Bore Completion Report

BORE 27215

KULCHILL OUTSTATION

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Darwin
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**LIST OF ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</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>kilometre</td>
</tr>
<tr>
<td>L/c/d</td>
<td>litre per capita per day</td>
</tr>
<tr>
<td>L/d</td>
<td>litre per day</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>ML</td>
<td>megalitre</td>
</tr>
<tr>
<td>m³/d</td>
<td>cubic metres per day</td>
</tr>
<tr>
<td>pH</td>
<td>acidity and alkalinity index</td>
</tr>
<tr>
<td>u/cm</td>
<td>microsiemens per centimetre</td>
</tr>
</tbody>
</table>
1. INTRODUCTION

The objective of this work was to drill and construct a production bore for Kulshill Outstation. The first production bores for this community were drilled and constructed during 1989. These bores (20221 and 20222) were destroyed and another production bore was drilled in close vicinity to the previous one, by Water Resources Division on behalf of Aboriginal Essential Services of the Power and Water Authority.

The Kulshill Outstation is an outstation of Port Keats. It is located 300 km south west from Darwin and is accessible by road throughout the year.

Geomorphologically the area is located within the Cambridge Gulf Lowlands Unit. It mainly consists of flat and low-lying soil and marshy alluvium plains. Much of the coast and river estuaries are bordered by salt flats and at several places low coastal sand dunes support considerable vegetation.

The outstation lies in monsoonal climate with a mean annual rainfall of 2100 mm. Most of the rain falls between October and April. The annual mean temperatures are 32°C maximum and 20°C minimum.

2. HYDROGEOLOGY

Geologically the area lies within the Joseph Bonaparte Gulf. It is covered by sediments of the Mullaman Beds of the Lower Cretaceous age underlain by Permian sediments. The Mullaman Beds mainly consist of claystone, siltstone and sandstone. The Permian sediments are composed of siltstone, silty sandstone, minor limestone, local conglomerate and diamicite.

The outstation area is underlain by the Permian sediments which is known as a good water bearing formation. Bore 27215 was selected based on stratigraphy. It intersected Permian sandstone to 49.1 m and encountered an aquifer between 47.0 m and 48.9 m with a supply of 5 L/s (airlift).

3. WATER QUALITY

Water quality details from the Bore 27215 drilled in Kulshill outstation are summarised in Table 1. The water quality is within the recommended limit for drinking water as adopted by the Australian Water Resources Council/National Health and Medical Research Council (Reference 1).
<table>
<thead>
<tr>
<th>COMMENT</th>
<th>PRODUCTION BORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iodide</td>
<td>NaCl</td>
</tr>
<tr>
<td>Fluoride</td>
<td>F</td>
</tr>
<tr>
<td>Bicarbonate</td>
<td>HCO₃⁻</td>
</tr>
<tr>
<td>Nitrate</td>
<td>NO₃⁻</td>
</tr>
<tr>
<td>Sulphate</td>
<td>SO₄²⁻</td>
</tr>
<tr>
<td>Chloride</td>
<td>Cl⁻</td>
</tr>
<tr>
<td>Bicarbonate</td>
<td>CO₃²⁻</td>
</tr>
<tr>
<td>Calcium</td>
<td>Ca²⁺</td>
</tr>
<tr>
<td>Potassium</td>
<td>K⁺</td>
</tr>
<tr>
<td>Sodium</td>
<td>Na⁺</td>
</tr>
<tr>
<td>pH</td>
<td>6.5</td>
</tr>
<tr>
<td>Total dissolved solids</td>
<td>160</td>
</tr>
<tr>
<td>Total alkalinity</td>
<td>47</td>
</tr>
<tr>
<td>Specific conductance</td>
<td>120</td>
</tr>
<tr>
<td>Date of sampling</td>
<td>17.10.09</td>
</tr>
<tr>
<td>Bore Registered Number</td>
<td>22725</td>
</tr>
</tbody>
</table>

WATER QUALITY DATA

Analysis in milligrams per litre - mg/L (unless otherwise stated)
4. WATER DEMAND

The water demand for Kulshill Outstation is estimated to be about 50.0 m$^3$/d. The demand can be met from Bore 27215 which is capable of yielding up to 216.0 m$^3$/d.

5. RESULTS

The production bore 27215 was drilled and constructed with PVC Class 9 casing and stainless steel screens. The bore is located at AMG co-ordinates 561900 - 8505000.

A four hundred minute constant discharge test and recovery test were conducted on Bore 27215 and water samples were collected.

The pump test report indicates a maximum pumping rate of 2.5 L/s with the relevant pump setting of 20.0 m below ground level (Test Report Bore RN 27215).

The maximum continuous pumping rate and pump setting depth are based on the available hydraulic data which are considered safe but not conservative.

6. RECOMMENDATIONS

It is recommended that:

- the pump setting depth should be 10 m below ground level for a maximum pumping rate of 0.5 L/s.
- the pump setting depth should be 14 m below ground level for a maximum pumping rate of 1.5 L/s.
- the pump setting depth should be 12 m below ground level for a maximum pumping rate of 1.0 L/s.
- the pump setting depth should be 18 m below ground level for a maximum pumping rate of 2.0 L/s.
- the pump setting depth should be 20 m below ground level for a maximum pumping rate of 2.5 L/s.
- absorption trenches and septic tanks be located at a minimum of 100 metres from the bores.
REFERENCES


023DK
WATER DIRECTORATE

TEST REPORT — BORE RN. 27215

Bore location: KULCHILL OUTSTATION
Client/owner: AES

PORT KEATS
Client's reference:
Purpose of supply: Domestic

Map: PORT KEATS 1:100 000 Sheet 4869
Grid reference: 561900 - 8505000

RECOMMENDATIONS
Pumping rate: 2.5 L/s. Pump setting: 20 m below ground level
General recommendations are given on the reverse side.
The aquifer and bore can currently 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).

SASCO House, DARWIN NT

BORE DATA
Finished depth: 49.1 m Completion date: 3/10/90 Test date: 17/10/90
Standing water level 3.93 m on 16/10/90 Test rates: multi-rate to 4.65 L/s
Construction details:
Test duration 400 minutes

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 3</td>
<td>203 mm ID Steel casing</td>
</tr>
<tr>
<td>0 - 46.8</td>
<td>146 mm ID PVC Class 9 casing</td>
</tr>
<tr>
<td>46.8 - 48.8</td>
<td>113 mm ID Stainless steel screens with 0.4 mm aperture</td>
</tr>
<tr>
<td>48.8 - 49.1</td>
<td>113 mm ID Stainless steel sump</td>
</tr>
</tbody>
</table>

Notes: 1. Top of casing as constructed was 1.05 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 113 mm Inside screens

COMMENTS
1. The above recommendations are based on multirate test up to 4.65 L/s for 400 minutes and assume hydrological conditions remain constant.

2. Provision should be made when equipping the bore to allow water levels to be monitored while pump is operating.

3. For lower pumping rates setting can be as follows:
- 0.5 L/s pump setting 10 m
- 1.0 L/s pump setting 12 m
- 1.5 L/s pump setting 14 m
- 2.0 L/s pump setting 18 m

WATER QUALITY

See water laboratory report (Analysis No. 90/91/0385)
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.
POWER AND WATER AUTHORITY

DEPTH (m) | BORE CONSTRUCTION | GRAPHIC LOG | STRATA DESCRIPTION | AQUIFERS (WATER STRUCK)
---|---|---|---|---
0 | CEMENT | LATERITE and CLAY | CLAY: yellow and white | SWL 3.33m 16/10/90
5 | 146mm ID PVC CASING CLASS 9 | LATERITE and SANDY CLAY | CLAY: yellow, white and grey
10 | 203mm ID STEEL CASING | SANDSTONE: yellow, brown and CLAY | CLAY: grey
15 | GRAVEL PACK | SANDSTONE: brown and CLAY | CLAY: grey and yellow
20 | CEMENT | SANDSTONE: grey and CLAY | CLAY: black
25 | SUMP SCREEN 6.4mm APERTURE | SANDSTONE: brown and CLAY | SANDSTONE: brown and CLAY
30 | 113mm ID TELESCOPIC STAINLESS STEEL CASING | SANDSTONE: yellow, white and CLAY | SANDSTONE: yellow, white
35 | PACKER | SANDSTONE: white | SANDSTONE: white
40 | 113mm ID SUMP STAINLESS STEEL | SANDSTONE: yellow, white | SANDSTONE: yellow, white
45 | 113mm ID TELESCOPIC STAINLESS STEEL | SANDSTONE: brown and CLAY | SANDSTONE: brown and CLAY
50

COMPOSITE LOG OF BORE 27215