SANDOVER HIGHWAY
ROAD MAINTENANCE BORES
1991 DRILLING PROGRAMME

K BERRY
WATER RESOURCES BRANCH
ALICE SPRINGS

DECEMBER, 1991
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Water Resources Branch Alice Springs Library
Author
Principal Engineer Groundwater
Darwin Library

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1.0 INTRODUCTION

In July of 1991 the WRB was engaged by the Department of Transport and Works to arrange the construction of bores near Utopia and Ammaroo on the Sandover Highway. Rehabilitation of the roads bore near Urapuntja Store (RN 13724) was also sought.

Following the completion of this work in August 1991, remaining funds were used to construct an additional bore near Argadargada in November 1991. The locations of all bores are shown in Figure 1.

Transport and Works have a general requirement of a minimum yield of 2 l/s for road maintenance bores. Bores are not test pumped, so performance is determined by airlift yield during drilling and after casing.
2.0 DRILLING NEAR UTOPIA

2.1 Background

The requested site was at chainage 115 km, with an attached map showing a site at 120 km from the Plenty Highway. There are sporadic outcrops of lithic sandstone of the Central Mount Stuart Beds and gneiss of the Arunta Complex in the area (Shaw et al, 1975). Prospects of obtaining a supply of 2 l/s from these rock types are poor.

Sites were selected at chainage 128 km, targeting the Tomahawk Beds, and at 123 km, targeting Sandover River alluvium and/or faulted bedrock.

2.2 DRILLING RESULTS

The first site drilled was at the western foot of the Tomahawk Range (RN 15864). The Range comprises Tomahawk Beds which have low dips in the area. It was hoped that drilling would intersect clean sandstone or limestone such as outcrops near the drillsite. The hole was drilled to a total depth of 120 m through interbedded siltstone and non-porous sandstone. No groundwater was produced. A geologic log of samples collected during drilling is presented in Appendix A. The best reference section for Tomahawk beds is drillhole NTGS ELK6 (Stidolph, et al 1988). Correlation suggests RN 15865 was spudded near the top of the Formation and remained within the middle and upper units. Prospects within the Formation may be better where the more dolomitic lower unit occurs at shallower depths. Most drilling in the Tomahawk Beds has been on the Huckitta Map sheet area where results are variable.

The second drillsite at chainage 123 km from the Plenty Highway, intersected coarse-grained Cainozoic alluvium to 54 metres, and was cased as a production bore. The final airlift yield from 30 metres was 4 L/s. A Composite Bore
Log is shown as Figure 2. A test report giving details required to equip the bore is given in Appendix A. Bore data is summarized in Section 6.
3.0 REHABILITATION OF BORE EN 13724 NEAR URAPUNTJA

The bore is located at chainage 154 km from the Plenty Highway. The drilling rig was used to clear the bore from 26 metres to the original total depth of 54 metres. Material cleared from the bore included stones, sticks and PVC pipe. Airlift after the cleanout was 2 L/s indicating no loss of performance. The screw cap was spot welded to the casing to prevent further vandalism.

4.0 DRILLING NEAR AMMAROO HOMESTEAD

A drillsite was selected at chainage 222.5 km from the Plenty Highway, at the clients desired location. The drilling target was the Chabalowe formation. This was intersected at 54-78 metres below a thick zone of clayey regolith. The lithologies encountered were interbedded sandstone, siltstone and dolomite, this being typical of the upper unit of the Formation (Stidolph et al, 1988). The airlift yield after casing the bore was 3 L/s from 65 m depth.

A Composite Bore Log is shown as Figure 3. A test report giving details required for equipping the bore is given in Appendix A. Bore data is summarized in Section 6.

5.0 DRILLING NEAR THE ARGADARGADA HOMESTEAD

5.1 BACKGROUND

The requested bore location was at or nearby to the east of the Argadargada access road turn off. The area is underlain by the very thick and extensive Arrinthroonga Formation. Locally the Highway is oriented along strike and crosses an extensive sand sheet with no outcrop or air-photo features.
Since there was little scope for geologic input into siting the bore and success rates in the area approach 100%, the bore inspector was instructed to drill where access to the road shoulder was possible, to a target depth of 180-190m. The first site was located at the Annitowa turnoff, a second site was drilled a further 12.5 km NE near Carbeen Bore, these sites were abandoned uncased. A third site was later drilled successfully on the Argadargada access road near Mulga Bore.

5.2 DRILLING RESULTS

Site 1 (RN 16050) was drilled to a total depth of 186 metres. Siltstone and porous, well sorted sandstone to a depth of 105 metres, and underlying dolomite to total depth, are part of the middle and lower units of the Arrinthurunga Formation respectively (Stidolph et al, 1988). The drilled interval is correlated on lithologic descriptions with the interval 1100-1700 ft in bore BMR 13 Sandover (Smith, 1967), located near RN 13016 (Figure 1). Groundwater was airlifted from the hole between 174 and 186 metres depth during drilling. The rate rose briefly to 2 L/s then dropped to 0.3 L/s.

Site 2 RN16051 was drilled to a total depth of 139 metres through dolomite and dolarenite. Lithologic descriptions correspond to those of the Lower Carbonate Unit of the Arrinthurunga Formation. The movement down through the stratigraphic sequence from BMR 13 Sandover to RN 16050 to RN 16051 probably indicates a swing in strike from NE in eastern ELKEDRA to EW or SE in western SANDOVER. There was minor seepage from 95 metres. The hole was abandoned in hard dolomite at 139 metres.

Lithologic descriptions of samples from drillholes RN 16050 and 16051 are included in Appendix A.
The third site drilled was successfully completed as a production bore (RN 16059). The bore is located on the Argadargada access road 1.8 km from the Sandover Highway near Mulga Bore. The bore intersected 36 metres of coarse-grained alluvium overlying caprock and grey dolomite to a total depth of 48.5 metres. The stratigraphic position of the dolomite within the Arrinthrunga formation is unknown. A maximum airlift yield of 2 L/S was obtained. A Composite Bore log for RN 16059 is shown as Figure 4. A test report giving details required for equipping the bore is given in Appendix A. Bore data is summarized in section 6.

6.0 SUMMARY OF ROADS BORES ON THE SANDOVER HIGHWAY

The completion of three new production bores brings the total number of road maintenance bores on the Sandover Highway to ten. Location and equipment data for these bores is tabulated below. A summary of all bores within 3 km of the Highway with yield greater than 1.0 L/S is presented in a previous WRB report (Garner and Wiegele, 1991).

<table>
<thead>
<tr>
<th>RN</th>
<th>CHAINAGE from Plenty Hwy (km)</th>
<th>TOTAL DEPTH (m)</th>
<th>AIRLIFT YIELD (L/S)</th>
<th>SWL (m)</th>
<th>REC PUMP SETTING (m)</th>
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<tbody>
<tr>
<td>13336</td>
<td>43</td>
<td>90</td>
<td>1.9</td>
<td>52</td>
<td>80</td>
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<tr>
<td>13337</td>
<td>60</td>
<td>43</td>
<td>3.2</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>15866*</td>
<td>123</td>
<td>54</td>
<td>4.0</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>13724</td>
<td>154</td>
<td>54</td>
<td>2.3</td>
<td>30</td>
<td>43</td>
</tr>
<tr>
<td>15867*</td>
<td>222</td>
<td>78</td>
<td>3.0</td>
<td>53</td>
<td>66</td>
</tr>
<tr>
<td>13987</td>
<td>253</td>
<td>198</td>
<td>5.0</td>
<td>78</td>
<td>190</td>
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<tr>
<td>13015</td>
<td>279</td>
<td>88</td>
<td>2.6</td>
<td>50</td>
<td>75</td>
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<td>13016</td>
<td>323</td>
<td>46</td>
<td>10.0</td>
<td>24</td>
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<td>13017</td>
<td>352</td>
<td>58</td>
<td>8.0</td>
<td>27</td>
<td>50</td>
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<td>16059*</td>
<td>373</td>
<td>48.5</td>
<td>2.0</td>
<td>33</td>
<td>40</td>
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</table>

* Denotes - drilled as part of this programme.
7. REFERENCES


Shaw et al, 1975 Alcoota 1:250,000 Series Geological Map BMR


FIGURES
### Composite Log of Bore

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Graphic Construction Log</th>
<th>Strata Description</th>
<th>Aquifers (Water Structure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4.5</td>
<td>Drilled 0-6.5m</td>
<td>0-45m CLAYEY ALLUVIUM Pale red-brown, some cementing at 3-12m</td>
<td></td>
</tr>
<tr>
<td>5-14.8</td>
<td>Cased 5.5-4.5m</td>
<td>▼ SWL = 14.8m 9/8/91</td>
<td></td>
</tr>
<tr>
<td>15-16.8</td>
<td>Cased 4.5-3m</td>
<td>1.3 L/s Cond = 1900 μS/cm</td>
<td></td>
</tr>
<tr>
<td>17-30</td>
<td>Drilled 6.5-54m</td>
<td>45-54m SAND white, fine to medium grained, well sorted sub-angular quartz</td>
<td></td>
</tr>
<tr>
<td>31-35</td>
<td>Cased 5-4m</td>
<td>SWL = 14.8m 9/8/91</td>
<td></td>
</tr>
<tr>
<td>36-40</td>
<td>Cased 4.5-3m</td>
<td>▼ SWL = 14.8m 9/8/91</td>
<td></td>
</tr>
<tr>
<td>41-50</td>
<td>Drilled 4-45m</td>
<td>2.0 L/s Cond = 2500 μS/cm</td>
<td></td>
</tr>
<tr>
<td>51-54</td>
<td>Cased 3-0.5m</td>
<td>After casing: Airlift yield = 4 L/s Cond = 3000 μS/cm from 30m</td>
<td></td>
</tr>
</tbody>
</table>

**Completed 9/8/91**

0-54m: Cainozoic Alluvium

**G.P.S. Location:** 452089mE 7547077mN

40m South of Sandover Highway 6.8km North-east of Utopia turnoff; 28.4km South-west of Urapuntja Store

**FIGURE 2**
## COMPOSITE LOG OF BORE

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>BORE GRAPHIC CONSTRUCTION LOG</th>
<th>STRATA DESCRIPTION</th>
<th>AQUIFERS (Water Struck)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6</td>
<td>Cased +0.6-7.8m 168mm O.D. Steel</td>
<td>DRILLED 6-7.8m 200mm Ø AIR ROTARY</td>
<td>SAND Red-brown</td>
</tr>
<tr>
<td>10-20</td>
<td>Cased +0.6-5.4m 219mm O.D. Steel</td>
<td></td>
<td>CAPROCK Mauve cemented sandy clay. Mottled cream, crimson and ochreous material, slightly calcareous</td>
</tr>
<tr>
<td>25-65</td>
<td>2.5mm shots at 66-7.8m</td>
<td></td>
<td>CLAY, Yellow-mauve</td>
</tr>
<tr>
<td>54-78</td>
<td>T.D. = 78m</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Completed 11/8/91
54-78m Chabalowe Formation

- 0.7 L/s
  Cond = 1570 µS/cm
- 3.0 L/s
  Cond = 1750 µS/cm

After casing
Airlift yield = 3 L/s
Cond = 1750 µS/cm from 65m

G.P.S. LOCATION: 527398mE 7598121mN
North side of Sandover Highway
5.4km East of Ammaroo Station turnoff

RN 15867

FIGURE 3
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Bore Construction Log</th>
<th>Graphic Aquifers (Water Struck)</th>
<th>Composite Log of Bore</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5.5</td>
<td>Cased 0.6 ID. Steel</td>
<td>SAND / GRAVEL: Fine to very coarse-grained clear angular quartz with larger clasts of laterite and quartzite, with hornblende minor garnet and muscovite.</td>
<td></td>
</tr>
<tr>
<td>5.5-10.5</td>
<td>Drilled 0-4.9m</td>
<td>SANDSTONE: As above, cemented in silty matrix.</td>
<td></td>
</tr>
<tr>
<td>10-15.5</td>
<td>Cased 0.5 ID. Steel</td>
<td>CAPROCK: Dark red-brown rounded quartz and laterite clasts in clay matrix.</td>
<td></td>
</tr>
<tr>
<td>15.5-20</td>
<td>Drilled 4.9-48.5m</td>
<td>DOLOMITE: Light grey, featureless.</td>
<td></td>
</tr>
<tr>
<td>20-22.5</td>
<td>Cased 0.5-0.6 ID. Steel</td>
<td>DOLOMITE: As above with some porous, vuggy dolarenite.</td>
<td></td>
</tr>
<tr>
<td>22.5-24</td>
<td>Drilled 24-28mm ID.</td>
<td>Gradual increase from 36-45m to 2 L/s Cond = 2260 μS/cm</td>
<td></td>
</tr>
<tr>
<td>24-48.5</td>
<td></td>
<td>SWL = 33m 18/11/91</td>
<td></td>
</tr>
</tbody>
</table>

**Strata Description:**
- **CLAY** Red-brown, sandy, hard.
- **SAND / GRAVEL** Fine to very coarse-grained clear angular quartz with larger clasts of laterite and quartzite, with hornblende minor garnet and muscovite.
- **SANDSTONE** As above, cemented in silty matrix.
- **CAPROCK** Dark red-brown rounded quartz and laterite clasts in clay matrix.
- **DOLOMITE** Light grey, featureless.
- **DOLOMITE** As above with some porous, vuggy dolarenite.

**Figure 4**

**Notes:**
- East side of Argadargada access road, 1.8km from Sandover Highway.
- Completed 18/11/91
- TD = 48.5m
- 42-48.5m: Arrinthuranga Formation

**RN 16059**
Bore location: South side of Sandover Hwy  
6.8 km NE of Utopia T/o  
28.4 km SW of Urapuntja Store  

Client/owner: Dept of Transport & Works  

Client's reference:  

Purpose of supply: Road Maintenance  

Map: ALC00TA  

Grid reference: 452089 m E 7547077 m N  

RECOMMENDATIONS  

Pumping rate: four L/s. Pump setting: 30 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:  

(In all correspondence refer to the bore's RN number).  

BORE DATA  

Finished depth: 54 m  

Completion date: 09/08/91  

Standing water level 14.8 m on 09/08/91  

Construction details:  

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 0.5 - 6.0 m</td>
<td>219 mm O.D Steel Collar</td>
</tr>
<tr>
<td>+ 0.5 - 54 m</td>
<td>168 mm O.D Steel</td>
</tr>
<tr>
<td>30 - 36 m</td>
<td>2.5 mm oxy slots</td>
</tr>
</tbody>
</table>

Notes:  
1. Top of casing as constructed was 0.5 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 150 mm  

AQUIFER TEST  

Test date: 09/08/91  

Test rates: 4 L/s  

Test duration 2 hrs  

WATER QUALITY  

T.D.S. = 1405 mg/L  

Nitrate = 4 mg/L  

Fluoride = 1.4 mg/L  

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.
TEST REPORT — BORE RN 15867

Bore location: North Side of Sandover Hwy
5.4 km NE of Ammaroo T/o

Client/owner: Dept Transport & Works
Client's reference:
Purpose of supply: Road Maintenance

Map: ELKEDRA
Grid reference: 5 27 398 m E 75 98121 m N

RECOMMENDATIONS
Pumping rate: 3 l/s. Pump setting: 66 m below ground level
General recommendations are given on the reverse side.
The aquifer and bore can/cannot sustain higher pumping rates with deeper pump settings or for short periods in favourable seasons. Further advice can be obtained from:
(In all correspondence refer to the bore's RN number).

BORE DATA
Finished depth: 78 m Completion date: 11/08/91 Test date: 11/08/91
Standing water level 53 m on 11/08/91 Test rates: 3 l/s
Construction details: Test duration 2 hrs

Interval (m) Description
+ 0.6 - 5.4 219 mm O.D Steel Collar
+ 0.6 - 78 168 mm O.D. Steel
66 - 72 2.5 mm oxy slots

Notes:
1. Top of casing as constructed was 0.6 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 150 mm

COMMENTS

Recommended rate based on Airlift test only.
Forward any bore performance information to W.R.B. Alice Springs, NT.

WATER QUALITY
T.D.S. = 930 mg/L
Nitrate = 3 mg/L
Fluoride = 1.0 mg/L
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.
TEST REPORT — BORE RN 16059

Bore location: East side of Argadarga Access Road
1.8 km south of Sandover Hwy

Client/Owner: Dept. Transport & Works
Client’s reference: Purpose of supply: Road Maintenance

Map: SANDOVER
Grid reference: 664 200 mE 7614000 mN

RECOMMENDATIONS
Pumping rate: two L/s. Pump setting: forty m below ground level
General recommendations are given on the reverse side.
The aquifer and bore can/cannot sustain higher pumping rates with deeper pump settings or for short periods in favourable seasons. Further advice can be obtained from:
(In all correspondence refer to the bore's RN number).

BORE DATA
Finished depth: 48.5 m Completion date: 18/11/91 Test date: 18/11/91
Standing water level 33 m on 18/11/91 Test rates: 2 L/s
Construction details: Test duration 2 hrs
Interval (m) Description
+ 0.5 - 5 219mm 0.0 Steel
+ 0.5 - 48 168mm 0.0 Steel
36 - 48 2.5mm oxy slots

Notes:
1. Top of casing as constructed was 0.5 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 150 mm

COMMENTS
Recommended rate based on Airlift test only.
Forward any bore performance information to W.R.B. Alice Springs, NT.

WATER QUALITY
T.D.S. = 1150 mg/L
Nitrate = 27 mg/L
Fluoride = 1.8 mg/L
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.

BORE LOCATION MAP
### FINAL STATEMENT OF BORE

**NAME OF OWNER:** DEPT. TRANSPORT & WORKS  
**NAME OF BORE:** Road Bore  
**INTENDED USE:** Road Bore  
**LOCATION:** Sandover Highway

**REGISTRATION No:** 15863  
**INDEXMAP No:** 21/55  
**ADVICE No:**  
**PERMIT No:**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Particulars of strata</th>
<th>Name of Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5</td>
<td>Sand Clay</td>
<td>Green &amp; Cole Driller</td>
</tr>
<tr>
<td>5</td>
<td>36</td>
<td>Silty Sandstone</td>
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</tr>
<tr>
<td>36</td>
<td>120</td>
<td>Sandstone</td>
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**NAME OF Driller:** N. Murphy  
**Date Commenced:** 7.8.91  
**Date Completed:** 8.8.91  
**Depth Drilled:** 120 (m)  
**Completion Depth:** 120 (m)

**METHOD OF DRILLING**  
- Rot. ☑  
- Rev. Circ. ☐  
- Cable ☐  
- Others ☐

**HOLE DIAMETER**

<table>
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<tr>
<th>From</th>
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<th>DRILLING FLUID</th>
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<td>0</td>
<td>6.5</td>
<td>250mm</td>
<td>Air</td>
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<td>6.5</td>
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<td>Air</td>
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**PARTICULARS OF CASING**

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**PARTICULARS OF PERFORATIONS OR SCREEN STRINGS**

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<th>From</th>
<th>To</th>
<th>Diam (ID)</th>
<th>Aperture</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CEMENTING/GRAVEL PACKING**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Type</th>
<th>Depth (m)</th>
<th>Yield (L/s)</th>
<th>SWL (m)</th>
<th>Duration (Hr)</th>
<th>Quality</th>
<th>SC</th>
<th>pH</th>
<th>Bottle No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</table>

**STRATA AND WATER SAMPLES**

- ☑ Have been  
- ☐ Will be  
- Left at PUNA ALPACAS

<table>
<thead>
<tr>
<th>Completion Yield (L/s)</th>
<th>Method</th>
<th>Duration</th>
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</table>

**COMPLETION SWL (m) | Depth Lift (m)

<table>
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<tr>
<th>Completion SWL</th>
<th>(m)</th>
<th>Depth Lift</th>
<th>(m)</th>
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</thead>
<tbody>
<tr>
<td>LOCATION SKETCH OF BORE</td>
<td>LOCATION DESCRIPTION OF BORE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.8 m/Km</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E S SE X NE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W N SW NW</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OF: UTOPIA TURN OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SOUTH SIDE OF ROAD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FINAL CONSTRUCTION STATUS**
- □ Capped
- □ Casing pulled
- □ Left for Observation
- □ Abandoned
- □ Equipped
- □ Backfilled
- □ Others ( )

**ADDITIONAL INFORMATION OF BORE**
Could not pull 6" out - left in and plate welded to top cemented

Signature of Licenced Driller: [Signature]
Date: 13/8/91

**FOR OFFICIAL USE ONLY**

**HOW LOCATED**: □ GPS □ TST □ SURVEY □ HAND PLOTTED □ OTHER ( )

**ELEVATION OF BORE AND**: (m) From □ GL □ TOC

**DESCRIPTION OF PROPERTY**
- □ Rural
- □ VCL
- □ Min
- □ Pastoral
- □ Reserve
- □ SPL
- □ EL
- □ Other

Lease No : Lot No : Hundred of : Portion No : Sect. No : Town of :

**CLASS OF BORE**
- □ TOWN
- □ OCM
- □ AGR
- □ MIN
- □ COMM
- □ PAS
- □ OTHER

**USE OF BORE**
- □ INV.
- □ PROD.
- □ OBS.
- □ MON.
- □ IRR.
- □ EXC.
- □ R/H
- □ ROAD

**GRID REFERENCE**
- □ AMG
- □ CLARKE
Zone: S 3 Scale: 1:250,000

**AWRC STREAM BASIN No**: 1001

**TECTONIC UNIT NAME**

**GEOPHYSICAL LOG RUN**
- □ Gamma
- □ SP
- □ Camera
- □ Density
- □ Point Res.
- □ Caliper
- □ Other ( )

Date Registered: 13/8/91 Plotted on the map: Yes / No

Officer: [Signature]: RN 16885
## THE NORTHERN TERRITORY OF AUSTRALIA

### Control of Water Act

### FINAL STATEMENT OF BORE

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Particulars of strata</th>
<th>Name of Contractor</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>4</td>
<td>Sandy Clay</td>
<td>Groosy &amp; Cae Deilers</td>
</tr>
<tr>
<td>4</td>
<td>39</td>
<td>Sandstone</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>46</td>
<td>Clay</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>54</td>
<td>Sand with Bands of Clay</td>
<td></td>
</tr>
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### NAME OF OWNER: Dept. Transfers & Works

<table>
<thead>
<tr>
<th>REGISTRATION No : 15866</th>
</tr>
</thead>
</table>

| INDEX MAP No : 21/5/52  |

### NAME OF BORE: Road Bore

| INTENDED USE: Road Bore |

### LOCATION: Sandover Highway

### Name of Driller: N. Murray

### Date Commenced: 8.8.91

### Date Completed: 9.8.91

### Depth Drilled: 54.5 m

### Completion Depth: 54.5 m

### METHOD OF DRILLING

- Rot: ☑
- Rev. Circ. ☑
- Cable ☑
- Others ☑

### HOLE DIAMETER

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Diameter Type</th>
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<tbody>
<tr>
<td>0</td>
<td>6.5</td>
<td>290 mm Air</td>
</tr>
<tr>
<td>6.5</td>
<td>54.5</td>
<td>200 mm Air</td>
</tr>
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</table>

### PARTICULARS OF CASING

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Diam (ID)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6.5</td>
<td>290 mm</td>
<td>Steel</td>
</tr>
<tr>
<td>0</td>
<td>54.5</td>
<td>168 mm</td>
<td>Steel</td>
</tr>
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### PARTICULARS OF PERFORATIONS OR SCREEN STRINGS

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Diam (ID)</th>
<th>Aperture Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6.5</td>
<td>290 mm</td>
<td>Slots</td>
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</table>

### CEMENTING/GRAVEL PACKING

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Type</th>
</tr>
</thead>
</table>

### AQUIFERS (Water Bearing Strata)

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Yield (l/s)</th>
<th>SWL (m)</th>
<th>Quality</th>
<th>SC Cond.</th>
<th>pH</th>
<th>Bottle No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>1.3</td>
<td></td>
<td>Good</td>
<td>1900</td>
<td></td>
<td>QQ 01</td>
</tr>
<tr>
<td>48</td>
<td>2</td>
<td></td>
<td>Good</td>
<td>2800</td>
<td></td>
<td>P2.22</td>
</tr>
<tr>
<td>54</td>
<td>2</td>
<td></td>
<td>Good</td>
<td>3000</td>
<td></td>
<td>P2.58</td>
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</table>

### STRATA AND WATER SAMPLES

- Have been ☑
- Will be ☑

<table>
<thead>
<tr>
<th>Completion SWL</th>
<th>Depth Lift</th>
<th>Method</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.5 m</td>
<td>10 m</td>
<td>Airlift</td>
<td>2.4 hrs</td>
</tr>
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</table>

Viewed at 02:02:59 on 18/02/2010
LOCATION SKETCH OF BORE

LOCATION DESCRIPTION OF BORE

1.3 π/Km

□ E □ S □ SE □ NE
□ W □ N □ SW □ NW

OF: Uhona and Mr. Skinner

Boundary Grid

FINAL CONSTRUCTION STATUS

- Capped □ Casing pulled □ Left for Observation □ Abandoned
□ Equipped □ Backfilled □ Others

ADDITIONAL INFORMATION OF BORE

Signature of Licenced Driller: [Signature]

Date: 13/8/91

FOR OFFICIAL USE ONLY

HOW LOCATED: □ GPS □ TST □ SURVEY □ HAND PLOTTED □ OTHER

ELEVATION OF BORE AND: (m) From □ GL □ TOC

DESCRIPTION OF PROPERTY

□ Rural □ VOL □ Min □ Pastoral
□ Reserve □ SPL □ EL □ Other

Lease No: PL-878
Lot No: 49
Portion No: 22
Sect. No: 10
Hundred of: 7
Town of: 2

CLASS OF BORE

□ TOWN □ VOL □ AGR □ MIN □ COMM □ PAS □ OTHER

USE OF BORE

□ INV. □ PROD. □ OBS. □ MON. □ IRR. □ EXC. □ R/H □ ROAD

GRID REFERENCE

□ AMG □ CLARKE Zone: 53 Scale: 1:250,000

EASTING: 2346
NORTHING: 22313
LONGITUDE:

LATITUDE: MAP NAME: PLECHOT
MAP NUMBER: 5F57-10

AWRC STREAM BASIN No: 1001 TECTONIC UNIT NAME:

GEOPHYSICAL LOG RUN

YES □ NO Date: 1/1 Depth: (m)
□ Gamma □ SP □ Camera □ Density
□ Point Res. □ Caliper □ Other

Date Registered: 13/8/91 Plotted on the map: Yes
Officer: [Signature]
Remarks: [Signature]

Viewed at 02:02:59 on 18/02/2010
### Final Statement of Bore

**Control of Water Act**

**The Northern Territory of Australia**

#### Name of Owner: J. Cooper & Co. Drilling

#### Registration No: 15867

**Index Map No:** 29/148

**Advice No:**

**Permit No:**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>11</td>
<td>36</td>
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<tr>
<td>36</td>
<td>54</td>
</tr>
<tr>
<td>54</td>
<td>78</td>
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</table>

**Particulars of strata**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Type</th>
</tr>
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<tbody>
<tr>
<td>0-11</td>
<td>Sandy Clay</td>
</tr>
<tr>
<td>11-36</td>
<td>Clay</td>
</tr>
<tr>
<td>36-54</td>
<td>Sandstone</td>
</tr>
<tr>
<td>54-78</td>
<td>Dolomite</td>
</tr>
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</table>

**Name of Driller:** N. Murph

**Date Commenced:** 10.8.91

**Date Completed:** 11.8.91

**Depth Drilled:** 78 m

**Completion Depth:** 78 m

**Method of Drilling:**

- Rot.  □ Rev. Circ.  □ Cable  □ Others

**Hole Diameter**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6.3</td>
</tr>
<tr>
<td>6.3</td>
<td>78</td>
</tr>
</tbody>
</table>

**Drilling Fluid**

- 250 mm Air
- 200 mm Air

**Particulars of casing**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Diameter (mm)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6</td>
<td>219</td>
<td>Steel</td>
</tr>
<tr>
<td>0</td>
<td>78</td>
<td>168</td>
<td>Steel</td>
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</tbody>
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**Particulars of perforations or screen strings**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Diameter (mm)</th>
<th>Aperture Type</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>6</td>
<td>168</td>
<td>2.5 mm Screws</td>
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</table>

**Casing suspended:** Yes

**Method:**

- Casing above GL: 1.6 (m)

**Top of packer set at:**

**Length of packer:**

**Method of packer connection:**

**Cementing/Gravel Packing**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>68.6</td>
<td>4.7</td>
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<tr>
<td>68.6</td>
<td>70</td>
<td>3</td>
</tr>
<tr>
<td>70</td>
<td>73</td>
<td>3</td>
</tr>
</tbody>
</table>

**Aquifers (Water Bearing Strata)**

- Depth (m)  YIELD (l/s)  SWL (m)  Duration (Hr)  Quality  SC  pH  Bottle No.
- 68.6  68  70  5  Good  125  7.0  1036
- 67  65  70  3  Good  175  8.0  9807
- 68  67  70  3  Good  1730  Good  95  91

**Strata and water samples**

- **Have been** Yes  **Will be** No

- **Leased at:** Alice Springs

- **Completion Yield:** 3 (l/s)

- **Method:** Airjet

- **Duration:** 2.5 hrs
**LOCATION SKETCH OF BORE**

<table>
<thead>
<tr>
<th>Location Sketch</th>
<th>Bearing Type</th>
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<tr>
<td>N</td>
<td>5.4 km</td>
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<tr>
<td>E</td>
<td>S</td>
</tr>
<tr>
<td>SE</td>
<td>NE</td>
</tr>
<tr>
<td>W</td>
<td>N</td>
</tr>
<tr>
<td>SW</td>
<td>NW</td>
</tr>
</tbody>
</table>

**LOCATION DESCRIPTION OF BORE**

- **OF:** Amoco Turn Off
- **on North Side of Road**

**FINAL CONSTRUCTION STATUS**

- **X** Capped
- **☐** Casing pulled
- **☐** Left for Observation
- **☐** Abandoned
- **☐** Equipped
- **☐** Backfilled
- **☐** Others ( )

**ADDITIONAL INFORMATION OF BORE**

- **Signature of Licensed Driller:** [Signature]
- **Date:** 13/8/91

**FOR OFFICIAL USE ONLY**

- **HOW LOCATED:**
  - GPS
  - TST
  - SURVEY
  - HAND PLOTTED
  - OTHER ( )

- **ELEVATION OF BORE AND:**
  - From GL
  - TOC
  - (m)

- **DESCRIPTION OF PROPERTY:**
  - Rural
  - VCL
  - Min
  - Pastoral
  - Reserve
  - SPL
  - EL
  - Other

- **Lease No:** RL-791
- **Lot No:**
- **Hundred of:**
- **Section No:**
- **Town of:**

- **CLASS OF BORE:**
  - TOWN
  - COMM
  - AGR
  - MIN
  - COMM
  - PAS
  - OTHER

- **USE OF BORE:**
  - INV.
  - PROD.
  - OBS.
  - MON.
  - IRR.
  - EXC.
  - R/H
  - ROAD

- **GRID REFERENCE:**
  - AMG
  - CLARKE
  - Zone: S3
  - Scale: 1:2,500,000

- **EASTING:** 3193
- **NORTHING:** 2890
- **LONGITUDE:**
- **LATITUDE:**
- **MAP NAME:** GLHOUA
- **MAP NUMBER:** 5F53-7

- **AWRC STREAM BASIN No:** 1001
- **TECTONIC UNIT NAME:**

- **GEOPHYSICAL LOG RUN**
  - YES/NO
  - Date:
  - Depth (m):
  - Gamma
  - SP
  - Camera
  - Other ( )

- **Date Registered:** 14/6/91
- **Plotted on the map:** Yes
- **Remarks:** RN15867

- **Signature:** [Signature]

**Remarks:** RN15867
**FINAL STATEMENT OF BORE**

**NAME OF OWNER:** Dept. Transport & Works  
**REGISTRATION No:** 16050

**NAME OF BORE:**  
**INDEXMAP No:** 30/276

**INTENDED USE:** Road Bore  
**ADVICE No:**

**LOCATION:** Sandyover Highway  
**PERMIT No:**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Name of Strata</th>
<th>Name of Contractor</th>
<th>Name of Driller</th>
<th>Date Commenced</th>
<th>Depth Drilled</th>
<th>Completion Depth</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>Topsoil</td>
<td>Green &amp; Co Drivers</td>
<td>S. Richards</td>
<td>30.3.91</td>
<td>180</td>
<td></td>
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<tr>
<td>3</td>
<td>25</td>
<td>Mudstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>96</td>
<td>Sandstone</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>96</td>
<td>125</td>
<td>Limestone with Clay Bands</td>
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<tr>
<td>125</td>
<td>180</td>
<td>Limestone + Chert</td>
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**CONTRACTED DEPT:**

**DATE COMMENCED:** 30.3.91

**DATE COMPLETED:** 31.3.91

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<th>From</th>
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<th>Diameter</th>
<th>Type</th>
<th>From</th>
<th>To</th>
<th>Diameter</th>
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<td></td>
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<td>250 mm</td>
<td>6.1</td>
<td>180</td>
<td>200 mm</td>
<td>Air</td>
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**METHOD OF DRILLING:**

- Rot. □ Rev. Circ. □ Cable □ Others

**HOLE DIAMETER:**

- Rot. □ Rev. Circ. □ Cable □ Others

**DRILLING FLUID:**

- Rot. □ Rev. Circ. □ Cable □ Others

**PARTICULARS OF CASING:**

- Rot. □ Rev. Circ. □ Cable □ Others

**PARTICULARS OF PERFORATIONS OR SCREEN STRINGS:**

- Rot. □ Rev. Circ. □ Cable □ Others

**CEMENTING/GRavel PACKING:**

- Rot. □ Rev. Circ. □ Cable □ Others

**AQUIFERS (Water Bearing Strata):**

- Rot. □ Rev. Circ. □ Cable □ Others

**STRATA AND WATER SAMPLES:**

- Rot. □ Rev. Circ. □ Cable □ Others

---

Viewed at 02:02:59 on 18/02/2010
<table>
<thead>
<tr>
<th>LOCATION SKETCH OF BORE</th>
<th>LOCATION DESCRIPTION OF BORE</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>300 m N, E W, S, NE, SW, NW</td>
</tr>
<tr>
<td></td>
<td>OF: ANNITANA TURN OFF</td>
</tr>
<tr>
<td></td>
<td>25m SOUTH OF ROAD</td>
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<table>
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<tr>
<th>FINAL CONSTRUCTION STATUS</th>
<th>ADDITIONAL INFORMATION OF BORE</th>
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<tbody>
<tr>
<td>□ Capped</td>
<td>Signature of Licensed Driller:</td>
</tr>
<tr>
<td>□ Casing pulled</td>
<td>Date 3/9/91</td>
</tr>
<tr>
<td>□ Left for Observation</td>
<td></td>
</tr>
<tr>
<td>□ Abandoned</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HOW LOCATED:</th>
<th>ELEVATION OF BORE AHD:</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ GPS</td>
<td>(m) From:</td>
</tr>
<tr>
<td>□ TST</td>
<td>□ GL</td>
</tr>
<tr>
<td>□ SURVEY</td>
<td>□ TOC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESCRIPTION OF PROPERTY</th>
<th>Lease No:</th>
<th>Lot No:</th>
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<tbody>
<tr>
<td>□ Rural</td>
<td>PA=792</td>
<td></td>
</tr>
<tr>
<td>□ Pastoral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Reserve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ SPL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ EL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Other</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>CLASS OF BORE</th>
<th>USE OF BORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ TOWN</td>
<td>□ INV.</td>
</tr>
<tr>
<td>□ COM</td>
<td>□ PROD.</td>
</tr>
<tr>
<td>□ AGR</td>
<td>□ OBS.</td>
</tr>
<tr>
<td>□ MIN</td>
<td>□ MON.</td>
</tr>
<tr>
<td>□ COMM</td>
<td>□ IRR.</td>
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<tr>
<td>□ PAS</td>
<td>□ EXC.</td>
</tr>
<tr>
<td>□ OTHER</td>
<td>□ R/H</td>
</tr>
<tr>
<td>□ ROAD</td>
<td>□ ROAD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GRID REFERENCE</th>
<th>EASTING</th>
<th>NORTHING</th>
<th>LATITUDE</th>
<th>LONGITUDE</th>
<th>MAP NAME</th>
<th>MAP NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>67770</td>
<td>76210</td>
<td></td>
<td></td>
<td>SOW-001</td>
<td>SF 53-8</td>
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</table>

<table>
<thead>
<tr>
<th>Awrc Stream Basin No:</th>
<th>Tectonic Unit Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Geophysical Log Run</th>
<th>YES/NO</th>
<th>Date:</th>
<th>Depth: (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Gamma</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ SP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Camera</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Density</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Point Res.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Caliper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date Registered:</th>
<th>25/1/91</th>
<th>Plotted on the map:</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Officer:</td>
<td>R. J.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remarks:</td>
<td>RN16050</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### The Northern Territory of Australia

#### Control of Water Act

#### Final Statement of Bore

<table>
<thead>
<tr>
<th>Name of Owner:</th>
<th>Dept. Transport &amp; Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Bore:</td>
<td>Road Bore</td>
</tr>
<tr>
<td>Intended Use:</td>
<td>Road Bore</td>
</tr>
<tr>
<td>Location:</td>
<td>Sandover Highway</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Registration No:</th>
<th>16051</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index/Map No:</td>
<td>30/277</td>
</tr>
<tr>
<td>Advice No:</td>
<td></td>
</tr>
<tr>
<td>Permit No:</td>
<td></td>
</tr>
</tbody>
</table>

| Name of Contractor: | Green & Cole Deliers |

| Particulars of Bore | Name of Driller: | S. Richards |
|---------------------|------------------|
| Date Commenced: | 31.8.91 |
| Date Completed: | 2.9.91 |
| Depth Drilled: | 139 m |
| Completion Depth: | |

#### Particulars of Strata

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Stratum</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>Topsoil</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>Mudstone + Clays</td>
</tr>
<tr>
<td>12</td>
<td>139</td>
<td>Hard Dolomite + Limestone</td>
</tr>
</tbody>
</table>

#### Particulars of Drilling

<table>
<thead>
<tr>
<th>Hole Diameter</th>
<th>Drilling Fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>Air</td>
</tr>
<tr>
<td>139</td>
<td>Air</td>
</tr>
</tbody>
</table>

#### Particulars of CASING

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Diameter (ID)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>250 mm</td>
<td>Air</td>
</tr>
<tr>
<td>6.1</td>
<td>139</td>
<td>200 mm</td>
<td>Air</td>
</tr>
</tbody>
</table>

#### Particulars of Perforations or Screen Strings

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Diameter (ID)</th>
<th>Aperture Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Casing Suspended

<table>
<thead>
<tr>
<th>Method:</th>
<th>Casing above GL:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>(m)</td>
</tr>
<tr>
<td>No</td>
<td>(m)</td>
</tr>
</tbody>
</table>

#### Method of Drilling

<table>
<thead>
<tr>
<th>Method:</th>
<th>Length of Packer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rot.</td>
<td>(m)</td>
</tr>
</tbody>
</table>

#### Cementing/Gravel Packing

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Type</th>
<th>Depth (m)</th>
<th>Yield (L/s)</th>
<th>SWL (m)</th>
<th>Duration (Hr)</th>
<th>Quality</th>
<th>SC</th>
<th>pH</th>
<th>Bottle No.</th>
</tr>
</thead>
</table>

#### Strata and Water Samples

<table>
<thead>
<tr>
<th>Strata and Water Samples:</th>
<th>Completion Yield:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have been</td>
<td>Method:</td>
</tr>
<tr>
<td>Will be</td>
<td>Duration:</td>
</tr>
<tr>
<td>Left at: Alice Springs</td>
<td>Depth Lift:</td>
</tr>
</tbody>
</table>

---

Viewed at 02:02:59 on 18/02/2010
### Location Sketch of Bore

<table>
<thead>
<tr>
<th>Location Description of Bore</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5 m/Km</td>
</tr>
</tbody>
</table>

- E   S   SE   NE
- W   N   SW   NW

OF: Anmitowa Turn Off

- 30 m South of Road

### Final Construction Status

- Capped
- Casing pulled
- Left for Observation
- Abandoned
- Equipped
- Backfilled
- Others

### Additional Information of Bore

**Signature of Licensed Driller:**

**Date:** 3/9/91

**FOR OFFICIAL USE ONLY**

### How Located:

- GPS
- TST
- Survey
- Hand Plotted
- Other

### Elevation of Bore (m)

- From GL
- To TOC

### Description of Property

- Rural
- VCL
- Min
- Pastoral
- Reserve
- SPL
- EL
- Other

### Lease No.: PL876

### Portion No.: Hundred of

### Section No.: Town of

### Class of Bore

- Town
- DOM
- AGR
- MIN
- COMM
- PAS
- Other

### Use of Bore

- INV
- PROD
- OBS
- MON
- IRR
- EXC
- R/H
- Road

### Grid Reference

- AMG
- CLARKE
- Zone: 53
- Scale: 1:250,000

### Easting: 6680

### Northing: 76221

### Latitude:

### Longitude:

### Map Name: SAN DOVILL

### Map Number: 8F 53-8

### AWRC Stream Basin No: 1001

### Tectonic Unit Name:

### Geophysical Log Run

- Yes / No
- Date:
- Depth (m)
- Gamma
- SP
- Camera
- Density
- Point Res.
- Caliper
- Other

### Date Registered: 25/9/91

### Officer: R. DAFI

### Signature:

### Remarks: RN 13051

### Officer recommendation: Yes / No
### The Northern Territory of Australia

**Control of Water Act**

**FINAL STATEMENT OF BORE**

#### NAME OF OWNER:  **The Works**

#### NAME OF BORE:  **Road Construction**

#### INTENDED USE:  **Road Construction**

#### LOCATION:  **BAGADARADA**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Particulars of strata</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>TOPSOIL</td>
</tr>
<tr>
<td>9</td>
<td>21</td>
<td>CLAY</td>
</tr>
<tr>
<td>36</td>
<td>45</td>
<td>RIVER SAND</td>
</tr>
<tr>
<td>48.5</td>
<td></td>
<td>SOFT LIMESTONE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HARD LIMESTONE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DOLAMITE</td>
</tr>
</tbody>
</table>

#### NAME OF CONTRACTOR:  **Gorey & Co.**

#### NAME OF DRILLER:  **S. Richards**

<table>
<thead>
<tr>
<th>Date Commenced</th>
<th>Date Completed</th>
<th>Depth Drilled</th>
<th>Completion Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-11-91</td>
<td>18-11-91</td>
<td>48.5 m</td>
<td>48.5 m</td>
</tr>
</tbody>
</table>

#### METHOD OF DRILLING

- **Rot.**
- **Rev. Circ.**
- **Cable**
- **Others**

#### HOLE DIAMETER

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Diameter Type</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>4.9</td>
<td>254 mm</td>
</tr>
<tr>
<td>4.9</td>
<td>48.5</td>
<td>204 mm</td>
</tr>
</tbody>
</table>

#### PARTICULARS OF CASING

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Diam (ID)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4</td>
<td>4.9</td>
<td>203 m</td>
<td>STEEL</td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td>155 mm</td>
<td>STEEL</td>
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</table>

#### PARTICULARS OF PERFORATIONS OR SCREEN STRINGS

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Diam (ID)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>45</td>
<td>245</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

#### CEMENTING/GRAVEL PACKING

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>45</td>
<td></td>
</tr>
</tbody>
</table>

#### AQUIFERS (Water Bearing Strata)

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Yield (L/s)</th>
<th>Swl (m)</th>
<th>Duration (hr)</th>
<th>Quality</th>
<th>SC</th>
<th>pH</th>
<th>Bottle No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>45</td>
<td>245</td>
<td></td>
<td>2</td>
<td>2.260</td>
<td>QEQ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### STRATA AND WATER SAMPLES

- **Have been**
- **Will be**

** Completion Yield:** 2 (L/s)  **Method:** AIR  **Duration:** 2 Hrs

**Completion Swl:** 33 (m)  **Depth Lift:** 55+4 (m)
**LOCATION SKETCH OF BORE**

<table>
<thead>
<tr>
<th>Sandover High Way</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8 H/m</td>
<td></td>
</tr>
<tr>
<td>SN 16054</td>
<td></td>
</tr>
</tbody>
</table>

**LOCATION DESCRIPTION OF BORE**

<table>
<thead>
<tr>
<th>800 m/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>E   S   SE   NE</td>
</tr>
<tr>
<td>W   N   SW   NW</td>
</tr>
</tbody>
</table>

**FINAL CONSTRUCTION STATUS**

- Capped
- Casing pulled
- Left for Observation
- Abandoned
- Equipped
- Backfilled
- Others ( )

**ADDITIONAL INFORMATION OF BORE**

- Signature of Licenced Driller: Craig Oldfield
- Date: 25/11/91

**FOR OFFICIAL USE ONLY**

**HOW LOCATED:**

- [ ] GPS
- [ ] TST
- [ ] SURVEY
- [ ] HAND PLOTTED
- [ ] OTHER ( )

**ELEVATION OF BORE AND:**

- (m) From GL: [ ]
- TOC: [ ]

**DESCRIPTION OF PROPERTY**

- [ ] Rural
- [ ] VCL
- [ ] Min
- [ ] Pastoral
- [ ] Reserve
- [ ] SPL
- [ ] E.L
- [ ] Other

**LEASE No: PL 876**

**Lot No:**

**Hundred of:**

**Sect. No:**

**Town of:**

**CLASS OF BORE**

- [ ] TOWN
- [ ] COM
- [ ] AGR
- [ ] MIN
- [ ] COMM
- [ ] PAS
- [ ] OTHER

**USE OF BORE**

- [ ] INV
- [ ] PROD
- [ ] OBS
- [ ] MON
- [ ] IRR
- [ ] EXC
- [ ] R/H
- [ ] ROAD

**GRID REFERENCE**

- [ ] AMG
- [ ] CLARKE

**CLARKE Zone:** S-3

**Scale:** 1:250,000

**EASTING:** 4,654

**NORTHING:** 3062

**LATITUDE:**

**LONGITUDE:**

**MAP NAME:** Sandover River

**MAP NUMBER:** SF53-8

**AWRC STREAM BASIN No:** 1001

**TECTONIC UNIT NAME:**

**GEOPHYSICAL LOG RUN**

- [ ] YES
- [ ] NO

**Date:**

**Depth:** (m)

- [ ] Gamma
- [ ] SP
- [ ] Camera
- [ ] Density

- [ ] Point Res.
- [ ] Caliper
- [ ] Other ( )

**Date Registered:** 26/11/91

**Plotted on the map:** Yes / No

**Officer:** [Signature]

**Remarks:** RN 16054

<table>
<thead>
<tr>
<th>Bottle No.</th>
<th>Lab. Register No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P258</td>
<td>91/92/0410</td>
</tr>
</tbody>
</table>

Date Received in Lab. | Time Sampled | Date Sampled |
14/9/91               | 1400         | 9/9/91       |

Location and Details: SANOVER HIGHWAY ROAD BORE
RN 15866 DEPTH 30m QT: 1.0LPS MAP 5F35-8

SANOVER RIVER Sampler R. DARBY
RN No RMA 8013

**ANALYSIS — PHYSICAL**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Total dissolved solids (mg L⁻¹ - dried at 103°C)</td>
<td>1575</td>
<td></td>
</tr>
</tbody>
</table>

**ANALYSIS — CHEMICAL (mg L⁻¹)**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium, Na</td>
<td>340</td>
<td></td>
</tr>
<tr>
<td>Chloride, Cl</td>
<td>634</td>
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<tr>
<td>Potassium, K</td>
<td>31</td>
<td></td>
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<tr>
<td>Sulphate, SO₄</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>Calcium, Ca</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>Nitrate, NO₃</td>
<td>5</td>
<td></td>
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<tr>
<td>Magnesium, Mg</td>
<td>74</td>
<td></td>
</tr>
<tr>
<td>Bicarbonate, HCO₃</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Total Hardness (as CaCO₃)</td>
<td>508</td>
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</tr>
<tr>
<td>Total Alkalinity (as CaCO₃)</td>
<td>188</td>
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<tr>
<td>Iron (total) Fe</td>
<td>0.16</td>
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<tr>
<td>Fluoride, F</td>
<td>1.0</td>
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</tr>
<tr>
<td>Silica, SiO₂</td>
<td>23</td>
<td></td>
</tr>
</tbody>
</table>

**ANALYSIS — ADDITIONAL (mg L⁻¹)**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper, Cu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead, Pb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arsenic, As</td>
<td></td>
<td></td>
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<tr>
<td>Manganese, Mn</td>
<td>1044</td>
<td></td>
</tr>
<tr>
<td>Zinc, Zn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cadmium, Cd</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* UNSUITABLE FOR ANALYSIS

---

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**DATE:** 27 AUG 1991

**CHECKED:** J. Hume

**SIGNATORY:** C. W. A. B. L.
This report relates specifically to the "sample tested as received".


Boxes marked thus indicate:
- Levels are within the limits as quoted in the "Guidelines for Drinking Water Quality in Australia", 1987 N.H. & M.R.C. and the A.W.R.C.
- Levels exceed non-health related limits.
- Levels exceed health related limits.

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## ANALYSIS — PHYSICAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Electrical conductivity</td>
<td>1890</td>
<td>(mg L(^{-1}) - dried at 160(^\circ) C)</td>
</tr>
<tr>
<td>Total Suspended solids</td>
<td>1150</td>
<td></td>
</tr>
</tbody>
</table>

## ANALYSIS — CHEMICAL (mg L\(^{-1}\))

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium, Na</td>
<td>265</td>
<td>[303A]</td>
</tr>
<tr>
<td>Potassium, K</td>
<td>46</td>
<td>[303A]</td>
</tr>
<tr>
<td>Calcium, Ca</td>
<td>35</td>
<td>[311C]</td>
</tr>
<tr>
<td>Magnesium, Mg</td>
<td>70</td>
<td>[303C]</td>
</tr>
<tr>
<td>Total Hardness (as CaCO(_3))</td>
<td>375</td>
<td>[314B]</td>
</tr>
<tr>
<td>Total Alkalinity (as CaCO(_3))</td>
<td>452</td>
<td>[403]</td>
</tr>
<tr>
<td>Iron, (total) Fe</td>
<td>0.16</td>
<td>[303A] *</td>
</tr>
<tr>
<td>Silica, SiO(_2)</td>
<td>69</td>
<td>[425D]</td>
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</tbody>
</table>

## ANALYSIS — ADDITIONAL (mg L\(^{-1}\))

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper, Cu</td>
<td></td>
<td>[304] [304A]</td>
</tr>
<tr>
<td>Manganese, Mn</td>
<td></td>
<td>[304] [304A]</td>
</tr>
<tr>
<td>Selenium</td>
<td></td>
<td>[303E]</td>
</tr>
<tr>
<td>Lead, Pb</td>
<td></td>
<td>[303A] [304]</td>
</tr>
</tbody>
</table>

*UNSATURABLE FOR ANALYSIS*

---

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- Levels exceed non-health related limits.

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SAMPLE DESCRIPTIONS

RN 15865

0-12m ALLUVIUM. Red-brown, micaceous clayey silt with fine sand to gravel-sized angular clasts of quartz and fine-grained quartz sandstone.

12-15m SANDSTONE/SILTSTONE. Medium grey, fissile sandy siltstone and green poorly sorted sandstone, fine to medium-grained sub-angular to sub-rounded quartz and glauconite.

24-27m SILTSTONE. Dark grey-blue, fine-sandy.

39-24m SAND/SILTY SANDSTONE. Very fine sub-angular quartz sand and grey silty very fine-grained sandstone.

61-78m SILTSTONE. Medium grey.

81-84m SILTSTONE/SANDSTONE. Medium grey, micaceous fissile sandy siltstone and fawn to white silty to clean fine-grained sandstone.

117-120m As above, also with fine to medium-grained glauconitic sandstone.

Interpretation: 12-120m Tomahawk beds.
SAMPLE DESCRIPTIONS

0-24m  CAPROCK/WEATHERED ROCK.  Dark red-brown, ferruginous/siliceous gravel to 7m.  Light yellow-orange to dark crimson and ochre, stiff clay 7-18m.  White clay with sand to gravel-sized angular quartz, 18-24m.

24-45m  SILTSTONE/CLAYSTONE.  Medium yellow-brown, highly weathered some crimson-white bleaching.

45-49m  SANDSTONE.  Light grey fine to medium-grained, moderately sorted, rounded quartz with quartzose cement.  Black manganiferous/sulphidic selvedges/clots.

49-93m  SANDSTONE.  Light khaki, fine to medium-grained, well sorted, well rounded.  Weakly cemented, porous.  Slightly silty in bands from 84-93m.

93-105m  SANDY SILTSTONE.  Khaki, friable, very fine sandy.

105-162  SILTSTONE/DOLOLUTITE/DOLARENITE.  Pale khaki, buff, light rose, some claystone, especially at 156-162m.  Minor chert.

162-186  DOLOMITE/DOLOLUTITE/DOLARENITE.  Poor sample, small chip size (contamination and rehammering).  Similar to above but with greater proportion of very fine-grained light grey-green and cream, hard dolomite.

Interpretation:  0-105m Arrinthrunga Fm, Middle Unit.
  105-186m Arrinthrunga Fm, Lower Unit.
SAMPLE DESCRIPTIONS

0-9m  ALLUVIUM/CAPROCK.  Red-brown sandy dolomite gravel.

9-15m  DOLOMITE.  Light khaki, completely weathered.

15-98m  DOLOMITE/DOLARENITE.  Buff, cream and grey, very fine-grained to microcrystalline. Little structure. Minor patchy quartz and very small quartz/sulphide veining. Bands of pale olive DOLETITE at 54-66m, OOLITIC DOLOMITE at 63-66m and ALGAL DOLARENITE at 72-75m.

98m  CLAYSTONE HORIZON?

98-135m  DOLOMITE.  Light to medium grey, microcrystalline, very minor thin veining.

Interpretation: 9-135m Arrinthurunga Fm, Lower Unit.