AFMECO PTY LTD

ALICE SPRINGS BASE

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DRILLING IN THE ILLOGWA CREEK AREA - 1980

by

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NORTHERN TERRITORY GEOLOGICAL SURVEY

ALICE SPRINGS

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1. INTRODUCTION

THE AREA

Selected areas along the margin of the Eromanga Basin, that have a suitable area of source rocks, have been under investigation for "sandstone" type uranium, normally believed to be located at the redox interface.

This particular area is downstream from some uranium anomalies, found by Esso in the Arunta Complex Basement (see Location Map).

The area investigated is partially on Numery Pastoral Lease and partially on vacant Crown Land. The Central Lands Council submitted a claim for the whole Simpson Desert area.

WORK PROGRAMME

Following on a similar drilling programme in the Tieyon/New Crown area adjacent to the South Australian/Northern Territory border, a work schedule was undertaken as follows:

1. E.L. applications for two areas, which were granted on 10.10.79.

2. Grading of roads, pads and emergency airstrips early in 1980.

3. Drilling programme between 10.7.80 and 27.7.80 with some delay in the beginning due to the necessity to hire a D6 bulldozer to keep the drill mobile in the heavy sand. Total drilled - 841 m.

4. A review was undertaken during August, 1980 in conjunction with a review of the Plenty River area drilling programme which followed on this programme.

CONTRACTOR AND EQUIPMENT

Wallis Geochemical Drilling Co. Pty Ltd of 54 Beaconsfield Avenue, Midvale, Western Australia, 6056, were given the contract for what was initially programmed as a 5000 m overall contract for this area and the Plenty River area, later reduced to around 3000 m.

The drill was a Gemco H.22 with International body, and a Schramm Compressor of 250 psi, mounted on a separate Mercedes truck. The drill was of the reverse circulation type called "Air Core", using NQ rods with liners and tungsten bits.

A separate Bedford water truck and a 4 x 4 utility vehicle accompanied the drill.

A single crew of three men were accommodated in a caravan.

The "Air Core" system, using a cyclone, recovers 100% of the rock cuttings, occasionally including approximately "A" size core sticks with the cuttings.
DISCUSSION OF DRILLING METHODS

This variant of the reverse circulation type of drilling was immensely superior to an attempt at diamond drilling of the Eromanga Basin Sediments, previously undertaken at depths below about 180 metres. The presence of water (either too much in these holes, once the aquifer was intersected, or too little where the ground is merely moist) reduced the capabilities of the drill fairly readily, and a sophisticated drilling technique is required to attain depths approaching 200 m. "Torquing up", or bogging of the rods due to an inability to ream the hole above the bit when withdrawing the rods, along with sanding of the rods, was a constant hazard.

LOGGING PROGRAMME

Logging was done by Geoscience Associates of 26-28 Pambula Street, Regency Park, S.A. 5010, using a Geoscience logging truck mounted on an F.350 chassis with a "Limited Slip Differential".

The holes were all logged using natural Gamma and Neutron-Neutron logging methods. The gamma probe employed a 1/2" x 1/2" detector crystal.

No anomalies of any consequence were located, and the Neutron-Neutron logs were less useful here than elsewhere.
2. GEOLOGY OF THE ILLOGWA CREEK AREA

Intensely folded Amadeus Basin sediments tend to pinch in this general area. In consequence basement rocks lie in the eastern part of the area (see Plate 2) and are found in the subsurface.

**Post Fromanga Sediments**
Wind blown sand and river alluvium.

**Albian-Aptian-Cenomanian of the Cretaceous**

**Klu - Wallumbila Formation**
Where fresh this is a bluish-grey mudstone and siltstone with grey limestone locally common, and minor lenticular sandstone, intraformational conglomerate, in places glauconitic.

**Klc - Cadna-Owie Formation**
Consists largely of medium-grained sublithic sandstone with siltstone especially abundant towards the base. The average thickness of this formation is 60 metres.

**Adelaidean to Lower Palaeozoic**

**Amadeus Basin Sequence**
Strongly folded members of varying ages and lithologies.

**The Arunta Block**

**Granites and Gneisses**
Undifferentiated metamorphic rocks.
3. **GEOPHYSICS**

Quarter million aeromagnetic sheet maps and gravity maps are available for the area. Significant features have been marked on the Geological Sheet Map (see Plate II). They were used in an attempt to interpret the structure of the basement and basin sediments, but without notable success.
4. RESULTS OF SUBSURFACE STUDY

BASEMENT

Holes 1 and 4 intersected Arunta basement, and Hole 5 would probably also have intersected Arunta basement. This demonstrates a "closing off" or re-alignment of the Amadeus Basin sediments, prior to swinging north-south and joining up (?) with the Adelaide Geosyncline.

The rocks intersected were chlorite-rich with coarse granite to pegmatitic material admixed, along with ferruginous weathering products.

Amadeus Basin Sequence

Holes 2 and 3 went into indurated sediments, of probable Amadeus Basin sequence.

In Hole 3 an oxidised white to off-white siltstone was intersected at the bottom of the hole. As the drill had reached its maximum penetration limit due to a high water flow, no attempt was made to penetrate the unit.

In Hole 2 the rock encountered was a grey-green sandstone, jointed, sheared and highly indurated. Some core was recovered.

THE EROMANGA BASIN SEDIMENTS

1. The Wallumbila Formation

There is a very striking variation in thickness encountered in drilling, from perhaps 17 metres of possible Wallumbila Formation in Hole 1, to 116 m in Hole 2.

Composed largely of siltstones and shales with minor sandstones, particularly in the upper part of Hole 2, ochreous in the oxidised zone, sometimes rather chalky, to dark grey to black when reduced (generally at depths greater than 90-100 m). The oxidised zone frequently shows evidence of manganese staining, and carbonate (crystalline) is present in the reduced zone.

2. The Cadna-Owie Formation

This is a pyritic, glauconitic sandstone where reduced, and shows secondary silicification of varying types where oxidised, and cherty bands and silica cemented layers were encountered.

The sandstone is generally sequential, with a fairly rapid alternation from coarse sands, through finer sands to siltstones. Some intraformational sandstone and shale breccia were encountered.

This marine succession with glauconite, spheroidal pyrite nodules, carbonate, and relatively fine-grain size was generally close to 60 m thick except for Hole 2 where it was unusually fine-grained and thin. A small radiometric peak was present in Hole 2, of 22 cps at 145 m (see Section 1).
POST EROMANGA SEDIMENTS

Along the Illogwa Creek magnetite-bearing riverine gravels and medium to coarse sandstones are present. These layers of varying thickness - up to 26 m - have a ferruginous, manganiferous or siliceous (billy) cement.
5. **ECONOMIC GEOLOGY**

The neutron-neutron logs gave poor correlation, but only the Cadna-Owie marine sandstone is believed to be present. The radiometric response was poor.

There is abundant water of fair to good quality present in this area:-

1. The "top water" relates to the groundwater moving down the Illogwa Creek. This is generally encountered at shallow depth (less than 100 m) in the upper part of the Illogwa Creek, and is fairly fresh.

2. The "bottom water" is related to the sandstones and has a higher calcium and magnesium content and slightly lower pH, and occurs below 120 metres depth, and is salty (Water Resources Analyses).

The uranium content is shown on Plates IV and V. Water analyses are given in Table 1.

**TABLE 1: WATER ANALYSES**

(Results in milligrams per litre)

<table>
<thead>
<tr>
<th>Hole No.</th>
<th>V</th>
<th>U</th>
<th>Th</th>
<th>pH</th>
<th>HCO₃⁻</th>
<th>F</th>
<th>Si</th>
<th>Ca</th>
<th>Mg</th>
<th>T.D.S.</th>
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<tr>
<td>JUB 1 (A)</td>
<td>15</td>
<td>15</td>
<td>9</td>
<td>8.2</td>
<td>246.4</td>
<td>0.976</td>
<td>30</td>
<td>50</td>
<td>34</td>
<td>465</td>
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<tr>
<td>(B) 15</td>
<td>15</td>
<td>x</td>
<td>7.9</td>
<td>267.2</td>
<td>0.870</td>
<td>40</td>
<td>62</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JUB 2</td>
<td>15</td>
<td>10</td>
<td>7</td>
<td>8.1</td>
<td>264.7</td>
<td>1.440</td>
<td>30</td>
<td>100</td>
<td>35.5</td>
<td></td>
</tr>
<tr>
<td>JUB 3</td>
<td>Hole collapsed - not sampled</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JUB 4</td>
<td>10</td>
<td>25</td>
<td>15</td>
<td>7.9</td>
<td>148.8</td>
<td>0.724</td>
<td>30</td>
<td>350</td>
<td>125</td>
<td>3010</td>
</tr>
<tr>
<td>JUB 5</td>
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<td>30</td>
<td>20</td>
<td>7.7</td>
<td>122.0</td>
<td>1.324</td>
<td>35</td>
<td>530</td>
<td>71</td>
<td>3800</td>
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APPENDIX 1

DRILL HOLE LOGS