DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
MINERAL RESOURCES DIVISION

TARCOOLA-ALICE SPRINGS STANDARD GAUGE RAILWAY BALLAST SUPPLIES SITE INVESTIGATIONS AT ETHEL WELL

Client : Commonwealth Railways

by

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and

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Rept.Bk.No. 72/183
G.S. No. 4948
D.M. No. 442/72

20th September, 1972.

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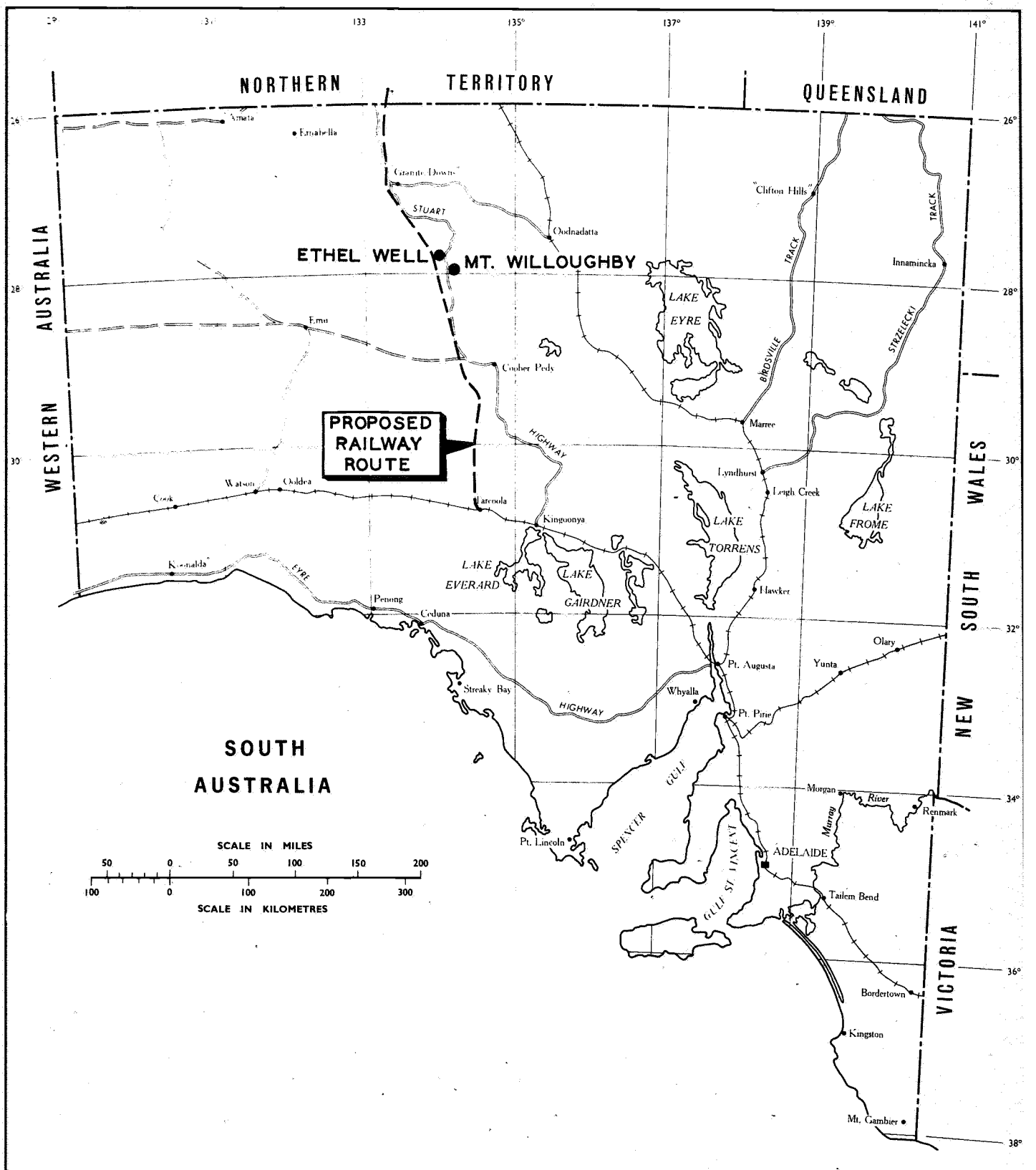

DEPARTMENT OF MINES —— SOUTH AUSTRALIA

Compiled. D. NICHOL	TARCOOLA–ALICE SPRINGS RAILWAY BALLAST SUPPLIES LOCALITY PLAN	Date: 7 AUG 1972
Drn. T.J.E. Ckd. L.V.W.		Drg. No. S 9939 Ba

P.F. No. S5850 994.2

DEPARTMENT OF MINES
SOUTH AUSTRALIA

Rept.Bk.No. 72/183
G.S. No. 4948
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TARCOOLA-ALICE SPRINGS STANDARD GAUGE RAILWAY BALLAST SUPPLIES SITE INVESTIGATIONS AT ETHEL WELL

Client : Commonwealth Railways

ABSTRACT

Geological mapping and drilling of two exploratory diamond core holes near Ethel Well led to the selection of an area of Mount Willoughby Limestone potentially suitable for the development of a ballast quarry.

Twenty-five rotary air holes were drilled which showed the presence of some 100,000 cubic metres (130,000 cubic yards) of material lying within 4 metres (13 feet) of the surface. Additional reserves exist outside of the area tested by drilling.

The material is of very low grade and would be suitable only as preliminary or bottoming ballast.

Following consultation with Commonwealth Railways engineering personnel it was concluded that the site was not worth development.

INTRODUCTION

Construction of a standard gauge railway between Tarcoola and Alice Springs (840 kilometres (520 miles)) is proposed to replace the existing narrow gauge track from Maree to Alice Springs (870 kilometres (540 miles)).

The volume requirements, distribution of potential ballast sites and geology of the South Australian section of the route are described by Hiern (1970). A further reconnaissance carried out on the section between Mabel Creek and Marla Bore is described by Nichol (1971a). During this reconnaissance potential ballast sites were selected in a freshwater limestone unit which crops out in the area of Mount Willoughby H.S. and in the vicinity of Ethel Well. (See locality Plan No. S 9939).

Investigations carried out in the area of Mount Willoughby H.S. have been described by Nichol (1972).

The present report is concerned with investigation of the Limestone unit referred to herein as Mount Willoughby Limestone (defined by Nichol, 1971 b) in the vicinity of Ethel Well.

The work was shared by the authors as follows:-

Reconnaissance mapping	(D.N.)	22.3.72 to 31.3.71
Diamond drilling	(D.N.)	12.7.71 to 17.7.71
Rotary air drilling	(A.M.F.)	6.8.71 to 8.8.71
Stadia survey by N. Edwards	(D.N.)	16.10.71 and 26.4.72

The authors are jointly responsible for the statements made in this report.

GEOLOGICAL SETTING

The oldest rocks exposed in the area are shales, sandy shales and siltstones of Lower Cretaceous age. The surface zone of these rocks was subjected to intense leaching and kaolinisation during the Tertiary period and a capping of hard siliceous rock (silcrete) was formed.

The silcrete and underlying kaolinitic zone are referred to as the duricrust profile. The Mount Willoughby Limestone, a thin freshwater limestone deposit of Upper Cainozoic age, occurs along the headwater valleys of the main creeks. This unit rests with erosional unconformity on the duricrust profile. Younger surficial deposits consist of gravel, sand spread, gibber and alluvial material.

The present day land surface is flat, channelled by occasional creeks which lie on the western margin of the Lake Eyre catchment area.

LIMESTONE IN THE ETHEL WELL AREA

Mapping in the vicinity of Ethel Well revealed that the Mount Willoughby Limestone outcrops in an area of at least 100 square kilometres (40 square miles) along the headwater valley of Wintinna Creek (see plan No. 71-748). The unit varies between 1 and 13 metres (3 and 43 feet) in thickness. The strata are flat lying, are unconformably underlain by the duricrust profile and rocks of Lower Cretaceous age and are overlain by sand spread, gibber and alluvial material.

The sediments which compose the Mount Willoughby Limestone are weakly consolidated brown and pale brown siltstone, calcareous siltstone and silty limestone which grade into off-white and pale brown limestone. The carbonate content of the limestone varies between 50% and 99%. The main carbonate component is calcite though up to 15% dolomite may be present. Other carbonate minerals were not observed. Quartz, feldspar, manganese limonite and iron stained clay minerals are also present.

Rapid lateral and vertical variation in lithology is a characteristic feature of the unit and an important factor in the selection of a potential ballast site.

A very hard, white chalcedony capping probably of secondary origin is often associated with the limestone. However it is discontinuous and is restricted to the upper 0.5 metres (1.6 feet) of the formation.

The only material below the chalcedony capping suitable for ballast occurs in thin lenses of more strongly cemented off-white and pale brown limestone which are intercalated with large amounts of soft, friable material. These lenses are generally restricted to depths of less than 4.0 metres (13 feet) below the surface.

SITE INVESTIGATIONS

Diamond Drilling

Cliff sections at Ethel Well and John Well were found to contain the best development of harder material and one diamond core hole was drilled vertically at each locality to obtain fresh material for examination (see plan No. 71-748).

The drill sites were located back from the escarpment faces and the holes were designed to show the thickness of hard limestone present and the degree to which cliff exposures had been affected by weathering.

The drill logs for the two diamond drill holes are included in Appendix A.

The quality of rock intersected by the two holes was generally poor. The thickness of better quality material was about 3.5 metres (11.5 feet) in each case with an additional 1.0 metre (3.3 feet) near the bottom of each hole. The hole at Ethel Well (BE1) contained marginally better material than the one at John Well (BJ1) and the Ethel Well site was selected for a programme of rotary air drilling.

Rotary Air Drilling

A programme of rotary air drilling was devised to investigate quality and thickness of rock in the immediate vicinity of BE1. Twenty five holes were sited on a square grid at 90 metre (300 feet) centres as shown on plan No. 71-823.

The logs for the twenty four rotary air drill holes are included in Appendix B.

The quality of material intersected was generally poor. In many of the holes, hard, white and pale brown limestones occur in the upper 4.0 metres (13 feet) with patches of softer, more porous silts and poorly consolidated limestone. Hard white chalcedony occurs near the top of some holes as a solid but discontinuous capping.

The zone containing siliceous material and relatively hard limestone is referred to as the zone of "better quality material" although much of this would undoubtedly disintegrate and be lost in extraction and crushing. This zone is depicted on the sections on plan No. 71-823 and was used in volume calculations.

Reserves

It can be seen from sections BB', CC' and DD' on plan No. 71-823 that a drainage channel, now filled by Recent silts and gravels, has been incised into the limestone in the southwest of the grid area. This isolates the intersection of limestone in MH6 from the main body of "useable material" and this intersection was disregarded in volume calculations.

Although there are exposures of limestone on the margin of the escarpment, the thickness of limestone displayed was not used in volume calculations because selective weathering of the softer material has made them unrepresentative.

Intersections of "better quality material" are indicated on the sections in plan No. 71-823. Reserves have been determined by joining these intersections by straight lines and multiplying the average area of adjacent sections by their separation and summing these volumes. The volume of "better quality material" thus outlined is approximately 90,000 cubic metres (120,000 cubic yards), that is, half that ideally required for a ballast site. Of this, a considerable proportion would be lost during extraction and crushing.

Calculation of overburden by the same method indicates that some 9,000 cubic metres (12,000 cubic yards) are present.

The volumes quoted apply to the area tested by drilling. Exposures in the escarpment indicate that the limestone unit is of similar character beneath the whole of the plateau area shown on plan No. 71-823. Total reserves could thus be reasonably quoted to be in excess of 200,000 cubic metres (250,000 cubic yards). The overburden ratio would be similar. Further drilling would be necessary to confirm this statement.

SUMMARY AND CONCLUSIONS

Detailed site investigations for railway ballast for the proposed Tarcoola-Alice Springs standard gauge railway have been carried out in the vicinity of Ethel Well.

The Mount Willoughby Limestone of Upper Cainozoic age crops out in an area of at least 100 square kilometres (40 square miles) along the headwaters of Wintinna Creek in the area of Ethel Well and John Well.

A geological mapping programme was followed by diamond drilling in the limestone unit and the most promising area was selected for further testing. This area has been investigated by a programme of rotary air drilling and 90,000 cubic metres (120,000 cubic yards) suitable only for low grade preliminary or bottoming ballast have been blocked out.

Overburden over this volume has been calculated to be 9,000 cubic metres (12,000 cubic yards).

Additional reserves exist outside of the area drilled. Because the material is of poor quality no further work has been carried out. After consultation with Commonwealth Railways engineering personnel it was decided that the site should be abandoned.

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20th September, 1972.

REFERENCES

Firman, J.B., 1971. Regional Stratigraphy of Surficial Deposits in the Great Artesian Basin and Frome Embayment in South Australia. Dept. Mines, unpublished report RB. 71/16.

Hiern, M.N., 1970. Reconnaissance Survey of Ballast Sources. Tarcoola-Alice Springs Standard Gauge Railway, Tarcoola-Kulgera Section. Dept. Mines unpublished report RB. 70/191.

Nichol, D., 1971a. Progress Report on Tarcoola-Alice Springs Railway Ballast Supplies, Mabel Creek - Marla Bore Section. Dept. Mines, unpublished report RB. 71/81.

_____ 1971b. The Mount Willoughby Limestone. Quart. Geol. Notes. Geol. Surv. S. Aust. No. 39.

_____ 1972. Progress Report on Tarcoola-Alice Springs Railway Ballast Supplies. Limestone Deposit - Mount Willoughby Homestead Area. Dept. Mines unpublished report RB. 72/16.

APPENDIX A

EXPLANATORY NOTES AND LOGS OF DIAMOND DRILL HOLES

APPENDIX A

EXPLANATORY NOTES AND LOGS OF DIAMOND DRILLING

EXPLANATORY NOTES ON DRILLING PROCEDURES

Equipment

The type of diamond drilling machine used was the Hindrill F.20.

All core was drilled at HMLC core size, the nominal diameter of core being two inches. The cores were obtained with "M" type stationary inner tube core barrels fitted with bottom discharge bits. The inner tubes were of the split type, ensuring minimum disturbance of the core during removal from the barrel.

Storing and marking of cores

Cores were stored in wooden boxes, each compartment of which has been designed to contain one metre (3.28 feet) of core. The internal length for each compartment was actually 1.03 metres (3.38 feet), to allow for 100 per cent core recovery (roughness of the ends of the core, and small inaccuracies in measurement when breaking it to fit the box, make it difficult to fit one metre (3.28 feet) of core in a compartment of exactly that length). The boxes were marked with consecutive compartment numbers at one end, and the drilled depths from the surface in metres at the other.

The core was boxed in this manner at the drill site, the core being placed in its appropriate place in the box as soon as it was extracted from the core barrel.

An aluminium depth marker was placed at the end of each core run and the depth recorded on the upper surface of the marker in felt pen, immediately it was placed in the box. The measured depth of the hole in metres from the surface was painted on the side of the core box and on the core. Timber blocks cut to the correct length indicate core not recovered (red blocks) and core removed for testing (yellow blocks).

The core has been stored at the Department of Mines Drilling and Mechanical Branch, Dalgleish Street, Thebarton, South Australia and is available for inspection.

NOTES ON DIAMOND DRILL LOG SHEETS

The logs have been plotted on a vertical scale of one centimetre = 0.50 metres (1:50).

The descriptions given on the log sheet refer only to materials recovered as core. Core may be lost by the material being ground or washed away during the drilling process; it may usually be inferred that such material was relatively weak. However, this cannot always be assumed, since even solid rock core may be ground away and lost during drilling operations under some conditions.

To the left of the graphic log is a geological description of the materials sampled. This includes:-

Geological age) Printed vertically
Rock unit name)
Colour of material
Type of material

Classification of the rock substance in terms of its porosity, its condition and its hardness has been shown graphically in the appropriate columns. Such classification has been based on a qualitative estimate only.

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF DIAMOND DRILL HOLE

HOLE Nº D.E.1.

SERIAL Nº 610/72

FEATURE MOUNT WILLOUGHBY LIMESTONE DEPOSIT PLAN REFERENCE 71-748

LOCATION ETHEL WELL, WINTINNA CREEK COORDINATES –

ANGLE FROM HORIZ. 90° DIRECTION –

DESCRIPTION OF CORE	LOG	DEPTH (m.)	POROSITY AND CONDITION (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	CORE LOSS	CASING	DEPTH (FT.)
UPPER CAINOZOIC — MOUNT WILLOUGHBY LIMESTONE								
Off-white silicified limestone								
Pale brown limestone					laminar bedding			
Brown silty limestone		1			Thinly bedded			5
Pale brown and off-white limestone					Intraclastic			
Brown limestone		2			Poorly developed bedding			
		3			Patches of manganese			10
		4						15
		5						
Brown calcareous siltstone		6						20
		7						
		8						25
Brown limestone		9			Intraclastic			30
No core recovered		10						

POROSITY TERM

HP Highly Porous
P Porous
MP Moderately Porous
SP Slightly Porous
NP Non Porous

CONDITION TERM

Fresh
Decomposed
Weathered
Altered
Not applicable

HARDNESS TERM

VS Very soft
S Soft
MH Moderately Hard
H Hard
VH Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº 9
TYPE MINORILL
DRILLER O. WHITE
START 13-7-71
FINISH 14-7-71

LOGGED D. NICHOL
DATE 14-7-71
TRACED J.M.B.
CHECKED R.H.

SHEET 1 OF 2 DRG Nº S9527 Ba

P.F. Nº S9411 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF DIAMOND DRILL HOLE

HOLE Nº D.E.1

SERIAL Nº 610/72

FEATURE MOUNT WILLOUGHBY LIMESTONE DEPOSIT PLAN REFERENCE 71-748

LOCATION ETHEL WELL, WINTINNA CREEK COORDINATES -

ANGLE FROM HORIZ. 90° DIRECTION -

DESCRIPTION OF CORE	LOG	DEPTH (m.)	POROSITY AND CONDITION (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	CORE LOSS	CASING	DEPTH (FT.)
CAINOZOIC / MOUNT WILLOUGHBY LIMESTONE: No core recovered								
Brown siltstone		11						35
No core recovered								
DURICRUST PROFILE: Pale brown fragmental zone of the duricrust profile		12						40
END OF HOLE 12·18 M.								

POROSITY TERM

HP Highly Porous
P Porous
MP Moderately Porous
SP Slightly Porous
NP Non Porous

CONDITION TERM

Fresh
Decomposed
Weathered
Altered
Not applicable

HARDNESS TERM

VS Very soft
S Soft
MH Moderately Hard
H Hard
VH Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº 9
TYPE MINDRILL
DRILLER D. WHITE
START 13-7-71
FINISH 14-7-71

LOGGED D. NICHOL
DATE 14-7-71
TRACED J.M.B.
CHECKED R.H.

SHEET 2 OF 2

DRG Nº S 9527a Ba

P.F. Nº S9411 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

HOLE Nº D.J.1
SERIAL Nº 609/72

PROJECT TARCOOLA–ALICE SPRINGS RAILWAY BALLAST PROJECT.

LOG OF DIAMOND DRILL HOLE

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.
PLAN REFERENCE 71-748
COORDINATES —
LOCATION JOHN WELL, WINTINNA CREEK.
ANGLE FROM HORIZ. 90° DIRECTION —

DESCRIPTION OF CORE	LOG	DEPTH (m.)	POROSITY AND CONDITION (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	CORE LOSS	CASING	DEPTH (FT.)
RECENT — Gibber and sandy clay								
Pale brown and white calcareous breccia.					Sub angular fragments of white limestone in a matrix of brown silty limestone.			
White limestone.		1						5
Pale brown limestone.		2			Poorly bedded: intraclastic patches of manganese.			
		3						10
Brown calcareous siltstone.		4			Poorly bedded: intraclastic patches of manganese.			15
		5						
		6						20
		7						
		8						25
		9						
								30
Brown siltstone.		10						

CAINOZOIC — UPPER — MOUNT WILLOUGHBY LIMESTONE

POROSITY TERM

HP Highly Porous
P Porous
MP Moderately Porous
SP Slightly Porous
NP Non Porous

CONDITION TERM

Fresh
Decomposed
Weathered
Altered
Not applicable

HARDNESS TERM

VS Very soft
S Soft
MH Moderately Hard
H Hard
VH Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº 9	LOGGED D. NICHOL
TYPE MINDRILL	DATE 13.7.71
DRILLER D WHITE	TRACED S.J.C.
START 12.7.71	CHECKED R.H.
FINISH 13.7.71	

SHEET 1 OF 2 | DRG Nº S9526_Ba

P.F. Nº S9411 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA - ALICE SPRINGS RAILWAY BALLAST PROJECT.

LOG OF DIAMOND DRILL HOLE

HOLE Nº D. J. 1.

SERIAL Nº 609/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE 71-748

COORDINATES —

LOCATION JOHN WELL, WINTINNA CREEK.

ANGLE FROM HORIZ. 90° DIRECTION —

DESCRIPTION OF CORE	LOG	DEPTH (m.)	POROSITY AND CONDITION (HP P MP SP NP | VS S | MH H VH)	STRUCTURES	CORE LOSS	CASING	DEPTH (FT.)
UPPER CAINOZOIC / MT. WILLOUGHBY LIMESTONE: Brown siltstone							35
Pale brown limestone		11		Occasional manganese coated intraclasts.			
Brown siltstone		12					
No core							40
END OF HOLE 12·53 M.		13					50

POROSITY TERM

HP Highly Porous
P Porous
MP Moderately Porous
SP Slightly Porous
NP Non Porous

CONDITION TERM

Fresh
Decomposed
Weathered
Altered
Not applicable

HARDNESS TERM

VS Very soft
S Soft
MH Moderately Hard
H Hard
VH Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº 9
TYPE MINDRILL
DRILLER D.WHITE
START 12-7-71
FINISH 13-7-71

LOGGED D. NICHOL
DATE 13-7-71
TRACED S.J.C.
CHECKED R.M.

SHEET 2 OF 2

DRG Nº S9526a Bg

P.F. Nº S9411 MB

APPENDIX B

EXPLANATORY NOTES AND LOGS OF ROTARY AIR DRILL HOLES

APPENDIX B

EXPLANATORY NOTES AND LOGS OF ROTARY AIR DRILL HOLES

EXPLANATORY NOTES ON DRILLING PROCEDURES

All drill holes were put down using a truck mounted Mayhew 1,000 rotary drill. Only highly disturbed air-blown samples were recovered during drilling, but these were sufficient to determine the type of rock material present at different depths.

Rock-cuttings for each sample interval were collected in annular sample pans and placed in sample bags marked with the Location, Hole No., and Interval.

The samples have been stored at the Department of Mines Drilling and Mechanical Branch, Dalgleish Street, Thebarton, South Australia and are available for inspection.

NOTES ON ROTARY AIR DRILL LOG SHEETS

The logs are plotted on a vertical scale of one centimetre = 0.50 metres (1:50).

The penetration rate is an expression of the strength of the rock material and it is expressed graphically. Classification of rock substance in terms of its qualitatively estimated porosity and hardness are also shown graphically in order to explain penetration rate.

TABLE

ESTIMATE OF USABLE MATERIAL IN EACH BOTANY AIR DRILL HOLE

Hole No.	Thickness Estimate (metres)	Hole No.	Thickness Estimate (metres)
ME 1	3.0	ME 14	0.5
ME 2	2.0	ME 15	1.5
ME 3	1.0	ME 16	2.5
ME 4	0.5	ME 17	1.0
ME 5	0.5	ME 18	3.5
ME 6	2.5	ME 19	1.0
ME 7	0.5	ME 20	0
ME 8	0	ME 21	3.5
ME 9	0.5	ME 22	1.5
ME 10	1.0	ME 23	0
ME 11	2.0	ME 24	1.0
ME 12	1.0	ME 25	0
ME 13	1.5		

The interval selected for representation on graphic logs was 0.5 metres (1.6 feet). Variations in quality of material of less than 0.5 metres (1.6 feet) were actually recorded in the field and explains small discrepancies between the generalised graphic logs and the more accurate estimates of thickness of material which were made in the field.

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº ME1/ME21.

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE JL-823

COORDINATES

LOCATION ETHEL WELL

ANGLE FROM HORIZ 90° DIRECTION

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) 1 2 3 4 5 6 7 8 9	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
White silicified limestone							
White and off-white limestone.							
White, off-white & brown limestone.		1			soft silty interbands.		
White and brown limestone.					White limestone interbands.		
Brown silty limestone.		2			Brown silty interbands.		5
Brown and grey limestone.							
Brown and grey limestone.		3					10
Brown and grey limestone.							
Brown siltstone		4					15
Brown siltstone							
Brown siltstone		5					
Brown siltstone							18 ft.
END OF HOLE 5·5M.							

POROSITY TERM		HARDNESS TERM	
HP	Highly Porous	VS	Very Soft
P	Porous	S	Soft
MP	Moderately Porous	MH	Moderately Hard
SP	Slightly Porous	H	Hard
NP	Non Porous	VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67
TYPE MAYHEW 1000
DRILLER W. BOYD
START 6 AUG 1972
FINISH 6 AUG 1972

LOGGED A.M. PAIN
DATE 24/1/72.
TRACED D.W.W.
CHECKED L.V.W.

SHEET 1 OF 1

DRG Nº S9659 Ba

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E.2
SERIAL Nº 905/72

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT
FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.
LOCATION ETHEL WELL
PLAN REFERENCE 71-823
COORDINATES
ANGLE FROM HORIZ 90° DIRECTION —

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) 1 2 3 4 5 6 7 8 9	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
Brown calcareous soil.					Silicified limestone rubble.		
Brown and white limestone.					Silty limestone interbands.		
Pale brown calcareous siltstone.		1					
Brown and white limestone.							
White and brown calcareous siltstone.							
Brown limestone.							5
White limestone.							
White and pale brown silty limestone.		2					
Brown limestone.					Silty interbands		
Brown limestone.		3					
Brown limestone.							10
Brown limestone.		4					
Brown calcareous siltstone.							
Brown calcareous siltstone.		5					15
Brown calcareous siltstone.							18ft.
END OF HOLE 5·5 METRES.							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67	LOGGED A.M. PAIN
TYPE MAYHEW 1000	
DRILLER W. BOYD	DATE 6.8.71
START 6.8.71	TRACED S.J.C.
FINISH 6.8.71	CHECKED L.V.W.

SHEET 1 OF 1 — DRG Nº S9642 Ba.

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF ROTARY AIR DRILL HOLE

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

HOLE Nº ME.3

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

LOCATION ETHEL WELL

PLAN REFERENCE 71-823

COORDINATES

ANGLE FROM HORIZ. 90° DIRECTION

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) (1 2 3 4 5 6 7 8 9)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
Brown silty soil					limestone rubble		
White limestone					Patchy silicification		
White calcareous siltstone.							
Brown and white calcareous siltstone.		1					
Pale brown calcareous siltstone.							5
Pale brown calcareous siltstone.		2					
Pale brown calcareous siltstone.							
Pale brown calcareous siltstone.		3					
Pale brown calcareous siltstone.							10
Pale brown calcareous siltstone.		4					
Pale brown calcareous siltstone.							
Pale brown calcareous siltstone.		5					15
Pale brown calcareous siltstone.							
END OF HOLE 5·5 METRES							18 ft.

POROSITY TERM		HARDNESS TERM	
HP	Highly Porous	VS	Very Soft
P	Porous	S	Soft
MP	Moderately Porous	MH	Moderately Hard
SP	Slightly Porous	H	Hard
NP	Non Porous	VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67
TYPE MAYHEW 1000
DRILLER W. BOYD
START 6·6·71
FINISH 6·8·71

LOGGED A.M. PAIN
DATE 6·8·71
TRACED S.J.C.
CHECKED L.V.W.

SHEET 1 OF 1

DRG Nº S9643 Ba

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA–ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E.4

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE 71-823

COORDINATES

LOCATION ETHEL WELL

ANGLE FROM HORIZ 90° DIRECTION —

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) (1 2 3 4 5 6 7 8 9)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
Red brown silty soil.					Silicified limestone rubble.		
Red brown clay.		1			3-4% quartz grains.		
Red brown clay.					3-4% quartz grains.		5
Brown silts.		2					
Brown silts.							
Brown silts.		3					10
Silty conglomerate.							
Silty conglomerate.		4					
Silty conglomerate.							15
Silty conglomerate.		5					
Silty conglomerate.							
END OF HOLE 5·5 METRES							18 ft.

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67

TYPE MAYHEW 1000

DRILLER W. BOYD

START 6.8.71

FINISH 6.8.71

LOGGED A.M. PAIN

DATE 6.8.71

TRACED S.J.C.

CHECKED J.Y.W.

SHEET 1 OF 1

DRG Nº S9644 80

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E.5

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE 71-823

COORDINATES

LOCATION ETHELL WELL

ANGLE FROM HORIZ 90° DIRECTION —

	DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) 1 2 3 4 5 6 7 8 9	DEPTH (FT.)
CAINOZOIC	ALLUVIUM	Red brown silt.				Silicified limestone rubble.		
		Slightly moist red clay.	1			5% quartz grains.		5
		Slightly moist red clay.						
		Slightly moist red clay.						
		Red brown calcareous siltstone.	2					
		Red brown calcareous siltstone.						
UPPER	MT. WILLOUGHBY LIMESTONE	Buff to pale red calcareous siltstone.	3					10
		Buff to pale red calcareous siltstone.						
		Buff to pale red calcareous siltstone.	4					
		Buff to pale red calcareous siltstone.						15
		Silty pale red conglomerate.	5			Silcrete rubble.		
		Silty pale red conglomerate.				Silcrete rubble.		18 ft.
		END OF HOLE 5·5 M.						

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67

TYPE MAYHEW 1000

DRILLER W BOYD

START 7-8-71

FINISH 7-8-71

LOGGED A.M. PAIN

DATE 7-8-71

TRACED S.J.C.

CHECKED L.V.W.

SHEET 1 OF 1

DRG Nº S9645 Bo

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA–ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº ME6

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

LOCATION ETHEL WELL

PLAN REFERENCE 71-823

COORDINATES

ANGLE FROM HORIZ 90° DIRECTION –

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) 1 2 3 4 5 6 7 8 9	DEPTH (FT.)
UPPER CAINOZOIC / MT. WILLOUGHBY LIMESTONE							
Red brown silty soil.					Silicified limestone rubble.		
Red brown clay.							
White limestone.		1			Some pale brown interbands.		
Brown silty limestone.							5
Brown silty limestone.		2					
Brown silty limestone.							
Brown silty limestone.		3					10
Red-brown calcareous siltstone.							
Red-brown calcareous siltstone.		4					
Red-brown calcareous siltstone.							15
Red-brown calcareous siltstone.		5					
Red-brown calcareous siltstone.							18 ft.
END OF HOLE 5·5 M.							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67

TYPE MAYHEW 1000

DRILLER W. BOYD

START 7-8-71

FINISH 7-8-71

LOGGED A.M. PAIN

DATE 7-8-71

TRACED S.J.C.

CHECKED L.V.W.

SHEET 1 OF 1

DRG Nº S9644 Bo

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº ME. 7
SERIAL Nº 905/72

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT
FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.
LOCATION ETHEL WELL
PLAN REFERENCE 71-823
COORDINATES
ANGLE FROM HORIZ 90° DIRECTION

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) (1 2 3 4 5 6 7 8 9)	DEPTH (FT.)
UPPER CAINOZOIC / MT. WILLOUGHBY LIMESTONE							
Brown silty soil					Silicified limestone rubble		
Slightly moist red clay		1			Fine quartz grains		
Slightly moist red clay							5
Red to buff silt		2					
Red to buff silt							
Pale brown silty conglomerate							
Pale brown silty conglomerate		3			Silcrete pebbles		
Pale brown silty conglomerate					Silicified limestone pebbles		10
Pale brown silty conglomerate		4			Silicified limestone pebbles		
Pale brown silty conglomerate					Silcrete, limestone and semi indurated silt pebbles		15
Pale brown silty conglomerate		5					
Pale brown silty conglomerate					Silcrete and limestone pebbles		18 ft
END OF HOLE 5·5 m.							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67	LOGGED A.M. PAIN
TYPE MAYHEW 1000	
DRILLER W. BOYD	DATE 7/8/71
START 7/8/71	TRACED S.L.T.
FINISH 7/9/71	CHECKED L.V.W.
SHEET 1 OF 1	DRG Nº S 9647 Bo

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº ME 8

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE 71-823

COORDINATES

LOCATION ETHEL WELL

ANGLE FROM HORIZ 90° DIRECTION

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.)	DEPTH (FT.)
CAINOZOIC / UPPER / ALLUVIUM: Red-brown silty soil					Silicified limestone rubble		
Slightly clayey brown silt		1					
MT. WILLOUGHBY LIMESTONE: Pale brown and white calcareous siltstones.							
Pale brown and white calcareous siltstones		2					5
Pale brown and white calcareous siltstones							
Pale brown calcareous siltstones.		3					10
Pale brown calcareous siltstones.							
Pale brown calcareous siltstones.		4					
Pale brown calcareous siltstones.							15
Pale brown calcareous siltstones.		5					
Pale brown calcareous siltstones.							16 ft.
END OF HOLE 5·5 m.							

POROSITY TERM		HARDNESS TERM	
HP	Highly Porous	VS	Very Soft
P	Porous	S	Soft
MP	Moderately Porous	MH	Moderately Hard
SP	Slightly Porous	H	Hard
NP	Non Porous	VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67
TYPE MAYHEW 1000
DRILLER W. BOYD
START 7/8/71
FINISH 7/9/71

LOGGED A.M. PAIN
DATE 7/8/71
TRACED S.L.J.
CHECKED J.V.W.

SHEET 1 OF 1 DRG Nº S 9648 Bo

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E. 9

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE 71-823

COORDINATES

LOCATION ETHEL WELL

ANGLE FROM HORIZ 90° DIRECTION

DESCRIPTION OF CHIPS		LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.)	DEPTH (FT.)
Red - brown silty soil	ALLUVIUM					Silicified limestone rubble		
Red - brown silt			1			Silicified limestone rubble		
Brown calcareous siltstone	UPPER CAINOZOIC MT. WILLOUGHBY LIMESTONE							5
Brown calcareous siltstone			2					
Brown calcareous siltstone								
Brown calcareous siltstone			3					10
Brown calcareous siltstone								
Pale brown silty conglomerate			4			Silcrete pebbles		
Pale brown silty conglomerate						Silcrete pebbles		
Pale brown silty conglomerate						Silcrete pebbles		15
Pale brown silty conglomerate			5			Silcrete pebbles		
Pale brown silty conglomerate								18 ft.
END OF HOLE 5·5 m.								

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67

TYPE MAYHEW 1000

DRILLER W. BOYD

START 2 8 71

FINISH 2 8 71

LOGGED A.M. PAIN

DATE 7 8 71

TRACED G.L.T.

CHECKED L.V.W.

SHEET 1 OF 1

DRG Nº S9649 B6

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E. 10
SERIAL Nº 905/72

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT
FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.
LOCATION ETHEL WELL AREA
PLAN REFERENCE 7/-823
COORDINATES
ANGLE FROM HORIZ 90° DIRECTION

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.)	DEPTH (FT.)
Red-brown silty soil					Silicified limestone rubble		
Pale pink & off-white limestone					Patchy silicification		
White silicified limestone		1			Banded		
Pale brown siltstone							5
Pale brown siltstone		2					
Pale brown siltstone							
Pale brown siltstone		3					10
Pale brown siltstone							
Pale brown siltstone		4					
Pale brown siltstone							15
Pale brown siltstone		5					
Pale brown siltstone							18 ft.
END OF HOLE 5·5m							

UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67
TYPE MAYHEW 1000
DRILLER W. BOYD
START 7-8-71
FINISH 7-8-71
LOGGED A.M. PAIN
DATE 7-8-71
TRACED S.L.T.
CHECKED L.V.W.

SHEET 1 OF 1
DRG Nº S9650 Bo

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT **LOG OF ROTARY AIR DRILL HOLE**

HOLE Nº M.E. 11

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE 31-823

COORDINATES

LOCATION ETHEL WELL

ANGLE FROM HORIZ. 90° DIRECTION -

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
White limestone					Patchy silicification		
White limestone							
White limestone		1					
White limestone							5
White limestone		2					
White and brown calcareous silt							
White and brown calcareous silt		3					10
Brown calcareous silt.							
Brown calcareous silt		4					
Brown calcareous silt							15
Brown silt		5					
Brown silt							18 ft.
END OF HOLE 5·5 m.							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67
TYPE MAYHEW 1000
DRILLER W. BOYD
START 7/8/71
FINISH 7/8/71

LOGGED A.M. PAIN
DATE 7/8/71
TRACED S.L.T.
CHECKED L.V.W.

SHEET 1 OF 1

DRG Nº S9651 Bo

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E 12

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE

LOCATION ETHEL WELL

PLAN REFERENCE 71-823

COORDINATES

ANGLE FROM HORIZ 90° DIRECTION

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) (1 2 3 4 5 6 7 8 9)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
Red-brown silty soil					Silicified limestone rubble friable silty interbands		
White and brown silty limestone							
White and brown silty limestone		1					
White and brown silty limestone							5
White and brown silty limestone		2					
Brown calcareous siltstone							
Brown calcareous siltstone		3					10
Brown calcareous siltstone							
Brown silt		4					
Brown silt							15
Brown silt		5					
Brown silt							18 ft.
END OF HOLE 5·5 m.							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67
TYPE MAYHEW 1000
DRILLER W. BOYD
START 7/8/71
FINISH 7/8/71

LOGGED A.M. PAIN
DATE 7/8/71
TRACED S.L.T.
CHECKED L.V.W.

SHEET 1 OF 1

DRG Nº S 9652 Ba

P.F. Nº S 9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº ME 13
SERIAL Nº 905/72

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

LOCATION ETHEL WELL

PLAN REFERENCE 71-823

COORDINATES

ANGLE FROM HORIZ 90° DIRECTION —

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) (1 2 3 4 5 6 7 8 9)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
Brown silty soil					Silicified limestone rubble		
White calcareous silt							
Brown and white limestone		1					
Brown and white limestone							5
Brown and grey limestone		2					
Brown and grey silty limestone							
Brown and grey silty limestone		3					10
Brown silt							
Brown silt		4					
Brown silt							15
Brown silt		5					
Brown silt							18 ft.
END OF HOLE 5·5 m.							

POROSITY TERM		HARDNESS TERM	
HP	Highly Porous	VS	Very Soft
P	Porous	S	Soft
MP	Moderately Porous	MH	Moderately Hard
SP	Slightly Porous	H	Hard
NP	Non Porous	VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67
TYPE MAYHEW 1000
DRILLER W. BOYD
START 7/8/71
FINISH 7/8/71

LOGGED A.M. PAIN
DATE 7/8/71
TRACED S.L.T.
CHECKED J.V.W.

SHEET 1 OF 1

DRG Nº S.9653 Bo

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E. 14

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE 71-823

COORDINATES

LOCATION ETHEL WELL

ANGLE FROM HORIZ 90° DIRECTION

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) (1 2 3 4 5 6 7 8 9)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
Brown silty soil					Silicified limestone rubble		
Brown and white limestone							
Brown limestone		1					
Brown limestone							5
Brown limestone		2					
Brown limestone							
Brown calcareous siltstone							
Brown calcareous siltstone		3					10
Brown calcareous siltstone							
Brown siltstone		4					
Brown siltstone							15
Brown siltstone		5					
Brown siltstone							18 ft.
END OF HOLE 5·5 m.							

POROSITY TERM		HARDNESS TERM	
HP	Highly Porous	VS	Very Soft
P	Porous	S	Soft
MP	Moderately Porous	MH	Moderately Hard
SP	Slightly Porous	H	Hard
NP	Non Porous	VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67

TYPE MAYHEW 1000

DRILLER W. BOYD

START 7/8/71

FINISH 7/8/71

LOGGED A.M. PAIN

DATE 5/8/71

TRACED S.L.T.

CHECKED J.V.W.

SHEET 1 OF 1

DRG Nº S9654 Bo

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E. 15
SERIAL Nº 905/72

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT
FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.
LOCATION ETHEL WELL
PLAN REFERENCE 71-823
COORDINATES
ANGLE FROM HORIZ 90° DIRECTION —

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) (1 2 3 4 5 6 7 8 9)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
Silicified white limestone.							
White limestone.		1					
White limestone.							
White limestone.		2					5
White limestone.							
Brown limestone.		3					
Brown limestone.							10
Brown limestone.		4					
Brown limestone.							
Buff to pale brown siltstone.		5					15
Buff to pale brown siltstone.							
							18 ft.
END OF HOLE 5·5 M							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67
TYPE MAYHEW 1000
DRILLER W. BOYD
START 7/8/71
FINISH 7/8/71

LOGGED A.M. PAIN
DATE 7/8/71
TRACED S.J.C.
CHECKED L.V.W.

SHEET 1 OF 1 | DRG Nº S9655 Ba

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E. 16

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE 71-823

COORDINATES

LOCATION ETHEL WELL

ANGLE FROM HORIZ 90° DIRECTION —

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
White silicified limestone.							
White limestone.					Patchy silicification.		
White and brown limestone.		1					
White, pale grey and brown limestone.							5
White, pale grey and brown limestone.		2					
White, pale grey and brown limestone.							
White, pale grey and brown limestone.		3					10
Brown to buff silty limestone.							
Brown to buff silty limestone.		4					
Brown to buff siltstone.							15
Brown to buff siltstone.		5					
Brown to buff siltstone.							18 ft.
END OF HOLE 5·5 M							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67

TYPE MAYHEW 1000

DRILLER W. BOYD

START 8/8/71

FINISH 8/8/71

LOGGED A.M. PAIN

DATE 8/8/71

TRACED S.J.C.

CHECKED L.V.W.

SHEET 1 OF 1

DRG Nº S 9656 Ba

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E.17
SERIAL Nº 905/72

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

LOCATION ETHEL WELL

PLAN REFERENCE 71-823
COORDINATES
ANGLE FROM HORIZ 90° DIRECTION

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) 1 2 3 4 5 6 7 8 9	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
White limestone.							
White limestone.		1					
White limestone.							
White and brown limestone.		2					5
Brown limestone.							
Brown to buff silty limestone.		3					10
Brown calcareous siltstone.							
Brown calcareous siltstone.		4					
Pale brown siltstone.							15
Pale brown siltstone.		5					
Pale brown siltstone.							18 ft.
END OF HOLE 5·5 M							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67	LOGGED A.M. PAIN
TYPE MAYHEW 1000	
DRILLER W. BOYD	DATE 8/8/71
START 8/8/71	TRACED S.J.C.
FINISH 8/8/71	CHECKED L.V.W.

SHEET 1 OF 1 — DRG Nº S.9657 Ba

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E.18

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

LOCATION ETHEL WELL

PLAN REFERENCE 71-823

COORDINATES

ANGLE FROM HORIZ 90° DIRECTION

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.)	DEPTH (FT.)
UPPER CAINOZOIC / MT. WILLOUGHBY LIMESTONE							
White, off white and brown limestone.							
Brown limestone.		1					5
Brown limestone.							
Brown limestone.		2					
Off-white and pale grey limestone.							
Off-white and pale grey limestone.		3					10
Brown limestone.					Soft silty interbands		
Brown silty limestone.		4			Soft silty interbands		
Brown siltstone.							15
Brown siltstone.		5					
Brown siltstone							18 ft.
END OF HOLE 5·5 M							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67

TYPE MAYHEW 1000

DRILLER W. BOYD

START 8/8/71

FINISH 8/8/71

LOGGED A.M. PAIN

DATE 8/8/71

TRACED S.J.C.

CHECKED L.V.W.

SHEET 1 OF 1

DRG Nº S9658 Bo

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº ME 19

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

LOCATION ETHEL WELL

PLAN REFERENCE 71-823

COORDINATES

ANGLE FROM HORIZ 90° DIRECTION

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) (1 2 3 4 5 6 7 8 9)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
Brown silty soil.							
White limestone.							
White limestone.		1			Patchy silicification		5
Pale brown silty limestone							
Pale brown silty limestone		2					
Pale brown to buff calcareous limestone.							
Red-brown to buff siltstone.		3					10
Red-brown to buff siltstone.							
Red-brown siltstone.		4					
Red-brown siltstone.							15
Red-brown siltstone.		5					
Red-brown siltstone.							
Red-brown siltstone.		6					20
Red-brown siltstone.							
Red-brown siltstone.		7					
Red-brown siltstone.							25
Red-brown siltstone.		8					
Red-brown siltstone.							
Red-brown siltstone.		9					30
Red-brown siltstone.							
Red-brown siltstone.		10					

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67	LOGGED A.M. PAIN
TYPE MAYHEW 1000	
DRILLER W. BOYD	DATE 8-8-71
START 8-8-71	TRACED A.R.
FINISH 8-8-71	CHECKED L.V.W.

SHEET 1 OF 2 DRG Nº S9620 Ba

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT **LOG OF ROTARY AIR DRILL HOLE**

HOLE Nº ME 19

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE 71-823

COORDINATES

LOCATION ETHEL WELL

ANGLE FROM HORIZ 90° DIRECTION —

	DESCRIPTION OF CHIPS	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) 1 2 3 4 5 6 7 8 9	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE	Red-brown siltstone.						
	Red-brown siltstone.	11					35
MESOZOIC — BLEACHED CRETACEOUS SHALE (Duricrust Profile)	Pale grey shale.						
	Pale grey shale.	12					40
	Pale grey shale.						
	Pale grey shale.	13					42·6 ft.
	END OF HOLE 13·0m.						
		4					
		5					

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67	LOGGED A.M. PAIN
TYPE MAYHEW 1000	
DRILLER W. BOYD	DATE 8-8-72
START 8-8-72	TRACED A.R.
FINISH 8-8-72	CHECKED L.V.W.

SHEET 2 OF 2 | DRG Nº S9620a-Ba

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº ME 20

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE 71-823

COORDINATES

LOCATION ETHEL WELL

ANGLE FROM HORIZ 90° DIRECTION —

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) (1 2 3 4 5 6 7 8 9)	DEPTH (FT.)
ALLUVIUM: Red-brown silty soil.					Silicified limestone rubble.		
Red-brown silty soil.		1					
Red-brown silty soil.							5
White and grey limestone.		2					
White limestone.					Patchy silicification.		
White and pale brown limestone.		3			Patchy silicification.		10
White and pale brown silty limestone.							
Pale brown to buff silty limestone.		4					
Brown silty calcareous siltstone.							15
UPPER CAINOZOIC MT. WILLOUGHBY LIMESTONE: Brown silty calcareous siltstone.		5					
Brown silty calcareous siltstone.							
Brown silty calcareous siltstone.		6					20
Brown siltstone.							
Brown siltstone.		7					
Brown siltstone.							25
Brown siltstone.		8					
Brown siltstone.							
Brown siltstone.		9					30
Brown siltstone.							
Brown siltstone.		10					

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67	LOGGED A.M. PAIN
TYPE MAYHEW 1000	
DRILLER W. BOYD	DATE 8-8-72
START 8-8-72	TRACED A.R.
FINISH 8-8-72	CHECKED J.V.W.

SHEET 1 OF 2 DRG Nº S 9621 Ba

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT **LOG OF ROTARY AIR DRILL HOLE**

HOLE Nº ME 20
SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.
PLAN REFERENCE 71-823
COORDINATES
LOCATION ETHEL WELL
ANGLE FROM HORIZ 90° DIRECTION —

		DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) 1 2 3 4 5 6 7 8 9	DEPTH (FT.)
UPPER CAINOZOIC	MT. WILLOUGHBY LIMESTONE	Brown siltstone.							
		Brown siltstone.		11					35
		Brown siltstone.							
		Brown siltstone.		12					
MESOZOIC	BLEACHED CRETACEOUS SHALE (Duricrust Profile)	Pale grey shale.							40
		Pale grey shale.		13					
		Pale grey shale.							
		Pale grey shale.		14					45
									46 ft.
		END OF HOLE 14·0m.							
				5					

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
YH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67	LOGGED A.M. PAIN
TYPE MAYHEW 1000	
DRILLER W.BOYD	DATE 8-8-72
START 8-8-72	TRACED A.R.
FINISH 8-8-72	CHECKED L.V.W.

SHEET 2 OF 2 DRG Nº S9621a Ba

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº ME1/ME21.

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE 71-823

COORDINATES

LOCATION ETHEL WELL

ANGLE FROM HORIZ 90° DIRECTION

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) (1 2 3 4 5 6 7 8 9)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
White silicified limestone							
White and off-white limestone.							
White, off-white & brown limestone.		1			soft silty interbands.		
White and brown limestone.					White limestone interbands.		
Brown silty limestone.		2			Brown silty interbands.		5
Brown and grey limestone.							
Brown and grey limestone.		3					10
Brown and grey limestone.							
Brown siltstone		4					15
Brown siltstone							
Brown siltstone		5					
Brown siltstone							18 ft.
END OF HOLE 5.5M.							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67
TYPE MAYHEW 1000
DRILLER W. BOYD
START 6 AUG 1972
FINISH 6 AUG 1972

LOGGED A.M. PAIN
DATE 24.1.72.
TRACED D.W.W.
CHECKED L.V.W.

SHEET 1 OF 1

DRG Nº S9659 Ba

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E. 22

SERIAL Nº 905/72

FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.

PLAN REFERENCE 71-823

COORDINATES

LOCATION ETHEL WELL

ANGLE FROM HORIZ 90° DIRECTION —

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.)	DEPTH (FT.)
CAINOZOIC / UPPER / MT. WILLOUGHBY LIMESTONE							
Brown silty soil	0.3 m				Silicified limestone rubble		
White silicified limestone							
White limestone							
White limestone		1			Patchy silification		
White limestone							5
Brown silty limestone		2					
Brown silty limestone							
Brown silty limestone		3					10
Brown silty limestone							
Brown and buff silts		4					
Brown and buff silts							15
Brown and buff silts		5					
Brown							16 ft
END OF HOLE	5.5 m						

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67	LOGGED A.M. PAIN
TYPE MAYHEW 1000	
DRILLER W. BOYD	DATE 8/8/71
START 8/8/71	TRACED SLT
FINISH 8/8/71	CHECKED L.V.W.

SHEET 1 OF 1 | DRG Nº S9660 Ba

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº ME. 23
SERIAL Nº 905/72

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT
FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.
LOCATION ETHEL WELL
PLAN REFERENCE 71-823
COORDINATES
ANGLE FROM HORIZ 90° DIRECTION —

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H YH)	STRUCTURES	PENETRATION TIME (MINS.) (1 2 3 4 5 6 7 8 9 10)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
White and pale brown limestone							
Brown, slightly silty limestone		1					
Brown, slighty silty limestone							5
Brown, slighty silty limestone		2					
Brown silty limestone							
Pale brown calcareous siltstone		3					10
Pale brown calcareous siltstone							
Pale brown calcareous siltstone		4					
Pale brown calcareous siltstone							15
Pale brown calcareous siltstone		5					
Pale brown calcareous siltstone							18 ft.
End of Hole 5·5 M.							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
YH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67
TYPE MAYHEW 1000
DRILLER F. PIGGNITTER
START 8-8-71
FINISH 8-8-71
LOGGED A.M. PAIN
DATE 8-8-71
TRACED D.J.M.
CHECKED L.V.W.

SHEET 1 OF 1 | DRG Nº S9661 &c

P.F. Nº S9410 MB

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº M.E. 24
SERIAL Nº 905/72

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT
FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.
LOCATION ETHEL WELL
PLAN REFERENCE 71.823
COORDINATES
ANGLE FROM HORIZ 90° DIRECTION -

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
Brown silty soil					Silicified limestone rubble		
White limestone					Patchy silicification		
White limestone		1			Patchy silicification		
Brown, slighty silty limestone							5
Grey, brown and white limestone		2					
Grey, brown and white limestone							
Brown and buff silty limestone		3					10
Brown and buff silty limestone							
Buff calcareous silt		4					
Buff calcareous silt							15
Buff calcareous silt		5					
Buff calcareous silt							18 ft.
END OF HOLE : 5·50m							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº D.M.67
TYPE MAYHEW 1000
DRILLER W. BOYD
START 8 AUG 1972
FINISH 8 AUG 1972

LOGGED A.M. PAIN
DATE 8 AUG 72
TRACED T.J.E.
CHECKED I.V.W.

SHEET 1 OF 1 | DRG. Nº S9662 Ba

P.F. Nº S9410 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF ROTARY AIR DRILL HOLE

HOLE Nº ME. 25
SERIAL Nº 905/72

PROJECT TARCOOLA-ALICE SPRINGS RAILWAY BALLAST PROJECT
FEATURE MT. WILLOUGHBY LIMESTONE DEPOSIT.
LOCATION ETHEL WELL
PLAN REFERENCE 71, 823
COORDINATES
ANGLE FROM HORIZ 90° DIRECTION

DESCRIPTION OF CHIPS	LOG	DEPTH (m.)	POROSITY (HP P MP SP NP)	HARDNESS (VS S MH H VH)	STRUCTURES	PENETRATION TIME (MINS.) (1 2 3 4 5 6 7 8 9)	DEPTH (FT.)
UPPER CAINOZOIC — MT. WILLOUGHBY LIMESTONE							
Brown silty soil							
Grey and brown limestone							
Grey and brown limestone		1					
Grey and brown limestone							5
Brown, and grey limestone		2					
Brown to buff silty limestone							
Brown to buff silty limestone		3					10
Brown to buff silty limestone							
Brown siltstone		4					
Brown siltstone							15
Brown siltstone		5					
Brown siltstone							18 ft.
END OF HOLE 5·50 m.							

POROSITY TERM

HP	Highly Porous
P	Porous
MP	Moderately Porous
SP	Slightly Porous
NP	Non Porous

HARDNESS TERM

VS	Very Soft
S	Soft
MH	Moderately Hard
H	Hard
VH	Very Hard

MINERAL RESOURCES DIVISION

DRILL Nº DM 67
TYPE MAYHEW 1000
DRILLER W. BOYD
START 8 AUG 1971
FINISH 8 AUG 1971
LOGGED A.M. PAIN
DATE 8 AUG 1971
TRACED T.J.E.
CHECKED J.V.W.

SHEET 1 OF 1 | DRG Nº S 9663 Ba

P.F. Nº S9410 MB

N

To Alice Springs

To Stuarts Highway

STUART

WINTINNA HS.

WINTINNA CREEK

HIGHWAY

To Coober Pedy

DJ

JOHN WELL

To Marble Well

DONGUDINNA CREEK

ETHEL WELL

DE1

See Plan No. 71-823

To Wintinna Bore

LEGEND

- Alluvial material
- Gibber
- Telford Gravel
- Mount Willoughby Limestone
- Siliceous duricrust
- Lower Cretaceous Shale and Siltstone

- Track
- Main road
- Fence
- DE1 — Drill hole location and number
- River or creek
- Geological boundary
- Approximate geological boundary

SCALE IN KILOMETRES

0 1 2 3 4 5 6

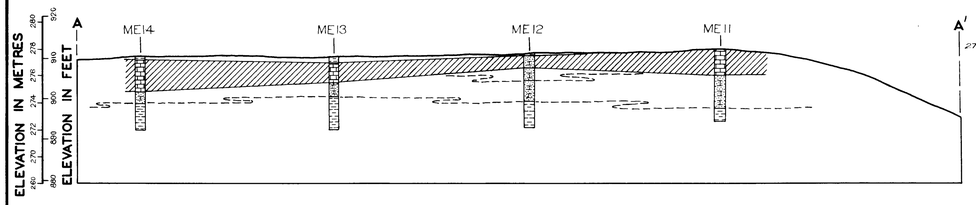
0 1 2 3 4

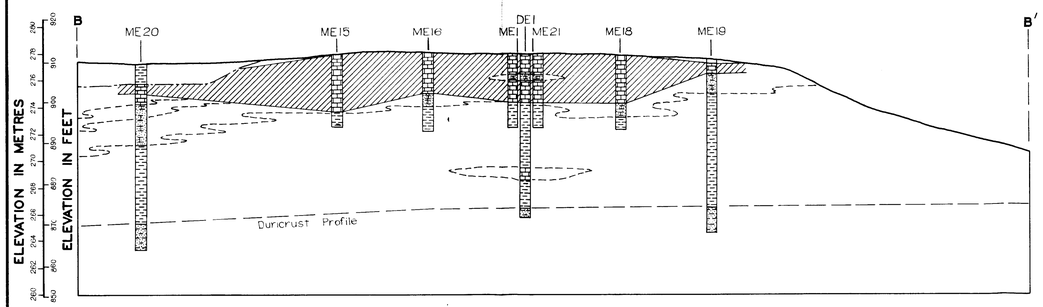
SCALE IN MILES

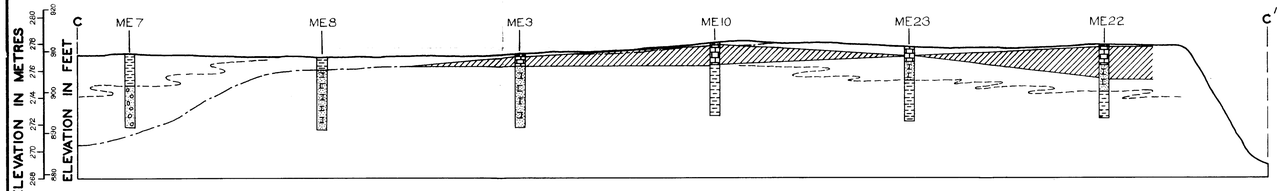
DEPARTMENT OF MINES — SOUTH AUSTRALIA

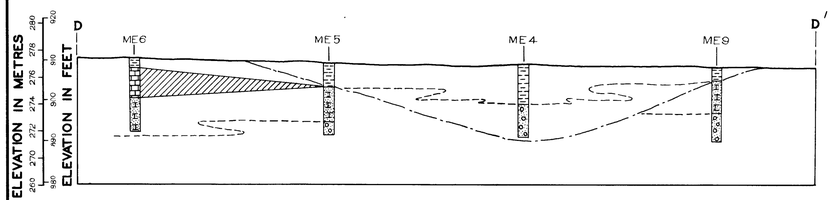
TARCOOLA – ALICE SPRINGS RAILWAY
LIMESTONE DEPOSIT
ETHEL WELL AREA

NON-METALLIC MINERALS SECTION	GEOLOGIST	Drn. D.N.	SCALE: AS SHOWN
		Tcd. SLT	71-748
		Ckd. R.H.	
Director of Mines	SEN. GEOLOGIST	Exd.	DATE: 1 OCT. 1971









SCALE IN METRES

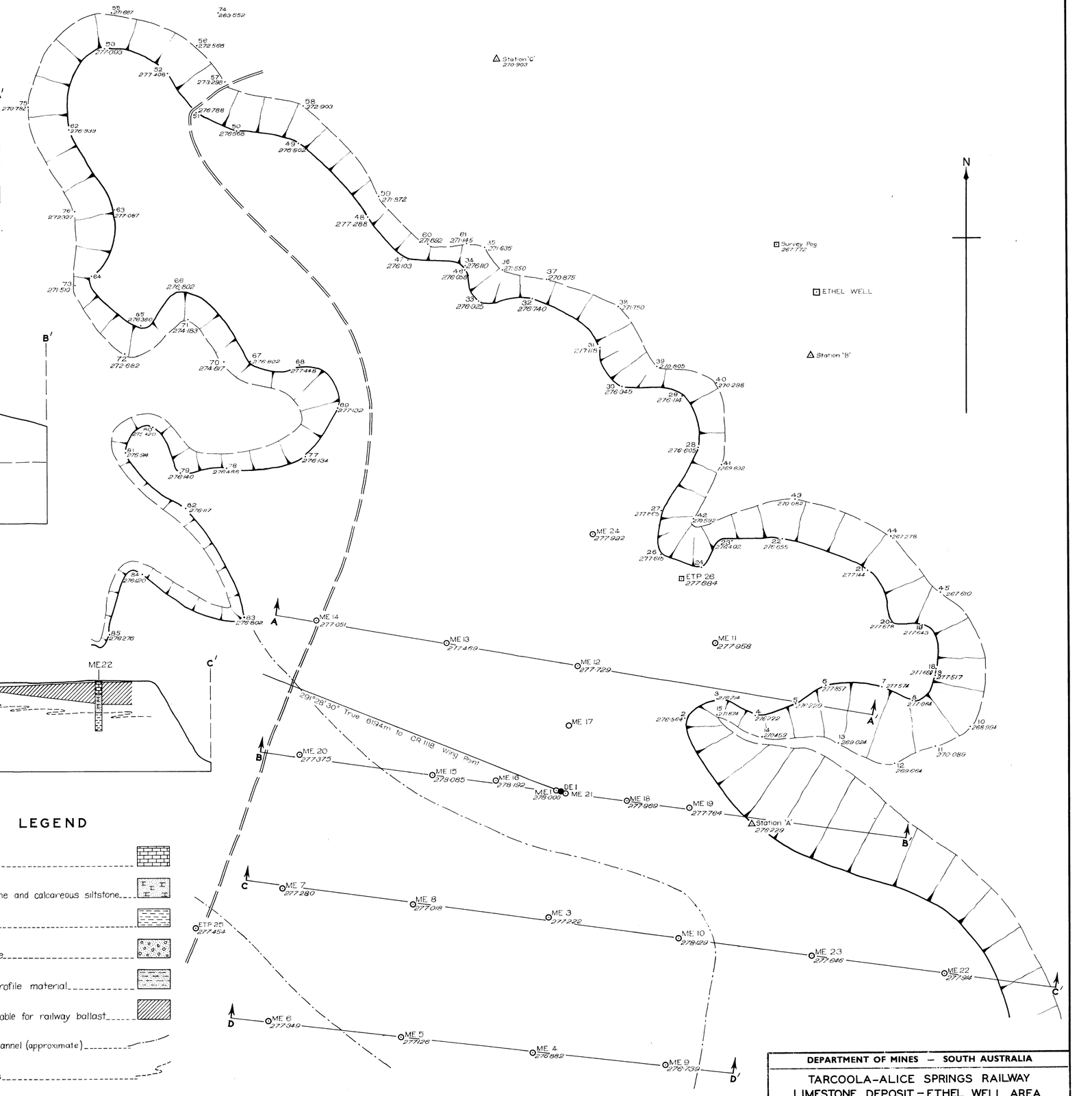
50 0 50 100 150

200 100 0 100 200 300 400 500

SCALE IN FEET

LEGEND

- Limestone
- Silty limestone and calcareous siltstone
- Siltstone
- Conglomerate
- Duricrust profile material
- Material suitable for railway ballast
- Drainage channel (approximate)
- Trend lines
- Diamond drillhole — DE1
- Rotary air drillhole with N° and R.L. in metres — ME1 276.000



For geological plan of Ethel Well area see Drg No. 71-748

Surveyor: N. Edwards S.F.B. 458, 461

Datum M.S.L. Port Adelaide

DEPARTMENT OF MINES — SOUTH AUSTRALIA

TARCOOLA-ALICE SPRINGS RAILWAY
LIMESTONE DEPOSIT — ETHEL WELL AREA
LOCATION OF ROTARY DRILLHOLES AND GEOLOGICAL SECTIONS

MINERAL RESOURCES DIVISION		Drn D.N.	SCALE: AS SHOWN
	GEOLOGIST	Tcd. D.V.M.	71-823 Ba
Director of Mines	SEN. GEOLOGIST	Ckd.	
		Exd.	DATE: 9-8-72