POWER AND WATER AUTHORITY
REPORT NO 69/89D

Bore Completion Report
BORE 26067
SURPRISE CREEK OUTSTATION
(CALVERT HILLS)

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CONTENTS

1. INTRODUCTION
2. HYDROGEOLOGY
3. WATER QUALITY
4. WATER DEMAND
5. RESULTS
6. RECOMMENDATIONS
REFERENCES

ATTACHMENTS

1. BORE LOCATION PLAN
2. COMPOSITE LOG OF BORE 26067
3. TEST REPORT - BORE 26067

DISTRIBUTION

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Water Directorate (Darryl Day) 2
Water Directorate Library, Darwin 2
Water Directorate Library, Alice Springs 1
Water Directorate Bore Data File 1
Hydrogeology Branch, Darwin 3
Area Manager, Power and Water Authority, Katherine 1

015:GDWT3
LIST OF TABLES

1. STRATIGRAPHY AND LITHOLOGY
2. WATER QUALITY DATA
**LIST OF ABBREVIATIONS**

<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>GL</td>
<td>ground level</td>
</tr>
<tr>
<td>ID</td>
<td>internal diameter</td>
</tr>
<tr>
<td>km</td>
<td>kilometre</td>
</tr>
<tr>
<td>L/s</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>milligrams 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 investigations and drilling on an excision of Calvert Hills Station. This work was undertaken by the Power and Water Authority with the aim of constructing one water supply bore for the proposed Surprise Creek Aboriginal Outstation. The population may be in excess of 20 people.

The excision lies approximately 3 km upstream of the Surprise Creek crossing of the Borroloola to Queensland Road. This is near to the crossing of Surprise Creek by an old well formed track, and approximately 160 km SE of Borroloola. This area is covered by the 1:100 000 Topographic Map Pungalina, Sheet 6364 (AMG Grid Reference 735200 - 8131200).

The site is on an area of elevated plains at a level of about 150 m ASL. Annual rainfall averages between 700 mm and 800 mm and is almost entirely confined to the monsoon period, December to March. Annual average evaporation is about 2600 mm.

The preliminary hydrogeological study, interpretation of aerial photographs, hydrochemical and other relevant studies were carried out in the office. This was followed by field reconnaissance in September 1988 during which three sites were selected for possible drilling and access checked. Drilling was undertaken in October and the production bore was pump tested in November 1988.

2. HYDROGEOLOGY

Regional geology is covered by the 1:250 000 Geological Series Map, Robinson River (Reference 1). The area lies in the McArthur Basin and is underlain by rocks of Lower Proterozoic age with a veneer of Cainozoic sediments. Local stratigraphy is shown in Table 1.
TABLE 1 STRATIGRAPHY AND LITHOLOGY

<table>
<thead>
<tr>
<th>CAINozoIC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(CZS)</td>
<td>Soil, sand, laterite</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LOWER PROTEROZOIC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>McArthur Group</td>
<td>Karns Dolomite (Pmk). dolomite, dolarenite, oolitic chert.</td>
</tr>
<tr>
<td></td>
<td>Masterton Formation (Ptn). sandstone, feldspathic sandstone, conglomerate.</td>
</tr>
<tr>
<td></td>
<td>- with possible intercalated Gold Creek Volcanics (Ptg) - andesine basalt, tuffaceous siltstone.</td>
</tr>
<tr>
<td></td>
<td>Wollogorang Formation (Pto) dolomitic siltstone, feldspathic sandstone, dolarenite, silty and sandy dolomite.</td>
</tr>
</tbody>
</table>

Three bore sites were selected to take advantage of secondary porosity within the Lower Proterozoic sediments. These were located on geological lineaments interpreted from aerial photographs and observed during ground reconnaissance. Bore 26067, the only one drilled, intercepted an aquifer of fractured dolomite and chert between 27 m and 30 m. This yielded approximately 10 L/s (airlift) of good quality water. The bore was drilled to a total depth of 64.6m with no increase in discharge.

3. WATER QUALITY

Water samples were collected during pump testing of Bore 26067. Water quality analysis results are summarised in Table 2. Results are within recommended limits for drinking water as adopted by the Australian Water Resources Council/National Health and Medical Research Council (Reference 2).
| BORE REGISTERED NUMBER | DATE OF SAMPLING | SPECIFIC CONDUCANCE (μS/cm AT 25°C) | TOTAL SOLIDS SOLIDS mg/L BY EVAP AT 105°C | pH | SODIUM, Na | POTASSIUM, K | CALCIUM, Ca | MAGNESIUM, Mg | TOTAL HARDNESS (AS CaO) | TOTAL ALKALITY (AS CaO) | IRON (TOTAL Fe) | SILICA, SiO₂ | CHLORIDE, Cl⁻ | SULPHATE, SO₄ | NITRATE, NO₃ | BICARBONATE, HCO₃ | FLUORIDE, F | NACL (CALC FROM CHLORIDE) | COMMENTS |
|------------------------|------------------|--------------------------------------|---------------------------------------------|----|-------------|--------------|-------------|--------------|----------------|----------------|---------------|-------------|--------------|---------------|-------------|--------------|----------------|----------------|----------------|----------|
| 26067                  | 21.10.88         | 430                                  | 245                                         | 7.8 | 5           | 4            | 42          | 27           | 216            | 223            | 9.7           | 25          | 12           | 6             | <1           | 272           | 0.2          | 20            | Airlift sample |
| 26067                  | 7.11.88          | 430                                  | 240                                         | 7.1 | 5           | 3            | 42          | 29           | 224            | 222            | 0.5           | 25          | 8            | 6             | <1           | 271           | 0.1          | 13            | Pumped sample  |

Analysis in milligrams per litre - mg/L (unless otherwise stated)

**WATER QUALITY DATA**
4. WATER DEMAND

The proposed population of 20 people would require a supply of 0.5 L/s. This calculation is based on 1000 L/c/d. However, pump test data indicates that Bore 26067 could probably meet further water demand up to 8 L/s.

5. RESULTS

Bore 26067 has been drilled and constructed with steel casing slotted adjacent to the aquifer zone. Water samples were collected while drilling and pump testing. Discharge rates of up to 8 L/s of potable quality water may be sustainable from Bore 26067.

6. RECOMMENDATIONS

It is recommended that:-

- the pump setting for Bore 26067 should be 27 m below ground level for a pumping rate of 8 L/s.

- septic tanks and absorption trenches should be located a minimum of 100 m from the bore.
REFERENCES


TEST REPORT — BORE RN. 26067

Bore location: SURPRISE CREEK OUTSTATION

Client/owner: CHent's reference:

Client's reference: Purpose of supply: Domestic

Map: PUNGALINA 1:100 000 Sheet 6364

Grid reference: 735000 8130700

RECOMMENDATIONS

Pumping rate: 8.0 L/s. Pump setting: 27.0 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 for short periods in favourable seasons. Further advice can be obtained from: PAVA, Water Directorate (in all correspondence refer to the bore's RN number). SASCO House, DARWIN NT

BORE DATA

Finished depth: 63.9 m Completion date: 21/10/88 Test date: 7/11/88

Standing water level: 8.58 m on 7/11/88 Test rates: 8.0 L/s

Construction details: Test duration 8 hrs

Interval (m) Description
0 - 6.3 203 mm ID Steel Casing
0 - 28 152.4 mm ID Steel Casing
28 - 34 152.4 mm ID Steel Casing with perforations
34 - 44 152.4 mm ID Steel Casing
44 - 63.9 Open Hole

AQUIFER TEST

Notes: 1. Top of casing as constructed was 0.90 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 152.4 mm

COMMENTS

1. The above recommendations are based on a constant rate test at 8 L/s for 8 hours and assume that hydrological conditions remain constant.

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

3. For pumping rates to 5 L/s pump may be set at 16 metres.

WATER QUALITY

See water laboratory report (Analysis No. 88/89/0930)
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 claysy 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.
AMCo Grid References

Surprise Creek O/S 735200 - 8131200

Bore 26067 735000 - 8130700
POWER AND WATER AUTHORITY

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015:GDWT3
### AQUIFERS DEPTH BORE GRAPHIC

#### STRATA DESCRIPTION

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Construction Log</th>
<th>Graphic Log</th>
<th>Strata Description</th>
<th>Aquifers (Water Struck)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Alluvial sands</td>
<td></td>
<td>0-3 m Alluvial sands</td>
<td></td>
</tr>
<tr>
<td>3-18</td>
<td>Brown clay</td>
<td></td>
<td>3-18 m Brown clay</td>
<td></td>
</tr>
<tr>
<td>18-40</td>
<td>Dolomite and chert</td>
<td></td>
<td>18-40 m Dolomite and chert</td>
<td></td>
</tr>
<tr>
<td>40-64.6</td>
<td>Chert and sandstone</td>
<td></td>
<td>40-64.6 m Chert and sandstone</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>64.6 m</td>
<td>8.58 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7/11/88</td>
</tr>
</tbody>
</table>

**COMPOSITE LOG OF BORE 26067**