NEW PETROLEUM POTENTIAL IN FIJI AND INITIATIVES TO ATTRACT OIL COMPANIES TO INVEST IN EXPLORATION

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ACKNOWLEDGEMENTS

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SUMMARY

A new evaluation of Fiji's petroleum potential has identified over twenty prospects which could contain oil and gas in Bligh Water Basin and Bau Waters Basin. If oil is present, each prospect could contain reserves in the order of 300 million barrels of oil. Government revenues from only one such oil field could be on the order of US$ 5.8 billion over twenty years (or US$ 1.4 billion discounted) and would thus have a major impact on the national economy.

The only way to determine if oil is present is to attract international oil companies to invest in exploration drilling in Fiji.

It is accepted practice in the oil industry to promote petroleum prospects by a promotion tour, which is linked to a licensing round. It is proposed that a promotion tour be held for Fiji. A promotion team of four will comprise a senior Fiji Government Minister and his officials, including a SOPAC petroleum expert. The team will make presentations to the senior management of selected international oil companies and their financial advisors in Australia, Canada, France, Germany, Holland, Japan, the UK and the USA, and thereby encourage the oil companies to explore Fiji's new petroleum prospects.

Financial support of F$ 188,000 is required for the promotion tour.
OBJECTIVES

This work is a contribution to the SOPAC 1993 Work Plan Task 93.RG.21b. The report was requested by the Fiji Government to provide an overview of new petroleum potential identified by SOPAC in the offshore basins of Fiji and to propose initiatives for promoting this to international oil companies. The report provides technical background for a paper drafted for the Fiji Government Cabinet (Rodd and van Meurs 1993a).

INTRODUCTION

This document provides a summary of a recent evaluation of the petroleum potential of Fiji by SOPAC in conjunction with the Mineral Resources Department (Rodd 1993). The evaluation has identified more than twenty new petroleum prospects in Fiji’s offshore basins. The only way to determine whether the prospects contain petroleum is for them to be drilled.

Exploration drilling is very costly and high risk. For example, an exploration program in Fiji could cost on the order of US$ 20 million, with no certainty that commercial oil or gas will be discovered. It is necessary, therefore, to attract international oil companies which have the necessary financial resources to invest in exploration.

It is proposed that the new petroleum prospects be promoted to the oil companies in order to encourage them to invest in exploration. It is accepted practice in the oil industry to do this with a promotion tour and licensing round.

When assessing the petroleum potential of new areas, oil companies look for several key geological factors which are prerequisites if oil and gas is to be discovered. Briefly, these are:

1) Source rocks capable of generating oil and gas if buried to sufficient depths in the subsurface.

2) Reservoir rocks capable of holding the oil and gas once generated. In Fiji, Tertiary reef limestones are the best potential reservoir.

3) Seal rocks which must directly overlie the reservoir rock and be capable of retaining the oil and gas.

4) Traps which are special geological structures in the subsurface which comprise the reservoir and seal rocks, and thus trap the oil and gas.

5) That the sequence of events is correct: that the formation of the trap is succeeded by the migration of oil from the source rocks into the trap.
The new evaluation shows that all these criteria are met in Fiji's Bligh Water Basin and Bau Waters Basin (Rodd 1993). and that, as a result, there is considerable potential for petroleum in these offshore basins.

**FIJI'S PETROLEUM POTENTIAL**

**Regional Perspectives**

The new evaluation of Fiji's petroleum potential shows that there are many similarities between the geology of Fiji and South East Asia which has major reserves of oil and gas (Rodd 1993). In Indonesia, Malaysia and the Philippines, several decades of exploration has established ancient Tertiary reefs to be major petroleum reservoirs. Most recently, in Papua New Guinea, gas fields in the Tertiary reefs are being developed in the Gulf of Papua for export to Japan. This shows that there is a valuable international market for gas as well as oil.

The same Tertiary reef reservoirs form a geological trend which extends from Papua New Guinea, through the island arcs of Solomon Islands and Vanuatu to Fiji (see Figure 1). Such geological trends highlight areas which have favourable petroleum potential and are thus often pursued by oil companies. Consequently, this is an important factor which could attract oil companies to explore in Fiji.

**Results of Previous Petroleum Exploration in Fiji**

In order to discover oil and gas it is necessary to undertake seismic surveys and drilling programs. Exploration by oil companies in Fiji took place between 1969 and 1987 (Eden and Smith 1984, Rodd 1993). This included the acquisition of some 18,000 km of seismic data in offshore areas of Bligh Water and Bau Waters, and the drilling of seven wells.

Drilling showed that rocks capable of generating oil and gas (source rocks) are present in the offshore basins of Fiji. Indeed, traces of oil and gas were actually encountered whilst drilling some of the wells.

Although the wells did not find commercial petroleum reserves, Rodd (1993) has shown that this is because none of the seven wells reached their targets of Tertiary reef limestones. It is also clear that six of the wells were located in positions where petroleum could not be trapped.

These findings are important with regard to the petroleum potential of Fiji. The failure of any of the wells to find petroleum could be taken by oil companies as a discouraging factor. However, it is evident that this lack of success arises from the fact that the wells were drilled at the wrong locations, and not because the geology of Fiji is intrinsically unfavourable.

At present there are no exploration licences held in Fiji.

[MR145 - Rodd]
Fiji's Prospective Basins

The largest prospective offshore basin is Bligh Water Basin covering some 9500 km. Shallow water depths combine with sediment thicknesses in excess of 5000 m and favourable geology to make this the most prospective basin in Fiji (see Figure 2).

Bau Waters Basin is the offshore extension of the onshore Rewa Basin. The shallow water area is restricted to a nearshore zone some 25 km wide with an area of 1600 km. Sediment thicknesses reaching over 4000 m and promising geology make this the second most prospective basin in Fiji.

Source Rocks for Petroleum

Previously there was some doubt regarding the presence of source rocks in Fiji (Johnson 1991). This is critical, because without source rocks there can be no petroleum. However, the new evaluation shows that source rocks ranging of Tertiary age do occur on Viti Levu and have been encountered in offshore exploration wells (Rodd 1993). These source rocks may generate oil and gas if buried to sufficient depths in the offshore basins.

The source rocks identified in Fiji are very similar in composition and chemistry to those which are known to generate oil and gas in Indonesia, Malaysia and the Philippines. This will be a major encouraging factor for oil companies.

Oil and gas traces encountered during drilling, and oil seeps provide conclusive evidence that hydrocarbons have indeed been generated in Fiji's offshore basins. A possible large oil seep in sediments on the sea bottom occurs in the south of Bligh Water Basin. This will be surveyed in detail in the next few months by SOPAC and the Mineral Resources Department (SOPAC Task 93.FJ.21b).

Petroleum Reservoirs

Two potential ancient reef reservoir horizons of Tertiary age have been identified: the Miocene and Pliocene (Rodd 1993). These occur in the offshore Bligh Water and Bau Waters Basins and represent two separate target horizons for exploration. Over twenty new possible traps have been found using seismic data in these basins (see Figure 2).

On seismic data these ancient buried reefs occur as mounded features (see Figure 3) and are very similar to Tertiary reefs which produce oil and gas in Indonesia, Malaysia, Philippines and Papua New Guinea (cf. Durkee 1990). Each reef could be filled with oil or gas.

The amount of petroleum that can be held in the reservoir is determined by the porosity: a network of small holes which are connected in much the same way as holes in a sponge. The porosity of the reef reservoirs is likely to be moderate to high, representing between 10% to over 25% of the total
volume of the reservoir (Rodd 1993). This is an encouraging factor to oil companies since it means that, if oil is present, relatively large volumes could be contained within, and recovered from, the reservoir.

A second type of reservoir has also been identified. These are ancient deep water limestone deposits called turbidite fans. These are also of Tertiary age though they are less common than the reef limestones. They represent a secondary target for exploration.

### Estimated Economic Value

At this stage there is no guarantee that oil and gas is present. It is necessary to attract oil companies to drill the traps and find out if they contain petroleum reserves. Oil companies have to weigh the risks (a typical exploration program in Fiji could cost about US$ 20 million) against the possible rewards.

Following accepted practice in the oil industry, it is possible to estimate the petroleum reserves from the size of the traps. If oil is present, estimates of the possible reserves of oil is on the order of 300 million barrels in each trap (Rodd 1993). Economic analysis of these prospects by Rodd and van Meurs (1993b) shows that each trap of this size could generate total revenues of over US$ 16 billion over twenty years. With the royalty and tax rates on petroleum in Fiji, the Government take could be about US$ 5.8 billion over twenty years (or US$ 1.4 billion using a social discount rate of 10%).

Alternatively, if gas is present, this is an equally valuable energy resource both in Fiji and overseas.

### PROMOTION TOUR TO INTERNATIONAL OIL COMPANIES

#### Justification

The evaluation of Fiji’s petroleum potential by Rodd (1993) has identified major new petroleum potential in Fiji’s offshore basins. It is now important to promote these new prospects to oil companies in order to encourage investment in exploration. It is only in this way that the new exploration targets can be drilled and this potentially very valuable resource developed.

Promotion tours are an accepted method of promotion in the oil industry and have been very successfully used by developing countries to attract oil companies to invest in exploration, including Papua New Guinea and Tonga.

During the tour a high level team of Fiji Government Ministers, their officers and a petroleum expert from SOPAC will meet with the senior management of oil companies who are responsible for decision-making on new exploration ventures. Presentations will be given on the petroleum potential of Fiji, and the legal and fiscal terms will be discussed. Small, one-day conferences will be
organised, one in each of the major oil centres of Calgary, Houston, London, Tokyo and Sydney.
Follow-up meetings will be held with oil companies that show particular interest in Fiji.

Following accepted practice in the oil industry, the promotion tour will be linked to a formal offer of exploration acreage made by the Fiji Government to the oil industry. Oil companies will be invited to assess the available data and make bids for the offered acreage in a licensing round.

**Promotion Tour Activities**

The promotion team will make presentations to selected large oil companies, their banks and financial advisors. Financial support of F$ 188,000 is required for the following (See Appendix 1 for details):

1) Travel, including airfare, for the four member promotion team from Fiji to Australia, Canada, Europe, Japan and USA, in order to make presentations to selected oil companies and to attend follow-up meetings

2) Per diem (at UN rates) for the promotion team for a total of eight weeks for the duration of the tour

3) Hire of facilities for small, one day conferences/ receptions at five venues (Calgary, Houston, London, Tokyo and Sydney)

4) Production of promotional material (including brochures, catalogues and maps), and advertising the tour and licensing round in oil industry publications.

Individual meetings will be held with international oil companies, including Japex, Nippon and Idemitsu in Japan; Ampol, BHP and Santos in Australia; Amoco, Chevron, Occidental, Hunt Oil, Mobil, Shell Oil and Exxon in the USA; Canadian Oxy and Saskoil in Canada; BP and British Gas in the UK; Elf and Total in France; and Deminex in Germany.

Several of these companies have already expressed interest in the petroleum potential of Fiji at recent oil industry conferences.

The promotion tour and acreage offer will be well advertised beforehand in oil industry journals and magazines. In all over 200 oil companies will be invited to attend the special Fiji conferences in Calgary, Houston, London, Tokyo and Sydney, together with banks and financial advisors.
Benefits for Fiji

Only large oil companies have the financial resources and technology to drill Fiji's new exploration targets and discover oil. The promotion tour will attract these oil companies to invest in exploration in Fiji.

If oil is discovered the Government revenues would be on the order of billions of US dollars (Rodd and van Meurs 1993). This would have a major impact by diversifying and strengthening the Fiji economy and could represent the single largest commercial development in Fiji.

There would be many spin-offs for Fiji with the commercial development of service industries and contractors. The exploration operations would also provide local employment.

CONCLUSIONS AND RECOMMENDATIONS

1) A new evaluation of the petroleum potential of Fiji (Rodd 1993) has identified numerous new prospects in offshore Bligh Water Basin and Bau Waters Basin. These new exploration targets are reefal limestones and turbidite limestones, both of Pliocene and Miocene age.

2) Each prospect could contain recoverable reserves on the order of 300 million barrels of oil. Economic analysis shows that, if oil is present, each prospect could generate Government revenues of US$ 5.8 billion over twenty years (or US$ 1.4 billion using a social discount rate of 10%)(Rodd and van Meurs 1993b). If gas is present, this also is valuable energy resource.

3) In order for the new petroleum prospects to be drilled it is necessary to attract international oil companies to invest in exploration in Fiji.

4) It is standard practice in the oil industry to promote petroleum prospects using a promotion tour in which senior Government Ministers, their officials and a petroleum expert meet with the decision makers of international oil companies.

5) It is recommended that a promotion tour be held to promote Fiji's petroleum prospects to oil companies in Australia, Canada, France, Germany, Holland, Japan, the U.K. and the U.S.A. The estimated cost of the tour is F$ 188,000.
REFERENCES


APPENDIX 1

Proposed Budget for Promotion Tour

The following costs are for a promotion team of four people, comprising one Government minister, two Government officers and one petroleum expert from the South Pacific Applied Geoscience Commission (SOPAC).

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<tbody>
<tr>
<td>i) Travel costs, including airfare</td>
<td>66,000</td>
</tr>
<tr>
<td>4 people</td>
<td></td>
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<tr>
<td>ii) Per diem (UN rates)</td>
<td>83,000</td>
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<tr>
<td>4 people for 8 weeks</td>
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<tr>
<td>iii) Conferences/receptions</td>
<td>20,000</td>
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<td>5 venues (Calgary, Houston, London, Tokyo and Sydney)</td>
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<td>iv) Advertising and promotional material</td>
<td>19,000</td>
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<td></td>
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<tr>
<td><strong>Total</strong></td>
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