Bore Completion Report

BORE 25410

DISTRICT HOSPITAL NHULUNBUY

D Karp
Hydrology Division
Water Resources Group
Darwin

January 1988
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Water Directorate Library, Darwin 1
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17:HYGEO1
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<table>
<thead>
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<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMG</td>
<td>Australian Map Grid</td>
</tr>
<tr>
<td>°C</td>
<td>degree Celsius</td>
</tr>
<tr>
<td>km</td>
<td>kilometre</td>
</tr>
<tr>
<td>L/s</td>
<td>litre per second</td>
</tr>
<tr>
<td>m</td>
<td>metre</td>
</tr>
<tr>
<td>mm</td>
<td>millimetre</td>
</tr>
<tr>
<td>m³</td>
<td>cubic metre</td>
</tr>
<tr>
<td>m³/d</td>
<td>cubic metres per day</td>
</tr>
</tbody>
</table>
1. INTRODUCTION

The objective of this work was to investigate the groundwater potential and subsequently construct a production bore providing a water supply for irrigation at the Gove District Hospital.

The work was carried out in October and November 1987 by the Water Resources Group of the Water Directorate on behalf of the Department of Health and Community Services - East Arnhem Region.

Preliminary hydrogeological study, interpretation of aerial photographs, hydrochemical study and other relevant studies of the area were carried out in the office. Hydrogeological field reconnaissance was completed in October 1987.

The Gove District Hospital is situated in Nhulunbuy town at the AMG co-ordinates 693300 - 8652000 (Gove 1:100 000 Sheet 6273).

Nhulunbuy town occupies the northern part of Gove Peninsula. It has a monsoonal climate with highest and lowest recorded temperatures of 45.6°C and 11.3°C respectively. The average maximum temperature between 30°C and 33°C occurs during the wet season which lasts from November to March. The wet season begins and ends at Gove about one month later than western Arnhem Land. The average minimum temperature between 20.0°C and 26.5°C occurs during the dry season between May and September. The average annual evaporation is 2667 mm and average annual rainfall is 1429 mm.

Arnhem Land is divided into three major physiographic units - the Arafura Fall, the Gulf Fall and the Coastal Plain.

The Arafura Fall in the Gove Peninsula area could be described as a unit containing three main geomorphological features: Plateau, Plateau remnants and Slopes of intermediate level.

The Plateau which originally occupied the whole of the Gove Peninsula, at present covers central and eastern parts of the peninsula and is elevated between 60 and 80 metres above sea level.
The Plateau remnants occur to the west. The best example of Plateau remnants occur east of the Speedway and behind the Gove Hospital. The plateau and plateau remnants are the remnants of a peneplain which was extending throughout the region during Mesozoic and Tertiary times.

The Plateau and Plateau remnants are surrounded by the Slopes of intermediate level. This unit has developed from plateau during the erosion period. Elevation on its surface ranges from 2 to 40 metres above sea level.

2. HYDROGEOLOGY

The Gove Peninsula is located in the northern part of the Proterozoic Arnhem Block and is covered by geological map Arnhem Bay - Gove NT 1:250 000 Sheet SD53-3/4.

The area is underlain by the Archaean Bradshaw Granite and covered by the Lower Cretaceous Mullaman Beds underlying the Cainozoic sediments. The Bradshaw Granite is outcropping close to the drilling area. The biggest outcrops are on Drimmie Head, Wargarpunda Point and west of Mount Saunders. The Bradshaw Granite consists of foliated garnetiferous granite and garnetiferous gneiss with abundant metamorphic inclusions. It is covered by Mullaman Beds composed mainly of white and yellow sandy claystone, ferruginous sandstone, grits, clean white quartz sandstone, and dolomitic siltstone. The overlying Cainozoic sediments mainly consist of sand, residual soil, lateritic soil, bauxite and laterite. The lateritisation occurred throughout the Northern Territory during the Tertiary peneplanation. Well developed lateritic profiles consists commonly of a ferruginous zone, a mottled zone and a pallid zone.

The investigation drilling carried out in October 1987 in the Gove District Hospital area encountered the major aquifers in weathered zone within granite between 21.0 m and 40.5 m of depth with supply between 0.2 L/s and 2.0 L/s.
3. WATER QUALITY

Water samples were collected during the drilling, and test pumping. The results are given in Table 1. The chemical analysis of the water was carried out by the East Point Laboratory of Water Resources Darwin. The results indicate that the water quality of the production bore are within the recommended limit for drinking water as adopted by the Australian Water Resources Council/National Health and Medical Research Council (Reference 1) except for pH which can be adjusted to an acceptable level with a suitable treatment.

4. WATER DEMAND

The water demand for irrigation at the Gove District Hospital could be met with supply from the Bore 25410 which is estimated to be 112.3 m³/d.

5. RESULTS

During the investigation drilling, four bores (25336, 25337, 25338 and 25410) were drilled and one (25410) was constructed with Class 9 PVC casing and stainless steel screens.

A twenty four hour constant discharge and recovery test was conducted on Bore 25410 and water samples were collected.

The test pump shows that Bore 25410 could yield 1.3 L/s (see Test Report Bore 25410). The maximum continuous pumping rate and pump setting depth is based on available hydraulic data which is considered safe but not conservative.
<table>
<thead>
<tr>
<th>Analysis in milligrams per litre - mg/l. (unless otherwise stated)</th>
<th>GROUNDWATER QUALITY</th>
<th>BORE REGISTERED NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>SODIUM, Na</td>
<td>8</td>
<td>25410</td>
</tr>
<tr>
<td>POTASSIUM, K</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>CALCIUM, Ca</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>MAGNESIUM, Mg</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>TOTAL HARDNESS AS CaCO₃</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>TOTAL ALKALINITY AS CaCO₃</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>IRON (TOTAL) Fe</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>SILICA, SiO₂</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>CHLORIDE, Cl</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>SULPHATE SO₄</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>NITRATE, NO₃</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BICARBONATE, HCO₃⁻</td>
<td>40</td>
<td></td>
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<tr>
<td>FLUORIDE, F</td>
<td>0.1</td>
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</tr>
<tr>
<td>NaCl (CALC FROM CHLORIDE)</td>
<td>270</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>6.1</td>
<td></td>
</tr>
<tr>
<td>SPECIFIC CONDUCTANCE US/CM AT 25°C</td>
<td>590</td>
<td></td>
</tr>
<tr>
<td>TOTAL DISSOLVED SOLIDS (mg/l-bp) EVAP. AT 180°C</td>
<td>340</td>
<td></td>
</tr>
<tr>
<td>DATE OF SAMPLING</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>COMMENTS</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>
6. RECOMMENDATIONS

It is recommended that:

- the pump setting for the Bore 25410 should be 38.0 m from ground level for a pumping rate of 1.3 L/s.
- absorption trenches and septic tanks be located a minimum of 100 metres from the bore.
REFERENCE


TEST REPORT — BORE RN. 25410

Bore location: GOVE DISTRICT HOSPITAL GROUNDS

Map: GOVE 1:100 000 SHEET 6273
Grid reference: 693200 – 8651900

Client/owner: GOVE DISTRICT HOSPITAL
Client’s reference:
Purpose of supply: IRRIGATION

RECOMMENDATIONS
Pumping rate: 1.3 L/s. Pump setting: 38 m below ground level
General recommendations are given on the reverse side.
The aquifer and bore cannot sustain higher pumping rates with deeper pump settings or for short periods in favourable seasons. Further advice can be obtained from: PAWA, Water Directorate (In all correspondence refer to the bore’s RN number).

BORE DATA
Finished depth: 39.4 m
Completion date: 31/10/87
Standing water level: 6.10 m on 21/11/87

Construction details:

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 2.2</td>
<td>203 mm ID Steel casing</td>
</tr>
<tr>
<td>0 – 25.9</td>
<td>147 mm ID PVC Class 9 casing</td>
</tr>
<tr>
<td>25.9 – 39.4</td>
<td>152 mm ID PVC Class 9 casing with 3mm x 200 mm slots</td>
</tr>
</tbody>
</table>

Test date: 20/11/87
Test rates: 1.4 L/s
Test duration: 23 hrs

Notes: 1. Top of casing as constructed was 0.37 m above ground
2. All depths are measured from natural ground level
3. Test rates are not indicative of safe long term pumping rates.

WARNING: MINIMUM INTERNAL BORE DIAMETER IS 147 mm Nominal Size

COMMENTS
1. These recommendations are based on a 20 hour constant drawdown test at fork conditions and a flow rate of 1.4 L/s and assumes hydrologic conditions will remain constant.

2. For long term pumping a suitable pump should be selected to enable continuous pumping whilst bore is at a fork condition.

3. Provision to monitor water levels whilst bore is equipped by installing a 25 mm socket in the bore capping should be incorporated to monitor effects of long term pumping at fork conditions.

WATER QUALITY
See water laboratory report (Analysis No. 87/88/0875)

WRD4020
**POWER AND WATER AUTHORITY**

**WATER DIRECTORATE**

**DEPTH (m)**

**BORE CONSTRUCTION**

**GRAPHIC LOG**

**STRATA DESCRIPTION**

**AQUIFERS (WATER STRUCK)**

- **LATERITE & CLAY**: red, yellow
- **CLAY**: yellow, white
- **GRANITE**: weathered

**COMPOSITE LOG OF BORE**

25410
**TEST REPORT — BORE RN. 25410**

Bore location: GOVE DISTRICT HOSPITAL GROUNDS  
Client/owner: GOVE DISTRICT HOSPITAL  
Purpose of supply: IRRIGATION

Map:  
Grid reference:  

**RECOMMENDATIONS**

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General recommendations are given on the reverse side.  
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**AQUIFER TEST**

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**WATER QUALITY**

See water laboratory report (Analysis No. 87/88/0875)

WRD4020
RECOMMENDATIONS FOR FINISHING, OPERATING AND PROTECTING GROUNDWATER BORES

Attention to the following points will ensure a long and safe life for the bore supply and help prevent pollution of the groundwater resource.

1. Construct a concrete apron around the bore head to prevent surface flow, seepage and waste from entering the bore.

2. Seal the space between the casing and pump equipment to prevent entry of vermin, dirt and pollutants.

3. Maintain pumping equipment in good order to prevent pollution. Prevent spillage of fuel and oil on the ground around the bore. Store fertilizers and other chemicals at least 50 m away.

4. Keep stock away from the bore head. Discourage domestic activity at the bore. The first tap on the pipeline should not be less than 5 m from the bore head.

5. Pumping the bore at higher than recommended rates may fork the bore leading to instability or pump maintenance problems. Seek the professional advice of an hydrogeologist or groundwater engineer.

6. If the bore is no longer required, the casing is to be removed or securely capped and the bore backfilled with clayey material. A cement plug may be required in some instances.

In addition, please ensure that the BORE IDENTIFICATION TAG is retained securely at all times. The registered bore number is Water Resources Division's only reference to the scientific and engineering data on this bore, and hence important to WRD's further advice to bore owners.