GROUNDWATER INVESTIGATION

GML 120, 175, 161 and 315

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Report No: 5/83/2
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INTRODUCTION

This report contains results of the hydrogeological investigation conducted to determine the groundwater availability of the GML's No. 120, 161, 176 and 315. The work was undertaken at the request of the Department of Mines and Energy and was carried out in September, 1983.

LOCATION AND ACCESS

This area is located some 4 km from the Fountain Head Siding in the South-Western corner of the McKinlay River 1:100 000 sheet.

The best access to the area is from the Stuart Highway, via the bitumen road to the Fountain Head Siding (13 km) and then 4 km Eastwards along the gravel road parallel to the railway line. Both roads are passable all year.

PREVIOUS DRILLING

Four bores were drilled on the lease area in the past. (Bores RN 22056, RN 22057, RN 22058, RN 22059.) Three of them were unsuccessful and one, (RN 22058), yielded 1.2 L/s.

GEOLOGICAL SETTING

The area belongs to the Lower Proterozoic Pine Creek Geosyncline. The leases are underlain by metasediments of the Burrel Creek formation. These mainly comprise of slightly metamorphosed shale, siltstone and greywackes (phyllite). The Lower Proterozoic sediments are dipping 50° SW. They are in parts covered by Tertiary and Quaternary alluvials and soils.

WORK CONDUCTED

Interpretation of aerial photographs, geological interpretation from existing bore and geological reports followed by a field reconnaissance were undertaken in order to construct a geological model of the area.
The information obtained was supported by discussions held with geologists from the N.T. Geol. Survey, and Water Division.

This investigation was assisted by about 3 km of geophysical traverses to provide a check on the geological interpretation and to find drilling sites. Resistivity methods were employed. Traverses were made along existing tracks (see Appendix).

Five bore hole sites were selected. Three of them were located on the basis of geological interpretation and two on the grounds of surface geophysical investigation.

**RESULTS**

Only four bore holes were drilled. They are:

<table>
<thead>
<tr>
<th>BORE RN</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN 22420</td>
<td>31</td>
</tr>
<tr>
<td>RN 22421</td>
<td>26</td>
</tr>
<tr>
<td>RN 22422</td>
<td>28</td>
</tr>
<tr>
<td>RN 22423</td>
<td>35</td>
</tr>
</tbody>
</table>

All bore holes were unsuccessful. The best result (0.2 L/s) was obtained in hole RN 22423.

One of the proposed sites was not drilled as it was located too far from the tenement.

**RECOMMENDATION**

It is recommended that no further drilling for water be carried out in the lease area.
INTRODUCTION

On 5/9/33 a small resistivity traverse was completed in the Fountain Head area (see map attached) by geophysical staff of the Water Division, R.T. Department of Transport and Works. This work comprised approximately 2.8 km at pole-dipole resistivity traversing involving 46 observations of apparent resistivity and was completed by one geophysicist and two field assistants in a total survey period of some 4 hours.

GEOLOGY

The geology in the vicinity of Fountain Head comprises lower proterozoic Barril Creek Formation (siltstone, argillite etc.). To the north west various argillaceous lithologies with lenticular material and minor carbonaceous shale of the later lower proterozoic Mount Sonic Formation outcrop. Both units are substantially folded and the major structural elements in the area appear to trend in a north by north-west to south west direction.

SURVEY OBJECTIVES

The Barril Creek formation has long been recognized as a poor prospect for significant supplies of groundwater. The present survey was directed towards the detection of any secondary porosity developed in this formation by structural or weathering processes.

INSTRUMENTATION

The resistivity instrumentation employed in the present survey is documented in some detail in Hydrogeophysical report 60/2.

RESULT

Previous experience with similar problems in similar environments has shown a suitable resistivity array for the present purpose to be a pole-dipole configuration with a potential dipole of 50 metres and a pole-dipole separation of 100 metres.

The attached profile shows the results obtained with such an arrangement along line 1 (see attached map). Features of the profile are:

11 An average or background resistivity of 200-300
   ohm-metres. This is quite normal for the particular area
   and the present lithologies.

14:PHI
(2) The presence of an intensely conductive indication between 200 E and 350 E. Although certainly not definitive this anomaly has the appearance of a very thin (i.e. < 50 metres) steeply dipping conductor centred at 275 E.

(3) The presence of significantly lower than normal apparent resistivities between 350 E and 800 E. These values could derive from either:

(i) an increase in total longitudinal conductance (S) of the superficial layers (i.e. an increase in conductivity and/or thickness of these beds),

(ii) a decrease in bedrock resistivity, or

(iii) a combination of the above.

Insufficient geophysical data is present to resolve this ambiguity. However, the elevated topography at this location (with little obvious alluvium) would tend to discount the former explanation. For this reason (as well as the steeply dipping nature of the geology) it is suggested that the present broad conductive anomaly results from a change within the Burrel Creek Formation perhaps to a more conductive argillaceous lithology between 350 E and 800 E.

4. There appears to be little reflection in the eastern section of the traverse of the boundary between the Burrel Creek and Mount Bonnie Formations previously mapped at this location.
Map 1: Fountain Head Resistivity Traverse

scale 1: 25 000

Pf6 - Burrel Creek Frm.