POWER AND WATER AUTHORITY
REPORT NO 90/90D

Bore Completion Report
BORE 25996
MANGALAWARRA
OUTSTATION

R Sanders
Hydrogeologist
Water Resources Division
Darwin
April 1990
LIST OF TABLES

1. WATER QUALITY DATA

004RS
<table>
<thead>
<tr>
<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>ID</td>
<td>internal diameter</td>
</tr>
<tr>
<td>km</td>
<td>litre per second</td>
</tr>
<tr>
<td>L/c/d</td>
<td>litre per capita per day</td>
</tr>
<tr>
<td>m</td>
<td>metre</td>
</tr>
<tr>
<td>mm</td>
<td>millimetre</td>
</tr>
<tr>
<td>m³/d</td>
<td>cubic metres per day</td>
</tr>
<tr>
<td>mg/L</td>
<td>milligram per litre</td>
</tr>
<tr>
<td>pH</td>
<td>acidity and alkalinity index</td>
</tr>
<tr>
<td>SWL</td>
<td>standing water level</td>
</tr>
</tbody>
</table>
1. INTRODUCTION

This report provides details of groundwater investigation and drilling for Mangalawarra Outstation (known previously as Jawwarlal and Alyawarra). This work was undertaken by the Water Resources Division of the Power and Water Authority with the aim of constructing a water supply bore to supplement the present bore (RN 14568). The population is expected to range between 60 and 100 people.

The Outstation is situated approximately 19 km west of the Warrego mine site and 3.7 m north of the Lajamanu road along a well formed track. The elevation is about 300 m ASL. The area is covered by Topographic Map Tennant Creek, 1:250 000 Sheet SE53-14 (AMG Grid Reference 352200 - 7856000). The established community is on a plains area bounded on its western edge by a ridge of Cambrian sediments.

The climate is arid. Temperatures are hot in summer and mild in winter. The yearly average rainfall is about 365 mm and is confined mainly to the summer months. Mean annual pan evaporation is about 3900 mm. The streams in the area are seasonal and few waterholes contain water at the end of the dry.

Preliminary hydrogeological study, including aerial photograph interpretation, was undertaken in the office. Drill sites were pegged and rig access checked in September 1988. An initial attempt to drill was unsuccessful due to wet season rains in December 1988. Drilling of one investigation bore and one production bore in April 1989 was followed by pump testing in July of the same year.

2. HYDROGEOLOGY

Regional geology is covered by the 1:250 000 Geological Series Map Tennant Creek (Dodson and Gardener, 1978). The area is located in the Tennant Creek Block near to the eastern edge of the Wiso Basin. It is underlain by sediments of the Proterozoic Hayward Creek Formation. These may are intruded by Proterozoic foliated granites at depth.

The Hayward Creek Formation is made up of quartz or feldspathic sandstones, with some basalt and pebble beds. Hayward Creek rocks are very poor aquifer materials with little primary porosity. Small groundwater supplies do exist however where fracturing of the Proterozoic lithologies exists.
The existing bore, RN 14668, intercepted water at between 68 m and 70 m in sandstone. Bore 25995 was drilled to 140 m and encountered only 0.25 L/s at 72 m depth. The bore, sited 300 m north of RN 14668, intercepted sandy clay to 42 m and sandstone to total depth. Bore 25996, located at the intersection of a geological lineation and a creek bed yielded 1 L/s of potable quality water from sandstone at 91 m depth. Drilling continued to 112 m without an increase in water supply. Bore 25996 was subsequently constructed with slotted steel casing adjacent to the aquifer zone.

3. WATER QUALITY

Water samples were collected during drilling of RN 25995 and RN 25996. Chemical analysis results are within recommended limits for drinking water (AWRC and NHRMC, 1987) and are summarised in Table 1.

4. WATER DEMAND

A population of 60 to 100 people requires a supply of between 0.7 L/s and 1.2 L/s to provide the recommended 1000 L/c/d. Pump test results indicate that this bore should be capable of sustaining up to 1 L/s if a pump setting of 86 m is adopted. This bore should be utilised in combination with RN 14668 which is currently yielding about 0.2 L/S.

5. RESULTS

Two holes have been drilled at Mangalawarra to supplement RN 14668. The second one, RN 25996, has been constructed with slotted steel casing adjacent to the aquifer zone. Pump testing has shown that yields of up to 1 L/s should be sustainable from this bore.
It is recommended that:

- a pump setting of 86 m and a pumping rate of not more than 1 L/s should be adopted;

- absorption trenches and septic tanks should not be constructed within 100 m radius of the bore.

- Further recommendations for bore equipping are included in the Test Report (see Attachments).
REFERENCES


| Analysis in milligrams per litre (mgl) (unless otherwise stated) | bore registered number | date of sampling | specific conductance (μσ/cm at 25°C) | total dissolved solids (mg/l by evap. at 180°C) | pH | sodium, Na | potassium, K | calcium, Ca | magnesium, Mg | total hardness (as CaCO₃) | total alkalinity (as CaCO₃) | iron (total), Fe | silica, SiO₂ | chloride, Cl | sulphate, SO₄ | nitrate, NO₃ | bicarbonate, HCO₃ | fluoride, F | NaCl (calc from chloride) | comments |
| pumped sample | 25906 | 26.4.89 | 225 | 6.9 | 16 | 8 | 8 | 7 | 7 | 66 | 64 | 75 | 4.0 | 28 | 14 | 5 | 3 | 93 | 23 | 28 | 0.2 | 0.4 | 93 | aired lift sample |
| aired lift sample | 25906 | 22.7.89 | 105 | 115 | 7.4 | 12 | 9 | 11 | 7 | 57 | 62 | 62 | u/s | 11 | 14 | 12 | 2 | 75 | 0.3 | 26 | 17 | 33 | 5.6 | comments |
DEPT BORE CONSTRUCTION LOG STRATA DESCRIPTION AQUIFERS (WATER STRUCK)

SANDY CLAY

CLAYSTONE: yellow

SANDSTONE: brown

CLAY: grey

SANDSTONE: white

CEMENT

152mm ID STEEL CASING

152mm ID SLOTTED STEEL CASING

203mm ID STEEL CASING

0.52m

COMPOSITE LOG OF BORE RN 25996

S.W.L. 56.4m 22/7/89

1 L/s
WATER RESOURCES DIVISION

TEST REPORT — BORE RN. 25996

Bore location: Mangalawarra
Client/owner: NT Government
Client's reference: AES
Purpose of supply: Aboriginal Cutstation

Map: TENTANT CREEK 1:250 000 Sheet SE 53-14
Grid reference: 351900 - 7856300

RECOMMENDATIONS
Pumping rate: 1.0 L/s. Pump setting: 86 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 Resources (In all correspondence refer to the bore’s RN number).

BORE DATA
Finished depth: 112.76 m
Completion date: 2/5/89
Standing water level 56.42 m on 22/7/89
Construction details:

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5.98</td>
<td>203 mm ID Steel casing cemented</td>
</tr>
<tr>
<td>0 - 88.65</td>
<td>152 mm ID Blank steel casing</td>
</tr>
<tr>
<td>88.65 - 100.65</td>
<td>152 mm ID Oxy slotted steel casing</td>
</tr>
<tr>
<td>100.65 - 112.76</td>
<td>152 mm ID Blank steel casing sump</td>
</tr>
</tbody>
</table>

Notes: 1. Top of casing as constructed was 0.52 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 152 mm

COMMENTS
1. The above recommendations are based on a constant rate test of 1 L/s for 500 minutes and assume hydrological conditions remained constant.
2. Provisions to obtain water samples should be incorporated in the reticulation.

WATER QUALITY

See water laboratory report (Analysis No.)
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.