine ankerite and quartz. There is about 15% sphalerite amongst 75% galena. Individual galena grains are 2 - 4 mm in size; while the sphalerites are in the size range 0.01 - 0.8 mm.

In addition to these major sulphides, there are sparse fine pyrites (1 - 10 microns), small localised swarms of minute jamesonite needles (5 - 10 microns), but neither tetrahedrite, argentite nor stannite. From this section, the trace amounts of silver and tin cannot be accounted for; nor is there evidence for 25% zinc.

21505 Massive recrystallised sphalerite, with sparse galena
ZT-79-2 and fine pyrite.

100-120 Zonally-textured, recrystallised sphalerite crystals of several mm size, make up 80% of the bulk of the sample. Elongate recrystallised quartz intergrowths, quartz-sericite intergrowths, and occasional ankerite, are dispersed in rough parallelism through the sphalerite aggregate. Amorphous carbonaceous material is associated with these intergrowths. Some 5% galena is irregularly dispersed through the intergranular boundaries within the sphalerite aggregate.

The ore contains less than 1% very fine pyrite; but none of the sulphosalts noted in former samples, were detected.

-7-

The grain size of the galena is highly variable to a maximum of 0.6 mm.

The proportions of galena and sphalerite are incompatible with the assay quoted.

21506 Stressed-recrystallised banded galena-sphalerite
ZT-79-2 in brecciated chloritised felsic volcanic rock.

100 - 120 Aggregates of polygonal zonally-textured recrystallised sphalerites of 0.5 - 2.0 mm size, make up 65% of the bulk of the sample. The total of about 20% galena is mainly in areas separate from the sphalerite; and about 5% of the galena is in grain boundary areas amongst the sphalerite.

In the areas separately occupied by prominent galena or prominent sphalerite, there are 10 - 15% quartz, quartz-sericite-chlorite, or ankerite in fine grained aggregates.

The size of the galena in the sphalerite-rich areas ranges from a few microns - 4.0 mm. In addition, there are thin continuous selvages amongst the sphalerite crystals. The gangue minerals noted above, and sparse fine pyrite of less than 0.05 mm size, also exist amongst the sphalerite.

The galena-rich areas embody 10% sphalerite crystals of 0.05 - 2.5 mm size, as well as irregularly distributed gangue minerals, and sparse fine pyrite. The grain size of the galena anhedral is 3 - 5 mm; and all of the crystals are extensively distorted.

-8-

The fine grained sulphosalts which were noted in former specimens do not appear in either the galena or sphalerite, hence the trace amount of silver and tin, noted in the assays, cannot be accounted for in this case.

The banded-recrystallised lead-zinc ore appears to be associated with a chloritised-sericitised felsic volcanic host rock. This rock may have been brecciated.

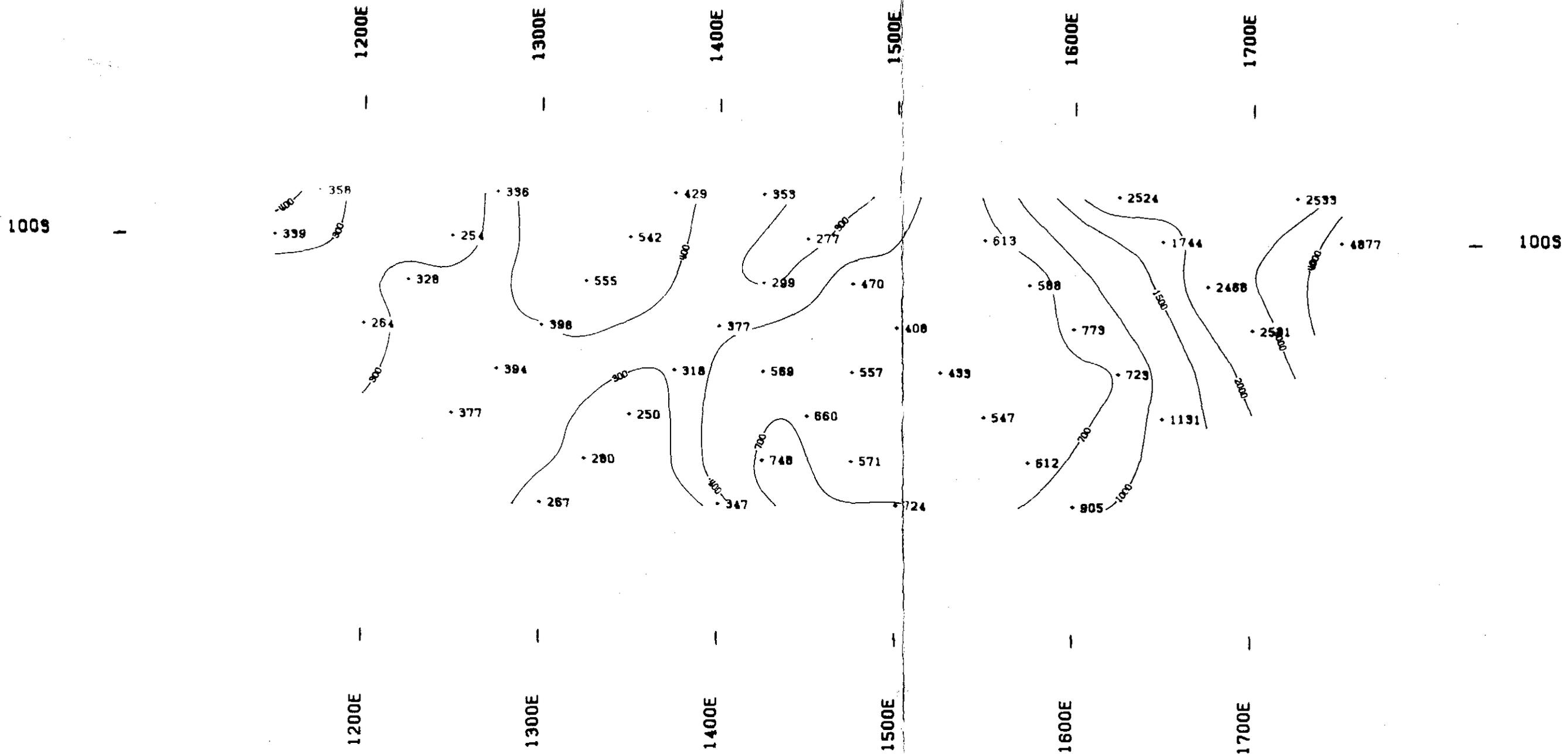
A.W.G. Whittle

A.W.G. WHITTLE,

25th February 1980.

APPENDIX 5

INDUCED POLARIZATION SURVEY - PROFILES



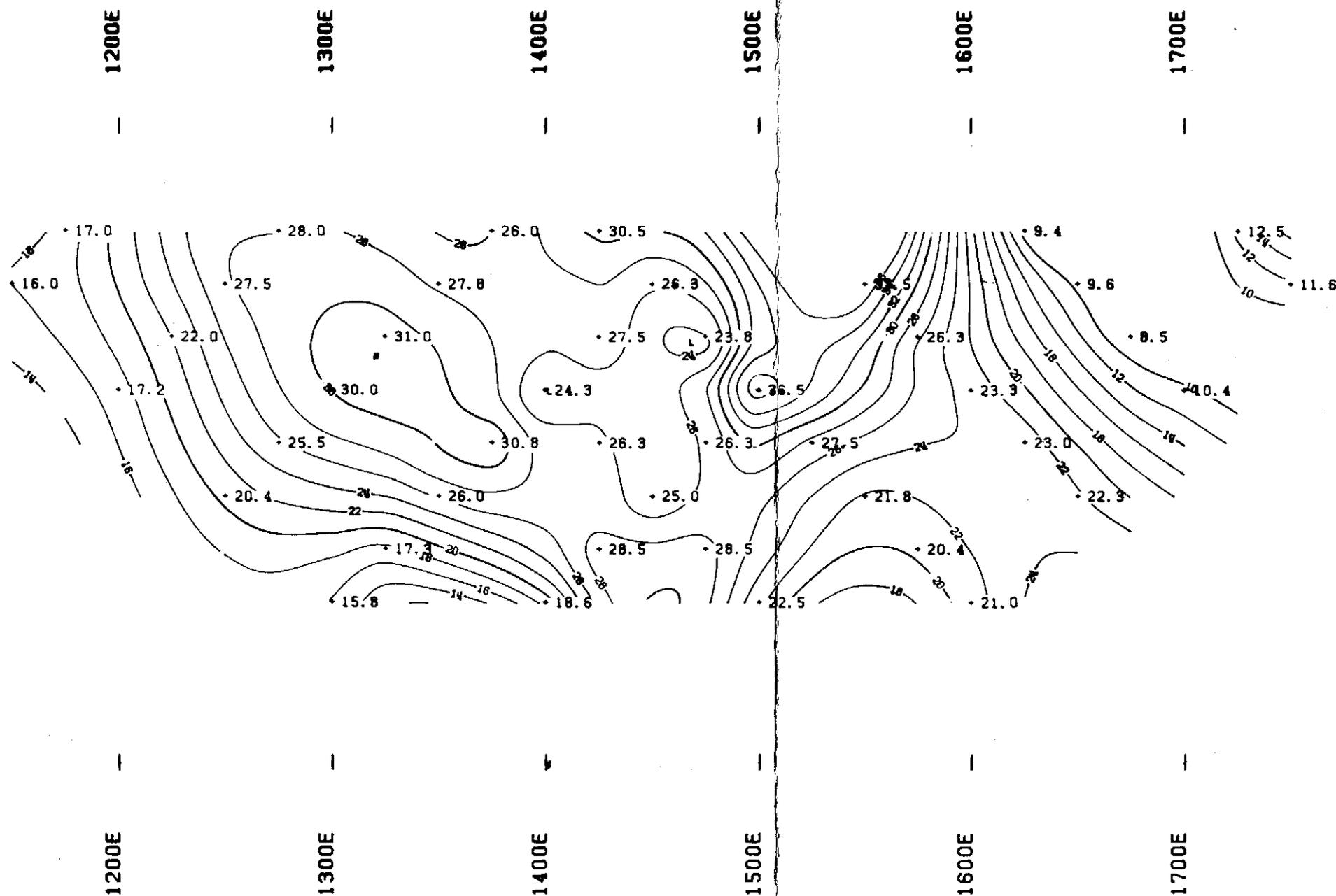
A-78-60 ZEEHAN OCEANA GRID 100M DIPOLE-DIPOLE RESISTIVITY
 LINE 3200N SCALE=1:2500 DATA BY SCINTREX JAN 1980

5 cm

"A"

1009

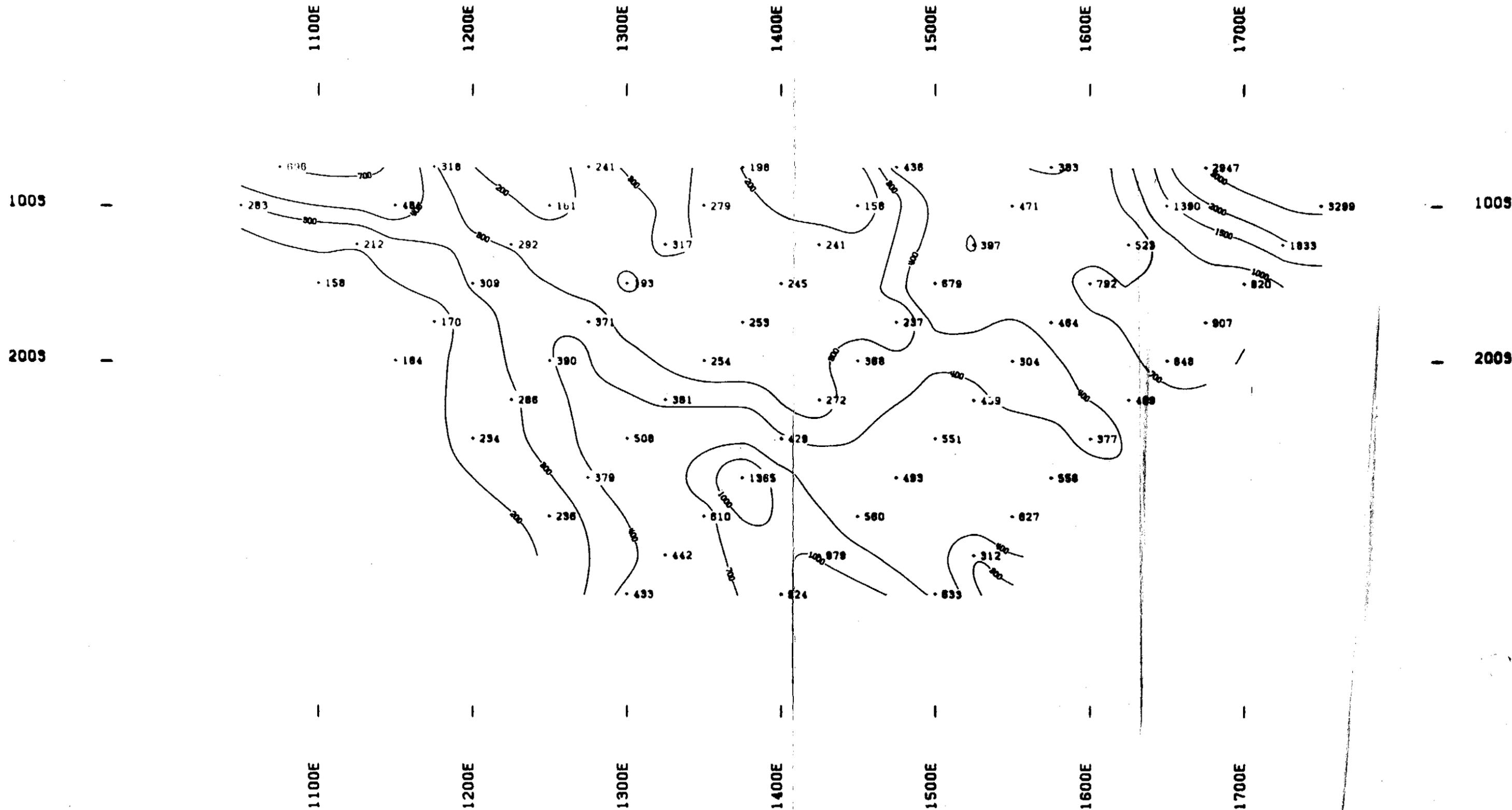
1005



A-78-60 ZEEHAN OCEANA GRID 100M DIPOLE-DIPOLE CHARGEABILITY
 LINE 3200N SCALE=1:2500 DATA BY SCINTREX JAN 1980

5 cm

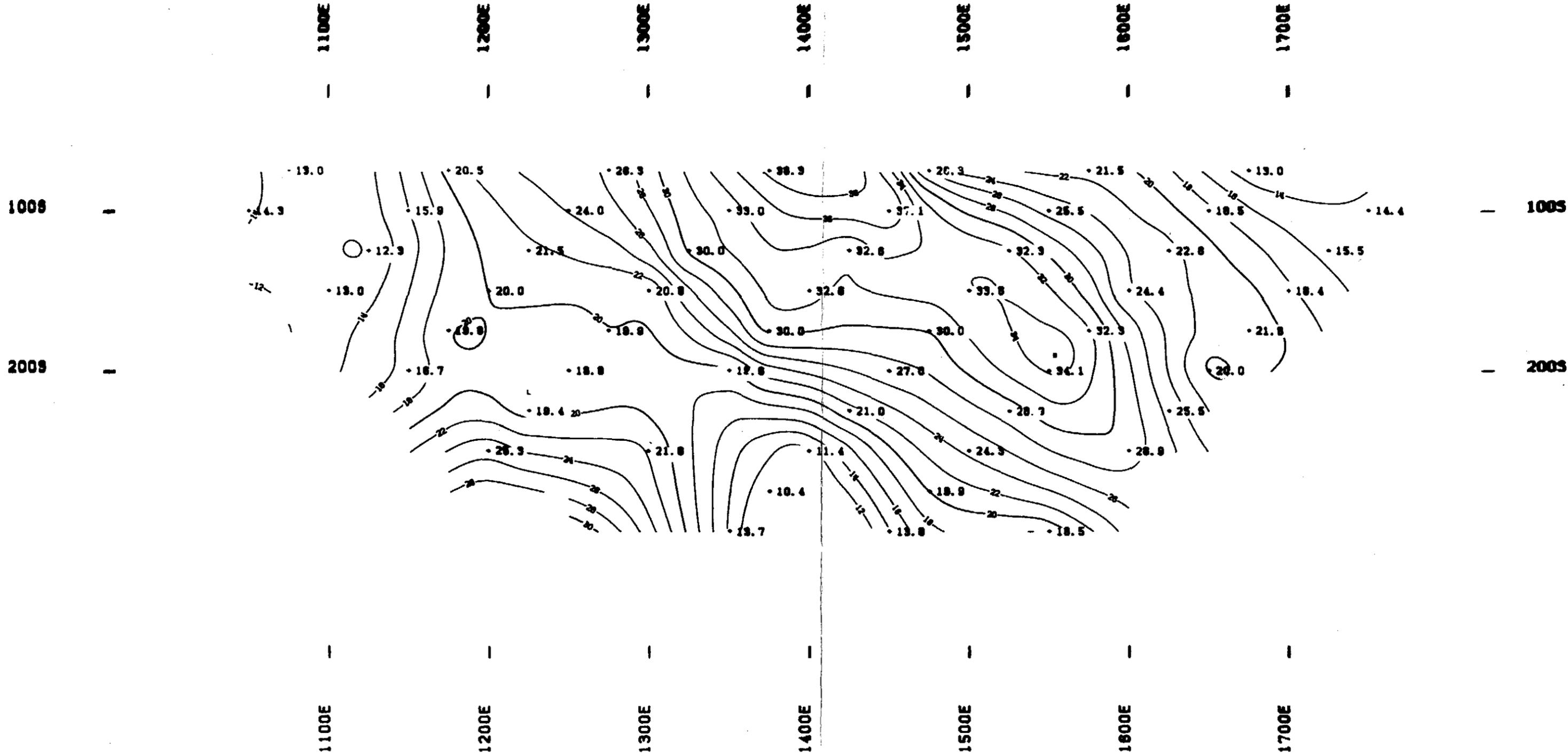
"B"



A-78-60 ZEEHAN OCEANA GRID 100M DIPOLE-DIPOLE RESISTIVITY
 LINE 3500N SCALE=1:2500 DATA BY SCINTREX JAN 1980

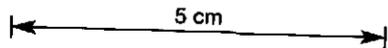
5 cm

"C"



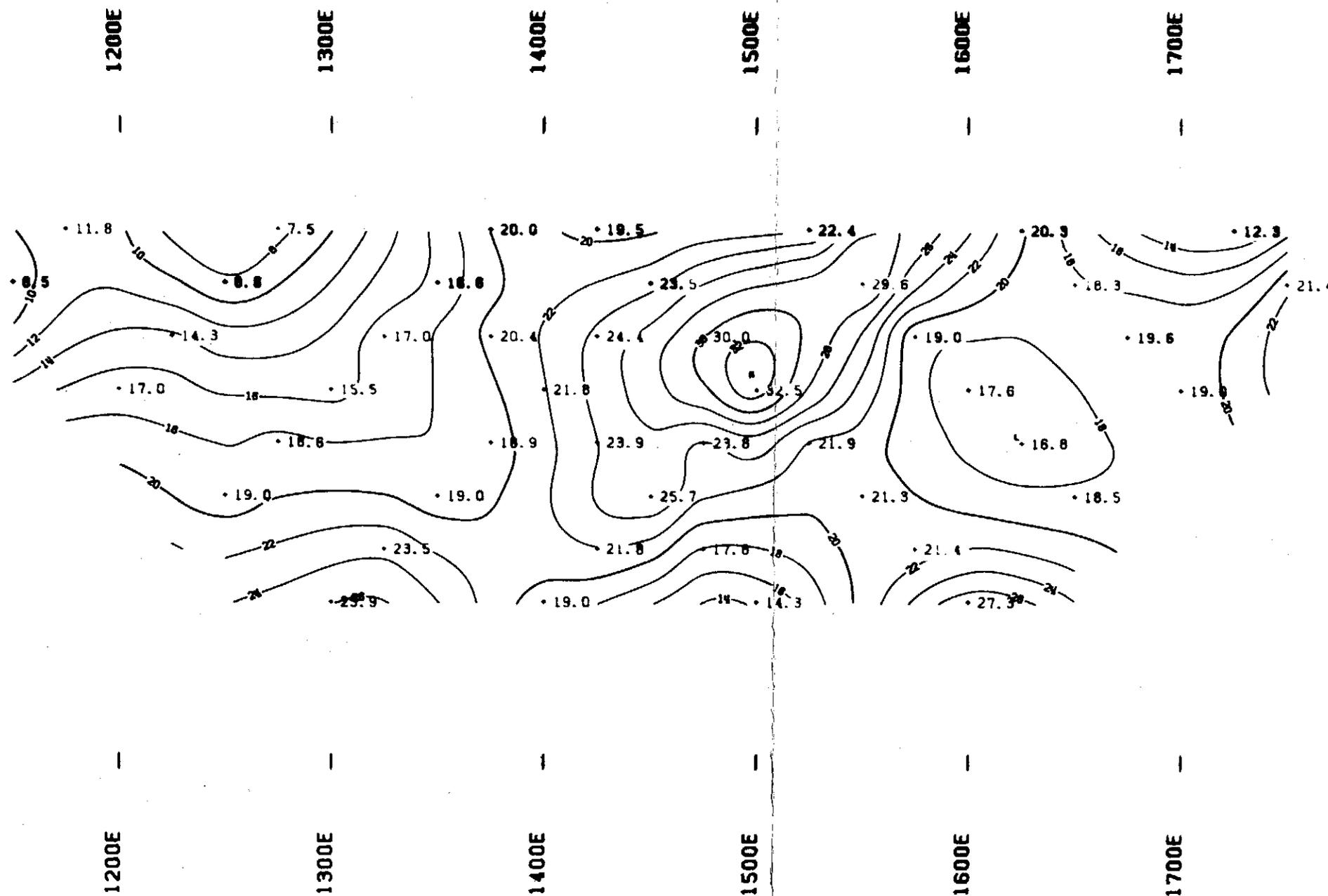
A-78-60 ZEEHAN OCEANA GRID 100M DIPOLE-DIPOLE CHARGEABILITY
 LINE 3500N SCALE=1:2500 DATA BY SCINTREX JAN 1980

"D"



1009

1009

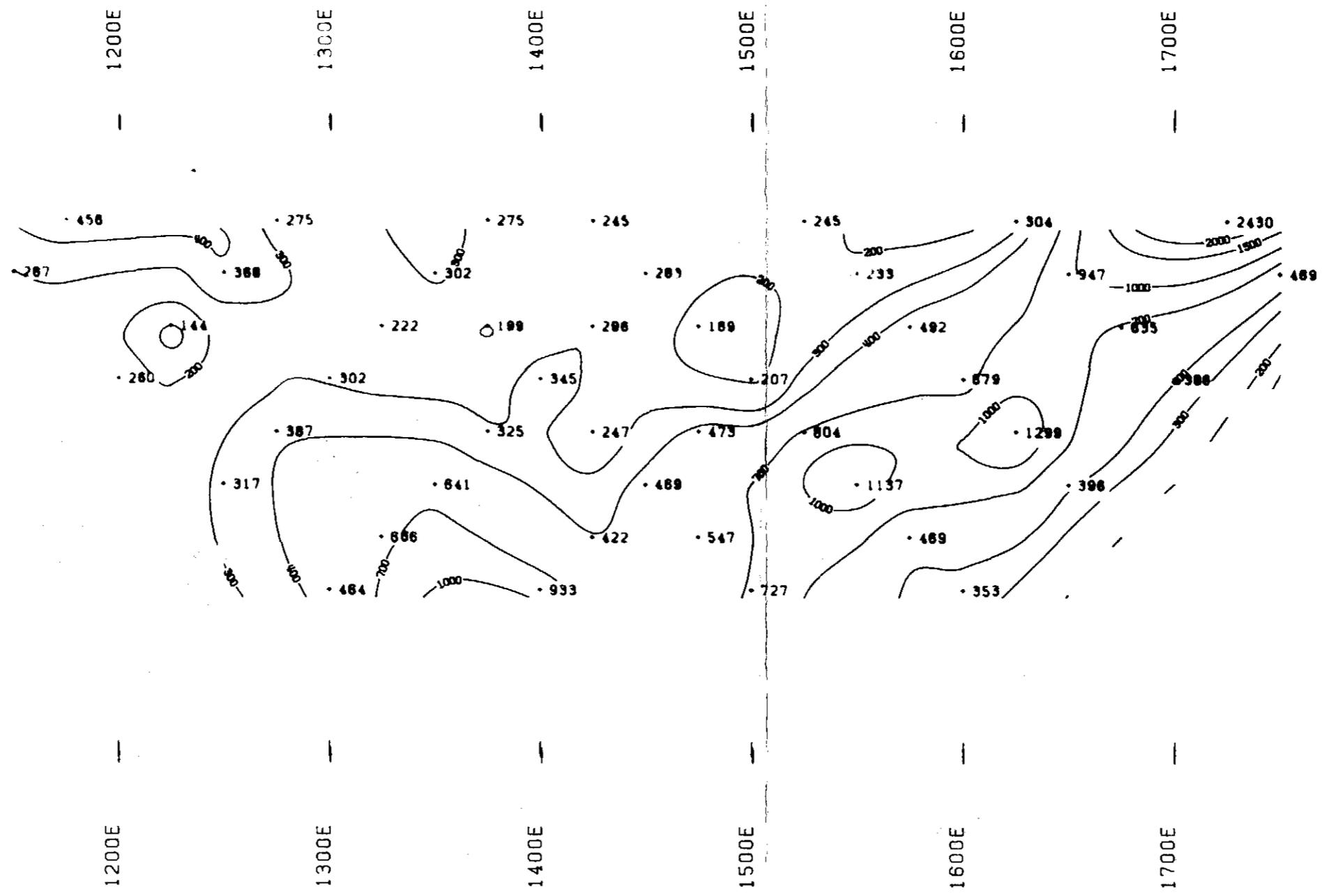


A-78-60 ZEEHAN OCEANA GRID 100M DIPOLE-DIPOLE CHARGEABILITY
LINE 3700N SCALE=1:2500 DATA BY SCINTREX JAN 1980

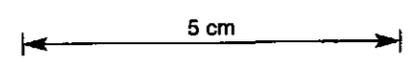
5 cm

100S

100S



A-78-60 ZEEHAN OCEANA GRID 100M DIPOLE-DIPOLE RESISTIVITY
 LINE 3700N SCALE=1:2500 DATA BY SCINTREX JAN 1980



"E."

APPENDIX 6

PULSE ELECTROMAGNETIC SURVEY - PROFILES

031133

LINE 1400N DOWN COMP.

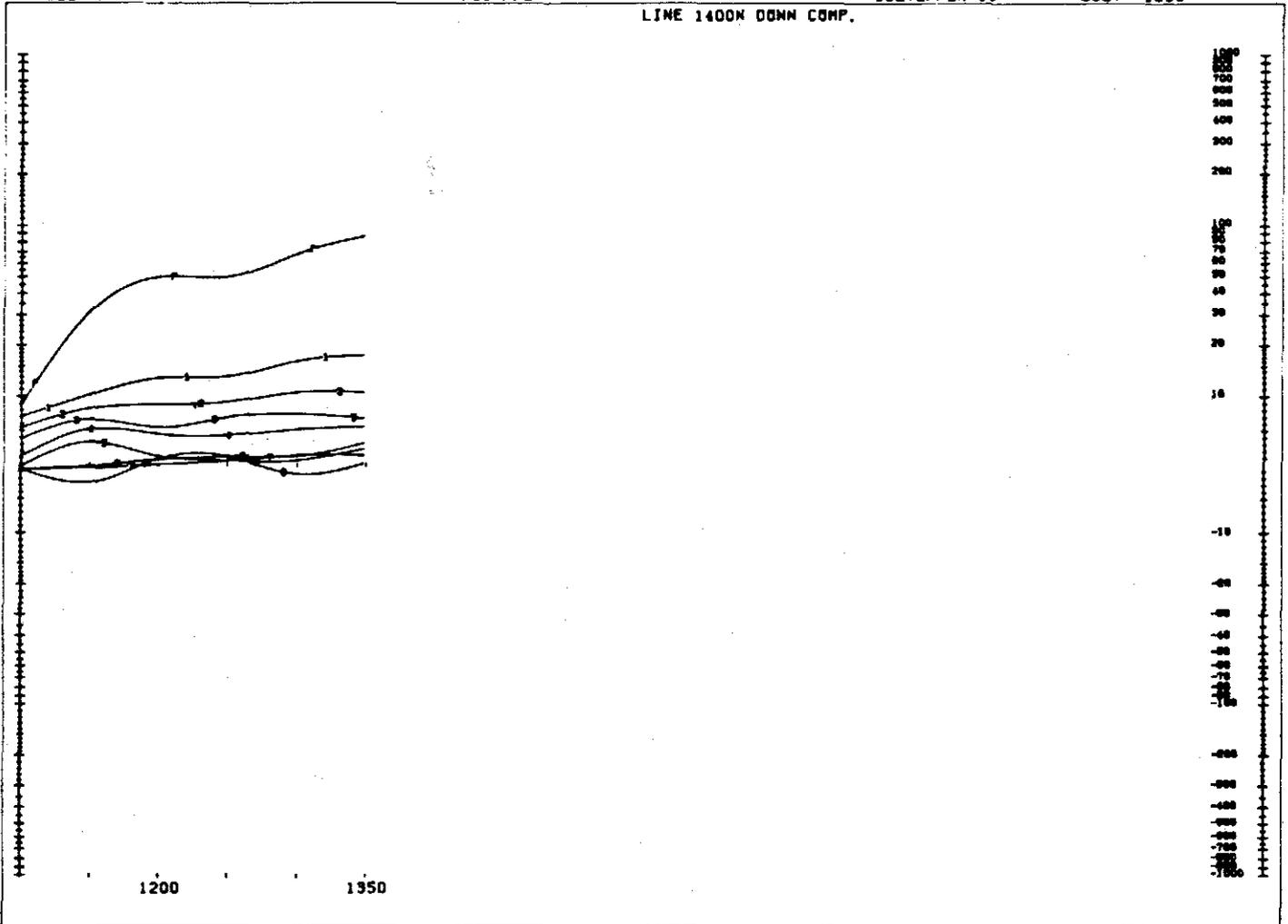
ZEEHAN

AUSTRAL

GOETERREX-9C

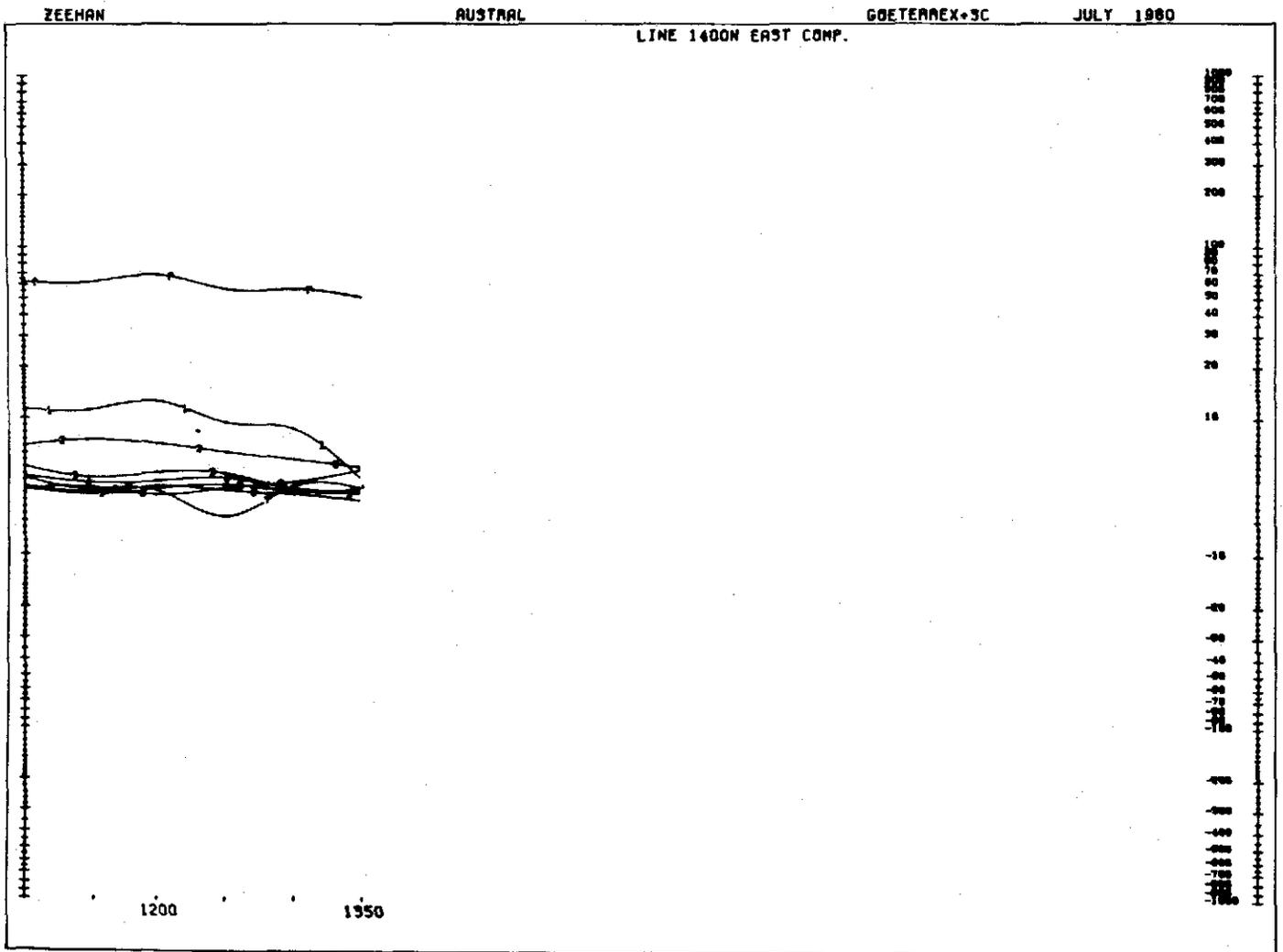
JULY 1980

LINE 1400N DOWN COMP.



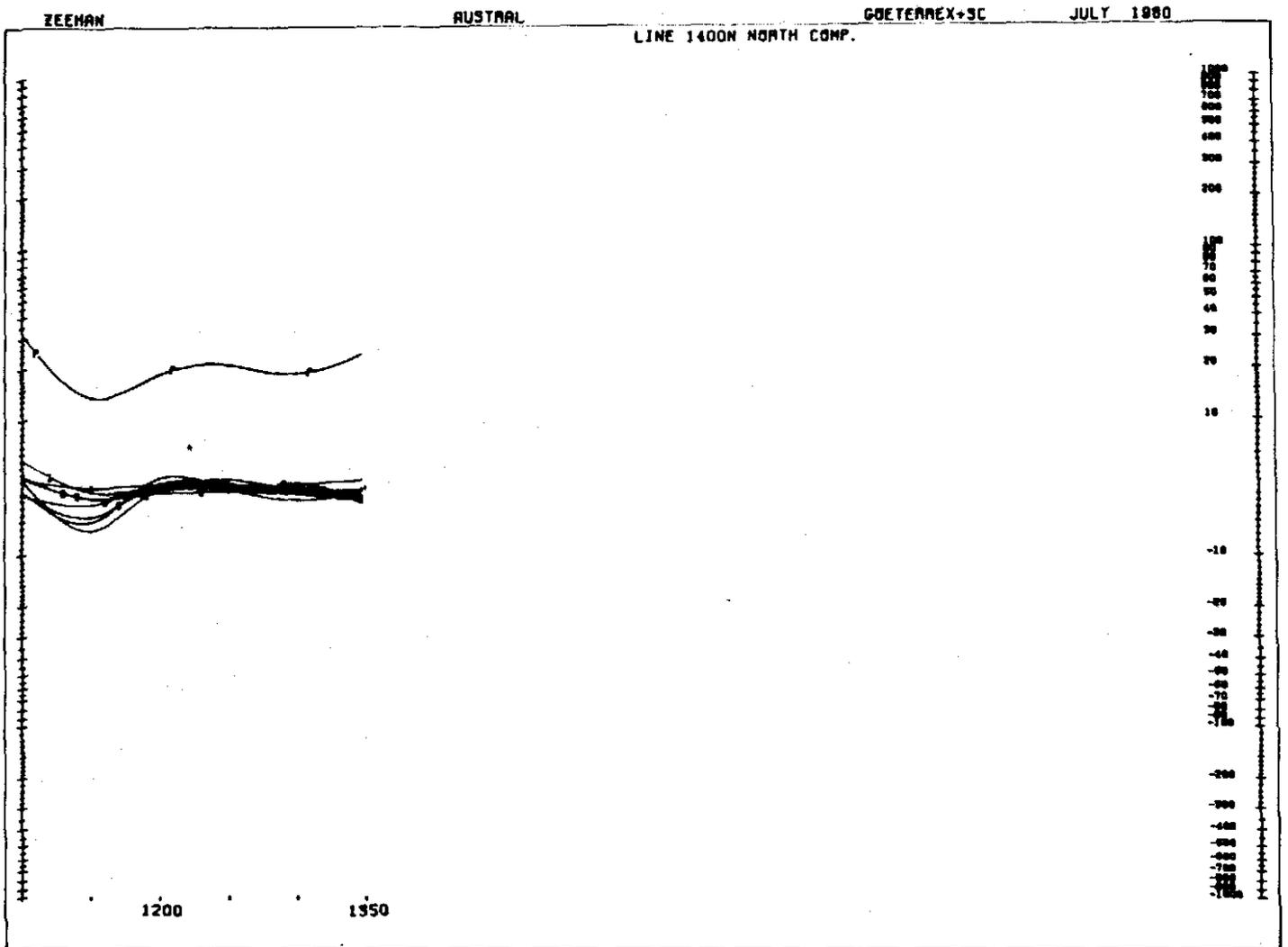
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LINE 1400N EAST COMP.



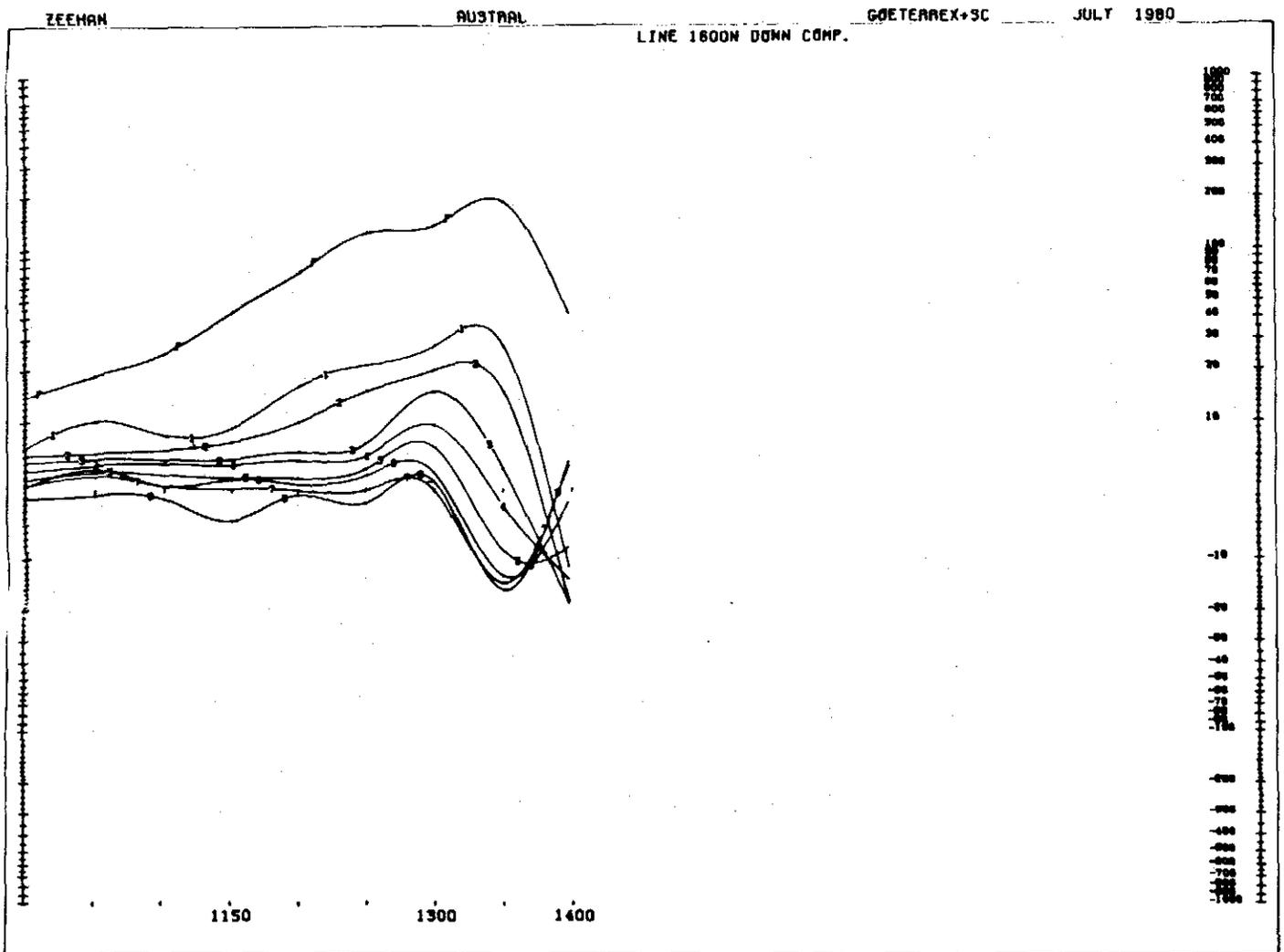
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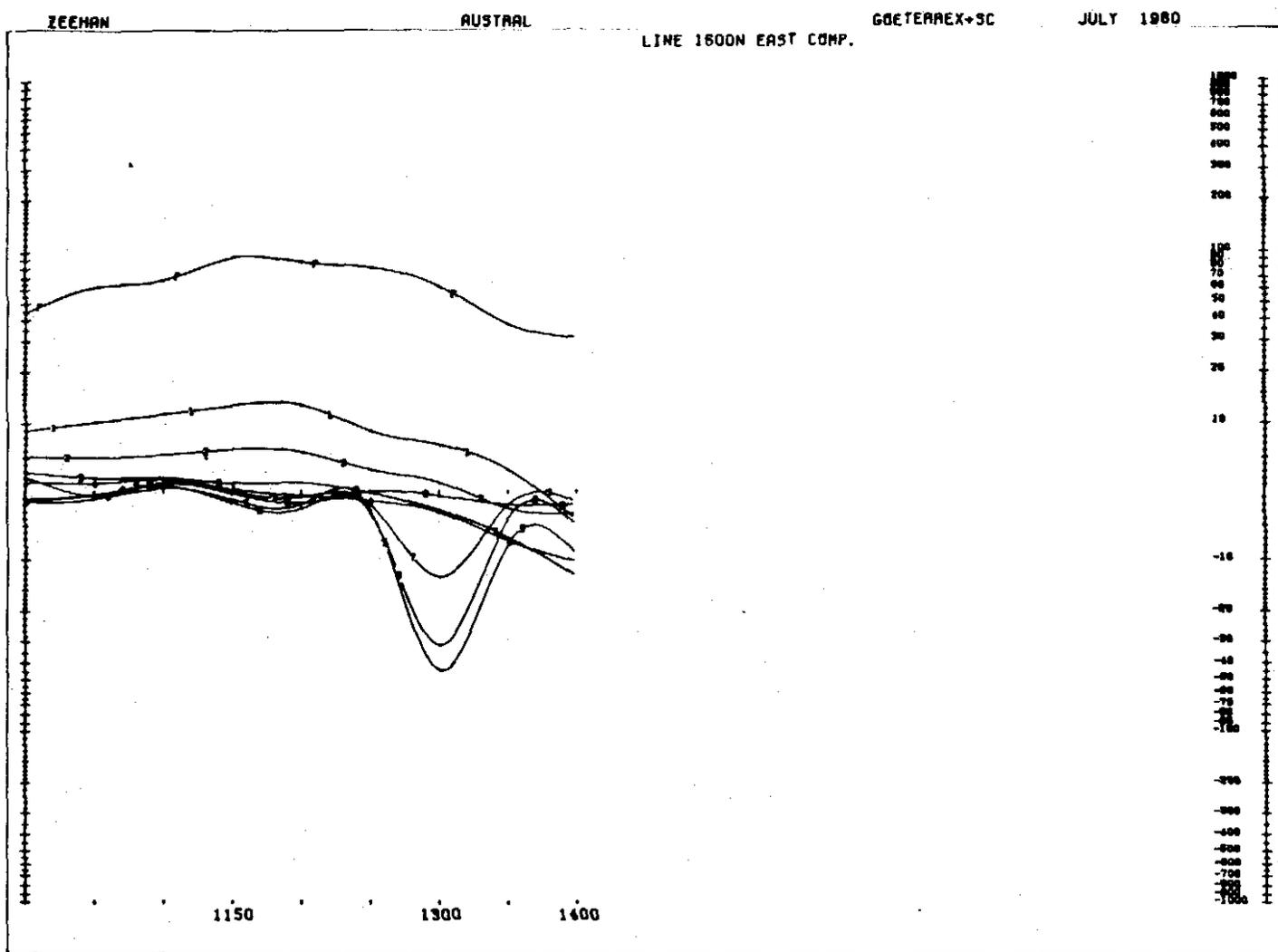
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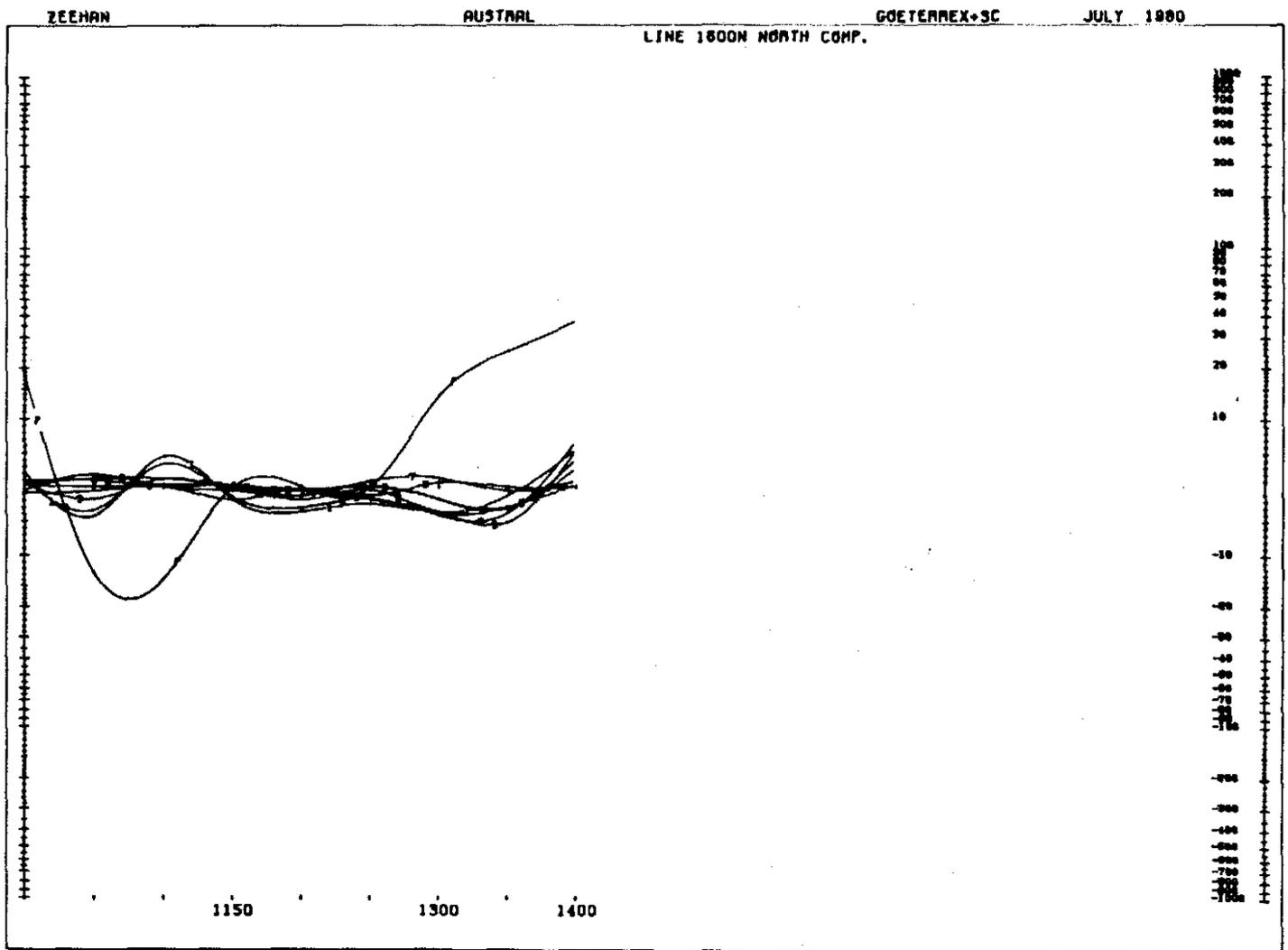
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LINE 1600N EAST COMP.



031138

LINE 1600N NORTH COMP.



LINE 1800N DOWN COMP.

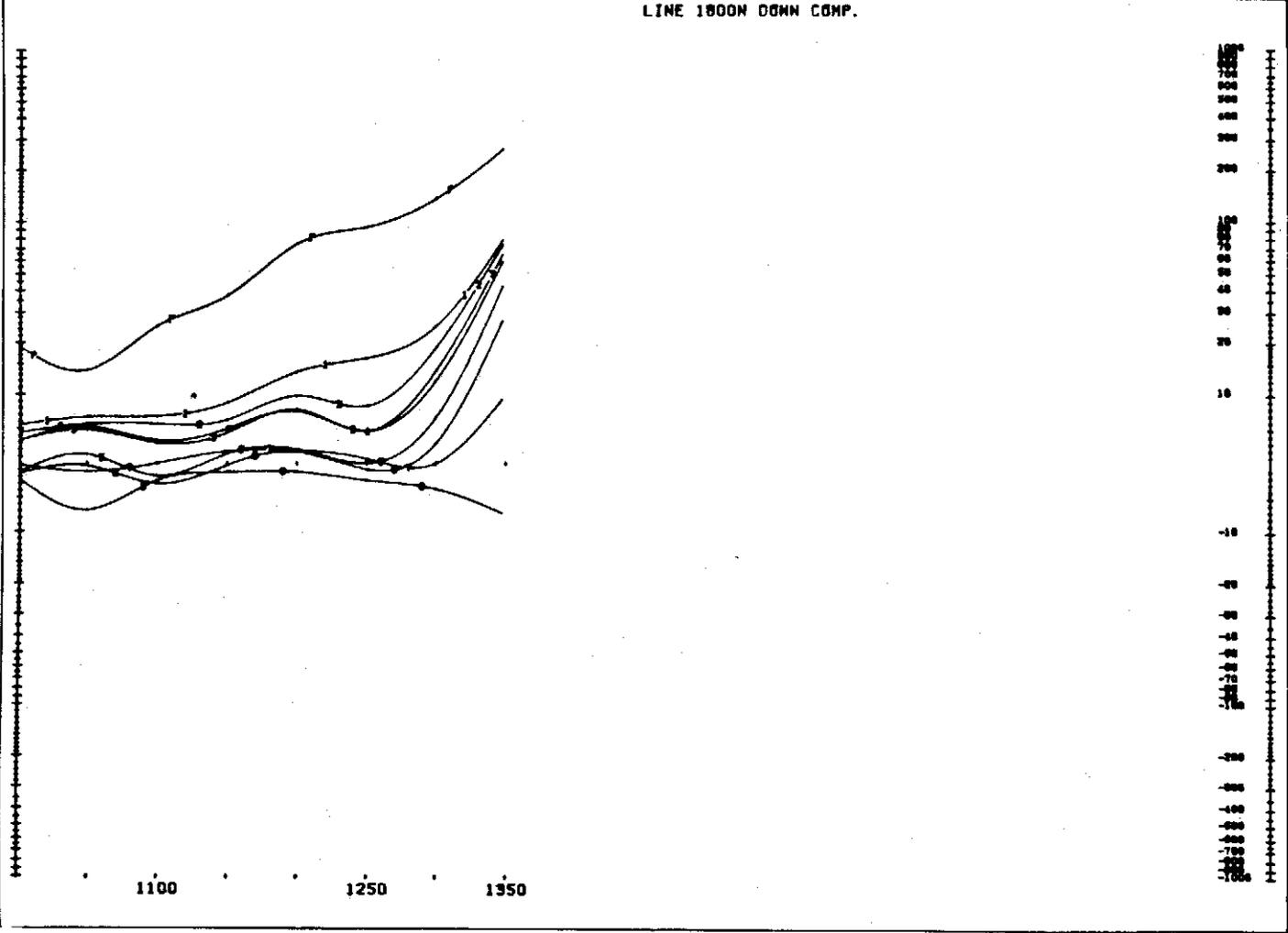
ZEEHAN

AUSTRAAL

GOETERREX+SC

JULY 1980

LINE 1800N DOWN COMP.



031141

LINE 1800N NORTH COMP.

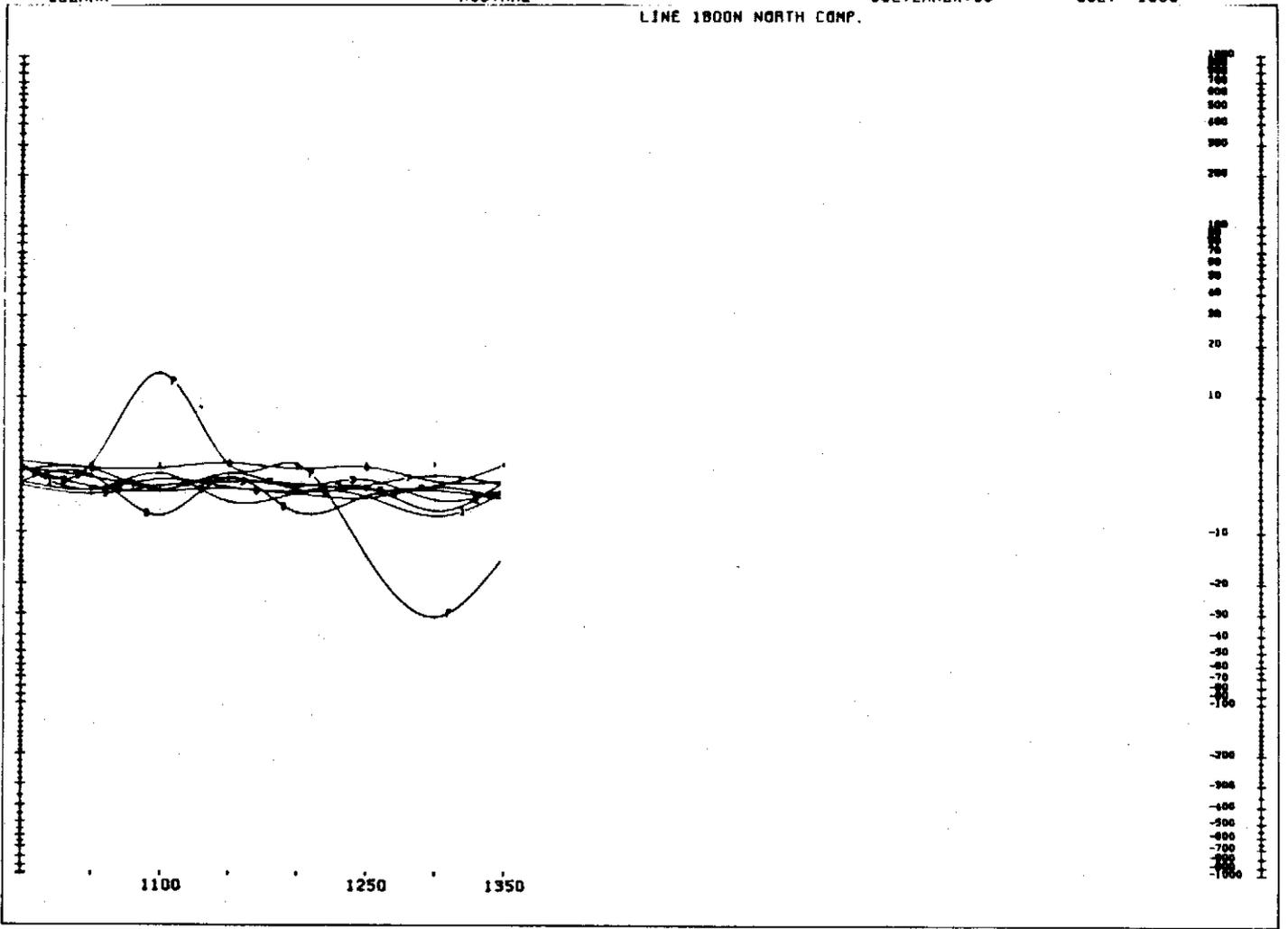
ZEEHAN

AUSTAAL

GOETERREX+3C

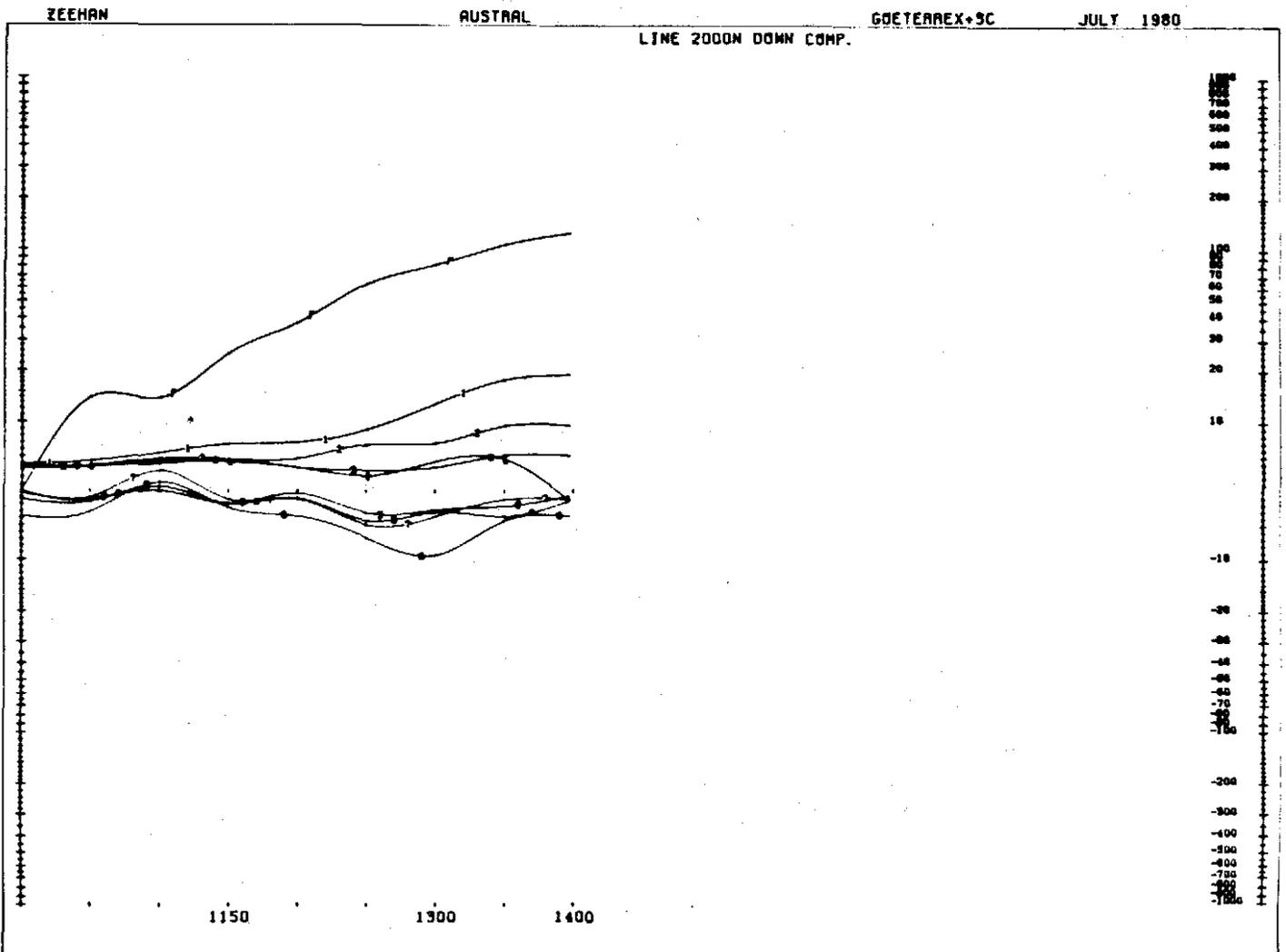
JULY 1980

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031142

LINE 2000N DOWN COMP.



031143

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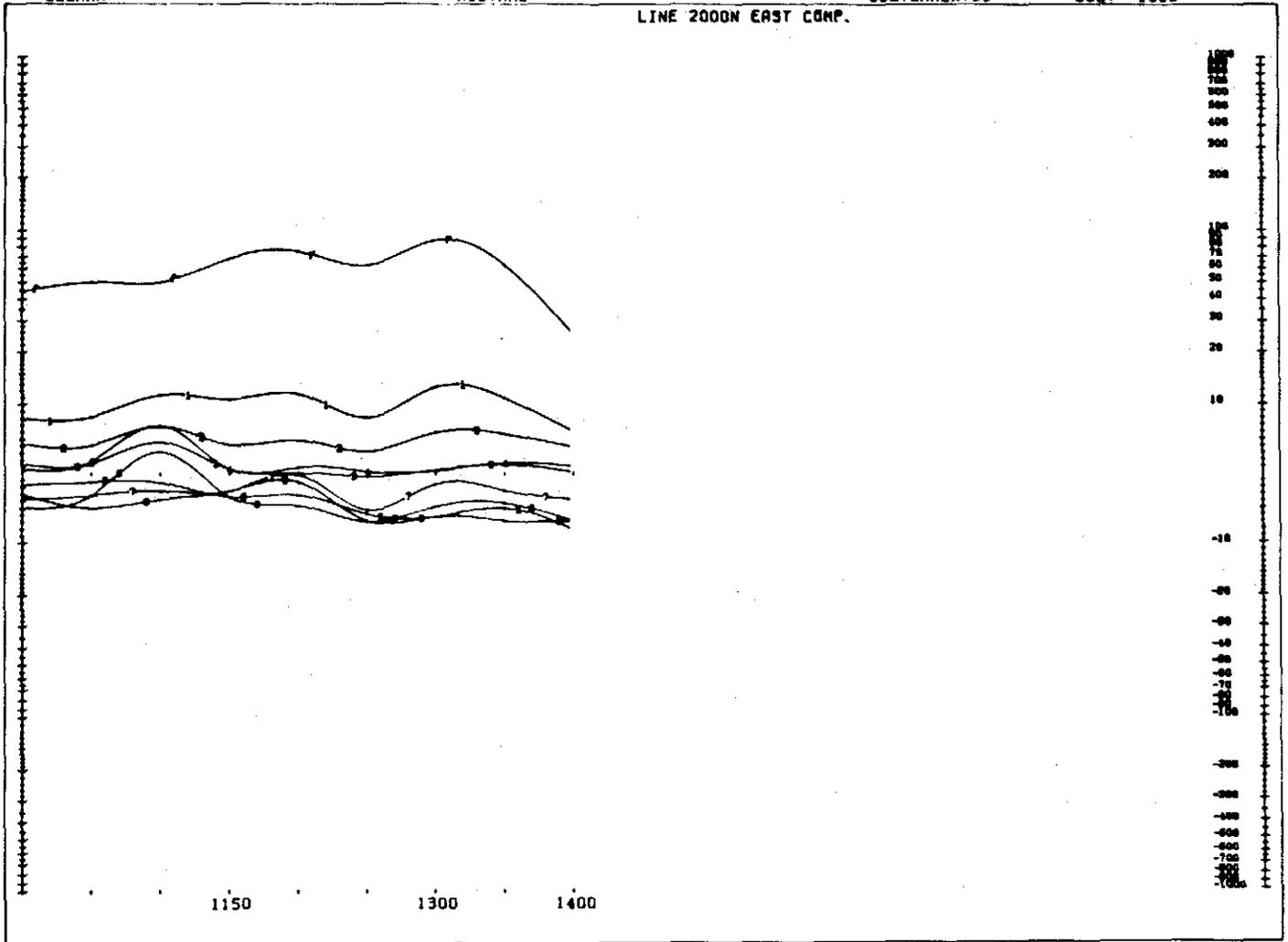
ZEEHAN

AUSTAL

GBETERREX+3C

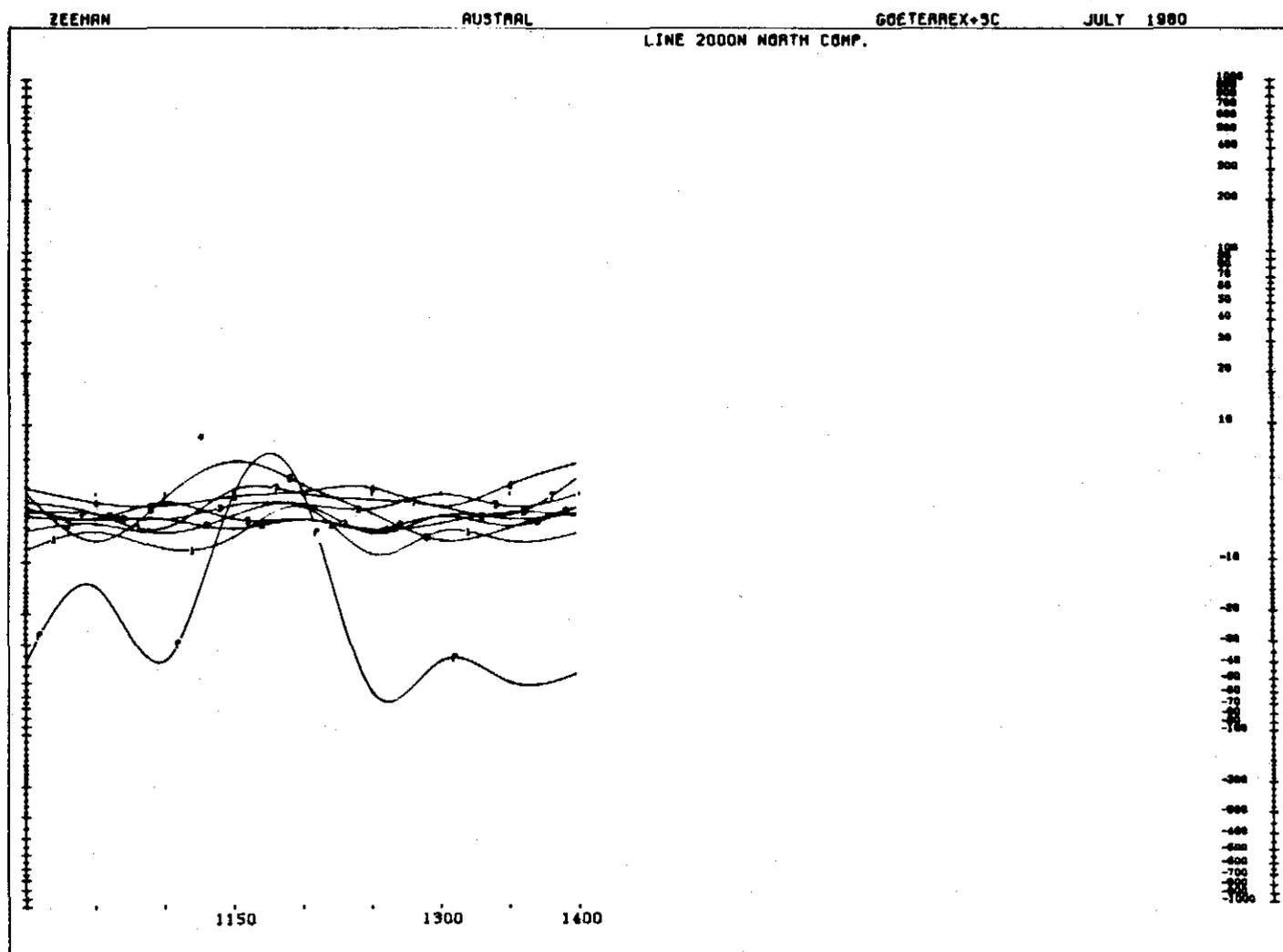
JULY 1980

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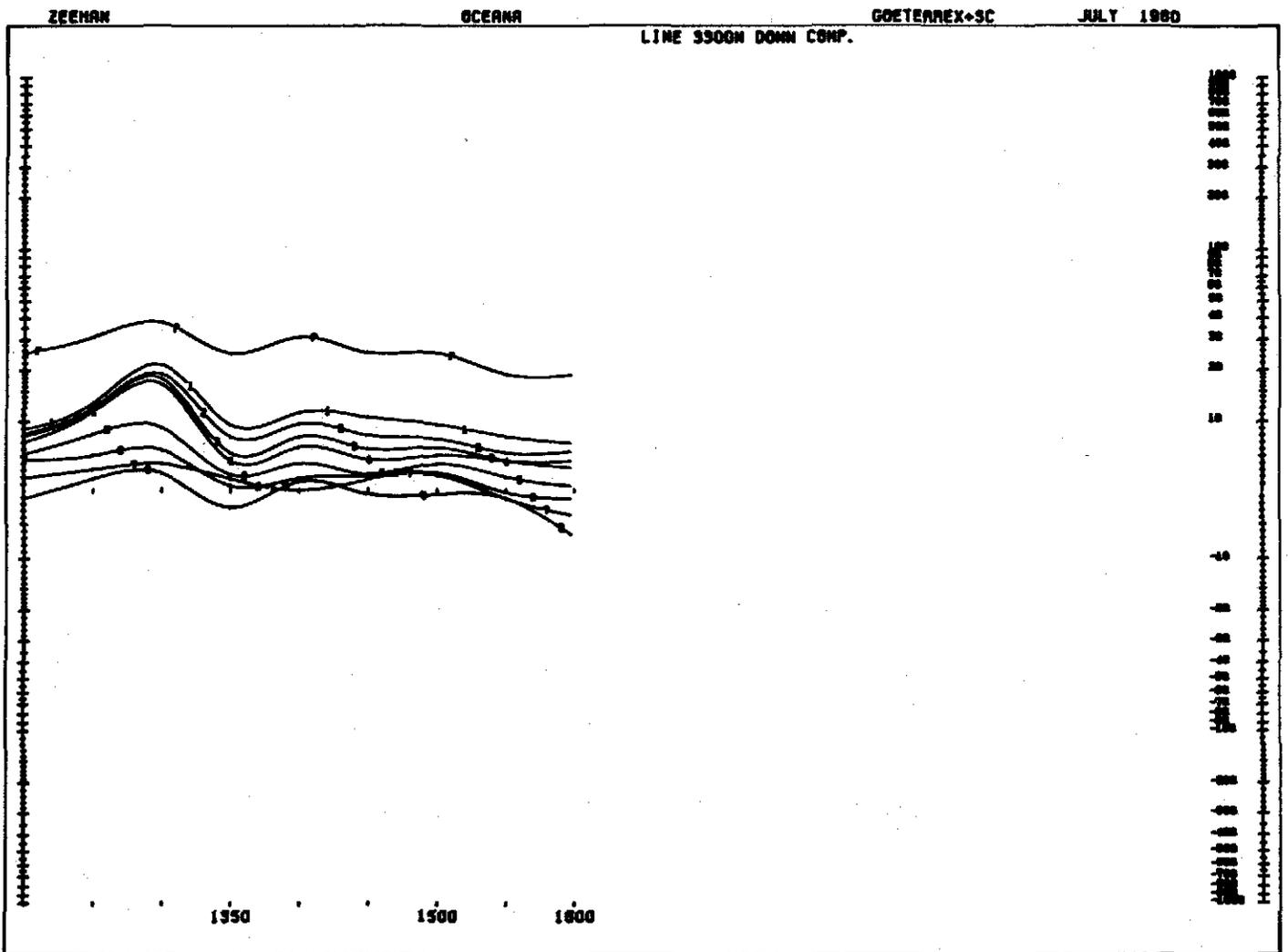
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LINE 2000N NORTH COMP.



031145

LINE 3300N DOWN COMP.



031147

LINE 3300N NORTH COMP.

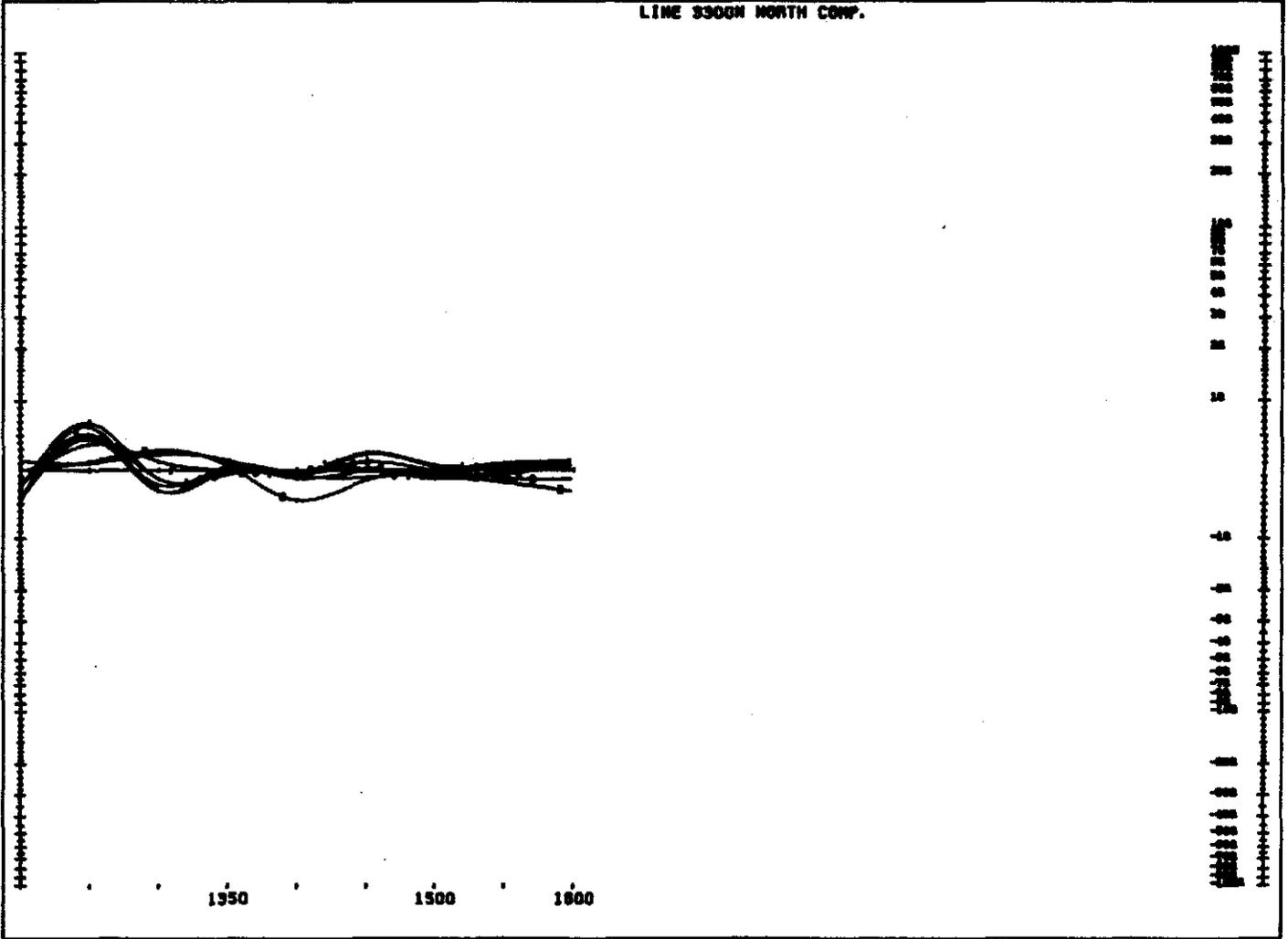
ZEEWAD

OCEANA

GOETTEREX-SC

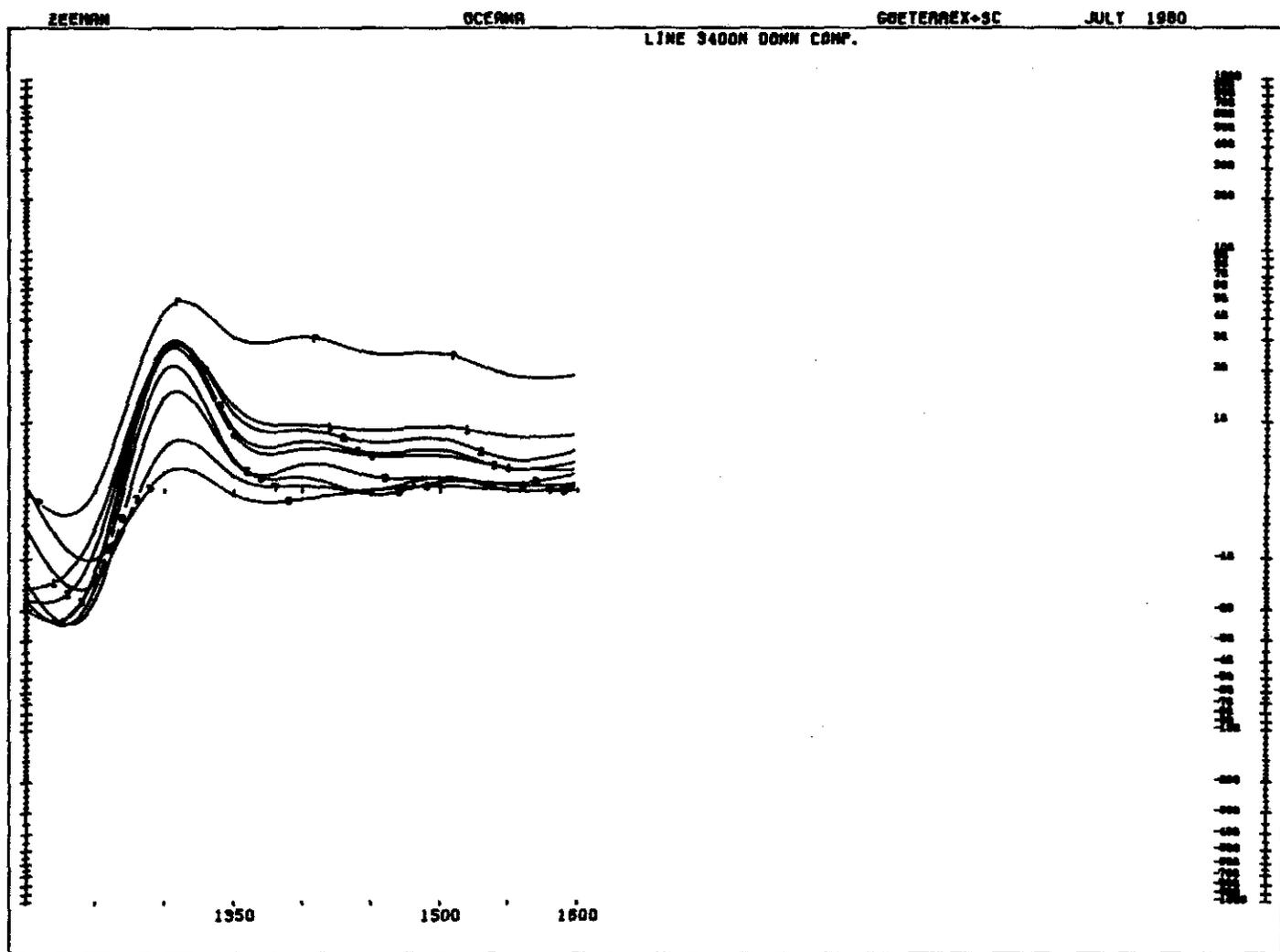
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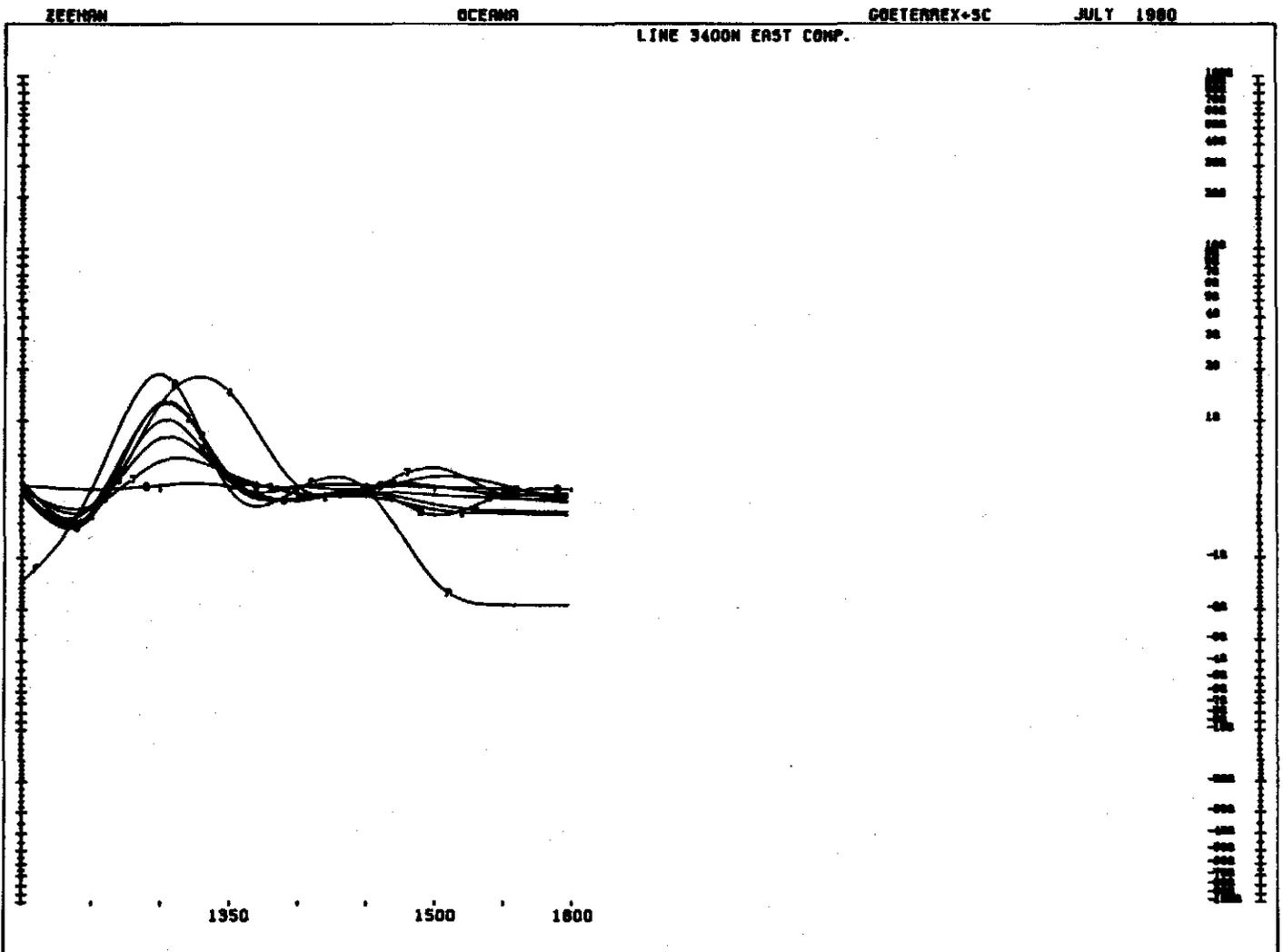
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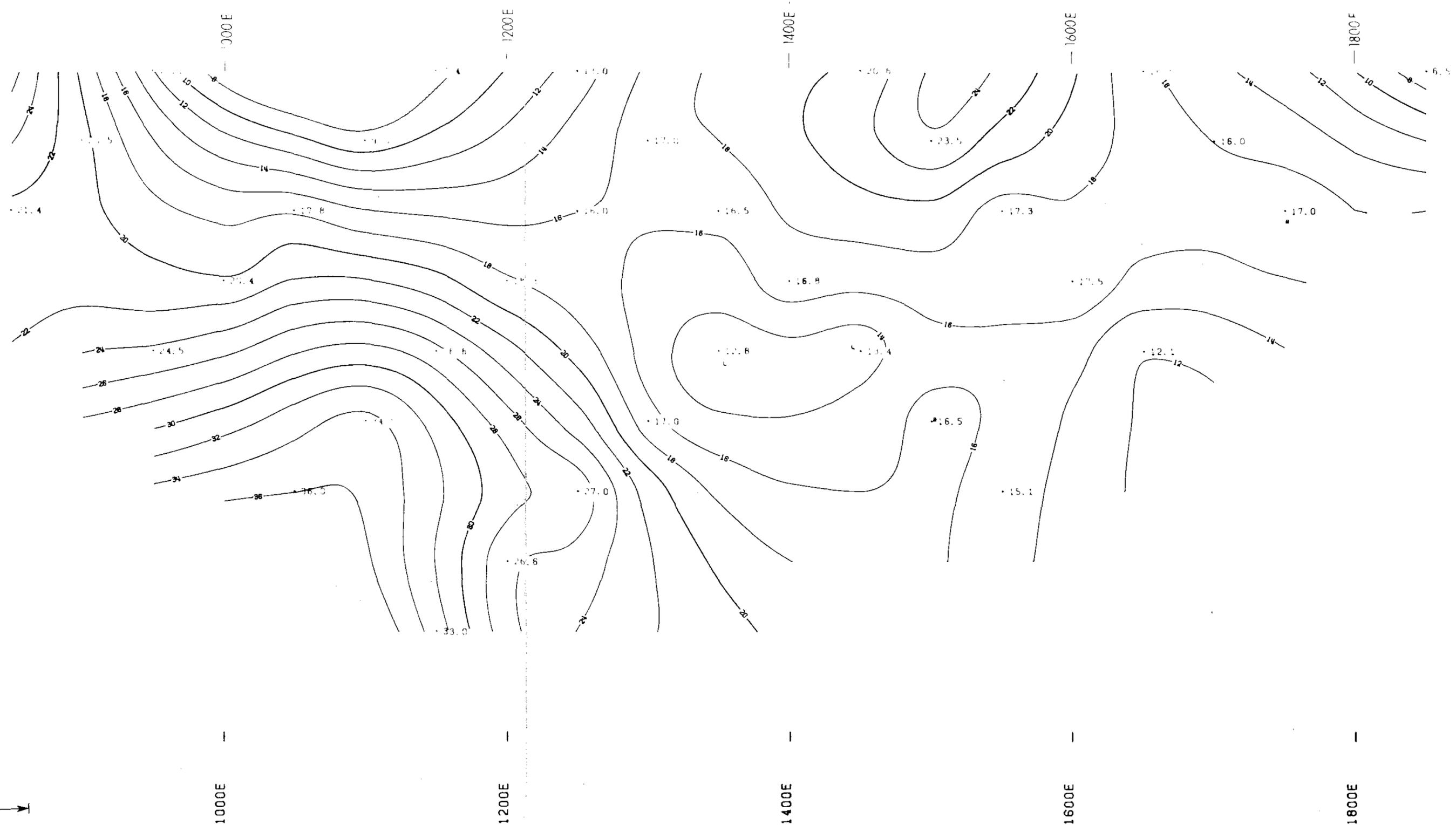
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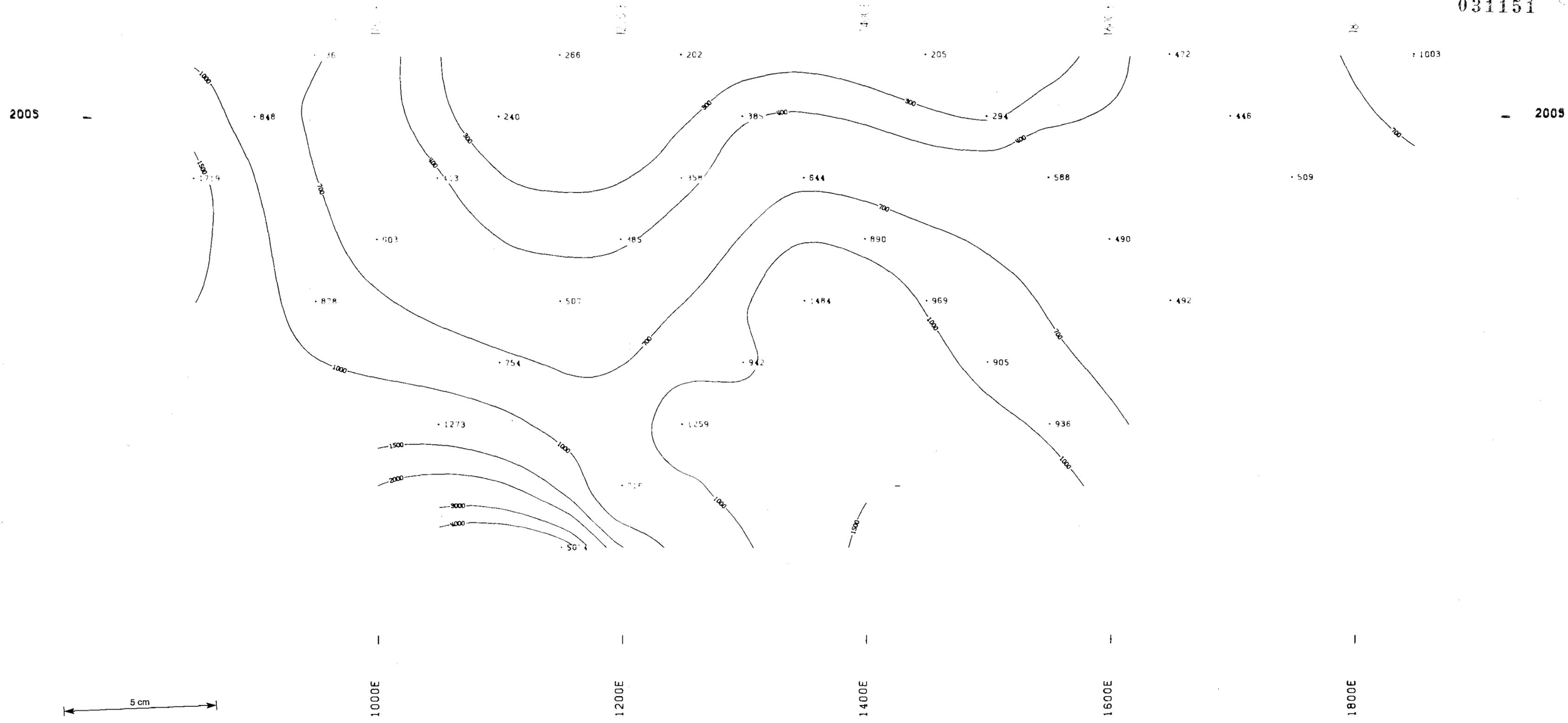
2008

2009



5 cm

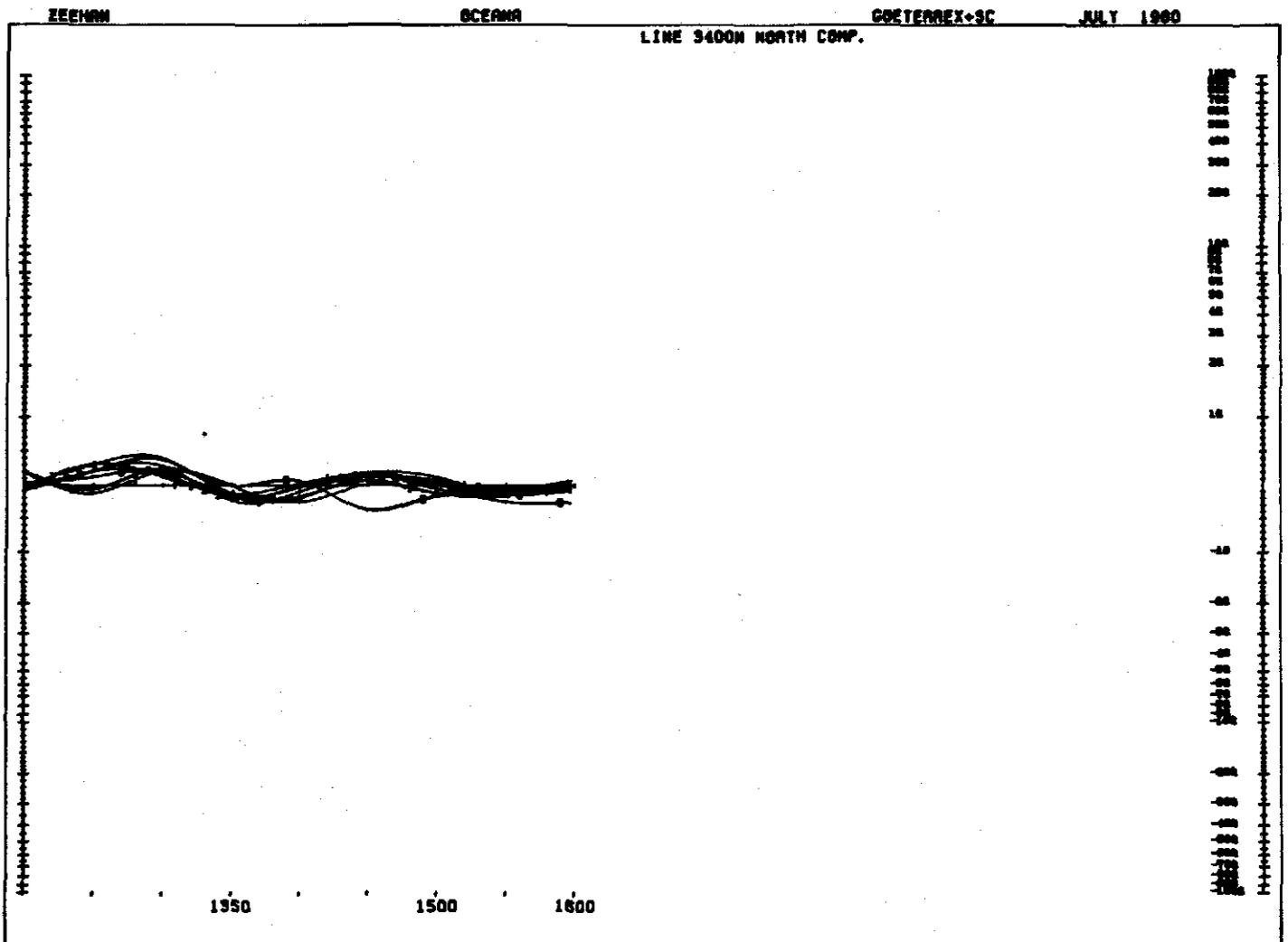
A-78-60 ZEEHAN OCEANA GRID 200M DIPOLE-DIPOLE CHARGEABILITY
 LINE 3700N SCALE=1:2500 DATA BY SCINTREX JAN 1980
 "F."



A-78-60 ZEEHAN OCEANA GRID 200M DIPOLE-DIPOLE RESISTIVITY
 LINE 3700N SCALE=1:2500 DATA BY SCINTREX JAN 1980
 "G."

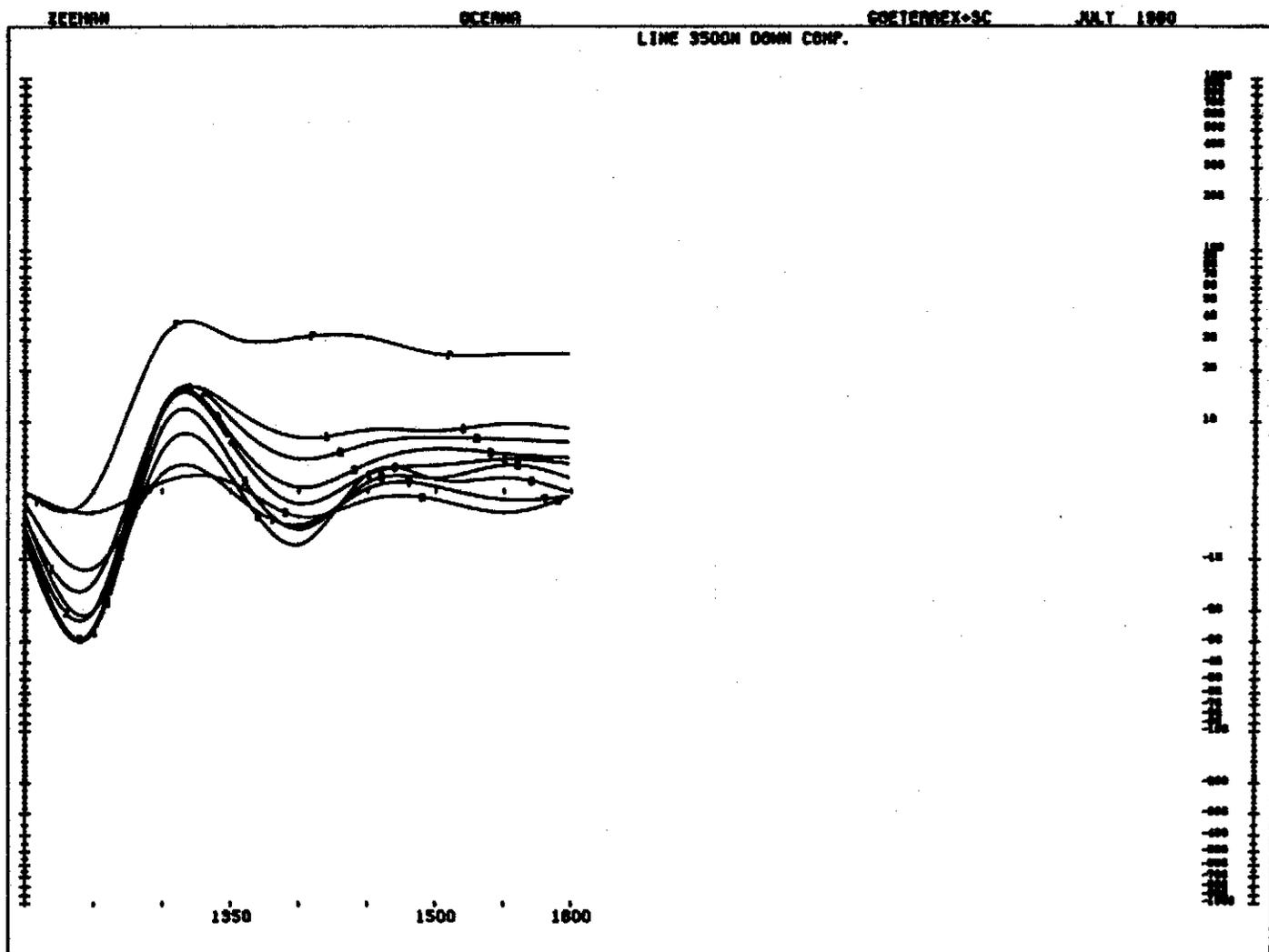
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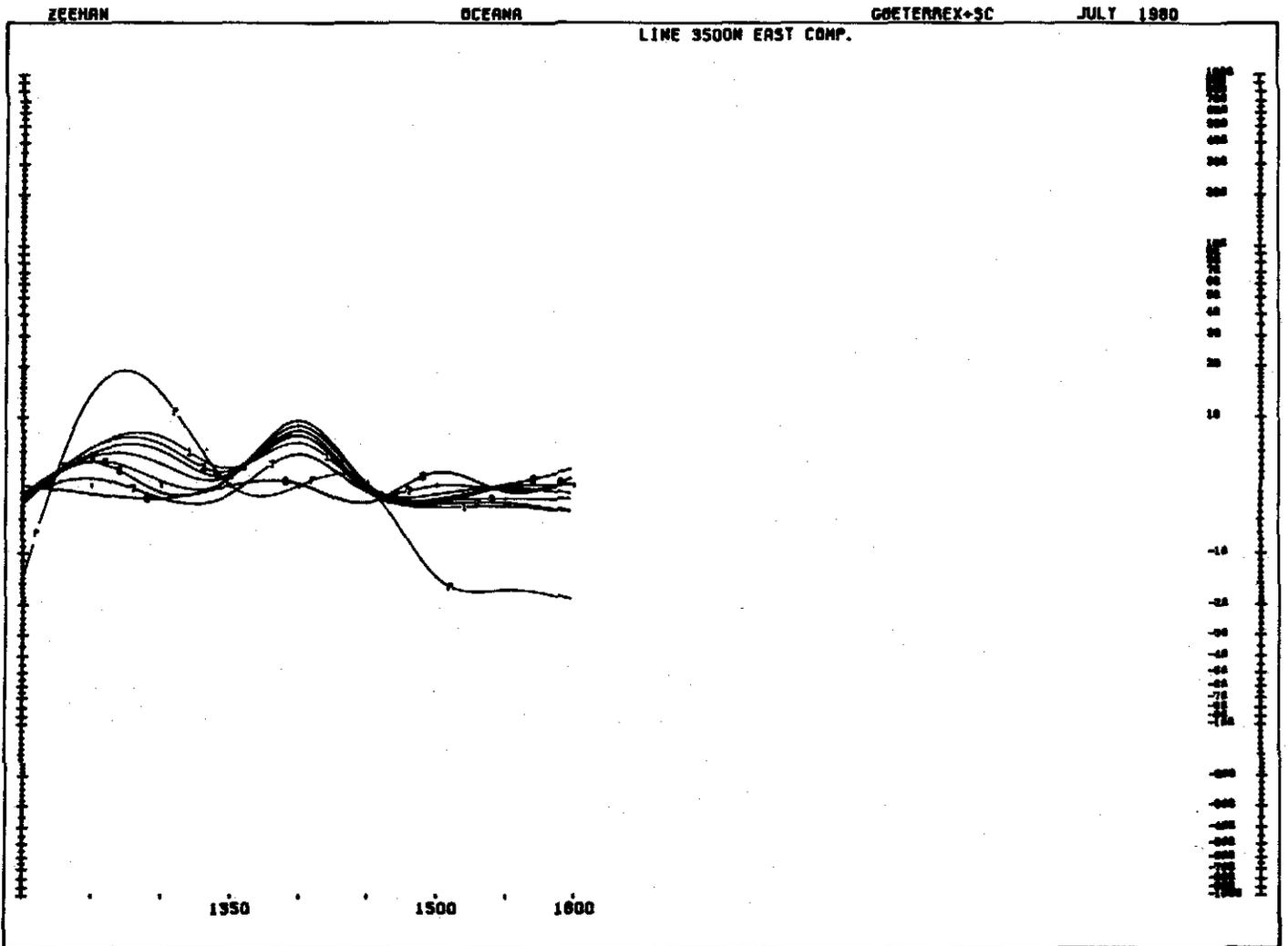
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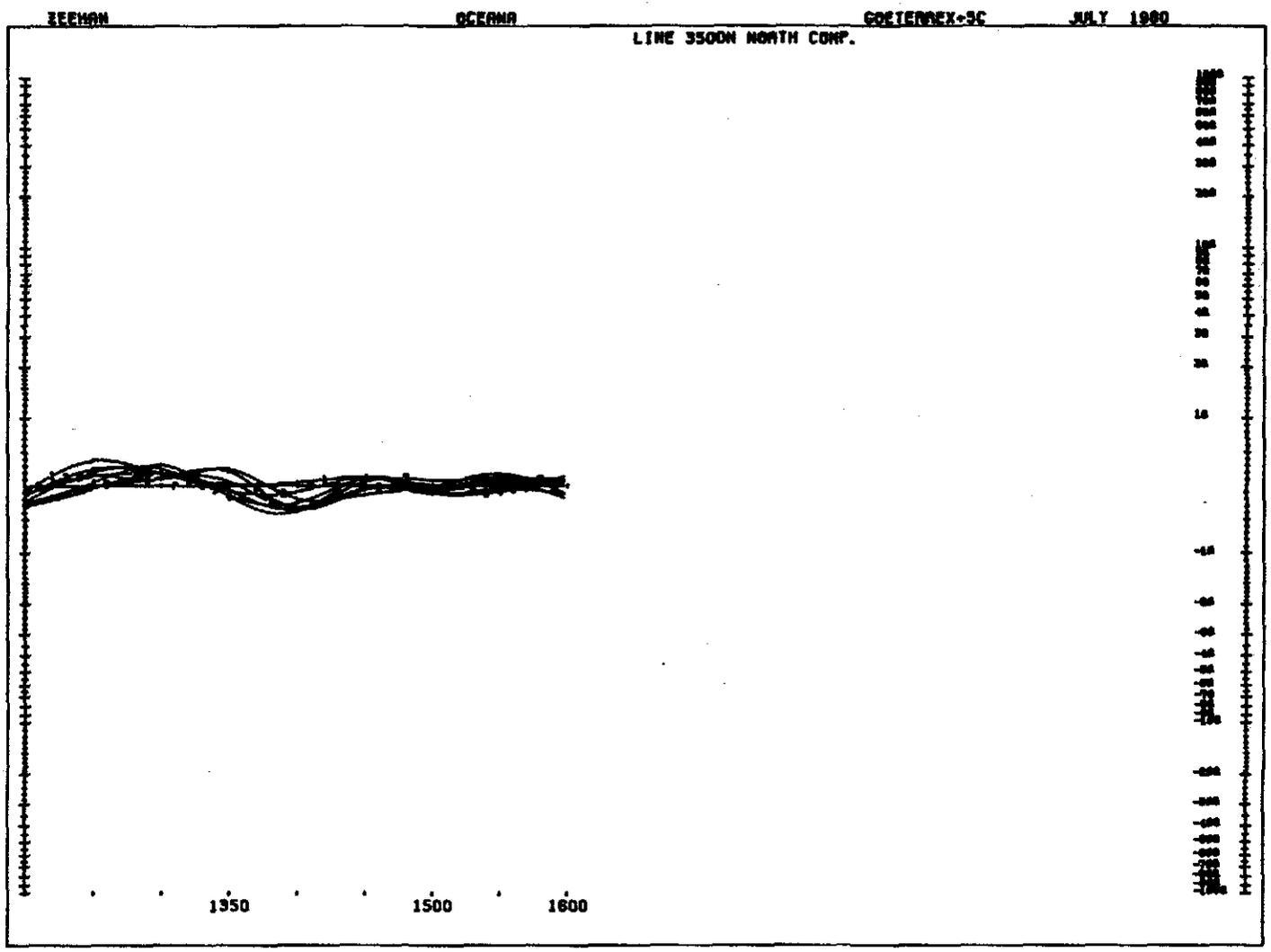
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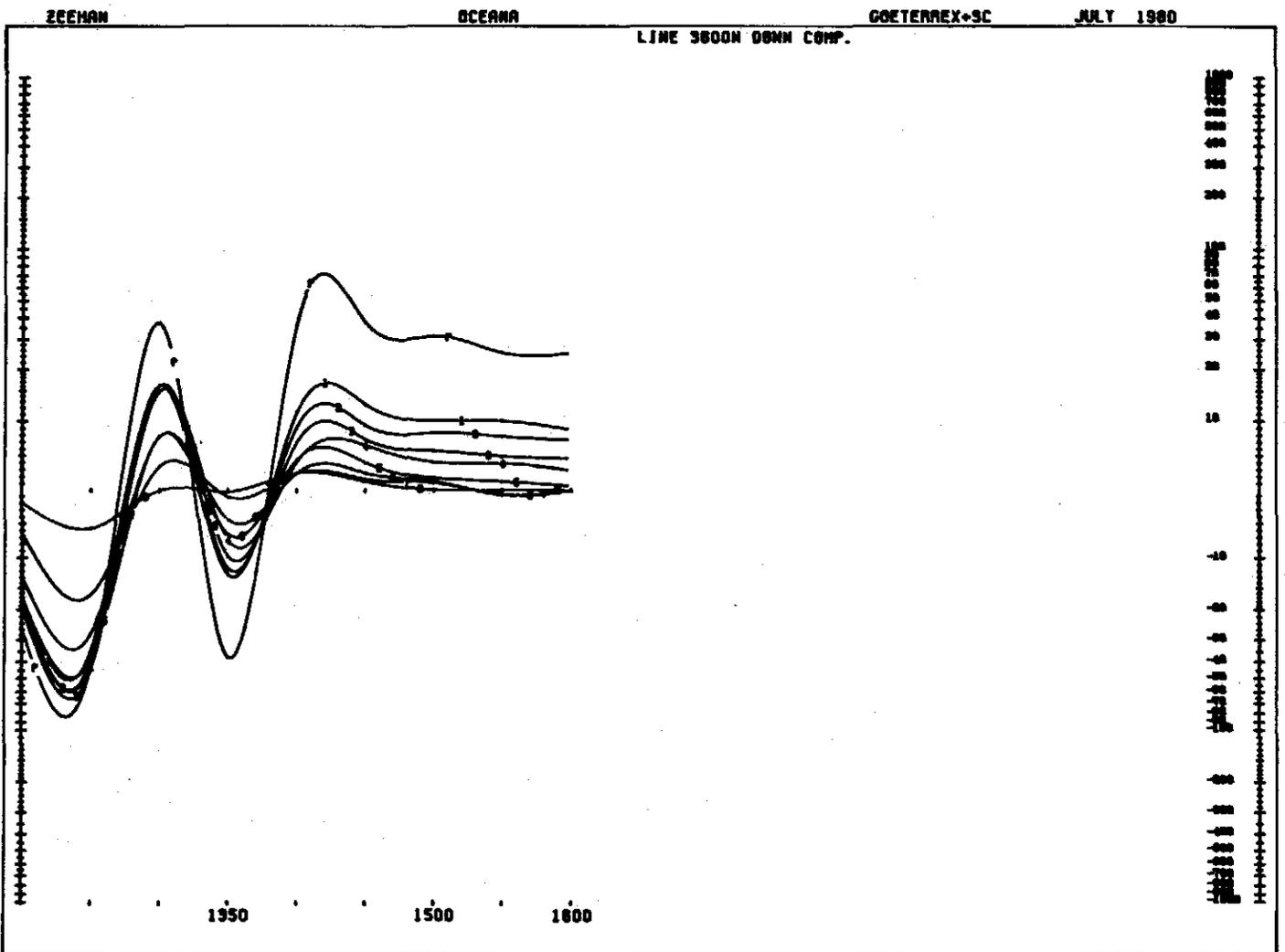
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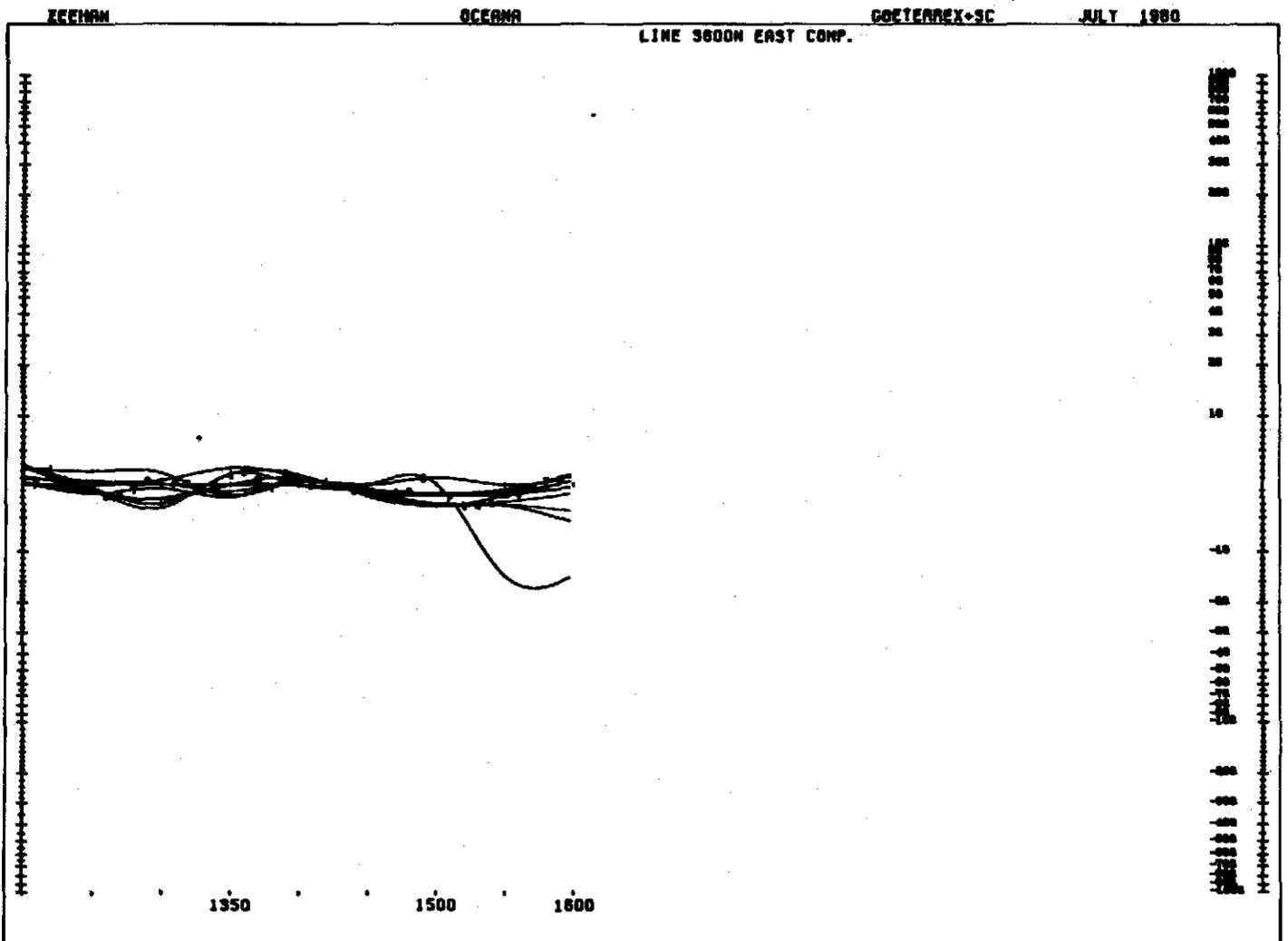
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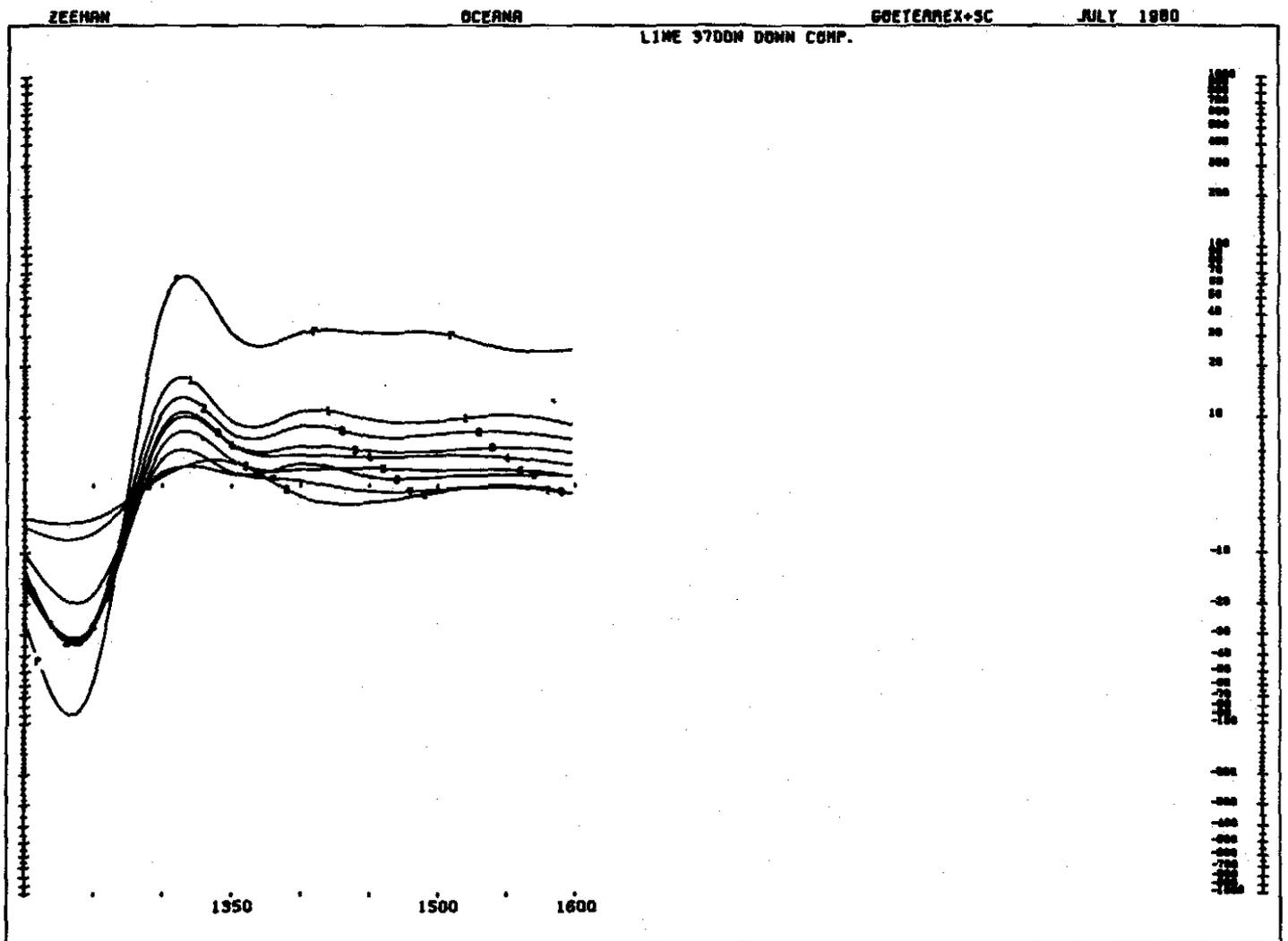
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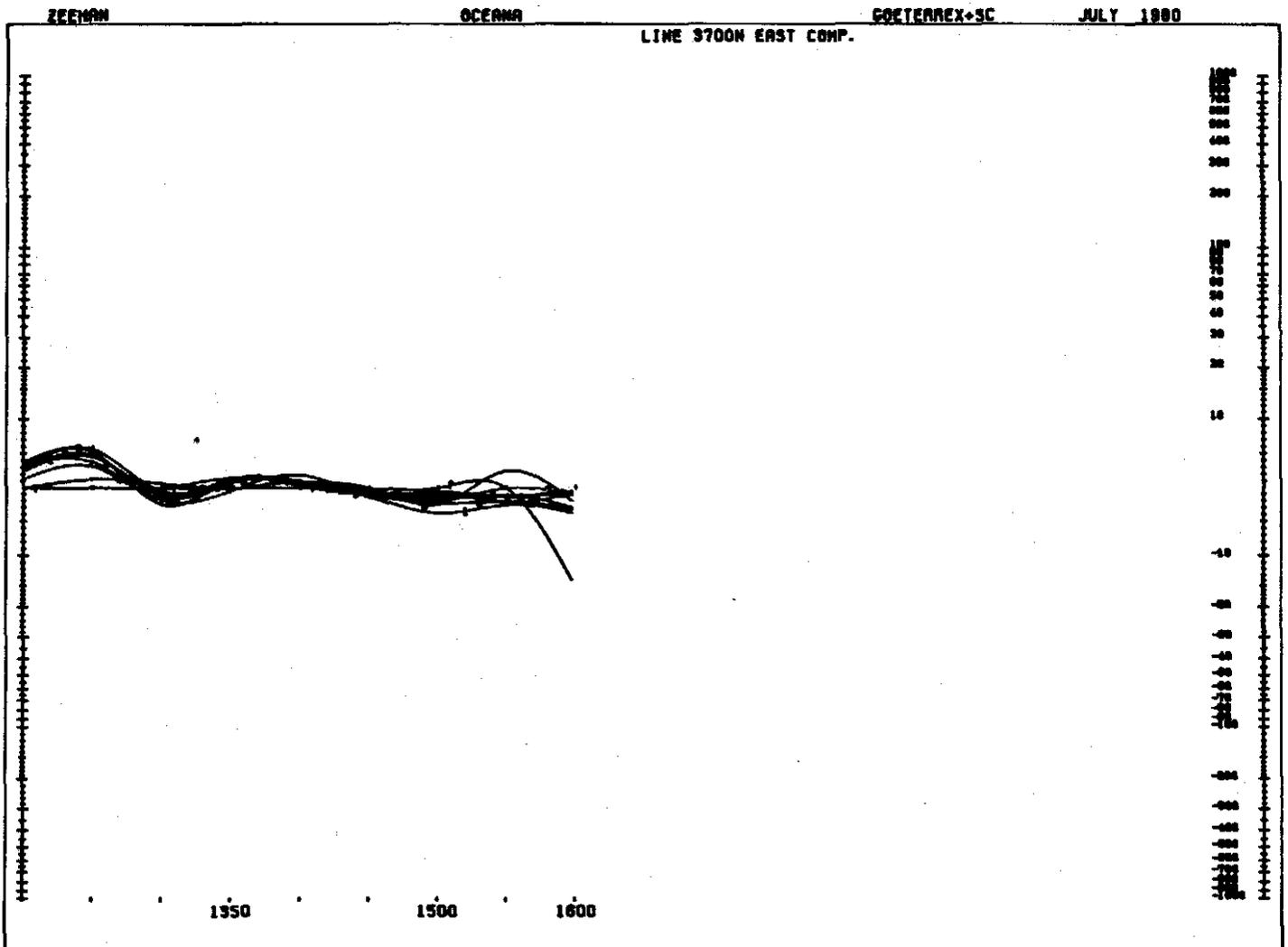
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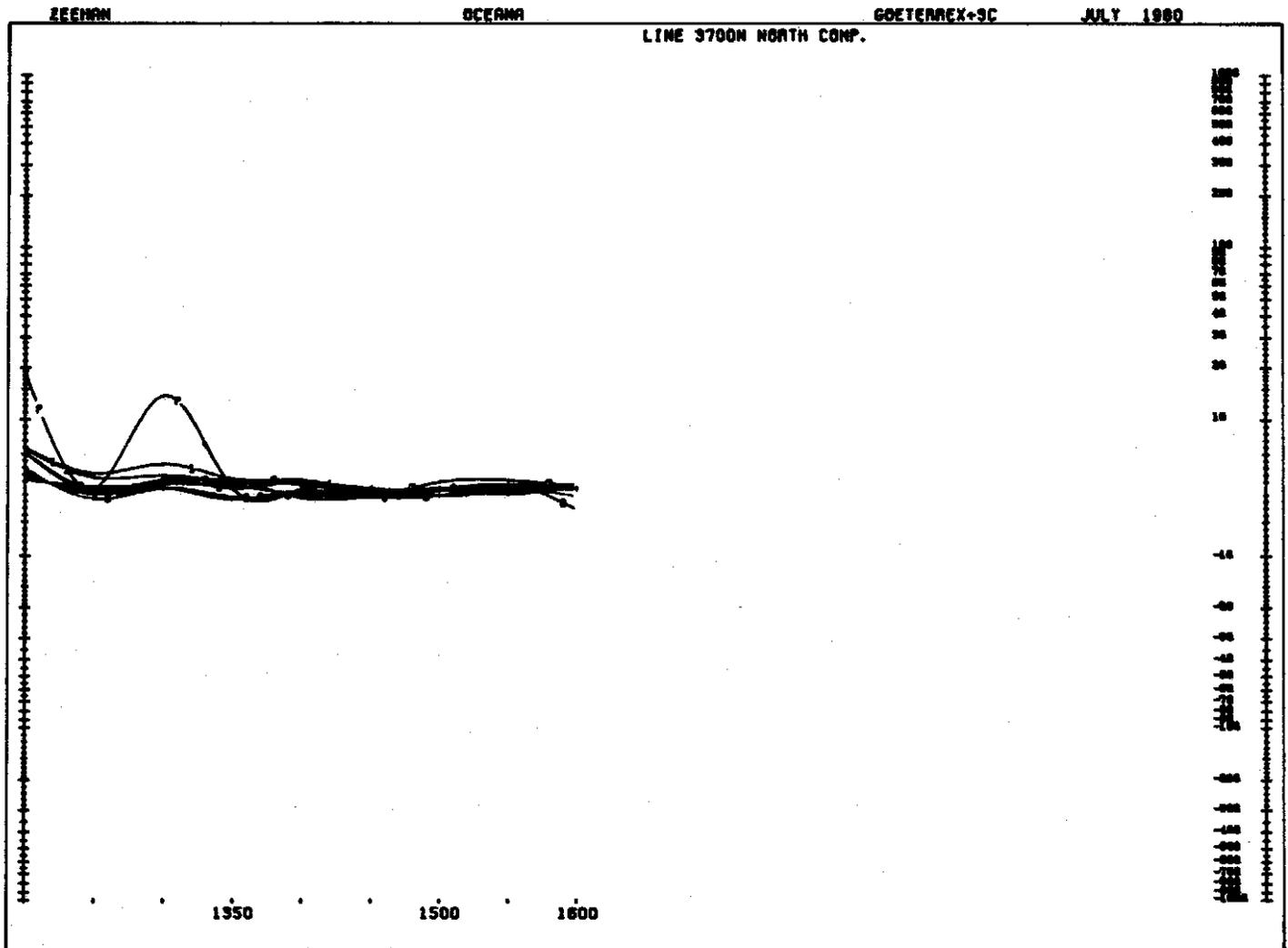
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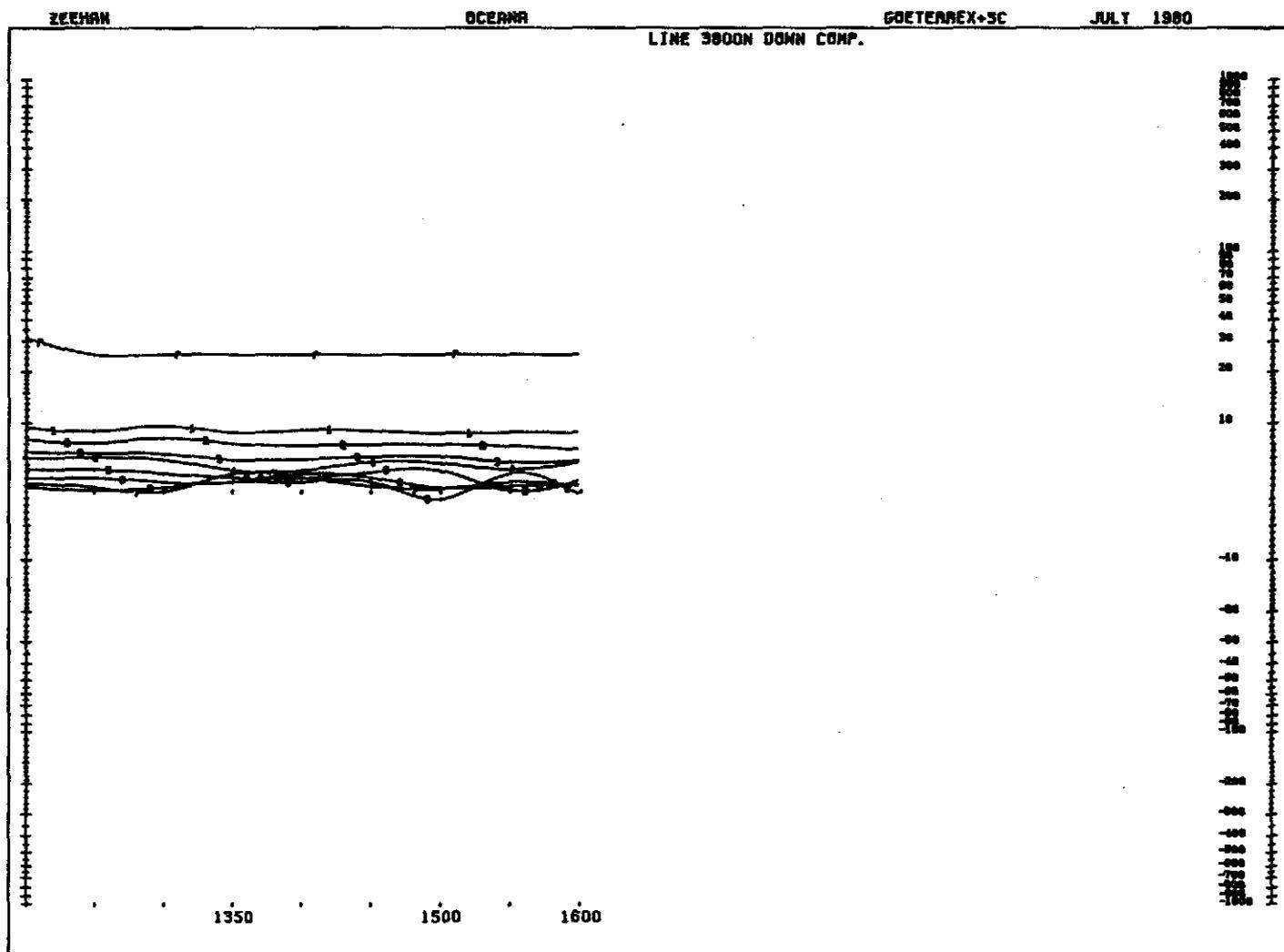
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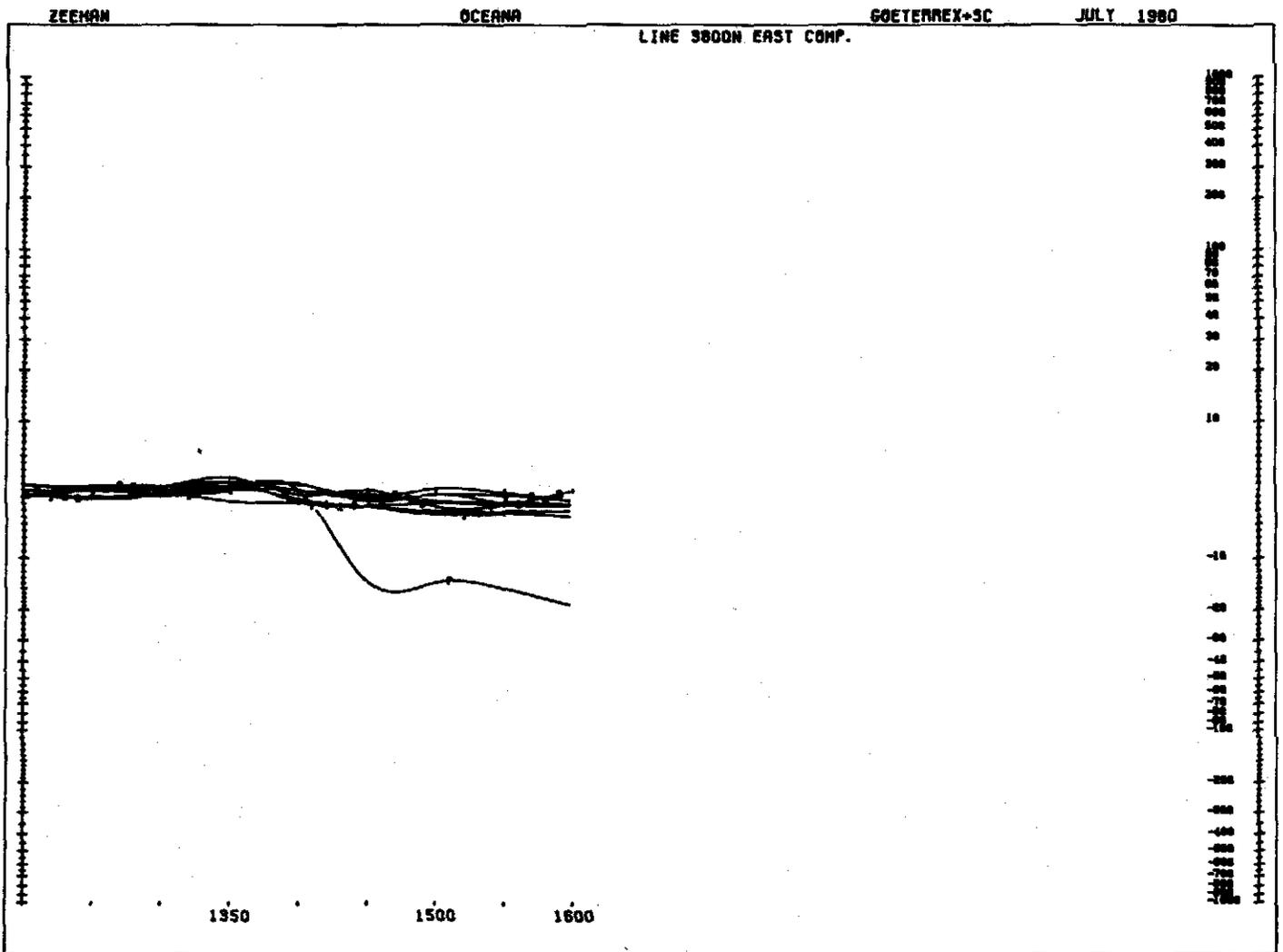
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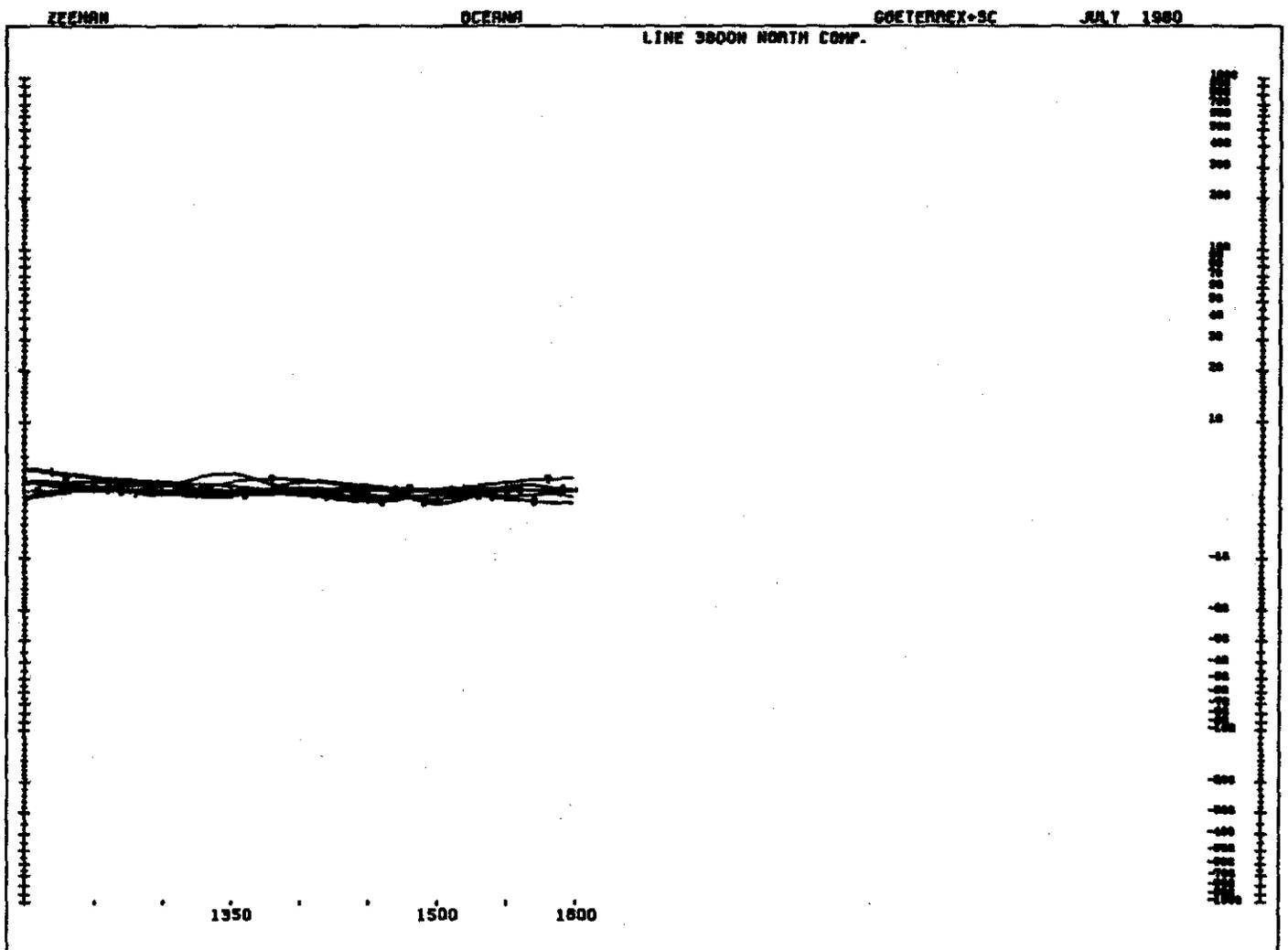
021163

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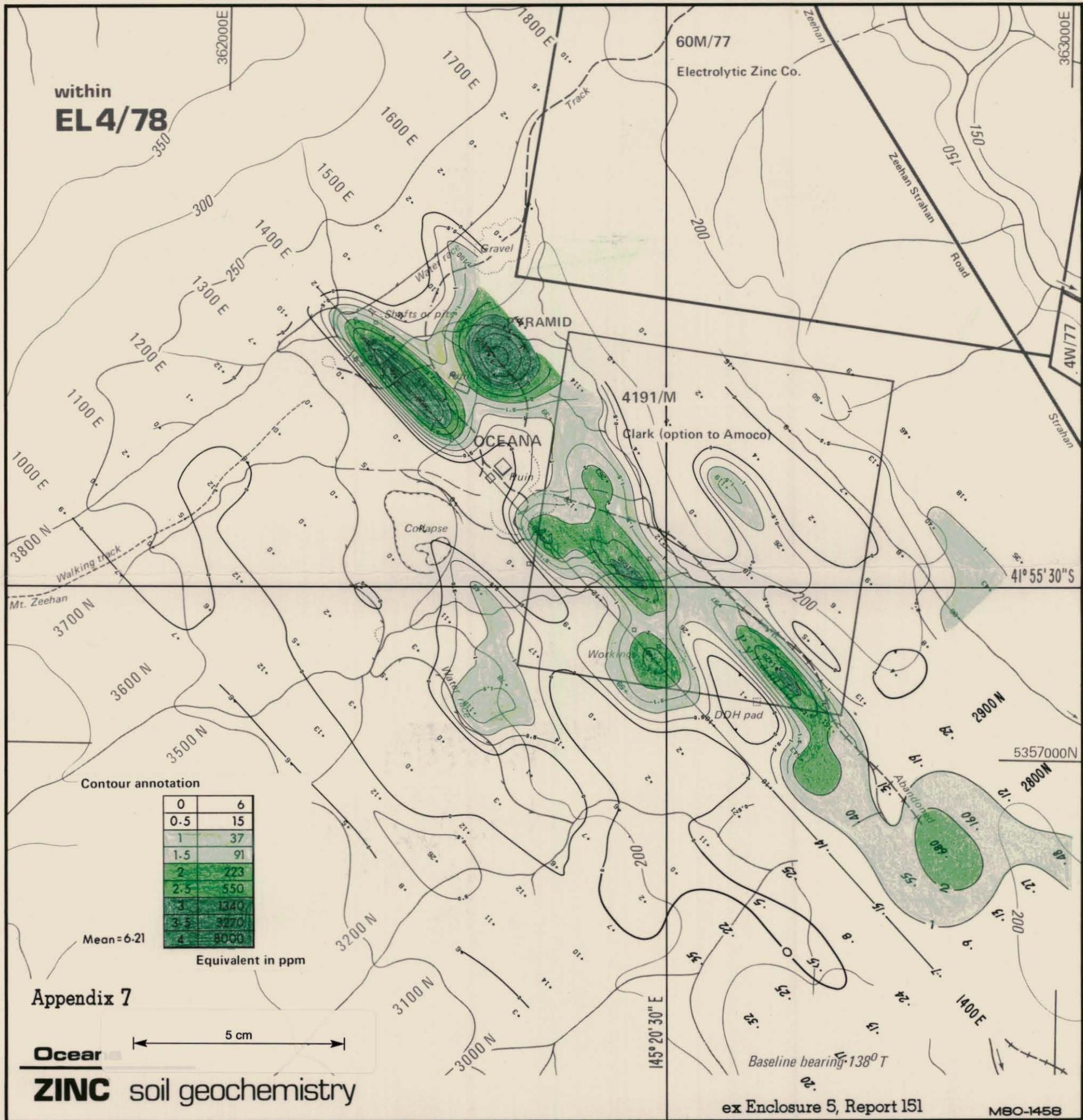
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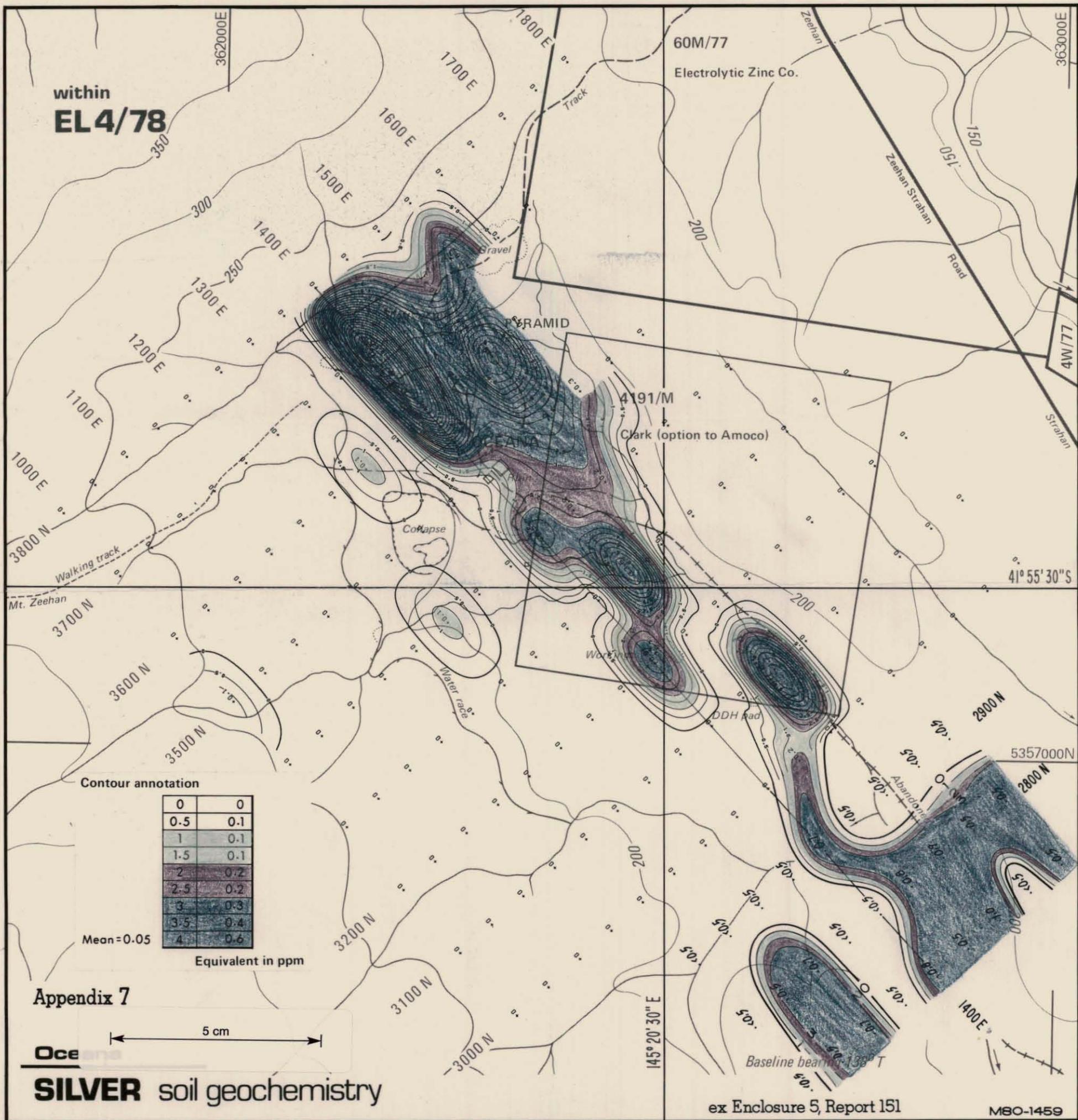


APPENDIX 7

OCEANA PROSPECT - GRID EXTENSIONS - SOIL GEOCHEMISTRY



031167



031168

APPENDIX 8

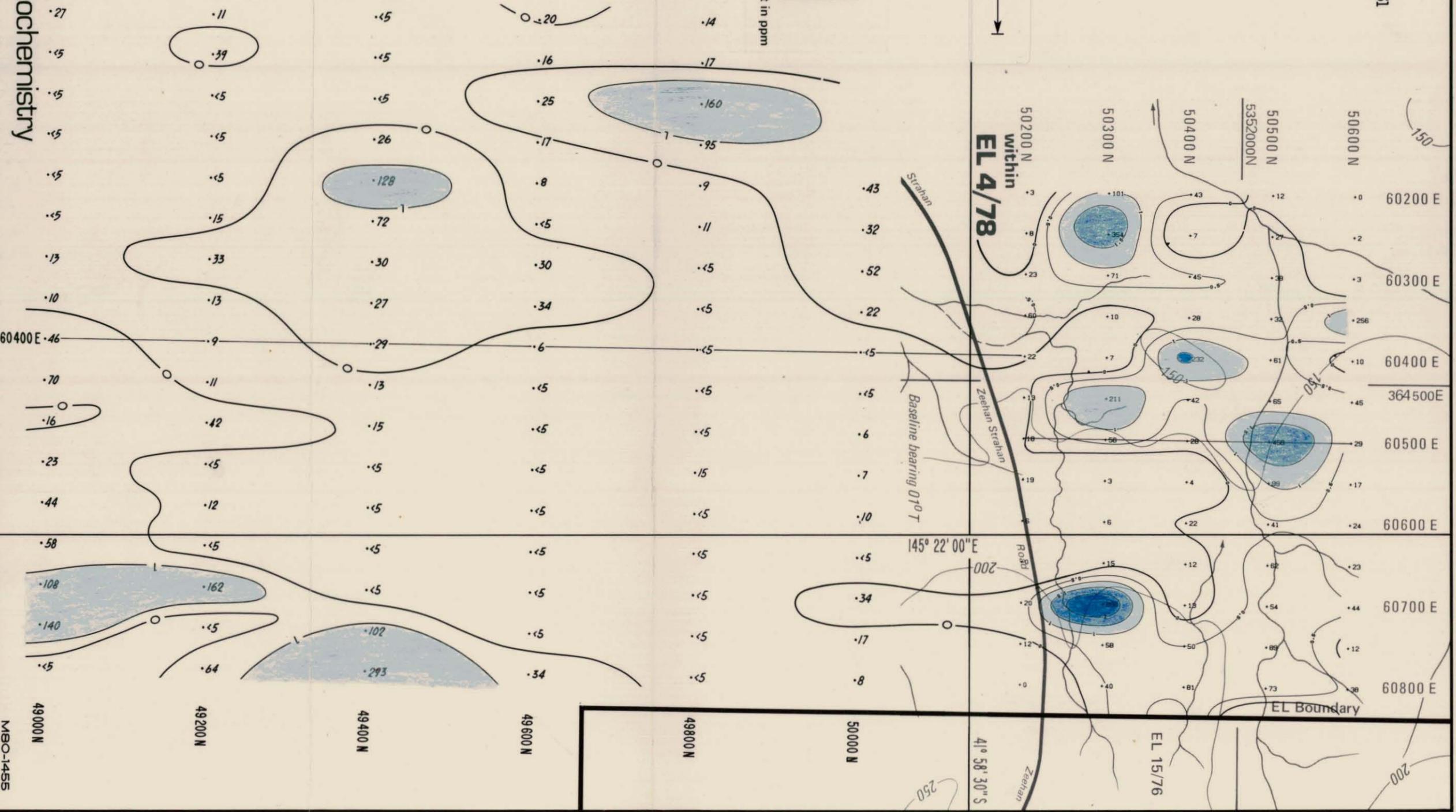
MYRTLE PROSPECT - GRID EXTENSIONS - SOIL GEOCHEMISTRY

5 cm

Contour annotation

| | |
|-----|-----|
| 0 | 19 |
| 0.5 | 43 |
| 1 | 96 |
| 1.5 | 216 |
| 2 | 486 |

Mean = 19.03
Equivalent in ppm



Appendix 8

Myrtle
LEAD soil geochemistry

49000 N
49200 N
49400 N
49600 N
49800 N
50000 N

031170

MBO-1455

ex Enclosure 6, Report 151

5 cm

Contour annotation

| | |
|-----|------|
| 0 | 18 |
| 0.5 | 34 |
| 1 | 65 |
| 1.5 | 124 |
| 2 | 240 |
| 2.5 | 455 |
| 3 | 872 |
| 3.5 | 1670 |
| 4 | 3200 |

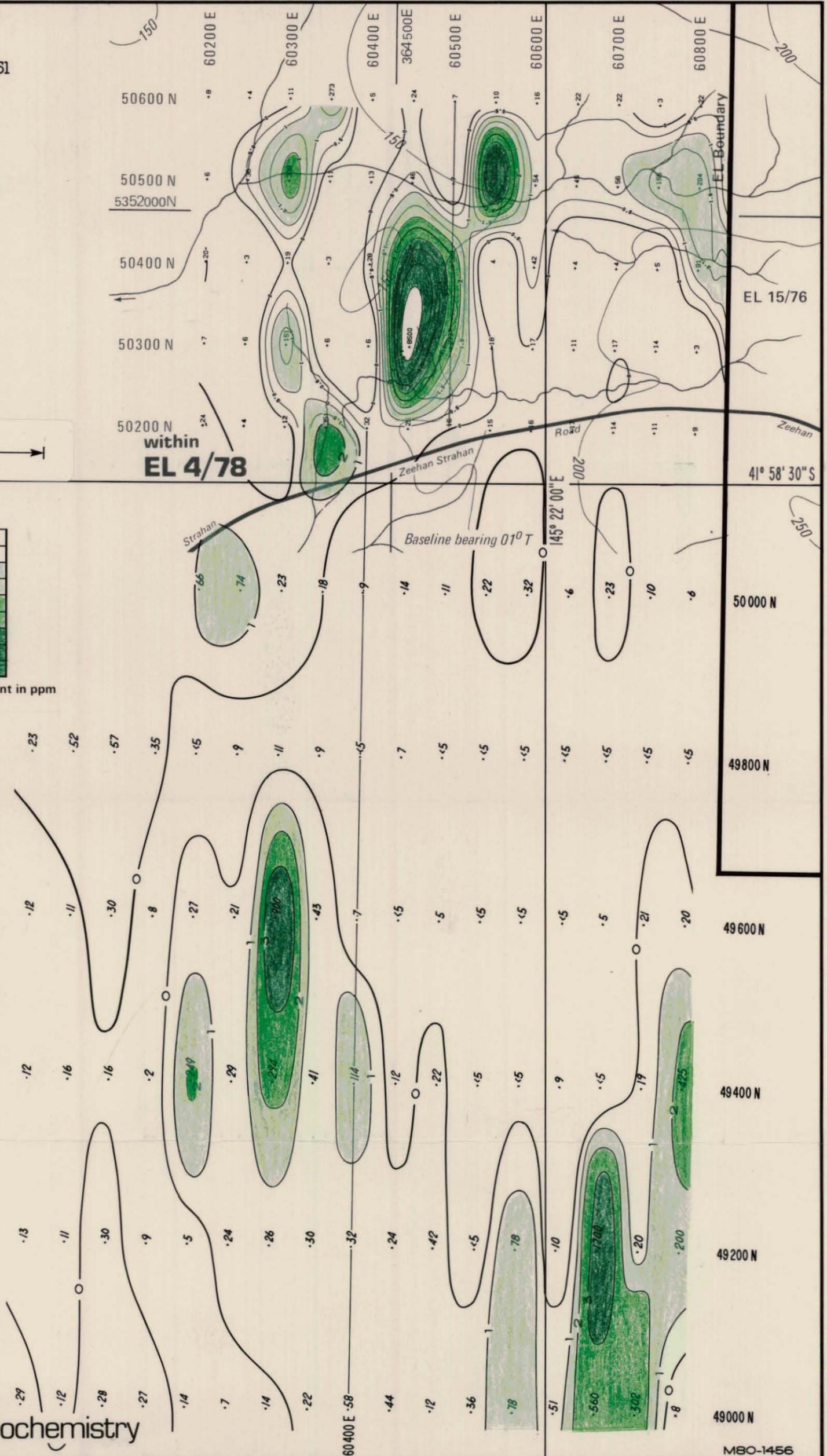
Mean = 17.73

Equivalent in ppm

Appendix 8

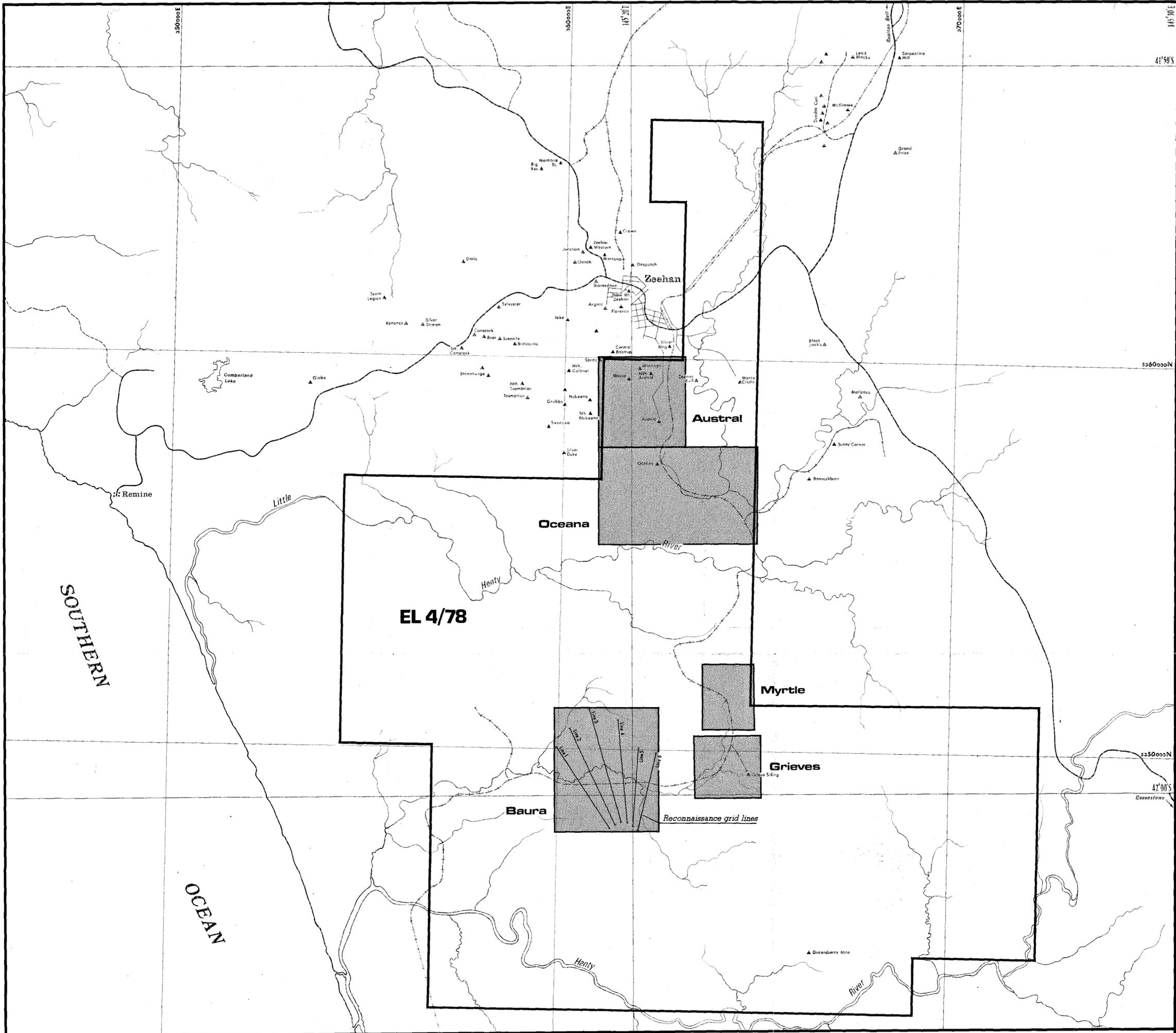
Myrtle

ZINC soil geochemistry

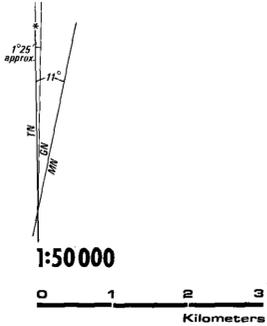


MBO-1456

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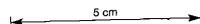


Location



Compiled from enlargement of Zeehan 1:63360 scale and Strahan 1:50000 scale geologic maps. Transverse Mercator Projection

031172



Amoco Minerals Australia Company

80-14495

| | | | |
|--------------------------|---------------------|--------------------|----------------------|
| Project | ZEEHAN | | Nº A-78-60 |
| Project Partner | Zeehan EL 4/78 | | |
| PROSPECT LOCATION | | | |
| Map Ref. ANG | K-55-5 | Latitude 42° 00' S | Longitude 145° 20' E |
| Surveyed | Date | Scale | 1:50000 |
| Drawn | S.F., R. Smyth-King | Date | August 1980 |
| Report 179 | | Drawing Nº | M80-1476 |

