

OLIVERS PHOSPHATE WORKINGS
RESULTS OF PERCUSSION DRILLING
Section 65, 66 Hd. Willunga

by

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FIGURES

- Fig. 1 Looking southwest into Quarry I
Fig. 2 Looking south at Quarry III and shaft (across fence)
Fig. 3 Quarry IV and inclined drive

PLANS

<u>Plan No.</u>	<u>Title</u>	<u>Scale</u>
67-746	Detailed plan of workings amended.	1" = 40'
68-616	Revised geological cross-sections	1" = 40' horiz. 1" = 20' vert.

Rept. Bk. No. 67/65
G.S. No. 4094
D.M. No. 43/68

DEPARTMENT OF MINES
SOUTH AUSTRALIA

Rept. Bk.No. 67/65
G.S. No. 4094
D.M. No. 43/68

OLIVERS PHOSPHATE WORKINGS
RESULTS OF PERCUSSION DRILLING
Sec. 65, 66 Hd. Willunga

ABSTRACT

Seven percussion drillholes averaging 40' deep were put down at Oliver's Phosphate Workings $1\frac{3}{4}$ miles east of Noarlunga. Results indicated reserves of less than 5,000 tons of phosphate rock suitable for fertilizer manufacture, cutting previous estimates by more than one half.

Unless shallow phosphate deposits of suitable size and low iron oxide plus alumina content occur to the south of the workings, quarrying would not be an economic proposition.

Limited exploration to the south is proposed.

INTRODUCTION

This report is an appendix to a previous report prepared for Mr. L.K. Oliver of McLaren Vale (Callen 1968), and discusses the results of percussion drilling at Oliver's Phosphate Workings. Mr. Oliver owns the land and mineral rights over the workings, which are situated $1\frac{3}{4}$ miles east of Noarlunga. The drilling was undertaken by Mobil Quarries Ltd., and sampling and core logging by the Mines Department in February, 1968, to prove whether extensions of the phosphorite existed, as follows:

- (1) Along the western side of the workings, between a thick sequence of purple slates and the Brighton Limestone. The tonnage of phosphate rock present would depend on the geological structure developed on this side of the workings. It was suspected that this structure was a fault, situated some distance west of the workings, and running northeast-southwest.



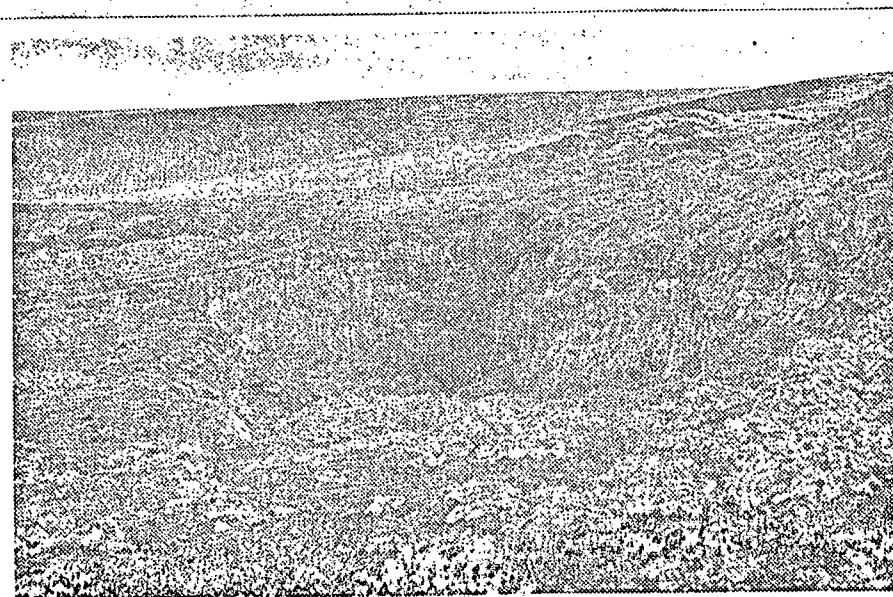
18591

Fig. 1
Looking southwest into Quarry I



18589

Fig. 2
Looking south at Quarry III and shaft (across fence)



18590

Fig. 3
Quarry IV and inclined drive

(2) South of Quarry III (see plan 67-746, op. cit)

phosphorite was known to be present, but was expected to have too much overburden for quarrying to be an economic proposition. A hole was drilled here at the request of the owner.

DRILLING RESULTS

The positions of the holes drilled are shown on plan 67-746, and some of the holes and the reinterpreted geology are incorporated on the geological sections (B to F on plan 68-616). Logs of the holes are given in appendix 2.

An Ingersoll Rand air feed rotary percussion drill was used to drill 7 holes ranging from 30' to 48' deep, and totalling 277'. Samples were taken at 2' intervals, logged, and tested in the field for phosphate content. Samples showing reaction with the vanado-molybdate reagent were retested, and those containing more than $2\%P_2O_5$ were sent for assay (see appendix 1).

No provision for sampling was made on the drill, and hence approximately 30% of the sample was lost. The only material collected being coarser rock which fell close to the hole.

Wet clay horizons which were encountered in most holes just above the phosphate rock caused jamming of the rocks and blockage of air flow, producing partial or complete loss of sample within the phosphorite horizon.

In spite of the limitations, it was possible to obtain the depth to the phosphorite with an accuracy of plus or minus 3'. The thickness of phosphorite could only be determined approximately, and in any case would vary according to the grade required, and the selectivity of the mining operation.

A table showing predicted and observed depths of overburden, thickness of phosphorite horizon, and grade is given below:

Hole No	Depth of overburden	Predicted depth of overburden	Thickness of phos - phorite in Ft.	GRADE (%)	
				P ₂ O ₅	Al ₂ O ₃ + Fe ₂ O ₃
1	-	25'	Not inter - sected	-	-
2	28'	25'	6'	10.4	12.5
3	-	20'	Not inter - sected	-	-
4	-	5'	" "	-	-
5	10'	30'	8'	7.9	19.4
5	18'		8'	15.5 (Assuming 10% P ₂ O ₅ for 22' - 24')	24.2 (Assuming 20% for 22'-24')
<i>5A</i>	10'		16'	11.7	21.8
5A	22'	20'	8'	11.3 (Assuming 5% P ₂ O ₅ from 26' - 28')	12.9 (Assuming 15% from 26'-28')
7	22'	?	2'	6.5	25.8

In holes 2 and 5A, results were as predicted. Holes 1 and 3 were entirely within the purple shales, which are above the Brighton Limestone. Holes 4 and 7 penetrated the yellow sandstone, but no phosphate of significance was present. Hole 5 penetrated a deeply weathered phosphatic yellow sandstone at a much shallower depth than predicted.

CONCLUSIONS

Based on results from Holes 1, 2 and 3, a fault is suggested to explain the juxtaposition of the purple slate sequence and the phosphatic yellow sandstone. The fault was suggested from former work, but was thought to be further west. Its proximity to the quarry cuts reserves to less than 1/5 of those previously estimated.

Absence of phosphorite in hole 7 can be explained by postulating that the hole was drilled in a fault zone, or down dip on a steeply dipping limb of the anticline in Quarry I.

Absence of phosphorite in hole 4 is probably due to the dip on the beds in Quarry II being steeper than predicted, thus bringing the phosphorite to the surface closer to the edge of the quarry.

The presence of 16' of 12% P_2O_5 in hole 5 close to the surface means that overburden is less than that determined previously. The reason for this is unknown. Thus shallow deposits suitable for quarrying could be present, though iron oxide and alumina content is probably too high to make this worthwhile.

RECOMMENDATIONS

Apart from a narrow zone flanking the west side of Quarries I and III, no phosphate is expected to exist adjacent to the workings. The low tonnage, and high acid soluble iron oxide and alumina content would make mining unprofitable.

Phosphorite present to the south of Quarry III could continue along the direction of strike of the folds at shallow depths. Its presence could be tested by hand augering, followed by percussion drilling using adequate sampling equipment if its presence were proved. However, unless alumina and iron oxide content is much lower than that indicated by hole 5, mining would not be recommended.

In the event of further reserves being discovered in this area, holes 6 and 12 should be drilled.



RAC:RW
16.10.1968

R.A. CALLEN
GEOLOGIST
NON-METALLIC MINERALS SECTION

REFERENCE

Callen, R.A. 1968 Phosphate Deposits - Oliver's Workings
Sec. 65, 66 Hd. Willunga, Rpt. Bk. 66/12 (unpubl.)

APPENDIX I

Phosphate tests and assays

HOLE N° 2
SERIAL N°
DRILL TYPE PERCUSSION

NOT	RECORDED
-----	----------

SHEET 1 OF 5 DRG. N° S 6013 Hall

PHOSPHATE TESTS AND ASSAYS OF DRILL HOLE

HOLE N° 4
SERIAL N°
DRILL TYPE PERCUSSION

SAMPLE N°	SAMPLE DEPTH	SAMPLE METHOD	PHOSPHATE TEST % P ₂ O ₅							ASSAY RESULT (% Acid soluble)					SCINTILLO- METER READING μR/hr	COMMENTS
			0	0-0.5	0.5-1	1-2	2-5	5-10	>10	P ₂ O ₅	Fe ₂ O ₃	Al ₂ O ₃	MnO	F		
	34'-36'	RANDOM SMALL SAMPLE	✓													

DEPARTMENT OF MINES - SOUTH AUSTRALIA

OLIVER'S PHOSPHATE WORKINGS
McLAREN VALE

NON-METALLIC MINERALS SECTION

START 4:30:00	TESTED BY G. Lyon
FINISH	Tcd. A.M.D
R. A. Callen GEOLOGIST	Ckd. L.V.W.
SHEET 2 OF 5	DRG. N° S6814 Hall

PE N° 56753 MB

HOLE N° 5
SERIAL N°
DRILL TYPE PERCUSSION

NOT RECORDED

SHEET 3 OF 5	DRG. N° S 6815 Hall
--------------	------------------------

HOLE N° 5A
SERIAL N°
DRILL TYPE PERCUSSION

[illegible]

NON-METALLIC MINERALS SECTION

START	TESTED BY C. Lyon
FINISH	Tcd. AM & D
R. A. Callen GEOLOGIST	Ckd. L.V.W.

SHEET 4 OF 5 DRG. N° S 6816 Hall

HOLE N° 7
SERIAL N°
DRILL TYPE PERCUSSION

[illegible]

NON-METALLIC MINERALS SECTION

START	TESTED BY C. Lyon
FINISH	Tcd. A MCD
R.A. Callen GEOLOGIST	Ckd. L.V.W.

SHEET 5 OF 5	DRG. N° S 6817 Hall
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APPENDIX 2

Geological logs of drill holes

DEPARTMENT OF MINES - SOUTH AUSTRALIA

LOG OF PERCUSSION DRILLHOLE

HOLE N°1

SERIAL N°

PROJECT: OLIVER'S PHOSPHATE WORKINGS

SECTION 65

HUNDRED WILLUNGA

FEATURE PHOSPHATE BEDS

CO-ORDINATES

R.L. Surface

FT.

ANGLE FROM HORIZONTAL 30°

R.L. Collar

FT.

LOCATION: 1 1/2 miles E. Noarlunga

DIRECTION

Datum

SAMPLE INTERVAL (FT.)		DESCRIPTION OF SAMPLE	SUMMARY LOG	GRAPHIC LOG	WEATHERING	SAMPLE WEIGHT (LBS)	ESTIMATED WEIGHT (LBS)	% RECOVERY	HOLE SIZE DEPTH FT.	WATER LEVEL DATE	CASING
FROM	TO										
0'	2'	Grey slaty limestone.	GREY SLATY LIMESTONE								
2'	4'	As above with purple slate.									
4'	6'	Purple slate and yellowish silty slate.									
6'	8'	Purple and brown slate.									
8'	10'	Purple slate with minor brown slate and white blebs (siltstone?)	PURPLE AND GREY SLATE								
10'	12'	As above with higher proportion of white siltstone									
12'	14'	As above but paler.									
14'	16'	As above, paler, some quartz fragments.									
16'	18'	Pale greyish purple slate.									
18'	20'	Purple and greyish yellow slate.									
20'	22'	Green to white slate with minor purple slate.	GREEN TO WHITE SLATE								
22'	24'	Pale white to yellowish slate.									
24'	26'	As above.									
26'	28'	Purple slate, minor yellowish slate.	PURPLE SLATE								
28'	30'	As above.									
		END OF HOLE Hole stopped since yellow siltstone not encountered.									

WEATHERING

FR - Fresh

SW - Slightly weathered

MW - Moderately weathered

HW - Highly weathered

CW - Completely weathered

Rotary Percussion

Air Return

NON-METALLIC MINERALS SECTION

DRILL N° MOBIL QUARRIES

TYPE Ingersoll Rand

DRILLER T. Jones

START 20.2.68

FINISH 29.2.68

LOGGED BY R.A. Callen

DATE 20.2.68

TRACED A.M.S.D.

CHECKED L.V.W.

SHEET 1 OF 7

DRG N° S 6806

Hall

P.F. N° 56761 INB

LOG OF PERCUSSION DRILLHOLE

SERIAL N°

PROJECT:

OLIVER'S PHOSPHATE

SECTION 65

HUNDRED WILLUNGA

WORKINGS

CO-ORDINATES

R.L. Surface

FT.

FEATURE: PHOSPHATE BEDS

ANGLE FROM HORIZONTAL 90°

R.L. Collar

FT.

LOCATION: 1 3/4 miles E. Noarlunga

DIRECTION

Datum

SAMPLE INTERVAL (FT)		DESCRIPTION OF SAMPLE	SUMMARY LOG	GRAPHIC LOG	WEATHERING	SAMPLE WEIGHT (LBS)	ESTIMATED WEIGHT (LBS)	% RECOVERY	HOLE SIZE, DEPTH FT.	WATER LEVEL DATE	CASING
FROM	TO										
0	2	Black soil and yellow calcareous siltstone.	SOIL								
2	4	As above plus yellow-brown clay, less calcareous.	Yellow brown clay with siltstone.								
4	6	As above.									
6	8	Brecciated pale grey to white claystone, quartz and siltstone fragments.	SILTSTONE BRECCIA								
8	10	Orange clay with white siltstone fragments.									
10	12	White claystone with brown specks.	WHITE CLAYSTONE								
12	14	As above.									
14	16	White claystone.									
16	18	As above.									
18	20	As above.									
20	22	As above with brown clay.	BROWN CLAY								
22	24	Brown clay									
24	26	Brown clay.									
26	28	Hard pale yellow claystone	INDURATED PHOSPHATIC YELLOW CLAYSTONE								
28	30	As above.									
30	32	As above.									
32	34	As above.									
34	36	Brown clay - hole caved.	PALE YELLOW CLAYSTONE								
36	38	Pale yellowish siltstone.									
38	40	As above									
40	42	Slaty limestone	SLATY GREY LIMESTONE								
42	44	As above									
44	46	As above									
46	48	As above.									
		END OF HOLE Stopped since slaty limestone was penetrated.									

WEATHERING

FR = Fresh

SW = Slightly weathered

MW = Moderately weathered

HW = Highly weathered

CW = Completely weathered

ROTARY PERCUSSION

AIR RETURN

NON-METALLIC MINERALS SECTION

DRILL N° MOBILE QUARRIE

TYPE Ingersoll Rand

DRILLER T. Jones

START 20.2.68

FINISH 20.2.68

SHEET 2015

LOADED BY

R.A. Callen

DATE 29.2.68

TRACED A.M.C.D.

CHECKED L.V.W.

DRG N° S 6807

Holl

LOG OF PERCUSSION. DRILLHOLE

HOLE N° 3

SERIAL N°

PROJECT:

OLIVER'S PHOSPHATE

SECTION 65

HUNDRED WILLUNGA

WORKINGS

CO-ORDINATES

R.L. Surface

FT.

FEATURE PHOSPHATE BEDS

ANGLE FROM HORIZONTAL 90°

R.L. Collar

FT.

LOCATION: 1 3/4 miles E. Noarlunga

DIRECTION

Datum

SAMPLE INTERVAL (FT.)		DESCRIPTION OF SAMPLE	SUMMARY LOG	GRAPHIC LOG	SW WEATH- ING	SAMPLE WEIGHT (LBS)	ESTIMATED WEIGHT (LBS)	% RECOVERY	HOLE SIZE, DEPTH FT.	WATER LEVEL DATE	CASING
FROM	TO										
		Not Recorded	SOIL								
			PURPLE SHALE								
			WHITE SLATE WITH PURPLE AND BROWN LAMINAE.								
			PURPLE SLATE								
		END OF HOLE Drilled in absence of geologist									

NOT RECORDED

POOR

NOT MEASURED

NONE

NONE

WEATHERING

FR - Fresh

SW - Slightly weathered

MW - Moderately weathered

HW - Highly weathered

CW - Completely weathered

Rotary Percussion

Air Return

NON-METALLIC MINERALS SECTION

DRILL N° MOBILQUARRIES

TYPE Ingersoll Rand

DRILLER T. Jones

START 29.2.68

FINISH 29.2.68

LOGGED BY R.A. Callen

DATE 29.2.68

TRACED A.M.S.D.

CHECKED L.V.W.

SHEET 30 of 7

DRG N° S 6808

Hall

DEPARTMENT OF MINES - SOUTH AUSTRALIA
LOG OF PERCUSSION DRILLHOLE

HOLE N° 4
SERIAL N°

PROJECT:

OLIVER'S PHOSPHATE WORKINGS

SECTION 65

HUNDRED WILLUNGA

FEATURE: PHOSPHATE BEDS

CO-ORDINATES

R.L. Surface

FT.

LOCATION: 1/2 miles E. Noarlunga

ANGLE FROM HORIZONTAL 90°

R.L. Collar

FT.

DIRECTION

Datum

SAMPLE INTERVAL (FT.)		DESCRIPTION OF SAMPLE	SUMMARY LOG	GRAPHIC LOG	WEATHERING	SAMPLE WEIGHT (LBS.)	ESTIMATED WEIGHT (LBS.)	% RECOVERY	HOLE SIZE, DEPTH FT.	WATER LEVEL DATE	CASING
FROM	TO										
0	2	Black soil	SOIL								
2	4	As above									
4	6	Yellow and white siltstone									
6	8	As above									
8	10	Hard pale cream siltstone	Pale cream siltstone								
10	12	As above									
12	14	As above									
14	16	As above									
16	18	As above									
18	20	As above									
20	22	White siltstone and quartz fragments	QUARTZ								
22	24	Yellow siltstone									
24	26	Purple shale									
26	28	As above	PURPLE SHALE								
28	30	Yellow and white siltstone									
30	32	As above									
32	34	As above	Yellow and white laminated siltstone.								
34	36	As above									
36	38	As above									
38	40	Brown clay	BROWN CLAY								
40	42	Slaty limestone.	SLATY LIMESTONE								
42	44	As above									
		END OF HOLE Stopped since slaty limestone encountered.									

WEATHERING

FR - Fresh
SW - Slightly weathered
MW - Moderately weathered
HW - Highly weathered
CW - Completely weathered

Rotary Percussion
Air Return

NON-METALLIC MINERALS SECTION

DRILL N° MOBIL QUARRIES LOGGED BY
TYPE Ingersoll Rand R.A. Callen
DRILLER J. Jones DATE 1.3.68
START 1.3.68 TRACED A.M.E.D.
FINISH 1.3.68 CHECKED L.Y.W.

SHEET 4 OF 7 DRG N° S 6809 Hall

DEPARTMENT OF MINES - SOUTH AUSTRALIA

LOG OF PERCUSSION DRILLHOLE

HOLE N°5

SERIAL N°

PROJECT: OLIVER'S PHOSPHATE WORKINGS

SECTION 65 HUNDRED WILLUNGA

FEATURE: PHOSPHATE BEDS

CO-ORDINATES

R.L. Surface

FT.

ANGLE FROM HORIZONTAL 90°

R.L. Collar

FT.

LOCATION: 12 miles E. Noarlunga

DIRECTION

Datum

SAMPLE INTERVAL (FT)		DESCRIPTION OF SAMPLE	SUMMARY LOG	GRAPHIC LOG	SW WH MW HW CW	RING LV	SAMPLE WEIGHT (LBS)	ESTIMATED WEIGHT (LBS)	% RECOVERY	HOLE SIZE DEPTH FT	WATER LEVEL DATE	CASING
FROM	TO											
0	2	Dark brown clay and ferruginous fragments, minor yellow siltstone.	SOIL									
2	4	Yellow and white siltstone	YELLOW SANDSTONE WITH YELLOW TO WHITE SILTSTONE INTERBEDS									
4	6	As above										
6	8	As above										
8	10	As above, minor black siltstone.										
10	12	Yellow sandstone										
12	14	As above with yellow clay										
14	16	As above										
16	18	As above										
18	20	Yellow clayey sandstone with indurated yellow sandstone and siltstone.										
20	22	As above										
22	24	As above										
24	26	Hard yellow sandstone, and clay.	BROWN CLAY									
26	28	NO SAMPLE										
28	30	Brown clay and yellow sandstone, minor limestone.	SLATY LIMESTONE									
30	32	50% gray slaty limestone, rest brown clay.										
32	34	Slaty limestone.										
		END OF HOLE Stopped since in slaty limestone.										

WEATHERING

FR - Fresh
SW - Slightly weathered
MW - Moderately weathered
HW - Highly weathered
CW - Completely weathered

Rotary Percussion
Air Return

NON-METALLIC MINERALS SECTION

DRILL N° MOBIL QUARRIES LOGGED BY
TYPE Ingersoll Rand R.A. Callen
DRILLER T. Jones DATE 1.3.68
START 1.3.68 TRACED AMED
FINISH 1.3.68 CHECKED L.V.W.

SHEET 30 of 71 DRG N° S 6810 Hall

P.F. N° 56761 MB

LOG OF PERCUSSION DRILLHOLE

SERIAL N°

PROJECT:

OLIVER'S PHOSPHATE..

SECTION G5

HUNDRED WILLUNGA

WORKINGS

CO-ORDINATES

R.L. Surface

FT

FEATURE: PHOSPHATE BEDS

ANGLE FROM HORIZONTAL 90°

R.L. Collar

FT

LOCATION: 12 miles E. Noarlunga

DIRECTION

Datum

SAMPLE INTERVAL (FT.)		DESCRIPTION OF SAMPLE	SUMMARY LOG	GRAPHIC LOG	WEATHERING	SAMPLE WEIGHT (LBS.)	ESTIMATED WEIGHT (LBS.)	% RECOVERY	HOLE SIZE	DEPTH FT	WATER LEVEL	Casing
FROM	TO											
0	2	Blacksoil, lunkar, brown claystone.	SOIL									
2	4	Yellow and white siltstone	YELLOW SILTSTONE WITH LAMINAE OF WHITE SILTSTONE									
4	6	Yellow siltstone, minor white siltstone.										
6	8	White siltstone, minor yellow siltstone.										
8	10	Yellow siltstone, minor white siltstone.										
10	12	As above										
12	14	As above										
14	16	As above										
16	18	As above										
18	20	As above, with white claystone										
20	22	As above										
22	24	As above	BROWN CLAY									
24	26	As above										
26	28	As above	SLATY LIMESTONE									
28	30	White claystone and yellow clay										
30	32	Brown clay and slaty limestone										
32	37	Slaty limestone.										
		END OF HOLE Stopped since in slaty limestone.										

WEATHERING

FR - Fresh
 SW - Slightly weathered
 MW - Moderately weathered
 HW - Highly weathered
 CW - Completely weathered

Rotary Percussion
 Air Return

NON-METALLIC MINERALS SECTION

BRILLIANT MOBILE QUARRIES
 TYPE Ingersoll Rand
 DRILLER T. Jones
 START 1:3:68
 FINISH 1:3:68

LOGGED BY R. A. Giller
 DATE 1:3:68
 TRACED A.M.S.D.
 CHECKED L.V.W.

SHEET 6 OF 7 DRG N° S 6811
 Hall

LOG OF PERCUSSION DRILLHOLE

HOLE N° 7

SERIAL N°

PROJECT:

OLIVER'S PHOSPHATE

SECTION G5

HUNDREDWILLUNGA

WORKINGS

CO-ORDINATES

R.L. Surface

FT.

FEATURE: PHOSPHATE BEDS

ANGLE FROM HORIZONTAL 90°

R.L. Collar

FT.

LOCATION: 1 1/2 miles E. Noorlunga

DIRECTION

Datum

SAMPLE INTERVAL (FT.)		DESCRIPTION OF SAMPLE	SUMMARY LOG	GRAPHIC LOG	SW WEATH- ING	SAMPLE WEIGHT (LBS.)	ESTIMATED WEIGHT (LBS.)	% RECOVERY	HOLE SIZE, DEPTH FT.	WATER LEVEL DATE	CASING
FROM	TO										
0	2	Blacksoil and kunkar	SOIL, KUNKAR.								
2	4	Pale green silica nodules and bright yellow sandstone.	Alternating yellow claystone, siltstone and sandstone with silica nodules.								
4	6	White claystone, yellow siltstone and silica nodules.									
6	8	As above, but no silica.									
8	10	White claystone, soft.									
10	12	Yellow and white claystone.									
12	14	As above									
14	16	Pale yellow claystone									
16	18	Pale yellow claystone and yellow sandstone.	PALE YELLOW CLAYSTONE WITH MINOR SILTSTONE AND SANDSTONE								
18	20	As above									
20	22	As above									
22	24	As above, with rare ironstone fragments.									
24	26	Soft pale yellow claystone with ironstone fragments.									
26	28	Yellow and white claystone									
28	30	As above									
30	32	As above with indurated bands and clays.									
32	34	Pale yellow claystone.									
34	36	As above with darker yellow siltstone.									
36	38	Pale yellow claystone									
38	40	As above									
40	42	As above									
42	44	Purple limestone yellow claystone and brown clay.	PURPLE LIMESTONE								
		END OF HOLE Stopped since in brown clay horizon.									

WEATHERING

FR - Fresh
 SW - Slightly weathered
 MW - Moderately weathered
 HW - Highly weathered
 CW - Completely weathered

Rotary Percussion
 Air Return

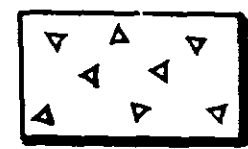
NON-METALLIC MINERALS SECTION

DRILL N° MOBILQUARRES
 TYPE Ingersoll Rand
 DRILLER T. Jones
 START 3:1:68
 FINISH 3:1:68

LOGGED BY R.A. Collen
 DATE 3.1.68
 TRACED A.M.C.D.
 CHECKED L.V.W.

SHEET 7 OF 7 DRG N° S 6812 Hall

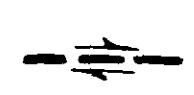
For Legend see Fig. 2



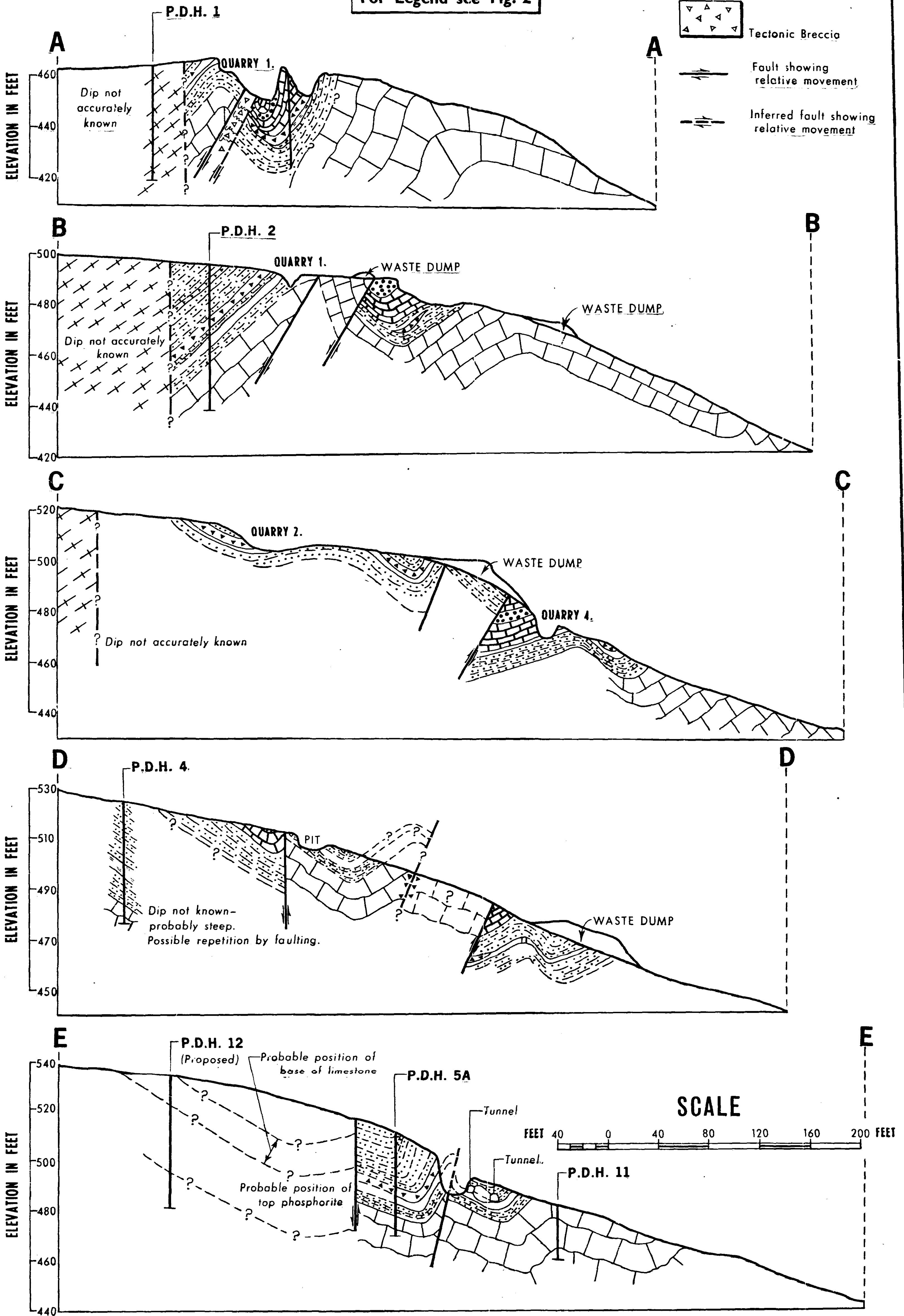
Tectonic Breccio



Fault showing relative movement



Inferred fault showing relative movement



SCALE IN FEET



T.N. M.N.

QUARRY 1

QUARRY 4

QUARRY 2

QUARRY 3

LEGEND

REFERENCE TO SIGNS

52 Strike and dip of bedding

70 Strike and dip of cleavage

55 Strike and dip of joint

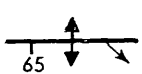
Vertical joint

38 Direction and plunge of minor fold

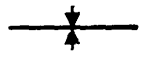
Fault, position accurate

Fault, position approximate

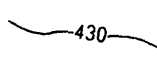
Fault, inferred and concealed



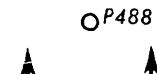
Anticline showing dip of plane, direction and plunge of fold



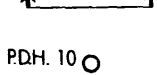
Syncline showing dip of plane, direction and plunge of fold



Contour (Interval=10 ft.)



Petrological sample



Geological Cross-Sections



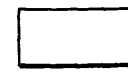
Percussion Drill Hole - completed



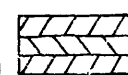
Percussion Drill Hole (proposed)

RECENT

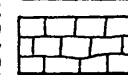
ADELAIDE SYSTEM



Soil, kunkar



Pink, oolitic, dolomitic limestone with yellow shale fragments



Grey limestone with yellow shale fragments



Purple sandy and shaly limestone, intraformational breccia near base. Cross-bedded



Laminated, bright-yellow sandstone



Grey limestone



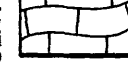
Intraformational siltstone breccia silica nodules at base



Purple siltstone



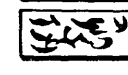
Cream, yellow buff and grey laminated micaceous siltstone cross bedded. Shale and sandstone in part



Indurated micaceous shaly siltstone strongly phosphatic, intraformational breccia in part. Manganese and apatite coated joints

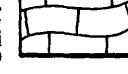


White to cream finely laminated and cross-bedded phosphatic micaceous siltstone and sandstone



Brown limestone

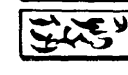
TAPLEY HILL SLATES



Grey, laminated, very calcareous siltstone, cross-bedded



Tectonic breccia



Quartz and calcite veins