PENYEME & ILPERLE
Excisions
JINKA STATION
Bore Completion Report

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December 1993
SUMMARY

A successful bore was drilled on each of two proposed excision areas on Jinka Station. Both bores have been proved capable of pumping 0.5 L/s for at least 8 hours, higher rates may be possible but have not been tested for.

Penyeme excision area on the Marshall river has potable groundwater of 1450 mg/L total dissolved solids (TDS).

Ilperle excision area on the Plenty River has potable groundwater of 367 mg/L TDS.

KEYWORDS

SUBJECT  Excision
          Community Water Supply

GEOLOGY  Arunta Block
          Division Two
          Irindina gneiss
          calc - silicate rock

LOCATION  Penyeme
          Ilperle
          Jinka Station
          Huckitta 1:250,000 sheet.
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1) Geological log and construction details
2) Time drawdown graph of test pumping
3) Recommendations RN 16236
4) Water Quality analysis

ABBREVIATIONS

bgl  below ground level
EC   electrical conductivity
ID   inside diameter
km   kilometres
L/s  litres per second
m    metres
mg/L milligrams per litre
RN   registered number
SWL  standing water level
TDS  total dissolved solids (in mg/L)
µS/cm microsiemens per centimetre
WRB  Water Resources Branch
<table>
<thead>
<tr>
<th>DISTRICT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEGAL SECTION, CENTRAL LAND COUNCIL</td>
<td>1</td>
</tr>
<tr>
<td>EXCISIONS OFFICE, CENTRAL LAND COUNCIL</td>
<td>2</td>
</tr>
<tr>
<td>EXCISION HOLDERS C/- EASTERN OFFICE, CENTRAL LAND COUNCIL</td>
<td>4</td>
</tr>
<tr>
<td>TECHNICAL SUPPORT BRANCH, ALICE SPRINGS</td>
<td>2</td>
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<tr>
<td>MICHAEL BROAD, JERVOIS STATION</td>
<td>1</td>
</tr>
<tr>
<td>WATER RESOURCES LIBRARY, ALICE SPRINGS</td>
<td>3</td>
</tr>
<tr>
<td>WATER RESOURCES LIBRARY, DARWIN</td>
<td>1</td>
</tr>
<tr>
<td>PAWA LIBRARY, DARWIN</td>
<td>1</td>
</tr>
<tr>
<td>PRINCIPAL ENGINEER GROUNDWATER</td>
<td>1</td>
</tr>
<tr>
<td>AUTHOR</td>
<td>1</td>
</tr>
<tr>
<td>NT DEPT OF LANDS &amp; HOUSING, ALICE SPRINGS</td>
<td>1</td>
</tr>
</tbody>
</table>
1. INTRODUCTION

This work arises from an agreement to relinquish an Aboriginal land claim title on a former stock reserve in return for two viable excision living areas. The two proposed excisions, Penyeme and Iperle, are on the Jinka pastoral lease some 200 km north east of Alice Springs (see figure 1).

Water Resources Branch of the NT Power and Water Authority (PAWA) were requested by the Department of Lands & Housing via the Technical Support Branch, PAWA to attempt the establishment of water supplies at these two areas. Drilling for groundwater occurred in October 1993.

2. HYDROGEOLOGY

Published geological mapping (Stirzaker & Freeman 1985) shows both excision areas to have regions of outcropping Irindina Gneiss, a unit of the Arunta block metamorphic complex. Elsewhere on these excision areas Irindina gneiss is inferred to be overlain by alluvial sediments associated with the nearby ephemeral rivers, the Plenty and Marshall (see figure 2).

As drilling statistics elsewhere in the Arunta block (eg Mt Doreen) show groundwater prospects are generally poor, the initial desk top study for this work downplayed the chance of success, even though some potable bores existed nearby (WRB file 162.1 & 2). Any potential aquifers were identified as being within fractured hard crystalline basement, weathered basement and overlying alluvial sediments, or a combination of these.
3. 1993 WORKS

3.1 DRILLING

In October 1993 WRB arranged access to selected drill sites at or near Penyeme and Ilperle for the Government period water bore drilling contractor, Gorey and Cole Pty Ltd.

3.1.1 Penyeme RN 16235

Drilling commenced at Penyeme on the 21/10/93 at the site shown on figure 2. This bore was drilled to 26 m and airlifted 1.0 L/s of low salinity (EC 2400 µS/cm) water from calc-silicate rocks of the Arunta Block. The bore RN 16235 was subsequently constructed for production as shown in Appendix A.

3.1.2 Ilperle RN 16236

Drilling of RN 16236 commenced at Ilperle, at the location shown on figure 2 on the 23/10/93. This hole was drilled to 31.4 m and airlifted 1.0 L/s of very low salinity (EC 580) water, from fractured biotite gneiss. This hole was also constructed for use as a production bore (see Appendix B).

3.2 TESTING

3.2.1 Penyeme

Bore RN 16235 was test pumped by Gorey & Cole Pty Ltd at a constant rate of 0.5 L/s for 8 hours. The time-drawdown graph of this test is presented in Appendix A, where it can be seen that over 90% of available drawdown remained at the end of the test. It is not known if hydraulic boundaries would cause an increase in the rate of drawdown at longer pumping times. As this bore has been recommended at
3.2.2 Ilperle

The time drawdown graph from the 9 hour, 0.5 L/s, constant rate test conducted by Gorey & Cole on bore RN 16236 is presented in Appendix B. Again, like the test at Penyeme, a large percentage of available drawdown remained at the end of this test. The reason for the sudden drop in water level between 80 to 100 minutes shown on this graph is not known. A temporary accidental increase in pump rate or the dewatering of a fracture around 2 m below the SWL could explain this drop. Again indications are that this bore has been recommended (see recommendations Appendix B) at a rate lower than is hydraulically achievable, thus no operating problems are envisaged for this bore at 0.5 L/s.
4. QUALITY

A full chemical analysis of water sampled at near the end of the test pumping for each bore is presented in the bore data Appendices, A & B. Water quality at Ilperle with 367 mg/L TDS is excellent.

Water quality at Penyeme (Appendix A) at 1450 mg/L TDS is just below the NH&MRC (1987) non health related guideline maximum salinity of 1500 mg/L TDS. Fluoride and nitrate ion concentrations, often a health concern elsewhere in central Australia, are low in this bore.

5. CONCLUSION

Bores yielding potable water have been drilled and tested at two proposed excision sites, Penyeme and Ilperle, on Jinka pastoral lease (Number PHL 4). Both bores have good hydraulic characteristics and have been recommended at 0.5 L/s. Barring unforeseen events such as rapid deterioration in quality or drop in water table elevation, these two excisions are regarded as having as viable a water supply as most remote outstations/homesteads in central Australia.
6. RECOMMENDATIONS

1. RN 16235 (Penyeme) should be equipped at a rate of no more than 0.5 L/s.

2. RN 16236 (Ilperle) should be equipped at a rate of no more than 0.5 L/s.

3. Means to monitor water levels and a water meter should be installed in each bore.

4. The SWL and total depth of each bore should be noted each time pumping equipment is removed from the bores.

5. A water sample should be submitted for electrical conductivity measurement on a yearly basis, with any significant variations subjected to full chemical analysis.

6. No development should take place within 200 m of each bore, to minimise risk of pollution of the aquifers.
7. REFERENCES


WRB file 162.1 and 162.2. Water Resources Branch files Penyeme and Iperle, Excisions on Jinka. WRB Library, Alice Springs.
Figures
FIGURE 1

PENYEME & ILPERLE
Excisions
JINKA STATION
LOCATION MAP
PENYEME AND ILPERLE EXCISIONS
Jinka Station
BORE LOCATION MAP

FIGURE 2
Appendix A

Bore Data RN 16235 Penyeme
<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>BORE CONSTRUCTION LOG</th>
<th>GRAPHIC</th>
<th>STRATA DESCRIPTION (Water Struck)</th>
<th>AQUIFERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>204mm steel casing</td>
<td>+</td>
<td>Red aeolian surficial sand with some chalcedony.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>+</td>
<td>+</td>
<td>Oc qtz (veins) with small calcareous veins throughout.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>+</td>
<td>+</td>
<td>A/a becoming dark grey to grey-green with increase in mica content, perhaps phlogopite.</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>+ + + + + + + + + + + +</td>
<td></td>
<td>TD 26m</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>+ + + + + + + + + + + +</td>
<td></td>
<td>Calc-silicate rock; a unit of the IRINDINA GNEISS, DIVISION 2, ARUNTA BLOCK</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>+ + + + + + + + + + + +</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>+ + + + + + + + + + + +</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>+ + + + + + + + + + + +</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMPOSITE LOG OF BORE**

**PENYEME EXCISION – JINKA STATION**

North bank of Marshall River

**RN 16235**

**APPENDIX A.1**
PENYEME EXCISION
Marshall River
JINKA STATION

APPENDIX A 2

RN 16235
CONSTANT RATE TEST AT 0.5 L/s
8 Hour Test 21/10/93
SWL 6.1m bgI
Available Drawdown was 10.9m
WRR Test Book No 1372
**WATER RESOURCES DIVISION**

**TEST REPORT - BORE RN. 16235**

Bore Location: PENYEME EXCISION, ON MARSHALL RIVER, JINKA STATION  
Client: Technical Support Branch  
Intended Use: Domestic  
Map: Huckitta  
Grid Reference: 567981 E 7479233 N

**RECOMMENDATIONS**

Pumping Rate: 0.5 L/s  
Pump Setting: 16.5 m below Ground Level.

General recommendations are given on the reverse side. The aquifer and bore can sustain higher pumping rates short periods. Further advice can be obtained from: Water Resources Branch, Nth Stuart Highway, ALICE SPRINGS, NT., 0870

(In all correspondence please refer to bore’s RN number)

**COMPLETION DETAILS**

- Finished depth: 26 m  
- Completion Date: 21/10/93  
- Standing Water Level: 6.1 m on 21/10/93  

**BORE CONSTRUCTION**

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+0.5 - 5.5</td>
<td>204 mm ID steel casing</td>
</tr>
<tr>
<td>+0.5 - 17</td>
<td>155 mm ID steel casing</td>
</tr>
<tr>
<td>17 - 23</td>
<td>155 mm ID perforated steel casing</td>
</tr>
<tr>
<td>23 - 25.35</td>
<td>155 mm ID steel casing</td>
</tr>
</tbody>
</table>

**WARNING:** Minimum internal bore diameter is 155 mm.

**NOTES:**
1. Top of casing as constructed was 0.5 m above ground level.  
2. All depths are measured from natural ground level.  
3. Test rates are not necessarily indicative of sustainable long term pumping rates.

**COMMENTS**

As aquifer extent and the frequency and magnitude of recharge are unknown, cautious exploitation of this groundwater resource is recommended. With regular collection of water level data from this bore a better assessment of likely long term aquifer performance may be possible. It should be noted that bores drilled in fractured hard rock aquifers, such as the aquifer tapped by this bore, quite often yield water at a rate in excess of the available sustainable aquifer yield, hence the recommendation for cautious exploitation of this resource should be doubly heeded.

**WATER QUALITY**

1450 mg/L TDS when tested, Analysis No 93/94/0508  
Prepared by: John Wischusen

boredata

**APPENDIX A.3**
RECOMMENDATIONS FOR FINISHING, OPERATING AND PROTECTING GROUNDWATER BORES

Attention 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 fertiliser 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 a 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.
**ANALYSIS - PHYSICAL**

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td></td>
<td>7.0</td>
</tr>
<tr>
<td>Electrical conductivity</td>
<td></td>
<td>8410</td>
</tr>
<tr>
<td>Total dissolved solids</td>
<td>(mg L(^{-1}) dried at 105°C)</td>
<td>1450</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Sodium, Na</td>
<td></td>
<td>286</td>
</tr>
<tr>
<td>Potassium, K</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Calcium, Ca</td>
<td></td>
<td>116</td>
</tr>
<tr>
<td>Magnesium, Mg</td>
<td></td>
<td>83</td>
</tr>
<tr>
<td>Iron, (total) Fe</td>
<td></td>
<td>0.7</td>
</tr>
<tr>
<td>Total Hardness (as CaCO(_3)) Calculation</td>
<td></td>
<td>6.31</td>
</tr>
<tr>
<td>Total Alkalinity (as CaCO(_3))</td>
<td></td>
<td>3.19</td>
</tr>
<tr>
<td>Silica, SiO(_2)</td>
<td></td>
<td>49</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>Value</th>
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<tbody>
<tr>
<td>Copper, Cu</td>
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</tr>
<tr>
<td>Lead, Pb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manganese, Mn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc, Zn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nickel, Ni</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cobalt, Co</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

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.

---

**DATE:** 9 Nov 1993

**CHECKED:**

**SIGNATURE:**

This laboratory is registered by the National Association of Testing Authorities, Australia. The results reported herein have been performed in accordance with its terms of registration. This report shall not be reproduced except in full.
Appendix B

Bore Data RN 16236 Ilperle
<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>BORE CONSTRUCTION LOG</th>
<th>STRATA DESCRIPTION (Water Struck)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>204mm steel casing</td>
<td>Red sand with micaceous fragment surface aeolian</td>
</tr>
<tr>
<td>6</td>
<td>155mm steel casing</td>
<td>Gneiss, predom qtz and biotite, large chip size indicates fracturing!</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>a/a gneiss opaque feldspars clear qtz with biotite - occ pink qtz</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>a/a but finer gneissic fabric in part - OCC metallic mineral, chalcopyrite?</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Sample breaks up to constituent minerals readily - Weathered rock</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>TD 31.4m</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>Fractured biotite gneiss a unit of the IRINDINA GNEISS. DIVISION 2, ARUNTA BLOCK.</td>
</tr>
</tbody>
</table>

ILPERLE EXCISION - JINKA STATION  
South bank of Plenty River  
RN 16236  
APPENDIX B.1
Appendix B.2

RN 16236
Constan Rate Test at 0.5 L/s
SWL 8.2 m bgl
Available Drawdown was 9.2 m
WRB Test Book No. 1373

ILPERLE EXCISION
Plenty River
JINKA STATION

TIME (minutes)
30 25 20 15 10 5 0

DRAWDOWN IN METRES

APPENDIX B.2
WATER RESOURCES DIVISION
TEST REPORT - BORE RN. 16236

Bore Location: ILPERLE EXCISION ON PLENTY RIVER, JINNA STATION
Client: Technical Support Branch
Intended Use: Domestic
Map: Huckleita
Grid Reference: 564580 E 746499 N

RECOMMENDATIONS
Pumping Rate: 0.5 L/s Pump Setting: 17 m below Ground Level.

General recommendations are given on the reverse side. The aquifer and bore can sustain higher pumping rates for short periods. Further advice can be obtained from:

Water Resources Branch, Nth Stuart Highway, ALICE SPRINGS, NT., 0870

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

COMPLETION DETAILS
Finished depth: 31.4 m
Completion Date: 23/10/93
Standing Water Level: 8.2 m on 23/10/93

BORE CONSTRUCTION

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+0.5 - 5.5</td>
<td>204 mm ID steel casing</td>
</tr>
<tr>
<td>+0.5 - 17.42</td>
<td>155 mm ID steel casing</td>
</tr>
<tr>
<td>17.42 - 24.12</td>
<td>155 mm ID perforated steel casing</td>
</tr>
<tr>
<td>24.12 - 31.4</td>
<td>155 mm ID steel casing</td>
</tr>
</tbody>
</table>

WARNING: Minimum internal bore diameter is 155 mm.

Notes:
1. Top of casing as constructed was 0.5 m above ground level.
2. All depths are measured from natural ground level.
3. Test rates are not necessarily indicative of sustainable long term pumping rates.

COMMENTS

As aquifer extent and the frequency and magnitude of recharge are unknown, cautious exploitation of this groundwater resource is recommended. With regular collection of water level data from this bore a better assessment of likely long term aquifer performance may be possible. It should be noted that bores drilled in fractured hard rock aquifers, such as the aquifer tapped by this bore, quite often yield water at a rate in excess of the available sustainable aquifer yield, hence the recommendation for cautious exploitation of this resource should be doubly heeded.

WATER QUALITY

367 mg/L Tds when tested, Analysis No 93/94/0509

Prepared by: John Wischusen

APPENDIX B.3
RECOMMENDATIONS FOR FINISHING, OPERATING AND PROTECTING GROUNDWATER BORES

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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

boredata
## Technical Report WRA93051

**Date Received in Lab:** 1/11/93

<table>
<thead>
<tr>
<th>R/N No.</th>
<th>Depth (m)</th>
<th>Q</th>
<th>Map</th>
<th>Sampler</th>
</tr>
</thead>
<tbody>
<tr>
<td>16236</td>
<td>30</td>
<td>0.5</td>
<td></td>
<td>R. DARBY</td>
</tr>
</tbody>
</table>

**Location:** ILLPERLE PLENTY RIVER JINKA

### ANALYSIS - PHYSICAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value (mg L⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.3</td>
</tr>
<tr>
<td>Electrical conductivity (microsiemens at 25°C)</td>
<td>610</td>
</tr>
<tr>
<td>Total dissolved solids (mg L⁻¹ - dried at 105°C)</td>
<td>367</td>
</tr>
</tbody>
</table>

### ANALYSIS - CHEMICAL (mg L⁻¹)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value (mg L⁻¹)</th>
</tr>
</thead>
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<td>Sodium, Na</td>
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</tr>
<tr>
<td>Chloride, Cl</td>
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</tr>
<tr>
<td>Potassium, K</td>
<td>8</td>
</tr>
<tr>
<td>Sulphate, SO₂</td>
<td>57</td>
</tr>
<tr>
<td>Calcium, Ca</td>
<td>46</td>
</tr>
<tr>
<td>Nitrate, NO₃</td>
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</tr>
<tr>
<td>Magnesium, Mg</td>
<td>31</td>
</tr>
<tr>
<td>Bicarbonate, HCO₃</td>
<td>279</td>
</tr>
<tr>
<td>Iron, total Fe</td>
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<tr>
<td>Carbonate, CO₃</td>
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<tr>
<td>Total Hardness as CaCO₃calculation</td>
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<tr>
<td>Total Hardness as CaCO₃titration</td>
<td>229</td>
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<tr>
<td>Total Alkalinity as CaCO₃</td>
<td>60</td>
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<tr>
<td>Sodium (from chloride)</td>
<td>49</td>
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<tr>
<td>Silica, SiO₂</td>
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</tr>
</tbody>
</table>

### ANALYSIS - ADDITIONAL (mg L⁻¹)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value (mg L⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper, Cu</td>
<td></td>
</tr>
<tr>
<td>Manganese, Mn</td>
<td></td>
</tr>
<tr>
<td>Zinc, Zn</td>
<td></td>
</tr>
<tr>
<td>Lead, Pb</td>
<td></td>
</tr>
<tr>
<td>Nickel, Ni</td>
<td></td>
</tr>
<tr>
<td>Cobalt, Co</td>
<td></td>
</tr>
</tbody>
</table>

### Notes
- **U/S** DENOTES UNSUITABLE FOR ANALYSIS
- **I/S** DENOTES INSUFFICIENT SAMPLE
- **F** DENOTES FILTRATE ANALYSIS
- **T** DENOTES TOTAL ANALYSIS

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", 1997 N.H. & M.R.C. and the A.W.R.C.
- Levels exceed non-health related limits.
- Levels exceed health related limits.

**DATE:** 9 Nov 1993

**CHECKED:**

**SIGNATURE:**

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