N Power
Senior Engineer Groundwater
July 1987
1. **INTRODUCTION**

In line with the brief of the Alice Springs Water Supply Augmentation Study this is the first of four production bores to be drilled in the Roe Creek borefield to meet the projected peak day demand of Alice Springs.

The bore has been constructed south of production bore RN 6520 (P8) and will ultimately replace it.

2. **GEOLOGY**

Bore 14864 has been constructed down dip of bore 6520 in the upper unit of the Merenie Sandstone Formation. The current augmentation study has divided the Merenie Sandstone Formation into two units. When the job brief was written it was thought that the main producing zone in fractured sandstone of the upper unit, identified in the other production bores west of Roe Creek as being between approximately 150m - 200m below ground level, would follow the dip of the Formation. Under this interpretation the bore casing was to be set at a minimum depth of 200m and water extracted from the aquifer below this depth. The investigation drilling to locate suitable sites for the four production bores determined, however, that the main producing zone did not follow the dip of the Formation but stayed at the same topographic level below ground level as defined above.

Bore 14864 has been constructed as shown in the Appendix with the casing set at 174.8m. The bore extracts water from the main producing zone between 176.9 - 212.8m. From this zone the bore is hydraulically capable of yielding in excess of 100 L/s for pump drawdowns of approximately 5m. Testing of an investigation borehole beside 14864 indicates that with casing set at 200m and the borehole deepend to around 290m, the bore would be hydraulically less efficient with a pump drawdown of around 12m at 85 L/s. Investigation drilling and testing, however, indicate that this result is not uniform across the aquifer west of Roe Creek.

3. **WATER QUALITY**

Chemical water quality analysis is attached in the Appendix. The quality is typical of the water being extracted from the aquifer in this part of the borefield.
4. **BOREFIELD PERFORMANCE**

The surveyed ground level of the bore is RL 552.505m AHD. The top of casing level is 552.716m AHD.

Increasing extraction from the Merenie Sandstone since 1964 has established a "Mining" situation where the potentiometric surface (water level) is being drawn down across the borefield West of Roe Creek. This rate of decline is around 2.5m per year. In April 1987 the standing water level in 14864 was 132.5m below ground level (RL 420.00m AHD). As the drawdown in 14864 due to pumping will be approximately 5m at the operational pumping rates, the main determinant of the pump setting and ultimate life of the bore is the rate of decline of the potentionmetric surface. The following recommendations on pumping rates and pump setting are framed with this situation in mind.

5. **RECOMMENDATIONS**

**PUMPING RATE**

The prediction of the performance of RN 14864 is based on short term pumping tests up to 78 L/s. It is hydraulically possible to pump the bore at higher rates but field testing will be required to confirm the drawdowns and hole stability at these rates. A specific pumping rate has not been recommended but rather a drawdown verses time curve for three pumping rates 60, 75 and 84 L/sec and indicative drawdown curves at 100, 120 and 150 L/s. These curves are shown in the Appendix. The curves have been prepared under three sets of pumping conditions which are:

1. Continuous pumping without regional drawdown.
2. Continuous pumping with 2.5m per year regional drawdown.
3. Intermittent pumping for 8 hours per day with a 2.5m per year regional drawdown.

For pumping rates up to 84 L/s the curves include an allowance of 1m drawdown due to interference from pumping of the nearby production bores. For the higher rates an allowance of 1.5m drawdown due to interference has been allowed which assumes the neighbouring bores are also pumping at similar rates.
PUMP SETTING

A pump setting of 150.5m has been recommended. This setting should be sufficient for five years before the pump needs to be lowered. A two metre submergence over the pump intake has been included in this recommended pump setting.

Water Resources should be contacted to recommend a further pump setting in five years time so that the bores performance and expected lifetime can be re-assessed.

Provision should be made to fit a water level measuring device such as an airline when equipping the bore.
APPENDIX

TEST REPORTS
Bore location: Roe Creek Borefield
Client/owner: NT Government
Client's reference: P24
Purpose of supply: Town Water

Map: SF 53.14
Grid reference: 379 350 ME 7366 350 mN

RECOMMENDATIONS
Pumping rate: see curve L/s. Pump setting: 150.5 m below ground level
General recommendations are given on the reverse side.
The aquifer and bore can 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). North Stuart Hwy Alice Springs

BORE DATA
Finished depth: 227 m Completion date: 1/4/87 Test date: 22/4/87
Standing water level 132.5 m on 13/4/87 Test rates: 66 L/s
Construction details:

Interval (m) Description
0 - 9.4 508 mm OD Blank Casing
0 - 174.8 400 mm OD Blank Casing/ 387 mm ID
173.4 - 173.8 Packer
173.4 - 176.9 254 mm ID Blank Casing
176.9 - 212.84 3.5 mm Aperture Stainless Steel Screens
212.84 - 227.0 254 mm Blank Casing with sub 2 7/8" IF pin or

Notes:
1. Top of casing as constructed was 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 25 mm

COMMENTS
SEE ATTACHED COMMENTS

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.
508mm OD STEEL CASING

400mm OD STEEL CASING / 387mm ID

PACKER 173.4 - 173.8

3.5mm APERTURE STAINLESS STEEL SCREEN

254mm ID BLANK CASING

SUB 2% IF PIN WELDED TO BASE

ROE CREEK RN 14864
**LOCATION AND DETAILS**

ROE CREEK PRODUCTION BORE R/N 14864 DEPTH 150m ASL 65125 TEMP 32°C COND 720 40V NO 7653

Proposed water use:- Domestic, Stock, Irrigation. other (specify)  

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### ANALYSIS – PHYSICAL

- **pH**: 7.8
- **Colour (Hazen units)**:  
- **Specific conductance (microsiemens/cm at 25°C)**: 840
- **Turbidity (NTU's)**:  
- **Total dissolved solids (mg/L - by evaporation at 180°C)**: 475
- **Suspended solids (mg/L)**:  

### ANALYSIS – CHEMICAL (mg/L)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>Sodium, Na</td>
<td>97</td>
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<tr>
<td>Chloride, Cl</td>
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<tr>
<td>Potassium, K</td>
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<tr>
<td>Sulphate, SO₄</td>
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<tr>
<td>Calcium, Ca</td>
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<tr>
<td>Nitrate, NO₃</td>
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<tr>
<td>Magnesium, Mg</td>
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<tr>
<td>Bicarbonate, HCO₃</td>
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<tr>
<td>Total Hardness (as CaCO₃)</td>
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<tr>
<td>Carbonate, CO₃</td>
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<tr>
<td>Total Alkalinity (as CaCO₃)</td>
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<td>Fluoride, F</td>
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<tr>
<td>Orthophosphate, PO₄</td>
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<td>Silica, SiO₂</td>
<td>19</td>
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<tr>
<td>NaCl (calc. from chloride)</td>
<td>112</td>
</tr>
</tbody>
</table>

### ANALYSIS – ADDITIONAL (mg/L)

- **Copper, Cu**:  
- **Lead, Pb**:  
- **Arsenic, As**:  
- **Manganese, Mn**:  
- **Zinc, Zn**:  
- **Cadmium, Cd**:  
- **Nickel, N**:  
- **Cobalt, Co**:  

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

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