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AMOCO MINERALS AUSTRALIA COMPANY

PROJECT A-78-60

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PROGRESS REPORT

MICROFILMED

JANUARY TO JUNE 1983

ZEEHAN

EXPLORATION LICENCE 4/78

TASMANIA

P.A. JONES

JUNE 1983

REPORT 353

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Project Location

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SUMMARY AND CONCLUSIONS

Exploration target for the prospect is a large Irish style carbonate hosted lead-zinc-silver orebody.

Exploration licence 4/78 was granted to Amoco Minerals Australia Company for a period of six months from June 14, 1978 with further renewals subject to Mines Department approval. Negotiations are continuing towards the establishment of a joint venture with Electrolytic Zinc encompassing the area within EL 4/78.

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

limestones.

Similarities in style of mineralization and geological setting, between the Oceana mineralization and major Irish deposits indicate great potential for locating further sedimentary exhalitive lead-zinc orebodies of significant tonnage and grade in Gordon Limestone within EL 4/78.

Culture and geologic mapping was completed on the Pyramid and Nubeena extended prospects.

Regional rockchip and detailed rockchip sampling programs were conducted on EL 4/78 and on the Pyramid and Nubeena grids. Samples from the Pyramid are analogous to those taken on the Oceana prospect.

Bedrock sampling programs were conducted on the Greives and Myrtle prospects outlining numerous percentile lead and zinc values.

A regional stream sediment program covering the majority of EL 4/78 was conducted during the period outlining a number of strongly anomalous values requiring detailed follow up.

Encouraging results were obtained from three of the six trenches excavated on the Oceana prospect. Two parallel southerly trending zones (approximately 300 meters in length) of greater than one percent lead/zinc were delineated indicating a strong geochemical tail exists from the Oceana mineralized zone.

Preliminary metallurgical tests are being conducted by Amoco's Laboratories on two separate samples (50 and 25 kilogram) of Oceana core. EZ also conducted limited tests on three one kilogram samples of Oceana drill core.

Petrographic studies have been conducted on Nubeena drill core and on core from the Oceana. A second batch of samples was despatched for petrographic, sulfur isotope and fluid inclusion studies.

Data generated from detailed ground magnetic surveys on the Austral and Pyramid prospects during the previous period are included within this report.

John Bishop of Mitre Geophysics was contracted to conduct a detailed examination and modelling program on the Nubeena magnetic feature using all available data. His conclusion was that ZT-82N-1 failed to intersect all of the causitive bodies.

Three aeromagnetic responses (anomalies B,D and H) warranting ground follow up were delineated from the West Coast Aeromagnetic Survey conducted by Geoex for the Tasmanian Mines Department. Ground traverses over the magnetic responses delineated anomalies varying from 20 to 185 nanoTeslas. A number of traverses were soil sampled at 25 meter stations and the samples assayed for copper, lead, zinc, silver, tin, gold, nickel, chromium, cobalt and tungsten. Two further anomalies (A and G) require reconnaissance ground follow up.

Contoured gravity data for the Pyramid prospect originally completed in 1980 are included. A 0.5 milligal anomaly lies coincident with the Pyramid workings.

A program of downhole surveying was implemented by Geoex and Mitre Geophysics on Oceana and Nubeena diamond holes.

Amoco geophysicist P. Staples is conducting an assessment on the North Austral data where coincident gravity/IP, IP/EM-37 and PEM/Magnetic targets were delineated.

An interpretation of the regional BMR gravity data was commenced.

John Bishop of Mitre Geophysics was contracted to compile and synthesize previous geophysical data conducted prior to Amoco programs (1978). Anomalous responses delineated from these data were summarized on a prospect by prosepct basis.

Two holes totalling 519 meters were diamond drilled on the Oceana prospect. Hole ZT-82-13 was continued from the previous period and intersected strong lead-silver mineralization within a siderite/dolomite host: 264-286 = 22 meters of 7.5% lead, 0.6% zinc and 66 g/t silver. The lithologic log, section and geologic plan for ZT-82N-1 is included within this report.

An airphoto interpretation of major structures relating to the limestone sequence will be conducted as lead-zinc occurrences within the Zeehan area and the major Irish style zinc-lead deposits are clearly genetically related to major crustal fractures acting as mineralized conduits.

Anomalous stream values will be followed up in detail.

Geologic mapping will commence on the Myrtle to Rose Valley prospect and a reinterpretation of the Oceana to south Oceana prospect will be completed.

Airborne magnetic follow up surveys and diamond drillhole ZT-83-14 will be completed.

Thin section, polished section, sulfur isotope and fluid inclusion studies will also be completed during the period.

LOCATION AND ACCESS

Exploration Licence 4/78 (EL 4/78) is located immediately south of the town of Zeehan which has a population of approximately 5,000 (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 town 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.

EL 4/78
ZEEHAN
Comstock
Remine
Trial Harbour
Austral
Oceana
MT ZEEHAN 702
MT AGNEW 848
Cumberland Lake
Granite Cr
Little Comstock Cr
Henty River
Fen Creek
Badger River
Professor Range
Professor Plateau
McCutcheons Cr
Bottle Cr
Tully River
Henty Dunes
Lost Creek
Misery Flat
Manuka River
Burgess Rt
Tully R
Little Tully R
Strahan
Regatta Point
Strahan Aerodrome
Long B
Lettes Bay
Surging Pt
CAPE SORELL
Macquarie Hds
Edwards Bay
Braddon Pt
Fraser Flats
Yellow Bluff
KELLY CHANNEL
Round Hd
Cat I
Neck I
King Pt
Connellys Pt
Pine Cove
Connellys Pine Creek
Sophia Pt
Backagain Pt
Elizabeth I
Betsys Bay
Liberty Bay
Liberty Pt
Table Head
Sloop Rks
Sloop Pt
Dunes Creek
MACQUARIE HARBOUR
Coal Head
Teepookana
KING RIVER
Lyell Comstock Cr
Pearl Creek
Linda
Mt Lyell Mine
Gormanston
Queenstown Aerodrome
QUEENSTOWN
MT OWEN 1146
Lynchford
Princess River
Queen River
Thureau Hills
Mt Huxley 925
Proprietary Pk 1103
MT JUKES 1168
Central Pk
West Jukes Pk
Crotty
Lake Margaret
1147 MT SEDGWICK
Marble Bluff
Langdon River
Yolanda
Lodge Lo
Basin Lake
Lake Margaret
Mt Geikie
Farquhar Lo
Mt Mary
L Smeer
WESTERN ARM
Mt Tyndall
Tyndall Cr
L Hunter
L Rollestan
Walford Pk
L Dora
Newton Pk
Newton River
Tyndall Range
STICH RANGE
Mt Julia 840
Julia Pk
Westwood
760 Mt Selina
L Selina
820 Whitecliff Hills
MT READ
The Gooseneck
Jones Cr
Dobson River
Arthur River
MOUNT MURCHISON
Queens Hd 1275
Williamsford
Commonwealth Hill
Carbine Hill
Black Hill
Mt Razorback
MURCHISON HWY
1143 MT DUNDAS
Dundas
ZEEHAN HIGHWAY
Ewart Cr
Farrell Creek
Amber Creek
Dundas River
Little Henty River
Heemskirk Creek
Piney Creek
142 MT HEEMSKIRK
Western Hills
Renison Bell
PIEMAN RIVER
Wilson R
Huskisson R
Stanley
Northridge Cr
Stringer Creek
Healy Cr
950 MT BLACK ROSEBERY
Mt Sale
MT FARRELL
712
Tullah
PIEMAN R
Dam (Under construction)
011
145°30'E
42°00'S
5 cm
Figure 1
Location
magnetic declination 13·5°
10 km
528012

DESCRIPTION OF THE PROPERTY AND OWNERSHIP

Exploration licence 4/78 of approximately 208 square kilometers in area was granted to Amoco Minerals Australia Company for the period of six months from June 14, 1978. The tenement was recently renewed for 12 months to July 14, 1984.

New Mines Department regulations in force since July 1, 1982 require Amoco to reduce by 50% the area of EL 4/78 on July 14, 1985.

Negotiations are continuing towards the establishment of a joint venture with Electrolytic Zinc Industries encompassing the area within EL 4/78. As soon as negotiations are finalized a copy of the agreement will be forwarded to the Department of Mines Hobart for filing.

Amoco retains their 60% equity in the previously negotiated farm-in with EZ covering Mining Licence 60M/77 and 4W/77 embracing the southern portion of the Austral prospect. Four other independently held mining leases lie within the tenement. Lease 38M/77 and 39M/77 granted to Eraght-Moony are designed to embrace slag dumps containing tin silicates from the Oonah tin mine. Leases 11M/66 and 12M/66 covering the Queensberry copper-lead-zinc-silver vein deposit are held by the Malcom Bendall Mining Syndicate.

HISTORY AND PREVIOUS EXPLORATION

A detailed description of the mining history and exploration carried out within EL 4/78 has been summarized in two previous progress reports:-

'Progress Report for the period June 1979 to June 1980' (Amoco Report 179) and 'Progress Report for the period June 1980 to June 1981' (Amoco Report 249).

REGIONAL GEOLOGY

The basement complex is comprised of Precambrian schists, quartzites, siltstones, shales, andesitic and basaltic lavas and pyroclastics which form a stable craton to the northwest of the tenement. The Lower Cambrian units such as the Crimson Creek Formation are predominantly shallow water volcaniclastic sediments including argillites, grits, tuffaceous arenites and minor dolomites. 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 northwest axial trends. The quartzose and hematitic Owen Conglomerate at Mt. Zeehan was deposited within a graben structure in the Lower Ordovician period and is transgressively overlain by micaceous siltstones, tubicolar sandstones, grits and minor sandstones and

shales. It is the time equivalent of the Moina Sandstone which was deposited in the Zeehan Basin. The Moina Sandstone is overlain disconformably by the Ordovician Gordon Limestone. The disconformity is marked by a discontinuous white quartz pebble conglomerate followed by the Gordon Limestone sequence which is comprised of interbedded massive to laminar, fossiliferous limestones and argillaceous dolomites with numerous chaoatic slump breccia horizons and zones of clastic sedimentation including fossiliferous calcareous sandstones, siltstones and shales. Siluro-Devonian sediments within the basin are fossiliferous marine, coarse grained and cross bedded quartzose sandstones, siltstones, minor quartzites and dolomitic to pyritic shales and siltstones.

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

Extensive Tertiary and Quaternary gravel deposits blanket much of the prospective carbonate 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 with sedimentation. North-northeast striking faults are thought to have developed in post Permian times and are not common within the tenement area.

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

MINERALIZATION

Exploration within the prospective Gordon Limestone sequence has been modelled on the Irish type (Navan, Silvermines) carbonate hosted sedimentary exhalitive lead-zinc deposit. These orebodies are structurally and lithologically controlled and are invariably located adjacent to major deep seated basement sutures as well as smaller oblique extension faults which are regarded as the mineralizing feeders. Epigenetic ore zones occur in local dilation zones, en echelon overlaps and bends on these faults and at intersections of the faults with the major basement sutures. Stratiform orebodies are deposited syngenetically - syndiagenetically in small down faulted basins developed along the strike of the oblique extension fault from mineralized solutions exhaled from the faults, probably just after a period of fault movement. These same fault movements are thought to be responsible for the coeval initiation of submarine debris flow

breccias within the ore horizon.

Drilling to date shows that two distinct styles of mineralization occur at the Oceana prospect, epigenetic stratabound feeder mineralization north of the Oceana Mine Fault and stratiform syndiagenetic mineralization south of the Mine Fault. Stratiform syndiagenetic mineralized horizons intersected in holes ZT-80-3,4,7 and ZT-82-10A are stratigraphically restricted to the base (western ore zone) and top (eastern zone) of a series of chaotic submarine debris flow breccias similar to those found in major Irish mines. These breccias are atypical of the shallow water Gordon Limestone sequence as their characterisitics imply a deeper water depositional environment . Three separate and distinct ore lenses occur in the epigenetic mineralized zone (feeder zone) north of the Mine fault within a sequence of recrystallized and weakly silicified dolomites with abundant siderite and minor calcite. The coarse nature of the sulfides and gangue minerals suggest that the 'feeder' zone is centered on the Oceana fault.

It should be noted that only limited wide spaced diamond drilling has been conducted on the Oceana to date with a number of 200 meter intervals having no drilling information (Enclosure 11). Further drilling will more than likely add to our understanding of the deposit and delineate the deposit further.

WORK CONDUCTED BY AMOCO

Work during the period entailed geologic mapping, costeaning, downhole geophysical, airborne magnetic follow up and geochemical surveys. Two diamond holes totalling 519 meters were drilled to test down dip mineralized zones on the Oceana prospect. Petrographic, sulfur isotope and fluid inclusion studies were also implemented as were some preliminary metallurgical tests.

Prospect locations are shown on Enclosure 1. All computer contouring of geophysical surveys was conducted by CEANET of North Sydney.

Geologic Mapping

Culture and geologic mapping was completed on the Pyramid prospect approximately one kilometer to the southeast of the Oceana mine. The grid was mapped and is presented at a scale of

1:2500 (Enclosure 14). Detailed mapping was also conducted over the magnetic feature delineated on the Nubeena grid, (Enclosure 15) incorporating subsurface data obtained from drillhole ZT-82N-1.

Numerous workings including shafts, adits, costeans and prospecting pits were located on the Pyramid prospect, many of which are masked by vegetation regrowth or by talus deposits. The prospect is marked by an east to southeast trending, heavily faulted sequence of Gordon Limestone underlain to the south by Lower Ordovician sandstones, grits and siltstones and overlain to the north by Silurian quartzites, conglomerates, siltstones and slates. The north dipping sequence was initially subjected to prominent strike faulting which has later been offset by intense north and northeast trending cross fracturing. The majority of workings lie adjacent to the locus of the major fault sets. A strong southeast plunging residual gravity response (0.5 milligals, Enclosure 16) occurs coincident with both the workings and a 40 nanoTesla magnetic response.

Further detailed mapping was conducted over the magnetic response delineated on the Nubeena grid (Enclosure 12). Subsurface data acquired from drillhole ZT-82N-1 were incorporated into the final compilation. An isolated sliver of Cambrian intermediate and basic extrusive volcanics (Success Creek?) and altered serpentinites (talc magnesite chromite schists) overlies a thin sequence of Lower Cambrian? (Crimson Creek) volcaniclastic, carbonate veined sediments which in turn overlies a monotonous sequence of upper Precambrian pyritic black shales, siltstones, minor quartzites and breccias (Oonah Quartzite). Minor workings including adits and prospecting pits were mapped in the vicinity of the contact zone between the altered serpentinites and the underlying sediments. A two meter intersection of 23.4% lead and 313 g/t silver was encountered in ZT-82N-1 at this stratigraphic position.

Analytical Techniques

Rockchip, bedrock geochemical, regional soil, stream sediment and panned concentrate samples were dried, crushed and pulverized and despatched to Comlabs for analysis for copper, lead, zinc, silver and tin. Costean samples were sent to Analabs in Tasmania for both preparation and analysis for basemetals and tin.

Analysis for basemetals was by AAS after hydrochloric acid digestion and tin by XRF.

Rockchip samples were analysed for an additional 12 elements, tungsten, arsenic, antimony and barium by XRF and gold, nickel, cobalt, bismuth, molybdenum, vanadium, cadmium and manganese by AAS. Costean samples were analyzed for an additional three elements, cadmium and manganese by AAS and antimony by XRF. The regional stream samples were analysed for the following additional elements - gold, nickel and chromium and regional soil samples (airmagnetic follow up) for gold, nickel, cobalt, chromium and tungsten.

Check assays on every twentieth sample were carried out by Amdel in Adelaide.

Rockchip Geochemistry

Regional:

Regional sampling has been conducted in conjuction with the stream sediment sampling program in an effort to locate the majority of workings outside of the gridded areas.

Two minor workings (Enclosure 7) lying along strike and to the south of the Silver King, Zeehan Bell line of lode assayed up to 1.6% lead, 0.02% zinc and 117 g/t silver (Table 1) within quartz impregnated Siluro-Devonian black shales. Quartz poor black shales returned background values for basemetals.

TABLE 1 - REGIONAL ROCKCHIP SAMPLING - EL 4/78

SAMPLE	AMG CO-ORD	ROCK TYPE	Cu	Pb	Zn	Ag	Sn	Au	Sb	Ni	Co	Bi	Mo	V	Cd	Mn	W	As	Ba
92463	3641-53533	Ferruginous shale	10	120	190	<1	4	<0.05	6	22	4	14	6	10	<1	28	<10	6	190
92480	3636-53587	Black shale	16	48	50	<1	8	<0.05	<4	10	<4	14	6	40	<1	12	<10	8	630
92481	3636-53587	Quartz impregnated shale	85	1.55%	230	117	<4	<0.05	420	8	<4	12	<4	20	2	14	15	90	220
92482	3643-53577	Galena - quartz vein	90	1.60%	200	31	<4	<0.05	115	10	<4	14	<4	20	2	20	10	95	250

TABLE 2 - PYRAMID - ROCKCHIP & DUMP SAMPLING

SAMPLE	CO-ORD	ROCK TYPE	Cu	Pb	Zn	Ag	Sn	Au	Sb	Ni	Co	Bi	Mo	V	Cd	Mn	W	As	Ba
27606	1780N 1436E	Sideritic lime-stone + lead	440	18.9	0.38	170													
27607	1780N 1436E	Sideritic lime-stone + lead	530	19.2	0.29	210													
27608	1780N 1436E	Sideritic lime-stone + lead	395	23.9	0.20	140													
27609	1780N 1436E	Sideritic lime-stone + lead	360	34.4	0.22	200													
29742	1780N 1436E	Argillaceous lime-stone + siderite	185	1.8	0.25	7.5	<4	<0.05	64	-	4	<4	-	-	5				
92040	2600N 1420E	Siliceous siltstone	6	130	135	1	<4	<0.05	4	<4	<4	<4	<4	10	<1	150	<10	4	60
92041	2100N 1500E	Pyritic sandy grit	4	430	240	1	<4	0.10	24	<4	4	<4	<4	40	<1	10	10	6	85
92042	1800N 1430E	Ironstone	22	260	2900	1	<4	<0.05	<4	110	46	<4	<4	30	<1	1.10	20	12	60
92043	1420N 1715E	Ferruginous shale	8	990	16	<1	6	<0.05	4	6	<4	<4	<4	40	<1	16	10	4	380
92044	2030N 1700E	Pisolitic Bog Iron	6	120	50	1	<4	<0.05	<4	<4	<4	14	<4	40	<1	0.28	<10	9	105
92045	1875N 1750E	Massive galena	560	74.0	0.42	225	<40	<0.05	400	<4	<4	10	<4	<10	55	330	<100	<100	150
92046	1700N 1450E	Limestone	16	0.36	0.15	4	6	<0.05	6	10	8	6	<4	20	11	0.77	<10	22	55
92047	1750N 1480E	Dump 'ore'	110	17.8	1.30	85	<40	<0.05	100	50	10	<4	<4	10	53	2.3	<100	<100	40
92048	1785N 1450E	Dump 'ore'	220	17.3	0.26	60	<40	<0.05	100	48	12	<4	<4	10	13	2.0	<100	<100	50
92049	1835N 1405E	Ironstone	12	0.11	0.58	3	4	<0.05	4	260	130	<4	<4	<10	<1	1.6	<10	46	35
92050	2140N 1300E	Black limey sandstone	8	830	60	1	<4	<0.05	14	8	4	<4	<4	10	<1	20	15	10	135

TABLE 3 - NUBEENA - ROCKCHIP & DUMP SAMPLING

SAMPLE	CO-ORD	ROCK TYPE	Cu	Pb	Zn	Ag	Sn	Au	Sb	Ni	Co	Bi	Mo	V	Cd	Mn	W	As	Ba	Cr
79851	2115N 1625E	Ironstone (Dump)	8	46	170	<1	4	0.10	<4	60	18	<4	<4	220	<1	460	<10	8	15	-
79852	2102N 1754E	Siltstone-pyritic D/grey carbonac.	20	200	60	<1	4	<0.05	24	26	12	<4	<4	20	<1	32	<10	16	300	-
79853	2105N 1790-1800E	Hematitic tuff siltstone	360	32	65	<1	<4	<0.05	50	26	8	<4	30	160	<1	46	10	170	220	-
79854	2135N 1555E	Hematitic silst. (Addt. dump)	6	180	100	<1	8	<0.05	16	10	4	<4	<4	20	<1	960	<10	26	200	-
79855	2150N 1625E	Ironstone (Composite dump)	4	110	1100	<1	6	0.10	6	380	60	<4	<4	70	<1	2400	<10	165	30	-
79195	2100N 1625E	Ironstone	4	120	230	1	6													
79196	2000N 1600E	Tuffaceous silstone	<2	24	230	<1	<4													
79197	2075N 1600E	Quartzite	2	4	26	<1	4													
92455	2100N 1605E	Altered Serpentite 5% magnetite	8	60	300	1	<4	<0.05	4	2100	180	<4	<4	<10	<1	2150	<10	<2	<10	300
92456	2035N 1587E	Gabbro? Mafic intrusive	8	1150	12	1	<4	<0.05	4	160	28	<4	<4	20	<1	185	<10	2	350	46
92457	2000N 1550E	Ferruginous clays + 15% Cr crystals	6	24	520	1	<4	<0.05	10	7500	360	<4	<4	90	<1	4900	<10	55	10	1.75%
92458	2120N 1485E	Siliceous, pyrite siltstone	12	60	14	<1	6	<0.05	4	14	<4	<4	<4	20	<1	75	<10	16	310	70

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Pyramid:
Detailed composite rockchip sampling has been completed on the Pyramid grid southeast of the Oceana (Table 2 and Enclosure 14) prospect. Sixteen samples including lead/zinc/siderite dump material, outcropping ironstones, ferruginous siltstones, shales and grits and also limestone were collected from the zone of old workings and from elsewhere on the grid. Strongly anomalous assays were reported from the Pyramid dumps (up to 18% lead, 1.3% zinc and 225 g/t silver) and also from an ironstone north along strike assaying up to 0.1% lead, 0.6% zinc and 3 g/t silver. Ironstone containing minor galena occurs within a fault zone cutting the Amber State/Crotty Quartzite contact grid east of the workings.

Nubeena:
Further rockchip sampling has been conducted on the 'bulls eye' shaped magnetic feature on the Nubeena prospect (Table 3 and Enclosure 12). Four samples of altered serpentinites, gabbro? and siliceous siltstone were assayed returning values up to 0.11% lead, 0.05% zinc, 0.75% nickel, 0.04% cobalt and 1.75% chromium. The surface samples in general mirrored that obtained from ZT-82N-1 with the exception that copper values in drillcore were high (up to 0.1% copper) in comparison to quite low values being returned at surface (due to leaching?).

Bedrock Sampling
A bombadier J5 mounted jackro 200 hydraulic auger rig was used successfully to penetrate the thick fluvioglacial gravels blanketing much of the prospective Gordon Limestone sequence south of the Little Henty River. Holes were drilled to an average depth of five meters with top of bedrock samples being obtained at 25 meter intervals along grid lines. A number of holes drilled to the south of the Grieves workings on line 4400N had gravels in excess of five meters and therefore remain unsampled.

Looking across the Zeehan-Strahan Road and the Baura, Grieves and Myrtle prospects.

Setting out on the stream sediment survey.

A total of 104 bedrock samples were taken on two prospects - Grieves and Myrtle with sampling initially concentrating around the Grieves mine as well as on reconnaissance lines spaced at 400 meter intervals north of the workings (Enclosures 17 and 18).

Grieves:
Limited sampling on lines 4400N, 4500N and 4600N adjacent to the old workings has produced strongly anomalous values up to 940 ppm lead and 0.93% zinc over approximately 200 meters strike and 100 meters width at the contact between the Gordon Limestone and underlying Moina Formation. Further highly anomalous values were obtained on lines 5000N and 5100N at the same position with values ranging up to 1.15% zinc and 0.07% lead. No sampling was conducted coincident with the Grieve mine due to steep terrain precluding bombadier access, however disseminated galena/sphalerite was observed in veinlets within slightly weathered limestone. Limestone breccias, oolitic limestone and black dolomite horizons were also evident in outcrop the latter containing abundant fine grained syngenetic sphalerite? and pyrite (thin section 93812, Amoco Report 151)

Myrtle:
A zone of anomalous zinc and lead (values up to 0.43% zinc, 0.44% lead) occurs at the upper contact between the Gordon Limestone and the overlying Crotty Quartzite on line 48600N. The strong tenor anomaly occurs at the same stratigraphic level as that found at the Mariposa prospect on the eastern flank of the Zeehan Basin.

Further reconnaissance sampling on 40 meter spaced lines is recommended to complete the initial bedrock coverage of the Myrtle to Rose Valley limestone sequence.

Stream Geochemistry

A regional stream sediment program collecting -80 mesh and panned concentrate samples was completed over the greater part of EL

4/78. A total of 152 samples were collected during the program, approximately one third of which were samples generated from detailed follow up of initial results. Enclosures 2 thru 6 show sample locations and anomalous assay results for the following combinations: lead-zinc, copper-silver, gold-tin and nickel-chromium. All results are in analytical result sheets included as Appendix 1.

Strongly anomalous values occur within the Little Henty River as well as the creeks draining the Austral Smelter and Oceana valleys. A small creek draining a thin sliver of Amber Slate south of the Austral grid assayed up to 0.6% lead and 1.4% zinc and will require detailed ground follow up as galena/sphalerite was found within ironstone nearby (Enclosure 3) however, possible contamination from the Zeehan smelter cannot be discounted. Contamination occurs in Parting Creek (sample 91595 assayed 3.1% zinc, 0.9% lead and 39 g/t silver) as well as near the town refuse dump where both high lead and chrome (up to 2.2%) values were returned.

A number of valid moderate to strongly anomalous values have been obtained requiring detailed follow up. Sample 92263 located on Malcolm Creek north of the Henty River assayed strongly in respect to lead (1700ppm) silver (23g/t) and copper (105ppm) and occurs within a favorable sequence of sediments and minor tuffs of Cambrian age.

High background values of chrome reporting in the panned concentrate fraction are probably due to detrital magnetite known to occur within the sediments lying stratigraphically above the Gordon Limestone.

Costeaning

Six trenches totalling 610 meters were excavated at the Oceana prospect using an O & K hydraulic excavator. The trenches varied in depth from 0.15 to 7.0 meters were mapped in detail at a scale

of 1:200 and sampled over intervals of two meters (Tables 4 and 5 and Appendix 2).

The costeans were designed to evaluate the untrenched zone between the Oceana and South Oceana workings between lines 3300N and 2850N (Enclosure 10). The trenching proved to be extremely difficult and hazardous to map and sample due to thick unconsolidated fluvioglacial gravels, sink holes and zones of unweathered hard limestone occurring near surface making chip sampling extremely difficult. However, assays from three of the trenches delineated two parallel southerly trending zones of greater than one percent lead/zinc up to 300 meters south of line 3400N. This would indicate a strong geochemical tail extends south from the Oceana mineralized zone before reappearing at the highly mineralized South Oceana workings.

TABLE 4 - OCEANA COSTEAN DATA

Northing (Line)	Eastings	Zones Not sampled	Reason	Total Length (m)
3250N	1350 - 1450	1404 - 1406	Caved	100
		1390 - 1392	Dam water	
3150N*	1350 - 1450	1390 - 1398	Sink hole	100
3100N	1324 - 1450			126
3050N	1350 - 1450	1394 - 1400	Gravel	100
3000N	1350 - 1434			84
2900N*	1350 - 1450	1398 -m 1412	Deep water on bedrock	100
			TOTAL	610

*Costeans slighly off line - see Enclosure 10

TABLE 5 - OCEANA - SIGNIFICANT COSTEAN RESULTS

Costean	Interval	(m)	Pb%	Zn%	Ag g/t
3300N*	1381-1385 =	4	1.3	0.2	3.8
3250N	1384-1390 =	6	0.2	1.1	3.2
	1440-1446 =	6	1.7	0.8	11.5
3200N*	1366-1368 =	2	1.0	0.2	0.5
	1378-1392 =	14	0.4	1.4	1.6
	1426-1432 =	6	1.0	0.8	9.3
3150N	1432-1434 =	2	0.2	0.9	2.0
3100N	1378-1380 =	2	0.2	0.9	5.0
	1430-1436 =	6	0.9	0.8	8.6

* Costean data taken from previous Amoco progress report 347

Metallurgy

Preliminary metallurgical tests are being conducted by Amoco's Laboratories in Denver on two separate samples (50kg assaying 8.8% lead, 2.3% zinc, 74.6 g/t silver and 25 kg assaying 22.8% lead, 12.6% zinc, 213.7 g/t silver) obtained from Oceana drillcore (ZT-79-2, ZT-80-4). Results of these tests will be included when available.

Electrolytic Zinc Industries also conducted minor tests on three representative one kilogram samples from the Oceana (21335, 12349, 21609) to ascertain their compatability with the standard Rosebery/Que River mill feed. EZ metallurgists do not consider the tests sufficient to form any firm conclusions on the compatability or otherwise of the Oceana material with Rosebery/Que River feed, however the following observations can be made (Appendix 3).

The high grade sample 21335 (Amoco assay 21.1% lead, 39.9% Zn, 191g/t silver and EZ assay 25.4% lead, 41.4% zinc, 200.2g/t silver) shows that a good lead and zinc concentrate can be obtained at the expense of zinc and silver (losing 60% zinc in the tail). This is thought to be due to a thin oxidized layer

coating the galena/sphalerite sulfides thus hindering flotation.

Sample 21349 (Amoco assay 1.7% lead, 2.8% zinc, 4.7g/t silver and EZ assay 1.8% lead, 2.3% zinc, 5.6g/t silver) being low grade showed poor lead and zinc concentration losing 45% zinc and 53% lead in the tailings. However good silver recovery was obtained with only negligible values reporting in the tail.

Sample 21609 (Amoco assay 12.9% lead, 0.5% zinc, 72g/t silver and EZ assay 9.1% lead, 0.5% zinc, 58.1g/t silver) is comparible to the head grade of the old Oceana mine and results show that a good lead-silver concentrate can be obtained with only minor lead and zinc being lost in the tail.

The latter sample would appear at this early stage to be compatible with the standard Rosebery/Que River feed.

Petrography

Thirty samples from Oceana, Austral and Nubeena drill core were despatched to Central Mineralogical Services in Adelaide and to G. Green, Department of Mines, Tasmania for petrographic descriptions (Appendix 4 and 5).

Nine of the 12 samples from ZT-82N-1 were described as of igneous basic to ultramafic or granitoid composition with the remaining three being from a black shale siltstone fine sandstone sequence. The Cambrian volcanic sequence (Success Creek? - Lower Cambrian) has been heavily quartz, sericite, chlorite, carbonate altered, however gross textures not evidenced in thin section would suggest the rocks are more explosive (including agglomerates, tuffs and lavas) rather than intrusive. The clastic samples are heavily deformed and brecciated these being diagnostic features of the Upper Precambrian Oonah Quartzite sequence (pers com: A. Brown, Mines Department).

Seven samples from drillhole ZT-80-4 at Oceana were petrographically studied by G. Green in order to obtain some insight into the ore genesis of the Oceana mineralization. He states that carbonate (siderite?) replacement of an initial dolomitized carbonate sequence as well as fissure filling is a significant factor controlling the lead-zinc mineralization. He noted both biogenic framboidal and abiogenic euhedral pyrite and states that sphalerite was introduced into the system in pulses (giving rise to zoned sphalerite of varying iron composition). Galena, minor tetrahedrite and chalcopyrite were introduced last of all and is occasionally found replacing sphalerite. He also states that slump breccias may be hydrothermal breccias cemented after the middle Devonian deformation phase.

A second batch of samples was despatched for petrographic, sulfur isotope and fluid inclusion studies and included core from ZT-79-2, ZT-80-3,4,7,9 and ZT-82-13 on the Oceana and ZT-80A-3 on the Austral prospect. Initial results have changed Green's thinking to one of syndiagenetic deposition of lead/zinc sulfides within chaotic slump breccias, however results from these studies will be appended in the next six monthly report.

Geophysics

Summary:

Geophysical surveys and data interpretation included downhole gamma, density and sirotem logging by Geoex, gamma and density logging by Mitre Geophysics and compilation of detailed ground magnetic, gravity and EM-37 data by Amoco. Amoco also commenced a regional program of aeromagnetic follow up. Mitre Geophysics was also contracted to compile and synthesis all previous geophysical data conducted by Tenneco (1971), BMR (1947) and the Imperial Geophysical Experimental Survey (IGES)(1929).

Ground Magnetics:

Detailed ground magnetic surveys using two Geometrics G856 magnetometers were completed on the Austral prospect between

lines 400N to 2000N and from 700N to 2700N on the Pyramid prospect during early 1982. The contoured data delayed due to extraction and computing problems is presented at a scale of 1:2500 in Enclosures 13 and 15.

Austral: Zones of weak anomalism on the Austral prospect occur over pisolitic ironstone from 1200N to 1400N at 1275E and coincident with massive ironstone at the Flux Quarry from 1800N to 1900N at approximately 1125E. Moderate negative anomalies occur coincident with a small outcrop of Tertiary? basalt on line 2000N at 1350E however, a large negative response occurring between lines 700N and 1100N and coincident with the Zeehan Smelter slag dumps, swamps most of the southern portion of the grid. Minor one point anomalies appear to be culture related as evidenced by numerous occurrences of scrap iron on the grid.

Pyramid: A weak to moderate 20 to 40 nanoTesla response of dimensions 200 by 50 meters was delineated coincident with the Pyramid zone of workings. An ironstone immediately north of the workings returned an identical signature (approximately 40 nanoTeslas) to that observed on the northern portion of the Oceana prospect.

Minor one point anomalies also appear culture related as observed on the Austral grid.

Contoured data for the Myrtle and Myrtle Extended prospects remains unpresentable due to equipment malfunction of the Geometrics G856 magnetometers.

Nubeena Magnetic Feature: The very strong 3000 nanoTesla anomaly delineated at 1625E on lines 2000 and 2100N at Nubeena was subjected to a number of detailed surveys during the period.

Magnetic susceptability readings were taken at one meter intervals (the average of three separate readings being the

observed figure on Table 6) along core from ZT-82N-1 and matched with the geology prior to Mitre Geophysics conducting modelling surveys. A number of shallow magnetic units rather than a single body at depth occur within the extrusive intermediate volcanic sequence. The underlying talc-magnesite schist and interbedded shale, siltstone and sandstone units show very weak susceptabilities which appear to relate to the siderite content of the rock.

John Bishop of Mitre Geophysics concluded after modelling the observed response that diamond drillhole ZT-82N-1 failed to intersect all of the causitive bodies. However he states it seems likely that those sources not intersected are similar to those which were, namely magnetite bearing units within a sequence of tuffs and agglomerates (Appendix 6).

Further interpretative work conducted by Amoco geophysicist S. Collins (Appendix 7) suggests that the magnetic body remaining untested would need a susceptability of 20 by 10^3 cgs units to produce the observed anomaly. This is 10 times more magnetic than material intersected by ZT-82N-1. He also suggests a westerly dip of 85˘ (cross cutting bedding?) for the anomaly is not inconcsistent with modelling trends. In his view such a west dip would be sufficient to cause the drillhole to miss any down dip extensions of this interpreted body.

A second diamond hole is recommended to scissor the sequence, in view of the prospects proximity to major magnetic mineral deposits, (Renison, Queen Hill and Mt. Lindsay) to fully explain the magnetic response.

Airborne Magnetics:

Results were received from an airborne magnetic survey (line spacing 500 meters) conducted by Geoex in conjuction with the Tasmanian Mines Department late in 1982 (Enclosure 8). Several anomalies were identified by Amoco's geophysicist as being of

TABLE 6 - MAGNETIC SUSCEPTIBILITIES ($x10^{-3}$cgs) ZT-82N-1

DEPTH(m)	READING	ROCK TYPE	DEPTH	READING	ROCK TYPE
0-6	No core		39-40	0.1	Minor hornblende crystals in andesite basalt flow
6-7	0	Clay	40-41	1.7	
7-8	0.1		41-42	1.4	
8-9	0.3		42-43	1.3	Agglomerate andesite/basalt
9-10	0.4		43-44	0.3	
10-11	0.3	Coarse tuffaceous andesite	44-45	0.5	
11-12	0.4		45-46	0.8	
12-13	0.4		46-47	0.3	
13-14	0.4		47-48	0.2	
14-15	0.5	Andesitic/ basaltic flow	48-49	0.3	
15-16	0.5		49-50	0.2	Dacite flow minor acidic
16-17	0.6	Agglomerate andesite/basalt	50-51	0.2	fragments
17-18	0.6		51-52	0.4	
18-19	1.5		52-53	0.7	
19-20	0.9		53-54	1.1	
20-21	0.1		54-55	0.2	
21-22	2.3	Andesitic/	55-56	0.2	
22-23	0.4	basaltic flow	56-57	0	
23-24	1.3		57-58	0.1	
24-25	3.0		58-59	0	
25-26	2.5		59-60	0.1	Fine grained tuffaceous
26-27	1.4		60-61	0.1	andesite
27-28	0.4		61-62	0.1	
28-29	0.2		62-63	0.1	
29-30	0.1	Agglomerate	63-64	0	
30-31	0.9	andesite/basalt	64-65	0.1	
31-32	0.7		65-66	5.0	Agglomerate andesite/basalt
			(High of 26)		Minor massive magnetite
32-33	0.5		66-67	1.4	hematite veins
33-34	1.1		67-68	3.0	
34-35	1.1		68-69	2.0	
35-36	1.2	Coarse andesite/	69-70	0.9	
36-37	0.9	basalt flow	70-71	1.0	Andesitic/basaltic flow
37-38	0.7		71-72	2.0	
38-39	0.5		72-73	1.5	

MAGNETIC SUSCEPTIBILITIES ($x10^{-3}$cgs) ZT-82N-1

DEPTH(m)	READING	ROCK TYPE	DEPTH	READING	ROCK TYPE
73-74	1.0		108-109	0.5	
74-75	2.0	Coarse andesitic/	109-110	0.4	
(High of	9.5)	basaltic flow			
75-76	1.1		110-111	0	Agglomerate andesite/basalt
76-77	0.5		111-112	0.2	Abundant siderite veining
77-78	0.1		112-113	0	
78-79	3.0		113-114	0	
79-80	0		114-115	0	
80-81	0.5		115-116	0	
81-82	2.5		116-117	0	
82-83	0.9	Andesitic	117-118	0	
83-84	4.5	basaltic flow	118-119	0	
84-85	0		119-120	0	
85-86	0		120-121	0	
86-87	0	Clay	121-122	0	
87-88	0		122-123	0	Transitional zone
88-89	0		123-124	0	
77-78	0.1		112-113	0	
78-79	3.0		113-114	0	
79-80	0		114-115	0	
80-81	0.5		115-116	0	
81-82	2.5		116-117	0	
82-83	0.9	Andesitic	117-118	0	
83-84	4.5	basaltic flow	118-119	0	
84-85	0		119-120	0	
85-86	0		120-121	0	
86-87	0	Clay	121-122	0	
87-88	0		122-123	0	Transitional zone
88-89	0		123-124	0	
89-90	0		124-125	0	
90-91	0	Chloritized	125-126	0	
91-92	0	andesitic/	126-127	0	
92-93	0	basaltic flow	127-128	0	
93-94	0.1		128-129	0	
94-95	0.1		129-130	0	
95-96	0.1		130-131	0	
96-97	0.1	Chlorite and	131-132	0	Talc-magnesite schist with 5%
97-98	0.1	serpentine	132-133	0	chromite (altered serpentinite?)
98-99	0.1	altered andesitic/	133-134	0	
99-100	0.1	basaltic flow	134-135	0	
100-101	0.1		135-136	0	
101-102	0		136-137	0	
102-103	0		137-138	0	
103-104	0		138-139	0	
104-105	0		139-140	0	
105-106	0.9	Agglomerate	140-141	0	
106-107	0	andesite/basalt	141-142	0	
107-108	1.2	abundant siderite veining	142-143	0	

MAGNETIC SUSCEPTIBILITIES ($x10^{-3}$cgs) ZT-82N-1

DEPTH(m)	READING	ROCK TYPE	DEPTH	READING	ROCK TYPE
143-144	0	Talc-magnesite	178-179	0.1	Brecia of grey to dark
144-145	0	schist with 5% chromite (altered serpentinite?)	179-180	0	grey siltstone
145-146	0.2	Sandstone trace	180-181	0	Breccia sandstone clasts
146-147	0	chromite and	181-182	0	in a graphitic matrix
147-148	0	magnetite	182-183	0	
148-149	0	Chalcedonic	183-184	0	
149-150	0.1	dolomite	184-185	0	
150-151	0.1	Altered serpent-	185-186	0	
151-152	0.2	inite cut by qtz	186-187	0	
152-153	0	siderite veins	187-188	0	
153-154	0		188-189	0	
154-155	0	Poorly bedded	189-190	0	Graphitic siltstone minor
155-156	0	sandstone	190-191	0	bedded pyrite
156-157	0		191-192	0	
157-158	0	Serpentinite	192-193	0	
158-159	0		193-194	0	
159-160	0		194-195	0	
160-161	0		195-196	0	
161-162	0	Sandstone	196-197	0	
162-163	0		197-198	0	
163-164	0		198-199	0	
164-165	0		199-200	0	
165-166	0		200-201	0	
166-167	0		201-202	0	
167-168	0	Interlayered	202-203	0	
168-169	0	sandstone	203-204	0	Medium grained sandstone with
169-170	0	siltstone	204-205	0	large pyrite nodules
170-171	0	Black siltstone	205-206	0	
171-172	0	Bedded grey and	206-207	0	
172-173	0.1	blk siltst minor	207-208	0	
173-174	0.1	siderite veining	208-209	0	
174-175	0.1		209-210	0	
175-176	0.1		210-211	0	Black graphitic shales, highly
176-177	0	Breccia of grey	211-212	0	brecciated in sections
177-178	0.1	to dk grey silst.	212-213	0	

MAGNETIC SUSCEPTIBILITIES ($x10^{-3}$cgs) ZT-82N-1

DEPTH(m)	READING	ROCK TYPE
213-214	0	
214-215	0	Black graphitic shales,
215-216	0	highly brecciated in
216-217	0	sections
217-218	0	
218-219	0	
219-220	0	
220-221	0	
221-222	0	
222-223	0	
223-224	0	
224-225	0	
225-226	0	
226-227	0	
227-228	0	
228-229	0	

E.O.H 229.1m

potential interest and have been labelled alphabetically from A to I (not in order of merit). Follow up surveys have previously been conducted on anomalies E,F and H during late 1982 by Mitre Geophysics leaving the remainder to be surveyed during the period January to June 1983.

Three (B,D and H) out of the five aeromagnetic responses remaining were ground checked using a Geometrics G816 or Scintrex MP-2 magnetometer. Reconnaissance magnetic and soil lines spaced at 100 to 200 meter intervals were completed where possible perpendicular to each of the anomalous trends and assayed for copper, lead, zinc, silver, tin, gold, tungsten, chromium and nickel (Appendix 8).

The Tasmanian Mines Department (Report 1982/39) conducted a regional examination of the major responses describing the anomaly parameters and incorporating known geology before commenting on the probable source of the anomalies (Appendix 9).

Anomaly 17: Bottle Creek (364346) embracing Amoco's H and I anomalies is described as a small eastwest feature with extensions to the northwest of up to 180 nt. The overall anomaly is attributed to a faulted contact between Cambrian/Ordovician rocks and Devonian, minor Permo-Carboniferous cover.

Anomaly 18: Melody Creek (368346) embracing anomalies F and G is likened to a small northwest elongate ovoid anomaly of up to 125 nt. Again the response is attributed to a northwest trending fault displacing a thick Cambrian felsic volcanic sequence against a quartzwacke unit.

Anomaly 19: Professor Range (368350) (Amoco anomalies B,D and E) is described as a narrow linear anomaly of up to 125 nt. A possible source for the responses is magnetite in sandstones within a sequence of Cambrian quartwacke-mudstone-conglomerate rocks.

Aeromagnetic Anomaly Follow-up:
A summary of Amoco's follow up program including both magnetic and geochemical surveys is as follows:

Anomaly B: Four parallel lines of 350, 450, 500 and 550 meters in length (varying from 100 to 150 meters apart) were surveyed over the ten nanoTesla airborne response (Appendix 8). A highly erratic 20 to 30 nanoTesla ground response was observed on all lines however, additional work may be required to detail this response as it would appear that the anomaly has not been fully delineated to the north, south and west.

Assays from lines B,A and D show no elevated values coincident with the weak magnetic trend.

Anomaly D: The anomalous trend occurs south of the North Henty workings which lie at the contact between Cambrian clastic sediments and Ordovician Limestone. Three parallel lines of 300, 400 and 450 meters in length being 116 and 170 meters apart were surveyed aver the 30 nanoTesla airborne response (Appendix 8). A highly anomalous magnetic trend was delineated characterized by a double peak (maximum value of 185 nanoTesla's) and having a width of from 200 to 300 meters. The trend is open both to the north and south and appears confined to ferruginous shale units lying within more massive quartzites and sandstones.

Assay results from soils taken on line B show moderate copper, lead and zinc anomalism confined to all the footwall and hanging wall contact zones of the magnetic feature. Assays range up to 50 ppm zinc, 30 ppm lead, 38 ppm copper from backgrounds of less than 10 ppm (see line C). Tin assays were of background value only. Line A is only partially sampled due to the eastern portion (from 250 to 450 meters) being horizontal scrub precluding handauger sampling.

Further work is necessary to detail the anomalous trend and perhaps tie this response to Anomaly E approximately 2.5 kilometerts along strike to the south.

Anomaly H: Two parallel reconnaissance lines of 200 and 350 meters in length (spaced at 200 meters) were surveyed over the 15 nanoTesla airborne response. A sharp moderate to strongly anomalous magnetic trend was delineated over a width of 100 meters with values ranging up to 150 nanoTesla's. Sampling was not conducted due to terrain and vegetation conditions, far enough to the west hence the lack of background magnetic and geochemical data.

No geochemical signature is observed coincident with the magnetic response with values not exceeding background levels. Similar geochemical responses were observed from Anomaly I and E completed during 1982 both of which are tentatively attributed to magnetite occurring within fault zones?

Two further anomalies, Anomalies A and G need reconnaissance ground follow up. Anomaly A will need helicopter or boat support and Anomaly G will need bombadier muskeg support for access.

Gravity:
Contoured gravity data for the Pyramid prospect originally completed in 1980 is included as culture and geological mapping for this prospect has been completed (Enclosure 16).

The gravity picture on this grid is quite complex being strongly influenced by geological noise and terrain effects. Three anomalies deserve further attention. Two 0.5 milligal anomalies are centered at 1250N:1700E and 2500N:1550E (both possibly fault related?) with depths of approximately 100 meters. A somewhat shallower 0.5 milligal anomaly is centered at 1500N:1475E coincident with and along strike to the south from the Pyramid workings and associated 20-40 nanoTesla magnetic response. From

the data it would appear that the anomaly has a southeasterly plunge.

Downhole Geophysics:
A program of downhole surveying was conducted by Geoex on holes ZT-82-10A, 11 on the Oceana prospect and ZT-82N-1 on the Nubeena prospect late in 1982 (Appendix 10). A mobile truck mounted system was used enabling Sirotem, natural gamma and density surveys to be conducted to depths of 600 meters. Subsequent to these surveys Mitre Geophysics was contracted to implement downhole gamma and density surveys using a T450E SIE logger on holes ZT-82-12 and ZT-83-14 on the Oceana prospect (Appendix 11). Hole ZT-82-13 remains unsurveyed as the hole was lost whilst retreiving drill casing. The gamma probe was lost down ZT-82-12 after the hole caved through the 40 millimeter PVC casing.

Downhole gamma logging failed to aid the geological understanding of the Oceana prospect. Previous logs from holes ZT-80-7 and ZT-80-9 as well as holes ZT-82-12 and 83-14 logged by Mitre Geophysics were included in the synthesis, however extreme weathering in holes ZT-82-11, ZT-82-12 and part of ZT-83-14 may account for the failure to match individual logs. The density trace from hole ZT-82-10A is masked by a sine wave curve due to an electronic fault.

Except for a possible anomaly at the bottom of ZT-82-11 which could be related to a sludge build up, the downhole sirotem survey revealed little of interest. The lead and zinc mineralization intersected to date has been found to be an extremely poor conductor over widths greater than 10 to 20 centimeters.

Synthesis of Amoco Geophyical Data:
An initial assessment of the results of the Zeehan Geonics EM-37 (Appendix 12) was completed during the period.

The surveys conducted on the Oceana, Austral and North Austral prospects suggest there are a number of conductive zones worthy of follow up investigations. Loop effects were observed on all the grids and possibly relate to contrasts in the weathering profile.

Weak to moderately conductive zones were delineated on both the Austral and North Austral grids at approximately 1550E. At North Austral two zones of local enhancement (2200N and 2700N) are coincident with both anomalous IP and soil geochemistry.

Other geophysical surveys, gravity, gradient array IP, ground magnetics and PEM (moving loop), conducted prior to the EM-37 survey were assessed during the period outlining coincident gravity/IP and PEM/magnetic targets (Appendix 12).

An interpretation of the regional BMR gravity data was commenced. The major features on the map reflect the known geology and structural parameters, however more subtle features will require more detailed interpretation.

Synthesis of Previous Geophysical Data:
John Bishop of Mitre Geophysics was contracted to compile and synthesize previous geophysical data (Appendix 13) conducted by IGES (1929), BMR (1947) and Tenneco (1971). Anomalous responses delineated from these surveys have been summarized on a prospect by prospect basis.

Oceana: Two well defined (0.4 to 0.5 milligal) gravity anomalies were observed coincident with known mineralization. The southern anomaly trends south of the Oceana main shaft to line 3100N and is coincident with the geochemical D 'tail' defined by Amoco's recent costeaning program and earlier detailed gravity program. A weak magnetic anomaly was also observed over the gravity response and tests by CSIRO on the core of (Zeehan Exploration) DDH-1 showed the mineralization to be 'slightly magnetic'. SP

showed a response to mineralization but was not readily discernible from background noise levels.

Austral: Two linear zones of low resistivity were defined near old workings (Austral-Flux Quarry) on the north western portion of the Austral Limestone sequence. These zones may be significant as the mineralization at Austral occurred within a 'black pug' (decomposed Gordon Limestone) which might be expected to be of low resistivity.

Silver King - Silver Bell: None of the several methods tried were diagnostic, a resistivity low may reflect the host horizon in a similar manner to Austral.

Regional: Tenneco conducted a helicopter borne HEM-701 survey over all the limestones within EL 4/78 returning numerous anomalies and anomalous trends.

A strong trend observed on the Pyramid prospect appears related to a major northwest trending linear. Numerous single point anomalies and anomalous trends were delineated in the vicinity of the Myrtle, Grieves and Baura prospects. Two grids were staked by Tenneco to detail some of these responses using both Turam and SP surveys however anomalies delineated were suggestive of surficial conductors.

Diamond Drilling

Two holes, ZT-82-13 and ZT-83-14 were completed at the Oceana prospect during the period. Drillhole locations are shown on Enclosure 9. Drilling details and incomplete assay results from the Oceana and from Nubeena are summarized (Tables 7 and 8). Drill sections assay results and logs remain incomplete and will be included in the next progress report with the exception of the Nubeena hole ZT-82N-1 (Appendix 14, Enclosure 12). All holes were cased where practible with 40 millimeter ID PVC pipe ensuring downhole geophysical surveys could be conducted at a

later date.

Diamond hole ZT-82-13 mentioned previously in Amoco's progress report 347 as being at 220 meters at the end of December 1982 was completed to a depth of 346 meters. Highly significant lead-silver values were encountered within a siderite/dolomite host west of those cut in ZT-79-2 with 22 meters from 264 to 286 meters assaying 7.5% lead, 0.6% zinc and 66 g/t silver (Table 8). The hole was terminated after veering north of line 3700N and passed through the Oceana Fault zone into the previously described barren Moina Formation at approximately 300 meters downhole. Signficant syngenetic pale yellow-brown sphalerite was encountered from 341 to 343 meters as fine dissemination within the more arenaceous units interbedded with barren siltstones. This zone has later been cut by minor epigenetic siderite/galena/sphalerite vein mineralization indicating the Oceana Fault may have been an active feeder zone or conduit prior to the deposition of the limestone sequence.

As the mineralized zone encountered in ZT-82-13 was a new discovery west of those cut in ZT-79-2 a precollar diamond hole ZT-83-14 was sited to test the mineralization encountered in ZT-79-2 approximately 125 meters down dip. The precollar was completed in NQ to a depth of 173 meters after cutting the Oceana Mine Fault which is manifest by badly caving weathered and decomposed limestones from 60 to 100 meters.

Diamond hole ZT-82N-1 was collared to test an airborne and ground magnetic response of up to 3000 gammas at the Nubeena prospect (Enclosure 12). Mafic and ultramafic agglomerates, tuffs, fine grained lavas, varying in magnetic intensity (due to the high magnetite component - Table 6) and minor pegmatitic granite? were cut befor passing into a talc magnesite schist (altered serpentinite?) containing abundant chromite and a two meter wide zone of massive lead-silver mineralization (2 meters of 23.4% lead, 0.3% zinc, 313g/t silver). This unit overlies a 20 meter

thick sequence of tuffaceous siltstones and sandstones (the base of the Cambrian Crimson Creek Formation?) heavily carbonate veined which in turn overlies black pyritic shales, siltstones and minor sandstones and brecciated combinations of these units (the top of the Pre-Cambrian Oonah Formation). Drill log and drill section are included as Appendix 14.

The sequence encountered in ZT-82N-1 would therefore appear to occur at the same stratigraphic level as the 'Severn pyrrhotite-cassiterite Deposit' (adjacent to Queen Hill) presently being explored by Aberfoyle Exploration. This is also confirmed by anomalous values of up to 220 ppm tin and possibly by the fact that detailed modelling of the magnetic data (Appendix 6) suggests only 70% of the overall anomaly has been explained by drilling.

TABLE 7 ZEEHAN DRILLING DETAILS

Hole	Coordinates	Declination	Azimuth	Depth (m)
ZT-82-13	3685N:1250E	-60	GE	346
ZT-82-14*	3670N:1575E	-61	GW	173
ZT-82N-1	2090N:1717E	-54	GWSW	229.10

* Precollar - planned depth 400 meters

TABLE 8 OCEANA - SUMMARY OF DIAMOND DRILLING

Hole	Coords	Decl	Az	Depth	Bottom Coords	Mineralization
ZT-82-13	3685N 1250E	-60	090°G	346	3710N 1428E	154-166=12m @ 0.01% Pb, 1.72% Zn, 2g/t Ag
						264-286=22m @ 7.5% Pb, 0.6% Zn, 66g/t Ag
					incl	272-286=14m @ 10.8% Pb, 0.7% Zn, 97g/t Ag
					and	278-283=5m @ 21.2% Pb, 1.6% Zn, 205g/t Ag
						335-336=1m @ 0.6% Pb, 2.2% Zn, 3g/t Ag
						341-343=2m @ 1.0%Pb, 1.5% Zn, 34g/t Ag
ZT-83-14	3670N 1575E	-61	270°G	173*	N/A	Not at target

EXPLORATION POTENTIAL

The lead-zinc silver deposit at Oceana is of the Irish type and there is excellent potential for locating further sedimentary exhalitive lead-zinc orebodies of significant tonnage and grade in Gordon Limestone within the remainder of EL 4/78.

Further diamond drilling is necessary on the Oceana, South Oceana and Nubeena prospects and trenching and diamond drilling on both the Austral and North Austral prospects to realize their potential.

PROPOSED PROGRAM

An airphoto examination of structure within EL 4/78 will be conducted. Where anomalous zones occur in proximity to the Gordon Limestone sequence, bedrock sampling programs will be initiated. Bedrock sampling will also commence on the Pyramid prospect southeast of the Oceana deposit.

Anomalous stream values obtained during the January to June program will be followed up in detail by closer spaced stream sampling, rockchip sampling and where possible by reconnaissance soil sampling.

Geological mapping will commence on the Myrtle to Rose Valley prospect and a reinterpretaion of the Oceana to South Oceana prospect will be completed.

The program of airborne magnetic follow up will be completed.

Drillhole ZT-83-14 on the Oceana prospect will be completed and targets on the Austral and North Austral grids will initially be costeaned then diamond drilled.

Thin section, polished section, sulfur isotope and fluid inclusion studies will also be completed during the period.

SIGNED: ..... for

P.A. JONES

AMOCO MINERALS AUSTRALIA COMPANY

EXPENDITURE FOR THE PERIOD JANUARY 1, 1983 TO JUNE 30, 1983

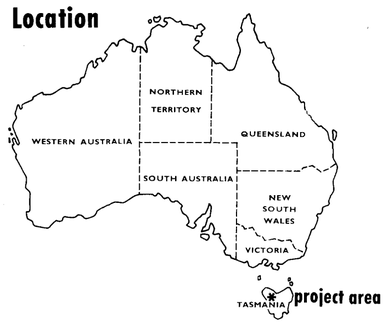
EXPLORATION LICENCE NO. 4/78

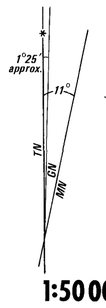
Salaries and Wages	36,198.26
Supplies	(1,710.18)
Supplies - maps	535.15
Cookery	6,520.51
Field Office Rent	3,490.46
Field Supplies	954.18
Freight	2,891.03
Aircraft Charter	999.60
Travel	(3,174.32)
Communications	2,806.99
Geophysics	(8,404.67)
Consultants/Contractors	5,171.53
Drilling	1,212.09
Assays	4,723.21
Legal Fees	(703.00)
Equipment Rental	3,670.89
Equipment Operation & Maintenance	13,604.14
Property Payments	3,336.93
Outside Services	908.57
	73,031.37
Overhead	21,388.99
	$94,420.36

T.J. CONQUEST
ACCOUNTANT

350000E
360000E
145°20'E
370000E
41°50'S
5360000N
53500000N
42°00'S
Queenstown
Rennison Bell
Lead Blocks
Serpentine Hill
McKimmie
Dundas Goni
Grand Prize
Sassafrass
Big Ben
Montana SL.
Crown
Junction
Zeehan Western
Montana
Oonah
Despatch
Doric
Zeehan
Stormsdown
New Mt. Zeehan
Argent
Florence
Tenth Legion
Sylvester
Nike
Kynance
Silver Stream
Comstock
Boss
Susanite
Britannia
Sth. Comstock
Central Balstrup
Silver King
Black Jack's
32M/75
38M/77
39M/77
J.N.R Enraght-Moony
Montagu
Nth. Austral
Zeehan Blk
Maxim
Monte Cristo
Spray
Nth. Colonel
Stonehenge
Cumberland Lake
Globe
North Austral
Nth. Tasmanian
Tasmanian
Nubeena
Grubbs
Sth. Nubeena
Swansea
Nubeena
Silver Duke
Austral
Electrolytic Zinc
Mariposa
60M/77
4M/77
Oceana
Oceana
Sunny Corner
Bannockburn
Pyramid
Remine
Little
Henty
River
SOUTHERN
OCEAN
EL 4/78
Myrtle
Grieves
Grieve Siding
Baura
Rose Valley
Malcolm Bendall Mining Syndicate
11M/66
12M/66
Queensberry Mine
Henty
River

Location





1:50000

0 1 2 3
Kilometers

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

528053

5 cm

AMOCO

Amoco Minerals Australia Company

5308

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 1981	Drawing Nº M80-1476

Report 353

Enclosure 1

5309

EL 4/78
Amoco

EL 15/76
CSR

EL 15/76
Amoco/CSR JV Area

145°15'E
145°20'E
145°25'E
41°55'S
42°00'S
5365000 N
5360000 N
5355000 N
5350000 N
5345000 N
AMG
355000 E
360000 E
365000 E
370000 E

MONTANA FLATS
Pine Creek
Big Tillite Creek
Barbeck Creek
Partins Creek
Zeehan
Oonah Hill
Silver Lead Road
Nike Creek
McIvor Hill
Comstock
Granville
Granville Harbour
Harbour Creek
Stonehenge
McLean Creek
Augusta Creek
Oceana
Barbeck Creek
MT. ZEEHAN
LITTLE HENTY RIVER
Chevron Creek
Fan Creek
Shell Creek
Bluestone Creek
Eden Creek
BADGER RIVER
Huts
Old Line
Lake Mallanna
Henty Bridge
Geology
McCutcheons
Henty River
Tully Road
Strahan
SOUTHERN OCEAN
Rayna
Tmu Bay Railway
Dundas
MURCHISON HIGHWAY
Station Creek
Dundas Creek
Misery Hill
Renison Bell
Melba Creek
abandoned
Nevada Creek
Black Hill
Carbine Hill
Mt. Razorback
Concert Creek
Road
Kosminski Hill
Comet Creek
South Comet Creek
Rivulet
Ctimie
ZEEHAN HIGHWAY
Mariposa Creek
Old Smelter
Dundas Creek
Wasaway
Tom Creek
Berry Creek
Howards Road
Farrell
Amber
Professor Creek
PROFESSOR RANGE
Professor Plateau
Queensberry Track
Queenstown
Lodders Lookout
Matchitty Ridge
Mackay Creek
Jubilee Creek
Abbots Creek
Lyell Highway
Ewart Creek

92249 92250 92125 92126 92109 92110 92113 91596 91595 92112 92111 92101 92102 92106 92105 92107 92108 92104 92114 92115 92116 88043 92117 88044 92118 92119 88167 92129 88168 88048 88045 88047 92190 174 88169 173 170 172 171 175 92121 92122 92120 92123 92124 88159 160 88158 88052 88050 88051 88049 88048 88161 92131 92133 92132 92160 88036 88035 88037 88034 91653 92167 91654 91652 88032 88033 92155 92156 88031 92148 92147 92149 88030 88029 92146 92145 92144 92150 92143 88027 88028 92161 92162 92142 92163 92141 92140 92138 92139 92168 92169 92171 92172 92151 92152 92154 92153 92170 92220 92278 92277 92276 92275 92274 92219 92218 92217 92214 92255 92256 92267 92268 92269 92270 92271 92260 92262 92261 92257 92258 92259 92209 92254 92253 92263 92264 92206 92204 92265 92266 92222 92226 92225 92195 92196 92197 92199 N/S N/S

Location

TN 11° MN

1:25000

0 1 2 kilometers

Notes

Stream sediment sample location and number 92259

Base compiled from 1:15840 scale Pieman Project mapping series

Topographic contours in feet

528054

AMOCO

5 cm

Amoco Minerals Australia Company

5309

Project	ZEEHAN			Nº A·78·60	
Project Partner					
Zeehan EL 4/78					
STREAM SEDIMENT GEOCHEMISTRY **SAMPLE LOCATIONS**					
Map Ref. ANG	K-55-5	Latitude	42°00'S	Longitude	145°20'E
Surveyed	Amoco	Date	1983	Scale	1:25000
Drawn Geodfng	R.S-K., S.F.	Date	July 1983	Drawing Nº	M83-2084

Report 353

Enclosure 2

5310

EL 4/78
Amoco

EL 15/76
CSR

EL 15/76
Amoco/CSR JV Area

Zeehan

MT. ZEEHAN

Rayna

Dundas

Oonah Hill

Mc Ivor Hill

Comstock

Granville

Granville Harbour

Misery Hill

Black Hill

Carbine Hill

Mt. Razorback

Kosminski Hill

Howards

Queenstown

Lodders Lookout

Professor Plateau

Henty Bridge

Strahan

Lake Mallanna

Southern Ocean

Oceana

Renison Bell

Old Smelter

Hut

Huts

Road

Creek

River

Range

Plateau

Ridge

Lookout

Railway

Highway

Harbour

Rivulet

Tramway

Track

Line

Location

NORTHERN TERRITORY
WESTERN AUSTRALIA
QUEENSLAND
SOUTH AUSTRALIA
NEW SOUTH

TN 11° MN

Notes

Top results denoted from stream sediment sampling
Bottom results from panned concentrate
Order of results – lead, zinc
Only values considered anomalous shown –
ie. 70 and greater for lead, 70 and greater for zinc

5 cm

Amoco Minerals Australia Company

5310

Project ZEEHAN Nº A·78·60

Project Partner

Zeehan EL 4/78

STREAM SEDIMENT GEOCHEMISTRY

5311

EL 4/78
Amoco

EL 15/76
CSR

EL 15/76
Amoco/CSR JV Area

Zeehan

MT. ZEEHAN

Granville

Granville Harbour

Rayna

Dundas

Renison Bell

Black Hill

Carbine Hill

Mt. Razorback

Kosminski Hill

Misery Hill

Oonah Hill

Mc Ivor Hill

Comstock

Old smelter

Howards

Queenstown

Henty Bridge

Lake Mallanna

Professor Plateau

Loaders Lookout

Macphy Ridge

Location

NORTHERN TERRITORY
WESTERN AUSTRALIA
QUEENSLAND
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
TASMANIA
Zeehan

1:25000
0 1 2 kilometers

TN 11° MN

Notes

Top results denoted from stream sediment sampling
Bottom results from panned concentrate
Order of results - gold, tin
Only values considered anomalous shown -
_0·05 and greater for gold, 30 and greater for tin
All other results appended to this report
Values in ppm

Base compiled from 1:15840 scale Pieman Project mapping series

Topographic contours in feet

528056

AMOCO

5 cm

Amoco Minerals Australia Company

5311

Project	ZEEHAN			Nº	A·78·60
Project Partner					
Zeehan EL 4/78					
STREAM SEDIMENT GEOCHEMISTRY **GOLD, TIN**					
Map Ref. ANG	K-55-5	Latitude	42°00′S	Longitude	145°20′E
Surveyed	Amoco	Date	1983	Scale	1:25000
Drawn Geoffrey R. S-K., S.E.		Date	July 1983	Drawing Nº	M83-2086

Report 353

Enclosure 4

5312

EL 4/78
Amoco

EL 15/76
CSR

EL 15/76
Amoco/CSR JV Area

MONTANA FLATS
Zeehan
MT. ZEEHAN
HENTY
LITTLE
PROFESSOR RANGE
Granville
Comstock
Oonah Hill
Mc Ivor Hill
Rayna
Dundas
Misery Hill
Black Hill
Carbine Hill
Mt. Razorback
Kosminski Hill
Oceana
Old smelter
Farrell
Rivulet
Professor Plateau
Lodders Lookout
Queenstown
Strahan
Lake Mallanna
Henty Bridge
Howards Road
Queensberry Track
Old Line Road
Zeehan Highway
Murchison Highway
Emu Bay Railway
Renison Bell
Pine Creek
Tillitino Creek
Big Bend Creek
Parnett Creek
Linda Creek
Silver Lead Creek
Nike Creek
Harbour Creek
Stonehenge Creek
McLeans Creek
Austral Creek
Chevron Creek
Eden Creek
Bluestone Creek
Melba Creek
Nevada Creek
Concert Creek
Comet Creek
Mariposa Creek
Tom Creek
Berry Creek
Amber Creek
Melody Creek
Matchby Ridge
Ewart Creek
Shell Creek
Fea Creek
Cabin Bay
Parsing Creek
Pyramid Creek
Cleveland Creek
Professor Creek
Western Creek
Cuni Creek
Cam Creek
Jukes Creek
Lyell Creek
Mc Cutcheons Creek
Geologist Creek
Lake Creek
Cam River
Henty River
Savage River
Pieman River
Badger River
Arthur River
Southern Ocean

130, <1
24, <1
8,2
4, <1
130, <1
32, <1
200, 39
12,2
4, <1
8,2
N/S
46, 3
4,1
55, 10
28,6
6,2
N/S
32,2
4, <1
85, 12
830, 20
85, 11
440, 11
28,3
30,2
12,1
30,2
22,5
10,1
34,9
10,2
115, 13
140, 9
65, 15
16,2
55,9
90,7
8, <1
40,3
12,2
4, <1
138,2
12, <1
32,8
2, <1
8,1
105,23
170, <1
20, <1

41°55'S
42°00'S

5365000 N
5360000 N
5355000 N
5350000 N
5345000 N
AMG
355000 E
360000 E
365000 E
370000 E
145°15'E
145°20'E
145°25'E

Location

TN 11° MN

1:25000

0 1 2 kilometers

Notes

Top results denoted from stream sediment sampling
Bottom results from panned concentrate
Order of results - copper, silver
Only values considered anomalous shown -
ie. 50 and greater for Cu, 2 and greater for Ag
All other results appended to this report
Values in ppm

Base compiled from 1:15840 scale Pieman Project mapping series

Topographic contours in feet

528057

AMOCO

5 cm

Amoco Minerals Australia Company

5312

Project	ZEEHAN					Nº A·78·60	
Project Partner							
Zeehan EL 4/78							
STREAM SEDIMENT GEOCHEMISTRY **COPPER, SILVER**							
Map Ref. ANG	K-55-5	Latitude	42°00'S	Longitude	145°20'E		
Surveyed	Amoco	Date	1983	Scale	1:25000		
Drawn Geodftng	R.S-K., S.F.	Date	July 1983	Drawing Nº	M83-2087		

Report 353

Enclosure 5

5313

EL 4/78
Amoco

EL 15/76
CSR

EL 15/76
Amoco/CSR JV Area

Zeehan

MT. ZEEHAN

Rayna

Dundas

Renison Bell

Black Hill

Carbine Hill

Mt. Razorback

Kosminski Hill

Misery Hill

Oonah Hill

McIvor Hill

Comstock

Granville

Granville Harbour

Oceana

Howards

Queenstown

Lodders Lookout

Henty Bridge

Lake Mallanna

Professor Plateau

Melba Creek

Pine Creek

Big Bend Creek

Brainert Creek

Montana Flats Creek

Tillite Creek

Patrick Creek

Eagle Creek

Silver Lead Creek

Nike Creek

Harbour Creek

Stonehenge Creek

Milpaa Creek

Chevron Creek

Shelf Creek

Fan Creek

Bluestone Creek

Eden Creek

Gaolgust Creek

McGuigans Gully

Henty River

Murchison Highway

Zeehan Highway

Old Line Road

Queenstown Road

Strahan Road

Queenstown Track

Professor Range

Farrell Rivulet

Amber Creek

Mariposa Creek

Westerway

Berry Creek

Ewart Creek

Concert Creek

Comet Creek

South Comet Creek

Crimie Creek

Dundas Creek

Emu Bay Railway

Auckland Creek

Old smelter

Badger Nuts

Location

NORTHERN TERRITORY
WESTERN AUSTRALIA
QUEENSLAND
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
TASMANIA
Zeehan

TN 11° MN

1:25000

0 1 2 kilometers

Notes

Top results denoted from stream sediment sampling
Bottom results from panned concentrate
Order of results - nickel chromium
Only values considered anomalous shown -
ie. 25 and greater for Ni, 50 (ss), 200 (pc) and greater for Cr
All other results appended to this report
Values in ppm

Base compiled from 1:15840 scale Pieman Project mapping series

Topographic contours in feet

528058

AMOCO

5 cm

Amoco Minerals Australia Company

5313

Project	ZEEHAN			Nº	A·78·60
Project Partner					
Zeehan EL 4/78					
STREAM SEDIMENT GEOCHEMISTRY NICKEL, CHROMIUM					
Map Ref. ANG	K-55-5	Latitude	42°00′S	Longitude	145°20′E
Surveyed	Amoco	Date	1983	Scale	1:25000
Drawn Geodtng R.S-K., S.F.		Date	July 1983	Drawing Nº	M83-2088

Report 353

Enclosure 6

5314

EL 4/78
Amoco

EL 15/76
CSR

EL 15/76
Amoco/CSR JV Area

92480 * 16,48,50,<1,8,<0.05,12
92481 - 85, 1.55%, 30,117,<4,<0.05,14
92482 * 90,1.69%,200,31,<4,<0.05,20
92463 * 10,120,190,<1,4,<0.05,28

Zeehan
Oonah Hill
Mc Ivor Hill
Comstock
Granville
Granville Harbour
Stonehenge
Oceana
MT. ZEEHAN
Old smelter
Rayna
Dundas
Misery Hill
Renison Bell
Black Hill
Carbine Hill
Mt. Razorback
Kosminski Hill
Howards
Queenstown
Professor Plateau
Lodders Lookout
Lake Mallanna
Henty Bridge
Strahan

MONTANA FLATS
Pine Creek
Tillite Creek
Big Creek
Bannatyn Creek
Peppina Creek
Oonah Road
Silver Lead Creek
Nike Creek
Harbour Creek
Comstock Creek
Stonehenge Creek
McLean Creek
Agate Creek
Emu Bay Railway
Melba Creek
abandoned Nevada Creek
HIGHWAY
MURCHISON
Stanley Creek
Dundas Road
Concord Creek
Comet Creek
South Comet Creek
Crimie Creek
Rivulet
ZEEHAN HIGHWAY
Mariposa Creek
Westerway
Tom Berry Creek
Rivulet
Farrell
Amber
Ewart Creek
Professor Creek
Queenberry Creek
Macfarlane Creek
Loddon Plains Creek
Macfarlane Ridge
Pappenarth Creek
Fern Creek
Shell Creek
Bluestone Creek
Eden Creek
Galeguest Creek
McEwicheons Creek
Henty River
Old Line Road
Queenstown Road
Lyell Highway
Chauvel
Rivulet
Creek

LITTLE HENTY
BADGER RIVER
HENTY RIVER
PROFESSOR RANGE
SOUTHERN OCEAN

5365000 N
5360000 N
5355000 N
5350000 N
5345000 N AMG
355000 E AMG
360000 E
365000 E
370000 E
145°15'E
145°20'E
145°25'E
41°55'S
42°00'S

Location

TN 11° MN

1:25000

0 1 2 kilometers

Notes

Rockchip sample location and number *92463
Order of results – Cu, Pb, Zn, Ag, Sn, Au, Mn

Base compiled from 1:15840 scale Pieman Project mapping series

Topographic contours in feet

528059

5 cm

Amoco Minerals Australia Company

5314

Project	ZEEHAN			Nº	A·78·60
Project Partner					
Zeehan EL 4/78					
REGIONAL ROCKCHIP GEOCHEMISTRY					
Map Ref. ANG	K-55-5	Latitude	42°00'S	Longitude	145°20'E
Surveyed	Amoco	Date	1983	Scale	1:25000
Drawn Geodfng R.S-K., S.F.		Date	July 1983	Drawing Nº	M83-2089

Report 353

Enclosure 7

EL 4/78

SOUTHERN OCEAN

Henty River

Zeehan

Cumberland Lake

Renison Bell

Queenstown

A B C D E F G H I J

145°20'E

360000E

370000E

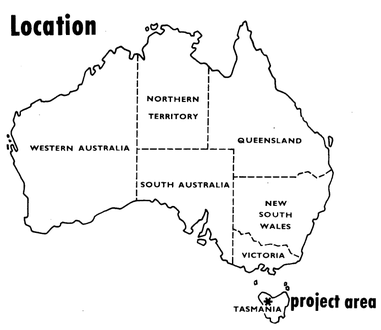
41°50'S

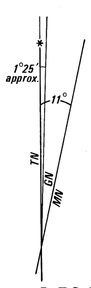
42°00'S

5360000N

5350000N

Location





1:50000

0 1 2 3 Kilometers

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

Notes

Survey by Geoex for the Tasmanian Department of Mines, flown May 1981.
Contour interval is 5 nTesla

Magnetic anomalies selected by Amoco for follow-up

Reconnaissance ground magnetics and soil geochemistry traverses

528060

5 cm

Amoco Minerals Australia Company

5315

Project	ZEEHAN			Nº A-78-60	
Project Partner					
Zeehan EL 4/78					
RESIDUAL TOTAL MAGNETIC INTENSITY					
Map Ref. ANG	K-55-5	Latitude	42°00'S	Longitude	145°20'E
Surveyed	Geoex	Date	May 1981	Scale	1:50000
Drawn	Amoco	Date	1983	Drawing NºM83-1972	

Report 353

Enclosure 8

THE OCEANA MINE

LONGITUDINAL SECTION

Stoped ground (NBH/SBH JV) .....
Stoped ground (old companies) .....
Tentative ore limits .....
Diamond drill hole: showing width and grade of mineralization

3100 N | 3200 N | 3300 N | 3400 N | 3500 N | 3600 N | 3700 N | 3800 N

SE — NW

0 METERS

Powells shaft | No.5 shaft | No.1 | No.6 | No.3 | Jollys shaft | No.4

Delineated by costeaning

Projected open cut

Low grade

Old main shaft

No.1 level

No.2 level

Low grade pillar

No. 3 level

No.4 level (sump)

No. 5 level

No.6 level

ZT-82-11
5m of 3.5% Pb, 2.7% Zn, 25g/t Ag
4m of 1.1% Pb, 1.1% Zn, 9.8g/t Ag
16m of 3.0% Pb, 2.1% Zn, 14g/t Ag
22' of 3.1% Pb
14' of 5.0% Pb
1m of 2.2% Pb, 2.3% Zn, 20g/t Ag
15.5' of 4.2% Pb
ZEEHAN EXPLORATION DRILL HOLE (1947)

ZT-80-2
includes 26m of 22.3% Pb, 11.7% Zn, 203g/t Ag (Lens1)
includes 14m of 8.4% Pb, 3.0% Zn, 57g/t Ag (Lens 2)

ZT-82-13
22m of 7.5% Pb, 0.6% Zn, 66 g/t Ag (Lens 3)

ZT-80-6
5m of 1.8% Pb, 1.2% Zn, 7g/t Ag
8m of 1.2% Pb, 0.2% Zn, 6g/t Ag

ZT-80-8
153m of 5.1% Pb, 3.5% Zn, 42 g/t Ag

ZT-80-7
2m of 12.0% Pb, 11.1% Zn, 70 g/t Ag (Western zone)

ZT-80-4
11m of 12.0% Pb, 4.0% Zn, 89g/t Ag (Eastern zone)
5m of 22.3% Pb, 2.0% Zn, 323 g/t Ag (Western zone)

ZT-80-3
1m of 8.3% Pb, 0.4% Zn, 74 g/t Ag (Eastern zone?)

ZT-82-12
4m of 11.6% Pb, 0.3% Zn, 80.3 g/t Ag
4m of 1.4% Pb, 0.5% Zn, 7.0 g/t Ag (Lens 1?)

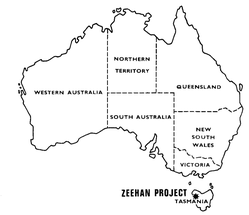
ZT-82-10A
1m of 2.2% Pb, 0.3% Zn, 13g/t Ag
4m of 3.5% Pb, 0.5% Zn, 41.5 g/t Ag (Eastern zone)
2m of 4.2% Pb, 0.3% Zn, 55 g/t Ag

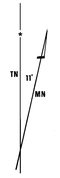
ZT-80-5

Oceana Fault

100 | 200 | 300 | 400

Location





1:1000
0 500 meters
5 cm

Amoco Minerals Australia Company

5318

Project	ZEEHAN			Nº A-78-608	
Project Partner					
Oceana **LONGITUDINAL SECTION**					
Map Ref. ANG	K-55-5	Latitude	41°55'S	Longitude	145°20'E
Surveyed	P. Jones	Date	1983	Scale	1:1000
Drawn	R. SK	Date	1983	Drawing Nº	M83-2074

Report 353

Enclosure 11

Legend

QUATERNARY
- Alluvium etc — GR

TERTIARY
- Basalt — 2C 2

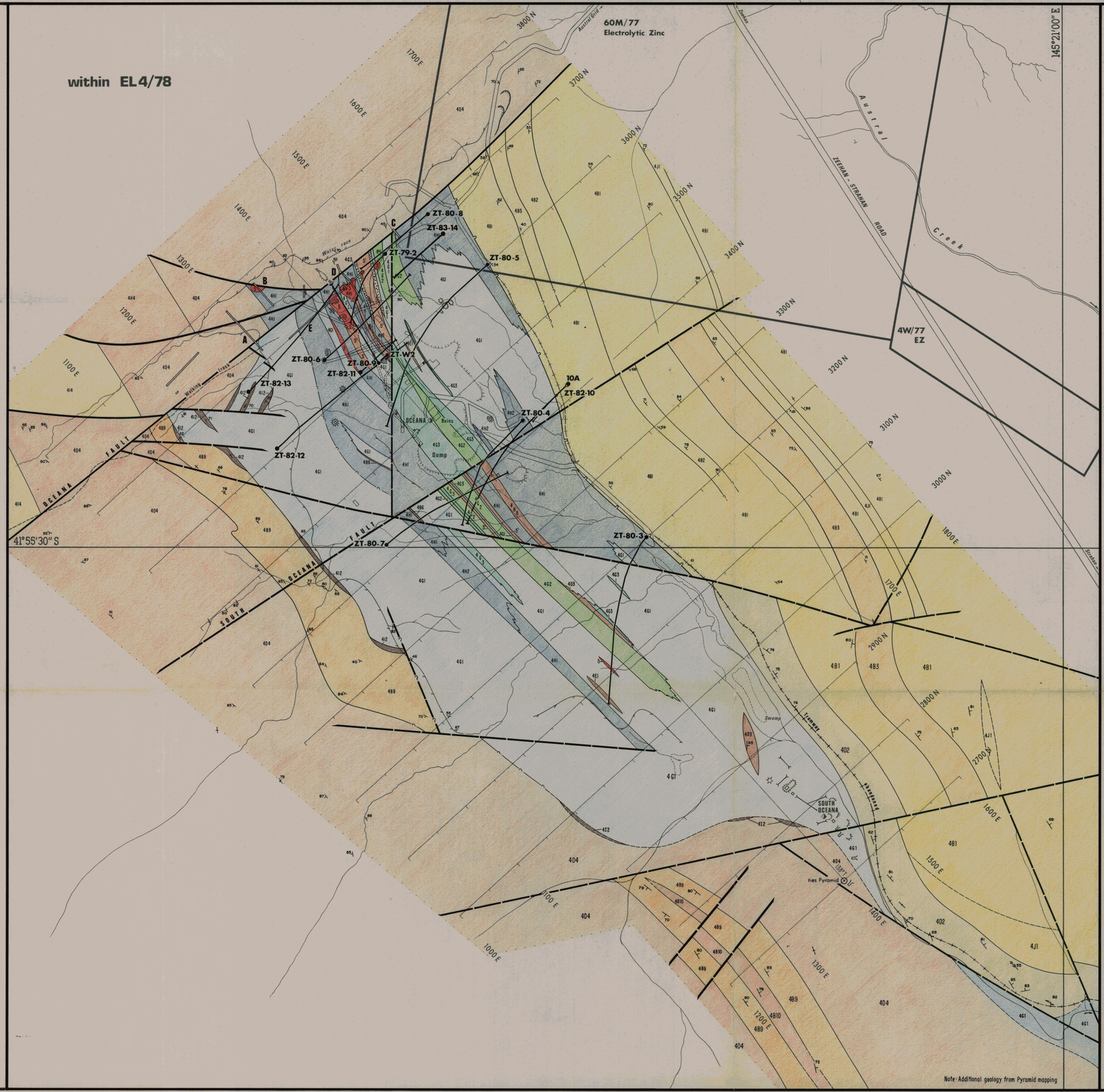
DEVONIAN
- Florence Quartzite — 4A 26
  - Undifferentiated quartzites, sandstones, siltstones

SILURIAN
- Amber Slate — 4D1 68
  - Siltstone interbedded with shales
- Crotty Quartzite
  - Undiff. sandstones, siltstones and grits — 4B1 6
  - Sandstone, massive — 4B2 6
  - Sandstone, cross bedded — 4B3 9
  - Sandstone, tubicolar — 4B4 44
  - Sandstone, white, friable — 4B5 6
  - Siltstone — 4D2 57
  - Conglomerate — 4I1 6
  - Grits — 4J1 6

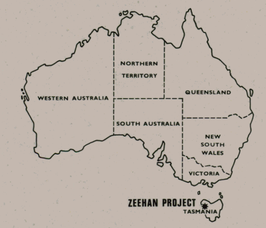
ORDOVICIAN
- Gordon Limestone
  - Sandstone — 4B6 63
  - Sandstone, fossiliferous — 4B7 63
  - Sandstone breccia — 4B8 63
  - Siltstone — 4D3 63
  - Shale — 4E1 63
  - Claystone — 4F 63
  - Limestone — 4G1 33
  - Limestone, fossil breccia — 4G2 46
  - Limestone, slumped — 4G3 41
  - Dolomite, black — 4H1 35
  - Dolomite breccia — 4H2 35
  - Dolomite, silicified — 4H3 35
  - Conglomerate — 4I2 66
  - Ironstone — 5 14
  - Mineralization — 5I 12
- Moina Formation
  - Sandstone, tubicolar — 4B9 10
  - Sandstone — 4B10 64
  - Undifferentiated — 4D4 64
  - Siltstone, tubicolar — 4D5 64
  - Dolomite — 4H4 64
  - Conglomerate — 4I3 64
  - Grit — 4J2 64
  - Ironstone — 5 14
- Mt. Zeehan Conglomerate
  - Conglomerate — 414 50

CAMBRIAN
- Crimson Creek Formation
  - Undifferentiated — 1E1 20
  - Tuff, volcano lith-arenite — 1E 2 20
  - Sandstone-tuff — 4B 11 20
  - Shale — 4E 2 20
  - Ironstone — 5 14
  - Siltstone — 4D6 20

PRECAMBRIAN
- Oonah Quartzite
  - Undifferentiated — 4A1 60
  - Micaceous quartzite — 4A2 60
  - Sandstone, brown — 4B12 60
  - Siltstone — 4D7 60



Location



Symbols

- Geologic contact, position accurate
- Geologic contact, position approximate
- Fault, position accurate
- Fault, position approximate
- Fault, inferred
- Unconformity
- Facies change
- Shear zone
- Zone of intense cleavage
- Brecciation
- Overturned bedding
- Measured dip and strike
- Plunging anticline (minor)
- Quartz vein
- Outcropping Pb/Zn mineralization
- Shaft/prospecting pit
- Adit
- Underground workings
- Costean
- Cutting or quarry
- Dump
- Amoco rock chip location 36242
- Amoco costean B
- Amoco drillhole

TN 11° MN

1:2500

0 100 200 meters

5 cm

528061

Amoco Minerals Australia Company

5316

Project	ZEEHAN			Nº A-78-608	
Project Partner					
Oceana					
FACTUAL GEOLOGY					
Map Ref. ANG	K-55-5	Latitude	41°55'S	Longitude	145°20'E
Surveyed	P. Jones	Date	1981	Scale	1:2500
Drawn	R. SK	Date	1981	Drawing Nº	M81-1705

Report 353

Enclosure 9

within EL4/78

60M/77
Electrolytic Zinc

4W/77
EZ

See Appendix 1 of Report 347 for detailed costean information
(and Apendix 2, Report 353)

41°55'30" S

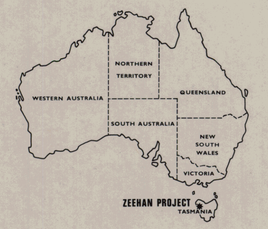
145°20'00" E

COSTEAN E 3700 N

SOUTH OCEANA

COSTEAN 2750 N

Location



Notes

ZT-80- (etc) prefix omitted from hole numbers

Contour Intervals

1%
4%
10%

TN 11° MN

1:2500
0 100 200 meters

5 cm

128062

Amoco Minerals Australia Company

5317

Project	ZEEHAN			Nº A-78-608	
Project Partner					
Oceana					
COSTEAN GEOCHEMISTRY					
LEAD/ZINC [COMBINED]					
Map Ref. ANG	K-55-5	Latitude	41°55'S	Longitude	145°20'E
Surveyed	J. Supree	Date	1982	Scale	1:2500
Drawn	SF, R. SK	Date	January 1983	Drawing Nº M83-1975	

Report 353

Enclosure 10

SPL129
Mt Lyell

EL 4/78
Amoco Minerals

Legend

QUATERNARY
- Alluvium etc — GR

TERTIARY
- Basalt — 2C1 2

DEVONIAN
- Florence Quartzite — 4A 26
  - Undifferentiated quartzites, sandstones, siltstones

SILURIAN
- Amber Slate — 3D1 88
  - Siltstone interbedded with shales
- Crotty Quartzite
  - Undiff. sandstones, siltstones and grits — 4B1 6
  - Sandstone, massive — 4B2 6
  - Sandstone, cross bedded — 4B3 9
  - Sandstone, tubicolar — 4B4 44
  - Sandstone, white, friable — 4B5 6
  - Siltstone — 4D2 57
  - Conglomerate — 4I1 6
  - Grits — 4J1 6

ORDOVICIAN
- Gordon Limestone
  - Sandstone — 4B6 63
  - Sandstone, fossiliferous — 4B7 63
  - Sandstone breccia — 4B8 63
  - Siltstone — 4D3 63
  - Shale — 4E1 63
  - Claystone — 4F 63
  - Limestone — 4G1 33
  - Limestone, fossil breccia — 4G2 46
  - Limestone, slumped — 4G3 41
  - Dolomite, black — 4H1 35
  - Dolomite breccia — 4H2 35
  - Dolomite, silicified — 4H3 35
  - Conglomerate — 4I2 88
  - Ironstone — 5 14
  - Mineralization — 5I 14
- Moina Formation
  - Sandstone, tubicolar — 4B9 10
  - Sandstone — 4B10 64
  - Undifferentiated — 4D4 64
  - Siltstone, tubicolar — 4D5 64
  - Dolomite — 4H4 64
  - Conglomerate — 4I3 64
  - Grit — 4J2 64
  - Ironstone — 5 14
- Mt. Zeehan Conglomerate
  - Undiff. conglomerate, siltstone, sandstone — 4I4 38
  - Ironstone — 5
- CAMBRIAN
  - Mafic and Ultramafic Flows
    - Intrusives, variabley serpentinized — 2C2 43
    - Talc-magnesite schist, up to 20% chromite — 2C3 18
  - Crimson Creek Formation
    - Interbedded shales, siltstones, tuffs, conglomerates — 1E 1 20
    - Tuff, volcano lith-arenite — 1E 2 20
    - Sandstone-tuff — 4B 11 20
    - Shale — 4E 2 20
    - Ironstone — 5 14
    - Siltstone — 4D6 20
- PRECAMBRIAN
  - Donah Quartzite
    - Undiff. arenite / black shale — 4A1 60
    - Quartzite (micaceous arenites) — 4A2 60
    - Sandstone, brown — 4B12 60
    - Siltstone — 4D7 60
    - Slate (black shale) — 4E 3 87
    - Volcanics — 1E 3 60
    - Ironstone — 5 14

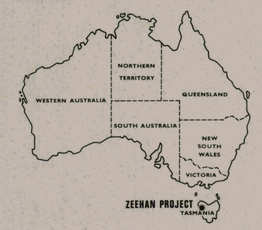
ZT-82N-1

60M/77
Electrolytic Zinc (Amoco JV)

BEAUMONT'S ADIT
BUTTERS ADIT
PERRY'S
Plunging Syncline
Plunging Anticline
Walking Track
Tramway
Flux Quarry
AUSTRAL
Swamp
Fire Break
Ramsdorf Track
Abandoned Tramway
Zeehan
Austral Creek

41°55'S
145°20'E

Location



Symbols

- Geologic contact, position inferred
- Geologic contact, position approximate
- Fault, position accurate
- Fault, position approximate
- Fault, inferred
- Unconformity
- Facies change
- Shear zone
- Zone of intense cleavage
- Brecciation
- Dip and Strike
- Vertical dip and strike
- Vertical foliation
- Quartz vein (qtz)
- Silicified cemented breccia
- Shaft/prospecting pit
- Adit
- Underground workings
- Costean
- Cutting or quarry
- Dump
- Amoco rock chip location (36242)
- Amoco costean (B)
- Amoco drillhole

TN 11° MN

1:2500
0 100 200 meters

5 cm

528063

Amoco Minerals Australia Company

5319

Project	ZEEHAN			Nº A-78-60B	
Project Partner					
Nubeena					
FACTUAL **GEOLOGY**					
Map Ref. ANG	K-55-5	Latitude	41°55'S	Longitude	145°20'E
Surveyed	P. Jones	Date	1981	Scale	1:2500
Drawn	Hovick	Date	1982	Drawing Nº	M82-1814

Report 353

Enclosure 12

within EL 4/78

39M/77
J.N.R. Enraght-Moony

60M/77
Electrolytic Zinc (Amoco) Ltd

AUSTRAL

Flux Quarry

Quarry

Quarry

Zeehan

Creek

Australia

ZEEHAN - STRAHAN ROAD

Zeehan Smelter Ruin

Large negative anomaly due to smelter slag dump

Dump

Swamp

OCEANA ROAD

Water race

Austral Creek

LITTLE HENTY

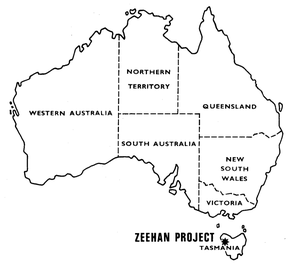
41°55'S

145°21'E

2000 N
1900 N
1800 N
1700 N
1600 N
1500 N
1400 N
1300 N
1200 N
1100 N
1000 N
900 N
800 N
700 N
600 N
500 N
400 N

1000 E
1100 E
1200 E
1300 E
1400 E
1500 E
1600 E
1700 E
1800 E

Location



Notes

Computer graphics by CEA, North Sydney
Unfiltered data. Contour interval 20 gammas

TN 11° MN

1:2500
0 100 200 meters

5 cm

AMOCO

528064

Amoco Minerals Australia Company

5020

Project	ZEEHAN			Nº A-78-60B
Project Partner				
Austral				
GROUND MAGNETICS **VALUES, CONTOURS**				
Map Ref. ANG	K-55-5	Latitude	41°55'S	Longitude 145°20'E
Surveyed	S. Collins	Date	1982	Scale 1:2500
Drawn	CEA, S. Fowler	Date	April 1983	Drawing Nº M83-2072

Report 353

Enclosure 13

Legend

QUATERNARY
- Alluvium etc — GR

TERTIARY
- Basalt — 2C 2

DEVONIAN
- Florence Quartzite — 4A 2H
  - Undifferentiated quartzites, sandstones, siltstones

SILURIAN
- Keel Quartzite
  - Undifferentiated quartzite, sandstone — 44S 3
- Amber Slate
  - Siltstone interbedded with shales — 401 40
- Crotty Quartzite
  - Undiff. sandstones, siltstones and grits — 401 4
  - Sandstone, massive — 402 4
  - Sandstone, cross bedded — 403 4
  - Sandstone, tubicolar — 404 4A
  - Sandstone, white, friable — 405 4
  - Siltstone — 402 40
  - Conglomerate — 411 4
  - Grits — 4J1 4

ORDOVICIAN
- Gordon Limestone
  - Sandstone — 406 4D
  - Sandstone, fossilliferous — 407 4D
  - Sandstone breccia — 408 4D
  - Siltstone — 403 4D
  - Shale — 4E1 4D
  - Claystone — 4F 4D
  - Limestone — 4G1 4D
  - Limestone, fossil breccia — 4G2 4D
  - Limestone, slumped — 4G3 4
  - Dolomite, black — 4H1 4D
  - Dolomite breccia — 4H2 4D
  - Dolomite, silicified — 4H3 4D
  - Conglomerate — 412 4D
  - Ironstone — 5 4
  - Mineralization — 6T 4
- Molna Formation
  - Sandstone, tubicolar — 409 4
  - Sandstone — 4B10 4A
  - Undifferentiated — 404 4A
  - Siltstone, tubicolar — 405 4A
  - Dolomite — 4H4 4A
  - Conglomerate — 413 4A
  - Grit — 422 4A
  - Ironstone — 5 4
- Mt. Zeehan Conglomerate
  - Conglomerate — 414 4J

CAMBRIAN
- Crimson Creek Formation
  - Undifferentiated — 1E 1 2D
  - Tuff, volcano lith-arenite — 1E 2 2D
  - Sandstone-tuff — 6B 11 2D
  - Shale — 6E 2 2D
  - Ironstone — 5 4
  - Siltstone — 606 2D

PRECAMBRIAN
- Oonah Quartzite
  - Undifferentiated — 4A1 4D
  - Micaceous quartzite — 4A2 4D
  - Sandstone, brown — 4B12 4D
  - Siltstone — 407 4D

5321

within EL 4/78

ZEEHAN - STRAHAN ROAD

41°55'30" S

145°21'00" E

Location

1:2500

0 100 200 meters

6 cm

525065

Amoco Minerals Australia Company

5321

Project	ZEEHAN			Nº A-78-60A	
Project Partner					
Pyramid FACTUAL **GEOLOGY**					
Map Ref. ANG	K-55-5	Latitude	41°55'S	Longitude	145°20'E
Surveyed	G. Kary	Date	1983	Scale	1:2500
Drawn	RSK	Date	May 1983	Drawing Nº M83-2052	

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Enclosure 14

within EL 4/78

ZEEHAN - STRAHAN ROAD

41°55'30" S

145°21'00" E

Location

Notes

Computer graphics by CEA North Sydney
Unfiltered data
Contour interval 10 gammas

TN 11° MN

1:2500

0 100 200 metres

5 cm

AMOCO 528066

Amoco Minerals Australia Company 5322

Project	ZEEHAN		Nº A-78-60A
Project Partner			
Pyramid GEOPHYSICS **GROUND MAGNETICS**			
Map Ref. ANG	K-55-5	Latitude	41°55'S Longitude 145°20'E
Surveyed	J. Supree	Date	August 1982 Scale 1:2500
Drawn	CEA, RSK	Date	July 1983 Drawing Nº M83-2073

Report 353

Enclosure 15

within EL 4/78

41°55'30" S

145°21'00" E

ZEEHAN - STRAHAN ROAD

Pyramid Creek

Tyrsweg

LITTLE HENTY RIVER

Swamp

Suggested R.P.

1600 E 1700 E 1500 E 1400 E 1300 E 1200 E 1100 E 1000 E 1900 E 1800 E 1700 E 1600 E 1500 E 1400 E 1300 E 1200 E 1100 E 1000 E 900 E 800 E

3000 N 2900 N 2800 N 2700 N 2600 N 2500 N 2400 N 2300 N 2200 N 2100 N 2000 N 1900 N 1800 N 1700 N 1600 N 1500 N 1400 N 1300 N 1200 N 1100 N 1000 N 900 N 800 N 700 N

Location

Note

Computer graphics by CEANET, North Sydney

Survey by SOLO, April 1981

TN 11° MN

1:2500

0 100 200 meters

5 cm

AMOCO

528067

Amoco Minerals Australia Company

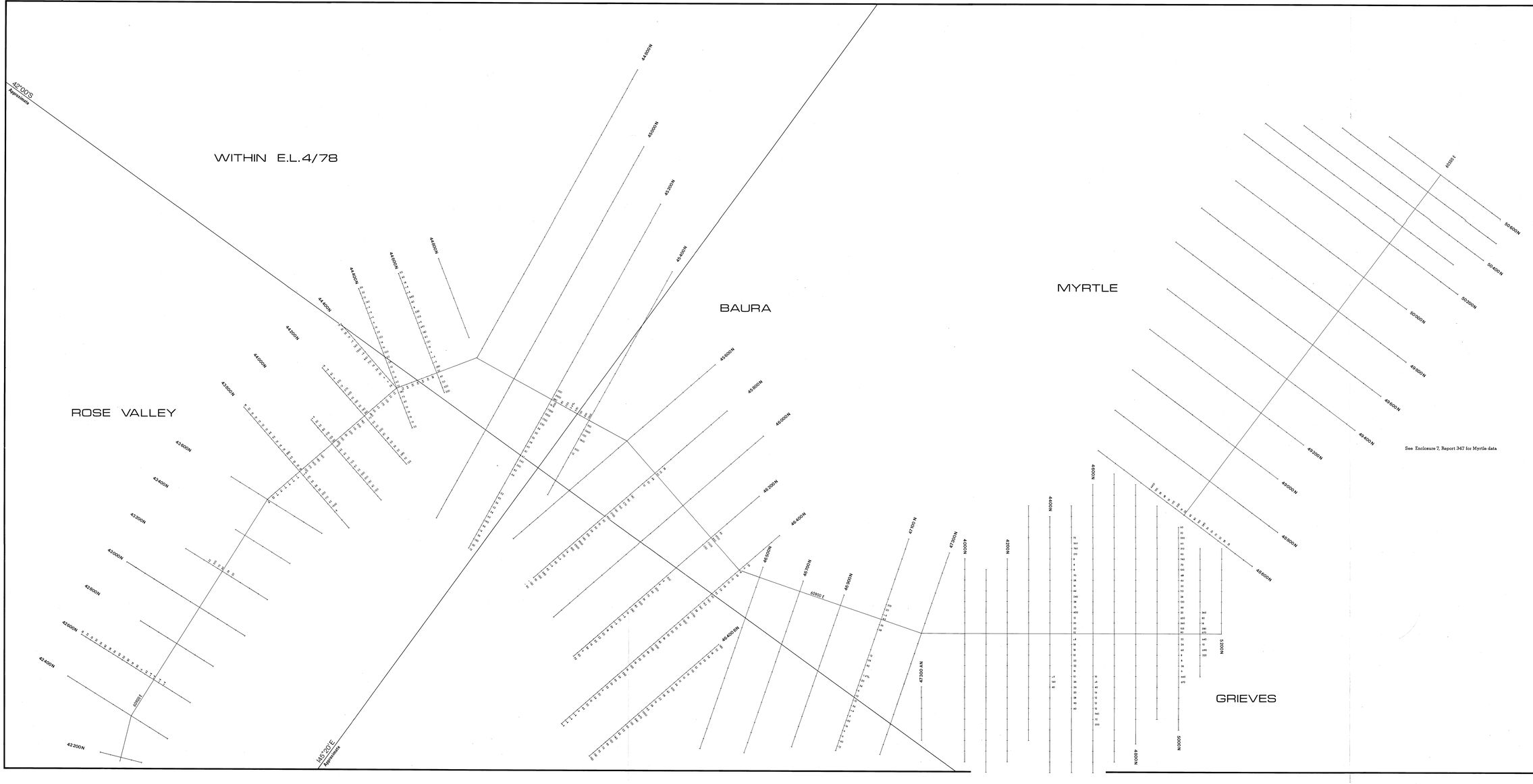
5823

Project	ZEEHAN			Nº A-78-60A	
Project Partner					
Pyramid					
BOUGUER GRAVITY					
Map Ref. ANG	K-55-5	Latitude	41°55'S	Longitude	145°20'E
Surveyed	SOLO	Date	April 1981	Scale	1:2500
Drawn	RSK	Date	May 1983	Drawing Nº	M83-2053

Report 353

Enclosure 16

5324



Location

ZEEHAN PROJECT

1:5000

0 50 250 Metres

5 cm

52806S

Amoco Minerals Australia Company

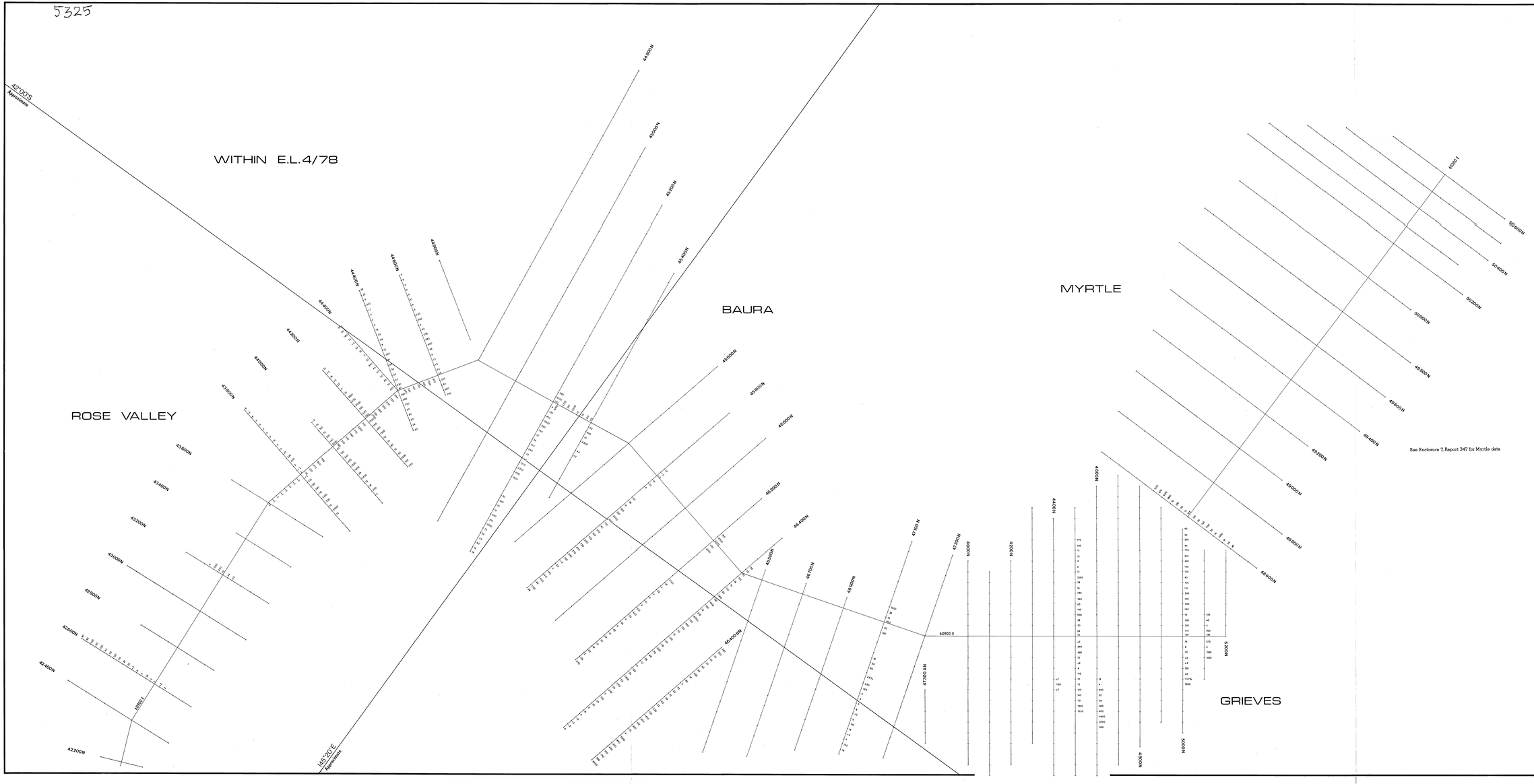
5504

Project	ZEEHAN		Nº A-78-608
Project Partner			
Myrtle to Rose Valley			
BEDROCK GEOCHEMISTRY			
LEAD			
Map Ref: ANG	K-55-5	Latitude	41°35'S Longitude 145°20'E
Surveyed	Amoco	Date	1982 Scale 1:5000
Drawn	Geodrafting	Date	January 1983 Drawing NWA2-1968

Report 353

Enclosure 17

5325



Location

1:5000

0 50 100 200 METRES

5 cm

528069

Amoco Minerals Australia Company

5325

Project	ZEEHAN			N° A-78-608	
Project Partner					
Myrtle to Rose Valley					
BEDROCK GEOCHEMISTRY					
ZINC					
Map Ref. ANG	x-55-5	Latitude	41°55'S	Longitude	145°20'E
Surveyed	Amoco	Date	1982	Scale	1:5000
Drawn	Geodrafting	Date	January 1983	Drawing N° M83-1969	
Report 553					

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APPENDIX 1

STREAM SEDIMENT GEOCHEMISTRY - ANALYTICAL RESULTS SHEETS

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COMLABS Pty. Ltd.

COMPUTERISED ANALYTICAL LABORATORIES

Head Office and
Central Laboratory
305 SOUTH ROAD,
MILE END SOUTH
STH. AUST. 5031
TEL.: (08) 43 5722
TELEX: AA89323

NATA REGISTERED No. 1526

All thermo plotted
G.K.

OUR REF.: COM 830315

YOUR REF.: O/N 9353 D/N 4373

[redacted] Basemetals A.

[redacted] Tin A & B.

Basemetals B.

Mr. P. Jones,
Amoco Minerals Aust. Ltd.,
61 Counsel Street,
ZEEHAN TAS 7469,

25.2.83

Dear Phil,

RE: JOB COM 830315

Enclosed are the assays for the samples delivered to our laboratory on the 21st February 1983.

Yours sincerely,
COMLABS PTY LTD

per :

c.c.: Mr. S. Fowler

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ANALYTICAL REPORT

B = Panned Concentrates A = -80 mesh

JOB COM830315 O/N : 4373

Results in ppm

SAMPLE	Cu	Pb	Zn	Ag	Ni	Cr	Au
92101 B	<2	14	12	<1	<4	140	<0.05
92102 B	<2	22	48	<1	<4	470	<0.05
92103 B	<2	<4	16	<1	<4	790	<0.05
92104 B	14	24	110	<1	22	210	<0.05
92105 B	<2	<4	22	<1	<4	880	<0.05
92106 B	24	46	350	<1	85	450	<0.05
92107 B	2	<4	20	<1	<4	170	<0.05
92108 B	32	55	420	<1	100	380	<0.05
92109 B	<2	<4	6	<1	<4	120	<0.05
92110 B	<2	<4	16	<1	<4	500	<0.05
92111 B	6	36	36	<1	<4	160	<0.05
92112 B	6	16	80	<1	<4	1200	<0.05
92113 B	<2	<4	6	<1	<4	290	<0.05
92114 B	<2	75	28	<1	<4	140	<0.05
92115 B	<2	<4	34	<1	<4	1850	<0.05
92116 B	4	42	100	<1	<4	95	<0.05
92117 B	<2	55	42	<1	<4	440	<0.05
92118 B	<2	24	40	<1	<4	170	<0.05
92119 B	<2	<4	26	<1	<4	160	<0.05
Contam/Acetol Smelt 92120 B	830	1.05%	3.2%	20	16	130	<0.05
" 92121 B	4	240	150	<1	<4	310	<0.05
" 92122 B	<2	12	220	<1	22	2.20%	<0.05
" 92123 B	440	5800	1.40%	11	16	230	<0.05
92124 B	<2	26	20	<1	<4	400	<0.05
92125 B	<2	<4	10	<1	<4	90	<0.05

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ANALYTICAL REPORT

JOB COM830315 O/N : 4373

Results in ppm

SAMPLE	Cu	Pb	Zn	Ag	Ni	Cr	Au
92126 B	<2	<4	10	<1	6	590	<0.05
92127 B	<2	<4	6	<1	6	50	<0.05
92128 B	<2	<4	10	<1	4	50	<0.05
92129 B	4	44	10	1	<4	80	<0.05
1. * 92130 B	28	290	80	[illegible]	<4	180	<0.05
2. * 92131 B	<2	220	230	<1	6	2050	<0.05
Contm Oceana 92132 B	10	1300	1300	2	14	110	<0.05
* 92133 B	10	80	160	1	<4	230	<0.05
92134 B	<2	16	20	<1	18	270	<0.05
Contm. Dundas 92135 B	75	3500	1450	[illegible]	110	210	<0.05
" 92136 B	46	2000	1050	[illegible]	95	3000	<0.05
okay 3. * 92137 B ←	65	520	850	[illegible]	20	200	<0.05
92138 B ←	<2	48	42	<1	12	140	<0.05
92139 B	<2	26	50	<1	18	70	<0.05
92140 B	<2	<4	12	<1	6	490	<0.05
92141 B	<2	20	70	<1	8	85	<0.05
92142 B	<2	30	60	<1	10	150	<0.05
92143 B	<2	22	42	<1	6	85	<0.05
92144 B	<2	10	60	<1	10	110	<0.05
92145 B	<2	8	28	<1	14	22	<0.05
* 92146 B	40	38	60	[illegible]	34	130	<0.05
92147 B	4	10	46	<1	18	120	<0.05
92148 B	<2	14	16	<1	8	90	<0.05
92149 B	<2	6	36	<1	8	100	<0.05
→ 92150 NO B SAMPLE							
92151 B	<2	<4	4	<1	8	130	<0.05

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ANALYTICAL REPORT

JOB COM830315 O/N : 4373

Results in ppm

SAMPLE	Cu	Pb	Zn	Ag	Ni	Cr	Au
92152 B	<2	<4	6	<1	10	150	<0.05
92153 B	<2	<4	6	<1	<4	190	<0.05
→ 92154 NO B SAMPLE							
* 92155 B	8	26	65	<1	32	60	<0.05
92156 B	4	6	32	<1	14	2000	<0.05
92157 B	2	12	18	<1	6	130	<0.05
* 92158 B	12	42	180	<1	24	80	<0.05
92159 B	70	520	2200	7	14	185	<0.05
* 92160 B	140	1200	2200	9	16	500	0.30
92161 B	6	22	36	<1	10	150	<0.05
92162 B	4	12	30	<1	8	240	<0.05
92163 B	6	32	55	<1	10	250	<0.05
92164 B	4	12	20	<1	6	85	<0.05
92165 B	8	10	16	<1	12	50	<0.05
5 * 92166 B	90	640	1100	7	14	240	<0.05
92167 B	16	190	110	2	<4	130	<0.05
* 92101 A	14	310	42	1	6	20	<0.05
* 92102 A	8	210	110	1	8	10	<0.05
92103 A	22	65	70	<1	12	18	<0.05
92104 A	32	60	190	<1	40	70	<0.05
92105 A	18	42	36	<1	24	60	<0.05
92106 A	130	110	520	<1	170	80	<0.05
92107 A	6	22	32	<1	10	30	<0.05
92108 A	130	145	660	<1	190	100	<0.05
92109 A	2	4	12	<1	<4	8	<0.05
92110 A	4	28	20	<1	<4	24	<0.05

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ANALYTICAL REPORT

JOB COM830315 O/N : 4373

Results in ppm

SAMPLE	Cu	Pb	Zn	Ag	Ni	Cr	Au
92111 A	20	160	190	<1	12	18	<0.05
92112 A	24	50	130	<1	32	60	<0.05
92113 A	4	4	12	<1	<4	10	<0.05
92114 A	6	60	50	<1	6	18	<0.05
92115 A	4	28	30	<1	<4	12	<0.05
92116 A	12	75	130	2	26	26	<0.05
92117 A	8	85	60	<1	<4	18	<0.05
92118 A	12	75	60	1	16	26	<0.05
92119 A	16	165	130	1	12	20	<0.05
92120 A	85	2500	500	12	10	38	<0.05
92121 A	32	680	460	2	10	32	<0.05
92122 A	6	95	140	<1	4	250	<0.05
92123 A	85	3300	800	10	6	30	<0.05
92124 A	8	95	175	<1	<4	<4	<0.05
92125 A	<2	<4	4	<1	<4	8	<0.05
92126 A	4	6	12	<1	<4	34	<0.05
92127 A	4	6	12	<1	<4	8	<0.05
92128 A	2	8	10	<1	<4	8	<0.05
92129 A	46	650	1000	3	<4	6	<0.05
92130 A	55	660	110	10	<4	10	<0.05
92131 A	36	770	880	2	22	60	<0.05
92132 A	34	4400	1400	9	28	12	<0.05
92133 A	22	250	410	5	<4	12	<0.05
92134 A	14	300	50	4	6	18	<0.05
92135 A	120	4400	1200	20	60	120	<0.05

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ANALYTICAL REPORT

JOB COM830315 O/N : 4373

Results in ppm

SAMPLE	Cu	Pb	Zn	Ag	Ni	Cr	Au
92136 A	26	610	210	4	24	40	<0.05

Method of Analysis : Cu Pb Zn Ni : AAS1/1A
Cr : AAS2
Ag : AAS3
Au : AAS5A

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ANALYTICAL REPORT

JOB COM830315 O/N : 4373

Results in ppm

SAMPLE	Sn
92101 B	38
92102 B	75
92103 B	<4
92104 B	20
92105 B	70
92106 B	20
92107 B	14
92108 B	24
92109 B	16
92110 B	8
92111 B	175
92112 B	44
92113 B	6
92114 B	6
92115 B	34
92116 B	4
92117 B	95
92118 B	4
92119 B	16
92120 B	210
92121 B	26
92122 B	6
92123 B	75
92124 B	90
92125 B	8

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ANALYTICAL REPORT

JOB COM830315 O/N : 4373

Results in ppm

SAMPLE	Sn
92126 B	<4
92127 B	6
92128 B	8
92129 B	6
92130 B	80
92131 B	12
92132 B	<4
92133 B	20
92134 B	14
92135 B	26
92136 B	60
92137 B	155
92138 B	4
92139 B	10
92140 B	4
92141 B	4
92142 B	4
92143 B	12
92144 B	<4
92145 B	4
92146 B	4
92147 B	8
92148 B	10
92149 B	6
92151 B	10

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ANALYTICAL REPORT

JOB COM830315 O/N : 4373

Results in ppm

SAMPLE	Sn
92152 B	6
92153 B	6
92155 B	4
92156 B	10
92157 B	<4
92158 B	8
92159 B	90
92160 B	115
92161 B	6
92162 B	<4
92163 B	<4
92164 B	10
92165 B	8
92166 B	80
92167 B	32
92101 A	[illegible]18[illegible]
92102 A	[illegible]18[illegible]
92103 A	6
92104 A	[illegible]32[illegible]
92105 A	[illegible]12[illegible]
92106 A	[illegible]56[illegible]
92107 A	12
92108 A	[illegible]42[illegible]
92109 A	10
92110 A	<4

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ANALYTICAL REPORT

JOB COM830315 O/N : 4373

Results in ppm

SAMPLE	Sn
92111 A	24
92112 A	20
92113 A	8
92114 A	8
92115 A	8
92116 A	10
92117 A	20
92118 A	10
92119 A	16
92120 A	18
92121 A	22
92122 A	6
92123 A	18
92124 A	4
92125 A	4
92126 A	6
92127 A	<4
92128 A	<4
92129 A	34
92130 A	70
92131 A	16
92132 A	12
92133 A	44
92134 A	18
92135 A	100

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ANALYTICAL REPORT

JOB COM830315 O/N : 4373

Results in ppm

SAMPLE	Sn
92136 A	30

Method of Analysis : Sn : XRF1

013

528083

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Head Office and
Central Laboratory
305 SOUTH ROAD,
MILE END SOUTH
STH. AUST. 5031
TEL.: (08) 43 5722
TELEX: AA89323

NATA REGISTERED No. 1526

All assays Plotted GL

OUR REF.: COM 830360

YOUR REF.: O/N E 9358 Des. 4374

Mr. P. Jones,
Amoco Minerals Aust. Co.,
61 Counsel Street,
ZEEHAN TAS 7469,

9.3.83

Dear Phil,

RE: JOB COM 830360

Enclosed are the assays for the samples delivered to our laboratory on the 28th February 1983.

Yours sincerely,
COMLABS PTY LTD

per :

c.c.: Mr. S. Fowler

014

528084

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ANALYTICAL REPORT

JOB COM830360 O/N : 4374

Results in ppm

SAMPLE	Sn
92137 A	36
92138 A	4
92139 A	<4
92140 A	<4
92141 A	4
92142 A	6
92143 A	<4
92144 A	4
92145 A	<4
92146 A	4
92147 A	<4
92148 A	<4
92149 A	6
92150 A	8
92151 A	<4
92152 A	<4
92153 A	<4
92154 A	<4
92155 A	4
92156 A	6
92157 A	6
92158 A	6
92159 A	105
92160 A	140
92161 A	4

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ANALYTICAL REPORT

JOB COM830360 O/N : 4374

Results in ppm

SAMPLE	Sn
92162 A	<4
92163 A	6
92164 A	<4
92165 A	<4
92166 A	100
92167 A	170
92168 A	8
92169 A	<4
92170 A	6
92171 A	4
92172 A	6
92173 A	<4
92174 A	<4
92175 A	8
92176 A	4
92177 A	8
92178 A	6
92179 A	<4
92180 A	<4
92181 A	<4
92182 A	6
92183 A	250
92184 A	4
92185 A	230
92186 A	2150

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ANALYTICAL REPORT

JOB COM830360 O/N : 4374

Results in ppm

SAMPLE	Sn
92187 A	18
92188 A	<4
92189 A	4
92190 A	990
92191 A	<4
92192 A	<4
92193 A	16
92194 A	180
92195 A	4
92196 A	<4
92197 A	4
92198 A	<4
92199 A	4
92200 A	6
92169 B	6
92170 B	4
92171 B	<4
92172 B	<4
92173 B	<4
92174 B	<4
92175 B	6
92176 B	4
92177 B	4
92178 B	4
92179 B	<4

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ANALYTICAL REPORT

JOB COM830360 O/N : 4374

Results in ppm

SAMPLE	Sn
92180 B	4
92181 B	<4
92182 B	<4
92183 B	95
92184 B	16
92185 B	70
92186 B	220
92187 B	6
92188 B	<4
92189 B	<4
92190 B	95
92191 B	<4
92192 B	<4
92193 B	6
92194 B	125
92195 B	<4
92196 B	4
92197 B	<4
92198 B	<4
92199 B	4
92200 B	<4

Method of Analysis : Sn : XRF1

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ANALYTICAL REPORT

JOB COM830360 O/N : 4374

Results in ppm

SAMPLE	Cu	Pb	Zn	Ni	Cr	Ag	Au
92137 A	42	900	870	40	30	[illegible]	<0.05
92138 A	16	50	80	20	48	<1	<0.05
92139 A	10	44	32	12	16	1	<0.05
92140 A	10	24	22	6	48	<1	<0.05
92141 A	8	28	28	<4	26	<1	<0.05
92142 A	8	50	55	<4	22	<1	<0.05
92143 A	4	12	10	<4	6	<1	<0.05
92144 A	6	18	22	8	10	<1	<0.05
92145 A	6	12	20	<4	8	<1	<0.05
92146 A	8	26	36	16	14	<1	<0.05
92147 A	6	14	22	10	8	<1	<0.05
92148 A	4	6	14	<4	6	<1	<0.05
92149 A	8	24	28	<4	26	<1	<0.05
92150 A	18	75	95	<4	4	<1	<0.05
92151 A	2	6	8	<4	10	<1	<0.05
92152 A	4	12	16	<4	8	<1	<0.05
92153 A	6	105	110	<4	6	<1	<0.05
92154 A	4	12	16	<4	8	<1	<0.05
92155 A	6	20	18	8	10	<1	<0.05
92156 A	6	30	14	<4	8	<1	<0.05
92157 A	8	24	24	<4	8	<1	<0.05
92158 A	14	22	80	8	24	<1	0.30
92159 A	65	820	1100	16	26	[illegible]	0.30
92160 A	115	1700	2300	14	85	[illegible]	0.25
92161 A	20	95	150	20	30	1	<0.05

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ANALYTICAL REPORT

JOB COM830360 O/N : 4374

Results in ppm

SAMPLE	Cu	Pb	Zn	Ni	Cr	Ag	Au
92162 A	8	34	44	4	90	<1	<0.05
92163 A	10	95	80	6	28	<1	<0.05
92164 A	4	<4	12	<4	<4	<1	<0.05
92165 A	4	18	18	6	8	<1	<0.05
92166 A	55	510	1000	<4	80	9	0.25
92167 A	65	800	790	16	32	15	0.40
92168 A	8	14	18	10	10	<1	<0.05
92169 A	12	28	26	6	12	<1	<0.05
92170 A	4	14	20	<4	8	<1	<0.05
92171 A	6	12	10	<4	8	<1	<0.05
92172 A	4	10	12	<4	12	<1	<0.05
92173 A	110	38	75	12	10	<1	<0.05
92174 A	75	38	60	12	16	<1	<0.05
92175 A	60	38	75	28	34	<1	<0.05
92176 A	65	46	90	16	22	<1	<0.05
92177 A	60	30	55	18	32	<1	<0.05
92178 A	12	46	28	10	14	<1	<0.05
92179 A	38	46	60	18	16	<1	<0.05
92180 A	16	50	70	22	18	<1	<0.05
92181 A	8	14	16	4	18	<1	<0.05
92182 A	10	50	65	16	16	<1	<0.05
92183 A	70	1000	950	110	390	4	<0.05
92184 A	8	150	60	8	10	<1	<0.05
92185 A	75	1450	1000	130	36	3	<0.05
92186 A	160	1900	1250	85	300	8	<0.05

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ANALYTICAL REPORT

JOB COM830360 O/N : 4374

Results in ppm

SAMPLE	Cu	Pb	Zn	Ni	Cr	Ag	Au
92187 A	42	120	150	28	12	1	<0.05
92188 A	6	10	8	<4	4	<1	<0.05
92189 A	18	18	18	<4	14	<1	<0.05
92190 A	130	4800	1800	85	65	15	<0.05
92191 A	38	24	26	<4	6	<1	<0.05
92192 A	190	18	22	<4	16	<1	<0.05
92193 A	42	300	125	22	12	<1	<0.05
92194 A	70	2300	1200	160	75	6	<0.05
92195 A	6	14	18	<4	160	<1	<0.05
92196 A	10	14	18	<4	22	<1	<0.05
92197 A	12	34	40	8	8	<1	<0.05
92198 A	20	32	24	10	16	<1	<0.05
92199 A	170	44	95	24	20	<1	<0.05
92200 A	12	30	24	12	10	<1	<0.05
92168 ????							
92169 B	4	<4	8	<4	90 X	<1	<0.05
92170 B	4	14	12	6	40	<1	<0.05
92171 B	4	4	8	<4	70 X	<1	<0.05
92172 B	2	4	10	<4	340	<1	<0.05
92173 B	26	28	85	22	120 X	<1	<0.05
92174 B	14	26	60	14	85 ✓	<1	<0.05
92175 B	16	28	80	20	110 ✓	<1	<0.05
92176 B	10	20	55	32	130 ✓	<1	<0.05
92177 B	18	16	46	18	220	1	<0.05
92178 B	4	16	20	8	200	<1	<0.05
92179 B	12	24	70	32	135	<1	<0.05

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ANALYTICAL REPORT

JOB COM830360 O/N : 4374

Results in ppm

SAMPLE	Cu	Pb	Zn	Ni	Cr	Ag	Au
92180 B	8	105	870	50	2300	1	<0.05
92181 B	8	8	14	10	190	<1	<0.05
92182 B	4	12	36	12	145	<1	<0.05
92183 B	110	5500	2200	90	80	12	<0.05
92184 B	6	70	220	16	85	1	<0.05
92185 B	110	6000	2700	120	140	10	<0.05
92186 B	160	8500	3700	95	80	18	<0.05
92187 B	12	75	50	14	32	1	<0.05
92188 B	2	10	8	<4	36	<1	<0.05
92189 B	4	14	20	<4	48	<1	<0.05
92190 B	115	6000	2800	110	1500	12	<0.05
92191 B	10	22	20	4	60	<1	<0.05
92192 B	12	14	20	6	55	<1	<0.05
92193 B	6	50	38	12	1500	1	<0.05
92194 B	120	5200	2800	120	160	12	<0.05
92195 B	8	12	8	<4	260	<1	<0.05
92196 B	4	8	14	4	1350	<1	<0.05
92197 B	4	12	26	6	270	<1	<0.05
92198 B	4	4	22	4	2200	<1	<0.05
92199 B	20	18	50	16	200	<1	<0.05
92200 B	4	8	20	10	95	<1	<0.05

Method of Analysis : Cu Pb Zn Ni : AAS1
Cr : AAS2
Ag : AAS3
Au : AAS5A

022

528092

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Head Office and
Central Laboratory
305 SOUTH ROAD,
MILE END SOUTH
STH. AUST. 5031
TEL.: (08) 43 5722
TELEX: AA89323

NATA REGISTERED No. 1526

All streams plotted G.K.
Rock chips " G.K

OUR REF.: COM 830546

YOUR REF.: O/N E 9369 Des. 4375

Mr. G. Kary,
Amoco Minerals Aust. Ltd.,
61 Counsel Street,
ZEEHAN TAS 7469,

6.4.83

Dear Greg,

RE: JOB COM 830546

Enclosed are the assays for the samples delivered to our laboratory on the 24th March 1983.

Yours sincerely,
COMLABS PTY LTD

per :

P R Harvey

c.c.: Mr. B. Roxburgh

023

528093

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ANALYTICAL REPORT

JOB COM830546 O/N : 4375

Results in ppm

	SAMPLE	Cu	Pb	Zn	Ag	Au	Ni	Cr	Sn	
STREAM SEDS	92201 A	14	22	18	1	0.10	<4	38	<4	A8082 C
"	92202 A	10	22	18	1	<0.05	<4	34	<4	"
"	92203 A	16	40	60	1	<0.05	16	18	6	"
"	92204 A	12	22	16	<1	<0.05	<4	16	<4	A8082 D
"	92205 A	22	40	40	<1	<0.05	8	30	<4	"
"	92206 A	10	16	22	1	<0.05	<4	6	6	"
"	92207 A	12	22	26	<1	<0.05	<4	10	<4	"
"	92208 A	12	16	24	1	<0.05	<4	14	<4	"
"	92209 A	26	42	140	1	<0.05	42	28	6	"
"	92210 A	26	32	50	1	<0.05	18	16	4	"
"	92211 A	24	50	60	<1	<0.05	18	24	4	"
"	92212 A	28	44	100	1	<0.05	34	22	4	"
"	92213 A	18	40	50	<1	<0.05	12	22	<4	"
"	92214 A	22	65	70	1	<0.05	20	20	4	"
"	92215 A	20	38	70	1	<0.05	18	20	6	"
"	92216 A	18	32	70	1	<0.05	12	20	<4	"
"	92217 A	16	42	36	1	<0.05	<4	18	6	"
"	92218 A	24	40	44	1	<0.05	8	16	4	"
"	92219 A	14	24	36	1	<0.05	<4	12	<4	"
"	92220 A	14	28	42	1	<0.05	6	6	4	"
"	92221 A	14	16	26	1	<0.05	8	6	4	?
"	92222 A	8	22	24	1	<0.05	<4	8	4	A8082 D
"	92223 A	6	18	26	1	<0.05	4	8	6	A8082 C
"	92224 A	4	14	20	1	<0.05	<4	4	<4	"
"	92227 A	4	10	20	1	<0.05	<4	4	<4	"

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ANALYTICAL REPORT

JOB COM830546 O/N : 4375

Results in ppm

	SAMPLE	Cu	Pb	Zn	Ag	Au	Ni	Cr	Sn	
STREAM SEDS	92228 A	4	12	28	1	<0.05	<4	8	<4	A8082 C
"	92229 A	6	10	26	1	<0.05	<4	28	4	"
"	92230 A	8	20	26	1	<0.05	<4	8	6	"
"	92231 A	8	16	20	1	<0.05	<4	18	4	"
"	92232 A	10	34	42	1	<0.05	<4	32	4	"
	92233 A	6	12	16	1	<0.05	8	110	<4	"
"	92234 A	4	12	16	1	<0.05	4	100	6	"
"	92235 A	4	14	20	1	<0.05	6	65	<4	"
"	92236 A	4	12	20	1	<0.05	<4	150	<4	"
"	92237 A	2	12	20	1	<0.05	<4	75	<4	"
"	92238 A	2	10	18	1	<0.05	<4	30	4	"
"	92239 A	4	10	22	1	<0.05	<4	50	<4	"
"	92240 A	4	18	24	1	<0.05	<4	70	<4	"
"	92241 A	2	6	16	1	<0.05	<4	32	4	"
"	92242 A	6	70	60	1	<0.05	<4	760	<4	"
"	92243 A	14	100	30	1	<0.05	<4	34	<4	"
"	92244 A	10	95	32	1	<0.05	<4	140	4	"
"	92245 A	4	10	18	1	<0.05	<4	75	<4	"
"	92246 A	8	12	20	2	<0.05	4	44	<4	"
"	92247 A	6	40	44	1	<0.05	12	540	4	"
"	92248 A	50	180	140	1	<0.05	14	75	10	"
"	92249 A	8	16	28	2	<0.05	8	1000	4	A8082 D
"	92250 A	4	6	20	1	<0.05	<4	24	4	"
"	92251 A	4	10	18	1	<0.05	<4	4	<4	"
"	92252 A	2	4	16	1	<0.05	<4	18	4	"

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ANALYTICAL REPORT

JOB COM830546 O/N : 4375

Results in ppm

	SAMPLE	Cu	Pb	Zn	Ag	Au	Ni	Cr	Sn	
STREAM SEDS	92253 A	6	18	20	1	<0.05	<4	20	4	A8082 C
"	92254 A	8	16	26	1	<0.05	4	14	4	"
"	92255 A	14	30	80	1	<0.05	38	18	4	"
"	92256 A	14	80	50	1	<0.05	22	16	4	"
"	92257 A	12	22	48	1	<0.05	24	28	4	"
"	92258 A	12	24	44	1	<0.05	18	22	<4	"
"	92259 A	14	125	130	1	<0.05	18	18	<4	"
"	92260 A	<2	10	22	1	<0.05	<4	14	4	"
"	92261 A	6	18	24	1	<0.05	<4	12	6	"
"	92262 A	6	20	20	1	<0.05	<4	22	<4	"
"	92263 A	8	70	40	1	<0.05	8	4	<4	"
"	92264 A	4	6	12	<1	<0.05	8	4	6	"
"	92265 A	12	24	20	1	<0.05	10	22	<4	"
"	92266 A	18	32	28	1	0.10	14	20	6	"
"	92267 A	10	18	18	1	0.10	8	16	<4	"
"	92268 A	46	30	100	1	<0.05	60	30	<4	"
"	92269 A	38	44	70	2	<0.05	32	28	<4	"
"	92270 A	10	22	24	1	<0.05	14	16	6	"
"	92271 A	12	18	32	1	<0.05	18	16	6	"
"	92272 A	32	34	44	8	<0.05	18	30	<4	"
"	92273 A	10	8	20	1	<0.05	8	16	4	"
"	92274 A	6	12	20	1	<0.05	6	12	4	"
"	92275 A	6	12	18	1	0.05	8	8	<4	"
"	92276 A	4	10	8	1	0.10	<4	12	6	"
"	92277 A	4	6	16	1	<0.05	8	18	<4	"

026

528096

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ANALYTICAL REPORT

JOB COM830546 O/N : 4375

Results in ppm

	SAMPLE	Cu	Pb	Zn	Ag	Au	Ni	Cr	Sn	
STREAM SEDS	92278 A	4	12	16	1	<0.05	8	12	4	A8082 D
"	92201 B	4	8	42	1	<0.05	10	2800	<4	A8082 C
"	92202 B	4	6	22	1	<0.05	4	280	<4	"
"	92203 B	4	10	32	1	<0.05	10	105	6	"
"	92204 B	4	16	60	1	<0.05	8	105	4	A8082 D
"	92205 B	8	16	44	1	<0.05	16	65	<4	"
"	92206 B	4	6	16	1	0.10	10	65	<4	"
"	92207 B	2	4	20	1	0.10	14	85	<4	"
"	92208 B	4	<4	14	1	<0.05	10	100	<4	"
"	92209 B	12	32	90	1	<0.05	38	70	<4	"
"	92210 B	6	8	30	1	<0.05	20	65	<4	"
"	92211 B	10	28	140	1	<0.05	60	55	<4	"
"	92212 B	12	20	110	1	<0.05	50	65	4	"
"	92213 B	8	12	30	1	<0.05	18	145	4	"
"	92214 B	6	22	30	1	<0.05	20	75	8	"
"	92215 B	6	14	50	<1	<0.05	32	65	6	"
"	92216 B	8	14	65	<1	<0.05	26	80	6	"
"	92217 B	6	16	30	<1	<0.05	14	65	6	"
"	92218 B	4	8	20	<1	<0.05	6	70	<4	"
"	92219 B	4	8	24	<1	<0.05	12	105	6	"
"	92220 B	4	10	30	<1	<0.05	<4	60	4	"
"	92221 B	<2	<4	12	<1	<0.05	<4	65	<4	"
"	92222 B	2	<4	12	<1	<0.05	<4	145	<4	A8082 D
"	92223 B	<2	<4	16	<1	<0.05	<4	260	<4	A8082 C
"	92224 B	<2	<4	26	<1	<0.05	<4	640	4	"

.../ 5

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ANALYTICAL REPORT

JOB COM830546 O/N : 4375

Results in ppm

	SAMPLE	Cu	Pb	Zn	Ag	Au	Ni	Cr	Sn	
STREAM SEDS	92227 B	<2	<4	12	<1	<0.05	<4	800	<4	A8082C
"	92228 B	2	<4	12	<1	<0.05	<4	110	<4	"
"	92229 B	<2	<4	14	<1	<0.05	<4	125	<4	"
"	92230 B	<2	8	18	<1	<0.05	<4	350	<4	"
"	92231 B	<2	8	20	<1	<0.05	4	240	<4	"
"	92232 B	4	28	75	<1	<0.05	4	100	<4	"
"	92233 B	2	<4	16	<1	<0.05	<4	130	6	"
"	92234 B	<2	<4	18	<1	<0.05	<4	140	<4	"
"	92235 B	<2	<4	20	<1	<0.05	<4	130	<4	"
"	92236 B	<2	16	26	<1	<0.05	<4	120	<4	"
"	92237 B	<2	6	16	<1	<0.05	<4	130	<4	"
"	92238 B	2	<4	12	<1	<0.05	<4	175	4	"
"	92239 B	2	6	50	<1	<0.05	8	3000	4	"
"	92240 B	2	22	16	<1	<0.05	<4	90	4	"
"	92241 B	2	50	30	<1	<0.05	<4	180	4	"
"	92242 B	2	48	70	<1	<0.05	<4	195	4	"
"	92243 B	4	32	90	<1	<0.05	<4	750	<4	"
"	92244 B	6	32	90	<1	<0.05	<4	100	<4	"
"	92245 B	2	<4	44	<1	<0.05	4	360	8	"
"	92246 B	2	<4	16	<1	<0.05	<4	190+	4	"
"	92247 B	14	30	190	1	<0.05	26	2.50%	12	"
"	92248 B	14	50	70	1	<0.05	10	230	<4	"
"	92249 B	4	<4	12	<1	<0.05	4	750	<4	A8082D
"	92250 B	4	<4	12	<1	<0.05	<4	830	<4	"
"	92251 B	4	<4	10	<1	<0.05	4	180	4	"

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ANALYTICAL REPORT

JOB COM830546 O/N : 4375

Results in ppm

	SAMPLE	Cu	Pb	Zn	Ag	Au	Ni	Cr	Sn	
STREAM SEDS	92252 B	2	<4	10	<1	<0.05	<4	80	<4	A-8082 D
"	92253 B	2	<4	10	<1	<0.05	<4	95	<4	"
"	92254 B	6	4	20	<1	<0.05	8	95	<4	"
"	92255 B	16	26	120	<1	<0.05	44	32	4	"
"	92256 B	8	34	40	<1	<0.05	20	50	<4	"
"	92257 B	6	16	55	1	<0.05	34	50	4	"
"	92258 B	8	12	36	<1	<0.05	22	50	<4	"
"	92259 B	8	150	80	1	<0.05	28	70	4	"
"	92260 B	4	10	20	<1	<0.05	16	65	<4	"
"	92261 B	4	6	16	<1	<0.05	6	95	<4	"
"	92262 B	2	8	22	<1	<0.05	<4	360	<4	"
"	92263 B	105	1700	8	23	<0.05	<4	95	24	"
"	92264 B	16	250	155	2	<0.05	<4	90	4	"
"	92265 B	8	4	26	<1	<0.05	4	36	<4	"
"	92266 B	8	4	22	<1	0.10	6	50	<4	"
"	92267 B	6	6	22	1	<0.05	10	65	<4	"
"	92268 B	28	12	90	<1	<0.05	40	55	4	"
"	92269 B	12	10	36	<1	<0.05	14	50	<4	"
"	92270 B	8	8	24	1	<0.05	6	80	<4	"
"	92271 B	10	12	42	<1	<0.05	16	60	<4	"
"	92272 B	2	<4	14	<1	<0.05	<4	55	4	"
"	92273 B	4	<4	14	<1	<0.05	<4	75	<4	"
"	92274 B	4	8	26	<1	<0.05	6	65	6	"
"	92275 B	4	8	26	<1	<0.05	8	50	10	"
"	92276 B	4	12	65	<1	<0.05	8	50	4	"

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ANALYTICAL REPORT

JOB COM830546 O/N : 4375

Results in ppm

	SAMPLE	Cu	Pb	Zn	Ag	Au	Ni	Cr	Sn	
STREAM SEDS	92277 B	6	<4	<4	<1	<0.05	<4	65	<4	A8082 D
"	92278 B	2	6	6	<1	<0.05	<4	55	4	"
"	91595 ~~92595~~ B	200	9300	3.10%	39	<0.05	14	350	105	"
"	91596 ~~92596~~ B	8	10	20	1	<0.05	<4	570	36	"

Method of Analysis : Cu Pb Zn Ni : AAS1
Cr : AAS2
Ag : AAS3
Au : AAS5A
Sn : XRF1

030

528100

COMLABS Pty. Ltd.
COMPUTERISED ANALYTICAL LABORATORIES

Head Office and
Central Laboratory
305 SOUTH ROAD,
MILE END SOUTH
STH. AUST. 5031
TEL.: (08) 43 5722
TELEX: AA89323

NATA REGISTERED No. 1526

All Streams Plotted G.K.
Rock Chips Plotted G.K.

OUR REF.: COM 830634

YOUR REF.: Despatch 4377 Order E 9375

Mr. P. Jones,
Amoco Minerals Aust. Ltd,
61 Counsel Street,
ZEEHAN. TAS. 7469,

12.4.83

Dear Phil,

RE: JOB COM 830634

Enclosed are the assays for the samples delivered to our laboratory on the 5th April, 1983.

Yours sincerely,
COMLABS PTY LTD

per :

c.c.: NORTH SYDNEY

031

528101

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ANALYTICAL REPORT

JOB COM830634 O/N : 4377

STREAM SAMPLE Results in ppm

-80 mesh

SAMPLE	Cu	Pb	Zn	Ag	Sn
92377 A	10	8	150	<1	8
92378 A	10	12	240	1	8
92379 A	10	6	16	<1	<4

Method of Analysis : Cu Pb Zn : AAS1
Ag : AAS3
Sn : XRF1

032

528102 ✓

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ANALYTICAL REPORT

JOB COM830634 O/N : 4377

STREAM SAMPLE -80 mesh

Results in ppm

SAMPLE	Ni	Cr	Au
92377 A	8	1.75%	<0.05
92378 A	20	3.90%	<0.05
92379 A	<4	500	<0.05

Method of Analysis : Ni : AAS1
Cr : AAS2/AAS4 Fusion
Au : AAS5A

033

528103

COMLABS Pty. Ltd.

COMPUTERISED ANALYTICAL LABORATORIES

Head Office and
Central Laboratory
305 SOUTH ROAD,
MILE END SOUTH
STH. AUST. 5031
TEL.: (08) 43 5722
TELEX: AA89323

NATA REGISTERED No. 1526

All streams plotted G.K
Rock Chips plotted G.K

OUR REF.: COM 830763

YOUR REF.: Des. 4378 O/N E 9382

Mr. P. Jones,
Amoco Minerals Aust. Co.,
61 Counsel Street,
ZEEHAN TAS 7469,

27.4.83

Dear Phil,

RE: JOB COM 830763

Enclosed are the assays for the samples delivered to our laboratory on the 19th April 1983.

Yours sincerely,
COMLABS PTY LTD

per :

034

528104 ✓

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ANALYTICAL REPORT

JOB COM830763 O/N : 4378

Results in ppm

	SAMPLE	Cu	Pb	Zn	Ni	Ag
STREAM SEDS PANNED CONC.	88027 B	4	12	4	<4	<1
"	88028 B	4	4	14	10	<1
"	88029 B	4	10	6	<4	<1
"	88030 B	4	<4	6	6	<1
"	88031 B	4	10	22	8	<1
"	88032 B	8	75	36	16	1
"	88033 B	4	6	12	12	<1
"	88034 B	4	16	8	<4	<1
"	88035 B	4	20	8	4	<1
"	88036 B	4	8	6	6	1
"	88037 B	4	6	4	<4	<1
"	88038 B	4	<4	8	<4	<1
"	88039 B	4	<4	12	<4	<1
"	88040 B	6	20	28	12	<1
"	88041 B	6	26	38	10	1
"	88042 B	6	26	22	14	<1
"	88043 B	6	38	140	16	<1 ✓
"	88048 B	12	200	290	32	1 ✓
"	88049 B	10	120	300	24	1
"	88050 B	10	320	360	14	<1
"	88051 B	32	710	880	16	3
"	88052 B	30	1300	700	22	2
STREAM SEDS -80 MESH	88027 A	4	12	8	<4	<1
"	88028 A	4	10	8	<4	<1
"	88029 A	6	24	16	6	<1

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ANALYTICAL REPORT

JOB COM830763 O/N : 4378

Results in ppm

	SAMPLE	Cu	Pb	Zn	Ni	Ag
STREAM SEDS - 80 MESH	88030 A	4	10	10	6	<1
"	88031 A	4	22	16	6	<1
"	88032 A	12	95	80	18	<1
"	88033 A	8	70	40	16	1
"	88034 A	14	180	55	6	1
"	88035 A	18	290	190	6	1
"	88036 A	16	110	80	4	1
"	88037 A	6	44	34	<4	1
"	88038 A	4	16	38	<4	<1
"	88039 A	4	6	28	<4	<1
"	88040 A	10	60	85	24	1
"	88041 A	8	55	80	18	1
"	88042 A	8	55	60	18	<1
"	88043 A	8	55	60	16	1
"	88044 A	14	130	140	22	1
"	88045 A	6	95	95	8	<1
"	88046 A	8	100	85	8	2
"	88047 A	8	105	46	8	1
"	88048 A	16	85	55	42	1
"	88049 A	16	290	220	12	1
"	88050 A	10	170	70	6	1
"	88051 A	12	75	50	18	1
"	88052 A	28	1150	600	22	3

Method of Analysis : Cu Pb Zn Ni : AAS1
Ag : AAS3

528106 ✓

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ANALYTICAL REPORT

JOB COM830763 O/N : 4378

Results in ppm

	SAMPLE	Sn	Cr	Au
STREAM SEDS PANNED CONC	88027 B	6	44	<0.05
"	88028 B	14	48	<0.05
"	88029 B	4	240	<0.05 ✓
"	88030 B	8	95	<0.05
"	88031 B	<4	230	<0.05 ✓
"	88032 B	<4	20	<0.05
"	88033 B	4	90	<0.05
"	88034 B	4	30	<0.05
"	88035 B	<4	36	<0.05
"	88036 B	<4	50	<0.05
"	88037 B	6	75	<0.05
"	88038 B	10	240	<0.05 ✓
"	88039 B	4	270	<0.05 ✓
"	88040 B	4	100	<0.05
"	88041 B	4	100	<0.05
"	88042 B	4	65	<0.05
"	88043 B	4	90	<0.05
"	88048 B	<4	55	<0.05
"	88049 B	6	28	<0.05
"	88050 B	<4	380	<0.05 ✓
"	88051 B	6	150	<0.05
"	88052 B	10	210	<0.05 ✓
STREAM SEDS -80 MESH	88027 A	6	10	<0.05
"	88028 A	4	6	<0.05
"	88029 A	8	20	<0.05

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ANALYTICAL REPORT

JOB COM830763 O/N : 4378

Results in ppm

	SAMPLE	Sn	Cr	Au
STREAM SEDS -80 MESH	88030 A	<4	10	<0.05
"	88031 A	6	24	<0.05
"	88032 A	10	12	<0.05
"	88033 A	8	10	<0.05
"	88034 A	12	6	<0.05
"	88035 A	<4	8	<0.05
"	88036 A	6	8	<0.05
"	88037 A	4	4	<0.05
"	88038 A	6	32	<0.05
"	88039 A	12	46	<0.05
"	88040 A	8	14	<0.05
"	88041 A	4	14	<0.05
"	88042 A	6	12	<0.05
"	88043 A	10	12	<0.05
"	88044 A	6	12	<0.05
"	88045 A	4	10	<0.05
"	88046 A	22	8	<0.05
"	88047 A	14	6	<0.05
"	88048 A	4	20	<0.05
"	88049 A	14	28	<0.05
"	88050 A	8	50	<0.05
"	88051 A	4	14	<0.05
"	88052 A	6	80	<0.05

Method of Analysis : Sn : XRF1
Cr : AAS2
Au : AAS5A

038

528108

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Head Office and Central Laboratory
305 SOUTH ROAD,
MILE END SOUTH
STH. AUST. 5031
TEL.: (08) 43 5722
TELEX: AA89323

NATA REGISTERED No. 1526

Streams all plotted G.K.
Rock Chips plotted G.K.

OUR REF.: COM 830819

YOUR REF.: Despatch 4380

Mr. P. Jones,
Amoco Minerals Aust. Ltd,
61 Counsel Street,
ZEEHAN. TAS. 7469,

3.5.83

Dear Phil,

RE: JOB COM 830819

Enclosed are the assays for the samples delivered to our laboratory on the 27th April, 1983.

Yours sincerely,
COMLABS PTY LTD

per :

P R Harvey

c.c.: NORTH SYDNEY

COMLABS Pty. Ltd.
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ANALYTICAL REPORT

JOB COM830819 O/N : 4380

Results in ppm

SAMPLE	Cu	Pb	Zn	Ag	Ni	Cr	Au	Sn	
Stream Sed Panned Conc 88044 B	14	155	120	<1	20	38	0.10	4	Trib L Henty
" 88045 B	8	145	90	1	4	60	<0.05	10	"
" 88047 B	12	130	38	1	<4	150	<0.05	38	"
" 92377 B	6	<4	30	1	8	5000	<0.05	<4	Trib Amber Cr
92378 B	6	<4	80	<1	16	1.40%	<0.05	4	"
92379 B	4	<4	10	<1	8	1350	<0.05	<4	"

Method of Analysis :

Cu Pb Zn Ni	:	AAS1
Cr	:	AAS2/2A
Ag	:	AAS3
Au	:	AAS5A
Sn	:	XRF1

040

528110

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Head Office and Central Laboratory
305 SOUTH ROAD,
MILE END SOUTH
STH. AUST. 5031
TEL.: (08) 43 5722
TELEX: AA89323

NATA REGISTERED No. 1526

OUR REF.: COM 830889

YOUR REF.: Des. 4381 O/N 9388

Mr. P. Jones,
Amoco Minerals Aust. Ltd,
61 Counsel Street,
ZEEHAN. TAS. 7469,

11.5.83

Dear Phil,

RE: JOB COM 830889

Enclosed are the assays for the samples delivered to our laboratory on the 4th May, 1983.

Yours sincerely,
COMLABS PTY LTD

per :

P R Harvey

c.c.: NORTH SYDNEY

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ANALYTICAL REPORT

JOB COM830889 O/N : 4381

Results in ppm

SAMPLE	Sn
STREAMS - PANNED CONS 88158 B	8 TRIB. of Little Henty R.
88159 B	6
88160 B	6
88161 B	4
88162 B	<4
88163 B	<4
88164 B	6
88165 B	<4
88167 B	55 ✓
88168 B	14
88170 B	4
88171 B	<4
88173 B	30 ✓
88174 B	4
88175 B	4

Method of Analysis : Sn : XRF1

042

528112

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ANALYTICAL REPORT

JOB COM830889 O/N : 4381

Results in ppm

STREAMS PANNED CONCS

SAMPLE	Cu	Pb	Zn	Ag	Ni	Cr	Au
88158 B	4	80	110	1	<4	110	<0.05
88159 B	<2	28	28	<1	<4	110	<0.05
88160 B	4	60	40	1	<4	80	<0.05
88161 B	2	14	12	<1	<4	100	<0.05
88162 B	2	<4	6	<1	<4	160	<0.05
88163 B	2	<4	8	<1	<4	140	<0.05
88164 B	2	<4	4	<1	<4	125	<0.05
88165 B	2	<4	4	<1	<4	170	<0.05
88167 B	4	<4	32	1	4	320	<0.05
88168 B	6	12	10	<1	6	250	<0.05
88170 B	4	155	480	1	<4	46	<0.05
88171 B	6	70	30	<1	<4	160	<0.05
88173 B	6	22	12	<1	<4	470	<0.05
88174 B	4	14	8	<1	<4	100	<0.05
88175 B	4	44	110	<1	<4	80	<0.05

TRACES of little Heaty R.

Method of Analysis : Cu Pb Zn Ni : AAS1
Cr : AAS2
Ag : AAS3
Au : AAS5A

043

528113 ✓

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ANALYTICAL REPORT

JOB COM830622 O/N : 4376

Results in ppm

	SAMPLE	Cu	Pb	Zn	Ag	Sn
STREAM SEDS	92225 A	6	10	6	<1	<4
"	92226 A	10	20	12	<1	4
"	92225 B	6	8	6	<1	<4
"	92226 B	4	6	4	<1	<4

Method of Analysis : Cu Pb Zn : AAS1
Ag : AAS3
Sn : XRF1

044

528114

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ANALYTICAL REPORT

JOB COM830622 O/N : 4376

Results in ppm

	SAMPLE	Ni	Cr	Au
STREAM SEDS	92225 A	6	36	<0.05
"	92226 A	<4	40	<0.05
"	92225 B	<4	160	<0.05
"	92226 B	<4	140	0.10

Method of Analysis : Ni : AAS1
Cr : AAS2
Au : AAS5A

045

528115

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Head Office and
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305 SOUTH ROAD,
MILE END SOUTH
STH. AUST. 5031
TEL.: (08) 43 5722
TELEX: AA89323

NATA REGISTERED No. 1526

All streams plotted except Au
Rock Chips Plotted G.K
*N.B. Au values assumed to
be <0.05, please change to 5 Fault
G.K.

OUR REF.: COM 830931

YOUR REF.: Des. 4383 O/N 9390

Mr. P. Jones,
Amoco Minerals Aust. Ltd,
61 Counsel Street,
ZEEHAN. TAS. 7469.,

24.5.83

Dear Phil,

RE: JOB COM 830931

Enclosed are the assays for the samples delivered to our laboratory on the 9th May, 1983.

Yours sincerely,
COMLABS PTY LTD

per :

c.c.: NORTH SYDNEY

COMLABS Pty. Ltd.
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ANALYTICAL REPORT

JOB COM830931 O/N : 4383

Results in ppm

SAMPLE	Cu	Pb	Zn	Ni	Ag	Cr	Sn	
Stream Sed. Panned Conc 88210 B	140	4900	2600	85	13	1350	60	Trib. Farrell Riv.
" 88211 B	220	880	4300	110	20	2400	40	"
" 88212 B	100	3450	2200	100	7	340	70	"
" 88213 B	90	2200	1800	85	8	820	130	"
" 88214 B	100	3900	2200	90	9	370	65	"
" 88216 B	8	44	22	4	<1	24	10	Trib. Dundas Riv
" 88217 B	16	50	65	20	<1	40	12	Trib L Henty Riv
" 88218 B	8	46	140	12	<1	75	<4	Trib Dundas Riv
" 88219 B	6	6	12	10	<1	80	<4	"
" 88220 B	22	12	34	14	<1	110	<4	(near Anom K) Trib Dundas Riv
" 88221 B	8	48	75	4	<1	120	10	"
" 88222 B	4	12	10	4	<1	130	6	Mariposa Cree
" 88223 B	4	<4	80	4	<1	200	4	Trib Henty Riv
" 88225 B	4	<4	42	4	<1	200	14	Trib L Henty Riv
" 88226 B	10	50	32	8	<1	70	<4	"
" 88227 B	6	34	38	6	<1	65	<4	"
" 88228 B	2	<4	4	4	<1	160	4	Trib Leslie Ck
" 88229 B	12	14	85	38	<1	430	6	"
" 88230 B	4	<4	14	4	<1	390	<4	Trib Dundas R
" 88231 B	6	22	16	6	<1	110	4	"
" 88232 B	4	6	4	4	<1	85	4	"
" 88233 B	2	<4	20	4	<1	1300	8	"
" 88234 B	135	2900	2700	125	8	670	200	Dundas Riv
" 88235 B	18	270	120	18	<1	660	44	Trib Dundas Riv
" 88236 B	580	6000	3400	165	13	770	100	Dundas Riv.

528117

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ANALYTICAL REPORT

JOB COM830931 O/N : 4383

Results in ppm

	SAMPLE	Cu	Pb	Zn	Ni	Ag	Cr	Sn	
Stream Seds Panned Conc	88237 B	10	34	60	16	<1	55	6	Trib Dundas Riv
"	88238 B	10	22	70	26	<1	70	6	"
"	88239 B	12	24	70	22	<1	65	6	"
"	88240 B	8	20	60	22	<1	65	<4	Farrell Riv
"	88241 B	6	16	38	20	<1	55	<4	Trib Farrell Riv
"	88242 B	8	50	85	22	<1	130	6	Farrell Riv.
"	88243 B	2	6	6	4	<1	95	4	Trib Farrell Riv
Stream Seds -80 fraction	88158 A	6	36	46	<4	<1	4	<4	Trib L. Henty Ri
"	88159 A	2	16	22	<4	<1	8	8	"
"	88160 A	6	36	60	<4	1	6	<4	"
"	88161 A	2	8	14	<4	<1	6	6	"
"	88162 A	2	16	18	<4	<1	8	4	"
"	88163 A	4	14	16	<4	<1	8	8	"
"	88164 A	4	22	20	<4	<1	8	6	"
"	88165 A	2	8	16	<4	<1	8	<4	"
"	88166 A	6	38	55	<4	<1	4	<4	"
"	88167 A	10	75	125	14	<1	14	10	"
"	88168 A	6	70	65	10	<1	85	10	"
"	88169 A	2	22	12	<4	<1	6	8	"
"	88170 A	2	18	12	<4	<1	4	4	"
"	88171 A	2	30	22	<4	1	<4	6	"
"	88172 A	6	16	24	<4	2	6	8	"
"	88173 A	4	40	32	<4	<1	4	8	"
"	88174 A	4	46	40	<4	1	8	8	"
"	88175 A	4	46	16	<4	<1	10	<4	"

528118

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ANALYTICAL REPORT

JOB COM830931 O/N : 4383

Results in ppm

SAMPLE	Cu	Pb	Zn	Ni	Ag	Cr	Sn	
Stream Seds -80 fraction 88210 A	90	1800	1550	105	7	430	210	Trib Farrell R
" 88211 A	80	1550	1000	105	5	150	180	"
" 88212 A	125	1500	1150	80	5	240	430	"
" 88213 A	100	1900	1350	120	7	140	190	"
" 88214 A	155	1650	1200	70	8	320	680	"
" 88215 A	32	900	340	26	3	34	80	Trib Dundas R
" 88216 A	6	55	14	4	<1	8	10	Trib L Henty R
" 88217 A	24	80	50	16	<1	12	14	Trib Dundas R
" 88218 A	10	36	40	10	<1	10	10	"
" 88219 A	10	24	14	6	<1	20	4	(near "Anom K)
" 88220 A	12	22	16	6	<1	22	8	(near "Anom K)
" 88221 A	8	130	120	6	1	22	16	Mariposa Ck
" 88222 A	4	28	20	4	<1	16	4	Trib Henty R
" 88223 A	2	14	10	<4	<1	6	8	"
" 88224 A	6	26	32	<4	<1	8	6	?
" 88225 A	10	44	20	4	11	6	6	Trib L Henty Riv
" 88226 A	4	22	14	4	<1	8	6	"
" 88227 A	8	65	40	4	<1	4	18	"
" 88228 A	4	16	12	<4	<1	10	12	Trib Leslie Ck
" 88229 A	6	26	22	4	<1	55	12	"
" 88230 A	8	22	28	4	<1	80	8	Trib Dundas Riv.
" 88231 A	4	18	14	4	<1	10	4	"
" 88232 A	6	24	14	<4	<1	10	4	"
" 88233 A	6	18	18	4	<1	130	8	"
" 88234 A	95	1250	1250	110	4	180	280	Dundas Riv.

528119 ✓

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ANALYTICAL REPORT

JOB COM830931 O/N : 4383

Results in ppm

SAMPLE	Cu	Pb	Zn	Ni	Ag	Cr	Sn	
Stream Seds -80 fraction 88235 A	20	230	130	14	<1	100	8	Trib Dundas Riv.
" 88236 A	550	1650	670	110	7	290	195	Dundas Riv
" 88237 A	12	38	32	10	<1	10	<4	Trib Dundas Ri
" 88238 A	12	75	60	10	<1	12	12	"
" 88239 A	12	24	30	16	<1	12	10	"
" 88240 A	6	24	10	6	<1	18	<4	Farrell Riv.
" 88241 A	12	44	36	14	<1	16	<4	Trib Farrell R
" 88242 A	24	38	60	16	<1	65	4	Farrell Riv
" 88243 A	6	34	22	10	<1	12	8	Trib Farrell Ri

Method of Analysis :
Cu Pb Zn Ni : AAS1
Cr : AAS2
Ag : AAS3
Au : AAS5A
Sn : XRF1

050

528120

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STH. AUST. 5031
TEL.: (08) 43 5722
TELEX: AA89323

NATA REGISTERED No. 1526

OUR REF.: COM 830931

YOUR REF.: Additonal Assay

Mr. P. Jones,
Amoco Minerals,
61 Counsel Street,
ZEEHAN. TAS. 7469.,

14.6.83

Dear Phil,

RE: JOB COM 830931

Enclosed are the Au assays which were previously omitted from our Job 830931.

Yours sincerely,
COMLABS PTY LTD

per :

c.c: SYDNEY

051

528121

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ANALYTICAL REPORT

JOB COM830931 O/N : ADDITIONAL

Results in ppm

SAMPLE	Au	
Stream Samples - Dawnoo Concs		
88210B	<0.05	Trib of Forrest R.
88211B	<0.05	
88212B	<0.05	
88213B	<0.05	
88214B	<0.05	
88216B	<0.05	Trib of Little Henty R.
88217B	<0.05	Trib of Dundas R.
88218B	<0.05	
88219B	<0.05	
88220B	<0.05	
88221B	<0.05	Marinoosa Ck.
88222B	<0.05	Trib of Little Henty R.
88223B	<0.05	
88225B	<0.05	
88226B	<0.05	
88227B	<0.05	
88228B	<0.05	Trib of Leslie Ck.
88229B	<0.05	" " "
88230B	<0.05	Trib of Dundas R.
88231B	<0.05	
88232B	<0.05	
88233B	<0.05	
88234B	<0.05	Dundas R
88235B	<0.05	Trib of Dundas R.
88236B	<0.05	Dundas R

052

528122

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ANALYTICAL REPORT

JOB COM830931 O/N : ADDITIONAL

Results in ppm

SAMPLE	Au	
88237B	<0.05	Trib of Dundas R.
88238B	<0.05	
88239B	<0.05	
88240B	<0.05	Farrell R
88241B	<0.05	Trib of Farrell R
88242B	<0.05	Farrell R
88243B	<0.05	Trib of Farrell R.
88158A	<0.05	Trib of Little Henty R
88159A	<0.05	
88160A	<0.05	
88161A	<0.05	
88162A	<0.05	
88163A	<0.05	
88164A	<0.05	
88165A	<0.05	
88166A	<0.05	
88167A	<0.05	
88168A	<0.05	
88169A	<0.05	
88170A	<0.05	
88171A	<0.05	
88172A	<0.05	
88173A	<0.05	
88174A	<0.05	
88175A	<0.05	

Stream Samples - Panned Conc's

Stream Samples - Stream Sediments

All

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ANALYTICAL REPORT

JOB COM830931 O/N : ADDITIONAL

Results in ppm

STREAM SAMPLES - STREAM SEDIMENTS

SAMPLE	Au	
88210A	<0.05	See page 2 of this report for locations
88211A	<0.05	
88212A	<0.05	
88213A	<0.05	
88214A	<0.05	
not on page 2 - 88215A	<0.05	- Trib of Dundas R
88216A	<0.05	
88217A	<0.05	
88218A	<0.05	
88219A	<0.05	
88220A	<0.05	
88221A	<0.05	
88222A	<0.05	
88223A	<0.05	
88224A	<0.05	
88225A	<0.05	
88226A	<0.05	
88227A	<0.05	
88228A	<0.05	
88229A	<0.05	
88230A	<0.05	
88231A	<0.05	
88232A	<0.05	
88233A	<0.05	
88234A	<0.05	

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ANALYTICAL REPORT

JOB COM830931 O/N : ADDITIONAL

Results in ppm

SAMPLE	Au	
STREAM SAMPLES - STREAM SEDIMENTS 88235A	<0.05	See pages 2 & 3 on this report for locations
88236A	<0.05	
88237A	<0.05	
88238A	<0.05	
88239A	<0.05	
88240A	<0.05	
88241A	<0.05	
88242A	<0.05	
88243A	<0.05	

Method of Analysis : AAS5A

528125

APPENDIX 2

OCEANA - DETAIL COSTEAN PLANS

W

L2900N

Cu	Pb	Zn	Ag	Sn	Sb	Mn	Cd
15	60	215	0·5	X	8	30	X
20	120	285	X	X	7	70	0·5
5	25	90	X	X	X	65	X
5	15	75	X	X	X	70	X
5	70	265	X	X	X	75	X
5	35	115	X	X	X	220	X
5	125	155	X	X	3	240	X
5	55	140	X	X	X	170	X
5	80	160	X	X	4	125	X
15	310	3275	1·0	X	13	30	30
15	60	355	0·5	X	X	130	X
5	20	120	X	X	X	210	X
5	120	290	X	X	3	570	X
5	85	300	X	X	4	235	X
10	175	410	X	X	4	250	1·0
10	65	430	X	X	3	145	X
15	95	125	X	X	4	65	X
25	100	140	X	X	4	95	X
5	20	50	X	X	5	95	X
X	165	220	0·5	X	X	300	0·5
X	90	235	X	X	X	365	X
10	35	90	X	X	X	265	X
25	70	575	X	X	17	35	X
25	50	340	X	X	3	45	X
10	60	65	X	X	4	60	X
10	25	30	X	X	X	35	X
15	15	40	X	X	3	30	X
15	265	45	0·5	X	3	25	X
10	65	175	0·5	X	5	25	X
15	50	220	X	X	5	30	X
15	115	210	0·5	X	3	35	0·5
15	70	445	X	X	3	40	X
10	80	770	X	X	4	45	X
5	105	85	X	X	3	40	X
10	10	25	X	X	X	535	X
10	10	40	X	X	X	265	X
10	15	30	X	X	X	235	X
10	15	40	X	3	X	235	X
15	45	70	X	X	X	50	X
15	15	35	X	3	X	270	X
15	15	35	0·5	X	X	210	X
20	15	30	X	4	X	250	X

GEOLOGY

INTERVAL

1440E

Limestone - Light grey, S/W, 20% Bryozoa abundant carbonaceous material

Limestone - Black, fresh, minor coarse Dolomite, trace siderite veining

Limestone - Black, fresh fine grained, slightly silty, moderate siderite veining

1430E

Limestone - Black, fresh fine grained, moderate cross cutting siderite veins at 110/30° S and 035/40° W Bedding 135/85° E

Limestone - Black, C/W

Limestone - Light Grey, fresh, minor carbonaceous horizons

Limestone - Black, fresh fine grained abundant siderite veining

Limestone - Grey, S/W, smooth weathered surface, very poor sample (no sample 1422-1424 E)

1420E

Silty Limestone - Black, fresh, minor Brachiopods, moderate siderite veining

Py

Siltstone - Black, fresh, fine grained, abundant brachiopods, minor Pyrite on shell fragments

1410E

CREEK

NO SAMPLES - Deep water and mud over fresh rock

1400E

Py

Dolomite - Black, fresh finely crystalline Bedding 120/80E minor Limestone Abundant siderite veining. Trace Py

Silty Limestone - Black fresh fine grained abundant siderite veining

Siltstone - Brown, C/W.

1390E

- Bedding 130°/70° and 135°/90°

Siltstone - Black, S/W coarse, minor shell fragments, 20% pods of orange ferruginous sandy material Fracture 080/20° N 135°/85°S

Sandstone - Dark grey, S/W well banded, minor slumping Bedding 130/75° E

Breccia - Dark grey, S/W, vuggy weathered, possible fossil breccia, silty

1380E

Siltstone - Black, S/W, minor sandy content

Sandy Limestone - Black, S/W

CREEK

OVERBURDEN

1370E

Siltstone - Black S/W to C/W, minor micro cavities

Limestone - Light Grey very finely laminated slightly siliceous Bedding 130°/85E

Siltstone - Black fresh fine grained, minor iron staining

1360E

Dolomite - Black, fresh finely crystalline, minor Light grey shell fragments

Siltstone - Black, fresh fine grained Bedding 115°/90°

Limestone - Light grey, fresh finely laminated minor Black siltstone

Dolomite - Black, fresh finely crystalline fossil rich, minor pre-cavities

1350E

OCEANA

L 2900N 1350-1450E

COSTEAN PROFILE

Scale
1:200 - Vertical
1:500 - Horizontal

C/W - completely weathered
H/W - Highly "
S/W - Slightly "
fresh - not "

Py - Pyrite
GN - Galena
SL - Sphalerite
Cer - Cerussite

△△ - Breccia

528126

OCEANA COSTEAN

2900 N

LU

L 3000N

Cu	Pb	Zn	Ag	Sn	Sb	Mn	Cd
X	50	230	X	6	9	335	X
X	20	65	X	X	X	275	X
5	30	70	X	X	3	370	X
5	20	65	X	X	X	285	X
5	35	95	X	X	X	225	X
5	35	115	X	X	X	280	X
5	25	65	X	X	X	220	X
5	50	165	X	X	3	215	X
5	230	2450	X	X	6	440	6·0
10	135	1750	X	X	5	260	4·0
5	80	315	X	X	4	335	X
5	70	335	X	X	X	170	X
X	50	215	X	X	5	155	X
5	55	185	X	X	3	150	X
10	335	1300	X	X	5	260	5·0
10	285	4500	X	X	X	150	1·5
10	310	6300	X	X	4	140	2·5
10	445	9750	X	X	X	120	7·5
X	70	225	X	X	X	210	X
10	3150	1950	2·0	X	X	1300	8·5
30	200	5600	X	X	9	50	2·0
10	320	1550	X	X	3	465	5·5
20	605	3650	1·0	X	17	165	50
25	790	5950	2·0	6	13	45	295
20	690	5600	3·0	X	16	50	250
20	725	4250	X	X	21	45	285
20	855	2900	1·0	X	14	35	34
15	100	305	X	X	4	20	1·5
10	40	1450	X	X	8	25	X
30	230	1350	X	3	9	25	60
45	610	970	X	X	24	20	7·5
25	395	1250	X	4	20	20	80
45	90	400	X	X	5	20	X
20	440	2800	1·0	X	12	20	11·0
15	575	2650	2·0	X	8	20	35·5
60	235	205	X	4	10	15	1·5
20	85	360	X	4	6	15	1·0
45	315	1550	X	5	23	20	9·0
25	210	715	X	7	19	25	4·0
20	60	100	0·5	X	7	10	X
25	40	55	0·5	X	7	10	X
30	170	1080	0·5	4	13	25	6·0

GEOLOGY	INTERVAL
	1440E
	No Sample - fresh rock under 1-2 m of mud/water.
	1430E
Limestone	Black to Dark Grey, fresh, fine grained. Minor siderite veining
	1420E
Dolomite	Black, fresh, finely crystalline minor calcite/siderite veins
Dolomite	Dark Grey, fresh, minor shell fragments and possible worm burrows.
Silty Limestone	Dark Grey, S/W, minor ferruginous stains along fracture. Minor soft ferruginous pods as described from L 2900 N Highly fractured
Limestone	Light grey, S/W, slightly carbonaceous
	1410E
Limestone	Dark Grey to Black, fresh fine grained. Moderate siderite veining. Minor py
py	
Silty Limestone	Black, C/W, very poor sample
Silty Limestone	Dark Grey, S/W, minor fine siderite/calcite veins. Slight vuggy weathering
	1400E
Limestone	Black to dark Grey, fresh, fine grained. Moderate to Heavy siderite veining
Dolomite	Black, fresh, finely crystalline moderate siderite/calcite veins
Silty Limestone	Green, S/W, highly fracture moderate siderite veining
	1390E
Silty Limestone	Green to Black, S/W moderately fractured Bedding 170°/85°W
Limestone	Green to Black, H/W, well Laminated, trace py Fractures 020/70N, 080/75S Bedding 135/90
	1380E
Siltstone	Dark Green, S/W, micaceous slightly sandy, variably pyritic Bedding 150/80 W, 140/90
py	
Sandy Limestone	Black, S/W, minor shale horizons. Trace py Bedding 135/65 E
	1370E
Limestone	Brown to Green, S/W, well Layered, slightly sandy Bedding 110/85E, 130/75 W.
Limestone	Brown, C/W, ferruginous overburden
py	
Limestone	Black to Dark Grey, H/W minor silt content. Trace py.
Siltstone	Green, H/W finely laminated, minor sandy horizons, trace py
py	1360E
Limestone	Black, H/W, massive
Limestone	Brown to Black, H/W, up to 2% py, finely laminated
py	
Limestone	Dark Brown to Black, H/W massive.
	1350E

OCEANA COSTEAN PROFILE

L 3000N 1350-1434 E

C/W - Completely weathered
H/W - Highly "
S/W - Slightly "
fresh - non "

Scale: 1:200 vertical
1:500 horizontal

Py - Pyrite GN Galena
Cer - Cerussite SL Sphalerite

057

528127

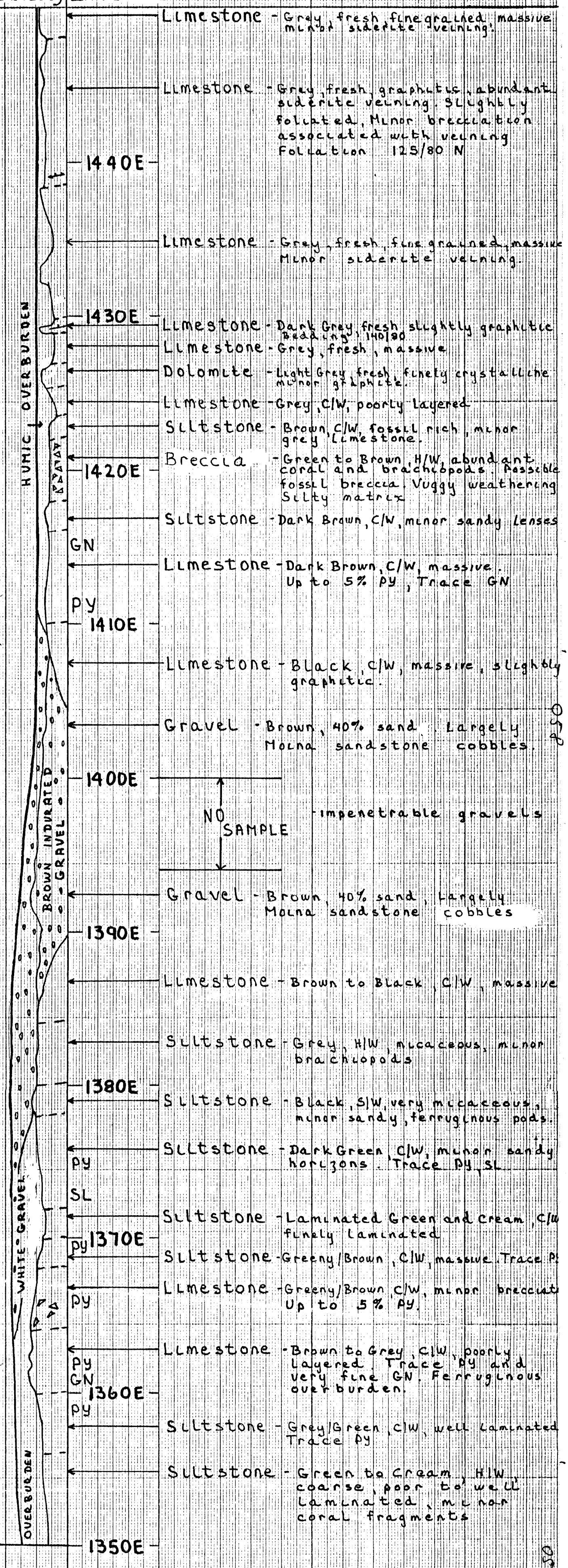
OCEANA COSTEAN

3000 N

W

L 3050 N

Cu	Pb	Zn	Ag	Sn	Sb	Mn	Cd
15	45	185	X	X	X	230	0.5
20	60	300	0.5	X	X	500	1.0
15	50	125	X	X	4	475	X
15	85	355	X	X	5	525	1.0
15	255	1400	1.0	X	3	1750	6.0
15	380	1600	0.5	X	5	1250	7.0
10	185	980	X	X	3	265	4.0
10	375	1750	0.5	X	4	280	6.5
10	130	590	X	X	X	165	2.5
25	410	2500	1.0	X	10	55	11.5
10	85	345	0.5	X	7	125	2.0
15	55	195	X	X	4	75	1.0
35	425	2350	1.5	X	17	40	8.0
25	100	820	X	X	4	25	3.0
30	35	470	X	X	X	40	1.0
25	45	320	X	X	3	40	1.0
25	65	375	X	X	6	40	2.0
30	265	965	0.5	X	8	35	5.0
30	205	1550	0.5	3	10	35	3.5
30	230	950	0.5	X	10	40	4.0
25	785	4650	1.5	X	12	25	18.0
25	945	5100	2.0	3	13	25	19.5
30	940	5100	1.5	X	11	20	24.0
20	45	20	X	3	5	50	1.0
20	110	25	1.0	X	4	45	1.5
35	2100	6700	4.0	X	15	20	50
30	650	1300	1.0	X	10	20	11.0
30	490	1850	1.0	X	16	20	14.0
30	1250	3650	2.0	X	22	15	27.5
40	1400	2650	2.0	4	30	25	15.5
40	80	85	0.5	25	9	15	1.0
35	230	125	X	12	15	25	1.0
30	20	45	X	X	4	30	0.5
50	200	95	X	X	8	35	1.0
30	140	135	0.5	X	8	30	3.5
30	325	1950	X	10	12	25	14.0
10	5	10	X	10	7	15	0.5
35	655	955	1.0	X	18	15	9.0
20	225	2350	1.0	5	10	20	9.0
25	305	1700	0.5	15	10	25	5.5
25	360	1000	0.5	16	15	20	13.5
40	165	530	0.5	7	13	15	2.5
15	155	205	0.5	7	10	15	3.0
30	25	20	6.0	9	5	10	0.5
15	X	30	X	12	5	10	0.5
10	X	30	X	10	3	15	X
20	5	15	X	12	7	10	0.5



OCEANA

COSTEAN PROFILES

L 3050N 1350-1450E

Scale 1:200 vertical
1:500 horizontal

C/W - Completely weathered
H/W - Highly "
S/W - Slightly "
Fresh - non "

- Breccia
- Gravel

GN - Galena
SL - Sphalerite
py - Pyrite
Cer - Cerussite

528128
OCEANA COSTEAN
3050 N

W

L 3100N

Cu	Pb	Zn	Ag	Sn	Sb	Mn	Cd	GEOLOGY	INTERVAL
10	65	155	X	X	3	130	X		Limestone - Light and Dark Grey, mottled, fresh, minor siderite veining
30	210	490	X	X	6	25	2.0		Silty Limestone - Greeny/Brown, C/W
35	315	595	0.5	X	7	35	1.5		
20	425	325	X	X	5	120	1.0		Limestone - Grey, fresh, fine grained, moderate siderite veining
10	90	130	0.5	X	X	155	0.5		1440E
30	2050	960	1.5	X	11	20	8.0		Sandy Limestone - Dark Green, C/W, well bedded.
30	3000	2850	9.0	X	6	30	19.5		Silty Limestone - Green/Grey C/W, Highly fractured. Trace Py
45	1.14%	0.87%	13	X	21	35	55	py	
35	1450	2150	2.0	X	25	30	9.0		
60	1.28%	1.24%	11	3	22	20	95		Siltstone - Dark Green to Brown, C/W moderately to highly fractured. Massive.
25	475	2000	1.0	X	13	30	55		1430E
25	695	1550	1.5	X	15	30	10.5		
25	460	2100	1.5	X	11	35	10.0		
20	100	510	X	X	8	15	2.0		Shale - Finely Laminated Tan and Brown H/W, Trace Py, Bedding 115/85 N
20	80	310	0.5	X	6	20	1.0	py	
25	105	795	1.0	X	10	25	2.5		1420E
20	115	440	1.0	X	12	25	1.0		Breccia - Mainly siltstone fragments, minor coral fragments and sandy fragments. Trace Py.
20	45	220	X	X	10	25	X		
25	90	365	0.5	X	8	20	1.0		Siltstone - Green to Light Brown, C/W, well bedded. Bedding 140/70 W
30	450	1800	2.0	X	12	30	6.5		Silty Limestone - Blue/Grey, C/W, massive
40	275	630	1.5	X	16	35	3.0		1410E
40	125	275	2.0	X	21	40	1.0	py	Silty Limestone - Green C/W well bedded minor coral fragments 2% Py
55	240	895	1.5	X	16	40	2.5	py	Breccia - Blue to green silty Limestone fragments C/W. Trace Py
30	165	255	1.0	3	16	40	0.5		
35	200	645	0.5	X	18	25	2.0	py	Limestone - Greeny/Blue to Grey, C/W poorly Layered. Minor Pyrite Laminations
35	375	975	2.5	X	17	45	4.0		Silty Limestone - Dark Green, C/W, minor brecciation.
40	215	430	1.5	X	15	40	1.0		1400E
365	1900	3850	8.0	X	65	30	16.0	py	Breccia - C/W, silty fragments
2300	3000	5900	12.5	X	140	30	27.5	py	Siltstone - Green, C/W, minor coral fragments 1% Py
30	405	370	0.5	X	14	25	2.0		Limestone - Grey to Green, C/W, minor Py.
30	315	430	0.5	X	16	30	0.5	GN py	Siltstone - Dark Green, C/W, up to 1% Py Minor GN
30	535	1350	0.5	X	12	20	5.0		1390E
30	970	3650	2.5	X	20	20	16.0		Siltstone - Brown, C/W, massive
25	1300	5900	2.5	X	25	20	26.0		Siltstone - Green/Brown, C/W, massive
20	975	4480	2.5	X	17	20	25.5		Siltstone - Dark Green to Grey, C/W minor coral rich horizons
45	1850	9400	5.0	X	21	55	38.0	py	1380E
30	200	670	X	X	7	50	2.0		Siltstone - Dark Green, C/W, massive Trace Py.
20	115	400	X	X	8	35	2.5		Sandstone - Dark Green, H/W, micaceous minor brecciation.
20	70	250	X	X	8	35	0.5		
25	40	220	X	X	9	40	X		Siltstone - Green, H/W, micaceous Trace Py, Car Bedding 105/80 S
25	75	300	X	X	8	55	1.5		1370E
20	30	170	X	X	6	25	X		Siltstone - Dark Brown, C/W, minor coral fragments
25	20	155	0.5	X	13	20	X		Sandy Limestone - Dark Green, C/W minor fine sandstone horizons Bedding 145/90
20	180	1450	0.5	X	5	25	4.0	py	
20	30	215	X	X	8	30	X		Breccia - Black Limestone (C/W) fragment in a dark Green matrix. Minor coral fragments. Trace Py, possible Car. Bedding 130/75 W,
20	45	870	X	X	7	25	0.5	Car	1360E
20	15	115	X	X	3	30	X		Siltstone - Green/Grey, H/W, micaceous, poorly bedded. Bedding 135/62 W
20	15	125	0.5	4	3	30	X		Silty Limestone - Green/Grey, H/W, poorly bedded.
25	15	150	X	4	3	20	X		Siltstone - Tan to Brown, C/W, well bedded minor slumping
30	50	75	X	X	X	20	1.0	py	Siltstone - Finely Laminated cream and brown, C/W, Trace Py.
35	175	90	X	X	8	20	1.5		1350E
45	105	75	X	4	8	20	X		Siltstone - Dark Brown, H/W, massive
35	35	65	X	X	5	30	X		Siltstone - Green/Brown, C/W, minor coral rich horizons. minor foliation
40	45	75	X	X	9	20	X		
20	30	15	X	9	X	15	X		Silty Limestone - Dark Grey, H/W, abundant brachiopods. Minor Py
35	20	45	X	X	7	35	X	py	1340E
25	35	35	X	4	X	20	X		Siltstone - Grey/Green, S/W, slightly foliated. Minor vuggy, coral rich horizons. Joint Planes 025/LSN, 170/30E
25	40	60	X	X	X	30	X		
30	95	130	X	X	4	30	X		Shale - Brown/Green, H/W, minor coral rich horizons
25	30	45	X	X	3	35	X		Sandstone - Grey/Green, H/W, coral rich.
30	75	35	X	X	4	30	X		1330E
30	65	40	X	3	8	20	X		Siltstone - Green, C/W, fine grained micaceous.
30	45	25	X	X	4	30	X		Siltstone - Dark Brown, C/W, massive
									Sandstone - Green, H/W, fine, micaceous

WHITE UNCONSOLIDATED GRAVELS

BROWN INDURATED GRAVELS

1320E

C/W - Completely weathered
H/W - Highly "
S/W - Slightly "
fresh - non "

OCEANA COSTEAN PROFILE
L 3100N 1324-1450 E
Scale 1:200 vertical
1:500 horizontal

Breccia

Gravel

528129

OCEANA COSTEAN

3100 N

W

L 3150 N

Cu	Pb	Zn	Ag	Sn	Sb	Mn	Cd
5	110	350	X	X	3	270	0·5
5	300	695	0·5	X	7	135	2·0
5	430	465	0·5	X	3	165	1·5
5	685	980	1·0	X	5	1150	3·0
5	1750	1250	1·5	X	X	2800	6·5
10	110	425	1·5	X	X	460	0·5
10	235	620	1·0	X	X	485	2·0
25	1300	1600	3·5	X	11	75	8·0
20	1600	9400	2·0	X	25	30	15·0
20	585	5050	2·0	X	13	25	6·0
15	290	1150	1·0	X	12	130	4·0
20	450	1800	1·5	X	18	25	10·0
20	490	1050	1·5	X	17	20	3·0
15	45	75	X	X	4	35	X
10	35	80	0·5	4	3	30	X
15	30	45	0·5	X	5	20	X
15	150	1000	0·5	X	6	20	1·5
15	225	1300	1·0	X	10	20	3·5
25	110	340	0·5	X	7	20	X
20	40	425	X	X	6	25	X
20	90	365	0·5	X	8	25	0·5
20	135	510	0·5	X	11	15	1·0
15	120	465	0·5	X	7	20	0·5
30	150	420	0·5	X	12	40	1·5
30	255	2600	0·5	X	16	15	11·0
30	330	1650	0·5	X	19	15	13·5
40	1450	2950	2·0	X	18	15	19·5
35	1450	1400	0·5	X	42	30	18·5
55	1050	1800	0·5	X	20	15	10·0
35	590	6050	1·5	X	16	20	9·0
85	2350	2350	5·0	X	99	25	55·5
140	2000	2050	5·0	X	55	20	36·0
150	2150	3100	5·0	X	41	20	32·5
35	1650	7650	5·0	X	28	25	40·0
20	625	5080	3·0	X	11	30	23·0
25	160	975	1·0	X	10	35	4·0
30	75	365	0·5	3	4	50	0·5
25	80	410	X	X	6	35	1·0
25	130	525	X	X	5	50	1·0
20	45	170	X	X	6	40	X
20	25	160	X	X	5	35	X
15	30	410	X	X	4	25	X
30	100	60	X	X	6	35	X
25	75	440	X	X	7	30	0·5
20	65	245	X	X	8	25	0·5
20	115	875	X	X	6	15	1·5

GEOLOGY INTERVAL

SINK HOLE

OVERBURDEN

1440E
Dolomite - Dark Grey, fresh, medium crystalline

1430E
Limestone - Light Grey, fresh fine grained minor Dolomite. Minor siderite veining.

1420E
Dolomite - Dark Grey, fresh finely crystalline Minor siderite/calcite veining

1410E
Limestone - Light Grey, fresh, minor worm burrows. Heavy siderite veining Minor quartz veining.

1400E
Limestone - Mottled Light Grey, fresh, patches of Dark Grey Dolomite. Minor siderite veining. Rare brachiopods Bedding 140/85 E

1390E
Dolomite - Dark Grey, fresh, finely crystalline

1380E
Siltstone - Dark Green, C/W,

1370E
Silty Limestone - Dark Green, C/W

1360E
py
Siltstone - Grey to Blue Grey, S/W, coarse grained. Slightly foliated. Minor Iron staining. Trace Py
Bedding 145/55 W
Foliation 135/70 W
Joint Plane 010/40 E

1350E
Siltstone - Green, C/W, well Laminated

Siltstone - Dark Grey, C/W, micaceous, poorly bedded. Coral rich horizons. Minor brecciation

Siltstone - Laminated Tan and Greeny Brown, C/W finely laminated.

Siltstone - Green, C/W, Ferruginous overburden.

Siltstone - Green, C/W, Shale horizons. Coral stems in shale. Trace Py

Breccia - Shale fragments in a coral rich matrix. C/W. Up to 1% Py.

Siltstone - Dark Green, C/W, slightly foliated

Limestone - Green to Rusty Brown, C/W, trace siderite veining

Breccia - Green Limestone fragments in a dark matrix. C/W

NO SAMPLE - Gravel filled sink holes.

Silty Limestone - Green, C/W, fine grained. Minor coral fragments

Limestone - Dark Green, C/W, massive. Highly fractured

Breccia - Fragments of finely bedded siltstone and massive Limestone, C/W, minor quartz crystals. Trace Py.

Limestone - Dark Green, C/W, massive 1% Py

Limestone - Blue/Green, C/W, poorly Layered Abundant coral fragments Minor brecciation.

Breccia - Dark Green, C/W, fragments of silicified fossil stems, Limestone and siltstone.

Breccia - as above, mainly foliated Limestone fragments

Sandstone - Dark Green, H/W, fine grained, massive

Siltstone - Green, H/W to C/W, fine grained massive.

Siltstone - Laminated Light and dark Green H/W, minor sandy horizons

Siltstone - Green, H/W to C/W, micaceous, minor shale.

Silty Limestone - Dark Grey/Black, C/W, minor breccia content.

Siltstone - Brown, C/W, minor coral fragments Possible Cer.

Cer.

W

C/W Completely weathered
H/W Highly "
S/W Slightly "
fresh non "

OCEANA

COSTEAN PROFILE

L3150N 1350 - 1450 E

Scale 1:200 vertical
1:500 horizontal

Δ Δ Δ Δ - Breccia

o o o - Gravel

528130

OCEANA COSTEAN

3150 N

060

L 3250 N

Cu	Pb	Zn	Ag	Sn	Sb	Mn	Cd	GEOLOGY	INTERVAL
5	170	220	0·5	X	X	325	0·5		
25	1700	1200	2·5	X	8	300	12·5	Limestone - Grey, fresh, slightly foliated. Very poor samples, due to 2.5-3.0 m overburden. Samples are of thin weathered layer above fresh Limestone plus fragments of fresh rock broken from trench by excavator. Minor overlying gravels	
20	0·82%	0·84%	4·0	X	8	3500	60		
25	0·81%	0·83%	7·5	X	18	80	60		
150	3·52%	0·81%	23	X	22	270	225		
5	90	300	X	X	5	230	X		1440E
10	395	1250	1·0	X	7	420	4·0		
10	370	220	0·5	X	5	505	X	Dolomite - Dark Grey, S|W, carbonaceous, slightly foliated. Minor siderite /calcite veining.	
10	130	240	1·5	X	8	500	X		
5	75	205	0·5	X	5	390	X	Dolomite - Mottled Grey, fresh, mixture of Limestone and Dolomite	
5	40	390	X	X	3	305	1·0		1430E
10	15	80	X	X	X	340	0·5	Limestone - Light Grey, fresh, massive, minor siderite veining.	
10	20	165	X	3	X	30	X	Siltstone - Grey, fresh, fine grained, minor shale and shell fossil fragments. Trace py. Bedding 130/90	py
20	60	470	0·5	3	9	25	X	Siltstone - Dark Grey, S|W, micaceous. Bedding 130/90	
20	110	665	0·5	X	8	45	1·5	Sandy Limestone - Grey, H|W, minor siltstone beds.	
20	115	245	X	X	X	50	1·0		1420E
30	120	2150	X	X	13	20	2·0	Siltstone - Laminated brown/green, H|W, finely laminated.	
20	115	700	X	X	7	15	1·5	Limestone - Laminated Grey, C|W, minor breccia content. 2% py. Minor corals	py
20	30	125	0·5	X	X	20	X	Breccia - Grey Limestone fragments in a dark matrix, C|W, 1% py	py
20	40	240	X	X	X	20	X	Limestone - Light Grey, C|W, slumped, finely laminated.	
40	255	550	1·0	X	10	20	4·5	Limestone - Black, C|W, massive, mixed with possible Karst Breccias containing up to 10% py. 10-15% Molna cobbles in Breccia.	1410E
40	485	1750	1·5	X	17	30	13·5		py
/	/	/	/	/	/	/	/	NO SAMPLE - Extreme caving of gravels.	NO SAMPLE
35	325	1700	1·5	X	22	20	8·0	Breccia (KARST BRECCIA) - Black, C|W, matrix, with 25% Molna sandstone cobbles/pebbles, and moderate siltstone and Limestone breccia fragments	
25	335	1700	2·0	X	15	20	6·5		1400E
40	850	3300	2·5	X	19	15	15·0	Limestone - Brown, C|W, massive	
40	1400	4050	3·0	X	22	15	17·5		
40	465	1900	2·5	X	12	20	10·0	Breccia (KARST BRECCIA) - Brown, C|W matrix, abundant Molna boulders, minor angular fragments	
40	490	800	3·0	X	10	10	45	Limestone - Dark Grey, C|W, massive, poor sample, heavy sand influx	
/	/	/	/	/	/	/	/	NO SAMPLE - 2m left to stop influx of water	1390E
25	1650	1·11%	3·0	X	21	25	45	Limestone - Black, C|W, minor Molna pebbles Karst filling ?! Trace py, GN	py, GN
25	1600	1·16%	3·0	X	20	30	45		
55	2500	0·97%	3·5	10	145	70	37·5	Breccia - Light grey Limestone, minor Molna pebbles in a dark matrix, possible Karst filling ?? Trace Cer 5-10% py. C|W	py, Cer
30	145	750	5·5	X	17	220	1·0		
10	45	355	3·0	X	3	105	X	Limestone - Light Grey, S|W, moderate siderite /calcite veins. Ferruginous in sections	1380E
25	170	1000	1·0	X	24	25	2·0		
40	315	920	2·5	X	32	35	2·5	Limestone - Blue/Grey, C|W, massive, minor Molna sandstone pebbles	
40	715	810	1·5	X	25	20	3·5	Limestone - Blue/Grey, C|W, finely laminated. Minor coral fragments. Up to 5% py	
25	390	1500	2·0	3	17	10	7·5		py
30	150	320	1·5	X	14	10	2·5	Breccia - Fragments of laminated tan/green siltstone and green siltstone in a Leght green matrix.	
25	70	110	0·5	X	8	15	X		1370E
30	150	485	1·5	X	8	15	1·5	Siltstone - Dark Green, C|W, Highly fractured slightly sheared.	
25	110	190	1·0	X	5	15	X	Siltstone - Finely laminated tan and green/brown, C|W. Minor py	py
20	130	175	1·5	X	6	15	1·0		
20	90	290	1·0	X	5	15	0·5	Siltstone - Dark Green C|W, massive. Minor thin brecciated sandstone horizons. Up to 2% py in breccia horizons. Bedding 155/60W Breccia/siltstone contact 125/65S	py
40	65	85	1·0	X	8	25	X		1360E
65	305	55	X	X	11	30	X	Sandstone - Light Green H|W fine grained moderate fossil fragments. Slight vuggy weathering.	
15	25	20	0·5	X	6	20	X	Siltstone - Blue-green, H|W, poorly foliated micaceous. Minor brachiopods Foliation 110/55S. Joint planes 045/85W 120/35S	
20	250	530	X	X	9	35	2·5		
20	165	365	X	X	7	25	1·5	Silty Limestone - Dark Green, poorly bedded Minor coral fossils	1350E

528131

OCEANA COSTEAN

3250 N

C\|W - Completely Weathered
H\|W - Highly "
S\|W - Slightly "
fresh - Non "

- Foliation
- Bedding

OCEANA
COSTEAN PROFILE
L 3250N 1350-1450E
Scale 1:200 vertical
1:500 horizontal

- Breccia
- Gravel

APPENDIX 3

METALLURGY - CORE SAMPLES FLOTATION TESTS by EZ Industries

CORE SAMPLES\STANDARD ROSEBERY FLOTATION TEST

PRODUCT	WT%	CUM WT%	ASSAY PB	ASSAY ZN	ASSAY FE	ASSAY CU	RECOVERY PB	RECOVERY ZN	RECOVERY FE	RECOVERY CU	CUMULATIVE ASSAY PB	CUMULATIVE ASSAY ZN	CUMULATIVE ASSAY FE	CUMULATIVE ASSAY CU	CUMULATIVE RECOVERY PB	CUMULATIVE RECOVERY ZN	CUMULATIVE RECOVERY FE	CUMULATIVE RECOVERY CU
CU CONC	1.37	1.37	45.50	25.50	1.70	0.23	2.45	0.85	1.24	3.96	45.50	25.50	1.70	0.23	2.45	0.85	1.24	3.96
PB CONC	25.44	26.81	67.70	12.20	0.50	0.07	67.70	7.55	6.76	22.40	67.70	12.20	0.50	0.07	70.15	8.40	8.00	26.36
ZINC CONC	24.84	51.65	11.10	52.30	2.10	0.08	10.84	31.61	27.73	24.99	11.10	52.30	2.10	0.08	80.99	40.01	35.73	51.35
FINAL TAIL	48.35	100.00	10.00	51.00	2.50	0.08	19.01	59.99	64.27	48.65	10.37	51.44	2.36	0.08	100.00	100.00	100.00	100.00
HEAD ASSAY			25.44	41.10	1.88	0.08												
core assay			21.60	39.80			191 Ag											
CU CONC	1.20	1.20	11.00	4.70	22.40	0.08	7.48	2.45	0.91	4.11	11.00	4.70	22.40	0.08	7.48	2.45	0.91	4.11
PB CONC	2.31	3.51	24.20	21.50	12.10	0.03	31.57	21.52	0.94	2.95	24.20	21.50	12.10	0.03	39.05	23.98	1.86	7.06
ZINC CONC	2.78	6.29	5.10	26.00	16.70	0.11	8.01	31.33	1.57	13.03	5.10	26.00	16.70	0.11	47.06	55.31	3.42	20.09
FINAL TAIL	93.71	100.00	1.00	1.10	30.50	0.02	52.94	44.69	96.58	79.91	1.12	1.82	30.10	0.02	100.00	100.00	100.00	100.00
HEAD ASSAY			1.77	2.31	29.59	0.02												
core assay			1.70	1.80			4.7gt											
CU CONC	1.20	1.20	53.30	2.10	8.50	0.25	7.02	5.03	0.36	11.00	53.30	2.10	8.50	0.25	7.02	5.03	0.36	11.00
PB CONC	7.63	8.83	70.00	1.60	5.00	0.03	58.84	24.45	1.37	8.43	70.00	1.60	5.00	0.03	65.85	29.48	1.73	19.43
ZINC CONC	5.22	14.05	38.00	5.10	15.60	0.09	21.84	53.31	2.91	17.29	38.00	5.10	15.60	0.09	87.70	82.79	4.64	36.72
FINAL TAIL	85.95	100.00	1.30	0.10	31.00	0.02	12.31	17.21	95.36	63.28	3.40	0.39	30.12	0.02	100.00	100.00	100.00	100.00
HEAD ASSAY			9.08	0.50	27.94	0.03												
core assay			12.90	0.50			72gt											

CORE 21335 ZT 79-2 111-112m OX/QUE/LEO LINEAR SURFACE

CORE 21349 ZT 79-2 125m-126m

CORE 21609 HOLE ZT 84 304-305m

READY

ROSEBERY(77%)-QUE RIVER(23%)/STANDARD ROSEBERY FLOT TEST

PRODUCT	WT%	CUM WT%	ASSAY PB	ASSAY ZN	ASSAY FE	ASSAY CU	RECOVERY PB	RECOVERY ZN	RECOVERY FE	RECOVERY CU	CUMULATIVE ASSAY PB	CUMULATIVE ASSAY ZN	CUMULATIVE ASSAY FE	CUMULATIVE ASSAY CU	CUMULATIVE RECOVERY PB	CUMULATIVE RECOVERY ZN	CUMULATIVE RECOVERY FE	CUMULATIVE RECOVERY CU
CU CONC	6.91	6.91	18.10	24.57	13.57	7.17	32.18	17.47	6.62	61.19	18.10	24.57	13.57	7.17	32.18	17.47	6.62	61.19
PB CONC	7.77	14.68	19.27	21.83	17.60	1.50	38.52	17.45	9.66	14.40	19.27	21.83	17.60	1.50	70.70	34.92	16.28	75.59
ZINC CONC	29.56	44.24	2.72	19.46	25.96	0.48	20.69	59.18	54.19	17.52	2.72	19.46	25.96	0.48	91.39	94.09	70.47	93.11
FINAL TAIL	55.76	100.00	0.60	1.03	7.50	0.10	8.61	5.91	29.53	6.89	1.33	7.42	13.90	0.23	100.00	100.00	100.00	100.00
HEAD ASSAY			3.89	9.72	14.16	0.81												

READY

CORE SAMPLES - GOLD AND SILVER DISTRIBUTION

	ASSAY			DISTRIBUTION	
	Wt	Ag	Au	Ag	Au
No. 21335					
Copper Conc	1.37	985	0.7	6.74	8.87
Lead Conc	25.44	451	0.1	57.31	23.48
Zinc Conc	24.84	99	0.1	12.28	22.92
Tail	48.35	98	0.1	23.67	44.73
Head	100.00	200.20	0.11	100.00	100.00
No. 21349					
Copper Conc	1.20	99	0.7	21.16	7.51
Lead Conc	2.31	115	0.3	47.31	6.17
Zinc Conc	2.78	30	0.1	14.85	2.50
Tail	93.78	<1*	<0.1	16.68	83.82
Head		5.61	0.11	100.00	100.00
No. 21609					
Copper Conc	1.20	838	0.8	17.31	8.86
Lead Conc	7.63	396	<0.1	52.02	7.00
Zinc Conc	5.22	226	0.1	20.31	4.80
Tail	85.95	7	<0.1	10.36	79.34
Head		58.08	0.11	100.00	100.00

* Assume <1 = 1 to calculate distribution

All assays in g/t

APPENDIX 4

PETROGRAPHY REPORT by Central Mineralogical Services

Central Mineralogical Services

39 Beulah Road
Norwood, S.A. 5067
Telephone 42 5659

Mr. G. Kary
Geologist
Amoco Minerals Aust. Co.
61, Counsel Street
ZEEHAN / TAS. 7469

22nd March, 1983

REPORT CMS 83/3/5

YOUR REFERENCE:	Order No. E 9362
DATE RECEIVED:	3rd March, 1983
SAMPLE NOS.:	12 Samples
SUBMITTED BY:	G. Kary
WORK REQUESTED:	Petrology

H.W. Fander, M. Sc.

528137

REPORT CMS 83/3/5

Zeehan Drill Core Samples

Twelve core samples were received for petrological examination; thin-sections were prepared, and offcuts were subjected to carbonate stain tests, where appropriate. Each rock is briefly described in the accompanying tables.

Summary

The first nine rocks are igneous, mostly of basic or ultramafic composition, but with one altered ?granitoid (113.6 m). The rocks are all thoroughly altered and many are sheared; thus, their interpretation is dependant on any primary textures which may have survived, and on the nature of the alteration minerals. The presence of chromite in some rocks is a good indication of an ultramafic derivation, even though samples like 138.6 m and 160.0 m contain no other evidence of such an origin. The alteration patterns are variable, producing rocks which are apparently of different origin; this is confusing in hand specimens and can lead to misinterpretations.

These intersections seem to be from a severely altered mafic-ultramafic complex, perhaps a Cambrian sequence similar to that at Serpentine Hill and others in the Zeehan-Dundas-Renison Bell district.

The other three intersections at the bottom of the hole are from a black shale-siltstone-fine sandstone sequence; the finer-grained rocks are deformed and brecciated, and the tectonism may be related to the emplacement of the overlying igneous rocks. Correlation of these sediments is difficult because such lithologies are fairly common in the area.

H.W. Fander, M. Sc.

CENTRAL MINERALOGICAL SERVICES

Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
31.0 (T.S. 45466)	Chloritised ?Basalt Breccia. Irregular fragments of completely altered ?basalt (quartz, sericite, chlorite) set in massive chlorite (clinochlore).	Poorly preserved ?basaltic/doleritic fabric. Breccia structure.	Fine oxide opaques. Quartz-carbonate veins. Fine pyrite.	Far too severely altered to be interpreted with certainty; may have been extrusive, but aggromerate unlikely.
39.3	Altered ?Dolerite. Stubby ?plagioclase crystals pseudomorphed by quartz, sericite, carbonate; completely chloritised ferromagnesian minerals.	Typical doleritic fabric well-preserved; medium-grained, brecciated.	Coarse carbonate masses and veins. Smal magnetite crystals.	Despite a series of severe alterations rock can be interpreted with reasonable confidence as dolerite (diabase).
56.2	Sheared, Altered ?Dolerite. Wedges and large masses of completely altered dolerite; bands/veins of very coarse ankerite, wedges of vein-quartz.	Relict doleritic textures preserved; rock severely brecciated and veined.	Scattered small magnetite crystals.	Multiple alteration and retrogression from original rock precludes detailed interpretation.
88.7	Altered Dolerite. Ferromagnesian minerals pseudomorphed by pale chlorite, interstitial feldspars represented by quartz, carbonate, sericite.	Medium-grained, typical doleritic fabric. Homogeneous.	Scattered magnetite. Chlorite and talc veins. Siderite patches.	Fabric suggests an intrusive rock; no evidence of flow. Totally altered, but textures fairly diagnostic.
106.8	Altered ?Basalt. Completely chloritised, sericitised and silicified rock with well-preserved pseudomorphs after ferromagnesians and feldspar.	Variable fabric, possibly a lava breccia; extensively fractured.	Many siderite veins. Extensive talc development in places.	May have been an extrusive rock, possibly flow-brecciated. Steatitisation is a younger phase.
113.6	Altered ?Granitoid. Medium- to coarse-grained patches of stressed quartz intergrown with feldspars altered to sericite, chlorite, carbonate.	Mostly even-grained, igneous fabric; parts are very coarsely-crystalline.	Chlorite-carbonate patches and veins. Coarse pseudomorphs after ?feldspars.	Quartz in this rock appears to be primary; thus, composition was felsic. Coarse crystals may be a pegmatitic phase.
127.3	Talc-Magnesite Schist. Fine matted-parallel talc flakes, and numerous small magnesite crystals and streaks, lenses.	No relict textures recognisable; schistose fabric.	Well-defined chromite euhedra throughout. Quartz veins.	Chromite crystals strongly indicate ultramafic derivation of rock; possibly a steatitised, sheared serpentinite.
138.6	Quartz-Ankerite Rock. Irregular masses of featureless chalcedonic quartz, and patches, veins of finely to coarsely crystalline ankerite.	Structureless; abundant fracturing, veining, some shearing.	Fragments and euhedral crystals of chromite.	Presence of chromite indicates ultimate origin was ultramafic, but other features of such rocks are absent.

CENTRAL MINERALOGICAL SERVICES

Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
160.0	Magnesite Rock. Granular and fibrous magnesite, crudely banded, with parallel wisps of Mg-chlorite/antigorite throughout.	No relict textures. Semi-schistose; some shearing.	Conspicuous chromite fragments. Sulphides - colourless sphalerite, ?millerite.	Clearly related to ultramafic rocks; probably sheared serpentinite largely replaced by magnesite.
177.1	Brecciated Shale. Folded, brecciated masses of shale composed of recrystallized clays, pyrite, carbonaceous matter; heavily carbonate-veined.	Laminated and massive, very fine-grained. Plastic deformation.	A few larger pyrite crystals. Silty, quartzose lenses, cherty fragments.	Fairly typical black shale unit, extensively carbonated - perhaps during diagenesis; younger deformation.
204.7	Micaceous, Carbonaceous Sandstone. Framework of small subangular quartz grains, muscovite flakes. Interstitial fine carbon; carbonate cement.	Well-sized, uniform, weakly bedded. Average grainsize = 0.1 mm.	Detrital dravite tourmaline. Carbonaceous, pyritic veinlets.	Small sericite aggregates may represent altered feldspar grains. Rock is featureless, homogeneous. Well-indurated.
219.1 (T.S. 45477)	Laminated Siltstone. Broader bands of quartzose siltstone separated by thinner laminae of recrystallized clays and carbon. Fine carbonate throughout.	Folded, brecciated in places, with plastic deformation of shaly laminae.	Fragmented quartz veins with pyrite.	Intercalations of black shale and siltstone. Quartz veining preceded deformation.

APPENDIX 5

PETROGRAPHY REPORT by G. Green, Department of Mines, Tasmania

071

528141

C/- Department of Mines,
P.O. Box 56,
ROSNY PARK.
Tasmania. 7018

17 November, 1982

Mr P.A. Jones,
Amoco Minerals Aust. Co.,
ZEEHAN.
Tasmania. 7469

Dear Mr Jones,

Petrographic descriptions of the following slides from drill hole ZT-80-4 follow.

The samples described are:

1.	247	metres	Host rock
2.	252.7	"	Autobrecciated texture
3.	253.7	"	Sphalerite-galena
4.	251.65	"	Sphalerite-siderite-galena
5.	270	"	Calcite-veined host rocks
6.	280-285	"	Siderite-veined host rocks
7.	306.3	"	Sphalerite-carbonate

Yours sincerely,

Geoff

(Geoffrey R. Green)
GEOLOGIST

Section 4 provides the best evidence of the genesis of the deposit and will be discussed first. It contains only minor disseminated base metal sulphides.

The original carbonate is medium to dark grey in colour and consists of two varieties:

(a) Relatively coarse-grained hypidiotopic dolosparite with dolomite rhombs 0.2 to 0.3 mm across in a sparse argillaceous matrix (10%);

(b) Argillaceous dolosparite with sparser and finer (0.04 to 0.1 mm dolomite rhombs in an argillaceous matrix consisting of sericite, chlorite, fine grained quartz and carbonaceous opaques.

Intermediates between these endmembers exist. Rare detrital quartz is present.

These dolomite fragments display a well developed tectonic cleavage defined by alignment of phyllosilicates and stylolites. The cleavage shows variable orientation between fragments.

The dolomite fragments are set in a matrix of coarsely crystalline pleochroic (brownish-grey to colourless) carbonate probably siderite. Contacts between dolomite and siderite are sometimes marked by an increase in the frequency of stylolites in the dolomite and the irregular nature of contacts suggests replacement of dolomite as well as fracture filling were involved in siderite emplacement. Away from contacts with the fragments there is an increase in grain-size of siderite crystals and a change in habit from blocky (irregular interlocking grains) to coarse drusy crystals up to 2 mm long. The siderite contains numerous unreplaced inclusions (fragments) of dolomite and one fragment of black slate.

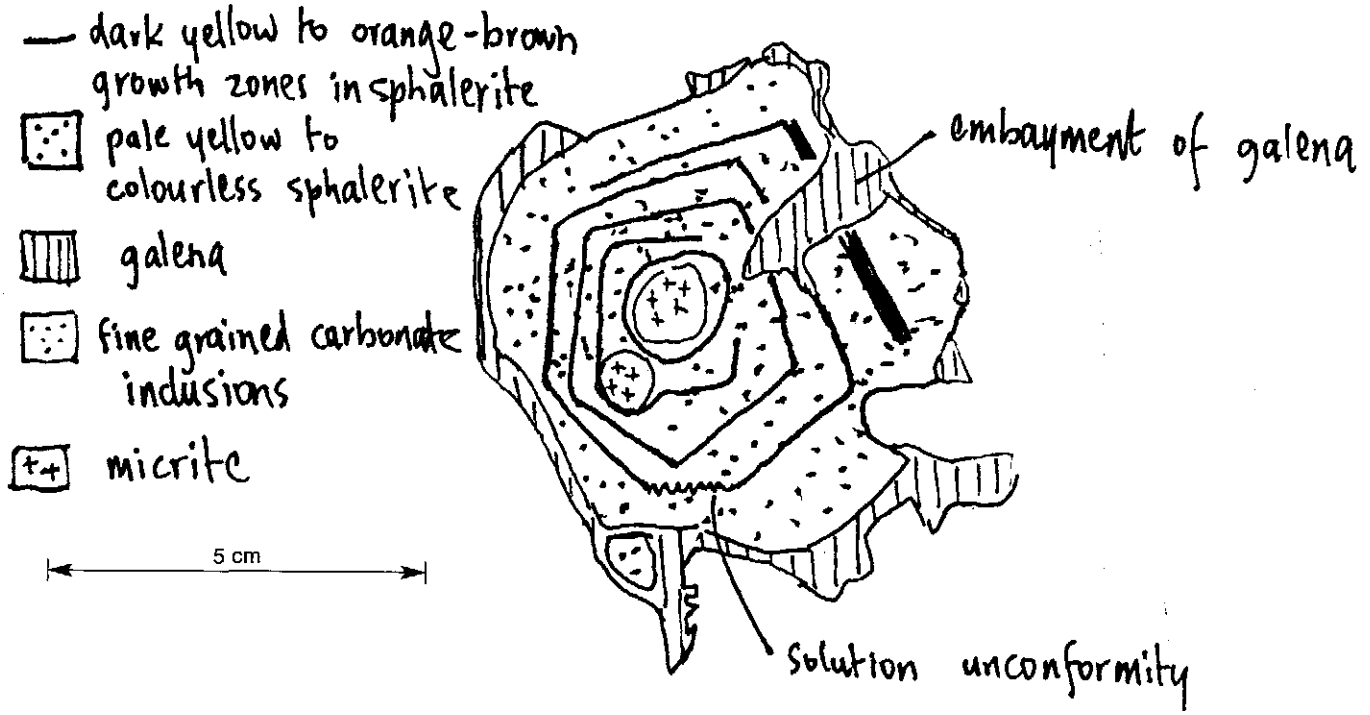
Two vughs are rimmed by euhedral crystal terminations of siderite. One cavity is filled with calcite (lower relief than surrounding carbonate, no pleochroism), the other is filled partly with a clastic geopetal filling of dolomite rhombs, coarser siderite crystal fragments and pyrite grains. The remainder of the vugh is filled with chlorite (Mg-rich? - pale green to colourless pleochroism, anomalous Berlin blue birefringence) which surrounds (partly replaces?) a single calcite grain similar to that filling the other vugh. Thin chlorite veins cut the siderite and possibly represent feeders for the vugh chlorite.

The crystal terminates of 'siderite' lining the vugh are noticeably paler in colour than the bulk of the 'siderite' (lower Fe content?) but they are still pleochroic and have higher relief than the calcite.

Mineralization

Sulphides (dominantly sphalerite and galena) constitute 5% of the rock and occur as blebs 0.5 to 3 mm in diameter both in the dolomite and siderite.

Sphalerite displays well developed compositional zoning shown in one grain sketched below. The grain about 1 mm in diameter and is predominantly pale yellow in transmitted light with darker yellow to brownish orange growth zones and an outer rim of very pale colour. Sphalerite growth commenced, apparently by replacement, around dusty fine-grained micrite inclusions. The sphalerite crystal is strongly corroded and is surrounded by a thin film of galena. The embayment shown in the sketch is good evidence that sphalerite deposition preceded that of galena and was seen in all mineralized specimens examined.



← 1.1 mm →

Sphalerite grain is surrounded by coarse sparry siderite.

Mineralization also is present in the veins along siderite/dolomite contacts. The earliest mineral is pyrite present as euhedra and framboids. This is occasionally overgrown and partly replaced by galena or sphalerite.

Thin veinlets of carbonate-galena, galena, or carbonate-chlorite-galena are present filling very fine, parallel fractures in siderite. Rare, minute grains of tetrahedrite occur in galena containing strongly corroded relics of sphalerite and one grain of chalcopyrite was noted near a siderite-sphalerite-galena triple point.

This section provided more information on paragenesis than any other. The general sequence of events is:

(1) Deposition of original calcium carbonate sediment.

(2) Dolomitization (not seen in this section).

(3) Main Tabberaberan deformation (formation of cleavage in dolomite).

(4) Fracture opening and dissolution of dolomite.

(5) Cementation by siderite (disoriented cleaved clasts of dolomite).

(6) Further dissolution of dolomite and siderite.

(7) Precipitation of zoned sphalerite.

(8) Dissolution of sphalerite and carbonate.

(9) Precipitation of galena, calcite and chlorite (chalcopyrite, tetrahedrite).

(10) Further movement on fractures - mild deformation of galena.

Pyrite appears to have been deposited at various stages. The framboidal pyrite may be biogenic. Concentration of pyrite (both euhedral and framboidal) at dolomite/siderite boundaries may in part reflect passive enrichment of biogenic pyrite during dissolution of dolomite but there is no doubt that dolomite/siderite contacts were permeable to later hydrothermal solutions as evinced by replacement of pyrite by sphalerite and galena.

The paragenetic sequence observed in the specimens is identical to that noted by Both and Williams from the rest of the vein deposits in the Zeehan field, by Green (1973) at the Spray Mine and by Green (in preparation) from the Queensberry Mine.

The one significant difference in the samples from ZT80-4 is the clear evidence that carbonate replacement as well as fissure filling is significant in this mineralization. This is in accord with the geological observations of Jack in the underground workings of the Oceana Mine. This raises the possibility of larger fault-controlled replacement-style orebodies rather than confined fissure veins occurring in the Gordon Limestone, although it should be noted that the Oceana mineralization was predominantly in the form of two parallel fissure lodes (Jack, 1961).

Further it should be noted that the 'slump' breccias described in core are probably hydrothermal breccias cemented after Middle-Devonian cleavage formation.

1. Host rocks

Bulk of slide consists of interlocking euhedral to subhedral dolomite rhombs 0.03 to 0.08 mm across. One angular grain of quartz of similar size was seen. A few patches of micrite containing irregular coarser grains of carbonate and shell fragments occur. Some stylolitic veins and clear calcite veins are present. Traces of galena are associated with these and minor galena also occurs in vughs, rimmed by clear calcite. Fine grained pyrite and traces of chalcopyrite occur in the stylolitic vein.

(3) The section consists of about 45% sphalerite, 35% carbonate (mostly manganoan siderite-XRD) and 20% galena.

Several generations of sphalerite are apparent. The first involves growth of yellow to orange-brown granular sphalerite similar to that seen in sample 4 and interpreted to be of replacement origin. These are overgrown by more continuous bands of banded orange sphalerite and finally by pale spahlerite which lines calcite-quartz-filled vughs. The diameter of individual banded zones reach 5 mm. This is interpreted as initial sphalerite formation by replacement around small nucleii followed by further carbonate replacement leading to open cavity filling.

Galena is later and dark dusty opaque zones occur in sphalerite which probably are due to minute inclusions of galena. Pyrite inclusions occur in sphalerite and galena rarely, some appear to be partly re-crystallized framboidal grains. Tetrahedrite is rare and occurs as minute grains in galena, mostly near sphalerite-galena contacts. A few chalcopyrite inclusions are present in sphalerite.

(5) This section shows similar textures to specimen (4). Both generations of carbonate are present (dolomite and siderite) but siderite predominates. Galena fills fractures in the siderite. Abundant fine-grained pyrite (1%) occurs throughout the rock and as inclusions in galena.

(7) This section consists of galena and sphalerite in plumose siderite. No dolomite is present. Sphalerite occurs as strongly corroded relicts in sphalerite. Truncation of sphalerite colour banding by galena confirms the replacement relationship. Prominent very thin veins of chlorite and galena fill fractures. In addition, calcite veinlets are present. Pyrite grains are very rare.

(2) 'Autobrecciated texture'

Oldest part of rock - (dark grey) consists of biosparmicrite - (biogenic fragments of sparite) whose chambers are filled with and the walls partly replaced by micrite. Detrital carbonate, quartz and carbonate grains are a minor component of the rock. The rock is cut by several sets of veins about 1 mm wide of strained, polysynthetically twinned, carbonate. These veins are considered to be pre- or syn-deformational in age. In places stylolites can be traced across them. No sulphide mineralization is associated with this veining episode. Adjacent to these veins, in localised patches, euhedral to subhedral carbonate crystals about 0.1 mm in diameter replace the biosparmicrite. This is the cream coloured 'matrix' of the autobrecciated texture. A later post-deformation vein of unstrained calcite cuts all the above lithotypes.

Conclusion: 'Autobrecciated texture' is a result of neomorphic spar replacement of micrite adjacent to carbonate veins formed during deformation.

Polished section

A few very fine grains of pyrite and rutile are scattered through the rock. Two fine grains of galena were seen in a stylolite.

XRD indicates that the dark grey biosparmicrite is dolomite and the twinned carbonate is siderite.

(6) 'Calcite-veined host rocks'

Poorly washed biosparite (Blatt *et al.*, 1972 fig. 13.9) or Biosparmicrite.

Fossil fragments have micrite walls with vessels filled by sparite. These include algal and bryozoan fragments. Clasts of sparite and

calcarenite consisting of dolomite rhombs and quartz grains in a fine grained carbonate matrix are also present. Clasts are up to 7 mm in diameter. Matrix is pale brown carbonaceous micrite. Fine predeformational (polysynthetically twinned dolomite, cut by stylolites) and post deformational (clear calcite) grains are present.

Polished Section

No base metal sulphides present. Pyrite in framboidal aggregates of fine crystals occurs in bodies up to 1 mm in diameter. A little rutile occurs in the margins of one of these. Fine grains of pyrite and rutile are scattered through the rock and are somewhat concentrated in stylolites.

528148

APPENDIX 6

NOTE ON THE NUBEENA MAGNETIC ANOMALY by J. Bishop, Mitre Geophysics

A NOTE ON THE NUBEENA MAGNETIC ANOMALY

SUMMARY

Interpretation of the 'Nubeena magnetic anomaly', suggests that DDH ZT-82-N1 has not intersected all of the causative bodies. However it seems likely that those sources not intersected are similar to those which were; namely magnetite bearing units within a sequence of tuffs and agglomerates (or possibly altered intrusives). Thus the interpretation does not indicate the presence of any potentially economic source, such as (tin bearing) pyrrhotite.

DISCUSSION

The ground magnetic survey on the Nubeena grid has confirmed the anomaly located by the Mines Dept aeromagnetic survey and defined a rectangular shaped anomaly approximately 275m x 150m, with a maximum amplitude of nearly 3000 gammas. Two profiles are shown in Figure 1. The modelling has used line 2000N, since the effect of the near surface response is much reduced on this line.

The initial interpretation (by S. Collins) indicated a wide magnetic zone of upto 100m width (or possibly two narrower zones) dipping at 70 degrees to the east. The top of the body was estimated at 50m, with some material extending to within 20m of the surface.

Following this interpretation, diamond drill hole ZT-82-N1 was collared in the Crimson Creek Formation at 2090N/1717E with a declination of 255 degrees (to grid north) and an inclination of 54 degrees. Length of hole was 229m. The hole intersected approximately 125m of tuffs and agglomerates (or possibly altered and brecciated intrusives); core angles to siderite veining and possible 'bedding' suggest a near vertical dip. From 125m to 160m the hole intersected a competent 'schist' (?altered serpentinite). From 160m to 185m, the hole intersected tuffaceous sediments; again the core angles indicate a near vertical dip. Below 185m, are black siltstones and shales of the Oonah Quartzite.

A log of the magnetic susceptibilities shows that there are a number of shallow magnetic units within the tuffs and agglomerates, rather than a single body at depth (Figure 2). The log suggests that three equivalent bodies may be used for an interpretation. Assuming a vertical dip, the bodies have the following values:

Body (1), intersected between 8m and 55m. True thickness 27m susceptibility 0.75×10^{-3} cgs units.

Body (2), intersected between 65m and 84m. True thickness 10m; susceptibility 1.73×10^{-3} cgs units.

Body (3), intersected between 105m and 110m. True thickness 3m; susceptibility 0.6×10^{-3} cgs units.

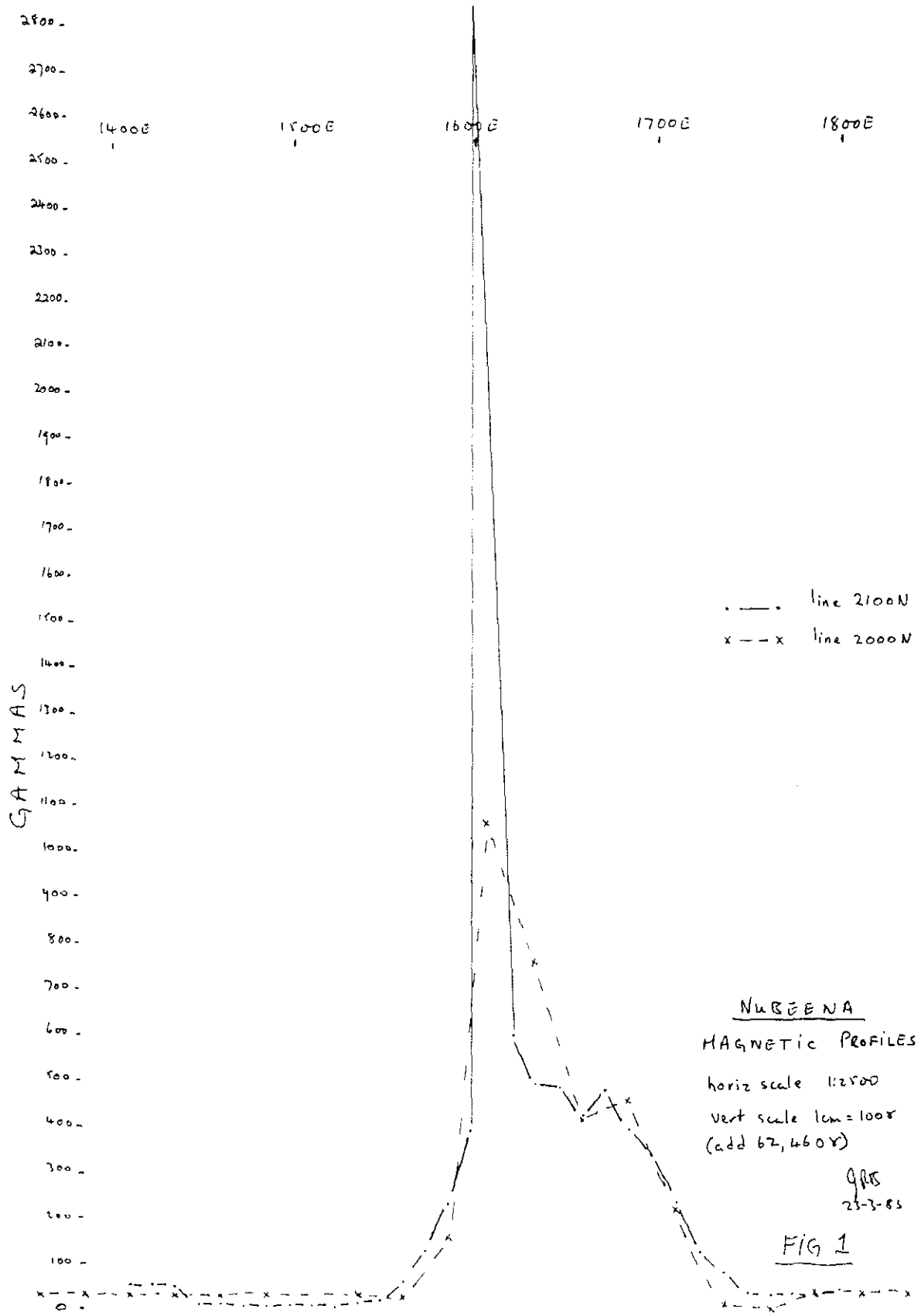
With vertical dip, these three bodies cannot account for the observed response. If a 60 degree dip to the east is assumed and the susceptibilities of the bodies are altered, then a better match is obtained (Figure 3). This may be improved by the addition of intermediately placed bodies. Figure 4 shows a reasonable fit to the observed data, assuming a vertical dip and with the addition of two further bodies to the west.

Thus, if the dip is near 60 degres to the east, then it is likely that the drill hole has intersected the bulk of the causative bodies. However, if the dip is much steeper than this (as is suggested in the core), then further magnetic units are required to explain the anomaly. But since (weathered) rock similar to that intersected by the core has been found above the main anomaly (near 1625E), it seems likely that such units would also be part of the tuff/agglomerate sequence.

Although interpretation of the magnetics suggests that DDH ZT-82-N1 has not intersected all of the magnetic sources contributing to the 'Nubeena magnetic anomaly', it seems likely that the hole has adequately tested the anomaly.

John Bishop

J.R. Bishop.
31-3-83.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500
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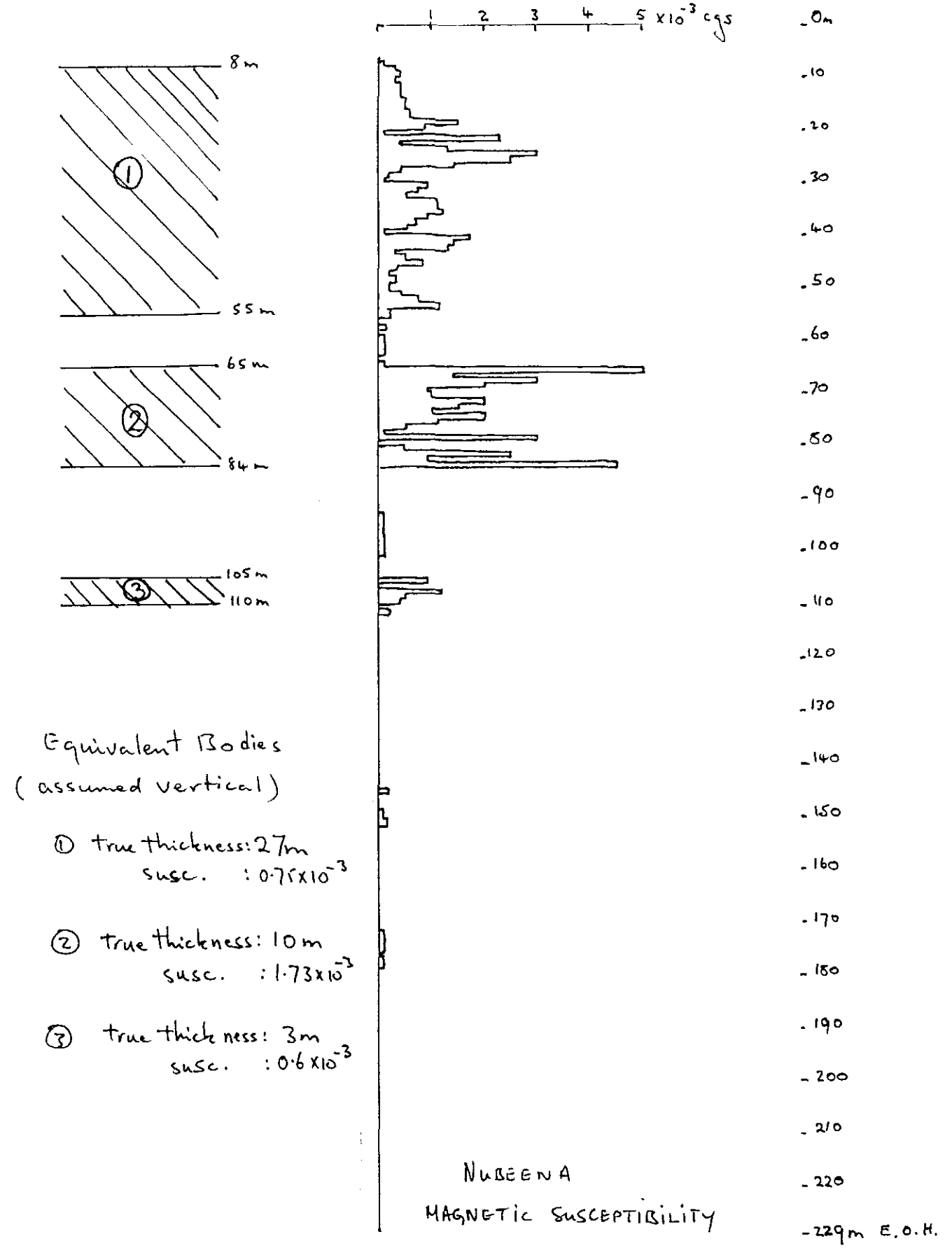
200
100
0
GAMMAS
1400E
1500E
1600E
1700E
1800E
line 2100N
line 2000N
NUBEENA
MAGNETIC PROFILES
horiz scale 1:2500
vert scale 1cm = 100γ
(add 62,460γ)
QRS
23-3-85

FIG 1

082

528152



Equivalent Bodies
(assumed vertical)

① true thickness: 27m
susc. : 0.75×10^{-3}

② true thickness: 10m
susc. : 1.73×10^{-3}

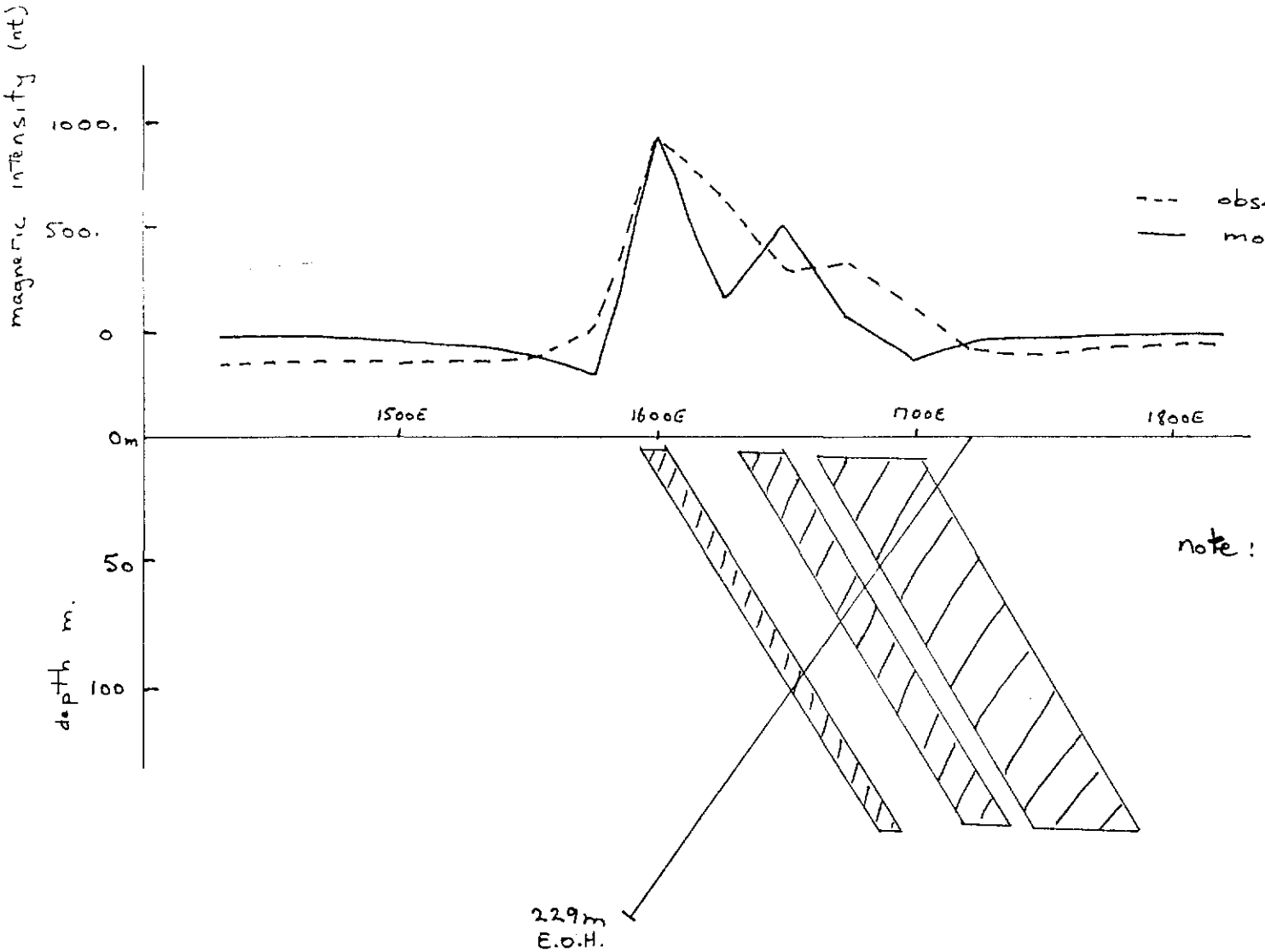
③ true thickness: 3m
susc. : 0.6×10^{-3}

5 cm

NUBEENA
MAGNETIC SUSCEPTIBILITY
DDH : ZT-82-N1

vert. scale 1:1000

JRB
23-3-83



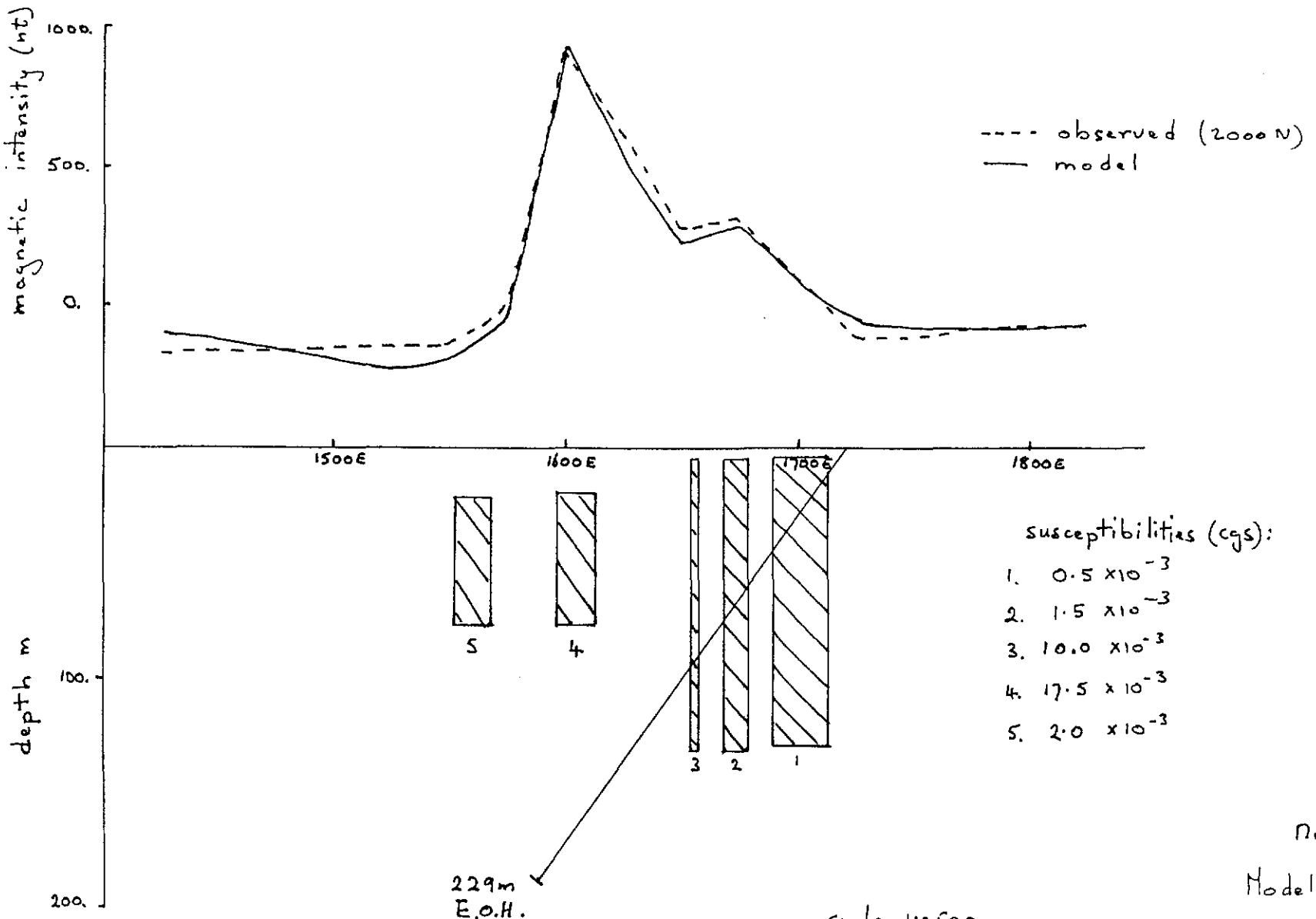
note: this 'fit' may be improved by introducing intermediate bodies &/or changing the widths of existing bodies.

scale 1:2500

Nubeena Magnetics
Modelling: 2000N
Fig 3

26-3-85

CO 22614



5281741

Nubeena Magnetics

Modelling : 2000N

Fig 4

JAS
26-3-83

528155

APPENDIX 7

NUBEENA MAGNETIC ANOMALY - MEMO by S. Collins, Amoco

528156

Amoco Minerals Australia Company — **Inter-Office Correspondence**

Date: May 12, 1983

To: P.A. Jones — Location: Zeehan
cc B.G. Roxburgh

From: S. Collins — Location:

Subject: **NUBEENA MAGNETIC ANOMALY**

Following discussions with John Bishop of Mitre Geophysics, I feel that the magnetic anomaly at Nubeena has not been adequately tested by drillhole ZT-82-N1.

Modelling work undertaken by John Bishop produces a close fit to the observed magnetics when a body or bodies which are not intersected in the drillhole are assumed to lie at about more than 20 meters depth below 1600E. The magnetic body would need to have a susceptibility of about 20×10^{-3} cgs to produce the observed anomaly. This is 10 times more magnetic than material intersected by the existing hole.

The magnetic modelling also suggests a possible dip to the west (or multiple bodies). A westerly dip on a magnetic body of 85° would be sufficient to cause the drillhole to miss any down dip extensions of this body. In view of geological evidence a westerly dip seems unlikely. However, the proximity of this anomaly to major magnetic mineral deposits warrants the further drill testing of this anomaly to fully explain the magnetic response.

I recommend a drillhole drilled from an existing drill pad at 1520E on 2050N. The hole to be drilled at 45° to the east would need to be 170 meters in length to fully test this zone.

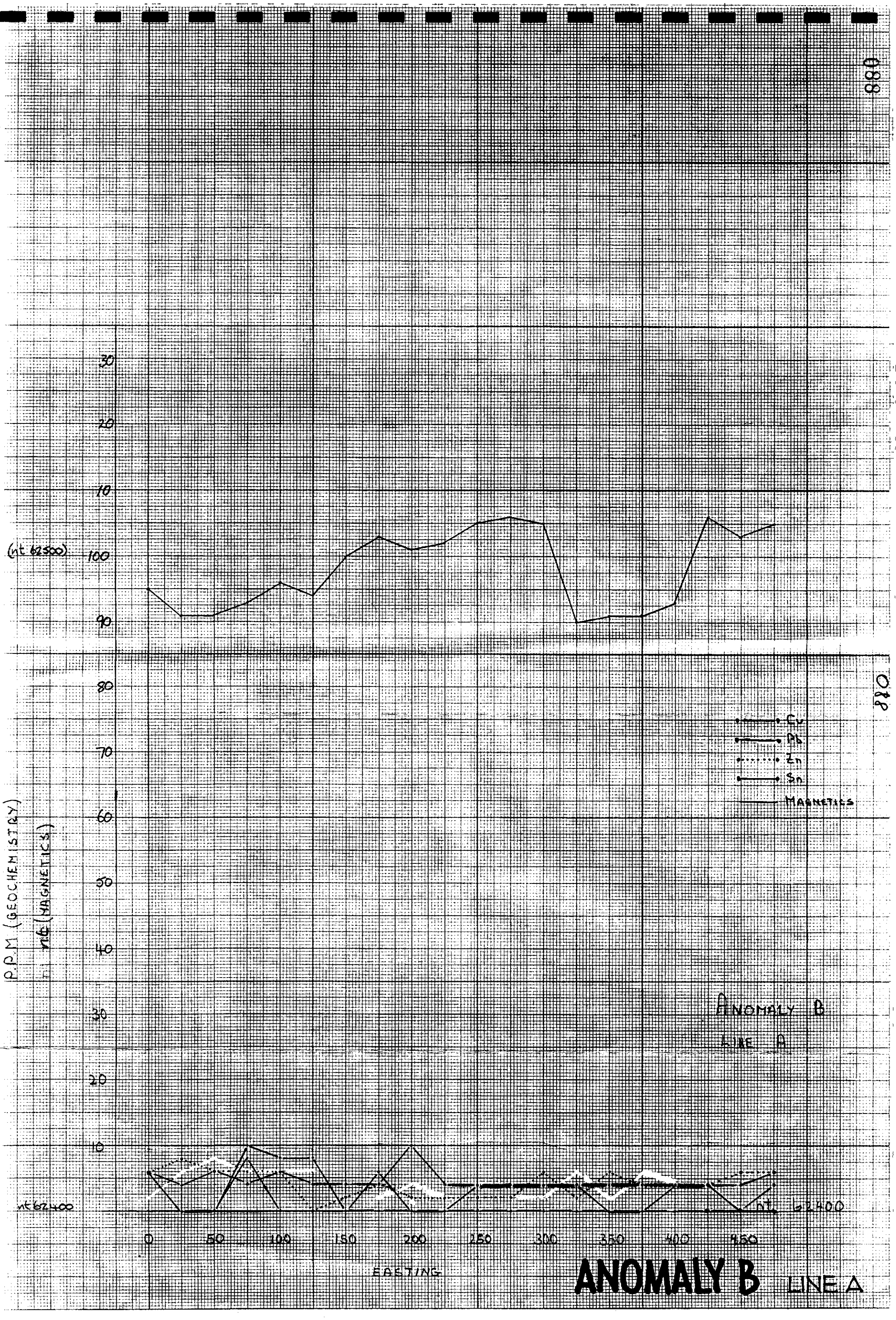
S. COLLINS

528157

087

APPENDIX 8

FOLLOW-UP OF AEROMAGNETIC ANOMALIES B, D AND H - GROUND MAGNETICS AND SOIL GEOCHEMISTRY PROFILES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(nt 62500)
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nt 62400
P.P.M (GEOCHEMISTRY)
nT (MAGNETICS)
Cu
Pb
Zn
Sn
MAGNETICS
080
0
50
100
150
200
250
300
350
400
450
nt 62400
EASTING
ANOMALY B
LINE A
ANOMALY B
LINE A

528158

680

20

10

(2500) 100

90

80

70

60

nt (MAGNETICS)

50

40

30

20

10

ANOMALY B

LINE B

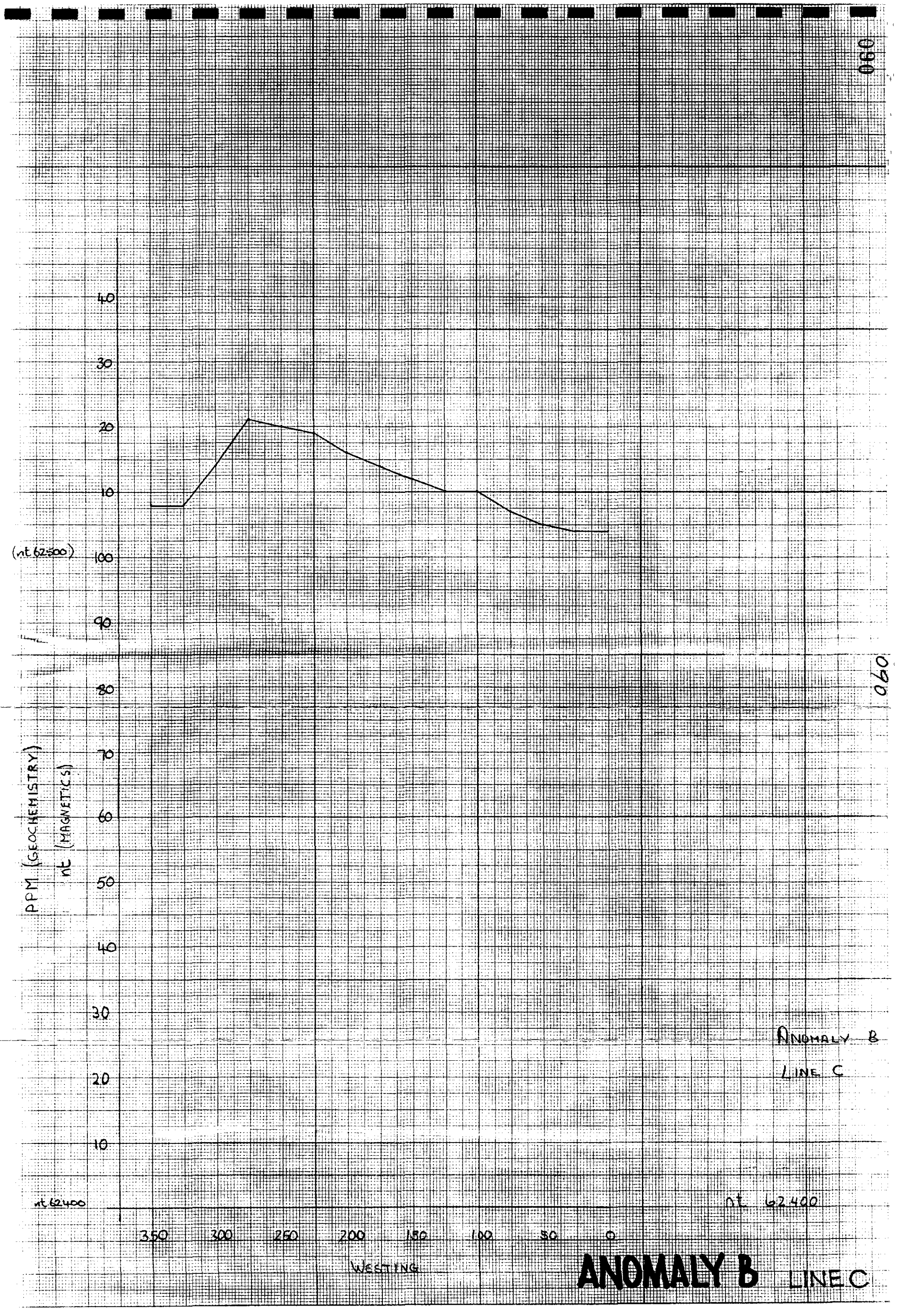
nt 62400

500 450 400 350 300 250 200 150 100 50 0

WESTING

ANOMALY B LINE B

528159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PPM (GEOCHEMISTRY)
nt (MAGNETICS)
ANOMALY B
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WESTING
ANOMALY B
LINE C

528160

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nt 62400

PPM (GEOCHEMISTRY)
nt (MAGNETICS)

Cu
Pb
Zn
Sn
Au
nt

160

ANOMALY B
LINE D

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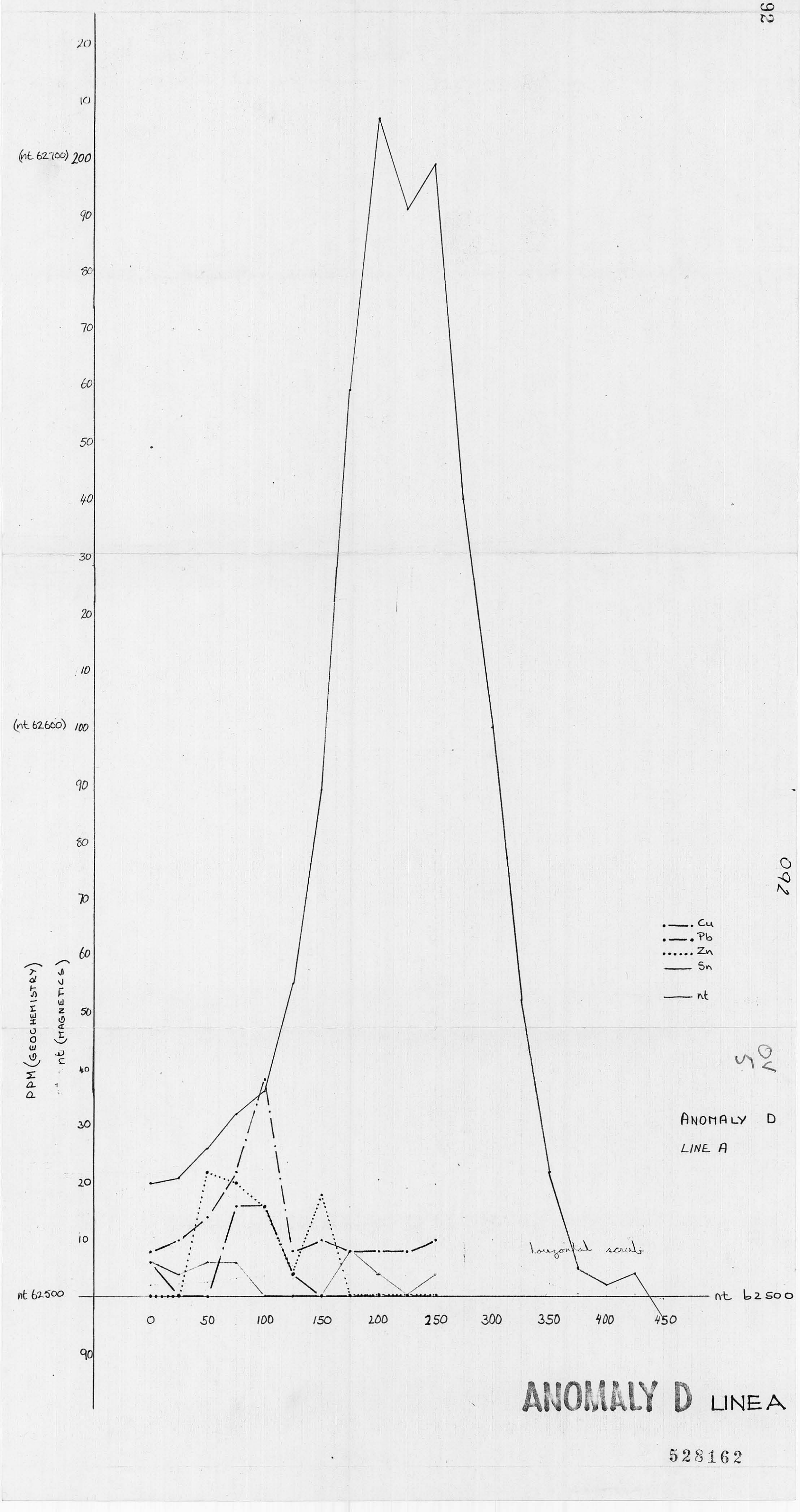
WESTING

ANOMALY B LINE D

528161

092

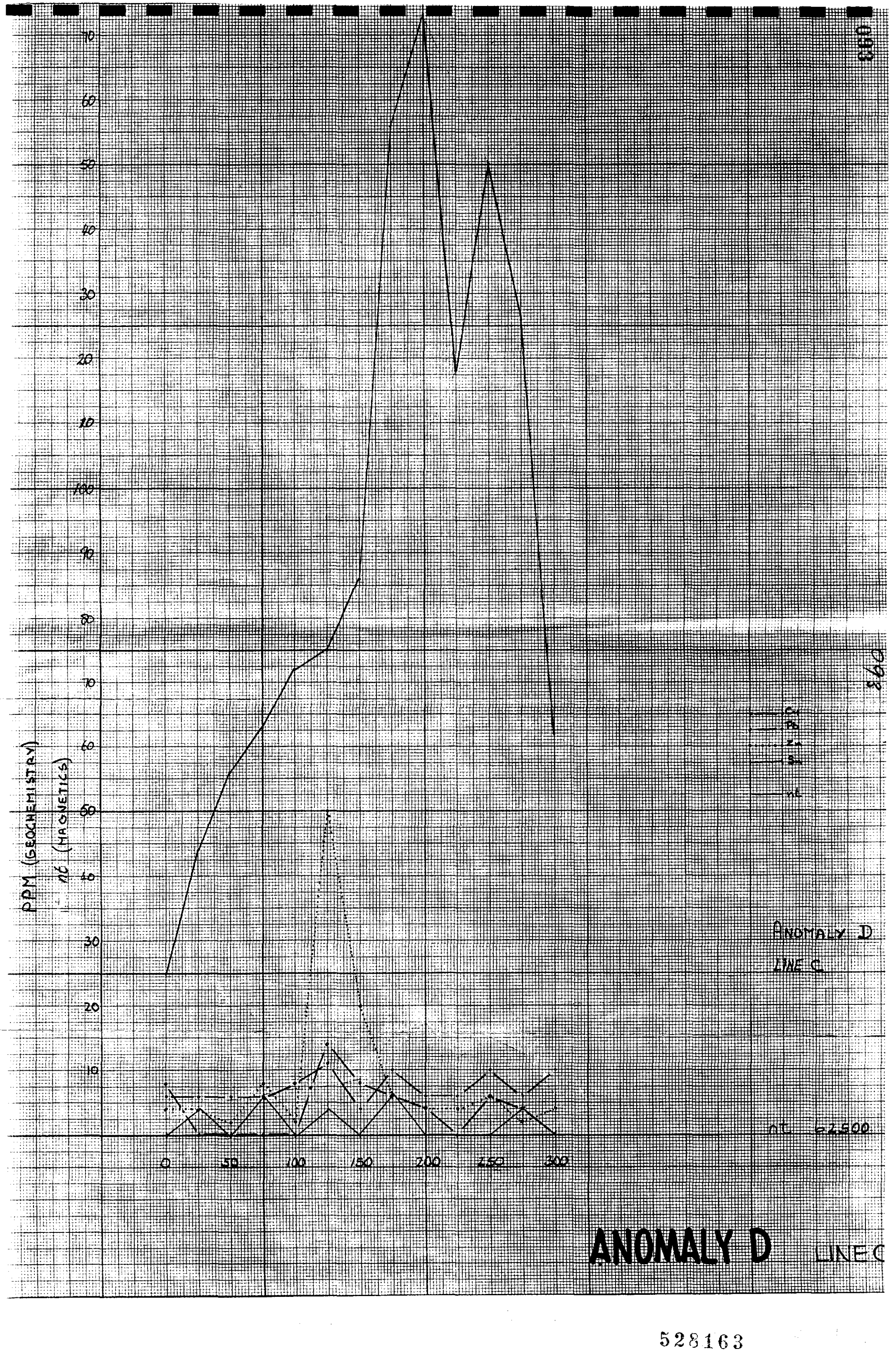


092

ANOMALY D
LINE A

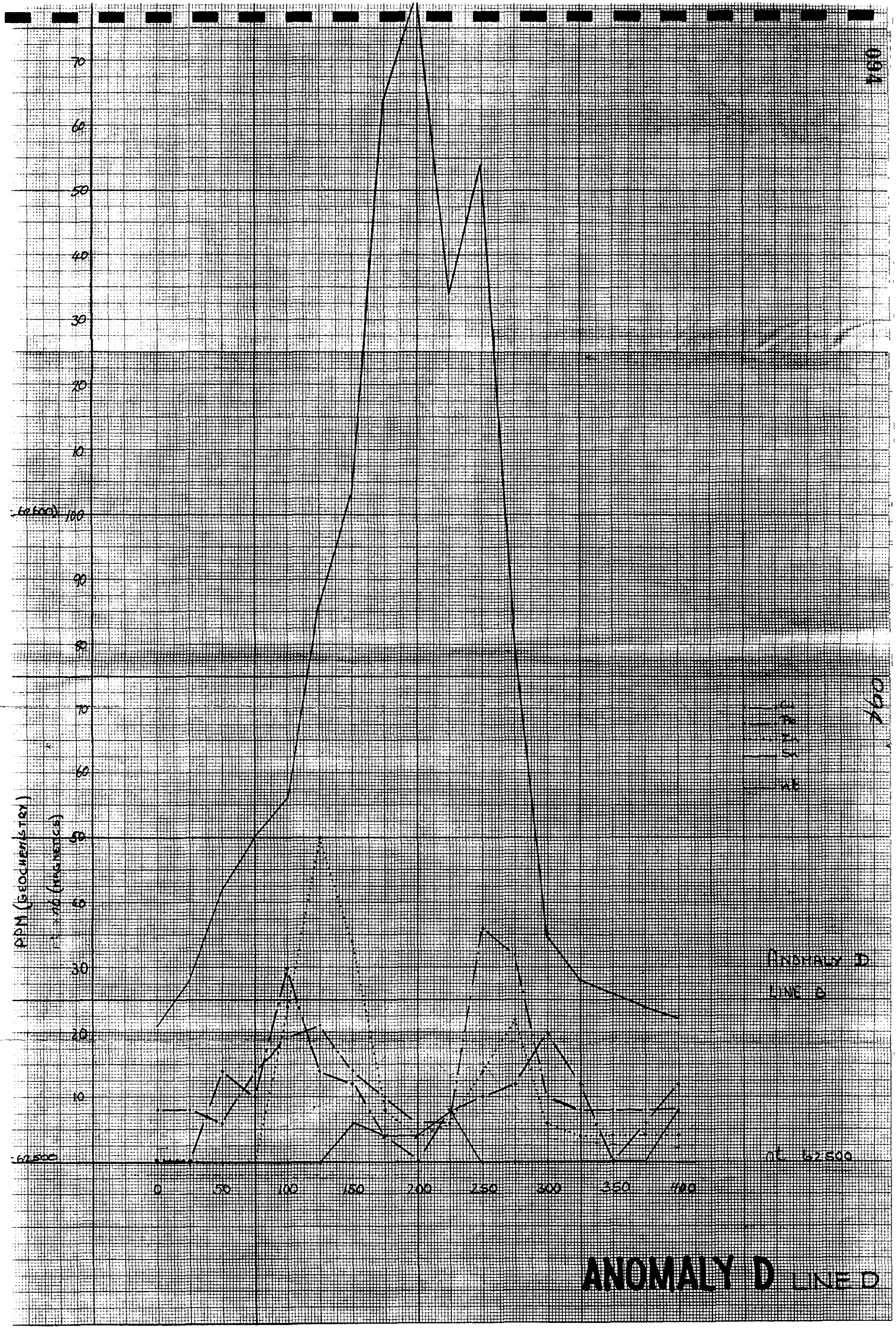
ANOMALY D LINE A

528162



ANOMALY D LINE C

528163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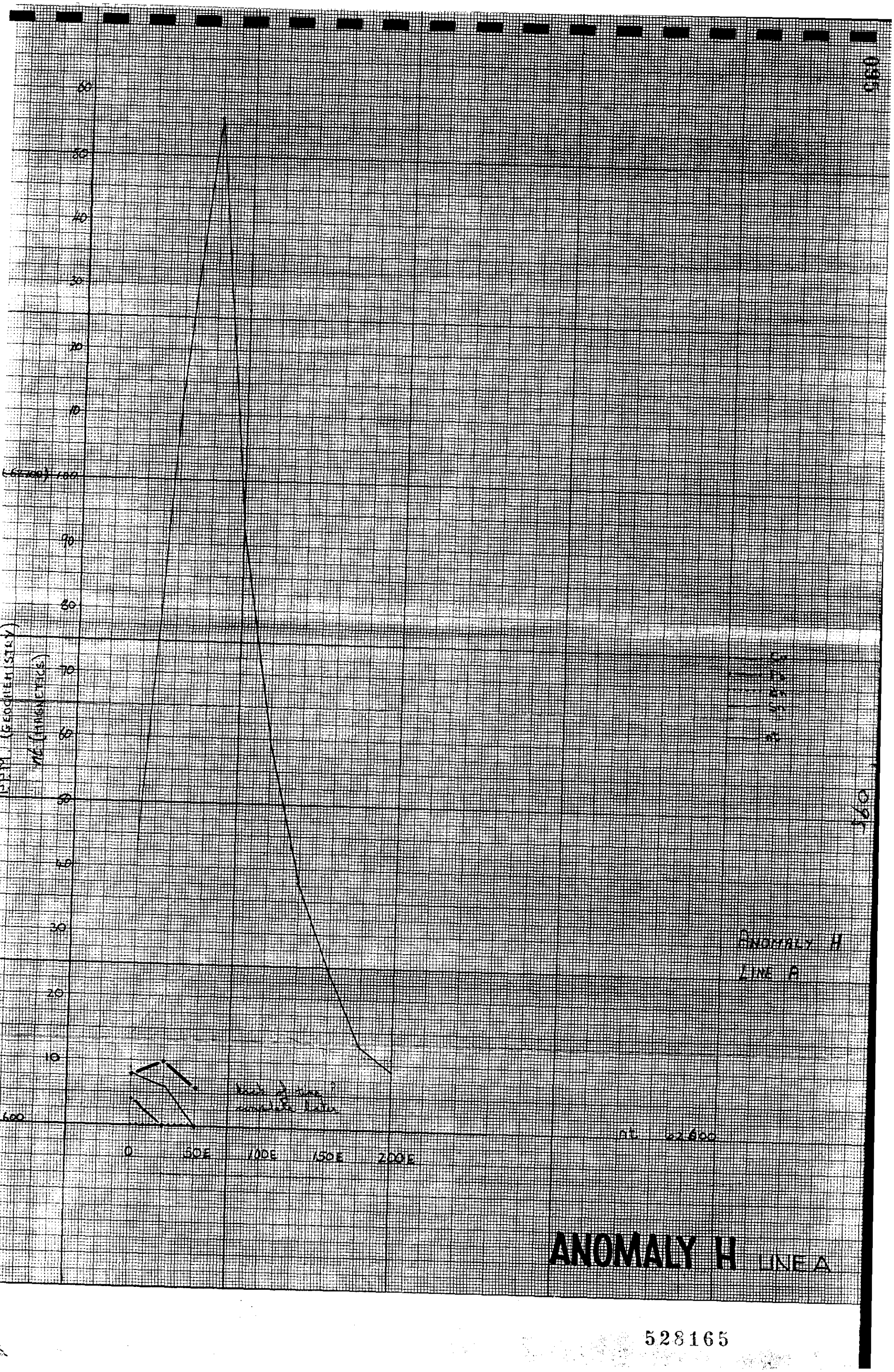
PPM (GEOCHEMISTRY)
(MAGNETICS)
ANOMALY D
LINE D
ANOMALY D
LINE D
at 62500

528164


CRM
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62600
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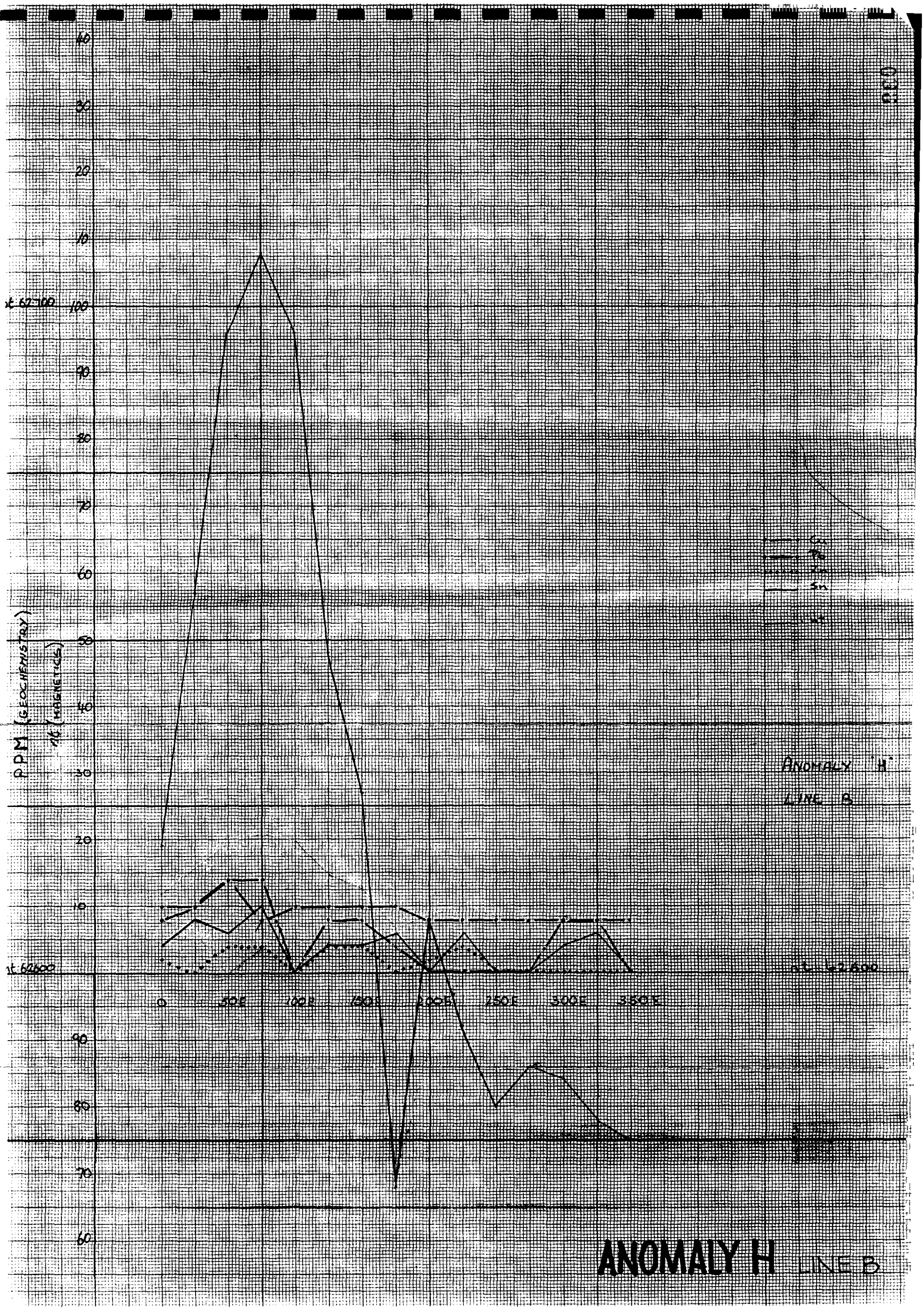
nt.
62600
5/0
LINE A
ANOMALY H
LINE A

528165


PPM (GEOCHEMISTRY)
Δγ (MAGNETICS)
ANOMALY H
LINE B
0
50E
100E
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200E
250E
300E
350E
N.
S.
ANOMALY H LINE B

528166

APPENDIX 9

THE 1981 WEST COAST AEROMAGNETIC SURVEY:
SUMMARY OF INFORMATION AND RESULTS - Department of Mines, Tasmania

098

528168

1982/39. The 1981 West Coast aeromagnetic survey : summary of information and results

K.D. Corbett,
R.G. Richardson,
P.L.F. Collins,
G.R. Green,
A.V. Brown

Abstract

Technical and geological aspects of the 1981 aeromagnetic survey of western Tasmania, conducted for the Department of Mines, are briefly described and discussed. The survey provides valuable insights into the distribution of rock units and potential mineralised zones, and should act as a significant incentive for further exploration. Several important but previously unsuspected geological features are indicated, including a belt of mafic-intermediate volcanic rocks and possible ultramafic rocks in the Strahan area, and a possible ultramafic body south-west of Zeehan. A tabulation is given of some 67 magnetic anomalies and their geological interpretation.

INTRODUCTION

The need for a uniform, high-standard aeromagnetic coverage of western Tasmania, to serve as a guide for mineral exploration and for interpretation of regional geology, has been apparent for many years but has not been possible because of lack of funds. During the 1980-81 financial year the Commonwealth Government made available a sum of $200 000 for additional mineral exploration in Tasmania. Various proposals were submitted by the Department of Mines, and $149 280 was allocated for a regional aeromagnetic survey of part of western Tasmania.

The area selected for the survey extended from the southern end of Macquarie Harbour (AMG gridline 300 km N) to north of Mt Bischoff (gridline 422 km N), and from the west coast eastwards to the margin of the Tyennan Precambrian region (gridline 395 km E). Total area covered is of the order of 620 km², at a cost of about $24 per km².

TECHNICAL ASPECTS OF THE SURVEY

Specifications and equipment

The aim of the survey was to provide sufficient data to resolve problems and to commence a unified, moderately detailed aeromagnetic coverage using reproducible specifications. The survey was not intended to replace company exploration projects at 150-300 m line spacing, but rather to provide a basis for future surveys. Existing geological maps of the area indicated that a flight line spacing of 500 m was the optimum spacing to adequately define the structures.

The survey was flown with a fixed-wing aircraft equipped only with a magnetometer and associated recording equipment, to minimise aircraft weight. The east-west flight direction chosen is approximately normal to the main geological structures. Flying was completed over a period of eight months, commencing in May 1981. Bad weather during winter forced suspension of flying for several months when flying time fell to less than one hour per week.

The survey specifications may be summarised as follows:-

Flight line direction:	east-west
Flight line spacing:	500 m
Tie-line spacing:	10 km
Terrain clearance:	150 m nominal (135 m actual coverage)
Sample interval:	42 m nominal

The observed data were corrected for diurnal variation, and the International Geomagnetic Reference Field subtracted. Although some negative residual values resulted, it was not felt necessary to apply a base shift to make all values positive. The data was smoothed along flight lines using a three-point filter. No other corrections were performed. The data was gridded on a 125 m square mesh before contouring. No attempt has been made to correct for the effect of varying terrain clearance, and this may have introduced spurious anomalies or diminished real anomalies.

Data available

The data was supplied by the contractor in three forms:

(i) flight path plots,
(ii) stacked profile plots,
(iii) contour maps

All data was at a scale of 1:50 000, with the Australian Map Grid shown. The contour maps have a contour interval of 5 nT except in areas of steep gradient where the interval is increased. This has the effect of enhancing the low-amplitude anomalies, and the contour maps should be used in conjunction with the stacked profile plots.

The contour maps have been photographically reduced by the Department of Mines, and are now available at scales of 1:63 360, 1:100 000, 1:250 000 and 1:500 000, to coincide with the scales of existing geological maps. Flight path plots and stacked profile plots are available only at 1:50 000 scale.

Copies of the data may be obtained by writing to the Director of Mines.

Extension of survey and further data treatment

It is clearly desirable that the aeromagnetic coverage be extended to encompass the major mineralised areas in the west and north of the state, as a further incentive for mineral exploration. This should preferably be done over the next two or three years. The remainder of the state should then be covered over a number of years. The technique of using a minimum-weight fixed-wing aircraft has proven cost effective, and further work should use the same technique and specifications.

When adequate in-house computing facilities are available, the data should be re-processed to remove possible spurious effects and to make interpretation easier. The suggested processing sequence is:

(i) Production of regional and residual magnetic field contour maps
(ii) Re-contouring of the data at selected intervals
(iii) Correction to a uniform terrain clearance on a line-by-line basis and performance of (i) and (ii) above

(iv) Correction to a uniform terrain clearance on an areal basis and performance of (i) and (ii) above

GEOLOGICAL ASPECTS OF THE SURVEY

Introduction

The aeromagnetic data provide a valuable guide to the distribution of rock types and geological structures in western Tasmania. Many rock types have a characteristic magnetic signature, and the aerial technique allows penetration through a considerable depth of cover rocks in some circumstances. For example, anomalies due to basement sources are apparent over the 200 m+ thick sequence of Tertiary sediments around Macquarie Harbour. The technique is also effective in areas of vegetation cover where outcrop is limited and access is difficult, as is the case over much of western Tasmania. A brief examination of the data has been made in conjunction with available geological information to determine the characteristics of the known geological features and to interpret or comment upon those features of the aeromagnetics not clearly referable to known geological structures.

Significant regional features

The following features are prominent at a regional scale (refer fig. 1):

(1) The marked contrast between the magnetically 'quiet' units, *e.g.* the Siluro-Devonian Eldon Group sedimentary sequence, the Ordovician Gordon Limestone, the Devonian granitoids, much of the Precambrian basement, and the magnetically 'noisy' units, *e.g.* most Cambrian rocks, the Owen Conglomerate (in part), the Tertiary basalt, and the metamorphosed Precambrian rocks. This contrast makes the technique particularly useful in areas of poorly-known geology or in areas of extensive superficial cover.

(2) The strong magnetic signature of the belt of Precambrian schist and amphibolite (Arthur Lineament) in the north-west part of the area. The magnetite bodies within this belt in the Savage River area record maximum values in excess of 10 000 nT above nominal zero.

(3) The strong signature of the Cambrian ultramafic-mafic complexes, with values generally in the range of 1000-5000 nT. The areal extent of these bodies is indicated with considerable accuracy by the magnetic data, and the presence of a previously unsuspected body is suggested south-west of Zeehan.

(4) The moderately strong but variable signature of the Cambrian Mt Read Volcanics belt, with values generally in the range of 250-1000 nT. The magnetite-bearing rhyolites which extend intermittently between South Darwin Peak and Mt Farrell are prominent sources within this belt. Some known andesite bodies give positive responses (*e.g.* around Queenstown), but by contrast the andesites near the Que River Mine and near Tullah have little magnetic expression. This may be a function of the latter being mainly extrusive rocks. The Tyndall Group volcanic-epiclastic sequence has a strong magnetic signature in many areas around Queenstown, possibly because of concentrations of detrital magnetite. Some strong positive features are associated with the Owen Conglomerate along this belt, and could reflect hematite-rich beds and/or buried Cambrian sources. A particularly large and strong feature is located over the Owen Formation north-east of Mt Sedgwick.

(5) A strong positive anomaly associated with a belt of Cambrian ultramafic rocks and andesitic volcanic rocks south of Macquarie Harbour apparently extends north as an arcuate belt through a large positive feature near the mouth of the King River. Most of the area is covered with Tertiary sediments, but Cambrian basalt and andesite crop out to the east. A probable extension of the anomaly belt occurs near the coast north-west of Strahan. The magnetic signature suggests a near continuous belt of volcanic rocks and possibly ultramafic rocks, comparable in size to the Mt Read Volcanics.

(6) The contrast between the 'flat', low-profile magnetic response of the Devonian granite plutons and the prominent positive responses of the adjacent Precambrian and Cambrian country rocks. Much of the positive response can be attributed to contact metamorphism (hornfels-skarn development). The contrast is accentuated by a dipole effect in some areas, *e.g.* northern margin of Meredith Granite, north-east margin of Heemskirk Granite, where a complementary trough parallels the ridge of high values.

(7) The highly noisy magnetic signature of the Tertiary basalt in the Waratah-Guildford area, with values generally in the range of -150 to +300 nT. Locally stronger positive values in excess of 500 NT possibly indicate sub-basalt sources.

Tabulation of anomalies and their geological interpretation

Some 67 prominent features on the aeromagnetic map (fig. 2) are listed below, together with probable and possible geological sources, and comments on the geology. Co-ordinates are given to the nearest kilometre, and are shown in brackets after the location.

1. Cape Sorell [352325]

Anomaly shape	:	Circular
Relative intensity	:	150 nT
Known geology	:	Precambrian quartzite and mudstone
Possible sources	:	Dolerite intrusion and/or granite contact
Comments	:	Abundant dolerite boulders (Precambrian?) at Split Rock [351325] indicate probable off-shore intrusion (P.W. Baillie, pers. comm.). Devonian granite occurs 3 km to south, with some contact metamorphic effects.

2. Backagain Point [358318]

Anomaly shape	:	Part of lensoid feature
Relative intensity	:	90 nT
Known geology	:	Precambrian quartzite and mudstone
Comments	:	No obvious source

3. South-west of Liberty Point [357312]

Anomaly shape : Two small circular features

Relative intensity: 50-100 nT

Known geology : Precambrian quartzite-mudstone-conglomerate sequence

Comments : BHP mapping shows NE-trending conglomerate unit in this area

4. Double Cove-Lucas Creek area [360310]

Anomaly shape : Linear belt 2 km wide

Relative intensity: Peaks to 250-400 nT

Known geology : Cambrian basalt, gabbro, and sedimentary sequence

Probable source : Cambrian basalt and gabbro

Comments : Corresponds to a belt of pillow basalt, breccia, and gabbro mapped by BHP ('Lucas Creek Volcanics' of White, 1975). Anomaly indicates volcanic rocks extend south-west to coast.

5. Near Birthday Bay [300358]

Anomaly shape : Several small circular features

Relative intensity: 50-100 nT

Known geology : ?Early Cambrian carbonate-quartzite sequence and adjacent Precambrian schist

Comments : Hematite-magnetite vein at Precambrian contact known to be cause of one anomaly

6. 6 km south of Double Cove [363307]

Anomaly shape : Several small features trending NNE

Relative intensity: Peak at 150 nT

Known geology : Cambrian mudstone-greywacke-conglomerate sequence

Possible source : Mafic intrusive or volcanic rocks

7. Head of Big Creek [362302]

Anomaly shape : Several small features

Relative intensity: Peak at 110 nT

Known geology : Precambrian schist faulted against Cambrian sequence

Comments : Westernmost anomaly due to serpentinised gabbro dyke at faulted contact

528173

8. Asbestos Point-Noddy Creek area [370305]

Anomaly shape : Linear belt 5 km wide trending NNE

Relative intensity: Peaks to 1000-1500 nT

Known geology : Cambrian ultramafic rocks, gabbro, intermediate to acid volcanic rocks, mudstone, greywacke.

Probable source : Ultramafic, intermediate to acid volcanic rocks, gabbro

Comments : Western part of this belt lies over faulted strips of serpentinite. Eastern part corresponds to a belt of andesitic and dacitic volcanic rocks and associated intrusive rocks ('Noddy Creek Volcanics' of White, 1975). Large high over central Macquarie Harbour probably due to continuation of ultramafic-volcanic rock belt, which apparently continues beneath Tertiary cover to connect with King River anomaly (13).

9. Birch Inlet [375300]

Anomaly shape : Northern end of linear feature

Relative intensity: 650 nT

Known geology : Tertiary sediments

Probable source : Cambrian basalt

Comments : Cambrian basalt sequence ('Birch Inlet Volcanics' of White, 1975) probably extends beneath Tertiary cover.

10. Mt McCall to Raglan Range

Anomaly shape : Irregular clustered and isolated features

Relative intensity: Peaks to 250-400 nT

Known geology : Precambrian metasediments, with some garnet schist, possible amphibolite and eclogite

Possible sources : Garnet schist, amphibolite, eclogite

11. 3 km north of Kelly Basin [380313]

Anomaly shape : Two small circular features

Relative intensity: 50 nT

Known geology : Gordon Limestone adjacent to fault contact with Tertiary sediments

Comments : Possible sources include near-surface feature in Gordon Limestone, or buried extension of Cambrian source at Mt Sorell

12. Pine Cove Creek [367324]

Anomaly shape	:	Ovoid feature within larger belt
Relative intensity	:	240 nT
Known geology	:	Cambrian basalt and andesite
Probable source	:	Basalt, andesite
Comments	:	Coincides with outcrops of basalt and andesite mapped by Cox in the Strahan Quadrangle (Baillie *et al.*, 1977) at western margin of Cambrian sequence.

13. Mouth of King River [363327]

Anomaly shape	:	Elongate NW-trending lens 3 km wide
Relative intensity	:	600 nT
Known geology	:	Cainozoic sediments overlying Cambrian volcano-sedimentary sequence
Possible source	:	Mafic-intermediate volcanic, ultramafic rocks. Recent pyritic delta deposits.
Comments	:	Lies partly over King River delta pyritic deposits, but size, shape, trend, association with larger belt, and similarity to anomaly over Macquarie Harbour, all suggest relation to buried Cambrian source of volcanic and/or ultramafic rocks. Small offshoot to north [364329] lies over andesite and basalt in Beehive Creek area (Cox, *in* Baillie *et al.*, 1977).

14. Ocean Beach [358335]

Anomaly shape	:	Truncated NW-trending feature possible continuation of arcuate belt (8, 12, 13).
Relative intensity	:	450 nT
Known geology	:	Cainozoic sediments over Palaeozoic basement
Possible source	:	Mafic-intermediate volcanic, ultramafic rocks
Comments	:	Similar in dimensions to anomalies 13 and 8 (northern end) - possibly continuation of that belt offset by faulting. Siluro-Devonian sediments crop out 2 km to north-east, and gravity data (Leaman, 1974) indicate 80-400 m of Tertiary cover.

15. Tully River [361341]

Anomaly shape	:	Cluster of small features
Relative intensity	:	150 nT
Known geology	:	Tertiary boulder beds and Permo-Carboniferous tillite
Possible source	:	Dolerite boulder beds in Tertiary

528175

16. Badger River [355350]

Anomaly shape : Irregular

Relative intensity: 200 nT

Known geology : Jurassic dolerite intruding Permian sequence

Probable source : Jurassic dolerite

Comments : Similar morphology to dolerite feature at 54.

17. Bottle Creek [364346]

Anomaly shape : Small east-west feature with extension to north-west

Relative intensity: 180 nT

Known geology : Large fault displaces Cambrian and Ordovician rocks against Devonian, with some Permo-Carboniferous cover.

Comments : Mineralisation along strike at Queensberry Mine gives no magnetic response

18. Melody Creek [368346]

Anomaly shape : Small, NW-elongated ovoid anomaly

Relative intensity: 125 nT

Known geology : Cambrian felsic volcano-sedimentary sequence faulted against quartzwacke sequence

Possible source : Felsic volcanic rocks

Comments : Thick felsic volcanic sequence in Melody Creek is cut-off by NW-trending fault parallel to anomaly

19. Professor Range [368350]

Anomaly shape : Narrow linear anomaly

Relative intensity: 125 nT

Known geology : Late Cambrian quartzwacke-mudstone-conglomerate sequence on west flank of anticline

Possible source : Detrital magnetite in sandstone

Comments : No known source. Anomaly follows strike of bedding, with suggestion of continuation around nose of anticline. No dykes or volcanic rocks known in area.

20. The Sisters [375345]

Anomaly shape : Irregular N-S to NNE-trending belt

Relative intensity: 280 nT

Known geology : Cambrian volcano-sedimentary sequence with felsic tuffs

Probable source : Felsic tuffs

Comments : Features follow strike of mapped felsic tuff units, with faulted boundaries to south and west (Baillie *et al.*, 1977).

528176

21. Rinadeena [377332]

Anomaly shape	:	Two small circular features on N-S trend
Relative intensity	:	50 nT
Known geology	:	Siluro-Devonian Eldon Group, possibly some Ordovician limestone-shale
Comments	:	Geology poorly known. Old Mt Lyell Co. map shows N-S fault in Eldon Group, with nearby prospect

22. South Darwin Peak [383315] to King River [383333]

Anomaly shape	:	Complex N-S belt 6-8 km wide
Relative intensity	:	Peaks at 1000 nT
Known geology	:	Cambrian Mt Read Volcanics with some Owen Conglomerate cover
Probable source	:	Magnetite-bearing volcanic and epiclastic rocks.
Comments	:	Main ridge of high values corresponds to central rhyolite sequence, which carries veins of magnetite-hematite and patchy Cu-sulphides. Breaks in ridge coincide with Owen Conglomerate cover. Subsidiary eastern peak at South Darwin Plateau overlies east margin of Darwin Granite and base of overlying epiclastic sequence containing detrital hematite-magnetite. Trough in Clark River-Garfield River area corresponds with volcano-sedimentary sequence. Western ridge of high values lies over volcaniclastic conglomerate sequence with detrital hematite on east flank of Mt Sorell.

23. Lower Queen River [378334]

Anomaly shape	:	Two small circular anomalies
Relative intensity	:	50-80 nT
Known geology	:	Cambrian volcano-sedimentary sequence
Possible source	:	Mafic-intermediate volcanic rocks
Comments	:	Sequence poorly known but includes basalt and andesite further north (Corbett, 1979)

24. Mt Huxley-Whip Spur [383337]

Anomaly shape	:	Irregular
Relative intensity	:	Peaks to 250 nT
Known geology	:	Cambrian Mt Read Volcanics
Probable source	:	Felsic-intermediate volcanic rocks
Comments	:	Double high anomaly NE of Mt Huxley [384334] lies over volcaniclastic conglomerate sequence with detrital hematite. Complex anomalies over upper Whip Spur correspond with Darwin-type rhyolite. Trough at foot of Whip Spur lies along contact between central and western sequences (Corbett, 1979).

25. Lynchford [374337]

Anomaly shape	:	Irregular lens with NNE orientation
Relative intensity	:	250-500 nT
Known geology	:	Intermediate tuff (Tyndall Group) overlying Lynch Creek basalt
Probable source	:	Tyndall Group tuff
Comments	:	Closely follows outcrop of Comstock Tuff, even to fault displacement. Adjacent Lynch Creek basalt gives little response.

26. Queenstown-Lake Margaret area

Anomaly shape	:	Complex belt
Relative intensity	:	Peaks to 250 nT
Known geology	:	Mt Read Volcanics, including volcano-sedimentary sequences, acid and intermediate intrusive rocks, altered and mineralised volcanic rocks.
Probable source	:	Various volcanic and intrusive units
Comments	:	Complex belt with many sources. Identifiable sources include andesite bodies at Little Owen Spur, Reservoir, Mill-magazine area, Crown Hill and lower Lake Margaret Road. Linear western anomaly along Zeehan Highway corresponds with dacite porphyry body. A linear high lies over altered volcanic rocks on Philosophers Ridge, but no clear response from the Mt Lyell ore-bodies is apparent at this scale. A strong positive anomaly (400 nT+) covers the known outcrop of the Comstock Tuff in the Comstock Valley. The cause of the arcuate high in the upper Langdon River [377346] is not known.

27. Mt Owen-Mt Lyell

Anomaly shape	:	Complex large lens
Relative intensity	:	Peaks to 500-700 nT
Known geology	:	Mt Read Volcanics, including much Tyndall Group, with overlying Owen Conglomerate
Probable source	:	Mainly Tyndall Group volcaniclastic conglomerates, also Owen Conglomerate.
Comments	:	Large high at east end of Mt Lyell reflects Tyndall Group exposed beneath Owen Conglomerate, particularly volcaniclastic conglomerate sequence. Narrower belts of volcanicalstic conglomerate at Mt Owen also have strong positive response. Positive anomalies over Owen Conglomerate may reflect hematitic units. Source of spot high beneath moraine near Gormanston not known.

528178

Known geology : Jurassic dolerite overlying Cambrian and Precambrian rocks

Probable source : Dolerite

Comments : The small anomaly lies at the western margin of the dolerite outcrop

32. Upper Henty River [377357]

Anomaly shape : Large NE-trending wedge

Relative intensity: Peak at 1500 nT

Known geology : Ultramafic rocks and gabbro intruding Cambrian sedimentary sequence between North and South Henty Falls

Probable source : Ultramafic rocks, gabbro

Comments : Main peak corresponds with large, poorly known area of gabbro, pyroxenite, and serpentinite at SW end of North Henty Fault. Only small serpentinite bodies known along fault plane to NE, but anomaly suggests larger bodies at depth.

33. Mt Geikie to Mt Read

Anomaly shape : Complex N-S belt

Relative intensity: Peak at 250 nT

Known geology : Mt Read Volcanics, including central volcanic sequence, western volcano-sedimentary sequence, and Tyndall Group

Probable source : Various sources in volcanic rocks

Comments : Main southern ridge [381355] lies mainly over Tyndall Group but overlaps onto underlying patchily mineralised andesite sequence. 'Toe' at southern end [379353] may correspond to andesite body or possibly to mineralisation. Main ridge north of Henty River [377363] lies over ash-flow sequence near western margin of central volcanic belt, and partly over Jones Creek shale lens. Two small highs NE of Hercules Mine lie on shale lenses, but Hercules host-rock shale has no obvious expression. Isolated high to the west of main belt [376362] lies near contact between large tuff unit and shale-greywacke sequence.

34. Lake Julia-Red Hills

Anomaly shape : Complex belt

Relative intensity: Peak at 1500 nT

Known geology : Mt Read Volcanics, Owen Conglomerate

Probable source : Felsic volcanic rocks, Tyndall Group

Comments : Strong ridge over Red Hills [383367] reflects mineralised magnetite-bearing rhyolite. Smaller highs near Lake Julia [382363] lie over fault wedges of volcanic rocks (Tyndall Group) exposed beneath Owen Conglomerate.

35. Lake Selina-Mt Murchison

528179

Anomaly shape : Complex belt

Relative intensity: Peaks to 550 nT

Known geology : Mt Read Volcanics, Owen Conglomerate, Murchison Granite

Probable source : Mainly felsic volcanic rocks and granite

Comments : Several highs near Lake Selina over patchily mineralised felsic volcanic rocks and volcaniclastic conglomerate. A linear high north of the Anthony River [386367] lies over Owen Conglomerate. Two circular highs east of Mt Murchison [387368] lie over Cambrian Murchison Granite.

36. Mt Murchison-Mt Farrell

Anomaly shape : Complex belt

Relative intensity: Peaks to 500-600 nT

Known geology : Mt Read Volcanics, Owen Conglomerate, Murchison Granite

Probable source : Mainly felsic volcanic rocks and granite

Comments : Series of highs follows belt of Murchison Granite, known to have high magnetic susceptibility (Collins *et al.*, 1981). Highs due north of Mt Murchison [386373] probably due to magnetite-bearing rhyolite. Arcuate high over Owen Conglomerate SE of Mt Farrell [388375] may reflect underlying granite. NNE-trending ridge along western margin of Mt Farrell may reflect altered or mineralised volcanic rocks. Strong negative gradient to Henty Fault Zone at western margin of this zone. Andesitic rocks along western side of Henty Fault Zone have negative expression.

37. Sophia River-Mt Romulus

Anomaly shape : Complex NNE-trending belt

Relative intensity: Peaks to 300 nT

Known geology : Precambrian-Cambrian contact, Owen Conglomerate, Tertiary basalt

Possible source : Various

Comments : Noisy magnetic response over Precambrian quartzite near contact contrasts with quiet magnetic response over Granite Tor granite. Line of highs along Cambrian-Owen Conglomerate contact interrupted by noisy area of Tertiary basalt.

38. Rosebery-Tullah-Bastyan Dam area

Anomaly shape : V-shaped belt

Relative intensity: Peaks to 300 nT

Known geology : Mt Read Volcanics

Possible source : Various

Comments : Anomalies show poor correspondence with known rock units. Significance of the broadening ridge of highs extending north from Rosebery is not clear. Position of Rosebery orebody is marked by small high-low couplet.

39. Mt Kershaw-Boco area

Anomaly shape : NE-trending double belt

Relative intensity: 300 nT

Known geology : Mt Read Volcanics

Possible source : Andesite

40. Mt Block-Mt Charter

Anomaly shape : Scattered small anomalies

Relative intensity: 150 nT

Known geology : Mt Read Volcanics

Probable source : Volcanic units

Possible source : Andesite

Comments : Andesite sequence around Que River Mine has no obvious expression, nor does Jurassic dolerite at Mt Charter

41. 2 km east of Que River Mine [393393]

Anomaly shape : Spot anomaly

Relative intensity: 150 nT

Known geology : Contact between Mt Read Volcanics and Owen Conglomerate

42. Bulgobac [380393]

Anomaly shape : NE-trending belt 2 km wide

Relative intensity: 350 nT

Known geology : Cambrian sedimentary sequence adjacent to Mt Read Volcanics

Comments : NE trend is parallel to strike, but there are no known sources. Irregularities at NE end probably due to Tertiary basalt.

43. Dundas to Pieman River

Anomaly shape : Complex broad belt

Relative intensity: Peaks to 3500 nT

Known geology : Cambrian ultramafic-mafic complexes, Dundas Group, Crimson Creek Formation, Devonian mineralisation.

Probable source : Ultramafic rocks, Devonian mineralisation and hornfels

Comments : Prominent arcuate high over Razorback ultramafic body [369364] has peak at north margin of body. Connecting ridge to Serpentine Hill area may partly reflect Devonian hornfelsing in Dundas Group. Serpentine Hill complex has main central high over Stichtite Hill [368367], with an unconnected ridge to NE in Ring River area [373370]. Narrow NE-trending ridge of highs along Great Northern Creek [372367] may indicate Devonian hornfelsing. N-S ridge along Colebrook Hill reflects the ultramafic body, with an easterly extension [375372] probably reflecting adjacent mineralisation. Isolated high south of this ridge [374367] lies over Fahl and Rich P.A. prospects. An ovoid anomaly (500+ nT) is located over the main massive pyrrhotite ore bodies at Renison Bell [370371].

44. Pieman River to Webbs Creek

Anomaly shape : N-S belt

Relative intensity: Peaks to 3500 nT

Known geology : Cambrian ultramafic belt and sedimentary sequence

Probable source : Ultramafic rocks

Possible source : Mafic volcanic rocks

Comments : Main ridge corresponds to outcrop belt of sheared serpentinite, pyroxenite, peridotite. Broadening of anomaly at north end indicates continuation of ultramafic rocks at depth. Subsidiary N-S ridge at east side [376377] lies near contact between Cambrian greywacke sequence and Rosebery Group.

45. Pieman River to Parsons Hood

Anomaly shape : Complex NW-trending belt

Relative intensity: Peaks to 3500 nT

Known geology : Cambrian ultramafic complex and sedimentary sequence; granite contact

Probable source : Ultramafic rocks, Devonian hornfels

Comments : Prominent ridge follows belt of layered pyroxenite-peridotite-serpentinite from Pieman River [372374] to mouth of Little Wilson River [363388]. Ridge on west flank of main ridge [367377] reflects dunites of same complex. Noisy magnetic response west of this reflects Crimson Creek Formation with basalt intercalations. Steep gradients and associated lows reflect margin of Meredith Granite. Several positive anomalies (to 600+) in Parsons Hood-Salmon Creek-Mt Livingstone area correspond to Devonian hornfelsing in Cambrian rocks. A positive anomaly (1000 nT) at 361382 may reflect the Mt Lindsay skarn.

46. Huskisson River area

Anomaly shape : Curved N-S belt of lows

Relative intensity: -200 nT

Known geology : Large syncline of Siluro-Devonian sedimentary rocks

47. Upper Webbs Creek [367393]

Anomaly shape : Three highs in E-W line

Relative intensity: Maximum 120 nT

Known geology : Meredith Granite contact with Gordon Limestone and Eldon Group

Possible source : Hornfelsed limestone

48. East of Mt Ramsay

Anomaly shape : N-S belt

Relative intensity: Peak at 1000 nT

Known geology : Cambrian sedimentary sequence adjacent to Meredith Granite

Possible source : Devonian hornfels or skarn; Cambrian basalt

49. Coldstream River [376402]

Anomaly shape : Double lens

Relative intensity: Peak at 500 nT

Known geology : Tertiary basalt overlying possible Precambrian sedimentary sequence

Possible source : Devonian hornfels; Tertiary basalt

50. NW of Melba Flats [365367]

Anomaly shape : Large circular feature

Relative intensity: Peak at 350 nT

Known geology : Cambrian Crimson Creek Formation faulted against Precambrian rocks

Possible source : Cambrian basalt or gabbro? Devonian mineralisation.

Comments : Area of poor outcrop and poorly known geology

51. Trial Harbour-Zeehan area

Anomaly shape : Complex arcuate belt

Relative intensity: Peaks to 2000 nT

Known geology : Precambrian and Cambrian sequences with ultramafic-mafic bodies, intruded by Heemskirk Granite to west and faulted against Ordovician and Siluro-Devonian to east and south.

Probable source : Ultramafic rocks, basalt, Devonian hornfels and mineralisation.

Comments : Strong ridge (to 1800 nT) over ultramafic body at Trial Harbour. Similar ridge (to 2000 nT) with classic dipole effect over area mapped as Crimson Creek Formation at Comstock Creek [355357] suggests another ultramafic body. Strong ridge (to 2500 nT) occurs over magnetite-serpentinite body at Tenth Legion mine [356362] and extends SE along line of Tenth Legion Fault. The McIvors Hill gabbro shows a variable response. A circular high (500 nT) in the vicinity of the Swansea-Grubbs-North Tasmanian mines [360359] and another over Queen Hill [362362] may reflect basalt in these sequences.

52. North margin of Heemskirk Granite

Anomaly shape : Complex belt

Relative intensity: Peaks to 100-350 nT, up to 1500 nT

Known geology : Devonian granite intruding Precambrian Oonah Formation. Some Tertiary basalt and associated sediments.

Probable source : Devonian hornfels and skarn, Tertiary basalt

Comments : Series of low-profile highs over the Heemskirk Granite east of Mt Heemskirk possibly due to hornfels rafts in granite. Other magnetic highs in Oonah Formation probably due to hornfelsing and metasomatism associated with granite emplacement. A small circular anomaly of 100-150 nT above background is located over the St Dizier skarn deposit at 345368.

53. Granville Harbour [337373]

Anomaly shape : Arcuate lens

Relative intensity: Peak at 1500 nT

Known geology : Cainozoic sediments and Tertiary basalt overlying Precambrian Oonah Formation to south, and Ordovician-Silurian-Devonian to north.

Possible source : Ultramafic body; skarn

Comments : Anomaly much higher than others along north margin of granite, and higher than expected for Tertiary basalt. Northern part of anomaly probably overlies Gordon Limestone.

54. Northridge Creek, Pieman River [350374]

Anomaly shape : Lens 10 x 5 km

Relative intensity: Peaks to 300 nT

Known geology : Jurassic dolerite ring intrusion in Precambrian

Probable source : Jurassic dolerite

Comments : Greater intensity along NE side suggests thicker dolerite on this side.

55. Lower Pieman-Savage River

Anomaly shape : Complex belt of parallel ridges, trending NNE, up to 12 km wide

Relative intensity: Peaks to 10 000 nT

Known geology : Belt of Precambrian schist, quartzite and amphibolite (Arthur Lineament) with large magnetite lenses.

Probable source : Magnetite lenses, amphibolite, basic volcanic rocks

Comments : Prominent ridges probably reflect lithological units. Belt shows marked thinning or 'necking' at Savage River. Strong eastern ridge with peaks over 10 000 nT follows line of magnetite bodies from Savage River to Rocky River. A continuation of this ridge crosses the Pieman River north of Stringer Creek. Narrow western ridge (1000+ nT) follows line of amphibolite and basalt SE of Corinna [341385]. Westernmost ridge corresponds to basalt of Bernafai Ridge [338385].

56. Pieman Heads [327383]

Anomaly shape : Irregular

Relative intensity: Maximum 300 nT

Known geology : Pieman Granite intrudes Precambrian relatively unmetamorphosed sequences

Possible source : Hornfels

Comments : Positive features at margins of granite north and south of Pieman Heads may reflect hornfelsing of country rocks.

57. Interview River-Norfolk Range area

Anomaly shape : Irregular, scattered and linear anomalies over large area

Relative intensity: Maximum 150 nT

Known geology : Sequences of Precambrian siltstone and quartzite, with scattered dolerite dykes

Comments : Geology poorly known north of Lagoon River [403 km N]. Positive features south of this show strong correlation with siltstone sequences, whereas adjacent quartzite sequence is relatively quiet. Some linear features may correspond to dolerite dykes.

58. Bald Hill area [360410]

Anomaly shape : Large complex arcuate lens 18 x 8 km

Relative intensity: Maximum 3000 nT

Known geology : Ultramafic-mafic complex with associated basalt and Cambrian sediments.

Probable source : Ultramafic complex

Comments : The prong subtended to the NE from the main complex lies over Cambrian sediments, but suggests presence of ultramafic rocks.

59. Lower reaches of Whyte River [353400]

Anomaly shape : Arcuate belt 5 x 1 km

Relative intensity: 300 nT

Known geology : Cambrian and Precambrian rock, Devonian granite

Probable source : Devonian hornfels

Possible source : Cambrian mafic rocks

60. Mt Stewart [359400]

Anomaly shape : Irregular

Relative intensity: 250 nT

Known geology : Ultramafic-mafic complex, Devonian granite

Probable source : Ultramafic rocks

Comments : The low profile to negative response suggests a thin pendant of ultramafic rocks, with the granite-country rock contact passing north of Mt Stewart.

61. Luina area [365407]

Anomaly shape : NE-trending lens (3 x 1 km) surrounded by low magnetic intensity

Relative intensity: 800 nT

Known geology : Cambrian basalt, sedimentary sequence (Crimson Creek Formation correlate) and ultramafic rocks.

Probable source : Basalt

Comments : Positive anomaly due to major basalt unit (Deep Creek Volcanics). Local highs may be due to minor basalt units. The Cleveland pyrrhotite-cassiterite deposit shows as an inflection on the gradient near 365407. The lack of response may be due to mining, as most of the upper ore bodies have been mined out.

62. Magnet Dam-Wombat Flat-Mt Ramsay area

Anomaly shape : Arcuate belt around granite margin

Relative intensity: Maximum 1500 nT, mostly 250-750 nT

Known geology : Cambrian sediments and basalt (Crimson Creek Formation correlate) intruded by Devonian granite. Tertiary basalt cover in places.

Probable source : Cambrian basalt, hornfels, Tertiary basalt.

Comments : Strong positive anomalies are due to Cambrian basalt and contact-metamorphosed Cambrian sediments, and are strong enough to mask the magnetic response of overlying Tertiary basalt between Johnson Creek [373398] and Corinna Road. Strong negative anomalies over granite are probably dipole effects. Three spot highs over granite 3 km north of Mt Ramsay are probably due to Tertiary basalt.

63. Mt Bischoff area [375412]

Anomaly shape : Low intensity wedge with central heart-shaped anomaly

Relative intensity: Peak 250 nT

Known geology : Precambrian quartzite-mudstone sequence intruded by Devonian porphyry dykes and flanked by Cambrian sediments and ultramafic rocks and by Tertiary basalt.

Probable source : Devonian mineralisation

Comments : Low intensity area due to Precambrian rocks. Central anomaly with NE lobe due to massive pyrrhotite mineralisation at Mt Bischoff mine. No significant magnetic response due to Magnet Dyke, but positive ridge to north [375416] probably due to Cambrian basalt (P.R. Williams, pers. comm.)

64. Guildford-Waratah area

Anomaly shape : Large area of complex low-order noisy magnetics

Relative intensity: Mostly -200 to +200 nT scattered peaks of 250-300 nT

Known geology : Mostly Tertiary basalt plain overlying Lower Palaeozoic and Permo-Carboniferous

Probable source : Mainly Tertiary basalt

Comments : Basalt has characteristic random pattern of small, irregular, low-order anomalies

65. Waratah River area [376421]

Anomaly shape : Wedge broadening northwards

Relative intensity: 250-500 nT

Known geology : Cambrian basalt and sediments (P.R. Williams, St Valentines Quadrangle mapping)

Probable source : Cambrian basalt

66. Wardle River-Godèrich Road area [383421]

Anomaly shape : Irregular

Relative intensity: Peaks to 550 nT

Known geology : Tertiary basalt

528187

Probable source : Cambrian basalt under Tertiary basalt

67. Mt Pearse area [384403]

Anomaly shape : Arcuate quiet area

Relative intensity: 0-50 nT

Known geology : Owen Conglomerate correlate of Mt Pearse syncline, surrounded by Tertiary basalt

Probable source : Ordovician clastic rocks

Comments : NE-trending ridge with 250-350 nT values west of Mt Pearse [381403] may reflect Cambrian source under Tertiary basalt.

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[21 December 1982]

APPENDIX 10

DOWNHOLE SIROTEM, NATURAL GAMMA AND DENSITY SURVEYS ON HOLES ZT-82-10A,11 (OCEANA) AND ZT-82N-1 (NUBEENA) by Geoex

119

119

528189

GEOEX PTY LTD

SIROTEM SURVEY

CLIENT AMOCO MINERALS

AREA OCEANIA

LINE Nº 2T-82-10A

LOOP CONFIG. DOWN HOLE

LOOP DIMENSION 200m

STATION INTERVAL 5m

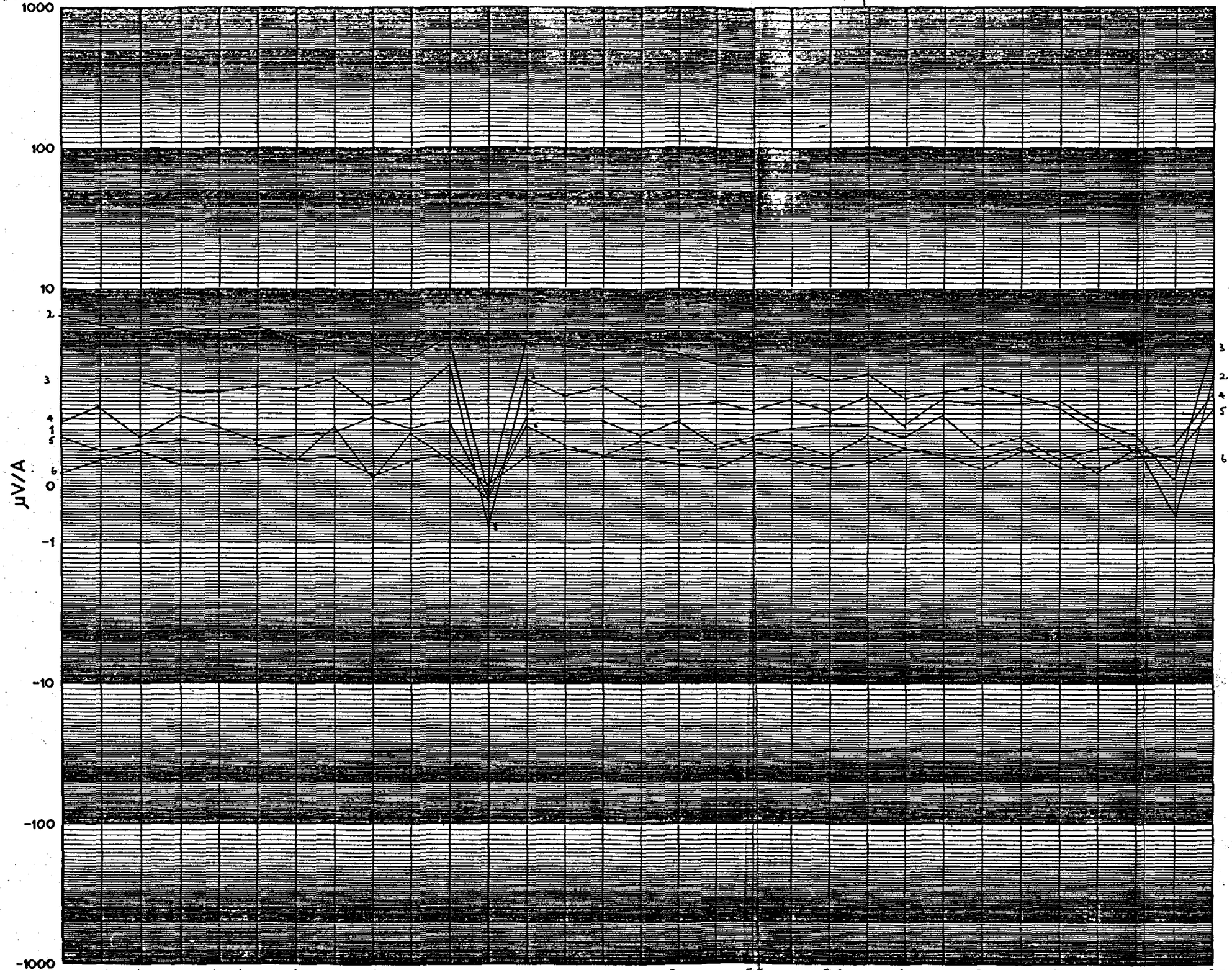
STACKS 512

SFERICS OFF

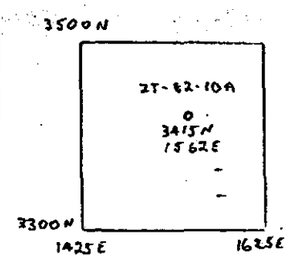
INST. SERIAL Nº 1230

OPERATOR P. MCSKIMMING

DATE 14-1-83



LOOP DIAGRAMS ETC.



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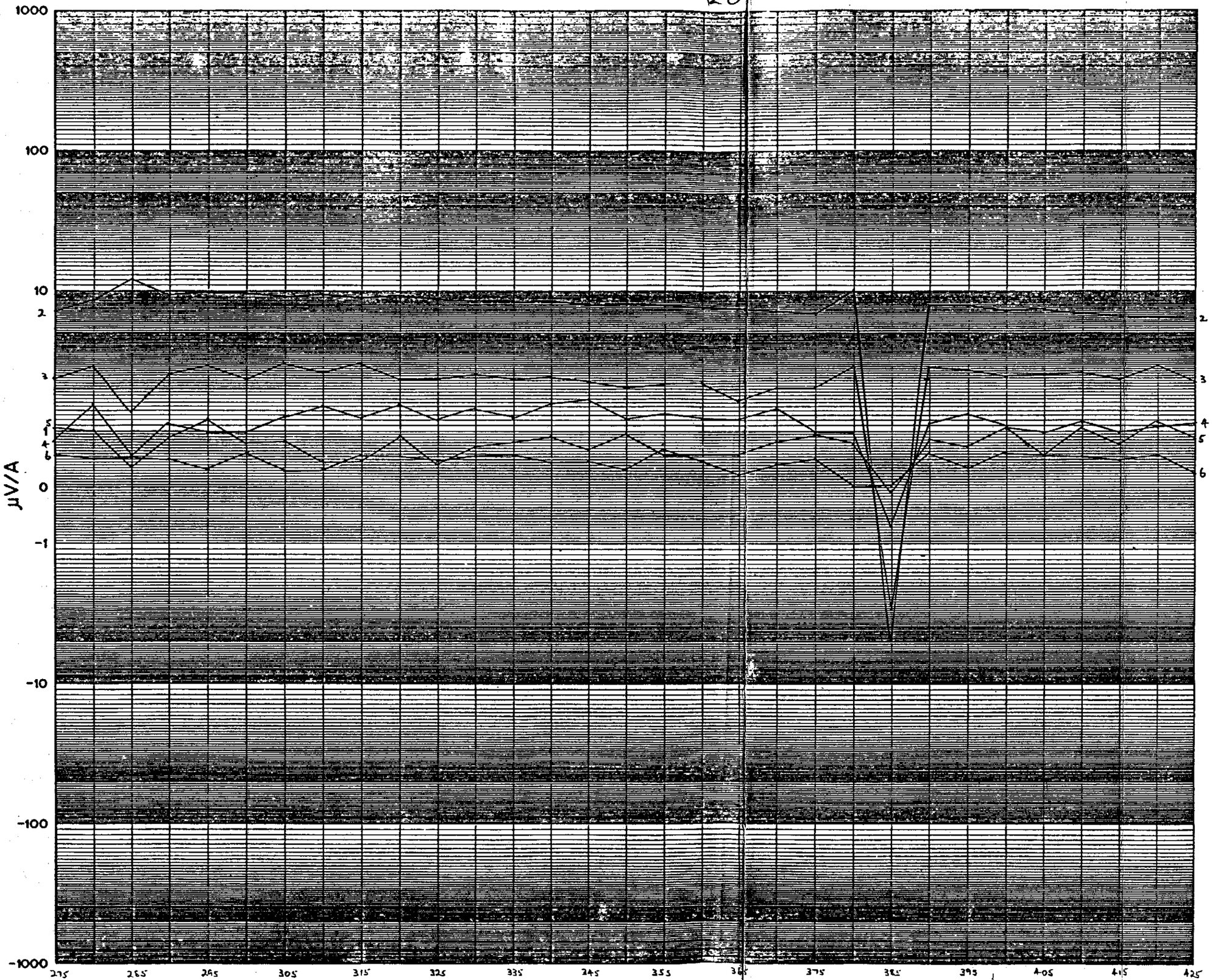
130



GEOEX

528190

SIROTEM SURVEY

CLIENT ..... AMOCO MINERALS

AREA ..... OCEANA

LINE Nº ..... ZT - 83 - 10A

LOOP CONFIG. ..... DOWN HOLE

LOOP DIMENSION 200m

STATION INTERVAL 5m

STACKS 512

SFERICS ..... OFF

INST. SERIAL Nº 122D

OPERATOR ..... P. MCSKIMMING

DATE ..... 14 - 1 - 83

LOOP DIAGRAMS ETC.

398.5 - 399.5

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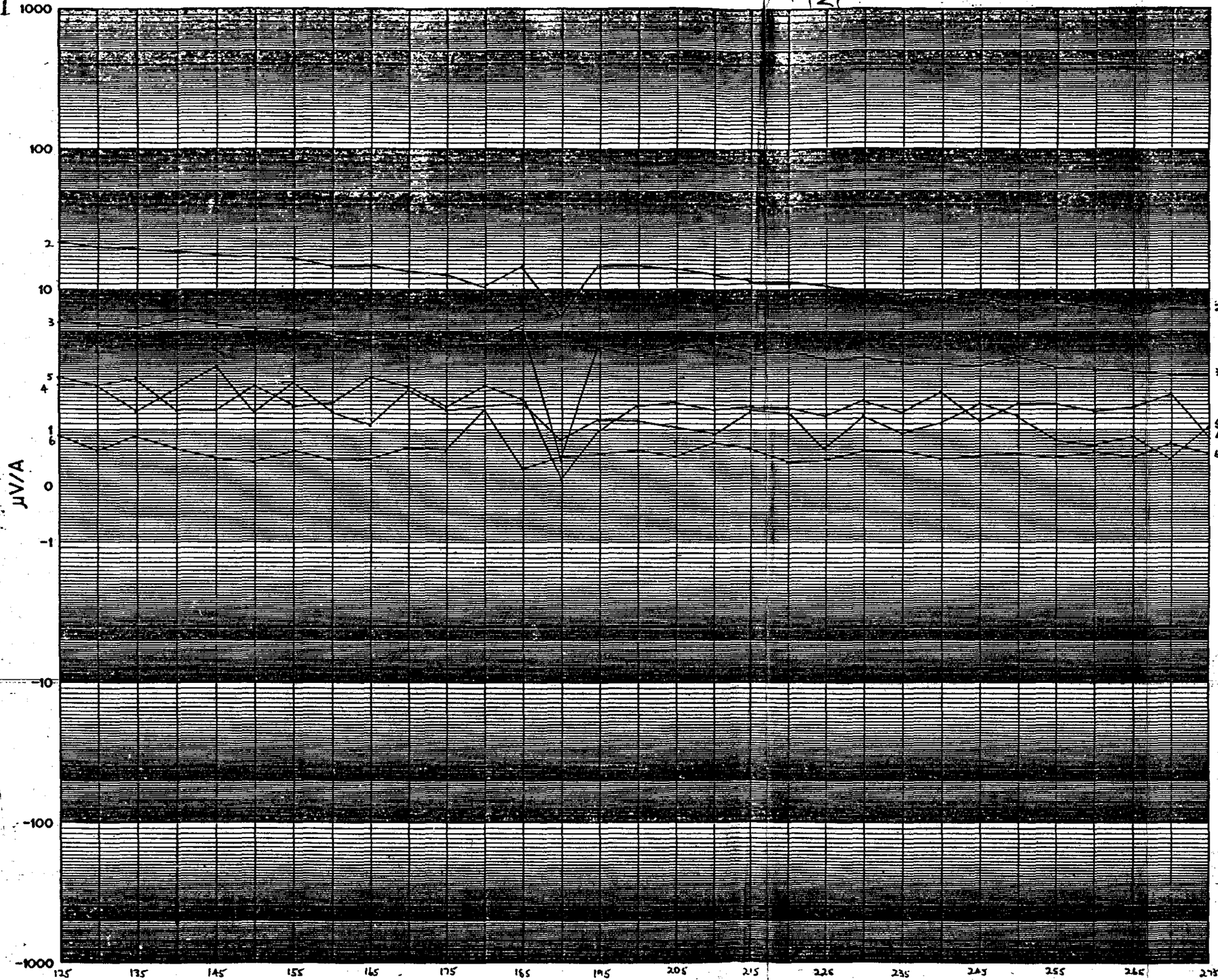

GEOEX PTY LTD

SIROTEM SURVEY

528191

CLIENT ANGLO MINERALS

AREA OCEANA

LINE Nº 27 - 62 - 10A

LOOP CONFIG DOWN HOLE

LOOP DIMENSION 200m

STATION INTERVAL 5m

STACKS 512

SFERICS OFF

INST. SERIAL Nº 1230

OPERATOR P. MCSKIMMING

DATE 14 - 1 - 63

LOOP DIAGRAMS ETC.

10A

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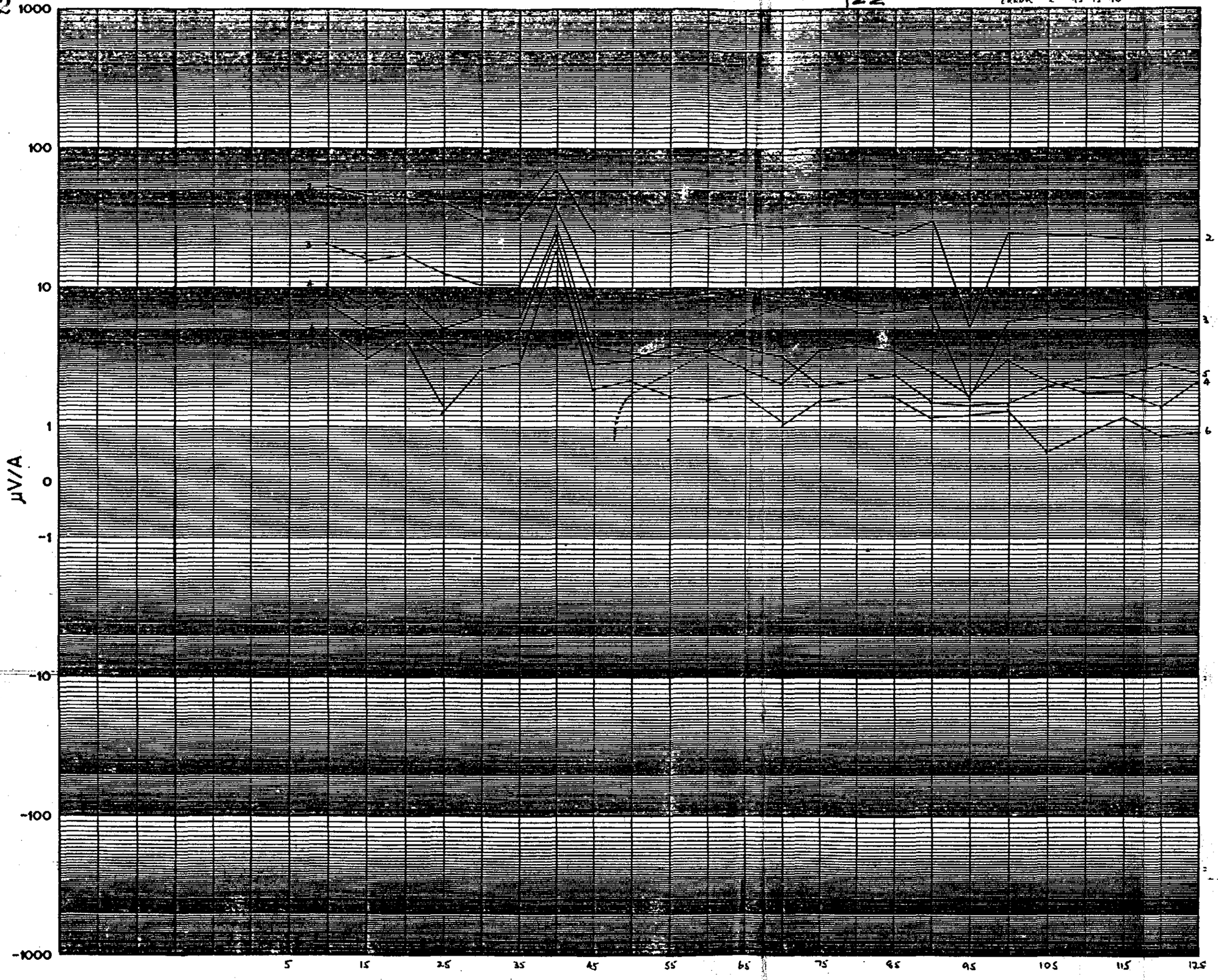

GEOEX PTY LTD.

SIROTEM SURVEY

528192

CLIENT AMOCO MINERALS

AREA OLEARY

LINE Nº 2T - 82 - 10A

LOOP CONFIG. DOWNHOLE

LOOP DIMENSION 200m

STATION INTERVAL 5m

STACKS 512

SFERICS OFF

INST. SERIAL Nº 1220

OPERATOR P. McSKIMMING

DATE 14 - 1 - 83

LOOP DIAGRAMS ETC.

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-1
-10
-100
-1000

μV/A

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DEPTH (m)

GEOEX PTY LTD

528193

SIROTEM SURVEY

CLIENT AMOCO MINERALS

AREA OCEANA

LINE Nº 27 - 82 - 11

LOOP CONFIG. DOWN HOLE

LOOP DIMENSION 200m

STATION INTERVAL 5m

STACKS 512

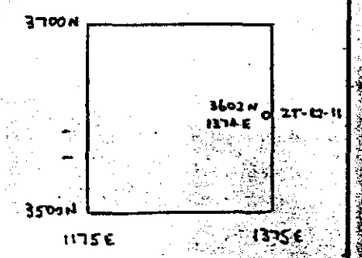
SFERICS OFF

INST. SERIAL Nº 1220

OPERATOR P. McSKIMMING

DATE 15 - 1 - 83

LOOP DIAGRAMS ETC.



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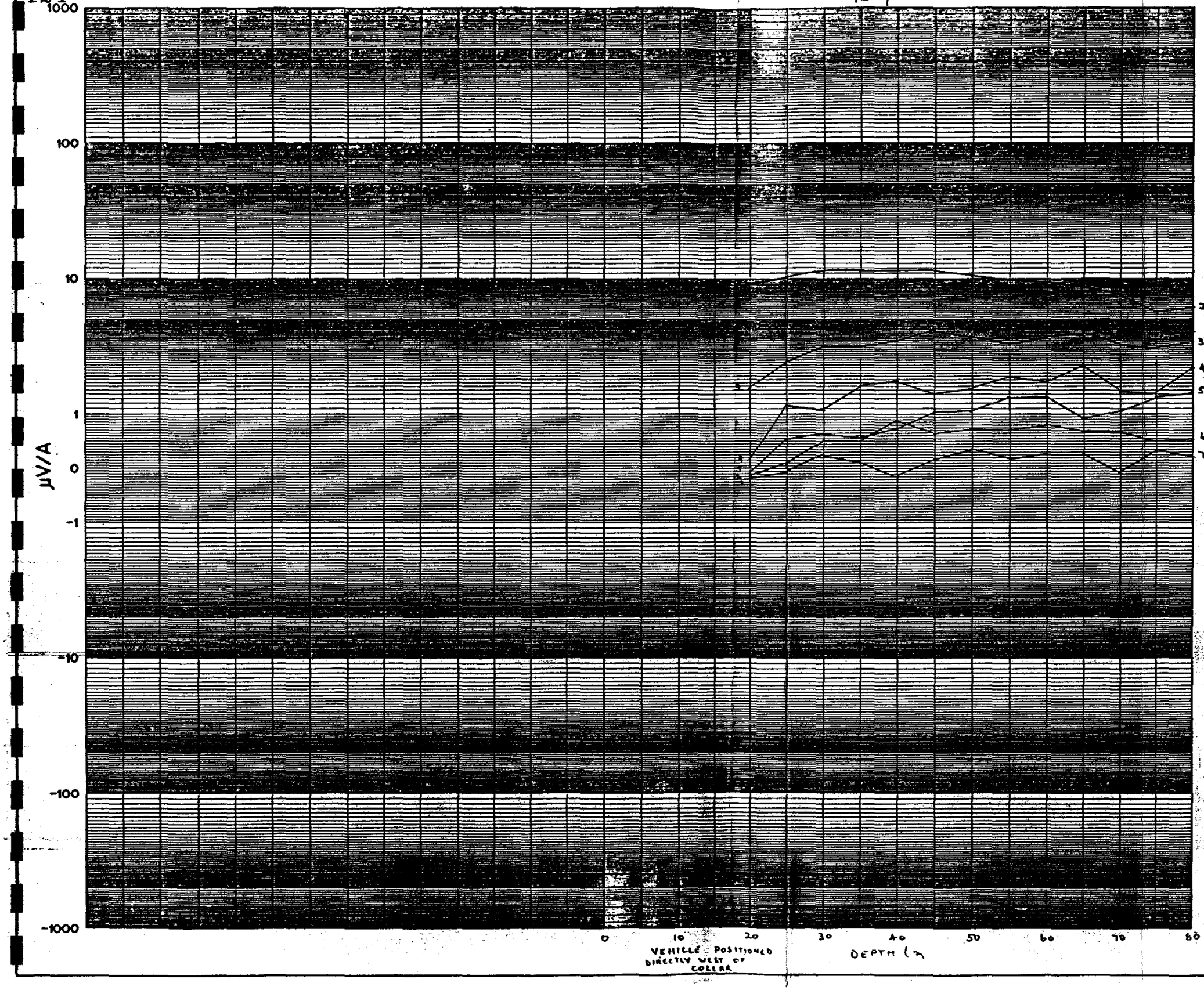

GEOEX PTY LTD

528194

SIROTEM SURVEY

CLIENT AMOCO MINERALS

AREA NURRENA

LINE Nº 2T - 82 - N1

LOOP CONFIG DOWNHOLE

LOOP DIMENSION 200m

STATION INTERVAL 5m

STACKS 512

SFERICS OFF

INST. SERIAL Nº 1220

OPERATOR P. MCSKIMMING

DATE 17 - 1 - 83

LOOP DIAGRAMS ETC.

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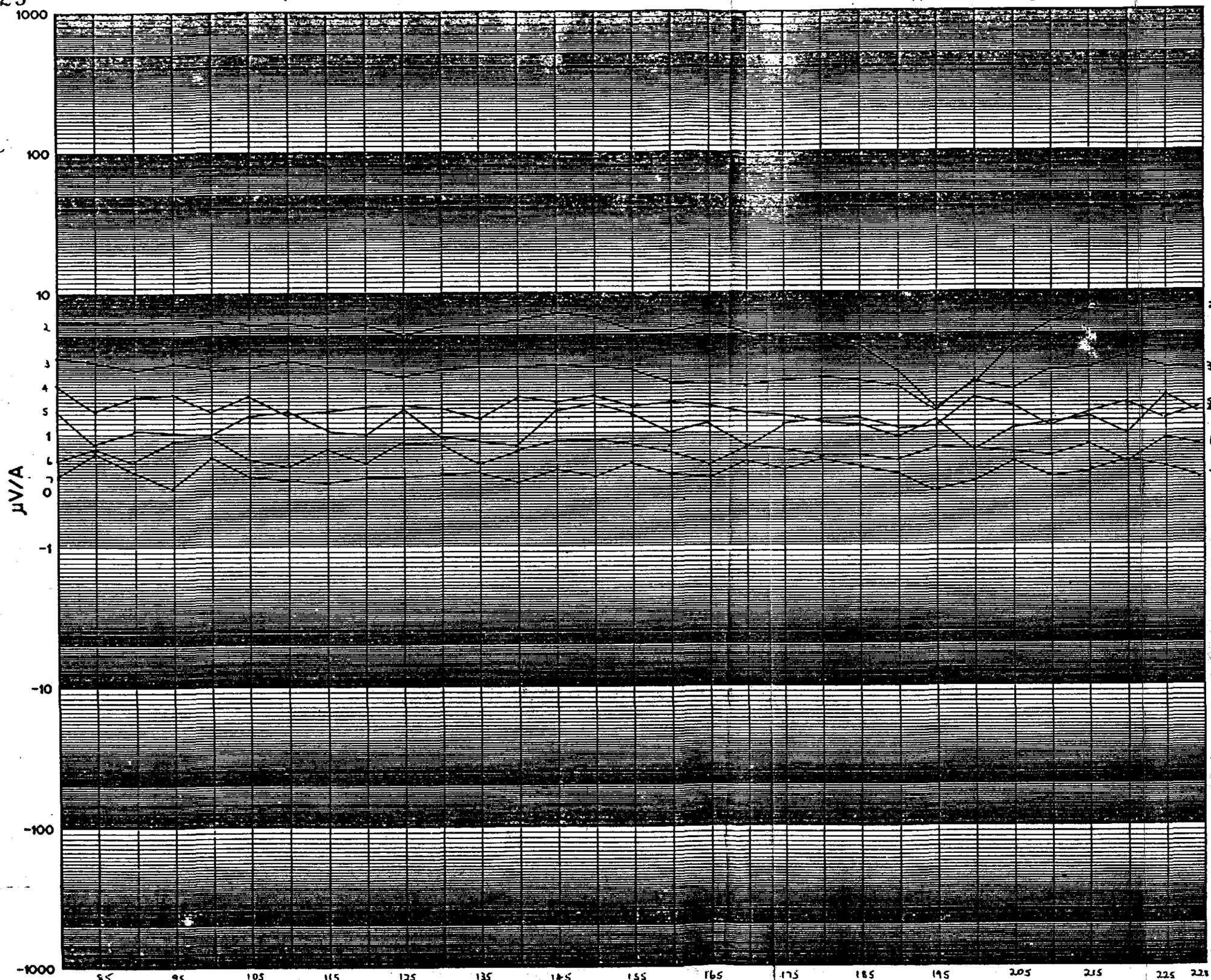
tape report 197 to 190 125



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528195

SIROTEM SURVEY

CLIENT AMOCO MINERALS

AREA NUREENA

LINE Nº 2T - 82 - N1

LOOP CONFIG DOWNHOLE

LOOP DIMENSION 200m

STATION INTERVAL 5m

STACKS 512

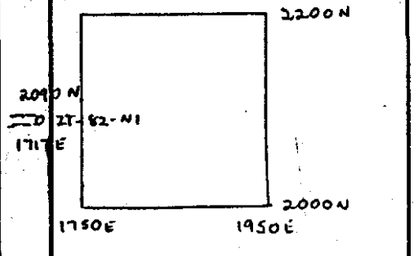
SFERICS OFF

INST. SERIAL Nº 122D

OPERATOR P. MASKIMMING

DATE 17 - 1 - 83

LOOP DIAGRAMS ETC.



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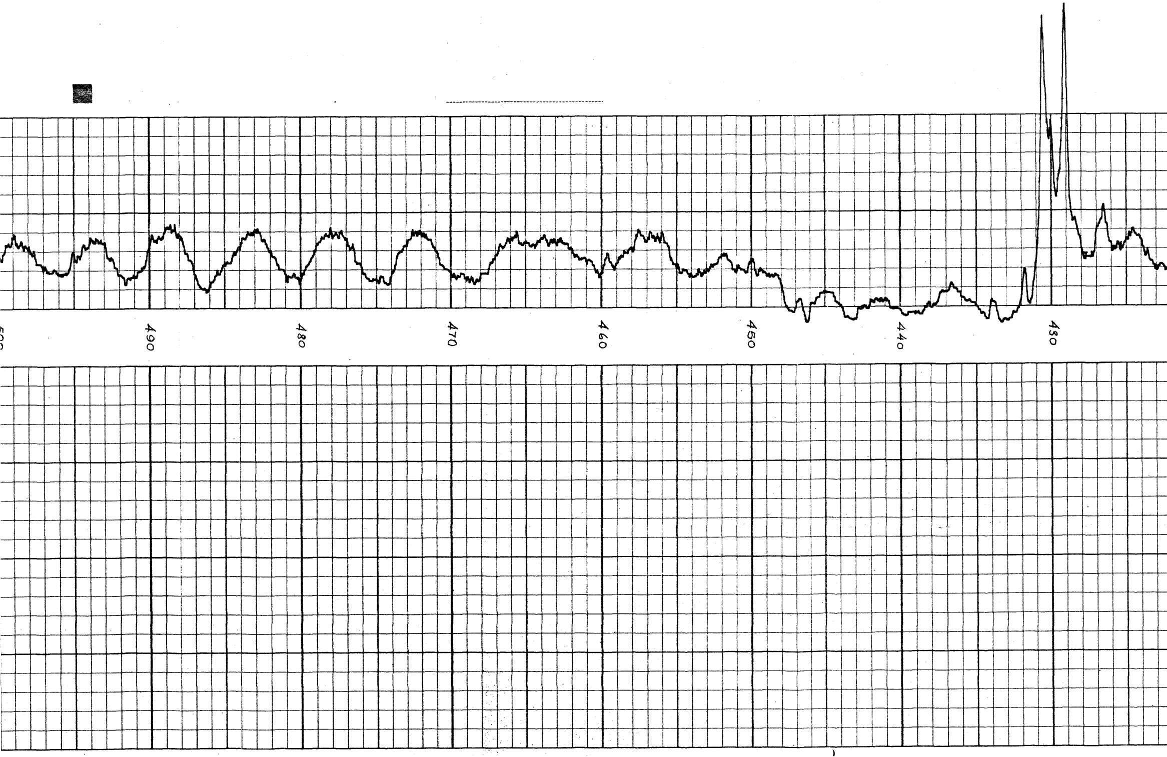

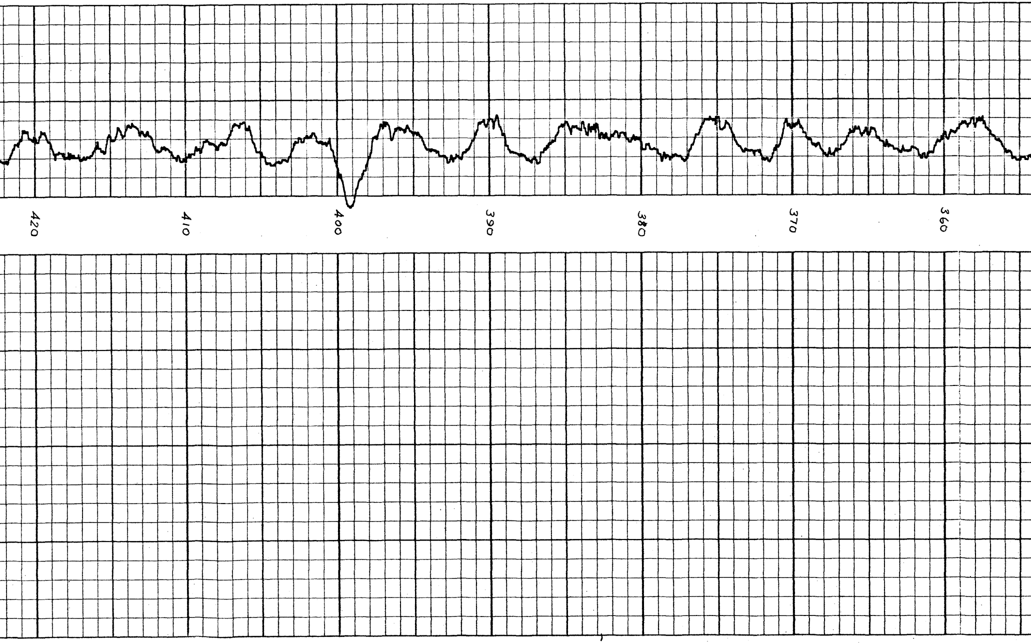

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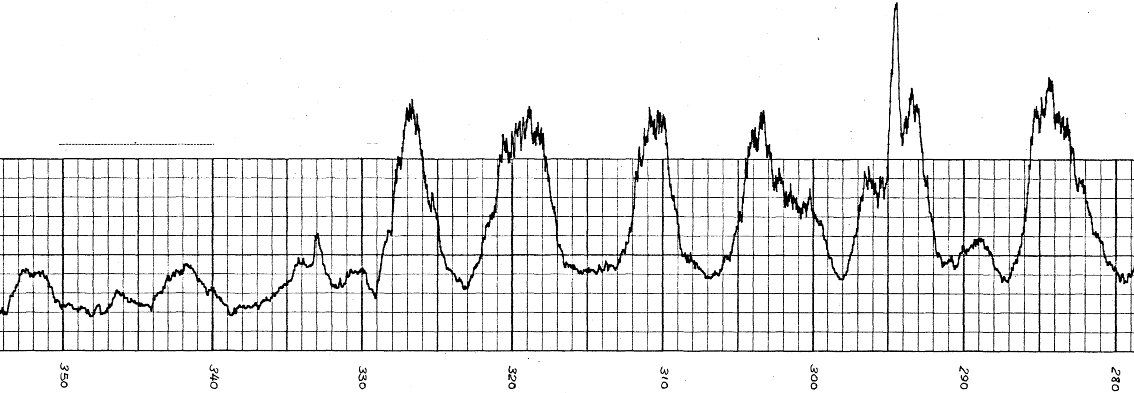

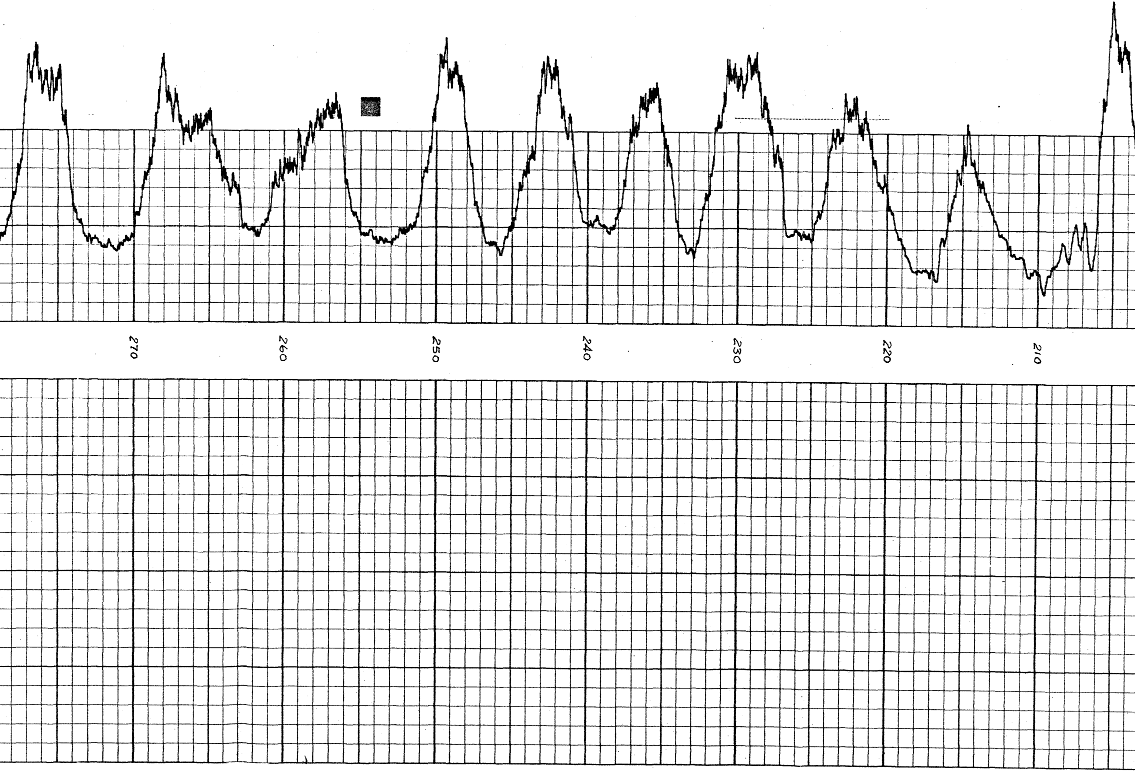

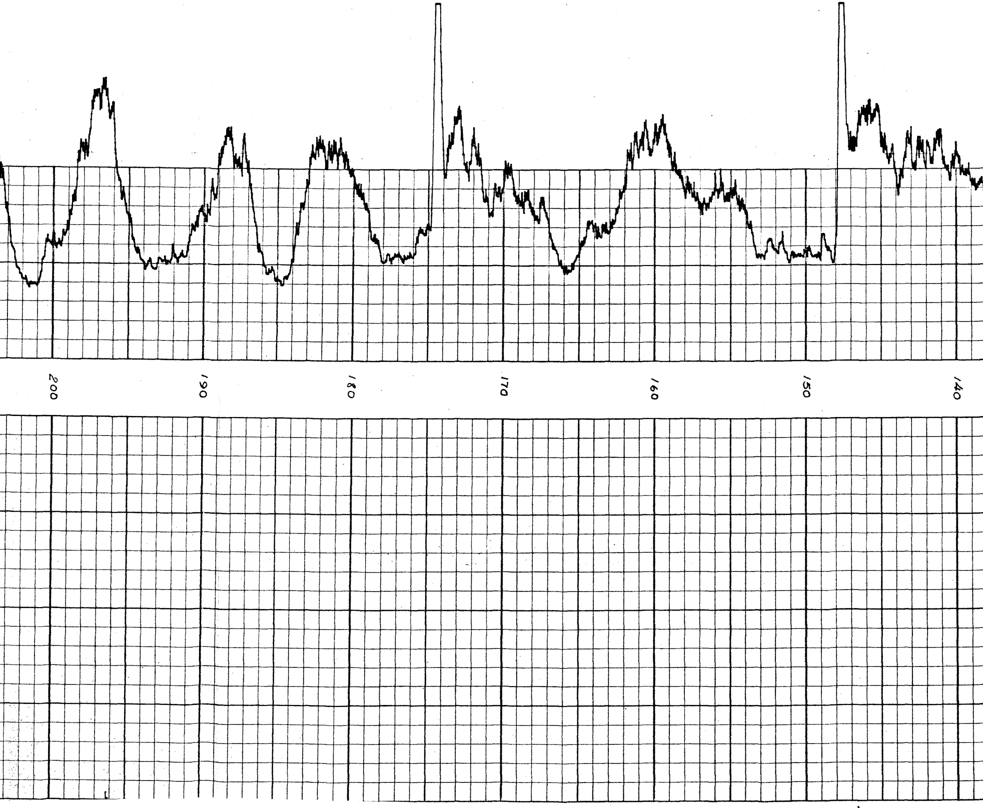

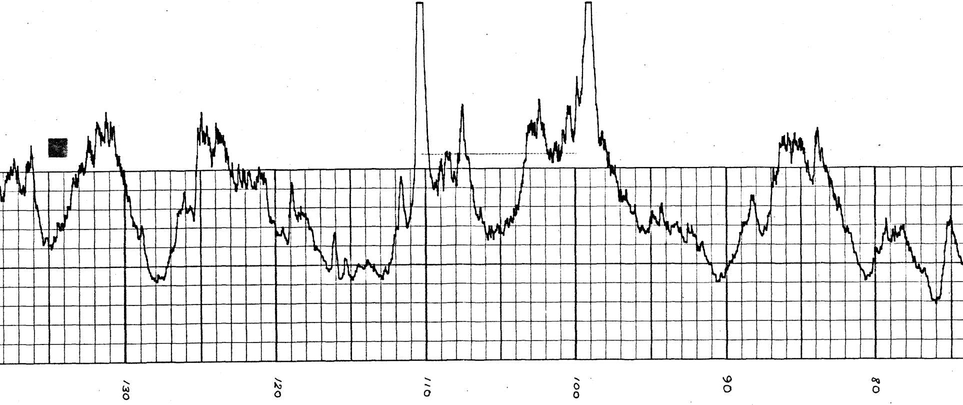

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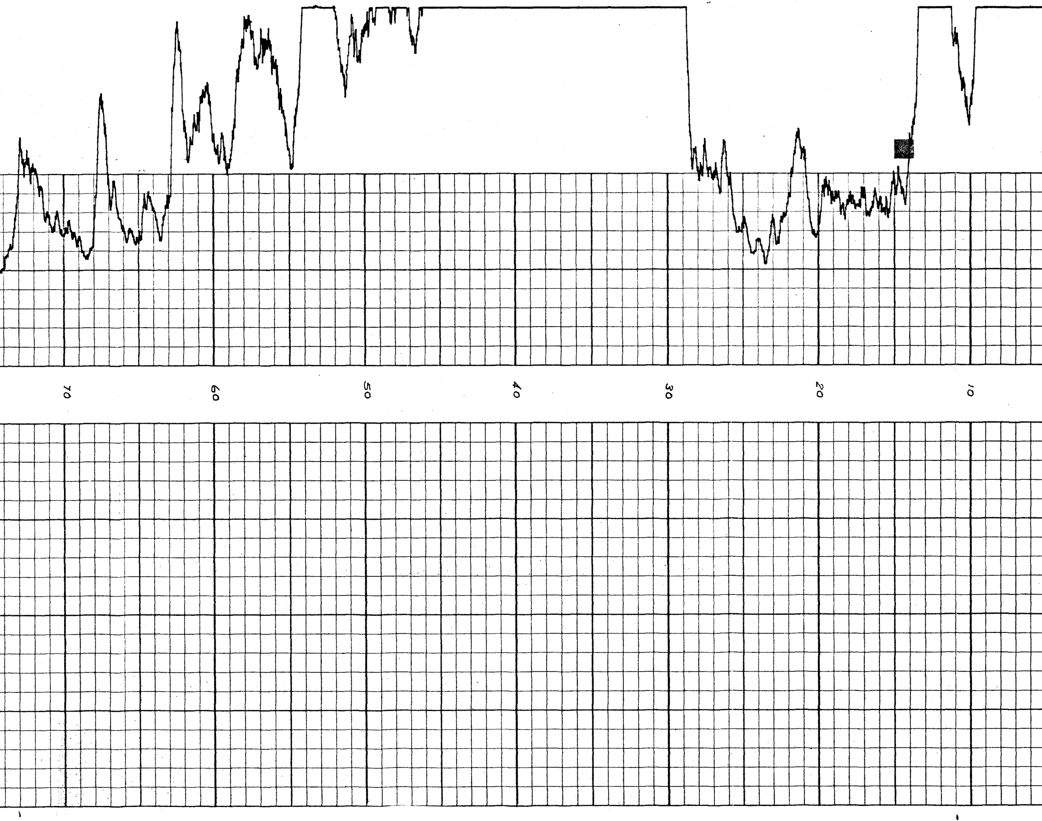


12.6

GEOEX
PTY. LTD.

5 cm

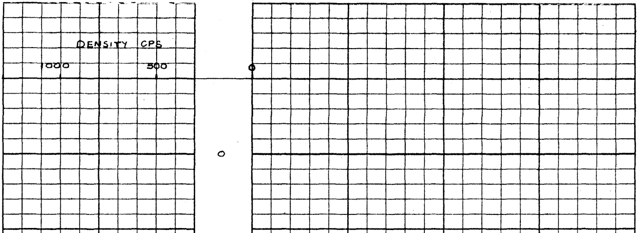
LOGGING DATA

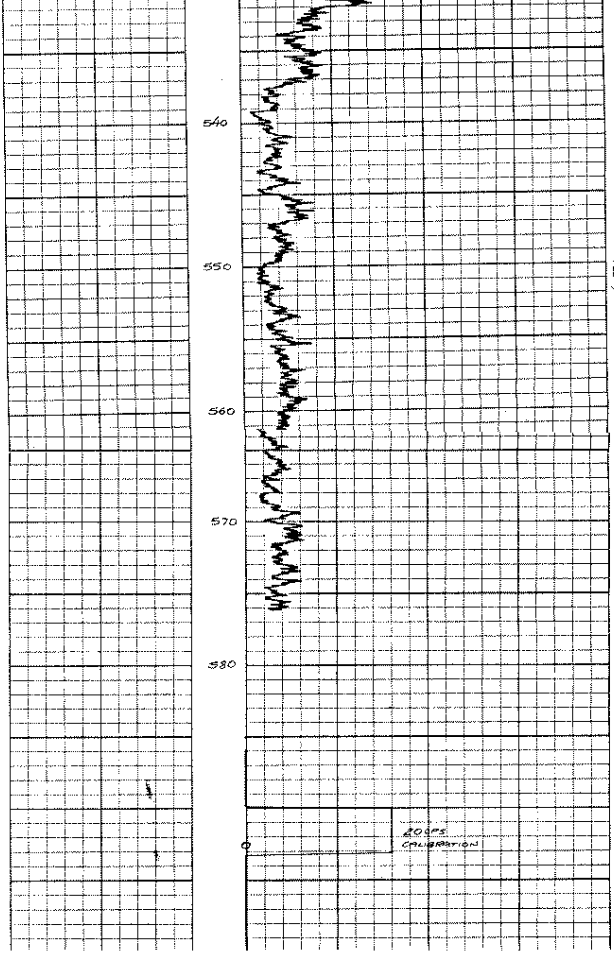
CLIENT : AMOCO

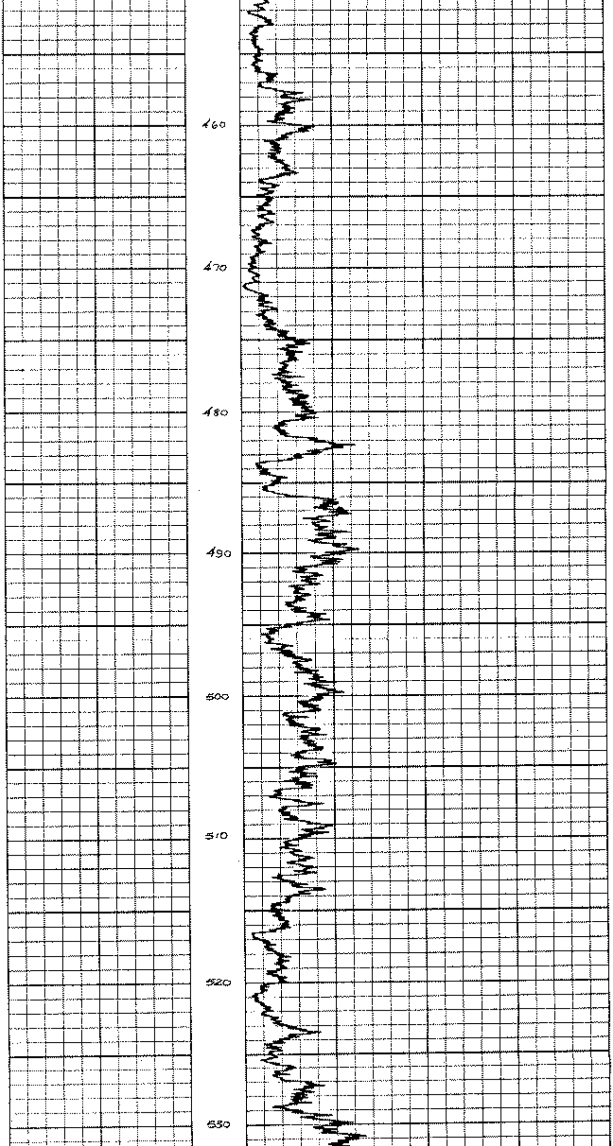
DATE 13-1-83

LOCATION	DENSITY
STATE TASMANIA	
REGION ZEEHAN (OCEANA)	FIRST READING
PROJECT	RANGE 100 CPS/DIVISION
HOLE DATA	TIME CONSTANT 1 SECOND
HOLE Nº ZT-82-104	LOGGING SPEED 6 METRES/MINUTE
HOLE SIZE	PAPER SCALE 1:200
CASING PVC	BACKGROUND COUNTS
T.D. 576 METRES	DETECTOR SIZE
SURFACE ELEVATION	DIGITAL READ OUT
BOREHOLE MEDIUM WATER/MUD	**ELECTRIC**
FLUID LEVEL	FIRST READING
DRILLER	RESIST. SCALE (Ω/DIV.)
INTERPRETATION DATA	S.P. SCALE (MY/DIV.)
PROBE Nº	PROBE SIZE
CALIBRATION STANDARD	RES. TYPE SINGLE POINT
'K' FACTOR	RIG TIME
DEAD TIME	
OPERATOR J. TAYLOR	
REMARKS	

DENSITY (CPS) S. P. RESISTIVITY







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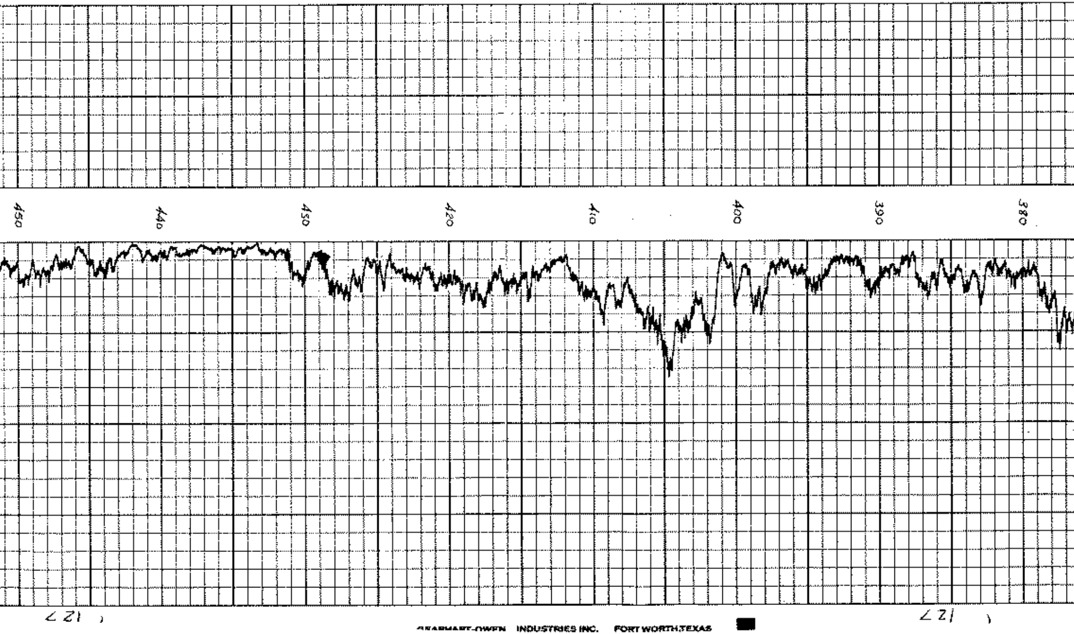
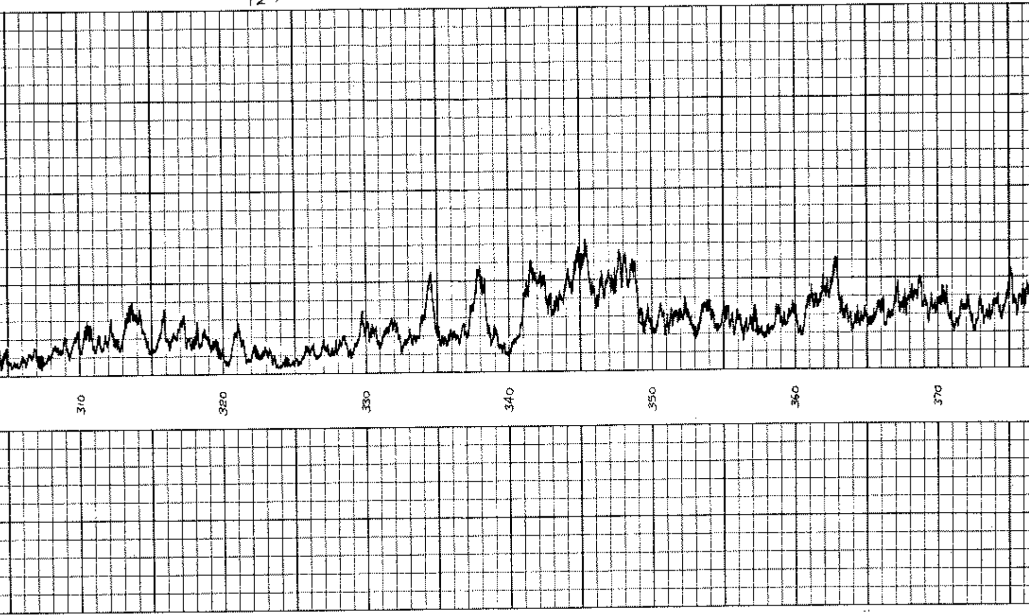


GRAPHMART-OWEN INDUSTRIES INC. FORT WORTH, TEXAS



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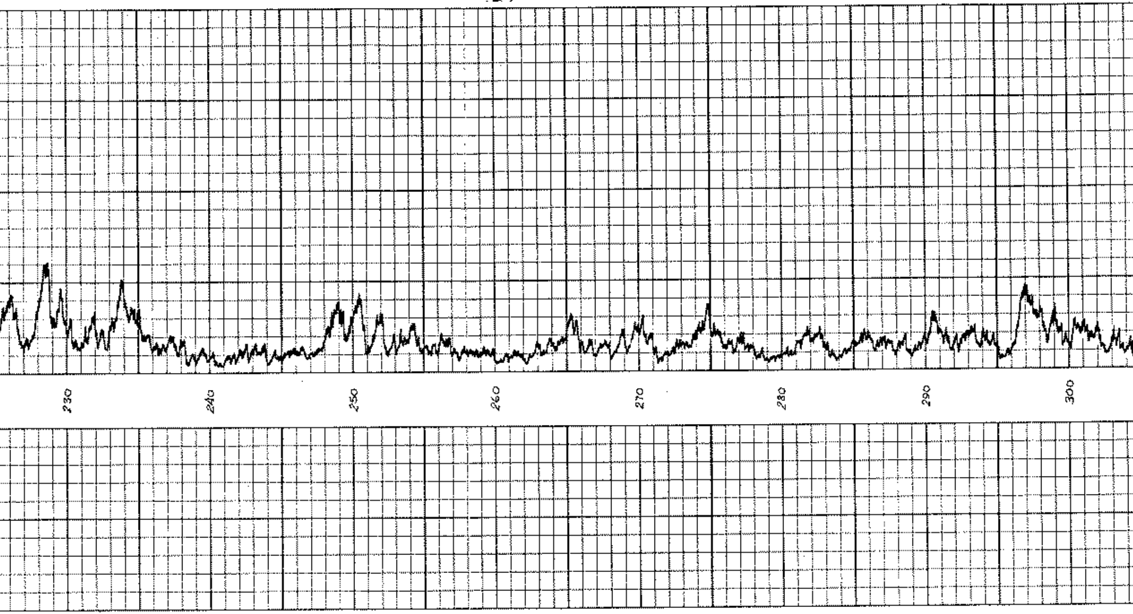

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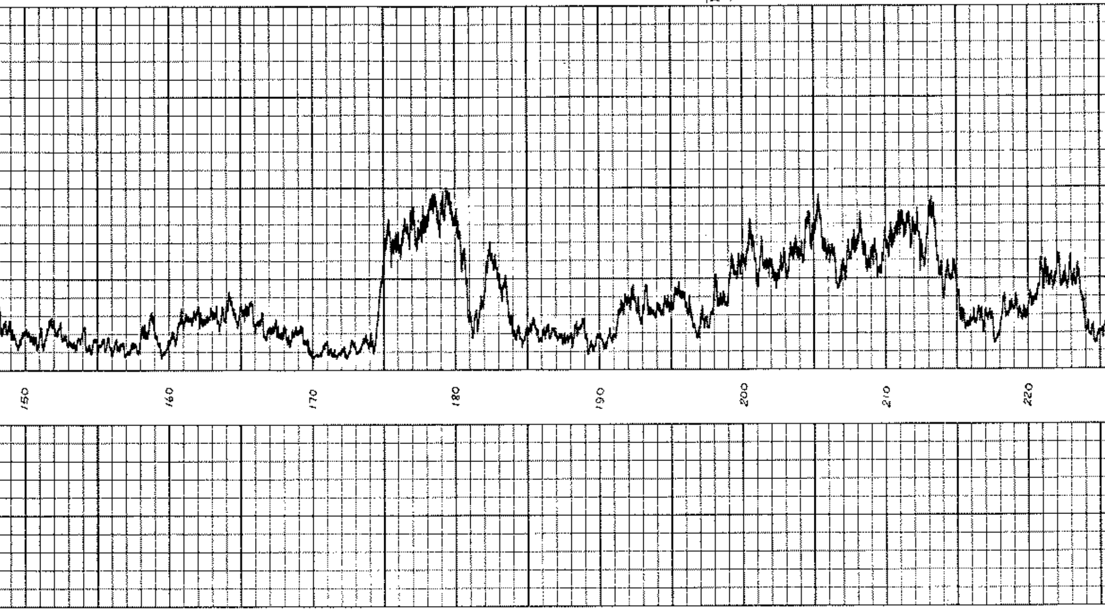
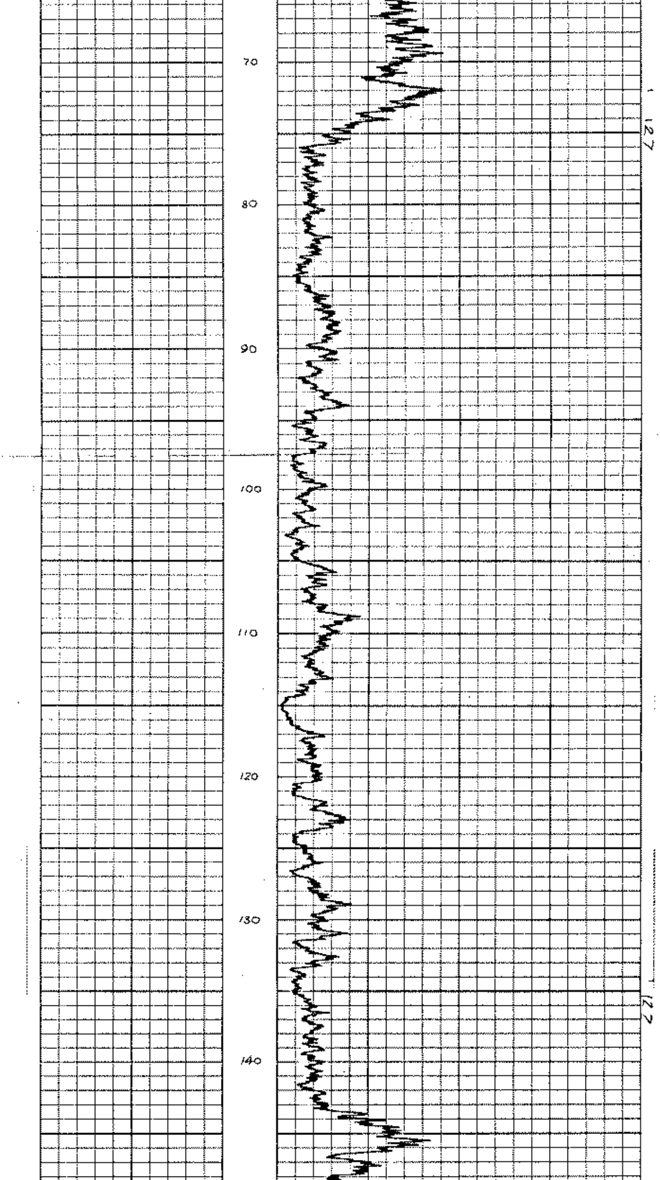
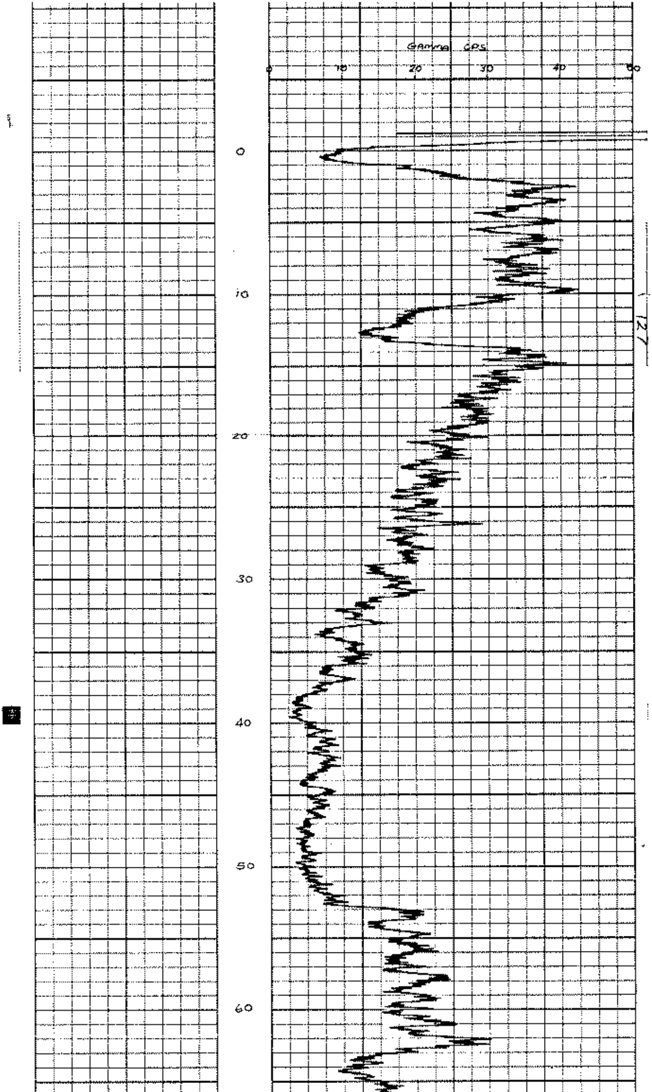






528157

GEOEX PTY. LTD.

5 cm

LOGGING DATA

CLIENT : AMOCO

DATE 13-1-83

LOCATION		GAMMA RAY	
STATE	TASMANIA		
REGION	ZEEHAN (OCEANA)	FIRST READING	
PROJECT		RANGE	2.5 CPS/DIVISION
HOLE DATA		TIME CONSTANT	2 SECONDS
HOLE Nº	ZT- 82- 10A	LOGGING SPEED	6 METRES/MINUTE
HOLE SIZE		PAPER SCALE	1:200
CASING	PVC	BACKGROUND COUNTS	
T.D.	576 METRES	DETECTOR SIZE	
SURFACE ELEVATION		DIGITAL READ OUT	
BOREHOLE MEDIUM	WATER/MUD	ELECTRIC	
FLUID LEVEL		FIRST READING	
DRILLER		RESIST. SCALE (Ω/DIV.)	
INTERPRETATION DATA		S.P. SCALE (MV/DIV.)	
PROBE Nº		PROBE SIZE	
CALIBRATION STANDARD		RES. TYPE	SINGLE POINT
'K' FACTOR		RIG TIME	
DEAD TIME			
OPERATOR	J. TAYLOR		
REMARKS			

GAMMA CPS :

528198 128

GEOEX PTY. LTD.

5 cm

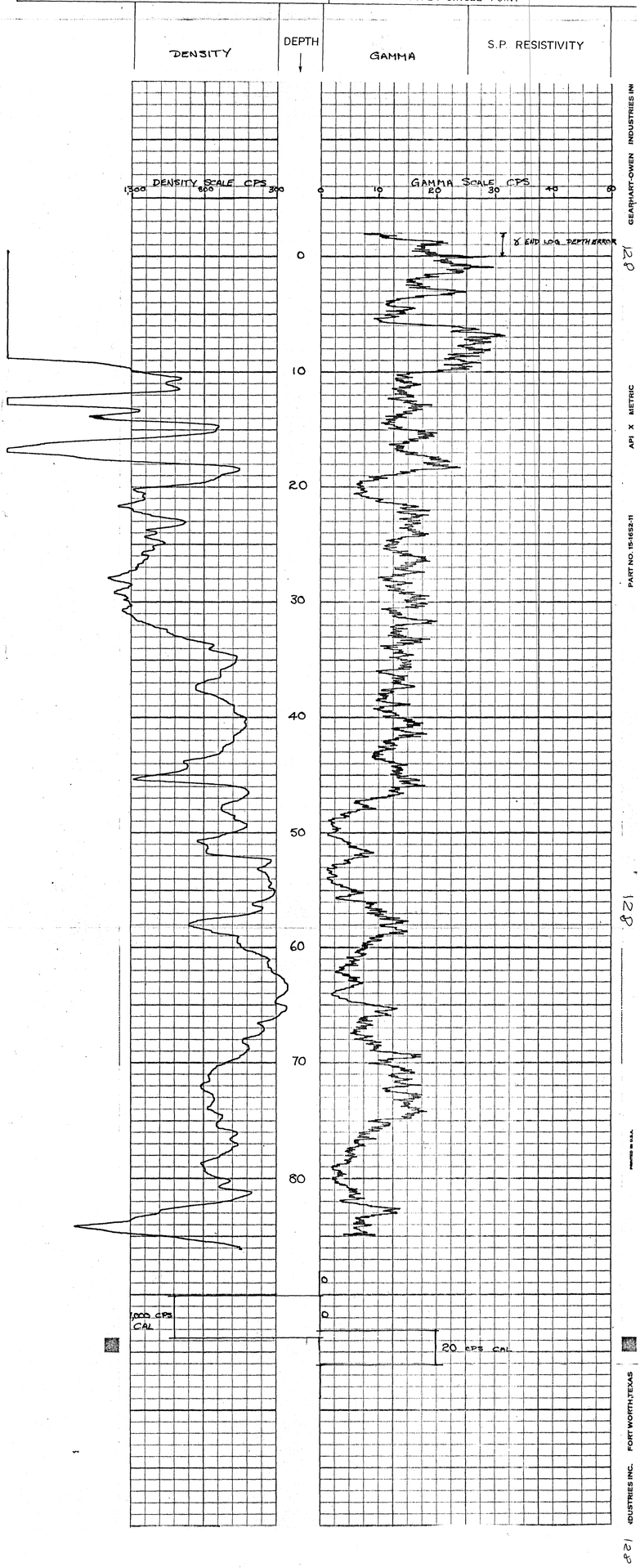
LOGGING DATA

CLIENT: Amoco

DATE: 16-12-82

LOCATION	
STATE	TASMANIA
REGION	ZEEHAN
PROJECT	OPERATOR M. O'NEILL
HOLE DATA	
HOLE Nº	ZT8211 45°
HOLE SIZE	
TOTAL DEPTH (m)	86 m
CASING DEPTH (m)	40 mm P.V.C. – 86 m
SURFACE ELEVATION	–
DATUM ELEVATION	0 m
BOREHOLE MEDIUM	WATER / MUD
FLUID LEVEL	–
INTERPRETATION DATA	
PROBE Nº	
PROBE O.D. (mm)	
LOGGING SPEED (m/min)	6
PAPER SPEED (m/cm)	2
REMARKS	

GAMMA	
LOGGED DEPTH (m)	85
RANGE (cps/cm)	5
TIME CONSTANT (sec)	2
CALIBRATION STANDARD	100 API UNITS
BACKGROUND COUNTS (cps)	5 – 10
DETECTOR SIZE	
DENSITY	
LOGGER DEPTH (m)	86
RANGE (cps/cm)	200
TIME CONSTANT (sec)	2
CALIBRATION STANDARDS:	
SOURCE	Cs 137
SPACING (cm)	35
ELECTRIC	
LOGGED DEPTH (m)	
RESISTIVITY SCALE (ohm/cm)	CAL. STD: 100 Ω
S.P. SCALE (mV/cm)	CAL. STD: 0,100mv
PROBE SIZE: 7·6 m	
RESISTIVITY TYPE: SINGLE POINT	



GEARHART-OWEN INDUSTRIES INC. FORT WORTH, TEXAS

API X METRIC

PART NO. 15-1652-11

128

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GEOEX
PTY. LTD.

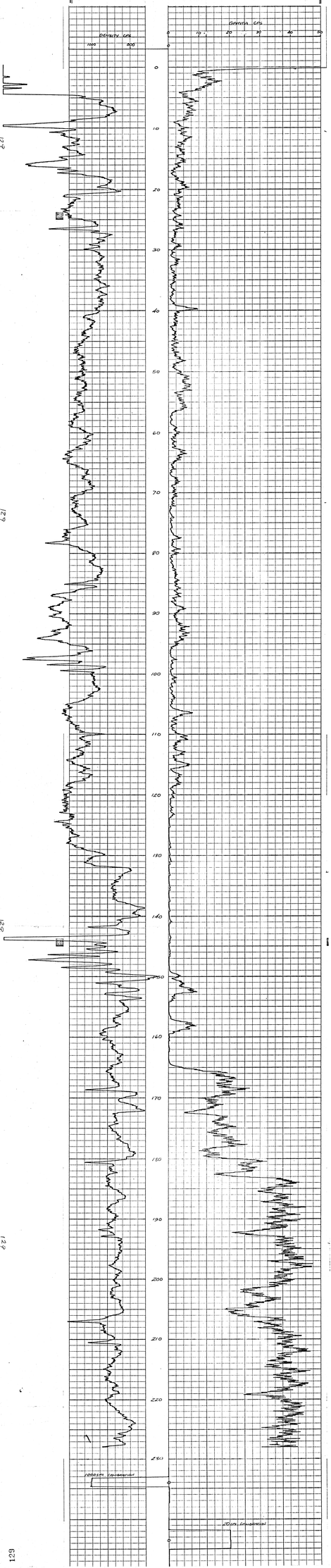
5 cm

LOGGING DATA

CLIENT: AMOCO

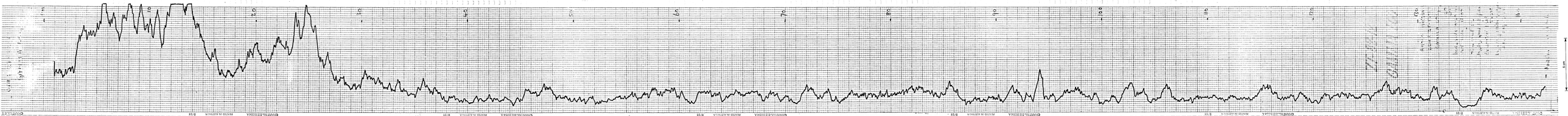
DATE 17-1-82

LOCATION	GAMMA RAY / DENSITY
STATE TASMANIA	
REGION ZEEHAN (NW SHEET)	FIRST READING
PROJECT	RANGE 2.5 cps/DIVISION / 1000 cps/DIVISION
HOLE DATA	TIME CONSTANT 2 SECONDS / 4 SECONDS
HOLE N° ZT-82-N1	LOGGING SPEED 6 METRES/min
HOLE SIZE	PAPER SCALE 1:200
CASING PVC	BACKGROUND COUNTS
T.D. 224 METRES	DETECTOR SIZE
SURFACE ELEVATION	DIGITAL READ OUT
BOREHOLE MEDIUM WATER/MUD	ELECTRIC
FLUID LEVEL	FIRST READING
DRILLER	RESIST. SCALE (Ω/DIV.)
INTERPRETATION DATA	S.P. SCALE (MV/DIV.)
PROBE N°	PROBE SIZE
CALIBRATION STANDARD	RES. TYPE SINGLE POINT
'K' FACTOR	RIG TIME
DEAD TIME	
OPERATOR J. TANGE	
REMARKS	



APPENDIX 11

DOWNHOLE GAMMA AND DENSITY SURVEYS ON HOLES ZT-82-12, ZT-83-14
by Mitre Geophysics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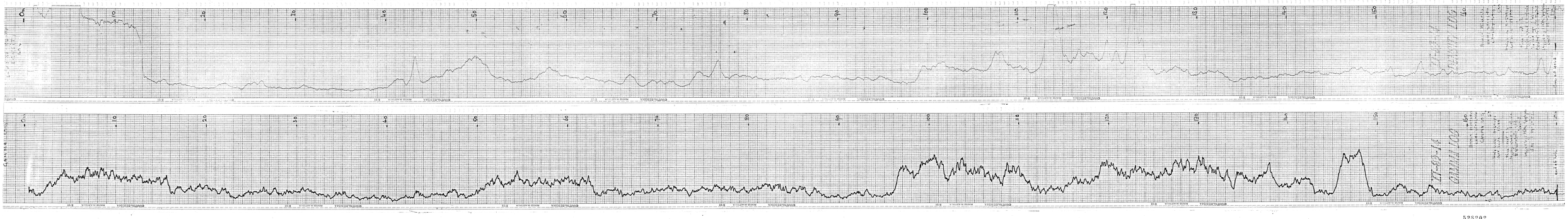
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APPENDIX 12

EM-37 SURVEY - PRELIMINARY ASSESSMENT LOGISTIC REPORT AND PROFILES by P. Staples, Amoco and Geoterrex

Amoco Minerals Australia Company

Inter-Office Correspondence

Date: MAY 24, 1983

To:	B. ROXBURGH P. JONES	Location:	SYDNEY TASMANIA	File Ref.:
From:	P.J. STAPLES	Location:	PERTH	File Ref.:

Subject: ZEEHAN EM-37 SURVEY

A preliminary assessment of the results of the Zeehan EM-37 Survey suggest there are a number of conductive zones worthy of follow-up investigation. In all cases, other than on the Austral and North Austral grids these responses are complicated by "loop effects". "Loop effects", in general, appear related to surficial changes, such as large contrasts in horizontal weathering conditions and related conductivity, and would be reduced with smaller transmitter loops. Large loop surveys carried out in areas with surficial problems, such as this, would give better results, if the transmitter loop were of the same length as the target.

A moderate to weakly conductive zone exists on the Austral and North Austral grids at approximately 1550E. There is some local enhancement of the conductivity response on the North Austral grid at 2200N and 2700N. In the former case, the zone appears more conductive or thicker between 2150N and 2400N, and in the latter case, a similar change occurs between 2600N and 2750N.

Contour maps of the EM-37 responses on the North Austral and the Mariposa grids have been completed and accompany this report.

P.J. STAPLES

Project Geophysicist

RE: EM-37

Copy of telex from P. Staples to B. Roxburgh/P. Jones, May 27, 1983.

North Austral Prospect

A review of the geophysical data available for the North Austral prospect has been undertaken in conjunction with an interpretation of the EM-37 results. The data available includes ground magnetics, gravity, PEM (moving loop), gradient array IP and EM-37. As a consequence of basemetal mineralization, the most significant features of the various surveys are:

A) A 1 milligal gravity anomaly situated along grid north-south between 2500N and 3000N. At the north and south extremities this zone appears to be comprised of at least two sources up to 100 meters apart and which converge in the vicinity of line 2700N.

B) Five separate chargeable zones delineated in the gradient array IP survey. These zones appear continuous and trend grid north-south. Two of these zones are coincident with the interpreted gravity sources north of line 2500N, converging also in the vicinity of line 2700N. The chargeable zones however, are continuous to the south of line 2500N in the absence of any resolvable gravity response. The eastern most of these interpreted trends is co-incident with an EM-37 response of line 2200N.

C) The EM-37 survey has outlined a weak to moderately conductive zone at approximately 1550E. The response does not exhibit exponential decay, which supports the interpreted extension of the zone beyond the survey area. This zone appears to be related to the Balstrup Fault and is located immediately to

the west (about 50 meters) of the fault. There are two zones of local enhancement of the response, caused by an increase in the conductivity or the thickness of the source, and these extend from 2150N to 2400N and 2600N to 2750N. Both responses could be interpreted as due to grid south plunging sources.

D) On line 2800N there is a PEM conductive source which is roughly coincident with a single line magnetic anomaly.

RECOMMENDATIONS

Four drill holes are recommended.

1. The combined IP and EM-37 anomalies on line 2200N. Drilling should be designed to test a near vertical target at a depth of about 100 meters at 2250N and 1550E.

2. The combined gravity and IP sources between 1400E and 1500E on line 2700N. The depth to the IP sources is approximately 50 meters. Drilling should be designed to test a near vertical target at a depth of 50 meters, 100 meters wide and centered on 1450E.

3. An EM-37 conductor on line 2700N at 1575E at a depth of approximately 100 meters. This may be an extension of drilling, 100 meters to the north at the Montague workings, however, it is proposed as a separate target.

4. Combined PEM and magnetic source at 1600E on line 2800N. The depth is approximately 100 meters.

528207

800E 900E 1000E 1100E 1200E 1300E 1400E 1500E 1600E 1700E 1800E

2900N
2800N
2700N
2600N
2500N
2400N
2300N
2200N
2100N

+1500 +1000 +500 0 -500 -1000 -1500 -2000 -3000 -4000 -5000

NORTH AUSTRAL EM-37 (CHAN. 5 EAST COMP.) LOOP 3 1:5000

5 cm

528208

800E 900E 1000E 1100E 1200E 1300E 1400E 1500E 1600E 1700E 1800E

2900N 2800N 2700N 2600N 2500N 2400N 2300N 2200N 2100N

NORTH AUSTRAL EM-37 (CHAN. 11 EAST COMP.) LOOP 3 1:5000

5 cm

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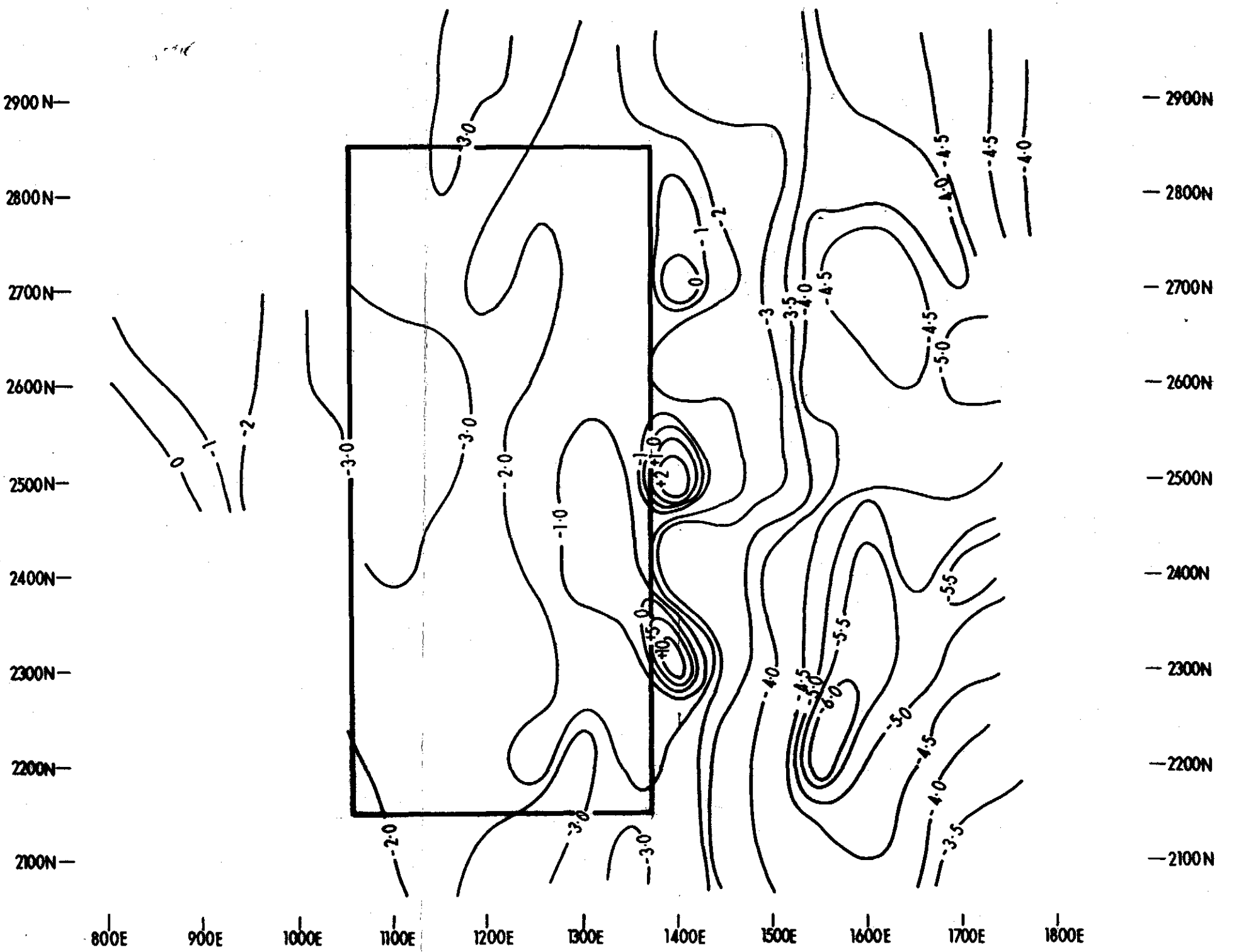

NORTH AUSTRAL EM-37 (CHAN. 15 EAST COMP.) LOOP 3 1:5000

5 cm

528210

LOGISTICS REPORT

FOR AN

EM-37 SURVEY

AT

ZEEHAN, TASMANIA

ON BEHALF OF

AMOCO MINERALS AUSTRALIA COMPANY

GEOTERREX PTY. LTD.

JOB NO. 85-1456

DECEMBER, 1982

528211

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APPENDIX B: EM-37 Plotting and Interpretation Conventions.

1. INTRODUCTION:

1.1 General.

Geoterrex Pty. Ltd. conducted an electromagnetic survey on behalf of Amoco Minerals Australia Co. near Zeehan, Tasmania between 9th December and 23rd December, 1982.

Four grids were surveyed in the area:

a) OCEANA grid (1 loop)
b) AUSTRAL grid (1 loop)
c) NORTH AUSTRAL grid (1 loop)
d) MARIPOSA grid (1 loop)

1.2 Terrain - Geophysical Conditions.

Generally the terrain over the grids was quite rugged with swamps and dense vegetation hindering progress. In many cases, inadequate line-cutting proved to be a major problem. Cultural effects were all but absent in all areas. The ground proved to be extremely resistive with the swamps providing the only surficial conductivity.

1.3 Personnel.

Geoterrex supplied two men for the survey:
John Peacock (Snr. Geophysicist/crew chief) and Alan King (Snr. Geophysicist).
Amoco supplied several field assistants to help lay out the transmitter loops.

1.4 Equipment.

Geoterrex supplied the Geonics EM-37 unit, cassette logger and HP-85, all peripherals, sufficient wire for two transmitting loops and a 4WD vehicle.

SURVEY DETAILS cont.

Throughout the survey only the 25 Hz transmitter pulse and an integration time of 41 sec. were used. Both polarities of the Z and X components were taken to fully compensate for any DC offset.

2.2 Data Presentation.
The data was recorded on cassette and plotted each evening on the HP-85. Final computer-drawn report-sized plots were presented upon completion of the survey.

Respectfully submitted,

Tony Lynch

for JOHN PEACOCK,
Geophysicist.

Appendix A

EQUIPMENT SPECIFICATIONS

2. SURVEY DETAILS:

2.1 Field Operations.

Details of the coverage on each grid are given below:

a) OCEANA grid

1 transmitter loop

Loop 1 : 1400E/ 1700E/ 3000N/ 3650N

8 lines:	L2900N	1150E-1650E	(500m @ 50m stns)
	L3100N	"	"
	L3200N	"	"
	L3300N	"	"
	L3400N	"	"
	L3500N	"	"
	L3600N	"	"
	L3700N	"	"

b) AUSTRAL grid

1 transmitter loop

Loop 2 : 1375E/ 1050E/ 550N/ 1250N

9 lines:	L 500N	1100E-1700E	(600m @ 50m stns)
	L 600N	"	"
	L 700N	"	"
	L 800N	1100E-1750E	(650m @ 50m stns)
	L 900N	1100E-1750E	"
	L1000N	1100E-1700E	(600m @ 50m stns)
	L1100N	"	"
	L1200N	"	"
	L1300N	"	"

c) NORTH AUSTRAL grid

1 transmitter loop

Loop 3 : 1050E/ 1375E/ 2150N/ 2850N

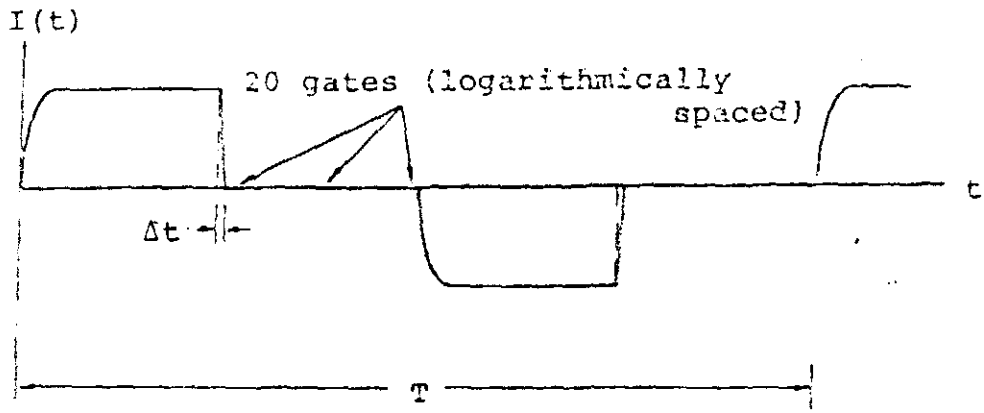
9 lines:	L2100N	1000E-1700E	(700m @ 50m stns)
	L2200N	1100E-1700E	(600m @ 50m stns)
	L2300N	"	"
	L2400N	"	"
	L2500N	800E-1700E	(900m @ 50m stns)
	L2600N	850E-1700E	(850m @ 50m stns)
	L2700N	1100E-1700E	(600m @ 50m stns)
	L2800N	1100E-1800E	(700m @ 50m stns)
	L2900N	1100E-1700E	(600m @ 50m stns)

EM37 Ground Transient Electromagnetic System Technical Specifications

Transmitter

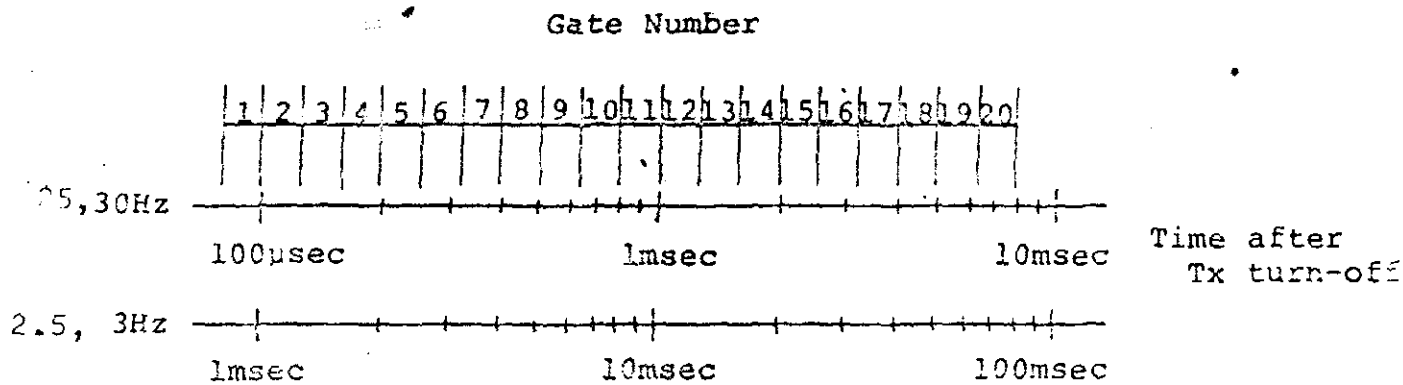
Current Waveform	-	See Fig. 1
Repetition rate	-	3Hz or 30Hz in countries using 60Hz power line frequency; 2.5Hz or 25Hz in countries using 50Hz power line frequency; all four base frequencies are switch selectable.
Turn-off time (Δt)	-	fast linear turn-off of maximum 300 µsec. at 20 amps into 300x600m loop. Decreases proportionally with current and (loop area)$^{\frac{1}{2}}$ to minimum of 20 µsec. Actual value of Δt read on front panel meter.
Transmitter loop	-	any dimensions from 40x40m to 300x600m maximum at 20 amps. Larger dimensions at reduced current. Transmitter output voltage switch adjustable for smaller loops. Value of loop resistance read from front panel meter; resistance must be greater than 1 ohm on lowest voltage setting to prevent overload.
Transmitter protection	-	circuit breaker protection against input overvoltage; instantaneous solid state protection against output short circuit; automatically resets on removal of short circuit. Input voltage, output voltage and current indicated on front panel meter.
Transmitter output voltage	-	150 volts (zero to peak) maximum; 20 volts (zero to peak) minimum
Transmitter output power	-	2.8 kw maximum
Transmitter wire supplied	-	1800m. #10 copper wire PVC insulated with nylon jacket; transmitter wire contained on 6 reels (supplied); 2 reel winders supplied.
Transmitter motor generator	-	5 HP Honda gasoline engine coupled to 120 volt, 3 phase, 400Hz alternator. Approximately 8 hours continuous operation from full (built-in) fuel tank.

Measured quantity	-	time rate of decay of magnetic flux along 3 axes.
Sensor	-	air-cored coil of bandwidth 40 kHz; 100cm dia. by 7x5cm cross-section. Coil holder supplied to facilitate measurement along 3 axes.
Time channels	-	20 time channels with locations and widths as shown in Fig. 2. Successive operation at 30Hz, then 3Hz, effectively gives 30 channels covering range from 80 μsec. to 80 msec.
Output display	-	4 digit plus sign LED display; display also shows channel number and gain.
Integration time	-	2^n cycles at 30Hz; n=4,6,8,10,12,14 (switch selectable); similar integration times at other base frequencies.
Receiver output noise referred to input	-	typically 1.5×10^{-10} volt/m^2 at last gate at 30Hz with integration time of 34 seconds. Noise will be higher during intense local spherics activity.
Output connector	-	all 20 channels in analogue format and house-keeping functions in digital format available from output connector.
Synchronization to Tx	-	any of the following (switch selectable) (1) reference cable (2) primary pulse (3) 27 MHz radio link (40 channels) (4) high stability (oven controlled) quartz crystals.
Noise rejection circuitry	-	Selective clipping of atmospheric noise pulses at all times. Audio output of Rx coil (transmitter pulse blanked out) is available on built-in loud speaker for ready identification of interference.
Receiver batteries	-	12 volt rechargeable Gel-cell; 9 hours continuous operating time at 17°C. Two batteries and a battery charger supplied to permit charging of second battery from transmitter motor-generator during survey.



Transmitter Current Waveform

FIG. 1



Gate Location and Widths

FIG. 2

BANDWIDTH OF EM-37 SYSTEM

2.5 Hz Repetition Rate

CHANNEL	BEGINNING	END	GATE WIDTH	MID-GATE
1	.800	.970	.17	.885
2	.970	1.21	.24	1.09
3	1.21	1.58	.37	1.40
4	1.58	1.95	.37	1.77
5	1.95	2.44	.49	2.20
6	2.44	3.16	.72	2.80
7	3.16	3.93	.77	3.55
8	3.93	4.92	.99	4.43
9	4.92	6.34	1.42	5.63
10	6.34	7.90	1.56	71.2
11	7.90	9.62	1.72	8.76
12	9.62	12.12	2.50	10.87
13	12.12	15.87	3.78	14.00
14	15.87	19.57	3.67	17.72
15	19.57	24.57	5.00	22.1
16	24.57	31.77	7.20	28.2
17	31.77	39.57	7.80	35.7
18	39.57	49.57	10.00	44.6
19	49.57	63.77	14.20	56.67
20	63.77	79.37	15.60	71.6

ALL TIMES ARE IN MILLISECONDS FROM END OF RAMP.

BANDWIDTH OF EM-37 SYSTEM

25 Hz Repetition Rate

CHANNEL	BEGINNING	END	GATE WIDTH	MID-GATE
1	.080	.097	.017	.0885
2	.097	.121	.024	.109
3	.121	.158	.037	.140
4	.158	.195	.037	.177
5	.195	.244	.049	.220
6	.244	.316	.072	.280
7	.316	.393	.077	.355
8	.393	.492	.099	.443
9	.492	.634	.142	.563
10	.634	.790	.156	.712
11	.790	.962	.172	.876
12	.962	1.212	.250	1.087
13	1.212	1.587	.378	1.400
14	1.587	1.957	.367	1.772
15	1.957	2.457	.400	2.21
16	2.457	3.177	.720	2.62
17	3.177	3.957	.780	3.57
18	3.957	4.957	1.000	4.46
19	4.957	6.377	1.420	5.667
20	6.377	7.937	1.560	7.16

ALL TIMES ARE IN MILLISECONDS FROM END OF RAMP.

Appendix B

EM-37 PLOTTING AND INTERPRETATION CONVENTIONS

The Geoterrex fixed-loop time-domain convention system has been designed with consistency in mind. Given the great diversity of grid and loop orientations, it is most important that anomalies are of a predictable shape.

To fully understand the convention, four basic rules must be laid down:

1) The vertical primary field (Z component) is positive within any loop. To be consistent with a Cartesian co-ordinate system, the Z^+ direction is defined as 'up', i.e. the field vectors point up within the loop and down when outside the loop.

2) The X component is defined as that which points along the grid lines. Depending upon which direction the lines run, W or S is defined as X^+.

3) Using a right hand orientation where X^+ is direction of the middle finger, and Z^+ is the direction of the thumb, then Y^+ is the direction defined by the index finger.

4) North or East is always plotted to the right on the page.

With these four rules, the shapes of the half space responses for late times for all three components are uniquely defined as shown in Figures 1, 2, 3a and 3b.

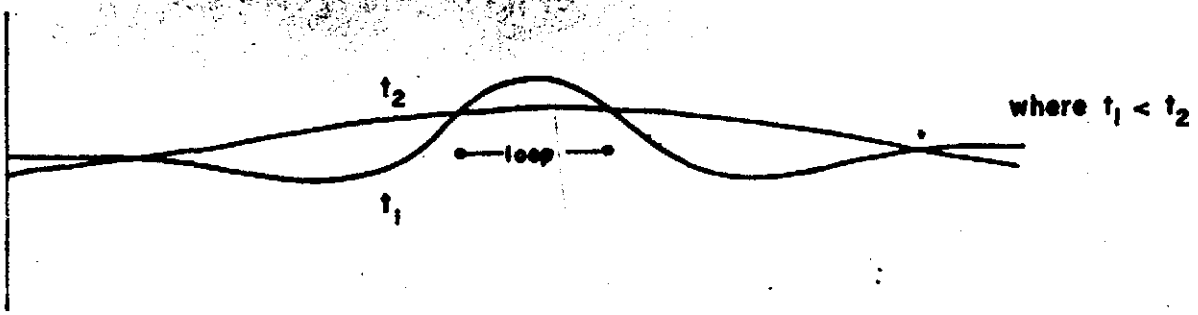


Fig. 1 Half-space response : Z component

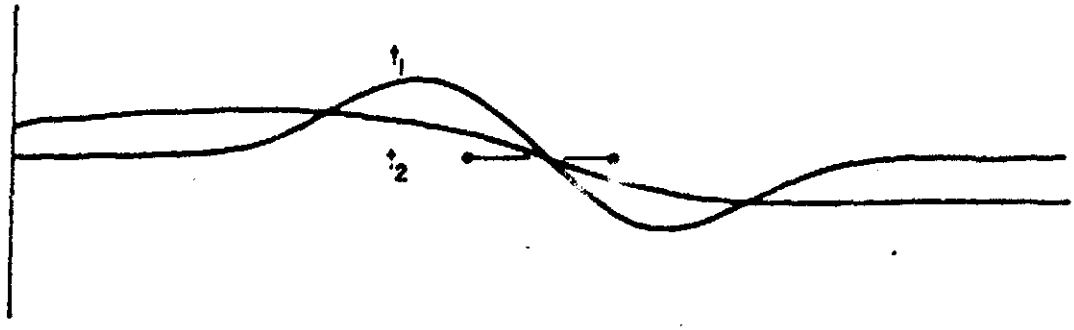


Fig. 2 Half-space response : X Component

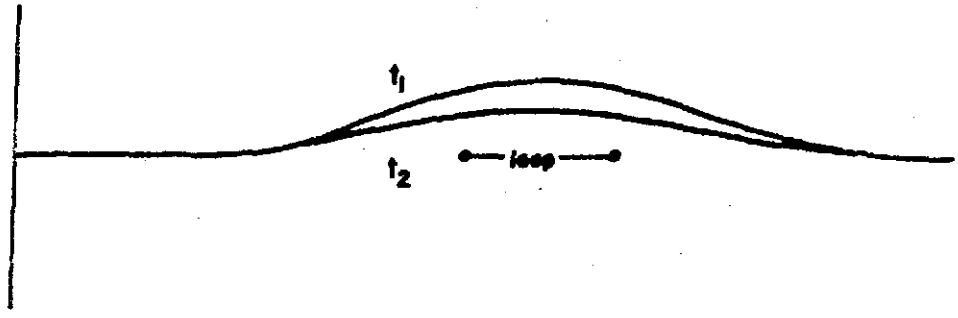


Fig. 3(a) Half-space response : Y component
(Positive half of loop)

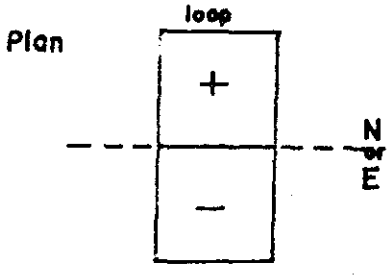


Fig. 3(b) Half-space response : Y component
(Negative half of loop)

Note: Unlike the Z component, there is only one maxima or minima for the Y component for a homogeneous half-space.

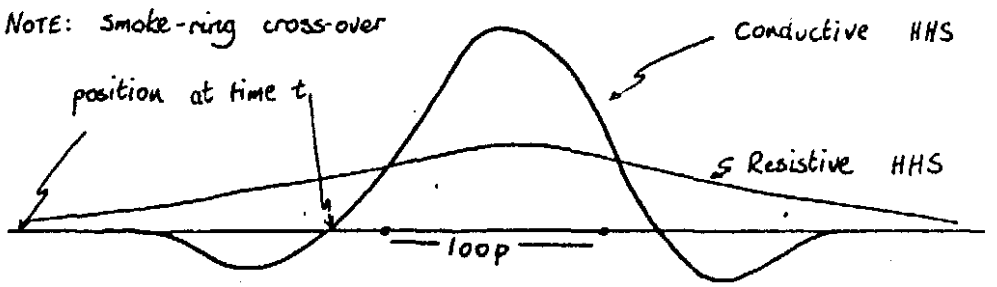


Fig 4. Comparison of conductive and resistive homogeneous half-space responses for Z-component.

A conductive homogeneous half-space is characterised by an early channel high amplitude response with a slow migration of the smoke-ring crossover from the loop.

By comparison, a resistive HHS will exhibit a lower early channel amplitude response and a rapid migration of the smoke-ring.

Note that the rate of decay of the channel amplitude responses for both conductive and resistive HHS is the same, and is proportional to t.exp (-5/2).

The migration of the smoke-ring determines the detection of a conductor with respect to time and space. For example, a conductor located beyond the smoke-ring in a relatively conductive environment will not be energised by intermediate times but may be evident at late times if the smoke-ring has passed beyond it. In short, only conductors within the limits of the smoke-ring at a given time can possibly be detected.

Confined Conductor Responses

528225

The response due to a confined conductor is closely related to the aforementioned half-space responses and to the conductor's position with relation to the loop. Figures 5, 6, 7a and 7b show the responses for a vertical plate.

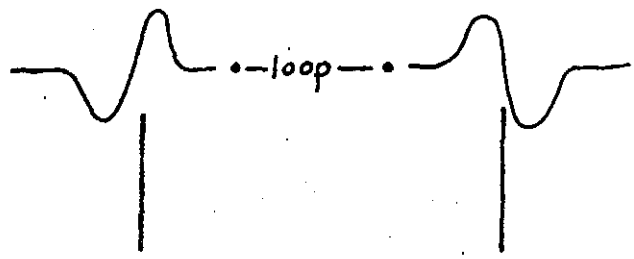


Fig. 5 Vertical conductor: Z component

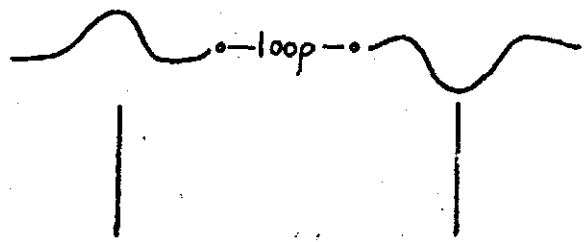
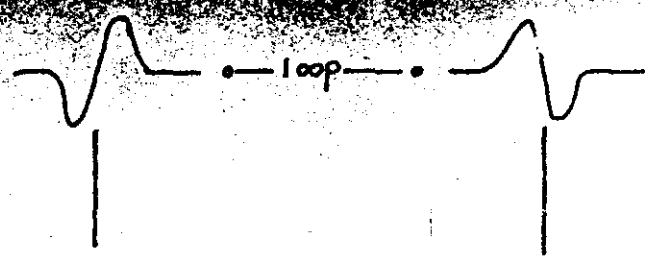


Fig. 6. Vertical conductor: X component



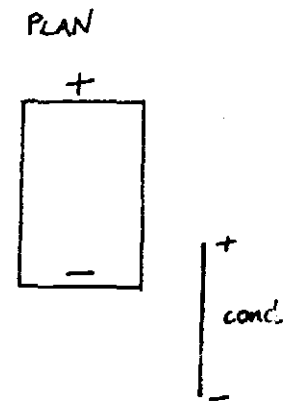


Fig. 7a Vertical conductor: Y component
(Positive side of conductor.)

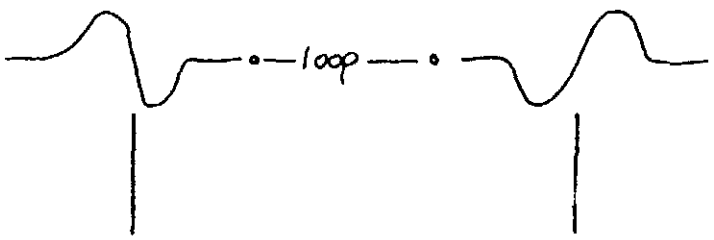


Fig. 7b Vertical conductor : Y component
(Negative side of conductor)

When the dip of the conductor is allowed to vary, the responses become more complicated. Figures 8 through to 12 show how the dip effects the vertical and horizontal components.

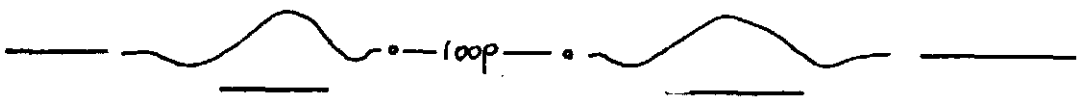


Fig. 8 Horizontal conductor : Z component

NOTE: Late-time response character both inside and outside loop the same.

NOTE: difference of amplitude

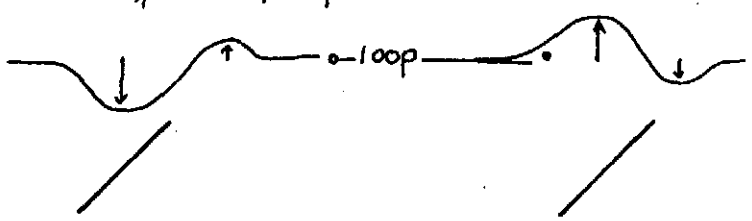


Fig. 9. Dipping conductor : Z component

NOTE: That the positive shoulders in Fig 9. are on the loop side of the anomaly.

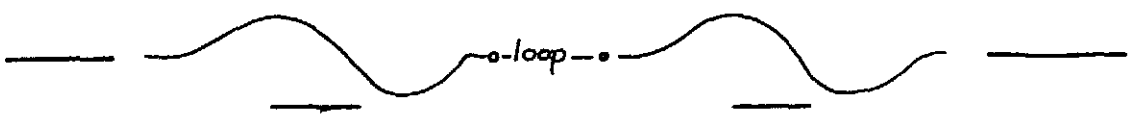


Fig. 10. Horizontal conductor : X component

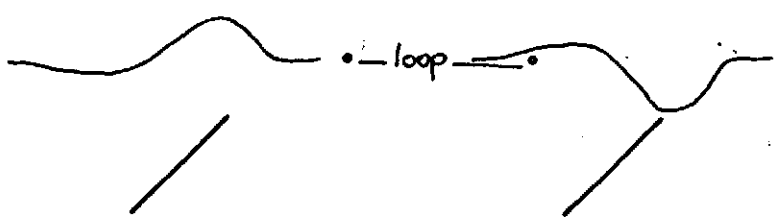


Fig. 11. Dipping conductor : X component

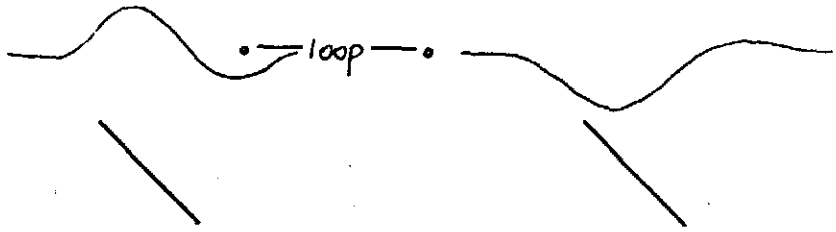


Fig. 12 Dipping conductor : X component

By remembering the shapes of the responses for these few simple geometrics, the identification of false anomalies can be avoided.

In conclusion, by identifying features which appear to have stable (non-diffusing) responses with respect to an appreciable length of time one can isolate confined targets from the half-space. After these interesting features have been identified, the geometry of the situation can be ascertained.

GEOTERREX WEEKLY PRODUCTION REPORT

Amoco PROJECT No. 85-1456 TYPE OF SURVEY EM37

1550

DATE	PRODUCTION			
Dec 5/82				
Dec 6/82	AK flies Syd → Devonport		Airfare $169.90	
Dec 7/82				
Dec 8/82				
Dec 9/82	JP flies Syd → Devonport	S	Airfare $169.90 Excess baggage $7.00	paid 2x$15
Dec 10/82	Read L3700 } 1150E → 1650E L3600 } L3500 Loop 1 - Occ na — 35 stations	P	Fuel $7.76	paid 2x$15
Dec 11/82	od @ 6:00am to experiment with loop effect Loop broken overnight Read L2900N } 1650E → 1150E Loop 1 L3100N } these lines were very poorly cut — very slow going — 24 stations	P		paid 2x$15

5289 2329

Hotel Name – Hotel Cecil Period - ..... Bill paid by Client or G

npany Hired From – ..... Period – .....

S: Attach Pink Copy of Order to this report.

John Peacock } Crew
Alan King }

N.B. Breakfasts paid for by Amoco
$15 covers remaining meals

PARTY CHIEF

GEOTERREX WEEKLY PRODUCTION REPORT

159

Amoco PROJECT No. 85-1456 TYPE OF SURVEY EM-37

DATE	PRODUCTION			
Dec 12/82	Read L 3200N, L 3300N, L 3400N } 1150E → 1650E Loop 1 36 stations ✓ Moderate terrain	P		pad 2x $15
Dec 13/82	Reread L 3400N, L 3500N } 1500E → 1150E Loop 1 44 stations ✓ Read Loop 2 Arrival L 1300, L 1200 } 1100E → 1700E = Bulldozer breaks wire necessitating resplice	¾ P		pad 2x $15
Dec 14/82	Read L 1100N, L 1000N } 1100E → 1700E Loop 2 L 900N, L 800N } 1100E → 1750E 54 stations ✓	P	Fuel $9.38	pad 2x $15
Dec 15/82	Read L 700N, L 600N, L 500N } 1100E → 1700E Loop 2 39 stations ✓ These lines are not easy going	P		pad 2x $15
Dec 16/82	Rain all day	S		pad 2x $15
Dec 17/82	Read L 2100N, L 2200N, L 2300N, 2400N } 1000E → 1700E, 1100E → 1700E 54 stations ✓ light rain in morning	P	Fuel $9.00	pad 2x $15
Dec 18/82	Read L 2900 1100E → 1700E L 2800 1100E → 1800E L 2700 1100E → 1700E swampy - difficult to set up 41 stations ✓ intermit. light rain all day	P		pad 2x $15

5228226

Hotel Name — ..... Period — ..... Bill paid by Client or Ge

pany Hired From — ..... Period — .....

: Attach Pink Copy of Order to this report.

ry bad for loop effect.

PARTY CHIEF: [illegible]

GEOTERREX WEEKLY PRODUCTION REPORT

Amoco . PROJECT No. 85-1456 TYPE OF SURVEY EM 3

DATE	PRODUCTION			Mis
Dec 19/82	Read L 2600N, L 2500N } 850E → 1700E Loop 3 Lines marginally cut in some areas.	P light rain all day 34 stations ✓	paid 2x$15	
Dec 20/82	Read L 5890 0N, L 5900 0N } 66950E → 67550E Rain in morning delays start Loop 4 – Mariposa – Logged over Area – very difficult working	½S ½P 28 stations ✓	paid 2x$15	
Dec 21/82	Read L 59100N, L 59200N, L 59300N } 66950E → 67550E Loop 4	P 40 stations ✓	paid 2x$15	
Dec 22/82	AK and Mark (of Amoco) Read Loop 4 L 59400N, L 59500N } 67550E → 66950E JP deathly ill with flu (stays @ hotel) Pack equipment and roll up loop.	P 28 stations ✓	paid 2x$15	
Dec 23/82	JP and AK drive Zeeham → Davenport	S	2 airfares $2x169.90 Fuel $21.60 Fuel $11.40 paid 2x$15	Can w
Dec 24/82				
Dec 25/82				

: Hotel Name – ..... Period – ..... Bill paid by Client or G

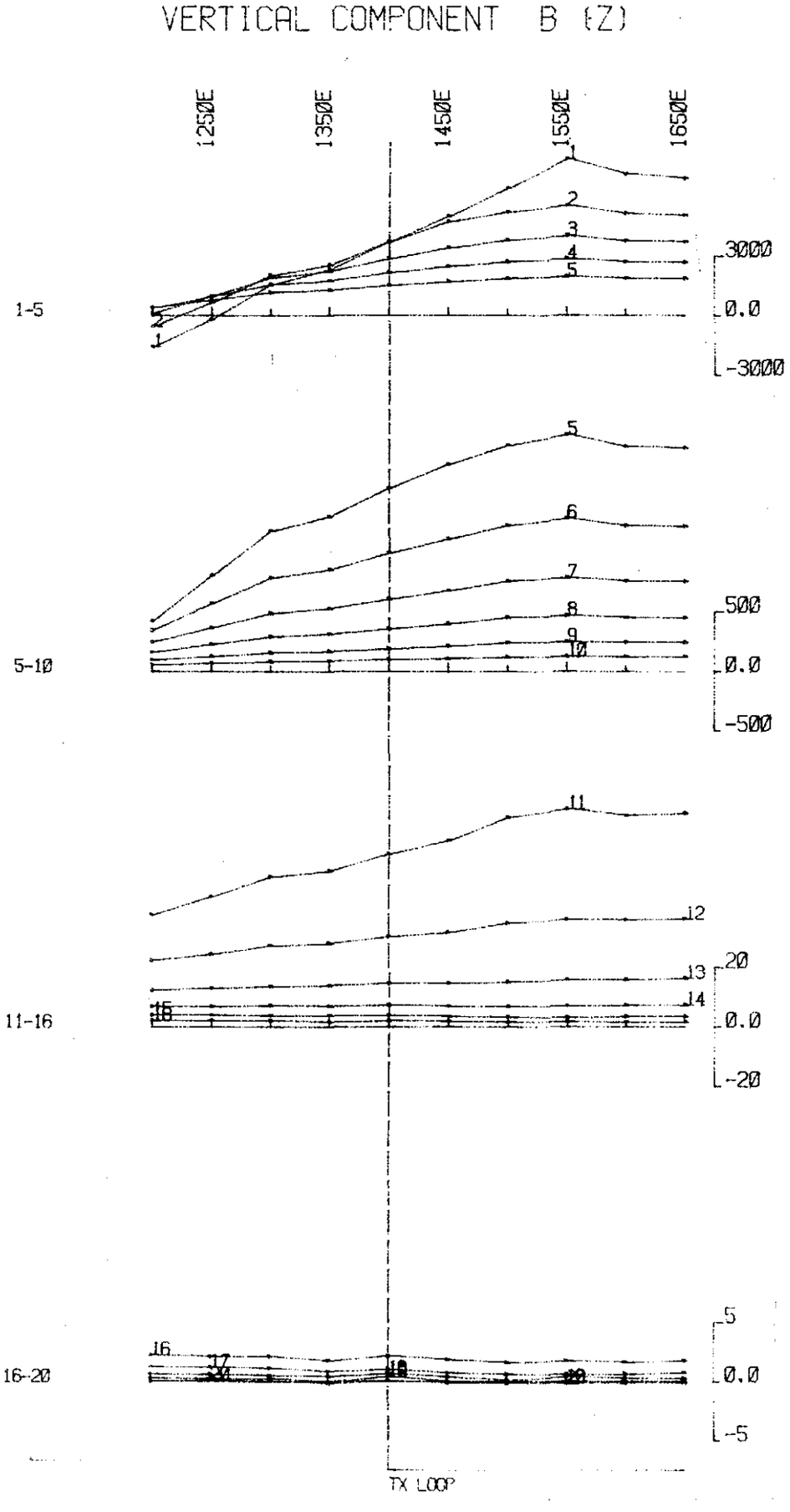
mpany Hired From – ..... Period – .....

S: Attach Pink Copy of Order to this report.

PARTY CHIEF

5280230

161



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre

5 cm

TX LOOP SIDES	: 3000N	1400E
	: 3650N	1750E
TX LOOP SIZE	: 350m X 650m	
TX TURN OFF TIME	: 2ø	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 1ø	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P. .A.K	
DATE	: 11-DEC-1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

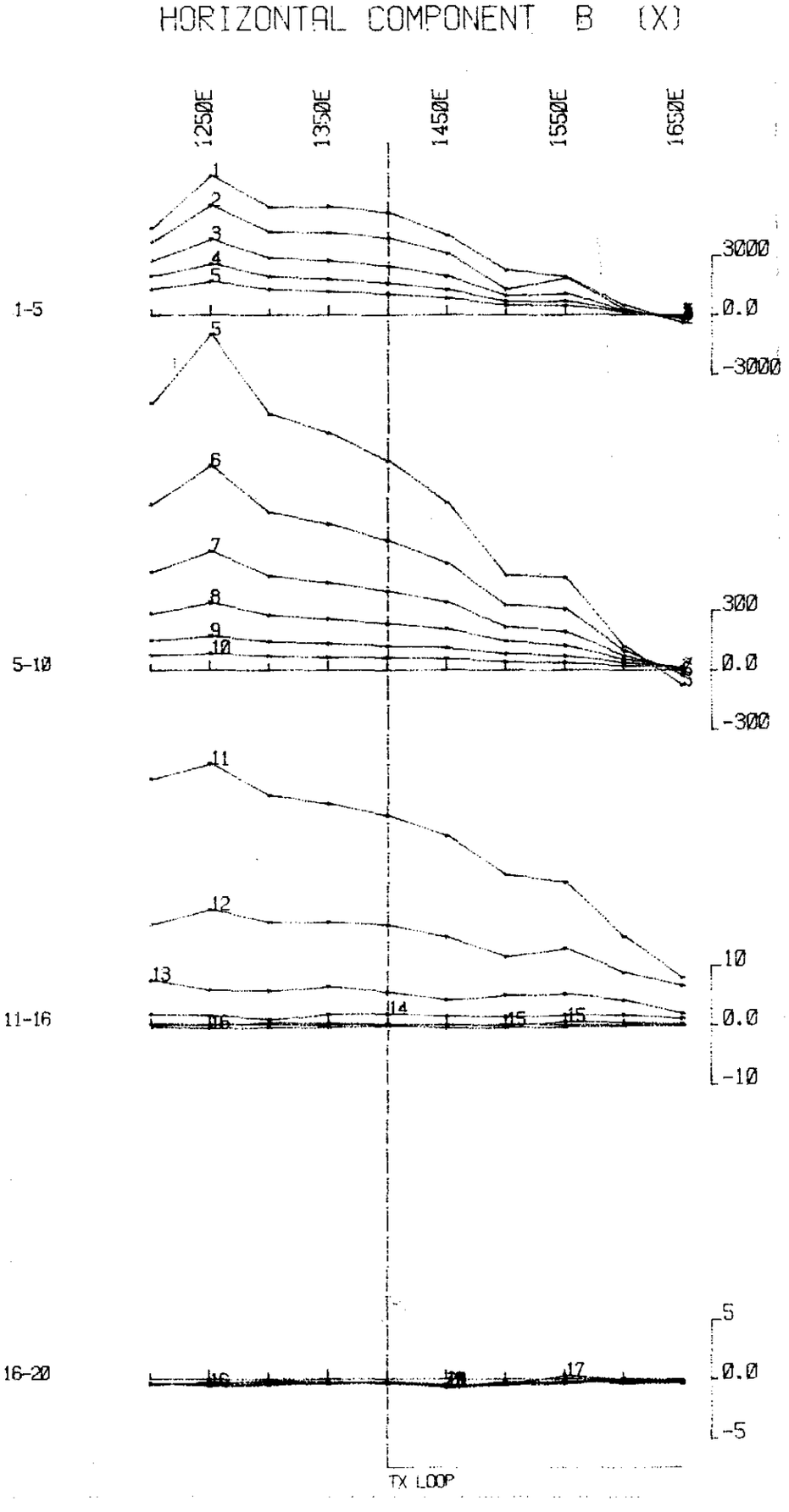
PROJECT : OCEANA

AREA : Zeehan Tas.

LINE : 2900N Z

TX LOOP : 1

162



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

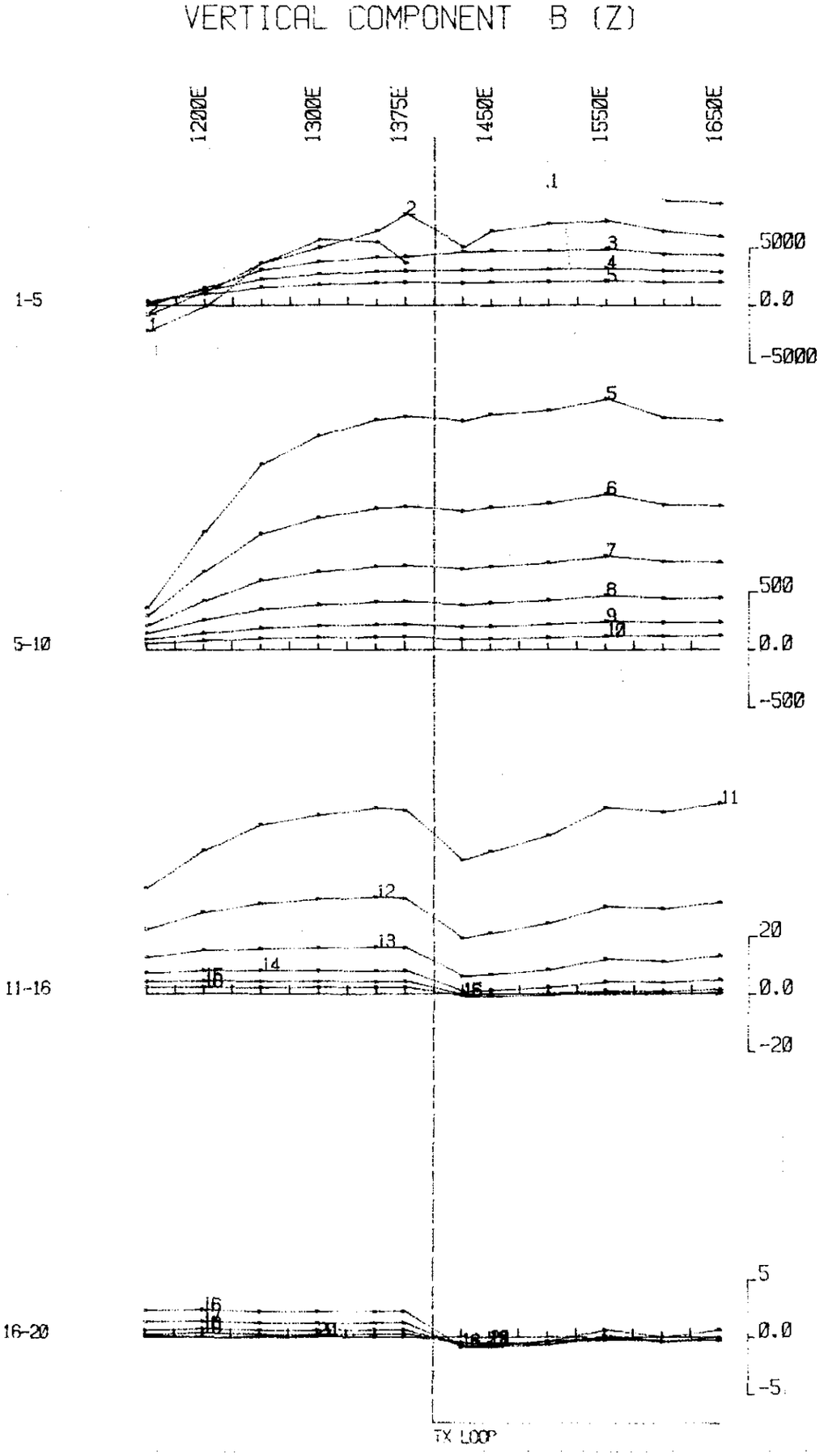
nanovolts per metre squared

5 cm

TX LOOP SIDES	:	3000N	1400E
	:	3650N	1750E
TX LOOP SIZE	:	350m X 650m	
TX TURN OFF TIME	:	290	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. A.K	
DATE	:	11-DEC-1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT	: Amoco Minerals Aust.	
PROJECT	: OCEANA	
AREA	: Zeehan Tas.	
LINE	: 2900N	X
TX LOOP	: 1	



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

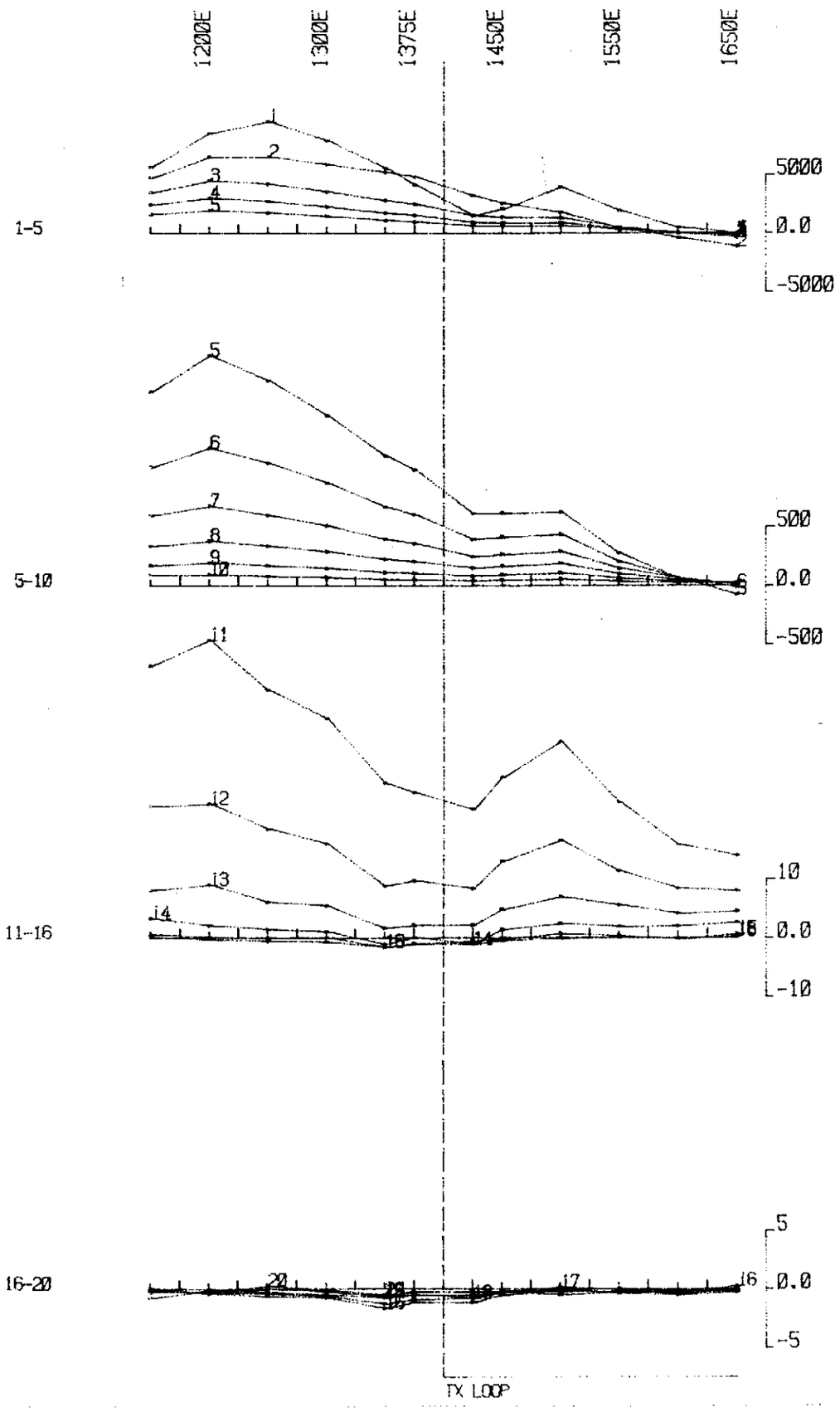
TX LOOP SIDES	:	3000N	1400E
	:	3650N	1750E
TX LOOP SIZE	:	350m X 650m	
TX TURN OFF TIME	:	200	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. -A.K	
DATE	:	11-DEC-1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 82-1456

CLIENT	. Amoco Minerals Aust.	
PROJECT	. OCEANA	
AREA	. Zeehan Tas.	
LINE	. 3100N	Z
TX LOOP	1	

164

HORIZONTAL COMPONENT B (X)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	:	3000N	1400E
	:	3650N	1750E
TX LOOP SIZE	:	350m X 650m	
TX TURN OFF TIME	:	290	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. /A.K	
DATE	:	11-DEC.1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT . Amoco Minerals Aust.

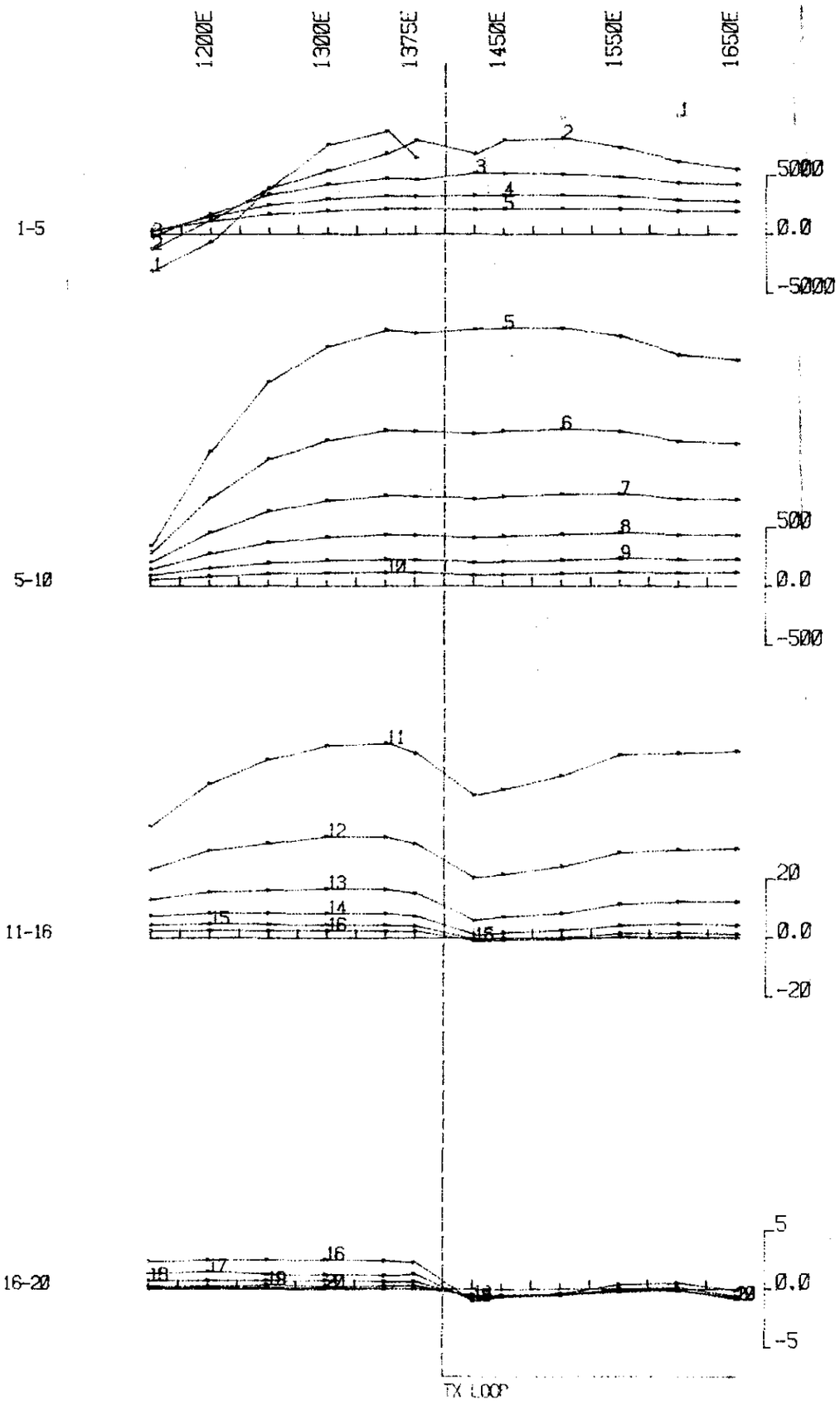
PROJECT : OCEANA

AREA . Zeehan Tas.

LINE . 3100N X

TX LOOP : 1

VERTICAL COMPONENT B (Z)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

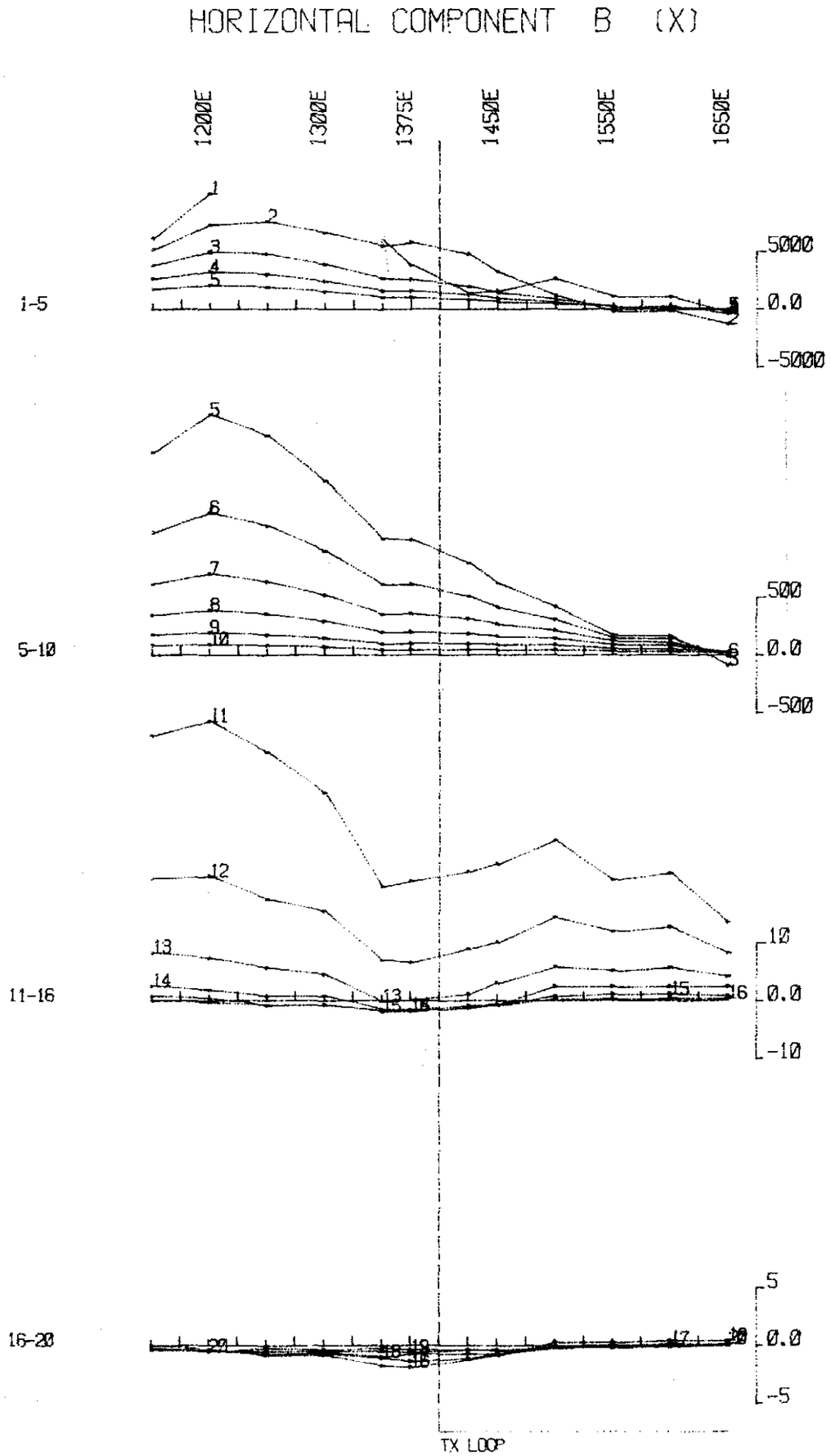
5 cm

TX LOOP SIDES	: 3000N	1400E
	: 3650N	1750E
TX LOOP SIZE	: 350m X 650m	
TX TURN OFF TIME	: 290	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P.-A.K	
DATE	: 12-DEC-1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT	: Amoco Minerals Aust.
PROJECT	: OCEANA
AREA	: Zeehan Tas.
LINE	: 3200N Z
TX LOOP	: 1

166



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

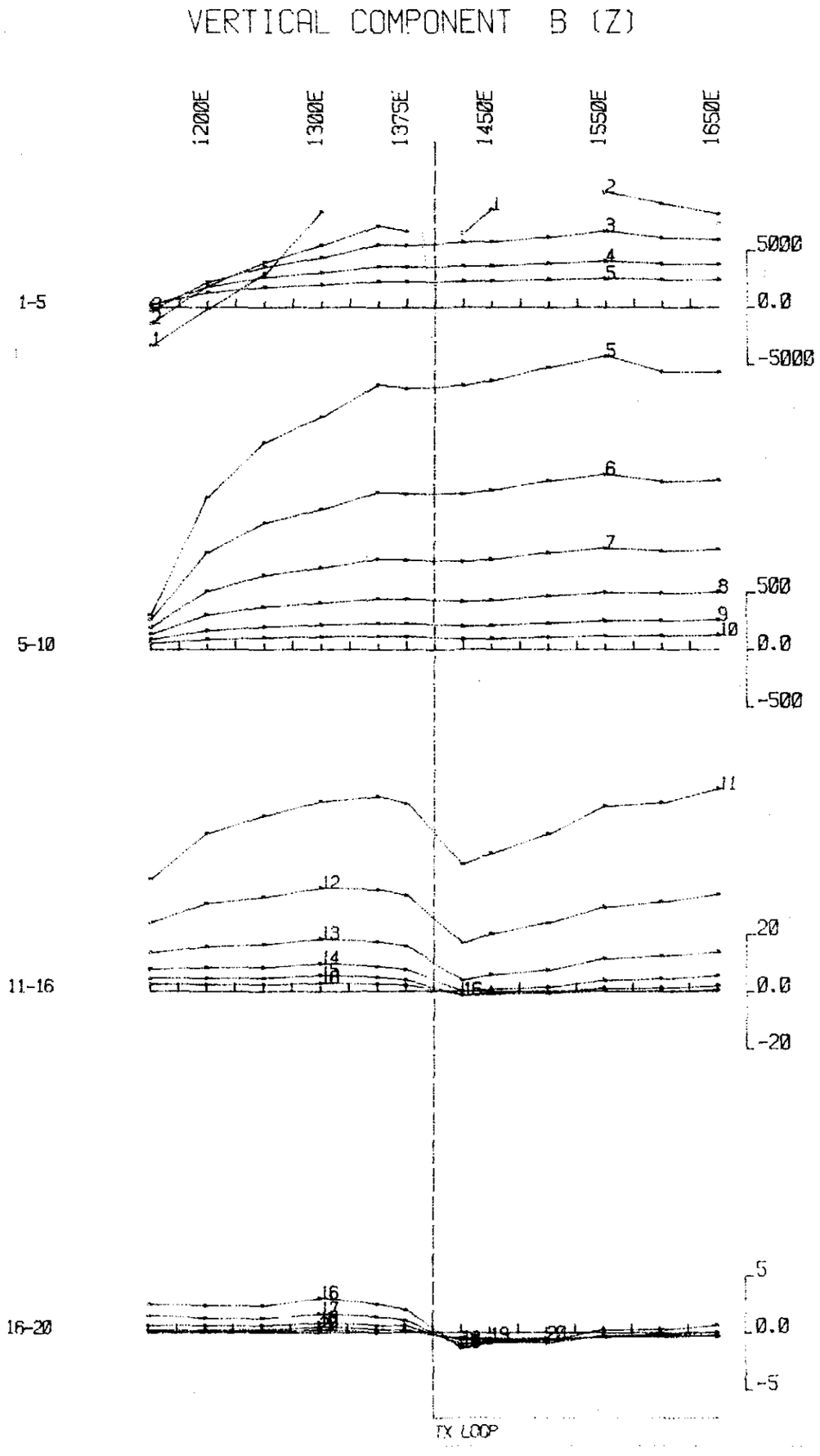
TX LOOP SIDES	:	3000N	1400E
	:	3650N	1750E
TX LOOP SIZE	:	350m X 650m	
TX TURN OFF TIME	:	29Ø	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P.-A.K	
DATE	:	12-DEC.1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT	:	Amoco Minerals Aust.
PROJECT	:	OCEANA
AREA	:	Zeehan Tas.
LINE	:	3200N X
TX LOOP	:	1

167



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	:	3000N	1400E
	:	3650N	1750E
TX LOOP SIZE	:	350m X 650m	
TX TURN OFF TIME	:	2ø	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	1ø	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P.,A.K	
DATE	:	12-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : OCEANA

AREA : Zeehan Tas.

LINE : 3300N Z

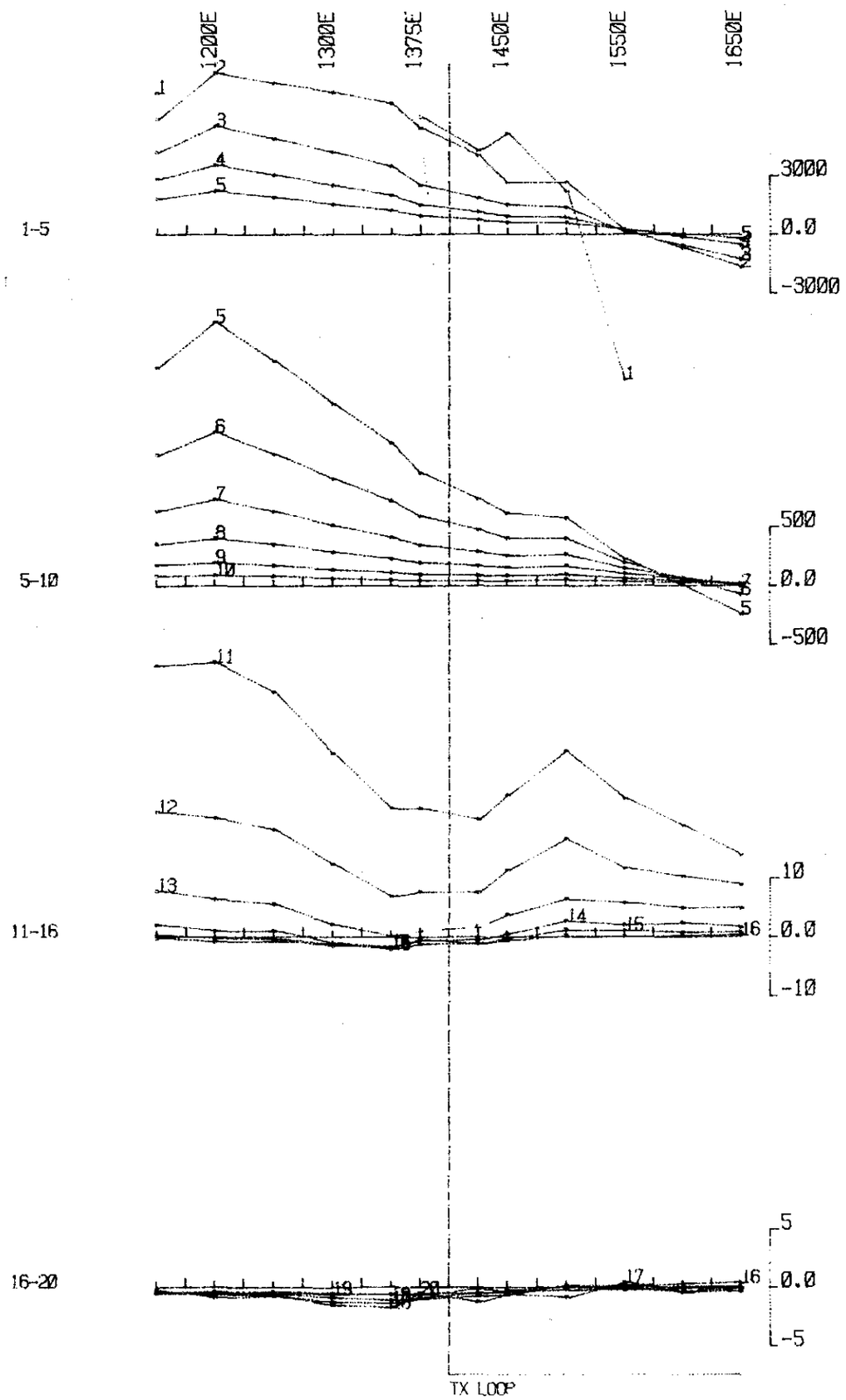
TX LOOP : 1

168

168

528238

HORIZONTAL COMPONENT B (X)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	:	3000N	1400E
	:	3650N	1750E
TX LOOP SIZE	:	360m X 650m	
TX TURN OFF TIME	:	290	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P., A.K	
DATE	:	12-DEC-1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 82-1456

CLIENT . Amoco Minerals Aust.

PROJECT . OCEANA

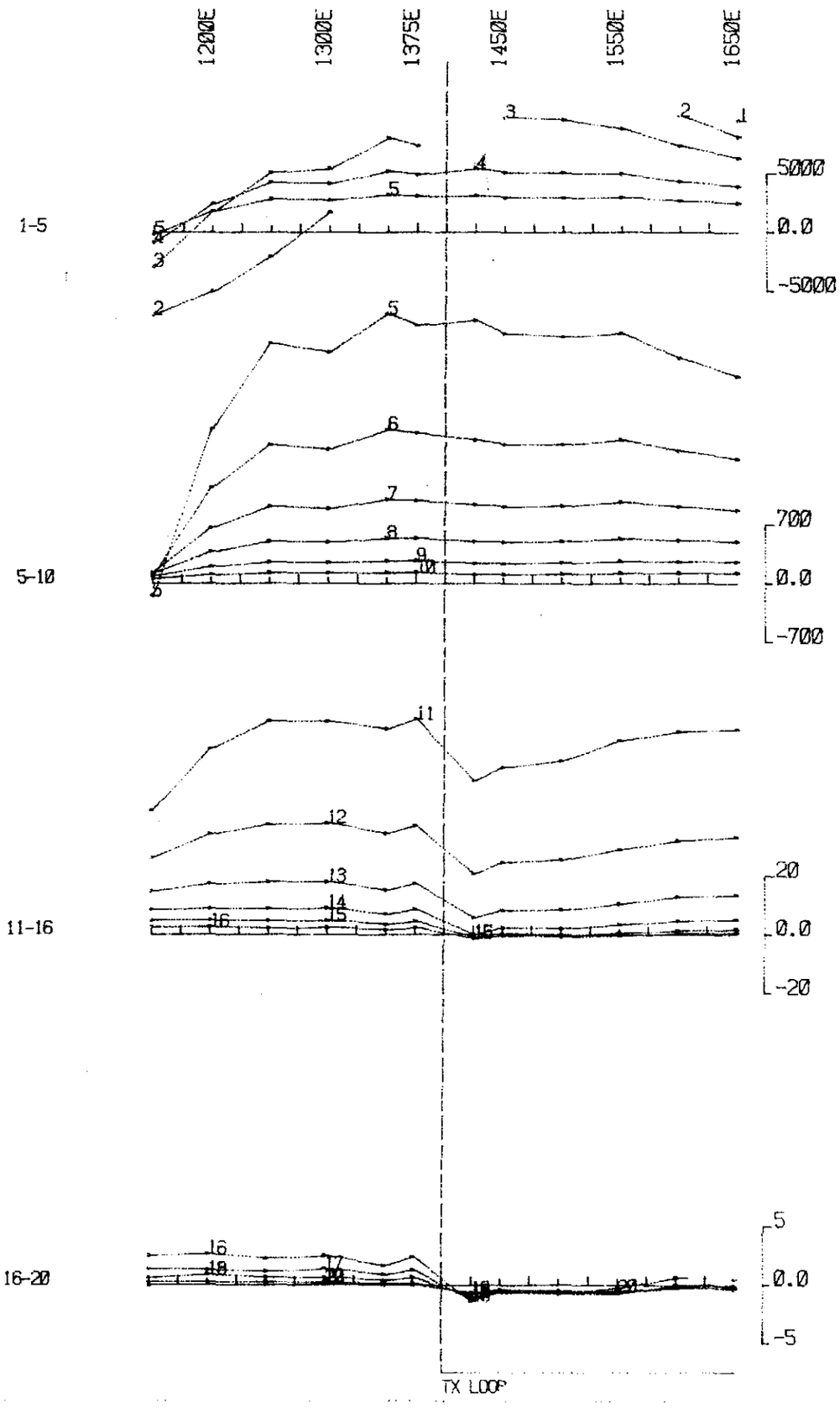
AREA . Zeehan Tas.

LINE : 3300N X

TX LOOP : 1

169

VERTICAL COMPONENT B (Z)



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	:	3000N	1400E
	:	3650N	1750E
TX LOOP SIZE	:	350m X 650m	
TX TURN OFF TIME	:	290	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. A.K	
DATE	:	12-DEC,1982	

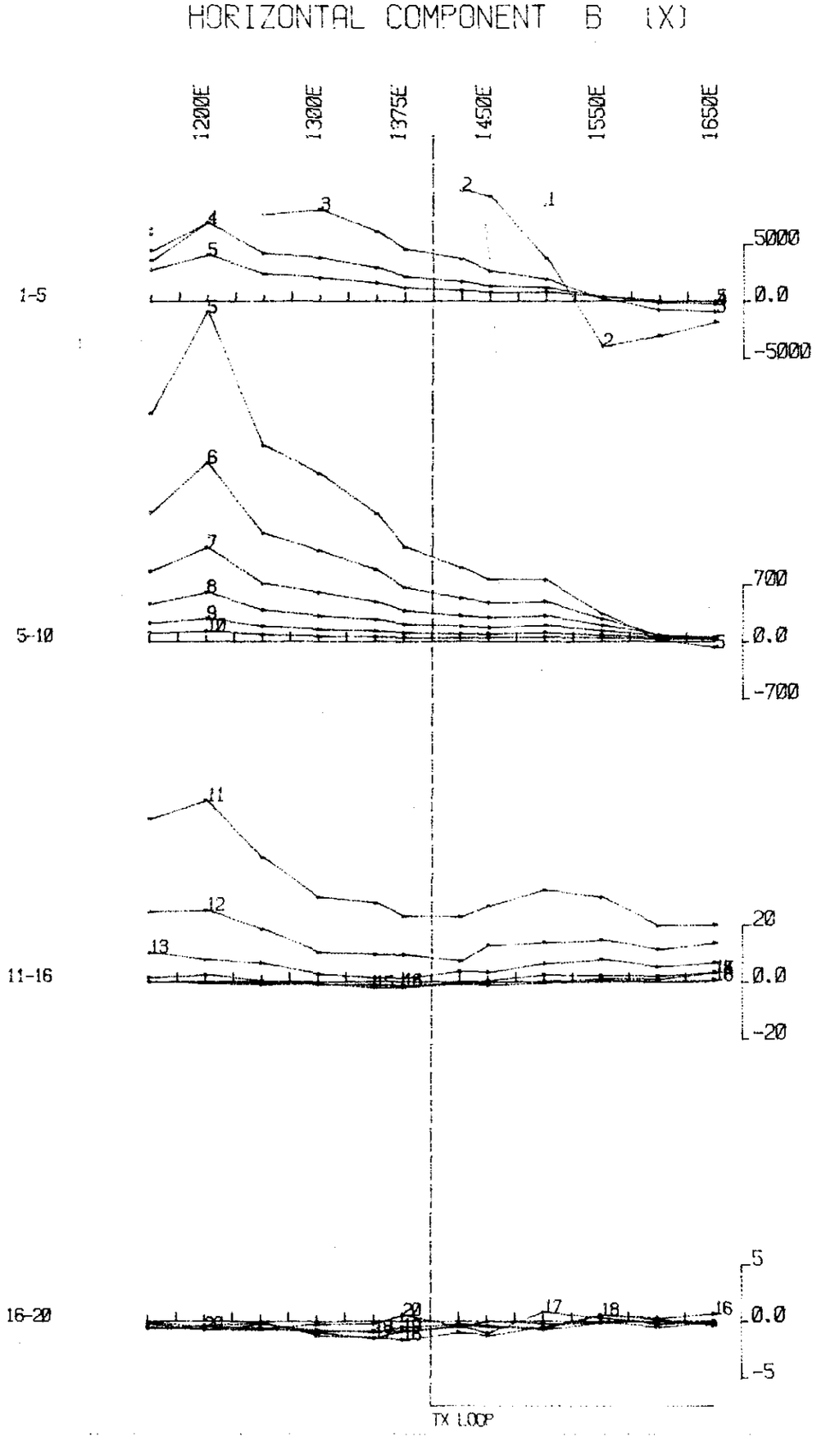
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT	: Amoco Minerals Aust.	
PROJECT	: OCEANA	
AREA	: Zeehan Tas.	
LINE	: 3400N	Z
TX LOOP	: 1	

170

528240



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

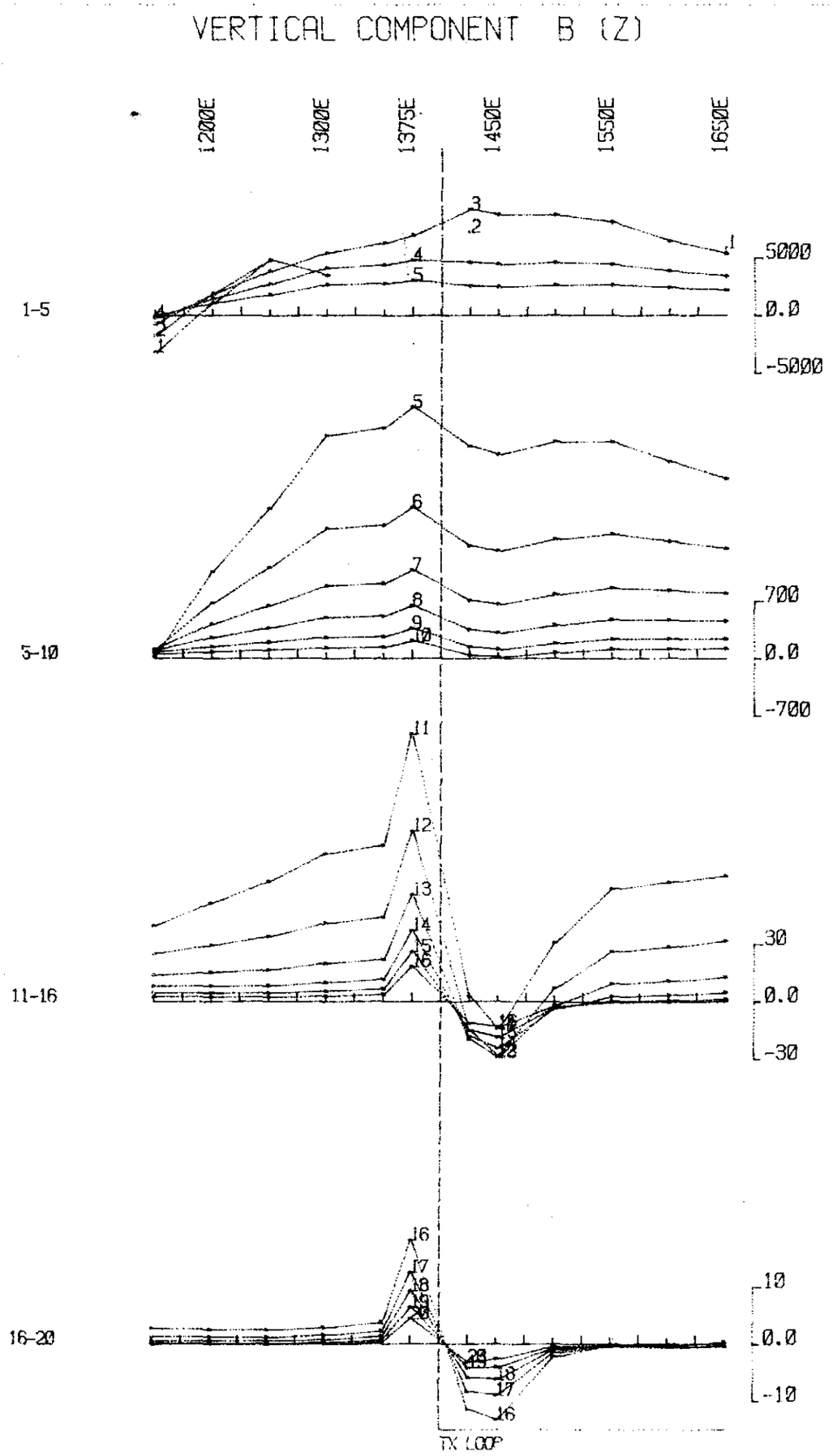
TX LOOP SIDES	: 3000N	1400E
	: 3630N	1750E
TX LOOP SIZE	: 350m X 650m	
TX TURN OFF TIME	: 290	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P. A.K	
DATE	: 12-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 86-1456

CLIENT	: Amoco Minerals Aust.	
PROJECT	: OCEANA	
AREA	: Zeehan Tas.	
LINE	: 3400N	X
TX LOOP	: 1	

170

171



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

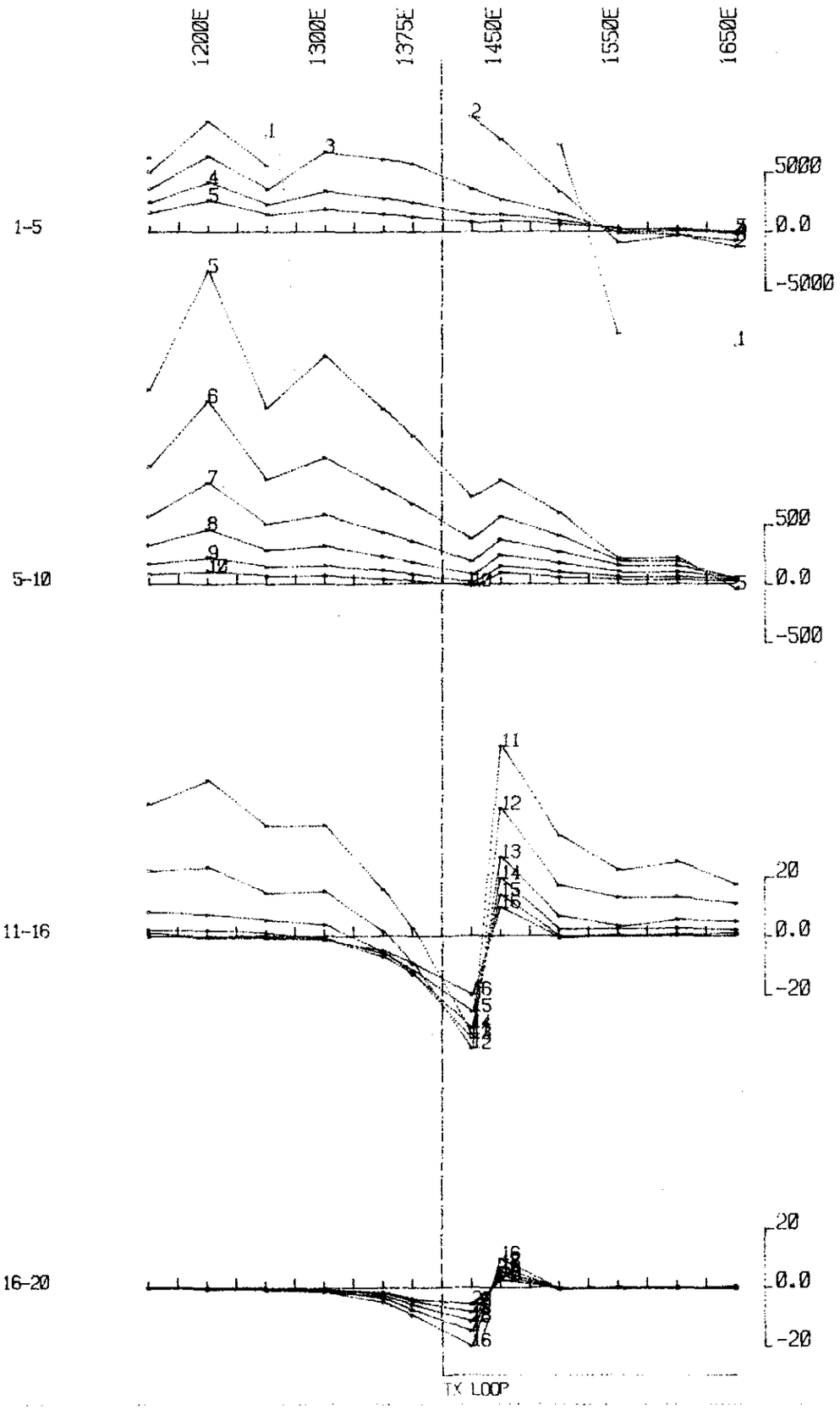
TX LOOP SIDES	: 3000N	1400E
	: 3650N	1750E
TX LOOP SIZE	: 350m X 650m	
TX TURN OFF TIME	: 290	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P.-A.K	
DATE	: 10-DEC.1982	

SURVEYED AND COMPILED BY	PROJECT NO.
GEOTERREX PTY. LTD.	85-1456

CLIENT	: Amoco Minerals Aust.
PROJECT	: OCEANA
AREA	: Zeehan Tas.
LINE	: 3500N Z
TX LOOP	: 1

172

HORIZONTAL COMPONENT B (X)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	:	3000N	1400E
	:	3650N	1750E
TX LOOP SIZE	:	350m X 650m	
TX TURN OFF TIME	:	2ms	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. A.K	
DATE	:	10-DEC.1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : OCEANA

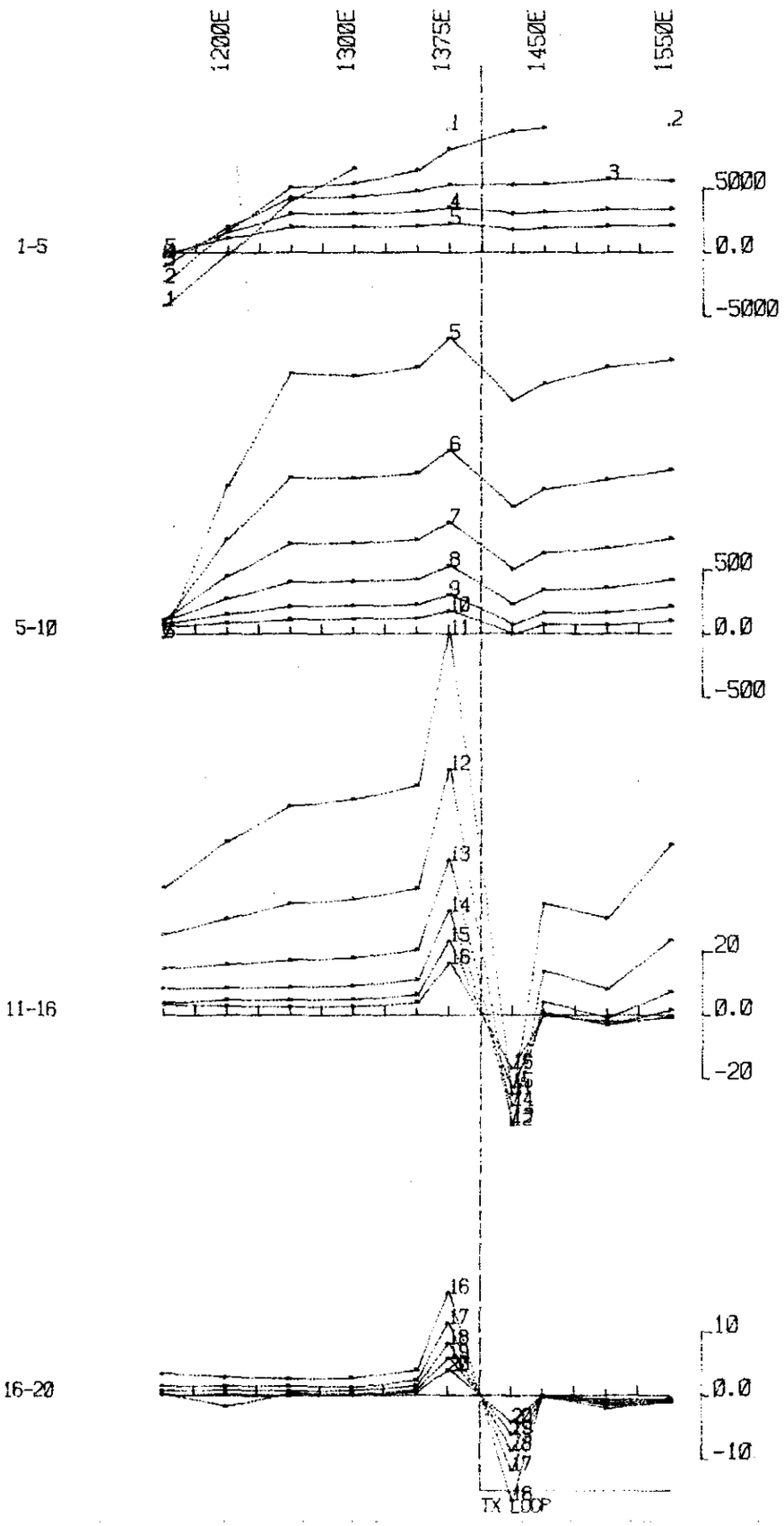
AREA : Zeehan Tas.

LINE : 3500N X

TX LOOP :

173

VERTICAL COMPONENT B (Z)



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	:	3000N	1400E
	:	3650N	1750E
TX LOOP SIZE	:	350m X 650m	
TX TURN OFF TIME	:	290	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	8	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. A.K	
DATE	:	13-DEC-1982	

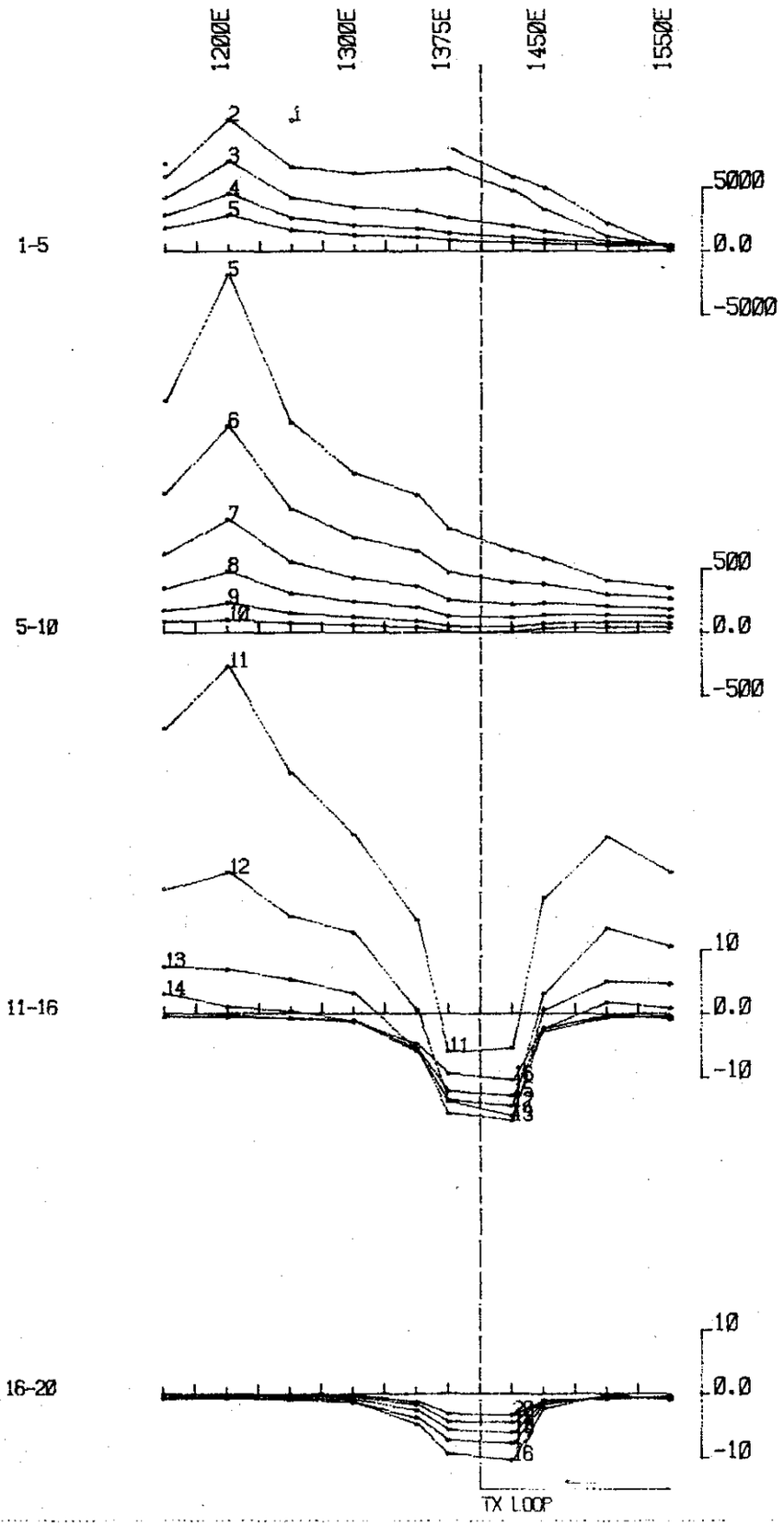
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT	:	Amoco Minerals Aust.
PROJECT	:	OCEANA
AREA	:	Zeehan Tas.
LINE	:	3500N Z
TX LOOP	:	1

174

HORIZONTAL COMPONENT B (X)



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	: 3000N	1400E
	: 3650N	1750E
TX LOOP SIZE	: 350m X 650m	
TX TURN OFF TIME	: 290	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 8	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P./A.K	
DATE	: 13-DEC.1982	

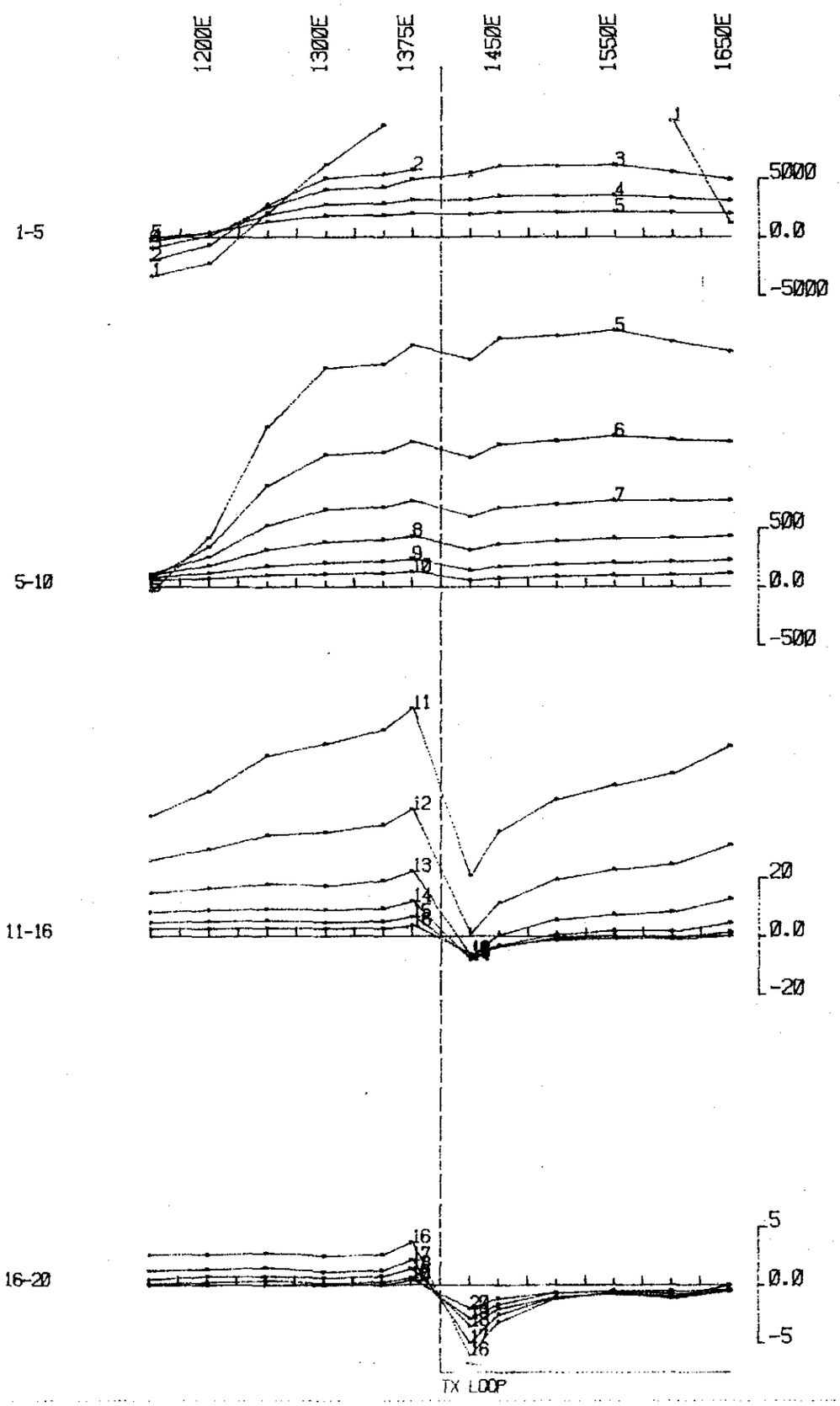
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 86-1456

CLIENT	: Amoco Minerals Aust.
PROJECT	: OCEANA
AREA	: Zeehan Tas.
LINE	: 3500N X
TX LOOP	: 1

175

VERTICAL COMPONENT B (Z)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

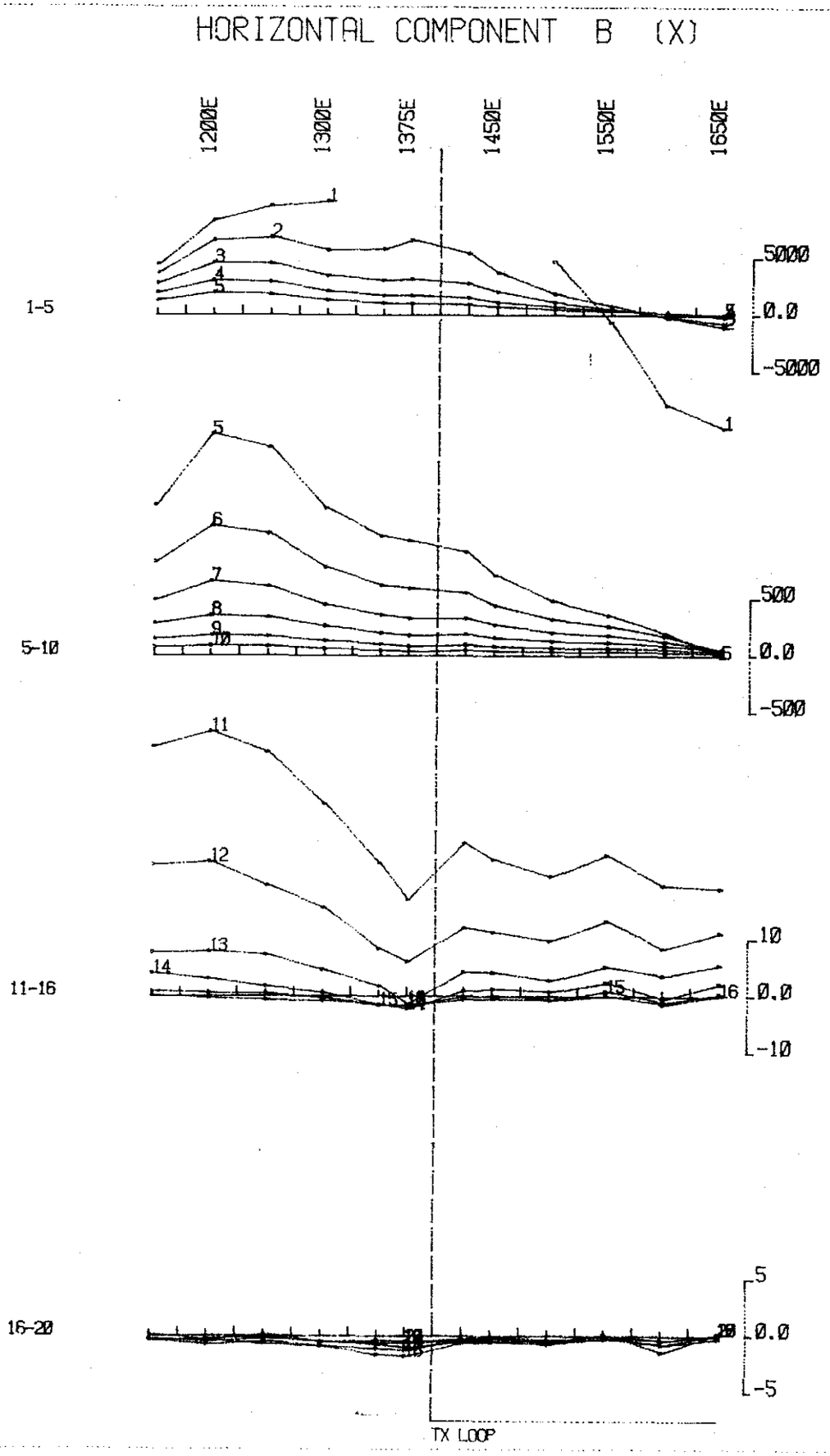
TX LOOP SIDES	: 3000N	1400E
	: 3650N	1750E
TX LOOP SIZE	: 350m X 650m	
TX TURN OFF TIME	: 290	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P. A.K	
DATE	: 10-DEC,1982	

SURVEYED AND COMPILED BY	PROJECT NO.
GEOTERREX PTY. LTD.	85-1456

CLIENT	: Amoco Minerals Aust.	
PROJECT	: OCEANA	
AREA	: Zeehan Tas.	
LINE	: 3600N	Z
TX LOOP	: 1	

176

528246



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	: 3000N	1400E
	: 3650N	1750E
TX LOOP SIZE	: 350m X 650m	
TX TURN OFF TIME	: 280	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P.,A.K	
DATE	: 10-DEC,1982	

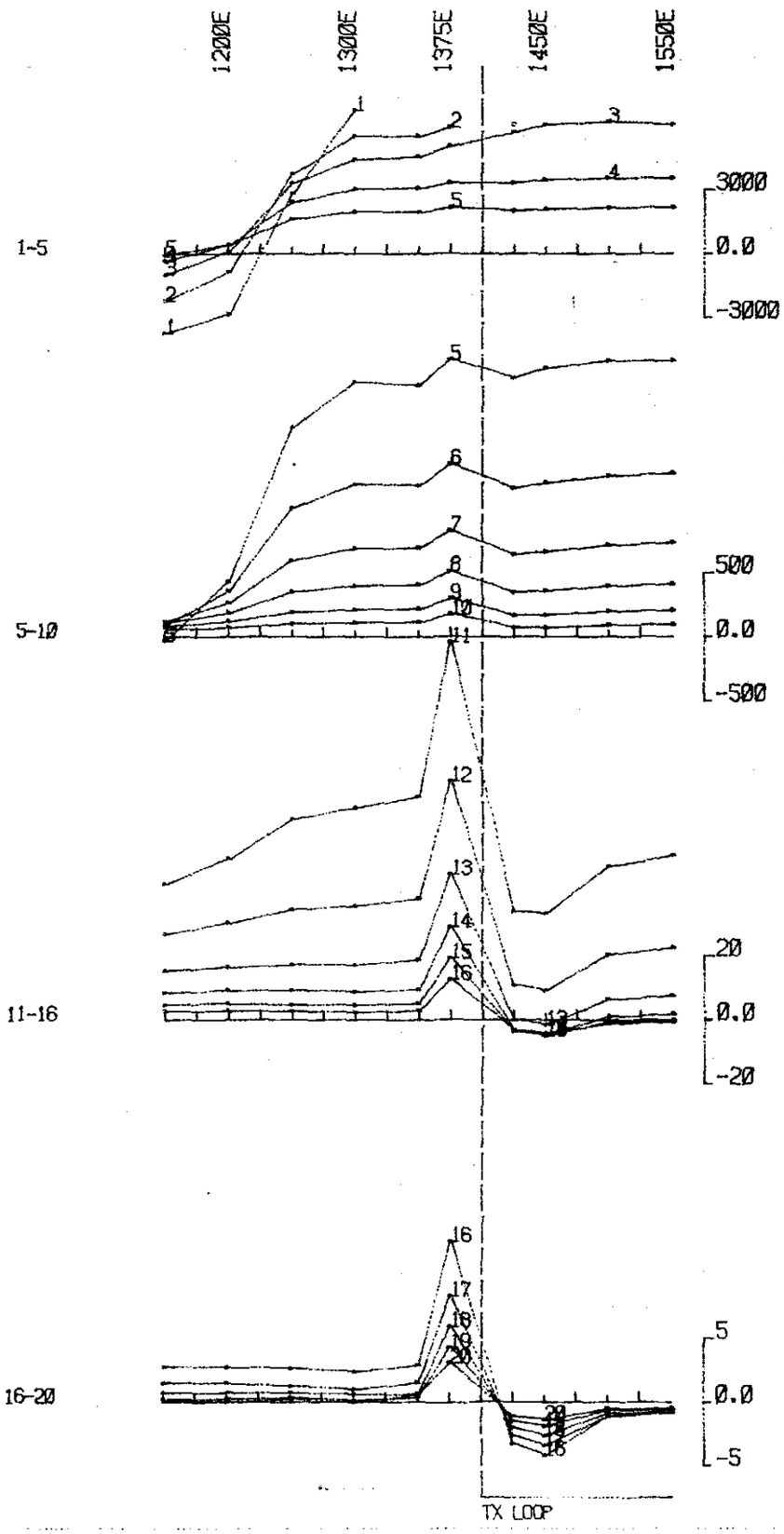
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT	: Amoco Minerals Aust.
PROJECT	: OCEANA
AREA	: Zeehan Tas.
LINE	: 3600N X
TX LOOP	: 1

177

528247

VERTICAL COMPONENT B (Z)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

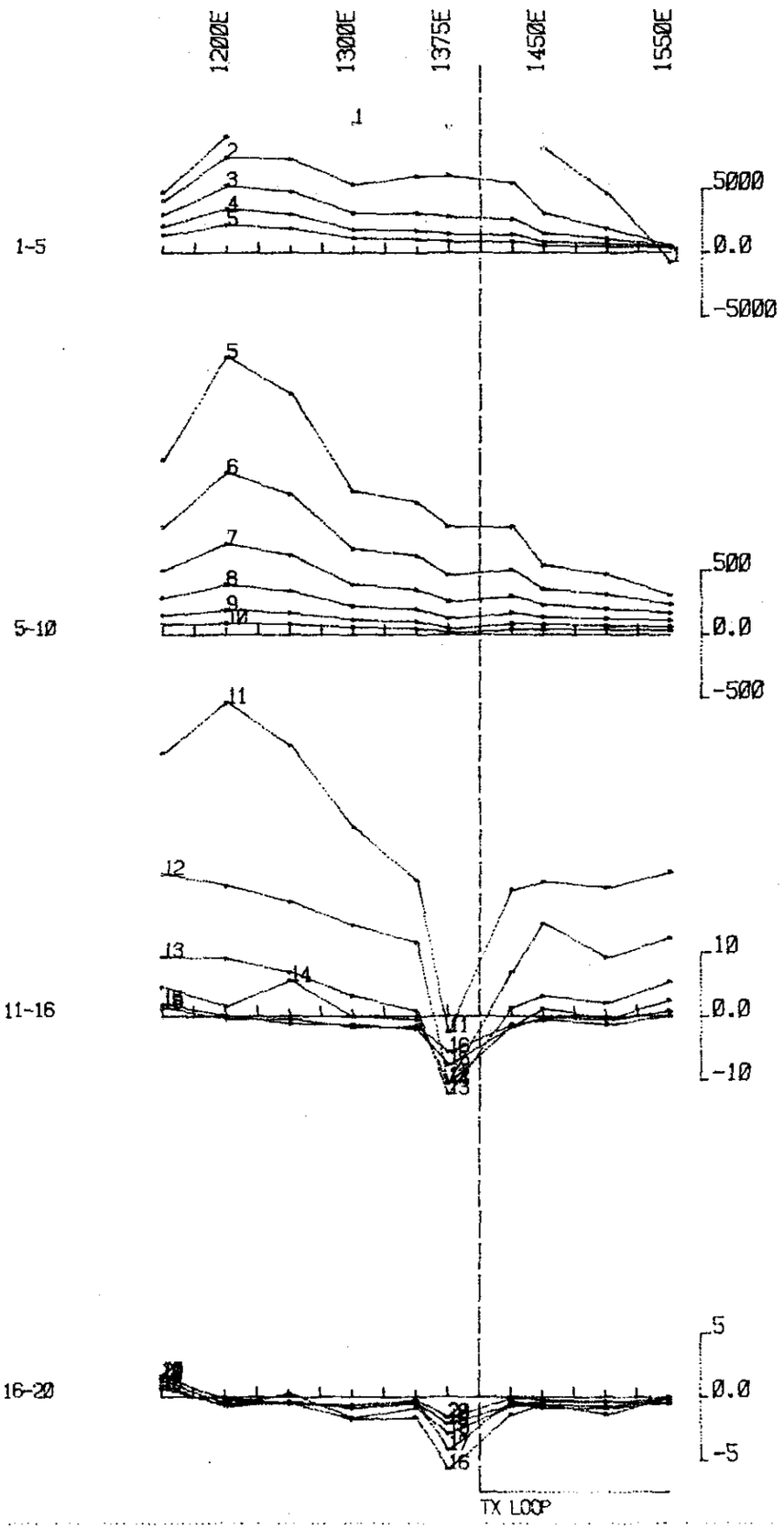
TX LOOP SIDES	: 3000N	1400E
	: 3650N	1750E
TX LOOP SIZE	: 350m X 650m	
TX TURN OFF TIME	: 290	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 8	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P., A.K	
DATE	: 13-DEC.1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT	: Amoco Minerals Aust.
PROJECT	: OCEANA
AREA	: Zeehan Tas.
LINE	: 3600N Z
TX LOOP	: 1

178

HORIZONTAL COMPONENT B (X)



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

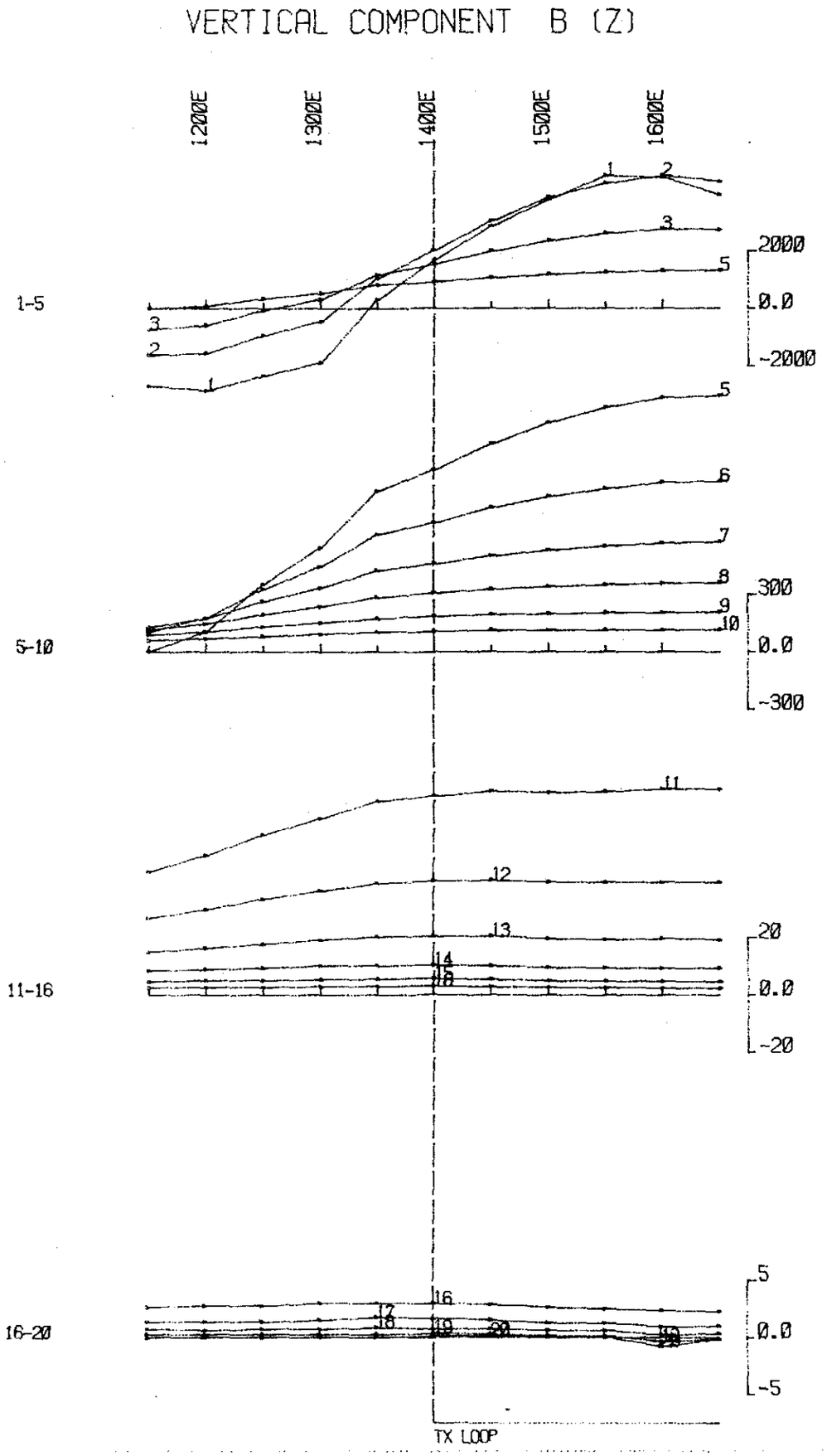
TX LOOP SIDES	: 3000N	1400E
	: 3650N	1750E
TX LOOP SIZE	: 350m X 650m	
TX TURN OFF TIME	: 29Ø	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 8	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P.,A.K	
DATE	: 13-DEC.1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT	: Amoco Minerals Aust.	
PROJECT	: OCEANA	
AREA	: Zeehan Tas.	
LINE	: 3600N	X
TX LOOP	: 1	

179

528249



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

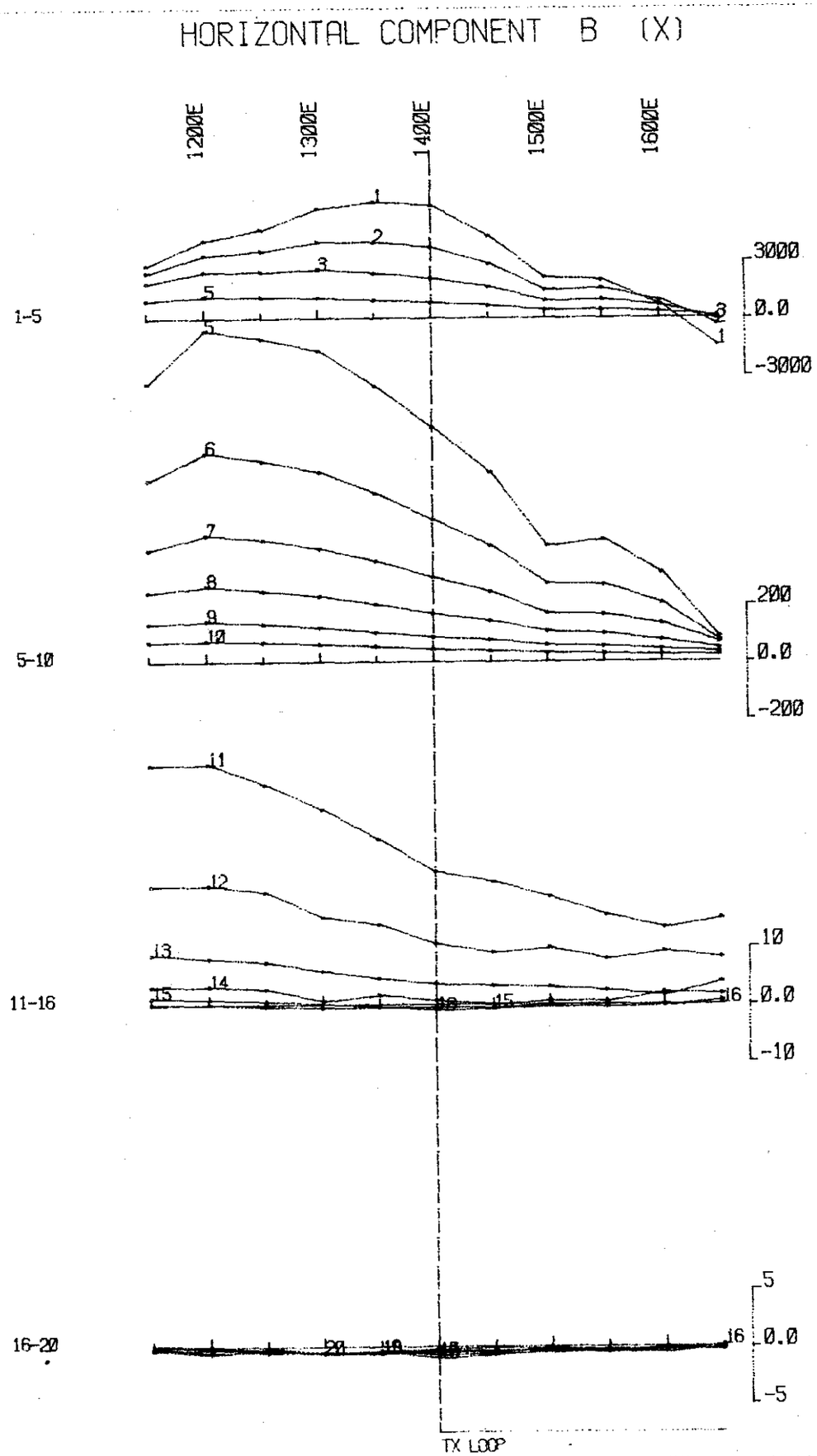
5 cm

TX LOOP SIDES	:	3000N	1400E
	:	3650N	1750E
TX LOOP SIZE	:	350m X 650m	
TX TURN OFF TIME	:	29Ø	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P.,A.K	
DATE	:	10-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT	: Amoco Minerals Aust.	
PROJECT	: OCEANA	
AREA	: Zeehan Tas.	
LINE	: 3700N	Z
TX LOOP	: 1	

180



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

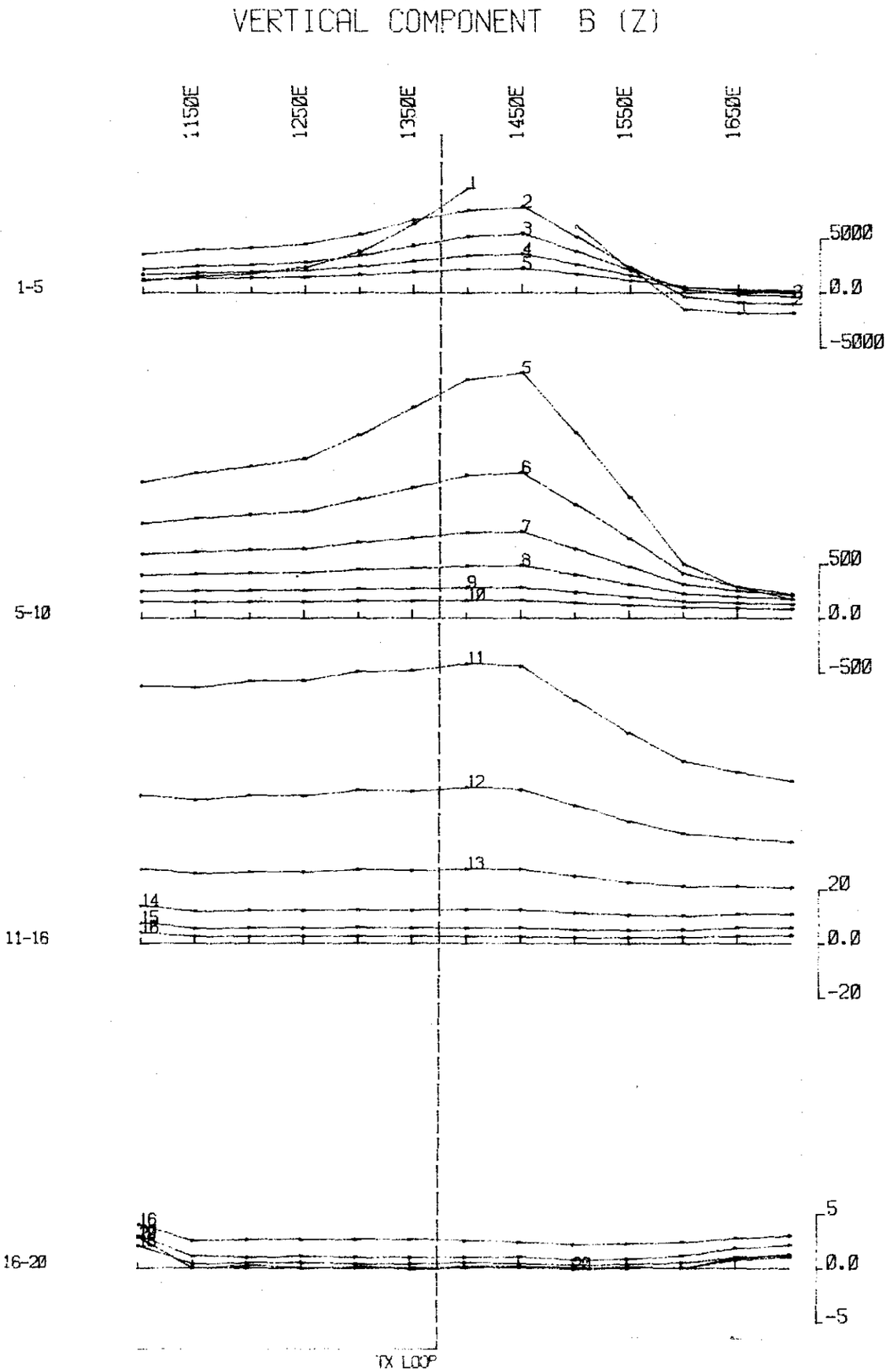
5 cm

TX LOOP SIDES	: 3000N	1400E
	: 3650N	1750E
TX LOOP SIZE	: 350m X 650m	
TX TURN OFF TIME	: 290	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P., A.K	
DATE	: 10-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT	: Amoco Minerals Aust.	
PROJECT	: OCEANA	
AREA	: Zeehan Tas.	
LINE	: 3700N	X
TX LOOP	: 1	



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	: 550N	1050E
	: 1250N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 2ø4	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 1ø	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P, A.K	
DATE	: 15-DEC,1982	

SURVEYED AND COMPILED BY	PROJECT NO.
GEOTERREX PTY. LTD.	85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : AUSTRAL

AREA : Zeehan Tas.

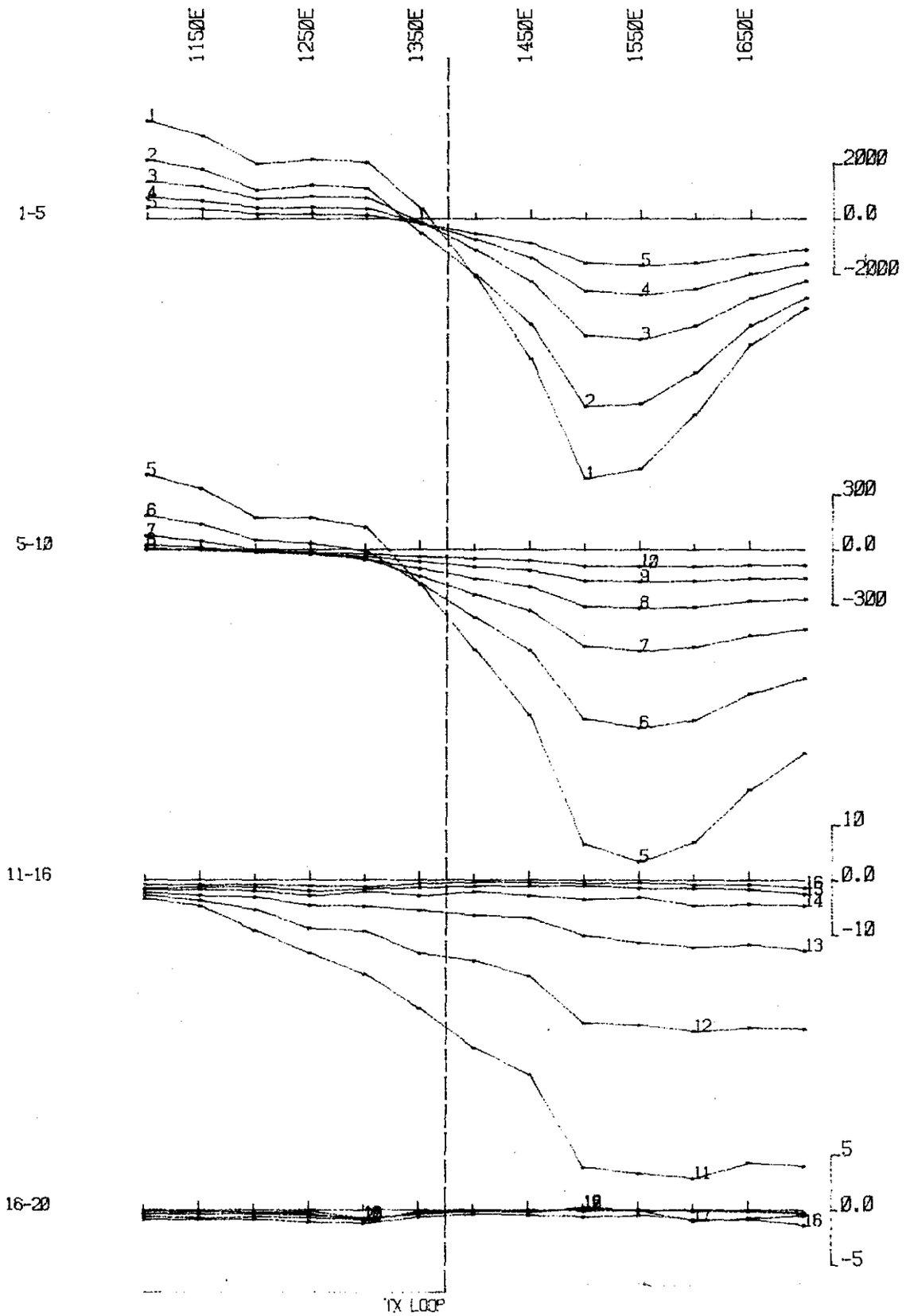
LINE : 500N Z

TX LOOP : 2

182

528252

HORIZONTAL COMPONENT B (X)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	:	550N	1350E
	:	1250N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	294	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. A.K	
DATE	:	15-DEC.1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

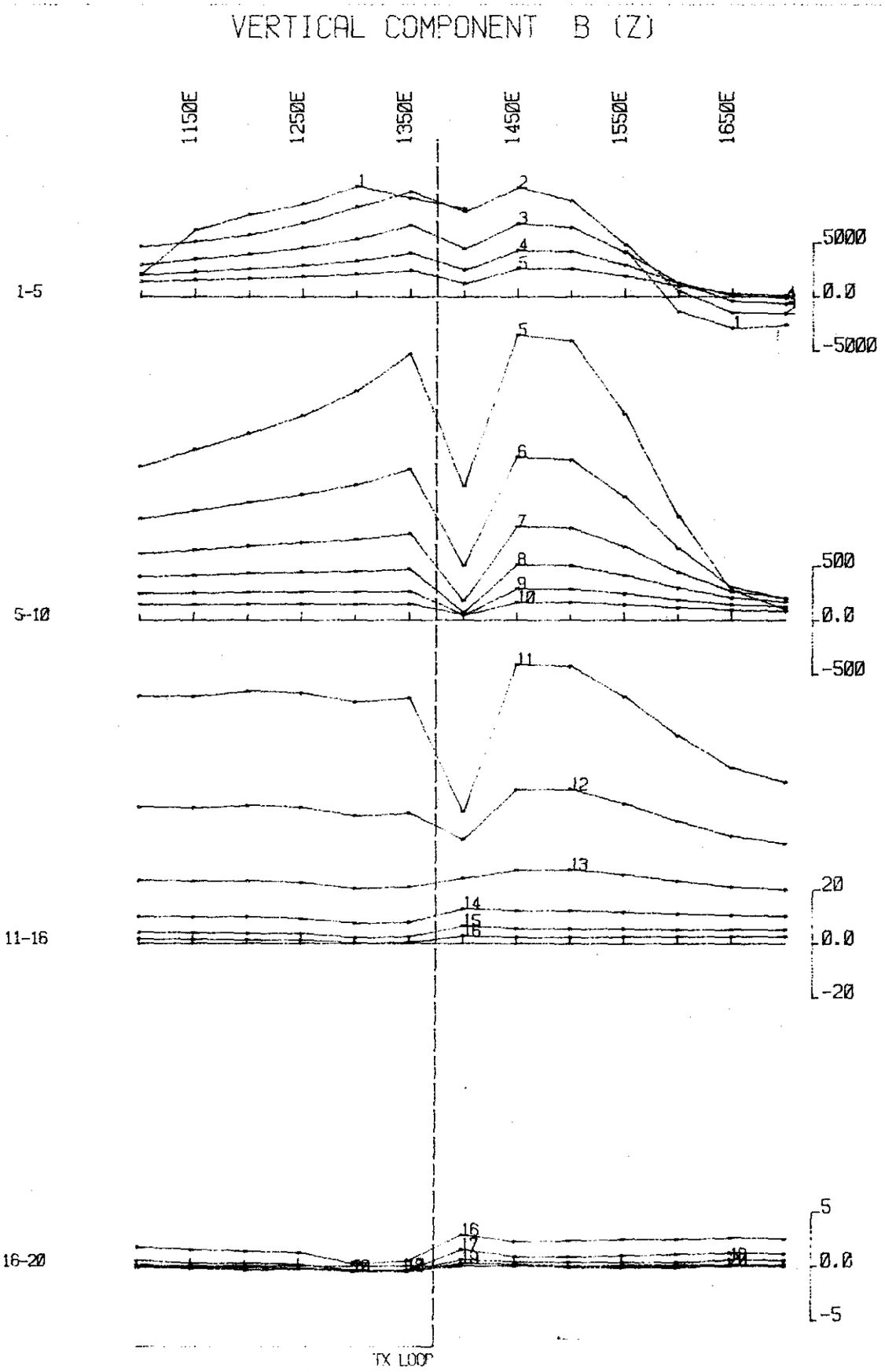
PROJECT : AUSTRAL

AREA : Zeehan Tas.

LINE : 500N X

TX LOOP : 2

185



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	:	550N	1050E
	:	1250N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	2ø4	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	1ø	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5ØØØ	
SURVEYED BY	:	J.P. A.K	
DATE	:	15-DEC-1982	

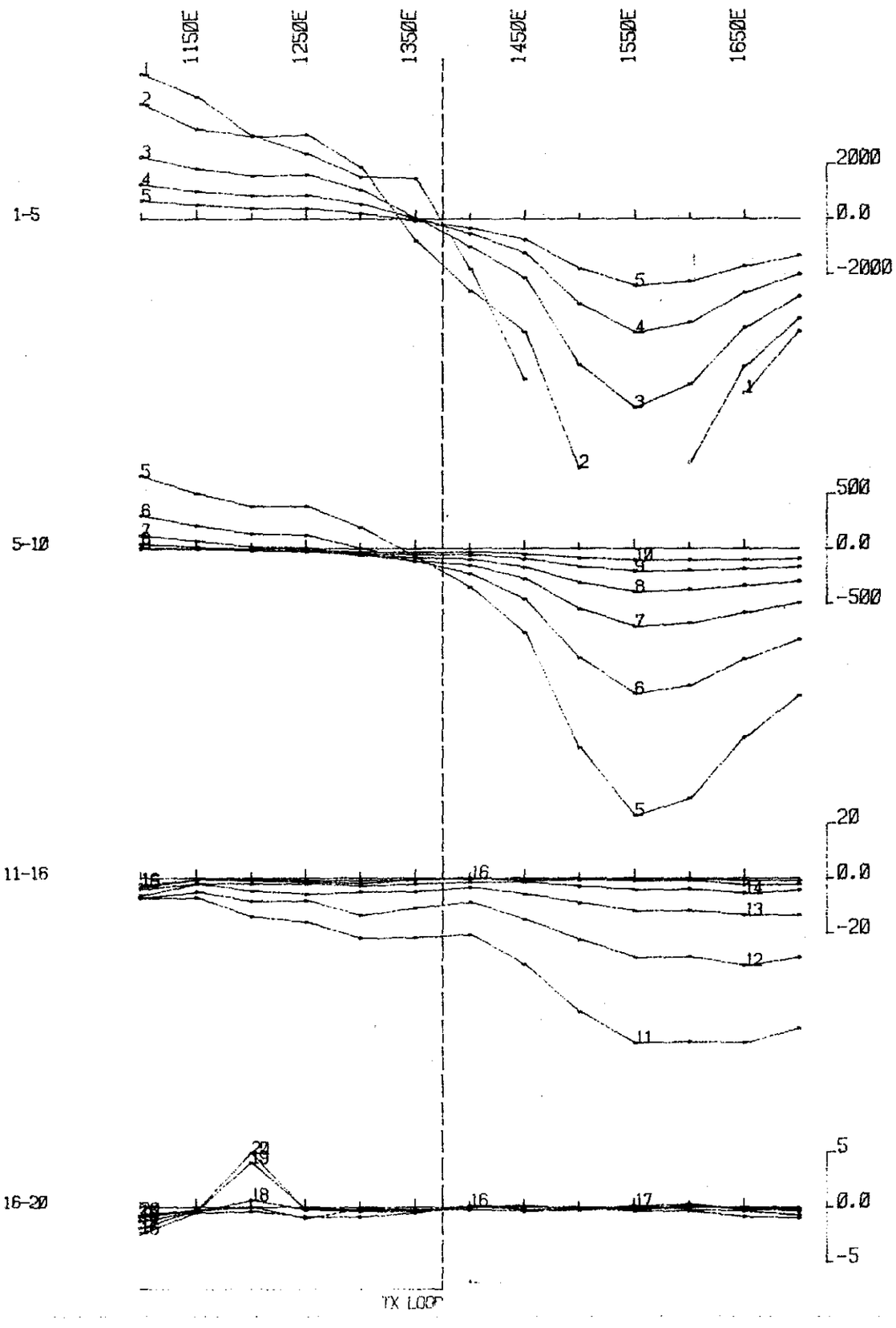
	SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT	:	Amoco Minerals Aust.
PROJECT	:	AUSTRAL
AREA	:	Zeehan Tas.
LINE	:	600N Z
TX LOOP	:	2

184

528254

HORIZONTAL COMPONENT B (X)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	: 550N	1050E
	: 1250N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 294	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P. A.K	
DATE	: 15-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : AUSTRAL

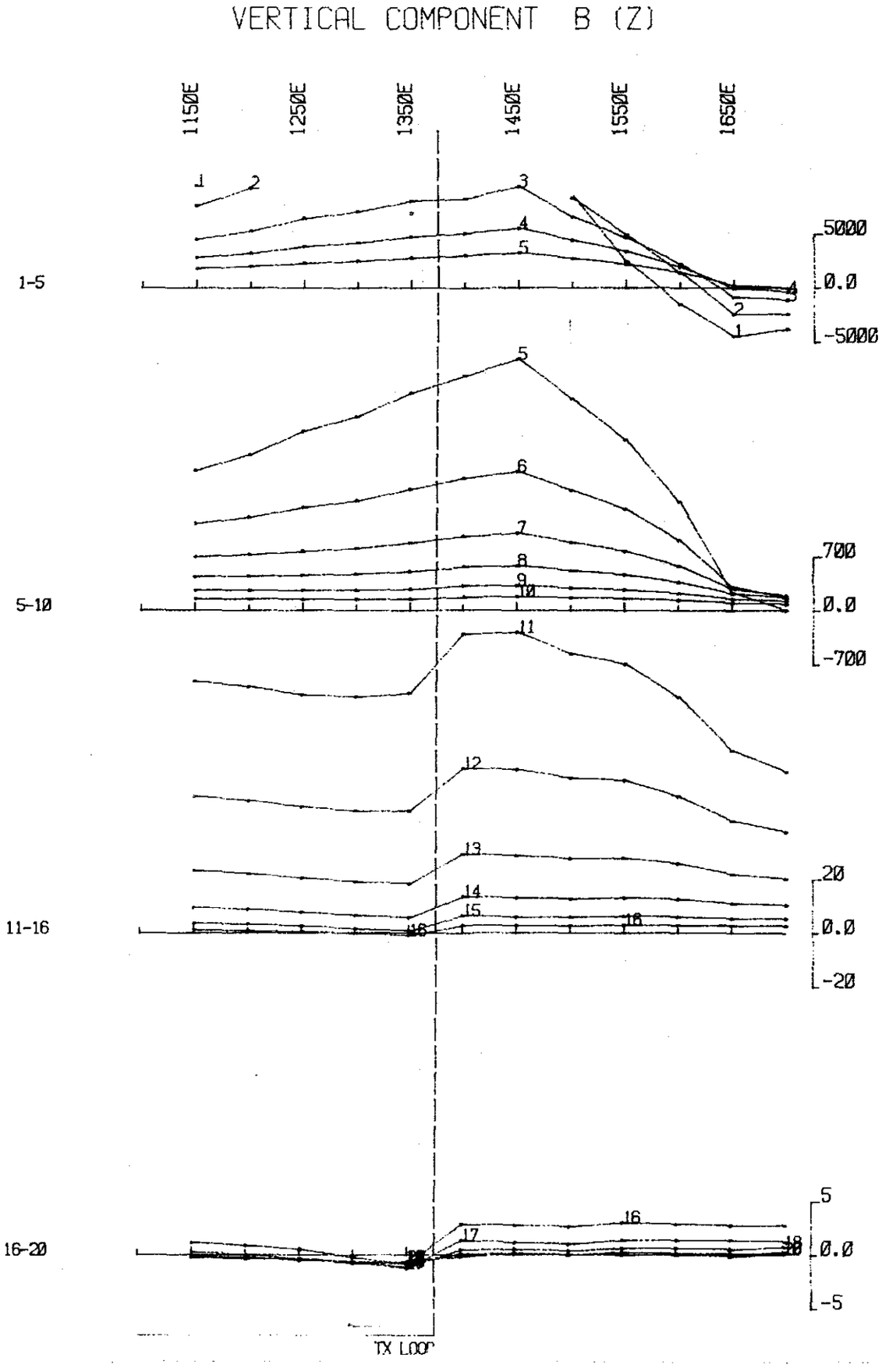
AREA : Zeehan Tas.

LINE : 600N X

TX LOOP : 2

185

528255



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

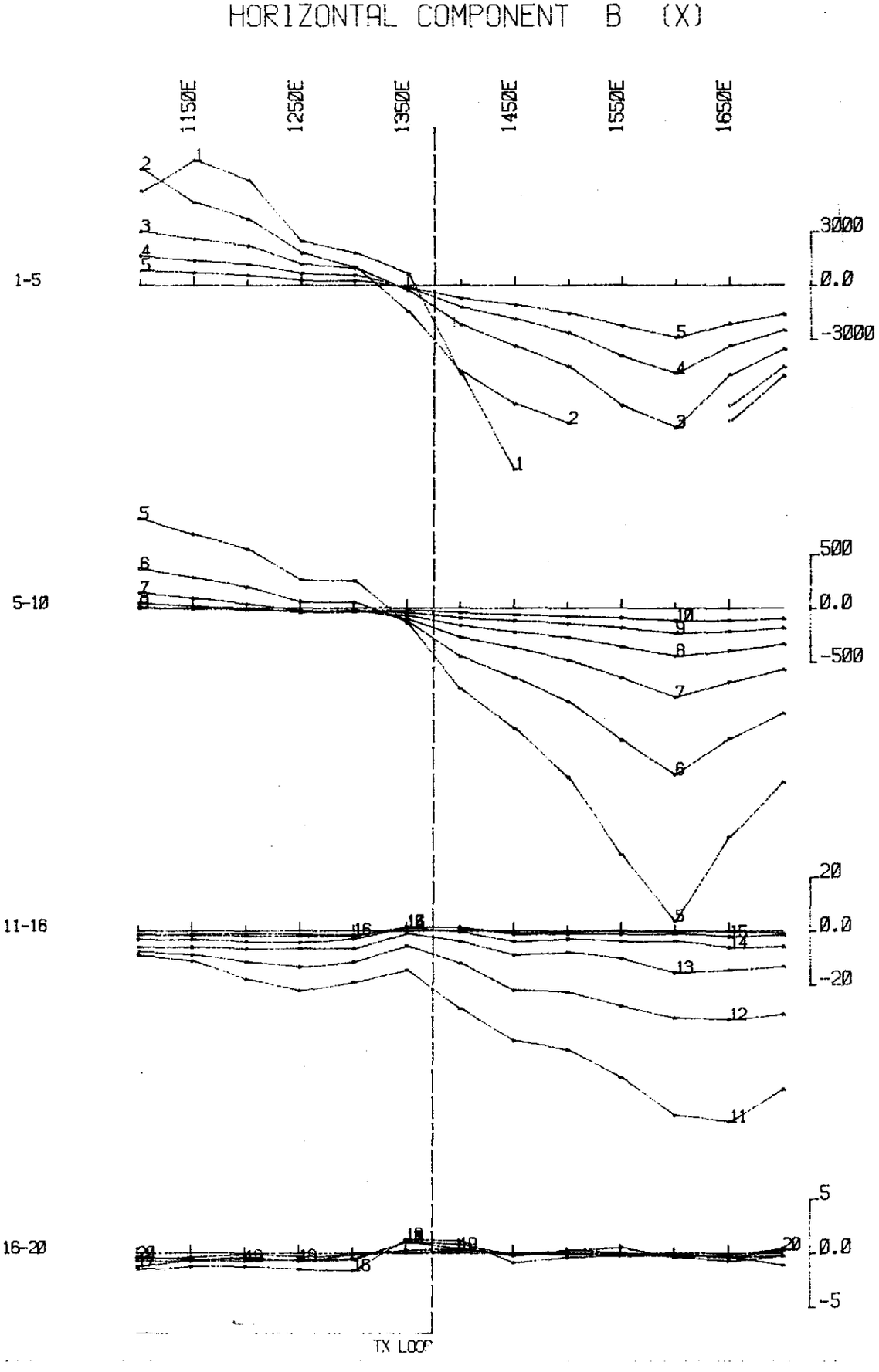
TX LOOP SIDES	: 550N	1050E
	: 1250N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 294	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P.-A.K	
DATE	: 15-DEC,1982	

SURVEYED AND COMPILED BY	PROJECT NO.
GEOTERREX PTY. LTD.	85-1456

CLIENT	: Amoco Minerals Aust.	
PROJECT	: AUSTRAL	
AREA	: Zeehan Tas.	
LINE	: 700N	Z
TX LOOP	: 2	

186

528256



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	: 550N	1050E
	: 1250N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 294	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P., A.K	
DATE	: 15-DEC, 1982	

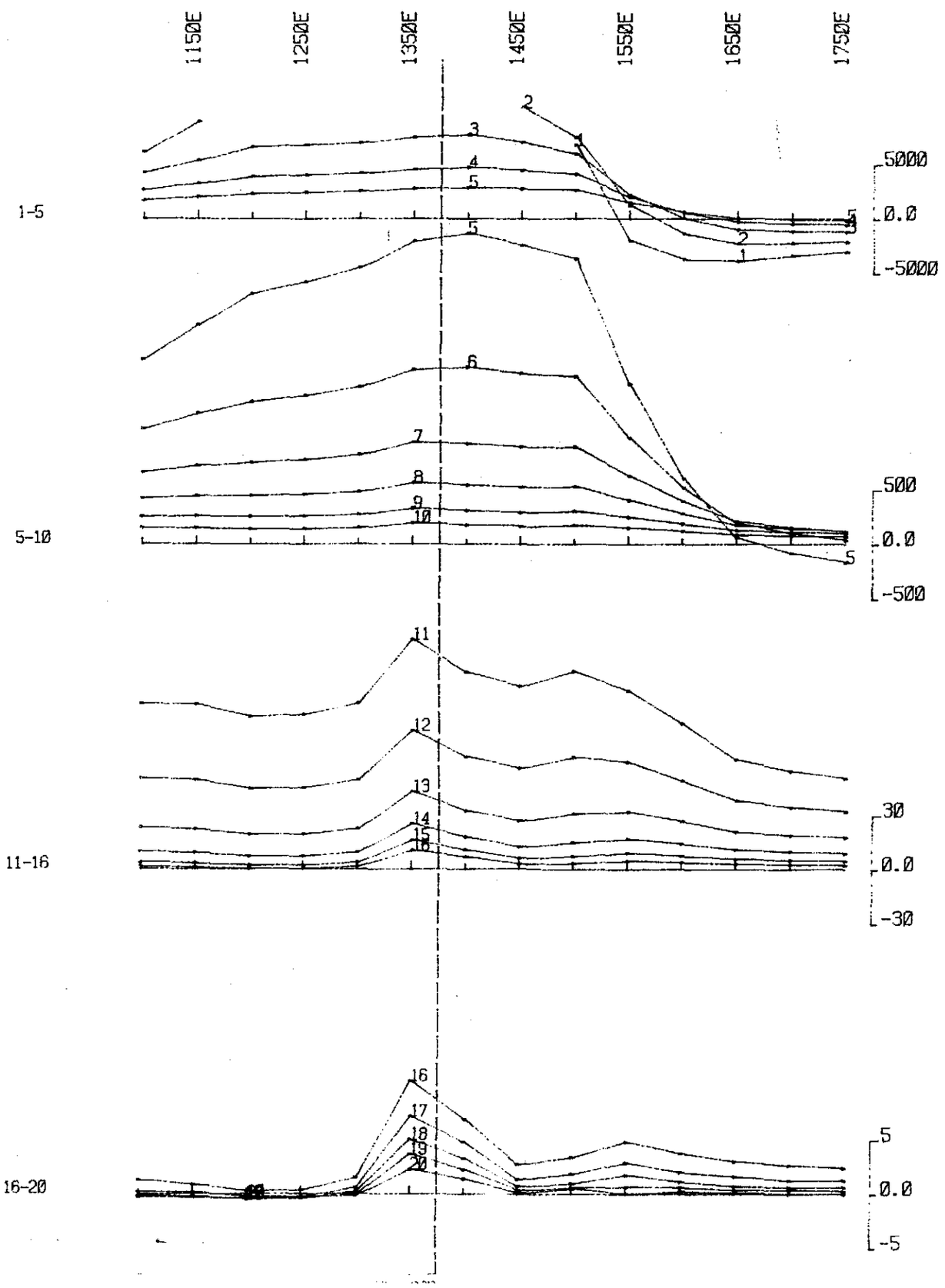
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT	: Amoco Minerals Aust.
PROJECT	: AUSTRAL
AREA	: Zeehan Tas.
LINE	: 700N X
TX LOOP	: 2

187

528257

VERTICAL COMPONENT B (Z)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	: 550N	1050E
	: 1250N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 294	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P.,A.K	
DATE	: 14-DEC,1982	

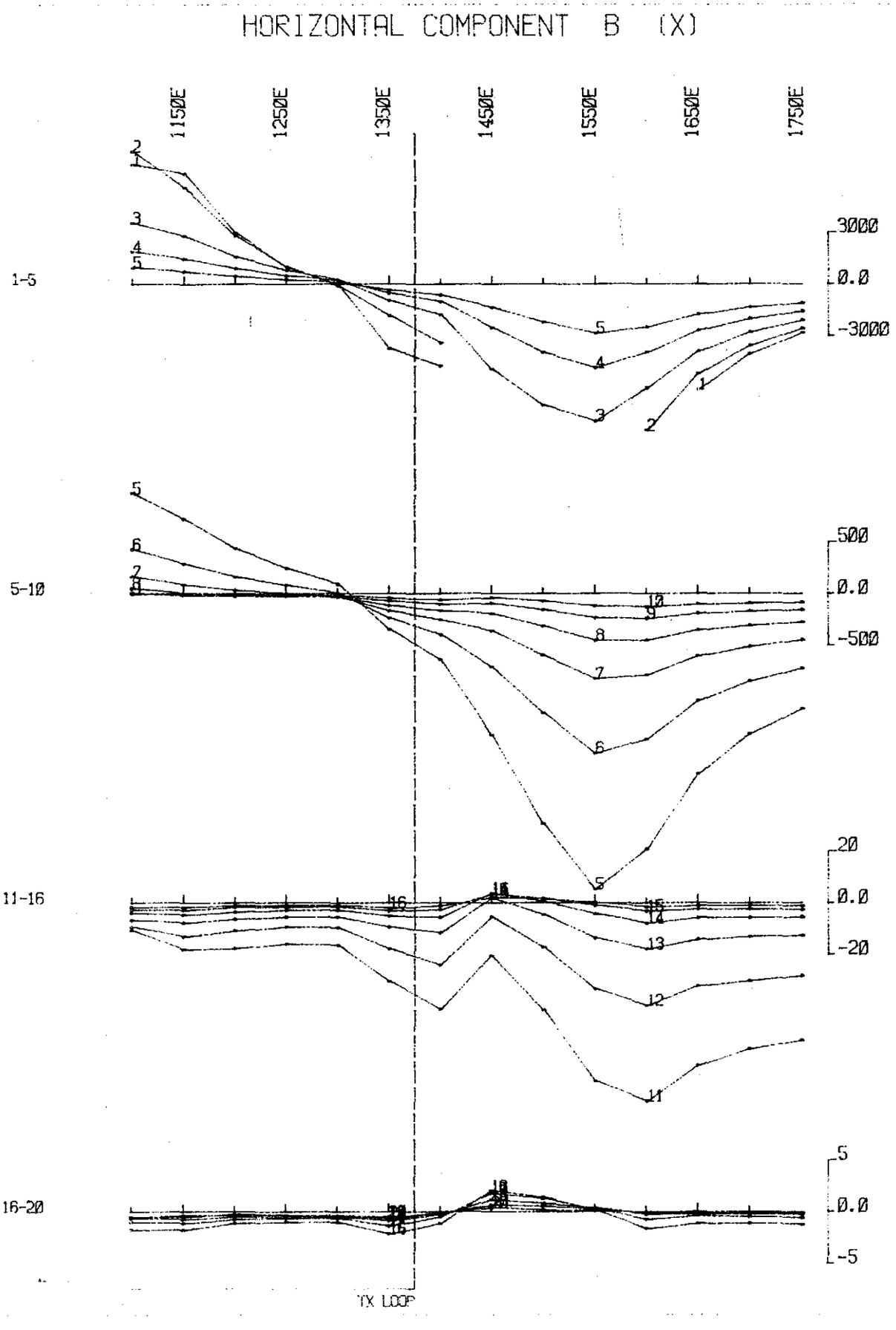
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT	: Amoco Minerals Aust.
PROJECT	: AUSTRAL
AREA	: Zeehan Tas.
LINE	: 800N Z
TX LOOP	: 2

188

528258



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	:	550N	1050E
	:	1250N	1375E
TX LOOP SIZE	: 325m X 700m		
TX TURN OFF TIME	: 294		
CURRENT	: 12.5A		
FREQUENCY	: 25 Hz		
INTEGRATION TIME	: 10		
SYNC MODE	: CRYSTAL		
HORIZONTAL SCALE	: 1:5000		
SURVEYED BY	: J.P. A.K		
DATE	: 14-DEC.1982		

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : AUSTRAL

AREA : Zeehan Tas.

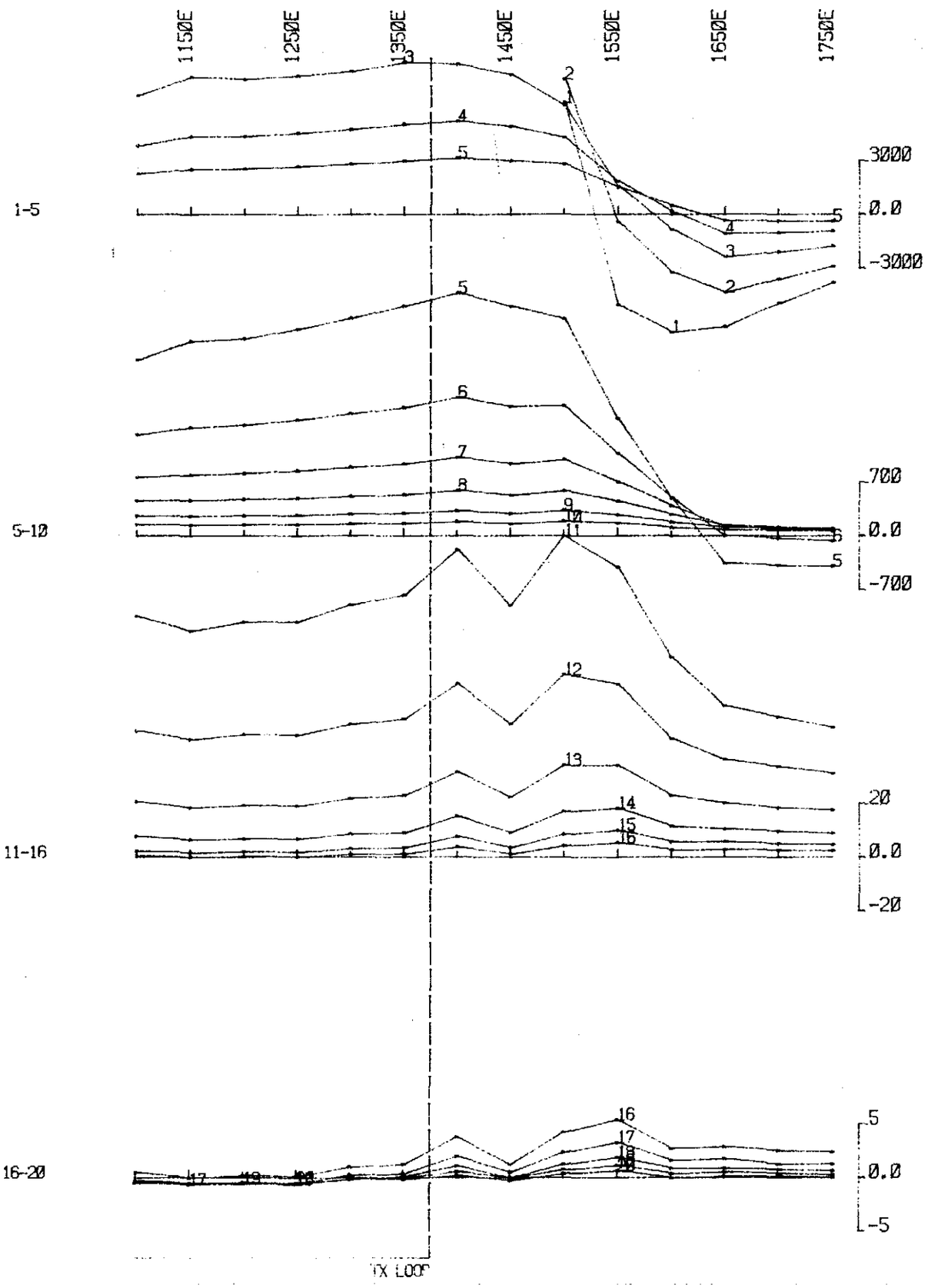
LINE : 800N X

TX LOOP : 2

189

528259

VERTICAL COMPONENT B (Z)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	: 550N	1050E
	: 1250N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 294	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P.,A.K	
DATE	: 14-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : AUSTRAL

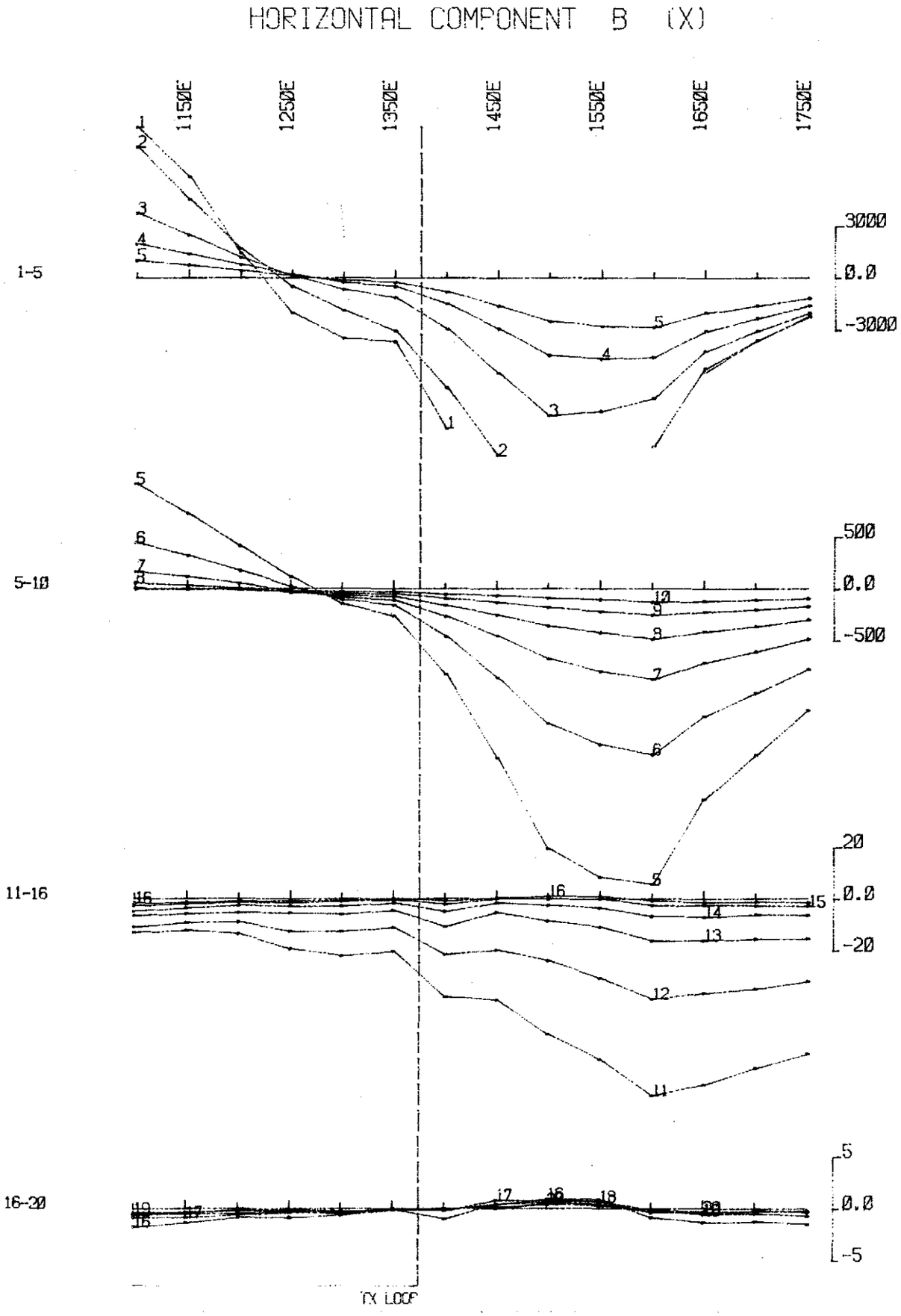
AREA : Zeehan Tas.

LINE : 900N Z

TX LOOP : 2

190

528260



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	: 550N	1050E
	: 1250N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 2ø4	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 1ø	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5ØØØ	
SURVEYED BY	: J.P./A.K	
DATE	: 14-DEC/1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : AUSTRAL

AREA : Zeehan Tas.

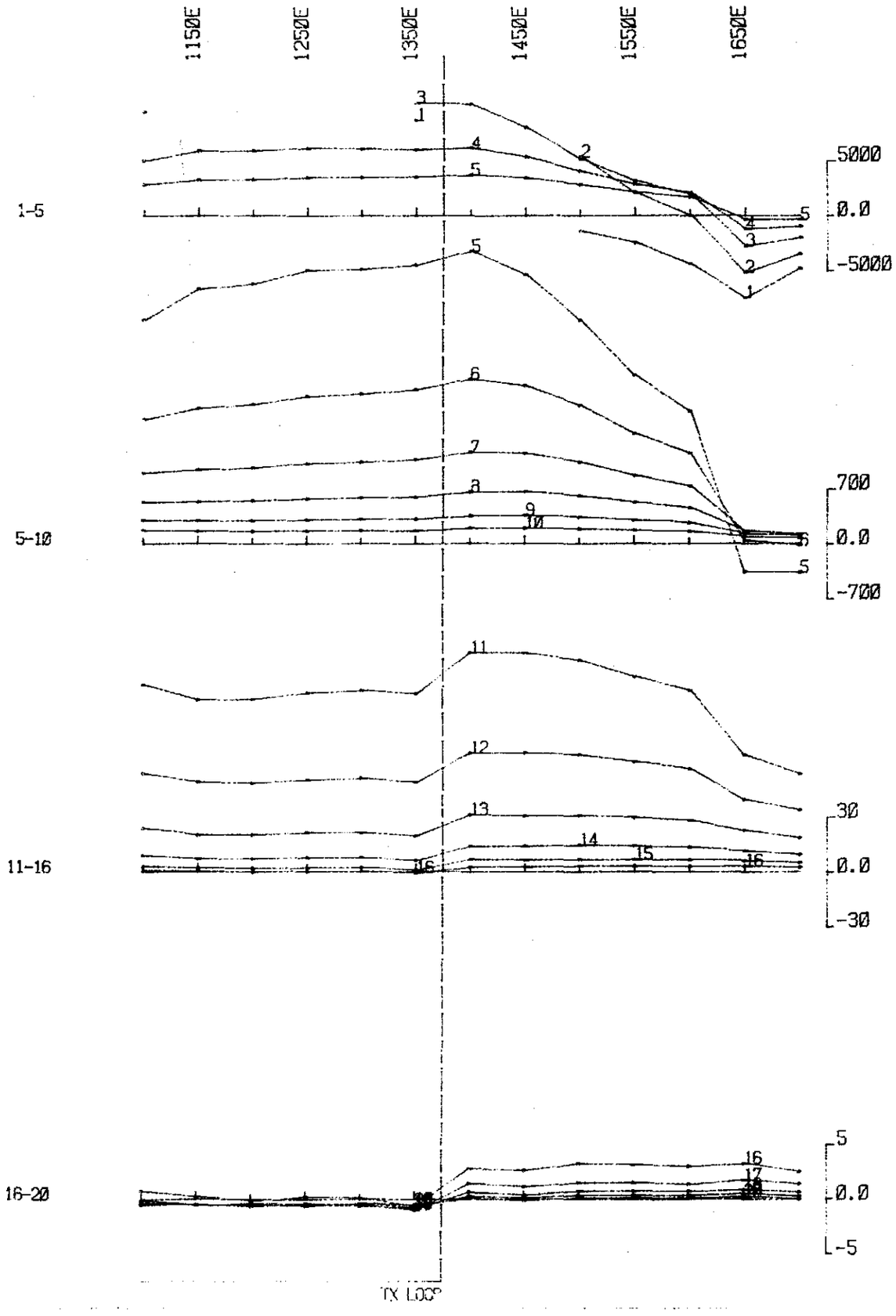
LINE : 900N X

TX LOOP : 2

191

528261

VERTICAL COMPONENT B (Z)



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	: 550N	1050E
	: 1250N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 294	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P. A.K	
DATE	: 14-DEC-1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : AUSTRAL

AREA : Zeehan Tas.

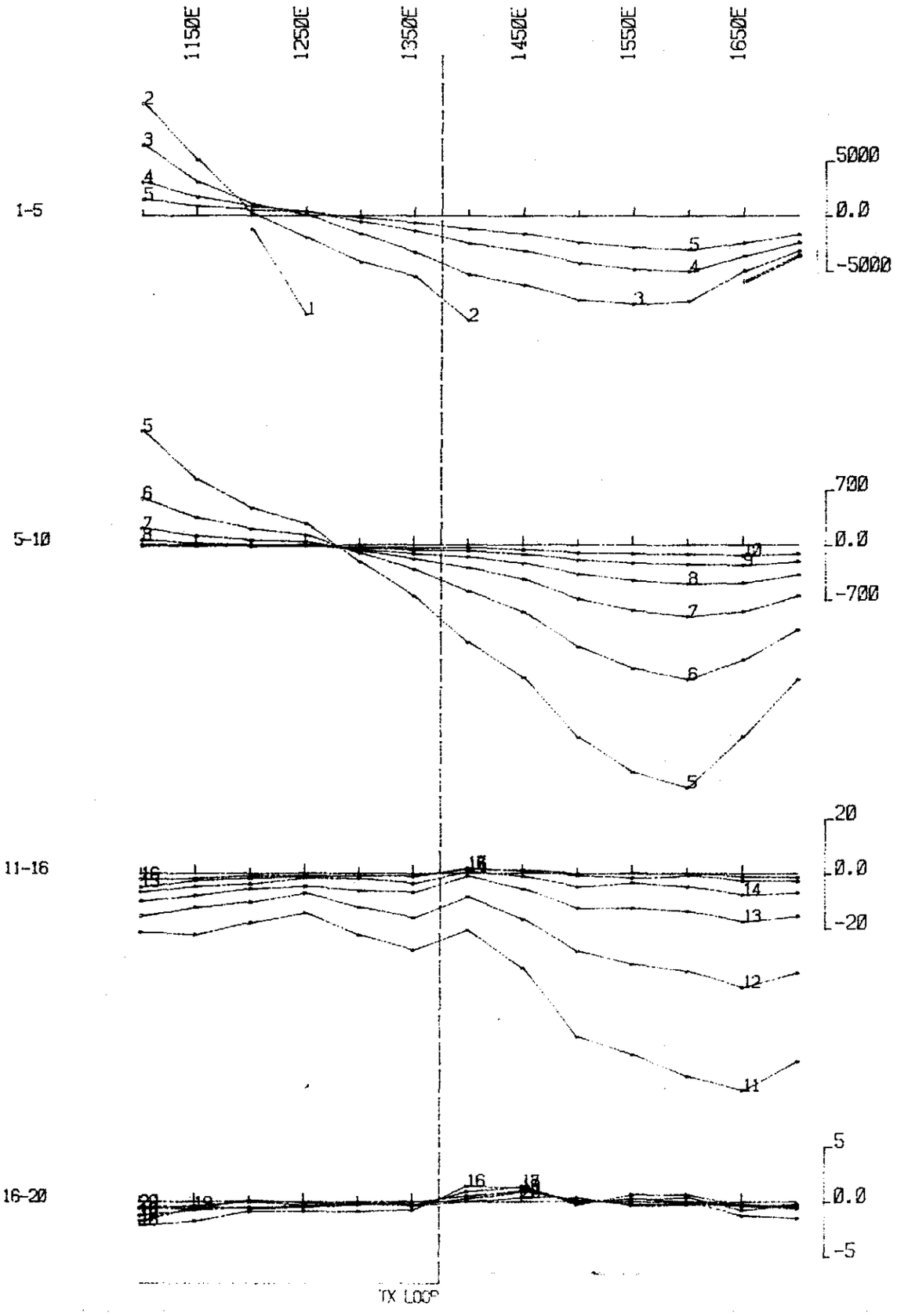
LINE : 1000N Z

TX LOOP : 2

192

528262

HORIZONTAL COMPONENT B (X)



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	:	550N	1250E
	:	1250N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	294	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P./A.K	
DATE	:	14-DEC,1982	

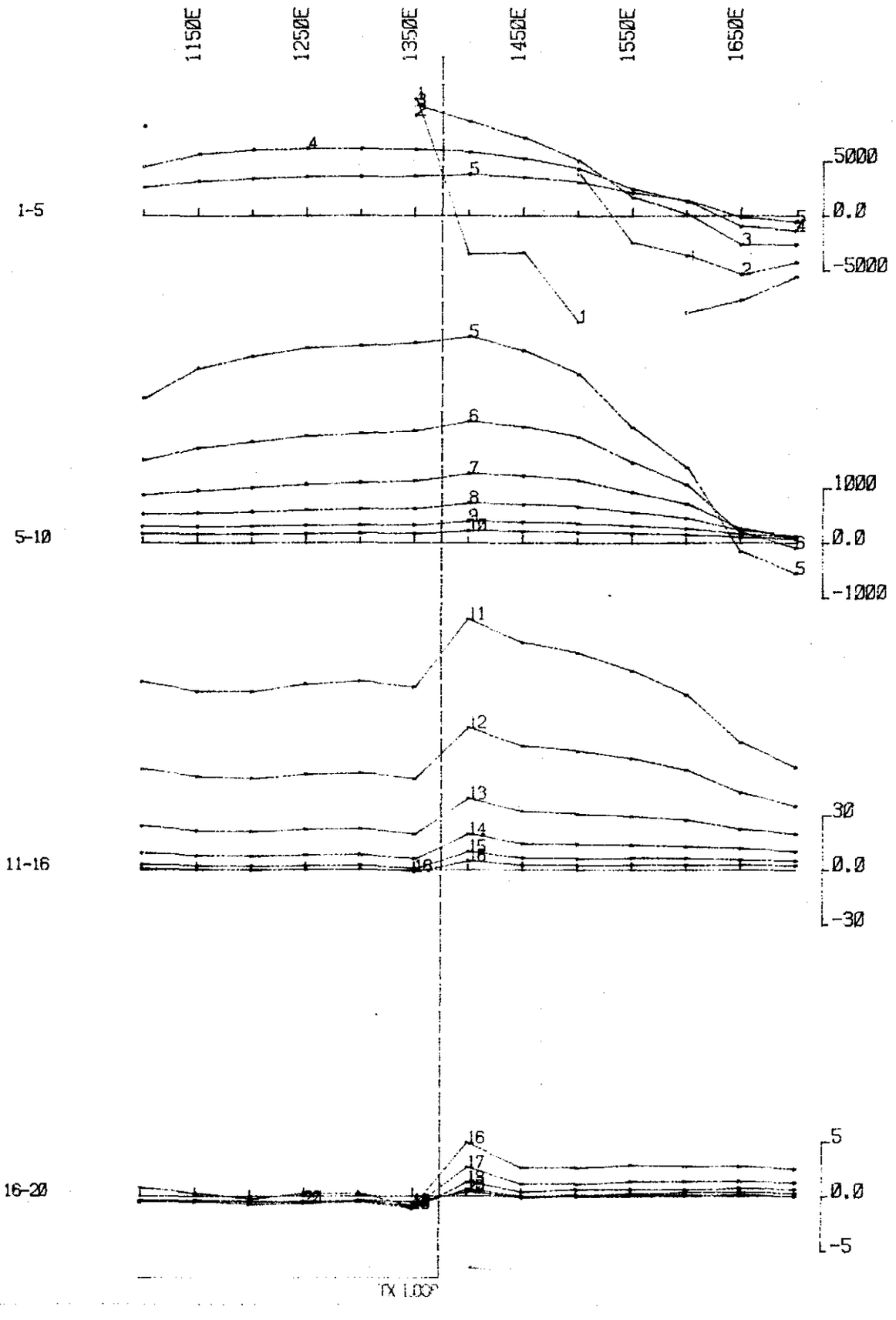
	SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT	:	Amoco Minerals Aust.
PROJECT	:	AUSTRAL
AREA	:	Zeehan Tas.
LINE	:	1000N X
TX LOOP	:	2

193

528263

VERTICAL COMPONENT B (Z)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

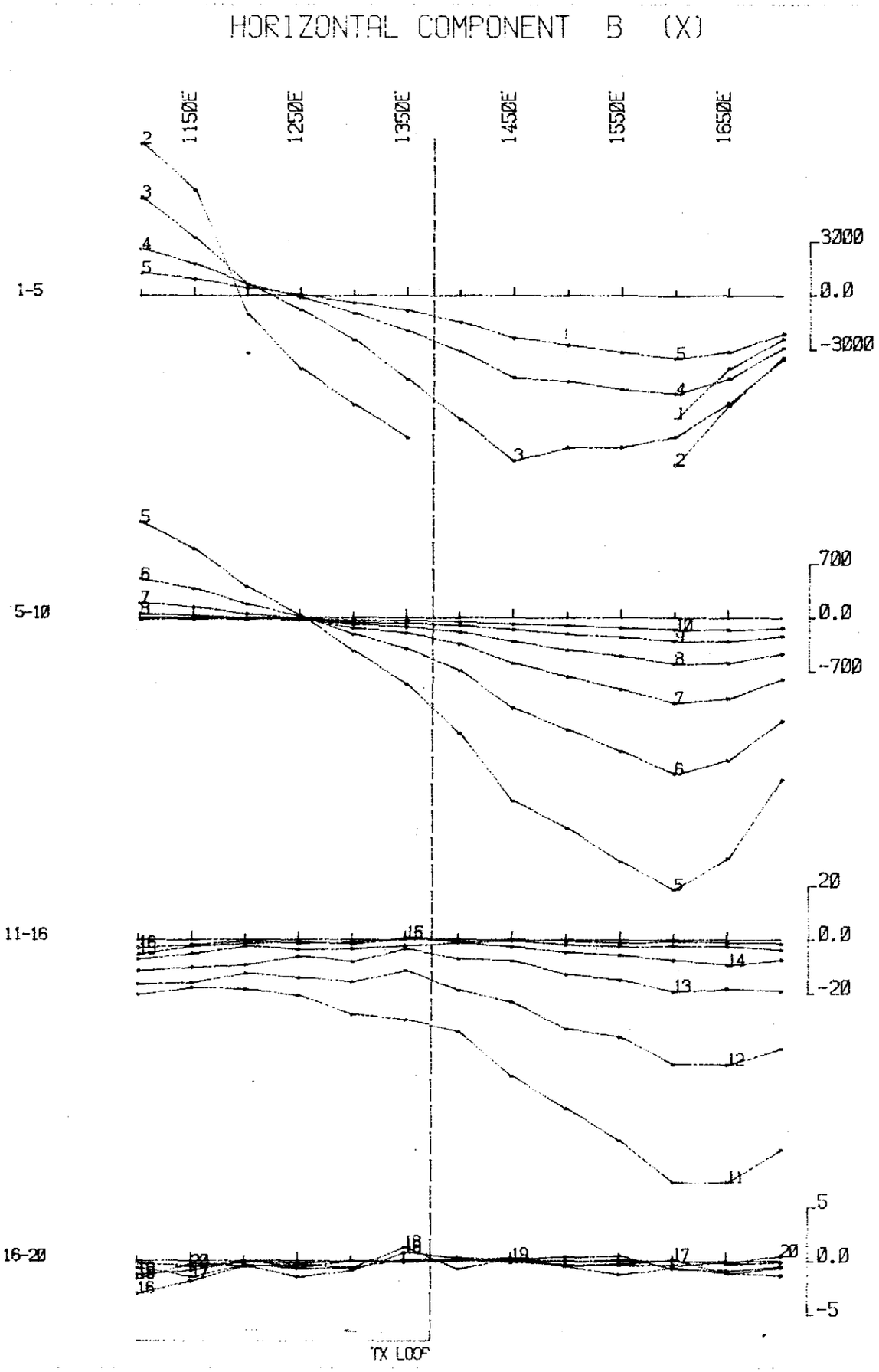
TX LOOP SIDES	:	550N	1050E
	:	1250N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	294	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	8	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. A.K	
DATE	:	14-DEC-1982	

SURVEYED AND COMPILED BY	PROJECT NO.
GEOTERREX PTY. LTD.	85-1456

CLIENT	: Pasco Minerals Aust.	
PROJECT	: AUSTRAL	
AREA	: Zeehan Tas.	
LINE	: 1100N	Z
TX LOOP	: 2	

194

528264



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	:	550N	1050E
	:	1250N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	29µ	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	8	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. A.K	
DATE	:	14-DEC/1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

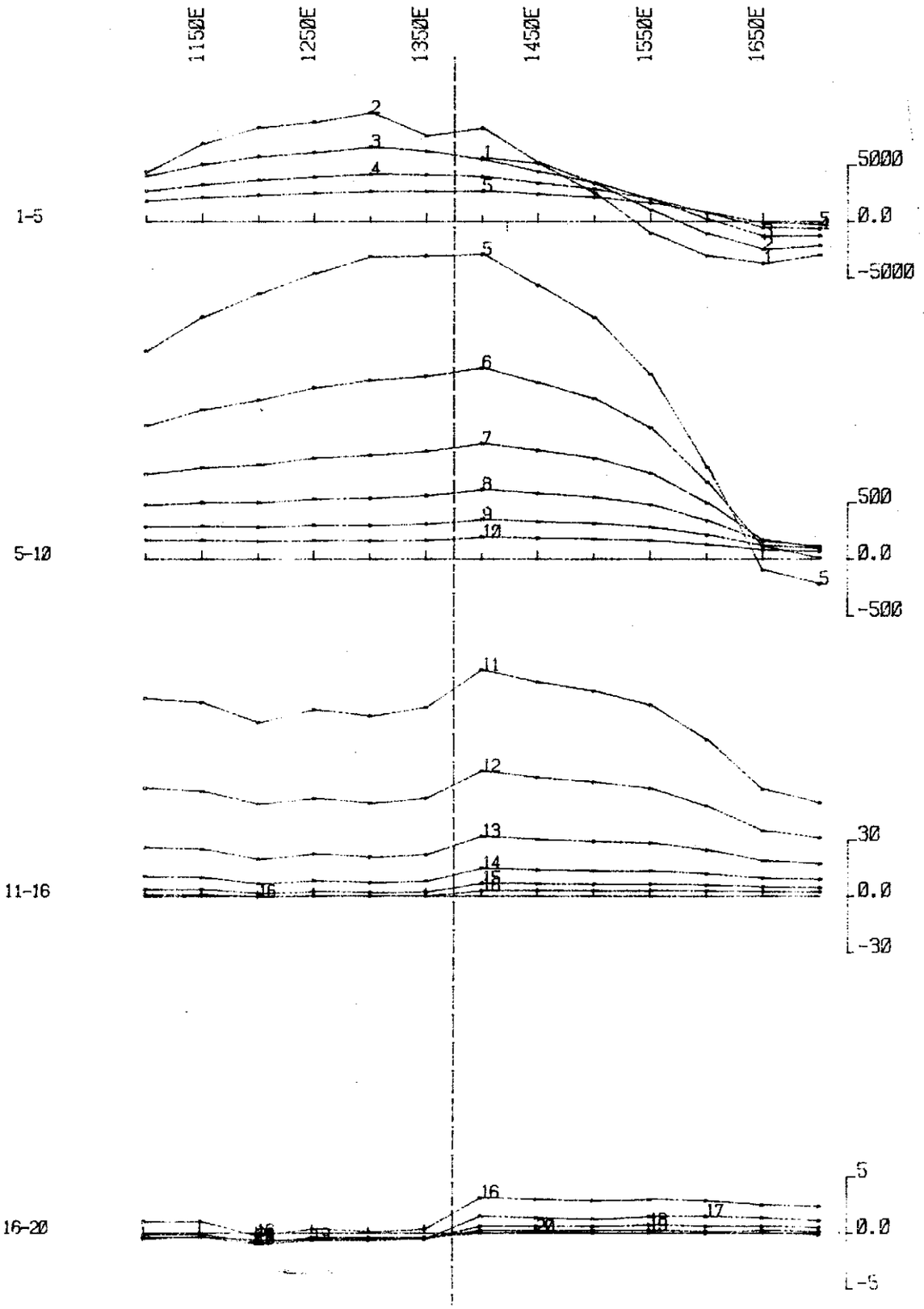
PROJECT NO. 35-1456

CLIENT	:	Amoco Minerals Aust.
PROJECT	:	AUSTRAL
AREA	:	Zeehan Tas.
LINE	:	1100N X
TX LOOP	:	2

195

528265

VERTICAL COMPONENT B (Z)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	: 550N	1050E
	: 1250N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 294	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P. -A.K	
DATE	: 13-DEC.1982	

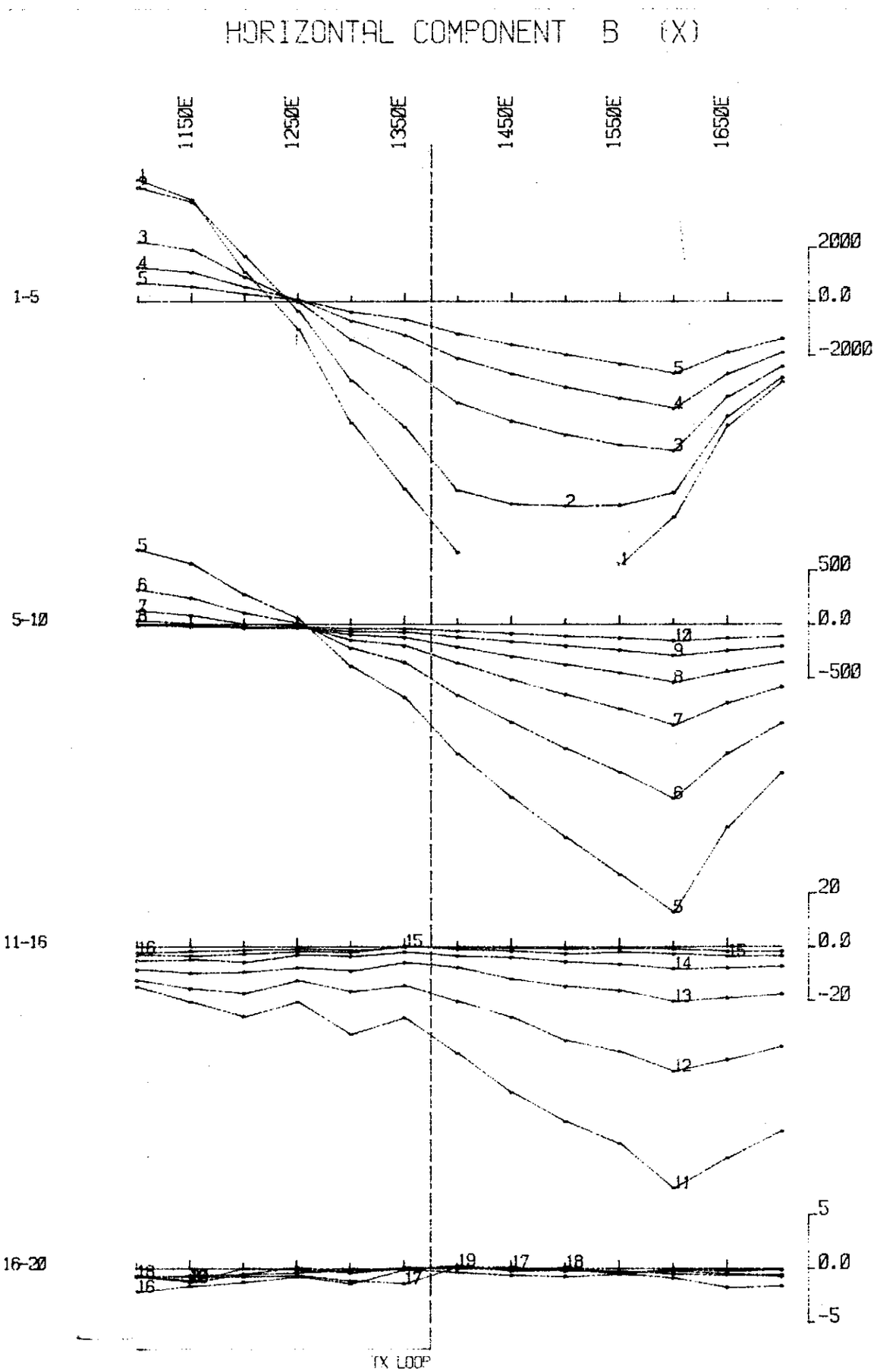
	SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 82-1456

CLIENT : Amoco Minerals Aust.

PROJECT : AUSTRAL

AREA : Zeehan Tas.

LINE : 1200N Z



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	:	550N	1250E
	:	1250N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	29ms	
CURRENT	:	12.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P., A.K	
DATE	:	13-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 35-1456

CLIENT : Amoco Minerals Aust.

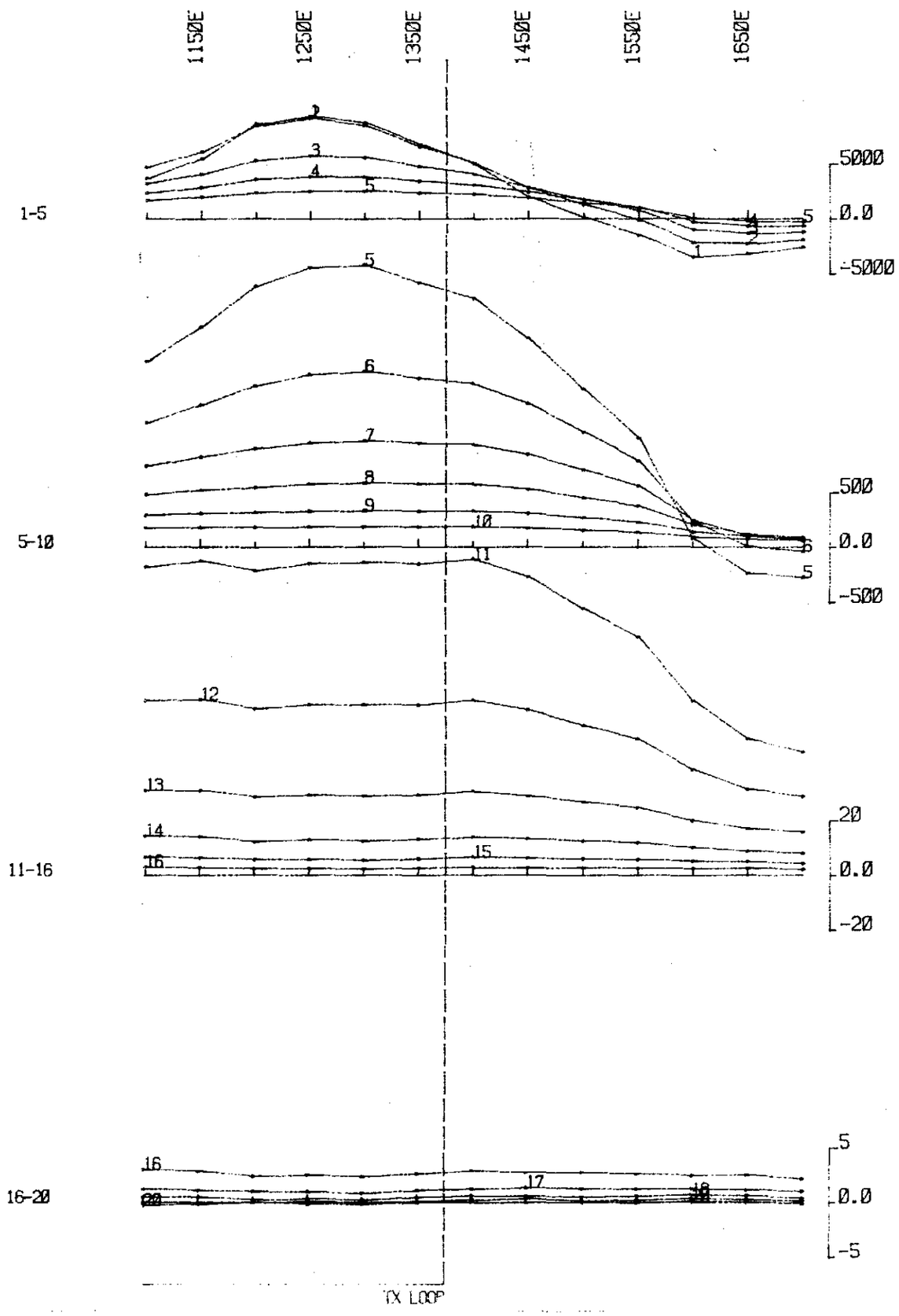
PROJECT : AUSTRAL

AREA : Zeehan Tas.

LINE : 1200N X

TX LOOP : 2

VERTICAL COMPONENT B (Z)



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	: 550N	1250E
	: 1250N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 2ms	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P.,A.K	
DATE	: 13-DEC,1982	

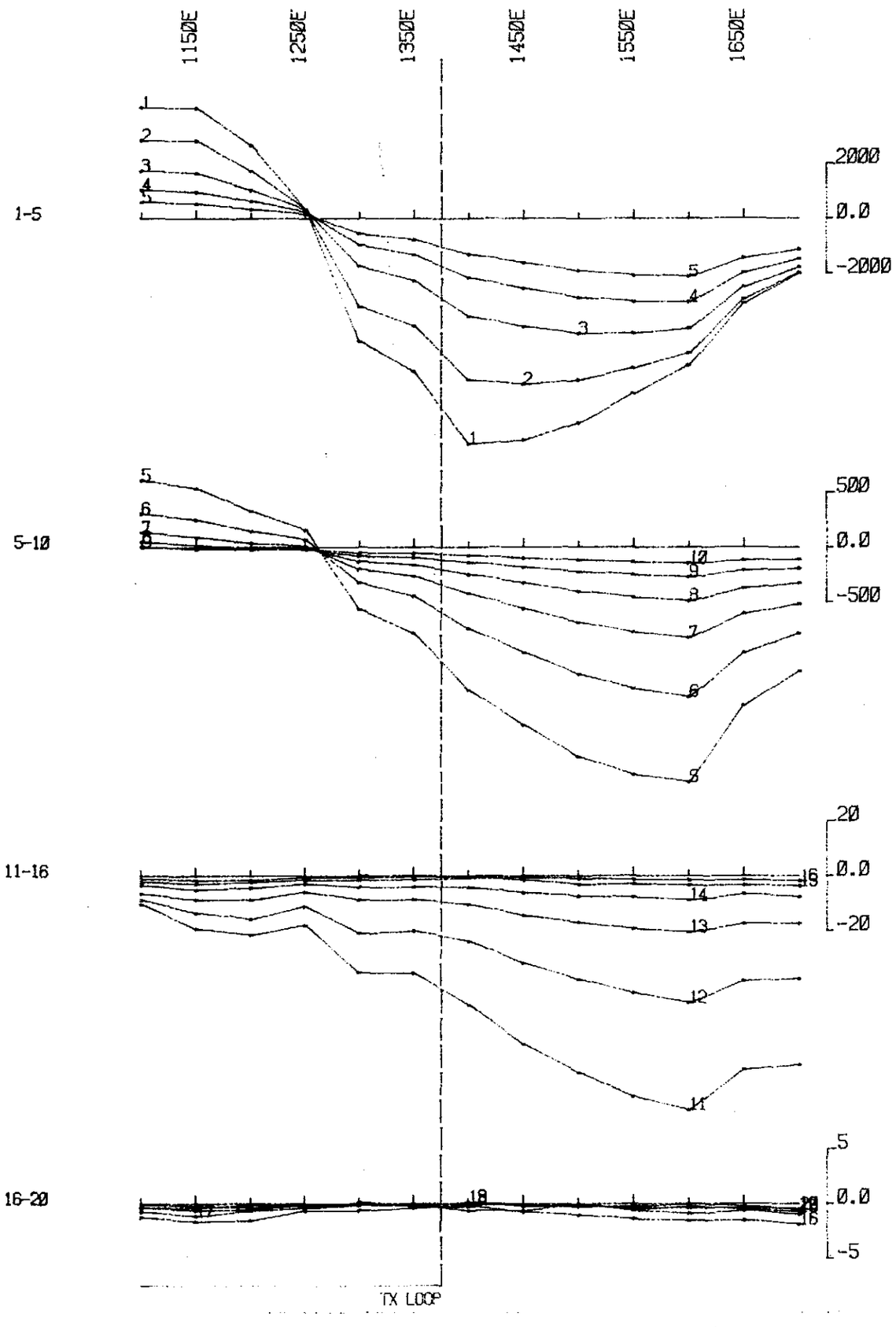
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 82-1456

CLIENT	: Amoco Minerals Aust.	
PROJECT	: AUSTRAL	
AREA	: Zeehan Tas.	
LINE	: 1300N	Z
TX LOOP	: 2	

528268

HORIZONTAL COMPONENT B (X)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	: 550N	1050E
	: 1250N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 294	
CURRENT	: 12.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P. A.K	
DATE	: 13-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : AUSTRAL

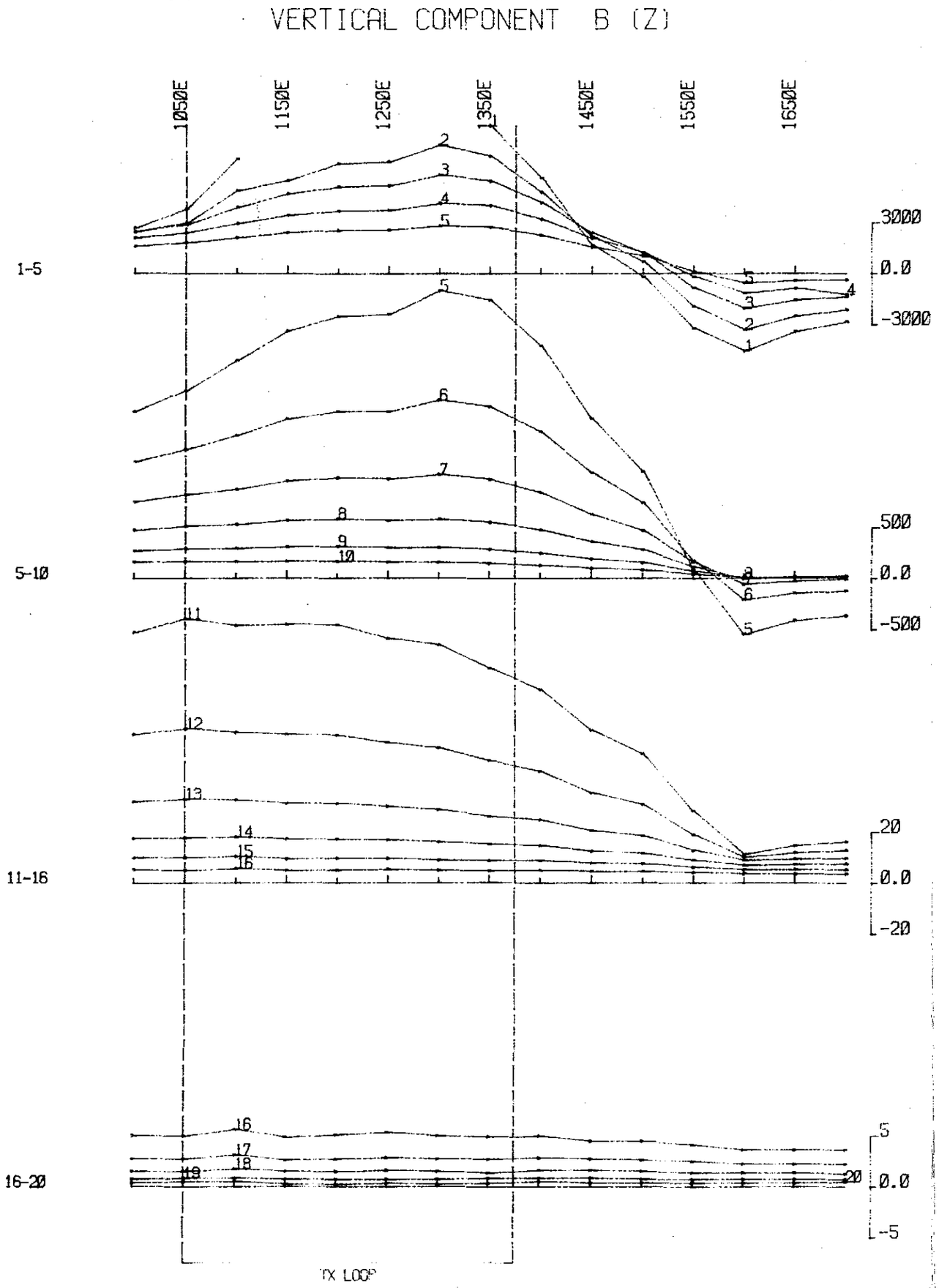
AREA : Zeehan Tas.

LINE : 1300N X

TX LOOP : 2

199

528269



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	:	2150N	1050E
	:	2850N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	294	
CURRENT	:	13.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. .A.K	
DATE	:	17-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

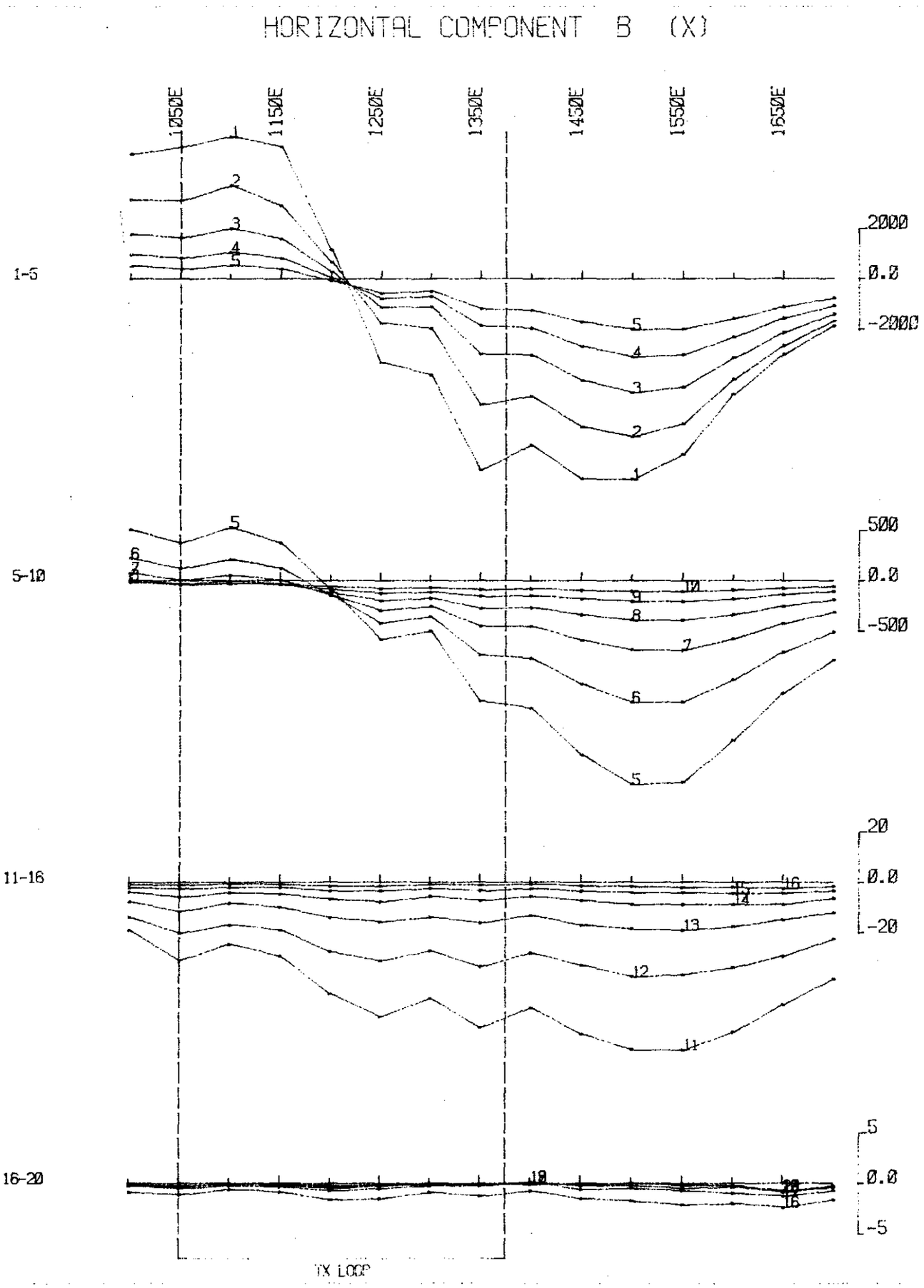
PROJECT : NORTH AUSTRAL

AREA : Zeehan Tas.

LINE : 2100N Z

TX LOOP : 3

528270



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	: 2150N	1050E
	: 2850N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 294	
CURRENT	: 13.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P. A.K	
DATE	: 17-DEC,1982	

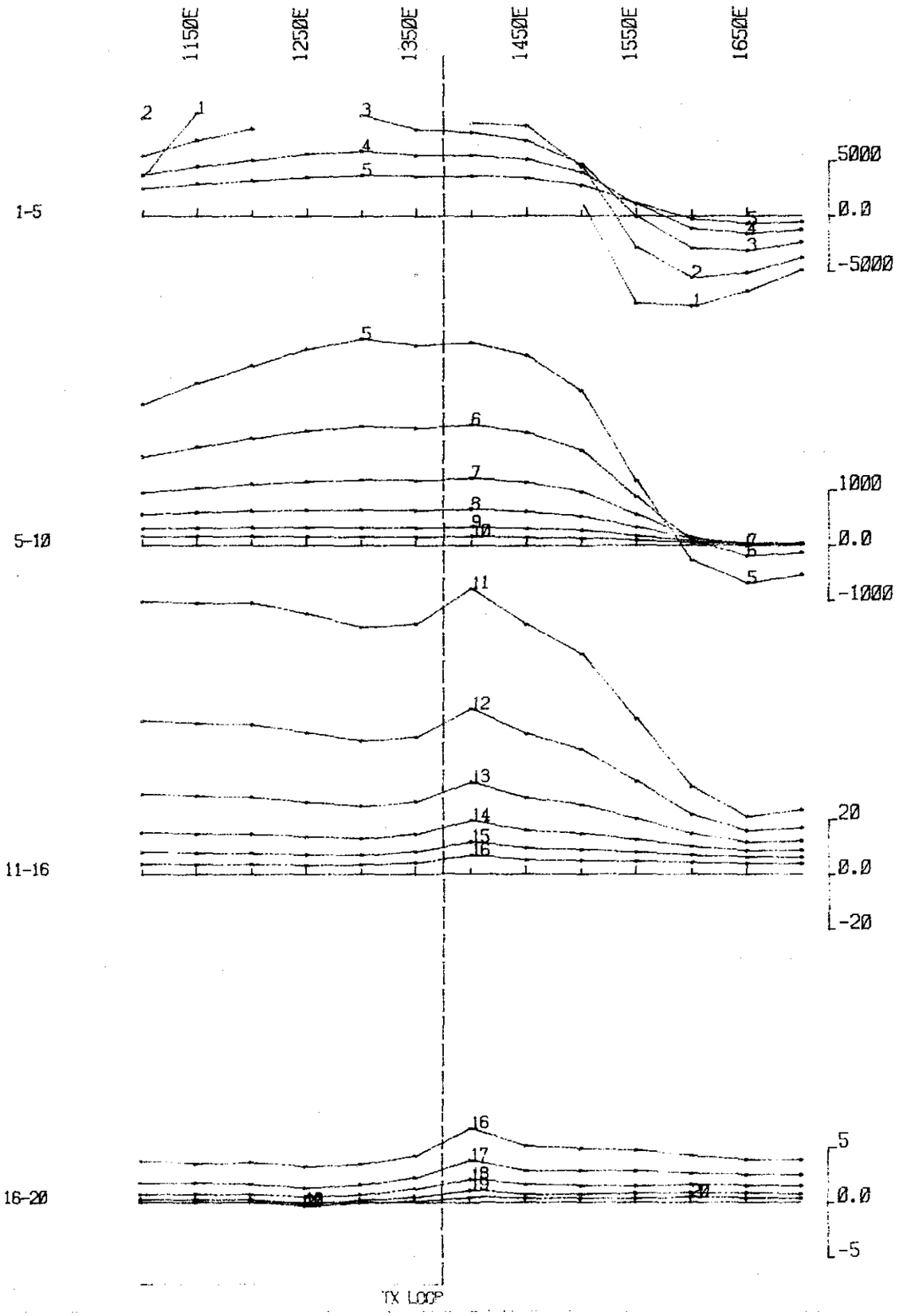
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT	Amoco Minerals Aust.
PROJECT	NORTH AUSTRAL
AREA	Zeehan Tas.
LINE	2100N X
TX LOOP	3

528271

VERTICAL COMPONENT B (Z)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	:	2150N	1050E
	:	2850N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	294	
CURRENT	:	13.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. .A.K	
DATE	:	17-DEC-1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : NORTH AUSTRAL

AREA : Zeehan Tas.

LINE : 2200N Z

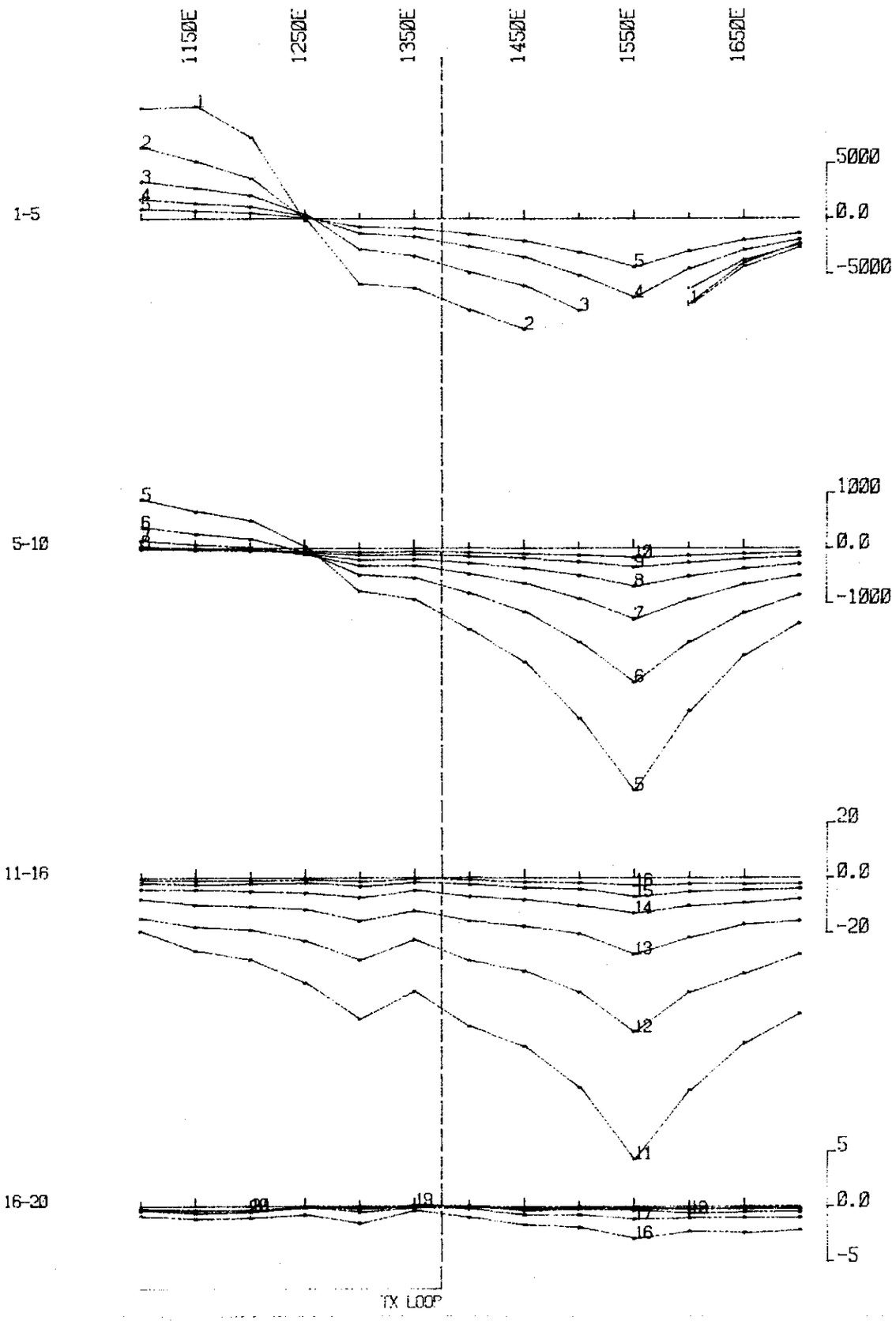
TX LOOP : 3

202

202

528272

HORIZONTAL COMPONENT B (X)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	: 2150N	1050E
	: 2850N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 294	
CURRENT	: 13.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P. A.K	
DATE	: 17-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : NORTH AUSTRAL

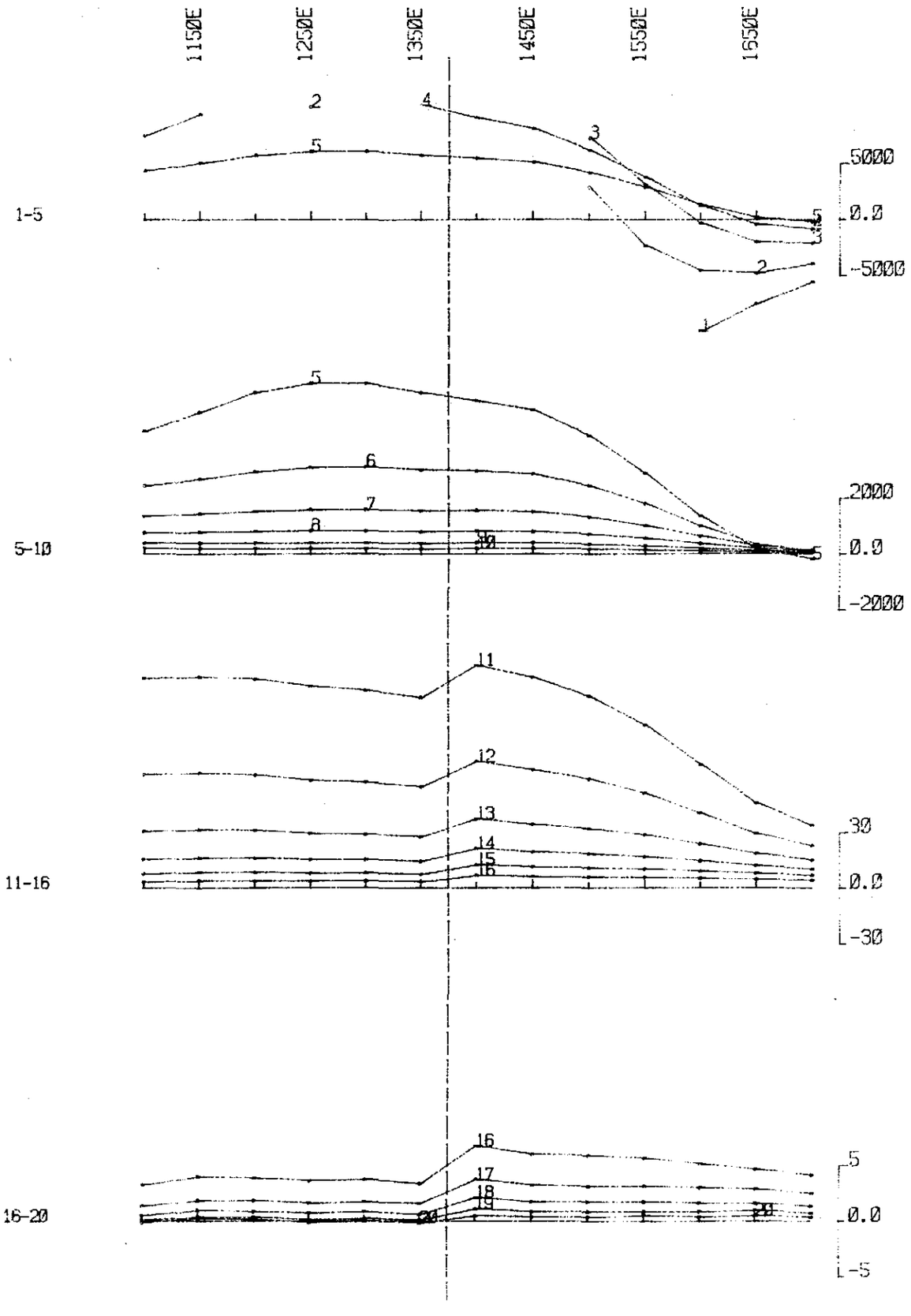
AREA : Zeehan Tas.

LINE : 2200N X

TX LOOP : 3

528273

VERTICAL COMPONENT B (Z)



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	: 2150N	1050E
	: 2850N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 2ms	
CURRENT	: 13.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P. A.K	
DATE	: 17-DEC.1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 35-1456

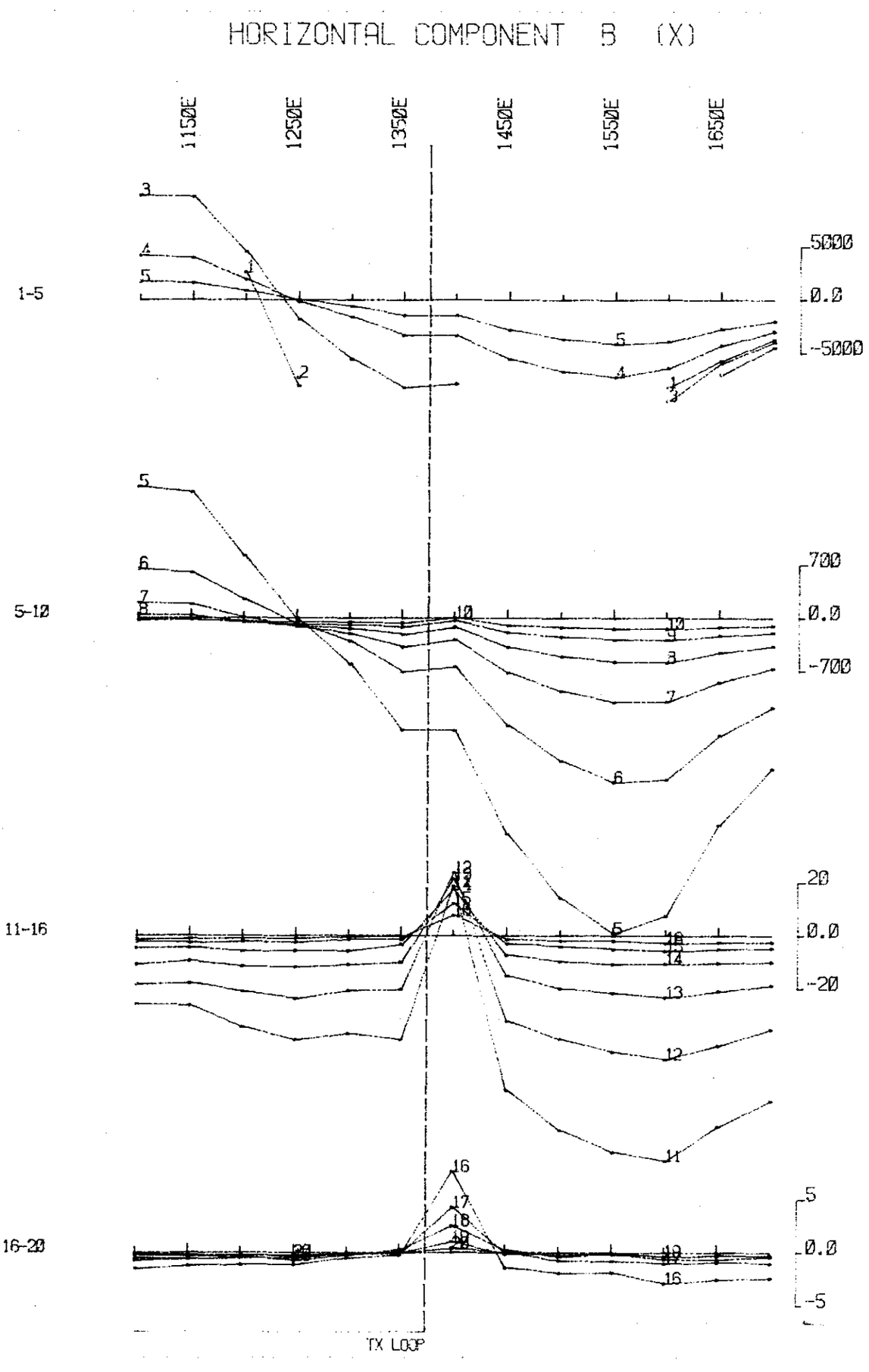
CLIENT : Amoco Minerals Aust.

PROJECT : NORTH AUSTRAL

AREA : Zeehan Tas.

LINE : 2300N Z

204



528274

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	:	2150N	1250E
	:	2850N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	2ms	
CURRENT	:	13.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. A.K	
DATE	:	17-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : NORTH AUSTRAL

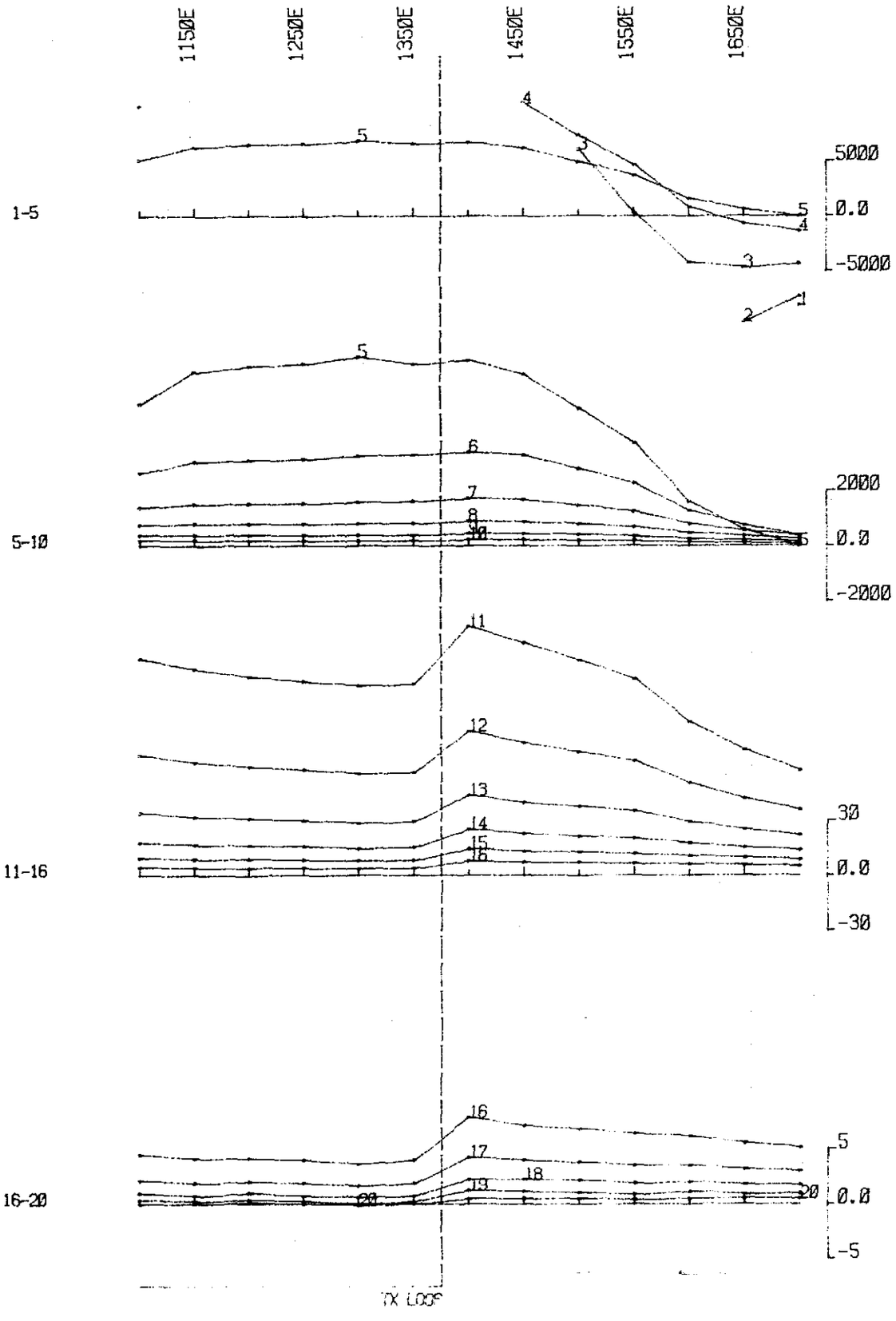
AREA : Zeehan Tas.

LINE : 2300N X

TX LOOP : 3

205

VERTICAL COMPONENT B (Z)



nanovolts per metre squared

528275

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	: 2150N	1050E
	: 2850N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 294	
CURRENT	: 13.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P. .A.K	
DATE	: 17-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : NORTH AUSTRAL

AREA : Zeehan Tas.

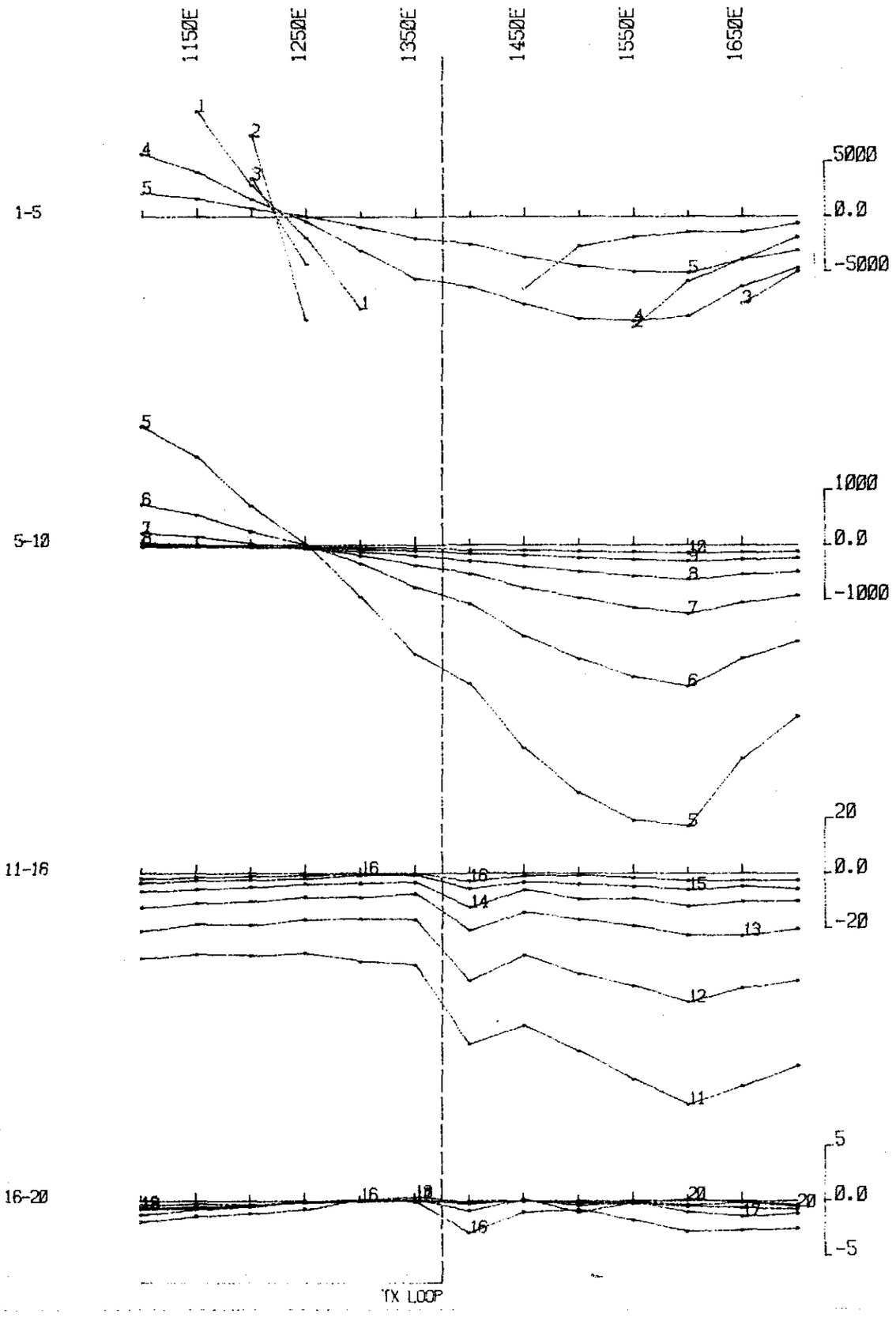
LINE : 2400N Z

TX LOOP : 3

206

528276

HORIZONTAL COMPONENT B (X)



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	:	2150N	1050E
	:	2850N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	294	
CURRENT	:	13.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. /A.K	
DATE	:	17-DEC/1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1496

CLIENT : Amoco Minerals Aust.

PROJECT : NORTH AUSTRAL

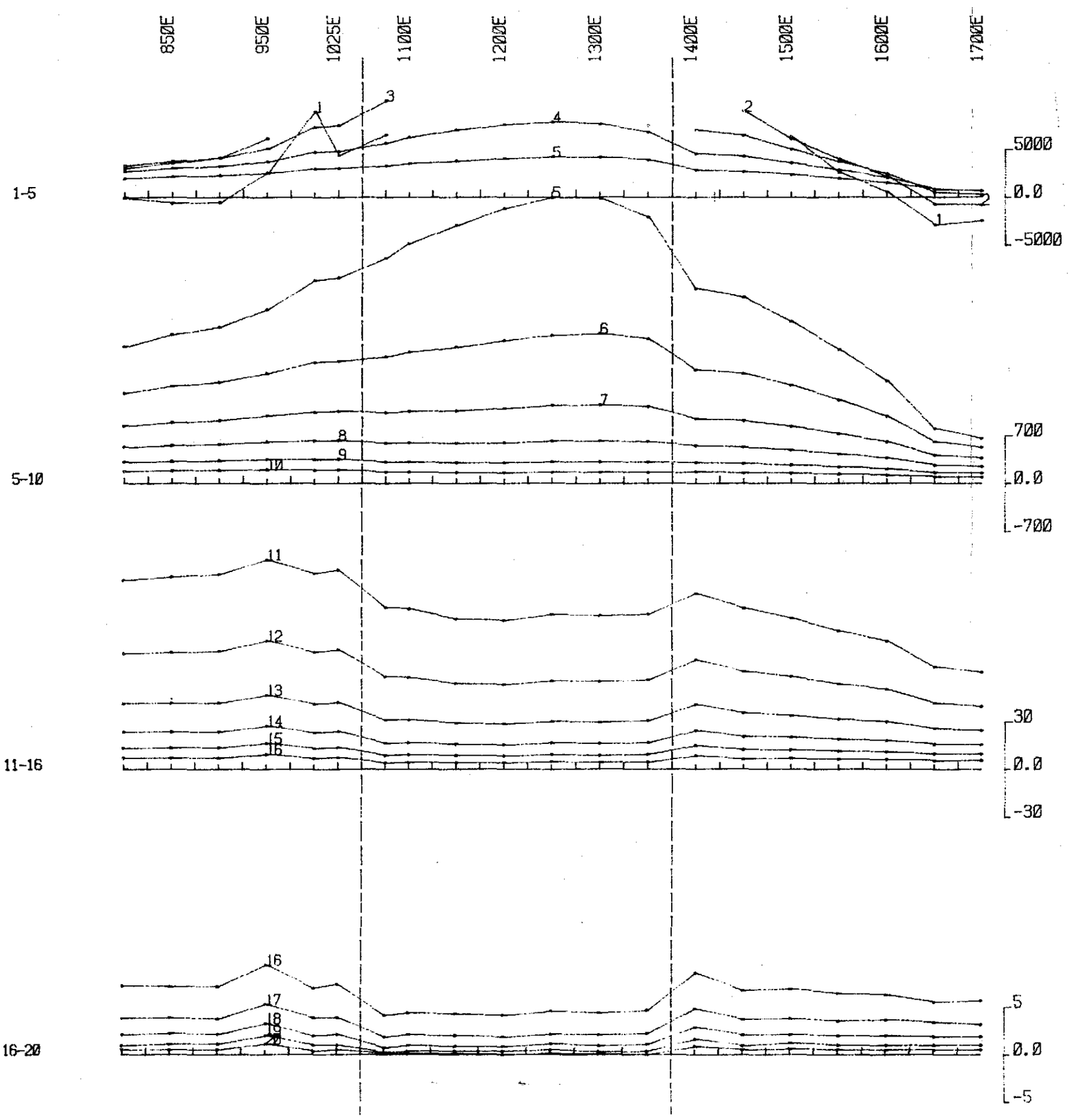
AREA : Zeehan Tas.

LINE : 2400N X

TX LOOP : 3

207

VERTICAL COMPONENT B (Z)



nanovolts per metre squared

528277

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	: 2150N	1050E
	: 2850N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 294	
CURRENT	: 13.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P. A.K	
DATE	: 19-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : NORTH AUSTRAL

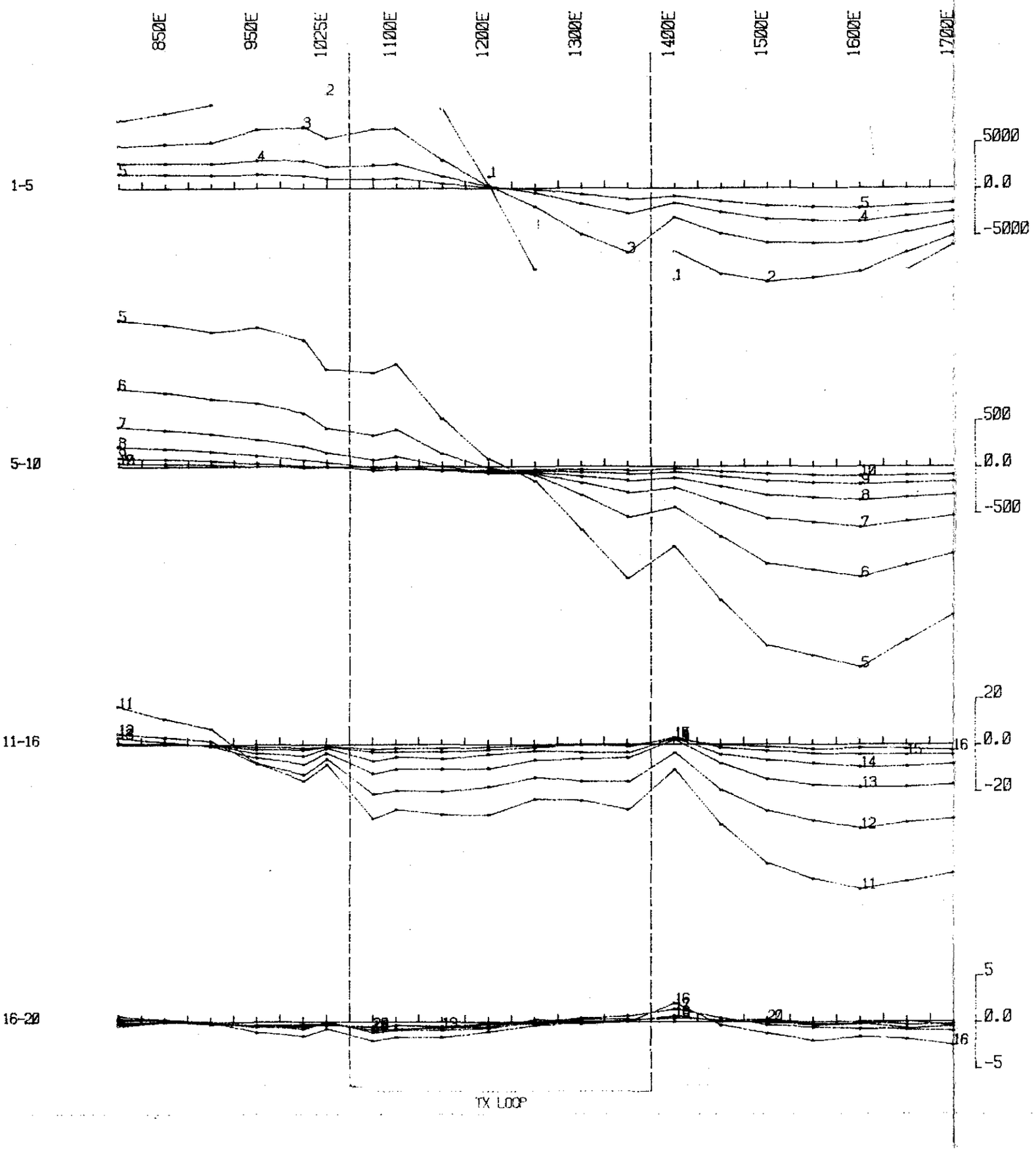
AREA : Zeehan Tas.

LINE : 2500N Z

208

528278

HORIZONTAL COMPONENT B (X)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	:	2150N	1050E
	:	2850N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	294	
CURRENT	:	13.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P., A.K	
DATE	:	19-DEC,1982	

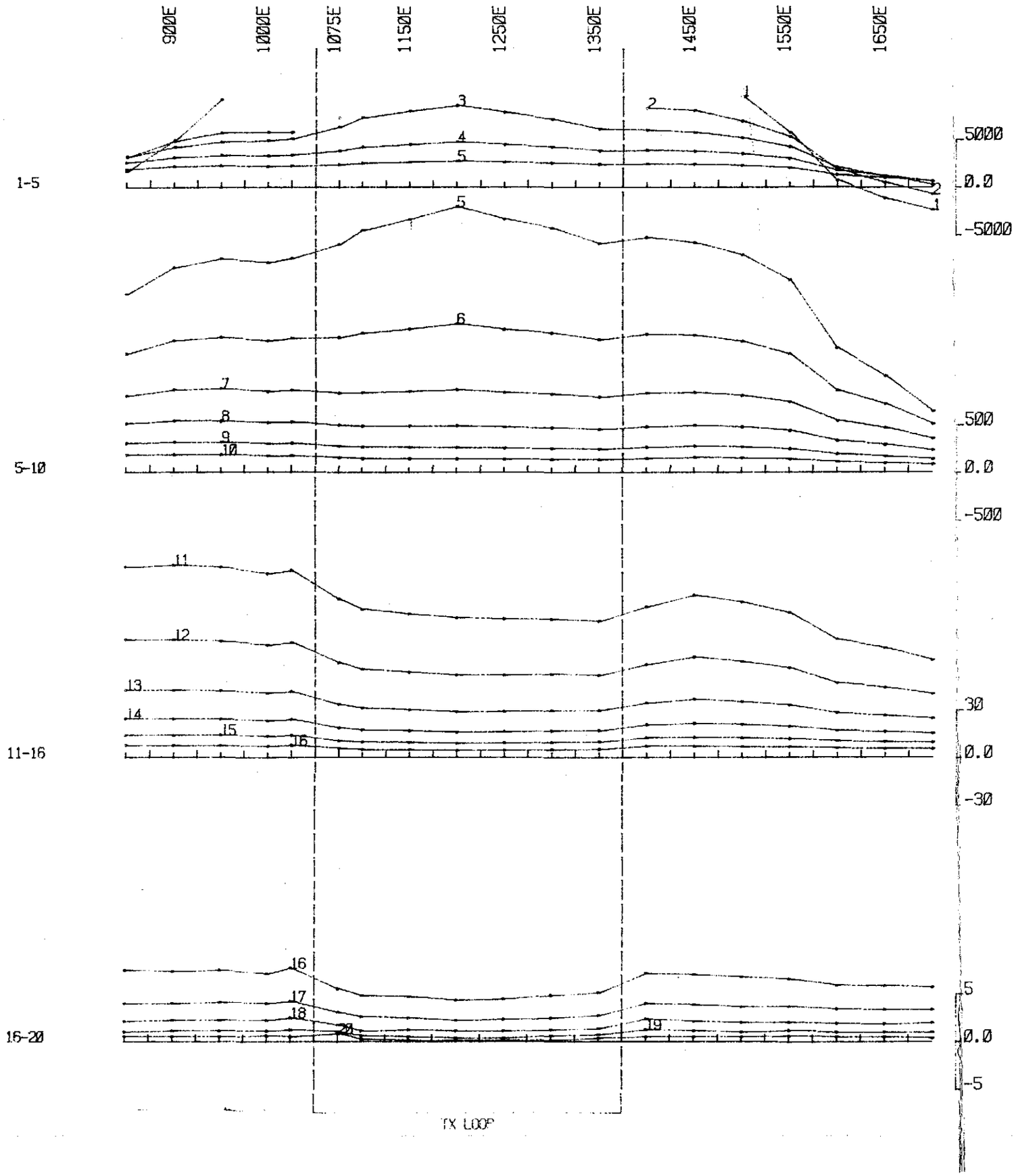
	SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1456

CLIENT	: Amoco Minerals Aust.	
PROJECT	: NORTH AUSTRAL	
AREA	: Zeehan Tas.	
LINE	: 2500N	X
TX LOOP	: 3	

209

528279

VERTICAL COMPONENT B (Z)



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	:	2150N	1050E
	:	2850N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	2ms	
CURRENT	:	13.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. A.K	
DATE	:	19-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : NORTH AUSTRAL

AREA : Zeehan Tas.

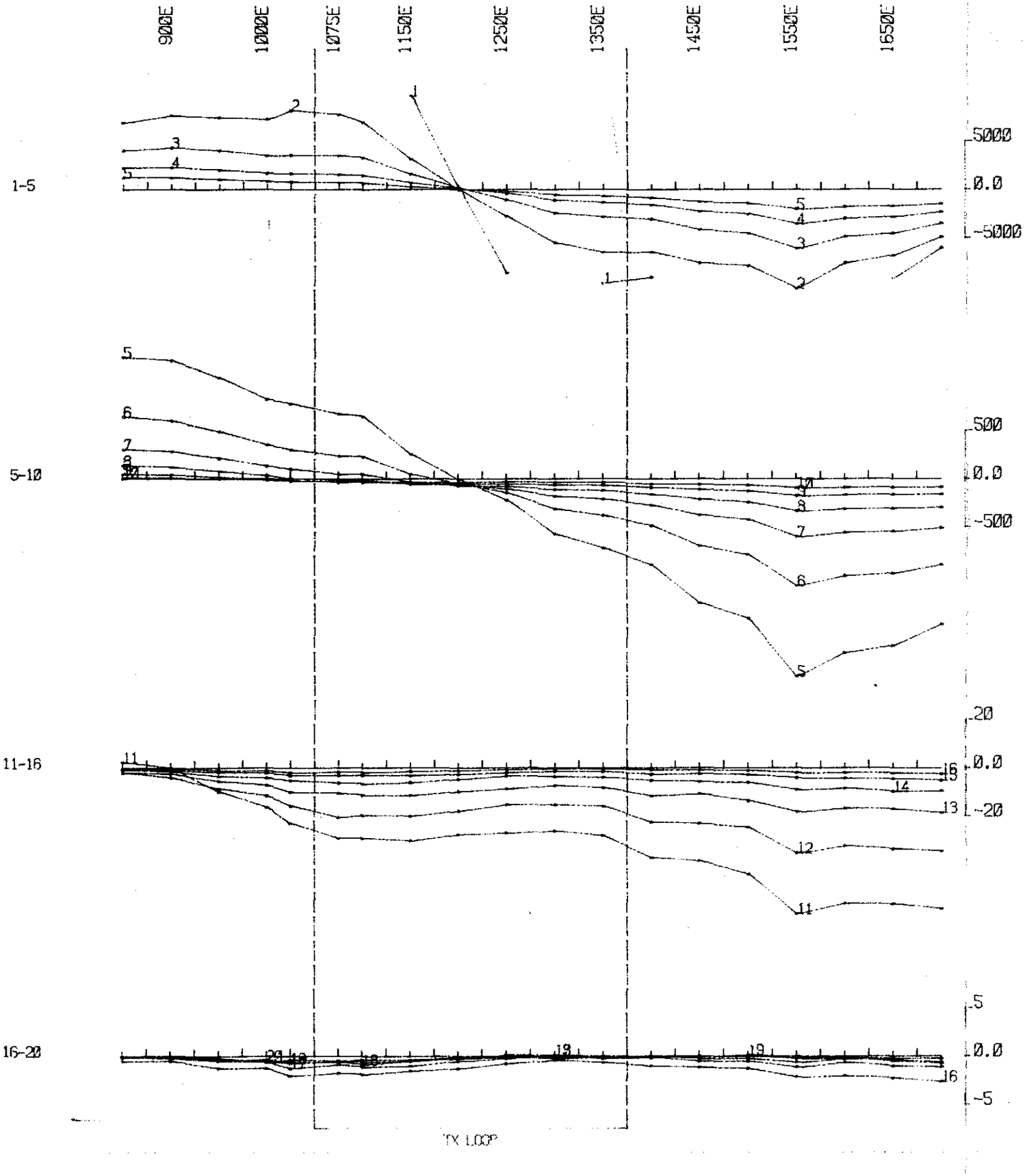
LINE : 2600N Z

TX LOOP : 3

210

528280

HORIZONTAL COMPONENT B (X)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	:	2150N	1350E
	:	2850N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	294	
CURRENT	:	13.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P. A.K	
DATE	:	19-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 35-1456

CLIENT : Amoco Minerals Aust.

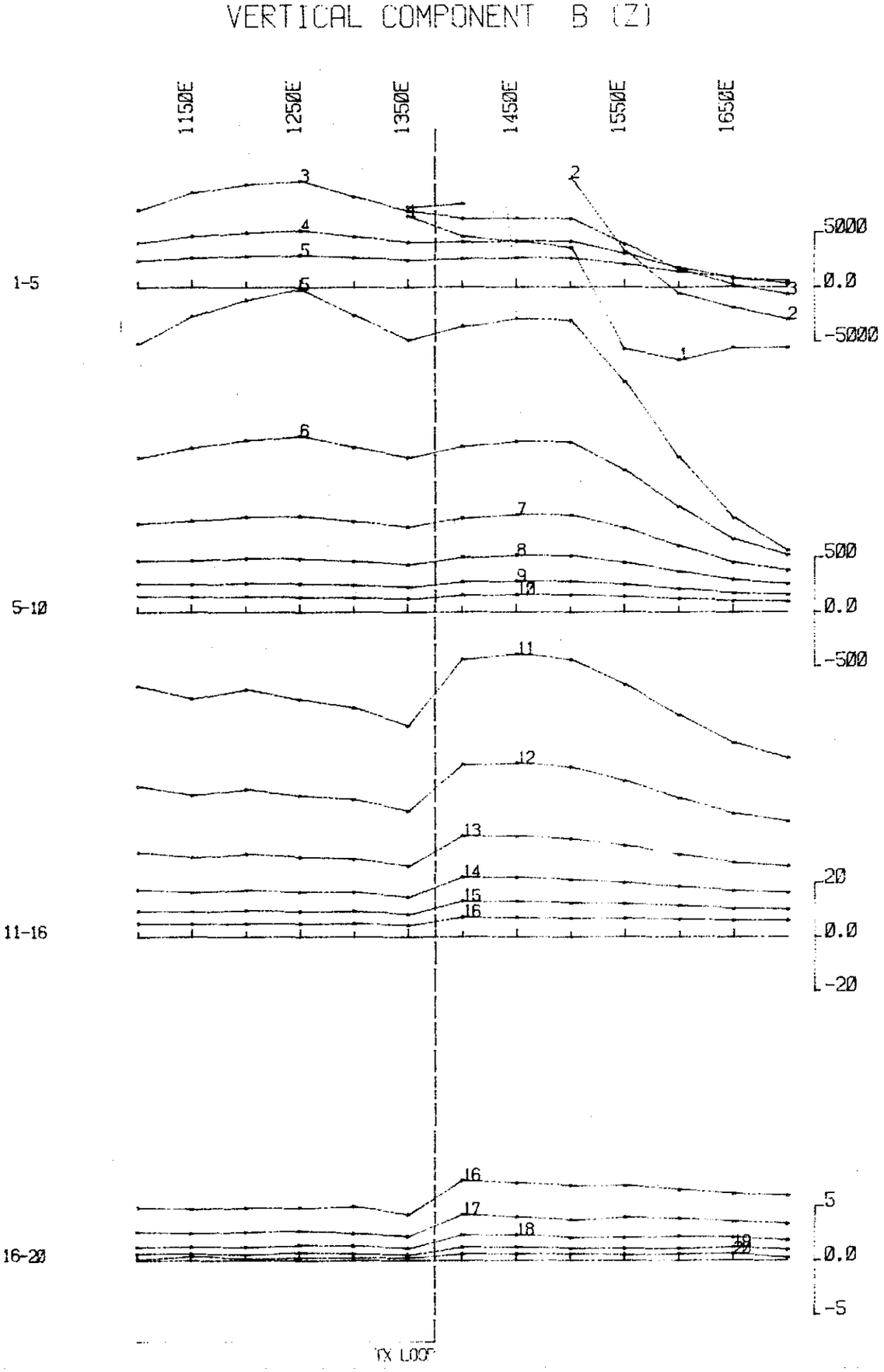
PROJECT : NORTH AUSTRAL

AREA : Zeehan Tas.

LINE : 2600N X

TX LOOP : 3

528281



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	:	2150N	1050E
	:	2850N	1375E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	294	
CURRENT	:	13.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P., A.K	
DATE	:	18-DEC,1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

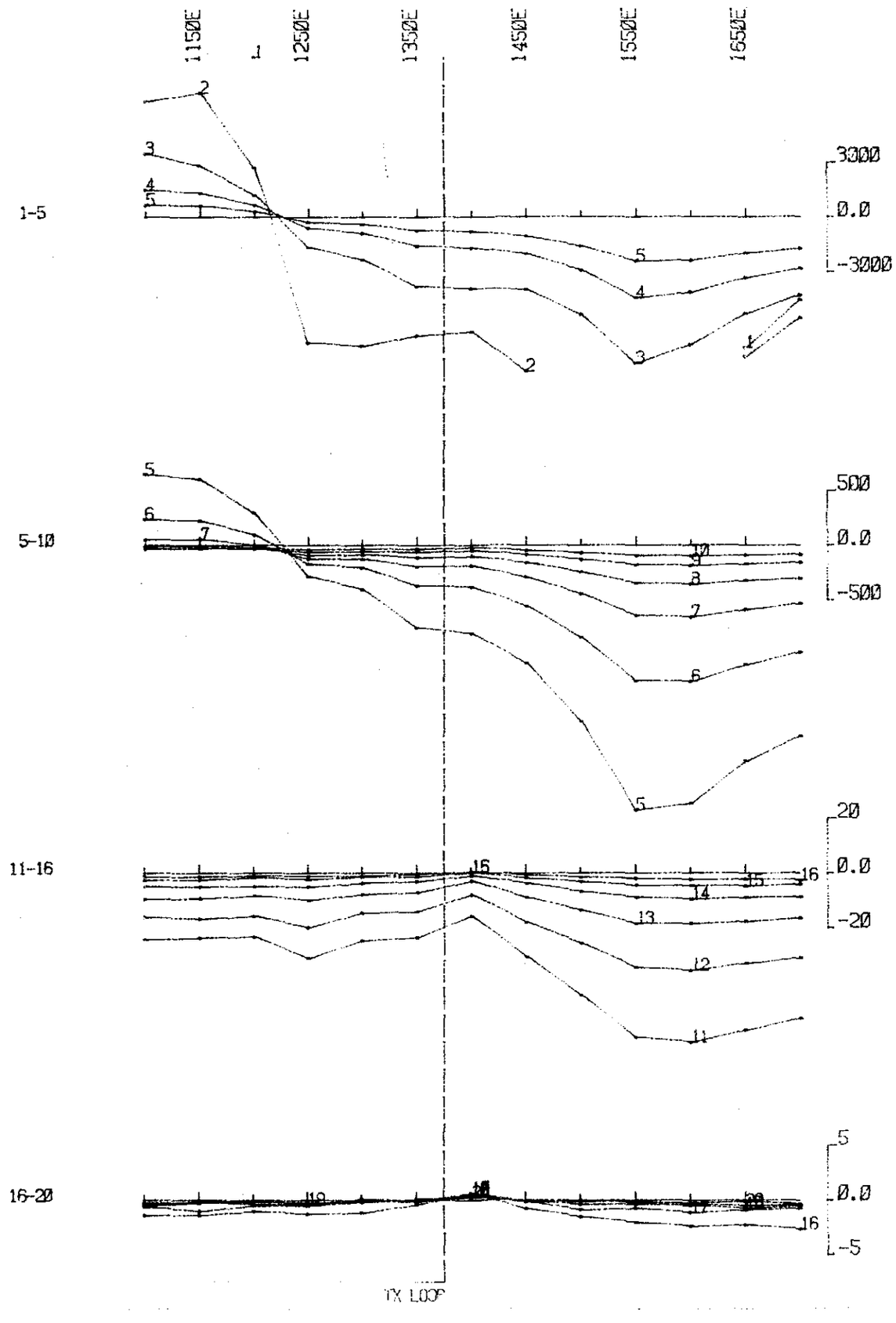
PROJECT NO. 85-1456

CLIENT	: Amoco Minerals Aust.	
PROJECT	: NORTH AUSTRAL	
AREA	: Zeehan Tas.	
LINE	: 2700N	Z
TX LOOP	: 3	

212

528282

HORIZONTAL COMPONENT B (X)



nanovolts per metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

TX LOOP SIDES	:	2150N	1350E
	:	2850N	1370E
TX LOOP SIZE	:	325m X 700m	
TX TURN OFF TIME	:	294	
CURRENT	:	13.5A	
FREQUENCY	:	25 Hz	
INTEGRATION TIME	:	10	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	J.P./A.K	
DATE	:	18-DEC/1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : NORTH AUSTRAL

AREA : Zeehan Tas.

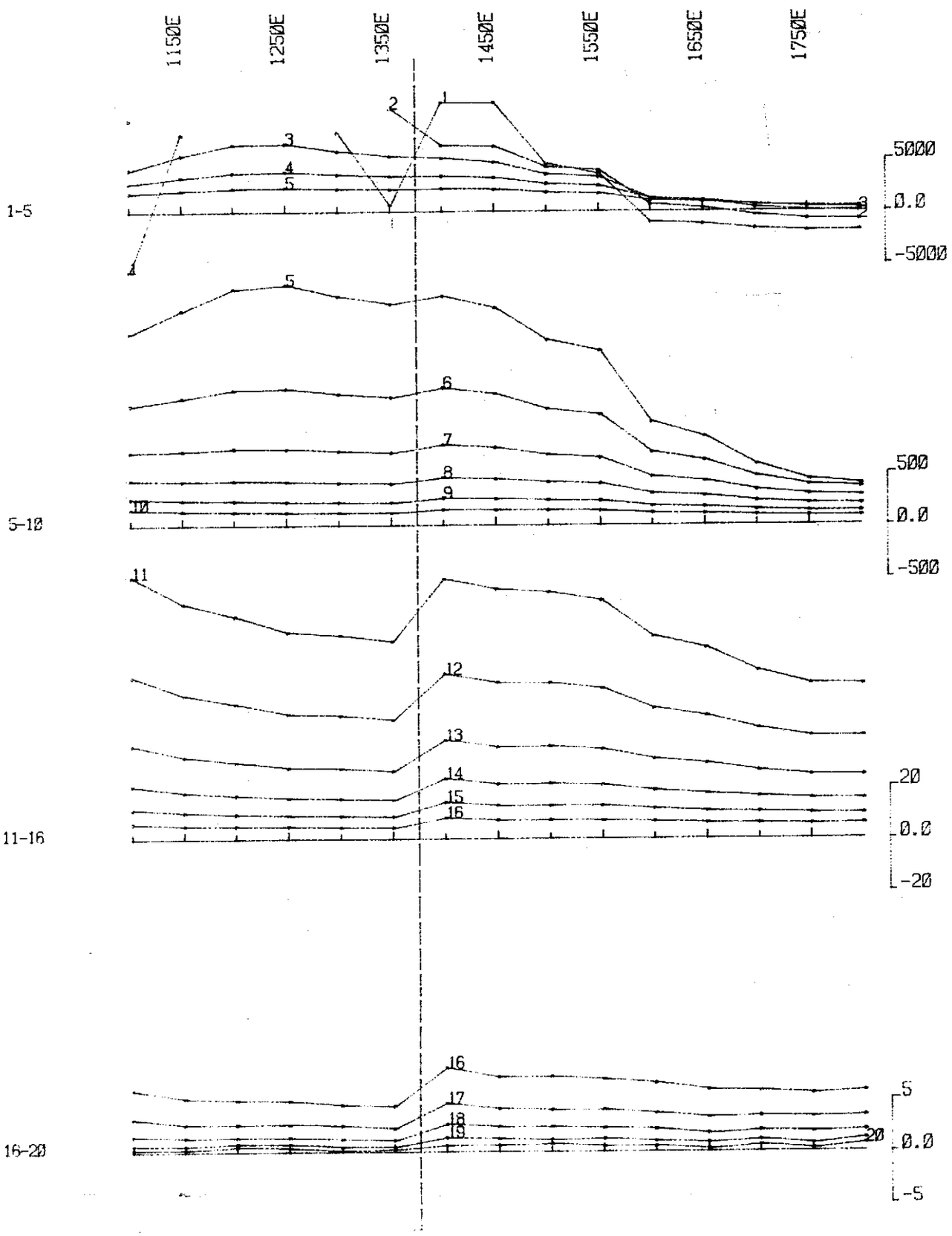
LINE : 2700N X

TX LOOP

213

528283

VERTICAL COMPONENT B (Z)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

5 cm

TX LOOP SIDES	: 2150N	1050E
	: 2850N	1375E
TX LOOP SIZE	: 325m X 700m	
TX TURN OFF TIME	: 2ms	
CURRENT	: 13.5A	
FREQUENCY	: 25 Hz	
INTEGRATION TIME	: 10	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: J.P., A.K	
DATE	: 18-DEC-1982	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1456

CLIENT : Amoco Minerals Aust.

PROJECT : NORTH AUSTRAL

AREA : Zeehan Tas.

LINE : 2800N Z

TX LOOP

528284

APPENDIX 13

*AN EVALUATION OF GEOPHYSICAL SURVEYS CARRIED OUT WITHIN EL 4/78 PRIOR TO 1978 by J. Bishop, Mitre Geophysics

*This appendix includes maps in folded form which accompany the enclosures.

MITRE GEOPHYSICS PTY LTD
MINERAL EXPLORATION AND ENGINEERING CONSULTANTS
BUGGS LANE- ELLIOTT TASMANIA 7325 PHONE 004-363143

AN EVALUATION OF THE GEOPHYSICAL SURVEYS CARRIED OUT WITHIN E.L. 4/78 PRIOR TO 1978.

for

AMOCO MINERALS AUSTRALIA COMPANY

by

Dr J.R. Bishop

* NOTE : SAME REPORT AS 83-2004A (DIFFERENT TITLE)

AM/MG83/02a
April, 1983.

528286

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TABLES and FIGURES

Note. This is an edited version of report AM/MG83/02. Only those figures showing surveys on E.L. 4/78 have been retained.

Table 1 Summary of geophysical surveys.

Figure 1 Area location map (1:50,000 scale)

Figure 2 BMR surveys (1947) -location (1:10,000 scale)

Figure 3 BMR surveys at Oceana -coverage (1:2,500 scale)

Figure 4 BMR gravity contours and magnetic indications at Oceana (1:2,500 scale)

Figure 5 BMR surveys at Austral -coverage and low resistivity zones (1:2,500 scale)

Figure 6 BMR surveys at Silver King/Silver Bell -coverage (1:5,000 scale)

Figure 7 Tenneco's helicopter EM (HEM-701) survey -coverage and anomalies (1:50,000 scale)

Figure 8 Tenneco surveys -SP and Turam- at the Grieves and Eden grids (1:5,000 scale)

Figure 13 Geophoto Turair survey, Professor Range (1:10,000 scale).

SUMMARY

This is an edited version of an earlier report (AM/MG83/02). Only geophysical surveys located within E.L. 4/78 have been included in this report.

The Zeehan mining field on the west coast of Tasmania was worked around the turn of the century for silver-lead-zinc. The deposits were mostly small and shallow-seated fissure veins. Prior to Amoco's exploration program, there had been little systematic searching for a strata-bound lead-zinc deposit within the limestones near Zeehan. Although such a target was the stated aim of several of the preceding lease holders, the area in general and several prospects in particular had not been well investigated.

Apart from some brief tests made in 1929 by the Imperial Geophysical Experimental Survey, the first geophysical surveys in the Zeehan area were carried out by the BMR in 1947. The work was done for Zeehan Explorations, a joint venture between North Broken Hill and Broken Hill South. At Oceana, the gravity method was shown to respond (though not uniquely) to mineralisation. The SP and EM surveys were not diagnostic, but the magnetics may have helped to distinguish the 'genuine' gravity responses. At Austral and Silver Bell, it was suggested that conductive zones may have defined a 'line of lode'.

In 1971, a helicopter-borne EM survey (using Scintrex's HEM-701 system) was carried out for Tenneco by Scintrex. This was flown over the areas now covered by Amoco's Oceana, Austral and Pyramid grids and the 'Gordon River' project grids: Baura, Grieves and Myrtle. It also covered part of the 'western limestones' of E.L. 4/78 which have not been gridded; as well as areas outside the lease. One well defined anomaly on the Austral grid was attributed to a cultural source; all other anomalies on E.L. 4/78 were weak and consistent with responses from superficial conductors.

Tenneco followed up some of the better HEM anomalies with Turam and SP surveys. These were located at Baura (Tenneco's Eden prospect) and Myrtle (Grieves prospect). On both grids, the Turam produced anomalies indicative of conductive overburden and the SP was not diagnostic (ie, either no anomalies or false responses from topography, etc.). At Baura, one line of gravity was read: no anomaly was recorded, but such small tests are inconclusive.

A second helicopter EM survey was flown in 1973. This was a Turair survey for Texins Development and a small part of it falls within E.L. 4/78. Two (weak) anomalies were recorded near Professor Range; one with a coincident magnetic anomaly. Neither has been followed up.

Gravity has been the most successful of the above surveys, responding directly to mineralisation at Oceana and it is

suggested that the method be used routinely for both reconnaissance and detailing surveys. SP has been shown to be inapplicable in areas with a cover of conductive material. And similarly, the EM surveys appear to have responded mainly, if not exclusively, to the overburden.

There have been big improvements in the EM technique since the early 1970's, however it is quite possible that the target mineralisation (a massive lead-zinc body) will not be very conductive. Nevertheless it is recommended that the more prospective (ie, better positioned) of the EM anomalies (from both the HEM-701 and Turair surveys) be located with a modern EM system such as PEM.

The effectiveness of magnetics has not been established but a high sensitivity survey over the Oceana prospect should help assess the potential for this technique. No IP surveys have been evaluated and although some limited petrophysical tests have suggested the possibility of high background chargeabilities, the method should prove useful.

INTRODUCTION

Amoco's E.L. 4/78 encompasses many of the old workings in the south eastern part of the Zeehan silver-lead-zinc mining field, as well as several other areas known to contain carbonate sequences which are considered to be favourable sites for base metal mineralisation.

Lead was discovered at Zeehan in 1882, and in the late 1880's to 1890's, the field was intensively worked. However by 1913 most of the systematic mining had ceased. Based on Blissett's (1962) figures, Both and Williams (1968) have estimated a total production of 200,000 tons of lead, 27,000,000 ozs of silver and 2,700 tons of zinc.

Exploration for base metals in the area (as distinct from prospecting) commenced in 1946 when Zeehan Explorations (a joint venture between North Broken Hill and Broken Hill South) began to assess many of the old workings. (This resulted in the reopening of the Oceana mine which was worked until 1960.) Subsequent explorers in the area include: Rio Tinto (late 1950's) New Consolidated Gold Fields (SPL 25, late 1960's), Texins Development (E.L. 7/68: Work carried out by Geophoto), Tenneco (E.L. 44/70) and McIntyre Mines (SPL 46, early 1970's). Most of these companies tried some form of geophysics on their leases.

This report is a compilation and evaluation of all the geophysics carried out within Amoco's lease prior to their taking up the licence. For costing purposes, Amoco have divided up the ground into two areas: the 'Zeehan Project' which covers the Oceana, Austral, North Austral (previously called Maxim), Pyramid and Nubeena grids and the 'Gordon River' (so called after a river in another,pending, E.L.) which covers the rest of the E.L. (see Figure 1). The data presented here has been divided up into these two areas.

EXPLORATION TARGET AND GEOLOGIC SETTING

Most of the old workings on the Zeeehan field were on fissure veins, controlled by faults or fractures: these were usually small and were invariably found to peter out at relatively shallow depths (Blissett, 1962). However some, such as the Oceana, contained diagenetic (or replacement) Pb-Zn mineralisation within carbonate sequences and this is the expected form for any economic deposit in E.L. 4/78 or the adjacent joint venture area.

The main carbonate sequences occur in the Ordovician Gordon Limestone, however other prospective sequences occur within the Proterozoic (Oonah Quartzite), Cambrian (Crimson Ck) and the Siluro-Devonian sediments. The prospective areas are poorly exposed, these rocks having decomposed to clays or shales near the surface where they often form swampy button-grass flats. There are also widespread Tertiary and Quaternary deposits

covering some prospective ground (Jones, 1979).

The Zeehan area has been highly disturbed by folding and faulting of Tabberabberan age and "the Ordovician to Devonian strata of the Zeehan Basin occur within a series of synclinal structures with north, northwest axial trends" (Jones, 1979). The beds dip generally steeply to the east and west in the Zeehan Project area and follow a series of steeply plunging anticlines and synclines in the Gordon River project area.

When considering the application of geophysics to an exploration program, it is often useful to try and categorise the type of ore body being sought, thus enabling the geophysicist to estimate the likely physical characteristics of the target.

An economic base metal deposit in the Zeehan area would probably be of the 'Irish-type', ie, the mineralisation would occur as epigenetic feeder zones including replacement veinlets, stockwork zones and cavity infilling, as well as syndiagenetic and stratiform ore. There would be relatively high silver content (although not to be compared with the silver mined at Zeehan in the basement rocks). Unlike the Irish deposits, there would probably not be abundant pyrite.

The only geophysical case history I have found dealing with the Irish-type deposits was written by Seigel in 1966. In this paper, which was largely written to promote the then relatively new technique of IP, Seigel states that following the discovery of the Tynagh lead-zinc-silver orebody in Ireland, several similar deposits were found by IP. The use of other methods was not discussed except that Seigel pointed out that for two of the bodies (not orebodies at the time of Seigel's paper) the disseminated mineralisation would not have shown EM responses. However Gustafson and Williams (1981) have noted that there are similarities between the 'Irish' deposit and the Mississippi Valley type, and there are a limited number of geophysical case histories over this kind of deposit.

Callahan and McMurray (1967) described the results of 32 years of geophysical experiments on Mississippi type deposits (ie, mostly flat-lying zinc-lead deposits, usually overlain by a thick cover of sediments). They concluded that down hole methods, in particular Applied Potential, were the most useful. Magnetics, EM, SP, and IP were not successful. They did not try gravity, but considered it would not be useful on theoretical grounds. However the authors were aware that their results should not be regarded as universal truths and pointed out that similar style, but near-surface deposits had been detected by geophysics in Ireland and in Canada.

The Irish discovery has been mentioned above. Lajoie and Klein (1979) showed that IP was successful at Pine Point in Canada because of the very low geologic noise levels (orebodies were defined by chargeability values above 5ms!). Again EM was not effective (using much more modern equipment than that described

by Callahan and McMurray) and gravity was useful for detailing deposits but not for exploration since mineralisation sometimes occurred in sink holes where unconsolidated sediments reduced the overall density contrast. Pyrrhotite is sometimes an ore accessory at Pine Point and Lajoie and Klein (1979) show a well defined 30 gamma magnetic anomaly over a deposit. However magnetics was not pursued owing to the difficulty of obtaining low noise data in the auroral zone which is subject to severe magnetic storm activity.

An economic deposit in E.L. 4/78 would be expected to be a strata bound, steeply dipping(?), tabular shaped body, probably dissected by faults: it would contain a higher proportion of lead than zinc. Such a body should be polarisable, dense and possibly conductive. A limited number of petrophysical measurements (Collins, 1980) has suggested that there are marked density and conductivity contrasts between ore and host rock, but not of chargeability (where both were chargeable) nor of magnetic susceptibility (where both were non-magnetic). Surface surveys have confirmed the chargeable nature of the country rock but have also shown that EM methods, employed to respond to the conductivity contrast, may be hampered by conductive surface conditions. Similarly, the gravity method may respond to the gangue mineral siderite (density 3.83-3.88g/cc) or be adversely affected by caverns and clays in the near surface limestones.

The geophysical surveys considered in this report have been evaluated in the light of these observations.

GEOPHYSICAL SURVEYS

The first geophysical surveys at Zeehan were conducted by the Imperial Geophysical Experimental Survey (IGES) over the Silver King and South King mines in 1929: these old workings lie partly within E.L. 4/78. The techniques tried were the equipotential method and self potential: no success was obtained with the former (quite possibly because of the absence of ore) and a strong anomaly from the latter was found to be due to a graphitic shale band (Edge and Laby, 1931). Although geophysics was being successfully applied at the nearby Mt Lyell copper field in the 1930's, a gap of some eighteen years occurred before geophysics was again tried at Zeehan. These surveys are discussed below under the areas covered by Amoco's two costing divisions.

1. ZEEHAN PROJECT AREA

In 1947 Zeehan Explorations approached the BMR to assist their exploration program with some geophysical surveys (Garretty, 1947). The BMR decided to use the gravity method and to test the application of magnetics, self potential, equipotential, EM and potential ratio methods. Surveys were conducted at Oceana, Austral and between the Silver King and the Silver Bell workings (the latter referred to as the South King in the BMR report: Langron, 1966). The locations of the surveys are shown in Figure

2. The results were not reported until some years after the surveys were done (Langron, 1966), although the results were given to Zeehan Explorations.

OCEANA

The coverage of the various surveys at Oceana is shown in Figure 3. The gravity method was the most effective, with a well defined (0.4 to 0.5 mgal) anomaly over known mineralisation (see Figure 4). Subsequent drilling, by Zeehan Explorations and Amoco, has shown that the southern end of the anomaly was due to low grade mineralisation in a sideritic gangue. Other, apparent, anomalies may have been caused by adjacent pockets of low density material since drilling showed no signs of mineralisation.

The trend and extent of the axis of a magnetic anomaly is also shown in Figure 4. This coincides with the gravity anomaly but does not continue southwards over the sideritic 'tail'. Other anomalies were produced elsewhere on the grid and there are undoubtedly effects from ferrous material around the old workings. No values are given, but tests on the core of (Zeehan Explorations') DDH 1, showed the mineralisation to be "slightly magnetic".

The self potential showed a response to mineralisation but this was not readily discernible from the background noise levels. The equipotential and potential ratio methods are outdated electrical techniques (described in Edge and Laby, 1931): weak indications over mineralisation were obtained by the former, but not by the latter. The electromagnetic method used was not described by Langron (1966) and nor was the coverage. "No anomalies were found that could be attributed to mineralisaton".

AUSTRAL

At Austral, resistivity and potential ratio surveys were carried out around the old workings. The coverages are shown in Figure 5. Two linear zones of low resistivity were defined by the latter and these are indicated in Figure 5 (this shows a southern extension of the eastern zone not interpreted by Langron, 1966). These zones may be significant since the mineralisation at Austral occurred in a 'black pug' (within the Gordon Limestone) which might be expected to be of low resistivity. The strongest indication was on line 3 over the flux quarry, where Blissett (1962) notes that the best of 5 holes drilled by Zeehan Explorations intersected 13% lead over a (?true) width of nearly 5m (16ft).

In 1971, both the Oceana and Austral areas were covered by a helicopter borne EM system (a Scintrex HEM-701) flown for Tenneco over E.L. 44/70. No anomalies were recorded over Oceana and the survey's best response, at Austral, is likely to have a cultural rather than geological cause (Gedde, 1972), see Figure 7.

SILVER KING-SILVER BELL

Most of the work carried out in the Silver King/Silver Bell area lies outside of Amoco's tenement; the former is about 450m beyond the lease boundary and the latter is on a mining lease within the E.L.. But the results are presented here for completeness and because the mineralisation occurs in a different geologic setting to the previous two sites (shale, rather than limestone, hosted). Thus presumably the conclusions made here may be considered when exploring over similar lithologies elsewhere on the lease. The methods tried consisted of gravity, magnetics and some self potential at the Silver King, and only potential ratio at the Silver Bell. The coverages are shown in Figure 6.

No promising anomalies were recorded by the gravity survey although the coverage was reduced by the presence of streams and swamps. Langron (1966) suggests that one anomaly (of 0.15mgal at 15N/1E) may be due to mineralisation but there is no indication on either of the adjacent lines. Iron debris interfered with the magnetometer survey which elsewhere showed mostly uniform responses. Two self potential traverses were made: one over the King shaft and the other 400ft north. Irregular profiles were recorded with maximum amplitudes of less than 30 mv. (It was to the south of the King shaft that the IGES defined a 150mv anomaly.)

Seven lines of potential ratio were surveyed at the Silver Bell, these showed no clear responses although Langron (1966) interpreted a resistivity contact zone which closely paralleled the 'line of lode'. The lack of geophysical response may reflect, of course, the lack of ore; however drilling by Zeehan Explorations in this area intersected some narrow veins of ore (Jones, pers. com.) and one might expect the 'line of lode' to possess some distinguishing physical characteristics.

Other surveys carried out in the Zeehan area, but outside of Amoco's leases, are briefly described here since the geological environments are the same.

Langron's 1947 BMR survey also carried out some gravity, self potential and resistivity traverses over a limestone area immediately to the north of the town and which included the 'Despatch' shaft; a strong gravity regional was observed but no anomalies of interest were recorded by any of the methods.

Further surveys were carried out by the BMR to the immediate northwest of Zeehan in 1954 (Daly, 1965). The methods used were self potential, magnetics and EM: several SP anomalies were obtained (some in excess of 300mv) but most of these were ascribed to (possibly ore-bearing) graphitic shales. EM and magnetic responses were apparently obtained over the Montana Silver Lead Co's workings; but of particular interest are the strong SP anomalies over Clarke's and Taylor's lodes at Queen Hill (since it is not unlikely that Aberfoyle will reopen these

deposits to form part of a tin mine). Daly (1965) quotes Gardner (1964) and Williams (1965) for more detailed surveys of the Queen Bill area.

2. THE GORDON RIVER PROJECT AREA

All of E.L. 4/78 except for the Oceana, Austral, North Austral, Pyramid and Nubeena grids is costed under the heading 'Gordon River Project'; the name is derived from a pending E.L. which is in the Gordon River area, south of Queenstown.

Amoco has established grids over all mapped or inferred limestone areas, except for those on the western side of the lease, a section of which outcrops on the lower reaches of McLean Ck where it joins the Little Henty River. This area was covered by Tenneco's HEM-701 survey (prospect 'D', Figure 7) but no anomalies were recorded.

The limestones to the south of the E.L. (covered by Amoco's Rose Valley, Sours, Trioves and Myrtle grids) were also covered by the HEM-701 survey, which defined two broad areas of conductive overburden. These largely coincided with the alluvial areas overlying the limestone. Gedde (1972) interpreted some conductive zones within these areas, as well as several zones and isolated anomalies outside of them (ie, not over the limestone); Figure 7 shows the position of these anomalies with respect to the Amoco grids.

Ground follow up was initiated over zone 'E' and near by conductors in the Mrytle grid area (Tenneco's Grieve's grid). This consisted of SP and partially overlapping Turam surveys. From the latter, Howland-Rose (1972) interpreted a number of sub-parallel conductive zones in the region of the HEM anomalies. These were apparently due to near-surface poor conductors, ie the results were consistent with responses from conductive horizons within alluvium. The SP survey with values mostly between -20 and +20mv, defined no anomalies; although a strong negative gradient (to -140mv) was recorded in the northeast corner of the grid. The SP contours and interpreted Turam conductors are shown in Figure 8.

On the Eden grid, the SP defined a -40 to -60mv trend perpendicular to the conductive zones defined by the Turam survey. The Turam anomalies were weak and again indicative of overburden conductors. The one anomaly interpreted by Howland-Rose (1972) as being caused by a good conductor (30 mhos), has a low amplitude and such quantitative estimates are likely to be quite inaccurate. A gravity profile across one of the more promising Turam anomalies showed no response (Shirley, 1972). The SP contours and interpreted Turam conductors are shown in Figure 8.

The latest of the Tenneco reports held by Amoco (Rugg, 1972), discusses the possibility of further work on the lease, including a detailed gravity survey. Presumably there should be a final report relinquishing their interest in the lease.

A Turair survey was carried out by Scintrex in 1973 for Geophoto, on behalf of Texins Development (E.L. 7/68). The southern section of the survey is in E.L. 4/78 where two anomalies (nos 15 and 16) were recorded near the Professor Range (see Figure 13). Both of the anomalies were weak, however no. 15 was coincident with a well defined, 60 gamma north-south striking magnetic anomaly. Apparently neither anomaly was followed up.

CONCLUSIONS AND RECOMMENDATIONS

(It is appreciated that subsequent work, carried out by Amoco, may well have answered or altered some, or all, of the suggestions made here.)

At Oceana, the gravity apparently responded, but not uniquely, to the mineralisation. The anomalies have been adequately tested by Zeehan Explorations' drilling. The magnetic results suggested that magnetics may help to discriminate those gravity anomalies due to massive sulphides from 'false' anomalies, and it is recommended that all drill core (or the holes themselves) be logged for magnetic susceptibility.

At Austral, the geophysics was not so definitive: a low resistivity zone was defined by the potential ratio method, and drilling of the most promising part of this, by Zeehan Explorations, revealed 5m of 13% Pb. This zone, which is apparently due to a "black pug" (not massive sulphides) could be further investigated.

At Silver King / Silver Bell, none of the several methods tried were diagnostic: a resistivity low may reflect the 'host horizon' in a similar manner to Austral. However at Austral the pug is due to weathering of limestones, whereas at the Silver King/Silver Bell, the host rocks are (?calcareous) shales.

On the Pyramid grid, one conductive EM zone and an isolated anomaly were recorded by the HEM-701 survey. However the anomalies are weak and follow up ground (EM) surveys would not be recommended solely on the strength of these anomalies.

A large number of anomalies were recorded by the HEM-701 survey in the Gordon River project area. The most promising of these were followed up by Turam and SP. Responses from the former were suggestive of superficial conductors, while the latter method was not diagnostic. One gravity profile over one of the better Turam responses, gave no anomaly.

To summarise the results of the various surveys described above; gravity surveys appear to be worthwhile even though 'false' anomalies can be obtained from siderite, adjacent caverns, etc.

The SP method is not applicable in areas of conductive cover, even if this cover is only one or two metres thick. The role of magnetics has not been proven: susceptibility measurements of (fresh) core which contains significant intersections of Pb/Zn mineralisation should help resolve the question. Any magnetic tests over old prospects (where there is a known resource), should be undertaken carefully, since the ferrous debris common in these areas can make such surveys useless: mounting the sensor on a 4 or 5m pole will (where practicable) often overcome the problem.

EM methods have improved considerably since the surveys described above were carried out, but it is not clear that EM responses can be expected from even economic quantities of mineralisation of the type sought. Test surveys of suitable methods (such as the Crone PEM owned by Amoco) over the Oceana deposit should help solve this question. Later generation helicopter EM systems such as Dighem have a much improved capability for discriminating bedrock conductors from superficial responses, but such surveys are not recommended for these areas, unless it is accepted that deposits may be missed or not recognised, because of the conductive surface conditions and the (relatively) poor conductivity of the ore. However it is possible that superficial EM anomalies (both ground and flown) may be significant if they locate the (weathered) surface expression of calcareous units.

Although no IP surveys have been evaluated and the (limited) core tests have suggested little contrast between mineralisation and host rock, such surveys are likely to be useful.

John Bishop

J.R. Bishop
June, 1983.

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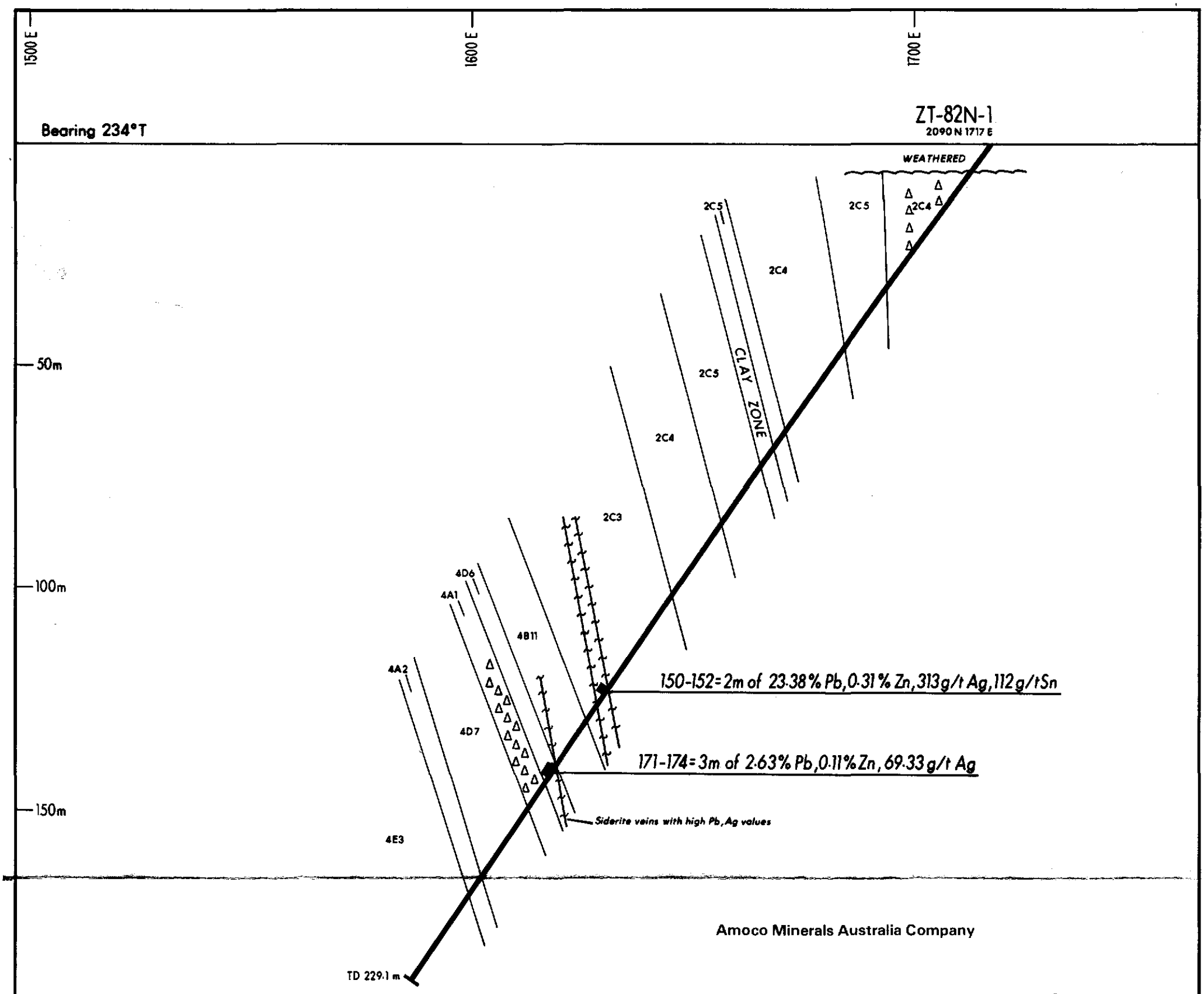
SUMMARY OF GEOPHYSICAL SURVEYS ON E.L. 4/78 PRIOR TO 1978.

AREA/DATE	OPERATOR:	METHOD	COMPANY	COMMENT
(1) ZEEHAN PROJECT AREA.				
SILVER KING-SOUTH KING, 1929.	IGES:	Equipotential	-	Not successful
	:	SP	-	Anomalies over graphitic shale
OCEANA, 1947.	BMR:	Gravity	Zeehan Explorations	Anomalies over mineralisation
"	"	Magnetics	" "	Possible correlation with mineralisation
"	"	SP	" "	Response in the noise level
"	"	Equipotential	" "	Weak indications
"	"	Potential Ratio	" "	Weak indications
"	"	EM	" "	No anomalies over mineralisation
1971.	Scintrex:	HEM-701	Tenneco	No anomalies
AUSTRAL, 1947.	BMR:	Resistivity	Zeehan Explorations	Not diagnostic
"	"	Potential Ratio	" "	Conductive zones possibly significant
1971.	Scintrex:	HEM-701	Tenneco	One anomaly; cultural cause likely
SILVER KING-SILVER BELL, 1947.	BMR:	Gravity	Zeehan Explorations	No anomalies
	"	Magnetics	" "	No anomalies (except for iron debris)
"	"	SP	" "	Two profiles; not diagnostic
"	"	Potential Ratio	" "	Conductive zone possibly significant
PYRAMID, 1971.	Scintrex:	HEM-701	Tenneco	Several weak anomalies
(2) GORDON RIVER PROJECT AREA.				
MYRTLE, 1971.	Scintrex:	HEM-701	Tenneco	Several weak anomalies
1972.	"	Turam	"	Responses from superficial conductors
"	Tenneco:	SP	"	Not diagnostic
GRIEVES, 1971.	Scintrex:	HEM-701	Tenneco	Several weak anomalies
BAURA, 1971.	Scintrex:	HEM-701	Tenneco	Several weak anomalies
1972.	"	Turam	"	Responses from superficial conductors
"	Tenneco:	SP	"	Not diagnostic
"	Shirley:	Gravity	"	Inconclusive
Prof. Range, 1973.	Scintrex:	Turair	Texins	Weak anomalies

APPENDIX 14

NUBEENA DRILLHOLE ZT-82N-1 LOG AND SECTION



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CAMBRIAN

Ultra Mafic Complex

Basalt - variable brecciation, highly altered relict flow and pyroclastic textures — 2C4 — 46

Dolerite - variable shearing, moderate chlorite and serpentine alteration — 2C5 — 45

Talc-magnetite schist - abundant quartz-carbonate veining, highly altered, up to 20% chromite chrystals, minor serpentinite — 2C3 — 18

Crimson Creek Formation

Sandstone - light grey to green, minor soft sediment deformation, abundant quartz-carbonate veining, some siltstone horizons — 4B11 — 20

Siltstone - black to grey, minor siderite veining — 4D6 — 20

5 cm

PRE CAMBRIAN

Oonah Quartzite

Shale - black graphitic, minor brecciation and calcareous sections, up to 5% pyrite, minor sandstone — 4A1 — 60

Quartzite - well developed muscovite, minor graphite — 4A2 — 60

Siltstone - black, minor graphite, one thin limestone horizon — 4D7 — 60

Black shale - graphitic, highly deformed, minor siltstone, minor pyrite masses — 4E3 — 67

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

PROSPECT: NUBEENA

CROSS SECTION DRILLHOLE ZT-82N-1

Scale: Vertical and horizontal - 1:1000

DRAWING N83-2024

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drill log

PROJECT ZEEHAN TAS	Nº A7860A	ELEVATION		COMMENCED 16/12/82	
PROSPECT NUBEENA		DIP COLLAR -54°		COMPLETED 12/1/83	
CO-ORDINATES 2090 N 1717 E		CORE SIZE 6.1-131.6 HQ 131.6-229.1 NQ		TOTAL LENGTH 229.1m	
BEARING G 223 M 234T		LOGGED BY G. KARY			

CORE HOLE SURVEY

Depth	Dip	Bearing	Depth	Dip	Bearing	Depth	Dip	Bearing
*73	-55°	208°	227	-56°	214°			
130	-56°	207°		*FIRST TWO SURVEYS MAY BE AFFECTED BY MAGNETISM				
177	-56°	216°						

METERAGE From	METERAGE To	DESCRIPTION	MINERALIZATION	SAMPLE Nº	METERAGE From	METERAGE To	METERAGE Length	ASSAYS ppm Cu	Pb	Zn	Ag	Sn	Cr	Ni
0	6.1	NO CORE												
6.1	7.3	WEATHERED TO LIGHT GREEN CLAY. MINOR REMNANT DARK GREEN, CHLORITIC FRAGMENTS		91739	6.0	11.0	5m	28	6	155	<1	<4	36	120
7.3	15.9	BASALT - GREEN TO DARK GREEN, FINE GRAINED, VARIABLE CHLORITIC ALTERATION.	TRACE PYRITE ASSOCIATED WITH CHLORITIC ZONES	91740	11.0	16.0	5m	12	<4	140	<1	<4	50	100
15.9	17.5	PYROCLASTIC BASALT - DARK GREEN, FINE MATRIX WITH ANGULAR TO SUBANGULAR CLASTS OF QUARTZ-FELDSPAR-EPIDOTE COMPOSITION. CLASTS ARE LESS BASIC THAN MATRIX - CLAST SIZE 1-5mm - MINOR FINE EPIDOTE VEINING	TRACE PYRITE WITH EPIDOTE VEINING	91741	16.0	21.0	5m	65	6	260	<1	<4	38	70
17.5	27.2	BASALT - GREEN, FINE GRAINED VARIABLE CHLORITIC ALTERATION ABUNDANT CALCITE VEINS (<1-11mm WIDE) AT 50° TO CORE AXIS, LARGER VEINS HAVE A CENTRAL CAVITY SHOWING GOOD CALCITE CRYSTAL DEVELOPEMENT, AND A QUARTZ SELVAGE		91742	21.0	26.0	5m	12	<4	200	<1	4	44	50

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drill log metric

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METERAGE From	METERAGE To	DESCRIPTION	MINERALIZATION	SAMPLE NO	METERAGE From	METERAGE To	METERAGE Length	ASSAYS ppm Cu	Pb	Zn	Ag	Sn	Cr	Ni
27.2	32.8	BASALT BRECCIA - DARK GREEN TO GREEN FINE GRAINED CHLORITIC MATRIX WITH LIGHTER GREEN, COARSER GRAINED FRAGMENTS. FRAGMENT SIZE 5-50mm - NORMALLY A SHARP CONTACT BETWEEN BRECCIATED AND NON-BRECCIATED BASALT - FRAGMENTS ARE ROUNDED TO SUB-ANGULAR, ROUNDING MAY BE A RESULT OF CHLORITE ALTERATION - MINOR CALCITE VEINING	30.2m - 5% PYRITE IN A LARGE (50mm x 12mm) FRAGMENT	91743	26.0	31.0	5m	48	24	260	<1	4	200	120
32.8	39.3	BASALT - GREEN, FINE TO MEDIUM GRAINED. CHLORITE ALTERATION ALONG FRACTURES AT 45° TO CORE AXIS. ABUNDANT CALCITE VEINING NEAR BASE.		91744	31.0	36.0	5m	22	16	230	<1	<4	60	80
				91745	36.0	41.0	5m	55	26	300	<1	<4	160	160
39.3	40.1	DOLERITE - DARK GREEN TO BLACK AMPHIBOLE CRYSTALS IN A GREEN EPIDOTE RICH MATRIX. AMPHIBOLE CRYSTALS <1mm - 2mm. MATRIX IS MEDIUM GRAINED												
40.1	45.1	DOLERITE - GREEN, HIGHLY ALTERED AND MINOR BRECCIATION. MINOR CHLORITE HALO'S AROUND SOME BRECCIA FRAGMENTS. MEDIUM GRAINED. - HEMATITE RICH VEINLETS AT 10° TO CORE AXIS	TRACE TO 1% CHALCOPYRITE DISSEMINATED THROUGHOUT.	91993	40.0	41.0	1m	46	10	270	1	<4	135	120
				91994	41.0	42.0	1m	16	12	180	<1	<4	28	24
				91995	42.0	43.0	1m	85	490	270	<1	6	26	28
				91996	43.0	44.0	1m	1000	220	380	2	<4	22	32
				91997	44.0	45.0	1m	860	75	350	1	4	120	120

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METERAGE From	METERAGE To	DESCRIPTION	MINERALIZATION	SAMPLE No	METERAGE From	METERAGE To	METERAGE Length	ASSAYS ppm Cu	Pb	Zn	Ag	Sn	Cr	Ni
45.1	56.2	DOLERITE - PALE GREEN, VERY FINE GRAINED, MINOR LARGE (200mm) POSSIBLE XENOLITHS OF DIORITE COMPOSITION. BASAL CONTACT SHOWS MINOR CONTACT ALTERATION - ABUNDANT CALCITE AND SIDERITE VEINING - BASAL CONTACT AT 55° TO CORE AXIS	TRACE CHALCOPYRITE	91747	46.0	51.0	5m	150	65	230	<1	<4	80	120
				91748	51.0	56.0	5m	90	18	170	<1	<4	70	170
56.2	63.8	BASALT - GREEN, HIGHLY SHEARED, MINOR CALCITE VEINING AND CHLORITE ALTERATION ABUNDANT QUARTZ-FELDSPAR VEINING. SHEARING AT 45° TO CORE AXIS	TRACE CHALCOPYRITE	91749	56.0	61.0	5m	180	22	240	<1	<4	460	210
				91750	61.0	66.0	5m	150	75	185	<1	6	105	160
63.8	66.7	BASALT BRECCIA - DARK GREEN CHLORITIC FINE GRAINED MATRIX WITH ANGULAR TO SUB-ROUNDED FRAGMENTS OF FINE GRAINED GREEN BASALT AND MINOR DIORITE - MINOR SERPENTINE AND CALCITE ALONG FRACTURES AT 20° TO C.A.	65.7-65.8 m 2% CHALCOPYRITE, MASSIVE MAGNETITE IN STRINGER AT 30° TO CORE AXIS	91998	64.0	65.0	1m	720	6	190	1	8	60	55
				91999	65.0	66.0	1m	250	<4	180	1	8	30	28
				92000	66.0	67.0	1m	240	6	260	1	12	38	38
			65.1-66.0 m 1% PYRITE, DISSEMINATED											
66.7	79.5	BASALT - GREEN, FINE TO MEDIUM GRAINED, RARE FRAGMENTS VAGUE FLOW BANDING AT 20° TO CORE AXIS. MODERATE TO INTENSE CHLORITE ALTERATION	68.0-69.0 m 2% PYRITE <1% CHALCOPYRITE	91914	66.0	71.0	5m	350	26	290	<1	<4	12	38
				91915	71.0	76.0	5m	750	95	390	<1	<4	150	120
			70.0-71.0 m 1% PYRITE	91916	76.0	81.0	5m	120	110	340	<1	4	165	130

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METERAGE From	METERAGE To	DESCRIPTION	MINERALIZATION	SAMPLE No	METERAGE From	METERAGE To	METERAGE Length	ASSAYS ppm Cu	Pb	Zn	Ag	Sn	Cr	Ni
79.5	84.6	DOLERITE - GREEN, MEDIUM GRAINED, 1mm. CRYSTALS OF AMPHIBOLE/PYROXENE THROUGHOUT. MODERATE TO INTENSE CALCITE VEINING WITH SOME ASSOCIATED BRECCIATION.	81.1 - 82.1 m 2% PYRITE TRACE CHALCOPYRITE	91917	81.0	86.0	5m	90	36	185	<1	6	28	60
84.6	88.1	CLAY - LIGHT GREEN, FINE CLAY		91918	86.0	91.0	5m	60	26	250	<1	6	330	165
88.1	93.5	DOLERITE - GREEN, MEDIUM GRAINED, LATTICE OF AMPHIBOLE /PYROXENE AND FELDSPAR. MAFIC MINERALS LARGELY ALTERED TO CHLORITE. 91.1 - 91.5m - AS ABOVE WITH 5% SERPENTINITE CLASTS.		91919	91.0	96.0	5m	70	12	260	<1	4	300	220
93.5	99.7	DOLERITE - GREEN TO DARK GREEN, FINE GRAINED, INTENSE FRACTURING AND BRECCIATION. ABUNDANT CHLORITE AND SERPENTINE ALTERATION ALONG FRACTURES		91920	96.0	101.0	5m	460	<4	290	<1	6	28	50
99.7	105.0	DOLERITE - OLIVE GREEN, VERY FINE GRAINED INTENSELY CUT BY SERPENTINE FRACTURES	100.1 - 104.1 1% PYRITE TRACE CHALCOPYRITE	91921	101.0	106.0	5m	290	28	410	<1	<4	175	125
105.0	121.2	BASALT - DARK GREEN MATRIX CUT BY EXTENSIVE PARALLEL SIDERITE/CALCITE AND QUARTZ SHEARS AT 25° TO CORE AXIS. INTENSE CHLORITE ALTERATION THROUGHOUT 112.0 - 114.0 m - 20% FRAGMENTS OF GRANITIC COMPOSITION IN CHLORITIC MATRIX	110.0 - 110.1 2% SPHALERITE IN CARBONATE VEIN. 120.0 - 121.0 TRACE PYRITE, CHALCOPYRITE IN QUARTZ CARBONATE VEINS	91922	106.0	111.0	5m	360	48	260	<1	<4	730	500
				91923	111.0	116.0	5m	130	85	120	<1	<4	460	320
				91924	116.0	121.0	5m	55	70	230	<1	<4	310	330

METERAGE From	METERAGE To	DESCRIPTION	MINERALIZATION	SAMPLE No	METERAGE From	METERAGE To	METERAGE Length	ASSAYS ppm Cu	Pb	Zn	Ag	Sn	Cr	Ni
		POOR FOLIATION AT 30° TO CORE AXIS												
121.2	124.3	TRANSITIONAL ZONE - DECREASING GREEN COLOUR TO ALMOST WHITE. INTENSE CARBONATE VEINING. MINOR TALC ON FRACTURE PLANES	1% CHROMITE IN PALE GREEN SECTIONS	91925	121.0	126.0	5m	8	32	170	<1	<4	680	430
124.3	144.2	TALC-CARBONATE SCHIST PALE BROWN TO PALE GREEN, FINE GRAINED, POORLY FOLIATED, INTENSELY CUT BY QUARTZ-CARBONATE VEINS NORMALLY AT 40° TO CORE AXIS. CHROMITE CRYSTALS INDICATE AN ULTRAMAFIC GENESIS. EXTREMELY ALTERED UNIT	129.0-130.0 1% GALENA AND TRACE SPHALERITE IN QUARTZ CARBONATE VEINING	91926	126.0	131.0	5m	8	130	260	<1	<4	990	440
				91992	129.0	130.0	1m	10	2100	2200	3	<4	1250	70
				91927	131.0	136.0	5m	22	195	400	<1	6	2050	790
				91928	136.0	141.0	5m	60	210	2000	<1	4	2400	590
			5-20% CHROMITE THROUGHOUT	91929	141.0	148.0	7m	24	490	350	<1	<4	1800	1700
		REDUCED FROM HQ TO NQ CORE AT 131.8m												
144.2	149.5	TALC-CARBONATE SCHIST LIGHT TO DARK GREY, FINE GRAINED, MINOR QUARTZ AND CARBONATE VEINING. FRACTURES AT 10°-50° TO CORE AXIS	TRACE CHROMITE AND MAGNETITE THROUGHOUT	91853	148.0	149.0	1m	8	660	510	2	<4	660	1950
				91854	149.0	150.0	1m	10	490	680	2	<4	640	140
			TRACE GALENA IN QUARTZ VEINS											
149.5	153.6	SERPENTINITE - GREEN FINE GRAINED HOST, CUT BY DENSE NETWORK OF QUARTZ AND SIDERITE VEINS. GOOD MINERALIZATION IN SOME VEINS	150.0-151.0 MASSIVE GALENA TRACE MALACHITE IN SIDERITE VEIN	91855	150.0	151.0	1m	540	44.7%	4400	600	200	100	880
				91856	151.0	152.0	1m	42	2.05%	1750	26	24	190	210
				91857	152.0	153.0	1m	12	2600	3400	4	12	100	220
			151.3-151.4 20% PYRITE	91858	153.0	154.0	1m	46	2900	8600	6	65	220	560

METERAGE From	METERAGE To	DESCRIPTION	MINERALIZATION	SAMPLE No	METERAGE From	METERAGE To	METERAGE Length	ASSAYS ppm Cu	Pb	Zn	Ag	Sn	Cr	Ni
153.6	157.3	TALC-CARBONATE SCHIST GREY, FINE GRAINED, FINELY LAMINATED, HIGHLY CONTORTED UNIT ALTERNATING WITH WHITE BANDY UNIT. MINOR SIDERITE FRACTURES AT 20° TO CORE AXIS. VAGUE LAYERING AT 30-50° TO CORE AXIS	TRACE CHROMITE THROUGHOUT 153.6-153.8 20% SPHALERITE 10% GALENA IN QUARTZ-CARBONATE VEIN	91859	154.0	155.0	1m	6	250	140	1	<4	250	790
157.3	159.0	SERPENTINITE - VERY FINE GRAINED, GREEN MOTTLED APPEARANCE. LARGELY NEPHRITE TEXTURE AND COLOUR. VERY SHARP CONTACTS AT 55° TO CORE AXIS.		91930	155.0	160.0	5m	8	240	250	<1	6	380	620
159.0	164.6	SANDSTONE - LIGHT TO DARK GREY QUARTZ RICH. VARIABLE AMOUNTS OF CARBONATE. DARKER SECTIONS MORE CALCAREOUS THAN LIGHTER AREAS. POORLY BEDDED. MODERATE TO HEAVY QUARTZ-CARBONATE VEINING POSSIBLE BEDDING AT 20° TO CORE AXIS.	162.3-162.5 5% SPHALERITE IN SMALL VEINS AT 25° TO CORE AXIS TRACE PYRITE THROUGHOUT POSSIBLE CHROMITE CRYSTALS	91931	160.0	165.0	5m	16	220	2300	<1	<4	670	1000
164.6	169.7	SANDSTONE/SILTSTONE INTERLAYERED GREEN SANDSTONE AND BLACK SILTSTONE. -SANDSTONE - FINE TO MEDIUM, POOR LAYERING. GRAINS ≤ 1mm, MAINLY SHALE, QUARTZ, AND FELDSPAR IN A GREEN MUDDY MATRIX. -SILTSTONE - FINE GRAINED, LACKS GOOD BEDDING, BUT FINE LAMINATING	167.3-167.4 2% CHALCOPYRITE IN VEIN	91932	165.0	169.0	4m	36	200	240	<1	<4	55	130

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METERAGE From	METERAGE To	DESCRIPTION	MINERALIZATION	SAMPLE No	METERAGE From	METERAGE To	METERAGE Length	ASSAYS ppm Cu	Pb	Zn	Ag	Sn	Cr	Ni
		EVIDENT IN ONE SMALL SECTION. SLUMPING AT CONTACT OF SANDSTONE AND SILTSTONE. CONTACT VARIABLE WITH AN AVERAGE 30° TO CORE AXIS MINOR SHEARS AND QUARTZ CARBONATE VEINS AT 20° TO CORE AXIS.												
169.7	170.3	VEIN BRECCIA - ANGULAR FRAGMENTS OF BLACK SILTSTONE AND GREEN SILTSTONE (1mm - 100mm DIAMETER) IN A MEDIUM TO COARSE SIDERITE VEIN.	5% PYRITE IN SILTSTONE FRAGMENTS	91860	169.0	170.0	1m	14	1000	960	2	14	26	110
170.3	176.1	SILTSTONE - BLACK TO GREY FINE GRAINED, FINE LAMINATIONS IN GREY SECTIONS, MINOR SANDSTONE LENS IN BLACK SILTSTONE. SIDERITE VEINS AT 0° TO 90° TO CORE AXIS BEDDING AT 60° TO CORE AXIS.	171.8-172.3 25% GALENA <1% SPHALERITE IN A SIDERITE VEIN	91861	170.0	171.0	1m	20	300	560	3	<4	30	85
				91862	171.0	172.0	1m	65	3.45%	2600	85	10	32	130
				91863	172.0	173.0	1m	95	3.05%	530	90	<4	44	130
				91864	173.0	174.0	1m	75	1.40%	200	33	<4	46	120
				91865	174.0	175.0	1m	34	230	85	2	4	48	95
176.1	181.5	SILTSTONE BRECCIA LIGHT GREY FINE AND MEDIUM GRAINED SILTSTONE FRAGMENTS IN A GRAPHITIC MATRIX. MINOR WELL LAMINATED, GREY, LIMESTONE FRAGMENTS.		91933	175.0	180.0	5m	46	110	500	1	6	50	220
181.5	182.6	SILTY LIMESTONE - GREY TO LIGHT GREY, VARIABLE SILT CONTENT. MINOR BRECCIATION CONTACT SHARP, AT 50° TO CORE AXIS.	182.0-182.6 15% PYRITE, FORMED AS LARGE (20mm) MASSES.	91934	180.0	185.0	5m	20	145	300	1	6	8	32

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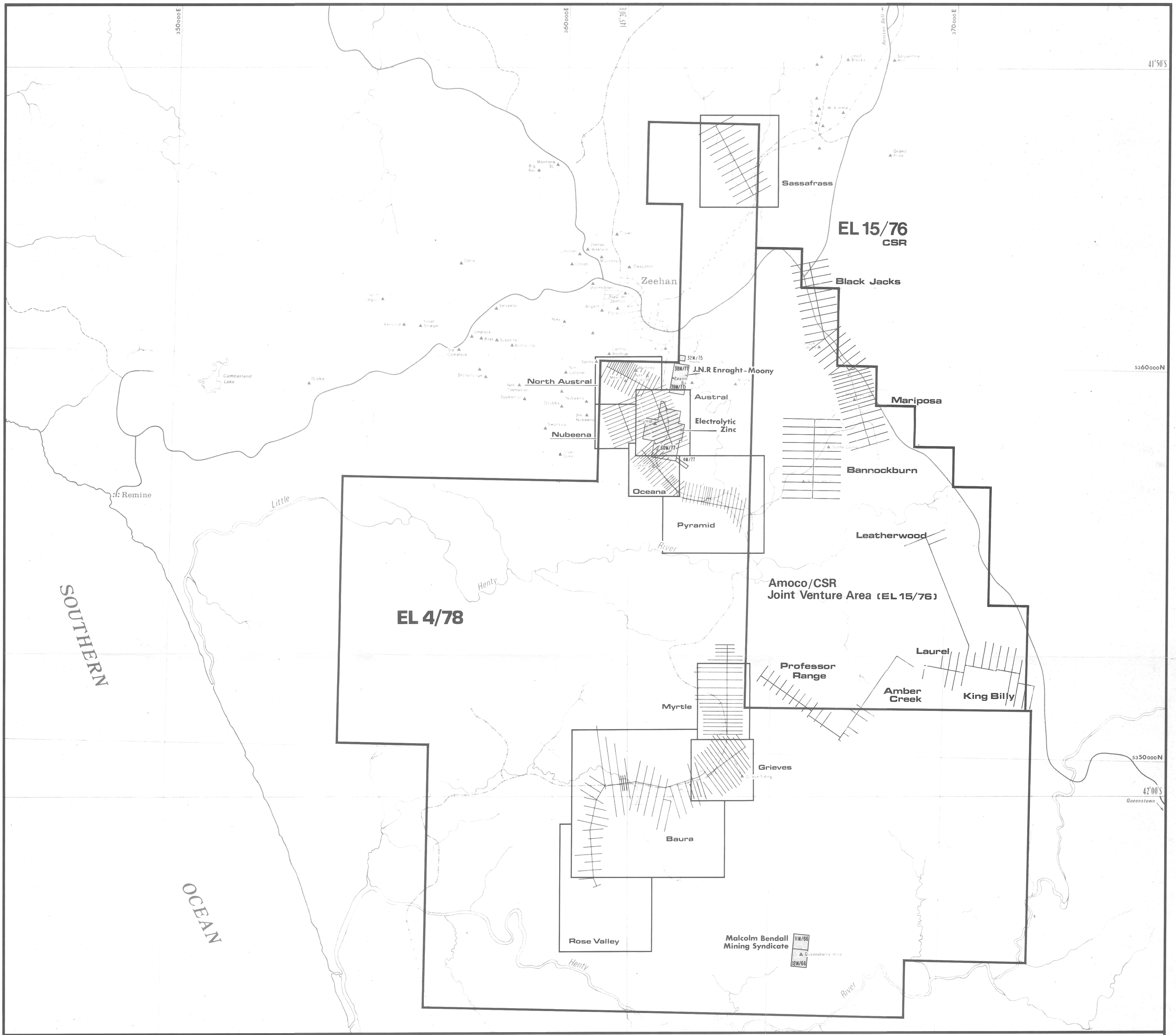
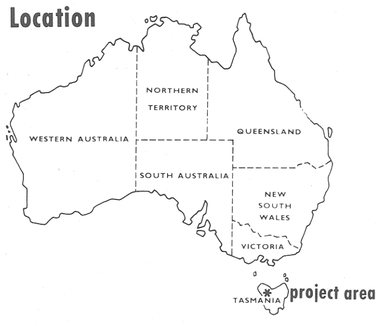
drill log metric

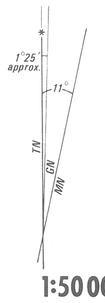
METERAGE From	METERAGE To	DESCRIPTION	MINERALIZATION
182.6	201.3	GRAPHITIC SILTSTONE	
		- DARK GREY, MODERATE NUMBER	
		OF THIN, LIGHT GREY SANDSTONE	
		HORIZONS, MINOR LIMESTONE.	
		MINOR BRECCIATION OF SANDSTONE	
		HORIZONS	
		184.6 - 185.0 - WELL LAMINATED	184.6-185.0
		GREY LIMESTONE, WELL BEDDED	15% PYRITE
		PYRITE ALONG SOME LAMINAE.	
		192.0 - 193.0 . VERY HIGH	186.7-186.8
		GRAPHITE CONTENT.	2% PYRITE
		187.6 . ISOCLINAL FOLD AXIS	
		PARALLEL TO LAYERING (50°	191.2-191.4
		TO CORE AXIS).	1% SPHALERITE
			TRACE GALENA
		BEDDING AVERAGES 45° TO	
		CORE AXIS	199.9-201.3
			5% PYRITE
201.3	205.7	SANDSTONE - BLACK AND	1% PYRITE
		WHITE, FINE TO MEDIUM GRAINED.	THROUGHOUT
		MINOR GRAPHITIC SILTSTONE	
		HORIZONS (PARTIALLY BRECCIATED)	
205.7	229.1	GRAPHITIC SHALE - BLACK,	1% OF
END		MODERATELY FOLIATED, MINOR	BRECCIA
OF		THIN LIGHT GREY SILTSTONE	FRAGMENTS ARE
HOLE		HORIZONS. MODERATE SLUMPING	MASSIVE PYRITE
		AND BRECCIATION EVIDENT	
		FOLIATION ANGLES	
		207.9 m 45° TO CORE AXIS	
		212.5 m 30° " "	
		219.3 m 10° " "	
		228.9 m 85° " "	

SAMPLE Nº	METERAGE From	METERAGE To	Length	ASSAYS ppm Cu	Pb	Zn	Ag	Sn	Cr	Ni
91935	185.0	190.0	5m	20	70	330	1	4	10	20
91936	190.0	195.0	5m	20	80	260	1	8	10	20
91937	195.0	200.0	5m	22	60	150	1	<4	6	14
91938	200.0	205.0	5m	22	34	75	1	8	24	10
91939	205.0	210.0	5m	30	70	190	1	4	50	18
91940	210.0	215.0	5m	24	300	550	1	<4	36	24
91941	215.0	220.0	5m	34	80	200	1	8	30	20
91942	220.0	225.0	5m	30	120	170	1	6	26	28
91943	225.0	229.1	4.1m	18	70	70	1	4	12	14



Location





1:50000

0 1 2 3
Kilometers

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

528311

5 cm

Amoco Minerals Australia Company

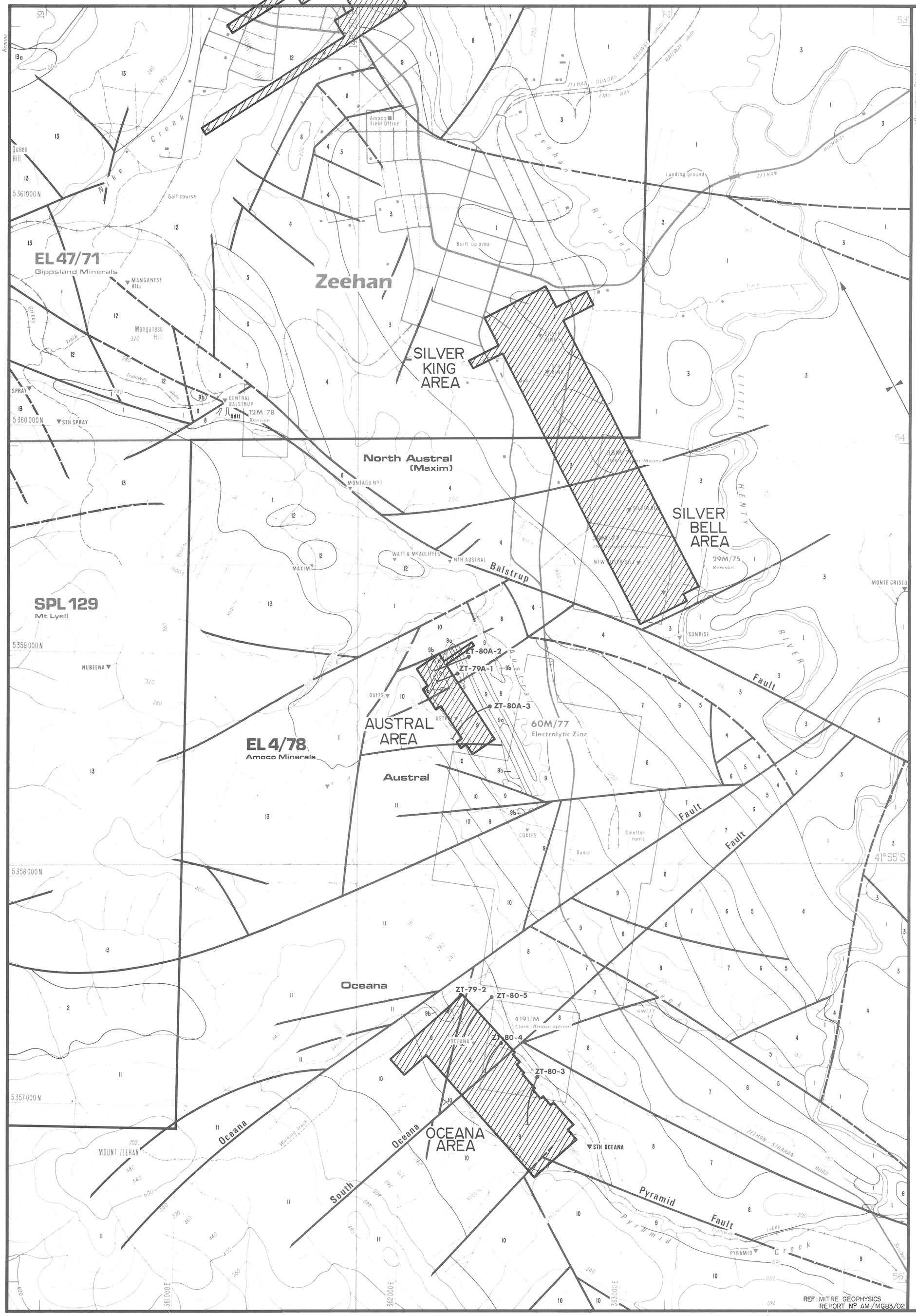
5326

Project	ZEEHAN		Nº A-78-60
Project Partner			
Zeehan EL 4/78 & Amoco/CSR JV			
PROSPECT LOCATION			
Map Ref. ANG K-55-5	Latitude 42°00'S	Longitude	145°20'E
Surveyed	Date	Scale	1:50000
Drawn T.G.D.S.	Date March 1983		

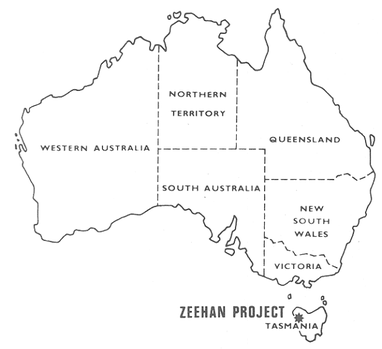
REF: MITRE GEOPHYSICS
REPORT Nº AM/MG83/02

TO ACCOMPANY APPENDIX 13 REPORT 353

Figure 1



Location



Legend

Quaternary
- Alluvium — 1
- Conglomerate talus — 2 (2)

Devonian
- Bell Shale — 3 (42)
- Florence Quartzite — 4 (26)

Silurian
- Austral Creek Siltstone — 5 (9)
- Keel Quartzite — 6 (51)
- Amber Slate — 7 (68)
- Crotty Quartzite — 8 (6)

Ordovician
- Gordon Limestone — 9 (33)
  - Interbedded calcareous sandstone and Ironstone — 9a (63), 9b (14)
- Moina Sandstone — 10 (64)
- Mt. Zeehan Conglomerate — 11 (58)

Cambrian
- Crimson Creek Formation — 12 (20)

Proterozoic
- Oonah Quartzite and Slate — 13 (60)
  - Volcanics — 13a (61)

Geology from the Zeehan 1:63 360 Geologic Sheet, field surveys and limited air photo interpretation

TN 11° MN

1:10000

0 100 500 meters

Notes :

BMR Surveys 1947-48
(Record No. 1966/163)

5 cm

528312

Amoco Minerals Australia Company

5327

Project	ZEEHAN			Nº A-78-608	
Project Partner					
B.M.R. GEOPHYSICAL SURVEY LOCATIONS					
Map Ref. ANG	K-55-5	Latitude	41°55'S	Longitude	145°20'E
Surveyed		Date		Scale	1:10000
Drawn T.G.D.S.		Date	March 1983		

REF: MITRE GEOPHYSICS REPORT Nº AM/MG83/02

ACCOMPANIES APPENDIX 13, REPORT 353

Figure 2

within EL4/78

60M/77
Electrolytic Zinc

4W/77
EZ

145°21'00" E

41°55'30" S

Location

Notes:

BMR Surveys 1947-48
(Record No 1966/163)

- Gravity Coverage
- Self Potential Coverage
- Magnetic Coverage
- Equipotential Coverage
- Potential Ratio Coverage

TN 11° MN

1:2500

0 100 200 meters

5 cm

528313

Amoco Minerals Australia Company

5868

Project	ZEEHAN			Nº A-78-60B	
Project Partner					
Oceana – B.M.R. Surveys					
GEOPHYSICAL COVERAGE					
Map Ref. ANG	K-55-5	Latitude	41°55'S	Longitude	145°20'E
Surveyed		Date		Scale	1:2500
Drawn	T.G.D.S.	Date	March 1983	Drawing Nº	

REF: MITRE GEOPHYSICS REPORT Nº AM/MG83/02

ACCOMPANIES APPENDIX 13, REPORT 355

Figure 3

within EL4/78

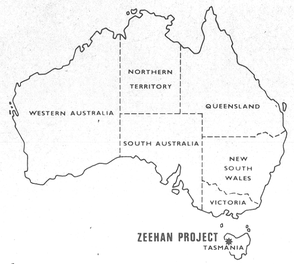
60M/77
Electrolytic Zinc

4W/77
EZ

145°21'00" E

41°55'30" S

Location



Notes:

BMR Surveys 1947-48
(Record No. 1966/163)

—0·2— Gravity Contour, interval 0·1 mg.

Axis of Magnetic Anomaly

TN 11° MN

1:2500

0 100 200 meters

5 cm

REF: MITRE GEOPHYSICS
REPORT Nº AM/MG83/02

528314

Amoco Minerals Australia Company

5329

Project	ZEEHAN			Nº A-78-608	
Project Partner					
Oceana – B.M.R. Surveys GRAVITY CONTOURS AND MAGNETIC INDICATIONS					
Map Ref. ANG	K-55-5	Latitude	41°55'S	Longitude	145°20'E
Surveyed		Date		Scale	1:2500
Drawn	T.G.D.S.	Date	March 1983	Drawing Nº	

ACCOMPANIES APPENDIX 13, REPORT 353

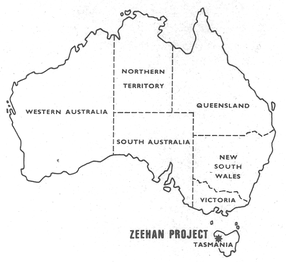
Figure 4

within EL 4/78

39M/77
J.N.R. Enraght-Moony

60M/77
Electrolytic Zinc (Amoco JV)

Location



Notes:

BMR Surveys 1947-48
(Record No. 1966/163)

Resistivity Coverage

Potential Ratio Coverage

Axis of zones of relatively Low Resistivity

1:2500

0 100 200 meters

5 cm

528315

Amoco Minerals Australia Company

5300

Project	ZEEHAN			Nº A-78-608	
Project Partner					
Austral – B.M.R. Surveys					
COVERAGE & LOW RESISTIVITY ZONES					
Map Ref. ANG	K-55-5	Latitude	41°55'S	Longitude	145°20'E
Surveyed		Date		Scale	1:2500
Drawn	T.G.D.S.	Date	March 1983	Drawing Nº	

REF: MITRE GEOPHYSICS REPORT Nº AM/MG83/02

ACCOMPANIES APPENDIX 13, REPORT 353

Figure 5

Zeehan

362 000E
363 000E
364 000E
5 360 000 N
5 359 000 N
3000 N
2500 N
2000 N
1800 E
1500 N
1400 E
1000 E

SILVER KING
STH KING
Oval
Track
LITTLE HENTY
RIVER Fault
Fault

CENTRAL BALSTRUP
Adit
12M/78
Renison

North Austral
(Maxim)

38M/77
JNR Enraght-Moony

SILVER BELL
39M/77
JNR Enraght-Moony
NEW SILVER BELL

29M/75
Renison

MONTE CRISTO
SUNRISE

MONTAGU No 1
MAXIM
WATT & McAULIFFES
NTH AUSTRAL
Balstrup
DUFFS
AUSTRAL
Austral

ZT-80A-2
ZT-79A-1
ZT-80A-3

60M/77
Electrolytic Zinc

EL 4/78
Amoco Minerals

Notes :

BMR Surveys 1947-48
(Record No. 1966/163)

——— Gravity Coverage
– – – – SP Coverage
····· Magnetic Coverage
—·—·— Potential Ratio Coverage

Amoco Minerals Australia Company

Project	ZEEHAN	Nº A-78-60
Project Partner	5 cm	

Silver Bell - Silver King - BMR Surveys 5331

GEOPHYSICAL COVERAGE

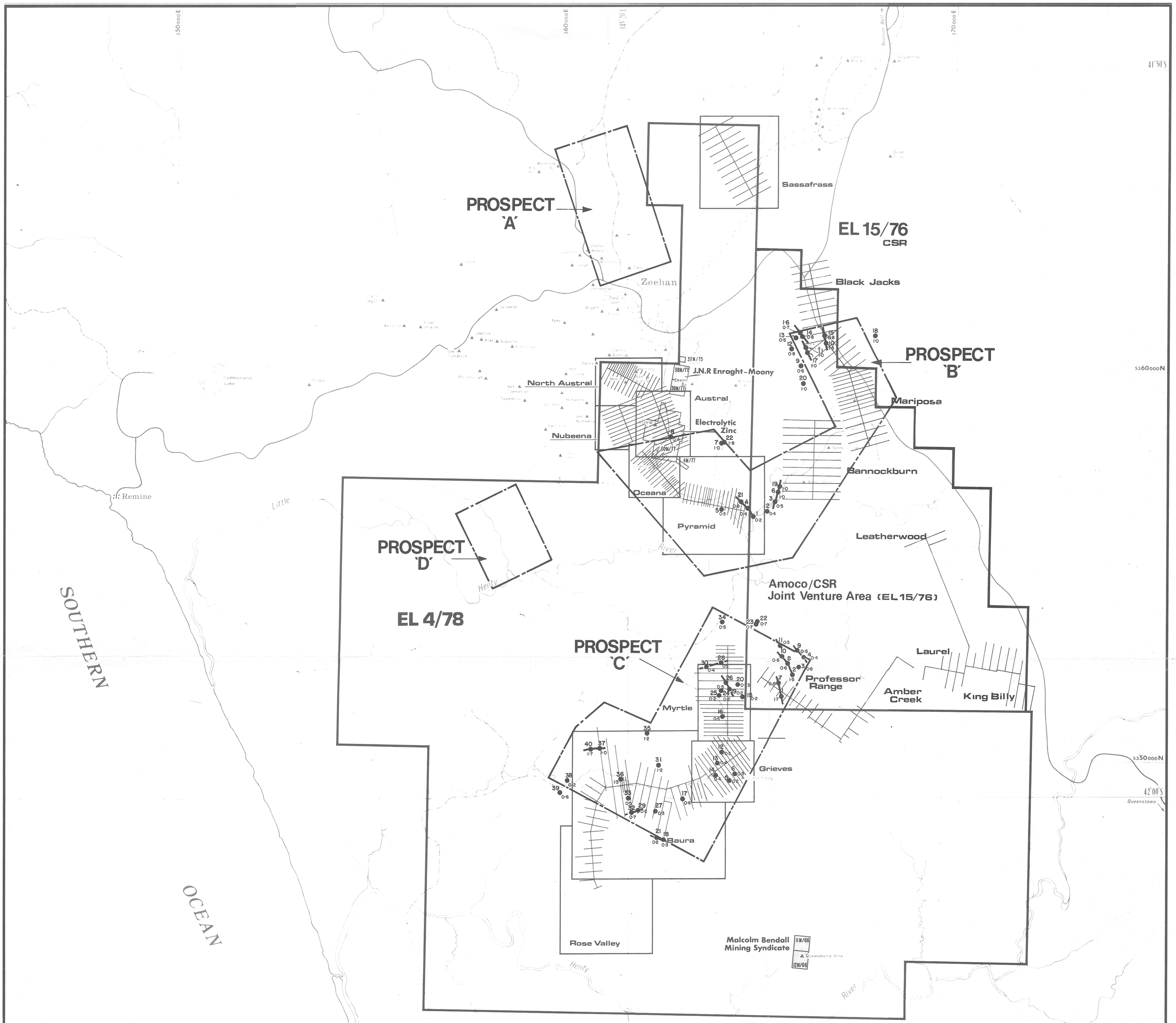
Map Ref. ANG	K-55-5	Latitude	42°00'S	Longitude	145°20'E
Surveyed		Date		Scale	1:5000
Drawn T.G.D.S.		Date	March 1983		

REF: MITRE GEOPHYSICS REPORT Nº AM/MG83/02

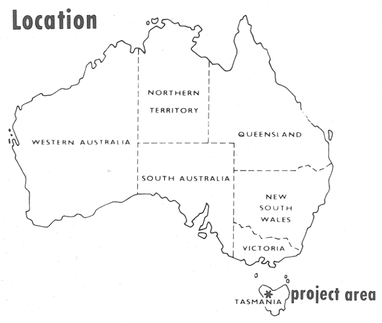
ACCOMPANIES REPORT 353, APPENDIX 13

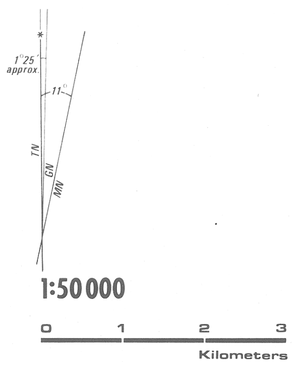
528316

Figure 6



Location





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

LEGEND

Survey boundary

15 0·8 — Anomaly code number; Anomaly location and Conductor axis; In phase/out of phase ratio

NOTES

Original maps show anomalies outside of survey boundaries.

Survey by Scintrex in 1971 for Tenneco

System used : HEM-701

528317

Amoco Minerals Australia Company

5 cm

Project	ZEEHAN			Nº A-78-60	
Project Partner					
Tenneco's Helicopter E.M. Survey COVERAGE & ANOMALIES					
Map Ref. ANG	K-55-5	Latitude	42°00'S	Longitude	145°20'E
Surveyed		Date		Scale	1:50000
Drawn T.G.D.S.		Date	March 1983	Drawing Nº	

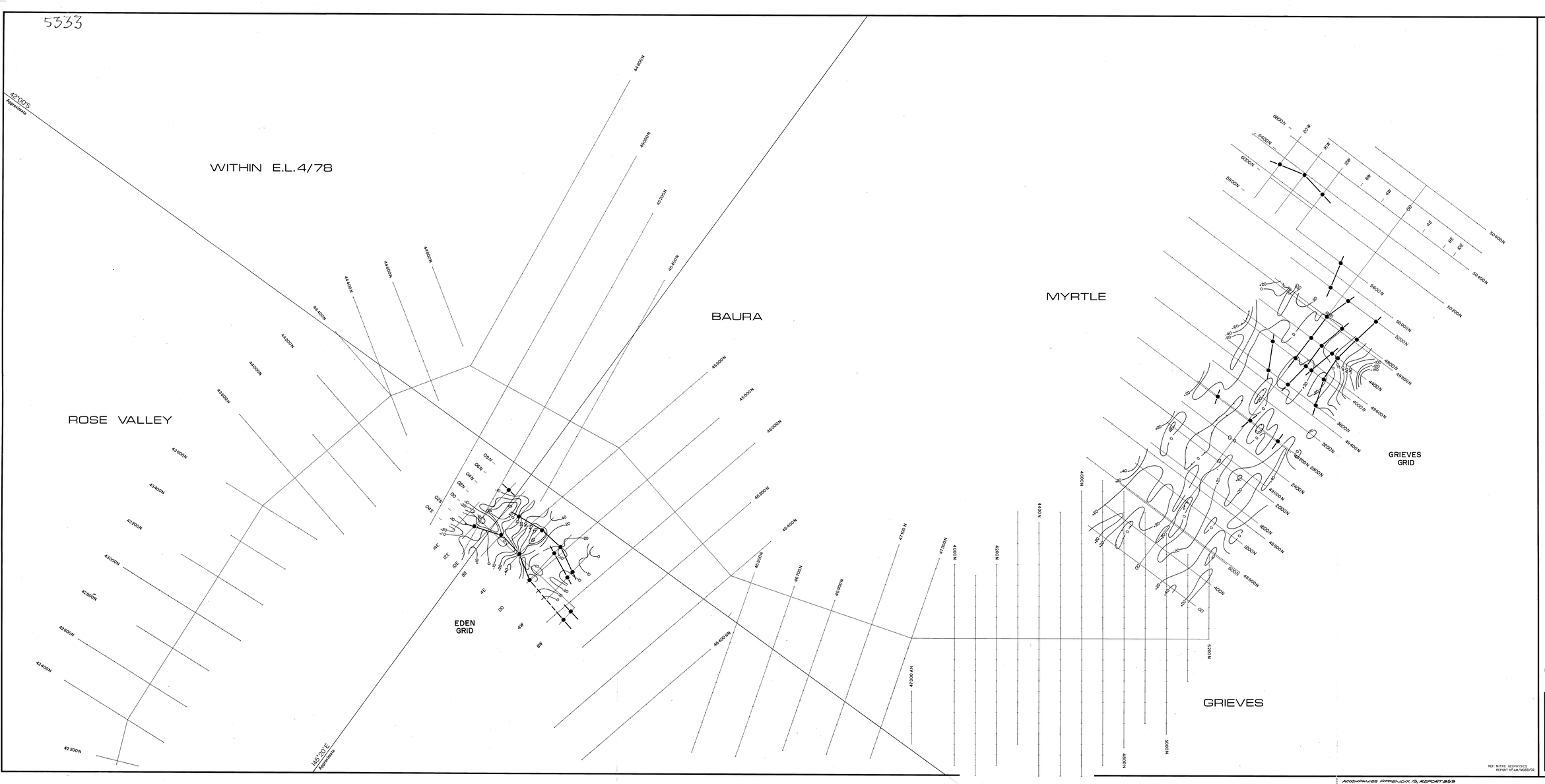
REF: MITRE GEOPHYSICS REPORT Nº AM/MG83/02

ACCOMPANIES APPENDIX 13, REPORT 353

83-2024

Figure 7

5333



Location

NOTES:

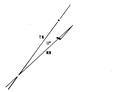
SP surveys by Tenneco, 1972.
Turam surveys by Scintrex, 1972.

Turam Anomaly Location

Turam Conductor Axis

−20 SP Potential (Volts)
Contour interval 10 (CMV Graves Grid
(CMV Eden Grid

Position of Eden Grid is approximate.



AMOCO MINERALS

528318

Amoco Minerals Australia Company

5333

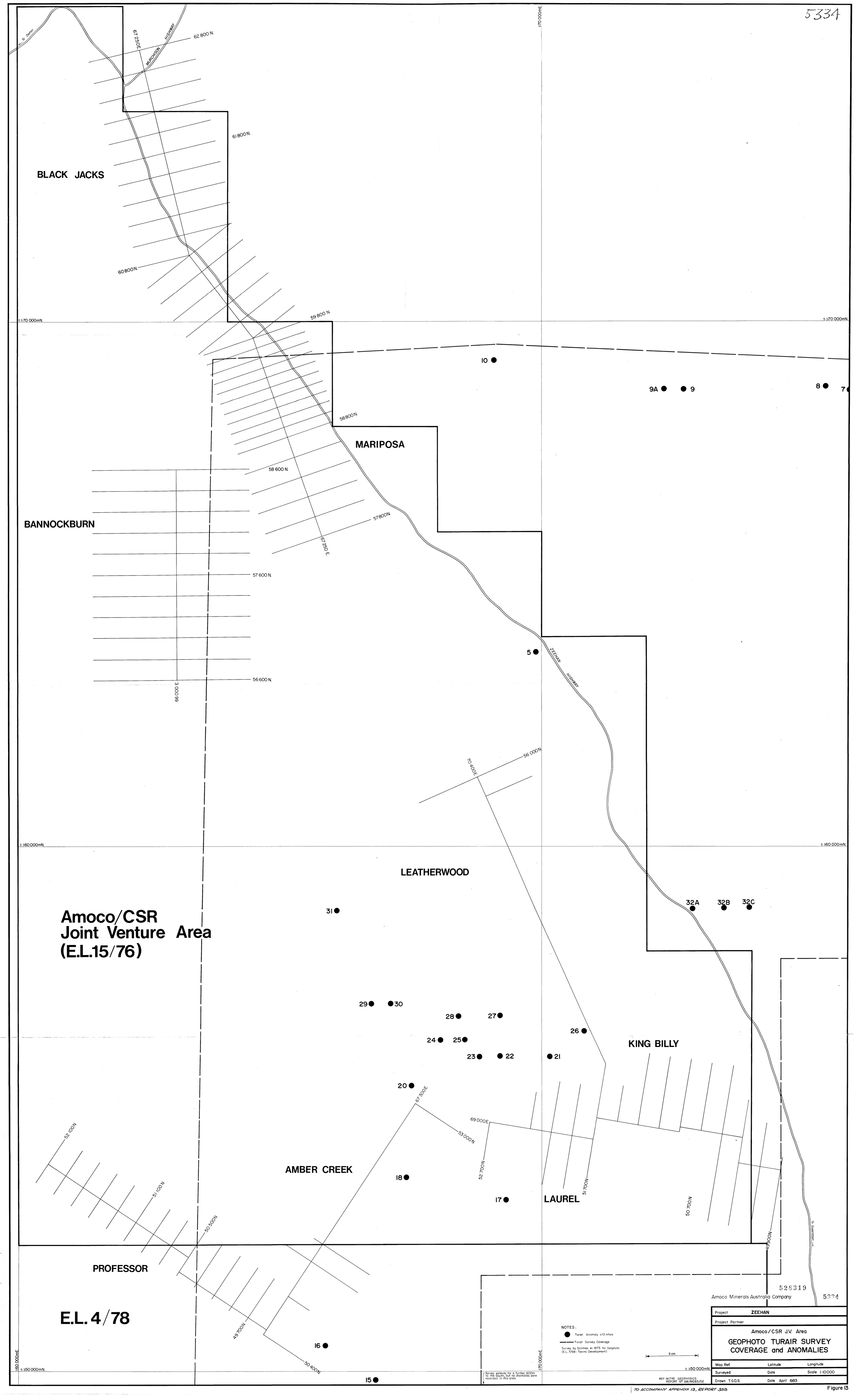
Project	ZEEHAN		Nº A-78-608
Project Partner			
Myrtle to Rose Valley			
Tenneco Surveys – SP and TURAM			
Map Ref. ANG	K-55-5	Latitude 41°55'S	Longitude 145°20'E
Surveyed		Date	Scale 1:5000
Drawn T.G.O.S.		Date April, 1983	Drawing Nº

REF: MITRE GEOPHYSICS REPORT Nº 83M/MG83/02

ACCOMPANIES APPENDIX 13, REPORT 553

Figure 8

5334



Amoco/CSR Joint Venture Area (E.L.15/76)

E.L. 4/78

528319

Amoco Minerals Australia Company 5334

Project	ZEEHAN	
Project Partner		
Amoco/CSR J.V. Area		
GEOPHOTO TURAIR SURVEY COVERAGE and ANOMALIES		
Map Ref.	Latitude	Longitude
Surveyed	Date	Scale 1:10000
Drawn T.G.D.S.	Date April 1983	

TO ACCOMPANY APPENDIX 13, REPORT 358

Figure 13