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REPORT ON GROUND WATER PROSPECTS YUENDUMU NATIVE RESERVE

by

T. QUINLAN

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YUENDUMU NATIVE RESERVE

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T. Quinlan
Resident Geologist,
Alice Springs.

INTRODUCTION

At the request of the District Welfare Officer two bore sites were selected by me on Yuendumu Native Reserve on 17th December, 1957.

REQUIREMENTS

One bore is required to augment the water supply for the settlement and to be in a position to supply the proposed Native camp. The second bore is required to open up an area of good feed to the North-West of the settlement.

OUTLINE GEOLOGY

The southern part of the reserve is underlain by Quartzites, Sandstones, and conglomerates of unknown age. They are folded and faulted and in some places show signs of bedding plane shearing. They rest unconformably on the metamorphics.

To the North there are fairly extensive outcrops of Quartz Mica Schist separated by spinifex and mulga sand-plains. The foliation of the schists is approximately east west. Ryan (1956) and Catley (1955) have reported on the occurrence of copper in these rocks.

RESULTS OF PREVIOUS DRILLING

To date 6 bores have been drilled on the Reserve (their locations are shown on Fig. 1). The following information has been obtained from the Department of Works and from Welfare Branch, N.T. Administration.

F.52/12-1 White Point Bore (1951) T.D. = 187' S.W.L. = 140' Supply = 1000 g.p.h. T.D.S. = 1915 P.P.M. water was obtained from "Limestones and Quartzites" below ?90 feet of alluvium.

F.52/12-2 Penhalls Bore No information available but probably similar to White Point Bore.

F.52/12-3 Yuendumu Settlement No. 1. (1945) T.D. = 137' S.W.L. ?90' Supply 1400 +g.p.h. T.D.S. 1264 p.p.m. (1955) The main aquifer appears to be the sand between 100' and 137'. This hole has to be sandpumped at regular intervals.

F.52/12-4 Yuendumu Settlement No. 2 (1953) T.D. = 111' Water was struck at 85 feet. S.W.L. = 85' Supply of 3000 g.p.h. (1953) Now is only 400 g.p.h. (Oct 1957) T.D.S. 1269 (1955) The main aquifer appears to be a loose white sand between 100 and 111 feet, this hole has to be sand pumped at regular intervals.

F.52/12-5. Dud T.D. ?70-80 feet. No further information is available.

F.52/12-6 Dud ("Dry Bore"). No information available.

SITES SELECTED DECEMBER 1957

F.52/12 - 7 Site 1 for the Settlement

Location:

The site recommended is 100 yards due west along the drain from F.52/12-3, the settlement No. 1. bore (Fig. 2). The site and the settlement are on a flat sand plain with spinifex and sparse mulga.

The site was not marked and it will be necessary to instruct the driller to pace out the distance along the line of the drain.

Reasons for Selection:

1. The two adjacent settlement bores struck the main supply of water at approximately 100 feet. It is expected that this bore will strike the sameaquifer at about the same depth.

2. The supply and quality of water obtained from this bore should be similar to that in the two existing bores, i.e. total dissolved salts approximately 1200 p.p.m., total hardness approximately 500 p.p.m., nitrate content 40-50 p.p.m. Fluoride content 1 to 2 p.p.m. supply 2000 to 3000 g.p.h.

3. The site was placed to the west of the existing bores because of the dud to the south.

4. The spacing of 100 yards from the existing bores is recommended because it is suspected that a cone of depression may have developed about Nos. 1 and 2.

Recommendations:

1. The total depth of the hole should be 140 to 150'. This will give a good sump for sanding and a substantial reserve for drawdown.

2. It is anticipated that normal pumping rate from the three bores will be high, up to 8,000 to 9,000 gallons per hour in peak periods, and this amount will be withdrawn from a small area on the ground. Also the underground extent of the basin is unknown.

In view of these facts it is recommended that pumping and recovery tests should be made to determine:

(a) if the bores are developing cones of depression

(b) the performance and nature of the aquifers

(c) the available reserves in the basin

(d) the minimum economic spacing for future bores.

F.52/12-8. Pastoral Bore Site

Location:

The site recommended is on the west bank of the Kerridy Creek 8½ miles north west of the settlement (Fig. 1). It was shown to the native Roy and marked by circles of tyre marks. It is on a spinifex sand plain of indefinite relief.

Reasons for Selection:

1. It is anticipated that the bore will pass through a good thickness of alluvium before striking bed rock of soft puggy schists and that water will be struck about 100 feet in alluvium.

2. The position of the bore is such that it should avoid any increase in salinity which may be caused by possible ponding against an outcrop of basement approximately 1 mile downstream.

3. The west bank of Kerridy Creek is preferred because it is closer to what is thought to be an ancient channel of the creek.

Recommendations:

1. The Resident Geologist should be informed as soon as possible when the driller has struck water or bed rock.

T. QUINLAN

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RESIDENT GEOLOGIST.

3.1.58

FIG. 1

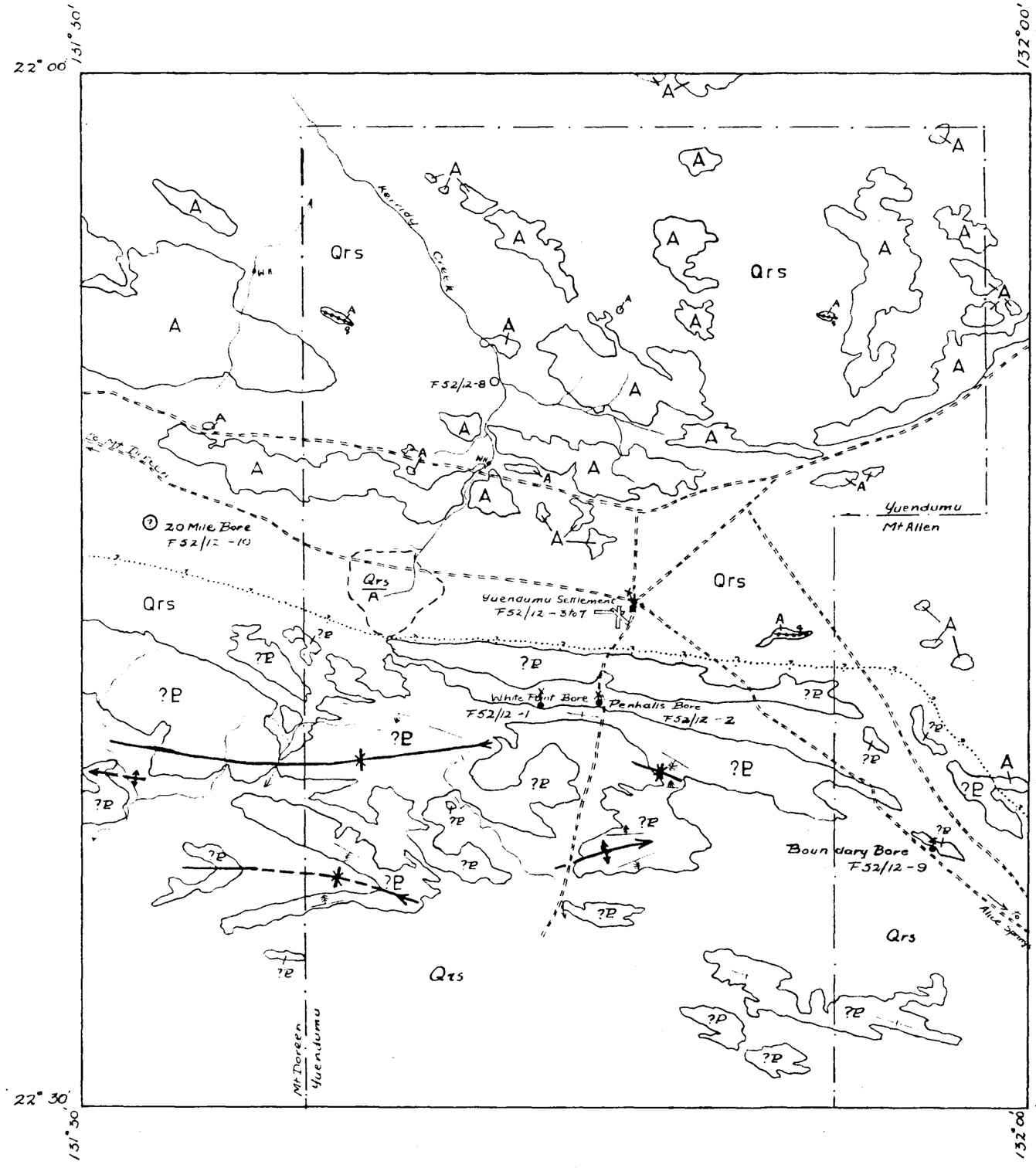


Fig. 1 GEOLOGICAL SKETCH MAP OF YUENDUMU NATIVE RESERVE

LEGEND

- Qrs — QUARTERNARY — Sand
- Qrs/A — QUARTERNARY — Shallow "Bedrock"
- ?P — ? PROTEROZOIC — Sandstones, Quartzites, Conglomerates
- A — ARCHAEZOIC — Schists — "Bedrock"
- q — ARCHAEOZOIC — Quartz Reef

- Geological Boundary
- " " Concealed
- Synclinal Axis
- Anticlinal Axis
- Water Course
- Road

Trend lines With dip — 0-15° — 15-45° — >45° — ca. 90°

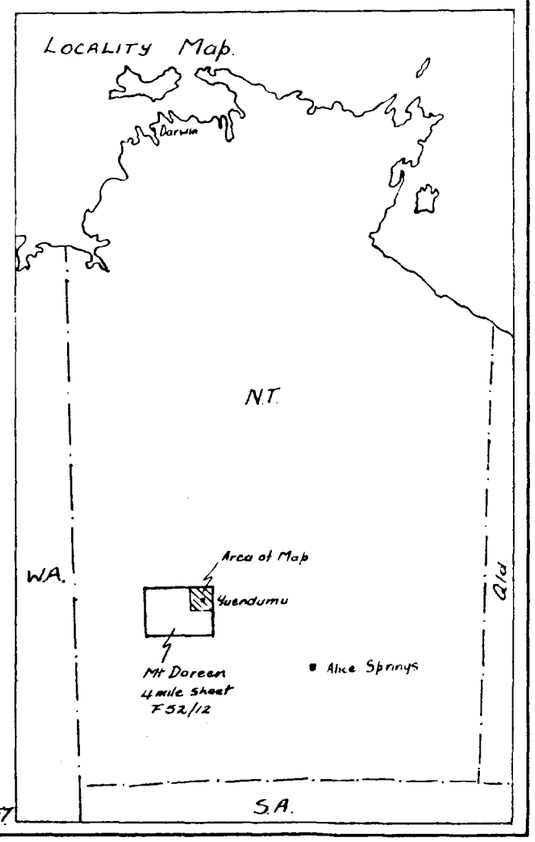
- F52/12-20 Water Bore position known
- (?) F52/12-10 " " " approximate
- ○ F52/12-8 Proposed Bore Site
- •W.H. Water Hole

N

Scale 1" = 4 mile approx

Base Map Photo Overlay Mosaic

Reliability Photo interpretation.



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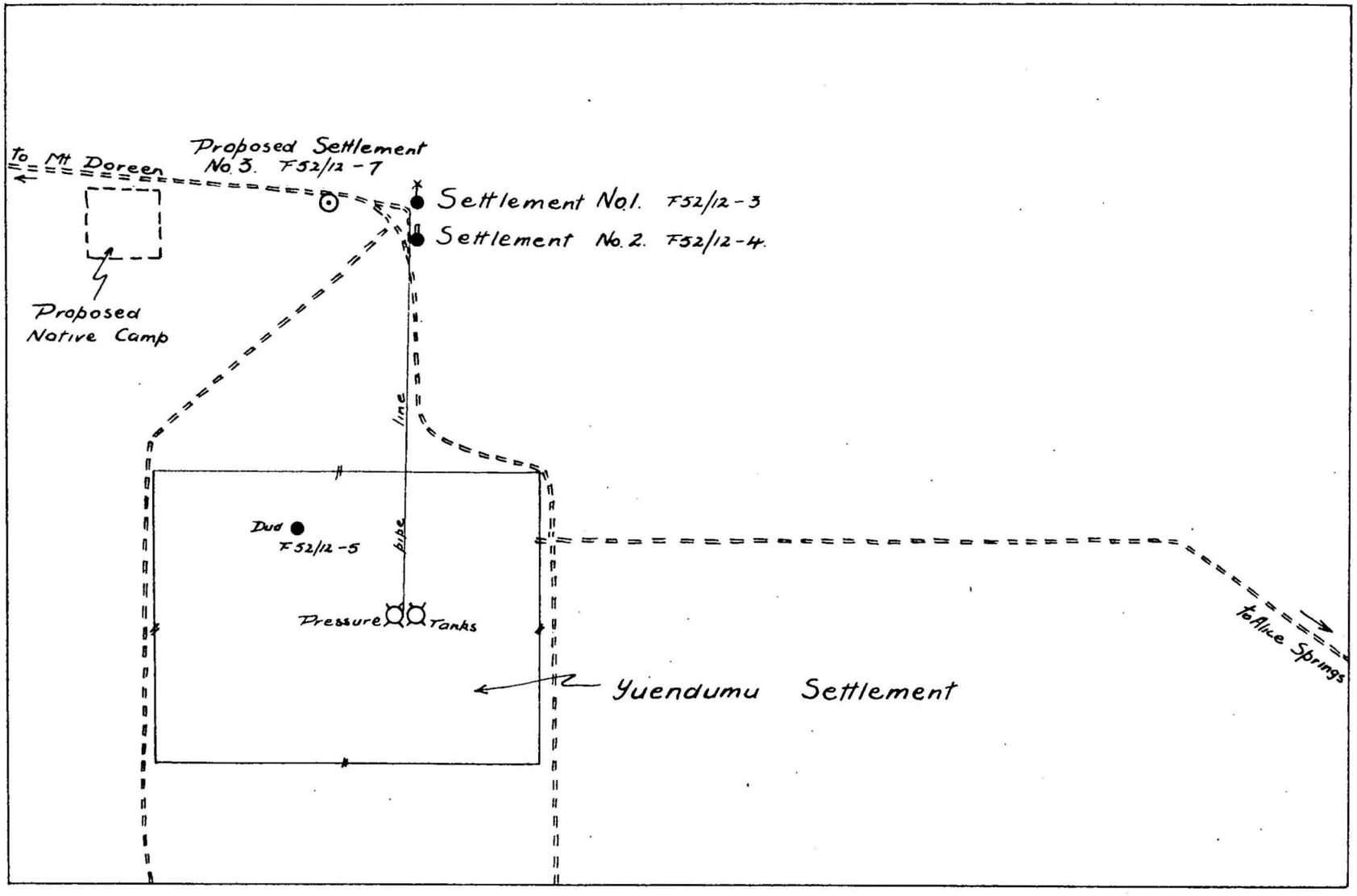
T. QUINLAN December 1957

FIG. 2



Legend

N

Scale

1" = 500' approx.

- Water Bore w. Windmill
- Water Bore w. Pumpjack
- Water Bore - Dud
- Water Bore Proposed Site

Fig. 2 SKETCH OF THE LOCATION OF WATER BORES AT YUENDUMU SETTLEMENT

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Fig 3 missing

SUPPLEMENTARY REPORT ON GROUND WATER PROSPECTS ON YUENDUMU NATIVE RESERVE N.T.

by

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Resident Geologist, Alice Springs.

This report is supplementary to a "Report on Ground Water Prospects, Yuendumu Native Reserve, N.T." by T. Quinlan of 3rd January, 1958 (B.M.R. Records 1958/1).

INTRODUCTION.

The site for the proposed bore to augment the supply at the Yuendumu Native Settlement was selected on the assumption that the existing bores obtained their supply from the alluvium which filled a fairly large basin in the metamorphic rocks, which become deeper to the north and to the west.

This assumption is now untenable as subsequent drilling failed to provide such a supply.

The results of the drilling to date suggest that the aquifer is a narrow channel sand filling the lower portions of an ancient drainage depression. There is no indication on the surface of the presence nor the trends of such a channel.

RESULTS OF DRILLING.

Two holes have been drilled in the vicinity of the existing settlement bores (these locations are shown on Fig. 3A). The following information has been supplied by the Department of Works, Alice Springs.

F52/12-7. YUENDUMU SETTLEMENT NO. 3 (1958)

T.D.127. Supply Nil. A trace of water was struck at 117 feet. The bore passed from "clay and gravel" into weathered schists at 17 feet. No trace of the sand which is the aquifer in No. 1 or No. 2 bores was found.

F52/12-11. YUENDUMU SETTLEMENT NO. 3A (1958)

T.D. 50. No water was struck in the hole. The bore passed from "clay and gravel" into weathered schists at 19 feet. No trace of the sand, which is the aquifer in No. 1 and No. 2 bores was found.

HYDROLOGY.

An east-west vertical projection was prepared (fig. 3b) from the cross section A-B (Fig. 3a) using the drillers logs, and on the basis of the following assumptions:-

(a) that the No. 1 and No. 2 bores reached, or that drilling ceased just above bedrock.

(b) that the static water level in the settlement No. 2 bore is an indication of the lateral extent of the aquifer.

The validity of this last assumption could be seriously questioned, but it is required as a working hypothesis until information is available on the contours of the present topography, the area of intake for and the piezometric surface of the aquifer.

Inspection of Fig. 3(b) suggests that the aquifer is a channel sand filling the lower portions of an ancient drainage depression and that the asymmetry of the section suggests that immediately to the north of the No. 1 bore the channel swings to the north-west. This is consistent with the hypothesis that this channel once formed the headwaters of ancient drainage system of Kerridy Creek (Fig. 1 in the preceding report).

It must be pointed out however, that this asymmetry may be more apparent than real. In all probability No. 2 bore does not penetrate the deepest part of the old channel as is shown to do in Fig. 3(b).

Exploration for channel sands is extremely difficult because of their narrow width, in this case 100 to 200 feet compared to their length, (which may be measured in miles) and as they are naturally sinuous in plan. In the absence of facilities for prospecting by the Resistivity method the position of the aquifer can only be found by trial drilling. At least 3 and perhaps 4, more bores are necessary, unless one of these intersects a sufficient thickness of the aquifer by chance.

RECOMMENDATIONS.

The following site is recommended:-

F52/12-12. YUENDUMU SETTLEMENT NO. 4.

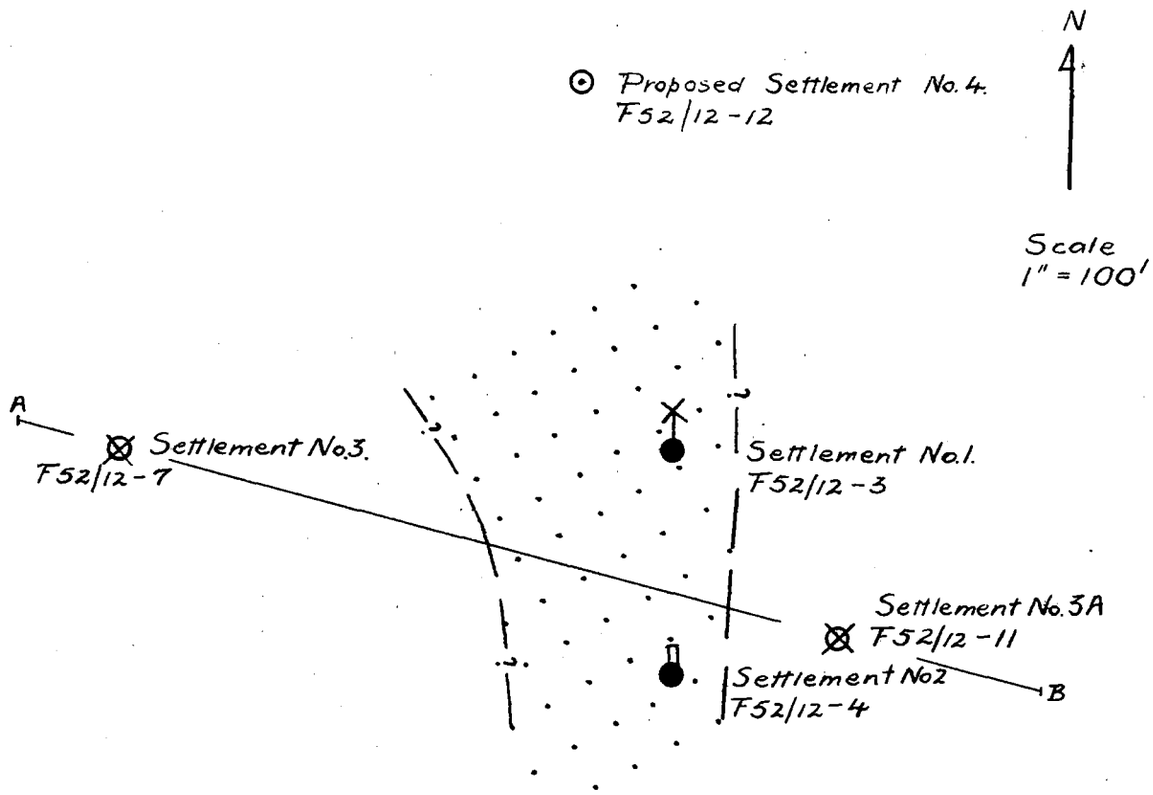
50 feet west and 200 feet north of the No. 1 bore. A bore here should provide the maximum information; also it stands a fair chance of intersecting a good thickness of the aquifer. It is important that -

(1) hole be drilled to at least 100 feet, or to hard drilling, even if schist is struck at shallow depth.

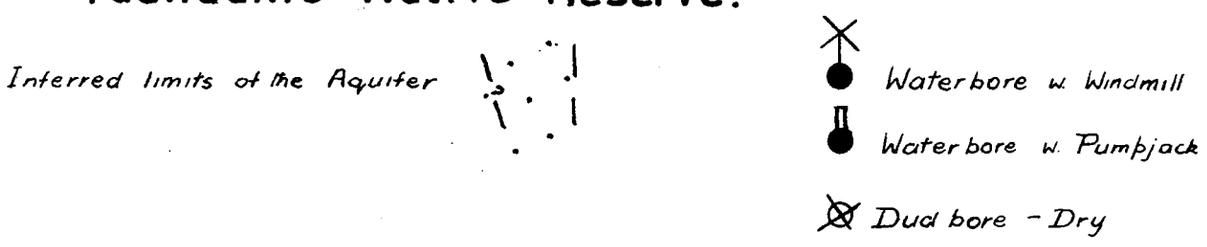
(2) standing water level be measured if water is struck.

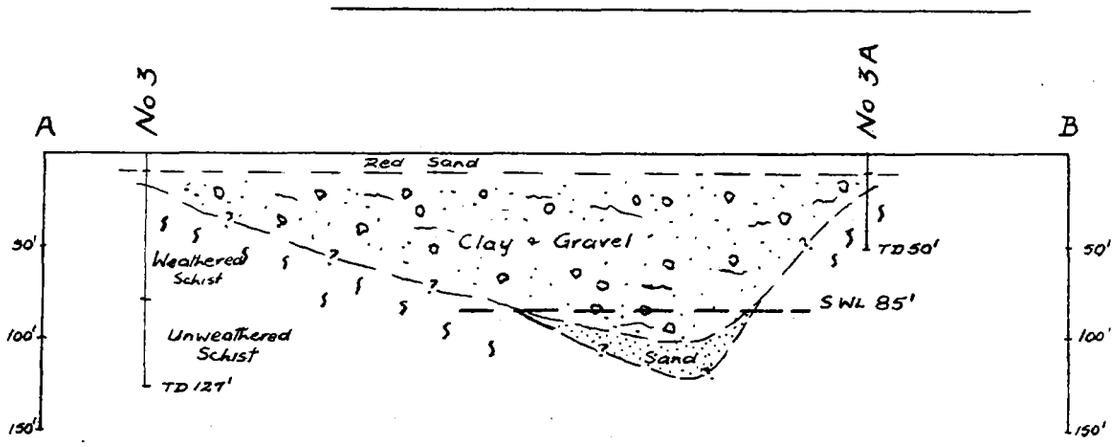
(3) samples of all the main rock types be kept for the geologist.

FIG. 3



(a) Supplementary sketch plan of water bores Yuendumu Native Reserve.





(b) Vertical projection of section A-B on an east west plane.

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