D.M. 757/48

DEPARTMENT OF MINES

SOUTH AUSTRALIA

DIAMOND DRILLING OF LIMESTONE DEPOSIT

SECS. 333/4, HD. MOOROOROO

(S.A. PORTLAND CEMENT CO. LTD.)

Proposals & Report No. 1.

by

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ENGINEERING GEOLOGY & MINERAL RESOURCES SECTION

GEOLOGICAL SURVEY BRANCH

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Report Reference		Date
G.S. 372	41/82	11/10/55

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(S.A. PORTLAND CEMENT CO. LTD.)

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1. INTRODUCTION

A request, to test by diamond drilling the old I.C.I. Limestone Quarry, Secs.333/4, Hd. Moorooroo at Angaston, has been received from the present operators S.A. Portland Cement Co. Ltd., with a view to increasing reserves and so extend the life of the treatment plant.

The area was visited on 22/9/55 in company with Mr. K.H. Fleming, A.S.A.S.M., Chief Chemist, when the problem was discussed.

2. PREVIOUS REPORTS

J.D. Campbell, I.C.I. Alkali (Aust.) Pty. Ltd., in "The Geology of the Angaston Marble Beds", 10/12/45 (unpublished), inter alia, discusses regional and detailed geology of the deposit and recommended diamond drilling. His maps showing the results of such drilling were examined in the field and are the basis of the following recommendations. The maps accompanying this report are adapted from or based on Campbell's originals.

3. GEOLOGY

The rocks in the area consist of metamorphics of the Upper pre-Cambrian Adelaide Series - mica schist, impure limestone, marble, sandstone etc.

The Deposit

The marble beingquarried is a coarsely crystalline bed 200'-400' thick, striking 300°-350° magnetic and dipping

70°-80° W. It is usually a massive white stone but in some sections readily crumbles to a sand on quarrying owing to separation of the calcite grains. Elsewhere staining occurs but does not affect the grade appreciably.

The marble is intruded by schisted amphibolite dykes striking subparallel to the marble but dipping 80°E - 80°W. The dykes vary greatly in thickness and disposition and are a serious problem in quarrying especially on the western margin. See Plan L55-85 attached.

The Wall Rocks.

The east wall rock (footwall) consists of impure limestone silicified in part and with a very variable amount of carbonate. Easterly from this impure limestone occur mica schists which mark a change in depositional environment.

The west wall rock, overlying the limestone worked, is depicted on Campbell's maps as sandstone but he states that it "is extremely variable ..... in some places ..... approximating mica schist and in others ..... silicified limestone. In about 100' (west) from the marble bed these sediments pass into true sandstone".

Structure

For purposes of prospecting the marble bed of interest appears to be 200-400' thick strike 300°-350° Magnetic and dip 70°-80° West and to have a footwall of impure limestone. It is intruded on its western margin by amphibolite dykes so that the hanging wall worked is a compromise between the limestone available and the amphibolite (schist) which dilutes it.

4. WORKINGS

At present, benches are being worked at R.L.'s 1330', 1285', 1260' with a proposed bench to come into production at R.L. 1210. For details See Plan L55-85 attached.

Future bench intervals are proposed at 50' intervals (SAPCO) with a 20' berm (S.M.E.) left between benches. Correlating these data future benches have been considered at R.L.'s. 1160', 1110', 1060' (See Sections (55-324) and Longitudinal Projections (55-325) attached) and their possible positions have been taken into account in proposing diamond drill holes. Present mill floor level approximates R.L. 1172.

5. PROPOSED DIAMOND DRILL HOLES

A number of factors need to be considered in laying out a diamond drilling programme.

5.1 For purposes of cement manufacture, minor variations in grade are not important in the quarry so long as they can be adjusted in the blending silos and therefore close spacing of D.D. Holes as required by I.C.I. is not warranted. A 500' spacing is proposed necessitating 4 holes (350', 400', 400', 400'+) to test the bed.

The relationships of these holes to previous D.D. Holes and to each other are shown on the Longitudinal Projections attached (55-325). As these two Long. Projections are at an angle to each other, D.D. Hole 11A and Proposed D.D. Hole No. 2 laid out perpendicular to the baseline of L.P2 and shown as vertical lines on L.P2 are shown as "angled" holes on L.P1.

5.2 While vertical holes allow some economy of footage, in a steeply dipping bed they test only a small proportion of the total thickness. For this reason declined holes (-40°, -30°, -30°, -30°) are proposed to test the whole bed as adequately as possible. This follows the practice established by Campbell and has a better chance of intersecting and evaluating the amphibolite (schist) dykes which may cause trouble in quarrying.

5.3 The choice between easterly declined holes and westerly declined holes depends to a great extent on the wall rocks. As the structure of the east wall is relatively simple and as this footwall will follow the quarry down and underly it in

depth no problems appear likely there and no large tonnages of limestone will be tied up in batters there.

The western wall, however, is not only the hanging wall but is complicated by the occurrence of amphibolite (schist) dykes and a closer evaluation of information there is necessary so that the economic balance between hanging wall removal and limestone left can be calculated.

For this reason holes collared in the eastern side of the quarry and declined westerly have been proposed.

5.4 The possible amount of hanging wall removed as overburden or as low grade material has been considered in the Sections attached (55-324) and affects not only the amount of limestone accessible on any one bench but the depth to which benching is practicable (See also Long. Proj. 55-325). A great deal of marble must unfortunately be left in the batter on the west (hanging) wall.

5.5 A minimum width of bench of approximately 100' for the lowest bench has been considered in that it allows 2 faces to be worked alternately by one shovel, removal of stone being possible by conveyor belt or diesel truck in an inclined underground haulage way. For the northern section the lowest practicable bench level appears to be 1060 (See L.P.1) and in the southern section, 1110' and 1160' (See L.P.2). For comparison purposes the present mill floor level approximates R.L. 1172.

5.6 Following these arguments, 4 diamond drill holes have been proposed to test the limestone at the western edge of the second lowest bench in each case. (i.e. R.L. 1110' in North; R.L.'s 1160' and 1210' in South) and to continue to test the western wall for structural purposes at the level of the lowest bench.

It is considered that continuity of the limestone in the upper proposed benches will be sufficiently well proved by correlation of data between the drillholes and the existing benches. Lengths given are estimates only being based on data known to date; one or more holes may need to be extended slightly

to intersect the western wall rocks.

PROPOSED DIAMOND DRILL HOLE

Hole Number	Section Number	Co-ordinate	Direction °True	Angle	Length
1	6	105'E	258°	-40°	350'
2	12A	235'E	228°	-30°	400'
3	1	235'E	258°	-30°	400'
4	17A	320'E	228°	-30°	400' *

Total footage 1550'-1600'.

6. POSSIBLE RESERVES

Should drilling confirm the structure considered in the cross sections, quarrying below the existing benches, as indicated there-on should be able to extract approximately 2⅓ million c. yds. of limestone which is approximately 5 million tons. Present production at 150,000 tons of cement per year requires approximately 250,000 tons of limestone giving a life of 20 years at present production and quarrying within the limits shown on the sections.

Life could be extended still further by

(a) Removing "west wall" as overburden or as low grade, thus adding to the tonnage available from each bench and allowing still lower benches to be opened up.

(b) Underground mining as used overseas.

At this stage, however, deep prospecting is not warranted and the results achieved by the four diamond drill holes proposed should be evaluated before any further exploration either of this occurrence or another is envisaged.

7. CONCLUSION & RECOMMENDATIONS

To test in depth the marble bed being quarried by S.A. Portland Cement Co. Ltd. in Secs. 333/4, Hd. Moorooroo, four

(4) diamond drill holes totalling 1550-1600 ft. are proposed and these should prove approximately 5 million tons, i.e. 20 years reserves at present rate of production.

Graham Whitten

Graham Whitten
SENIOR GEOLOGIST

ENGINEERING GEOLOGY & MINERAL RESOURCES SECTION

Encls.

GFW:AGK
11/10/55

T.N.
1330' LEVEL
1285' LEVEL
1260' LEVEL
Prop. D.D.H. No. 1. 350 Ft. at -40°
Prop. D.D.H. No 2 400 Ft. at -30°
Prop. D.D.H. No 4 400 Ft. at -30°
5/275E Depr. 30°
6/314E Depr. 30°
7/310E Depr. 30°
8/305E Depr. 30°
4/90E Depr. 5°
3/20E Dep. 20
3/29W Depr. 30
4/81 W Depr. 40° Vert. Depr. 30°
5/40W Depr. 45°
7/29W Depr. 30°
F2
F3
LOCALITY PLAN
MOOROOROO
ANGASTON
Main Road
Railway
Scale: 1" = 40 Chns.
SCALE IN FEET
SCALE IN METRES
Quarry face as indicated by Mr Fleming - Chief Chemist
Geology by J. D. Campbell.
S.A.G. DEPT. OF MINES
ANGASTON MARBLE
GEOLOGICAL PLAN
SECS. 333/4 HD. MOOROOROO (S.A. Portland Cement
Approved
Director of Mines
Passed
C.D
Drn
Tcd. R.G.C
Ckd.
Exd.
Scale - 1 Inch = 40 Feet
L 55-85
Date -
F 1
1083

-LEGEND-

Sandstone

Marble

Grey Marble & Black Limestone Mostly Highly Silicified

Mica Schist

Amphibolite Dyke

Fault

Strike & Dip of Bedding

Vertical Bore Hole

Inclined Bore Hole

Top of Quarry

Contours (5Ft interval)

All Outcrops Indicated By Darker Colour.

T.N.

1285' LEVEL

1260' LEVEL

Prop.D.D.H.No.3 400Ft. at -30°

Prop.D.D.H. No.1 350Ft. at -40°

Prop.D.D.H.No.2 400Ft. at -30°

6/314E Depr. 30°

7/310E Depr. 30°

8/305E Depr. 30°

5/275E Depr. 30°

4/90E Depr. 5°

3/115E Depr. 20°

2/56E Depr. 20°

3/20E Depr. 20°

1/64E Depr. 20°

1/42E Depr. 30°

2/16W Depr. 30°

3/29W Depr. 30°

5/40W Depr. 45°

7/29W Depr. 30°

4/81W Depr. 40° Vert. Depr. 30°

Depr. 18°

F1

F2

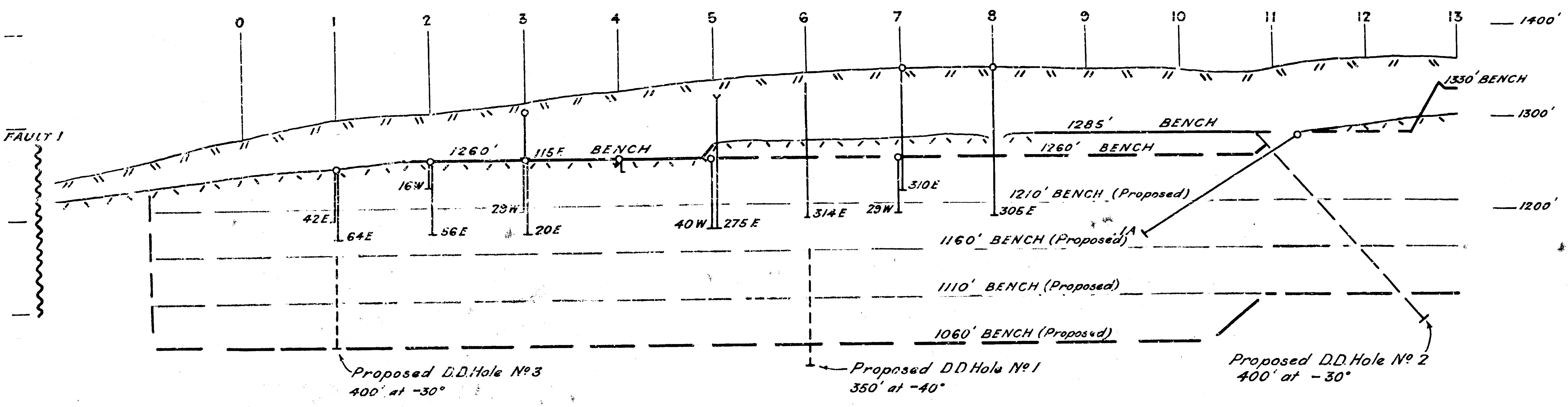
SCALE IN FEET

SCALE IN METRES

F 2

5


LEGEND
Sandstone
Marble
Grey marble & black limestone mostly highly silicified & nodular
Mica schist
Amphibolite dyke
SECTION 1
1/42E
1/64E
1200'
1100'
Proposed D.D Hole No 3
400' at -30°
SECTION 6
6/314E
1300'
1200'
1100'
Proposed D.D.H. No 1
350' at 40°
SECTION 12 A
1300'
1255'
1200'
1210'
1100'
Proposed D.D Hole No 2
400' at -30°
SECTION 17 A
17A
1300'
1200'
Proposed D.D.H. No 4
300' at -30°
S.A. DEPT. OF MINES
ANGASTON MARBLE
CROSS SECTIONS
SEC. 333·4 HD. MOOROOROO (S.A. PORTLAND CEMENT CO)
Reg. No.
D.M.
Compiled from original by J.D. Campbell
Associated Drawing
No.
Amendment
Approved
Director of Mines
Passed
Scale 40 feet to 1 inch
55 - 324
Date 27-9-55
To accompany report by G. Walker, Senior Geologist



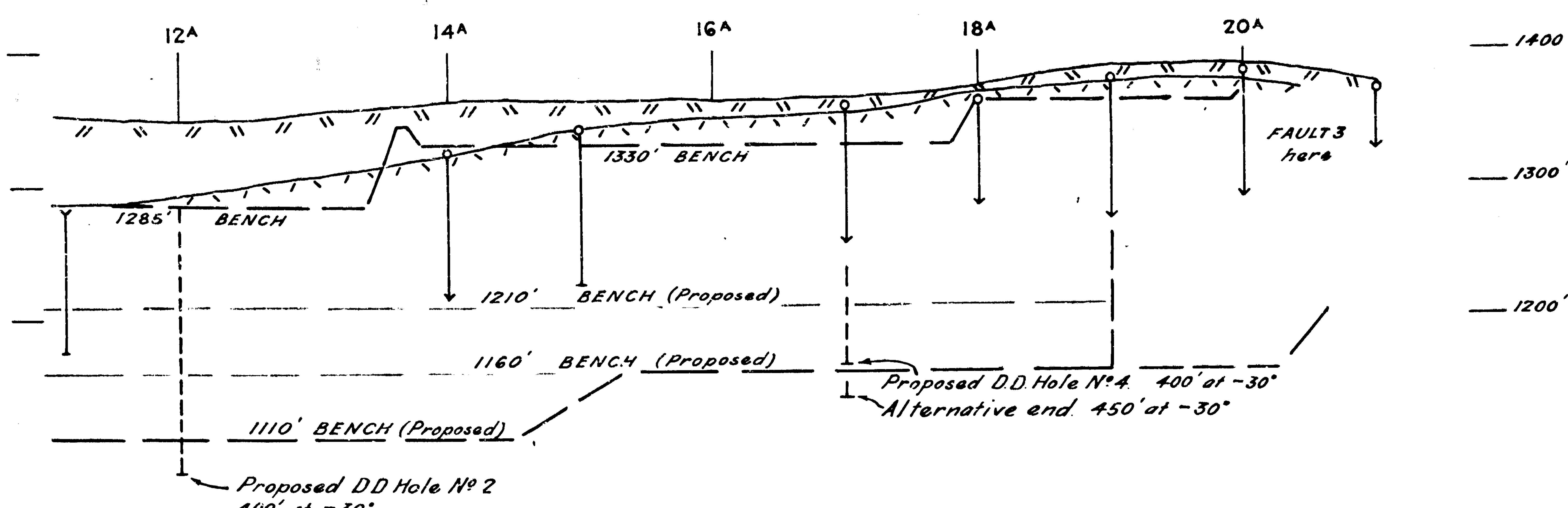
(L.P. 1)

LONGITUDINAL PROJECTION OF NORTHERN SECTION

LOOKING EASTERLY

LEGEND

- D.D. Hole. Collared in Marble Bed
- " " Entering Marble Bed - collared in Eastern Wall
- " " Leaving Marble Bed - entering Western Wall
- " " Stopped in Marble Bed
- Proposed D.D. Holes
- Longitudinal Projection of East Wall of Marble Bed
- Longitudinal Projection of West Wall of Marble Bed



(L.P. 2)

LONGITUDINAL PROJECTION OF SOUTHERN SECTION

LOOKING NORTH EASTERLY

To accompany report by G. Whitten, Senior Geologist.

S.A. DEPARTMENT OF MINES

ANGASTON MARBLE QUARRY

Hº MOOROOROO SECS. 333/4

LONGITUDINAL PROJECTIONS

No.		Nº	Date
	ANGASTON MARBLE GEOLOGICAL PLAN	L55-86	
	Associate Plan		

Approved | Passed | Drn. | Scale: 100 ft. to 1in.

Director | Tcd. | Ckd. | Exd.

55-325

Gk 9

Date 22-9-55