Rept. Bk. No. 63/64
G.S. No. 3542

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

REGIONAL SURVEYS DIVISION

STRATIGRAPHY OF THE CHOWILLA AREA
SOUTH AUSTRALIA

by

J. B. Firman
Assistant Senior Geologist
QUATERNARY STUDIES SECTION

8th September, 1966.

D.M. 424/66

RIB 63/64

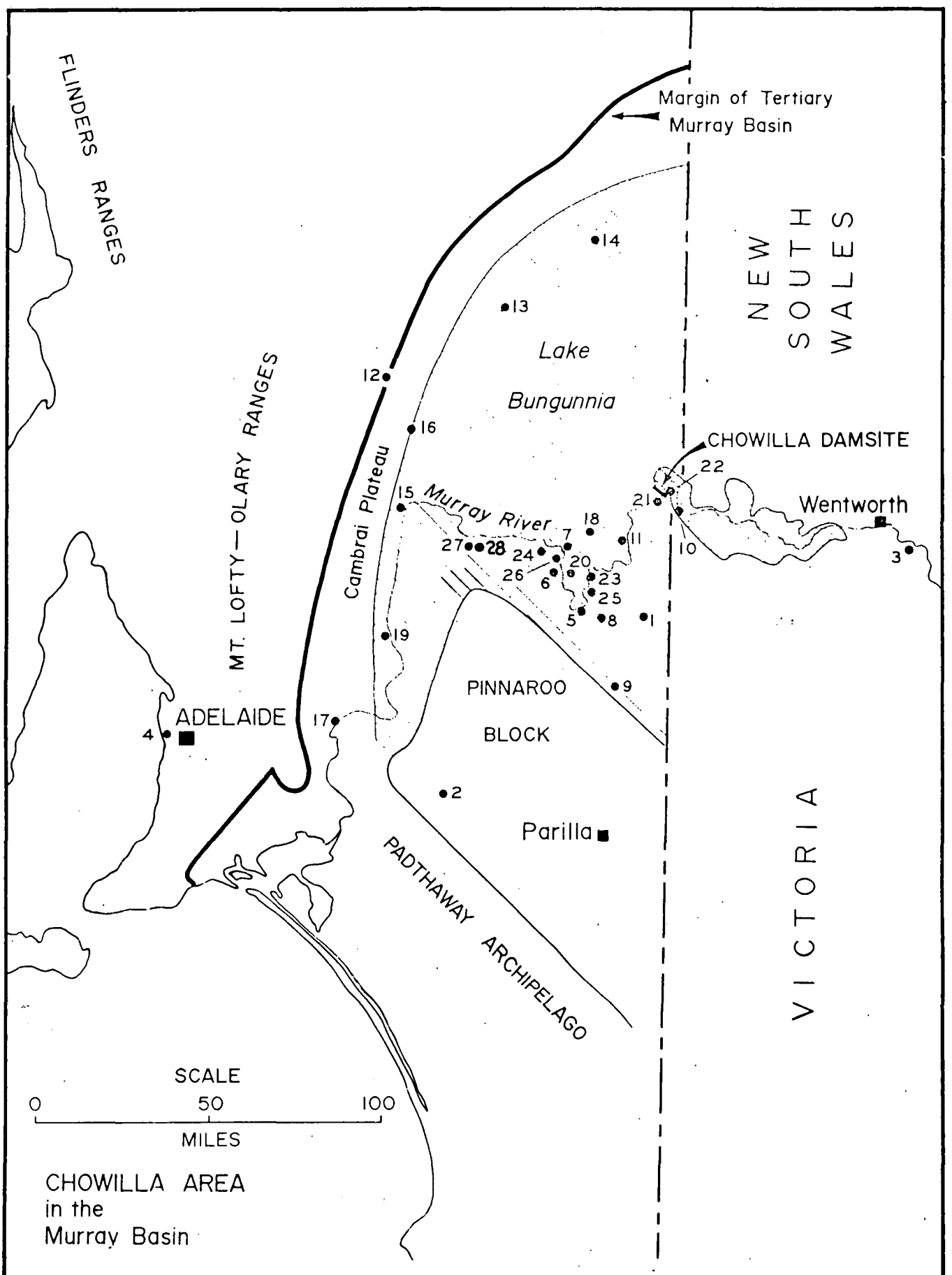
Chowilla Damsite. Left or S.E. abutment: (1) Loveday Soil. (2) Upper Member of Blanchetown Clay over (3), Lower Member. (4) Sandstone cap over (5), Parilla Sand.

Renmark 1-Mile Map 31146: (1) Younger Soil. (2) Ball and sheet calcrete in Bakara Soil. (3) Bungunnia Limestone.

Frontispiece 2

Boundary Point near Millewa: (1) Loveday Soil. (2) Bungunnia Limestone. (3) Upper and Lower members of Blanchetown Clay. (4) Sandstone cap. (5) Parilla Sand.

Pooginook 1-Mile Map 30088 (1) Calcrete in Bakara Soil. (2) Loxton Sands.



CHOWILLA AREA
in the
Murray Basin

1. Noora
2. Karoonda
3. Merbein
4. Lockleys
5. Loxton
6. Moorook
7. Sugarloaf Hill
8. Schleins Quarry
9. Paruna
10. Millewa
11. Renmark
12. Koomooloo
13. Pine Valley
14. Oakbank
15. Morgan
16. Balah
17. Mannum
18. Stony Pinch
19. Swan Reach
20. Loveday
21. Bunyip Reach
22. Border Gate
23. Berri
24. Kingston on Murray
25. Bookpurnong
26. Cobdogla
27. Waikerie
28. Holder Reserve

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STRATIGRAPHY OF THE CHOWILLA AREA

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INTRODUCTION

This report deals with the stratigraphy and sedimentary history of the Chowilla area in the Murray Basin. Local geology is set against a background of geological information derived from other areas in southern Australia. Local stratigraphy is based on information from cliff sections and bores, including A.O.C. North Renmark No. 1 and the stratigraphic bore put down near the east abutment of the Chowilla Dam site. Although the Stratigraphic Table (Table 1) shows the full sequence to Cambrian basement, emphasis is placed upon that portion of the Late Cainozoic sequence which extends from the Pata Limestone to the surface.

Cambrian basement

According to Terzaghi, Karl (1955) the term "engineering properties of sediments" refers to petrographic factors, modes of transport and deposition, and changes after deposition. The most convenient method for the presentation of such information is a review of geological events, in this case of the sedimentary history of the area based on stratigraphic analysis. Because sedimentary history is so important, stratigraphy has been kept to a minimum in the text.

The age, name, stratigraphic relationships and thickness of the beds, together with litholgy, environment of deposition and distribution are set out on Table 1, which is to be read in conjunction with the text. To facilitate reference to the table, important rock units in the Chowilla area are named in the margin of the text. Photographs of cliff sections form the frontispiece. Important localities are shown on the locality map adjoining the frontispiece. Cliff sections in the Chowilla area are set out in Appendix A, and are identified by numbers/ which are

also shown on the Chowilla and Renmark 1-mile geological maps. (Back pocket). Bore logs are set out in appendix B in two groups: Group 1 contains bores used in a re-interpretation of geology along the dam axis, and Group 2 contains bores shown on the Chowilla and Renmark 1-mile geological maps. An air-photo showing location of the dam axis, the geological section along the dam axis (Figure 1), and the stratigraphic table (Table 1) are included in the back pocket.

GEOLOGICAL EVENTS

The Murray Basin is a shallow basin containing about 1,000 feet of sediments which were deposited in the Cainozoic Era. Permian glacial marine and Cretaceous shale and sandstone are known, but the basin is essentially a Cainozoic basin and pre-Cainozoic events are not discussed. The sequence can be divided into two parts; an older part containing marine and estuarine sediments deposited during the Tertiary, and a younger part containing lacustrine, riverine and aeolian sediments deposited during the Quaternary.

Permian and Cretaceous sediments

Tertiary

Tertiary sedimentary events have been described for the basin generally by Ludbrook, N.H. (1961). At the Chowilla Dam site, the oldest Tertiary sediments penetrated by the stratigraphic bore near the east abutment are the Middle Miocene Pata Limestone and the Lower Pliocene Bookpurnong Beds (see Table 1 and Fig. 1), which are fossiliferous formations containing siltstone, marl, clay and sand. The sediments of both units were laid down in a marine gulf, but an important time break intervenes between the units, during which increased tectonic activity led to formation of extensive clastic deposits

Pata Limestone
Bookpurnong Beds

Loxton Sands, Norwest Bend Formation, Parilla Sand

in the late Tertiary. These clastic deposits are the Loxton Sands, Norwest Bend Formation and Parilla Sand. The retreat from the basin of the Tertiary sea is marked by the change from the marine Bookpurnong Beds through estuarine quartz sand of the lower beds in the Loxton Sands, to the lacustrine upper beds in the Loxton Sands.

Laterite and Ferricrete

One of the more important events during the lower Pliocene was the formation of ironstone in laterite[1] profiles on old land surfaces in the upland areas marginal to the depositional basin. Early lateritization peripheral to the basin may be indicated in the Bookpurnong Beds by deposition of iron-bearing minerals (oolitic siderite or "laterite" of the bore logs), and in the Loxton Sands by iron oxides in ferruginous beds and by characteristic red and yellow weathering colours. A correlation of this early ironstone in the laterite profile with the massive ironstone described by Gill, E.D. (1958) in the Black Rock Member of the Lower Pliocene Sandringham Sands in Victoria is possible. Near Chowilla, a ferruginous bed at the top of the Loxton Sands forms a sandstone cap. Ferruginisation of this kind is usually taken as evidence of a wet tropical climatic regime.

Yallunda Ferricrete

Sandstone cap

Although the sea retreated from most of the Murray Basin after deposition of the lower beds of Loxton Sands, a narrow estuary persisted on the western margin of the basin

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1 In this paper "laterite" is used for massive vesicular, cellular or concretionary ironstone overlying mottled and pallid zones. Detailed stratigraphic studies require more than recognition of this classical profile, because the profile is a polygenetic deep weathering profile made up of layers formed in different ways at different times, the base of the profile being as old as the first weathering of the parent rock. Furthermore, distinction must be made between two kinds of change of form (katamorphism); the destructive change of form due to physical and chemical comminution of rock in situ which is weathering, and the constructive change of form which leads to lithification, and which, in this environment, is continental diagenesis. These considerations lead to the use of ferricrete as a non-genetic descriptive term for the ironstone in this and other profiles.

until the end of the Tertiary. The lower Pliocene sea cut across the Tertiary sequence south of Morgan, and it is on this surface that the beds of the upper Pliocene Norwest Bend Formation were laid down. Late Pliocene sediments of the estuarine Norwest Bend Formation grade laterally into the fluvial-lacustrine Parilla Sand[1], which consists of a quartz sand sequence with thin lensing beds of clay found on the Pinnaroo Block and the surrounding lowlands.

Ferricrete in late Pliocene sands on the east slopes of the Mt. Lofty ranges, and in the upper beds of Parilla sand on the Pinnaroo Block, was probably formed at this time. These beds in South Australia and as far east as Nyah in Victoria are markedly ferruginous, in contrast to the lower beds of Parilla Sand exposed in the Murray River cliffs. In the Murray Basin, the ferruginous beds mark not only the end of the Pliocene tropical climatic regime, but also the onset of a colder climate during the Pleistocene.

The Karoonda Surface

Silicified cap

A long period of sub-aerial weathering followed Late Pliocene sedimentation. The silicified cap on the Parilla Sand was developed on the polycyclic land surface (named the Karoonda Surface herein) that formed at this time. The silicified cap occurs at Renmark, Stony Pinch, Noora, and further south near Karoonda on the Pinnaroo Block.

Late Pliocene - Pleistocene Tectonics

Faulting occurred throughout the Tertiary and, by the close of the Late Pliocene, an extensive fracture system had

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[1]The name "Parilla Sand, which is taken from the Hundred of Parilla in County Chandos, was first used in Firman, J.B. (1965)[2] and is defined herein.

been developed in southern Australia (Firman, J.B. - Late Cainozoic Tectonics - Western Margin of the Murray Basin (In Prep.)). Some fractures parallel older faults and have throws up to 200 feet, others are probably major joints. On photomosaics the fractures show as lineaments in several sets. Two of these are prominent and trend roughly northwest and northeast forming rhomboid blocks. Where the fractures intersect poorly cemented sediments in the Chowilla area they are not prominent and appear to be self-sealing.

The areal extent of the Murray Basin in the Pleistocene was much reduced by elevation of the ranges on the western margin of the basin and of the Pinnaroo Block and the Cambrai Plateau. In southern Australia, the lineaments control or influence the trend of rivers, lakes, marine shore lines and basin margins. Near Chowilla, the course of the Murray River, the thickness and outcrop of sediments and the trend of the lakes are controlled by this pattern of lineaments.

Quaternary

Pleistocene

The long period of erosion and sub-aerial weathering at the end of the Tertiary and the beginning of the Quaternary intervenes between a time of extensive quartz sand deposition in the Pliocene and a time of extensive clay deposition in the Pleistocene. The period was interrupted locally by tectonic movements and deposition of the Chowilla Sand. This deposit, which is derived by fluvial re-working of a thin bed of sandstone at the top of the Parilla Sand, is thin and lensing and of restricted areal extent. It is well developed at Merbein in Victoria. The lithology and position of the unit in the sequence suggests that the Chowilla Sand could be in much the same stratigraphic position as the sands at Lockleys in the

Chowilla Sand

St. Vincent Basin, which are placed on faunal content in the Calabrian Stage at the base of the Pleistocene. (Ludbrook, N.H., 1963). The nature and distribution of the Chowilla Sand and the absence of other sediments points to a relatively dry climate in contrast to the wet climate which followed.

Lake Bungunnia

Lakes were now developed over thousands of square miles of the southern Australian lowlands. In the Murray Basin, the lake system, which is named Lake Bungunnia (Firman, J.B., 1965), was probably composed of a large number of valley lakes. The Blanchetown Clay, which is characteristic of this environment, extends from Merbein in Victoria to the Willunga-Noarlunga Basin and grades laterally through the piedmont deposits to coluvial soils of the adjacent ranges. Near Chowilla Camp, the unit is thick, but it thins over the uplifted blocks that trend northwest through Loxton and Moorook.

Blanchetown Clay

Yamba Formation

The thickness and extent of the clays and sandy clays in Lake Bungunnia and elsewhere suggests that the climate was wet with streams transporting large amounts of finer clastics. Bedded gypsum is characteristic of the top of the unit within the basin. The formation of evaporites and the termination of clastic deposition indicates a drier climatic phase.

Gypsum

Thin discontinuous beds and lenses of dolomitic limestone occur in the upper green clay member of the Blanchetown Clay. Some of the limestone overlain by green clay at Sugarloaf Hill, Schleins Quarry and Paruna occupies this stratigraphic position. The lower red-brown clay member at Chowilla does not contain lenses of limestone. If ferruginous mottling and a red-brown colour indicate a warm climatic phase during deposition of the lower member, then, by contrast, the green clay suggests a colder climatic phase during deposition of the upper member. However, a simple correlation of lithology and

colour with climate does not apply throughout the basin, for the number and lithology of beds within the sequence varies from place to place, and the colour contrast is not everywhere apparent.

Bungunnia Limestone

A thin dolomitic limestone, the Bungunnia Limestone, overlies the upper green clay member of the Blanchetown Clay. The rock is mainly a dense micrite characteristic of a low energy environment, and could be compared with dolomitic sediments reported (Alderman, A.R., 1965) to be actively forming in saline lakes of the southeast of South Australia under the present climatic regime. Although lithologically similar to the discontinuous limestone beds within the Blanchetown Clay, the unit is distributed over a much wider area in the Murray Basin. (See Table 1 and the accompanying map). The wide extent and importance of the unit as a stratigraphic marker has been appreciated only recently, but the rock was mentioned by Tate, Professor Ralph (1885), who described "Travertine cover of thin-bedded sandy limestone (over) Red and blue clay" (Blanchetown Clay) as long ago as 1885.

A "Cypridiferous limestone" was collected from the Victorian Mallee in 1912 and matched with other limestone, notably a Diprotodon-bearing limestone from near Geelong, by Chapman, (Chapman, Frederick, 1936). In the Chowilla area, the unit crops out in the river cliffs at Millewa and downstream and is exposed in quarries from Renmark to Paruna.

Palaeogeomorphic reconstruction, which shows that the lake deposits extended seaward of the present strand, and the position of the lake deposits high in the Murray River cliffs 50 to 100 feet above a river now graded to a modern higher sea-level, suggests a terrain with less local relief and a lower seaward gradient than at present. The similarity of the Bungunnia Limestone to dolomitic sediments now forming in saline lakes near the sea-coast suggests that a similar

Telford

climate prevailed during Bungunnia Limestone time hundreds of miles inland of the present coast.

Gravel

Extensive deposits of gravel occur in outwash fans flanking the Mt. Lofty - Olary and Flinders Ranges. The gravel has a sandy clay matrix and overlies the Blanchetown Clay in the Koomooloo, Pine Valley, Oakbank area north of Chowilla. Evidence from the Flinders Ranges shows that the gravel overlies the Nilpena Limestone, which is probably the Bungunnia Limestone equivalent in the Beltana area (Leeson, B., 1966 Explanatory Notes: The Geology of the Beltana 1-mile Military Sheet, Geol. Surv. S.A. Rept. Bk.). The gravel was probably laid down during increased run-off caused by tectonic uplift of the ranges in a wet phase of the climatic regime prevailing around Lake Bungunnia.

Marine Regression and Incision of Prior Streams

Faulting of the Blanchetown Clay is the next event recorded in the sequence. This event has been interpreted by the writer from an unpublished section prepared by M.N. Hiern who examined river cliff sequences between Millewa and Renmark in 1961. Although displacement is only about 10 feet in the Chowilla area, it is much greater across faults bounding the east margin of the Mt. Lofty Ranges near the present coast.

Granule Conglomerate

A period of erosion is inferred from gravel of Bungunnia Limestone in granule conglomerates on hill tops near Loxton, and in talus of the river cliffs near Renmark. Fault-line scarps were eroded north of the river between Morgan and along the east margin of the Cambrai Plateau. West of the Murray River, between Morgan and Mannum, an early stream course was incised. Fossil tributaries of this stream, which were later calcreted during formation of Bakara soil, are

found just below cliff top along the present tract of the river. Evidence for erosion at this time is widespread in southern Australia and is taken here to mean a change in base level due to regression of the Pleistocene sea.

Loess

Lime released from weathering profiles, dry lakes and the exposed continental shelf was now blown by the wind to form a thin, but extensive blanket of loess on the landscape. In Table 1, various continental deposits are included with the loess for convenience. Some of these pre-date the loess and could be continental equivalents of the "aeolianite" in the late Pleistocene Bridgewater Formation found along the southern margin of the continent, others are probably as old as the Blanchetown Clay, and some deposits were forming when the loess was deposited. Structures in the loess resemble frost-heave structures and may indicate a cold climate at this time.

Calcrete in Bakara Soil

A thick horizon of lime accumulation was now developed in and on the loess and older deposits. The soil of this time, is named the Bakara Soil, (Firman, J.B. 1963 and 1964), and the land surface on which the soil developed is termed the Nildottie Surface. The Karoonda Surface and the Nildottie Surface converge at Stoney Pinch and other places where a calcrete[1] crust is formed on the silicified cap on the Parilla Sand.

The calcrete in Bakara Soil has been traced across the Pinnaroo Block to the south-east of South Australia, where it forms a calcareous crust over the Bridgewater Formation. Although the soil post-dates the aeolianites, it closely resembles the fossil soil-horizons developed within the aeolianite sequence, and on this basis the calcrete in Bakara Soil is assigned to the Pleistocene. The original A-horizon of the Bakara soil was stripped and the exposed calcrete was strongly indurated. Solution channels were developed in the calcrete, and these were infilled with red-brown sand. This sequence

[1] Equivalent to travertine, caliche, soil limestone or kunkar in the literature

of events suggests that the sand in solution channels was formed much later than the calcrete. Despite the time break between formation of the calcrete and deposition of the dark red-brown sand, the sand is comparable to other red-brown sand within the Bridgewater Formation, and comparable to "Fossil soils .... mostly of the terra rossa type ....." in Fairbridge, Rhodes W. and Teichert, Curt (1952). It is therefore placed tentatively in the Pleistocene.

The Pleistocene deposits, including calcrete of the Bakara Soil, are found at the top of the sequence exposed in the Murray River cliffs, or at the tops of slip-off slopes leading down to the river which are free of calcrete and are veneered with younger deposits. These facts and the narrow gorge of the river in the Swan Reach area, suggest that incision occurred after formation of the calcrete, probably by headward recession of a gorge as suggested in Tate (op. cit).

At this stage, the mouth of the Murray River was probably much further offshore. This interpretation follows from the position of the river at the time of maximum incision, when it was 50 feet below present sea level in the gorge tract south of Morgan. The deepest parts of the River Murray gorge during the earliest phase of incision was probably about 200 feet (Firman, J.B., 1963). Precise time of this maximum valley cutting is not known, but backfilling probably began with the post-glacial eustatic transgression.

Pleistocene Riverine Deposits

The history of riverine deposition is complicated, but deposits of different ages can be distinguished. The oldest in the Chowilla area are meander remnants stranded

Meander remnant deposits

about 10 feet above the river flats (See Fig. 1). Somewhat younger are the deposits forming the lower valley fill of coarse sand. These sands, which are named Monoman Formation on Table 1, probably correspond to the geomorphic unit "Coonambidgal I sediments" (Pels, Simon, 1966).

Lower valley fill - Monoman Formation

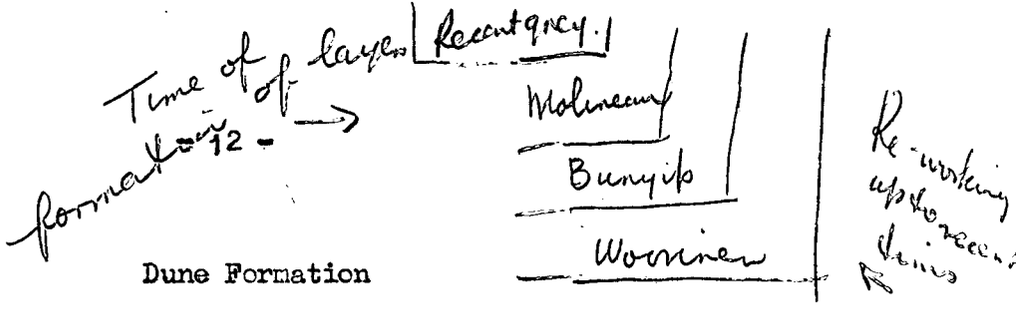
Pyritised bones of Nototherium and fossil logs, probably including E. camaldulensis, have been recovered from the Monoman Formation at Chowilla Dam site (See Figure 1). Coalified stumps and logs[1] have been recorded from the upper valley fill and from river sediments at Swan Reach, Blanchetown and Chowilla.

Recent

A broad view of late Cainozoic tectonic, eustatic and climatic events, as indicated by the shift from marine through estuarine, lacustrine and riverine to aeolian depositional environments, shows a general deterioration since the Pliocene of the continental environment.

According to Woods, J.T., (1962) "The fluctuating climate of (the Pleistocene) and the consequential rapid changes in the environment no doubt maintained strong selection pressure, especially on browsing and grazing herbivores of the open forests and grasslands. The possible results, rapid evolution, with increasing specialization, gigantism, and extinction, are all evident in the palaeontological record of the Quaternary ..... It would appear that the extinction of Pleistocene marsupial species was progressive, not a result of any sudden climatic change .... The arrival of Man (at least 10,000 years ago in the Murray Basin - Tindale, N.B., 1957) probably had a critical effect on certain species ..... (and) ..... Few of the extinct marsupials seem to have survived the time ..... about 5,000 years ago ....."

[1] Samples of the sub-fossil wood from Chowilla have been sent to Tokyo for radiocarbon dating. This age determination will be of value, not only in sedimentary studies connected with the construction of the dam, but in placing the Pleistocene-Recent boundary.



Dune Formation

In southern Australia, the Recent is characterized by at least four prominent stages of dune formation. From oldest to youngest the sands of the stages are Woorinen Formation, Bunyip Sand, Molineaux Sand and the modern grey sands of the dunes and sand sheets. Formation of dunes at these times may be attributed to higher velocity winds or lower rainfall during the generally drier climatic regime prevailing since the end of the Pleistocene.

Woorinen Formation, Bunyip Sand, Modern grey sands.

The oldest stage in the Murray Valley follows the erosion of calcrete in Bakara Soil and the release of lime silt from the underlying loess, which was mixed with quartz sand to form the extensive blanket of aeolian sands overlying older deposits in the basin. These sands, which form east-west trending longitudinal dunes, have been named Woorinen Formation (Lawrence, C.R., 1966). Of the five members recognised by Lawrence, only the equivalents of the lower three are mapped as Woorinen Formation in South Australia.

Because the Chowilla Damsite lies near the eastern eroded margin of the main sheet of calcrete flanking the Mt. Lofty Ranges, other evidence of post-calcrete erosion is seen in the deposits of calcrete gravel with a red-brown sand matrix, and in high-level occurrences of calcrete, now standing up to 200 feet above the lowlands adjacent.

Within the dunes of the Woorinen Formation, sedimentary layering is well-developed and illuvial horizons of platy calcrete occur. The soil that is developed within the aeolian sands, and elsewhere in most other deposits exposed to soil formation at this time, is a soil stratigraphic unit and is named Loveday Soil in this report after the Hundred of Loveday. Reconnaissance traverses suggest that the Widgellie Parna of Butler, B.E., 1956 in the Riverine Plains may corre-

Loveday Soil

late with Loveday Soil.

Aeolian re-working of the upper part of the Woorinen formation led to the formation of the Bunyip Sand (named after Bunyip Reach about one mile downstream from the site of the Chowilla Dam). Later decalcification of the Bunyip Sand produced an illuvial horizon of soft ropey calcrete in this unit. A later period of dune building occurred to the south on the Pinnaroo Block where the older aeolian sand was exposed to high impact winds and the Molineaux Sand[1] was formed. However, this sand lies just outside the Chowilla area and is not further dealt with in this report.

Recent Sediments in the Murray River Tract

Recent sediments in the Murray River tract near Chowilla include deposits of the older meander belt, the younger meander belt and the bed deposits of present river channels, which are now about 50 feet above modern sea level. These together form a younger valley fill overlying the Monoman Formation. The Tartangan Beds of Hale, H.M. and Tindale, N.B. (1930) near Swan Reach are tentatively correlated with sediments of the older meander belt. Shell from layer 6 in these beds is dated at 6020± 150 B.P. in Tindale, Norman B. (1957). The "Upper Beds" of Hale and Tindale, N.B. (op. cit.) are tentatively correlated with sediments of the younger meander belt in the Chowilla area.

At about the same time as the Woorinen Formation was developed and the upper valley fill was laid down in the Murray River, tributary streams incised through thin surficial deposits into the gypsiferous beds at the top of the Blanchetown Clay. Gypsiferous sediments were then deposited in the top of the upper Valley fill. When the tributary streams dried,

[1] Not yet defined, but name published in Firman, J.B., 1965[2]

gypsum was precipitated on the floors of valley lakes and was then blown by the wind to form lunettes and dune sands that interfinger with Woorinen Formation.

The most recent events in the Murray Basin are deposition of scattered grey quartz sand dunes and sand sheets throughout the landscape and over sediments of the older and younger meander belts, deposition of sediments in the modern river channels, deposition of talus at the base of Murray River cliffs and formation of halite crusts in the ephemeral valley lakes.

ACKNOWLEDGEMENTS

Include A. Williams and Lewis Barnes

Messrs. C. Lawrence and P. Macumber of the Geological Survey of Victoria, and Student Geologists N.S. Pledge, N. Duncan and A. Andrejewskis of the University of Adelaide gave valuable assistance to the writer during field work in the Chowilla area. Unpublished Departmental reports by N. H. Ludbrook; D. H. Stapledon and J.P. Trudinger, W. Johnson, M.N. Hiern and R.D. Steel, G. Roberts and others were consulted during preparation of the text. The author is indebted to Dr. Heli Wopfner and other officers of the Geological Survey for critical reading of the text.

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8/9/1966

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APPENDIX A - Geological Sections.

1. Miscellaneous Sections on the Renmark 1 - Mile Map.

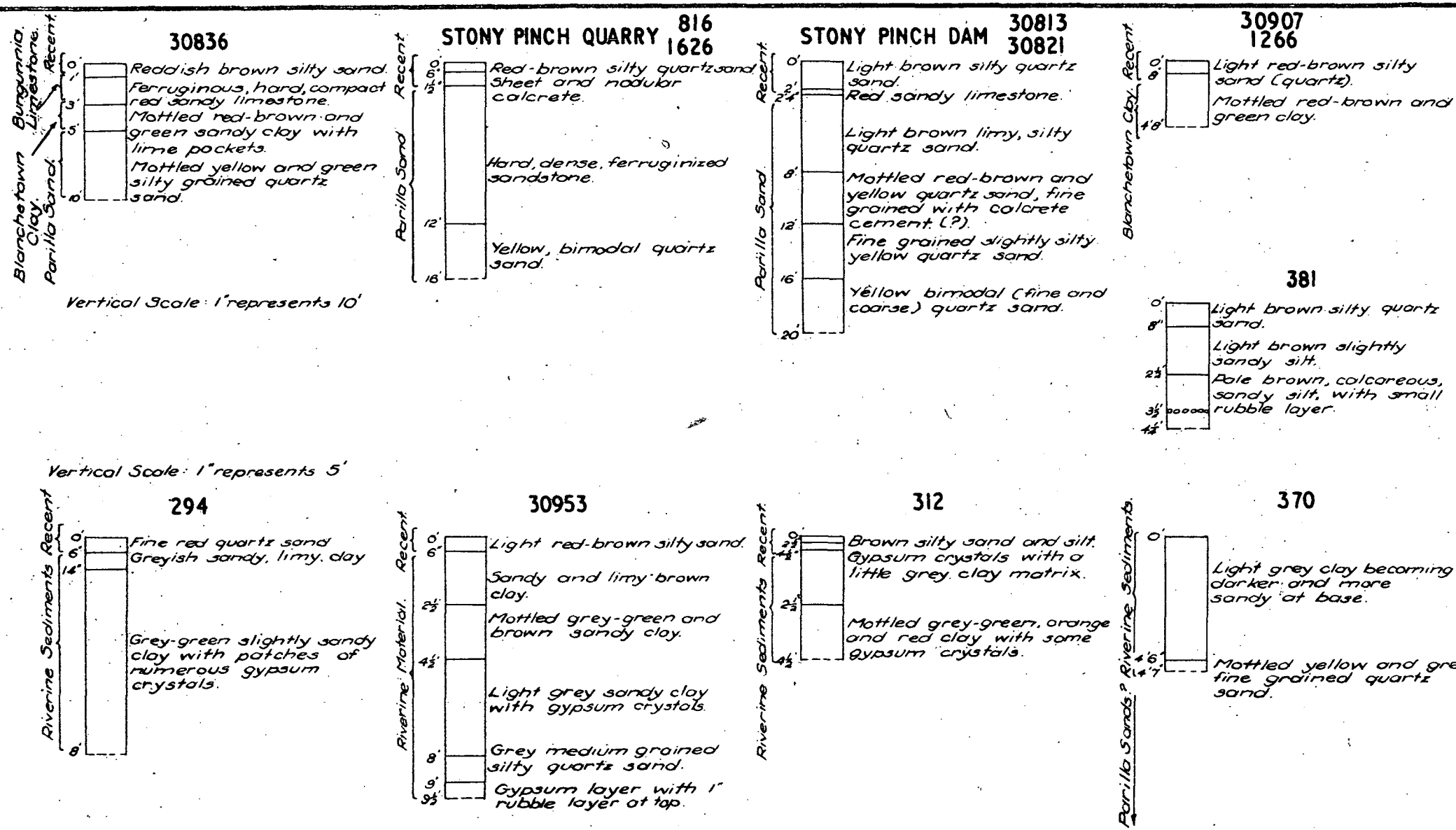
2. River Cliff Sections (Proceeding upstream)

   A. On Renmark 1 - Mile Map

   B. On Chowilla 1 - Mile Map.

For Rept. Bk. No. 63/64

1. Miscellaneous Sections on the Renmark 1-Mile Map



DEPARTMENT OF MINES — SOUTH AUSTRALIA

CHOWILLA AREA STRATIGRAPHY

CLIFF AND QUARRY SECTIONS

RENMARK AREA: MILLEWA, VICTORIA

Drn. J.F.

Tcd. A.R.D.

Ckd. L.W.W.

Exd.

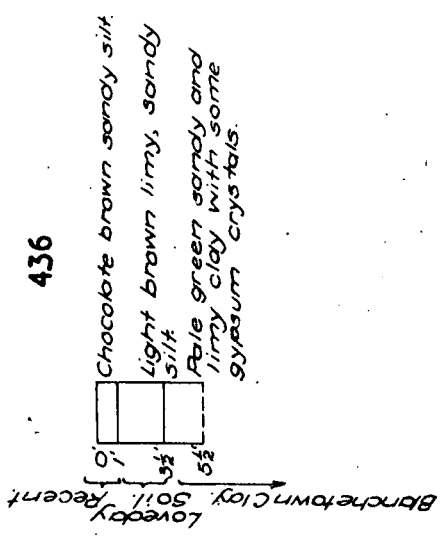
SCALE: As shown.

DATE: 23-8-66

S 5432 d

994.2 D+5

436



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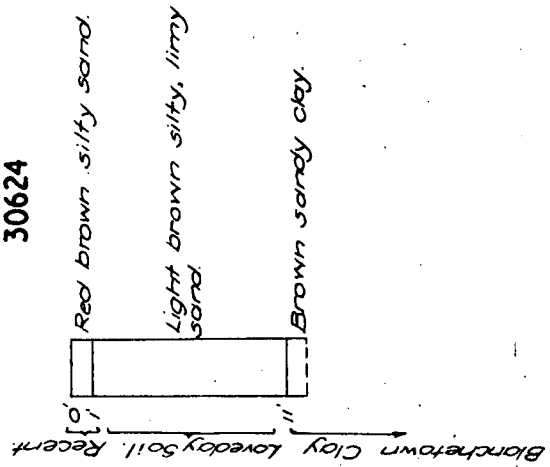

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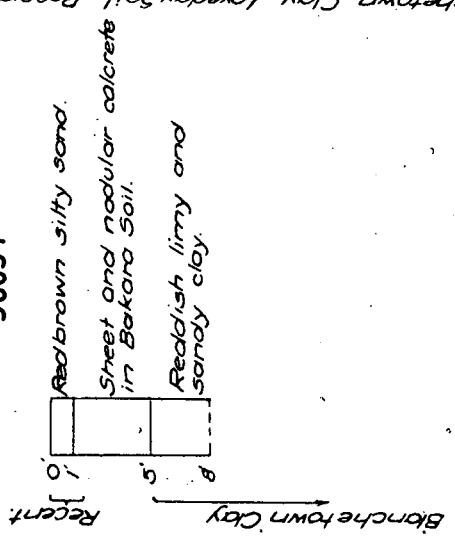

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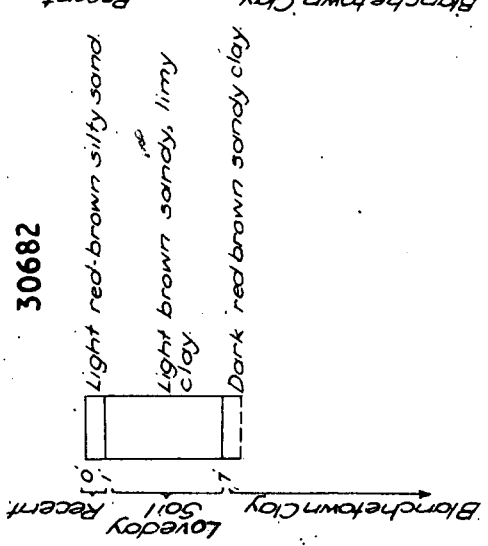

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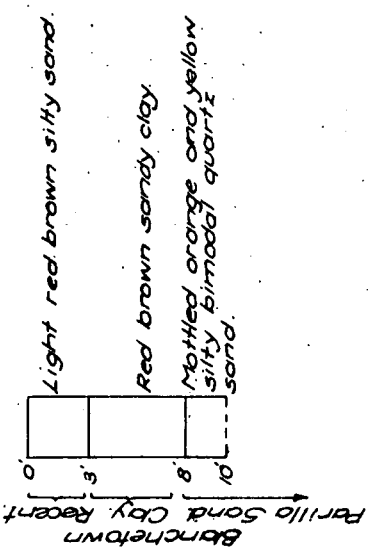

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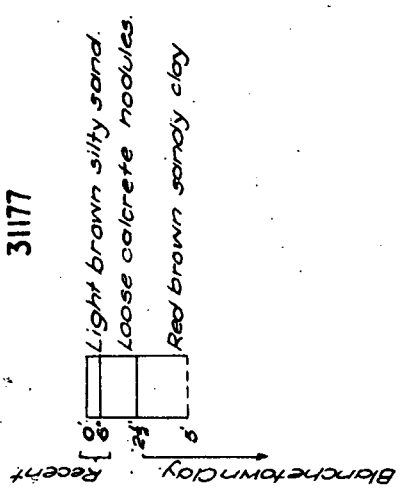

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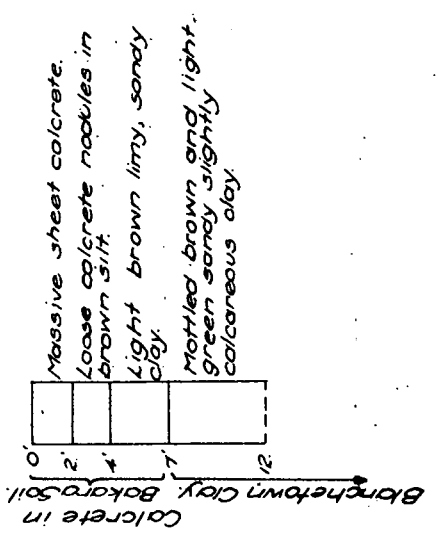


DEPARTMENT OF MINES — SOUTH AUSTRALIA

	Drn. J.F.	CHOWILLA AREA STRATIGRAPHY	SCALE : 1" = 10 feet.
	Tcd AMcD	CLIFF AND QUARRY SECTIONS.	S.5432 e
	Ckd. L.V.W.		994.2D+5
	Exd.	RENMARK AREA: MILLEWA, VICTORIA	DATE : 23-8-66.

2. River Cliff Sections (Proceeding upstream).

A. On Renmark 1-Mile Map.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

CHOWILLA AREA STRATIGRAPHY

CLIFF AND QUARRY SECTIONS

RENMARK AREA - MILLEWA, VICTORIA

Drn. J.F.

Tcd. A.R.T.P.

Ckd. L.V.W.

Exd.

S 5432

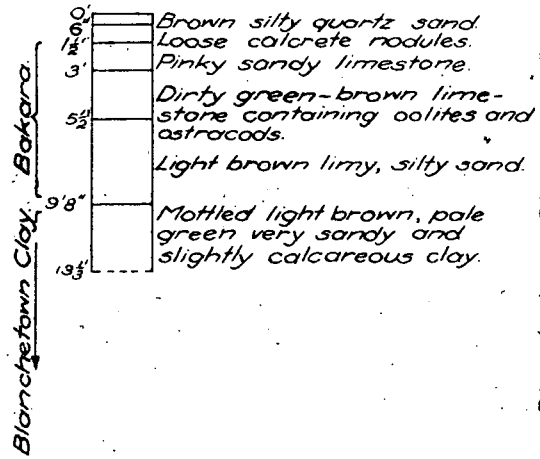
994.2 D+5

SCALE: 1" = 10 feet.

DATE: 23-8-66

CALPERUM QUARRY

31146



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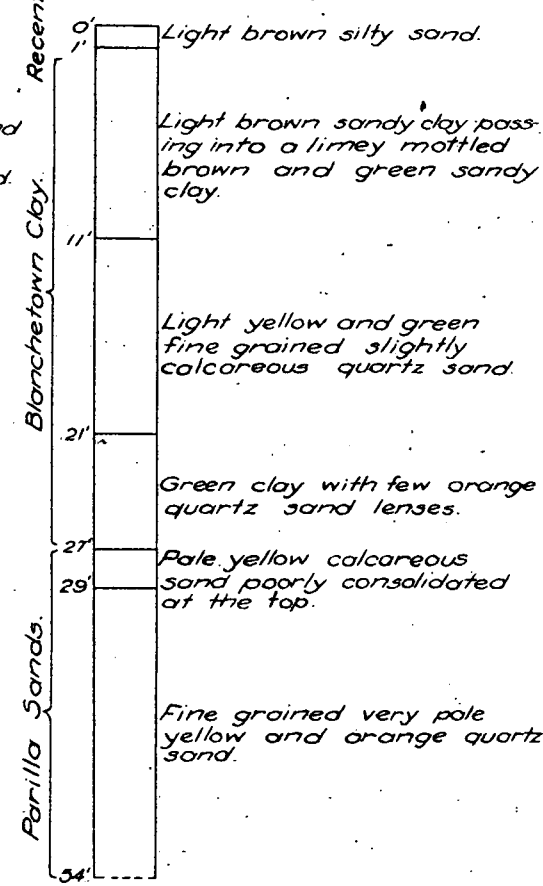

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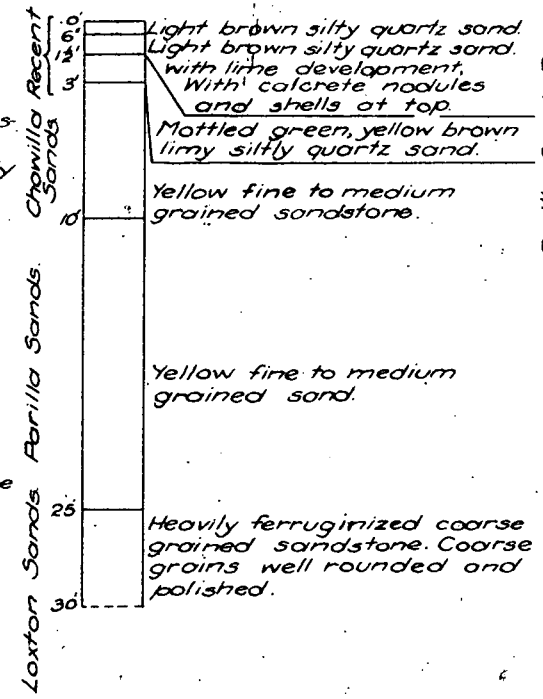

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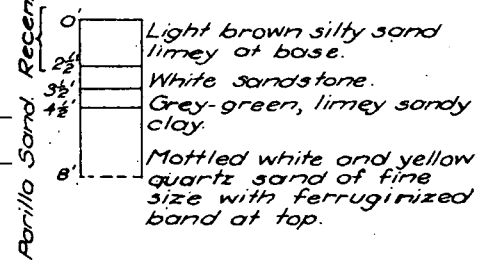
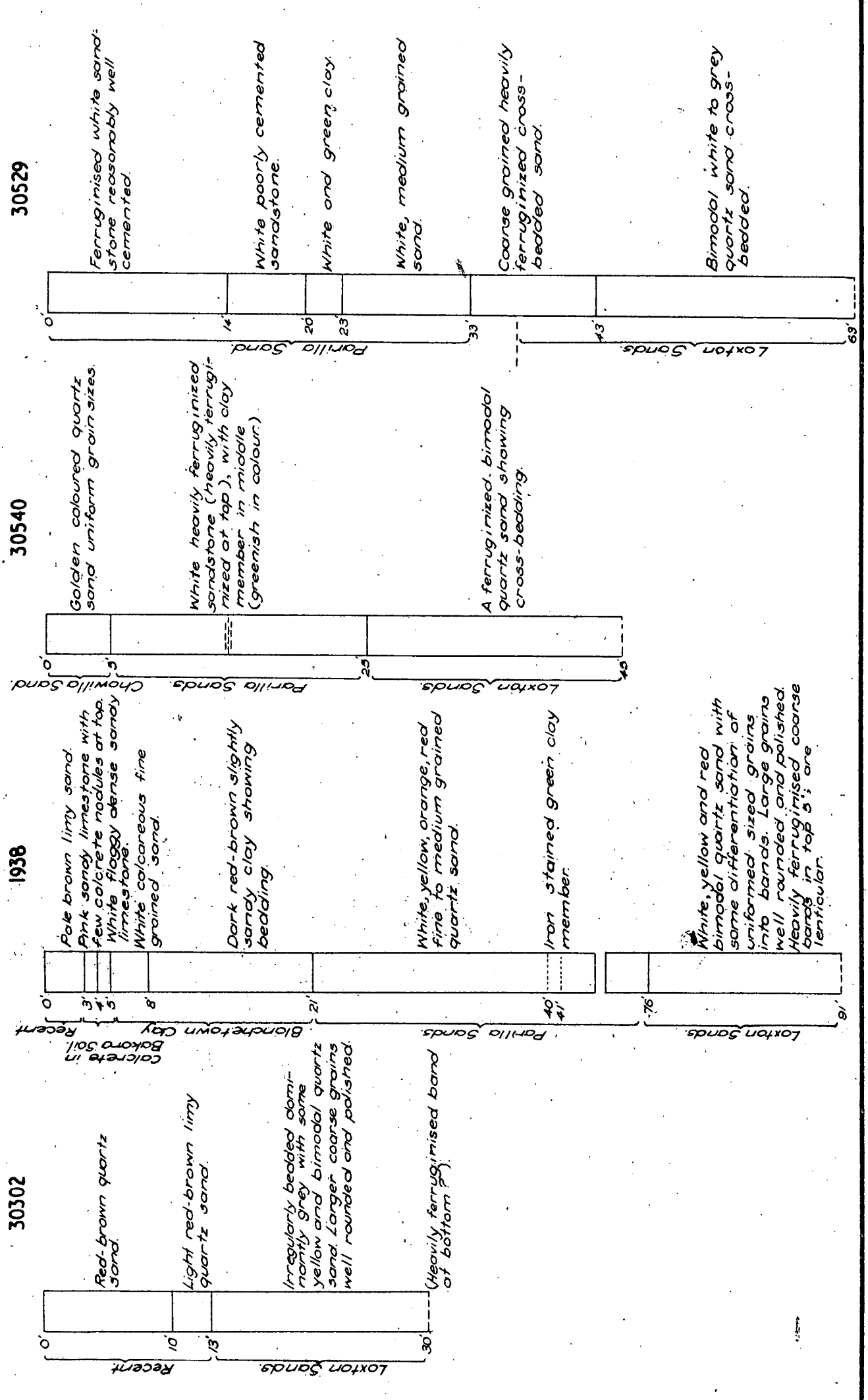




DEPARTMENT OF MINES — SOUTH AUSTRALIA

	Drn. J.F.	CHOWILLA AREA STRATIGRAPHY	SCALE: 1" = 10 feet.
	Tcd. A.M.D.	CLIFF AND QUARRY SECTIONS.	S 5432 a
	Ckd. L.V.W.		994·2 D+5
	Exd.	RENMARK AREA - MILLEWA, VICTORIA	DATE: 23-8-66.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

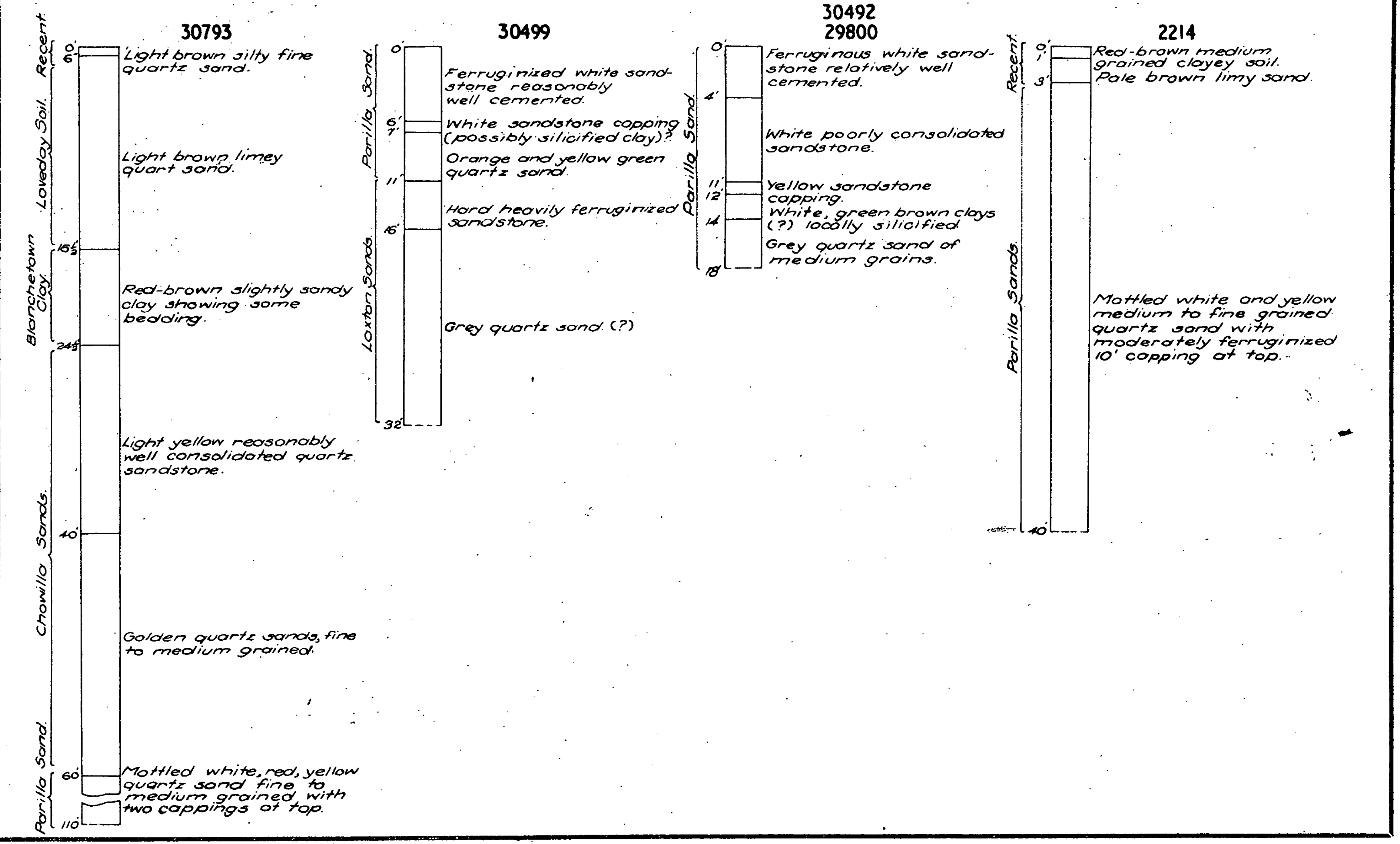
CHOWILLA AREA STRATIGRAPHY
CLIFF AND QUARRY SECTIONS
RENMARK AREA:-MILLEWA.VICTORIA

Drn. J.F.
Tcd. A.M.D.
Ckd. L.W.W.
Exd.

SCALE: 1" = 10 feet.

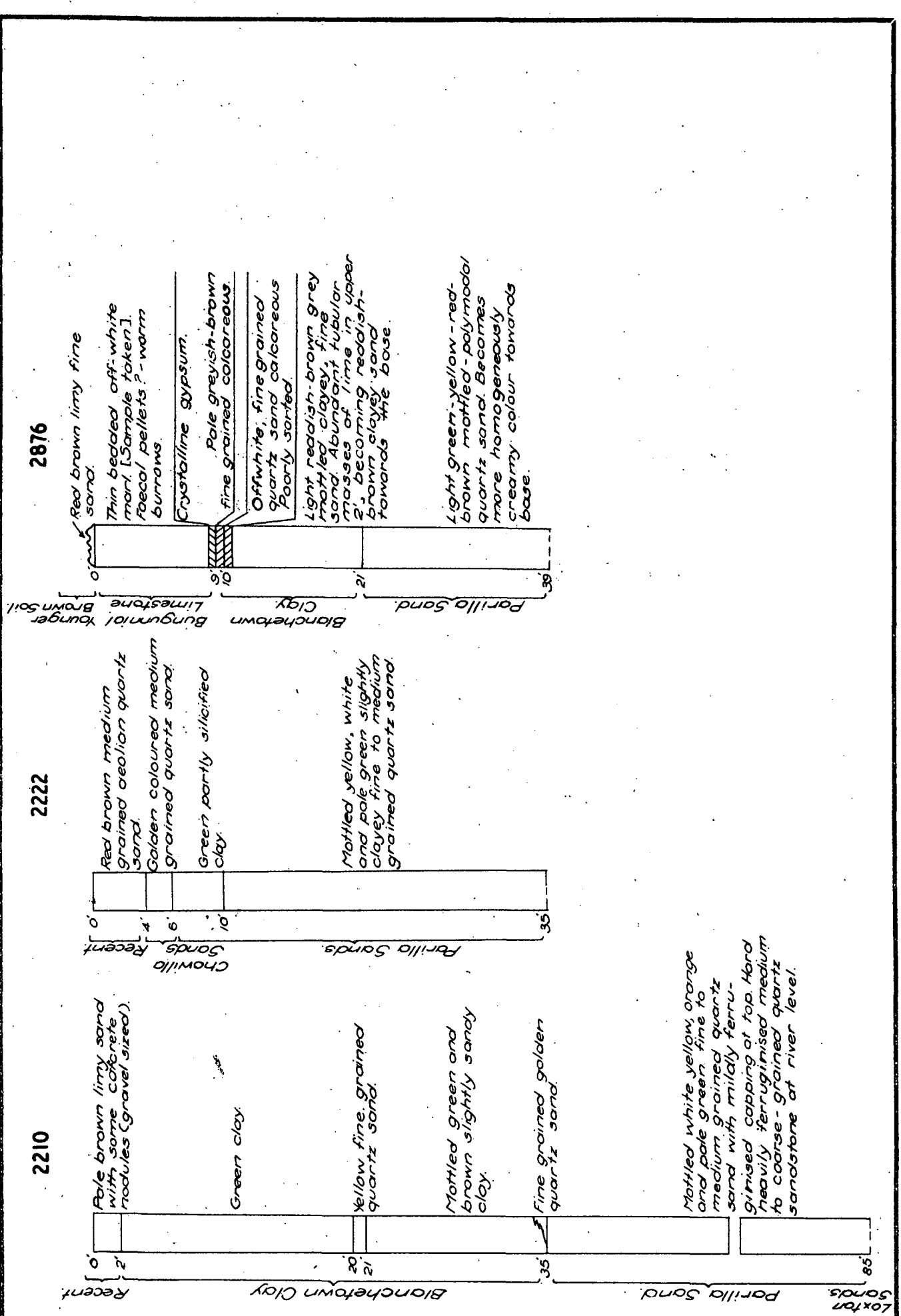
S 5432 b.
994.2D+5

DATE: 23-8-66.



2. River Cliff Sections (Proceeding upstream).

B. On Chowilla 1-Mile Map.



DEPARTMENT OF MINES — SOUTH AUSTRALIA

	Drn. J.F.	CHOWILLA AREA STRATIGRAPHY	SCALE: 1" = 10 feet.
	Tcd A/F.D.	CLIFF AND QUARRY SECTIONS	S 5432.c.
	Ckd. L.V.W.	RENMARK AREA - MILLEWA, VICTORIA	994.2 D+5
	Exd.		DATE: 23-8-66

APPENDIX B

BORE LOGS

GROUP 1

Bores used in Reinterpretation of Stratigraphy along the Dam Axis ("D" Line)

GROUP 2

Selected Bore Logs

Renmark and Chowilla 1-Mile Maps

GROUP 1

Bores Used in Re-Interpretation
of Stratigraphy along the "D" Line

Serial No.
Docket No

LOG OF PERCUSSION DRILL HOLE

G6
SHEET 1 OF 1

PROJECT CHOWILLA DAM — Hirer E & W.S. DEPT.
LOCATION RIGHT BANK - BORROW AREA "B" — COUNTY HAMLEY
FEATURE EMBANKMENT MATERIALS — Depth 80 feet R.L. 295.3 ft. Coords 100,000N 48736E

SOIL TYPE GEOLOGICAL DESCRIPTION	DEPTH (FEET)	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME	CONSISTENCY	MOISTURE CONTENT	WATER LEVELS
RECENT TERRESTRIAL DEPOSITS — WIND BLOWN SAND			SM	SAND, fine grained, excess silt and some clay fines, pale brown. Lime disseminated throughout, and concentrated in patches from 1·5 feet to 4 feet. Small rootlets in upper 2 feet.	Compact	Humid	
	10		SP	SAND, fine grained, some clay fines, light red-brown with white patches. Lime concentrated in abundant pockets.		Damp	
	20		SC	CLAY SOIL, moderate to high plasticity, some fine sand, grey-green and red-brown. Sand in vertical dykes, between 14 feet and 15 feet.	Very stiff	Moist	
			SP	SAND, fine to medium grained, some clay and silt fines, pale brown, little dry strength	C	D	
	30		CL	CLAY SOIL, low to moderate plasticity, contains fine grained sand in varying proportions, red brown, mottled grey green.	Very stiff	Moist	
PLIO-PLEISTOCENE LACUSTRINE DEPOSITS — Colour due to limonitic fines	40		SC	SAND, fine grained, excess of clay fines, red-brown to light brown, moderate to high dry strength. Some grains up to 0.03 inch diameter.	Firm		
	50		SP	SAND, fine grained, some clay and silt fines, red-brown to yellow brown. Little dry strength.	Dense	Damp.	
Lacustrine Sand. Quartz grains, angular to subangular, clear.	60		SP	SAND poorly graded, fine grained, little or no fines, pale yellow to light yellow brown. White, partly cemented lumps up to 0·1 foot diameter.			
Quartz grains, subrounded, clear.	70		SC-CL	SAND, fine to medium grained, 40-55% of clay fines, light grey-brown, high dry strength.	Very stiff	Moist	
Quartz grains, subangular 15% milky quartz.			SP	SAND poorly graded, medium grained, some silt and clay fines, light grey brown to pale brown. No dry strength.	Compact		
	80			END OF HOLE - 80 feet. R.L. 215·3 feet.			ABOVE WATER TABLE

PENETRATION DATA — BLOWS FOOT — PENETROMETER
0 20 40 60 80 kg/cm²

All samples taken using 'A' type shoe.

Samples for Mechanical Analysis.
77 to 78 ft.
69 to 70 ft.

TYPE OF SAMPLE	HYDROLOGY
Open Tube	Water cut
Sealed Tube	Static level
Auger barrel	Supply
Slush pump	Analysis (pts. p. million)
	Water level (date)

CONSISTENCY	REL. DENSITY	MOISTURE
V.S. Very Soft	V.L Very loose	D Damp.
S. Soft	L Loose	M. Moist
F. Firm	C Compact	V.M Very moist
St Stiff	D Dense	W. Wet
V.St. Very stiff	V.D Very dense	S. Saturated
H. Hard		

Plant No 24 — Logged J.P.T.
Type Percussion — Date 1 May 64
Driller Farrow — Drawn J.P.T.
Date comm. 20 Apr '64 — Checked
Date comp. 27 Apr '64 — Passed D.H.S.

PLAN NO. S. 3681 — Vertical Scale 1 inch = 10 feet.

Serial No.....
Docket No

DEPARTMENT OF MINES - SOUTH AUSTRALIA

LOG OF PERCUSSION DRILL HOLE

HOLE NO. G7
SHEET 1 OF 2

PROJECT CHOWILLA DAM — Hirer E & W.S. DEPT.
LOCATION RIGHT BANK - BORROW AREA "B" — COUNTY HAMLEY
FEATURE EMBANKMENT MATERIALS — Depth 110 feet R.L. 260·2 ft. Coords 47465 E 100,000 N

SOIL TYPE GEOLOGICAL DESCRIPTION	DEPTH (FEET)	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME	CONSISTENCY	MOISTURE CONTENT	WATER LEVELS
RECENT TERRESTRIAL DEPOSITS.			SM	SAND, fine grained, excess silty and some clay fines, some coarse sand, red brown. Lime in patches and disseminated from 2 feet to 7 feet.	V.L. Loose to compact	Humid	
	10		SP	SAND, fine grained, some clay fines, light red brown, lime concentrated in patches			
PLIO-PLEISTOCENE LACUSTRINE DEPOSITS	20		SC	SAND, fine grained, excess clay fines, deep red brown.		Damp.	
SANDSTONE, siliceous cement. Clear quartz grains angular to sub-angular.		XXXX	Rock	Fine grained, some fines yellow and red-brown.	Hard		
	30		SP	SAND, poorly graded, medium grained few silt fines, pale yellow-brown to pale yellow. Partly cemented from 24 to 26 feet and from 31 to 32 feet.	Dense		
			CL	CLAY SOIL, low plasticity, excess sand medium grained, light grey-brown.	Very stiff	Moist	
Quartz grains, subangular, about 10% milky quartz.	40		SP	SAND, Poorly graded, medium grained, few to no fines - some clay from 38 - 40 feet, white and pale yellow-brown. No dry strength.	Very dense	Damp	
Clear quartz, some dark grains, sub-rounded to sub-angular, up to 0·05 inch diameter.	50		SP	SAND, poorly graded, medium-grained, few clay fines, light yellow-brown, to pale grey brown, No dry strength.		Moist	
	60						
	70			Some patches with few silty fines, otherwise clean.			
Quartz grains, 90% clear, up to 0·01 inch diameter. Larger grains usually elongated, sub-angular. Smaller grains rounded to sub-angular.	80		SP	SAND, Poorly graded, medium to coarse, some silt and clay fines, brown to light yellow brown, Contains patches of pale grey sand without fines.	Compact		
Milky grains up to 0·2 inch diameter. →	90					Wet	
	100					S.	4 May 64

PENETRATION DATA

BLOWS/FOOT: 20 40 60 80 100 — PENETROMETER

Using 'A' type shoe.

All samples taken

140

150

TYPE OF SAMPLE	HYDROLOGY	CONSISTENCY	REL. DENSITY	MOISTURE
Open Tube	Water cut 98·5 ft	V.S. Very Soft	V.L. Very loose	H. Humid.
Sealed Tube	Static level 98·5 ft	S. Soft	L. Loose	D. Damp.
Auger barrel	Supply	F. Firm	C. Compact	M. Moist
Slush pump	Analysis (pts. p. million)	St. Stiff	D. Dense	V.M. Very moist
	Water level (date)	V.St. Very stiff	V.D. Very dense	W. Wet
		H. Hard		S. Saturated

Plant No 24 — Logged I.P.T.
Type Percussion — Date 4 May '64.
Driller Farrow — Drawn
Date comm 27 Apr 64 — Checked DMS
Date comp 4 May 64 — Passed

PLAN NO. S. 3680

Vertical Scale 1 inch = 10 feet

Serial No
Docket No

DEPARTMENT OF MINES - SOUTH AUSTRALIA

LOG OF PERCUSSION DRILL HOLE

HOLE NO. G7
SHEET 2 OF 2

PROJECT CHOWILLA DAM Hirer E&W.S. DEPT.
LOCATION RIGHT BANK - BORROW AREA "B" COUNTY HAMLEY.
FEATURE EMBANKMENT MATERIALS Depth 110 feet R.L. 260·2 Coords 47465 E 100000 N

SOIL TYPE GEOLOGICAL DESCRIPTION	DEPTH (FEET)	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME	CONSISTENCY	MOISTURE CONTENT	WATER LEVELS	PENETRATION DATA BLOWS/FOOT 20 40 60 80 100	PENETROMETER
Quartz grains; 25 to 40% milky quartz, up to 0·2 inch diameter, subrounded to subangular. Colour due to precipitation of ferruginous fines with rise and fall of water table.	100		SP	SAND, Well graded, medium to coarse grained, some clay fines, dark red-brown to yellow brown.	Compact	Saturated			
	110			END of HOLE - 110 feet RL. - 150·2 feet					

HOLE KEPT OPEN FOR GROUNDWATER LEVEL MEASUREMENT.

TYPE OF SAMPLE	HYDROLOGY	CONSISTENCY	REL. DENSITY	MOISTURE
Open Tube	Water cut	V.S. Very Soft	V.L. Very loose	H. Humid.
Sealed Tube	Static level	S. Soft	L. Loose	D. Damp.
Auger barrel	Supply	F. Firm	C. Compact	M. Moist
Slush pump	Analysis (pts. p. million)	St. Stiff	D. Dense	V.M. Very moist
	← Water level (date)	V.St. Very stiff	V.D. Very dense	W. Wet
		H. Hard		S. Saturated

Plant No 24 Logged J.P.T.
Type Percussion Date 4 May 64
Driller Farrow Drawn
Date comm 27 Apr 64 Checked DAR
Date comp 4 May 64 Passed

PLAN NO. S. 3680 a Vertical Scale

DEPARTMENT OF MINES - SOUTH AUSTRALIA

LOG OF PERCUSSION DRILL HOLE

HOLE NO. G35

SHEET 1 OF 1

PROJECT CHOWILLA DAM Hirer E&WS DEPT

LOCATION RIGHT BANK - BORROW AREA 'B' County : HAMLEY

FEATURE EMBANKMENT MATERIALS Depth 36 feet R.L. 250 feet Coords 49040E, 100000N

SOIL TYPE GEOLOGICAL DESCRIPTION	CASING R.L. (FEET)	DEPTH (FEET)	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME	CONSISTENCY REL. DENSITY	MOISTURE CONTENT	WATER LEVELS	PENETRATION DATA BLOWS FOOT 20 40 60 80 100
RECENT TERRESTRIAL DEPOSITS — Windblown Sand				SM	SAND, fine grained with some grains up to 1mm, excess silt, deep red-brown.		Humid		
RECENT TERRESTRIAL DEPOSITS — Calcareous B horizon	240	10		SM	SAND, fine to medium grained, excess silt, excess clay from 17 to 21 feet, red-brown to light red-brown, some black markings, medium to high dry strength. Lime disseminated and concentrated in patches. Grains up to 1mm.	Loose	Damp		
	6 inch						Moist		
	230	20							
PLIO PLEISTOCENE LACUSTRINE DEPOSITS — Quartz grains, subangular to angular. Siliceous cement.				SP	SAND, fine grained, weakly cemented, some clay, yellow-brown, medium to high dry strength. Grains up to 6mm.	Compact	Damp		
	220	30		SC-CL	SAND, fine to medium-grained, 40-60% clay, green grey.	Hard	S. Damp		
Subangular grains				SC	SAND, fine to medium grained, excess clay, yellow and red-brown, high dry strength. Grains up to 1.2mm.	Compact	M	No water encountered.	
Angular grains, some coloured.				SP	SAND, poorly graded, fine to medium grained, few fines, white, no dry strength		D		
					END OF HOLE 36 feet RL 214 feet				

Samples taken using 'A' type shoe.

TYPE OF SAMPLE	HYDROLOGY	CONSISTENCY	REL. DENSITY: MOISTURE
Open Tube	Water cut ——	VS-Very Soft	VL-Very Loose H-Humid
Sealed Tube	Static level ——	S-Soft	L-Loose D-Damp
Auger barrel	Supply ——	F-Firm	C-Compact M-Moist
Slush pump	Analysis (p.p.m) ——	St-Stiff	D-Dense W-Wet
Casing	← Water level. (Date)	VSt-Very Stiff	VD-Very Dense S-Saturated
		H-Hard	

Plant No 24 Logged J.P.T.

Type DM 500 Date 30 June '64

Driller Farrow Drawn J.P.T.

Started 24 June '64 Traced T.P.S.

Finished 29 June '64 Checked

PLAN No S3793 G+U

Vertical Scale 1 inch = 10 feet

DEPARTMENT OF MINES - SOUTH AUSTRALIA

LOG OF PERCUSSION DRILL HOLE

HOLE NO. G36

SHEET 1 OF 2

PROJECT CHOWILLA DAM — Hirer E & W.S DEPT

LOCATION RIGHT BANK - BORROW AREA 'B' — County: HAMLEY

FEATURE EMBANKMENT MATERIAL — Depth 120 feet R.L. 240 feet Coords 49336E, 100000N

SOIL TYPE / GEOLOGICAL DESCRIPTION	CASING R.L. (FEET)	DEPTH (FEET)	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION / GROUP NAME	CONSISTENCY / REL. DENSITY	MOISTURE CONTENT	WATER LEVELS	PENETRATION DATA BLOWS FOOT 20 40 60 80
RECENT TERRESTRIAL DEPOSITS — Windblown sand				SM	SAND, fine to coarse grained, excess silt, dark red brown, no dry strength. Abundant rootlets.	V.L.	Humid		
	230	10			0.5 feet of sandy clay at 37 feet.				
Reworked lacustrine sand. Quartz grains, rounded to subangular	220	20		SM	SAND, fine to coarse grained, excess silt, some clay, red-brown medium to high dry strength. Lime in patches to 24 feet. Some black organic markings. Pebbles up to 0.1 feet of fine grained ferruginous sandstone and small patches of clean yellow medium sand below 30 feet. Some grains to 2.5 mm.		Damp		
	210	30							
Lacustrine sands — Quartz grains, subangular, some opaque grains	200	40		SP	SAND, poorly graded, fine to medium grained, pale yellow brown, few clay fines as coating on grains slight dry strength. Grains up to 1 mm.	Dense.			
	190	50		SP	As above but slightly coarser grained, few to no fines. Grains up to 1.2 mm.				
	180	60							
PLIO-PLEISTOCENE LACUSTRINE DEPOSITS — Subangular grains, larger grains smooth				SP	SAND, poorly graded, fine to coarse grained, up to 2 mm, some clay		Moist		
Subrounded to subangular, numerous opaque grains. Some relict bedding	170	70		SP	SAND, medium to coarse grained, ferruginous fines coating grains, light brown to red-brown. Grains from 0.5 to 1.5 mm.		Wet	1 July '64	
Large grains commonly elongated or flattened.	160	80			Grains up to 2 mm.				
Subangular to angular, Numerous coloured and milky white quartz grains.	150	90		SP	SAND, coarse to medium with abundant fine gravel, some clay in water, yellow brown. Some grains up to 4 mm.		Saturated		

TYPE OF SAMPLE: Open Tube; Sealed Tube; Auger barrel; Slush pump; Casing

HYDROLOGY: Water cut 79 feet; Static level 79 feet; Supply; Analysis (p.p.m.); ← Water level. (Date)

CONSISTENCY: VS-Very Soft; S-Soft; F-Firm; St-Stiff; VSt-Very Stiff; H-Hard

REL. DENSITY MOISTURE: VL-Very Loose; L-Loose; C-Compact; D-Dense; VD-Very Dense; H-Humid; D-Damp; M-Moist; W-Wet; S-Saturated

Rig No. 24 — Logged J.P.T.

Type DM 500 — Date 6 July '64

Driller Farrow — Logged J.P.T.

Started 29 June '64 — Traced T.P.S.

Finished 4 July '64 — Checked

PLAN No. S3783 G 40

Vertical Scale 1 inch = 10 feet

DEPARTMENT OF MINES - SOUTH AUSTRALIA

LOG OF PERCUSSION DRILL HOLE

LE NO. G36

SHEET 2 OF 2

PROJECT CHOWILLA DAM Hirer E&WS DEPT

LOCATION RIGHT BANK BORROW AREA 'B' County : HAMLEY

FEATURE EMBANKMENT MATERIALS Depth 120 feet R.L 240 feet Coords 49336E 109000N

SOIL TYPE GEOLOGICAL DESCRIPTION	CASING R.L.(FEET)	DEPTH (FEET)	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME	CONSISTENCY REL. DENSITY	MOISTURE CONTENT	WATER LEVELS	PENETRATION DATA BLOWS FOOT 20 40 60 80
PLIO PLEISTOCENE. Quartz grains, subangular to angular. Abundant, grey, red and milky white quartz grains.	130 6 inch	110 120		SP	SAND, coarse to medium grained, abundant fine gravel, some clay in suspension, yellow brown. Grains up to 4mm. Deficient in fine sizes		Saturated		Samples taken by slush pump.

END OF HOLE 120 feet

R.L. 120 feet

TYPE OF SAMPLE: Open Tube; Sealed Tube; Auger barrel; Slush pump; Casing

HYDROLOGY: Water cut 79 feet; Static level 79 feet; Supply —; Analysis (p.p.m) —; ← Water level. (Date)

CONSISTENCY: VS-Very Soft; S-Soft; F-Firm; St-Stiff; VSt-Very Stiff; H-Hard

REL. DENSITY: VL-Very Loose; L-Loose; C-Compact; D-Dense; VD-Very Dense

MOISTURE: H-Humid; D-Damp; M-Moist; W-Wet; S-Saturated

Plant No 24 Logged J.P.T

Type DM500 Date 6 July '64

Driller Farrow Drawn J.P.T

Started 29 June '64 Traced T.P.S.

Finished 4 July '64 Checked

PLAN No S3383a G7J

Vertical Scale 1 inch = 10 feet

"D" 400'
P.D. 59
Serial No. 536/61
D.M. 765/60

PERCUSSION DRILL LOG "D"- 400'

PROJECT: CHOWILLA DAMSITE, RIVER MURRAY, COUNTY HAMLEY.

LOCATION: AXIAL LINE OF DAM, LINE "D"
HORIZONTAL DISTANCE FROM DATUM: - 400'

PURPOSE: TEST OF SUBSURFACE FOUNDATION CONDITIONS.
PRELIMINARY GEOLOGICAL HOLE.

PLANT: 20 — DRILLER: A. Tucker

R.L. SURFACE AT COLLAR: 230.75 — DEPTH: 229'

DATE COMMENCED: 21.7.1960 — DATE COMPLETED: 11.8.1960

BORE LOGGED: R.D. STEEL — DATE: 8.9.1960

Depth	Description	Depth	Type of Sample	Blows p/ft.
0'0" - 1'0"	Reddish brown fine sandy loam, with few gritty fragments, Compact but friable.	0- 1'	Open tube	8
1'0" - 3'0"	Red-brown slightly clayey fine sand, but with numerous coarse grit fragments. Compact but fairly friable.	1- 2' 2- 3'	"	10 23
3'0" - 5'0"	Light to pale reddish brown generally fine sandy and limy clay. Compact but fairly friable generally. Numerous small whitish lime pockets and scattered grit fragments.	3- 4' 4- 5	"	24 18
5'0" - 8'0"	Reddish brown to light reddish brown generally fairly sandy clay to clayey sand. Becoming very limy irregularly. Generally very compact and somewhat friable.	5- 6' 6- 7' 7- 8'	" " "	24 17 20
8'0" - 14'0"	Generally red-brown clayey sand, with scattered pale reddish brown limy patches. Very compact and somewhat friable. Fairly numerous coarser grit fragments.	8- 9' 9-10' 10-11' 11-12' 12-13' 13-14'	" " " " " "	12 25 23 30 30 25
14'0" - 15'0"	Red-brown slightly clayey sand. Very compact but fairly friable. Some small lime pockets and occasional lime nodules.	14-15'	"	35
15'0" - 17'0"	Reddish brown slightly clayey sand. Very compact, somewhat friable. Numerous coarse grit fragments and small pockets of light yellow-grey clayey sand.	15-16' 16-17'	" "	48 29
17'0" - 20'0"	Reddish brown clayey sand, with some light greyish and dark reddish grey mottling. Very compact slightly friable. Numerous grit fragments.	17-18' 18-19' 19-20'	" " "	33 35 34
20'0" - 21'6"	Reddish brown somewhat clayey sand. Very compact but fairly friable. Numerous coarser grit fragments and some small limy patches etc.	20-21'	"	60

Depth	Description	Depth	Type of Sample	Blows p/ft.
21'6" - 24'2"	Reddish brown, brown and light greyish mottled slightly clayey sand. Very compact, somewhat friable. Few small lime patches etc.	21-22' 22-23' 23-24'	Open tube " "	46 40 63
24'2" - 29'0"	Light yellowish generally medium grain sand, maybe slightly clayey in part. Very compact, but friable. Vague salmon pink mottling and scattered coarse grit fragments.	24-25' 25-26' 26-27' 27-28' 28-29'	" " " " "	63 64 41 51 62
29'0" - 31'0"	Light yellowish medium grain sand, with some dark yellow mottling. Very compact but friable, scattered grit fragments.	29-30' 30-31'	" "	73 96?
31'0" - 35'0"	Light yellowish medium to somewhat coarser grain sand, with some brick-red and offwhite mottling. Friable. Slightly clayey in part. Wet.	31-35'	"	Unreliab.
35'0" - 38'0"	Light yellowish generally medium grain sand but with some off-white and dark yellowish mottling. Friable.	35-38'	"	"
38'0" - 40'0"	Dark yellowish-medium grain sand, with some light yellow and dark-brown mottling. Scattered grit fragments. Friable.	38-40'	"	"
40'0" - 42'6"	Off-white, light grey-brown and yellow-brown mottled medium grain sand, with some dark red-brown mottling. Somewhat coarser grain in part.	40-43'	"	"
42'6" - 48'6"	Pale greyish generally medium to slightly coarse grain sand, with brownish mottling irregularly.	43-49'	"	"
48'6" - 49'0"	Light yellowish brown slightly clayey medium grain sand. Compact but friable.			
49'0" - 51'0"	Light brownish medium grain sand maybe very slightly clayey. Compact and friable. Some light reddish mottling.	49-51'	"	"
51'0" - 56'0"	Light yellowish to light yellow-brown medium grain sand, with some coarser gritty fragments.	51-56'	"	"
56'0" - 64'0"	Offwhite and yellowish mottled medium to somewhat coarser grain sand, with fine clay binding in part. Compact, but generally fairly friable.	56-64'	"	"

D - 400'

Depth	Description	Depth	Type of Sample	Blows p/ft.
64'0" - 67'0"	Yellowish medium to fairly coarse grain sand. Slight reddish and offwhite mottling. Slight clay binding. Compact but fairly friable.	64-67'	Open tube	Unreliable
67'0" - 69'0"	Reddish and yellowish mottled generally fairly coarse grain sand, with some finer interstitial clay fraction.	67-69'	"	"
69'0" - 73'6"	Light yellow generally fairly coarse grain sand, with darker yellow and greyish brown mottling. Compact and fairly friable.	69-73'	"	"
73'6" - 76'0"	Brick-red generally fairly coarse grain sand, but with finer interstitial reddish clay fraction.	73-76'	"	"
76'0" - 78'0"	Light and dark yellow generally fairly coarse grain sand, with some finer yellowish interstitial clay fraction.	76-78'	"	"
78'0" - 79'0"	Brick-red generally coarse grain sand, with some finer interstitial clay fraction. Some light grey-brown mottling. Numerous coarse grit fragments.	78-79'	"	"
79'0" - 83'0"	Light yellow and yellow generally coarse grain sand, with some finer interstitial clay fraction. Compact and fairly friable. Some off-white mottling and numerous grit fragments.	79-83'	"	"
83'0" - 86'0"	Yellowish medium to somewhat coarser grain sand, with some reddish mottling. Some finer fraction and coarse grit fragments.	83-86'	"	"
86'0" - 89'0"	Light yellowish brown and light greyish mottled, medium to somewhat coarser grain sand. Scattered coarse milky quartz grit fragments.	86-89'	"	"
89'0" - 91'0"	Offwhite, brownish and light yellowish brown mottled, medium to fairly coarse grain sand. Some finer interstitial clay fraction.	89-91'	"	"
91'0" - 92'0"	Offwhite generally fine grain sand, but with numerous coarser grit fragments.	91-92'	"	"
92'0" - 93'0"	Yellowish brown generally fine to medium grain sand, but with numerous coarse grit fragments.	92-93'	"	"
93'0" -102'0"	Pale yellowish to pale yellowish grey medium to somewhat coarser grain sand.	93-102'	Drilled	

Depth	Description	Depth	Type of Sample	Blows p/ft.
102'0"-104'0"	Greenish grey-brown medium to coarse grain sand, with numerous coarse grit fragments and some lumps of greyish marcasite.	102-104'	Drilled	-
104'0"-118'0"	Pale grey generally coarse grain sand, with some finer interstitial sandy fraction. Vague yellowish mottling in part. Numerous coarse to very coarse rounded milky quartz grit fragments.	104-118'	"	-
118'0"-128'0"	Pale yellowish generally coarse gritty sand, with fairly dominant, yellowish fine sandy fraction. Numerous coarse to very coarse milky quartz grit fragments.	118-128'	"	-
128'0"-130'0"	Light greyish coarse gritty sand with some finer light grey and light yellowish grey interstitial sand fraction.	128-130'	"	-
130'0"-132'0"	Light greyish generally fine grain sand, with numerous coarse rounded milky quartz grit fragments.	130-132'	"	-
132'0"-144'0"	Light greyish generally coarse gritty sand, with finer light grey and light yellow-grey fraction irregularly predominant.	132-144'	"	-
144'0"-146'0"	Light to pale grey generally fine grain sand, but with abundant coarse rounded milky quartz grit fragments.	144-146'	"	-
146'0"-164'0"	Light to pale grey generally coarse gritty sand, with finer fraction irregularly predominant. Abundant coarse to very coarse milky quartz grit fragments.	146-164'	"	-
164'0"-174'0"	Grey-brown generally fine grain sand, with numerous coarse to very coarse rounded grit fragments.	164-174'	Slush	-
174'0"-178'0"	Pale greyish generally fine grain sand, with scattered grit fragments, mica flecks etc.	174-177 177-178	" Open tube	- 36
178'0"-182'0"	Greyish to light grey-brown generally fine grain sand. Dark grey-brown and slightly clayey in part. Few coarse grit fragments. etc.	178-179' 179-180' 180-181' 181-182'	" " " "	47 40 42 44
182'0"-186'0"	Light grey to grey-brown generally fine grain sand, becoming dark bluish-grey and somewhat clayey in pockets.	182'-186	"	Av.43
186'0"-192'0"	Pale greyish very fine grain sand, with scattered mica flecks etc.	186-192'	"	Av.4

D - 400'

Depth	Description	Depth	Type of Sample	Blows p/ft.
192'0"-196'0"	Greyish to greyish brown generally fine grain sand. Bluish grey and slightly clayey in part.	192-196'	Open tube	45
196'0"-206'0"	Bluish grey firm moist slightly silty clay, occurring in discrete pockets with light grey-brown fine grain sand. Few small mica flecks etc.	192-206'	"	23
206'0"-224'0"	Grey-brown generally slightly clayey fine sand. Numerous mica flecks and small pockets of bluish grey silty clay.	206-224'	"	27
224'0"-229'0"	Greyish to greenish grey clayey fine sand with numerous small mica flecks etc. Somewhat pyritic.	224-229'	"	40

END OF HOLE 229'
WATER CUT 92'
WATER LEVEL 92'
ANALYSIS 1200+ ATS

"D" - 57'
P.D. 60
Serial No. 685/60
D.M. 765/60

PERCUSSION DRILL LOG "D" - 57'

PROJECT: CHOWILLA DAM SITE, RIVER MURRAY, COUNTY HAMLEY
LOCATION: AXIAL LINE OF DAM: LINE "D"
HORIZONTAL DISTANCE FROM DATUM: - 57'
PURPOSE: TEST OF SUBSURFACE FOUNDATION CONDITIONS
PRELIMINARY GEOLOGICAL HOLE.

PLANT: 23 — DRILLER: A. Graham
R.L. SURFACE: 218.06 — DEPTH: 75'
DATE COMMENCED: 5.9.1960 — DATE COMPLETED: 8.9.1960
BORE LOGGED: R.D. STEEL — DATE: 9.9.1960

Depth	Description	Depth	Type of Sample	Blows p/ft
0'0" - 3'0"	Red-brown sandy clay loam, with scattered grit fragments, plant remnants etc.	0- 1'	Open tube	19
		1- 2'	"	10
		2- 3'	"	22
3'0" - 4'0"	Light red-brown sandy and slightly limy clay. Few grit fragments etc. Compact and friable.	3- 4'	"	27
4'0" - 6'0"	Light red-brown sandy and limy clay. Compact and slightly friable. Scattered grit fragments and whitish lime pockets.	4- 5'	"	60
		5- 6'	"	78
6'0" - 8'0"	Red-brown very clayey sand to very sandy clay. Compact but fairly friable. Numerous ccarser grit fragments and occasional pockets of whitish earthy lime.	6- 7'	"	72
		7- 8'	"	75
8'0" - 11'0"	Reddish brown very sandy clay. Very limy in part, with whitish earthy lime pockets and scattered grit fragments. Very compact and slightly friable.	8- 9'	"	57
		9-10'	"	56
		10-11'	"	52
11'0" - 13'0"	Reddish brown clayey sand, with some whitish lime pockets and hard medium to coarse lime nodules.	11-12'	"	91
		12-13'	"	90
13'0" - 14'0"	Light reddish brown, clayey but fairly coarse grain sand. Soft and friable. Numerous gritty fragments.	13-14'	"	60
14'0" - 16'0"	Light reddish brown clayey sand, irregularly fine to coarse grain. Coarse to very coarse grit fragments. Compact but fairly friable.	14-15'	"	45
		15-16'	"	75
16'0" - 24'0"	Red-brown clayey sand, with scattered small earthy lime pockets and small lime nodules. Compact and slightly friable. Small grit fragments irregularly abundant.	16-17'	"	75
		17-18'	"	69
		18-19'	"	57
		19-20'	"	61
		20-21'	"	62
		21-22'	"	68
		22-23'	"	66
		23-24'	"	70

Depth	Description	Depth	Type of Sample	Blows p/ft.
24'0" - 28'0"	Red-brown clayey sand to very sandy clay. Compact and slightly friable. Scattered grit fragments and limy blobs.	24-25'	Open tube	65
		25-26'	"	71
		26-27'	"	69
		27-28'	"	65
28'0" - 33'6"	Reddish to reddish brown slightly clayey sand. Generally very compact but fairly friable. Fairly numerous coarser grit fragments.	28-29'	"	59
		29-30'	"	63
		30-31'	"	69
		31-32'	"	57
		32-33'	"	62
33'6" - 35'0"	Reddish brown to light reddish brown very sandy clay, with patches of light greyish mottling. Very compact and slightly friable. Scattered grit fragments etc.	33-34'	"	61
		34-35'	"	58
		35-36'	"	62
35'0" - 39'0"	Reddish brown clayey sand, with occasional small patches of greyish mottling. Very compact but fairly friable. Scattered coarse grit fragments.	36-37'	"	58
		37-38'	"	60
		38-39'	"	58
39'0" - 41'0"	Reddish brown clayey fine sand, with some light greyish mottling. Somewhat coarser grain in part, with irregularly abundant grit fragments. Generally very compact and fairly friable.	39-40'	"	57
		40-41'	"	56
		41-42'	"	59
41'0" - 43'0"	Reddish brown slightly clayey sand medium grain generally, but with scattered coarse grit fragments. Very compact, but friable and very moist.	42-43'	"	60
		43-44'	"	57
43'0" - 46'0"	Light reddish brown clayey sand, possibly becoming very sandy clay in part. Some light greyish patches. Scattered coarse grit fragments.	44-45'	"	59
		45-46'	"	52
46'0" - 47'0"	Brick-red, red-brown, light grey and dark yellow-mottled, clayey fine sand. Very compact and slightly friable. Scattered grit fragments, etc.	46-47'	"	55
47'0" - 52'0"	Off-white, dark yellow, yellow and lesser reddish mottled clayey sand with scattered coarse gritty fragments. Very compact and somewhat friable.	47-48'	"	52
		48-49'	"	51
		49-50'	"	58
		50-51'	"	55
		51-52'	"	59
52'0" - 54'0"	Offwhite, yellow and reddish brown mottled, finely sandy clay, with pockets of fine clayey sand. Very compact and slightly friable. Scattered grit fragments.	52-54'	Slush	-
54'0" - 58'0"	Light yellowish generally fairly coarse rounded sand, with finer yellowish clay binding.	54-58'	"	-

Depth	Description	Depth	Type of Sample	Blow p/ft
58'0" - 62'0"	Orange-brown generally coarse rounded sand, with some finer clay binding.	58-62'	Slush	-
62'0" - 65'0"	Yellow-brown coarse rounded sand, with numerous grit fragments and some finer clay binding. Slight greyish mottling in part.	62-65'	"	-
65'0" - 70'0"	Light yellowish generally fine to medium grain sand, with some orange and brownish mottling. Scattered coarse grit fragments.	65-70'	"	-
70'0" - 73'0"	Yellowish medium to somewhat coarser grain sand. Vague orange mottling. Scattered coarse grit fragments.	70- 73'	"	-
73'0" - 74'0"	Yellowish fairly coarse grain sand. Some light yellowish mottling, finer clay fraction and scattered grit fragments.	73-74'	"	-

END OF HOLE 74'

"D" 297.3
RD. 2
Serial No. 746/60
D.M. 765/60

PERCUSSION DRILL LOG "D" 297.3

PROJECT: CHOWILLA DAM SITE, RIVER MURRAY, COUNTY HAMLEY.
LOCATION: DAM SITE AXIS: LINE "D"
HORIZONTAL DISTANCE FROM DATUM 297.3'
PURPOSE: TEST OF SUBSURFACE FOUNDATION CONDITIONS
PRELIMINARY GEOLOGICAL HOLE.

PLANT: 20 — DRILLER: A. TUCKER
R.L. SURFACE COLLAR: 207.83 — DEPTH OF BORE: 300'
DATE COMMENCED: 19.5.1960 — DATE COMPLETED: 6.6.1960
LOGGED BY: R.D. STEEL — DATE: 8.6.1960

Depth	Description	Depth	Type of Sample	Blows p/ft.
0'0" - 2'0"	Brown fine grained sand. Compact, but somewhat friable. Numerous coarser grit fragments.	0- 1' 1- 2'	Open tube	25 38
2'0" - 6'0"	Light brown to pale brown sandy and somewhat limy clay, becoming fine clayey sand in part. Compact and slightly friable.	2- 3' 3- 4' 4- 5' 5- 6'	" " " "	91 101 162? 110
6'0" - 8'0"	Brown to light brown clayey sand. Compact and slightly friable. Numerous grit fragments. Becoming slightly limy in irregular patches.	6- 7' 7- 8'	" "	30 32
8'0" - 9'2"	Brown to light brown slightly clayey sand. Compact but fairly friable. Abundant coarser grit fragments.	8- 9'	"	30
9'2" - 9'10"	Brown to light brown clayey sand. Very compact but slightly friable. Travertinized in thin bands, to form hard irregular lumps.	9-10'	"	25
9'10"- 21'0"	Brown to light brown slightly clayey sand. Very compact, somewhat friable. Moist and unconsolidated in irregular pockets or layers. Small pockets of chalky white lime.	10-21'	"	43
21'0" - 23'0"	Brownish to light brown sand. Moist, compact but friable.	21-23'	"	65
23'0" - 24'0"	Brown to red-brown sandy clay, becoming very sandy in irregular patches. Very compact.	23-24'	"	32
24'0" - 28'10"	Brown to red-brown, slightly clayey sand. Generally very compact and slightly friable, but becoming softer in irregular pockets.	24-28'10	"	100?
28'10"- 34'0"	Brown, red-brown and light grey-brown mottled fine grained sand. Compact but slightly friable.	28'10-34'	"	84?
34'0" - 35'0"	Light grey-brown, light brown and yellowish brown mottled slightly clayey sand. Moist, compact and fairly friable.	34- 35'	"	52

"D" 297.3

Depth	Description	Depth	Type of Sample	Blow p/ft
112'0"-128'0"	Light grey to light brown, generally coarse grained sand, with abundant coarse gritty fragments.	112-128'	Slush	-
128'0"-140'0"	Light grey to light grey-brown fine to medium grained sand, with abundant coarse gritty fragments.	128-140'	"	-
140'0"-174'0"	Greyish, fine to medium grained sand, becoming lighter coloured in parts.	140-174'	"	-
174'0"-227'0"	Mid-grey clayey sand to sandy clay Possibly occurring in discrete pockets or layers, but mixed in sample by slushing action.	174-227'	"	-
227'0"-264'0"	Mid-grey to greenish grey mottled silty clay.	227-264'	"	-
264'0"-282'0"	Greenish grey, possibly glauconitic, silty to finely sandy clay, with abundant small fossil fragments.	264-282'	"	-
282'0"-300'0"	Greenish grey and grey mottled fine silty clay, with scattered micro and macro fossil fragments.	282-300'	"	-

END OF BORE 300'
WATER CUT 65', 264'
STATIC LEVEL 55'
ANALYSIS 124 ATS
SUPPLY 5000+ g.p.h.

"D" 800
P.D. 6
Serial No. 759/60
D.M. 765/60

PERCUSSION DRILL LOG "D" 800

PROJECT: CHOWILLA DAM SITE, RIVER MURRAY, COUNTY HAMLEY
LOCATION: DAM SITE AXIS: LINE "D"
HORIZONTAL DISTANCE FROM DATUM: 800'.
PURPOSE: TEST OF SUBSURFACE FOUNDATION CONDITIONS.
PRELIMINARY GEOLOGICAL HOLE.
PLANT: 20 DRILLER: A. TUCKER
R.L. SURFACE AT COLLAR: 184.97 DEPTH OF BORE: 100'
DATE COMMENCED: 7.6.1960 DATE COMPLETED: 11.6.1960
LOGGED BY: R.D. STEEL DATE: 16.6.1960

Depth	Description	Depth	Type of Sample	Blows p/ft.
0'0" - 3'2"	Light brownish to light reddish brown slightly clayey fine sand. Very compact, dry and somewhat friable. Slightly limy in small pockets, with numerous small grit fragments.	0- 1'	Open tube	-
		1- 2'	"	45
		2- 3'	"	
3'2" - 5'2"	Light reddish brown fine sandy clay to clayey fine sand. Very compact, dry and somewhat friable. Few small lime pockets and small nodules.	3- 4'	"	13
		4- 5'	"	20
5'2" - 7'0"	Light reddish brown and reddish brown fine clayey sand. Very compact, but somewhat friable and slightly moist. Offwhite and limy in scattered small pockets. Numerous coarse grit fragments.	5- 6'	"	19
		6- 7'	"	31
7'0" - 9'8"	Brown and red-brown clayey sand. Very compact and slightly friable. Small pockets of light brownish fine sand, and scattered coarser grit fragments.	7-8'	"	25
		8- 9'	"	42
		9-10'	"	66
9'8" - 12'0"	Light brown to light reddish brown and pale greyish mottled clayey fine sand. Very compact and slightly friable. Scattered coarser grit fragments.	10-11'	"	57
		11-12'	"	25
12'0" - 14'0"	Brick-red and light grey mottled silty clay, with vague yellow-brown mottling. Very stiff and slightly moist. Light yellow-grey and somewhat sandy in irregular patches. Fes grit fragments etc.	12-13'	"	27
		13-14'	"	18
14'0" - 17'0"	Light grey to pale grey clayey silt, with yellow-brown mottling Stiff and moist. Few small grit fragments, mica flakes etc.	14-15'	"	22
		15-16'	"	21
		16-17'	"	16
17'0" - 21'0"	Light grey to pale grey clayey silt, with yellow-brown and brick-red mottling. Firm and moist. Few small grit fragments etc.	17-18'	"	21
		18-19'	"	12
		19-20'	"	13
		20-21'	"	12

"D" 800

Depth	Description	Depth	Type of Sample	Blows p/ft.
21'0" - 23'0"	Light grey to pale grey and yellow-brown slightly clayey silt, with lesser brown and brick-red mottling. Firm and moist.	21-22'	Open tube	12
		22-23'		20
23'0" - 26'0"	Brown, light brown and light grey slightly clayey silt, with some yellow-brown and red-brown mottling. Firm and very moist. Few grit fragments, mica flakes etc.	23-24'	"	9
		24-25'	"	16
		25-26'	"	23
26'0" - 28'6"	Brown, dark brown and grey-brown finely sandy silt. Moist, very compact and somewhat friable. Few grit fragments and small mica flecks.	26-27'	"	16
		27-28'	"	15
		28-29'	"	20
28'6" - 30'0"	Light grey very fine silty sand. Firm to compact and very moist. Some darker grey streaking.	29-30'	"	14
30'0" - 33'0"	Brown to dark yellow-brown fine clayey silt, with pockets of light to mid grey fine sandy silt, Firm, becoming soft and very moist.	30-31'	"	16
		31-32'	"	17
		32-33'	"	16
33'0" - 35'0"	Mid-grey to light grey fine sandy silt, with slight yellow-brown mottling. Soft and moist generally. Fes grit fragments etc.	33-34'	"	14
		34-35'	"	12
35'0" - 40'0"	Light greyish, very fine silty sand. Soft and wet. Slightly micaceous.	35-36'	"	7
		36-37'	"	7
		37-38'	"	6
		38-39'	"	-
40'0" - 46'0"	Grey to light grey generally fine grain sand. Wet. Few small grit fragments.	39-40'	"	-
		40-41'	"	22
		41-42'	"	20
		42-50'	"	Av.22
46'0" - 52'0"	Greyish fine silty clay, becoming finely sandy in pockets. Wet.	50-52'	"	20
52'0" - 54'0"	Yellow-brown to light yellow-brown mottled fine sand. Wet. Few grit fragments, etc.	52-53'	"	Unreliab
		53-54'	"	-
54'0" - 58'0"	Pale brown generally fine grain sand. Wet.	54-58'	"	-
58'0" - 60'0"	Pale brown fine sand, with some greyish mottling. Few grit frags., etc.	58-60'	"	-
60'0" - 62'0"	Greyish generally fine to medium grain sand, with few grit fragments.	60-62'	"	-
62'0" - 66'0"	Light brown to greyish mottled, medium grain sand. Wet. Some coarser grit fragments.	62-66'	"	-
66'0" - 74'0"	Light brown to light grey-brown medium to coarse grain sand. Wet. Very abundant coarse grit fragments.	66-74'	"	-

"D" 800

Depth	Description	Depth	Type of Sample	Blows p/ft.
74'0" - 76'0"	Light grey-brown medium to coarse grain sand, with very abundant coarse grit fragments. Wet.	74-76'	Open tube	-
76'0" - 77'6"	Light brownish generally fine to medium grain wet sand with few coarse grit fragments.	76-77'6 "		-
77'6" - 80'0"	Light grey very coarse gritty sand. Numerous large rounded quartz grit fragments. Wet.	77'6"-80'"		-
80'0" - 94'0"	Light grey to light brown very coarse angular to sub-rounded quartz grit, with interstitial fine silty fraction. Wet.	80-94'	Slush	-
94'0" -100'0"	Probably light grey fine grain sand, with very abundant coarse rounded milky quartz grit fragments. Wet.	94-100	"	-

END OF HOLE	100'
WATER CUT	38'
STATIC LEVEL	38?
SUPPLY	360+ g.p.h.
ANALYSIS	1200+ ATS

"D" 1000
P.D. 36
Serial No. 521/61
D.M. 765/60

PERCUSSION DRILL LOG "D"1000'

PROJECT: CHOWILLA DAM SITE, RIVER MURRAY, COUNTY HAMLEY
LOCATION: AXIAL LINE OF DAM: LINE "D".
HORIZONTAL DISTANCE FROM DATUM: 1000'
PURPOSE: TEST OF SUBSURFACE FOUNDATION CONDITIONS.
PRELIMINARY GEOLOGICAL HOLE.
PLANT: 40 DRILLER: N. LOCK
R.L. SURFACE AT COLLAR: 171.20 DEPTH: 75'
DATE COMMENCED: 1.7.1960 DATE COMPLETED: 6.7.1960
BORE LOGGED: R.D. STEEL DATE: 18.8.1960

DEPTH From	DEPTH To	DESCRIPTION	DEPTH	TYPE OF SAMPLE	BLOWS p/ft.
0'	1'6"	Pale grey fine clayey sand, with pockets of greenish grey fine sandy clay. Very compact, slightly friable. Slightly yellow-brown mottling. Scattered grit fragments etc.	0-7'6"	Open tube	not recorded.
1'6"	2'6"	Greenish grey to light grey-brown and yellowish mottled, silty to finely sandy clay, becoming fine clayey sand in pockets. Very stiff generally. Few grit fragments etc.			
2'0"	2'6"	Light grey-brown to light yellowish and pinkish mottled, clayey sand to very sandy clay. Very stiff.			
2'6"	3'0"	Light grey-brown to light brownish grey and orange-brown mottled silty clay, becoming finely sandy in part. Generally very stiff. Few grit fragments, organic pockets and small lime pockets.			
3'0"	4'6"	Light brown to khaki silty clay. Very stiff. Somewhat limy in part, with lime pockets and rubble. Few grit fragments, mica flecks, etc.			
4'6"	5'0"	Bluish grey and pale grey silty clay, with prominent yellow-brown mottling. Very stiff, moist. Few grit fragments, mica flecks and small organic pockets.			
5'0"	5'9"	Light green-grey to light grey-brown very silty clay, with prominent yellow-brown mottling. Very stiff. Moist. Scattered grit fragments, mica flecks and dark grey iron oxide pockets.			
5'9"	6'3"	Greenish grey to light and dark yellow-brown mottled very silty clay, with few grit fragments, mica flecks and iron oxide pockets. Stiff and moist.			
6'3"	7'6"	Greenish grey to light brown and light to dark yellow-brown mottled clayey silt. Firm and moist. Numerous small mica flecks, iron oxide pockets and few plant remnants.			

PERCUSSION DRILL LOG. "D"1000

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
7'6"	11'0"	Light bluish grey somewhat clayey silt, with prominent light and dark yellow-brown mottling. Firm and moist. Numerous small mica flecks and some dark ferruginous staining. Becoming finely sandy in pockets at depth.	7'6"-27'0"	Open tube	not recorded
11'0"	11'9"	Yellow-brown fine clayey silt, with pockets of light bluish grey silty clay. Fairly soft and moist. Slightly Micaceous.			
11'9"	13'8"	Light grey to light yellowish fine grained sand, with dark yellow-brown mottling. Bluish grey and somewhat clayey in pockets. Very moist. Few grit fragments, mica flecks.			
13'8"	15'0"	Greenish brown to dark yellow-brown very clayey to finely sandy silt. Soft and very moist. Some bluish-grey silty clay pockets, numerous small mica flecks etc.			
15'0"	20'0"	Greenish brown and bluish grey very silty to finely sandy clay, with some yellow-brown mottling in part. Soft and very moist. Numerous small mica flecks etc.			
20'0"	21'3"	Mid-grey to light grey-brown slightly clayey silt, becoming finely sandy in part. Numerous small mica flecks etc.			
21'3"	25'0"	Light grey-brown fine grain sand, with pockets of bluish grey very silty clay. Soft and wet. Numerous small mica flecks etc.			
25'0"	27'0"	Mid-grey to light greenish grey clayey silt. Soft and wet. Small pockets of light grey-brown fine grain sand. Numerous small mica flecks etc.			
27'0"	43'6"	Core Missing.			
43'6"	44'0"	Yellow-brown medium to fairly coarse grain sand. Wet. Numerous grit fragments.	27'-44'	Slush-	
44'0"	48'0"	Light yellow-grey and yellowish brown mottled, medium grain sand, with scattered coarser grit fragments. Slightly micaceous.	44-48'	"	-
48'0"	51'0"	Greenish brown to yellow-brown and greyish brown, medium to fairly coarse grain sand, with numerous coarse rounded grit fragments and some lumps of greyish marcasite.	48-51'	"	-
51'0"	54'0"	Light greyish to grey coarse gritty sand with vague yellowish mottling. Some finer interstitial sandy fraction. Numerous coarse to very coarse rounded milky quartz grit fragments.	51-54'	"	-

PERCUSSION DRILL LOG. "D"1000

Depth From	Depth To	Description	Depth Type of Sample	Blows p/ft.
54'0"	57'0"	Light greyish to grey-brown medium grain sand, with numerous coarse grit fragments and few mica flecks.	54-57' Slush	-
57'0"	66'0"	Light greyish and light grey-brown medium to coarse grain sand, with numerous coarse to very coarse rounded milky quartz grit fragments.	57-66' "	-
66'0"	70'0"	Light greyish coarse gritty sand, with some finer interstitial yellowish mottling. Numerous very coarse milky quartz grit fragments.	66-70' "	-
70'0"	75'0"	Light greyish to light yellow-brown coarse grain sand, with some finer interstitial fraction and numerous coarse grit fragments.	70-75' "	-

END OF HOLE 75'
WATER CUT 12'
WATER LEVEL 11'8"
ANALYSIS 1200+ ATS
BLANKET THICKNESS 11'9"

"D" 1200
P.D. 25
Serial No. 519/61
D.M. 765/60

PERCUSSION DRILL LOG "D" 1200

PROJECT: CHOWILLA DAM SITE, RIVER MURRAY, COUNTY HAMLEY.
LOCATION: DAM SITE AXIS: LINE "D"
HORIZONTAL DISTANCE FROM DATUM: 1200'
PURPOSE: TEST OF SUBSURFACE FOUNDATION CONDITIONS.
SECONDARY GEOLOGICAL HOLE.
R.L. SURFACE AT COLLAR: 171.03 DEPTH: 50'
PLANT NO. 40 DRILLER: N. LOCK
DATE COMMENCED: 28.6.1960 DATE COMPLETED: 29.6.19
BORE LOGGED: R.D. STEEL DATE: 8.7.1960

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
0'0"	6'6"	Greyish to light grey and light grey-brown generally finely sandy clay, becoming fine clayey sand in part. Compact, dry and fairly friable. Few small pockets of bluish grey silty clay, some grit fragments and plant remains.	0- 1' 1- 2' 2- 3' 3- 4' 4- 5' 5- 6'	Open tube " " " " "	10 45 30 30 28 28
6'6"	8'2"	Light grey to light brown silty clay to clayey silt, with prominent light and dark yellow-brown mottling. Few grit fragments, organic pockets etc. Very firm.	6- 7' 7- 8'	" "	9 8
8'2"	9'3"	Light greyish and light yellow-brown fine sandy silt, with prominent brown and yellow-brown mottling. Firm, moist and somewhat friable, Some grit fragments, mica flecks and organic blobs.	8- 9'	"	10
9'3"	14'0"	Light greyish, and light yellow-brown very fine sandy silt, with brown and yellow-brown mottling. Firm becoming soft and very moist. Few grit fragments, mica flecks, organic blobs etc.	9-10' 10-11' 11-12' 12-13' 13-14' 14-15'	" " " " " "	12 15 7 6 7 7
14'0"	16'0"	Light grey and yellow-brown laminated clayey silt. Firm to soft and very moist.	15-16'	"	7
16'0"	18'0"	Bluish grey and light grey silty clay, with pockets of brown and yellow-brown fine sandy silt. Few grit fragments etc.	16-17' 17-18'	" "	7 7
18'0"	22'3"	Bluish grey slightly silty clay, with slight brownish and yellow-brown mottling. Soft and very moist.	18-19' 19-23'	" "	Low Low
22'3"	25'0"	Bluish grey and mid-grey finely silty clay. Soft and wet. Few small mica flecks etc.	23-25'	"	Low
25'0"	27'0"	Mid-grey to brownish grey slightly clayey fine sand, with pockets of light brownish fine sand. Soft and wet. Scattered mica flecks etc.	25-27'	"	Low

"D" 1200

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
27'0"	28'0"	Mainly light brownish fine grain sand, becoming bluish grey and slightly clayey in part. Soft and wet.	27-28'	Open tube	Low
28'0"	31'8"	Mid-grey to brownish grey clayey fine sand. Wet. Few pockets of medium grain sand, fairly numerous coarse grit fragments.	28- 32'	"	"
31'8"	32'8"	Yellowish brown medium to fairly coarse grain sand. Wet.			
32'8"	37'0"	Pale greyish brown medium to fairly coarse grain sand. Numerous coarser rounded grit fragments. Wet.	32-33' 33-37'	Slush "	- -
37'0"	44'0"	Light greyish generally fine to medium grain sand, with some coarser sand and grit fragments. Wet.	37-44'	"	-
44'0"	50'0"	Light greyish generally fine grain sand, with some coarser sand fraction. Numerous small mica flecks, etc. Wet.	44-50'	"	-

END OF HOLE 50'
WATER CUT 18'
WATER LEVEL 12'3"
SUPPLY 500+ g.p.h.
ANALYSIS 1200+ ATS
BLANKET THICKNESS 25'0"

"D" 3000'
P.D. 46
Serial No. 522/61
D.M. 765/60

PERCUSSION DRILL LOG "D" 3000

PROJECT: CHOWILLA DAM SITE, RIVER MURRAY, COUNTY HAMLEY.
LOCATION: DAM SITE AXIS, LINE "D"
HORIZONTAL DISTANCE FROM DATUM: 3000'
PURPOSE: TEST OF SUBSURFACE FOUNDATION CONDITIONS
1. SEALED TUBE SAMPLES TO 7'6"
2. TRIAL PUMP WELL FOR NO. 1 FIELD PERMEABILITY TEST AT "D" 3100

R.L. SURFACE AT COLLAR: 169.80 DEPTH: 138'
PLANT: No. 40 DRILLER: N. LOCK
DATE COMMENCED: 7.7.1960 DATE COMPLETED: 15.7.1960
BORE LOGGED: R.D. STEEL DATE: 21.7.1960

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
0'0"	7'6"	Continuous sealed Tube Samples	0-7'6	Sealed tube.	-
7'6"	8'0"	Light yellow-brown generally medium grain sand. Moist. Few dark organic patches.	7'6-9'0	Open tube.	14
8'0"	9'0"	Greenish grey slightly clayey silt, with prominent yellow-brown and slight greenish brown mottling. Moist.			
9'0"	10'6"	Light yellow-brown generally medium to fine grain sand, with some light greyish and dark yellow-brown mottling. Band of greyish clayey silt at 10'4"-10'6". Moist.	9-10' 10-11'	" "	14 13
10'6"	11'6"	Pale yellow-brown medium-grain sand, with some darker yellow-brown mottling in part. Few coarser grit fragments.			
11'6"	13'10"	Light yellowish brown generally medium grain sand, with slight grey-brown and darker yellow-brown mottling. Scattered coarser grit fragments. Wet.	11-12' 12-13'	" "	18 11
13'10"	16'9"	Dark yellowish brown generally medium grain sand. Some finer interstitial fraction and scattered coarse grit fragments. Slightly clayey in part.	13-14' 14-15' 15-16' 16-17'	" " " "	9 13 13 12
16'9"	18'0"	Light brownish generally medium grain sand. Bluish grey and clayey in pockets. Wet.	17-18'	"	14
18'0"	24'0"	Generally, light brownish medium grain sand, with vague greyish and greyish brown mottling in part. Wet.	18-19' 19-20' 20-23' 23-33'	" " " "	20 20 ? Av. 30
24'0"	33'6"	Light brownish generally medium to slightly coarse grain sand, with scattered coarser grit fragments. Slight yellowish brown mottling. Wet.			

"D" 3000'

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
33'6"	35'0"	Light brown fine to medium grain sand, with slight yellow-brown and grey-brown mottling. Few grit fragments, numerous mica flecks, etc.	33-35'	Open tube	Unreliable due to over compaction.
35'0"	39'3"	Light brown to light greyish-brown generally medium grain sand. Wet. Some finer fraction and scattered coarser grit fragments.	35-39'	"	"
39'3"	41'0"	Light brownish medium to fairly coarse grain sand, with some light and dark greyish mottling. Few wood fragments etc.	39-41'	"	"
41'0"	41'9"	Pale greyish to pale greyish brown generally medium grain sand. Some finer fraction, scattered grit fragments, etc. Wet.			
41'9"	43'3"	Bluish grey silty clay. Soft and moist. Numerous coarse to very coarse rounded milky quartz grit fragments and some hard lumps of marcasite.	41-43'	"	"
43'3"	44'6"	Pale greyish generally fine grain sand, with scattered small mica flecks, and some coarser grit fragments. Wet.			
44'6"	49'6"	Light greyish to light greyish brown medium to fairly coarse grain sand. Fairly numerous coarse rounded quartz grit fragments. Few large lumps of marcasite. Wet.	43-50'	"	"
49'6"	50'6"	Light grey to light grey-brown generally fine grain sand. Wet. Few coarse grit fragments.			
50'6"	54'6"	Pale grey fine to medium grain sand, with very abundant coarse to very coarse rounded milky quartz grit fragments. Becoming coarse gritty sand in part. Wet.	50-55'	"	"
54'6"	75'0"	Light greyish coarse gritty sand. Some finer interstitial sand fraction and very abundant coarse to very coarse rounded milky quartz grit fragments. Wet.	55-75'	Slush	-
75'0"	85'0"	Light greyish generally fine grain sand, with fairly numerous coarse rounded milky quartz grit fragments. Wet.	75-85'	"	-
85'0"	98'0"	Light greyish generally coarse gritty sand. Some finer interstitial fraction. Very abundant coarse to very coarse rounded milky quartz grit fragments. Wet.	85-98'	"	-

"D" 3000'

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
98'0"	118'0"	Greyish brown to light grey generally fine to medium grain sand, with scattered coarser grit fragments.	98-118'	Slush	-
118'0"	125'0"	Greyish brown fine grain sand, with few coarser grit fragments, mica flecks etc. Becoming somewhat bluish grey and clayey in part.	118-125'	"	-
125'0"	138'0"	Bluish grey silty to finely sandy clay in discrete pockets with light brownish generally fine grain sand.	125-138'	"	-

END OF BORE 138'
WATER CUT 10'6"
WATER LEVEL 8'8"
SUPPLY Large
ANALYSIS 1200+ ATS
BLANKET THICKNESS 9'0"

"D" 5200'
PD. 15
SERIAL NO. 793/60
D.M. 765/60

PERCUSSION DRILL LOG "D" 5,200'

PROJECT: CHOWILLA DAM SITE, RIVER MURRAY, COUNTY HAMLEY
LOCATION: DAM SITE AXIS: LINE "D"
HORIZONTAL DISTANCE FROM DATUM: 5,200'
PURPOSE: TEST OF SUBSURFACE FOUNDATION CONDITIONS
PRELIMINARY GEOLOGICAL HOLE.
PLANT: 20 DRILLER: A. TUCKER
R.L. SURFACE AT COLLAR: 168.36 DEPTH: 150'
DATE COMMENCED: 20.6.1960 DATE COMPLETED: 25.6.1960
BORE LOGGED: R.D. STEEL DATE: 6.7.1960

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
0'0"	1'0"	Greyish to bluish grey fine sandy clay, becoming grey-brown and sandy in pockets. Compact, but granular and fairly friable. Few small grit fragments and plant remnants.	0- 1'	Open tube	35
1'0"	2'0"	Grey to greenish grey silty clay becoming light greyish and finely sandy in pockets. Compact, dry and slightly friable. Few small grit fragments and plant remains.	1- 2'	"	59
2'0"	5'0"	Greenish grey silty clay, with vague yellow-grey and brownish mottling. Stiff and slightly moist. Slightly sandy in part, with small offwhite gypsum pockets.	2- 3' 3- 4' 4- 5'	" " "	63 23 16
5'0"	8'0"	Greenish grey and light yellowish grey silty clay. Very firm and slightly moist. Scattered small grit fragments, gypsum crystals and dark grey organic blobs.	5- 6' 6- 7' 7- 8'	" " "	17 8 Low
8'0"	9'6"	Greenish grey to bluish grey silty clay, with vague yellow-grey and yellow-brown mottling. Firm and moist. Few small grit fragments etc.	8- 9'	"	8
9'6"	10'0"	Pale grey to pale yellow-grey fine silty sand, with prominent light and dark yellowish-mottling. Soft and very moist.	9-10'	"	7
10'0"	11'9"	Greyish brown and blue-grey mottled silty clay, becoming light bluish grey to light yellow-brown and very silty to sandy in pockets. Firm and very moist.	10-11'	"	12
11'9"	12'9"	Grey to bluish grey silty clay, with pockets of light grey-brown and yellowish brown fine sand. Firm and very moist.	11-12'	"	13
12'9"	14'0"	Grey to bluish grey and yellowish brown mottled, fine silty sand. Wet. Few grit fragments, mica flecks etc.	12-13' 13-14'	" "	16 15

"D"5,200'

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
14'0"	15'4"	Light grey to light bluish grey fine silty sand. Wet. Few grit fragments, mica flecks etc.			
15'4"	18'0"	Coarsely mottled, light grey and light brown, generally fine grain sand. Wet. Few coarse grit fragments.	15-16'	Open tube	30
			16-17'	"	27
			17-18'	"	30
180"	21'0"	Light greyish to light greyish brown generally fine to medium grain sand. Wet. Scattered grit fragments.	18-19'	"	27
			19-20'	"	25
			20-21'	"	32
21'0"	25'6"	Light brownish generally fine to medium grain sand, with scattered coarser rounded milky quartz grains. Wet.	21-22'	"	50?
			22-23'	"	?
			23-25'	Slush	-
25'6"	37'0"	Light greyish brown generally fine grain sand. Wet. Numerous coarse to very coarse rounded milky quartz grit fragments.	25-37'	"	-
37'0"	45'0"	Greyish to greyish brown, generally fine grain sand. Wet. Numerous coarse rounded milky quartz grains. Bluish grey and clayey in pockets.	37-45'	"	-
45'0"	59'0"	Greyish to greyish brown fine to medium grain sand. Wet. Abundant coarse milky quartz grit fragments.	45-59'	"	-
59'0"	67'0"	Light greyish coarse gritty sand. Some finer interstitial sand fraction and numerous very coarse rounded quartz grit fragments.	59-67'	"	-
67'0"	75'0"	Light greyish to light greyish brown coarse gritty sand. Wet. Some finer interstitial fraction, but also very abundant coarse rounded to subangular milky quartz grit fragments.	67-75'	"	-
75'0"	93'0"	Light greyish medium to fairly coarse grain sand. Wet. Some finer interstitial fraction and scattered coarser sand and grit fragments.	75-93'	"	-
93'0"	104'0"	Greyish to greyish brown, generally fine grain sand. Wet and somewhat clayey in part. Few small mica flecks etc., scattered and grit fragments.	93-104'	"	-
104'0"	128'0"	Greyish to grey-brown fine grain sand. Somewhat clayey in part. Few mica flecks etc.	104-128'	"	-
128'0"	133'0"	Light greyish and light greyish brown generally fine grain sand. Few coarser gritty fragments and mica flecks.	128-133'	"	-
133'0"	140'0"	Bluish grey firm and very moist silty clay, occurring in discrete pockets with grey to light grey-brown generally fine grain sand. Fairly soft and very moist. Small mica flecks etc.	133-142'	Open tube	?

"D" 5200'

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
140'0"	150'0"	Pale greyish brown generally fine grain sand, but with odd coarser grit fragments etc.	142-150'	Slush	-

END OF BORE 150'
WATER CUT 11' ?
STATIC LEVEL 8'2"
SUPPLY 360 + g.p.h.
ANALYSIS 2818 ATS
BLANKET THICKNESS 9'6"

"D" 9600'
P.D. 22
Serial No. 791/60
D.M. 765/60

PERCUSSION DRILL LOG "D" 9600'

PROJECT: CHOWILLA DAM SITE; RIVER MURRAY, COUNTY HAMLEY.
LOCATION: AXIAL LINE OF DAM; LINE "D"
HORIZONTAL DISTANCE FROM DATUM; 9,600'
PURPOSE: TEST OF SUBSURFACE FOUNDATION CONDITIONS.
PRELIMINARY GEOLOGICAL HOLE.
PLANT: 23 DRILLER: W. HENDERSON
R.L. SURFACE AT COLLAR: 174.35' DEPTH: 150'
DATE COMMENCED: 23.6.1960 DATE COMPLETED: 28.6.1960
BORE LOGGED: R.D. STEEL DATE: 14.7.1960

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
0'0"	1'6"	Light grey and light grey-brown fine sandy clay, becoming fine clayey sand in pockets. Very compact, slightly friable. Few grit fragments, plant remains etc.	0-1'	Open tube	15
			1-2'	"	17
1'6"	2'6"	Greenish grey silty clay, with vague yellowish mottling. Stiff and moist. Few grit fragments, limy pockets and wood fragments.	2'-3'	"	17
2'6"	3'4"	Greenish grey, light yellow-grey, brown and yellowish mottled silty clay. Very stiff, slightly moist. Few grit fragments, plant remains etc.	3-4'	"	15
3'4"	4'8"	Greenish grey, brown and yellowish brown mottled, very silty clay. Very stiff, slightly moist. Few grit fragments and organic pockets.	4-5'	"	15
4'8"	6'6"	Greenish grey silty clay, with vague brown and yellow-brown mottling. Moist and very stiff. Some dark-grey ferruginous mottling, few grit fragments and ironstone nodules.	5-6'	"	17
			6-7'	"	10
6'6"	8'0"	Greenish grey very silty clay, with prominent yellow-brown mottling. Stiff and moist. Few grit fragments, organic pockets etc.	7-8'	"	19
8'0"	10'6"	Light bluish grey to light yellow-grey clayey silt, with light and dark yellow-brown mottling. Very firm, moist. Numerous small mica flecks and some dark organic matter. Occasional small ironstone nodules.	8-9'	"	23
			9-10'	"	30
			10-11'	"	30
10'6"	13'2"	Pale grey to pale yellow-grey, slightly clayey to finely sandy silt, with some yellow-brown and light yellow-brown mottling. Very firm, moist. Few small grit fragments and organic pockets.	11-12'	"	48?
			12'-13'	"	26
13'2"	14'0"	Light brown to greyish brown and yellow-brown mottled finely sandy silt. Firm and moist. Numerous mica flecks, and some organic pockets.	13-14'	"	50?
14'0"	15'6"	Light grey to brown and yellow-brown mottled, finely sandy silt. Bluish grey and clayey in pockets. Few grit fragments etc.	14-15'	"	73?

PERCUSSION DRILL LOG "D" 9600'

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
15'6"	17'10"	Light grey, light and dark yellow-brown mottled, fine silty sand. Wet. Numerous mica flecks etc.	15-16' 16-17'	Open tube	- -
17'10"	28'0"	Light brown, generally fine grain sand. Wet. Few coarser grit fragments.	17-28'	Slush	-
28'0"	35'0"	Light brown generally medium grain sand. Wet. Few coarser grit fragments.	28'-35'	"	-
35'0"	40'0"	Light brown medium to fairly coarse sand. Wet. Numerous coarser rounded milky quartz grit fragments.	35-40'	"	-
40'0"	46'0"	Light greyish to light greyish brown medium grain sand. Wet. Fairly numerous coarser grit fragments.	40-46'	"	-
46'0"	55'0"	Light grey generally fine to medium grain sand. Wet. Few coarser grit fragments.	46-55'	"	-
55'0"	59'0"	Light greyish medium grain sand. Wet Few coarser grit fragments.	55-59'	"	-
59'0"	61'0"	Greyish to bluish grey firm and moist silty clay, possibly containing pockets of light grey sand.	59-61'	"	-
61'0"	81'0"	Pale grey generally medium to fairly coarse grain sand. Wet. Fairly numerous coarse to very coarse rounded milky quartz grit fragments.	61-81'	"	-
81'0"	91'0"	Pale greyish fine to medium grain sand. Wet. Fairly numerous coarser grit fragments.	91-100'	"	-
91'0"	100'	Pale grey generally medium grain sand. Wet. Fairly numerous coarse to very coarse rounded grit fragments.			
100'	120'	Light greyish brown generally fine grain sand. Wet. Few small grit fragments, mica flecks etc.	100-120'	"	-
120'	131'	Light greyish to light greyish brown generally fine to medium grain sand. Wet. Scattered grit fragments and mica flecks.	120-131'	"	-
131	145	Mid-grey silty clay, with discrete pockets of brownish generally fine grain sand.	131-145'	"	-
145'	150'	Light brownish grey generally fine grain sand. Wet. Few small grit fragments.	145-150'	"	-

END OF HOLE 150' SUPPLY -
WATER CUT 18'0" ANALYSIS -
WATER LEVEL 11'0" BLANKET THICKNESS 15'6"

"D" 13,212'
P.D. 81
Serial No. 697/61
D.M. 765/60

PERCUSSION DRILL LOG "D" 13,212'

PROJECT: Chowilla Dam Site, River Murray
LOCATION: Dam Site Axis; Line "D"
in River, Horizontal distance from datum; 13,212'
PURPOSE: Test of subsurface foundation conditions
preliminary Geological hole.
PLANT NO.: 20 DRILLER: F. Farrow
R.L. SURFACE AT COLLAR: 151.12 DEPTH: 200'
DATE COMMENCED: 15.9.1960 DATE COMPLETED: 22.9.1960
BORE LOGGED: R.D. Steel DATE: 4.10.1960

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
0'	8'	Light brown fine to medium grain sand, with scattered mica flecks and fairly numerous coarser grit fragments.	0- 8'	Slush	-
8'	14'	Light brownish fine to medium grain sand, with scattered grit fragments and mica flecks. Some darker yellow-brown mottling.	8-14'	"	-
14'	16'	Light greyish brown generally fine grain sand, with scattered coarser grit fragments and few mica flecks.	14-16'	"	-
16'	20'	Light brown to light greyish brown fine to medium grain sand, with vague yellowish mottling. Scattered grit fragments.	16-20'	"	-
20'	22'	Light greyish brown fine to medium sand, with fairly abundant coarse grit fragments and mica flecks.	20-22'	"	-
22'	32'	Pale greyish fine to medium grain sand, with abundant coarse to very coarse grit fragments. Scattered mica flecks etc.	22-32'	"	-
32'	36'	Light greyish to pale greyish brown generally fine grain sand. Very abundant coarse to very coarse grit fragments.	32-36'	"	-
36'	40'	Light greyish to light greyish brown and vague yellow-brown mottled, fine grain sand, with abundant coarse to very coarse rounded milky quartz grit fragments.	36-40'	"	-
40'	54'	Pale brownish and pale greyish brown generally medium to somewhat coarser grain sand. Some finer interstitial sand fraction and numerous coarse grit fragments.	40-54'	"	-
54'	66'	Greyish to greyish brown generally medium grain sand, but with abundant coarse to very coarse milky quartz grit fragments.	54-66'	"	-

"D" 13,212'

Depth From	Depth To	Description	Depth	Type of Sample	Blow p/ft
66'	72'	Light brownish medium grain sand, with abundant coarse to very coarse grit fragments.	66-72'	Slush	-
72'	76'	Pale brownish generally fine to medium grain sand, with numerous coarse grit fragments.	72-76'	Slush	-
76'	80'	Light greyish to light brownish grey, generally medium grain sand but with numerous coarse grit fragments.	76-80'	"	-
80'	88'	Generally light greyish fine to medium grain sand, but with scattered coarser grit fragments.	80-88'	"	-
88'	92'	Generally light greyish fairly fine grain sand, with scattered grit fragments and mica flecks. Bluish grey and clayey in small pockets.	88-92'	"	-
92'	102'	Pale brownish grey generally fairly fine grain sand, with scattered small grit fragments and mica flecks Maybe slightly clayey in part.	92-102'	"	-
102'	106'	Greyish brown fine grain sand, slightly clayey, with pockets of bluish grey silty clay.	102-106'	"	-
106'	116'	Light greyish brown to light greyish generally fairly fine sand. Bluish grey and clayey in part.	106-116'	"	-
116'	120'	Greyish brown generally fine grain sand, in discrete pockets with bluish grey stiff, moist silty clay.	116-120'	"	-
120'	128'	Greyish brown to dark grey-brown slightly clayey sand, in discrete pockets with dark grey to bluish grey firm and moist silty to finely sandy clay, Scattered grit fragments, mica flecks etc.	120-128'	Open Tube	-
128'	132'	Greyish brown fine clayey sand, with discrete small pockets of bluish grey silty clay. Scattered mica flecks. etc.	128-132'	"	-
132'	148'	Bluish grey to mid-grey silty clay, with pockets of brownish to dark grey-brown clayey fine sand.	132-148'	"	-
148'	151'	Mid-grey to brownish grey clayey sand. Stiff and moist. Becoming bluish grey silty to sandy clay in discrete pockets. Few whitish fossil fragments.	148-151'	"	-
151'	153'	Dark greyish to dark greenish grey fine clayey sand, becoming very clayey sand in pockets. Stiff and moist. Fairly numerous macro fossil fragments.	151-153'	"	-

"D" 13,212'

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
153'	157'	Dark grey to dark brownish grey clayey fine sand, becoming bluish grey silty clay in irregular discrete pockets. Scattered whitish fossil fragments.	153-157'	Open Tube	-
157'	161'	Mid-grey to bluish grey stiff and moist silty clay, becoming finely sandy in part. Some dark grey iron sulphide accumulations, occasional mica flecks and macro fossil fragments.	157-161'	"	-
161'	163'	Mid-grey stiff and moist silty clay, with some lighter grey mottling. Possibly becoming finely sandy in small pockets, with fine iron-sulphide particles.	161-163'	"	-
163'	167'	Mid-grey stiff and moist silty clay to clayey silt. Very abundant micro and macro fossil fragments.	163-167'	"	-
167'	171'	Mid-grey to dark greenish grey, fairly stiff and moist but somewhat friable, clayey silt. Very abundant micro and macro fossil fragments.	167-171'	"	-
171'	173'	Mid-grey to brownish grey and lighter greyish very firm, moist and somewhat friable clayey silt, Becoming finely sandy in part, with very abundant micro and macro fossil fragments.	171-173'	"	-
173'	177'	Mid-grey very firm, moist clayey silt, becoming grey-brown and finely sandy in discrete pockets. Fairly abundant small grit fragments, micro and macro fossil fragments.	173-177'	"	-
177'	178'	Light greyish to light brownish grey and greenish grey mottled slightly clayey to finely sandy silt, with scattered grit fragments. Fairly numerous micro and macro fossil fragments. Firm and moist.	177-178'	"	-
178'	182'	Greyish to light brownish grey slightly clayey to finely sandy silt. Firm but fairly friable. Bluish grey and somewhat more clayey in small pockets. Scattered micro and macro fossil fragments.	178'-182'	"	-
182'	192'	Light greyish to light greenish grey and light brownish grey slightly clayey, fine sandy silt. Firm but fairly friable. Bluish grey and slightly clayey in part. Micro and macro fossil fragments irregularly abundant.	182-192'	"	-

"D" 13,212'

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
192'	196'	Light brown, light greyish brown fine sandy silt, with pockets of bluish grey clayey silt. Firm and fairly friable. Scattered small grit fragments.	192-196'	Open Tube	-
196'	200'	Light grey to light brownish grey fine sandy silt, with micro and macro fossil fragments. Irregularly abundant. Fairly friable.	196-200'	"	-

END OF HOLE 200'

PERCUSSION DRILL LOG "D" 16,327'

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
95'	130'	Greyish brown clayey sand, with pockets of bluish grey sandy clay, possibly occurring in discrete pockets. Fairly soft and wet. Few grit fragments and mica flecks.	95-130'	Slush	-
130'	135'	Bluish grey to greenish grey fine sandy clay, with pockets of greyish brown fine sand. Fairly soft and wet. Few coarse irregular lumps of marcasite.	130-135'	"	-
135'	150'	Bluish grey sandy clay, probably with pockets of grey-brown fine grain sand.	135'-150'	"	-

END OF HOLE 150'
WATER CUT 7'
STATIC LEVEL 2'6"
ANALYSIS 1200+ ATS.
BLANKET THICKNESS MINIMUM 7'0".

"D" 16,327'
P.D. 20
Serial No. 511/61
D.M. 765/60

PERCUSSION DRILL LOG "D" 16,327

PROJECT: Chowilla Dam Site, River Murray. Hd. Murtho
LOCATION: Dam Site Axis; Line "D",
Horizontal Distance from Datum; 16,327'.
PURPOSE: Test of subsurface foundation conditions.
Preliminary geological hole.
PLANT: 39 DRILLER: J. Doecke
R.L. SURFACE AT COLLAR: 170.48' DEPTH: 150'
DATE COMMENCED: 28.6.1960 DATE COMPLETED: 4.7.1960
BORE LOGGED: R.D. Steel DATE: 6.7.1960

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
0'	1'	Mid-grey to grey-brown fine silty clay, becoming finely sandy in pockets. Stiff and moist. Few grit fragments and plant remnants.	0-1'	Open Tube	7
1'	2'6"	Mid-grey silty clay, with vague light yellowish mottling. Very firm and moist.	1'-2'	"	7
2'6"	3'4"	Grey to bluish grey very silty clay, with some light and dark yellow-brown mottling. Very firm and moist. Few small organic pockets etc.	2'-3'	"	6
3'4"	6'	Light grey-brown, blue-grey and yellowish grey clayey silt, with darker yellow-brown mottling. Moist and very firm. Few small grit fragments and organic pockets.	3-4' 4-5' 5-6'	" " "	8 9 9
6'	7'	Light bluish grey, light yellow-brown and light grey-brown fine sandy silt, with some dark yellow-brown mottling. Firm and compact, becoming friable.	6-7'	"	10
7'	19'	Light grey to brownish grey, very silty to finely sandy clay. Soft and very moist. Few grit fragments and organic pockets.	7-19'	Slush	-
19'	50'	Light grey-brown medium grain sand, with some coarser grit fragments. Wet.	19-50'	"	-
50'	65'	Light grey generally fine to medium grain sand. Wet. Abundant coarse rounded milky quartz grit fragments.	50-65'	"	-
65'	80'	Pale greyish brown, fine to medium grain sand. Wet. Abundant coarse rounded milky quartz grains.	65-80'	"	-
80'	95'	Light greyish, generally fine grain sand. Wet. Few coarse grit fragments.	80-95'	"	-

"D" 16,987
P.D. 16
Serial No. 794/60
D.M. 765/60

PERCUSSION DRILL LOG "D" 16,987

PROJECT: Chowilla Dam Site, River Murray. Hd. Murtho
LOCATION: Dam Site Axis; Line "D"
Horizontal Distance from Datum; 16,987'
PURPOSE: Test of Subsurface Foundation Conditions,
Preliminary Geological Hole.
PLANT: 38 DRILLER: J. Doecke
R.L. AT SURFACE COLLAR: 172.44 DEPTH: 100'
DATE COMMENCED: 20.6.1960 DATE COMPLETED: 24.6.1960
BORE LOGGED: R.D. Steel DATE: 22.6.1960

Depth From	Depth To	Description &	Depth	Type of Sample	Blows p/ft.
0'	1'	Greyish brown fine clayey sand. Very compact, dry and somewhat friable. Small plant remnants and scattered grit fragments.	0-1'	Open tube	13
1'	3'	Greenish grey to brownish grey silty to finely sandy clay. Very compact and slightly friable. Scattered small grit fragments, plant remains and small limy pockets. Becoming sandier in pockets.	1-2' 2-3'	" "	18 20
3'	4'9"	Light yellow-grey to light greenish grey slightly clayey silt to fine sand. Moist and very firm. Few grit fragments, mica flecks and small plant remnants.	3-4' 4-5'	" "	12 11
4'9"	7'	Light bluish grey to light greenish grey fine silty sand, with light to dark yellowish brown mottling. Firm becoming very moist and fairly friable. Few grit fragments, mica flecks etc.	5-6' 6-7'	" "	11 12
7'	20'	Light brown slightly clayey fine sand, with numerous grit fragments. Wet.	7-20'	Slush	-
20'	30'	Light brown medium grain sand, with some coarser grit fragments.	20'-30'	"	-
30'	35'	Light grey-brown fine to medium grain sand, with some coarse grit fragments.	30-35'	"	-
35'	40'	Light grey-brown medium to coarse grain sand, with numerous coarse grit fragments. Large lumps of rotten wood.	35-40'	"	-
40'	45'	Light grey-brown coarse grain sand, with numerous coarse grit fragments. Pockets of firm and very moist, bluish grey silty clay.	40-45'	"	-

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
45'	50'	Bluish grey silty clay. Soft and very moist.	45-50'	Slush	-
50'	55'	Light brown to light greyish brown generally fine grain sand. Wet.	50-55'	"	-
55'	60'	Light brown medium grain sand, with some interstitial finer fraction and coarse grit fragments.	55-60'	"	-
60'	80'	Light brownish generally fine grain s and. Wet. Slightly yellowish brown and light grey-brown mottling.	60'-80'	"	-
80'	90'	Greyish fine to medium grain sand. Wet. Scattered coarse grit fragments and minute mica flecks. Slight yellow-brown mottling near top.	80'-90'	"	-
90'	100'	Light greyish medium to coarse grain sand, with some finer interstitial fraction. Numerous coarse rounded milky quartz grit fragments.	90-100'	"	-

END OF HOLE 100'
WATER CUT 26'
STATIC LEVEL 12'?
ANALYSIS 1200+ ATS. Vol.122/1373
BLANKET THICKNESS. 7'0" MINIMUM.

"D" 17,307'
P.D. 52
Serial No. 672/61
D.M. 765/60

PERCUSSION DRILL LOG "D"17,307'

PROJECT: Chowilla Dam Site. River Murray. Hd. Murtho
LOCATION: Dam Site Axis; line "D"
Horizontal distance from Datum 17,307
PURPOSE: Test of subsurface foundation conditions.
Secondary geological hole.
PLANT: 39 DRILLER: J. Doecke
R.L. SURFACE AT COLLAR: 171.12 DEPTH: 50'
DATE COMMENCED: 26.8.1960 DATE COMPLETED: 26.8.1960
BORE LOGGED: R.D. Steel DATE: 22.9.1960

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
0'	1'2"	Mid-grey to bluish grey silty clay becoming finely sandy in pockets. Scattered grit fragments and mica flecks. Firm and moist.	0-1'	Open Tube	7
1'2"	2'2"	Bluish grey to greenish grey silty clay, with vague yellowish mott- ling. Firm and moist. Few grit fragments, mica flecks and plant remnants.	1-2'	"	7
2'2"	3'	Greyish to yellowish grey and bluish grey silty clay, with small grit fragments, mica flecks and selenite crystals. Firm and moist.	2-3'	"	9
3'	4'	[illegible]ish to light yellowish grey [illegible] silt, with some darker [illegible]-brown mottling. Firm and moist. Scattered grit fragments, mica flecks etc.	3-4'	"	8
4'	5'	Greyish to light grey clayey silt, with some small pockets of pale grey fine sandy silt. Yellowish mottling in part. Few grit fragments and dark charcoal pockets. Firm and moist.	4-5'	"	7
5'	5'11'	Greyish to light yellow-grey and yellow-brown mottled clayey silt. Few grit fragments, mica flecks and charcoal pockets. Firm and moist.	5-6'	"	8
			6-7'	"	7
5'11"	8'	Greenish grey, light and dark yellow-brown mottled, slightly clayey to finely sandy silt. Slightly micaceous. Fairly firm and moist. Few charcoal pockets. Slightly gypseous in part.	7-8'	"	7
8'	9'	Greyish to slight greenish grey and light yellow-brown mottled very silty clay to clayey silt. Very firm to stiff, and moist. Some dark brown and dark grey mottling. Slightly micaceous.	8-9'	"	6

PERCUSSION DRILL LOG. "D" 17,307

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
9'	19'	Light greyish to light yellowish grey clayey silt to silty clay, probably with small patches of yellow-brown mottling. Slightly micaceous, scattered grit fragments, and some bluish grey pockets. Soft and wet.	9-19'	Slush	-
19'	25'	Light greyish brown generally fine to medium sand, with some slight yellow-brown mottling. Scattered mica flecks and irregularly fairly abundant coarse grit fragments. Wet.	19-25'	"	-
25'	29'	Light to pale greyish brown generally fine to medium grain sand, but with fairly numerous coarse rounded to subangular grit fragments.	25-29'	"	-
29'	31'	Light greyish brown generally medium grain sand, but with scattered coarse grit fragments, mica flecks etc.	29-31'	"	-
31'	35'	Pale greyish brown generally fine to medium sand, but with fairly numerous coarse grit fragments etc.	31-35'	"	-
35'	39'	Pale brownish to pale yellow-brown generally fine sand, but with fairly scattered mica flecks and coarser grit fragments.	35-39'	"	-
39'	50'	Light to pale greyish brown or yellow-brown fine to medium grain sand, but with irregularly abundant coarse grit fragments.	39-50'	"	-

END OF HOLE 50'
WATER CUT 7'
WATER LEVEL 6'
ANALYSIS Prob. 1200+ ATS
BLANKET THICKNESS 9'0"+

("D" 17,627'
P.D. 56
Serial No. 724/61
D.M. 765/60

PERCUSSION DRILL LOG "D" 17,627'

PROJECT: Chowilla Dam Site, River Murray Hd. Murtho

LOCATION: Dam Site Axis: Line "D"
Horizontal distance from Datum: 17,627'.

PURPOSE: Pump Hole for field tracer test.

R.L. SURFACE: 173.35' **DEPTH:** 50'

PLANT: 23 **DRILLER:** A. Graham

DATE COMMENCED: 29.9.1960 **DATE COMPLETED:** 30.9.1960.

BORE LOGGED BY: R.D. Steel **DATE:** 16.10.1960

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
0'	1'	Bluish grey silty to sandy clay, with some brown and grey-brown mottling. Few grit fragments, plant remnants etc. Compact and stiff.	0-1'	Open tube	24
1'	2'6"	Bluish grey silty clay, with some brownish mottling. Very stiff. Few grit fragments, plant remnants etc.	1-2' 2-3'	" "	10 9
2'6"	4'4"	Mid-grey to greyish brown silty clay, with some greenish brown mottling. Stiff. Few grit fragments, plant remnants, gypsum pockets.	3-4' 4-5'	" "	9 10
4'4"	5'6"	Light greyish to light greyish brown and yellowish brown very silty clay. Very stiff. Few grit fragments, organic pockets.	5-6'	"	7
5'6"	7'2"	Light yellow-grey to yellowish and light grey clayey silt. Very compact. Scattered mica flecks and small iron-oxide pockets.	6-7'	"	12
7'2"	8'4"	Light grey-light grey-brown and light yellowish brown slightly clayey and finely sandy silt. Some greenish mottling. Numerous mica flecks, grit fragments and small organic pockets.	7-8'	"	12
8'4"	9'	Mid-grey silty clay, with vague yellowish mottling. Very stiff and with hard calcareous nodules. Few grit fragments, organic pockets etc.	8-9'	"	12
9'	11'	Light greyish, light yellow- grey and yellowish fine sandy silt, slightly clayey in part. Vague green and dark brown mottling. Numerous mica flecks etc. Few hard calcareous nodules.	9-10' 10-11'	" "	12 14
11'	15'	Greyish brown to bluish grey silty clay, becoming finely sandy in part. Stiff. Numerous mica flecks, pockets iron-oxide and some hard calcareous nodules. Irregular pockets of dark blue-grey silty clay.	11-12' 12-13' 13-14' 14-15'	" " " "	14 14 14 14

PERCUSSION DRILL LOG "D" 17,627' Cont.

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
15'	35'	Light greyish to light greyish brown fine to medium grained sand, with scattered coarse grit fragments, mica flecks etc.	15-35'	Slush	-
35'	50'	Pale brown fine to medium sand, with numerous coarse grit fragments, and small mica flecks etc.	35-50'	"	-

END OF HOLE: 50'
WATER CUT: 11'
STATIC WATER LEVEL
BLANKET THICKNESS: 15'

"D" 17,727
P.D. 55
Serial No. 728/61
D.M. 765/60

PERCUSSION DRILL LOG "D" 17,727

PROJECT: Chowilla Dam Site, River Murray, Hd. Murtho
LOCATION: Axial Line of Dam: Line "D"
Horizontal Distance From Datum: 17,727'
PURPOSE: Observation Hole for Water Velocity Test Using Tracer Elements.

PLANT: 40 DRILLER: N. Lock
R.L. SURFACE AT COLLAR: 177.00 DEPTH: 48'
DATE COMMENCED: 26.9.1960 DATE COMPLETED: 28.9.1960
BORE LOGGED: R.D. Steel DATE: 5.10.1960

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
0'	1'	Light brown medium to coarse sand, with some finer clay binding. Fairly numerous rounded grit fragments.	0-1'	Open tube	Not recorded.
1'	2'6"	Mid-grey to bluish grey silty clay. Very stiff and compact. Few grit fragments, and plant remains. Faint yellowish mottling in part.	1-2'	"	"
2'6"	2'10"	Mid-grey to bluish grey silty clay, becoming light grey-brown in patches. Few small whitish lime pockets, grit fragments, plant remnants and iron oxide lumps.	2-3'	"	"
2'10"	3'6"	Light greyish to light yellowish grey clayey silt, with some darker yellow mottling. Compact, stiff and somewhat friable, with few grit fragments.	3-4'	"	"
3'6"	5'2"	Greyish to light brownish grey silty clay with vague yellowish mottling. Few small grit fragments and charcoal pockets. Slightly sandy in part, with few hard lime nodules.	4-5'	"	"
5'2"	6'6"	Light greyish to light yellowish brown, generally medium to coarse grain, but very clayey sand. Compact, but fairly friable.	5-6'	"	"
6'6"	7'3"	Light grey to light grey-brown and pale grey-brown clayey sand, with lesser brownish and salmon pink mottling. Stiff and compact.	6-7'	"	"
7'3"	8'2"	Finely mottled, light brown, red-brown and yellow-brown very silty clay, with pockets of bluish grey slightly silty clay. Few small grit fragments, organic pockets etc. Generally very stiff.	7-8'	"	"
8'2"	9'6"	Light greyish to light greyish brown clayey sand, with some brownish salmon pink and greenish mottling. Also containing pockets of bluish grey silty to sandy clay. Few small lime pockets and nodules, Stiff to very compact but slightly friable.	8-9'	"	"

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
9'6"	10'6"	Brick-red and light greyish mott-led silty clay, somewhat sandy in part. Stiff and moist. Scattered lime pockets, nodules and dark charcoal fragments.	9-10'	Open tube	Not recorded
10'6"	11'6"	Light grey to bluish grey and grey-ish brown very silty clay, becoming clayey fine silt in pockets. Some salmon pink mottling. Numerous small dark charcoal pockets.	10-11'	"	"
11'6"	13'4"	Light greyish to light bluish grey very silty clay, with prominent light and dark yellow-brown mottling. Few dark charcoal pockets etc.	11-12'	"	"
13'4"	15'6"	Bluish grey to light yellow-grey clayey silt, with some darker brown and light greenish mott-ling. Becoming finely sandy in pockets. Scattered grit fragments, mica flecks and organic blobs.	13-14' 14-15' 15-16'	" " "	" " "
15'6"	16'4"	Light bluish grey slightly clayey to finely sandy silt, with prominent yellow-brown and dark-brown mottling. Numerous amall grit fragments. Very firm, moist.	16-17'	"	"
16'4"	20'	Light bluish grey very silty clay to clayey silt, with yellow-brown dark-brown and slight greenish mottling. Numerous mica flecks and dark organic pockets. Very firm, moist.	17-18' 18-19' 19-20'	" " "	" " "
20'	21'	Light bluish grey clayey to finely sandy silt, with dark-brown, grey-brown and yellow-brown streaks. Numerous small mica flecks and occasional organic pockets. Firm and very moist.	20-21'	"	"
21'	22'	Bluish grey very silty clay, be-coming clayey silt in part, with prominent brown and dark yellow-brown mottling. Numerous mica flecks and occasional charcoal pockets. Firm and moist.	21-22'	"	"
22'	22'9"	Bluish grey, greenish brown, yellow-brown and dark brown slightly clayey to finely sandy silt. Numerous mica flecks etc. Firm and fairly friable.			
22'9"	23'	Light greyish fine silty sand, slightly micaceous, with pockets of grey to bluish grey very sandy clay, and few small organic pockets.	22-23'	"	"

"D" 17,727

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
23'	24'	Light bluish grey and lightgrey slightly clayey, sandy silt to fine sand, with prominent brown, yellow-brown and greenish mottling. Firm and fairly friable. Slightly micaceous and with few grit fragments.	23-24'	Open Tube	Not recorded
24'	43'	Pale brown to pale yellow-brown generally medium grain sand. Scattered grit fragments and mica flecks.	24-43'	"	"
43'	45'	Light greenish grey medium grain sand, with numerous coarse to very coarse grit fragments and scattered mica flecks.	43-45'	Slush	-
45'	50'	Orange-brown medium grain sand, with fairly abundant coarse to very coarse milky quartz grit fragments.	45-50'	"	-

END OF HOLE 50'
WATER CUT 7'
WATER LEVEL 6'5"
ANALYSIS -
BLANKET THICKNESS

"D" 17,787'
P.D. 12
Serial No. 785/60
D.M. 765/60

PERCUSSION DRILL LOG "D" 17,787'

PROJECT: Chowilla Dam Site, River Murray; Hd. Murtho
LOCATION: Dam Site axis; Line "D"
Horizontal distance from Datum 17,787'
PURPOSE: Test of subsurface Foundation conditions
Preliminary Geological hole.
PLANT: 38 DRILLER: J. Doecke
R.L. SURFACE AT COLLAR: 178.30 DEPTH: 100'
DATE COMMENCED: 15.6.1960 DATE COMPLETED: 20.6.1960
BORE LOGGED: R.D. Steel DATE: 23.6.1960

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
0'	1'	Light brownish medium-grained sand. Unconsolidated. Some grey-brown mottling.	0-1'	Open Tube	13
1'	2'	Light grey-brown medium grain rounded sand. Compact, dry and friable.	1-2'	"	11
2'	6'	Light grey, generally medium grain sand, with institial clay fraction. Compact, dry and fairly friable. Slightly limy in part.	2-3' 3-4' 4-5' 5-6'	" " " "	52 47 38 23
6'	7'	Off-white fine grain sand, with interstitial fine silt. Compact but fairly friable.	6-7'	"	22
7'	8'	Light grey to grey-brown compact clayey sand.	7-8'	"	24
8'	10'	Light green-grey to light yellow-grey clayey sand, with some light to dark yellow-brown mottling. Very compact to stiff and slightly friable.	8-9' 9-10'	" "	20 20
10'	11'	Light yellow-grey and yellow-brown clayey sand, with some yellow and light bluish mottling. Compact, moist and somewhat friable.	10-11'	"	22
11'	13'	Light yellow-brown, light bluish grey and orange-brown mottled clayey sand. Compact, moist, becoming friable.	11-12' 12-13'	" "	20 19
13'	18'	Light bluish grey and yellow-brown mottled sandy clay. Firm and moist. Pockets of fine grain sand.	13-18'	Slush	-
18'	23'	Bluish grey and light yellow-brown mottled fine sandy clay. Firm to soft and very moist.	18-23'	"	-
23'	25'	Light blue-grey clayey fine sand with greenish and dark yellow-brown mottling. Firm and moist. Small pockets of dark grey organic matter.	23-24' 24-25'	Open Tube	25 18

PERCUSSION DRILL LOG "D" 17,787'

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
25'	26'	Greyish fine grain sand. Compact, moist and unconsolidated.	25-26'	Open tube.	17
26'	32'	Light grey medium grain sand. Wet. Slightly clayey in part.	26-27' 27-32'	" Slush	17 -
32'	37'	Light brown generally medium grain sand, slightly clayey in part. Wet.	32-37'	"	-
37'	65'	Brick red, fine to medium grain sand, with scattered milky quartz grit fragments.	37-65'	"	-
65'	75'	Light grey to light yellowish brown generally fine grain sand, with scattered grit fragments.	65-75'	"	-
75'	100'	Greyish to brownish grey fine grain sand. Somewhat clayey in part, with scattered coarse rounded milky quartz grains.	75-100'	"	-

END OF HOLE 100'
WATER CUT 27'
STATIC WATER LEVEL 12'
SUPPLY 420+ gph.
ANALYSIS 622 ATS
BLANKET THICKNESS - Clay 18' - 25'

"D" 18,187'
P.D. 1
Serial No. 744/60
D.M. 765/60

PERCUSSION DRILL LOG "D" 18,187'

PROJECT: Chowilla Dam Site, Murray River Hd. Murtho
LOCATION: Dam Site Axis; Line "D" -
Horizontal distance from Datum 18,187'
PURPOSE: Test of Subsurface Foundation Conditions.
Stratigraphic Exploration Hole, East Bank. Establish geological column.

PLANT: 38 DRILLER: J. Doecke
R.L. SURFACE COLLAR: 262.79' DEPTH OF BORE: 300'
DATE COMMENCED: 12.5.1960 DATE COMPLETED: 14.6.1960
LOGGED BY: R.D. Steel DATE: 8.6.1960

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
0'	5'	Reddish brown fine grained sand. Moist and unconsolidated.	0-5'	Open Tube	Unreliable.
5'	9'	Brown to dark reddish brown fine grained sand. Moist and unconsolidated.	5-9'	"	"
9'	10'	Brown to reddish brown, fine clayey sand. Compact and somewhat friable.	9-10'	"	"
10'	18'	Light brown to light reddish brown, fine sand. Unconsolidated.	10-18'	"	"
18'	22'	Brown to reddish brown, clayey fine sand. Very compact, but somewhat friable. Numerous coarser grit fragments.	18-22'	"	"
(22')	24'	Reddish brown and yellowish brown mottled, clayey sand. Friable, but semi-cemented in part to form harder layers. Numerous coarse grit fragments.	22-24'	"	"
24'	30'	Light reddish brown clayey sand. Abundant coarser grit fragments.	24-30'	"	"
30'	31'	Pale brown to pale reddish brown and light grey mottled, slightly clayey sand. Cemented in part to hard lumps.	30-31'	"	"
31'	50'	Pale greyish brown, clayey sand. Compact. Numerous coarser grit grains.	31-50'	"	"
50'	52'9"	Pale greyish brown sand. Moist, and very compact; Numerous coarse grit fragments.	50-52'9"	"	"
52'9"	56'	Light brown to light yellowish brown; slightly clayey sand. Very compact and semi-cemented in part to harder lumps.	52'9-56'	"	"
56'	59'	Offwhite and yellow-brown mottled compact and somewhat friable sand. Numerous coarser grit fragments.	56-59'	"	"

PERCUSSION DRILL LOG "D" 18,187'

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
59'	62'4"	Brown to yellowish brown, slightly clayey sand. Very compact and somewhat friable.	59-62'4"	Open Tube	Unreliable
62'4"	65'	Reddish to light reddish brown and salmon pink mottled, slightly clayey sand. Compact.	62'4-65'	"	"
65'	67'	Light brown to reddish brown and lesser offwhite mottled, slightly clayey, medium grain sand. Compact.	65-67'	"	"
67'	69'	Light grey-brown and pale grey mottled, fine grained sand. Compact, but fairly friable.	67-69'	"	"
69'	71'	Light grey-brown to salmon pink and yellowish brown mottled, slightly clayey sand. Compact and moist.	69-71'	"	"
71'	74'	Offwhite and salmon pink mottled, slightly clayey sand. Compact but fairly friable.	71-74'	"	"
74'	77'	Pale grey-brown and offwhite, fine grained sand, with bands of coarser brown to yellow-brown sand. Compact and slightly friable.	74-77'	"	"
77'	80'	Offwhite to greyish-fine grained sand. Very compact and fairly friable. Small pockets of coarser brown to yellow-brown sand.	77-80'	"	"
80'	93'	Coarsely mottled, yellow-brown, salmon pink and light grey, medium to coarse grained sand. Possibly well compacted, but fairly friable.	80-93'	"	"
93'	98'	Coarsely mottled, yellowish brown salmon pink and light yellow-grey, medium to coarse grained sand. Becoming very silty, compact to semi-comented in irregular bands.	93-98'	"	"
98'	102'	Light reddish brown, generally coarser grained sand, becoming somewhat silty in part.	98-102'	Sludge	-
102'	107'	Light yellow-brown, generally coarse grained sand, with interstitial fine silty fraction.	102-107'	"	-
107'	108'	Yellowish brown, generally coarse angular sand, with abundant iron cemented concretionary nodules.	107-108'	"	-
108'	110'	Yellowish brown, medium to coarse grained sand, with finer interstitial silty fraction.	108-110'	"	-
110'	111'	Light brown, medium to coarse grained sand, with patches of red ochreous pigmentation.	110-111'	"	-

PERCUSSION DRILL LOG "D" 18,187'

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
111'	115'	Mainly light reddish brown, fine to medium grained sand.	111-115'	Sludge	-
115'	144'	Brick-red, fine to medium grained sand, with numerous coarser grit grains.	115-144'	"	-
144'	145'	Brick-red ferruginous silt, with few coarser gritty fragments.	144-145'	"	-
145'	160'	Light yellowish brown, medium grained sand, with abundant coarser gritty fragments.	145-160'	"	-
(160')	185'	Light grey, generally fine grained sand.	160-185'	"	-
185'	200'	Mid-grey, very silty to sandy clay, with pockets of light grey sand.	185-200'	"	-
200'	213'	Light grey, generally fine grained sand, becoming darker grey in part.	200-213'	"	-
(213)	229'	Mid-grey very silty clay, with small pockets of lighter grey sand. Generally soft to firm and very moist.	213-220'	"	-
			220-229'	Open tube	Unreliable
229'	232'6"	Mid-grey clayey sand. Soft and very moist.	229-232'	"	"
232'6	239'	Mid-grey to light brownish grey mottled clayey sand, with pockets of darker grey sandy clay. (Fossiliferous?). Moist and very firm. Occasional pyrite or marcasite nodules.	232-239'	"	"
239'	250'	Mid-grey very sandy clay, with small pockets of lighter brownish grey fine sand. Moist and very firm.	239-242'	"	-
			242-250'	Sludge	-
250'	265'	Bluish grey to greenish grey, finely sandy clay, with vague greenish grey mottling. Occasional coarse gritty fragments and possibly containing micro fossil fragments.	250-265'	"	-
(265')	300'	Greenish grey, (possibly glauconitic) fine silty clay with abundant micro and macro fossil fragments to 290'. Occasional dark grey-green coloured grit grains.	265-300'	"	-

END OF HOLE: 300'
WATER CUT: 226'
STATIC WATER LEVEL -
ANALYSIS: 1200+ ATS

"D" 18,987
P.D. 86
Serial No. 730/61
D.M. 765/6[illegible]

PERCUSSION DRILL LOG "D" 18,987

PROJECT: Chowilla Dam Site, River Murray, Hd. Murtho
LOCATION: Dam Site Axis; line "D"
Horizontal distance from datum: 18,987'
PURPOSE: Test of subsurface foundation conditions
Preliminary Geological Hole.
PLANT: 40 DRILLER: N. Lock
R.L. SURFACE AT COLLAR: 255.74 DEPTH: 211
DATE COMMENCED: 29.9.1960 DATE COMPLETED: 4.10.1960
BORE LOGGED: R.D. Steel DATE: 5.10.1960

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
0'	1'	Light reddish brown fine sandy loam. Friable. Scattered grit fragments, and small lime pockets.	0-1'	Open tube	Not recorded.
1'	2'6"	Light brown to light reddish brown fine clayey sand. Very compact and slightly friable. Numerous small white lime pockets and scattered grit fragments.	1-2'	"	"
2'6"	3'0"	Brick-red to orange-brown clayey fine sand. Very compact and slightly friable. Scattered grit fragments and lime pockets.	2-3'	"	"
3'	6'	Brick-red to red-brown clayey fine sand. Very compact and slightly friable. Pockets of lime and calcite crystals. Scattered grit fragments and some dark grey dendritic staining.	3-4' 4-5' 5-6' 6-7'	" " " "	" " " "
6'	8'	Reddish to reddish brown and light reddish very compact and slightly friable, slightly clayey sand. Scattered grit fragments and small limy pockets.	7-8'	"	"
8'	14'	Brick-red to reddish brown clayey fine sand. Very compact and slightly friable, with scattered grit fragments.	8-9' 9-10' 10-11'	" " "	" " "
11'	14'	Light reddish brown to red and orange-brown mottled slightly clayey fine sand. Very compact, becoming fairly friable. Fairly numerous coarse grit fragments.	11-12' 12-13' 13-14'	" " "	" " "
14'	22'	Orange-brown clayey fine sand, with some reddish and yellowish mottling. Very compact, fairly friable, with numerous small grit fragments.	14-15' 15-16' 16-17' 17-18'	" " " "	" " " "
22'	30'	Light reddish, somewhat clayey medium grain sand, with scattered coarse grit fragments.	18-19' 19-20' 20-30	" " Slush	" " -
30'	50'	Light reddish medium grain sand, with slight clay binding. Scattered coarser grit fragments.	30-50	"	-

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
50'	60'	Light reddish to orange-brown medium to slightly coarse grain sand, with some fine clay binding. Slight greyish mottling. Numerous coarser grit fragments.	50-60'	Slush	-
			60-70'	"	-
60'	70'	Buff coloured medium grain sand, with some clay binding. Faint reddish and yellowish mottling.	70-72'	"	-
70'	72'	Pale brownish to buff coloured, medium to slightly coarser grain sand, with some fine clay binding.			
72'	80'	Pale greyish to pale greyish brown fairly coarse grain sand, with some fine clay binding.	72-80'	"	-
80'	90'	Pale greyish coarse grain rounded sand, with abundant coarse rounded milky quartz grit fragments.	80-90'	"	-
90'	100'	Light reddish coarse grain sand, i.e. offwhite coarse sand with finer interstitial reddish fraction. Numerous coarse to very coarse rounded milky quartz grit fragments and occasional rounded gravels.	90-100'	"	-
100'	115'	Core missing	100-115'	"	-
115'	118'	Light yellowish brown generally fine to medium grain sand, but with fairly numerous coarser grit fragments.	115-118'	"	-
118'	120'	Light brownish to light reddish brown generally fairly fine to medium grain sand, but with scattered coarse grit fragments.	118-120'	"	-
120'	126'	Light brick-red, generally fine to medium grain sand, but with scattered grit fragments.	120-126'	"	-
126'	134'	Orange-brown to reddish brown generally fine to medium grain sand, with scattered coarse grit fragments.	126-134'	"	-
134'	140'	Orange-brown to reddish brown fine to medium grain sand, with fairly abundsnt coarse grit fragments.	134-140'	"	-
140'	150'	Light grey coarse to very coarse gritty sand, with finer interstitial sand fraction.	140-150'	"	-
150'	156'	Light greyish to light greyish brown generally fine to medium grain sand, with numerous coarse rounded milky quartz grit fragments.	150-156'	"	-

"D" 18,987

Depth From	Depth To	Description	Depth	Type of Sample	Blows p/ft.
156'	158'	Light greyish fine to medium grain sand, with scattered coarse grit fragments.	156-158'	Slush	-
158'	176'	Grey-brown clayey fine sand, with scattered coarse grit fragments and occasional rounded quartz gravels Scattered mica flecks etc.	158-176'	"	-
176'	190'	Greyish to greyish brown fine grain sand, somewhat clayey in part. Scattered mica flecks and coarse rounded milky quartz grit fragments.	176-190'	"	-
190'	204'	Light greyish fine grain sand, with some light grey-brown mottling. Scattered mica flecks etc.	190-204'	Slush	-
204'	210'	Mid-grey to bluish grey silty to finely sandy clay, in discrete pockets with grey-brown generally fine grain sand.	204-210'	"	-

END OF BORE 210'
WATER CUT 98'
WATER LEVEL 95'
SUPPLY 200+ g.p.h.
ANALYSIS 1200+ ATS?

Group 2

Selected Bore Logs

Renmark and Chowilla

1-Mile Sheets

Renmark 1-Mile Sheet

~~PERCUSSION DRILL LOG "D" 18.987~~

PROJECT: Renmark 1-Mile Sheet. CO. Hamley (Out of Hundreds.) Bore No7

LOCATION: Renmark Irrigation Trust.
PURPOSE:
PLANT: DRILLER:
R.L. SURFACE AT COLLAR: 69' DEPTH: 305'
DATE COMMENCED: DATE COMPLETED:
BORE LOGGED: DATE:

Depth	Description
0' - 7'	Well
7' - 20'	Mud and sand
20' - 62'	Driftsands
62' - 138'	Clay
138' - 203'	Sandy clay and shells
203' - 212'	Sandy clay and rocks
212' - 274'	Coral
274' - 305'	Clay and stone

END OF BORE AT 305'

~~PERCUSSION DRILL LOG "D" 18.987~~

PROJECT: Renmark 1-Mile Sheet — CO. Hamley (out of Hundreds) Bore No18

LOCATION: E. & W.S. Dept.
PURPOSE: Damsite investigation, Chowilla.
PLANT: 39 — DRILLER: J. DOECKE
R.L. SURFACE AT COLLAR: 164.29 — DEPTH: 144'
DATE COMMENCED: 23.9.1960 — DATE COMPLETED: 30.9.1960
BORE LOGGED: R.D. STEEL — DATE: 6.10.1960

Depth		Description
0' -	2'	Greyish to slight bluish-grey silty to finely sandy clay, becoming fine clayey sand in pockets. Scattered grit fragments, plant remnants, etc. Very compact and a slightly friable. Some dark grey dendritic staining.
2' -	3'	Greenish-grey to greyish and yellowish-grey very silty clay, with abundant disseminated whitish gypsum pockets. Very stiff and slightly moist.
3' -	4'	Greenish-grey and yellowish-grey clayey silt, with prominent brown and dark yellow-brown mottling. Very stiff. Scattered grit fragments.
4' -	6'2"	Greenish-grey and yellowish-grey slightly clayey silt with yellowish-brown mottling. Stiff to compact and somewhat friable. Occasional small pockets of gypsum and bluish-grey silty clay.
6'2-	9'	Bluish-grey to brown and yellow-brown mottled silty to very silty clay. Stiff and moist. Scattered grit fragments.
9' -	12'	Light grey to light green-grey clayey silt, with prominent brown and dark yellow-mottling. Very firm, moist becoming off-white fine sandy silt in pockets.
12' -	13'	Light greyish to light yellow-grey silty clay, with some darker-yellow-brown mottling. Firm and moist. Scattered grit fragments.
13' -	14'	Greyish to light grey, light bluish-grey and light brownish-grey laminated clay. Firm and moist.
14' -	22'	Light yellowish-brown generally coarse grain sand, with some slight interstitial finer fraction darker yellow mottling in parts. Numerous coarse rounded milky quartz grit fragments.
22' -	30'	Light greyish-brown generally fairly coarse grain sand, with slightly finer fraction and numerous coarse grit fragments.
30' -	40'	Greyish medium to slightly coarser grain sand, with fairly numerous coarser grit fragments.
40' -	56'	Greyish generally medium grain sand, with scattered coarse grit fragments.
56' -	60'	Light greenish-brown to light brown generally medium grain sand, with scattered coarse grit fragments.
60' -	66'	Light brown-grey fine to medium grain sand, with scattered coarser grit fragments.

Depth	Description
66' - 70'	Light-greyish fairly fine to medium grain sand, with scattered grit, fragments.
70' - 86'	Mid-grey to brown-grey fine clayey sand, with scattered grit fragments and mica flecks.
86' - 94'	Greyish slightly clayey fine sand, with pockets of blue-grey silty clay..
94' - 118'	Dark greenish-grey to brownish-grey fine grain sand with darker bluish-grey silty clay in discrete pockets.
118' - 126'	Greyish-brown slightly clayey fine sand, in discrete pockets with bluish-grey silty to finely sandy clay.
126' - 134'	Grey-brown and dark greenish-grey fine clayey sand, in pockets with bluish-grey silty to finely sandy clay.
134' - 135'	Dark bluish-grey to dark greenish-grey very silty clay, with numerous small ochreous blobs. Firm, moist and somewhat friable.
135' - 137'	Dark greenish-grey glauconitic marl, with some small pockets of silty clay. Very abundant micro and micro fossil fragments.
137' - 141'	Dark greenish grey glauconitic marl, with very abundant micro and micro fossil fragments. Firm and fairly friable. Some yellowish fossil fragments.
141' - 144'	Dark greenish-grey to light brownish-grey glauconitic marl. Firm but friable. Irregularly abundant micro and macro fossil fragments.

END OF BORE 144'
LOGGED BY .D. STEEL ON 6.10.60

~~PERCUSSION DRILL LOG "D" 18.187'~~

PROJECT: Renmark 1-Mile sheet
LOCATION:
PURPOSE:
PLANT:
R.L. SURFACE COLLAR:
DATE COMMENCED: 10.3.1924
LOGGED BY:

CO. Alfred HD. Paringa
Paringa Bridge Bore No. 5
DRILLER:
DEPTH: 59'6"
DATE COMPLETED: 12.3.1924
DATE:

Depth	Description
	From surface to 12' Sand light
12' - 16'	Yellow sand
16' - 30'	Fine sand
30' - 39'	Brown sand
39' - 53'	Coarse sand
53' - 59'6"	Fine sand

END OF BORE 59'6"

~~PERCUSSION DRILL LOG "D" 18.187~~'

PROJECT: Renmark 1-Mile Sheet
LOCATION: S.A. Bulk Handling.
PURPOSE: Foundation Testing.
PLANT: 17
R.L. SURFACE COLLAR:
DATE COMMENCED: 15.12.1964
LOGGED BY:

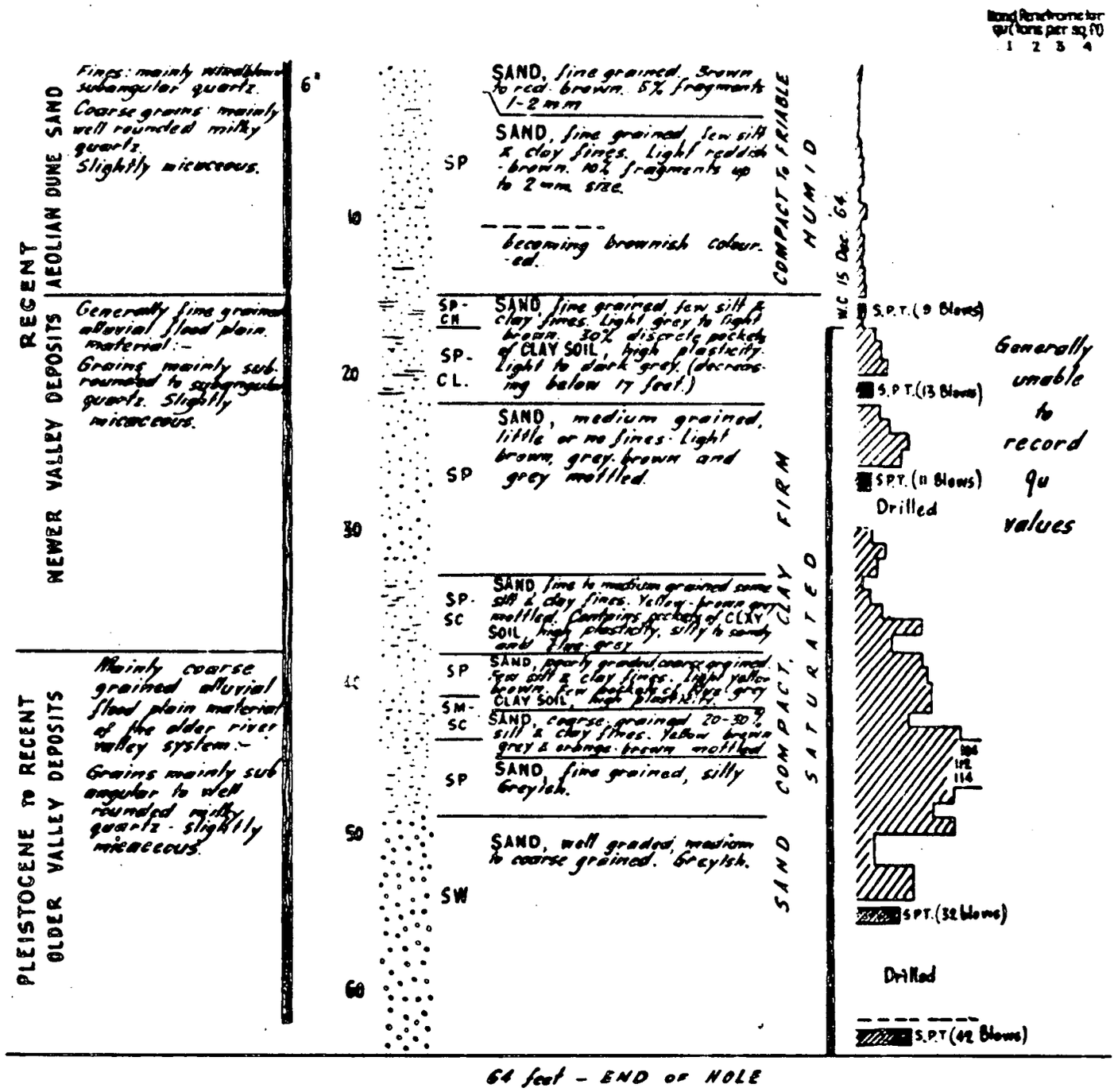
Co. Alfred HD. Paringa
Section 112 Bore C

DRILLER: A. TUCKER
DEPTH: 65ft.
DATE COMPLETED: 17.12.1964
DATE:

Depth	Description

SILO SITE
RAILWAY YARDS, PARINGA
TEST OF FOUNDATIONS

S.A.C.B.H. Ltd.
Section 112 PARINGA
64 ft. — —
Bore "C"



64 feet — END OF HOLE

Note:

- Open Tube "S" Series A Shoe.
- S.P.T. (Standard Penetration Test)
- Drilled — Shelb Samples.

17
Ruston
A. Tucker
15 Dec '64
17 Dec '64
S.4830
JBL

R.D. Shaw
17 Dec '64
R.D.S.

10 ft. to 1 in.

Chowilla 1-Mile Sheet

Serial No.....
Docket No.....

DEPARTMENT OF MINES - SOUTH AUSTRALIA

LOG OF PERCUSSION DRILL HOLE

HOLE NO. G1
SHEET 1 OF 1

PROJECT ..... CHOWILLA DAM ..... Hirer E & W.S. DEPT.
LOCATION ..... LEFT BANK, BORROW AREA "A" ..... Sec. 19 Hd. MURTHO
FEATURE ..... EMBANKMENT MATERIALS ..... Depth 60 ft. R.L. 279 ft. Coords. 69313 E. 99661 N.

SOIL TYPE GEOLOGICAL DESCRIPTION	DEPTH (FEET)	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME	CONSISTENCY	MOISTURE CONTENT	WATER LEVELS	PENETRATION DATA: BLOWS/FOOT (20 40 60 80 100)	PENETROMETER
TERRESTRIAL DEPOSITS — WIND BLOWN SAND. Well rounded grains. Few small lime nodules at 3 ft.	0		SP-SM	SAND, fine grained, Some silty, fines, red-brown to light red-brown	Loose	D			
			SM	SAND, very fine grained, excess silty fines, few clay fines, light brown to pale brown somewhat calcareous		Humid			
Lime present as irregularly disseminated patches & small hard nodules	10		SC	SAND, very fine grained, excess clay fines, some silty fines. Light brown to pale brown	Dense				
PLIO-PLEISTOCENE DEPOSITS LACUSTRINE — Irregular patches of whitish earthy lime	20		CL	CLAY low plasticity, very sandy, reddish to red brown	Hard	Damp	No water met	Slush Pump samples	'D' type shoe. Samples taken using
			CL to SC	becoming increasingly sandy & with some grey mottling					
			SC to CL	SAND fine grained, excess clay fines, brick-red, red-brown & grey mottled. Some pale red-brown mottling				more than 100	
	30		SM	SAND fine grained, excess silty fines, red-brown with yellow-brown mottling becoming more pronounced at depth	Very dense			Blows not recorded Drillers sample poor	
Lacustrine Sand. Sub-angular to sub-rounded quartz grains up to 0.05 in. Colouration mainly due to fines	40								
	50		SC to SP	SAND, medium grained, few clayey or silty fines, yellow-brown with light grey to reddish mottling	Compact	Damp / Humid		Blows not recorded, Representative samples every 5 feet only.	
			SP	SAND poorly graded, mainly pale grey, few fines					
	60			END OF HOLE 60 FEET. RL 219 FEET.					

Samples taken for Mechanical Analysis.
50 - 55 ft.
55 - 60 ft.

TYPE OF SAMPLE	HYDROLOGY
Open Tube	Water cut
Sealed Tube	Static level
Auger barrel	Supply
Slush pump	Analysis (pts. p. million)
	Water level (date)

CONSISTENCY	REL. DENSITY	MOISTURE
V.S. Very Soft	V.L. Very loose	H. Humid.
S. Soft	L. Loose	D. Damp.
F. Firm	C. Compact	M. Moist.
St. Stiff	D. Dense	W. Wet
V.St. Very stiff	V.D. Very dense	S. Saturated

Plant No 24 | Logged J.T.
Type Percussion | Date 7th April 64
Driller Phillips | Drawn J.P.T.
Date comm March 64 | Checked
Date comp March 64 | Passed

PLAN NO. S3654 G+J | Vertical Scale 1 in = 10 ft.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

HOLE NO. G80

SHEET 1 OF 1

SERIAL No. 472/66 LOG OF CABLE TOOL HOLE

PROJECT CHOWILLA PROJECT Hirer E. & W.S. DEPT

LOCATION TILMY FLAT County. HAMLEY

FEATURE DISPOSAL of SALINE WATER Depth 85 ft R.L. (Surface) 244.77 (Casing) 247.69 FEET.

SOIL TYPE GEOLOGICAL DESCRIPTION	CASING R.L. (FEET)	DEPTH (FEET)	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME	CONSISTENCY REL. DENSITY	MOISTURE CONTENT	WATER LEVELS	PENETRATION DATA BLOWS/FOOT (20 40 60 80 100) q_u tons/sq.ft (1 2 3 4)
PLEISTOCENE BLANCHETOWN CLAY — Few calcareous nodules, plant rootlets. Prismatic structure with polished faces on structural units.	6 inch 240	10		SC	SAND, poorly graded, excess clay fines increasing with depth; some silt, red-brown. Moderate to high dry strength. Few gravel fragments.	Loose	Damp		
				CL	CLAY SOIL, low plasticity, red-brown, mottled grey green, sand in dykes to 0.2 ft. wide, — form 5 to 10% of volume.	Hard	MC < PL		>4.5
PLIOCENE (LACUSTRINE) PARILLA SANDS — Quartz grains, sub-rounded to subangular. Clay as coating on grains.	230	20		SP	SAND; poorly graded, fine to medium grained, yellow-grey, moderate dry strength, some clay (appx 10%). Grains mainly less than 1 m.m. Band of CL-SC, grey-brown, from 28 to 29 ft., limonite stained cracks.	Compact	Humid		
Chert nodules. Mainly highly weathered		30		GP	Sample consists of GRAVEL fragments up to 0.1 ft. Clayey sand matrix. Medium dry strength.	Dense			
Shattered structure	220				SHALEY CLAY, brittle low strength, unmouldable, flaggy habit — easily broken into small prisms, sand and silt dykes green-grey.	Hard			130
				SC-SP	SAND, poorly graded, fine to medium grained, 15% clay, brown to grey. Medium dry strength increasing with depth.				101
Quartz grains, mainly subrounded	210	40			SAND, poorly graded, fine to medium grained, few fines, pale brown. No dry strength. Grains less than 1 m.m. Few rounded pellets of clay and clayey sand up to 20 m.m. Reddish brown and coarser grained below 55 feet. Few bands of clayey sand up to 2 cms thick.				102
Few angular opal or chert fragments up to 5 m.m across.	200	50		SP		Dense	Damp to humid	27 Jan '66 2 Feb '66 LEVEL BELOW 85 ft. MARCH '66	
	190	60							
	180			SP to SC					
	170	70							
				SP	Dark red-brown				
	160	80							
					85 ft. END of HOLE				

TYPE OF SAMPLE	HYDROLOGY	CONSISTENCY	REL. DENSITY	MOISTURE
Open Tube	Water cut 83 ft	VS-Very Soft	VL-Very Loose	H-Humid
Sealed Tube	Static evel 83 ft	S-Soft	L-Loose	D-Damp
Auger barrel	Supply	F-Firm	C-Compact	M-Moist
Slush pump	Analysis (p.p.m)	St-Stiff	D-Dense	W-Wet
Casing	← Water level. (Date)	VSt-Very Stiff	VD-Very Dense	S-Saturated
		H-Hard		

Plant No 9 Logged J.P.T.

Type Ruston 22W Date Jan. 66

Driller Christiansen Drawn J.P.T.

Started 10 Jan. 66 Traced G.F.J.M.

Finished 17 Jan. 66 Checked DMS

PLAN No S 5045 G+J

Vertical Scale 1 in = 10 ft

DEPARTMENT OF MINES — SOUTH AUSTRALIA

SERIAL No. 482/66

LOG OF CABLE TOOL HOLE

HOLE NO. G87

SHEET 1 OF 1

PROJECT CHOWILLA DAM

FEATURE SALINE WATER DISPOSAL

SECTION

LOCATION TILMY FLAT AREA

HUNDRED COUNTY HAMLEY

CO-ORDINATES

R.L. Casing 228.80 FEET

R.L. (Surface) 224.62 FEET

SOIL TYPE GEOLOGICAL DESCRIPTION	R.L. (FEET) DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME (Unified Soil Classification. U.S.B.R. Earth Manual 1st. Edition 1963.)	WATER LEVEL — CASING — MOISTURE CONTENT	CONSISTENCY REL. DENSITY	FIELD TEST DATA: BLOWS PER FOOT 20 40 60 80	FIELD TEST DATA: SOIL TEST PENETROMETER qu (Tons per sq. ft) 1 2 3 4
Surface sands			ML ↓ CL	CLAY, low plasticity, sandy silty and limey. Red-brown clay. Gravel up to 0·02 ft. 20% gravel, 10% sand 70% silt sizes. Medium dry strength.				
? PLEISTOCENE BLANCHETOWN CLAY: SAND quartz grains with lime and clay. Sand clay and lime occur in pockets. 8ft. to 9 ft moderately cemented lime. Possibly reworked.	220		SC	SAND, poorly graded, clayey Green sand, off-white lime and reddish-brown clay fines Medium grained sand up to 1m.m. across.			DRILLED, SLUSH PUMP SAMPLES 10 – 18ft.	
LIMESTONE, strongly? cemented, contains black organic matter.	10 210			Slush-pump samples are mainly sand with few rock fragments				
	20		SP	SAND, poorly graded clayey fines. Grey to off white colour with 18 to 20 ft. Reddish brown. Approx. 5% clayey fines				
Sand is mainly quartz grains; coated with clay fines 18 ft to 20ft	200							
PLIOCENE PARILLA SANDS (LACUSTRINE)	30						SLUSH-PUMP SAMPLES ONLY 26 – 100ft.	
	190							
	40							
	180							
	50							
	170			Medium grained with grains up to 1m.m. down to 55 ft., where sand grades into coarse grained; up to 2 m.ms. Sub-rounded.				
	60		SP					
	160				MARCH '66			
	70							
MIOCENE ? LOXTON SANDS (ESTUARINE)	150							
	80							
	140							
	90							
	130							
	100			END OF HOLE 100 FEET				

HUMID

TYPE OF SAMPLE

A shoe (SA)
D " (SD)
E " (SE)
G " (SG)
Sealed Tube - A Shoe - SAL
Standard Penetration Test - SPT

Water level, (date) → 7 May 65
WC ▶ Water cut
Casing

CONSISTENCY

VS. — Very Soft
S — Soft
F — Firm
St. — Stiff
V St. — Very Stiff
H — Hard

REL. DENSITY

VL — Very Loose
L — Loose
C — Compact
D — Dense
VD — Very Dense

MOISTURE CONTENT

H — Humid
D — Damp
M — Moist
W — Wet
S — Saturated

LL — Liquid Limit
PL — Plastic Limit
≏ Near
< Less than
> Greater than
≪ Much less than

ENGINEERING GEOLOGY SECTION

DRILL No. 9. LOGGED. M.C.B.
TYPE RUSTON DATE. 23 FEB. '66
DRILLER FARROW DRAWN. M.C.B.
START 11 FEB '66 TRACED. R.A.J.
FINISH 11 FEB '66 CHECKED J.W.S.

DRG. No. S5106 G+J

DEPARTMENT OF MINES — SOUTH AUSTRALIA

SERIAL No. 961/66

LOG OF ROTARY HOLE

HOLE NO. G 90

SHEET 1 OF 1

PROJECT CHOWILLA DAM

FEATURE SALINE WATER DISPOSAL

LOCATION TILMY FLAT

SECTION

HUNDRED COUNTY HAMLEY

CO-ORDINATES

R.L. Casing — — FEET

R.L. (Surface) 280.82 FEET

SOIL TYPE / GEOLOGICAL DESCRIPTION	R.L. (FEET) / DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION — GROUP NAME (Unified Soil Classification. U.S.B.R. Earth Manual 1st. Edition 1963.)	WATER LEVEL — CASING — MOISTURE CONTENT	CONSISTCY REL. DENSITY	FIELD TEST DATA: BLOWS PER FOOT 20 40 60 80	FIELD TEST DATA: SOIL TEST PENETROMETER qu (Tons per sq. ft) 1 2 3 4
	280		SM	Surface sand and silt.				
CALCRETE, quartz grains in lime; Gravel particles strongly cemented but moderately weathered.			GP and ML	GRAVEL, poorly graded gravel in lime silt of low plasticity matrix. Off-white colour, 10% gravel, 90% silty fines.			NOT APPLICABLE	
BLANCHETOWN CLAY. CLAY with quartz grains, rounded to sub-angular. limonite stained.	10 270		CL	CLAY, low plasticity, sandy. Green clay with red mottles. Sand grains up to 0.5 mm				
Quartz grains with clay and lime, sub-rounded grains, clay or silt coated.	20 260		SP	SAND, poorly graded, silty and clayey, limey in parts. Light green. Grains up to 0.5 mm. Fine to medium grained. Approx 20% fines.				
Quartz grains with clay. Grains rounded to sub-angular.	30 250		SP	SAND, poorly graded, silty and clayey. Grains up to 2 m.m. across up to 25% fines except 32ft to 37ft up to 10% fines. Reddish brown to yellow.				
PLIOCENE SANDS PARILLA (LACUSTRINE) Quartz grains with clay, subrounded to sub-angular, clay and silt coated grains.	40 240							
	50 230		SM	SAND, poorly graded, silty to about 60ft where grades into clayey. Light green colours becoming lighter with increasing depth. Grains up to 2 m.m across. Up to 15% fines.			DRILLED WITH AIR TO 68 FEET	
	60 220		SC					
	70 210			Driller reports sand for remainder of hole.	NO WATER CUT HOLE CASED TO 110 FT.		DRILLED WITH MUD TO TOTAL DEPTH OF 110 FEET.	
	80 200							
	90 190							
	100 180							
	110			END OF HOLE 110 FT.				

TYPE OF SAMPLE

A shoe (SA)
D " (SD)
E " (SE)
G " (SG)
Sealed Tube - A Shoe - SAL
Standard Penetration Test - SPT

Water level, (date) 7 May 65
WC Water cut
Casing

MOISTURE CONTENT

H — Humid
D — Damp
M — Moist
W — Wet
S — Saturated
LL — Liquid Limit
PL — Plastic Limit
≏ Near
< Less than
> Greater than
≪ Much less than

ENGINEERING GEOLOGY SECTION

DRILL No. 155 LOGGED M.C.B.
TYPE MAYHEW DATE 26 Feb 66.
DRILLER GUTTE. DRAWN M.C.B.
START 22 Feb 66 TRACED T.L.P.
FINISH 22 Feb 66 CHECKED D.M.

DRG. No. S5109 G+J

SERIAL No. 961/66

DEPARTMENT OF MINES — SOUTH AUSTRALIA

HOLE NO. G 91

SHEET 2 OF 2

PROJECT CHOWILLA DAM LOG OF ROTARY HOLE

FEATURE SALINE WATER DISPOSAL COUNTY HAMLEY

LOCATION TILMY FLAT CO-ORDINATES

R.L (Casing) 284·73 FEET

R.L. (Surface) 283·23 FEET

SOIL TYPE GEOLOGICAL DESCRIPTION	R.L. (FEET) DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME (Unified Soil Classification. U.S.B.R. Earth Manual 1st. Edition 1963.)	WATER LEVEL CASING MOISTURE CONTENT	CONSISTENCY REL. DENSITY	FIELD TEST DATA: BLOWS PER FOOT 20 40 60 80	FIELD TEST DATA: SOIL TEST PENETROMETER qu (Tons per sq. ft) 1 2 3 4
MIOCENE LOXTON SANDS (ESTUARINE)	180 110 170 120 160 130 150 140 140 150 130		SP ?	SAND	March '66		NOT APPLICABLE MUD DRILLING.	
				END OF HOLE 154 FT.				

TYPE OF SAMPLE

A shoe (SA)
D " (SD)
E " (SE)
G " (SG)
Sealed Tube - A Shoe - SAL
Standard Penetration Test - SPT

Water level, (date) 7 May 65
WC Water cut
Casing

CONSISTENCY

VS. — Very Soft
S — Soft
F — Firm
St. — Stiff
V.St. — Very Stiff
H — Hard

REL. DENSITY

VL — Very Loose
L — Loose
C — Compact
D — Dense
VD — Very Dense

MOISTURE CONTENT

H — Humid
D — Damp
M — Moist
W — Wet
S — Saturated

LL — Liquid Limit
PL — Plastic Limit
≏ Near
< Less than
> Greater than
≪ Much less than

ENGINEERING GEOLOGY SECTION

DRILL No. 155 LOGGED M.C.B.
TYPE MAYNEW DATE 23 Feb '66
DRILLER STREMPEL DRAWN M.C.B.
START 23 Feb '66 TRACED D.H.S.
FINISH 24 Feb '66 CHECKED D.H.S.

DRG. No. S 5710