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COMMONWEALTH OF AUSTRALIA.



DEPARTMENT OF NATIONAL DEVELOPMENT.
BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS.

RECORDS.

1956/10.

WATER SUPPLY INVESTIGATIONS, AREYONGA NATIVE SETTLEMENT, N.T.

by

J. B. Firman.

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INTRODUCTION.

The Welfare Branch, Northern Territory Administration, requested that bores be sited close to Areyonga Native Settlement to supply water suitable for human consumption. Another bore was required to supply water for agricultural purposes one and a half miles south-west of the Settlement. A geological reconnaissance was carried out and four bore sites were chosen on 11th and 12th January, 1956.

Localities mentioned in this report are indicated on the accompanying plan.

Areyonga Native Settlement is situated in the Krichauff Ranges, 143 road miles west of Alice Springs, N.T. The Settlement buildings are on a small alluvial flat near the junction of two small creeks which are headwaters tributaries of the Palmer River. The creeks flow only after heavy rains. Rainfall varies between 8 and 10 inches a year and is unreliable. The Settlement is bounded to the north, south and west by high hills. Small spring-fed pools, which contain a limited supply of water, occur in a creek bed approximately 200 yards north of the Settlement buildings.

PREVIOUS INVESTIGATIONS.

A bore situated below the springs was put down to a depth of 183 feet in April, 1953. Underflow water from the springs was struck at 12', but this was sufficient for drilling purposes only. The main supply was struck between 160 and 170'.

The bore water is derived partly from subsurface drainage from the pools. This is indicated by a decrease during heavy pumping of the water level in a shallow well on the creek bank opposite the bore. Pumping has not lowered the water levels in the pools or in shallow wells on the creek bank between the bore and the pools.

The yield from the bore was originally 1700 gallons per hour, but it decreased to 480 gallons per hour by the 12th January, 1956. The bore has been cleaned out and deepened and the yield is now 700 gallons per hour.

GEOLOGY.

The stratigraphic nomenclature used in this report is the nomenclature used by the Resident Staff at Alice Springs.

The sequence of rock types exposed in the area is set out below, (youngest rocks at the top of the table).

| Rock Type | Name | Age |
|--|------------------------------|-----------------------|
| Reddish-brown sandstone Felspathic in places. | Mareenie Sandstone | Ordovician ? |
| Reddish-brown sandstone. | Gill Sandstone | Ordovician ? |
| Sandstone. | Tempe Sandstone. | Upper Cambrian. |
| Dark reddish-brown sandstone and shale. | Found Sandstone. | ? |
| Felspathic sandstone interbedded with shale and limestone. | - ? - | ? |
| Massive crystalline limestone with collenia-type bioherms. | Bitter Springs Limestone. | Upper Proterozoic. |

Collenia-type bioherms are well developed in the Bitter Springs Limestone. The collenia-type fossils have their convex margin "upwards" which indicates that the beds are right side up.

A discordant contact occurs between the Bitter Springs Limestone and the Gill Sandstone near the Settlement. Where the Settlement road intersects the limestone, veinlets of quartz parallel the bedding planes. Strong grooving of the quartz parallel to the dip indicates later movement. A drag-fold in the limestone indicates that the younger limestone beds have been thrust to the north-east over the older limestone beds. The contact between the Bitter Springs Limestone and the underlying Gill Sandstones has been injected by vein quartz and strongly brecciated. These structural details appear to support the contention that the portion of the sequence south-west of and including the Bitter Springs Limestone has been overthrust over the portion of the sequence north-east of the limestone.

PROPOSED BORES

No. 1 Bore is sited on the alluvial flat at the Settlement, and is on the north bank of the creek in which the permanent pools are located. The bore is below the junction of the creek in which the pools are situated and another creek which flows from the east.

The bore should pass through alluvium and stream gravel to about 20 feet, intersecting the stream underflow within this depth. The bore should then enter the Gill Sandstone. The Gill Sandstone is permeable and strongly fractured and water in this bore should be similar in quantity and quality to the original bore north of the Settlement in Mareenie Sandstone. A bore depth of 250 feet will probably be sufficient.

If the bore is successful all sources of contamination upstream from the bore must be removed. Water analysis of ammonia, nitrates and nitrites and examination for harmful bacteria should be made before the water is used.

This bore has first priority.

No. 2 Bore is sited about 500 yards east of the Settlement on the north bank of a creek.

The Bore should pass through about 20 feet of alluvium and stream gravel, intersecting the stream underflow within this depth, and should then enter the Mareenie Sandstone. The Mareenie Sandstone, which crops out on the creek bank near the bore site, is strongly fractured, permeable and is lithologically similar to the Gill Sandstone. The creek adjacent to the bore is not fed by springs near the bore-site and the water may be more saline than in the No. 1 Bore. The quantity of water may be less than in No. 1 Bore because run-off from two streams is utilized in No. 1. A bore depth of 250 feet will probably be sufficient.

The bore has second priority.

No. 3 Bore is sited in a gorge about 1,000 yards south-west of the Settlement. The bore site is close to the road and on the east bank of the creek flowing from the pools above the Settlement.

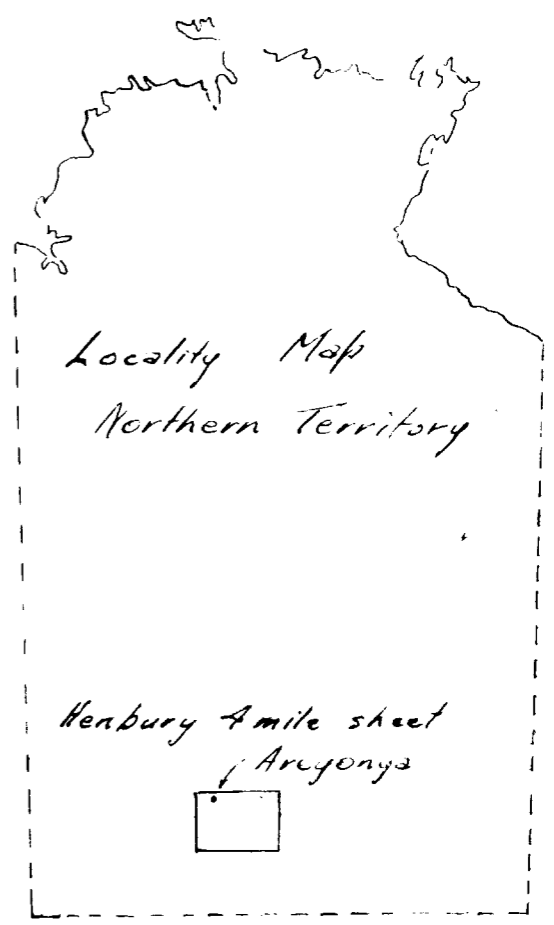
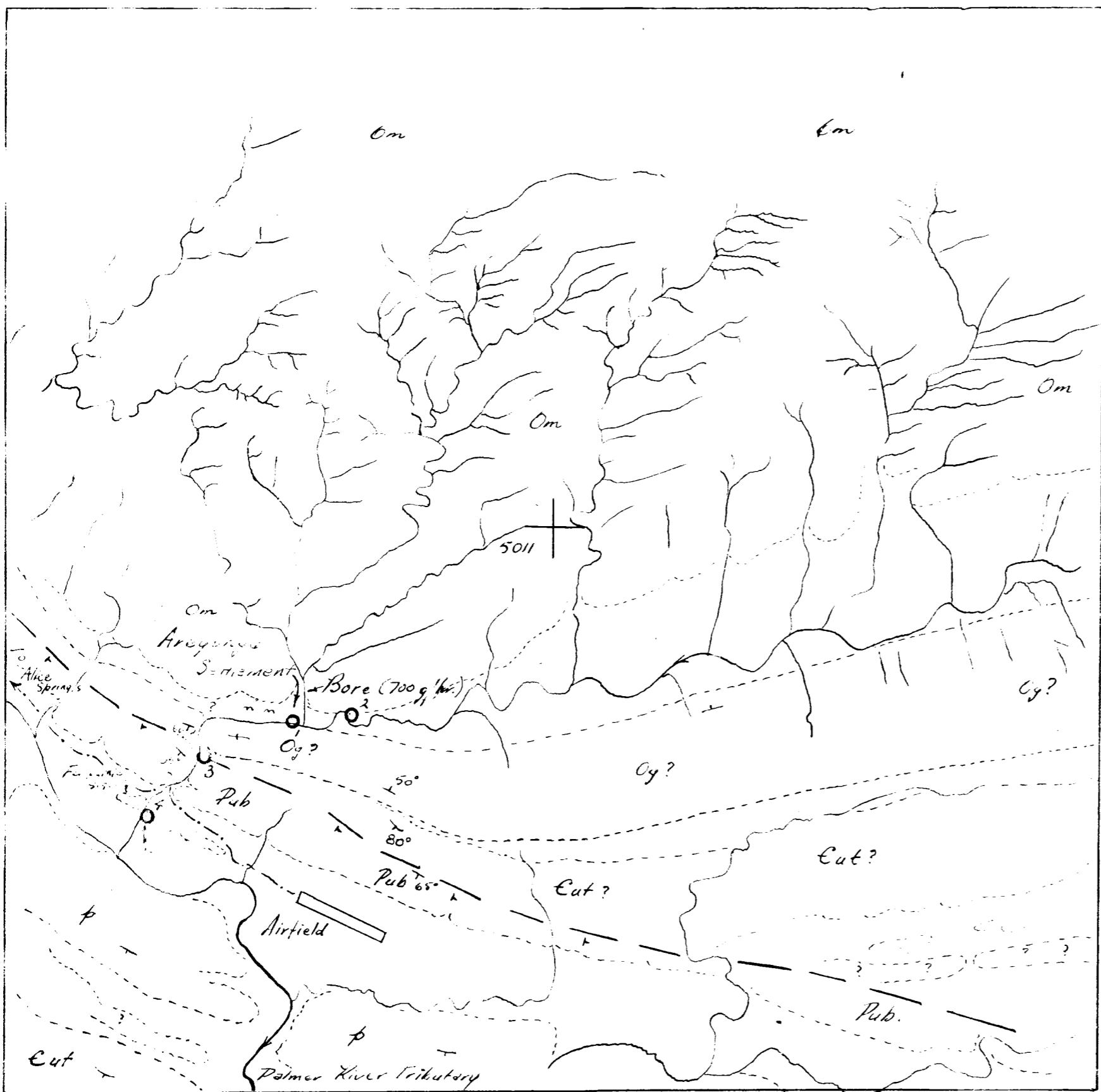
The bore should pass into the Bitter Springs Limestone at shallow depth (the limestone crops out close to the bore site) and enter the Gill Sandstone between 100 and 150 feet. The contact between these rocks is brecciated and stream underflow may pass through the brecciated zone into the underlying rocks. The water-table should be intersected at less than 30 feet. Water entering the bore in the limestone should be analysed because bores elsewhere in the Bitter Springs Limestone have had a high sulphate content. This portion of the bore can be cased off, if the sulphate content is too high, and the bore continued into the Gill Sandstone to a total depth of 250 feet.

Water from this bore may be contaminated by organic matter at the Settlement. A continuous check on the water should be made if it is used for human consumption.

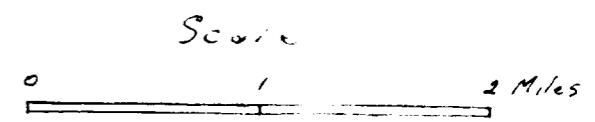
This bore has third priority.

No. 4 bore is situated close to the playing field one and a half miles south-west of the Settlement. The bore is on the east bank of the creek in which the pools occur. The water from this bore is for agricultural purposes. The stratigraphic sequence near the bore is obscured by rubble, but small outcrops of felspathic sandstone and limestone occur.

The bore should pass into limestone a few feet below the surface and continue in limestone to between 200 and 250 feet where it will intersect sandstone. The bore can be continued in the sandstone to 300 feet total depth if supply is inadequate. The sandstone is felspathic and its permeability at depth is unknown.



True North



Reference

| | | | |
|-------------------|-----|--------------------------|---------------------|
| Ordovician | Om | Mareenie Sandstone | Stream course |
| | Og | Gill Sandstone | Proposed bore site |
| Cambrian | Eut | Tempe Sandstone | Reverse Fault |
| | P | Pound Sandstone | Air photo |
| Upper Proterozoic | Pub | Bitter Springs Limestone | Henbury, Run 2/5011 |
| | | | --- Road |

Bureau of Mineral Resources
Geological Map
showing
Proposed Bore Sites
near
Areyonga Native Settlement, N.T.
J.B. Firman
January 1956.