WATER RESOURCES DIVISION
Assessment Branch

Report No 69/86 D

Bore Completion Report
Bores 24086 and 24280
Bukadal Outstation

May 1986
Hydrogeology Section
CONTENTS

1. INTRODUCTION
2. HYDROGEOLOGY
3. RESULTS
4. ATTACHMENTS
   BORE LOCATION MAP
   TEST REPORT - BORE RN 24086
   TEST REPORT - BORE RN 24280
   WATER SAMPLE ANALYSIS BORE RN 24086
   WATER SAMPLE ANALYSIS BORE RN 24280

DISTRIBUTION

Assistant Director
Department of Community Development
Darwin

Regional Officer
Department of Community Development
Nhulunbuy

Area Manager
Department of Transport and Works
Nhulunbuy

Water Resources Division Library

Water Resources Division Bore Data File
INTRODUCTION

This report provides details of construction and pumping recommendations for bores drilled at Bukadal Outstation.

The outstation is located approximately 75km south-east of Nhulunbuy at the AMG co-ordinates 744-663 (Caledon 1:100 000 sheet 6272).

Bores 24086, 24087, 24088, 24089, and 24280 were drilled. Bores 24086 and 24280 were successful.

The work was carried out in November 1985 on behalf of the Department of Community Development and involves preliminary investigation, construction and testing of the production bore.

HYDROGEOLOGY

The area is located in the northern part of the Arnhem Block. It is covered by Cainozoic sediment underlain by Caledon Granite of the Lower Proterozoic age. The Cainozoic sediments consist of laterite, lateritic soil, sand, residual soil and sand dunes.

Shallow aquifers with a supply between 0.2 and 0.3 L/s were encountered in Cainozoic sediments.

RESULTS

Five bores 24086, 24087, 24088, 24089 and 24280 were drilled, bores 24086 and 24280 was constructed with PVC casing and stainless steel screens.

A hundred and twenty minute pump test was completed on the bore 24086 and water samples were taken. A ninety minute pump test was completed on the bore 24280 and water samples were taken. Bore 24280 was equiped with a hand pump.

The water quality from bores 24086 and 24280 is considered suitable for human consumption.
TEST REPORT — BORE RN. 24086

Bore location: Bukadale Outstation Yirrakala Cape Shields MagCaledon 1:000 000 Sheet 6272
Grid reference: 744-663

Client/owner: Dept of Community Development
Client's reference: Cape Shields
Purpose of supply: Domestic

RECOMMENDATIONS
Pumping rate: 0.3 L/s. Pump: setting: 12.50 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: Water Resources
(in all correspondence refer to the bore's RN number).

BORE DATA AQUIFER TEST
Finished depth: 16.0m Completion date: 23.11.85 Test date: 29.11.85
Standing water level 1.90m on 23.11.85 Test rates: 0.3 L/s
Construction details: Test duration 2 hrs

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 1.6</td>
<td>152.4 mm ID Steel Surface Casing</td>
</tr>
<tr>
<td>0 to 14.0</td>
<td>100 mm ID Class 9 PVC Casing</td>
</tr>
<tr>
<td>13.10 to 15.70</td>
<td>75 mm Nominal Bore Diameter</td>
</tr>
<tr>
<td>15.70 to 16.0</td>
<td>o.75 mm Stainless Steel Screens with</td>
</tr>
<tr>
<td></td>
<td>Sump and packer Back Filled</td>
</tr>
</tbody>
</table>

Notes:
1. Top of casing as constructed was 0.20 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 72 mm

COMMENTS LITHOLOGY

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 1.6</td>
<td>1.6m Sand: grey</td>
</tr>
<tr>
<td>1.6 - 6.0</td>
<td>6.0m Sand: yellow</td>
</tr>
<tr>
<td>6.0 - 8.0</td>
<td>8.0m Sandy clay: yellow</td>
</tr>
<tr>
<td>8.0 - 12.4</td>
<td>12.4m Clay: red, white, yellow, yellow and laterite</td>
</tr>
<tr>
<td>12.4 - 16.0</td>
<td>16.0m Laterite</td>
</tr>
</tbody>
</table>

WATER QUALITY

See water laboratory report (Analysis No. 85/86/1306)
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 fertilizer 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.

(1) The above recommendations are based on a 2hr airlift and assume hydrologic conditions do not change.

(2) This bore was equipped with a Southern Cross diaphragm hand pump.
WATER RESOURCES DIVISION

TEST REPORT — BORE RN. 24280

Bore location: Bukadale
Outstation Yirrakala
Cape Shields

Client/owner: Dept of Community Development
Client's reference:
Purpose of supply: Domestic

Map: Caledon 1:100 000 Sheet 6272
Grid reference: 744 663

RECOMMENDATIONS

Pumping rate: 0.2 L/s. Pump setting: 9.0 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: Water Resources (In all correspondence refer to the bore's RN number). Sasco House, Darwin.

BORE DATA AQUIFER TEST

Finished depth: 12.0 m Completion date: 28.11.85 Test date: 29.11.85
Standing water level 2.18m on 29.11.85 Test rates: 0.2 L/s
Construction details:

Test duration 90 mins

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 1.6</td>
<td>152.4 mm ID Steel Surface Casing</td>
</tr>
<tr>
<td>0 to 10.6</td>
<td>100 mm ID Class 9 PVC Casing</td>
</tr>
<tr>
<td>9.42 to 12.0</td>
<td>75 mm Nominal Bore Diameter</td>
</tr>
<tr>
<td></td>
<td>0.75 mm Stainless Steel Screens with packer and sump</td>
</tr>
</tbody>
</table>

Notes:
1. Top of casing as constructed was 0.35 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 72 mm

COMMENTS LITHOLOGY

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0m - 1.6m</td>
<td>Sand: brown</td>
</tr>
<tr>
<td>1.6m - 5.2m</td>
<td>Sand: yellow</td>
</tr>
<tr>
<td>5.2m - 7.0m</td>
<td>Sand: yellow with some gravel and clay: gray</td>
</tr>
<tr>
<td>7.0m - 8.8m</td>
<td>Sand: yellow and laterite</td>
</tr>
<tr>
<td>8.8m - 12.0m</td>
<td>Granite: weathered</td>
</tr>
<tr>
<td>12.0m -</td>
<td>Granite</td>
</tr>
</tbody>
</table>

WATER QUALITY

See water laboratory report (Analysis No. 85/86/1304)
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 fertiliser 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.

(1) The above recommendations are based on airlifting and a pump test of 90 minutes at 0.2 litres per second and assume that hydrologic conditions do not change.

BORE LOCATION MAP

Viewed at 15:07:00 on 29/07/2010 Page 7 of 10.
### ANALYSIS - PHYSICAL

- pH: 7.3
- Colour (Hazen units)
- Specific conductance (micromhos/cm at 25°C): 390
- Turbidity (NTU's)
- Total dissolved solids (mg/L - by evaporation at 180°C): 235
- Suspended solids (mg/L)

### ANALYSIS - CHEMICAL (mg/L)

- Sodium (Na): 13
- Chloride (Cl): 22
- Potassium (K): 5
- Sulphate (SO₄): 8
- Calcium (Ca): 27
- Nitrate (NO₃): 2
- Magnesium (Mg): 23
- Bicarbonate (HCO₃): 199
- Total Hardness (as CaCO₃): 163
- Carbonate (CO₃): 1.4
- Total Alkalinity (as CaCO₃): 165
- Orthophosphate (PO₄): 0.3
- Iron (total Fe): 0.3
- Silica (SiO₂): 51
- Sodium Chloride (NaCl calc. from chloride): 35

### ANALYSIS - ADDITIONAL (mg/L)

- Copper (Cu)
- Lead (Pb)
- Arsenic (As)
- Manganese (Mn)
- Zinc (Zn)
- Cadmium (Cd)
- Nickel (Ni)
- Cobalt (Co)

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**THE SAMPLE AS ANALYSED COMPLIES WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRITORY DEPARTMENT OF HEALTH.**

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Analysed By: [Signature]
Date: 16/12/85

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.
**ANALYSIS - PHYSICAL**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.3</td>
</tr>
<tr>
<td>Specific conductance (mhos/cm at 25°C)</td>
<td>290</td>
</tr>
<tr>
<td>Total dissolved solids (mg/L - by evaporation at 180°C)</td>
<td>235</td>
</tr>
</tbody>
</table>

**ANALYSIS - CHEMICAL (mg/L)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium, Na</td>
<td>13</td>
</tr>
<tr>
<td>Chloride, Cl</td>
<td></td>
</tr>
<tr>
<td>Potassium, K</td>
<td>5</td>
</tr>
<tr>
<td>Sulphate, SO₄</td>
<td>8</td>
</tr>
<tr>
<td>Calcium, Ca</td>
<td>27</td>
</tr>
<tr>
<td>Nitrate, NO₃</td>
<td>2</td>
</tr>
<tr>
<td>Magnesium, Mg</td>
<td>23</td>
</tr>
<tr>
<td>Bicarbonate, HCO₃</td>
<td>199</td>
</tr>
<tr>
<td>Total hardness (as CaCO₃)</td>
<td></td>
</tr>
<tr>
<td>Total alkalinity (as CaCO₃)</td>
<td>163</td>
</tr>
<tr>
<td>Fluoride, F</td>
<td>1.4</td>
</tr>
<tr>
<td>Iron, (total) Fe</td>
<td>0.3</td>
</tr>
<tr>
<td>Orthophosphate, PO₄</td>
<td></td>
</tr>
<tr>
<td>Silica, SiO₂</td>
<td>51</td>
</tr>
<tr>
<td>NaCl (rule from chloride)</td>
<td>35</td>
</tr>
</tbody>
</table>

**ANALYSIS - ADDITIONAL (mg/L)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper, Cu</td>
<td></td>
</tr>
<tr>
<td>Lead, Pb</td>
<td></td>
</tr>
<tr>
<td>Arsenic, As</td>
<td></td>
</tr>
<tr>
<td>Manganese, Mn</td>
<td></td>
</tr>
<tr>
<td>Zinc, Zn</td>
<td></td>
</tr>
<tr>
<td>Cadmium, Cd</td>
<td></td>
</tr>
<tr>
<td>Nickel, N</td>
<td></td>
</tr>
<tr>
<td>Cobalt, Co</td>
<td></td>
</tr>
</tbody>
</table>

THE SAMPLE AS ANALYSED COMPLIES WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRITORY DEPARTMENT OF HEALTH.
THE SAMPLE AS ANALYSED \textbf{DOES NOT COMPLY WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRITORY DEPARTMENT OF HEALTH.}

\textbf{Technical Report WRD86069}

\textbf{Date received in Laboratory: 10-12-85}

\textbf{Date of sampling: 29-11-85}

\textbf{Laboratory Register No: 95/86/1304}

\textbf{ANALYSIS - CHEMICAL (mg/L)}

- Sodium, Na: 15
- Potassium, K: 6
- Calcium, Ca: 40
- Magnesium, Mg: 18
- Total Hardness (as CaCO$_3$): 122
- Total Alkalinity (as CaCO$_3$): 121
- Iron (total) Fe: 0.1
- Silica, SiO$_2$: 61
- Chloride, Cl: 18
- Sulphate, SO$_4$: 8
- Nitrate, NO$_3$: 6
- Bicarbonate, HCO$_3$-: 147
- Carbonate, CO$_3$-: 122
- Fluoride, F: 1.7
- Orthophosphate, PO$_4$-: 28
- Sodium, Na: 15
- Potassium, K: 6
- Calcium, Ca: 40
- Magnesium, Mg: 18
- Total Hardness (as CaCO$_3$): 122
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- Carbonate, CO$_3$-: 122
- Fluoride, F: 1.7
- Orthophosphate, PO$_4$-: 28

\textbf{ANALYSIS - ADDITIONAL (mg/L)}

- Copper, Cu: 0.01
- Lead, Pb: 0.005
- Arsenic, As: 0.005
- Manganese, Mn: 0.02
- Zinc, Zn: 0.05
- Cadmium, Cd: 0.005
- Cobalt, Co: 0.01

\textbf{ANALYSIS - PHYSICAL RWT 269}

- pH: 6.7
- Colour (Hazen units): 315
- Suspended solids (mg/L): 210
- Turbidity (NTU's): 10

\textbf{LOCATION AND DETAILS}

- Proposal: Domestic, Stock, Irrigation, other (qty: 0)
- Temp: 30°C
- Cond: 325 G.R.
- 77/248

\textbf{ANALYSIS - ADDITIONAL (mg/L)}

- Copper, Cu: 0.01
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- Cadmium, Cd: 0.005
- Cobalt, Co: 0.01

\textbf{NOTE:}

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\textbf{Date: 10-12-85}

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