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Prospect 602

CSR LIMITED

ALUMINIUM, MINERALS & CHEMICALS DIVISION

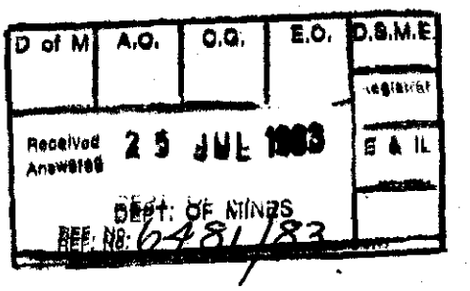
EXPLORATION GROUP

RENEWAL REPORT 1983

EXPLORATION LICENCE 15/76

DUNDAS, TASMANIA

EMR 78/83



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June 1983

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KEYWORDS

TASMANIA
TIN
COPPER
ZINC
LEAD
GOLD
SILVER
NICKEL
E.L. 15/76

EXPLORATION
MINERALISATION
SOIL
DRAINAGE
GEOLOGY
GEOCHEMISTRY
SAMPLING
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JOINT VENTURE

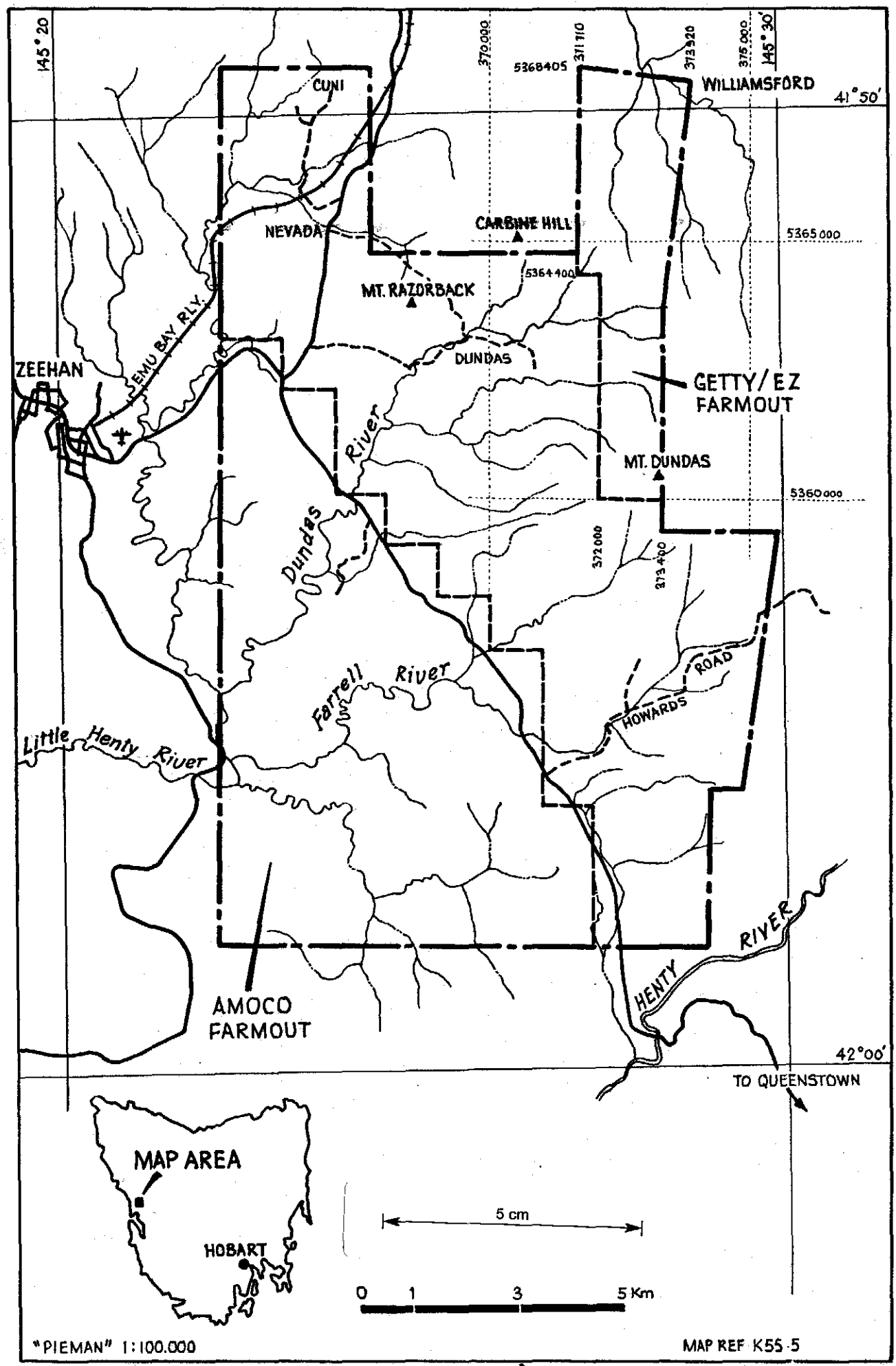

FIG. 1 LOCATION MAP E.L. 15/76 DUNDAS, TASMANIA

1. INTRODUCTION

Exploration Licence 15/76 was granted to CSR Limited on 2nd August, 1976. The Licence covers an area of 145 km^2 and is centred approximately 4 km east of Zeehan on the West Coast of Tasmania (Figure 1). It extends south from Melba Flats and Williamsford to the Henty River and west from Mt. Dundas to the Little Henty River.

This area contains small silver/lead/zinc deposits (Dundas), a small tin orebody (Mt. Razorback), small copper/nickel shows (Lead Blocks), small complex lead/antimony rich sulphides with minor Sn, Ag, Bi, W (Montezuma) and several small lead/zinc/fluorite concentrations (Mariposa). There is also potential for silver/lead/zinc mineralisation with tin sulphides in the upper units of the Oonah Formation (Oonah Mine type), copper/zinc/lead/silver/tin associations in the acid volcanics of the Dundas Group and Renison style tin replacement deposits.

Prior to 1976 the area was intensely prospected by many companies and individuals as well as investigated by government research. Since 1976 CSR has undertaken exploration to evaluate the Licence. Recently two portions of the Licence were joint ventured to Amoco (west of the Murchison Highway and E.Z./Getty (northeast of the Murchison Highway).

On 2nd February, 1983 the Licence was renewed for a period of 6 months. This report summarises the investigations completed during the period to June, 1983.

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2. SUMMARY

Exploration of E.L. 15/76 continued through early 1983 by CSR Limited and two groups of joint venture partners - Amoco and E.Z./Getty.

Amoco continued establishing grids and completing geochemical drainage, soil and rock-chip sampling and magnetic and EM surveys over areas of Gordon Limestone in the southwest of the Licence. Several drainage anomalies were outlined. Geochemical anomalies were located on the Bannockburn Grid. The previously located geochemical and geophysical anomalies on the Mariposa and Black Jacks Grids were confirmed and detailed by costeaning. Exploration of all the anomalies, as well as the new grids, will continue during the next period.

E.Z./Getty continued recutting and extending the CGFA grid in the northeast of the Licence. This grid has provided control for mapping, soil geochemistry, magnetics and GENIE-EM surveys. Several geophysical and geochemical anomalies were defined. These anomalies are to be further investigated by diamond drilling in the next period.

Results of CSR's investigations of the Howards Road, Nevada and Cuni Grids were disappointing. Only low order anomalies were located. Drainage geochemistry defined an area of Silurian sediments with anomalous tin. DIGHEM anomalies have been located on the ground. Some cannot be explained by surficial features and may be related to mineralisation. These anomalies will be further investigated by grid-controlled geochemistry and geophysics. A new concept of trace element analysis is being developed in an attempt to define deep tin deposit drill targets.

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3. GENERAL INFORMATION

E.L. 15/76 is situated 4 km east of Zeehan in the Land district of Montagu on the west coast of Tasmania. The sealed Murchison Highway diagonally bisects the Licence area (northwest-southeast). A series of unsealed roads, tracks and old tramways give reasonable access to most areas of the Licence.

All but the northeast of the Licence is drained by tributaries of the westerly-flowing Little Henty River system. The northeast area is drained by the headwaters of the Ring River which flows into the westerly-draining Pieman River system. Most of the streams are small and steep; typically "young" streams. On the flat areas of the easily eroded Gordon Limestone (southwest) the streams form swamps.

The vegetation cover in areas of Silurian, Devonian and Ordovician sedimentary rocks is generally buttongrass with local areas of dense ti-tree/sword grass/bowrah scrub. The remainder of the Licence is covered by cool temperate rain forest with patches of dense "horizontal" scrub. Minor areas of open grasslands occur in the cleared zones of Dundas and Cuni.

During 1981 Amoco Minerals Australia Company expressed an interest in obtaining exploration rights to areas of Ordovician Gordon Limestone. A Joint Venture agreement was signed between CSR and Amoco on 23rd December 1981 (although Amoco commenced work in October 1981) for the portion of E.L. 15/76 to the southwest of the Murchison Highway (Figure 1). Access to this area is via several old mining and exploration tramways and tracks from the Murchison Highway.

During late 1981-early 1982 Electrolytic Zinc Company of Australasia and Getty Oil Development Company Limited approached CSR with a view to joint venture exploration of the the Montezuma area of E.L. 15/76. A Heads of Agreement was

signed in early 1982 covering the old Geophoto Montezuma Grid and the CGFA Grid (Figure 1). Although E.Z./Getty commenced work on this area in February 1982 no joint venture agreement has been signed. Access to this joint venture area is by three tracks; a Geophoto drill access track to the Montezuma Grid (south); the Northeast Dundas Tram (central); and an extension of the Anglo-American Corporation drill access to E.L. 5/63 (north).

4. PREVIOUS EXPLORATION

A detailed review of all available previous exploration and prospecting data for the area covered by E.L. 15/76 is contained in Ellis (1982). A brief resume of this data is included in Macnamara and Ellis (1983). This latter report also includes details of the 1982 exploration.

During 1982 Amoco continued gridding, soil and rock-chip sampling and magnetic and gravity surveys over the Gordon Limestone in the southwest of the Licence. Geophysical and geochemical anomalies were located on the Mariposa (two) and Black Jacks (one) grids.

Early in 1982 E.Z./Getty (operators being E.Z) commenced work in the Montezuma area (northeast) of the Licence by recutting and extending the CGFA grid. Geochemical soil sampling located a single line of tin anomalies and a separate lead anomalous zone.

During 1982 CSR gridded areas of anomalous drainage geochemistry at Howards Road, Cuni and Nevada. Soil geochemistry, mapping and geophysics located several low order anomalies. Regional drainage sampling located several zones of geochemical anomalies mostly adjacent to known mineralisation. Similarly a regional (northern) DIGHEM survey delineated known structures and minor mineralisation. Only very weak DIGHEM anomalies occur away from the known mineralisation.

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5. GEOLOGY

The geology of the area of was described by Blissett (1962). Brown (1982) has recently remapped and reviewed the geology of the northern half of the Licence while K. Corbett is remapping the southern part of the Licence (pers.comm).

A brief summary of the geology of the Licence area is included in Macnamara and Ellis (1983). More detailed geology on individual prospects is referred to in Ellis (1982) and recent geological mapping is shown in Jones (1982a, 1982b, 1982c), Sainty (1982) and Macnamara (1983a, 1983b, 1983c).

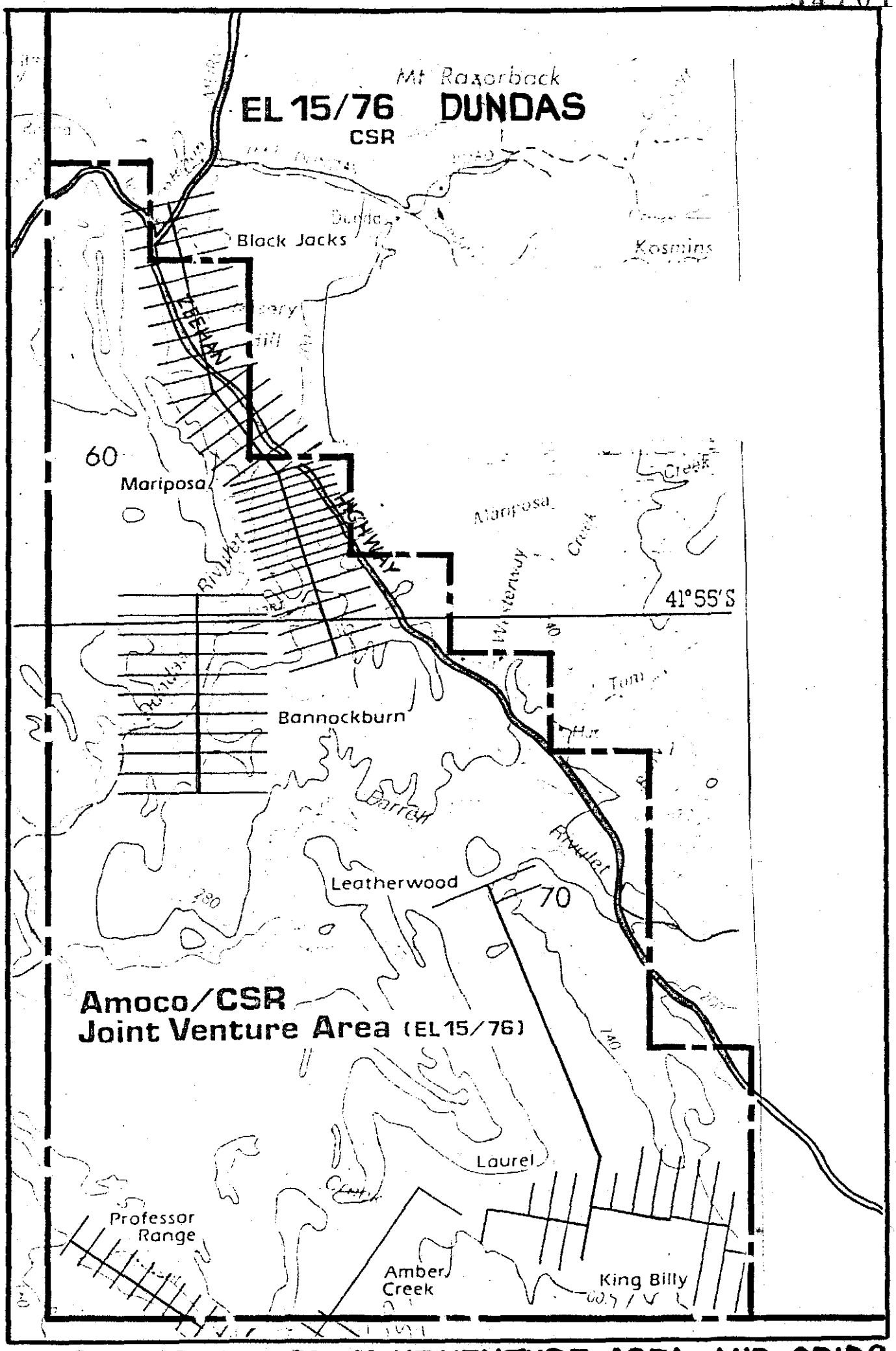

FIG. 2 CSR-AMOCO JOINT VENTURE AREA AND GRIDS

6. AMOCO JOINT VENTURE AREA

Amoco's main exploration target in the 58 km^2 block is Mississippi-style lead/zinc deposits in the Ordovician Gordon Limestone.

6.1 Current Exploration

Exploration by Amoco during the reporting period included geological mapping, stream sediment, rock chip and soil sampling surveys, costeaning, air magnetic follow-up and compilation of old geophysical data. Most of this work centred on the Black Jacks, Mariposa and Bannockburn areas with limited studies on the Amber Creek Grid (Figure 2).

Detailed results of this work have been reported by Bishop (1983) Appendix I and Jones (1983) Appendix II.

6.1.1 Geology

Detailed mapping of the Mariposa Grid has located zones of calcareous sandstones, siltstones and breccias. These are similar to host rocks at the Oceana and South Oceana prospects and as such are considered marker horizons to the lead/zinc mineralisation.

Several northeast trending faults cut the limestone sequence.

6.1.2. Geochemistry

Streams. Stream sediment and panned concentrate sampling outlined several anomalous areas. The most interesting anomaly was on a tributary of the Farrell River (southeast of

magnetic anomaly J) which showed 0.19% Pb, 0.16% Zn, 8ppm Ag and 680 ppm Sn in the -80 mesh fraction.

Other anomalies occur in the Dundas and Farrel Rivers. Many of these probably relate to contamination from workings upstream or from glacial gravels.

All anomalies require checking.

Soils. All accessible areas of the Bannockburn Grid have been soil sampled using the Jackro bombadier mounted auger. Steeper and/or thickly vegetated areas are being hand auger soil sampled.

During the sampling galena in carbonaceous siltstone was observed.

Rock Chip.

During the regional drainage sampling programme all old workings and mineralised outcrops were rock-chip sampled. The following anomalous values (in ppm) were observed :-

Area	Working	Pb	Zn	Ag	Sn
Amber Creek	North Henty	300	600	2	8
Amber Creek	United Ag-Pb	8	980	<1	<4
Amber Creek	East Amber	170	1150	<1	10
Black Jacks	Australasian	280	1100	1	6
Farrel Rivulet		0.2%	155	5	6
Westerway Creek		38	410	2	6

6.1.3 Costeaning

Costeans were dug over geochemical and geological targets on the Black Jacks and Mariposa

Grids. Samples were taken over 2 m intervals along the costeans.

Black Jacks. Four trenches totalling 308 m were excavated. The best results from these trenches are :-

Line		@	Pb (%)	Zn (%)	Ag (g/t)
61400N	67254-256E - 2 m	à	1.11	2.86	4.5
	67308-312E - 4 m	à	0.04	1.95	1.0
	67320-322E - 2 m	à	1.40	2.00	11.0
61150N	67230-232E - 2 m	à	0.92	0.44	43.0
	67244-252E - 8 m	à	0.95	0.46	5.0
61000N	67238-236E - 2 m	à	0.41	1.07	10.0
	67226-206E - 20 m	à	1.74	1.17	6.6
includes	226-218E - 8 m	à	3.16	1.58	5.8
and	214-212E - 2 m	à	1.18	0.60	25.0
and	210-206E - 4 m	à	1.34	1.84	3.3
	67198-196E - 2 m	à	0.27	1.30	-
62000N	67309-311E - 2 m	à	3.40	1.30	25.0

Mariposa. Eleven trenches totalling 660 m were dug. The best results to hand (analyses incomplete) are :-

Line			Pb (%)	Zn (%)	Ag (g/t)
59600N	67172-7202E- 30 m	à	1.01	1.84	13.07
includes	172-186E - 14 m	à	1.36	3.05	16.64
and	194-202E - 8 m	à	1.35	1.11	19.63
59091N	67074-076E - 2 m	à	1.83	0.43	12.00
59400N	67318-332E - 14 m	à	1.06	2.32	32.4
includes	320-324E - 4 m	à	1.69	5.83	39.5
59200n	67342-334E - 8 m	à	3.3	6.2	395.0
	67322-320E - 2 m	à	0.8	1.4	29.0
	67142-720E - 22 m	à	1.0	0.2	63.5
59100N	67166-162E - 4 m	à	0.8	0.9	3.3
	67152-150E - 2 m	à	0.2	1.9	7.5
59046N	67138-136E - 2 m	à	0.4	1.1	5.0
59000N	67325-323E - 2 m	à	0.9	1.7	13.0
	67098-096E - 2 m	à	0.5	1.3	10.0
58950N	67080-078E - 2 m	à	1.5	0.8	54.0
	67072-062E - 10 m	à	11.1	1.2	74.5
58900N	67094-082E - 12 m	à	1.5	1.2	7.4
	67078-072E - 6 m	à	2.2	1.9	52.0

These results suggest three mineralised zones are present :-

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(a) The line of the Mariposa workings on the western edge of the Gordon Limestone.
(b) A line within the Gordon Limestone adjacent to its eastern contact with the Dundas Group sediments.
(c) A zone in the centre of the Limestone.

6.1.4 Contract Geophysics

Mitre Geophysics was contracted to evaluate old geophysical data on the joint venture area. This evaluation (Bishop, 1983 - Appendix I) highlighted anomalies in several areas :-

Black Jacks. Three Turam conductors were identified between 60400N and 61200N. The northern response was coincident with the Amoco geochemical anomaly (Line 61000N) and had an S.P. trough slightly to the west.

Mariposa. A zone of high chargeability extends from north of the workings (truncated by a fault) south through the workings to the Nevada workings. A restricted gravity survey showed a coincident 0.5 m gal response in the vicinity of the workings and drill holes.

None of the surveys extended to the eastern edge of the Limestone.

Bannockburn. No anomalies were outlined by limited surveys.

Amber Creek. Several VLF-EM anomalies were identified. These may be "false" as VLF penetration of the thick (up to 50 m) blanketing fluvioglacial sediments is doubtful.

6.1.5 Amoco Geophysics

The interpretation of an EM-37 survey of the Mariposa area completed in 1982 indicated a poor to moderate west dipping conductor coincident with the gravity response. The anomaly is centred at 67150E on lines 59300N and 59400N.

Four aeromagnetic anomalies (C, J, K, L) outlined by a Department of Mines survey were ground checked. This ground work suggests that the plotted position of the aeromagnetic anomalies could be up to 400 m (E-W) from the true ground position. The ground traverses of most of the aeromagnetic anomalies should be repeated to check this discrepancy more thoroughly.

6.2 Proposed Exploration

Infill gridding to 100 m spacing is required around the two old workings on the Bannockburn Grid.

Mapping will continue on the Black Jacks, Mariposa and Bannockburn Grids at the same time as the hand auger soil geochemical sampling.

Soil sampling of the Bannockburn workings infill lines and the initial sampling of the Leatherwood, Laurel, Amber Creek and Professor Range Grids will be started using the bombadier mounted Jackro power auger. This sampling will concentrate on structurally anomalous areas.

Infill costeaning on the Mariposa and Black Jacks Grids is proposed. This may establish the continuity of the mineralisation. Costeaning on the Bannockburn Grid may also be undertaken.

An air photo structural interpretation of the limestone area will be undertaken. The Pb-Zn deposits appear to be related to major fractures and faults.

Airborne EM and Turam anomalies delineated by Mitre Geophysics will be checked using VLF-EM.

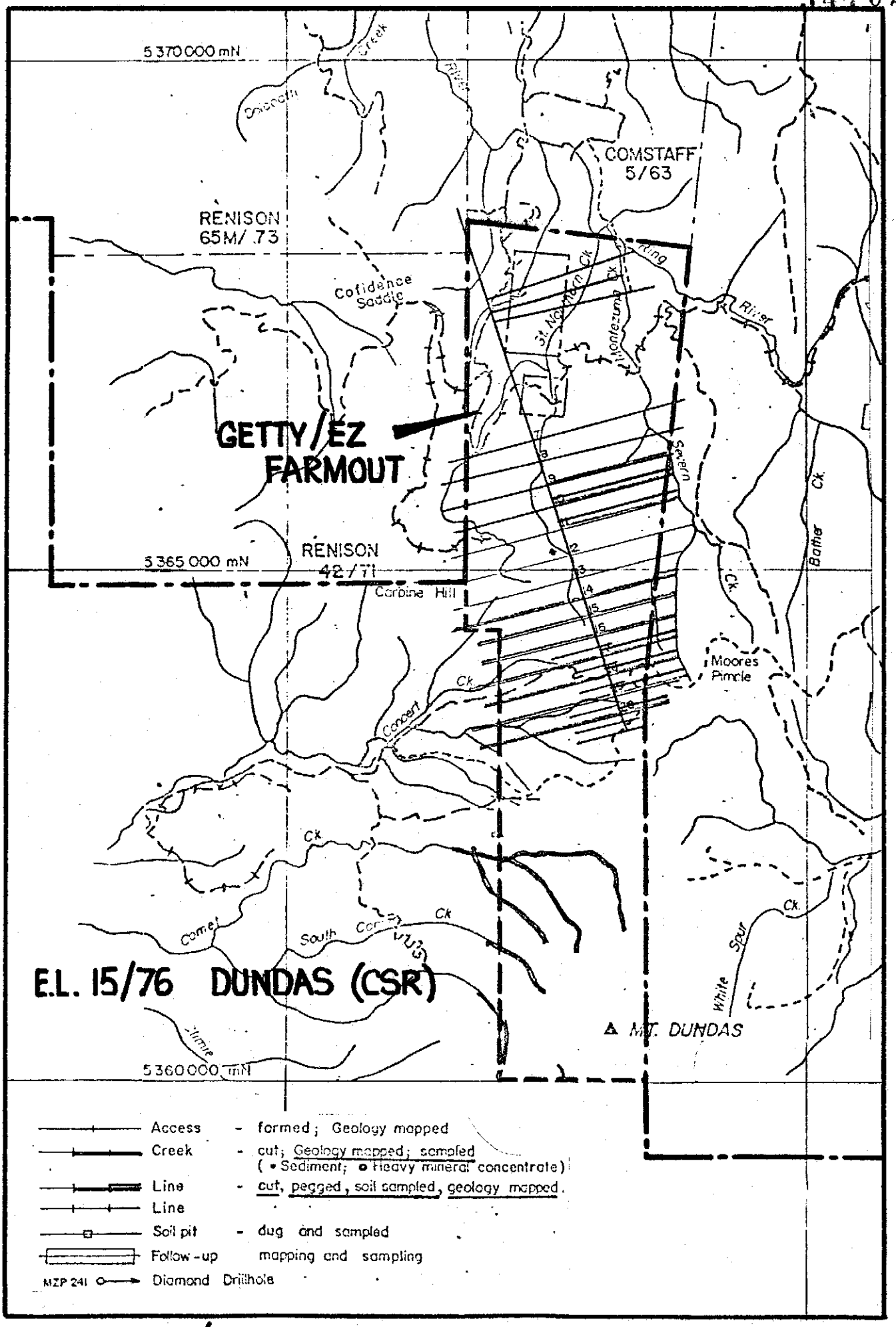

FIG. 3 E.Z./GETTY JOINT VENTURE AREA AND GRIDS

7. E.Z./GETTY JOINT VENTURE AREA

E.Z./Getty entered a joint venture with CSR on 14 km^2 block in the northeast (Montezuma area) of E.L. 15/76. Their main exploration target is Renison-style carbonate-hosted tin deposits. Lead/zinc or complex sulphide deposits are of minor interest.

7.1 Current Exploration

E.Z. (the operator) continued field work on the old CGFA and Geophoto grids and adjoining areas (Figure 3). This included the recutting of the CGFA lines 1, 1A and 2 and the cutting of new lines 16.5, 17.5, 18.5, 19.5, 20.5 and 21 (adding to the previously cut or recut lines 7 to 20). Most of these lines have now been pegged at 20 m intervals, soil sampled (analysed for Cu, Pb, Zn, Ag, Fe, Mn, Cr, As, Sn and W), geologically mapped and surveyed with both a Scintrex MP2 ground precision magnetometer and an SE-88 GENIE-EM.

Detailed results of this work have been reported by Sainty (1983), Appendix III. The following is a brief summary.

7.1.1 Geology

Geological mapping in the southern part of the grid showed a domal structure with a core of Concert Group schists and successive units of Maestries Dolomitic conglomerate, Oonah Formation black shales and quartzites, and Crimson Creek Formation arenites, greywackes and siltstones. The eastern flank of this dome is transected by the Montezuma Fault, the surface expression of which is a persistent linear Sn anomaly. The intersection of this fault with the Maestries Dolomitic Conglomerate

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may represent a suitable site for the formation of a Renison-style tin deposit.

In the north of the grid Dundas Group rocks are indicated. Laminated black siltstones with minor quartz arenites have been correlated with Brewery Junction Formation sediments while coarse lithic greywackes have been correlated with the Razorback Conglomerate. Minor limestone has been recorded.

Many of the geological features were defined by DIGHEM, GENEIE-EM, magnetics and soil Fe/Zn geochemistry.

7.1.2 Geochemistry

Infill soil geochemistry on Lines 17.5 to 19.5 enhanced and closely defined the line 18 Sn anomaly. The +100 ppm Sn anomaly is 400 m long (Lines 17.5 to 19.5) and averages 100 m wide.

Soil sampling of the southern extension grid lines showed the Line 20, 560 ppm Sn anomaly was a single line anomaly.

Resampling of Lines 1, 1A and 2 has duplicated CGFA's soil geochemistry. In addition three anomalous values were recorded on Line 1A. These are associated with old alluvial workings.

7.1.3 Geophysics

GENIE-EM anomalies generally correlated well with the DIGHEM conductor positions. Several separate GENIE-EM anomalies were also located.

On Lines 1, 1A and 2 GENIE anomalies correspond with DIGHEM anomalies A1 and A2 over the

faulted Brewery Junction - Razorback Conglomerate Formation contact. Resistivity measurements (3.9 and 33.5 ohms) infer a deep source for this anomaly and not the pyrite films evident at surface.

A GENIE-EM anomaly coincident with the Montezuma Fault on Line 7 was not detected by DIGHEM. GENIE-EM anomalies on Lines 9, 10, 11, 13 and 14 also coincident with the Montezuma Fault, corresponded to DIGHEM anomalies B4, B4, E1, F4-J1 and F5 respectively.

On Lines 16-18 GENIE responses were strong near the Maestries Dolomitic Conglomerate - Oonah Formation contact. These anomalies corresponded to DIGHEM anomalous trends Z and L.

Ground magnetics confirmed the subdued pattern of the DIGHEM magnetic survey. The only significant anomaly was associated with DIGHEM conductor trend A on Lines 1, 1A and 2.

7.2 Proposed Exploration

The above work has defined four anomalous zones :-

(a) Line 17-19.5 - the inferred intersection of the Maestries Dolomitic Conglomerate and the Montezuma Fault. This zone has :-
   i) Strong GENIE and DIGHEM responses
   ii) A 400 x 100 m (average) Sn anomaly to 1360 ppm.
   iii) known tin in pyrite veins.

(b) Line 14-15 - the Montezuma Fault transects Lower Crimson Creek sediments. This zone has :-
   i) Strong GENIE and DIGHEM responses
   ii) A 100 m wide slightly anomalous Sn zone (max. 45 ppm) on one line

iii) Possible occurrence of dolomitic horizons.

(c) Line 11 - the Montezuma Fault transects Upper Oonah Formation sediments. This zone has :-
i) Strong GENIE and DIGHEM responses
ii) A 100 m wide anomalous Sn zone (max. 140 ppm) on one line.

(d) Line 1, 1A, 2 - a deep-seated fault adjacent to a serpentinite body. This zone has :-
i) Strong GENIE and DIGHEM responses.
ii) Single point Sn anomaly of 47 ppm at GENIE anomaly mid-point.
iii) Known structurally-controlled mineralisation in dolomitic horizons in the adjacent ML 62/M75 Mining Lease - 1.46 m of 6.95% Sn.
iv) Old alluvial tin workings nearby.

In an extended term of the Licence E.Z./Getty intend to drill and/or costean these anomalies in the following order:-

(a) Line 17-19.5 - diamond drilling mostly from access established by Geophoto into the Montezuma Grid. Only minor site preparation is required.

(b) Line 1, 1A, 2 - costeaning and/or diamond drilling. Access is provided by old Minops Lease roads and costeans. Only minor site preparation is required.

(c) Line 14-15 - diamond drilling by helicopter-transported rig.

(d) Line 11 - diamond drilling probably by helicopter-transported rig.

8. CSR RETAINED AREA

CSR have retained the 73 km^2 central strip including the Cuni and Dundas mineral fields. Exploration targets in this area have been Renison-style replacement tin, volcanogenic massive sulphide and volcanogenic gold. It is now apparent that the first of these is the only possible target.

8.1 Current Exploration

Exploration during the present six month term of the Licence has consisted of the evaluation of exploration results. The 1982 Cuni, Nevada and Howards Road Grids results were compiled (Macnamara, 1983a, 1983b, 1983c) and the collation of the 1982 drainage sampling information is continuing. The DIGHEM anomalies have been located and inspected and are being tested with VLF-EM.

8.1.1 Howards Road Grid (Macnamara, 1983a)

Although Macnamara has reported anomalous gold in values in stream sediment and panned concentrate samples the anomalous values only occur in isolated streams. Furthermore some anomalies are not repeatable.

Similarly most of the anomalous gold soil values which occur in two lines (55050N and 55500N) are sporadic. On line 55050N the main "anomalous" zone is 520 m wide but only 7 out of 53 samples are anomalous. Of these the highest reading (0.2 ppm Au) was from colluvium as augering failed to penetrate the gravels and scree. Other "anomalous" values of 0.1 ppm Au (3 samples) and 0.05 ppm Au (4 samples) occurred in siltstones, limestones and dolerites. The anomalous gold samples are not associated with other element anomalies (i.e. Cu, Zn, Pb, Ag) or with ground magnetic or VLF-EM anomalies.

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Geological mapping of the Howards Road area has shown patches of high-level glacial gravels. Elsewhere these contain small quantities of gold and the gold detected at Howards Road could be derived from these gravels.

8.1.2 Nevada Grid (Macnamara, 1983b)

Macnamara reported a Cu/Zn/Pb/Ag/Au/Ni/Co/Cr anomaly extending for 800 m on the sheared contact of the Hodge Slate and serpentinite. In detail, the eastern 500 m of this zone (6200E to 6720E) shows markedly anomalous Cr with minor isolated Ni, Co, Cu, Pb and Zn anomalies. This zone corresponds to a chromite-bearing sintery quartz vein sheared system on the edge of the serpentinite which showed no ground magnetic or VLF-EM response. The western 200 m of the anomaly has slightly anomalous Pb and Zn values associated with a sharp, narrow, intense ground magnetic high. Although this magnetic response continues on the eastern lines there is no associated geochemical anomaly. The magnetic anomaly represents a marker horizon in the Razorback Conglomerate.

Repeat drainage sampling of streams with high Sn values confirmed the anomalies. Tin may have been derived from the Grand Prize tin zone 23 km to the east and have been transported in the fluvio-glacial gravels. Reworking of these gravels possibly led to concentration of tin in present streams. However no anomalous tin values have been recorded over the remnant gravel layers.

One anomalous drainage tin value which cannot be explained by fluvioglacial transport from the Grand Prize zone is to the south of the Nevada area. This drainage (with samples 602808M, 602809P, 602810M and 602811P) is within an enclosed valley

in Silurian slates and quartzites. The source of this tin anomaly has not been explained.

8.1.3 Cuni Grid (Macnamara, 1983c)

Macnamara reported anomalous Pb/Zn and Cr values, slightly anomalous Sn, Cu, Ni and Ag values and weak Au values in drainage samples.

All anomalous stream sediment tin values were from streams draining the Grand Prize line of tin mineralisation to the east of the Licence. One anomalous tin value from a panned sample (602823P) is unexplained. A stream sediment sample from the same location showed no tin. This stream drains the area to the northeast of the Licence.

Elevated drainage Cu, Ni, Pb, Zn and Ag values were expected due to the known occurrences of Cu/Ni and mineralisation. No new sources of these metals were indicated by the drainage samples. High Cr in drainages was also expected due to the presence of Cr bearing serpentinites.

The 1982 soil sampling defined a continuous Cu/Pb/Zn/Ni anomaly extending from line 8300N (6670-6700E) through lines 8221N (6605-6640E) and 8100N (6550-6620E) to Line 8000N (6500-6560E). This is coincident with a Cu-Ni anomaly along a metadolerite unit studied extensively by E.Z. Their drilling results were negative and no further work is warranted. A single line of Cu/Pb/Zn anomalies on Line 8221N (6900-6935E and 7080-7170E) are extensions of the patchy, discontinuous McKimmies-Lead blocks line of Pb/Zn mineralisation. These Cu/Pb/Zn anomalies were not supported by associated magnetic or VLF-EM anomalies and no further work is justified.

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8.1.4 Regional

Drainage Sampling. A report on regional stream sediment and panned concentrate samples is in preparation.

Results of the drainage sampling were disappointing (Macnamara and Ellis, 1983). Only one stream sediment tin anomaly in the area south of the Nevada Grid is of interest (see Section 8.1.2).

DIGHEM. Four unexplained 1982 DIGHEM anomalies (Macnamara and Ellis, 1983) were located on the ground. Anomaly 23B-24 Bx-26C was coincident with a shear zone within the Razorback serpentinite body. Samples from this shear zone showed no anomalous geochemical response.

	Sample 161416/1	Sample 161416/2
Cu	8	6
Pb	<4	<4
Zn	32	28
Ni	10	8
Co	<4	<4
Bi	<4	<4
Ag	<1	<1
Au	<0.005	<0.005
Sn	<4	6
W	<10	<10
As	10	<2
Fe (%)	2.35	0.16
Mn	18	20
Cr	500	350

Single line DIGHEM anomaly 27C was on the edge of an old quarry. This area contained several pieces of old machinery and metal pipes which probably explain the anomaly.

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Anomaly 26Ax-27Ax-28Ax is located in an alluvium-filled valley in Dundas Group sediments. The area is crossed by old power lines and several wire fences. No geological explanation for the anomaly is apparent except that the anomaly parallels the general structure of the district.

Anomaly 19C-20Ax is coincident with an old Geophoto VLF-EM anomaly on the Carbine Grid. The anomaly, extending into the Renison area to the north of E.L. 15/76, parallels the stratigraphic trends and faulting.

To what purpose?

These DIGHEM anomalies are being further investigated using VLF-EM techniques.

Aeromagnetics. Reprocessing of the Geoex airborne magnetic data by Pitt Research and CSR is still in progress.

Past Drilling. Most of the old drill core from the Dundas area has been located. Tasmanian Department of Mines drill core and most of the Geophoto drill core of the Dundas-Razorback-Grand Prize area is held by the Tasmanian Department of Mines at the Mornington Store. Much of the rest of the Geophoto core and more recent core from the Razorback area is held by Placer/Minops/CRAE (joint venture partners in the Razorback Mine area).

8.2 Proposed Exploration

Several bulk samples (approx. 30 kg) will be taken from areas of gravel cover and in-situ rocks at the Howards Road anomaly in an attempt to determine if the gold is related to the gravels or to fine gold in the Cambrian sediments.

To the south of the Nevada Grid further sampling (drainage and stream bank soils) along the anomalous stream will be completed to determine the source of the tin. Soil geochemistry, VLF-EM and magnetic surveys may follow if a potential source area is located.

No further work is warranted on the Nevada Grid.

The possibility of Success Creek sediments (Cambrian/Precambrian contact) occurring beneath the northwest corner of the Cuni area requires further investigation. Reprocessing of aeromagnetic data is proposed to aid geological interpretation. Stratigraphic drilling in an attempt to locate the Success Creek Group, in particular the dolomitic horizons suitable as tin replacement hosts, may follow.

Drill core from the Dundas/Razorback area will be examined and samples taken for trace element analysis. Trace element variations may provide a guide to deep Renison-style, dolomite hosted replacement tin deposit and aid in target definition.

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PDE/SS
July 1983

APPENDIX I

AMOCO MINERALS - EVALUATION OF GEOPHYSICAL SURVEYS WITHIN E.L. 4/78 AND PART E.L. 15/76 PRIOR TO 1978

See the accompanying report :-

BISHOP, J.R. (1983). Evaluation of the Geophysical Surveys carried out within E.L. 4/78 and part of E.L. 15/76 prior to 1978 for Amoco Minerals Australia Company, Amoco Minerals Report (unpubl).

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AN EVALUATION OF THE GEOPHYSICAL SURVEYS CARRIED OUT WITHIN E.L. 4/78 AND PART OF E.L. 15/76 PRIOR TO 1978.

for

AMOCO MINERALS AUSTRALIA COMPANY

by

Dr J.R. Bishop

AM/MG83/02
April, 1983.

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TABLES and FIGURES

SUMMARY

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.

This report lists and evaluates the geophysical surveys carried out within E.L. 4/78 and the joint venture area within E.L. 15/76, prior to 1978.

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 1950, the BMR carried out further work; this time for North Broken Hill at the Mariposa prospect. Again gravity anomalies coincided with the known mineralisation, but the magnetic results were not of assistance. In 1971, CGG carried out an IP survey at Mariposa for MacIntyre Mines: the known mineralisation was contained within one chargeability anomaly, but drilling elsewhere along the zone, and into an adjacent one, failed to produce any interesting intersections.

The Bannockburn area was investigated by Rio Tinto in 1959 using gravity, magnetics and EM. However the work was ineffectual, using short but widely spaced lines and no conclusions about the potential of this area can be made from these surveys.

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 as well as the 'Gordon River' project grids: Baura, Grieves and Myrtle. It also covered the Black Jack's, Mariposa and Bannockburn grids of the joint venture and part of the 'western limestones' of E.L. 4/78 which have not been gridded. Anomalies were recorded at Black Jack's, Pyramid, between Bannockburn and Pyramid and on the Baura-Grieves-Myrtle grids. One good anomaly on the Austral grid was attributed to a cultural source; all other anomalies 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), Myrtle (Grieves prospect) and Black Jack's. At Baura and Black Jack's, one line of gravity was read. On all three 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.). Neither of the two gravity profiles showed an anomaly, but such small tests are inconclusive. The Turam responses at Black Jack's are along strike from some interesting geochemical anomalies (Jones, pers. com.) and it is possible that some of these EM anomalies (ground or airborne) may be due to the surface weathering of (potentially mineralised) calcareous units.

A second helicopter EM survey was flown in 1973. This was a Turair survey for Texins Development which covered all of the joint venture area except for Black Jack's and the western two thirds of Bannockburn. Several anomalies were recorded in the southern part of the lease. Like the HEM-701 survey, all were weak and indicative of superficial conductors. None of these anomalies has been followed up and although several occur within an area surveyed with VLF in 1971 (by Geophoto for Texins), none can be said to have been located by the VLF (which also recorded only weak anomalies).

Gravity has been the most successful of the above surveys, responding to mineralisation at Oceana and Mariposa. IP surveys conducted by Amoco have apparently recorded high background values; however the IP at Mariposa defined two definite zones, of which the strongest part of one coincided with the known mineralisation. SP has been shown to be inapplicable in areas with a cover of conductive material. 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. Other recommendations arising from this evaluation are, to routinely use gravity and IP as reconnaissance and detailing exploration tools and, in particular, to continue the gravity survey at Mariposa to the south and north. High sensitivity magnetic surveys over the Oceana and Mariposa prospects should help assess the usefulness of such surveys.

INTRODUCTION

Amoco's E.L. 4/78 and the Amoco/CSR joint venture area within E.L. 15/76 encompass 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 leases (including the CSR joint venture area) prior to their taking up the licence. For costing purposes, Amoco have divided up their ground into three areas: the 'Zeehan Project' which covers the Oceana, Austral, North Austral (previously called Maxim), Pyramid and Nubeena grids; the 'Gordon River' (so called after a river in another,pending, E.L.) which covers the rest of the E.L. and the CSR joint venture which is an extension of Amoco's eastern boundary (see Figure 1). The data presented here has been divided up into these three 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 and JV areas 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 have 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 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 three 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).

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 Hill area.

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.

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 in the south of the E.L. (covered by Amoco's Rose Valley, Baura, Grieves 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. The gravity profile across one of the more promising Turam anomalies showed no response. 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.

3. JOINT VENTURE AREA

Several grids have been established in the joint venture area: all have been covered by some sort of geophysical survey by previous explorers. Three of the grids have been named after old workings in the limestones: these are the Black Jack's, Mariposa and Bannockburn grids. All three are shown as old lead-silver prospects on the Zeehan 1 mile geological sheet but none are mentioned in the explanatory notes (Blissett, 1962).

MARIPOSA

The Mariposa mine is a series of old prospects on the eastern side of the Zeehan syncline (the western side of which contains the Oceana and Austral workings). The mineralisation occurs in westerly dipping limestone near its western contact with the Crotty Quartzite.

At the request of the North Broken Hill Co., the BMR carried out magnetic and gravimetric surveys at Mariposa (Loh, 1950). The magnetic results were inconclusive, the survey being much effected by ferrous debris. However quite interesting gravity results were obtained: a linear gravity anomaly (maximum value 0.5mgal) closely paralleled, but did not coicide with, the apparent 'line of lode'. Loh's figure 4 shows several drill holes (drilled to the west into west dipping rocks ?) testing the gravity anomalies (although presumably drilled beforehand): all showed some mineralisation. (Blissett (1962), stating that this drilling was done by Zeehan Explorations, noted that "no encouraging indications of mineralisation" were intersected. It is also worth noting that Blissett's description of the old workings varies significantly from that quoted by Loh (1950).)

In the reports from MacIntyre Mines who subsequently took up the area, reference is made to a 100,000 ton 'orebody' defined by the Zeehan Explorations drilling (eg, Pollock, 1970).

Whether or not there is mineralisation here of a sufficient quantity to be 'interesting', the gravity results suggest that it is a useful method for this style of deposit. The residual contours are reproduced in Figure 9 and these indicate a continuation of the zone of interest to the south.

This continuation was apparently confirmed some twenty years later when an IP survey was undertaken by CGG for MacIntyre Mines (Omnes, 1971). SP measurements were also taken but the method was not successful and the results were not presented.(The SP was apparently a repeat of a survey made by MacIntyre themselves in 1969-70, (Pollock, 1970). Both surveys recorded anomalies which apparently coincided with topographic features within the Crotty Quartzite.)

The IP survey used the gradient array over lines spaced 200ft apart. Several moderate but well defined chargeability anomalies were recorded (20 plus ms): resistivities were mostly less than 500 ohm-m but the lows generally did not coincide with the chargeability anomalies. CGG interpreted a total of 16 anomalies however these all esentially fall into two zones: an easterly one, the central part of which overlies known mineralisation, and a western zone which occurs to the south(west) of the 'main' zone and which may be an offset (faulted) extension of it (see Figure 9). The lack of coincident resistivity lows suggests that there is no massive mineralisation near the surface (unless it is sphalerite-rich).

(The report by Omnes (1971) also deals with an area termed 'anomaly 1'; this unimaginatively named prospect is on the western slopes of Mt Dundas, outside of the Joint Venture area.)

McIntyre drilled four holes on the Mariposa grid (Bates, 1972): two holes into each of the two zones. (Superposition of the holes onto the chargeability maps suggests that, given a westerly dip, the east-facing holes have adequately tested the anomaly at each position, with the possible exception of DDH 4. Holes 3 and 4 tested the mineralisation along the Gordon Limestone/Crotty Quartzite contact: the anomalies were explained by "patchy pyrite mineralisation , very minor galena mineralisation, thin bands of graphitic shale in the quartzite, and probable graphitic material in the limestone" (DDH4 ended in limestone and may not, from the drill hole section, have reached the source of the IP anomaly; although it appears to have adequately tested a gravity high and it intersected mineralisation between 106 and 127ft.)

Holes 1 and 2 tested the south western zone which was "found to be due to graphitic shale with minor pyrite near the base of the amber shale" (Bates, 1972). Following these disappointing results, McIntyre dropped the lease.

Mariposa was included in Tenneco's HEM survey (described above) and in Texin's Turair survey (described below): no anomalies were recorded by either survey.

BLACK JACK'S

Black Jack's is a grid over limestone, north and along strike of the Mariposa grid. The grid was part of Tenneco's E.L. 44/70, when McIntyre Mines were exploring the Mariposa area.

Tenneco defined their target as being a "large replacement deposit" within the limestones and they flew a helicopter-borne EM system (the HEM-701 survey, previously discussed) over most of the known limestone occurrences in their E.L.: only weak anomalies were recorded from the survey (see Figure 7). At Black Jack's, only the southern portion was covered, where three conductive zones were defined: these were "very weak and poorly defined and as a result no quantitative analysis has been made"

(Gedde, 1972). Follow up surveys of Turam and SP were made over one of these zones (the easternmost zone). Howland-Rose (1972) interpreted four conductive zones from the Turam results which he (correctly) describes as "a series of north to north-north-west trending, shallow, weak conductors". They appear to be located on the eastern edge of a weakly conductive slab (eg, swamp) or rock type.

The SP surveys recorded several negative responses of 100 to 200mv, the larger 'anomalies' mostly occurred at the grid boundaries, ie they did not correlate with the EM indications and may be reflecting topographic changes.

One test line of gravity was run over an EM anomaly (Shirley, 1972); the reduced gravity profile tends to mirror image the topographic profile which suggests that the wrong density value has been used for the corrections. The data should be reprocessed to properly evaluate the method (since it is highly unlikely that the raw data is available, resurveying is recommmended). Figure 10 shows the SP contours and the Turam responses at Black Jack's.

The other HEM-701 zones, over (alluvial covered) Amber Slate and Florence Quarztite, immediately to the west of the old Black Jack's prospect, do not appear to have been followed up.

BANNOCKBURN

Rio Tinto Australian Exploration conducted some gravity , EM and magnetics in the Bannockburn area (the coverage is shown in Figure 11). The work was presented in a short (1 page) report by Boniwell (1959), titled "..surveys in the Mariposa Area,..". The magnetic profiles are missing from the copy held by Amoco. The data is not easily interpreted in the form presented (small scale profiles), however it does not appear to have been a very well implemented survey. The dip angle EM method used was probably not a very sensitive technique for detecting buried conductors beneath a conductive (ie, swampy) surface and the traverses were too short to obtain useful gravity data. Boniwell noted one small magnetic anomaly which correlated with an EM response.

While this survey would doubtless have detected any large, near surface deposit, Boniwell's conclusions that any futher work should depend on favourable results from a geochemical survey cannot be supported, especially so given the likely nature of the 'cover' referred to by Boniwell. (In the same year, a government geologist recommended drilling this area (Hughes, 1959).)

The 1971 HEM-701 survey for Tenneco covered the Bannockburn area, but no reponses were recorded over the grid which covers the areas of both known and suspected limestone (see Figure 7). A well defined zone recorded to the south west of the grid over Amber Slate, has apparently not been followed up.

PROFESSOR RANGE/AMBER CREEK/LAUREL/KING BILLY

The (inferred) limestones at the southern edge of the joint venture area (and which extend into E.L. 4/78) have been broadly covered by the following Amoco/CSR grids: Professor Range, Amber Creek, Laurel and King Billy. This area was investigated for Texins Development by Geophoto Resources under the name of the Amber Creek Prospect within E.L. 7/68. Johnston (1974) noted a"two fold exploration approach"; the first of which was a VLF survey over the grid. The results are shown in Figure 12, but since the VLF technique does not produce meaningful results in areas with clayey overburden, the anomalies are not considered significant. Shallow augering over these anomalies revealed no interesting geochemical anomalies. Magnetics was also carried out on some lines of the Amber Creek Prospect (600 to 800 ft apart) but the results, which I have not sighted, apparently showed "no significant anomalies".

Geophoto's second exploration approach, deep augering, followed a Turair survey flown in 1973. The coverage and anomalies from this survey are shown in Figure 13: apart from one response near the Zeehen Highway, all the other responses (within the lease) were concentrated in the southern portion of the joint venture area. Two anomalies, 21 and 26, were considered significant (since they were in the right area). Although the depth estimates for these anomalies of 125 and 115m respectively (Howland-Rose, 1973) "excluded the possibility of conductive moraine response", there was no encouragement from the deep auger sampling (to 15m): nor were there any corresponding anomalies from the earlier VLF survey. Most of the Turair anomalies lie outside of Amoco's (and Texin's) grids. And most are in areas of flat magnetics (magnetics were recorded with the EM responses in the Turair survey), however the southernmost anomaly, no. 15 is located over a well defined, 60 gamma, north-south striking anomaly.

The results from the augering program lead Geophoto to conclude that the geochemical anomalies were due to sulphide grains within the overburden and it was recommended that Texins Development should drop the lease (Johnston, 1974).

CONCLUSIONS AND RECOMMENDATIONS

(It is appreciated that subsequent work, carried out for 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.

On the Mariposa grid, both chargeability (from a gradient array IP survey) and gravity responded to mineralisation. The best responses were over the old workings and these have been (?) adequately explored by North Broken Hill drill holes. An extension of the gravity survey to the south and north to cover the chargeability zones is recommended.

At Black Jack's, Tenneco used the same approach as they had on the (what is now Amoco's) Gordon River area: Turam and SP, with one test line of gravity to follow up (some) anomalies from the HEM-701 survey. And the same results were obtained: Turam anomalies apparently caused by superficial conductors, no diagnostic responses from the SP and no gravity anomaly. Gravity cannot be properly assessed by reading only one line and the results from Black Jack's may not have been correctly processed since the profile mirrored the topography.

Those anomalies not followed up, lie to the west of the old Black Jack's prospect, over (partially covered) Siluro-Devonian sediments which may contain calcareous units and which may therefore be prospective: the anomalies are, however, weak.

The Bannockburn area was not effectively investigated by Rio Tinto: the short lines precluded any thorough appreciation of the gravity method and the dip-angle EM technique would not be effective in areas with conductive overburden such as probably occur at Bannockburn. Magnetics would be unlikely to be a 'first-pass' discriminator of mineralisation.

A conductive zone detected by the HEM-701 survey off the south-west corner of Amoco's Bannockburn grid has not been followed up.

Although weak, the anomalies overlie apparently 'uncovered' upper Silurian sediments, thus the zone may be worth pursuing if the rock types are considered prospective.

Much of the joint venture area was covered by Texins' (through Geophoto) Turair survey, although Black Jack's and the western two thirds of Bannockburn were not covered. There has been no ground follow up of any of the anomalies from this survey. Some fall within the area covered by Geophoto's VLF survey (superimpose Fig. 13 on Fig. 12), where there was no obvious correspondence, but most of the anomalies lie outside of Geophoto's and Amoco's grids. Thus presumably, the anomalies are not over the most prospective locations; however it has been noted that calcareous units occur in the adjacent formations and, since most of these units are not covered by button grass swamps (which are generally confined to the limestone), any EM responses are more likely to be due to bedrock conductors. Although all of the anomalies recorded in the survey were weak, it has been my experience that Turair may record such responses over quite good conductors. Further, it is possible that those EM anomalies (both flown and ground) defining superficial conductors may be significant if they locate the (weathered) surface expression of calcareous units.

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. Similarly IP can be a useful method: at Mariposa, the chargeability results outlined the known mineralisation and did not indicate a noisy background (unlike the core tests recorded in Collins,1980). The SP and VLF methods which account for a large proportion of the data, are not applicable in areas of conductive cover, even if this cover is only a 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 and Mariposa deposits 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, however 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.

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SUMMARY OF GEOPHYSICAL SURVEYS ON E.L. 4/78 AND THE AMOCO/CSR JOINT VENTURE AREA 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
(3) JOINT VENTURE AREA.				
MARIPOSA, 1950.	BMR	Gravity	NBH	Anomaly (?)coincident with mineralisation
	"	Magnetics	"	Inconclusive, effected by iron debris
1971.	CGG	IP	MacIntyre	Chargeability anomaly over mineralisation
"	"	SP	"	Not diagnostic

MARIPOSA,	1971.	Scintrex; HEM-701	MacIntyre	No anomalies
	1973.	" Turair	Texins	No anomalies
BLACK JACK'S,	1971.	Scintrex; HEM-701	Tenneco	Several weak anomalies
	1972.	" Turam	"	Several shallow, weak conductors
	"	Tenneco; SP	"	Anomalies may be due to topography
	"	Shirley; Gravity	"	Inconclusive
BANNOCKBURN,	1959.	Rio Tinto; Gravity	Rio Tinto	Inconclusive
	"	" Magnetics	"	? not sighted
	"	" EM	"	Inconclusive
	1971.	Scintrex; HEM-701	Tenneco	Some (weak) anomalies adjacent to grid
PROFESSOR RANGE/ AMBER CREEK/LAUREL/ KING BILLY.	1972.	Geophoto; VLF	Texins	Several weak anomalies, probably superficial
	1973.	Scintrex; Turair	"	Several weak anomalies

APPENDIX II

AMOCO MINERALS - PROGRESS REPORT
JANUARY TO JUNE 1983, JOINT VENTURE AREA
PART E.L. 15/76, DUNDAS

See accompanying report

KARY, G.L. and JONES, P.A. (1983). Progress Report January to June, 1983. Amoco-CSR Joint Venture Part E.L. 15/76, Dundas, Tasmania. Amoco Minerals Report (unpubl). 83-1998

APPENDIX III

ELECTROLYTIC ZINC CO. A'ASIA LTD.
MONTEZUMA JOINT VENTURE
PART E.L. 15/76 - PROGRESS REPORT
21/11/82 TO 3/5/83

See the accompanying report

SAINTY, R.A. (1983). Part E.L. 15/76
Progress Report on Activity
21st November 1982 to 3rd May 1983
E.Z. Co. A'Asia Ltd. Report No. 166 (unpubl.)

350000E
360000E
145°20'E
370000E
41°50'S
5360000N
5350000N
42°00'S
Queenstown

Benison Bell
Lead Blocks
Serpentine Hill
Douglas Cuni
McKimmie
Grand Prize
Montana SL
Big Ben
Crown
Zeehan Western Junction
Montana
Oonah
Despatch
Doric
Zeehan
Stormsdown
New Vt. Zeehan
Argent
Florence
Sylvester
Nike
Kyneton
Silver Stream
Comstock
Boss
Susanite
Britannia
Sth Comstock
Central Balstrup
Silver King
Spray
Nth Colonel
Stonehenge
Globe
Cumberland Lake
Nth Tasmanian
Tasmanian
Grubbs
Nubeena
Sth Nubeena
Swansea
Silver Duke
Remine
Little River
Henty
Henty River
SOUTHERN OCEAN

EL 15/76
CSR

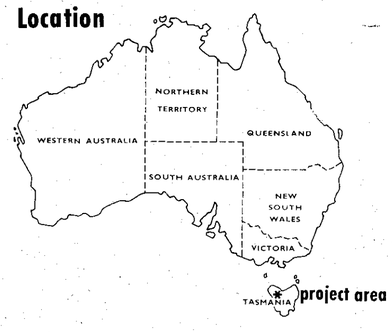
Sassafrass
Black Jacks
Mariposa
Bannockburn
Leatherwood
Pyramid
Oceana
North Austral
Nubeena
Austral Electrolytic Zinc
J.N.R Enraght-Moony
32M/75
38M/77
39M/77
7.60M/77
4M/77

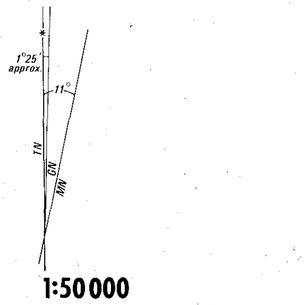
Amoco/CSR Joint Venture Area (EL 15/76)

EL 4/78

Professor Range
Laurel
Amber Creek
King Billy
Myrtle
Grieves
Grieve Siding
Baura
Rose Valley
Malcolm Bendall Mining Syndicate
11M/66
12M/66
Queensberry Mine

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

REF: MITRE GEOPHYSICS
REPORT Nº AM/MG83/02

54705S

5 cm

Amoco Minerals Australia Company

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		

1519 Figure 1

350000E
360000E
145°20'E
370000E
41°50'S
5360000N
5350000N
42°00'S
Queenstown

PROSPECT 'A'
PROSPECT 'B'
PROSPECT 'C'
PROSPECT 'D'

EL 15/76
CSR

EL 4/78

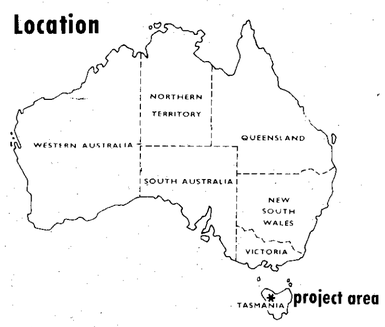
Amoco/CSR
Joint Venture Area (EL 15/76)

Sassafrass
Black Jacks
Mariposa
Bannockburn
Leatherwood
Laurel
King Billy
Amber Creek
Professor Range
Grieves
Myrtle
Baura
Pyramid
Oceana
Nubeena
North Austral
Austral
Electrolytic Zinc
J.N.R Enraght-Moony
Rose Valley
Malcolm Bendall Mining Syndicate
11M/68
12M/66
Queensberry Mine
32M/75
38M/77
39M/77
60M/77
4M/77

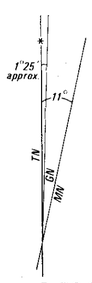
Zeehan
Zeehan Western
Montana
Montana St.
Grand Prize
Lead Blocks
Serpentine Hill
McKinnon
Sylvester
Argent
Nike
Silver Stream
Comstock
Boss
Susanite
Nth Comstock
Spray
Nth Austral
Nth Tasmania
Tasmania
Nubeena
Nth Nubeena
Grubbs
Swansea
Silver Duke
Stormsdown
Cumberland Lake
Globe
Remine
Sunny
Boomerang
Grove Siding

Little Henty River
Henty River
SOUTHERN OCEAN

Location



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



1:50000

0 1 2 3
Kilometers

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

REF: MITRE GEOPHYSICS
REPORT Nº AM/MG83/02

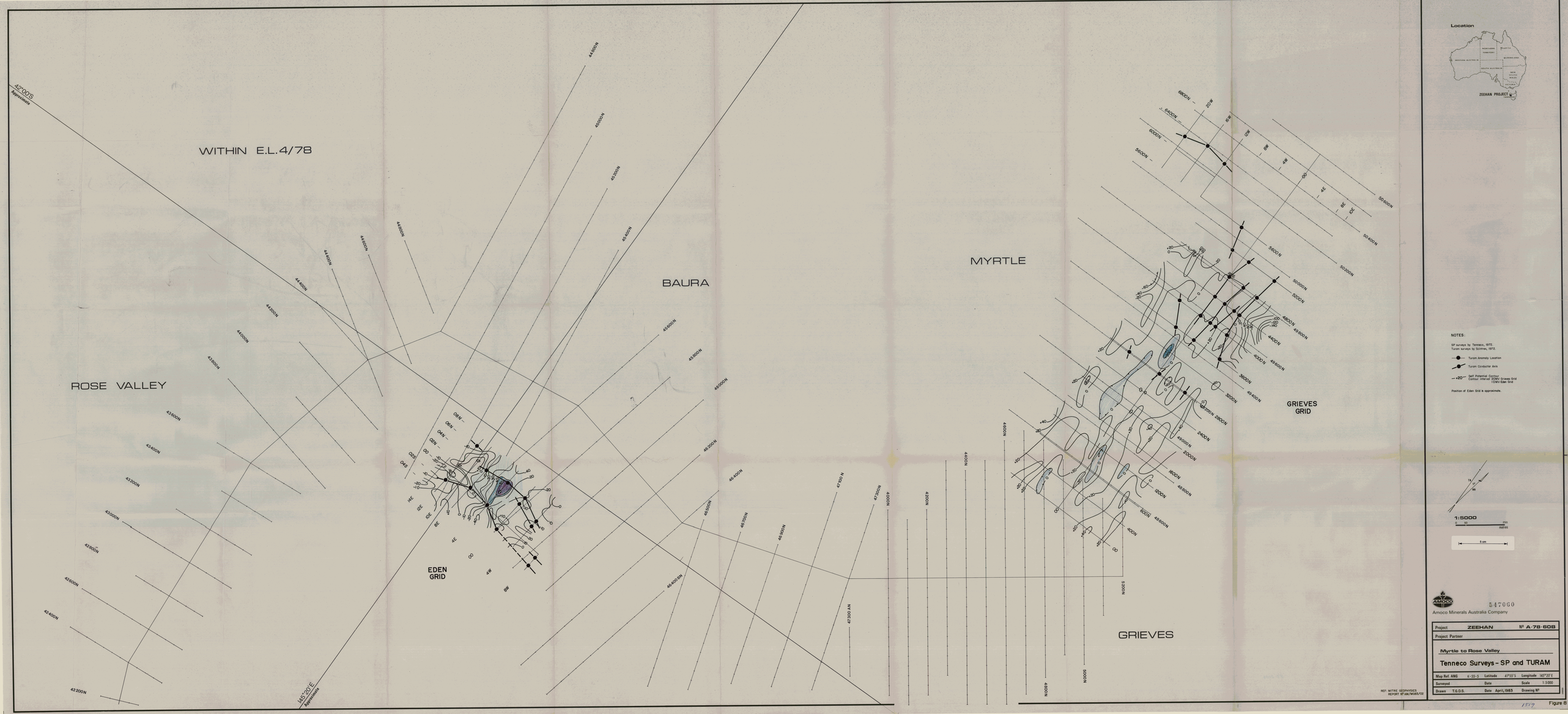
547059

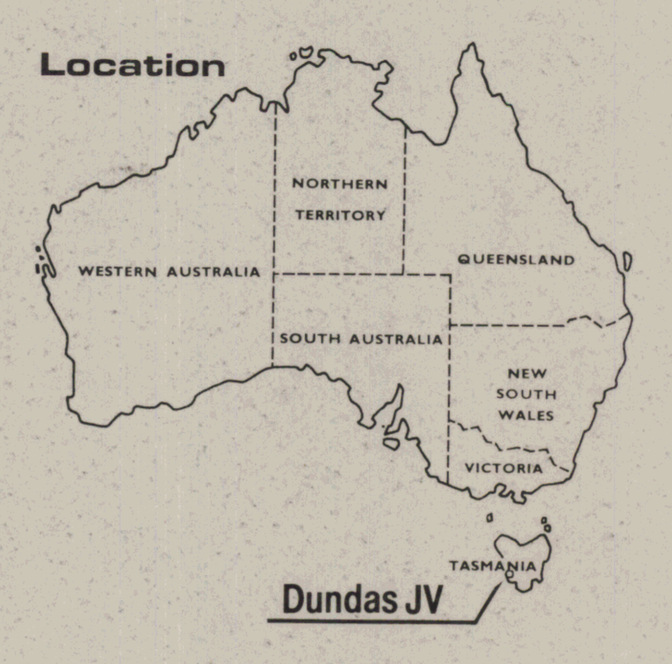
5 cm

Amoco Minerals Australia Company

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	M80-1476

1519 Figure 7


WITHIN E.L.4/78
ROSE VALLEY
BAURA
MYRTLE
GRIEVES
EDEN GRID
GRIEVES GRID
42°00'S Approximate
145°20'E Approximate
Location
ZEEHAN PROJECT
NOTES:
SP surveys by Tenneco, 1972.
Turam surveys by Scintrex, 1972.
Turam Anomaly Location
Turam Conductor Axis
Self Potential Contour Contour Interval 20MV Graves Grid 10MV Eden Grid
Position of Eden Grid is approximate.
1:5000
Amoco Minerals Australia Company
547060
Project ZEEHAN Nº A-78-608
Project Partner
Myrtle to Rose Valley
Tenneco Surveys - SP and TURAM
Map Ref. ANG c-55-5 Latitude 41°55'S Longitude 145°20'E
Surveyed Date Scale 1:5000
Drawn T.G.D.S. Date April, 1983 Drawing Nº
REF: MITRE GEOPHYSICS REPORT MTAM/MGRS/02
1517
Figure 8



TN 11° MN

1:2500

0 100 200 meters

Basemap compiled from field mapping and airphoto enlargement
Discrepancies exist

Notes

—+1— Gravity contours, interval 0·1mg.
—20— Chargeability contours.
·········· Magnetic Coverage

Gravity and magnetic surveys by BMR (Loh, record 1950/34).

IP survey by CGG for McIntyre Mines (Omnes, 1971).

REF: MITRE GEOPHYSICS REPORT Nº AM/MG83/02

547061

5 cm

Amoco Minerals Australia Company

Project	GORDON RIVER	Nº A·80·82	
Project Partner		CSR	
Dundas JV		Mariposa	
Gravity Contours, Chargeability Contours and Magnetic Coverage			
Map Ref. ANG K-55-5	Latitude 39° 55' S	Longitude 145° 25' E	
Surveyed	Date	Scale 1:2500	
Drawn T.G.D.S.	Date April 1983	Drawing Nº	

1520

Figure 9

EL 15/76
Amoco/CSR Joint Venture

Limit of Amoco/CSR Joint Venture Area

MURCHISON HIGHWAY

ZEEHAN HIGHWAY

DUNDAS RIVULET

Dump
Adit
Cut
Track
Watercourse
Quarry
Misery Hill
Dozer track
Trench
Drainage channel
Ties to Montpelia

67600 E
67500 E
67400 E
67300 E
67200 E
67100 E
67000 E
66900 E
66800 E
62800 N
62600 N
62400 N
62200 N
62000 N
61800 N
61600 N
61400 N
61200 N
61000 N
60800 N
60600 N
60400 N
60200 N
60000 N
5362000 N
5361000 N
5360000 mN AMG
39°53'S
39°54'S
145°23'E
145°24'E
366000 E
367000 E
35500 N

Location

Dundas JV

TN 11° MN

1:2500

0 100 200 meters

Basemap compiled from field mapping and airphoto enlargement
Discrepancies exist

Notes :

Turam survey by Scintrex (1972) for Tenneco (report Tas-003)
SP survey by Tenneco, 1972.
Gravity survey by Shirley, 1972.

+20 S.P. Contours
Gravity Coverage
Turam Coverage
Turam Conductor with axis.

547062

5 cm

Amoco Minerals Australia Company

Project	GORDON RIVER			Nº	A-80-82
Project Partner					CSR
Dundas JV					Black Jacks
SELF POTENTIAL CONTOURS AND OTHER INDICATIONS					
Map Ref. ANG	K-55-5	Latitude	39° 55' S	Longitude	145° 25' E
Surveyed		Date		Scale	1: 2500
Drawn	T.G.D.S.	Date	April, '83	Drawing Nº	

REF: MITRE GEOPHYSICS REPORT AM/MG83/02

1520

Figure 10

within EL 15/76
Amoco/CSR Joint Venture

65300 E 65400 E 65500 E 65600 E 65700 E 65800 E 65900 E 66000 E 66100 E 66200 E 66300 E 66400 E 66500 E 66600 E 66700 E

Ties to Mariposa
58600 N
58400 N
58200 N
58000 N
57800 N
57600 N
57400 N
57200 N
57000 N
56800 N
56600 N

39°55'S

5358000 N

5357000 mN AMG

145°23'E

368000 E

357000 E

Watercourse

Mariposa Creek

to Tashan

Track

RIVULET

DUNDAS

abandoned railway

Adit
Shaft

20N
20 N
0

16N
16 N

12N.
12 N

8N.
8 N

4N.
4 N

00
00

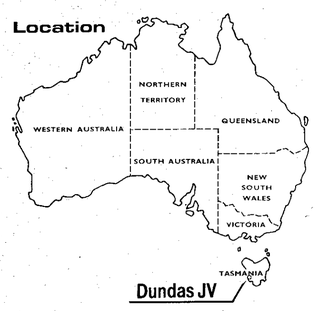
4S.
4 S

8S.
8 S
0

Watercourse

181° T

Location



Dundas JV

TN 11° MN

1:2500

0 100 200 meters

Basemap compiled from field mapping and airphoto enlargement
Discrepancies exist

Notes:

Surveys by Rio Tinto: see Bonlwell (1959).

——— Gravity Profiles
• • • • • Magnetic Coverage
—·—·— Electromagnetic Coverage

547063

5 cm

Amoco Minerals Australia Company

Project	GORDON RIVER		Nº A-80-82
Project Partner			CSR
Dundas JV			Bannockburn
GRAVITY PROFILES AND OTHER COVERAGE			
Map Ref. ANG	K-55-5	Latitude	39° 55' S Longitude 145° 25' E
Surveyed		Date	Scale 1:2500
Drawn T.G.D.S.		Date March 1983	Drawing Nº

REF: MITRE GEOPHYSICS REPORT Nº MG83/02

/5220 Figure 11

Amoco/CSR
Joint Venture Area (E.L.15/76)

370 000mE.

62 N.
58 N.
54 N.
50 N.
46 N.
42 N.
38 N.
34 N.
30 N.
26N.
22 N.
20N.
18 N.
14N.
10N.
8N.
6N.
4N.
00
2S.
4S.
6S.
8S.
10S.
14S.
14.5S.
19 S.
22 S.
23S.
27S.

20N.
16N.
12N.
8N.
4N.
2N.
00
2S.

Laurel

Amber Creek

King Billy

To Zeehan

ZEEHAN HIGHWAY

To Queenstown

547064

5 cm

Amoco Minerals Australia Company

NOTES:

Anomaly >20° Dip Angle

VLF survey by Geophoto in 1972 for Texins Development.

5 350 000mN.

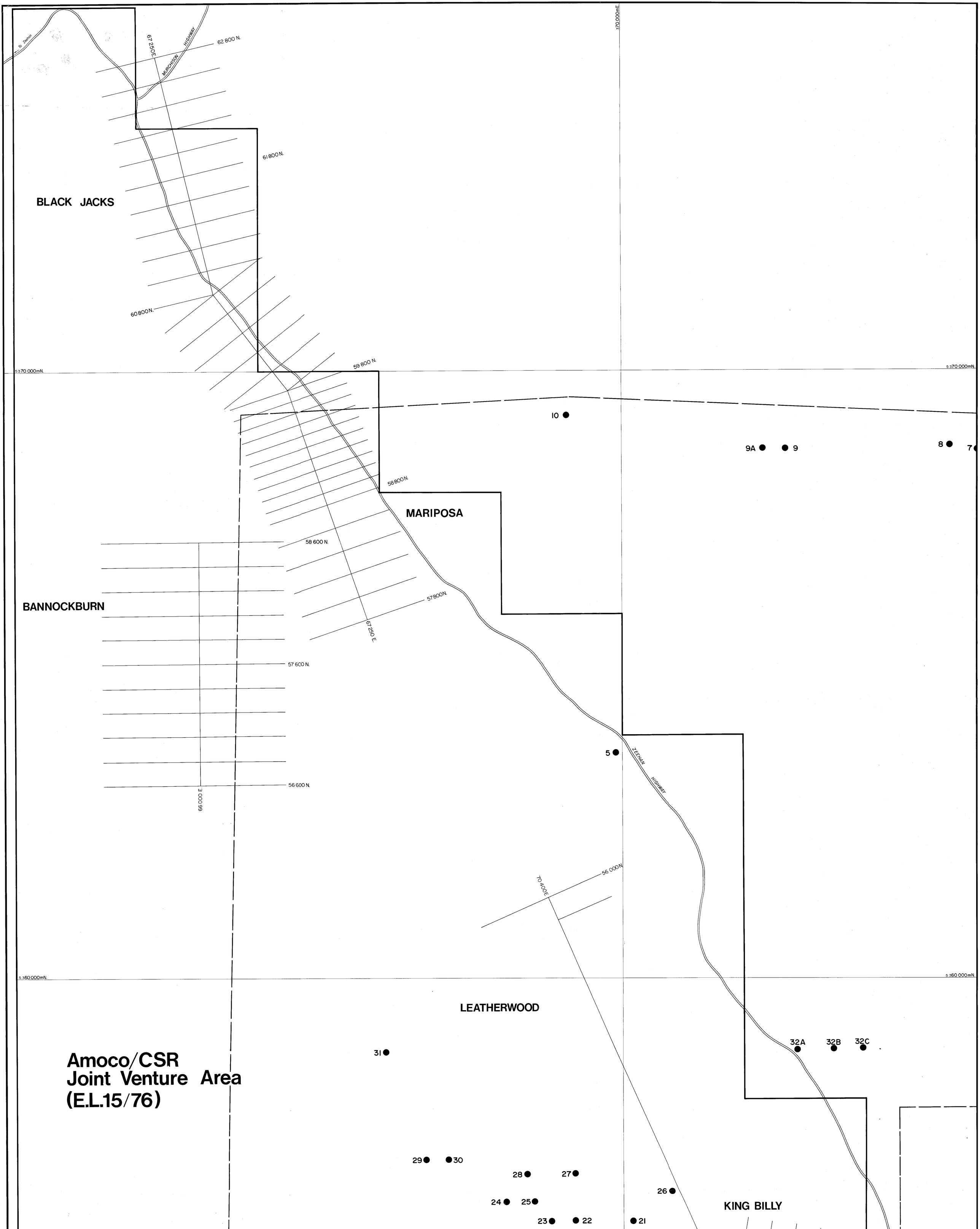
370 000mE.

REF: MITRE GEOPHYSICS REPORT Nº AM/MG83/02

Project	**ZEEHAN**	
Project Partner		
Amber Creek Area **GEOPHOTO VLF SURVEY**		
Map Ref.	Latitude	Longitude
Surveyed	Date	Scale 1:10,000
Drawn T.G.D.S.	Date April 1983	

15221

Figure 12



E 1521 Figure 13