Pg A

CONTENTS ENVELOPE 2815

TENEMENT: EXPLORATION LICENCE No.. 253

TENEMENT HOLDER: THE BROKEN HILL PROPRIETARY COMPANY limited

REPORTS:

Plans:

EXPLORATION LICENCE 253

ARDROSSAN, SOUTH AUSTRALIA

REPORT FOR THE QUARTER ENDED 2nd JANUARY, 1977

1. GENERAL

Exploration Licence 253 for dolomite was granted on 2nd July, 1976 for one year.

2. FIELD INVESTIGATIONS

A brief reconnaissance within E.L.253 was carried out during the quarter ended 2nd January, 1977.

3. OTHER INVESTIGATIONS

The assessment of the stratigraphy and structure of the Exploration Licence based on published and unpublished data is continuing.

4. PROPOSED EXPLORATION

A small drilling programme is being planned for the quarter ending 2nd April, 1977.

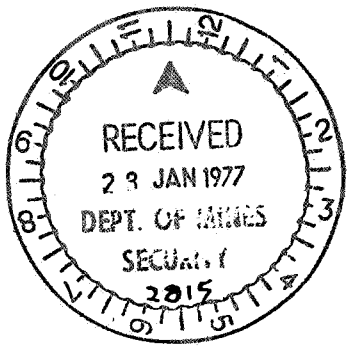
5. EXPENDITURE

Expenditure debited to E.L.253 during the quarter ended 31st December, 1976 was:

Wages and Salaries	$105
Fares and Mobilisation	74
Transport	37
	$216

Total expenditure to 31st December, 1976 is $216.

This report is submitted to the Mines Department as required by Condition 4 of Exploration Licence 253.



EXPLORATION LICENCE 253
ARDROSSAN, SOUTH AUSTRALIA

Report for the Quarter Ended 2nd April, 1977

1. General

Exploration Licence 253 for dolomite was granted on 2nd July, 1976 for a term of one year.

2. Field Investigations

No field investigations were carried out during the quarter.

3. Other Investigations

No other investigations were carried out during the quarter.

4. Proposed Exploration

The drilling programme planned for the quarter was postponed due to lack of availability of a suitable drilling contractor.

5. Expenditure

Expenditure debited to EL 253 during January, February and March, 1977 was -

Fares and Mobilisation	$62

Total expenditure to 31st March, 1977 is $278.

This report is submitted to the Mines Department as required by Condition 4 of Exploration Licence 253.

EXPLORATION LICENCE 253

ARDROSSAN, SOUTH AUSTRALIA

Report for the Quarter ended 2nd July, 1977

1. General

Exploration Licence 253 for dolomite expired on 1st July, 1977.

2. Field Investigations

No field investigations were carried out during the quarter.

3. Other Investigations

A review of existing data resumed. A suitable drilling contractor was not available when required and the proposal to drill was abandoned. A final report is being prepared.

4. Expenditure

Expenditure debited to E.L. 253 during April, May and June 1977 was:-

Surveying/Aerial Photographs	$899

Total expenditure to 30th June, 1977 is $1,167

This report is submitted to the Department of Mines as required by Condition 4 of Exploration Licence 253.

Exploration Licence 253

Ardrossan, South Australia

Report for the Quarter Ended 2nd October, 1976.

1. General

Exploration Licence 253 for dolomite was granted on 2nd July, 1976, for a term of one year.

2. Field Investigations

No field work was done within E.L. 253 during the first quarter.

3. Other Investigations

An assessment of the stratigraphy and structure of the Exploration Licence is being carried out based on available published and unpublished data.

4. Expenditure

No expenditure has been debited to Exploration Licence 253.

This report is submitted to the Mines Department as required by Condition 4 of Exploration Licence 253.

The Broken Hill Proprietary Company Limited

BHP House 140 William Street
Melbourne Victoria 3000 Australia

21st September, 1977

The Director of Mines,
Department of Mines,
P.O. Box 151,
EASTWOOD S.A. 5063

Dear Sir,

We submit our Final Report on Exploration Licence 253, Ardrossan, South Australia. Expenditure debited to E.L. 253 was:-

Wages and Salaries	$3,017
Fares and Mobilisation	165
Drilling	3,097
Transport	271
Surveying/Aerial Photographs	889
Sample Analysis	300
Other Items	61
	$7,800

Yours faithfully,

N. McLaren

N. McLaren,
Mineral Properties Superintendent.

Telephone 600701
Telegrams
'Hematite' Melbourne
Telex 30408

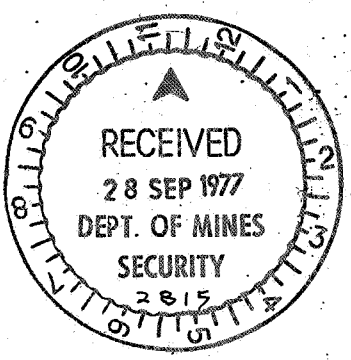
Postal Address
G.P.O. Box 86A
Melbourne
Victoria 3001

Your Ref:
Our Ref: NC:SJ E6/4

THE BROKEN HILL PROPRIETARY COMPANY LIMITED

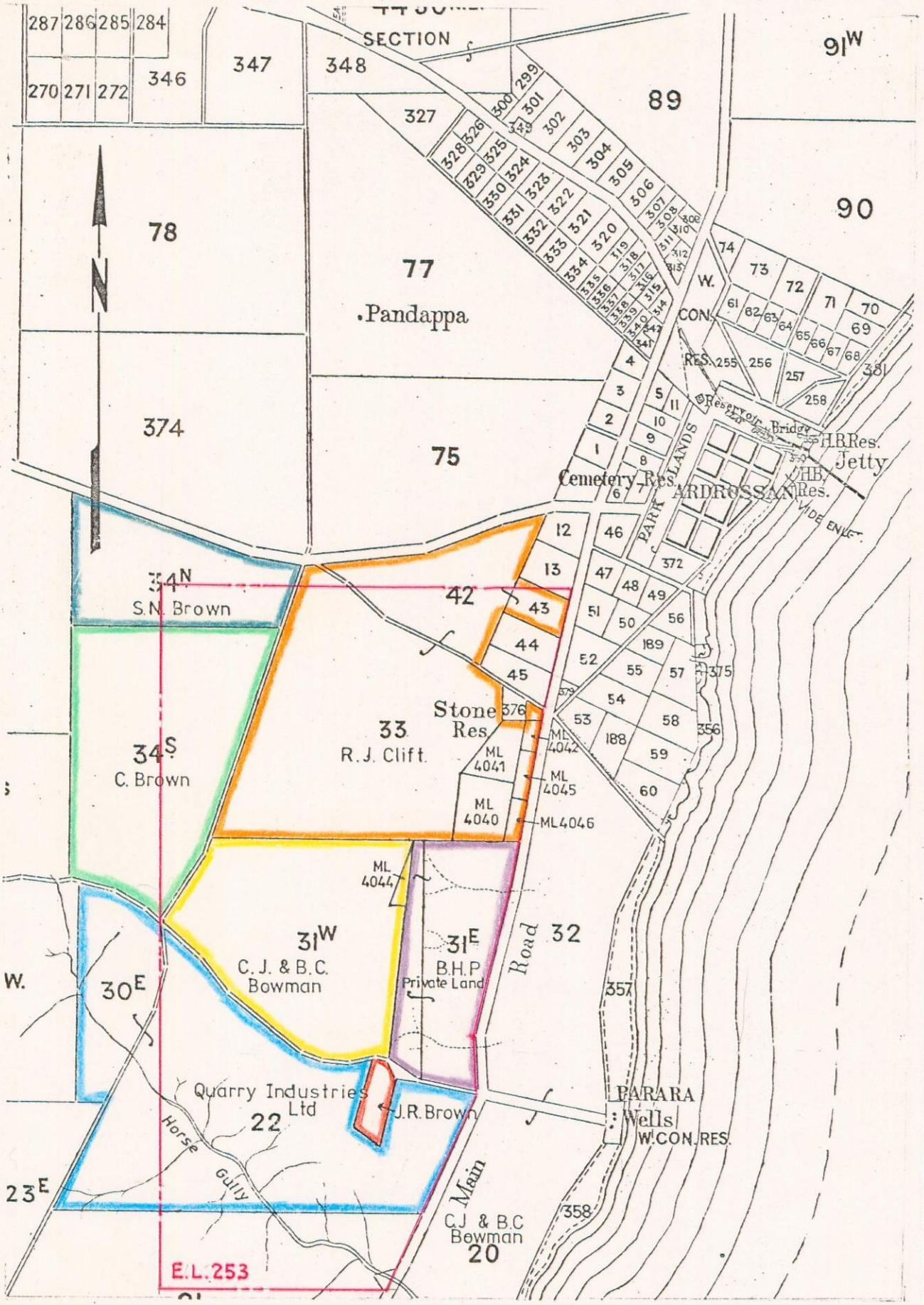
EXPLORATION LICENCE 253

ARDROSSAN, SOUTH AUSTRALIA.



WHYALLA, SEPTEMBER 1977

TABLE OF CONTENTS



SCALE 1:31 680

Centre: Whyalla.	THE BROKEN HILL PROPRIETARY CO. LTD.		Project No.
Date: 27·5·77	ARDROSSAN - MINING TENEMENTS		Drawing No. A4-1433

THE BROKEN HILL PROPRIETARY COMPANY LIMITED

EXPLORATION LICENCE 253
ARDROSSAN, SOUTH AUSTRALIA.

FINAL REPORT

INTRODUCTION

Exploration Licence 253 was granted to The Broken Hill Proprietary Company Limited on 2nd July, 1976 for a term of one year. Exploration Licence 253 is situated to the west of Ardrossan (Figure 1.).

Almost the entire area of Exploration Licence 253 is land exempt from the Mining Act by virtue of it being cultivated land. Eight separate freehold properties are encompassed by Exploration Licence 253. Cessers of Exemption were obtained for six of these properties. No attempt was made to obtain a Cesser of Exemption over the property held by Quarry Industries Ltd. and we were unable to obtain a Cesser of Exemption from Mr. R.J. Clift over Section 33, Hundred of Cunningham, County Fergusson. However Mr. R.J. Clift stated that he would be prepared to give consideration to a specific request to drill on a nominated part of his property. Notices of Entry were served on all property owners with the exception of the property owned by Quarry Industries. The location of the various properties and existing mining tenements within Exploration Licence 253 are shown on Figure 1.

REPORT ON INVESTIGATIONS

These comprised a literature search of all accessible data concerning the nature, occurrence and stratigraphic position of metallurgical grade dolomite at Ardrossan. A geological map at a scale of 1:5000 was compiled from existing Company maps and plans at a variety of scales as a base map for field checking to determine which areas had potential for metallurgical grade dolomite. This report also includes the results of diamond drillhole EX1, drilled

....2/...

on Section 33, Hundred of Cunningham under an agreement with R.J. Clift.

THE GEOLOGICAL SETTING OF THE ARDROSSAN DOLOMITE

The Ardrossan dolomite occurs in the lower part of the Cambrian Kulpara Limestone. The dolomite is pale yellow-buff with numerous small manganiferous dendrites on joint and rock fracture surfaces. Bedding is normally obscure and the dolomite very jointed and fractured. The stratigraphic sequence within Exploration Licence 253 is as follows:-

Recent			Soil and alluvium
		unconformity	
Tertiary	Middle Eocene		Sands and grits
		unconformity	
Lower Palæozoic	Cambrian		Parara Limestone
			Kulpara Limestone
			(base not seen)

The metallurgical grade dolomite forming the lower part of the Kulpara Limestone is best exposed in The Broken Hill Proprietary Company Limited's dolomite quarry at Ardrossan. The base of the Kulpara Limestone is not seen within E.L. 253 as the Cambrian sequence is cut-off by the Ardrossan-Kulpara fault which downthrows to the east. Elsewhere in Yorke Peninsula the Kulpara Limestone rests on quartz conglomerates and felspathic sandstones which locally pass upwards into red sandstones and shales.

The metallurgical grade dolomite of the Ardrossan Dolomite quarry passes upwards into a magnesian limestone. This magnesian limestone outcrops in the north-west corner of the Ardrossan quarry and in the south-west corner of Private Mine No.291 (The B.H.P. Co. Ltd.). It was also encountered in diamond drillhole EX1 on Section 33, Hundred of Cunningham. Nowhere was this dolomite or limestone observed to be fossiliferous.

The overlying Parara Limestone is fossiliferous and well exposed in Horse Gully on the property purchased by Quarry Industries.

....3/...

A pre-Eocene Karst topography was developed on the Kulpara Limestone and also presumably on the Parara Limestone. There are numerous solution pipes and cavities exposed in quarry bench faces which are close to the original land surface in the Ardrossan quarry. These pipes and cavities are filled with a pale clay or sand or a mixture of clay and sand. This surface is inturn overlain by at least 22.5 metres of coarse grained to pebbly sand which is equated with the Middle Eocene, North Maslin Sand near Adelaide by the Geological Survey. This sand occurs over much of the area of E.L. 253 and has made it impossible to determine the structure of the underlying Cambrian sequences in a search for areas where the lower part of the Kulpara Limestone would come close to the surface and be investigated for the possible occurrence of metallurgical grade dolomite.

To some degree the results of diamond drillhole EX1 indicate the presence of a syncline or synclines immediately to the west of The B.H.P. Co. Ltd.'s Private Mine and Mining Leases at Ardrossan.

THE RESULTS OF DIAMOND DRILLHOLE EX1

Diamond drillhole EX1 was drilled to the west of Mining Leases 4040 and 4041 on Section 33, Hundred of Cunningham under an agreement with R.J. Clift to test the potential of this area for the occurrence of metallurgical grade dolomite below unconsolidated and partially consolidated sands and pebbly grits of Tertiary age.

Diamond drillhole EX1 penetrated 22.5 metres of sands and pebbly sands before entering 62 metres of magnesian limestones. Metallurgical grade dolomite was encountered at a depth of 84.5 metres and was still in metallurgical grade dolomite at 91.44 metres when the hole was terminated.

Split core was sampled over two metre intervals and all two metre sample intervals were assayed for SiO_2, Al_2O_3, Loss on Ignition, P, CaO, MgO, Mn, S, Pb and Zn at The B.H.P. Co. Ltd.'s Quality Control Laboratories at Whyalla.

held at B.H.P. office, Whyalla.

....4/...

The geological and assay logs of diamond drillhole EX1 are reported as Appendices 1 and 2 to this report. Split core from this drillhole is currently stored at Whyalla.

Methods of analysis are as follows:-

a) SiO_2, Al_2O_3, P, CaO, MgO, Mn and Zn. Borate fusion, graphite briquette and spectrographic analysis on a direct reading optical emission spectrometer.

b) Sulphur (S). Combustion in a stream of oxygen, absorbtion of sulphur oxides and titration with alkali.

c) Lead (Pb). Acid solution and atomic absorption spectrometry.

d) Loss on Ignition. Loss of weight on ignition at $1000^{o}c$.

The lower limits of detection on analyses are as follows:

SiO_2	0.1%
Al_2O_3	0.1%
P	0.01%
CaO	0.1%
MgO	0.1%
Mn	0.1%
Zn	0.005%
S	0.001%
Pb	0.001%
L.O.I.	0.1%

APPENDIX 1.

GEOLOGICAL DRILL HOLE LOG – MINERALS S.A.

014

Bore No. EX1 Location ARDROSSAN - SECTION 33

Co-Ordinates R.L. at Collar

Total Depth 300' 91.44m R.L. at Bottom

Operators NORTH BROKEN HILL Rig LONGYEAR 38

Date Started Sampling Tools HQ NQ

Date Completed Drilling Type DIAMOND CORE

HQ 73'10" (22.5m) to 80'6" (24.53m)
NQ 80'6" (24.53m) to 300' (91.44m)

Drill Intersection From	To	Interval	Recovery	Solid Core Recovery	% Recovery	GEOLOGICAL DESCRIPTION
						Pre-collar. Interbedded loose, partially cemented and cemented quartz sands grits and quartz pebble conglomerates.
0m	22.5	22.5				Pebbles up to 10mm diameter predominately milky quartz, well rounded (water worn). Well defined bedding. Colour from yellow-brown to grey. Some yellow limonitic staining.
22.5	22.86	0.36				Grey - buff yellow intraformational limestone conglomerate. Matrix buff yellow clasts grey. Dendritic manganese on joint surfaces.
22.86	24.53	1.67				Grey, pink-grey, and buff clastic lime-stone (recrystallised?) with occasional thin <1mm clay partings.
24.53	24.86	0.34				Grey clastic (recrystallised?) limestone with more irregular patches white recrystallised calcite.
24.86	26.00	1.14				Grey, pink-grey and buff yellow limestone clastic (recrystallised).

DATE: LOGGED BY:

GEOLOGICAL DRILL HOLE LOG – MINERALS S.A.

Bore No. _____ Location _____

Co–Ordinates _____ R.L. at Collar _____

Total Depth _____ R.L. at Bottom _____

Operators _____ Rig _____

Date Started _____ Sampling Tools _____

Date Completed _____ Drilling Type _____

Drill Intersection From	To	Interval	Recovery	Solid Core Recovery	% Recovery	GEOLOGICAL DESCRIPTION
26.00	26.84	0.84				Pale buff recrystallised intraformational limestone conglomerate. Rare clay filled vugs and patches of white recrystallised calcite. Mn staining on joint surfaces.
26.84	27.76	0.92				Grey clastic limestone, some buff patches, stylolites.
27.76	37.89	10.13				Grey & buff intraformational limestone conglomerate dendritic manganese on some joint surfaces, some clay and black clay (Mn) filled small cavities.
37.89	44.40	6.51				Grey and buff partially recrystallised intraformational limestone conglomerate, Mn staining on joints, (dendritic) some stylolites.
44.40	60.27	15.87				Grey and buff grey intraformational limestone conglomerate clasts grey and more finely crystalline then buff grey matrix. Dendritic Mn on joint surfaces. Passing down to a dark grey matrix, some joints filled with pale yellow buff clay.
60.27	60.33	0.06				Thin band of clastic limestone composed of grey angular fragments of limestone with

DATE: _____ LOGGED BY: _____

GEOLOGICAL DRILL HOLE LOG – MINERALS S.A.

016

Bore No. _____ Location _____

Co–Ordinates _____ R.L. at Collar _____

Total Depth _____ R.L. at Bottom _____

Operators _____ Rig _____

Date Started _____ Sampling Tools _____

Date Completed _____ Drilling Type _____

Drill Intersection From	To	Interval	Recovery	Solid Core Recovery	% Recovery	GEOLOGICAL DESCRIPTION
						a larger fragment of pink thinly bedded
						limestone in a pink limestone matrix.
60.33	65.38	5.05				Pink-grey and buff bedded limestone,
						bedding wavy to broken. Small spots of
						manganese and dendritic manganese staining
						on joint surfaces. Pale yellow buff clay
						on some joint surfaces.
65.38	66.90	1.52				Pink-grey and buff limestone (intraform-
						ational conglomerate?).
66.90	73.76	6.86				Porous and cavernous grey and buff
						limestone.
73.76	76.80	3.04				Pink buff and grey bedded limestone.
						Some bands brecciated. Dendritic
						manganese on joint surfaces partially
						recrystallised.
76.80	77.21	0.41				Pale grey, pink and buff limestone
						dendritic manganese staining throughout
						rock.
77.21	83.41	6.2				Pink buff and grey limestone. Some
						brecciation of bands. Dendritic manganese
						on joint surfaces, partially recrystallise

DATE: _____ LOGGED BY: _____

GEOL 1720

GEOLOGICAL DRILL HOLE LOG – MINERALS S.A.

017

Bore No. _____ Location _____

Co–Ordinates _____ R.L. at Collar _____

Total Depth _____ R.L. at Bottom _____

Operators _____ Rig _____

Date Started _____ Sampling Tools _____

Date Completed _____ Drilling Type _____

Drill Intersection From	To	Interval	Recovery	Solid Core Recovery	% Recovery	GEOLOGICAL DESCRIPTION
83.41	91.44	8.03				Cream-buff recrystallised limestone (dolomite) some small cavities, manganese spotting on joint surfaces, some relic bedding ghost. Occasional clay filled joints.
						END OF HOLE.

DATE: _____ LOGGED BY: _____

GEOL 1720

APPENDIX 2.

ARDROSSAN DOLOMITE EX1

METRE FOOTAGE	SiO_2	Al_2O_3	Ign. Loss	P	CaO	MgO	Mn	S	Pb	Zn
WP19 22.5 to 24.5	06.1	01.1	38.2	0.55	42.0	04.8	00.1	0.03	.002	.005
WP20 24.5 to 26.5	06.5	01.3	39.1	0.92	38.0	10.0	00.1	0.04	.002	.005
WP21 26.5 to 28.5	05.6	01.0	40.9	0.44	38.0	11.0	00.1	0.02	.002	.005
WP22 28.5 to 30.5	04.5	00.8	42.0	0.34	38.0	12.0	00.1	0.02	.001	.005
WP23 30.5 to 32.5	04.9	01.1	42.6	0.23	33.0	15.0	00.1	0.01	.001	.005
WP24 32.5 to 34.5	06.0	01.2	41.8	0.25	34.0	15.0	00.1	0.01	.001	.005
WP25 34.5 to 36.5	04.6	01.0	43.0	0.20	34.0	15.0	00.1	0.04	.001	.005
WP26 36.5 to 38.5	04.3	00.9	40.9	0.35	44.0	05.4	00.1	0.02	.002	.005
WP27 38.5 to 40.5	03.8	00.6	41.5	0.28	45.0	05.7	00.1	0.01	.002	.005
WP28 40.5 to 42.5	04.1	00.8	41.5	0.24	46.0	05.2	00.1	0.01	.002	.005
WP29 42.5 to 44.5	03.9	00.7	41.5	0.25	45.0	05.3	00.1	0.02	.002	.005
WP30 44.5 to 46.5	02.8	00.6	42.2	0.23	48.0	04.3	00.1	0.02	.004	.005
WP31 46.5 to 48.5	34.0	15.0	01.7	0.47	41.0	02.2	00.5	0.58	.001	.005

Cont....

020

FOOTAGE	SiO_2	Al_2O_3	Ign. Loss	P	CaO	MgO	Mn	S	Pb	Zn
WP32 48.5 to 50.5	02.9	00.7	41.0	0.35	48.0	03.7	00.1	0.03	.015	.005
WP33 50.5 to 52.5	04.1	00.8	41.5	0.35	46.0	07.1	00.1	0.04	.003	.005
WP34 52.5 to 54.5	04.0	00.8	40.4	0.51	46.0	05.8	00.1	0.02	.001	.005
WP35 54.5 to 56.5	03.9	00.7	41.6	0.53	45.0	06.1	00.1	0.02	.002	.005
WP36 56.5 to 58.5	04.2	00.8	40.2	0.46	49.0	03.0	00.1	0.05	.001	.005
WP37 58.5 to 60.5	03.8	00.7	40.9	0.45	47.0	04.8	00.1	0.04	.001	.005
WP38 60.5 to 62.5	02.2	00.4	41.7	0.30	52.0	01.8	00.1	0.04	.001	.005
WP39 52.5 to 64.5	02.3	00.4	41.6	0.34	51.0	02.1	00.1	0.06	.001	.005
WP40 64.5 to 66.5	02.2	00.4	41.6	0.39	50.0	02.7	00.1	0.05	.001	.005
WP41 66.5 to 68.5	03.6	00.2	40.9	0.15	48.0	03.2	00.1	0.04	.001	.005
WP42 68.5 to 70.5	07.9	00.3	37.5	0.09	45.0	02.0	00.1	0.03	.001	.005
WP43 70.5 to 72.5	01.0	00.2	43.1	0.03	51.0	03.2	00.1	0.03	.001	.005
WP44 72.5 to 74.5	04.3	00.3	42.5	0.04	48.0	04.1	00.1	0.02	.001	.005

Cont....

021

M FOOTAGE	SiO_2	Al_2O_3	Ign. Loss	P	CaO	MgO	Mn	S	Pb	Zn
WP45 74.5 to 76.5	01.8	00.3	43.0	0.01	49.0	04.6	00.1	0.03	.001	.005
WP46 76.5 to 78.5	01.2	00.3	43.2	0.01	49.0	04.8	00.1	0.02	.001	.005
WP47 78.5 to 80.5	01.2	00.3	42.9	0.01	49.0	04.3	00.1	0.02	.001	.005
WP48 80.5 to 82.5	01.3	00.3	42.9	0.01	50.0	03.8	00.1	0.02	.001	.005
WP49 82.5 to 84.5	04.2	00.3	43.9	0.01	32.0	16.0	00.2	0.02	.001	.005
WP50 84.5 to 86.5	01.4	00.3	44.7	0.01	31.0	20.0	00.2	0.01	.001	.005
WP51 86.5 to 88.5	01.4	00.4	45.6	0.01	30.0	21.0	00.1	0.01	.001	.005
WP52 88.5 to 90.5	01.7	00.4	45.4	0.01	30.0	31.0	00.1	0.02	.001	.005
WP53 90.5 to 91.44	01.4	00.4	45.5	0.01	30.0	21.0	00.1	0.01	.001	.005

21.0 ? mb.

4 500E
5 000E
5 500E
E L 253
6 000E
6 500E
7 000E
34N.
42.
6 000 N
6 000N
5 500N
5 500 N
33.
STONE RES.
ML 4042
ML 4041
ML 4045
ML 4040
ML 4046
7cm
6cm
5cm
4cm
Borehole EX1 approx
5 000N
5 000 N
ML 4044
RL 44m
RL 55m
Waste Dump
RL 35m
RL 44m
4 500N
4 500 N
34S.
E L 253
31W.
31E.
32.
B.H.P PRIVATE MINE Nº 291
Waste Dump
4 000 N
30E.
4 000N
LEGEND
SILICIFIED GRIT.
MAGNESIAN LIMESTONE
DOLOMITE.
STRIKE AND DIP.
STRIKE AND DIP.
3 500N
50°
22.
10°
3000N
3 000 N
HORSE GULLY
This map has been compiled from :
– Geological observations marked on 40 ch to 1" map - Hd. of Cunningham - Anon.
– B.H.P. Geol. Dept plan - Geology of Cambrian Basin by K.L.A., D.G.W., 1957
– B.H.P. Geol. Dept plan Nºs 19100, A2 1427
– Australian Map Grid & Australian Height Datum.
358
2500N
2 500N
21.
100 0 100 200 300 400 500m
SCALE 1:5000
GULF St VINCENT
4 500E
5 000E
5 500E
E L 253
6000E
6 500E
7000E
To Edithburgh
The B.H.P. Co. Ltd, WHYALLA S.A.
EL 253 ARDROSSAN - GEOLOGICAL MAP.
Geology SVB
Drawn GG
Checked
Date SEPT. 77
A1 1436
2815-1