NUMBULWAR COMMUNITY
BORE COMPLETION REPORT
RN 30408, 30409 and RN 30910

I MATTHEWS
HYDROGEOLOGIST
WATER RESOURCES BRANCH
DARWIN
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REPORT NO. 18/97D
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LIST OF ABBREVIATIONS

BGL - Below ground level
ID - Inside diameter
km - kilometres
L - litres
L/s - litres per second
m - metres
mg/L - milligrams per litre
mm - millimetres
PVC - Polyvinylchloride
RN - Registered Number
SWL - Standing water level
TD - Total depth
TDS - Total dissolved solids
uS/cm - microSiemens per centimetre
DISTRIBUTION LIST

AES Regional Manager, Darwin  2
Water Resources Division Library, Darwin  3
Water Resources Division Library, Alice Springs  2
DLPE Library, Palmerston  1
1. INTRODUCTION

Water Resources Division (WRD) was requested by Aboriginal Essential Services, Power and Water Authority to drill and construct two bores at Numbulwar (see Figure 1). This drilling was to allow for the replacement of bore RN 24846 and for a bore in a new area to the north of the present borefield.

After further consultation, it was decided to construct and test two production bores and one monitoring bore, all within the present borefield (see Figure 2 for a bore location map). The production bores were drilled remote from RN 24846 due to concerns with iron bacteria problems.

2. HYDROGEOLOGY

The water supply at Numbulwar is extracted from unconsolidated coastal sand sediment deposits of Quaternary age. A paleachannel has been delineated from the drilling and yields up to 4 L/s are available from this aquifer. These sediments are underlain by impermeable, highly weathered Cretaceous siltstone. The water quality is potable.

A separate aquifer in Cretaceous aged sandstone about 7 km north of the borefield has also been delineated. Yields up to 20 L/s are possible. However, due to the very low pH the water is corrosive and would not be suitable for domestic use without some form of treatment. As such, drilling concentrated on the current borefield.

3. RESULTS

3.1 DRILLING

Due to the unconsolidated nature of the sediments, all bores were drilled with mud from the surface.

Bore RN 30408 was drilled midway between production bores RN's 22490 and 22494. Medium grained sand with shell fragments was struck to 2 m with sand and grey and sandy clay encountered to 14 m. Firm brown and white clay was struck to the TD of 16 m. The bore was cased with 154 mm ID steel casing and stainless steel screens and airlifted only 1.5 L/s. Due to the low yield the production casing was removed and the bore reconstructed with 50 mm PVC for monitoring purposes.

Bore RN 30409 was drilled with similar methods 10 m east of RN 30408. The bore struck sand with shell fragments and minor clay to 14 then brown and white clays to the TD of 15.5 m. The bore was cased with 154 mm ID steel with stainless steel screens from 9.5 - 14.5 m. The bore airlifted 3 L/s.

Bore RN 30910 was drilled south of RN 22490 and struck similar strata to that noted above. Stainless steel screens were set from 9.5 - 14.5 m and the bore airlifted 3 L/s.

3.2 PUMP TESTING

Both production bores underwent a 3 x 100 minute step and 8 hour constant rate test.

Bore RN 30409 was pumped for 100 minutes at 1, 2 and 3 L/s. The final drawdown was 3.81 m. Observation bore RN 30408 had a final drawdown of 2.04 m. The 8 hour constant rate test was undertaken at 3.5 L/s with the final drawdown being 4.39 m for the pumped bore and 2.26 m for the observation bore. The transmissivity was approximately 50 m²/day. The available drawdown was 6.5 m. A small amount of fine white sand was pumped through both tests.
The recommended maximum pumping rate for bore RN 30409 is 2.0 L/s with a pump setting of 9.0 m. The water is potable and both the EC (300uS/cm) and the pH (7.7) remained constant throughout the testing procedure. Full details can be found in technical note book number 2744. The bore was chlorinated and capped after testing.

Bore RN 30910 was also pumped for 100 minutes at 1, 2 and 3 L/s. The final drawdown was 5.32 m, while the available drawdown was 5.9 m. Observation bores RN's 22466, 24679 and 30409 were monitored with 0.22 m drawdown being the maximum (at RN 30409).

The recommended maximum pumping rate for bore RN 30410 is 1.5 L/s with a pump setting of 9.0 m. The water is potable and parameters remained constant throughout the test. Full details can be found in technical notebook number 2745. The bore was chlorinated and capped after testing.

4. WATER QUALITY

The water quality from the two new production bores is good with a low TDS. Due to the calcareous sands and shell debris component of the sediments the water exhibits a moderate bicarbonate and hardness level and no acidic pH. The water is suitable for reticulation due to its low corrosion potential.

Water samples from 5 bores were analysed for iron bacteria. The sample for bore RN 22469 contained low numbers (less than 200/ml) of filamentous and non-filamentous iron-associated micro-organisms while bores RN 22494, 24848 and 30409 showed low numbers of non-filamentous micro-organisms only. No iron-associated micro-organisms were detected in the sample from bore RN 30410.
5. RECOMMENDATIONS

1. Bore RN 30409 be equipped at a maximum rate of 2.0 L/s, with a pump setting of 9.0 m. Bore RN 30910 be equipped at a maximum rate of 1.5 L/s with a pump setting also of 9.0 m.

2. The water is potable and non-acidic and can be reticulated without specific treatment.

3. Downhole equipment should be chlorinated prior to transfer between bores within the borefield.

4. Further recommendations for bore equipping are included in the test reports (see Attachment 1).
6. REFERENCES


Fig. 2
<table>
<thead>
<tr>
<th>TABLE 1 - WATER QUALITY DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>BORE REGISTERED NUMBER</td>
</tr>
<tr>
<td>DATE OF SAMPLING</td>
</tr>
<tr>
<td>pH</td>
</tr>
<tr>
<td>ELECTRICAL CONDUCTIVITY (μS at 25 deg C)</td>
</tr>
<tr>
<td>TOTAL DISSOLVED SOLIDS (mg/L by evaporation at 180 deg C)</td>
</tr>
<tr>
<td>SODIUM, Na</td>
</tr>
<tr>
<td>POTASSIUM, K</td>
</tr>
<tr>
<td>CALCIUM, Ca</td>
</tr>
<tr>
<td>MAGNESIUM, Mg</td>
</tr>
<tr>
<td>IRON (TOTAL), Fe</td>
</tr>
<tr>
<td>TOTAL HARDNESS (as CaCO3)</td>
</tr>
<tr>
<td>TOTAL ALKALINITY (as CaCO3)</td>
</tr>
<tr>
<td>SILICA, SiO2</td>
</tr>
<tr>
<td>CHLORIDE, Cl</td>
</tr>
<tr>
<td>SULPHATE, SO4</td>
</tr>
<tr>
<td>NITRATE, NO3</td>
</tr>
<tr>
<td>BI CARBONATE, HCO3</td>
</tr>
<tr>
<td>CARBONATE, CO3</td>
</tr>
<tr>
<td>FLUORIDE, F</td>
</tr>
<tr>
<td>NaCl, (calc from chloride)</td>
</tr>
</tbody>
</table>

Notes:
- Values are environmental quality levels, not health-related limits.
- Maximum recommended levels for potable water. (AWRC/NHMRC, 1987)
**WATER RESOURCES DIVISION**  
**DEPARTMENT OF LANDS PLANNING AND ENVIRONMENT**  
**TEST REPORT - RN 30409**

Bore Location: NUMBULMAR.  
Map: Rose River 1:100,000 Sheet: 6069.  

**Client:** AES.  
**Purpose:** Domestic.

**RECOMMENDATION:**
- Pumping Rate: 2 L/s.  
- Pump Setting: 9 m.

For alternative pumping rates or settings contact: Water Resources, Palm Court, Darwin NT.

In all correspondence please quote bore 30409.

**BORE DATA:**

<table>
<thead>
<tr>
<th>Interval</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5.5 m</td>
<td>203 mm ID steel casing - cemented.</td>
</tr>
<tr>
<td>0 - 9.5 m</td>
<td>154 mm ID steel casing.</td>
</tr>
<tr>
<td>9.5 - 13.5 m</td>
<td>154 mm ID stainless steel screens, 0.5 mm apertures.</td>
</tr>
<tr>
<td>13.5 - 14.5 m</td>
<td>154 mm ID stainless steel sump.</td>
</tr>
</tbody>
</table>

**Notes:**
1. Top of casing as constructed was 1.10 m above ground.  
2. All depths are measured from natural ground level.  
3. Test rates are not necessarily indicative of a sustainable yield for production pumping.

**WARNING:** MINIMUM INTERNAL BORE DIAMETER IS 154 mm.  
MINIMUM INTERNAL BORE DIAMETER TO RECOMMENDED PUMP SETTING IS 154 mm.

**COMMENTS:**

1. The above recommendations are based on a test at rates to 3.5 L/s for 8 hours and assume hydrological conditions remain constant.
2. Provision to monitor water levels and obtain water samples while pumping should be incorporated when equipping this bore.
3. The bore may be subject to flooding.
4. This bore produced fine white sand during testing. This may dissipate with long term pumping.
5. The water quality exceeds Australian Standards for pH.

**WATER ANALYSIS:** 2333.

Prepared by: R Satchell  
26.11.96  
Checked by: B Thatcher
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. 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.

5. If the bore is no longer required the casing is to be securely capped.

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.

BORE LOCATION MAP.
NUMBULWAR BOREFIELD

DEPT (m) | BORE | GRAPHIC LOG | STRATA DESCRIPTION | AQUIFERS (WATER STRUCK)

0 | 1 | Fine grained yellow dune SAND
1 | 2 | Brown and white shells and SAND
2 | 3 | Sandy grey MUD with minor shells
3 | 4 | Medium grained SAND with 30% shell fragments
4 | 5 | Pale grey, medium grained SAND with up to 30% shell fragments
5 | 6 | Dark grey CLAY with some sandy clay
6 | 7 | Grey medium to coarse SAND and well rounded pebbles. Poorly sorted
7 | 8 | Khaki SAND and pebbles as above
8 | 9 | White and brown CLAY with some fine grained sand
9 | 10 | SWL 12-11-96
10 | 11 | 3 L/s
11 | 12 | 2.5
12 | 13 | 2.0
13 | 14 | 1.5
14 | 15 | 1.0
15 | 16 | 0.5
16 | 17 | 0.0

COMPOSITE LOG OF BORE 30409
Bore Location: NUMBULWAR.  
Map: Rose River 1:100,000 Sheet: 6069.  
Grid Reference: 793 - 216. 

Client: AES.  
Purpose: Domestic. 

RECOMMENDATION: Pumping Rate: 1.5 L/s.  
Pump Setting: 9 m. 

For alternative pumping rates or settings contact: - Water Resources, 
General recommendations are on the reverse side. - Palm Court, 
In all correspondence please quote bore 30910. - Darwin NT. 

BORING DATA: 
Finished depth: 14.5 m.  
Completion Date: 28.10.96.  
Standing Water Level: 2.08 m on 16.11.96.  
Test Date: 21.11.96.  
Test Rate: 2.5 L/s. 
Test Duration: 8 hours. 

Interval.  
0 - 5.5 m  
0 - 9.5 m  
9.5 - 13.5 m  
13.5 - 14.5 m  

Description.  
203 mm ID steel casing - cemented.  
154 mm ID steel casing.  
154 mm ID stainless steel screens, 0.5 mm apertures.  
154 mm ID stainless steel sump. 

Notes: 1. Top of casing as constructed was 1.10 m above ground.  
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3. Test rates are not necessarily indicative of a sustainable yield 
   for production pumping. 

WARNING: MINIMUM INTERNAL BORE DIAMETER IS 154 mm. 
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COMMENTS: 
1. The above recommendations are based on a test at rates to 2.5 L/s for 8 hours 
   and assume hydrological conditions remain constant. 
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   should be incorporated when equipping this bore. 
3. The bore may be subject to flooding. 

WATER ANALYSIS: 2336. 
Prepared by: R Setchell  
26.11.96. 
Checked by: B Thatcher
RECOMMENDATIONS FOR FINISHING, OPERATING AND PROTECTING GROUNDWATER BORES.

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4. Keep stock away from the bore head. Discourage domestic activity at the bore.

5. If the bore is no longer required the casing is to be securely capped.

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.

BORE LOCATION MAP.
COMPOSITE LOG OF BORE 30910