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A REVIEW OF O.P. 189

PR84/54A

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MAGELLAN PETROLEUM AUSTRALIA LIMITED

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A REVIEW OF O.P. 189

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NORTHERN TERRITORY
GEOLOGICAL SURVEY

DEPT OF MINES & ENERGY
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INTRODUCTION

Following the drilling of Bluebush No. 1, a reinterpretation of geophysical and geologic data indicated that areas prospective for hydrocarbons were restricted to the northern margin of OP 189. Two prospective structures were recognized in this area, and were identified by Irwin (1984) as Camel Flat prospects 5 and 6 (Fig. 1). Prospect 5 was independently identified by Oaks (1983) as Centenary West anticline. A comparative analysis of each prospect follows.

PROSPECT 5

General Statement

Prospect 5 is an east-west trending doubly-plunging anticline bounded to the north by a system of predominantly north-dipping thrust faults. The structure intersects line MCF 81-05 between stations 1230 and 1350, and line MCF 81-07 between stations 1600 and 1630 (Fig. 1). It has a minimum areal closure of 30 square kilometres and a minimum vertical closure of 80 metres (along line MCF 81-05) to 150 metres (along line MCF 81-07) at the base of the Arumbera. The depth to the base of the Arumbera in this area is approximately 2,100 metres. The Bitter Springs Formation, the probable source for hydrocarbons reservoired in the Arumbera at Dingo Nos. 1 and 2, lies within the present-day oil generative zone throughout the area (Fig. 2). The advantages and disadvantages of drilling this prospect are listed below.

Advantages

1. Over 800 metres (400 m. sec.) of potentially sealing Chandler evaporites and carbonates overlie the Arumbera (Fig. 3).

2. The conglomeratic sandstone which reservoirs gas at Dingo Nos. 1 and 2 is present along the north flank of the structure (Fig. 1). It is present in outcrop 9 kilometres to the north, and is likely to be up to 20 metres thick throughout the area (Fig. 1).

3. Secondary Cambrian and Proterozoic reservoir horizons lie adjacent to the Arumbera. Shows of oil were reported in the Chandler at Alice No. 1 and BMR Rodinga 1A, and the Chandler contained shows of gas at Alice No. 1 and Orange Nos. 1 and 2. Shows of gas were reported in the Areyonga at Ooraminna No. 1, shows of oil were reported in the Loves Creek at Mt. Winter No. 1, asphaltic material was reported in the Loves Creek at East Johnnys Creek No. 1, and shows of oil were reported in the Loves Creek and younger Proterozoic dolostones at Finke No. 1. Each of these units should subcrop in this area.

4. Reservoir horizons may be extensively fractured in this area. Cambrian and Proterozoic sediments are likely to be extremely brittle at depth, and lie adjacent to an area of intense structural deformation (Fig. 1).

5. The structural relief of the prospect is not artificially enhanced by a velocity pull-up beneath Chandler salt. RMS and interval velocities in the salt are actually slower than those in the underlying sediments.

6. Seismic lines and graded dirt tracks provide good access to the area.

7. An extensive water supply is available locally. Phillipson No. 5, Centenary, and East bores each lie with 15 kilometres of the structure.

Disadvantages

1. The Arumbera is present only along the north flank of the structure (Fig. 4).

2. Additional seismic data is required to adequately define the structure.

3. Acquisition of additional seismic data may be limited by outcrops to the west.

4. Primary target horizons lie at depths which approach the limits of the slim-hole drilling rig.

5. The structure has a limited area from which to drain hydrocarbons.

6. The prospect has little structural relief.

7. Extensive caving may occur while penetrating the Hermannsburg and Mereenie.

PROSPECT 6

General Statement

Prospect 6 is a northeast-southwest trending, southwest plunging asymmetrical anticline closed to the northeast by a north-dipping thrust fault. The structure intersects line MCF 81-07 between stations 1670 and 1750 (Fig. 1). It has a minimum areal closure of 4 square kilometres and a minimum vertical closure of 200 metres at the base of the Arumbera. The depth to the base of the Arumbera is also approximately 2,100 metres in this area. The Bitter Springs Formation, the probable source for hydrocarbons reservoired in the Arumbera at Dingo Nos. 1 and 2, lies within the present-day oil generative zone throughout the area (Fig. 2). The advantages and disadvantages of drilling this prospect are listed below.

Advantages

1. Over 1400 metres (700 m. sec.) of potentially sealing Chandler evaporites and carbonates overlie the Arumbera (Fig. 3).

2. The conglomeratic sandstone which reservoirs gas at Dingo Nos. 1 and 2 and an additional 130 metres of Arumbera are present across the structure (Figs. 1 and 4). The conglomeratic sandstone is present in outcrop 6 kilometres northwest of the structure, and is likely to be 20 metres thick throughout the area.

3. Secondary Cambrian and Proterozoic reservoir horizons lie adjacent to the Arumbera. Shows of oil were reported in the Chandler at Alice No. 1 and BMR Rodinga 1A, and the Chandler contained shows of gas at Alice No.1 and Orange Nos. 1 and 2. Shows of gas were reported in the Areyonga at Ooraminna No. 1, shows of oil were reported in the Loves Creek at Mt. Winter No. 1, asphaltic material was reported in the Loves Creek at East Johnnys Creek No. 1, and shows of oil were reported in the Loves Creek and younger Proterozoic dolostones at Finke No. 1. Each of these units should subcrop in this area.

4. Reservoir horizons may be extensively fractured in this area. Cambrian and Proterozoic sediments are likely to be extremely brittle at depth, and lie adjacent to an area of intense structural deformation (Fig. 1).

5. The prospect has moderately steep structural relief.

6. The structural relief of the prospect is not artificially enhanced by a velocity pull-up beneath Chandler salt. RMS and interval velocities in the salt are actually slower than those in the underlying sediments.

7. Seismic lines and graded dirt tracks provide good access to to the area.

8. An extensive water supply is available locally. Larrier and Limejuice bores lie within 8 kilometres of the structure.

Disadvantages

1. Additional seismic data is required to adequately define the structure.

2. Acquisition of additional seismic data may be limited by outcrops to the east and west.

3. Primary target horizons lie at depths which approach the limits of the slim-hole drilling rig.

4. The structure is closed to the northeast by a thrust fault which may not have formed an impermeable barrier to migrating hydrocarbons.

5. The structure has a limited area from which to drain hydrocarbons.

6. Extensive caving may occur while penetrating the Mereenie.

CONCLUSIONS AND RECOMMENDATIONS

Further exploration in OP 189 is warranted on a limited basis only. Prospect 6 is the more promising structure, but it should not be tested without acquiring additional seismic data. The structure may be relatively small and is likely to contain only marginally economic reserves.

It is recommended that funds for additional exploration in OP189 be drawn from outside sources.