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EL 2159

CRYSTAL BROOK (PART OF G2 LINEAMENT PROJECT)

ANNUAL AND FINAL REPORTS FOR THE PERIOD 29/3/96 TO 28/3/2000

Submitted by

Hazurn Pty Ltd and Crest Resources Australia NL 1998

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> Telephone: (08) 8463 3000 Facsimile: (08) 8204 1880



CREST RESOURCES AUSTRALIA NL

ACN 061 375 442

1050 Hay Street WEST PERTH WESTERN AUSTRALIA 6005 TEL 09 481 4101 FAX 09 481 4272

1997 ANNUAL REPORT **EXPLORATION LICENSE 2159 G2 PROJECT** SOUTH AUSTRALIA

TO

MINES AND ENERGY

SOUTH AUSTRALIA

191 Greenhill Road PARKSIDE SA 5063

PREPARED BY

James Searle PhD, MAusIMM CREST RESOURCES AUSTRALIA NL 20/3/1997



SUMMARY AND CONCLUSIONS

Crest Resources Australia NL has entered into a Joint Venture agreement with Hazurn Pty Ltd to explore the G2 Project exploration licences on the eastern margin of the Gawler Craton in South Australia. The project area consists of exploration licences (EL 2159, EL 2160).

The tenements are prospective for Moonta and Olympic Dam type gold-copper mineralisation, diamond bearing kimberlites and diamond placer deposits. The G2 Project area is situated at the junction of the major G2 structural corridor extending NW/SE across the Gawler Craton, the EW trending Polda Trough and the Torrens Hinge Zone margin of the Craton (Figure 1). The G2 structure has been interpreted as a major ore forming crustal structure, localising the world class Olympic Dam gold-copper-uranium mine. Previous exploration drilling in project area between 1978 and 1991 encountered galena and copper mineralisation, and anomalous concentrations of base metals, uranium rare earth elements (REE) and gold. Haematitic breccias, acid volcanics, and zones of alteration have been previously intersected in stratigraphic drilling of the Gawler Craton sequences in the G2 Joint Venture area.

Crest's experience in diamond exploration in the paleo Ord River and Cambridge Gulf systems and onshore of the Kimberley Region of Western Australia leads us to rate the diamond pipe and placer deposit potential of the G2 project area very highly. The G2 structural corridor contains numerous diamond occurrences and kimberlitic indicator fields. Aeromagnetic target features consistent with kimberlitic pipes have been identified within the project area.

Crest also considers the setting to be an analogue to the Namaqualand diamond province in Southern Africa where the Orange River flows west through the diamond province depositing high quality diamond placers in riverine and marine terraces. The paleochannel of the Murray River, prior to the uplift of the Flinders Ranges, is interpreted to have discharged into Spencer Gulf in the G2 Joint Venture area after traversing the kimberlite and diamond field to the north and east. Marine and riverine paleochannel and paleoterrace gravel deposits occur extensively within the G2 project area, and represent excellent targets for diamonds transported from their primary sources by the ancestral course of the Murray River.

The terms of the G2 Joint Venture are summarised as follows :

- 1) Crest can earn a 50% equity in the G2 Project by spending \$1Million within 4 years,
- Crest can earn another 20% equity by spending a further \$3Million within the next 4 years,
- 3) Crest is the Project Manager,
- 4) No consideration is payable to Hazurn.

Exploration in the first year of the tenement's grant from March 1996 was commenced by Hazurn Pty Ltd with an aeromagnetic survey. Due to processing and interpretation delays the initial interpretation results were not available until August 1996. Hazurn also experienced delays in completing a fund raising for exploration. While funds were secured for Hazurn's extensive nickel interests in Western Australia, it was not possible at that time to raise funds for the copper –gold G2 in South Australia. Commercial negotiations with Crest took until February 1997 to complete.

Following completion of legal documentation Crest was able to commence exploration in March 1997. Previous exploration by Hazurn Pty Ltd has consisted of an aeromagnetic survey flown in conjunction with Mines and Energy South Australian. Crest has begun a major compilation of existing exploration data and is currently interpreting this information in the context of the new aeromagnetic data. Exploration priorities have been established for initial fieldwork consisting of soil geochemical orientation surveys. These are scheduled for commencement in April. If the geochemical techniques prove applicable further surveys will be carried out to provide drilling target definition. If geochemical surveys will be undertaken to refine drilling targets.

Exploration licence 2159 has to be reduced by 30% and application made for renewal. A the area to be relinquished has been nominated and application has been made for a 12 month renewal of the licence. A 12 month renewal is critical for the management of the exploration, in that Crest as exploration manager has only taken over exploration in March 1997. Almost all of the tenement consists of farming land. Negotiation of access and timing of exploration activities to minimise interference is taking time. It will take the better part of the next 6 months to establish the most appropriate method of refining drill hole targets. The depth of Quaternary cover sequences, often in excess of 100m and expense of drilling in this project area dictates that drill hole target definition has to be of a very high order. This cannot be achieved rapidly.

TABLE OF CONTENTS

INTRODUCTION

GEOLOGICAL SETTING

PREVIOUS EXPLORATION

EXPLORATION IN THE FIRST 12 MONTHS

PROPOSED EXPLORATION

EXPENDITURE REPORT

TENEMENT AREA REDUCTION APPLICATION FOR RENEWAL OF TERM

<u>APPENDIX 1 – GEOPHYSICAL SURVEY AND PREVIOUS</u> <u>EXPLORATION SUMMARY</u>



INTRODUCTION

Crest resources Australia NL is exploring exploration licence E2159 in South Australia in Joint Venture with Hazurn Pty Ltd. The tenement is part of the G2 Project (Figure 1) which the Joint Venture is exploring for Olympic Dam style copper-gold-uranium mineralisation, diamond bearing kimberlites and placer diamond deposits. The Joint Venture agreement was concluded in late February 1997 and exploration was commenced on behalf of the Joint Venture in March 1997. In addition this report contains exploration data collected by Hazurn Pty Ltd prior to the commencement of the Joint Venture.

GEOLOGICAL SETTING

The G2 Project area is located at on the eastern side of Spencer Gulf in South Australia (Figure 1). The project name "G2" refers to the regional lineament visible in satellite imagery, gravity data and in regional magnetic maps. G2 is thought to be one of the controlling factors of the world class Olympic Dam copper-gold-uranium deposit located 350 kilometres to the NNW of the project area (Figure 2). The G2 project tenements staddle the subregional to regional tectono-stratigraphic subdivisions of the Spencer Shelf and the Torrens Hinge Zone.

Through much of the G2 project area, Cainozoic sequences up to 200m thick blanket the prospective Precambrian basement.

PREVIOUS EXPLORATION

Previous exploration on the exploration licence was carried out in the late 1970's and early 1980's, in the rush of activity that followed the initial discovery of Olympic Dam. A series of stratigraphic holes were drilled in the northern portion of the 2159 tenement on an area of coincident elevated magnetics and gravity. The highs cover and area of 20 by 10 kilometres, and only about a dozen holes were drilled. Beneath varying thicknesses of Cainozoic cover Proterozoic sediments probably of the Burra Group were intersected. Anomalous levels of gold and base metal mineralisation were intersected.



EXPLORATION IN THE FIRST 12 MONTHS

Exploration in the first year of the tenement's grant from March 1996 was commenced by Hazurn Pty Ltd with an aeromagnetic survey. Due to processing and interpretation delays the initial interpretation results were not available until August 1996. Hazurn also experienced delays in completing a fund raising for exploration. While funds were secured for Hazurn's extensive nickel interests in Western Australia, it was not possible at that time to raise funds for the copper –gold G2 in South Australia. Commercial negotiations with Crest took until February 1997 to complete.

Following completion of legal documentation Crest was able to commence exploration in March 1997. Previous exploration by Hazurn Pty Ltd has consisted of an aeromagnetic survey flown in conjunction with Mines and Energy South Australian. Copies of the geophysical data and interpretation reports are included in Appendix 1. As the survey7 was carried out in partnership with the Energy and Minerals South Australia digital data from the survey is also held by the Department.

Crest has begun a major compilation of existing exploration data and is currently interpreting this information in the context of the new aeromagnetic data. Exploration priorities have been established for initial fieldwork consisting of soil geochemical orientation surveys. These will commence in April. Crest has also begun fieldwork in the northern portion of E 2159 identifying regolith conditions and preparing for land access negotiations with farmers.

PROPOSED EXPLORATION

The exploration conditions on E2159 present considerable difficulties. In the first instance the tenement is largely covered by broad acre cereal farms. The local farming community has had little exposure to exploration company activities in recent years. Land access will have to be negotiated carefully and in full consideration of local attitudes and perceptions. Seasonal cropping conditions will have to be taken into account when planning geochemical, geophysical and drilling investigations.

Thick sequences of Cainozoic sediments and in some parts Cambrian limestones overly the prospective Precambrian sequences. Definition of drilling targets has to be precise as the cost of reaching the target zones will be high. Precise target definition will require a variety of geophysical techniques and possibly geochemical techniques. This cannot be achieved rapidly particularly with regard to the land access conditions mentioned above.

Once drill hole targets have been selected the initial phase of drilling will involve specialised high air RC and diamond core drilling to overcome difficult drilling conditions anticipated in the thick Cainozoic cover sequences.

EXPENDITURE REPORT

The tenement holder Hazurn Pty Ltd has been unable to meet the total expenditure requirement for exploration licence E2159 for a number of reasons beyond its control. Exploration in the first year of the tenement's grant from March 1996 was commenced by Hazurn Pty Ltd with an aeromagnetic survey. Due to processing and interpretation delays the initial interpretation results were not available until August 1996. Hazurn also experienced delays in completing a fund raising for exploration. While funds were secured for Hazurn's extensive nickel interests in Western Australia, it was not possible at that time to raise funds for the copper –gold G2 in South Australia. Commercial negotiations with Crest took until February 1997 to complete. Table 1 details the expenditure made by Hazurn Pty Ltd and subsequently Crest Resources Australia NL on exploration licence E 2159, up until the end of March 1997.

TENEMENT AREA REDUCTION AND APPLICATION FOR RENEWAL OF TERM

Based on the Hazurn aeromagnetic data and Crest's collation of previous exploration data a 35% of the E 2159 licence area has been prosed for relinquishment (Figure 1). The area relinquished is consider less prospective for the metalliferous and diamond targets that Crest is seeking. A 12 month renewal of the tenement has been requested as this would provide the necessary time to achieve a meaningful advancement of the project given the exploration conditions discussed above.

Table 1 SUMMARY REPORT ON MINERAL LEXPLORATION

Exploration licence no. 2159

For the 12 months ending 28th March 1997

Exploration manager Crest Resources Australia NL

Prepared by Dr James Searle, Exploration Manager

Date 21/3/97

Summary of operations

TOTA	AL \$6693	0
Overheads @15%	\$8730	
Open file searching (Consultant geologist)	\$3200	
Magnetic interpretation	\$7000	
Aeromagnetic survey	\$4000	0
Travel and accommodation in SA	\$1200	
Field work land access and regolith recon. 4 days @\$500/day	\$2000	
Open file research and data compilation 8 days @ \$ 600/day	\$4800	

EXPENDITURE FOR THE 12 MONTH PERIOD

ELLIOTT GEOPHYSICS PTY. LTD.



A.C.N. 050 294 427

17 Grandview Avenue, Urrbrae 5064 South Australia Telephone: (08) 379 3305 International: +61-8-379 3305 Facsimile: +61-8-379 5177

HAZURN PROJECT

PRELIMINARY AEROMAGNETIC INTERPRETATION

March 1996

Prepared for HAZURN PTY. LTD.

by

P. Elliott B.Sc(Hons), M.Sc.. M. Z. Steele B.Sc.

CONTENTS

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SUMMARY

1.0	INTRODUCTION	1
2.0	SURVEY DETAILS	3
3.0	INTERPRETATION AND MODELLING	4
4.0	CONCLUSION AND RECOMMENDATIONS	7
5.0	REFERENCES	8

Appendix 1: Previous Exploration, Hazurn Project Area. By D. Tonkin

LIST OF FIGURES

Figure No.	Subject	Scale
1	Tectonic Map, Hazurn Project Area.	A4
2	Diamond Occurrences, Sources, Indicators, and Tectonic Setting.	A4
3	Prospective Target Area, P1, P3, P4.	A4
4	Prospective Target Area, P2, P5, P6.	A4
5	Magnetic Model, P1.	A4
6	Magnetic Model, P2.	A4
7	Magnetic Model, P3.	A4
8	Magnetic Model, P4.	A4
9	Magnetic Model, P6.	A4

أفوا الجريجة والاردان

LIST OF TABLES

Table No.

1	Survey Details
2	Location of Anomalies

LIST OF PLATES

Plate	No. Subject	Scale
1	Flight Path Plot, Blyth	1:100000
2	Flight Path Plot, Caroona	1:100000
3	Flight Path Plot, Clare	1:100000

4	Flight Path Plot, Florieton	1:100000
5	Flight Path Plot, Jamestown	1:100000
б	Flight Path Plot, Pirie	1:100000
7	Flight Path Plot, Wallaroo	1:100000
8	Flight Path Plot, Whyalla	1:100000
9	Total Magnetic Intensity Contours, Blyth	1:100000
10	Total Magnetic Intensity Contours, Caroona	1:100000
11	Total Magnetic Intensity Contours, Clare	1:100000
12	Total Magnetic Intensity Contours, Florieton	1:100000
13	Total Magnetic Intensity Contours, Jamestown	1:100000
14	Total Magnetic Intensity Contours, Pirie	1:100000
15	Total Magnetic Intensity Contours, Wallaroo	1:100000
16	Total Magnetic Intensity Contours, Whyalla	1:100000
17	Preliminary Aeromagnetic Interpretation, Blyth	1:100000
18	Preliminary Aeromagnetic Interpretation, Caroona	1:100000
19	Preliminary Aeromagnetic Interpretation, Clare	1:100000
20	Preliminary Aeromagnetic Interpretation, Florieton	1:100000
21	Preliminary Aeromagnetic Interpretation, Jamestown	1:100000
22	Preliminary Aeromagnetic Interpretation, Pirie	1:100000
23	Preliminary Aeromagnetic Interpretation, Wallaroo	1:100000
24	Preliminary Aeromagnetic Interpretation, Whyalla	1:100000

1.0 INTRODUCTION

The following report summarizes a preliminary interpretation of the MESA B6 Area aeromagnetic data, flown as part of the South Australian Exploration Initiative. This survey covered the two exploration license applications (ELA33/94 and ELA 32/94 area) held by Hazurn Pty. Ltd. near Pt.Pirie, South Australia (Figure 1 shows the boundaries of the ELA'S).

The aim of this interpretation was to locate any obvious aeromagnetic anomalies, which may represent diamond bearing dykes, such as kimberlites, lamproites, carbonatites, etc.. A secondary objective was to identify other rock units, and structures, with which these anomalies might be associated; and to define any ancient drainages which might host alluvial diamonds.

The Hazurn Project exploration region covers several tectonic domains; the Adelaide Geosyncline, the Gawler Craton, the Torrens Hinge Zone (the transition zone between Adelaide Geosyncline and Gawler Craton), the Pirie-Torrens Basin and the St. Vincent's Basin. The western margin of the Adelaide Geosyncline is defined as the Torrens Hinge Zone, which represents both the edge of the Gawler Craton and the transitional zone between the thick folded sediments of the Adelaide Geosyncline, and very thin flat lying platform counter parts on the Stuart Shelf. Figure 1 is a Tectonic sketch of the region.





DME-SA 94-138

A report by Townsend et. al. (1994), on diamond occurrences within South Australia provides a good summary of anomalous regions, and their relationship to the Hazurn Area. Their figure 1 is reproduced here as figure 2. A summary by David Tonkin (1996), of previous exploration in the Hazurn area is also attached as Appendix 1.

Target areas defined in this report, will require detailed ground based magnetic surveys, followed by a shallow drilling program.

2.0 SURVEY DETAILS

The data used for this interpretation was acquired as part of the South Australian Exploration Initiative conducted by MESA. The survey covered the region known as the B6 Area.

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والمراسمة ووالجا والمجامع لأسرو وأحرار

Table 1: SURVEY DETAILS

Data acquisition contractor:	World Geoscience Corporation Limited
Date flown:	September / November 1994
Flight lines:	Traverse lines 400m Grid East-West
	Tie lines 4000m Grid North-South
	Traverse and tie lines being flown along fixed AMG
	Northings and Eastings
Survey height:	Mean terrain clearance 80m
Data processing contractor:	Pitt Research Pty. Ltd.

3.0 INTERPRETATION AND MODELLING

The materials used for this interpretation included 1:100,000 flight path plots (plates 1 to 8), 1:100 000 scale TMI contours (plates 9 to 16), contoured at 5 nanoTeslas, and 1:250 000 TMI contours, and colour shaded images, at various sun angles. The final result is a preliminary interpretation, presented as plates 17 to 24.

The principal magnetic sources in the ELA's, are the basement volcanics and granites, which are characterised by moderately magnetic material. This then grades to a magnetic low to the east of the Adelaide Geosyncline.

Structure: most of the main structures trend NNW-SSE, with there being some lineations trending NE-SW.

All of the major bullseye anomalies have been marked on the maps, these possibly could be kimberlites or carbonatites and require follow up ground field work. The 6 main anomalies occurring in the ELA'S are located on figure 3 & 4. These anomalies range between 20 to 260 nT, and are listed on Table 2.

Many small discrete anomalies, typical of kimberlite pipes, were also identified, but these have been convincingly correlated, on an individual basis, with farm houses, buildings, and other cultural objects, within the study area. They have therefore not been listed in this report.

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Prospective target area, Anomalies P1, P3, P4.

Figure 3.



Prospective target area, Anomalies P2, P5, P6.

Figure 4.

Table 2: LOCATION OF ANOMALIES

Anomaly	Flight line	Easting	Northing
P2	44750	251302	6290593
P5	44810	247934	6289379
Рб	44890	245508	6287819
P1	50311	247000	6280617
P3	50390	246920	6278975
P4	50450	246331	6277757

Modelling of the priority targets P1 to P6 was carried out, with the modelled curves shown as figures 5 to 9. Susceptibility values for basic igneous rocks were used for each of the models, and seemed to provide the necessary amplitudes required to fit the observed data. Induced magnetization only, was assumed during the modelling. The two anomalies which have the best fitting curves are P2 and P4, these give depths to the tops of the bodies of 230m and 140m respectively, allowing for a flight height of 80m. The shape of the P2 anomaly is a typical intrusive pipe signature. All of the rest of the curves modelled gave rough fit curves, the differences between the two curves could be due to there being zoning within the bodies (i.e. oxidation of magnetite) making them difficult to model accurately, and giving an overestimate of depth. Anomaly P5 was not modelled.

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Susceptibility:0.03 SI unitsDepth estimate:198m (below ground)Centre top:246550E, 6280799N

Figure 5: Anomaly Pl

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Susceptibility: 0.027 SI units Average depth: 226m; RHS 148m, LHS 236m (below ground) Centre top: 251106, 6290399N

Figure 6: Anomaly P2.

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Suceptibility: 0.025 SI units Depth Estimate: 366m (below ground Centre top: 246589E, 6279200N

Figure 7: Anomaly P3

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Susceptibility: Depth estimate: Centre top:

1

0.025 SI units 136m (below ground) 246307E, 6277800N

Figure 8: Anomaly P4

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Figure 9: Anomaly P6

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The anomalies, as modelled, appear to represent a series of intrusive dykes occurring along a fracture zone, they intrude through the basement material, as seen from the aeromagnetic data. This would give the probable intrusive bodies an age between mid to upper Proterozoic. Possible sources to the anomalies could be either carbonatites or Kimberlites at a depth of between <140m to 400m. A number of interesting anomalies also occur outside the ELA'S, as seen on the 1: 100 000 Pirie sheet interpretation.

4.0 CONCLUSION AND RECOMMENDATIONS

The basement rocks in the region are characterized by a low to moderate magnetic signature, ranging from 0 to 1000 nT. The Adelaide Geosyncline is dominated by a magnetic low, with some of the metasediments having a moderate magnetic signature. There are six (6) main bullseye anomalies occurring in the Hazurn ELA'S that should be considered for follow up ground magnetic surveys. These anomalies may represent possible kimberlitic, or other basic/ultrabasic dyke material.

There have been no ancient paleochannels identified from the magnetic interpretation.

To assist with further classification of magnetic rock units, magnetic susceptibility measurements could be made on core and rock outcrops.

It is recommended that a more comprehensive geological report be prepared for the area, which should include results of ground checking for each of the magnetic targets recorded in this report.

The aeromagnetic contours were used to locate discrete magnetic anomalies for this interpretation. This is probably sufficient for identification of anomalies with amplitudes greater than 5-10 nT (map contour interval is 5 nT). However, once the main targets have been tested, it is recommended that a more detailed interpretation at 1:25,000 scale be made, using the stacked profiles, and perhaps, contour plans produced using a 1 nT contour interval.

5.0 REFERENCES

Tonkin, D.G.,	1996	Previous Exploration Hazurn Project Area.
Townsend, I.J.,	1994	Review of Diamond Resources in South Australia
Morris, B.J.,		Dept. Mines and Energy, S.A
Farrand, M.G		Report Book: 94/34; DME 92/297

Previous Exploration Hazurn Project Area

January 1996

Prepared for Elliott Geophysics Pty Ltd

by D.G. Tonkin David Tonkin and Associates

Table of Contents

Summary	1
Introduction	1
Diamond and Kimberlite Investigations	2
Alluvial Diamond Potential	2
Base Metals Exploration	3 3 4
References	4

Tables (following text) Table 1 Exploration Summaries for Exploration Licences, Hazurn Project Area, 1973-1995 Table 2 Exploration Summaries for Special Mining Leases, Hazurn Project Area, 1950-1973 Table 3 Bottom Hole Intersections, Hazurn Project Area

Figures (following tables)

Figure 1	Location map	for Hazurn	Project Area -	-ELA 32/94	and ELA 33/94
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Figure 2 Previous Exploration Licences and work summaries, Hazurn Project Area

- Figure 3 Previous Exploration Licences and work summaries, Hazurn Project Area
- Figure 4 Previous Exploration Licences and work summaries, Hazurn Project Area
- Figure 5 Previous Exploration Licences and work summaries, Hazurn Project Area
- Figure 6 Previous Special Mining Leases and work summaries, Hazurn Project Area
- Figure 7 Previous Special Mining Leases and work summaries, Hazurn Project Area
- Figure 8 Location of stratigraphic drill holes, Hazurn Project Area
- Figure 9 Location of drill holes intersecting Wandearah Metasiltstone, Hazurn Project Area
- Figure 10 Location of drill holes not reaching basement, Hazurn Project Area

Previous Exploration - Hazurn Project Area

Summary

- No previous diamond exploration within the Hazurn Project Area was recorded.
- A kimberlite outcrop was identified near Bangor, about 8 km east of the Project Area, in 1973-74.
- Diamond exploration adjacent to the eastern boundaries of the Project Area, conducted by Dampier Mining (1979-81) and CRA Exploration (1979), was unsuccessful.
- Major Tertiary Quaternary channel deposits (if present), could host alluvial diamonds.
- Two areas of buried, pre-Adelaidean basement, between Bute and Port Broughton and between Wandearah West and Port Davis, are prospective for Olympic Dam type deposits.

Introduction

This literature survey was commissioned by Elliott Geophysics on behalf of Hazurn Pty Ltd, applicant for ELA 32/94 (Crystal Brook area) and 33//94 (Port Pirie area), referred to from here on as the *Hazurn Project Area*. The survey covered reports on previous exploration in the Project Area and environs (Figure 1) since 1950.

Survey results are substantially presented in 3 tables and 10 text figures, which summarise past exploration programs and tenement locations. In the interests of economy, these exploration summaries were extracted where possible from my own publication (Tonkin, 1993), which collated summaries from the Mineral Industry Quarterly. South Australia, from its inception in 1973.

 Table 1 summarises investigations on previous Exploration Licences, i.e. since

 1973. This same information is presented in graphic format on Figures 2 to 6.

Table 2 summarises investigations on Special Mining Leases, i.e. the period before 1973. This information is also presented graphically in Figures 6 and 7.

Table 3 lists stratigraphic drill holes (i.e those for which a geological log is available) in the Hazurn Project area, and includes location details, references and the geology of the lowermost unit drilled. The locations of stratigraphic (geologically logged) drill holes are shown on Figure 8. Figure 9 shows the locations and names of drill holes that intersected Wandearah Metasiltstone, the pre-Adelaidean basement unit interpreted as being equivalent in age to some of the rocks hosting the Olympic Dam deposit. Figure 10 shows locations and names of holes that failed to reach pre-Adelaidean basement, and the locations of the few Tertiary-Quaternary gravels or conglomerates intersected by drilling.

Diamond and Kimberlite Investigations

No report of previous diamond exploration over the Hazurn Project Area was found. The most encouraging finding was by Cultus Pacific (EL49, Table 1), who identified a kimberlite dyke near Bangor, about 8 km east of the centre of the Port Pirie ELA (Figure 2).

Dampier Mining flew airborne magnetic surveys adjacent to the northern section of the Port Pirie ELA in 1979-81 (EL496, Table 1 and Figure 3), without identifying any kimberlites. That survey did not quite extend far enough south to cover the Bangor kimberlite locality (Figure 2).

CRA Exploration (EL447, Table 1, Figure 4) was unsuccessful in a search for kimberlites in the Gladstone area, 20 km east of the Port Pirie ELA. CRA also held ground that included the Bangor locality (EL417, Table 1, Figure 4), but if they conducted any search for kimberlites it was not mentioned in the MIQ summary. A check of the original file (Envelope 3377) would be advisable. N.B. A drill hole testing an aeromagnetic anomaly in EL417 intersected

dolerite – this information could prove useful during interpretation of regional aeromagnetic data.

Alluvial Diamond Potential

Tertiary and Quaternary gravels deposited by streams draining the kimberlite fields near Terowie might have potential for alluvial diamonds. The former channels of major streams such as the Broughton river could be of interest.

Drill hole intersections of conglomerates or gravels were reported from 2 localities (Figure 10):

- 23 km SE of Port Broughton: Wokurna DDH 6 intersected Quaternary conglomerate from 0 to 13.95m; WR 18 intersected Tertiary-Quaternary gravel from 0 to 28m.
- 16 km SSE of Port Augusta: Augusta Salt DD 12 intersected Tertiary-Quaternary conglomerate from 14.25 to 15.54m.

The possibility of finding stranded beach deposits has been raised by the client. On the available evidence, this does not seem likely. Tertiary and Quaternary strata in the Pirie Basin do not appear to include any stranded beach deposits (Alley and Lindsay, 1995), such as the Loxton Sand of the more southerly Murray Basin (Rogers *et al.*, 1995).
Base Metals Exploration

More Significant Programs

Five past investigations in the Hazurn Project Area were particularly relevant to any exploration for Olympic Dam type deposits:

- MESA (EL 75, 207, 375; Bute Port Broughton) Considerable generative work, including drilling (Wokurna and WR series), was conducted over a period of several years (see Figure 2).
- North Broken Hill (EL 248, 420, 577, 972; Bute) Extensive programs (total 36,000m) of auger, percussion and diamond (Bute B series) drilling were conducted (Figure 5).
- North Broken Hill (EL 311, 519, 880; Port Germein Port Pirie Wandearah) Twenty diamond holes were drilled (PP series), with traces of Pb and Cu reported (see Figure 3).
- Uranerz and St Joe Australia (EL 481, 892, 1199, 1563; Port Broughton) Work included 17 diamond (PB series) and 268 rotary drill holes, with traces of base metals, uranium, REE and Au reported (see Figure 3).
- North Broken Hill (EL 714; Bute) A diamond hole (195m deep) was drilled on a magnetic target (Figure 4).
- St Joe Australia (EL 1141; Bute) A deep (423m) diamond hole (Bute B 51) was drilled on a magnetic high, intersecting trace chalcopyrite (see Figure 3).

Further research of open file envelopes and MESA reports would be required to fully evaluate these programs, but it is clear that the more prospective region covers the western half the Crystal Brook ELA (32/94) and the western half of the southern block of the Port Pirie ELA (33/94), these being the only areas where basement¹ was intersected by drilling.

The most favourable area would be between Bute and Port Broughton (Figure 9), where basement depth (Table 3) ranges from 11m (Bute B 32) to 109m (Bute B 25), before deepening sharply in the west to 300m or more (PB 1, Wokurna DDH 4 and Bute B 17).

Basement was also intersected in the area between Wandearah West and Port

¹ Basement here is taken, as it is on the Stuart Shelf further north, as pre-Adelaidean and pre-Pandurra Formation.

Previous Exploration - Hazurn Project Area

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Davis (Figure 9), but depths here range from 270m (PP 7) to 538m (PP 2). Elsewhere, there is no hard data on depth to basement, but at PP 15 it is at more than 801m, and at PP 20 it is more than 356m deep (Figure 10).

Other Programs

Four other programs that covered parts of the Hazurn Project Area and which may provide some useful data were:

- Australian Selection (EL 200; Wandearah) Five percussion holes were drilled (PWD series) into Cainozoic and upper Adelaidean strata (Figure 2).
- Mount Isa Mines (EL 1214; Wandearah West) Existing drill hole material was re-sampled (Figure 5).
- CRA Exploration (EL 1253; Bute) Existing diamond core was re-sampled (Figure 2).
- PS and GF Forwood (EL 1592; Bute) Rock geochemistry was undertaken (Figure 2).

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TABLE 1 — Exploration Summaries for Exploration Licences Hazurn Project Area, 1973-1995

LEASE	LICENSEE	DATE	ENV	EXPLORATION SUMMARY
EL49	Cultus Pacific NL & R.R.Kauzlaric	1973-74	2286	EL 49 (Cultus Pacific NL and R.R. Kauzlaric) Investigations in the Booleroo Centre area included a literature survey, and inspections of the Charlton Copper Mine, Yangya prospect, Booleroo Clay deposit and the sites of several aeromagnetic anomalies. A kimberlite dyke was identified near Bangor. (Env. 2286) DTA
EL60	Delhi International Oil Corp.	1973-75	2299	<u>EL 60</u> (Delhi International Oil Corp) Investigations were undertaken in the Telowie-Lake Torrens region during the period 1970-1977 to assess Lake Torrens brines for use as a feedstock in a petrochemical plant, which was considered for establishment at Redcliffs, near Port Augusta (Env. 2299) MIQ44
EL75 EL207 EL375	Director of Mines	1973-75 1975 - 77 1977 - 79	2429 2772 3353 .	<u>EL 375</u> (Director of Mines) Base metal potential was demonstrated at several stratigraphic levels in the Bute-Port Broughton area by interpretation of regional geophysical data and stratigraphic drilling traverses. (Reports 77/142, 78/109) MIQ13. See also MRR 147 (61-67) and RB 88/67
EL200	Australian Selection Pty Ltd	1975-76	2630	<u>EL 200</u> (Australian Selection (Proprietary) Ltd) Base metals on the southern Stuart Shelf were the target in the Wandearah area, with initial emphasis on deposits on the palaeo-erosion surface of the Pandurra Formation or equivalent. Percussion drilling (5 holes, 443m) failed to intersect the target horizon, or to disclose anomalous base metal concentrations. (Env. 2630) DTA
EL248 EL420 EL577 EL972	North Broken Hill Ltd	1976-83	2749 3311 3767	EL 248, 420, 577, 972 (North Broken Hill Ltd) Airborne and ground magnetic, gravity and induced polarisation surveys were conducted in Shelf facies Adelaidean sediments in the Bute area in the search for base metals. Auger drilling (21,231m), diamond drilling (34 holes aggregating 10,770m) and percussion drilling (104 holes aggregating 4,009m) were employed to explore the major stratigraphic units, particularly at unconformities, on basement highs and coincident with magnetic anomalies, without disclosing anomalous mineralisation (Env. 2749, 3311, 3767) MIQ27
EL311 EL880 EL519	North Broken Hill Ltd	1977-81	3023 3606	EL 311, 519, 880 (North Broken Hill Ltd) Exploration for base metals within Shelf facies Adelaidean sediments extended southerly from Port Germein, between Port Pirie and Port Davis to Wandearah, centred on coincident aeromagnetic/gravity anomalies. Drilling (20 diamond drillholes, aggregating 9208m) intersected traces of galena and weak copper mineralisation (Env. 3023, 3606) MIQ25
EL359	Australia-Cities Service Inc.	1977 - 78		EL 359 (Australia-Cities Service Inc) No report was furnished on area near Gladstone. MIQ10
EL417	CRA Exploration Pty Ltd	1978-80	3377	<u>EL 417</u> (CRA Exploration Pty Ltd) Evaluation of the old Charlton copper mine and environs near Wirrabara, for stratiform mineralisation in the Appila Tillite, yielded geophysical drilling targets. A diamond drillhole (150m) testing an IP anomaly did not intersect significant sulphides, and a percussion drillhole (100m) targeted on a magnetic peak intersected a dolerite intrusion (Env. 3377) MIQ19
EL447	CRA Exploration Pty Ltd	1979	3486	<u>EL 447</u> (CRA Exploration Pty Ltd) Geochemical sampling over 16 aeromagnetic anomalies failed to yield kimberlite indicator minerals or evidence of base-metal mineralisation in the Gladstone area. On the basis of known kimberlite occurrence in country Kimberley and the intensity of previous diamond-exploration activity in the Terowie area, the possibility of locating economic diamond pipes was considered to be remote. (Env. 3486) MIQ15
EL481 EL892 EL1199 EL1563	Jododex Aust. Pty Ltd, Uranertz (Aust) Pty Ltd St Joe Australia Pty Ltd	1979-91	3543	EL 481, 892, 1199, 1563 (Uranerz Australia Pty Ltd, Amaybend Pty Ltd, St Joe Australia Pty Ltd) Intensive exploration for uranium and base metals was conducted over the past decade in the Port Broughton area. Work included aerial magnetic and radiometric surveys, Landsat analyses, gravity, ground magnetic and IP surveys, rotary drilling (268 holes, total 12,489 m) and diamond drilling (17 holes, total 4,565 m). Minor concentrations of base metals, uranium, REE and gold were intersected (Env. 3543) MIQ61
EL496	Dampier Mining Co. Ltd	1979-81	3540 3991	<u>EL 496, 478 & 479</u> (Dampier Mining Co Ltd) These three licences near Quorn (496) and Peterborough (478 and 479) were significantly reduced in area after anomalies located by an airborne magnetic survey were checked on the ground. Mapping and rotary/percussion drilling to bedrock were used to identify anomaly sources. No kimberlites were identified in the areas relinquished (Env. 3893) MIQ19
EL714	North Broken Hill Ltd	1980-81	4006	EL 714 (North Broken Hill Ltd) An area of regional magnetic anomalism north of Bute was evaluated by gravity profiling and auger drilling geochemical traverses. A diamond drillhole 195 metres deep and 135 auger holes (aggregate 2,292 metres) disclosed no significant concentrations of base metals (Env. 4006) MIQ23
EL785	Sturts Meadows Prospecting Syndicate NL	1981-83	4309	EL 785 (Sturts Meadows Prospecting Syndicate NL) A detailed aeromagnetic survey was carried out over the northern extremity of Spencer Gulf in the search for Olympic Dam style mineralisation (Env. 4309) MIQ29
EL1141	St Joe Australia Pty Ltd	1983-84	5193	EL 1141 (St Joe Australia Pty Ltd) Ground magnetic and gravity surveys were utilised to investigate magnetic zones in probable middle Proterozoic rocks in the Bute area. The Lincoln Downs magnetic high zone was tested with one 423m diamond drillhole; trace chalcopyrite was intersected (Env. 5193) MIQ34

TABLE 1 — Exploration Summaries for Exploration LicencesHazurn Project Area, 1973-1995

LEASE	LICENSEE	DATE	ENV	EXPLORATION SUMMARY
EL1214	Mount Isa-Mines Ltd	1984-85	5435	EL 1214 (Mount Isa Mines Ltd) A TEM survey in the Wandearah West area indicated no bedrock conductors; sampling of previously drilled holes failed to disclose anomalous concentrations of base metals (Env. 5435) MIQ37
EL1243	ELectricity Trust of South Australia	1984-85	5892	EL 1243 (The Electricity Trust of South Australia) A percussion drilling programme (6 holes, aggregate 669m) in the Merriton area intersected carbonaceous Tertiary sediments but no coal in a graben marking the northernmost extension of the St Vincent Basin (Env. 5892) MIQ39
EL1253	CRA Exploration Pty Ltd	1984-85	5860	EL 1253 (CRA Exploration Pty Ltd) Reinterpretation of gravity data and geochemical analysis of diamond drillcore from previous drilling failed to provide encouragement for further base metal exploration in the Bute area (Env. 5860) MIQ40
EL1592	P.S. and G.F. Forwood Pty Ltd	1989-91	8212	EL 1592 (P.S. and G.F. Forwood Pty Ltd) Exploration for copper and gold near Bute included rock-chip and bedrock geochemistry, ground magnetic and Sirotem surveys (Env. 8212) MIQ63
EL1857	Intex Pty Ltd	1993-95		Licence replaced by EL 2056 (current).

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TABLE 2 — Exploration Summaries for Special Mining Leases Hazurn Project Area, 1950-1973

TRACE	LICENSEE	DATE	ENV	EXPLORATION SUMMARY
SML 17	Saeck J, Solar Salt Ltd,	195064		No reports. DME dockets are only reference. Most likely that investigations centred on
SML 18	Augusta Salt Ltd	Ì	-	assessment of solar sat potential.
SML 19	i -			
SML 22		Į į		
SML 26				
SML 29		l :		
SML 31		ł		
SML 40		1		
SML 51		l	1	
SML 57				
SML 214	RMC Minerals Pty Ltd	1968-70	859 1089	<u>SML 214</u> (Australian Blue Metals Pty Ltd, RMC Minerals Pty Ltd, Placer Prospecting (Aust) Pty Ltd) Mapping of the Spring Creek mine area delineated secondary copper mineralisation associated with faulting. Two completed diamond holes (total 285m) and a reported third hole (no drilling details) did not disclose significant mineralisation. (Env. 859, 1089) DTA
SML 233	Australian Blue Metals Ltd	1968	1186	SML 233 (Australian Blue Metals Ltd) Clay samples from the Hundred of Davenport proved unsuitable for refractory purposes. (Env. 1186) DTA
SML 237	CRA Exploration Pty Ltd	1968-69	1010	SML 237 (CRA Exploration Pty Ltd) The search for zinc silicate deposits in Lower Cambrian limestones of the Wakefield area comprised a drainage survey (20 samples) over an area of 25 km ² where the target stratigraphy crops out. Analyses were made for Zn, Pb, Cu, Ni, Ag and Mo. The highest Zn value was 120 ppm. No further work was warranted. (Env. 1010) DTA
SML 346 SML 613	Utah Development Co	1969-70	1217	SML 346. 613 (Utah Development Company) The search for strata-bound base metals in the Port Augusta – Wilkatana area included reconnaissance and grid geochemistry, geology, follow- up geochemistry, geophysics (IP and resistivity), and percussion and diamond drilling. Completed diamond holes were confined to Robinson's prospect (4 holes, aggregate 383m). Percussion holes (6 holes, aggregate 417m) were drilled at Reservoir prospect, Dutchman's area and Depot Creek. (Env. 1217) DTA
SML 375	Delhi Aust Petroleum Ltd	1970-72	1140 1330	<u>SML 375</u> (Delhi Australian Petroleum Ltd, Vam Ltd, Hardman Chemicals) Investigations were undertaken in the Port Pirie area during the period 1970-1977 to assess potential coastal sites for the production of solar salt for use as a feedstock in a petrochemical plant, which was considered for establishment at Redcliffs, near Port Augusta (Env. 1140, 1330) MIQ44
SML 426	Westchester Mining Corp Pty Ltd	1970-71	1567	SML 426 (Westchester Mining Corp Pty Ltd) A literature study for the Laura – Booleroo area was followed with an airborne magnetic, EM, VLF and radiometric survey (4,800 line km at 130m terrain clearance). Anomalies did not warrant follow-up. (Env. 1567) DTA
SML 472	Burbank Expln NL	1970-71	1497	SML 472 (Burbank Exploration NL) Investigations in the Melrose area comprised a literature survey and evaluation of the potential. Recommended work was not undertaken. (Env. 1497) DTA
SML 518	Base Minerals Ltd	1970-71	1	No reports. DME docket 1250/70 is only reference
SNA CO	Delhi International Oil	1072 72	1886	SML 662 (Delhi International Oil Corn) Investigations were undertaken in the Telowie-
SIVIL 002		1712-13	1000	Port Augusta area during the period 1970-1977 to assess potential coastal sites for the production of solar salt for use as a feedstock in a petrochemical plant, which was considered fo establishment at Redcliffs, near Port Augusta (Env. 1886) MIQ44

TABLE 3 - Bottom Hole Intersections, Hazurn Project Area

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HOLE NO.	LATITUDE	LONGITUDE	LOWERMOST UNIT INTERSECTED	LEASE	REF.
AUG SALT DD 12	-32,617085	137.865546	TQ 15.54-18.36 Undifferentiated Tertiary -Pleistocene rocks CLAY SAND Mottled orange-brown & off-white sandy clay with some lim		RB 58/33
1	-33.155233	138.012191	Opah 7.01·12.5 Hindmarsh Clay CLAY SILT Yw-bn & gy mottled sandy clay, soft (to 26'); yw-bn mottled silty clay with rd-bn med s		RB 50/176
10A	-33.181592	138.011393	Opah 6.1-7.8 Hindmarsh Clay CLAY SILT 20' to 21'6" sealed tube, bn to gn-gy silty clay with liime pockets, very stiff, damp, ca		RB 53/15
AA 1	-33.816634	137.927219	Lxw 43-53.5 Wandoarah Metasediments SLST CLAY Finely laminated siltstone, upper part weathered		RB 92/56
AA 2	-33,835881	137.937404	Teoch? 8-47 Bumbunga Sand Member SAND CLAY Fine to coarse & gravelly sands, minor clays		RB 92/56
AA 4	·33.844367	137.940676	Eok 41-44 Kulpara Formation LMST DLOM Green-grey recrystallised dolomitic limestone		RB 92/56
BUTE B 17	-33,788000	138.055586	Lxw 292-346.4 Wandearah Metasediments SLST DLOM Interbedded pink-grey dolomite & dolomitic siltstone, & grey siltstone	EL248	ENV 2749
BUTE B 20	·33.836377	138.017209	Lxw 50-108 Wandwarah Metasediments DLOM SLST Dolomite & dolomitic siltstone with haematitic calcite bands	EL248	ENV 2749
BUTE B 25	-33.853114	138.005175	Lxw 109-114.5 Wandearah Metasediments MSLT, Grey banded, part tuffaceous?	EL577	ENV 3767
			Lx? 114.5-121.5 Wallaroo Group MVOL? Grey-green fg siliceous poss acid-intermed		
			Lxw 121.5-123.5 Wandearah MSLT haematitic toward base		
BUTE B 32	-33.800297	138.004383	Lxw 10.65-34.15 Wandearah Metasediments MSLT SHLE Finely bedded shaley metasiltstone, fine sandy & clayey interbands	EL577	ENV 3767
BUTE B 51	-33.767778	137.988753	Lxw 38-426.6 Wandoarah Metasediments MSLT DLOM Interlayered siltstone & dolomite	EL1141	ENV 5193
DIESEL SHOP CH 1	-32.498942	137.765078	Nst 20.42-25.91 Tent Hill Formation SDST Feldspathic sandstone		RB 68/17
NECTAR BR DDH 1	·32.679244	137.992408	Nfi 3.01-16.23 Brighton Limestone LMST DLOM Pink massive dolomitic limestone with calcite veins & local contorted laminations		RB 77/104
PB 01	-33.651518	138.023273	Lxw 313.05-547.4 Wande arah Metasediments SLST BREC Siltstone & siltstone breccia, slate (?cherty in part), shale; haematitic in	EL481	ENV 3543
PB 02	-33,579786	137.948561	No 75-511 Emeroo Subgroup ARKS CGLM Arkose interbedded with conglomerate; local arkosic siltstones; heavy mineral banding in par	EL481	ENV 3543
PB 03	·33.562957	138.020622	No 248.71-287 Emeroo Subgroup SDST CGLM Arkosic sandstone & fine pebble conglomerate; crossbedded, heavy mineral banded; haemat	EL481	ENV 3543
PB 04	·33.722843	138.009171	Lxw 24-94 Wandearah Metasediments MPEL BREC Metasiltstone, brecciated in part; calcite veining; minor dolomitic, haematitic & c	EL481	ENV 3543
PB 21	-33.657469	137.932617	Lxw 60-85.4 Wandoarah Metasediments MSLT interlayered sericitic phylite and vfg sandstone	EL892	ENV 3543
PB 22	-33.716711	137.971578	Lxw 38.5-354,1 Wandearah Metasediments MSLT SEDC mslt, intercallated fg sdst & albite rock. Calcite matrix	EL892	ENV 3543
PB 23	-33,719911	137.941481	Lxw 27-63.5 Wandoarah Metasediments MSLT DLOM Interlayered siltstone and pink dolomite. Locally graphitic.	EL892	ENV 3543
PP 02	-33,385997	137.952508	Lxw 538-544.1 Wandearah Metasediments MSED? FSPO? Highly altered red fine grained (?meta)sediment & ?feldspar porphyry	EL311	ENV 3023
PP 03	-33.407047	137.923994	No 388-432.8 Emeroo Subgroup CGLM SLST Red conglomerate, minor siltstone & grit interbeds; minor disseminated haematite	EL311	ENV 3023
PP 04	-33.277733	137.870708	No 490-524.3 Emeroo Subgroup SDST SLST Red-pink locally gritty feldspathic sandstone, mainly massive, some heavy mineral bands;	EL311	ENV 3023
PP 05	-33.376917	137.927186	Lxw 353-376.9 Wandsarah Metasediments MSLT Grey haematitic brecciated metasiltstone; brecciation occurs as veining in situ; th	EL311	ENV 3023
PP 06	-33.348989	137.916808	Lxw 505-513.7 Wandsarah Metasediments MSLT SLST Very fine grained haematitic metasiltstone & siltstone	EL311	ENV 3023
PP 07	-33,366917	137.904578	Lxw 270-302.9 Wandsarah Metasediments MSLT MDST Haematitic metasiltstone interbedded with laminated haematitic mudstone	EL311	ENV 3023
PP 08	-33.358122	137.951414	No 400-457.6 Emeroo Subgroup CGLM QTZT Interbedded granule & pebble conglomerate & gritty quartzite; siltstone & grit at top	EL311	ENV 3023
PP 09	-33,392250	137.924969	Lxw 220-347.6 Wandsarah Metasediments MSLT SLST Brecciated altered haematitic metasiltstone & mudstone; laminated in part; dolo	EL311	ENV 3023
PP 10	-33,405169	137.958736	No 165-416 Emeroo Subgroup CGLM QTZT Conglomerate, quartzite, sandstone, shale, dolomitic siltstone, dolomite	EL311	ENV 3023
PP 11	-33.293375	137.959761	Nua 376.5-507.9 Appila Tillite DIMC SLST Diamictite, siltstone, sandstone, minor dolomite	EL311	ENV 3023
PP 12	·33.464956	137.955400	Mbe? 423-455 Boda Volcanics BSLT Massive medium grained amygdaloidal basalt	EL311	ENV 3023
			Nc? 455-627.4 Callanna Group??? SLST LMST Massive irregularly flaser bedded calcareous siltstone, rare laminated & abundant disrup		
PP 13	-33.392094	137.891186	Nc 215-309.8 Callanna Group SDST MDST Sandstones, mudstones, conglomerates, siltstones; dolomitic in part	EL311	ENV 3023
PP 14	-33.233394	137.933697	Nms 312-391.2 Skillogalee Dolomite DLOM SHLE Grey massive stylolitic dolomite with thin black shale laminations & interbeds; lo	EL311	ENV 3023
PP 15	·33.228667	137.894633	Nua 797-800.8 Appila Tillite SDST DIMC Sandstone, diamictite, siltstone, grit	EL311	ENV 3606
PP 16	-33.260522	137.842522	Nua 524-543.3 Appila Tillite DIMC CGLM Massive diamictite, pebble conglomerate, dolomite beds	[EL311	LENA 3000

TABLE 3 - Bottom Hole Intersections, Hazurn Project Area

Page 2

HOLE NO.	LATITUDE	LONGITUDE	LOWERMOST UNIT INTERSECTED	LEASE	REF.
PP 17	-33.379453	137,914431	Lxw 340-467.1 Wandearah Metasediments SLST Planar laminated haematitic siltstone, locally dolomitic or calcareous; local ?faul	EL519	ENV 3606
PP 18	-33,397472	137.959033	Lxw 423-576.5 Wandearah Metasediments MSLT DLOM Metasiltstones, brecciated with haematite in part, sandy dolomite, sandstone; ?	EL519	ENV 3606
PP 19	-33,309667	137,907122	Lxw 425-607.85 Wandearah Metasediments MSLT SLST Very fine grained partly laminated haematitic metasiltstone & haematitic micac	EL519	ENV 3606
PP 20	·32,997050	137.985596	Nsb 260-356 Brachina Formation SHLE SLST Laminated shale interbedded with massive micaceous siltstone, minor bedded sandstone w	EL880	ENV 3606
PWD 2	·33.493779	138.105844	Nsa 22·116 ABC Range Quartzite SDST SLST Pink-maroon fine to medium grained indurated sandstone, locally micaceous, with interb	EL200	ENV 2630
PWD 5	-33,269969	138.165715	Nb 12-97 Burra Group SDST SLST Interbedded sandstone & siltstone with shale & quartzite; some parts weathered to clay; haematit	EL200	ENV 2630
R 111	33.706789	137.932242	we 21-27 Weathering/weathered rocks CLAY Highly weathered basement, original lithology indeterminate: grey-green-white clays,	EL1199	ENV 3543
R 128	-33,745703	137.937236	Lx? 13:24 Wallaroo Group CLAY SLST Highly weathered basement, original litho indeterminate: indurated clay to siltstone (?weath	EL1199	ENV 3543
un•named	-33.173249	138.008214	N 158.5-175.26 Undifferentiated Neoproterozoic rocks. SLAT SDST Gray slate with sandstone layers, becoming reddish; upper part		
WOKURNA DDH 1	-33.708703	138.001130	LM1 24.6-61.5 Undifferentiated basic rocks: EYRE DHDB; Prot-beta GBRO Massive medium grained grey gabbro, weathered in places	EL207	ENV 3353
WOKURNA DDH 2	-33.705084	138.058302	Nua? 165.49-218.56 Appila Tillite QTZT Massive grey fine to medium grained dolomitic feldspathic quartzite; minor thin bands o	EL207	ENV 3353
WOKURNA DDH 3	-33,705135	138.116987	Nha 120.95-306.37 Angepena Formation SHLE SDST Interbanded red-maroon laminated shale & lesser pink-grey medium to coarse dolom	EL207	ENV 3353
WOKURNA DDH 4	-33.710944	138.043195	Lxw 334.1-395.77 Wandoarah Metasediments SLST SLAT Dark grey & reddish finely laminated slaty siltstone; layering is steeply di	EL207	ENV 3353
WOKURNA DDH 5	-33,705155	138.090172	Nft 171.32-294.65 Tapley Hill Formation SLST LMST Laminated calcareous siltstone interbanded with silty dolomitic limestone whi	EL207	ENV 3353
WOKURNA DDH 6	-33.714907	138,139821	NhIr 295.9-329 Reynella Siltstone Member SLST QTZT Maroon siltstone with dispersed granules of varying composition; laminated q	EL207	ENV 3353
WR 01	·33.706704	138.019838	Lxw 35-77.1 Wandoarah Metasediments MSLT Dark grey & red banded metasiltstone; steep contorted bedding; weathered to 74m	EL207	ENV 3353
WR 02	-33.708179	138.033172	Nua 30-44.32 Appila Tillite DIMC Diamictite: coarse rounded grains & pebbles of quartz, feldspar, dolomite & metasiltstone in	EL207	ENV 3353
WR 03	-33,706485	138.045613	Nu 52-58,2 Umberatana Group SLST LMST Fine grained dolomitic siltstone with interbeds of silty dolomitic limestone & calcareous	EL207	ENV 3353
WR 04	-33.705310	138.079953	Nfi 68-78.5 Brighton Limestone SLST LMST Siltstone, limestone & silty limestone, layers of fine grained dolomite & calcite from	EL207	ENV 3353
WR 05	-33.704974	138.097049	Nha 50.5-72.05 Angepena Formation SHLE SLST Finely laminated shale & siltstone, weathered above 70m, dolomitic below 70m with g	EL207	ENV 3353
WR 06	-33.709186	137.966560	Lxw 31-46.6 Wandoarah Metasediments DLOM Layered siliceous dolomite	EL207	ENV 3353
WR 09	-33.627786	137.969821	No 9-88 Emeroo Subgroup SDST Fine to medium grained friable feldspathic sandstone with heavy mineral laminae; weathered to san	EL207	ENV 3353
WR 10	·33.627705	137.990368	No 8-27 Emeroo Subgroup QTZT CGLM Feldspathic quartzite & weathered sandstone, with conglomerate below 25,; no recovery 19-25m	EL207	ENV 3353
WR 11	·33.627613	138.008406	No 18-30.9 Emeroo Subgroup QTZT Massive medium grained well rounded feldspathic quartzite, weathered to 24m	EL207	ENV 3353
WR 13	-33.627676	138.046649	Nua 35-42.15 Appila Tillite DIMC Weathered diamictite; subangular to subrounded clasts of metasiltstone, quartz, feldspar, gra	EL207	ENV 3353
WR 14	-33.627721	138,065172	Nfi 35.5-47.75 Brighton Limestone LMST SHLE Pale grey-brown fine grained limestone with thin dark green-grey shale laminations;	EL207	ENV 3353
WR 15	-33,593860	137.955321	No 16.5-36.7 Emeroo Subgroup QTZT CGLM Interbanded pale orange to pink heavy mineral banded quartzite, & conglomerate consistin	EL207	ENV 3353
WR 16	-33.708480	138.030713	Lxw 39-49.73 Wandsarah Metasediments MSLT DLOM Interlayered dark grey-brown fine grained dolomitic siltstone & pink silty dolom	EL207	ENV 3353
WR 17	-33.710269	138.042495	Nua 37-39.95 Appila Tillite DIMC Red-brown weathered diamictite: fragments of quartz, feldspar, micritic dolomite & quartzite	EL207	ENV 3353
WR 18	-33.708181	138.129301	Nss 28-38.6 Seacliff Sandstone QTZT SHLE Fine grained part feldspathic quartzite; upper part weathered; upper boundary uncertai	EL207	ENV 3353



Figure 1 Location map for Hazurn Project Area – ELA 32/94 and ELA 33/94



Figure 2 Previous Exploration Licences and work summaries, Hazurn Project Area



Figure 3 Previous Exploration Licences and work summaries, Hazurn Project Area



Figure 4 Previous Exploration Licences and work summaries, Hazurn Project Area



Figure 5 Previous Exploration Licences and work summaries, Hazurn Project Area



Figure 6 Previous Special Mining Leases and work summaries, Hazurn Project Area



Figure 7 Previous Special Mining Leases and work summaries, Hazurn Project Area



Figure 8 Location of Stratigraphic Drill Holes, Hazurn Project Area



Figure 9 Location of drill holes intersecting Wandearah Metasiltstone, Hazurn Project Area



Figure 10 Location of drill holes not reaching basement, Hazurn Project Area

ELLIOTT GEOPHYSICS PTY. LTD.



A.C.N. 050 294 427

17 Grandview Avenue, Urrbrae 5064 South Australia Telephone: (08) 379 3305 International: +61-8-379 3305 Facsimile: +61-8-379 5177

HAZURN PROJECT

SUMMARY OF GEOPHYSICAL TARGET AREAS FOR DIAMOND AND GOLD EXPLORATION

August 1996

Prepared for HAZURN PTY. LTD.

by

P. Elliott B.Sc(Hons), M.Sc..

CONTENTS

SUMMARY

1.0	INTRODUCTION	1
2.0	INTERPRETATION OF MAGNETIC DATA	2
3.0	CONCLUSION AND RECOMMENDATIONS	3
4.0	REFERENCES	4

Appendix 1: Previous Exploration, Hazurn Project Area. By D. Tonkin

LIST OF FIGURES

Figure No.

Subject

- 1 Tectonic Map, Hazurn Project Area.
- 2 Diamond Occurrences, Sources, Indicators, and Tectonic Setting.

3 Drillholes into Wandearah Metasiltstone (basement).

4 Magnetic Image and Target Overlay.

5 Prospective Target Area, P1, P3, P4.

6 Prospective Target Area, P2, P5, P6.

SUMMARY

The Hazurn Project area is some 200km north of Adelaide, near Port Pirie, South Australia. The licence areas were taken out on the basis of their diamond potential after they were flown for detailed aeromagnetics. There are some very obvious "bullseye" magnetic features, which probably represent kimberlite or carbonatite type intrusives. Diamonds have been found in the adjacent area to the east of the licences, and there is potential for similar finds within the licences. An advantage of the Hazurn Project area is that there has not been the same degree of uplift and erosion as for the areas to the east, and therefore buried kimberlites are more likely to be preserved.

Erosion of the landscape to the east may have lead to diamonds being carried down the ancient stream beds (paleochannels), and therefore allows for the prospect of finding diamonds in the old alluvial channels. There was some conjecture in the past about the Murray River passing through the area south of Pt. Pirie, however this seems to have been adequately dismissed by Harris et al (1979) for the time being. There is however a liklihood that other paleochannels do carry a bounty of diamonds in old placer deposits.

As a result of the recent geophysical appraisal, six (6) obvious targets have been identified in the central part of E.L. 32/94. These targets are estimated to vary between 100m and 400m depth based on modelling results. However, as they all emanate from a common source and are likely to reach a similar position near surface, the shallower depth can probably be taken as the best guide. This places the targets within a reasonably accessible position to be tested by a modest diamond drilling program.

1.0 INTRODUCTION

The following report summarizes a preliminary interpretation of the MESA B6 Area aeromagnetic data, flown as part of the South Australian Exploration Initiative. This survey covered the two exploration license applications (ELA33/94 and ELA 32/94 area) held by Hazurn Pty. Ltd. near Pt.Pirie, South Australia (Figure 1 shows the boundaries of the ELA'S). A more detailed description can be found in Elliott and Steele, (1996).

The aim of this interpretation was to locate any obvious aeromagnetic anomalies, which may represent diamond bearing dykes, such as kimberlites, lamproites, carbonatites, etc.. A secondary objective was to identify other rock units, and structures, with which these anomalies might be associated; and to define any ancient drainages which might host alluvial diamonds.

The Hazurn Project exploration region covers several tectonic domains; the Adelaide Geosyncline, the Gawler Craton, the Torrens Hinge Zone (the transition zone between Adelaide Geosyncline and Gawler Craton), the Pirie-Torrens Basin and the St. Vincent's Basin. The western margin of the Adelaide Geosyncline is defined as the Torrens Hinge Zone, which represents both the edge of the Gawler Craton and the transitional zone between the thick folded sediments of the Adelaide Geosyncline, and very thin flat lying platform counter parts on the Stuart Shelf. Figure 1 is a Tectonic sketch of the region.

A report by Townsend et. al. (1994), on diamond occurrences within South Australia provides a good summary of anomalous regions, and their relationship to the Hazurn Area. Their figure 1 is included in this report as figure 2. A summary by David Tonkin (1996), of previous exploration in the Hazurn area was also made as part of this project. Tonkin concluded that there has been no previous diamond exploration in the Hazurn Project area, but there was a kimberlite discovered near Bangor (some 8 km to the east). He also suggested that there is potential for Olympic Dam type deposits. Target areas described in the following sections, will require detailed ground based magnetic surveys, followed by a drilling program.

2.0 INTERPRETATION OF AEROMAGNETIC DATA

The principal magnetic sources in the ELA's, are the basement volcanics and granites, which are characterised by moderately magnetic material. The resultant magnetic high diminishes to a magnetic low east of the Adelaide Geosyncline.

Most of the main structures trend NNW-SSE, with there being some lineations trending NE-SW.

All of the major bullseye anomalies have been marked on the maps, these possibly could be kimberlites or carbonatites and require follow up ground field work. The 6 main anomalies occurring in the ELA'S are located on figures 4 to 6. These anomalies range between 20 to 260 nT, and are listed on Table 1.

Many small discrete anomalies, typical of kimberlite pipes, were also identified, but these have been convincingly correlated, on an individual basis, with farm houses, buildings, and other cultural objects, within the study area. They have therefore not been listed in this report.

Northing Anomaly Flight line Easting 6290593 251302 P2 44750 6289379 P5 44810 247934 6287819 P6 44890 245508 6280617 247000 P1 50311 6278975 246920 50390 P3 6277757 P4 50450 246331

Table 1: LOCATION OF ANOMALIES

Modelling of the priority targets P1 to P6 was carried out assuming susceptibility values for basic igneous rocks for each of the models, this seemed to provide the necessary amplitudes required to fit the observed data. Induced magnetization only, was assumed during the modelling. The two anomalies which have the best fitting curves are P2 and P4, these give depths to the tops of the bodies of 230m and 140m respectively, allowing for a flight height of 80m. The shape of the P2 anomaly is a typical intrusive pipe signature. All of the rest of the curves modelled gave rough fit curves, the differences between the model and measured curves could be due to there being zoning within the bodies (i.e. oxidation of magnetite) making them difficult to model accurately, and giving an overestimate of depth (Anomaly P5 was not modelled).

The anomalies, as modelled, appear to represent a series of intrusive dykes occurring along a fracture zone, they intrude through the basement material, as seen from the aeromagnetic data. This would give the probable intrusive bodies an age between mid to upper Proterozoic. Possible sources to the anomalies could be either carbonatites or Kimberlites at a depth of between <140m to 400m.

2

3.0 CONCLUSIONS AND RECOMMENDATIONS

The diamond potential of the Hazurn Project area has not previously been investigated, but there is strong encouragement from the recent aeromagnetic survey which located a number of "bullseye" magnetic anomalies similar to those found over kimberlites. These anomalies may alternatively represent Olympic Dam style deposits, which expands the prospectivity of the area for copper and gold.

The basement rocks in the region are characterized by a low to moderate magnetic signature, ranging from 0 to 1000 nT. The Adelaide Geosyncline is dominated by a magnetic low, with some of the metasediments having a moderate magnetic signature. There are six (6) main bullseye anomalies occurring in the Hazurn ELA'S that should be considered for follow up ground magnetic surveys, and drilling. These anomalies may represent possible kimberlitic, other basic/ultrabasic dyke material, or hematite/magnetite deposits associated mineralisation.

There have been no ancient paleochannels identified from the magnetic interpretation, however further studies should be made of the aeromagnetic data at a much smaller scale, coupled with studies of Landsat Thematic Mapper data.

To assist with further classification of magnetic rock units, magnetic susceptibility measurements could be made on core and rock outcrops.

It is recommended that a more comprehensive geological report be prepared for the area, which should include results of ground checking for each of the magnetic targets listed in this report.

The aeromagnetic contours were used to locate discrete magnetic anomalies for this interpretation. This is probably sufficient for identification of anomalies with amplitudes greater than 5-10 nT (map contour interval is 5 nT). However, after or during testing of the main targets it is recommended that a more detailed interpretation at 1:25,000 scale be made, using the stacked profiles, and perhaps, contour plans produced using a 1 nT contour interval, as well as detailed magnetic images.

4.0 REFERENCES

Elliott, P.J., 199 Steele, M.Z.,	6	Hazurn Project: Preliminary Aeromagnetic Interpretation Internal Company Report
Harris, W.K., Lindsay, J.W., Twidale, C.R.,	1979	Possible western outlet for an ancient Murray River in South Australia: A Discussion. Dept. Mines and Energy, S.A Report Book: 79/25;
Tonkin, D.G.,	1996	Previous Exploration Hazurn Project Area. Internal Company Report
Townsend, I.J., Morris, B.J., Farrand, M.G	1994	Review of Diamond Resources in South Australia. Dept. Mines and Energy, S.A Report Book: 94/34; DME 92/297





DIAMOND OCCURRENCES, SOURCES, INDICATORS AND TECTONIC SETTING

NES AND ENERGY

Figure 2.

DME-SA 94-138



Location of drill holes intersecting Wandearah Metasiltstone, Hazurn Project Area







Figure 5.

Prospective target area, Anomalies P2, P5, P6.



Figure 6.

CREST RESOURCES AUSTRALIA NL

ACN 061 375 442

1050 Hay Street WEST PERTH WESTERN AUSTRALIA 6005 TEL 09 481 4101 FAX 09 481 4272

ANNUAL REPORT APPENDIX 1 JMT EXPLORATION LICENSE 2159 G2 PROJECT SOUTH AUSTRALIA

TO

MINES AND ENERGY

SOUTH AUSTRALIA

191 Greenhill Road PARKSIDE SA 5063

PREPARED BY

James Searle PhD, MAusIMM CREST RESOURCES AUSTRALIA NL 20/3/1997



APPENDIX 1 GEOPHYSICAL SURVEY AND PREVIOUS EXPLORATION SUMMARY

9

PLATES 1–16

Plates 1–16 can be retrieved from PIRSA Customer Services

PLATES	PIRSA PLANS
1	1994–1701
2	1994–1716
3	1994–1707
4	1994–1713
5	1994–1710
6	1994–1704
7	1994–1695
8	1994–1698
9	1994-1702
10	1994–1717
11	1994–1708
12	1994–1714
13	1994–1711
14	1994–1705
15	1994–1696
16	1994–1699










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					HAZURN	PTY. LTD.
V V Magnetic basement (vokanics and granites)	~	Discrete magnetic anomaly,	Possible fault		HAZURN PROJECT	
		possible Kimberlite or Carbonotite	Magnetic lineation		PRELIMINARY AEROMAGNETIC INTERPRETATION	
	8	Probable cultural anomaly			WALLARC	O SHEET
0					5 6 7 8 9 ЮКМ <u>I I I I I I I I I I I I I I I I I I I </u>	
				ELLIOTT GEOPHYSICS PTY. LTD.	COMPILED BY : M. STEELE DRAFTED BY : GEODRAFTING PLAN NO.	DATE : FEB. 1996 Plate 23.





Hazurn Pty Ltd

21 Close Way, West Kalgoorlie WA 6430 PO Box 1280, Kalgoorlie WA 6430

Phone: (08) 9091 9253 Fax: (08) 9091 9256

G2 PROJECT EXPLORATION LICENCES 2159, 2160

SOUTH AUSTRALIA

ANNUAL REPORT

29 MARCH 1997 TO 28 MARCH 1998



Submitted by:

Hazurn Pty Ltd Post Office Box 1280 Kalgoorlie WA 6430

Date:

Author:

A P Rudd

December 1998

Distribution:

Primary Industries and Resources SA Heron Library



SUMMARY OF ACTIVITIES

This report details exploration carried out on the G2 Project, which comprises the 100% held E2159 and E2160 for the year ending 28 March 1998.

The G2 Project is located in the Port Pirie area of South Australia on the southeast margin of the Gawler Craton. The project area consists of 2668km² held under two granted Exploration Licences.

The tenements are prospective for Olympic Dam, Moonta or Ernest Henry style gold-copper mineralisation, diamond bearing kimberlite pipes, and diamond placer deposits. The G2 project area is situated on the major G2 structural corridor extending NW-SE across the Gawler Craton. The G2 structure has been interpreted as a major ore forming crustal structure, localising the world class Olympic Dam copper-gold-uranium mine to the NW of the project area.

Previous stratigraphic drilling indicates the potential for Olympic Dam or Ernest Henry type ore bodies in the project area. This encountered indications of major mineralising systems, notably haematitic breccias and host rock alteration in the Port Broughton area. A series of 20 vertical holes was drilled by North Broken Hill Ltd between 1978 and 1981 in a 400km² area of coincident magnetic and gravimetric anomalism. In 9 holes over a 20 x 7km area, highly anomalous copper, zinc, gold and uranium was intersected in Gawler Craton basement rocks and overlying Adelaidian Proterozoic sequences. The best intercepts included 7.3m at 0.85% Cu, 3.2m at 0.3g/t Au, and uranium values up to 250g/t. These results are highly significant and indicative of a major regional mineralising system.

High-resolution low level aeromagnetic surveys have been completed at Wandearah and Koolunga. Data imaging and interpretation by Hazurn indicates structural controls for Olympic Dam style mineralisation have been identified at Wandearah, and 11 promising kimberlitic aeromagnetic targets have been identified at Koolunga.

As well as kimberlitic diamond potential, scope exists for diamond placers derived from the erosion of high level diamondiferous kimberlites in the Flinders Ranges to the east of the project area. The Heron exploration model involves diamondiferous placer deposition from an ancestral West-flowing River Murray, with heavy minerals deposited in coastal flats within the western project area. The exploration model is based on the Namaqualand marine diamonds, South Africa.

TABLE OF CONTENTS

1.0	Introdu	ction	.1
2.0	Explora	ation Map Index	.2
	2.1	Location	.2
	2.2	Tenement Status	.2
3.0	Geolog	у	.5
	3.1	Regional Geology	.5
	3.2	Local Geology	.5
4.0	Previou	ıs Work	.6
5.0	Work (Completed – 1996/1997	.7
	5.1	Literature Research and Data Compilation	.7
	5.2	Aeromagnetic Data and Interpretation	.7
6.0	Discuss	sion and Recommendations	.8
7.0	Referen	1C65	.9

LIST OF FIGURES

Figure 1	G2 Project in the SE Gawler Craton
Figure 2	.Reduction and current tenure for Exploration Licence 21594

LIST OF TABLES

Table 1	Tenement Status, November 1	998 G2 Project	2
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LIST OF PLANS

Plan 1	G2 Project (SA) Detailed Aero-Mag Survey Contour Map of Total Magnetic	Intensity
	– Area 1	1:25,000
Plan 2	G2 Project (SA) Detailed Aero-Mag Survey Contour Map of Total Magnetic	Intensity
	– Area 2&3	1:25,000
Plan 3	G2 Project - Colour Image of Total Magnetic Intensity with Sun Illumination	from
	090 Degrees	1:25,000
Plan 4	G2 Project - Colour Image of First Vertical Derivative with Sun Illumination	from
	090 Degrees and colour from Total Magnetic Intensity	1:25,000
Plan 5	G2 Project – Colour Image of Second Vertical Derivative on 10m Upward	
	Continuation with colour from Total Magnetic Intensity	1:25,000
Plan 6	G2 Project - Colour Image of Total Magnetic Intensity with Sun Illumination	ı from
	225 Degrees	1:25,000

LIST OF APPENDICES

Appendix 1	Airborne Geophysical Survey Agreement between Crest and UTS
Appendix 2	Digital Data on CD - UTS Job Reference: A189 - G2 Project 3 Areas
Appendix 3	Exploration Proposal for Exploration Licences 2159 and 2160 South Australia. A
	Report for Crest Resources Australia NL by M H Randall
Appendix 4	Summary Mineralisation Information for Tenement 2159 and 2160
Appendix 5	Depth of Quaternary/Tertiary/Cainozoic Sediment within the Tenement Area 2159
	and 2160

1.0 INTRODUCTION

The tenements are prospective for Moonta, Olympic Dam or Ernest henry type gold-copper mineralisation, diamond bearing kimberlite pipes and diamond placer deposits. The G2 Project is situated at the junction of the major G2 structural corridor extending NW/SE across the Gawler Craton, the EW trending Polda Trough and the Torrens Hinge Zone margin of the Craton. The G2 structure has been interpreted as a major ore forming crustal structure, localising the world class Olympic Dam copper-gold-uranium mine.

In February 1997 Crest Resources Australia NL ("Crest") entered into a Joint Venture agreement with Hazurn Pty Ltd ("Hazurn") to explore the project area. During the 1998 calender year Crest formally withdraw from the joint venture without earning any equity. The tenements are held 100% by Hazurn Pty Ltd.

This report summarises exploration activities undertaken within the project area for the year ending 27 March 1998.

2.0 EXPLORATION MAP INDEX

2.1 Location

The G2 Project is located in the Port Pirie area of South Australia on the south east margin of the Gawler Craton (Figure 1).

2.2 Tenement Status

The Exploration Licences were granted to Hazurn on 29 March 1996. At the end of the second year the tenements were further reduced. Figure 2 illustrates the reduction and current tenure for Exploration Licence 2159.

Table 1 shows the current tenement status for the G2 Project.

Table 1Tenement Status, November 1998G2 Project

Tenement	Area	Date Granted	Hazurn Inferest
E2159	1,125 sq. km	29.03.96	100%
E2160	833 sq.km	29.03.96	100%



SCHEDULE A



3.0 GEOLOGY

3.1 Regional Geology

The project name "G2" refers to the regional lineament visible in satellite imagery, gravity data and in regional magnetic maps. G2 is thought to be one of the controlling factors of the world class Olympic Dam copper-gold-uranium deposit located 350 kilometres to the NNW of the project area (Figure 1). The G2 project tenements straddle the subregional to regional tectono-stratigraphic subdivisions of the Spencer Shelf and the Torrens Hinge Zone.

3.2 Local Geology

The potential for Olympic Dam or Ernest Henry type ore bodies in the project area is indicated by previous stratigraphic drilling encountering signs of major mineralising systems such as haematic breccias and host rock alteration in the Port Broughton area. Though much of the G2 project area, Cainozoic sequences up to 200m thick blanket the prospective Precambrian basement.

4.0 PREVIOUS WORK

Initial exploration on the licences was carried out in the late 1970's and early 1980's, in the rush of activity that followed the initial discovery of Olympic Dam. A series of stratigraphic holes were drilled in the southern portion of the 2160 tenement on an area of coincident elevated magnetics and gravity. Previous drilling has returned anomalous levels of gold and base metal mineralisation. Haematitic breccias, acid volcanics, and zones of alteration were also intersected.

During 1978-81 North Broken Hill Ltd drilled a series of 20 vertical holes in a 400 square kilometre area of coincident magnetic and gravimetric anomalism. In 9 holes spread over a 20 x 7 kilometre area highly anomalous copper, zinc, gold and uranium values were intersected in Gawler Craton basement rocks. The best intercepts included 7.3m at 0.85% Cu, 3.2m at 0.3g/t Au and uranium values up to 250g/t (equivalent to 0.3kg/tonne U308).

In 1996, Hazurn Pty Ltd completed an aeromagnetic survey in conjunction with Mines and Energy South Australia. Copies of the geophysical data and interpretation reports were included in the 1996/97 Annual Report.

In 1997 Crest Resources Australia NL entered into a Joint Venture agreement with Hazurn to explore the G2 Project. Compilation of existing exploration data was completed. Interpretations of the aeromagnetic data located a series of 5 "bulls eye" magnetic highs consistent with either kimberlitic pipes or other discrete intrusive bodies on the margin of the possible diapirically emplaced Yackamurundie Inlier. Brecciation and hydrothermal alteration of the inlier sequences indicate the potential for mineralising systems localised around the inlier margin and hence associated with the discrete anomalies.

5.0 WORK COMPLETED – 1996/1997

Work undertaken on the G2 Project has consisted of various activities that initially have comprised part of an extensive regional assessment of the area. These activities are briefly described below.

5.1 Literature Research and Data Compilation

All available data was compiled and reviewed. Relevant data has been entered into the Hazurn database. During the year Crest commissioned M H Randell to provide an assessment of previous exploration and to propose an exploration strategy to further evaluate Exploration Licences 2159 and 2160. This report is presented in Appendix 3.

Summary mineralisation and depth of Quaternary/Tertiary/Cainozoic sediments within the tenements is presented in Appendix 4 and 5.

5.2 Aeromagnetic Data and Interpretation

In August 1997, Crest undertook a 1200 line kilometre high-resolution low level aeromagnetic survey over three areas covering the Port Broughton drilling and the Yackamurundie "bulls eye" anomalies. The aim was to provide information on structural controls and focus on the anomalous mineralisation intersected in the Port Broughton drill holes as well as to refine the geometry and depth of the Yackamurundie features. Imaging and resolution were still in process at the end of the reporting year, but preliminary results are very encouraging.

The Airborne Geophysical Survey Agreement between Crest and Universal Tracking Systems Pty Ltd ("UTS") which includes survey details is presented as Appendix 1 and images as Plans 1 to 5.

Digital data is presented on CD attached as Appendix 2, UTS Job Reference: A189 - G2 Project 3 Areas.

6.0 **DISCUSSION AND RECOMMENDATIONS**

The exploration conditions on E2159 and E2160 present considerable difficulties. Firstly the tenements are largely covered by broad acre cereal farms and land access will have to be negotiated carefully and in full consideration of the farming community, timing of the proposed exploration programs will be critical due to seasonal cropping and seeding.

Thick sequences of Cainozoic sediments and in some parts Cambrian limestones (often in excess of 100m) overly the prospective Precambrian sequences. Drilling of targets will have to be precise, as the cost of reaching target zones will be high as possible sources to the aeromagnetic anomalies could be either carbonatites or kimberlites at a depth of between <140m to 400m.

Hence, precise target definition will require ground geophysical techniques and possibly geochemical techniques, which cannot be achieved rapidly particularly with regard to the land access conditions mentioned above in endeavouring to minimise interference to crops.

Exploration priorities will be decided when the aeromagnetic interpretations are complete.

7.0 REFERENCES Annual Report Exploration Licence 2160 G2 Project South Searle, J., 1997. Australia. Crest Resources Australia NL. Unpub. Rep. Annual Report Exploration Licence 2159 G2 Project South Searle, J., 1997. Australia. Crest Resources Australia NL. Unpub. Rep. Exploration Proposal for Exploration Licences 2159 and 2160 Randell, M.H., 1997. South Australia. A Report for Crest Resources Australia NL. Unpub. Rep. Preliminary Aeromagnetic Interpretation. Elliot, P.J., and Steele, M.Z., 1996 Hazurn Project: March 1996. Elliot Geophysics Pty Ltd. Prepared for Hazurn Pty Ltd. Unpub. Rep. Previous Exploration: Hazurn Project Area. January 1996. Tonkin, D.G., 1996 David Tonkin and Associates. Prepared for Hazurn Pty Ltd. Unpub. Rep. Hazurn Project: Summary of Geophysical Target Areas for Elliot, P., 1996 Diamond and Gold Exploration. August 1996. Elliot Geophysics Pty Ltd. Prepared for Hazurn Pty Ltd. Unpub. Rep.

APPENDICES

APPENDIX I

Airborne Geophysical Survey Agreement Between Crest and UTS.

AIRBORNE GEOPHYSICAL SURVEY AGREEMENT

Between

[CREST RESOURCES AUSTRALIA NL]

(" the Principal")

and

UNIVERSAL TRACKING SYSTEMS PTY LTD T/A UTS GEOPHYSICS (A.C.N. 058 054 603)

("UTS")

Contract Reference: C00262

CONTENTS

1. SURVEY SPECIFICATIONS AND LOGISTICS	
1.1 GENERAL FLYING SPECIFICATIONS	4
1.2 MOBILISATION. DEMOBILISATION AND ESTABLISHMENT	
1.3 PERSONNEL	4
1.4 ACCOMMODATION. MEALS AND SUPPLIES	5
1.5 SURVEY AIRCRAFT AND EQUIPMENT	5
1.6 SURVEY NAVIGATION AND DATA POSITIONING	6
1.7 BASE STATION DIURNAL MAGNETOMETER	7
1.8 AIRCRAFT MAGNETOMETER	7
1.9 GAMMA RAY SPECTROMETER	7
1.10 Altimeter Data	8
1.11 REFLIGHT SPECIFICATIONS	8
1.12 GOOD STANDARD PRACTISE	9
1.13 COMPANY REPRESENTATIVE	9
1.14 SURVEY ALTERATIONS	9
1.15 Flight Permits	9
1.16 Aboriginal Sacred Sites and Relics	
1.17 SAFETY AND ENVIRONMENTAL MANAGEMENT	
2. DATA PROCESSING SPECIFICATIONS	
	1 1
2.1 DATA PROCESSING.	
2.2 IN-FIELD DATA VERIFICATION AND PROCESSING	
2.3 MAGNETIC DATA PROCESSING.	11 12
2.4 SPECTROMETER DATA PROCESSING	
2.5 FINAL DATA MAPPING AND DIGITAL DATA	
2.6 GENERAL MAP PLOTTING SPECIFICATIONS	
2.7 LOGISTIC REPORT AND PROCESSING	
2.8 DELIVERABLE ITEMS.	
2.9 GOOD STANDARD PRACTISE	
3. SURVEY SCHEDULING	
3.1 DATA ACOUISITION	
3.2 DATA PROCESSING	

4. SURVEY CHARGES AND PAYMENT	
4.1 DATA ACOUISITION AND DATA PROCESSING CHARGES	
4.2 STANDBY CHARGES	
4.3 SCHEDULE OF PAYMENTS	
4.4 ACCOUNT PAYMENT DETAILS	
5. GENERAL CONDITIONS	
5.1 INSURANCE AND INDEMNITIES	
5.2 PROPRIETARY INFORMATION. DUPLICATION AND DISCLOSURE	
5.3 FORCE MAJEURE	
5.4 CHANGES	
5.5 ENTIRE AGREEMENT	
5.6 NOTICE	
5.7 TERMS OF AGREEMENT	
5.8 Premature Termination	
5.9 GOVERNING LAWS	
5.10 PARTIAL INVALIDITY	
5.11 ARBITRATION	
5.12 WAIVERS AND REMEDIES	
5.13 INTERPRETATION	
5.14 USE OF PROPRIETARY PRODUCTS AND INFORMATION	
5.15 SALES TAX	

1. SURVEY SPECIFICATIONS AND LOGISTICS

1.1 General Flying Specifications

This Survey Agreement covers an airborne geophysical survey over three areas near Port Broughton, SA as specified in the table below:

PROSPECT NAME	LINE SPACING	- LINE DIRECTION	TIE LINE SPACING	TIE LINE DIRECTION	SENSOR HEIGHT	SAMPLE DENSITY	TOTAL LINE KM
NW EL2159	100m	090-270	1000m	000-180	35m	<5m	728
EL2159, P1-6	100m	090-270	1000m	000-180	35m	<5m	239
EL2159, P1-4	100m	090-270	1000m	000-180	35m	<5m	98
·····	-						
TOTAL							1065

The total estimated number of line kilometres for this survey is 1065.

The minimum flight line length for the survey will be 500 metres.

The required survey height as stated in the above table may be varied where topographic relief or laws pertaining to built up areas do not allow this altitude to be maintained, or where the safety of the aircraft and equipment is endangered. The pilots decision regarding minimum safe terrain clearance will be conclusive and binding.

The coordinate boundaries for the survey area or areas to be flown are specified in the survey flight schedule or schedules included with this Agreement.

1.2 Mobilisation, Demobilisation and Establishment

UTS will mobilise to and demobilise from the survey area all equipment and crew. All costs incurred in doing so will be paid for by the Principal.

The mobilisation and demobilisation costs relating to this Agreement have been provided in Section 4.1 of this Agreement.

1.3 Personnel

UTS will provide experienced survey operators, technicians, pilots and engineers as required for the survey.

UTS will brief the pilot(s) in all aspects of the survey to ensure that every effort is made by the pilot(s) to maintain the nominated survey height and survey line position (safety considerations permitting).

UTS understands that the final quality of the survey is dependent upon the skill of the pilot(s) to fly the aircraft as required by this Agreement.

1.4 Accommodation, Meals and Supplies

Accommodation costs have been included in the prices quoted in Section 4.1 of this Agreement. No additional charges, other than the costs shown in Section 4.1, will be due for accommodation or supplies as part of this survey Agreement.

1.5 Survey Aircraft and Equipment

UTS will supply all aircraft and equipment necessary for the completion of the survey. This equipment will include:

1.5.1 Survey Aircraft

UTS fixed-wing FU24-950 aircraft. Single engine, piston aircraft.
4.5hour endurance, Av-Gas100 fuel.

1.5.2 Airborne Magnetic Sensors

- UTS designed fixed stinger attachment to the survey aircraft.
- Scintrex CS-2 Cesium Vapour Magnetometer.
- 0.001nT resolution, 0.01nT sensitivity.
- RMS AADCII Automatic Aeromagnetic Digital Compensator.
- 10Hz (0.1 second) magnetic sampling rate.
- Develco Vector Magnetometer (XYZ Components).

1.5.3 Base Station Diurnal Magnetometer

- Sensor #1 Scintrex 'Envi-mag' Proton Magnetometer.
- 0.1nT resolution, 0.1nT sensitivity.
- 0.2Hz (5 second) magnetic sampling rate.
- Sensor #2-Geometrics G-856 Proton Magnetometer.
- 0.1nT resolution, 0.1nT sensitivity.
- 0.1Hz (10 second) magnetic sampling rate.

1.5.4 Gamma Ray Spectrometer (Not Applicable to this Agreement)

- Exploranium Model GR-820 Spectrometer.
- 2 x 16 litre detector packs (32 litre total volume).
- 256 channels.
- 1Hz (1.0 second) sampling rate.
- Digital Temperature and Humidity data recorded.

1.5.5 Altimeters

- King Model KRA-405 Radar Altimeter.
- 0.3 metre accuracy, 0.1 metre resolution.
- 0 500 metre range.
- 10Hz (0.1 second) sampling rate.
- Air DB Barometric Altimeter
- 2 metre accuracy, 0.1 metre resolution.
- 0 3500 metre range.
- 10Hz (0.1 second) sampling rate.

1.5.6 Navigation and Data Positioning System

- Novatel 3951R 12 channel precision differential GPS system.
- RACAL Satellite Differential GPS correction receiver.
- UTS survey navigation software and cockpit guidance system.

1.5.7 Data Acquisition System

- UTS data acquisition, digital recording and output system.
- UTS field processing and quality control system.

1.6 Survey Navigation and Data Positioning

UTS will provide a real-time differential GPS system for aircraft line navigation and for locating of the survey data acquired. The differential GPS signal will be acquired through a satellite transmitted service to ensure real-time differential is maintained throughout the survey.

With optimal satellite geometry, a positional accuracy of 2 metres is obtainable from the differentially corrected GPS data. A positional update will be obtained at a rate of 2Hz or two times per second.

The differential GPS data positions will be digitally recorded in WGS84 datum and converted using a Universal Transverse Mercator Projection to metric Australian Map Grid (AMG) grid coordinates. The survey lines will be flown using the metric grid coordinates.

GPS derived aircraft height above the WGS84 datum will be recorded during the survey.

Additional GPS information including signal details, pseudo-ranges, satellites tracked and dilutions of precision will also be recorded during the survey. The survey flight path will be viewed and verified in the field.

1.7 Base Station Diurnal Magnetometer

UTS will supply two (2) base station magnetometers to monitor diurnal variations. The digital data recorded will be used to correct the magnetic data collected by the survey aircraft.

The base station magnetic sensors will be placed in a low gradient area beyond the region of influence by any man made interference. The sensor will be located within the survey area or at the nearest practicable airstrip or town.

The base station magnetometers will be synchronised with the survey aircraft acquisition system to within +/-2 seconds and will be operated during all survey acquisition flights.

The base station data will be digitally recorded at a cycle rate of 0.2Hz or at 5 second intervals). Instrument resolution and sensitivity will be 0.1nT.

No survey data will be provided within 5 minutes of those periods where the diurnal magnetic field departs more than 10nT from a straight line chord 10 minutes in length. The diurnal variations will be checked in-field on a daily basis.

1.8 Aircraft Magnetometer

Readings of the magnetic field (total magnetic intensity) will be digitally recorded at a resolution of 0.001nT at a 10Hz or 0.1 second reading interval.

At the start of the survey the system will be calibrated for reduction of heading error. The residual heading error for the aircraft will be less than 2nT over all flight directions.

The magnetometer shall have a nominal noise envelope not exceeding +/- 0.2nT peakto-peak. Section 1.11 of this Agreement provides reflight specifications relating to magnetometer noise levels exceeding this specification.

The magnetic data will be recorded digitally. An electronic synchronisation system will monitor and measure system parallax.

1.9 Gamma Ray Spectrometer (Not Applicable to this Agreement)

Where gamma ray spectrometer readings are acquired, data will be collected in 256 channels. One channel will be assigned for the collection of cosmic radiation by having its lower bound at 3MeV and its upper bound at 6MeV.

The main detectors will use at least 32 litres of sodium iodide crystals. If upward detectors are used to monitor background radiation, the volume of the upward looking detectors will be at least one quarter of the main detectors. The spectrometer used for the survey will be self-calibrating and auto-stabilising.

Thorium source tests will be performed before and after each survey flight to ensure system sensitivity remains constant. Resolution of the instrument will also be checked on a daily basis using the thorium source test.

A survey test line of at least 4Km will be flown each day at the nominal survey height to determine the effect of soil moisture and to ensure the equipment is functioning correctly.

Radiometric measurements will be made at one second intervals.

1.10 Altimeter Data

The radar altitude, or height above the terrain, of the survey data will be digitally recorded at a rate of 10Hz or once every 0.1 seconds. During the data processing stage, the altimeter data will be suitably filtered so that the final altimeter values are not spot heights.

Barometric height (and pressure) will be digitally recorded at a sample rate of 10Hz or once every 0.1 seconds.

1.11 Reflight Specifications

Unless otherwise specified by the Principal, data will be reflown under the following conditions at the expense of UTS. All reflown sections of survey lines must cross at least two tie lines.

- The actual flight line separation exceeds 50% of the planned survey line spacing over a continuous distance exceeding 1000 metres or where survey lines cross. The line spacing measurements to be used in determining such reflights will be made from the field flight path plots.
- The terrain clearance exceeds the planned survey terrain clearance by +/- 4 metres over a continuous distance exceeding 1000 metres, commensurate with the safety of the aircraft and equipment.

Terrain clearance deviation will be dependent upon tree canopy height, GPS satellite signal acquisition, topographic relief, aviation regulations and commensurate with the safety of the aircraft and equipment. The pilots decision regarding minimum safe terrain clearance will be conclusive and binding.

- The magnetometer instrument noise envelope of +/-0.2nT is exceeded over a cumulative total of 1000 metres or more of one survey flight line.
- The aircraft pilot makes radio transmissions which interfere with the magnetic response.

- The departures of the diurnal magnetic field from a straight line chord 10 minutes in length, exceeds 10nT.
- The base station recorded magnetometer instrument noise levels are in excess of 2nT for periods longer than 10 minutes or where both base stations have ceased to function.

1.12 Good Standard Practise

UTS will carry out and complete the survey in a diligent and workmanlike manner and in accordance with the details specified in this Agreement and in accordance with good standard practise appropriate to the airborne geophysical survey industry and by taking advantage so far as is reasonably practicable of the latest development of techniques in that industry.

1.13 Company Representative

At its own cost and expense, the Principal may arrange for a geologist or geophysicist ("The Company Representative") to be available with respect to the survey. Although it is understood that UTS is an independent contractor and shall have full right to direct the performance of the survey, The Company Representative shall have the right to inspect and review the data as and when collected. UTS and the Principal, in consultation and agreement with each other, shall have the right to vary the survey within the terms of the variations provided herein.

1.14 Survey Alterations

If after commencement of operations, the Principal cancels or reduces the scope of work contemplated by this Agreement for reasons other than may be reasonably attributable to UTS, the Principal shall remain liable to UTS for the full amount of the consideration specified in this Agreement.

The survey area may be extended by the Principal with agreement by UTS, with the request for extension being in writing by the Principal and with adequate notice.

1.15 Flight Permits

UTS shall ensure that all necessary flight licenses and permits have been obtained as may be required to authorise the survey to be conducted. However, where inhabited areas exist within or adjacent to the survey areas the specifications regarding line spacing and terrain clearance may be disregarded by UTS unless special dispensation has been granted to enable low flying over the inhabited areas.

The Principal shall ensure that all requirements of the relevant Government exploration regulations have been fulfilled in particular those pertaining to notification of landowners of the intended airborne survey.

1.16 Aboriginal Sacred Sites and Relics

UTS shall provide the services under this Agreement so as to prevent any damage or interference with any known Aboriginal Sacred Sites or Relics. UTS's personnel shall not enter onto, or fly over any Aboriginal Sacred sites without the prior consent of the Principal and/or the appropriate statutory authority.

1.17 Safety and Environmental Management

UTS is committed to providing and maintaining a safe and healthy work environment during all its work activities. We will ensure that the highest priority is given to the development, review and improvement of all its safety practises and procedures.

A copy of the company Safety and Environmental Management Statement has been included with this Agreement.

2. DATA PROCESSING SPECIFICATIONS

2.1 Data Processing

UTS will provide the data processing products as specified or requested in the following sections.

2.2 In-field Data Verification and Processing

At the conclusion of each survey day, the acquired survey data will be read from the survey aircraft field tapes and transferred to the in-field processing system.

Highest priority will be given to the quality control and quality assurance of the survey data through the use of computer software packages and quality assurance procedures.

A flight path plot will be produced from the differentially corrected GPS positions for flight path verification.

The located magnetic data will be suitably gridded and contoured for the purpose of magnetic data verification. The magnetic data will not be levelled in the field.

The recorded base station magnetic data will be transferred to the in-field computer and plotted daily as profiles for base station diurnal data verification.

The radar altitude and GPS height data will be plotted individually for data verification.

Where spectrometer data is acquired, daily thorium source tests for monitoring of system sensitivity and resolution will be performed and suitably recorded on the daily flight logs and plotted for checking. Plots of the average accumulated spectrum of each survey line will be produced to monitor spectral drift. Plots of the survey test line will also be produced and monitored.

The above quality control procedures and data produced will be available for inspection by the Principal.

2.3 Magnetic Data Processing

The raw magnetic data will be corrected for magnetic regional gradient in accordance with the current version of the IGRF model computed at the date of the survey.

Data from one of the two base station magnetometers will be used for removal of magnetic diurnal influences. In the event that this instrument has failed, data from the second base station will be used with the appropriate offset in magnetic level applied to compensate for the difference in magnetic level at each base station location. The offset will be derived from the two base stations recorded simultaneously during each survey.

The magnetic survey data will be levelled using the tie line data and further enhanced using microlevelling techniques.

The levelled magnetic data will be gridded and contoured for production of preliminary verification contour plots. The grid interval used will be a ratio of 1:5 of the survey flight line spacing.

The preliminary contour plot will be plotted on paper in black ink at a suitable scale to fit one map sheet. A flight path map will be plotted on the same map as the contour map defined above. On acceptance of these verification maps, final magnetic maps and products will be produced.

2.4 Spectrometer Data Processing (Not applicable to this Agreement)

Where spectrometer data has been acquired, the following processing methods will be applied to the survey data to standardise the airborne measurements to ground concentrations. These procedures have been defined in Grasty and Minty (1995).

The raw 256 channel data will be used to re-calibrate the energy spectrum between the potassium and thorium peaks.

Dead time corrections and cosmic and aircraft background removal will be applied. Radon background removal will be performed using the Minty spectral ratio method (1992).

Radar altimeter height, air temperature and barometric pressure data will be used to determine the effective height at standard temperature and pressure.

Spectral stripping will be performed using the stripping ratios determined during the pad calibration of the system.

The background corrected and stripped count rates will be corrected for variations in the altitude of the detector using data from the radar altimeter. Conversion to ground equivalent radioelement concentrations will be performed.

The channels of total count, potassium, uranium and thorium will be levelled as required to produce the final radiometric data. These four channels will be individually gridded to produce verification contour maps. The preliminary contour maps will be plotted on paper in black ink at a suitable scale to fit one map sheet. On acceptance of these verification maps, final contour maps and products will be produced.

2.5 Final Data Mapping and Digital Data

Upon acceptance of the preliminary plots defined in Section 2.3 and 2.4, UTS will supply to the Principal the following final data processing products.

Map sheet boundaries must be specified by the Principal prior to production of any final maps.

2.5.1 Magnetic Maps

A contour map of total magnetic intensity will be produced on film at a scale of 1:25,000. The contour interval used for the magnetic contour map will be agreed between UTS and the Principal on presentation of the verification contour map.

2.5.2 Radiometric Maps

Where radiometric data has been acquired, colour contour maps of total count will be produced on film at a scale of 1:100,000. The contour interval used for these contour maps will be agreed between UTS and the Principal on presentation of the verification contour map.

2.5.3 Digital Survey Data

The final located and gridded digital data will be provided on CD-ROM in ASCII format.

The final located magnetic data will contain the following fields for each magnetic sample recorded:

- Flight line number
- Survey area number and flight number
- Flight date (DDMMYY)
- Fiducial number
- Time of reading (local time)
- Universal Transverse Mercator (UTM) zone number
- Easting (metres)
- Northing (metres)
- Latitude (WGS84)
- Longitude (WGS84)
- Radar altimeter height (metres)
- GPS height (metres)
- Raw total magnetic intensity reading (nT)
- Diurnal magnetic correction applied (nT)
- Final levelled total magnetic intensity (nT)
- IGRF correction applied (nT)
- Final levelled, IGRF corrected total magnetic intensity (nT)

Gridded data will be provided for total magnetic intensity. Grid formats supplied will be ER-Mapper, Geosoft 2-byte integer format and GXF format.

Where radiometric data has been acquired, the final located radiometric data will contain the following fields for each radiometric sample recorded:

- Flight line number
- Survey area number and flight number
- Flight date (DDMMYY)
- Time of reading (local time)
- Universal Transverse Mercator (UTM) zone number
- Easting (metres)
- Northing (metres)

- Latitude (WGS84)
- Longitude (WGS84)
- Radar altimeter height (metres)
- GPS height (metres)
- Barometric height (metres)
- Barometric pressure (mb)
- Air temperature (degrees Celsius)
- Humidity (percent)
- Raw total count
- Raw potassium
- Raw thorium
- Raw uranium
- Raw cosmic
- Corrected total count
- Corrected potassium
- Corrected thorium
- Corrected uranium

Gridded data will be provided for the total count, potassium, thorium and uranium channels. Grid formats supplied will be ER-Mapper, Geosoft 2-byte integer format and GXF format.

A ASCII located data file will be provided for the RAW radiometric counts for the full 256 channels.

Further processed maps, profiles, contours or images may be ordered through UTS, but do not form part of this Agreement.

2.6 General Map Plotting Specifications

Plastic stable base materials will be used for the final maps unless otherwise specified. The title block will be at the southern end or eastern border of each sheet. All data plotted on each sheet will be plotted such that it can be read from the southern or eastern edge of the sheet.

For each pair of geophysical maps, the corners of the sheet areas should align exactly when the sheet borders are aligned.

2.7 Logistic Report and Processing

UTS will provide an airborne survey logistics report and processing (two copies) with the final survey data. This report will cover the parameters and techniques utilised on the survey including the base of operation, aircraft details, equipment used, personnel, flight information, processing details and data descriptions.

2.8 Deliverable Items

UTS shall deliver to the Principal all data derived from the survey including, but not limited to:

- Verification maps as specified in section 2.3 and 2.4 of this Agreement.
- Final maps as specified in section 2.5 of this Agreement.
- Final digital data as specified in section 2.5 of this Agreement.
- Logistics report (two copies) summarising the survey operations, data processing and describing the survey equipment and specifications.
- all materials supplied by the Principal or acquired by UTS in relation to the survey.

All data and maps supplied will be correctly annotated and clearly and comprehensively labelled before being delivered to the Principal.

Descriptive documentation of the formats used for all data supplied will be provided by UTS to facilitate any further processing.

2.9 Good Standard Practise

UTS will carry out and complete the data processing in a diligent and workmanlike manner and in accordance with the details specified in this Agreement and in accordance with good standard practise appropriate to the airborne geophysical survey industry and by taking advantage so far as is reasonably practicable of the latest development of techniques in that industry.
3. SURVEY SCHEDULING

3.1 Data Acquisition

Flying is expected to take place in late May to early June 1997, unless supplies of aviation fuel are limited or restricted or access to the survey area is prevented due to poor weather conditions. The survey will be continuously flown until completed, with an expected duration of 2-3 days. The survey base of operations is anticipated to be Port Broughton, SA.

3.2 Data Processing

Preliminary geophysical maps will be expected to be delivered within 21 days of receipt of all data in the UTS Perth office after completion of the data acquisition stage. Final maps will be available within 7 days of acceptance of the preliminary maps.

4. SURVEY CHARGES AND PAYMENT

(All survey charges are quoted in Australian dollars).

4.1 Data Acquisition and Data Processing Charges

The charge by UTS for data acquisition as described in Section 1 and data processing as described in Section 2, will be:

Mobilisation / demobilisation:	\$ 950.00
Data acquisition and preliminary data processing:	\$ 12,500.00
Total cost as per this Agreement:	\$ 13,450.00

4.2 Standby Charges

No standby charges are applicable under this survey Agreement.

4.3 Schedule of Payments

The schedule of payments will be as follows:

- a) A first progress payment of 30% of the estimated total contract price as defined in Section 4.1 upon mobilisation of the UTS crew.
- b) A second progress payment of a further 50% of the estimated total contract price as defined in Section 4.1 on completion of flying with partial payments of this amount due at the end of each calendar month for 50% of the contract value for that month.
- c) A third progress payment of a further 10% of the estimated contract price as defined in Section 4.1 on delivery of preliminary maps
- d) The balance of contract price on final delivery of all items as defined Section 2.8 of this Agreement.

UTS reserves the right to withhold delivery of data until receipt of the first and second progress payments at UTS Perth office.

4.4 Account Payment Details

The Principal shall pay the amount of the invoices in Australian funds within 14 days of receipt thereof to the account of:

Universal Tracking Systems Pty Ltd Valentine Road, Perth Airport P.O. Box 126 BELMONT WA 6104 Telephone: +61 9 479 4232 Facsimile: +61 9 479 7361

5. GENERAL CONDITIONS

5.1 Insurance and Indemnities

It is understood and agreed that UTS is, and shall be deemed and treated as, an independent contractor, that none of its employees, agents or subcontractors shall be employees of the Principal for any purposes and it is further agreed that as an independent contractor, UTS shall:

- 5.1.1 Accept responsibility and liability for:
 - all equipment used by it
 - all personnel employed by it and
 - all claims against it by third parties other than those arising out of any negligent act or omission of the Principal and/or its employees and sub-contractors if any.
- 5.1.2 Maintain in full force and effect insurance against risks to persons, including death, and property arising from its operations hereunder including Public Liability, Workers Compensation and Employer's Liability Insurance as specified below:
 - Workers Compensation & Employers Liability as per the relevant Government Act.
 - Worldwide Public Liability to a limit of \$5,000,000.
- 5.1.3 Accept responsibility and liability for and pay promptly all dues and assessments payable under workers compensation legislation in respect of its employees.
- 5.1.4 Insure its equipment against damage and accidents.
- 5.1.5 Keep safe and hold harmless the Principal and assume the entire risk and liability for all and any suits, claims, causes of action, liability and damages of any kind, whether direct of consequential, brought asserted or recovered against the Principal, by third parties arising out of negligent act or omission of UTS or its employees, servants and agents in the Agreement, unless such suits, claims, causes of action or liability are caused by a negligent act or omission by the Principal or failure of the Principal to comply with its obligations under the relevant common laws or statutes of the Local and/or Federal Government of Australia.
- 5.1.6 Within seven (7) days upon request from the Principal produce evidence of the Insurance policies required as aforesaid with evidence that such policies are current and all premiums have been paid.
- 5.1.7 If it receives notice from an insurer that any one or more of the said policies of Insurance are terminated or cancelled, UTS shall forthwith notify the Principal in writing within two (2) days of receipt of such notice and use its best endeavour to obtain substitute policy and policies of Insurance.

5.1.8 UTS or its agents shall not be liable to the Principal for any loss of use, profit or product whether such loss is based, or claimed to be based, upon any breach of either parties obligations under this Agreement, or whether such loss is based, or claimed to be based, upon any negligent act or omission of a party, its personnel, agents or appointed representatives.

5.2 Proprietary Information, Duplication and Disclosure

UTS hereby agrees that any confidential documents and information provided to it by the Principal to enable it to perform its obligations and duties under this Agreement shall be held in confidence by UTS and utilised solely for the performance of its obligations and duties hereunder and shall be returned to the Principal upon receipt by UTS of a written request for same and UTS further agrees and acknowledges that all specifications, results, data, materials and maps relating to or resulting from the services to be provided under this Agreement are the sole property of the Principal and further UTS shall use its best endeavours to ensure that its lawful employees, agents and contractors shall not without the prior written consent of the Principal retain for their own use, duplicate or disclose to a third party any such confidential documents, information, specifications, results, data, materials and maps.

5.3 Force Majeure

UTS will not be responsible for delays caused by acts of God, fire, wars, riots, strikes, bushfires, floods, or other acts beyond the reasonable control of UTS. It is agreed that UTS's obligations hereunder shall be suspended for the duration of any of the aforesaid events of force majeure providing always, however, that should any event delay in any aspect the performance of this Agreement for the period of seven (7) days or longer, both the Principal and UTS shall be entitled to determine the Agreement by written notice to the other party.

It is further agreed that UTS shall promptly advise the Principal in writing of any such event of force majeure giving reasonable full particulars thereof, together with the likely period of suspension involved.

Any determination regarding this Agreement by the Principal or UTS under these force majeure provisions shall provide for payment to UTS of initial mobilisation-demobilisation costs and payments to UTS to the value of work completed before the force majeure conditions prevailed.

5.4 Changes

The Principal may by written notice to UTS request changes and variations to the manner and mode of the survey to be performed by UTS hereunder and in the event that any such said changes or variations cause either an increase or decrease in the cost of the said survey and, or in the alternative, in the time required for the proper performance of the said survey, UTS shall within seven (7) days of the date of receipt of the said notice requesting changes and/or variations, notify the Principal in writing of its claim, if any, for an adjustment to be made either to the charges to be rendered hereunder and, or in the alternative, to the time required to perform and complete the said survey.

The provisions of this Agreement shall then thereby be deemed to be amended to that extent provided however that any such said changes and/or variations shall not permit or excuse UTS from continuing to perform its duties and obligations hereunder in a timely and orderly manner.

5.5 Entire Agreement

This Agreement is deemed to express, embody and supersede all understandings, agreements and commitments, written or oral between the Principal and UTS in respect of the survey.

5.6 Notice

All notices, consent, advices, reports, invoices or other communications required by authorisation by this Agreement shall be in writing or where given by telephone shall be confirmed in writing and shall be hand delivered, or sent by mail, telex, telegram or facsimile. Any other notice or other communication given under this Agreement may be sent by prepaid postage and notice shall be deemed to have been given two (2) days following its posting. Any notice or other communication hereunder delivered by hand shall be deemed to have been given on the day following delivery.

The address to be used for the service of notices in case of UTS is:

Universal Tracking Systems Pty Ltd Contract Administration P.O. Box 126 BELMONT WA 6104 Facsimile: +61 9 479 7361

5.7 Terms of Agreement

This Agreement shall commence on the date of execution and shall continue and remain in full force and effect whilst any obligation by either party remains outstanding hereunder unless terminated pursuant to Section 5.8 hereunder.

5.8 Premature Termination

This Agreement may be terminated by either party hereto upon thirty (30) days written notice. Premature termination shall not be deemed to release UTS from its obligations to deliver all original and processed data completed as at the date of termination or data which could be processed as a result of work completed to the date of termination. Should the Principal terminate this Agreement or any portion of the work UTS shall stop performance of the work involved on the effective date of termination.

Upon receipt and verification of UTS invoice, the Principal shall pay UTS all amounts properly due and owing for work performed to that date. Additionally, the Principal shall pay UTS, subject to the Principal audit, costs incurred by UTS within thirty (30) days following the effective date of termination as a direct result of such termination (including, but not limited to, reasonable cancellation charges actually paid by UTS to

its vendors, reasonable demobilisation charges and reasonable costs incurred in preserving or protecting materials, equipment or work in progress at the time of termination), plus an amount equal to fifteen percent (15%) of the foregoing termination costs in full settlement of all UTS claims for other costs and loss of anticipated profits.

5.9 Governing Laws

This Agreement shall be governed and construed in accordance with the Laws of the State of Western Australia and the parties hereto submit to the jurisdiction of the courts of that state and any courts competent to hear appeals therefrom.

5.10 Partial Invalidity

If at any time any provision of this Agreement is, or becomes illegal, invalid or unenforceable in any respect under the law of any jurisdiction, that provision shall be deemed severable from the rest of this Agreement and neither the legality, validity or enforceability of such provision under the law of any other jurisdiction shall in any way be affected or impaired thereby.

5.11 Arbitration

In the event of any dispute or difference arising between the parties hereto as to the construction of this Agreement, or to any matter or thing arising hereunder or in connection herewith then either party may give to the other notice in writing of such dispute or difference and requiring the same to be submitted to arbitration under this clause.

Forthwith after giving of such a notice, the parties shall consult in order to agree upon an arbitrator and, within seven (7) days of the date of which the notice is received the dispute shall be referred to arbitration in Perth in accordance with the Arbitration Act of Western Australia. Failing agreement between the parties on the appointment of an Arbitrator the dispute difference shall be settled by an Arbitrator to be appointed by the President for the time being of The Australasian Institute of Mining and Metallurgy. An award made by an Arbitrator under this clause shall be final and binding on the parties.

5.12 Waivers and Remedies

No failure on the part of either party to exercise, nor any delay in exercising, any right or remedy under the provision of this Agreement shall operate as a waiver thereof; nor shall any single or partial exercise of or failure to exercise, any right or remedy prevent any further or other exercise thereof or the exercise of any other right or remedy.

5.13 Interpretation

In this Agreement words imparting the singular or plural number shall include the plural and singular number respectively and words imparting a particular gender only shall include all genders.

5.14 Use of Proprietary Products and Information

UTS warrants that it will not use or incorporate in the work performed under this Agreement, any patented invention belonging to a third party, being a party not a signatory, to this Agreement, under which UTS or the Principal does not have rights, and that it will not use or incorporate in the work to be performed under this Agreement, any confidential or proprietary information belonging to a third party under which UTS or the Principal does not have rights.

5.15 Sales Tax

Sales tax exemption is to be claimed under this Agreement.

COORDINATES REPORT

Job ID code: Q0530a Client: Crest Resources Australia NL Job: G2 Project Zone 53

Surround Area1 766500.000 6299000.000 766500.000 6304000.000 779000.000 6304000.000 779000.000 6299000.000



COORDINATES REPORT

Job ID code: Q0530b Client: Crest Resources Australia NL Job: G2 Project, P2-6 Zone 54

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252000.000	6291000.000
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UTS offers to performs the above services at the stated charges

Signed on behalf of UTS: Wield

Position:

STRECTOR MANAGING

Date:

5 MAY 1997

Crest Resources Australia NL accepts the above offer

Signed on behalf of Crest Resources Australia NL:

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Position:

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Date:

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Universal Tracking Systems Pty Ltd

Occupational Safety, Health, Welfare and Environment Statement

Universal Tracking Systems is committed to providing and maintaining a safe and healthy work environment during all its work activities. We will ensure that the highest priority is given to the development, review and improvement of all its safety practises and procedures.

We recognise this commitment extends to our employees, client personnel and to the general public who may be affected by our activities.

In the promotion of health, safety and the environment, Universal Tracking Systems undertake to:

- provide and maintain a safe and healthy work environment with adequate welfare facilities.
- develop, implement and monitor effective safe work methods and standards through consultation and involvement of employees.
- provide appropriate education and training regarding health, safety and protection of the environment.
- implement procedures ensuring high standards of environmental quality is achieved.
- observe all Federal, State and Local environmental, occupational health and safety regulations and to promote improvement in these regulations.
- to insist that all sub-contractors used by Universal Tracking Systems operate with policies and practises of an appropriate high standard.

Through the successful application of these policies and practises, Universal Tracking Systems strive to provide an operation with high safety standards, improved service to our customers and in turn benefit from higher profitability.

N E Goodey Managing Director

APPENDICES

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APPENDIX 2

Digital Data on CD - UTS Job Reference: A189 – G2 Project 3 Areas.

APPENDIX 2

Digital data on CD (00000171) To be retrieved from hard copy only

APPENDICES

APPENDIX 3

Exploration Proposal for Exploration Licences 2159 and 2160 South Australia. A Report for Crest Resources Australia NL by M H Randall.

Heron/Report/Annual/G2 Project (981121)

EXPLORATION PROPOSAL FOR

EXPLORATION LICENCES 2159 AND 2160

SOUTH AUSTRALIA

A Report for

Crest Resources Australia NL

by M H Randell

Stirling, South Australia April 1997

Contents

EXECUTIVE SUMMARY

1.0	INTRODUCTION	1
2.0	PREVIOUS EXPLORATION	2
3.0	SIGNIFICANCE OF BULLSEYE MAGNETIC ANOMALIES	2
4.0	ECONOMIC POTENTIAL OF TENEMENTS	4
5.0	SITE INSPECTION AND ORIENTATION SOIL SAMPLING	5
6.0	PROPOSED WORK PROGRAM	6
7.0	COSTING OF PROPOSED PROGRAM	7
8.0	CONCLUSIONS	8

REFERENCES

List of Figures

Figure 1	Location Plan
Figure 2	Drill holes on EL 2160 "A" (before area reduction)
Figure 3	Drill holes on EL 2160 "B" and EL 2159 (before area reduction)
Figure 4	Magnetic contours showing anomalies P1-6 and 143-147
Figure 5	Location of soil traverses and proposed exploration program

EXECUTIVE SUMMARY

Three significant magnetic anomalies have been discovered by South Australian Exploration Initiative aeromagnetic surveys in Area B6 which includes Exploration Licences 2159 and 2160. The anomalies lie under about 120 metres of Tertiary sediments and alluvium of the Broughton River floodplain. Modelling of the anomalies suggests a dyke or series of plugs with a strike length of some three (3) kilometres and widths up to 600 metres. Rocks associated with the anomalies have potential to host

* diamonds in a kimberlite or lamproite pipes

* copper-gold-magnetite in a skarn setting

* gold and platinum group elements in mafic or ultramafic dykes.

Drilling is recommended.

1.0 INTRODUCTION

This report has been commissioned by Crest Resources Australia NL (Crest) to provide an assessment of previous exploration and to propose an exploration strategy to further evaluate Exploration Licences 2159 and 2160.

The licences were granted to Hazurn Pty Ltd (Hazurn) on 29 March 1996 over areas of 2638 square kilometres and 1267 square kilometres respectively. At the end of the first year the areas of EL 2159 and 2160 were reduced to 2160 square kilometres and 1835 square kilometres respectively and South Australian Exploration Initiative (SAEI) expenditure commitments were relaxed. It is understood that Hazurn has not undertaken field work although an interpretation of aeromagnetic data and a literature survey have been completed (Elliott, 1996). The licences have been renewed to 28 March 1998. Expenditure for the year is probably in the order of \$320,000 (calculated on the basis of \$30,000 per tenement per year plus \$97 per year per square kilometre of tenement area).

Crest has entered a joint venture with Hazurn which will allow it to earn a 51% interest in the licences by expending \$1 million in a twelve month period. Minimum expenditure is \$50,000 to be spent by the end of July 1997.

Crest is keen to evaluate the property for gold and base metal targets : preliminary structural and aeromagnetic interpretations highlight the location of the tenements at the intersection of the G2 and G7 structural corridors. This intersection is considered to be prospective for deep seated mineralising systems.

2.0 PREVIOUS EXPLORATION

David Tonkin and Associates undertook a literature search of reports describing previous exploration of the Hazurn project area which at the time comprised ELA's 32/94 and 33/94 (Tonkin, 1996). The survey was substantially based on summaries published in Mineral Industry Quarterly, South Australia, and provides tables of expired Special Mining Leases and Exploration Licences; related Mines and Energy South Australia (MESA) Envelope numbers; and bottom hole intersections of stratigraphic drill holes. Tonkin's report highlights intensive base metal exploration in the Torrens Hinge Zone aimed at co-incident gravity and magnetic anomalies. A data package prepared by Crest includes details of this work.

An important omission from Tonkin's search is diamond exploration work undertaken by Dampier Mining Company Pty Ltd on Exploration Licence 598 in 1981 (MESA Envelope 3812). This included aeromagnetic surveys, loam sampling, bulk gravel sampling (which recovered kimberlitic indicator minerals), and drilling. The implications of this program are discussed in section 3.0.

A printout of MESA's database is reproduced in figures 2 and 3 which show the location of all holes in the vicinity of EL's 2159 and 2160 (excluding water bores). This interrogation confirms the position of holes drilled in the search for basemetals and highlights the presence of holes drilled for diamonds and coal which are important in providing depth-to-basement information.

The most recent exploration is the aeromagnetic survey flown in 1994 as part of MESA's SAEI. The survey confirmed structural domains which underlie EL's 2159 and 2160 and identified numerous bullseye magnetic anomalies. Modelling of the latter suggests a series of pipes or dyke-like bodies. They have not been tested.

3.0 SIGNIFICANCE OF BULLSEYE MAGNETIC ANOMALIES

Dampier Mining Company Pty Ltd flew low level magnetics over portion of EL 2159 in 1981 and identified five (5) small magnetic anomalies which were numbered 143 to 147 inclusive (see figure 4).

It is important to realise that the Dampier survey did not cover the three largest bullseye anomalies in the SAEI survey over Hazurn's ground (see figure 4).

2

The following table lists currently identified anomalies (from north to south) in the eastern part of EL 2159.

Anomaly Centre AMG East	Anomaly Centre AMG North	Elliott Name	Dampier Name	Modelled Dimensions	Comment
251300	6290500	P2	147	226m deep 50m wide	Surface rocks are Rhynie Sandstone
249250	6289350	P5	Not named	Not modelled	Surface rocks are Callana Gp metasedimentss and breccias
250100	6288250	Not named	145	Not modelled	Surface rocks are Callana Gp metasedimentss and breccias
250600	6288250	Not named	146	Not modelled	At contact of Rhynie Sandstone and Callana Gp
248250	6287800	P6	143	282m deep 200m wide	Covered by Quaternary sediments. PSN 36 drilled to 16m into Rhynie Sandstone
250700	6287300	Not named	144	Not modelled	At contact of Rhynie Sandstone and Callana Gp
247500	6280700	P1	Not Flown	200 deep 600m wide	Quaternary cover
247250	6279000	Р3	Not Flown	355m deep 150m wide	Quaternary cover
246800	6277900	P4	Not Flown	136m deep 100m wide	Quaternary cover

Bullseye anomalies detected by Dampier lie at or near a small inlier of ?Callana Group metasediments within Rhynie Sandstones of significantly younger age. The Yackamoorundie Inlier was discovered and named during mapping of the Burra 1:250,000 sheet in 1993 by MESA geologists (Cowley,1993). It is most likely a diapiric structure and the strong co-incidence of magnetic anomalies suggest that faulted diapir margins have provided a locus for possible intrusion of magnetite-rich kimberlite, dolerite or even acid igneous plugs or dykes. Sandstones and siltstones in the inlier are brecciated and show recrystallisation due to lower greenschist metamorphism. The presence of K-feldspar, mica, tourmaline, rutile and talc may indicate hydrothermal alteration. Specular hematite is recorded at one locality.

Anomalies P1, P2 and P3 lie about 5 kilometres along strike and to the south west of the Yackamoorundie Inlier and are entirely covered by Tertiary sand and silt and Quaternary sediments. Bore holes within 2 kilometres of P3 and P4 recorded depths to pre-Tertiary of 116 and 128 metres. It is quite possible that all magnetic

3

anomalies are genetically linked and that diapiric rocks will host magnetic source rocks at the buried locations.

Dampier recovered kimberlitic indicator minerals during bulk sampling of Tertiary gravels in 1981. Two of the five aeromagnetic anomalies located by them were confirmed by ground surveys and one was tested with a percussion hole. This hole (PSN 36) intersected Tertiary gravel from 8 to 14 metres before entering Rhynie Sandstone. The gravels contained iron-rich magnetic fragments which may account for observed magnetic signatures.

4.0 ECONOMIC POTENTIAL OF TENEMENTS

As noted in the Introduction, EL's 2159 and 2160 lie close to the intersection of the G2 and G7 structural corridors. Although this may enhance prospectivity of the tenements the structural corridors are too wide to generate actual drill targets. Of more importance is the structural framework shown in figure 1 : the Torrens Hinge Zone has crustal fractures which have allowed accumulation of deep Adelaide Geosyncline rocks to the east and shallow time equivalent rocks on the Stuart/Spencer shelf to the west. It is not surprising that co-incident gravity-magnetic highs near Port Pirie have received considerable exploration attention! Drilling of the anomalies has failed to locate substantial mineralisation but has shown that the highs are most likely due to horst/graben faulting producing a relatively shallow block (Plimer, 1980).

Although the economic potential of the western portion of EL 2159 is not exhausted, further testing of this area will be expensive due to target depths.

Aeromagnetic surveying of Area B6 has confirmed the structural setting and has identified other areas of potential in EL 2159 :

(1) a magnetic high of huge dimensions (30 km long, 20 km wide) dominates the southern portion of EL 2159. The high is interpreted as a deep magnetite bearing sedimentary package or a large intrusive (Elliott, 1996). If it is a deep granite the prospectivity of other features is enhanced as it could provide a source for metal rich hydrothermal solutions.

(2) six or more bullseye anomalies have potential to be dykes or pipes which could host base and precious metals or diamonds.

Shallow coal or alluvial deposits are unlikely to represent attractive targets.

5.0 SITE INSPECTION AND ORIENTATION SOIL SAMPLING

On 15 April 1997 the district containing magnetic anomalies P1 to P6 was visited to assess ground conditions, current land usage, and to collect orientation soil samples.

The land is tightly held as freehold and pastoral leases and is used for mixed wheat and sheep farming. Road verges are narrow and are unlikely to afford sufficient space to operate a drill rig. The only apparent restraint to drill access will be gaining landowner approval and negotiating appropriate compensation in instances where crops may be disturbed. There are ample water resources available provided that access to SAWater can be arranged.

Eighteen soil samples were collected on four traverses which cross or pass close to four magnetic anomalies. The samples were collected at 250 metre intervals from roadside verges and were taken from B horizon soils at a depth of 10 cm. Samples were unsieved and stored in sealed plastic packages. The samples uniformly comprised red-brown loamy soils which most likely have been disturbed by roadmaking/farming activities in the last few decades. Traverses are shown on figure 5 and listed below :

Traverse	Start	End	Length	Sample Numbers
144	250020 mE 6286750 mN	251000 mE 6286660 mN	1.0 km	182401 to 182405 (5)
P2 or 147	250870 mE 6290630 mN	-		182406 (1)
P1	248550 mE 6280300 mN	246800 mE 8281270 mN	2.0 km	182407 to 182415 (15)
Ρ4	246380 mE 6278200 mN	246880 mE 6278200 mN	0.75 km	182416 to 182418 (3)

The samples have been submitted to Analabs, Perth, for MMI analysis for Cu, Pb, Zn, Cd, Ni, Au, Ag, Co and Pd. Potential contamination of the samples could arise from

* Cu contained in fertilisers applied to nearby agricultural land

* Pb from vehicle exhaust fumes

* Zn washed from galvanised fencing wire in the vicinity of most sample sites.

5

6.0 PROPOSED WORK PROGRAM

An exploration program to assess EL's 2159 and 2160 should at least include

* continued research and evaluation of previous exploration of the Torrens Hinge Zone. This could include construction of sections and fence diagrams; comparative examination of drill cores and logs; correlation of drill data with magnetic interpretation; and modelling of exploration targets.

* testing of bullseye magnetic anomalies in the eastern portion of EL 2159.

A work program to satisfy the latter could comprise:

(1) research land ownership at South Australia's Land Titles Office (LTO)

(2) apply to Department of State Aboriginal Affairs (DOSAA) for certification of sites of aboriginal significance

(3) serve Notices of Entry on appropriate landowners, government departments and District Council(s).

(4) advise MESA of proposed program

(5) design and conduct a ground magnetic survey to confirm aeromagnetic signatures. A possible program comprising some 323 line kilometres is illustrated in figure 5.

(6) interpretation and modelling of ground magnetics

(7) evaluate significance of orientation soil sampling and collect soils samples on ground magnetic grid

(8) drill test ground magnetic and or soil geochemical anomalies. Anomalies located on the floodplain of the Broughton River would best be tested using rotary mud methods to basement followed by diamond coring. The first hole would necessarily be vertically drilled to determine design parameters, other holes may be inclined if appropriate. A minimum of four holes should be drilled as suggested in the following table:

Proposed Høle	Collar Co-ords mE	Collar Co-ords mN	Dıp	Planned Depth	Target
C01	247500	6280700	Vertical	200 or less	P1
C02	247250	6279000	Vertical	150	P3
C03	247670	6280700	60 deg west	200	P1
C04	251300	6290500	Vertical	200 or more	P2

7.0 COSTING OF PROPOSED PROGRAM

For budget purposes the proposed program is likely to incur the following costs:

Consulting Geologists Fees to administer and implement program (see items 1 to 4 above).

Allow five (5) days @ \$350 per day	\$1,750
Ground magnetic surveys including DGPS gridding (items 5 and 6))
DGPS gridding, allow 4 days @\$1250 per day	\$5,000
Ground Magnetics, allow 10 days \$800 per day	\$8,000
Imaging and modelling, allow 3 days @ 400 per day	\$1,200
Soil sampling (item 7). Assume 200 m sample spacing ie five sa kilometre	amples per line
Collect 1615 samples, allow 16 days @ \$200 per day	\$8,000
Assay 1615 samples @ \$10 per sample	\$16,150

Drilling of four targets, say 500 metres of rotary mud drilling and 250 metres of diamond core drilling (item 8). Allow four days per precollar and 25 metres per day drilling core ie minimum of 16 plus 10 days

Geological supervision, allow 30 days @ \$350	\$10,500
Precollars, 500 metres @ \$25 per metre	\$12,500
Coring, 250 metres at \$100 per metre	\$25,000
Stores, assays, mobilisation	\$7,000

TOTAL	\$95,100

say \$100,000

8.0 CONCLUSIONS

Although EL's 2159 and 2160 have potential to host mineralisation linked to the Torrens Hinge Zone the presence of at least three untested magnetic targets in Adelaide Geosyncline rocks offers an attractive alternate. Source rocks producing the magnetic anomalies could host base or precious metal deposits or could manifest as kimberlite pipes.

An initial program to test the targets could cost \$100,000. However, revision of this program, for example, to exclude soil sampling, would substantially reduce predicted costs.

Mark Randell

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APPENDICES

APPENDIX 4

Summary Mineralisation Information For Tenement 2159 and 2160.

The information provided in the following tables is a summary of any mineralisation data which may help to identify and back up any targets for future exploration within these areas and also to identify areas that appear to be barren, so that areas of the tenements can be discarded.

Below is a table which shows the minimum limits for the geochemical data

Metal	Minimum limits
	ppm
Cu	500
Pb	500
Zn	500
Ag	5
Ni	500
Co	100
Мо	Anomalous Value
Au	0.05
Cd	Anomalous Value
P2O5	Anomalous Value

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we used in this report.

Table1

Table showing concentrations of various metals within the boreholes.

Borehole	Depth	Concentration	Co-ordinates
No.	(m)		(Long, lati.)
PP 2	221.1 - 251.7	25.6m @ 0.16% Cu including	137deg 57' 21" E
Ţ		10.1m @ 0.24% Cu	33deg 23' 12" S
PP 3	268.2 - 271.3	3.1m @ 0.24% Cu	
	320.1 - 323.1	3.1m @ 0.17% Cu	137deg 55' 35" E
	393.2 - 396.3	3.1m @ 0.32% Cu	33deg 22' 26" S
	393.2 - 397.2 ·	4.0m @ 0.1ppm Au	
		Zn values 0.11% to 0.18%	
		U values 50 to 250ppm	
PP 4	421.8 - 431.0	9.2m @ 0.2% Pb	137deg 52' 36" E
		Assayed values of Zn lie	33deg 16' 47" S
		between 1.6% and 0.3%	
PP 5	146 - 150.5	4.5n @ 0.11% Cu	
	146 - 152.7	6.7m @ 0.25ppm Au	
	218.5 - 222.2	3.7m@ 0.2% Cu	134deg 55' 34" E
	229.8 - 245.3	15.5m @ 0.32% Cu	33deg 22' 44" S
	296.2 - 303.5	7.3m @ 0.84% Cu, 0.02% Mo	
		including 2.7m @ 1.43% Cu and	
		0.04%Mo.	
		U values 25 to 50ppm	
PP 6	185.9 - 204.2	18.3m @ 0.15% Cu	137deg 55' 28" E
		Zn values 0.09% to 0.83%	33deg 21' 00" S
PP 8	289.6 - 311.1	21.5m @ 0.05% Cu	137deg 57' 27" E
	405.4 - 420.6	15.2m @ 0.06% Cu	33deg 21' 36" S
PP 9	150.3 - 153.5	3.2m @ 0.29ppm Au	137deg 55' 43" E
		U values 25 to 50ppm	33deg 23' 39" S
PP10	173.4 - 182.0	8.6m @ 0.16ppm Au	137deg 57' 44" E
	344.7 - 361.2	16.5m @ 0.09% Cu	33deg 24' 31" S
PP 15	780.3 - 783.0	2.7m @ 0.17% Pb	137deg 54' 06" E
			33deg 13' 48" S
Wokuma2	107.0 - 110.0	3.0m @ 0.20% Cu	Not
Wokurna4	287.0 - 300.0	13.0m @ 0.03% Cu	Available
Wokurna6	292.0 - 295.0	3.0m @ 0.29% Cu	at present

Table 2

Borehole - PP2

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg 57' 21" E, 33deg 23' 12" S

	Borehole Information		Geochemical Information					
Depth	Description	Depth	Description	Sample	F	Results	in ppm	
(m)		(m)		No.	Co	Au	Cu	
0-105m	Cainozoic.			Core				
226-300m	Conglomerate and quartzite, trace chalcopyrite.	181.8m	Weakly carbonaceous dolomitic siltstone with	1290-1295	220	0.1	2300	
320-329m	Conglomerate, local heavy mineral banding.		syngenetic pyrite.	1295-1300	160	0.1	4000	
371-401m	Haematitic rich basalt. Roopena volcanics.	311.2m	Tuffaceous felspathic sandstone with stratiform	1300-1303		0.1		
402-409m	Grit and conglomerate, haematitic.		sulphides and rutile.	1260			2100	
409-410m	Sandstone, haematitic and locally pyritic.							
410-417m	Micaeous sandstone, haematitic.	458.1m	Felspathic sandstone with barytic ankeritic and	Sludge	Zn			
544m	End of hole.		cherty lamellae which contain sulphides and	1010-1020	685			
			specularite.	1290-1300	1000			
				1300-1310	1450			
				1310-1320	750			
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	,			NK131077	150			
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				1290-1300	3250			
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Borehole - PP 3

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Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg 55' 35" E, 33deg 22' 26" S

-	Borehole Information		Geochemical Information					
Depth	Description	Depth	Description	Sample	F	Results in	ppm	
(m)		(m)		No,	Cu	Sample I	VO.	Zn
0-130m	Cainozoic.			Sludge		Sludge	;	
268-326m	Brown oxidised micaeous siltstone with trace to			741-745	1750	1030-104	0 1	1350
	minor chalcopyrite throughout veins.	360.5m	Conglomerate - no evidence of any mineralisation	745-748	1150	1040-105	0	680
387-398m	red conglomerate, minor disseminated haematite			748-751	2500	1050-106	0 1	1500
432m	End of hole.			751-754	3100	1060-107	0 1	1150
				754-757	2900	1070-108	0	960
				757-760	3000	1080-109	0 1	1400
				781-784	2200	1090-110	0 1	1650
				784-787	3150	1110-112	0 1	1780
				787-790	2200	1220-123	0 1	1100
				790-793	1950	1320-133	0	700
				793-796	2000	1330-134	0	750
				796-799	1150	1360-137	0	600
				799-802	4300	1380-139	0	700
				802-805	3000	1200-121	0	660
				805-808	2250	1390-140	0	640
				808-811	1700	1400-141	0	800
				811-814	1100			
				817-820	880			
				823-826	1800	-		
				829-832	1600			
				1560-1570	890			
				1580-1590	780			
				1590-1600	920			
					U			
				1069	150			
				957	<50			
				1294	250			
		1			Un	its assaye	d for:	;-
					Cu, F	^p b, Zn, Ág	, Ni, C	Co,
		1			Mo	o, Au, P2C)5, Cd	i.

Borehole - PP 4

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg 52' 36" E, 33deg 16' 47" S

	Borehole Information		Geochemical Information				
Depth	Description	Depth	Description	Sample	F	Results in ppn	n
(m)		(m)		No.	Pb	Sample No.	Zn
0-150m	Cainozoic.			Scan		Sludge	
175-345m	Units of sandstone, conglomerate and dolomites			1090-1100	1400	1250-1260	2400
	with minor amounts of pyrite.		· ·	1110-1120	1200	1260-1270	3770
345-430m	Carbonaceous shale, minor pyrite and trace	428.6m	Dolomite with sulphide bearing carbonaceous	1120-1130	990	1270-1280	7800
	chalcopyrite. Trace galena at base of unit with		shale, lamellae and embryo calcite-quartz-galena-	1360-1370	1500	1280-1290	3200
	contact of diamictite.		sphalerite veinlets.	1370-1380	860	1290-1300	3000
489-524m	Sandstone, heavy mineral banded and	499.6m	Lithic sandstone compoesd predominatly of	1380-1390	8300	1300-1310	5200
	haematitic in parts.		grains of acid volcanic rock. More likley related to	1390-1400	2860	1310-1320	1.65%
524m	End of hole.		Pandurra fromation as presence of grains of	1400-1410	2860	1320-1330	4970
			volcanic rock.	1410-1420	2700	1330-1340	8500
1				1420-1430	3700	1340-1350	4700
				Core		1350-1360	7900
				1384-1387	1900	1360-1370	3600
		*		1387-1390	1200	1370-1380	8900
				1390-1393	1350	1380-1390	4900
				1393-1396	1930	1390-1400	5500
				1396-1399	1100	1400-1410	2300
. [1399-1402	2300	1410-1420	1850
				1402-1405	2200	1420-1430	1700
				1405-1408	4900	1430-1440	2700
				1408-1411	1350	Does not fall	below
				1411-1414	2300	1000ppm Zn	for
						samples 930	-1720.
					Ur	its assayed for	or;-
				1	Cu, F	^p b, Zn, Ág, Ni	, Co,
					M	o, Cd, Au, P20	D 5.
1							
			•				

Borehole - PP 5

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg55' 34" E, 33deg 22' 44" S

	Borehole Information		Petrographic Information	Geochemical Information				
Depth	Description	Depth	Description	Sample	R	esults	in ppm	1
(m)		(m)		No.	Au	Cu	Mo	
0-130m	Cainozoic.			Core				
140-153m	Pebble conglomerate, clasts of haematitic		Petrographic description on conglomerate	479-484	0.3	1000		
1	sandstone, also witin this unit black shale about		178.3m to 185.0m show no evidence of	484-489	0.2	1040	70	
	8.9m thick uraniferous and trace pyrite.		mineralisation. Only description show in report.	489-494	0.3	950		
216-260m	Minor heavy mineral banding in sandstone. Fine			494-501	0.2			
	disseminated pyrite, chalcopyrite and chalcocite.			Sludge				
	Traces of pyrite.			717-720		1210		
265-290m	Haematitic altered basalt			720-723		2880		
290-305m	Pebble conglomerate. Up to 3% chalcopyrite/			723-726		1820		
	chalcocite.			726-729		2080		
314-353m	Haematitic altered basalt.			869-872		1260		
	UNCONFORMITY			952-959		1100		
355-377m	Haematitic brecciated metasiltstone. Carbonate			959-963		1490		
	haematite veining.			963-966		1560		
377m	End of hole.			966-972		1790		
		a.		986-989		0.52%		1
				989-992		0.42%		
				992-995		0,64%		
				995-998	(0.17%		
				972-975		0.42%		
				975-978	(0.37%		
				978-981		1.27%		
				981-984		1.08%		
				984-987		2.20%		
					U			
				977-982	50			
				982-984	<25			
				984-986	50			
					Un	its asa	yed fo	r:-
					Cu, P	b, Zn, J	Ag, Ni,	, Co,
	· .		· · · · · · · · · · · · · · · · · · ·		N	∕lo, Au	, P2O5	<i>i</i>

Borehole - PP 6

137deg 55' 28" E, 33deg 21' 00" S Petrographic Information **Borehole Information** Geochemical Information Description Depth Depth Description Sample Results in ppm (m) (m) No. Au 0-125m Cainozoic. Core 135-154m Dolomite, minor pyrite, trace chalcopyrite. 655-658 0.1 182-190m Shale, slightly uraniferous. Minor pyrite and 661-664 0.1 chalcopyrite. 667-670 0.1 Pebble conglomerate, trace pyrite, chalcopyrite 190-265m Sludge Zn Zn 550-560 1150 1180-1190 in upper part. 920 265-275m Haematitic basalt. 620-630 1070 1200-1210 1250 630-640 275-285m Haematitic conglomerate, 1350 1220-1230 3000 285-295m Haematitic basalt. 650-660 1660 1260-1270 1460 295-305m Haematitic conglomerate. 710-720 1660 1270-1280 2830 305-324m Haematitic veined basalt. 720-730 1500 1280-1290 1890 324-329m Conglomerate/breccia, haematitic matrix with 730-740 1430 1320-1330 2900 basalt clasts. 740-750 1150 Units assayed for --329-358m Basalt, haematite top and base. 750-760 1990 Cu, Pb, Zn, Ag, Ni, 399.9m 364-358m Felspathic quartzite with heavy mineral banding Felspathic sandstones composed predominatly 880-890 1570 Co, Mo, Au, Cd, shown by haematite. 407.5m of detrital quartz and microcline with 890-900 2700 P2O. 455-500m Haematitic sandstone. Haematite content 417.6m 1380 concentrations of opaque heavy mineral grains 900-910 436.8m 930-940 1700 increases to base. in a number of thin layers. Trace amounts of 500-513m Haematitic metasiltstone. Fine veinlets of barite. 940-950 1730 1060 carbonate-haematite. 950-960 513m 1940 End of hole. 1040-1050 1050-1060 4300 1060-1070 3500 820 1070-1080 1100-1110 2200 2270 1110-1120 1120-1130 8300 1130-1140 2900 1140-1150 2300 1150-1160 1240 1160-1170 930 1170-1180 2200

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

Borehole - PP 7

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins,

137deg 52' 35" E, 33deg 22' 11" S

	Borehole Information		Petrographic Information	Geochemical Information				
Depth	Description	Depth	Description	Sample	F	Results	in ppm	1
(m)		(m)	· · · · · · · · · · · · · · · · · · ·	No.	Мо	Au		
0-105m	Cainozoic.			Core				
141-153m	Haematitic amydaloidal basalt.			530-540	220			
153-191m	Quartzite, heavy mineral banding grading down	172.2m	Felspathic quartzite or sandstone with					
	to haematitic quartzite.	186 <i>.</i> 1m	concentrations of heavy mineral grains. The	All samples		<0.1		
244-270m	Haematitic siltstone, minor quartz-haematite	195.1m	sample shows similarity to Rhynie sandstone		Un	its ass	ayed fo	or:-
	veining.		than to Pandurra formation.		Cu,F	b, Zn,	Ag, Ni,	, Co,
270-302m	Haematitic mudstone interbedded with haematitic					Mo, C	d, Au.	
	metasiltstone and bands of iron rich Jaspilite.							
302m	End of hole	· · ·						
1								
1		1		1 · ·		1		1

Borehole - PP 8

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg 57' 27" E, 33deg 21' 36" S

	Borehole Information		Petrographic Information	Geoc	hemical Information
Depth	Description	Depth	Description	Sample	Results in ppm
(m)		(m)		No.	
0-130m	Cainozoic,				
190-198m	Finely carbonate veined black pyritic shale and				
	sandstone. Upto 20% pyrite but average 5%.		No petrographic descriptions with these cores		No significant assay
289-311m	Conglomerate and black pyritic shale, minor		logs or assays.		results. No assay for
	chalcopyrite/pyrite.				gold
<u>311-400m</u>	Dolomite, trace pyrite/chalcopyrite.				Units assayed for:-
400-457m	Pebble comglomerate, trace to minor				Cu, Pb, Zn, Ag, Ni, Co,
	chalcopyrite throughout.				Mo, Cd.
457m	End of hole				
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Borehole - PP 9

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg 55' 43" E, 33deg 28' 39" S

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	Borehole Information		Petrographic Information	Geoc	hemica	mical Informa		<u> </u>
Depth	Description	Depth	Description	Sample	F	Results	in ppm	1
(m)		(m)		No.	Cu	Мо	Au	
0-115m	Cainozoic.			Core				
155-220m	Pebble conglomerate, haematite increases in			493-496	1020		0.2	
	matrix below 205m. Quartzite clasts heavily			496-499		65	0.2	
	mineral banded.			499-503			0.4	
220-277m	Strongly haematitic mudstone and metasiltstone.	246.5m	Tectonic breccia of fragments of metasiltstone					
277-285m	Moderatly brecciated, haematitic mudstone.		and probable interstial quartz and specular	Sludge	Ag	Мо		U
288-294m	Brecciated haematitic meatsiltstone.		haematite derived mainly from the metasiltstone.	750-760	11		871	<25
294-315m	Brecciated haematitic meatsiltstone.	294.4m	Brecciated, dolomitcand haematitic metasiltstone	840-580		40	878	25
347m	End of hole,		with migratory dolomite and haematite in	900-910		20	881	25
	r		interstices.	930-940		36	887	50
		300.5m	Dolomitic and haematitic metasiltstone breccia	970-980		80	900	<25
			of tectonic origin.	980-990		94	912	25
				990-1000		300	934	25
				1000-1010		120	943	_50
				1010-1020		120	952	_25
				1020-1030		210	961	25
				1030-1040		80	972	50
				1040-1050		40	986	25
				1050-1060		120	997	25
				1060-1070		400	998	50
				1070-1080		200		
				1080-1090		205		
				1090-1100		53		
1				1100-1110		131		i
				1110-1120		38		
				1120-1130		54		
				1130-1040		22		L
					Un	its assa	ayed fo)r:-
					Cu, F	b, Zn,	Ag, Ni,	, Co ,
1						M	<u>).</u>	
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Borehole - PP 10

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg 57' 44" E, 33deg 24' 31" S

	Borehole Information		Petrographic Information			Geochemical Information					
Depth	Description	Depth	Description	Sample	R	esults	in ppm				
(m)		(m)		No.	Au	Мо					
0-135m	Cainozoic.			Core							
343-345m	Banded haematitic rich intermediate volcanic.			569-572	0.2						
345-363m	Massive, fine grained acid volcanic. Minor	345m	Sulphide bearing leucomicromonzonite.	572-575	0.1						
	disseminated chalcopyrite.	355m	Decomposed flow structure, pyroxene	575-578	0.1						
363-416m	Heavy mineral banded micaeous sandstone.	_	microdiorite.	578-581	0.1						
	End of hole.			581-584	0.1						
				584-587	0.1						
				587-590	0.3	20					
				590-593	0.2						
				593-597	0.2						
ĺ					Unit	ts assa	ayed fo	r:-			
					Cu, Pl	b, Zn,	Ag, Ni,	C0,			
					Mo	<u>, Cd, /</u>	Au, P2C)5			
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Borehole - **PP 11** 137deg 57' 58" F 33deg 17' 43" S

	Borehole Information		Petrographic Information	Geochemical Information				
Depth	Description	Depth	Description	Sample		Results	in ppn	n
(m)		(m)		No.				
0-235m	Cainozoic, sand and clay.							
243-374m	Grey black shale with frequent thin dolomitic							
	interbeds. Minor disseminated pyrite and rare		No petrographic descriptions with these cores		No	signific	ant as	say
	chalcopyrite. Tapely hill formation.		logs or assays.		res	results. No assay f		
375-503m	Tillite, trace to minor disseminated pyrite and				gold			
	chalcopyrite. Sturt tillite.				Umits assayed for			or:-
507m	End of hole.				Cu, I	^{>} b, Zn,	Ni, Co	, Mo,
						Ag,	Cd.	
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Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

Borehole - PP 12

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg 57' 29" E, 33deg 28' 02" S

	Borehole Information		Petrographic Information	Geoc	nation	
Depth	Description	Depth	Description	Sample	Results i	in ppm
(m)		(m)		No.		
0-107m	Cainozoic.					
243-307m	Pebble sandy conglomerate. Local heavy mineral		·			
	banding. Increasing haematite below 274m				No significa	ant assay
313-319m	Haematitic rich basalt.				results. No	assay for
421-457m	Massive basalt, trace chalcopyrite throughout.	421-442m	Basalts probably lava flows-446.2m could be from		gol	d
627m	End of hole.		thick basalt flow or a dolerite sill.		Units assa	yed for :-
]			Cu, Zn, Pb, J	Ag, Ni, Co,
					Mo, Q	Cd.
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Borehole - PP 13

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg 53' 47" E, 33deg 23' 43" S

	Borehole Information	Petrographic Information			Geochemical Information				
Depth	Description	Depth	Description	Sample	Results in	ppm			
(m)		(m)		No.					
0-162m	Cainozoic.	·							
162-184m	Haematitic rich basalt	227.1m	Ferruginised pyritic-arenaceous-silty-feldspathic						
195-199m	Massive haematitic rich basalt.		dolomite. Ferruginisation is the oxidation of 5%		No significar	nt assay			
246-272m	Haematitic conglomerate, sandstone and grit.		of stratiform pyrite. It can be considered to have		results. No as	ssay for			
272-309m	Haematitic, heavily mineral banded sandy		formed in a volcanic environment because of the		gold	2			
-	siltstone. Haematitc disseminations (1-3%)		incorporation of sharp angular quartz and feldspar		Units assay	ed for:-			
310m	end of hole.	1	amongst the chemically precipitated dolomite.		Cu,Pb, Zn, Ac	1, Ni, Co,			
		1			Mo, Co	d.			
			· · · · · · · · · · · · · · · · · · ·						
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Borehole - **PP 14** 137deg 56' 02' *E*, 33deg 13' 55" S Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

Borehole Information			Petrographic Information	Geochemical Information					
Depth	Description	Depth	Description	Sample	Results	in ppm			
(m)		(m)		No.					
0-235m	Cainozoic, Sand and clay.								
244-306m	Sheared and fractured carbonaceous shale, trace								
	and disseminated pyrite on fractures.		No petrographic descriptions with these cores		No significant assay				
391m	End of hole.	logs or assays.		results. No assay fo					
					ga	old			
					Units assayed for:-				
					Cu, Pb, Zn, Ag, Ni, Co,				
					Mo.				
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Borehole - PP 15

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg 54' 06" E, 33deg 13' 48" S

	Borehole Information		Petrographic Information	Geoc	Geochemical Information				
Depth	Description	Depth	Description	Sample		Results	in ppm		
(m)		(m)		No.	Au	Cu	Ag		
0-70m	Cainozoic.	ļ		Core					
70-225m	Quartzite and interbedded mudstone, minor			673-676	0.1				
	heavy mineral laminations and locally		No petrographic descriptions with these cores						
	disseminated pyrite. A.B.C. range quartzites.		logs or assays.	Sludge					
260-270m	Quartzite, minor disseminated pyrite and			200-210			15		
	chalcopyrite. Brachina formation.			2030-2040		950			
660-770m	Grey black shale with minor disseminated pyrite.			2040-2050		750			
	Tapely hill formation.				U	its ass	ayed for:-		
770-785m	Shale and massive dolomite. Trace minor			-	Cu, F	Þb, Zn,	Ag, Ni, Mo		
	disseninated galena. Woocalla dolomite.					Cd, A	u, Co.		
800m	End of hole.				[
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Borehole - PP 16

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

Borehole Information			Petrographic Information	Geochemical Information				
Depth	Description	Depth	Description	Sample	Results in ppm			
(m)		(m)		No.				
0-185m	Cainozoic.			3				
385-488m	Shale with interbedded dolomoite. Mionor pyrite							
	trioughout and rare trace of galena.		No petrographic descriptions with these cores		No significant assay			
501-505m	Sandy dolomite, trace pyrite and chalcopyrite.		logs or assays.		results. No assay for			
	Woocalla dolomite.				gold			
543m	End of hole.				Units assayed for:-			
					Cu, Pb, Zn, Ni, Co, Mo			
					Ag.			
-								
-								

Borehole - PP 17

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg 55' 05" E, 33deg 22' 57" S

	Borehole Information		Petrographic Information	Geochemical Information				
Depth	Description	Depth	Description	Sample	Results in ppm			
(m)		(m)		No.				
0-100m	Cainozoic.							
100-150m	Pebble conglomerate with quartzite, contains							
	partly heavy mineral bands. Emeroo range		No petrographic descriptions with these core		No significant assay			
	section of mawson equivalent.		logs or assays.		results. No assay fo			
305-315m	Haematitic sandstone, rare heavy mineral				gold			
	banding. Pandurra formation.				Units assayed for :-			
340-467m	Haematitic siltstone, Extensive haematitic -	-			Cu, Pb, Zn, Ág, Ni, C			
	carbonate veining. Pre-adelaidean basement.				Mo.			
467m	End of hole							
			· ·					

Borehole - PP 18

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg 57' 48" E, 33deg 24' 02" S

			Petrographic Information	Geochemical Info			ormation	
Depth	Description	Depth	Description	Sample	R	esults i	n ppm	1
<u>(m)</u>		(m)		No.				
0-125m	Cainozoic - Clay/Sand.							
225-295m	Interbedded heavy mineral banded sandstone and							
	conglomerate. Emeroo range section of Mawson		No petrographic descriptions with these core		No significant ass		nt ass	ay
	equivalent.		logs and assays.		results, No assay f			for
295-400m	Haematitic sandstone with heavy mineral				gold			
	banding and laminations. Pandurra formation.				Units assaved for			r:-
400-410m	Haematitic grit. Pandurra formation.				Cu, Pl	b, Zn, A	.g, Ni,	Co,
420-485m	Laminated haematitic metasiltstone.					Мо	•	
	Pre-adelaidean basement.							
514-537m	Fractured haematitic metasiltstone.							
537-555m	Pink haemititic sandstone. Pre-adelaidean							
	basement.							i
555-576m	Metasiltstone haematite sequence.							
	Pre-adelaidean basement.							
576m	End of hole.							
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Borehole - PP 19

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

137deg 54' 25" E, 33deg 18' 36" S

	Borehole Information		Geoc	Geochemical Information				
Depth	Description	Depth	Description	Sample	F	Results in ppr	n	
(m)		(m)		No.	Zn	Sample No.	Zn	
0-170m	Cainozoic, Alluvium			Sludge		1810-1830	1660	
170-221m	Skillogalee dolomite trace pyrite and chalcopyrite			1180-1190	550	1820-1830	1790	
	and rare galena. Adelaidean Burra Group.		No petrographic descriptions with these core	1190-1200	650	Gold Assay	Au	
224-293m	Quartzite/Conglomerate, minor heavy mineral		logs and assays	1200-1210	550	on all	<0.1	
	banding witin quarzite. Emeroo range section			1210-1220	900	samples		
	of mawson group.			1220-1230	1210	Units assaye	d for:-	
293-360m	Haematitic Basalt, trace chalcopyrite locally.			1230-1240	1070	Cu, Pb, Zn, /	Ag, Ni,	
	Beda volcanics.			1240-1250	1000	Co, Mo, Au.		
425-607m	Haematitic meatasilitstone, with rare pyrite.			1270-1280	560			
	Pre-adelaidean basement.			1520-1530	865			
607m	End of hole			1530-1540	720			
				1540-1550	800			
				1550-1560	880			
				1560-1570	1160			
				1570-1580	1140			
				1580-1590	1420			
				1590-1560	860			
				1600-1510	1070			
	<i>2</i>			1670-1680	2000			
				1680-1690	1920			
			·	1690-1700	1970			
				1700-1710	1530			
				1710-1720	1800			
				1720-1730	1390			
				1730-1740	3800			
				1740-1750	3450			
				1750-1760	1790			
			· · ·	1760-1770	1850			
				1770-1780	1920			
				1780-1790	1980		1	
				1790-1800	1660			
				1800-1810	1470			

Borehole - PP 20

Report No. - 3606

Company - North Broken Hill and Aquitaire Mins.

127deg 58' 54.4" E, 32deg 59' 47.8" S.

	Borehole Information		Petrographic Information	Geochemical Information				
Depth	Description	Depth	Description	Sample	F	Results	in ppr	1
(m)		(m)		No.	Zn			í — — — — — — — — — — — — — — — — — — —
0-170m	Cainozoic, Alluvium			318-321	520			
260-356m	Brachina formation. Fine heavy minerals define							[
	bedding, weak disseminated pyrite.		No petrographic gescriptions with these core		Un	its assa	ayed fo	r :-
356m	End of hole		logs and assays.		Cu, F	b, Zn,	Ág, Ni	, Co,
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Borehole -PB 1

Report No. - 88/67

Company - Jododex Australian Pty

	Borehole Information		Petrographic Information			Geochemical Information				
Depth	Description	Depth	Description	Sample	F	Results	in ppr	1		
(m)		(m)		No.	Ba	Mn	Ti			
0-20m	Alluvium	313.9m	Heamatitic-sericite shale with fine crystalline	1351	1000		5000			
43-117m	Sandstone/siltstone, trace to minor		haematite - may form 10% of a layer. Veins cross	1415	1000		4000			
	disseminations of pyrite throughout the unit.		cut and infilled with small patchy haematitic shale	4273		10000	10000			
	Pyrite varies from trace to patches.		host rock - origin?	5527		5000	1000	[
117-183m	Interbedded sandstone/siltstone. Pyrite is	322.25m	Haematitic shale with a scattering of haematitic	6233	800					
	common throughout this unit as trace to		dust throughout sample.	7648	800	3000	3000			
	disseminations and lenses associated with silty	327.95m	Laminated silty shale with ultrafine haematite	7152			2000			
	carbonaceous laminae.		and titaniferous dust, also where veining has	11490		2000	2000			
275-289m	Conglomerate with heavy mineral bands and]	occurred in the coarser crystalline areas	11520		2000				
1	haematitic fragments evident. Also cross cutting		haematitic blades are present.	Un	Units assayed for:-					
	veinlets of dolomite with common chalcopyrite	331.72m	Silty serscitic shale with haematitic dust.	Ba, Be, Ce,	Co, C	r, La, N	/n, Mo,	Nb,		
	as blebs or patches.	346.0m	Haematitic silty shale, breccia with infilled veins	Ni, Sc, Sr,	, Sc, Sr, Ta, Th, Ti, Y, Yb, Zr, A					
362-363m	Very brecciated and tuffaecous haematitic shale.		with accessory pyrite (0.03mm)	As, Bi, Cd,	s, Bi, Cd, Cu, Ga, Ge, In, Pb, S					
449-450m	Very pyritic, commonly pyritohedrous and	355.67m	Quartz siltstone with mineralised breccia and		Sn,	Zn.				
	haemititic mineralisation.		very fine haematite veinlets within the siltstone							
313-547m	Siltstone breccia/siltstone, trace pyrite and		and very coarse reddish corbonate.							
	haematite scattered throughout.	364.66m	Breccia of intercalated shalein sericitic - argillic							
			Carbonate more intensely haematised.							
		371.52m	Fairly massive, extremely fine pottassic-albite-							
		ľ	quartzite, haematite grains disseminated but							
			locally form heavy mineral laminations.							
		392.25m	Most extensively brecciated and mineralised							
			sample. Shale and silty shale breccia with							
			trace to accessory (5%) haematite. The							
			haematite form (sometimes) from oxidation of							
			former magnatite - though no evidence of							
			supergene oxidation.							
		1								

Report No. - 88/67+Env3543

Company - Jododex Australian Pty

Borehole - **PB 2** 137deg 50' 56" E, 33deg 34' 05" S

	Borehole Information		Petrographic Information	Geochemical Information				
Depth	Description	Depth	Description	Sample	Results in ppm			
(m)		(m)		No.				
L L	This borehole is made up of predominatly							
	Arkose and conglomerates with mineral							
	concentrations at various intervals.		No petrographic descriptions with these logs.	Units assayed for:-				
0-17m	Alluvium.				Cu, Zn, Pb.			
131-159m	Arkose - some heavy mineral banding up to 3mm			No significant assay results.				
	wide.							
148-149m	Arkose - heavy mineral rich (60%) horizon 61mm							
	wide.							
163-164m	Arkose - Heavy mineral rich (50%) horizon							
	340mm wide.							
312.2m	Arkose - haematitic rich layer.							
482-483m	Arkose - haematitic rich (60%) layer 80mm wide.							
511m	End of hole.	l		1				
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Borehole - PB 4

Report No. - 88/67+Env3543

Company - Jododex Australian Pty

138deg 00' 29" E, 33deg 43' 24" S

	Borehole Information		Petrographic Information	Geochemical Information				
Depth	Description	Depth	Description	Sample	Results in ppm			
(m)		(m)		No.				
0-24m	Quaternary							
32.5-59m	Haematitic (heavy mineral laminations) siltstone	52.9m	Haematitic shale with haematitic and titaniferous					
	and shale breccia.		dust and magnetite psuedomorphically replaced	No a	ssays on any units.			
59-94m	Predomiantly metasiltstones.		by haematite - may be due to supergene oxidation					
94m	End of hole.	91.5m	Chert dolomite rock - minor scattered pyrite.					
1								

Borehole - PB 22

Report No. - 88/67+Env3543

Company - Jododex Australian Pty.

137deg 58.56' E 33deg 43.0' S

	Borehole Information		Geochemical Information					
Depth	Description	Depth	Description	Sample	F	Results	in ppm	1 I
(m)		(m)		No.	Ag	Cu	Au	Fe
0-38.5m	Alluvium.			64.4-64.7m	0.62	7670	0.05	5.44
38.5-354m	Geophysically logged - Wanderah metasiltstone	199.6m	Metasiltstone - minor haematitie witin chlorite					
	Intensely brrecciated in upper 30m, decreasing in		filled stylolite - like veins.	All geoche	mical a	nalysis	comp	leted
	intensity down to about 130m.	244.35m	Metasiltstone - scattered magnetite.	on boreho	le PB2	2 is sho	own ab	ove
354m	End of hole.							
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Borehole	~	В	17
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Report No. - 88/67

	Borehole Information	Petrographic Information		Geochemical Information		
Depth	Description	Depth Description		Sample	Results in ppm	
(m)		(m)		No.		
0-58m	Cainozoic					
58-96m	Grey/black carbonaceous siltstone with 2-3%					
	disseminated and pyrite throughout unit.		No petrographic descriptions with these logs.	No a	ssays on an	y units.
282-346m	Pink/grey dolomite and dolomitic siltstone with					
	common quartz+carbonate+pyrite veining.					
346m	End of hole.					
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Bore	hole	- B	32
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Report No. - 88/67

	Borehole Information	Petrographic Information		Geochemical Information		
Depth	Description	Depth	Description	Sample	Results in ppm	
(m)		(m)		No.		
0-10m	Cainozoic					
68-195m	Siliceous dolomite - weakley magnetic					
	metasiltstone. Corbonate/chlorite/haematite/		No petrographic descriptions with these logs.	No a	ssays on any units.	
	quartz veining throughout. Trace pyrite.					
195m	End of hole.			· ·		
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Borehole - B 51

Report No. - 88/67

	Petrographic Information		Geochemical Information				
Description	Depth	Description	Sample	F	Results	in ppr	1
	(m)		No.				
Cainozoic	,						
Metaclaystone - brecciated, veined, sheared, quartz+calcite+chlorite/haematite/albit veining. Variable amounts of extremly fine detrital magnetite.		No petrographic descriptions with these logs.	No a	ssays o	on any	units.	
End of hole							
	Description Cainozoic Metaclaystone - brecciated, veined, sheared, quartz+calcite+chlorite/haematite/albit veining. Variable amounts of extremly fine detrital magnetite. End of hole	Description Depth (m) Cainozoic Metaclaystone - brecciated, veined, sheared, quartz+calcite+chlorite/haematite/albit veining. Variable amounts of extremly fine detrital magnetite. End of hole	Description Depth (m) Description Cainozoic Metaclaystone - brecciated, veined, sheared, quartz+calcite+chlorite/haematite/albit veining. No petrographic descriptions with these logs. Wariable amounts of extremly fine detrital magnetite. End of hole No petrographic descriptions with these logs.	Description Depth (m) Description Sample No. Cainozoic Metaclaystone - brecciated, veined, sheared, quartz+calcite+chlorite/maematite/albit veining. Variable amounts of extremy fine detrital magnetite. No petrographic descriptions with these logs. No a End of hole No no a No petrographic descriptions with these logs. No a	Description Depth (m) Description Sample No. Calnozoic Metaclaystone - brecciated, veined, sheared, quart2+calcite+chlorite/haematite/albit veining. Variable amounts of extremty fine detrital magnetite. No petrographic descriptions with these logs. No assays of No assays of No assays of assays of No assays of No assays of No assays of No assays of No assays of No assays of No assays of No assays of No assays of N	Description Depth (m) Description Sample No. Results Calnozoic Metaclaystone - brecciated, veined, sheared, quartz+calcite+chlorite/haematite/albit veining. No petrographic descriptions with these logs. No assays on any Variable amounts of extremly fine detrital magnetite. End of hole No petrographic descriptions with these logs. No assays on any	Description Depth (m) Description Sample No. Results in ppr Results in ppr No. Calnozoic Metaclaystone - brecciated, veined, sheared, quartz+calcite+chlorite/haematite/abit veining. Variable amounts of extremtly fine detrital magnetite. No petrographic descriptions with these logs. No assays on any units. End of hole No in the second se

Borehole - Wokurna 2

Report No. - 88/67

	Borehole Information	Petrographic Information		Geochemical Information		
Depth	Description	Depth	Depth Description		Results in ppm	
(m)		(m)		No.		
0-45m	Quaternary.					
105-109m	Feldspatis sandstone with disseminated pyrite	1				
	and minor pyritic stylolites.		No petrographic descriptions with these logs.	No a	ssays on any units.	
165-218m	Dolomitic feldspathic quartzite with minor					1
	disseminated pyrite in lower part.					
218m	End of hole.	-	· ·			
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Borehole - Wokurna 4

Report No. - 88/67

	Borehole Information	Petrographic Information Geochemical		emical Information		
Depth	Description	Depth	Description	Sample	Results i	n ppm
(m)		(m)		No.		
0-64m	Quaternary					
157-235m	Dolomitic siltstone with abundant pyrite and					
	heavy minerals on the darker laminations, calcite		No petrographic descriptions with these logs.	No a	ssays on any u	nits.
	and dolomite veining also.					
233-274m	Feldspathic quartzite ans pyritic siltstone with					
	calcite + pyrite veining.					
274-323m	Feldspathic pebble conglomerate with minor					
	heavy mineral laminations.					
334-395m	Slaty siltstone with quartz and sulphide veining.					
395m	End of hole.					
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Borehole - Wokurna 6

Report No. - 88/67

	Borehole Information		Petrographic Information	Geoch	nemical Info	mation	
Depth	Description	Depth	Description	Sample	Result	s in ppm	
(m)		(m)	·	No.			
0-15m	Quaternary.	_					
13-14m	Conglomerate with boulders of heavy mineral						
	laminated quartzite.		No petrographic descriptions with these logs.	No as	says on any	, units.	
283-295m	Quartzite with common interstial pyrite and						
	chalcopyrite. 1.2m @ 1.0%.						
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APPENDICES

APPENDIX 5

Depth of Quarternary/Tertiary/Cainozoic Sediment within the Tenement Area 2159 and 2160.

Borehole	Depth of overlying
No.	sediments (m)
PP2	105
PP3	130
PP4	150
PP5	130
PP6	125
PP7	105
PP8	130
PP9	115
PP10	135
PP11	235
PP12	107
PP14	162
PP15	235
PP15	70
PP16	185
PP17	100
PP18	125
PP19	170
PP20	170
PB1	20
PB2	17
PB4	24
PB22	38.5
B17	58
B32	10
B51	38

Depth of quaternary/tertiary/cainzoic seiment within the tenement area 2159 and 2160.



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Borehole	Depth of overlying
No.	sediments.
Tickera 1	42.9
Tickera 2	109.7
Wokurna 1	24.6
Wokurna 2	45.5
Wokurna 3	57.2
Wokurna 4	74.0
Wokurna 5	41.7
Wokurna 6	15.4
WR 1	35.0
WR 2	30.0
WR 3	52.0
WR 4	68.0
WR 5	69.9
WR 6	31.0
WR 7	72.0
WR 9	86.0
WR 10	19.0
WR 11	24.0
WR 13	35.0
WR14	35.5
WR 15	16.5
WR 16	39.0
WR_17	37.0
WR 18	35.6

Depth of quaternary/tertiary/cainzoic sediments witin the port pirrie area and lying witin tenament 2159.






Flight Line Direction:	090 - 270 degrees
Flight Line Separation:	100 metres
Tie Line Direction:	000 - 180 degrees
Tie Line Separation:	1000 metres
Mean Terrain Clearance:	35 metres
Sample Interval:	4-5 metres
Navigation:	Differential GPS
Survey Flown:	August 1997

Acquisition:	UTS Geophysic
Aircraft:	FU24-950 Aircra
Magnetometer:	Scintrex Cesium Vapour CS
Resolution:	0.001
Sensitivity:	0.001
Recording Interval:	0.1 s
Compensation:	AMS AADC II Compensat

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l size:	25mE x 25mN
our interval:	2n T
our interval:	10nT
our interval:	50nT
our interval:	100nT
our interval:	500nT



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Universal Transverse Mercator Projection Central Meridian 135 Degrees East AMG Zone 53

SCALE: 1:25 000

-TM1225-

REF. A189 - A1



PRIMARY INDUSTRIES AND RESOURCES S.A.

Mineral Resources Primary Industries and Resources SA 101 Grenfell Street ADELAIDE SA

GPO Box 1671 ADELAIDE SA 5001 Facsimile: 08 8463 3101

SUMMARY REPORT ON MINERAL EXPLORATION

(Separate form for each licence)

For Six Months End Mineral(s) Sought:	Expl ing: ^J F/J/F9 Gold/Copper	oration Licence No: Operator/Manager: Prepared by: Date:	2159 Hazurn Pty Ltd Hilary Dodds
		Phone No:	08 9593 5998
		Fax No:	08 9593 6190

SUMMARY OF OPERATIONS

(No. type of samples: line km & type of survey; No of holes: metres of each type of drilling; Environmental activities etc).

Some open file research and data compilation was undertaken during the past six months.

Data Interpretation.

V

Research to provide a comprehensive report on the area for both the Department and proposed Joint Venture Partners was instigated and finalised.

Geological Director visited the area, had some negotiations with proposed J/V Partners and carried out limited research at the Department.

[If field activity undertaken, attach A4 size plan showing general location and type of work done]

\$

EXPENDITURE:

Expenditure for Period: 29/9/98-28/3/99 (add detailed statement) Total Expenditure for Licence:

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\$14,300

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PRIMARY INDUSTRIES AND RESOURCES S.A.

Mineral Resources Primary Industries and Resources SA 101 Grenfell Street ADELAIDE SA

GPO Box 1671 ADELAIDE SA 5001 Facsimile: 08 8463 3101

SUMMARY REPORT ON MINERAL EXPLORATION

(Separate form for each licence)

ې Expl	oration Licence No:	2159
For Six Months Ending: 28/9/99	Operator/Manager:	Hazurn Pty Ltd
Mineral(s) Sought: Gold/Copper	Prepared by:	Hilary Dodds
	Date:	
	Phone No:	08 9593 5998
	Fax No:	08 9593 6190

SUMMARY OF OPERATIONS

(No. type of samples: line km & type of survey: No of holes: metres of each type of drilling; Environmental activities etc).

Literature/data re-evaluation targeting

Data Interpretation.

Main expenditure derived from J/V negotiations.

No Technical Report available as nil work carried out over past six months.

[If field activity undertaken, attach A4 size plan showing general location and type of work done]

\$

EXPENDITURE:

Expenditure for Period: 29/3/99-28/9/99 (add detailed statement) **Total Expenditure for Licence:** \$5,170.00

- 6 OCT 1999 MINERAL RESOURCES

PRIMARY INDUSTRIES AND RESOURCES S.A.

Mineral Resources Primary Industries and Resources SA 101 Grenfell Street ADELAIDE SA

GPO Box 1671 ADELAIDE SA 5001 Facsimile: 08 8463 3101

SUMMARY REPORT ON MINERAL EXPLORATION

(Separate form for each licence)

Explor	ation Licence No:	2159
For Six Months Ending: 28/3/00 (Operator/Manager:	Hazurn Pty Ltd
Mineral(s) Sought: Gold/Copper	Prepared by:	Hilary Dodds
	Date:	
	Phone No:	08 9593 5998
	Fax No:	08 9593 6190

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SUMMARY OF OPERATIONS (No. type of samples: line km & type of survey: No of holes: metres of each type of drilling: Environmental activities etc).

Literature/data re-evaluation targeting

Data Interpretation.

EXPENDITURE:

Main expenditure derived from J/V negotiations.

No Technical Report available as nil work carried out over past six months.

[If field activity undertaken, attach A4 size plan showing general location and type of work done]

Expenditure for Period: 29/8/99-28/3/2000
(add detailed statement)
Total Expenditure for Licence:

\$11,250.00 L

\$