

BEATRICE MARÉ

**DOES THE CROWN MINERALS ACT 1991
AND ITS ASSOCIATED POLICIES
ENCOURAGE PETROLEUM
EXPLORATION?**

**LLM RESEARCH PAPER
ENERGY AND NATURAL RESOURCES LAW (LAWS534)**

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Does the Crown Mineral Act 1991 and ...

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*Te Whare Wananga
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I ABSTRACT

The New Zealand petroleum exploration regime required to undertake exploration activities in New Zealand contains aspects which both encourage and discourage investment in petroleum exploration. Although the Crown Minerals Act 1991 is a regulatory statute its associated policy framework, the Minerals Programme for Petroleum, implies exploration should be at a rate which is compatible with the efficient management and allocation of the Crown Mineral Estate, including a fair financial return to the Crown.

Additionally, the Crown Minerals Act 1991 is the overriding and fundamental component of the exploration permitting regime and should provide with its associated policies and regulations a legal exploration environment that encourages investment.

An increase in exploration activity with respect to the current rate of exploration is required because of the Government's recent change in policy to provide for the Crown a "maximum financial return" on its minerals, to achieve a higher per centage of liquid fuel self-sufficiency, and continue investment in the Crown Minerals Estate.

However, the current level of exploration activity is not sufficient for many reasons and may be an artefact of the current exploration permitting regime. If so the Crown Minerals Act 1991 and its associated policies do not encourage petroleum exploration to the extent required, however they could.

The text of this paper (excluding contents page, footnotes and bibliography comprises approximately 14849 words.

II INTRODUCTION

All petroleum existing in its natural condition in New Zealand is the property of the Crown and accordingly an explorer wanting to undertake exploration in New Zealand must either obtain an exploration permit or an interest in an existing exploration permit, pursuant to section 30 of the Crown Minerals Act 1991.

The New Zealand petroleum exploration regime is a combination of:

- (a) The New Zealand legal system which has its origins in the laws of England and common law systems of England, the Commonwealth and the United States of America;
- (b) Statute introduced by Act of the New Zealand Parliament;
- (c) Regulations and orders in council, which are publicly legally binding documents; and
- (d) Political and administrative regulatory powers for permitting requirements

The petroleum exploration regime elements discussed in this paper include the Crown Minerals Act 1991 (CMA) and the Minerals Programme for Petroleum.

The CMA is the statute governing petroleum exploration in New Zealand and was enacted on 1 October 1991. Introduced on 1 October 1995 the Minerals Programme for Petroleum was developed pursuant to section 12 of the CMA and establishes the policies, procedures and provisions to be applied in respect of the management and allocation of petroleum.

This research paper analyses the relevant sections of the CMA and the Minerals Programme for Petroleum to comment on the capacity of these two documents to increase exploration activity in New Zealand. The impact the current exploration regime has had on exploration activity, and whether they take into account issues facing the wider energy market, and New Zealand's economy in general are also considered.

An increase in exploration activity is necessary for the Government to achieve its intention for the Crown to efficiently allocate the Crown Mineral Estate, receive a fair

financial return from its minerals, continue investment in petroleum exploration¹, meet increasing energy demands, and increase liquid fuel self-sufficiency.

Although the CMA does not expressly provide to increase exploration activity and has a regulatory responsibility, section 12 of the CMA states that the purpose of a Minerals Programme is to provide for

- “(a) The efficient allocation of rights in respect of Crown owned minerals; and*
- (b) The obtaining by the Crown of a fair financial return from its minerals.”*

The efficient allocation of rights should consider the objectives for having those rights and if the objectives are not being met, the allocation is considered inefficient. The objective of allocating exploration rights is to achieve the outcome of discovering hydrocarbons. Should the discovery not occur at a time when it is required, because of an insufficient exploration rate, the exploration undertaken is unsuccessful. This failure may be the result of an inefficient allocation of the resource. Additionally, the words “fair financial return to the Crown” have been replaced recently by “maximum financial return to the Crown”². This implies an aim to receive as much of a return as possible.

Chapter 2 of the Minerals Programme for Petroleum states

“This Minerals Programme for Petroleum has been prepared on the basis that the desired outcome is to allow continuing investment in petroleum prospecting, exploration and mining.”³

I assume the desired outcome to allow “continuing investment” is considered economically.

If the management role exercised by the Minister of Energy is limited to the functions and powers granted to him under the CMA, and the policies for the management and

¹ In a speech made by the Minister of Energy in 1994 it was said “we are committed to promoting policies and having a legislative framework in place that is supportive of the industry and is conducive to investment. We want to encourage exploration”, Ministry of Commerce 1994, 1.

² The change has not been by way of amendment to the CMA but is currently the objective for continuing investment in the Crown Minerals Estate (Crown Minerals, 1998).

³ See Minerals Programme for Petroleum 1995, para 2.6, 3. Emphasis added.

allocation of the petroleum resource provide for the Crown to obtain a fair financial return from its minerals, and efficiently allocate the resource, it makes sense that there should be compatibility between the statute and the policies. Subsequently the CMA should provide for at least a fair financial return to the Crown and should ensure the efficient allocation of the resource. Obviously the interpretation of "fair financial return" and "efficient allocation" will affect the opinion of obligation that the CMA has, and whether the CMA already serves its purpose.

The Government's current stance is to increase self-sufficiency of liquid fuels from its current 41 per cent figure⁴. Security of supply issues are less important today than in the past. Oil and coal are readily tradable internationally, however this is not the case for gas, and there are economic advantages in having a continuing supply of gas available for reticulation to industrial, commercial and domestic users, and electricity generation, where cost effective⁵. Continued investment in petroleum exploration is needed to identify new sources to replace currently producing fields once exhausted and meet the increasing demand for the energy source.

The alternative is to leave the petroleum in the ground and not provide to allocate permits to allow investment. This option is not considered to be in the best interest of the economy given petroleum's current economic use.

Because petroleum exploration is a balance of high risks and high benefits the petroleum regime must allow a "fair financial return to the Crown and encourage exploration and investment.

The Crown, as the manager of petroleum, wants to ensure that the resource is managed soundly, including minimising unavoidable waste⁶. I question whether at the exploration stage this "unavoidable waste" includes exploring at a rate insufficient to discover a petroleum supply, within a constrained time frame. If the exploration rate is not sufficient to meet the requirements and needs of a future gas and or oil supply, is the exploration activity considered wasteful of exploration costs, public and private. If exploration was at a rate to give a good "return for effort" it would not be wasteful.

⁴ Stated in a speech made by the Minister of Energy, See: Bradford 1998, 2.

⁵ See: Minerals Programme for Petroleum 1995, ch 2, para 2.7, 3.

⁶ See Minerals Programme for Petroleum 1995, ch 2, para 2.14, 5.

This research paper follows my previous seminar paper *Petroleum Law and Cyclicality* (Maré 1998) which correlated New Zealand petroleum legislation development and exploration activity since 1865⁷. Cyclicality analyses in Maré (1998) revealed that many fluctuations in exploration activity resulted over this 130 year period. Furthermore, the study showed that successful exploration began after the introduction of the Petroleum Act in 1937 and the introduction of the CMA in 1991. These exploration surges resulted with the legislation introduced, but may have coincided with other variables such as high oil price, government commercial participation and world oil shocks⁸. However, exploration increase since 1991 and more evidently in the last three years does not appear to coincide with other variables. The CMA and its associated policies is probably the most predominant driver for our latest and current surge in exploration activity.

Without a doubt the petroleum legislative regime needs to be internationally competitive to attract exploration funds. Without winning exploration investment there will be no return to the Crown for its petroleum resource. To be competitive there must be an attractive allocation and management regime, especially to offset areas of greater uncertainty in New Zealand, such as the under-explored status of the petroleum basins.

The question - Does the Crown Minerals Act 1991 and its associated policies encourage petroleum exploration? - draws fact and opinion from a number of fields including:

- (a) the Government's approach to the management and allocation of a common pool resource;
- (b) the Government's influences on the governing legislation, including the policies and politics at the time of preparing the legislation, enacting the legislation, and enforcing the legislation;
- (c) the Government's commercial interest in the resource;
- (d) the Government's energy policies; and
- (e) the petroleum prospectivity of New Zealand, including the probability of discovery.

⁷ In 1865 the first exploration well, Alpha, was drilled in New Plymouth under a land lease.

⁸ See: Maré 1998 and Grinlinton 1995.

The above areas will be addressed in the appropriate sections to give an overall framework to address this question.

To understand the development of petroleum exploration and petroleum legislation in New Zealand it is important to have an introduction to these two interrelated aspects, including their history. Accordingly the next two sections provide an outline of the history of exploration activity, and petroleum legislation development from the first land leases to the current regime. The history of the petroleum legislation also illustrates the amendments which were passed (easily) to accommodate requests to secure a petroleum supply for a world war, strategic positioning, to allow the Minister to have a commercial interest in petroleum, and to attract explorers⁹.

"Legal instruments of development, control and regulation, nevertheless, represent in a very real and practical sense the major impediments to effective decision-making."

Previous work on whether the CMA and the Minerals Programme for Petroleum encourages exploration was not found and is assumed not reported before this study. In a report by Ernst & Young (1994) comment was made predicting that the Minerals Programme would result in a continuing decrease in exploration activity.

Previous reports on the current permitting regime for petroleum are found in the following Ministry of Commerce publications: *The Crown Mineral Estate and its Management* (1997), *New Zealand Crown Minerals May* (1996), *Minerals Programme for Petroleum* (1995), and various volumes of *Petroleum Exploration in New Zealand News, Inc.* 1991 to 1998.

Data used to depict exploration activity was collected from statistical data held in Crown Minerals, including existing permits and licences, seismic acquired, and wells drilled. Literature on exploration activity is referred to in Beggs and Thrasher (1998), Upasena et al. (1998), *The Crown Mineral Estate and its Management* (1997) and Grinlinton (1995).

⁹ See: Mare 1998 and Grinlinton 1995.

III PREVIOUS WORK

An excellent précis of the development of New Zealand petroleum law and policy is found in Grinlinton (1995). Grinlinton captures the intricate events (both national and international) that impacted on the government petroleum policies chosen and the activity experienced since exploration began in New Zealand. This overview followed initial work looking at the development of petroleum law in New Zealand by Fisher (1986) and (1984). In Fisher (1986) he stated that although the legal system was one of many variables to impact on the acceleration of petroleum exploration he quickly added

*“Legal instruments of development, control and regulation, nevertheless, represent in a very real and practical sense the major impediments to effective decision-making.”*¹⁰

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¹⁰ See: Fisher 1986, emphasis added, 11.

Background issues to the Government's decision-making which affected the petroleum operating environment in New Zealand immediately prior to the enactment of the CMA include comments made in Grinlinton (1995), *Petrocorp v Minister of Energy*, and the Ministry for the Environment Working Papers for the Resource Management Law Reform studies in 1988.

Government indications of future energy forecasting and the dependency on the Crown Mineral Estate were reported in Bradford (1998), Lear (1998) Kidd (1994) and the Ministry of Commerce Energy Data File (1998) and Energy Outlook (1997).

Previous work in common pool resources is expansive and for this study the work by Ostrom (1990) (1984), Hardin (1968) and Berkes (1989) was reviewed.

The prospectivity of New Zealand has been extensively studied and includes King et al. (1998), Killops et al. (1998), Wood et al. (1998), Killops et al. (1996), King et al. (1996), Uruski et al (1996) and Johnston et al. (1992). Although much literature has been published before the dates of these papers, the most recent work was referenced because of the recent advancement in studies including the use of "petroleum systems"¹¹ and computer modelling techniques.

¹¹ A petroleum system is a technical four dimensional classification tool used to quantify the prospectivity of an area which incorporates an integrated consideration of determining factors for petroleum accumulation: source rocks, their maturation and the migration of hydrocarbons; reservoir systems and their enclosing seals; and the development of trapping structural or stratigraphic configuration.. See: Magoon and Dow 1994.

IV PETROLEUM EXPLORATION HISTORY IN NEW ZEALAND

Petroleum exploration in New Zealand officially began in 1865 when the first petroleum prospecting lease was granted for an area of fifty acres in Taranaki. One year later the first oil was extracted.

Despite early exploration efforts results were disappointing prior to 1955. Twenty-four wells were drilled between 1914 and 1955 in Taranaki. Although hydrocarbon shows were often encountered, no substantial discoveries resulted. The only commercially developed field of the time was at Moturoa where approximately 250,000 barrels of oil were produced between 1934 and 1972.

In 1955 a new era of exploration began with the formation of the Shell BP and Todd consortium. In 1959 their first well, Kapuni-1, led to the discovery of the Kapuni gas-condensate field. This field is still in production today. The discovery at Kapuni marked the beginning of the New Zealand gas industry.

Offshore seismic reflection surveying began in the 1960s and with this the first offshore New Zealand drilling programme was undertaken. The third well of this programme resulted in the discovery of the Maui Field in 1969. This discovery was followed a year later by the sub-commercial Maui-4 discovery.

Between 1965 and 1977 only one further onshore exploration well was drilled, Urenui-1, however was classified as non-commercial. Exploration increased during the 1970s and 1980s and resulted in further discoveries both on- and offshore. The McKee, Tariki, Ahuroa, Waihapa, Ngaere, Kaimiro and Kupe fields were discovered during this period.

In summary, a total of approximately 200 wells have been drilled in the Taranaki region since 1955. Of these, 121 were drilled between 1982 and 1992. There have been a total of 19 oil or gas discoveries in Taranaki of which 11 are considered commercial and are either producing or in various stages of development.

Of the 56 appraisal wells that have been drilled to appraise discovered petroleum resources, only six have been drilled outside the Taranaki region. None of these wells have resulted in a commercial discovery.

As can be seen in Figure 1, exploration activity was at its peak during the early to mid 1980s when there was significant government promotion of exploration through the state owned company, Petroleum Corporation of New Zealand, and by financing of up to 40 per cent of all exploration joint ventures. Since the mid 1980s, the level of exploration activity has declined. This declining trend has reversed over the past five years and is probably due to the introduction of a new fiscal and allocation regime.

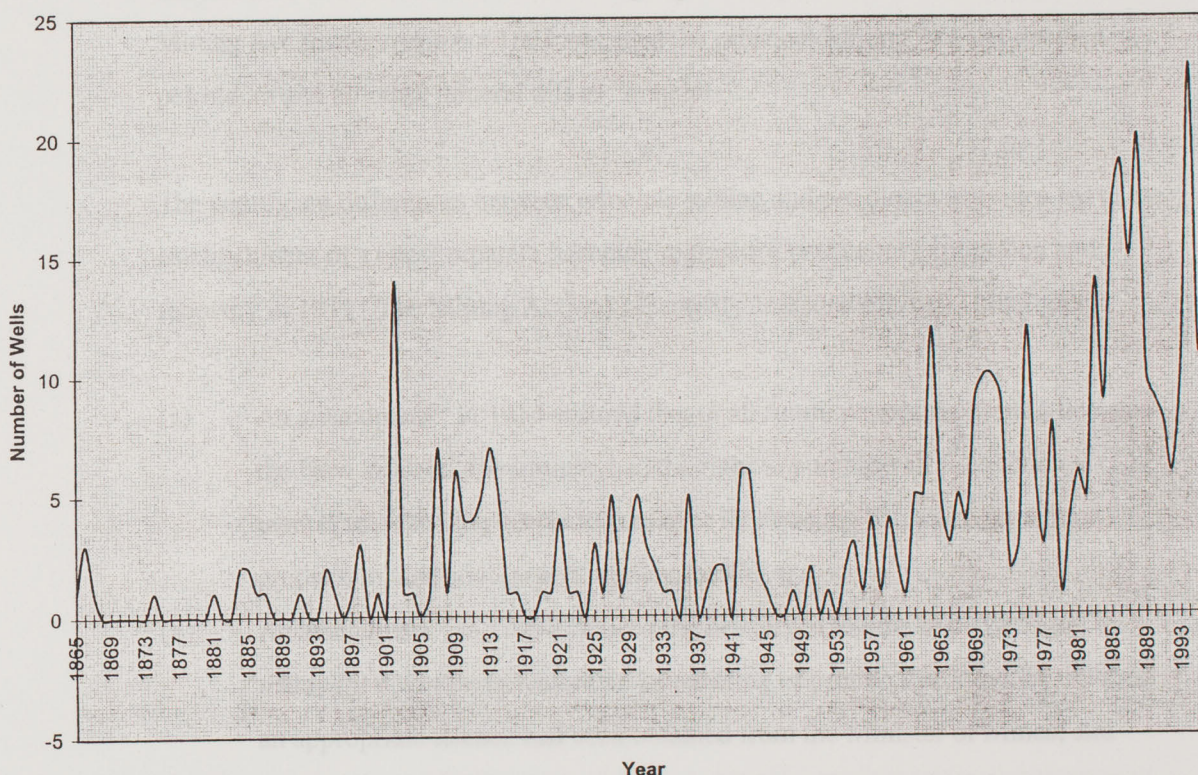


Figure 1: Exploration activity measured by number of wells drilled (Maré 1998).

¹² Mining Amendment Act 1914, s 31. This amendment followed the break out of war in 1914 and was seen necessary to secure supplies of petroleum in New Zealand for the Empire. See Grimshaw 1995.

¹³ Mining Amendment Act 1919, s 15. This amendment followed advice from the Empire to not allow foreigners any rights to petroleum in New Zealand. See Grimshaw 1995.

V PETROLEUM LEGISLATION

A *Brief History*

New Zealand's petroleum laws developed as it moved from a British colony to an independent nation state. Following the establishment of the British Government in New Zealand in 1840 and the first European discovery of petroleum in New Zealand in 1861 the first exploration activities were undertaken. An increase in exploration interest led to a state controlled licencing regime for petroleum on Crown land and the Mining Act Amendment Act 1892 amended the principal Mining Act and deemed petroleum and all other mineral oils as "minerals".

The significant differences between minerals mining and petroleum activities led to the establishment of a quasi separate licencing regime for petroleum exploration and recovery in 1911. The Mining Act was repeatedly amended until 1937 including:

- (a) An amendment¹² in 1914 ensured that in all future petroleum mining licences the New Zealand government had the right to purchase all production at market rates and the power to take over the working and management of production, and storage and refining facilities;
- (b) An amendment¹³ in 1919 extended the petroleum regime to private land by making it unlawful to undertake prospecting or production activities unless an appropriate licence had been obtained from the Minister of Mines; and
- (c) In 1926 the new Mining Act 1926 provided the Crown sole rights to grant petroleum licences while preserving the rights of the owners of the petroleum and surface estate to receive rents, royalties and compensation.

A petroleum Bill was introduced in 1927 and amongst other Mining Act provisions included the payment of a royalty to the owner of the petroleum, payment of injury to land and the imposition of a common carrier obligation on pipeline operators, the Bill continued the Crown's power to take the production, management and operation of oil

¹² Mining Amendment Act 1914, s 31. This amendment followed the break out of war in 1914 and was seen necessary to secure supplies of petroleum in New Zealand for the Empire. See Grinlinton 1995.

¹³ Mining Amendment Act 1919, s 15. This amendment followed advice from the Empire to not allow foreigners any rights to petroleum in New Zealand. See Grinlinton 1995.

wells and refineries in times of emergency. The Bill was abandoned and petroleum prospecting and development continued under the Mining Act 1926.

Finally petroleum received its own statute, the Petroleum Act 1937, which deemed all petroleum in its natural condition "to be the property of the Crown" regardless if the land had been alienated from the Crown or not. Several amendments to the Petroleum Act occurred:

- (a) In 1955 the petroleum regime was made more attractive with amendment that resulted in a provision for renewal of prospecting licences for a total of 10 years, the choice to commence work on a prospecting licence up to three months after the date of grant, and specification of conditions that were to be included in licences;
- (b) In 1975 Part I of the Act was repealed and replaced with more extensive provisions governing all petroleum licences; and
- (c) In 1980 the royalty provisions were amended and the Minister was given sole power to determine the point of valuation. The mining licence term was amended from a 40 year period to a two staged programme. The Minister was also given power to postpone development of discoveries, reduce areas or revoke licences for failure to develop a discovery.

Following the oil shocks of 1967 and 1973 the Government decided to secure its petroleum supplies and the Minister of Energy Act 1977 gave the Minister the power to "carry on" any business relating to petroleum¹⁴. Section 36 of the Petroleum Act gave the Minister the power to grant licences to himself.

Prior to October 1991 all petroleum prospecting or mining continued to be granted under sections 5 or 12 respectively of the Petroleum Act 1937. As provided for in sections 107 of the CMA, these licences continue to exist until their surrender, revocation or expiry.

¹⁴ This included exploration, production, processing, supply, distribution uses of conservation of energy, sources of energy, products from energy of sources of energy, mineral and mineral products. See Grinlinton 1995, 400-401.

B The Crown Minerals Act 1991

The CMA was enacted on 1 October 1991 and is the current legislation governing the management and allocation of rights in respect of the Crown Minerals Estate which includes all petroleum, gold, silver and uranium, and other Crown owned minerals¹⁵ in their natural states. The CMA is administered by Crown Minerals, a group within the Ministry of Commerce and permits are issued by the Minister of Energy.

The CMA sets the policy parameters for the management and allocation of petroleum, which is unlike the previous petroleum legislation, the Petroleum Act, because under that Act and its many amendments the detailed policies and processes to manage petroleum were set in place. The CMA's general policies are interpreted and detailed, including the Government's decision-making policies, in the Minerals Programme for Petroleum.

C The Minerals Programme for Petroleum

The Minerals Programme for Petroleum has been prepared to establish the framework for the policies, procedures and provisions to be applied in respect of the allocation and management of petroleum permitting, pursuant to section 12 of the CMA. Minerals programmes are prepared with regard to sections 16 to 19 of the CMA to provide for iwi, community and interested party consultation.

The Minerals Programme for Petroleum represents a new approach to the implementation of the policies of petroleum allocation and royalty recovery. It aims to provide clarity to petroleum investors about the conditions under which petroleum permits may be granted and complied with. Additionally it provides¹⁶ accountability of those administering the CMA.

¹⁵ Chapter 2, para 2.6 of the Minerals Programme for Petroleum, 3.

¹⁶ Chapter 2, para 2.17 of the Minerals Programme for Petroleum, 5.

¹⁷ See Preamble, para 3 of the Minerals Programme for Petroleum, 1.

¹⁸ Chapter 2, para 2.17 of the Minerals Programme for Petroleum, 5.

¹⁵ Other Crown minerals are owned by the Crown by way of land title.

¹⁶ Provision is in the form of outlining the reasons for and against the policies to be applied and providing for iwi, the public and industry input into the process of developing the policies, pursuant to ss 15-19 in the CMA.

Together the CMA and the Minerals Programme for Petroleum aims to provide for continued investment¹⁷, increased knowledge of New Zealand's petroleum resource¹⁸, an easily interpretable regime¹⁹, and an internationally competitive petroleum regime²⁰.

D Exploration Permit Provisions

To explore for petroleum in New Zealand a Petroleum Exploration Permit is required under the CMA. An exploration permit is granted to undertake exploration activities²¹, to identify petroleum deposits and evaluate the feasibility of mining any discoveries made. An exploration permit is granted for a five year period and may be renewed for a further term at which stage 50 per cent of the area must be relinquished. A permit holder has the right to all petroleum discovered in the permit term, subject to the conditions of the permit. Exploration permits confer exclusive rights to the permit holder who must comply with the conditions of the permit which include royalty conditions, the identified programme of work, relevant Acts and Regulations, paying annual fees and submitting activity reports. An exploration permit does not confer a right of access to land²².

1 Allocation

Petroleum exploration permits are allocated as the result of a Petroleum Exploration Permit Block Offer²³ or an Acceptable Frontier Offer (AFO)²⁴. These two exploration permit allocation mechanisms were introduced in October 1995.

A Petroleum Exploration Block Offer is a method of allocation by public tender in general accordance with section 24 of the CMA. The Government has a rolling two-year indicative block offer schedule which indicates the areas for a future blocks offer but does not disclose the exact block or the timing. This schedule allows explorers to plan ahead for future exploration bidding rounds. A blocks offer can be initiated either

¹⁷ Chapter 2, para 2.6 of the Minerals Programme for Petroleum, 3.

¹⁸ Chapter 2, para 2.17 of the Minerals Programme for Petroleum, 5.

¹⁹ See Preamble, para 3 of the Minerals Programme for Petroleum, i.

²⁰ Chapter 2, para 2.17 of the Minerals Programme for Petroleum, 5.

²¹ Exploration activities include geological and geophysical analyses, sampling, seismic data acquisition, and appraisal drilling and testing.

²² See: s 47 CMA 1991.

²³ See: ch 5, paras 5.2.5-5.2.47, Minerals Programme for Petroleum, 19-27.

²⁴ See: ch 5, paras 5.2.64-5.2.83, Minerals Programme for Petroleum, 30-33.

by the Government or by an explorer. Staged work programme bidding is the predominant application method for a blocks offer and the applicant proposing the best staged work programme will generally be the successful bidder. Typically a staged work programme for the first three years is required, with a decision on the next two years work made in the third year of the permit.

In areas of high prospectivity and strong competition interest cash bonus bidding may be used as a method of allocation²⁵.

The AFO allocation mechanism allows explorers to submit non-competitive bids over areas of their choice that are not already under permit or licence. Such applications may be made at any time, over any part of New Zealand that is currently available for exploration. The AFO allocation method allows an explorer, who has financial and technical resources, the opportunity to obtain a permit and commence exploration activity within a short time-frame²⁶.

The emphasis of the evaluation process for these applications is on the statement of proposed work and any supporting information. The work programme should detail the minimum work that is proposed to be undertaken and should clearly define the stages proposed to complete the work and any ongoing work commitment options.

2 Exploration permit application

Under an AFO system applications may be made at any time and are received as a priority in time application. If an application has been received and is being processed when another application for the same area arrives, the first application is considered solely on its merits and any further application is not considered until the first one is completed and has been determined as granted, declined or withdrawn. AFOs were not expected to be the preferred exploration permit allocation method and priority in time allocation had not applied to petroleum licencing since the early 1970s. The application is assessed and each application must:

- (a) provide information to indicate the applicant has technical and financial resources to undertake and complete the proposed exploration programme;

²⁵ See: ch 5, paras 5.2.48 and 5.2.49, Mineral Programme for Petroleum, 27.

²⁶ Without complications an exploration permit can be granted within three months from the date of application.

- (b) be subjected to iwi consultation pursuant to section 4 of the CMA; and
- (c) provide a map that clearly delineates a legal area boundary.

An exploration permit can be processed in approximately three months. Where more detail about the application and in depth iwi consultation is required the processing time is likely to take longer.

Under a blocks offer proposed work programmes are submitted by a due date and an exploration permit will be granted to the best work programme combination. If cash bonus bidding is required, bids are submitted and the best bid is awarded a permit.

3 Minimum work programme requirements

To be awarded an AFO exploration permit the applicant must, as a minimum, agree to undertake a programme of detailed exploration work sufficient to define a well-drilling location within 12 or 18 months of the commencement date of the permit. Once a location is defined the explorer must agree to drill an exploration well within 24 to 36 months of commencement date of the permit or surrender the permit.

The proposed work programme for an AFO or blocks offer exploration permit must satisfy the Minister of Energy's requirements to undertake exploration in accordance with good exploration and mining and increase the knowledge of New Zealand's resources and petroleum potential.

4 Crown share

Royalties are a return to the owner for the use of a resource, hence are payable to provide the Crown a return from its petroleum. Royalties are payable on all petroleum obtained under a permit, which is either sold or used in the production process as fuel or otherwise exchanged without sale²⁷ and is applicable to any petroleum produced during exploration.

The royalty regime is a hybrid one comprising of a five per cent ad volarem royalty (AVR) component, that is five per cent of the net revenues obtained from the sale of

²⁶ See Ernst & Young 1994, 65.

²⁷ Except in the case of a minimum impact activity pursuant to s49 of the CMA and s10 of the MTA which provides for access to land for petroleum via

²⁷ See: Minerals Programme for Petroleum 1995, ch 7, para 7.3, 71.

any petroleum, and a 20 per cent accounting profits royalty (APR) component, that is 20 per cent of the accounting profit of any petroleum production.

An AVR is payable on the basis of either a sales price received, or where there has been no sale, the deemed sales price. An APR is a mechanism by which the resource owner receives a share of profits once all significant costs have been recovered by the producer. An APR is payable on the net accumulated accounting profit of production from a petroleum field. Prices received for products and the costs of extracting, processing and selling those profits up to the point of sale are accounted for by the royalty.

A hybrid regime is thought to leave producers with levels of returns that will attract investment in oilfield development in New Zealand, compared to returns on royalty regimes in other countries²⁸.

5 Access to land

With the granting of an exploration permit no access to land to carry out exploration activities is awarded²⁹.

These five permit provisions will be revisited in terms of encouraging or inhibiting investment in petroleum exploration. As discussed in this section, the CMA is the legislation governing the Crown Mineral Estate. It is necessary to know what the Crown Minerals Estate is and its importance to New Zealand's economy.

²⁸ See: Ernst & Young 1994, 69.

²⁹ Except in the case of a minimum impact activity pursuant to s49 of the CMA and pursuant to ss 53 and 55 of the CMA which provides for access to land for petroleum via an arbitrator.

VI THE CROWN MINERAL ESTATE

A *The Crown Mineral Estate*

The Crown Mineral Estate refers to all minerals owned by the Government including oil, gas, minerals and coal resources. Under the CMA, the Crown owns all petroleum, gold, silver and uranium. The Crown also owns all minerals in land alienated from the Crown under various past acts and in all future alienations of land from the Crown.

The Crown Mineral Estate has considerable potential to increase investment growth in and contribute to the New Zealand economy, hence must be managed efficiently for economic and environmental reasons. The management must allow the Crown to obtain royalties, make efficient use of the resource compatible with sustainable development and growth of the economy, generate export income and increase energy sources³⁰. Because petroleum is a natural resource its allocation should reflect the efficient allocation of a commons in terms of the usage of the resource and defining its use as a property right. The Crown Mineral Estate forms an integral part of New Zealand's mining resources and the mining sector currently contributes:

- (a) 1.2 per cent of GDP;
- (b) 3.8 per cent of New Zealand's export receipts; and
- (c) 0.2 per cent of the total number of full time equivalents employed in New Zealand.

The sector also supports industries upstream of its activities and relies on the input of downstream industries. The oil industry is the largest contributor to the mining sector output and exports. [It is also the least labour intensive and is a net importer of oil.] xx

Oil and gas dominate the mining sector, by volume and value (Figure 2). In 1996 the petroleum industry contributed 42 per cent to the total volume output of the mining industry, and 72 per cent of the total value of the industry's output.

In the year ended June 1996 royalties from the petroleum industry paid the Crown \$22,090,000. Oil accounted for more than 50 per cent of the total exported mineral

³⁰ See: *The Crown Mineral Estate and its Management 1997*.

products. In terms of dollar value, petroleum dominates New Zealand's current natural resource production³¹.

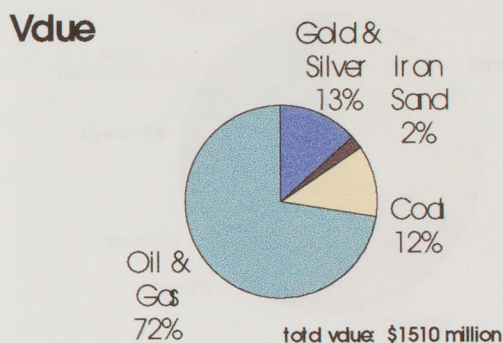
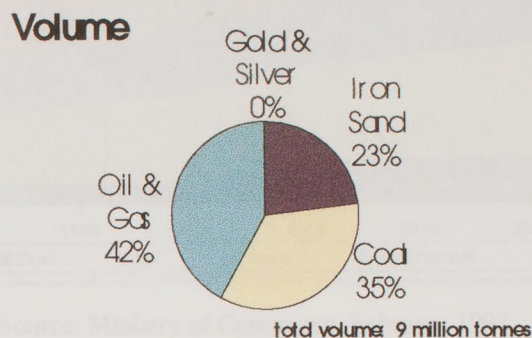


Figure 2: Mining industry output. Source: The Crown Mineral Estate and its Management, 1997.

B The Crown Mineral Estate and Energy

Energy contributes about 2.7 per cent to New Zealand's gross domestic product and directly employs about 8000 people which is approximately 0.5 per cent of the work force. New Zealand uses approximately 500 PJ of energy per year. Oil and gas provided 64 per cent of the total primary energy supply (Figure 3, 4 and 5) and dominates both the primary and consumer energy supply by fuel.

Figure 3: New Zealand's consumer energy by fuel. Source: Ministry of Commerce, February 1997.

To the end of March 1998 New Zealand produced 109.5 PJ of crude oil and condensate³¹ and 301 PJ of gas³². By contrast in that same year New Zealand imported 177.3 PJ of crude oil, 34.5 PJ of naphtha for refinery purposes and oil wholesalers imported 42.7 PJ of refined petroleum. Gas is not imported.

³¹ See: The Crown Mineral Estate and its Management 1997, 5

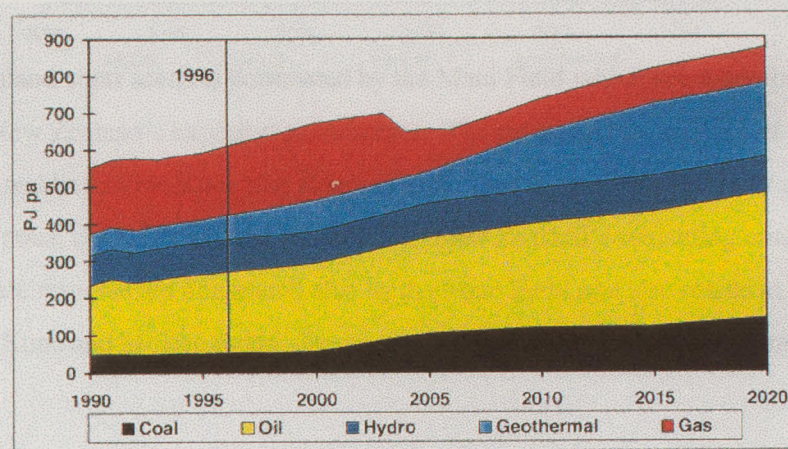


Figure 3: Source: Ministry of Commerce, February 1997.

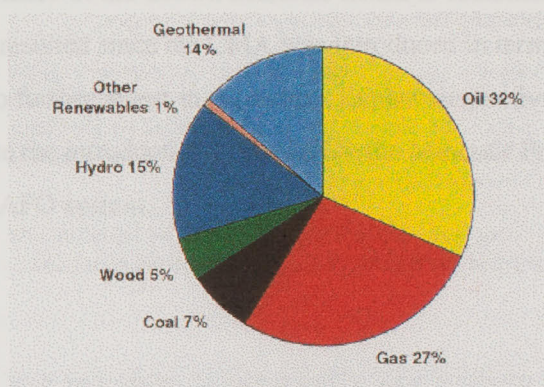


Figure 4: New Zealand's primary energy supply by fuel 1996. Source: Ministry of Commerce, February 1997.

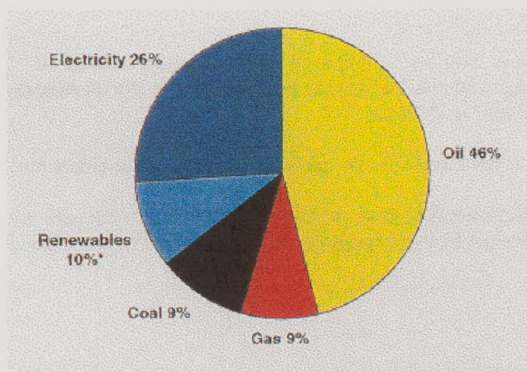


Figure 5: New Zealand's consumer energy by fuel 1996. Source: Ministry of Commerce, February 1997.

To the end of March 1998 New Zealand produced 109.5 PJ of crude oil and condensate³² and 201 PJ of gas³³. By contrast in that same year New Zealand imported 177.3 PJ of crude oil, 14.5 PJ of blendstock for refinery purposes and oil wholesalers imported 42.7 PJ of refined petroleum. Gas is not imported.

³² Energy Data File July 1998, 33.

³³ Energy Data File July 1998, 79.

New Zealand's gas scene is dominated by the Maui Field which accounts for 64 per cent of New Zealand's expected gas reserves. The remainder is made up of gas reserves residing in the Kupe and Kapuni fields. Gas is used for electricity generation, petrochemical manufacture, and reticulation. New Zealand's remaining crude oil and condensate reserves are dominated also by the Maui Field and also reside in the Kapuni, Kupe and McKee fields. Domestic transport dominates the consumer use of oil.

Now that the importance of the Crown Minerals Estate is established it is appropriate to look at what has resulted since the CMA was introduced in terms of the allocation of exploration rights to further invest in the estate. Exploration activity has increased over the period since the introduction of the CMA, the Minerals Programme for Petroleum, and the AFO system.

B A Brief Recap on New Zealand Exploration Activity

Substantial exploration activity did not start until the 1950s, following the enactment of the Petroleum Act 1937, the establishment of the Shell-BP-Todd consortium and the discovery of The Kapuni onshore gas/condensate field. The real success came in 1969 with the discovery of the Maui Field and this prompted the commercial participation of the Government in the petroleum industry which led to the discovery of the McKee, Kaimiro, Kupe, Turfai, Ahuroa, Waikato/Ngarewa fields.

Generally exploration activity since the 1950s has increased to now, with the exception of some downturns as shown in Figure 1. An explanation for these cycles of activity

VII EXPLORATION ACTIVITY

A *Measuring Exploration Activity*

Exploration activity includes geological and geophysical studies, to produce detailed surface and subsurface maps of the stratigraphy. Sub-surface drilling is undertaken to obtain stratigraphic information of the rock, and to encounter and locate subsurface fluids which include hydrocarbons and water. Exploration activity is measured to determine how much exploration is occurring or has occurred in an area.

During a geophysical survey seismic waves are transmitted into the sub-surface of the earth and the returning waves record the structure and components of the subsurface, including any hydrocarbon occurrences, to several kilometres depth. For onshore studies the seismic waves are generated along the surface of the earth and collected by a series of geophones over several kilometres. For offshore studies geophones are towed behind a survey vessel. Each survey results in a number of kilometres of seismic acquired. The number of kilometres covered by the survey is used as a measure of exploration activity.

Other measurements of exploration activity include the number of exploratory wells drilled, the number of exploration permits active and the total area covered by exploration permits.

B *A Brief Recap on New Zealand Exploration Activity*

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Generally exploration activity since the 1950s has increased to now, with the exception of some decreases as shown in Figure 1. An explanation for these cycles of activity

are further detailed in Mare (1998). One notable activity decrease is between 1988 to 1993, during the time of the Ngaere court case, withdrawal of government commercial participation, the environmental law reform and the Government's hold on granting petroleum permits³⁴.

C Activity since October 1991

In Maré (1998) the period 1991 to 1996 was identified as a period of increased exploration activity (Figure 1). Although the data for this graph only includes exploration wells drilled as a measure of exploration activity, it is a valid approximation³⁵ and the period 1991 to 1998 is further detailed in Figure 6a and 6b.

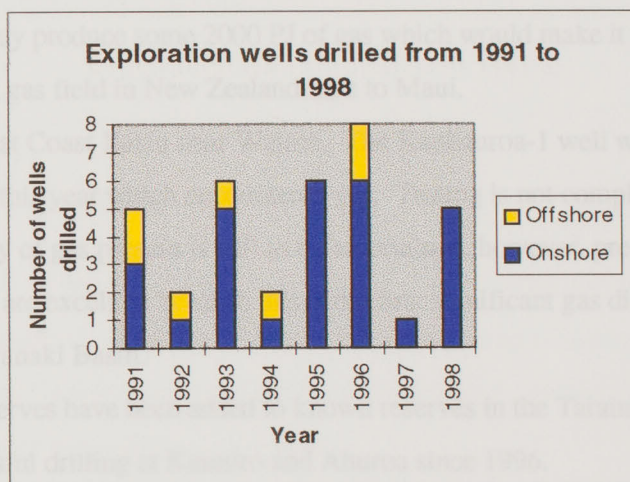


Figure 6a.

In the seven years from 1 October 1991 to 1 October 1998 petroleum exploration activity has amounted to:

- (a) approximately 5960 km of seismic acquired;
- (b) 33 wells drilled; and
- (c) an approximate expenditure of \$334.74 million³⁶.

³⁴ For three years prior to the introduction of the Minerals Programmes for Petroleum in 1995, it was not possible to apply for an exploration permit because of the uncertainty (advised by the Minister of Energy officials) in granting a permit without a Minerals Programme in place.

³⁵ This data is agreeable to that described by Grinlinton 1995.

³⁶ This figure was calculated using a yearly expenditure average of \$47.82 million based on the drilling and seismic figures given in The Crown Mineral Estate and its Management 1997, 45.

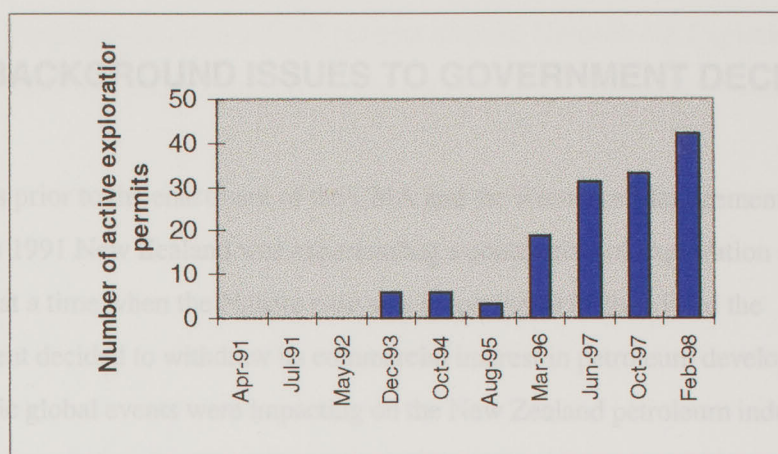


Figure 6b. Exploration permits active from 1991 to 1998 under the CMA.

This level of activity resulted in the following discoveries:

- (a) The Mangahewa gas field: First drilled in 1996 tests are continuing and the field may produce some 2000 PJ of gas which would make it the second biggest gas field in New Zealand next to Maui.
- (b) The East Coast Basin near Wairoa. The Kauhauroa-1 well was drilled in March this year which encountered gas. Testing is not completed and the quantity of gas present is still to be ascertained, however, present indications to date are excellent because this is the first significant gas discovery out of the Taranaki Basin.
- (c) Oil reserves have been added to known reserves in the Taranaki Basin with successful drilling at Kaimiro and Ahuroa since 1996.

Also notable in the last five years is the increase in the number of international companies exploring and the total number of sedimentary basins under permit in New Zealand, indicating the first serious exploration outside of the Taranaki Basin..

Overall the exploration activity illustrated above shows an increase in exploration activity especially since 1995 and resulting discoveries are encouraging. The activity of this period was influenced by many government changes in terms of the legislation that was enacted in 1991 and the Governments involvement in the petroleum industry.

²² Petroleum Exploration Limited was established in 1974 as the exploration arm of the New Zealand Government, which was wholly government-owned.

VIII BACKGROUND ISSUES TO GOVERNMENT DECISIONS

Five years prior to the enactment of the CMA and the Resource Management Act (RMA) in 1991 New Zealand was experiencing a contraction of exploration activity. This was at a time when the Ngaere case was preparing to be heard and the Government decided to withdraw its commercial interest in petroleum development. No specific global events were impacting on the New Zealand petroleum industry at this time.

The following subsections describe the political environment from 1987 to 1991 and capture the preparation that went into the resource management law reform, relevant to petroleum, which led to the enactment of the CMA and RMA as two independent statutes.

A The Ngaere Case 1987 to 1990

In February 1988 oil was discovered in the Waihapa Field. The discovery led to a three year legal battle over the rights to the oil in the unlicensed northern sector of the oil field known as Ngaere. This legal battle raised issues of conflict between the Minister's statutory and commercial functions.

In 1977 Petrocorp Exploration Limited³⁷ (Petrocorp) was granted Petroleum Prospecting Licence 38034 for a five year period in onshore Taranaki. Exploration resulted in the discovery of 30 million barrels of oil in the McKee Field in 1980, the Kaimiro/Stratford gas/condensate field in 1985, and oil in the Waihapa-1 well in 1988. In 1985 Petrocorp assigned a 51 per cent interest in PPL 38034 to the Minister of Energy on behalf of the Crown and was appointed to act as agent for the Crown. Petrocorp managed the Crown's interest as a joint venture participant in PPL 38034.

In 1986 an extensive exploration programme involved four new partners with interests in PPL 38034 as part of a Joint Venture Operating Agreement (JVOA), consisting of: the Minister of Energy with a 38.36 per cent interest; Petrocorp with a 30.04 per cent;

³⁷ Petrocorp Exploration Limited was established in 1978 as the exploration arm of the New Zealand Government, which was wholly government-owned.

Southern Petroleum NL with a 22.60 per cent interest; Nomeco NZ Exploration Co with and Blight Oil and Minerals (NZ) Ltd with a 2.00 per cent interest each.

The new joint venture drilled wells in PPL 38034 and discovered the Ahuroa and Tariki gas fields. In July 1987 the joint venture applied for Petroleum Mining Licences over the Waihapa, Ahuroa and Tariki gas discoveries and were awarded an initial term of a mining licence. Following the expiry of PPL 38034 the areas not covered by the new mining licences were offered for tender by the Minister of Energy as the Onshore Taranaki Prospecting Blocks Offer in November 1987. Of the seven blocks advertised Block 7 included the Ngaere area. Six competing applications (five prospecting and one mining) were received by 29 April 1988, including one from the Waihapa joint venture who had discovered 4000 barrels per day of waxy crude oil in February 1988.

Three New Zealand courts were involved, the High Court which found in favour of the joint venture, the Court of Appeal which found in favour of the Minister, and the Privy Council which confirmed the High Court's view.

The Minister had three options under the Petroleum Act 1937:

- (a) to award a prospecting licence over the area pursuant to section 5; or
- (b) to award the mining licence extension pursuant to sections 12 and 20; or
- (c) or to award himself a licence in the national interest as owner of the oil resource pursuant to section 36.

that the Minister had acted properly in acting in the national interest in respect of the licence. The Privy Council confirmed the High Court's view that the Minister had acted properly in acting in the national interest in respect of the licence.

The Minister chose the third option and in May 1988 Petroleum Mining Licence 38141 (Ngaere) was granted to himself on behalf of the Crown. This decision provoked considerable international media coverage. The Minister's decision was criticised by unsuccessful prospecting licence bidders who favoured the first option, the non-Crown Waihapa joint venturers who favoured the second option and various other industry people because of the perceived conflict of interest of the Minister's obligations and participation.

because of its regulatory role.

Petrocorp stopped being the Crown's agent on 12 May 1988 - 12 days after the Ngaere licence was awarded and in 1988 Petrocorp was sold to Fletcher Challenge Ltd. One justification for establishing Petrocorp was because of the tension inherent in the dual roles of the Minister of Energy as the regulator of petroleum and as a participating commercial partner. Petrocorp's corporate structure was to provide a bureaucratic division between the Crown's regulatory and commercial functions, and a commercial entity to legitimise the Crown's involvement in the petroleum industry.

New Zealand to establish and support the system of law that was going to be used.

¹⁰ [1991] 1 NZLR (PC & CA) 481 (PC).

However tension remained and the Minister's obligations were mentioned in *Petrocorp v Minister of Energy*³⁸ during the Ngaere case.

In this case the joint venture partners challenged the Minister's decision, including:

- (a) what the scope of the rights conferred by the Waihapa licence were;
- (b) the Minister's use/misuse of confidential data;
- (c) the Minister's contractual obligations under the JVOA;
- (d) whether the Minister's powers provided for by the Petroleum Act 1937 were appropriately exercised; and
- (e) were the Minister's actions made transparent to the joint venture partners
did the Minister Act fairly - with respect to the joint venture partners.

Three New Zealand courts were involved; the High Court which found in favour of the Minister of Energy; the Court of Appeal which, in a majority ruling, found in favour of the non-Crown Waihapa joint venturers (*Petrocorp et al*); and the Privy Council in London which found unanimously in favour of the Minister of Energy. On 19 March 1991 the Privy Council confirmed the Crown's rights to Ngaere and the legality of the actions of the Minister of Energy. The Privy Council confirmed the High Court's view that the Minister had broad powers to act in the national interest in respect of unlicensed areas. His statutory and commercial functions did not place him in any position of conflict.

Because of the two opposing decisions made by the courts, the New Zealand Government's public response to criticism was forced to be limited. The impact this legal battle had on the Government is considered to be a deciding factor for the Crown's withdrawal of commercial participation in the petroleum industry, especially because of its regulatory role.

B Environmental Law Reform

1 Resource management law reform

In January 1988 under a Labour Government the Minister for the Environment, the Right Hon Geoffrey Palmer, announced a review of the resource management laws in New Zealand to overhaul and improve the myriad of laws that were governing the

³⁸ [1991] 1 NZLR (HC & CA) and 641 (PC).

rights of people to use water, air, land and minerals (including petroleum)³⁹. This comprehensive review of the major laws that governed New Zealand's natural and physical resources involved the reform of the Town and Country Planning Act, the water and soil legislation, the minerals and petroleum legislation, and environmental assessment procedures. The reform was initiated because the government believed that sound environmental planning in New Zealand had been hampered by resource management laws that had developed over the years in an ad hoc manner. As a result the laws were fragmented, un-coordinated, overlapped and were excessively expensive to administer. The existing laws placed the emphasis on the process of resource management, rather than the effects and impacts of a course of action. This process required reversal.

The review sought to:

- (a) balance individual rights and public welfare on environmental matters;
- (b) reduce conflicts over resource use;
- (c) maintain the quality of our environment;
- (d) include economic and social factors in decision making;
- (e) protect the needs of future generations via sustainable management; and
- (f) allow the use of resources without endangering or compromising quality of life.

Aims of the new law were to streamline consent processes, define roles for central, regional and local government, and create wider opportunities for community participation in decision making.

The following is what the Resource Management Planning Act, as it was referred to prior to the 1991 enactment, outlined as the basis for further investigations and consultation for minerals and energy management:

- (a) that central government should continue responsibility of the allocation and management of mineral and energy resources, but local government would deal with the externalities of mining activities in the same way as other land and water use activities;
- (b) that the law should enable cash bidding for mineral resource;

³⁹ Ministry for the Environment 1988. In the Resource Management Law Reform booklet "People, Environment, and Decision making: the Government's Proposals for Resource Management Law Reform" the proposals of the reform are discussed.

- (c) that mining privilege rights to be registered on the title of land;
- (d) there be an improved central registration system for mineral ownership;
- (e) to consider provision under s 24 of the Mining Act which allows for exemption of areas for new mining be carried forward into the new Act; and
- (f) to formulate standards instead of licence conditions.

It was decided by the task group that petroleum fields are a pool resource likely to be best developed by a single organisation. The most efficient allocation method was considered to at a central level and the Crown would decide whether to exploit the resource, and if the answer is yes, at what rate and by who. It was decided that land owners be given more rights and the mineral rights owner would have to obtain the landowner's consent to access the minerals, but where access was unreasonably withheld there would be provision for arbitration.

Concern was mentioned about the possible conflicts of interest if one agency makes both the commercial decision (about allocation of minerals) and the regulatory decision about the conditions applied about to mining activity.

Further discussion in the mineral and energy section refers to "minerals"⁴⁰, and the use of petroleum is not discussed apart from the reference to petroleum as a common pool resource (as mentioned above). Because the Mining Act and the Petroleum Act had distinctive meanings for the words "mineral" and "petroleum" I do not think the reference to "minerals" includes petroleum. Hence there is very little comment on proposed changes to petroleum legislation, management and allocation and no comment on changes to the Petroleum Act.

The Government's diverse interest in mineral development were identified⁴¹:

- (a) as the mineral owner it may have commercial and strategic interests;
- (b) as the land owner it may have in maintaining surface land use undisturbed by mining activities; and

⁴⁰ Reference is made to the allocation, interests of mineral developers and landowners, third party impacts, powers of the Minister and decisions at national level and provisions for appeal with regards to minerals. Although some of these comments can be inferred to relate to petroleum, petroleum is not mentioned specifically. *"People, Environment, and Decision making"*, Ministry for the Environment, 1988, para 6, 42.

⁴¹ *People, Environment, and Decision Making*, Ministry for the Environment, para 6, 43.

- (c) as a manager of environmental effects, it has interests in good environmental management.

2 Renewable resources versus non-renewable resources

In Working Paper No.6 of the Resource Management Law Reform a separate legislation to address renewable and non-renewable resources was identified. Non-renewable resources were identified as having a temporal dimension calling for decisions to determine whether to exploit the resource now or in the future, discount for the future, and or give consideration to future generations including equity issues. Additionally any cost benefit analysis to determine the use of the non-renewable resource would involve non-market values which may be controversial⁴².

However, the working paper discusses the difficulty in distinguishing a renewable resource from a non-renewable resource and states "*we do not always know enough about the resource to classify it therefore it may not be a useful concept for setting up legislation*"⁴³. A simple approach to this uncertainty is to understand that non-renewable resources do not grow and can not replenish themselves, and examples of this type of resource are coal, minerals and petroleum. These resources have a finite source because their stock amount cannot increase. Renewable resources grow and add to the stock, and if harvested at a rate that does not exceed its maximum sustainable yield will continue to be a renewable resource. Examples include fish, grassland and forestry. Although renewable resources are finite in the sense that the stock can be depleted if harvest or extraction rates exceed the growth rate of the resource, they are renewable if allowed to grow to their carrying capacity. Hence renewable and non-renewable resources can be separated confidently.

The working paper decided if renewable resources were all those resources that could renew themselves naturally, then those that could not must be the non-renewable resources and categorised the environmental statutes as follows⁴⁴:

⁴² Non-market values such as environmental values are difficult to include in cost benefit analysis because the way an economist and an environmentalist value the environment differs. For example an economist may equate a monetary value to a wetland using a hedonic value related to surrounding property prices and an environmentalist would be unable to put a monetary value on the wetland that houses a diverse ecosystem.

⁴³ Working Paper No.6, Resource management Law Reform , 4.

⁴⁴ This categorisation of resources is taken from Resource Management Law Reform Users Group Working Papers, Working Paper No.6, 1988, 3.

Non-renewable resources:

- Mining Act 1971
- Coal Mines Act 1979
- Geothermal Energy Act 1953
- Petroleum Act 1937
- Quarries and Tunnels Act 1982
- Atomic Energy Act 1945.

Renewable resources:

- Town and Country Planning Act 1977
- Water and Soil Conservation Act 1967
- Soil Conservation and Rivers Control Act 1941
- Clean Air Act 1972
- The Noise Control Act 1982

This distinction between the renewable and non-renewable resources accounts for the separation of the two statutes, the CMA and the Resource Management Act 1991, prior to being enacted.

Working Paper No.6 suggested that non-renewable resources would be best managed by market forces rather than controlled by central government..(..)*“if the non-renewable resources are going to run out (which by definition they must) then it hardly seems necessary to control the rate of extraction by public planning.”*⁴⁵

Petroleum resources in particular were considered to be a resource that would best be controlled so that their rate of extraction would reflect the demand for the resource.

The paper pondered the fact that if it was considered appropriate to provide for control of the resource's extraction rate *“...(perhaps in a separate resource statute)*⁴⁶” then the relevant test would be:

⁴⁵ Resource Management Law Reform Users Group Working papers, Working Paper No.6, 1988, 4. Emphasis added.

⁴⁶ When the Petroleum Act 1937 was introduced the Government had indicated that if private industry was not prepared to explore for oil and gas the Crown would make investment itself. However, the Crown had only offered assistance by way of grants and bonus credits. 1988, 4.

⁴⁵ Ministry for the Environment, Working Paper No.6, 4. Emphasis added by use of italics only.

⁴⁶ Resource Management Law Reform Users Group Working Papers, Working Paper No.6, 1988, 4. Emphasis added.

“to ensure that non-renewable resources are depleted at a rate that enables transition to use of more abundant materials and ultimate sustainable use of renewable resources”⁴⁷.

The solution provided by Working paper No.6 was to give the landowner the right of access (power of veto) to the non-renewable resource and make the extraction subject to the renewable resource statute in the way it was actioned under the Town and Country Planning Act.

C Government Participation Change

Following the oil shocks of 1967 and 1973 the New Zealand Government decided a greater self-sufficiency in energy was required. Subsequently the government went from being a non-commercial⁴⁸ player in New Zealand's petroleum industry to a substantial commercial player. In 1973 the Crown became a 50/50 joint venture partner with Shell-BP-Todd to ensure development of the Maui Field. This move occurred during the leadership of the National Party and their “think big” era which developed New Zealand's first natural gas reticulation network, and synthetic fuel manufacture. Many of the downstream gas industries were emplaced at this time⁴⁹.

With the enactment of the Minister of Energy Act 1977 the Minister gained the power to “carry on” any business relating to petroleum. Additionally the Petroleum Act gave:

- (a) the Minister the power to grant licences to himself, and by himself or jointly with partners, purchase or otherwise acquire other licences or interests, and carry on mining operations⁵⁰; and
- (b) the Crown the right to participate in petroleum developments undertaken by other developers⁵¹.

⁴⁷ Resource Management Law Reform Users Group Working papers, Working Paper No.6, 1988, 4. Emphasis added.

⁴⁸ When the Petroleum Act 1937 was introduced the Government had indicated that if private industry was not prepared to explore for oil and gas the Crown would make investment itself, however, the Crown had only offered assistance by way of grants and bonuses Grinlinton 1995, 398.

⁴⁹ The initiation of the downstream petroleum industry is documented in “The Downstream Petroleum Industry in New Zealand”, Petroleum Exploration in New Zealand News, V43, 34-38.

⁵⁰ Section 36 of the Petroleum Act.

⁵¹ Sections 5(2) and 12(2) (as amended by the Petroleum Amendment Act 1975 s 3).

By 1978 the Minister held six petroleum prospecting licences and Petrocorp was incorporated with shares held by the Minister of Energy and Finance. The Minister of Energy's six licences and the 50 per cent share in the Maui Field were transferred to Petrocorp. Petrocorp acted as the agent of the Crown in petroleum development. Through Petrocorp the Crown contributed up to 40 per cent of the costs of an approved exploration programme and in return took a 51 per cent share in any discoveries that were developed. However, in 1984 the Minister of Energy decided to hold the licences directly.

In 1985 the Government's policy of participation in the petroleum industry changed to an 11 per cent non-contributory interest in all petroleum prospecting licences and an 11 per cent contributory interest in all petroleum mining licences if there was a commercial discovery.

However in May 1986 the Government announced its non-participation in any new mining activity, its sale of existing interests and the subsequent sale of Petrocorp to Fletcher Challenge Ltd for \$801.1 million⁵².

It is clear to see that the government decisions and policy making immediately prior to the introduction of the CMA has subsequently impacted on the exploration activity since 1991. To move now to the current government policies it is necessary to identify the relevant policies and decision making which are currently influencing exploration activity or have the power to influence it by way of amendment to the legislation that governs it.

⁵¹ See: Lear (1998), 790.

⁵² Grinlinton 1995 states that the withdrawal from commercial participation in the petroleum industry was due to the Government's programme of economic reform and reduced participation in commercial undertakings, 401.

IX GOVERNMENT INDICATIONS

A Central Government and Future Forecast

The New Zealand Government no longer provides energy supplies or services but sets the regime to ensure the efficient operation of those markets. There is no centralised energy planning and investment in the energy sector but the Government continues to analyse possible future patterns of energy demand and supply to identify key policy issues.

The Ministry of Commerce analyses the intricacies of the supply and demand interactions for energy in New Zealand's economy to make informed decisions about the future of the New Zealand energy sector. Assumptions used by the Ministry of Commerce⁵³ are:

- (a) future GDP growth of approximately 3 per cent;
- (b) an oil price of US\$19 per barrel for now and US\$26 in 2005;
- (c) a gas price of \$2.60 per gigajoule (GJ) for now, \$3.25 per GJ in 2010 and \$3.70 per GJ in 2020;
- (d) new gas discoveries at approximately 60 PJ per year; and
- (e) the closure of the two methanol production plants in 2003 and 2005 with the expiry of the Maui take-or-pay gas contracts.

The Ministry of Commerce's future energy outlook⁵⁴ predicts further deregulation in the energy sector because of the increasing demand for energy, the Maui Field depletion and evolution of energy sector companies in a light handed regulatory environment. Consumer energy demand has been predicted to grow by 1.5 per cent to 2020. Gas is considered a fuel option for now and will remain as the pivotal fuel of the future for New Zealand. The price and demand for gas will depend on the demand from Methanex's methanol producing plants⁵⁵. Gas is expected to be the continued fuel choice for electricity generation. The consumption of gas is expected to decrease

⁵³ See: Lear 1998, 399.

⁵⁴ Energy supply and demand scenarios for New Zealand to 2020 are reported in the Ministry of Commerce's *Energy Outlook* publication, 1997.

⁵⁵ Methanex New Zealand own and operate two plants which use gas to produce synthetic fuels. The annual gas demand for their purposes is

from the 1995 figure of 66.2 PJ per year to 57.8 per year⁵⁶. The demand for oil is expected to increase dramatically. By 2020 total consumer energy by oil is expected to increase from the 1995 figure of 197 PJ per year to 322.7 PJ per year⁵⁷.

The New Zealand Government has acknowledged the importance of the petroleum industry to the economic growth of New Zealand and believe that every barrel of oil discovered makes the country more financially secure⁵⁸. New Zealand is currently 88 per cent self-sufficient in its primary energy needs, but only 41 per cent self sufficient in liquid fuels. The Minister of Energy commented⁵⁹ that a challenge for New Zealand is to achieve 75 per cent self-sufficiency in liquid fuels before 2005, and complete self-sufficiency and net export of liquid fuels before 2010. The Minister believes these are reasonable targets given New Zealand's current exploration activity. In my view the current exploration rate is insufficient to meet these targets. Further exploration is required to realise New Zealand's hydrocarbon potential.

B Fair Financial Return

Fair financial return referred to in section 12 of the CMA is the financial return to the Crown from its petroleum resource. Aspects for consideration when determining a financial return are defined in the *Minerals Programme for Petroleum* and include:

- (a) the Crown's role as the resource owner;
- (b) the non-renewable nature of petroleum;
- (c) the competitiveness of the petroleum regime; and
- (d) payments for petroleum under a CMA permit apply equitably to all permit holders.

Fair financial return is also considered to be aimed at a level of return which does not discourage investment and in achieving it the Crown insures sound management of the resource with avoidance of unnecessary waste.

⁵⁶ This decrease reflects the depletion of Maui, *Energy Outlook* 1997, 18-19.

⁵⁷ See: Ministry of Commerce 1997, *Energy Outlook*, 18-19.

⁵⁸ See Bradford 1998, 1.

⁵⁹ A speech at the opening function of the 1998 New Zealand Petroleum Conference in Queenstown, March 1998.

C Crown Minerals' Mission

More recently the Government has decided to achieve a "maximum" financial return from the Crown Mineral Estate. The 1998 mission statement for Crown Minerals is

"To provide and promote opportunities for investment in the Crown Mineral Estate and to maximise the financial return to the Crown"⁶⁰.

This statement highlights a change from the previous mission to obtain a fair financial return and implies an aim to achieve the highest return possible from the Crown Mineral Estate to the Crown

D Foresight Project

In a report on the 1998 Foresight Project for the Ministry of Research, Science and Technology (MoRST) the vision for oil and gas exploration and development is:

To be a thriving efficient and environmentally responsible industry providing customers with secure supplies of oil and gas at internationally competitive prices, enhancing economic growth and social well being"⁶¹.

The purpose of the Foresight Project is to direct all sectors of New Zealand's economy and society to think strategically about the future, to 2010, including what research and development priorities will be needed to achieve the outcomes. The outcomes include:

- (a) continued self sufficiency in gas: Technological advance has recently resulted in new gas-fuelled systems which are free of greenhouse gas emissions, likely to be available in New Zealand by 2010. This technology will support the use of gas as a future fuel;
- (b) achievement of 75 per cent self-sufficiency in liquid fuels by 2005 and self-sufficiency and a net exporter of liquid fuels by 2010. Every barrel of oil produced is one less New Zealand has to import, reducing New Zealand's foreign debt and increasing national prosperity;

⁶⁰ See: Crown Minerals, Business Plan 1998/99. Emphasis added.

⁶¹ See: Sykes 1998. Emphasis added.

- (c) establishment of an internationally competitive fiscal regime for exploration and production. The report notes that although new discoveries will continue to be made with the present level of exploration an increased rate of exploration is required to meet the demand for oil and gas in the post-Maui era, and to achieve self sufficiency in liquid fuels by 2010; and
- (d) open access to explore for, produce and distribute oil and gas. The report notes that industry believe the CMA needs amendment so that an exploration permit carries an explicit right of access to land to undertake exploration, while ensuring that the rights and property of the service owner are protected by appropriate compensation arrangements and clearly specified operational requirements.

Furthermore the report states that the nation would benefit considerably from increases in domestic reserves and the provision of secure and competitively priced supplies of oil and gas, by reducing foreign debt and enhancing economic growth. The report states that the Government has a vested interest in encouraging and supporting oil and gas exploration, which it can do most effectively by ensuring an internationally competitive fiscal regime and open access for exploration and production.

The Government has signalled that New Zealand would benefit from its own supply of oil and gas, and sees gas as the dominant fuel option for the future. Because petroleum is a common pool resource and is highly elusive, the nature of this resource and the difficulty in obtaining it needs to be understood. Accordingly, the following two sections discuss these two aspects of petroleum.

⁴⁰ See Hardin 1968.
⁴¹ See Hardin 1968, 5.

X COMMON POOL RESOURCE

Petroleum is a common pool resource. A common pool resource is a resource which is difficult to exclude (control access) and has a high subtractability component. The difficulty of excluding a common pool resource lies with defining the appropriate property rights to use the resource to ensure the rights are both reasonable and defensible, and the "tragedy of the commons"⁶² is avoided. For petroleum a further difficulty is that the resource is not confined to a finite area of the earth's but instead is transient and moves to fill voids within the Earth's subsurface. The high subtractability results because once extracted, either in part or whole, the resource is not available for any one else's use.

A The Theories

Three closely related theories are encountered in addressing the management of a commons and are described in:

- (a) Garrett Hardin's "*The Tragedy of the Commons*" 1968;
- (b) Mancur Olson's "*The Logic of Collective Action*" 1965; and
- (c) the Prisoners Dilemma Game.

1 Tragedy of the commons

The tragedy of the commons describes the situation where there is no limit on the amount of users using a resource at the expense of each of the other users. Hardin's tragedy refers to what eventuates if a common pool resource is not controlled. Hardin uses herdsman and cattle, and grazing as the commons as an example, with each herdsman seeking to maximize his gain.

*"Each man is locked into a system that compels him to increase his herd without limit - in a world that is limited.....Freedom in a commons brings ruin to all"*⁶³.

The concept of rightful freedom is myopic in a finite world and commons use should be administered so as to prevent their destruction. Hardin (1968) recommends coercion

⁶² See Hardin 1968.

⁶³ See Hardin 1968, 5.

as a means to manage a commons and adds that it should be mutual coercion agreed upon by the majority of the people affected to give coercion increased favour if it is believed to be otherwise decided upon by beauracrats. However, majority votes as a deciding factor may not be the most ethical or efficient means of controlling a commons.

2 The logic of collective action

The assumption of the collective action theory is that individuals with common interests and ideas would inevitably act to achieve common outcomes. Mancur Olsen's *The Logic of Collective Action* challenges this concept and believes that unless the group is small or is controlled by coercion

“rational self interest individuals will not act to achieve their common or group interest”⁶⁴.

With collective action comes the hazards of making group decisions, because different approaches will result in different outcomes and a group provides a greater number of possibilities and iterations.

3 The Prisoners' dilemma game

The prisoners' dilemma game uses game theory⁶⁵ to describe the conflict between individual and group rationality. In the game the prisoners are the users of a common resource and do not communicate and do not have agreed upon rules and strategies for using the resource.

It is a non-co-operative game and all players possess complete information. The prisoners will overappropriate, defect on one another and their use of the resource does not result in a Pareto-optimal outcome⁶⁶. The prisoners' dilemma suggests that it is impossible for rational human beings to co-operate. It suggests that rational individual strategies create irrational collective outcomes. These suggestions challenge the belief that rational human beings can achieve rational. The dilemma lends itself to great philosophical debate.

⁶⁴ See Ostrom 1990.

⁶⁵ See Ostrom 1994, 293-296.

⁶⁶ A Pareto-optimal outcome is one which is achieved when one person cannot benefit any further without causing another person a loss. See: Teitenberg 1996, 25.

However, where individuals jointly use a common pool resource, communicate and have agreed upon strategies, they improve their joint outcomes and defeat the tragedy of the commons. The tragedy has been recently re-diagnosed as uncontrolled open access, hence open access use of common pools is avoided. A recent example of the New Zealand Government recognising the pitfalls of open access control on a common resource is the attempt to change the management of the fisheries from open access to a quota management system.

One of the reasons for appropriating all petroleum in its natural condition in 1937 was because of the nature of the resource, as a migratory body.

In trying to achieve collective benefits concerning a common pool resource Ostrom believes the three theories above have been used as the basis for policy prescription leading to just as tragic policy recommendations (Ostrom 1994). Such policies have recommended:

- (a) Leviathan as a coercive force to avoid the tragedy of the commons;
- (b) privatisation and the creation of a private-property system; and
- (c) an "only way" solution which requires a decided do-all-and-end-all approach.

Ostrom suggests an alternative- a "fifth game"⁶⁷, a self-financed, contract enforcement game. The individuals of the common pool make their own binding contracts and commit themselves to a co-operative strategy that they work out themselves. The individuals must negotiate and determine contracts prior to using the resource, discuss various strategies for sharing the carrying capacity of the resource and the costs for enforcing their negotiations.

Berkes (1989) discusses two views of a common pool resource. The first is where the resource is neither owned privately or by the State, it is one owned by no-one and is non-amenable to private appropriation. Subsequently, the resource becomes subject to open access and is freely available to the user. A second view is that common property should be restricted to communally owned resources where it is allocated to users and non-users are excluded. These restrictions would be enforced by law.

The allocation of a commons such as petroleum is a means of exclusion to control its use. To be effective, the allocation mechanism must be supported by a set of property

⁶⁷ See Ostrom 1990, 15-18.

rights that are defensible in a legal system available to the users. Additionally the legal and economic feasibility of excluding or limiting potential users should be derived from both physical attributes of the goods and the relevant institutions.

B Allocation of Petroleum as a Common Pool Resource

Under the common law ownership of things below the ground belong to the owner of the surface land. The owner of the soil or the surface of the ground owns or has exclusive right to every thing below it to an undefined depth. However there is one major exception to this - "thus at common law, gold and silver mines belong to the Crown"⁶⁸.

However, petroleum has caused particular problems for the common law because of the nature of its occurrence as a migratory substance. It has not been settled whether the common law rule above applies to petroleum in its natural condition and this rule to petroleum has been doubted⁶⁹.

The physical characteristics of petroleum have resulted in diverse views about its ownership. Two main opinions rose in the United States during the 1950s. The first one was that gases, oils and water do not belong to the surface land owner under which they are found, because "*like wild animals, hydrocarbons are only subject of ownership when placed into possession*"⁷⁰. The second opinion held that as long as the petroleum remained in its natural condition it was owned by the land owner and the ownership was only lost when the title to the petroleum was transferred before the land owner extracted it into possession⁷¹.

An important aspect of using a common pool resource (as it is to other resources which are not common pool ones) is the decision of how to allocate and manage it. The Minister of Energy is vested with the administration, ownership and allocation of petroleum. Ownership lies with the Crown and control of it lies with the Minister of Energy and the officials to who the Minister delegates his authority. The officials are Crown Minerals, a group within the Ministry of Commerce. Later in this paper the

⁶⁸ See: *Resource Management Law Reform: Working Paper No.7, 1988, 2.*

⁶⁹ *Michael Borys v Canadian Pacific Railway Company* [1953] AC 217.

⁷⁰ See: *Resource Management Law Reform, Working Paper No.7, 2.*

⁷¹ *Michael Borys v Canadian Pacific Railway Company* [1953] AC 217.

allocation mechanism chosen for petroleum is discussed. Management of petroleum as a Crown mineral and a commons involves the intricacies of the New Zealand Government's policies on energy and resource management at the central, regional and local levels. These issues cover an enormous quantity of policy, decision making and politics which have not been completely addressed in this paper.

Exploration activities need to be undertaken at a rate that is compatible with the probability of finding hydrocarbons and the temporal dimensions of the development programme. The probability of finding hydrocarbons refers to the probability of encountering any oil or gas.

New Zealand has 10 known sedimentary basins with potential to hold significant volumes of hydrocarbons. The Taranaki Basin is New Zealand's only commercial hydrocarbon producing region. Of a total of approximately 500,000 square kilometres of known sedimentary basins, only 220,000 square kilometres is currently held under petroleum exploration or mining permits, hence there is scope to expand this area under permit.

Geologically all 10 sedimentary basins in New Zealand have the necessary geological components to suggest hydrocarbons have resided or still reside within the basin stratigraphy. Figure 7 on page 47 illustrates New Zealand's hydrocarbon basins.

XI PETROLEUM DISCOVERY PROBABILITY

A *Rate of Exploration*

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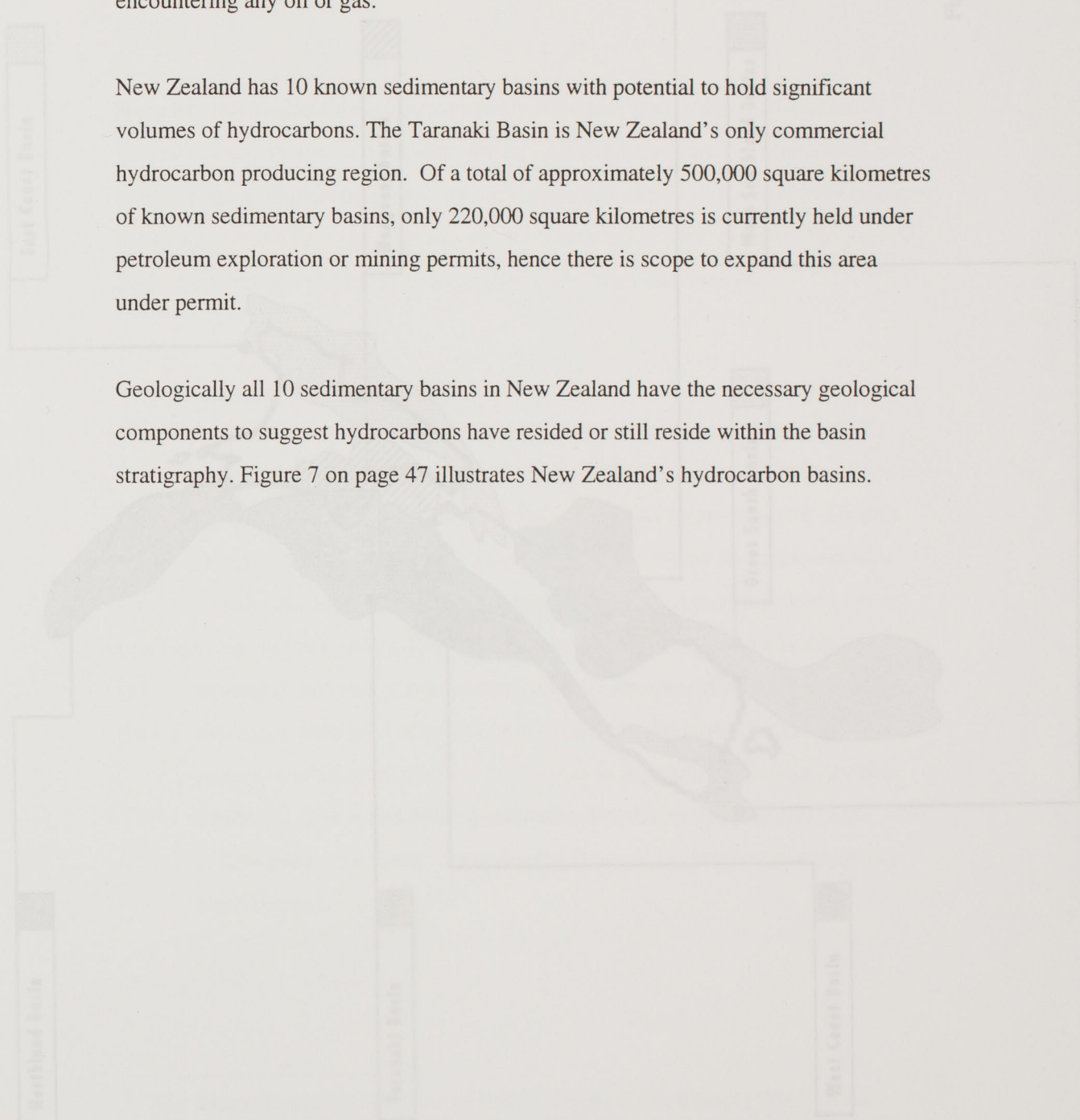


Figure 7: New Zealand's main petroleum basins.

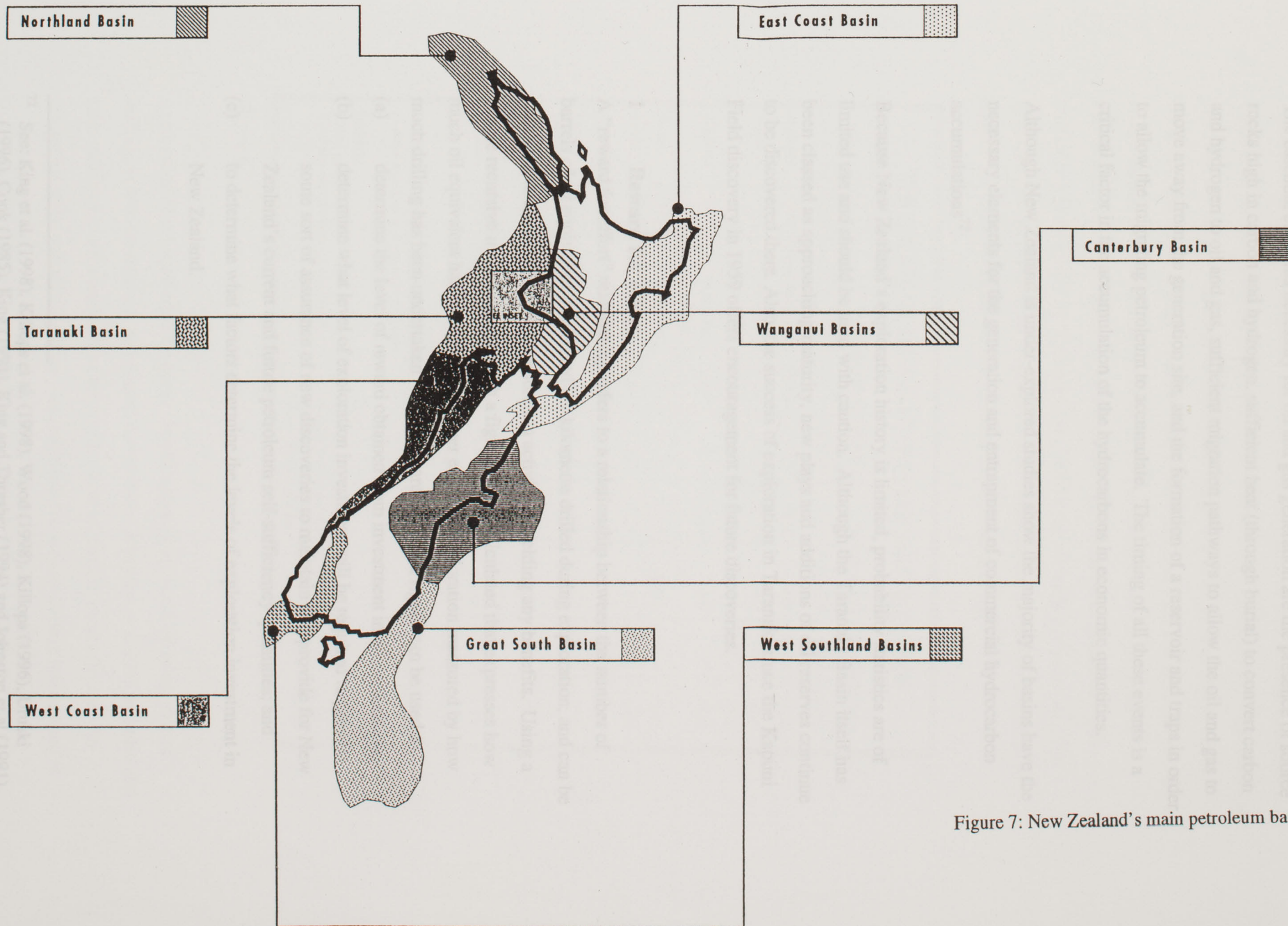


Figure 7: New Zealand's main petroleum basins.

The essential elements necessary for oil and gas generation are the presence of source rocks high in carbon and hydrogen, sufficient heat (through burial) to convert carbon and hydrogen to oil and gas, sufficient migration pathways to allow the oil and gas to move away from the generation site, and the formation of a reservoir and traps in order to allow the migrating petroleum to accumulate. The timing of all these events is a critical factor in the accumulation of the hydrocarbons in economic quantities.

Although New Zealand is under-explored studies show the majority of basins have the necessary elements for the generation and entrapment of commercial hydrocarbon accumulations⁷².

Because New Zealand's exploration history is limited, probability statistics are of limited use and should be used with caution. Although the Taranaki Basin itself has been classed as approaching maturity, new plays and additions of oil reserves continue to be discovered there. Also, the success of exploration in Taranaki since the Kapuni Field discovery in 1959 offers encouragement for future discoveries.

1 Reward for effort

A "reward for effort" relationship refers to a relationship between the number of barrels of oil equivalent discovered per kilometre drilled during exploration, and can be used to determine whether the exploration activity is yielding any benefits. Using a simple recursive modelling approach a figure can be calculated that expresses how much oil equivalent has been discovered per effort of exploration measured by how much drilling has been undertaken⁷³. The reward for effort figure can be used to:

- (a) determine the level of reward obtained from investment in oil exploration;
- (b) determine what level of exploration investment will be required to provide some sort of assurance of new discoveries to maintain and provide for New Zealand's current and future petroleum self-sufficiency quantities; and
- (c) to determine what factors determine the levels of exploration investment in New Zealand.

⁷² See: King et al. (1998), Killops et al. (1998), Wood (1998), Killops (1996), Uruski (1996), Cook (1985), King (1994), King and Thrasher (1994) and Johnston et al (1991).

⁷³ See: Upasena et al 1998.

Upasena et al (1998) determined a reward for effort figure of 0.92 million barrels of oil equivalent for New Zealand using data from 1970 to 1993. Cook (1985)⁷⁴ calculated a figure of 0.9 million barrels of oil equivalent using data from 1950 to 1985. Given these two calculated reward for effort values, New Zealand's oil and gas reserves (see figure 8), and petroleum usage growing at 1.6 per cent per annum, the level of exploration required to maintain New Zealand's current level of petroleum self-sufficiency is estimated by Upasena et al (1998) to be 40 wells per year. At 1998 drilling costs, an exploration programme would incur an annual investment of \$240 million for onshore drilling to \$800 million for offshore drilling.

	Discovery Date	Geological Unit	Oil/Condensate Reserves (MMB)		Gas Reserves (BCF)		1995 Daily Production	
			Total	As at 01.01.97	Total	As at 01.01.97	Oil/Cond (BOPD)	Gas (MMSCFD)
Kapuni	1959	Mangahewa Fmt	62.53	7.7	1,190.0	440	3,400	87.52
Maui	1969	Kapuni Group	173.50 ²	88.5	3,395.0	1,300	22,000	403
McKee	1980	McKee Fmt	53.14	17	156.1	98	5,100	19.6
Kaimiro	1982	McKee Fmt (Deep)	0.47	0.2	13.0	6.0	15	0.50
Kupe	1986	Farewell Fmt	16.30	16.30	256.0	256.0	0	0.00
Tariki	1986	Tariki Sst	2.84	2.6	72.0	70	300	6.00
Ahuroa	1987	Tariki Sst	0.62	0.5	23.0	20	300	5.0
Kaimiro (Shallow)	1988	MtMessenger/Moki Fmt	1.88	1.0	6.9	5.0	1000	1.18
Waihapa/Ngaere	1988	Tikorangi Fmt	22.88	0.87	26.7	0.67	1,800	2.6
Ngatoro	1992	MtMessenger Fmt	1.80	0.59	3.7	2.6	960	0.96
Total			335.96	135.26	5,142.4	2,198.27	34,875	526.36

This table has been compiled from reserve figures supplied by field operators in 1996. All reserves are classified as either expected or proven and probable.

Footnotes
 1. Total excludes gas reinjected.
 2. Includes oil/condensate/other NGL's.

Key
 MMSCFD = million standard cubic feet per day
 BOPD = barrels per day
 MMB = million barrels
 BCF = billion cubic feet

Figure 8:

Exploration effort is affected by many variables including world oil price, cost of drilling, petroleum demand, and market competition. Upasena et al 1998 included six such variables in their analyses to see which variables had the most effect on the reward for effort calculated. They concluded that the cost of drilling has a negative

⁷⁴ See: Cook 1985.

effect on exploration activity while world oil prices and the demand for petroleum are positive influences. Upasena et al (1998) also comment that government policy only weakly impacts on exploration effort⁷⁵ in their model however state that there is ample evidence from literature showing positive influence of the change in government policy in support of petroleum exploration.

Another commonly used measure of exploration success is given by the number of wildcat wells⁷⁶ required to be drilled to find one significant discovery. The international average value for this is 1:10, hence for every 10 wildcats drilled, one is a significant petroleum discovery. New Zealand's wildcat figure is 1:10.3⁷⁷.

2 Exploration versus increased exploration

Using the Upasena et al (1998) and Cook (1985) reward for effort values an exploration rate greater than the present level of activity is required to yield commercial quantities of petroleum for several reasons. The most obvious reason is to ensure the commercial discovery is within a time period that the discovered hydrocarbons are needed or wanted. For example if the Maui Field is expected to be completely depleted of gas by 2020 and gas is still the preferred energy fuel, the gas exploration should be at a rate to ensure the discovery occurs in time for the gas to be put on-line. The time required to place a new discovery on-line will vary depending on the proximity of the discovery to an established gas reticulation network. Similarly if gas is being explored for at the current rate right up until 2020 and in the year 2020 a major gas discovery is encountered government policy may change in the same year to support an alternative fuel because it would take too long to utilise the newly discovered gas.

Increased exploration also needs to be encouraged because at the current rate it is unlikely that a commercial discovery will result within a reasonable time period and a level of effort less than the minimum required effort can be considered wasteful and economically inefficient. The maximising behaviour of an explorer is to explore in such a way that gives a better chance of discovering a significant quantity of

⁷⁵ This is noted in Upasena et al. 1998 which also states that the exact effect of the government policy changes may not have been represented accurately by the dummy variable which resulted in the insignificant contribution to the model, 393.

⁷⁶ A wildcat well is the first well drilled in an area.

⁷⁷ See: Cook 1985.

hydrocarbons. If the explorer knows that one in 10.3 wells are likely to discover a significant hydrocarbon occurrence and the Upasena et al (1998) and Cook (1985) reward for effort value requires increased kilometres of drilling, with respect to current drilling rates, then this must be the minimum level of exploration undertaken. If exploration is not undertaken at this rate exploration could be seen to be wasteful in both the public⁷⁸ and private⁷⁹ areas.

Increased exploration is also necessary because New Zealand is a frontier area with little previous exploration activity and although our wildcat ratio is 1:10.3, only 0.3 higher than the international average, New Zealand is definitely under-explored. For example the Taranaki Basin, New Zealand's only hydrocarbon producing basin, has had only approximately 200 wells drilled in it. A similar area in a petroleum basin in North America may have had 2000-3000 wells drilled.

B Prospectivity and Its Assessment

Methods for assessing petroleum prospectivity range, from purely fundamental to purely statistical. Miller (1986) reviews the applicability of the main methodologies, noting that only those with some basis in geological fundamentals are useful, especially at the frontier end of the spectrum of exploration maturity.

The usefulness of a fundamental approach varies in proportion to the degree of knowledge of a basin's geology, which is in turn related to the amount of exploration effort which has occurred. The Taranaki Basin is better known than any other basin in New Zealand, and the knowledge of Taranaki can be extrapolated to create scenarios for analogous hypothetical petroleum systems elsewhere in and around New Zealand. The New Zealand Government has never published quantitatively assessed undiscovered resources, but a number of studies have been reported by both public sector and industry experts.

⁷⁸ The public refers to Government spending to allocate and manage petroleum exploration, in New Zealand especially the promotional funds allocated to attract explorers to explore in New Zealand.

⁷⁹ The private refers to the explorers.

1 Geological content

The desired result of exploration investment is resource discovery. A secondary but useful result is the discovery and collation of knowledge, leading to an improved understanding of the occurrence of oil and gas. This improved knowledge does not always condemn further prospectivity in the environs of a dry hole. There have been numerous examples in New Zealand and worldwide, of significant fields being unrecognised because the initial evaluation programme focused on one stratigraphic level but the important reserves resided in a completely unknown and different level.

Fundamental methods of prospectivity assessment are based on detailed and comprehensive basin analyses, similar to that conducted within exploration companies to identify leads and prospects using petroleum systems analysis. This method enables a "volumetric yield" determination, which is considered (Miller, 1986) the most reputable method for evaluating prospectivity. Its downside is that an extensive amount of exploration data and effort by specialised personnel, is required to produce useful results. It cannot be applied with confidence in very lightly explored areas due to a lack of data.

2 Statistical methods

Statistical methods can be applied at various scales: global, country, basin, or play⁸⁰. A relatively low prospectivity grading does not necessarily condemn an area, because there is always potential for new paradigms to have an impact. For example, the Western Platform of the Taranaki Basin lies beyond the region which is likely to have experienced a hydrocarbon charge based on present geological concepts. However, relatively long-distance secondary migration has been documented for several basins, including some containing giant fields, in many parts of the world, and if this process has operated in the Taranaki system then the prospectivity of the Western Platform needs to be upgraded. One prolific petroleum province where such secondary migration has been documented is the Oriental Basin in Venezuela, which as King (1994) pointed out, has a significant degree of geological analogy to Taranaki.

⁸⁰ A play is a genetically linked series of fields or prospects within a basin or province. For example, the Kapuni Group play in Taranaki Basin involves Eocene reservoirs, late Cretaceous source rocks, and mainly gas reserves in a group of fields which include the three largest. Conversely, the Mount Messenger Formation play in the same basin involves Miocene reservoirs, Eocene source rocks, mainly oil reserves, and small field size.

3 Geological analogy

A geological analogy between a very lightly explored basin and a basin proven as a petroleum-producer offers a reasonable means of constraining resource potential. Basins with similar geology should yield similar reward, in terms of total reserves, and field size distribution, for similar exploration effort.

For explorers, the purpose of exploration is to make discoveries, but the consequent benefit of obtaining useful knowledge improves the targeting of future investment. Few permits experience more than one exploration well unless it is a discovery, and a discovery with the first well of a programme is uncommon in under-explored basins anywhere in the world. There are many examples of significant discoveries coming at the end of drilling campaigns of up to 10 wells⁸¹.

4 Overview

New Zealand is under-explored for oil and gas, and present knowledge of several sedimentary basins suggest considerable promise for further discoveries. However, forecast investment levels over the next five years, which will be critical in terms of New Zealand energy supply economics, are likely to generate only modest reserve additions. Investment is too low and also weighted towards the relatively low risk, low reward opportunities of onshore and nearshore Taranaki. However the past two or three years have seen a reawakening of interest in some of the frontier regions which offer new possibilities, and given sufficient cumulative exploration effort, and the effective incorporation of present knowledge to improve exploration efficiency, further substantial oil and gas discoveries can be expected.

The precision of an estimate of the potential of a basin for hydrocarbon exploration is a function of how well a basin is known. This, in turn, relies on how much it has been explored. The less a basin is known the greater the risk of not finding hydrocarbons and the wider the range of possible resources that are likely to come from that basin. In New Zealand, only the Taranaki Basin has producing fields and hence there is always a reluctance for companies to explore New Zealand's other basins unless they are comfortable with the potential risks and benefits. Because most explorers are

⁸¹ For example the 235 million barrel Widuri oil field in Indonesia, discovered by Maxus with the last of a multi-well campaign in 1988. See: The Crown Mineral Estate and its Management n(1997), 52.

international, our exploration prospects must be competitive in a worldwide market, from the perceived geological risk and the financial return on petroleum discovered.

The geological complexity of New Zealand compared to some of the world's major hydrocarbon-producing countries requires a more intense exploration effort and understanding to bring the same perceived minimum risk that will encourage exploration. The level of previous exploration, the availability of data, and the availability to access research carried out on that data, all contribute to the perception. Statistically, at the early stages of exploration, more wells must be expected to be drilled before a significant success is found.

There is also a reverse component in this risk equation. The larger a structure then the easier it is to see and also the larger the volume it potentially holds. The earlier drilling will therefore usually test the larger structures and while there is less known about the required petroleum system surrounding that structure there is a greater chance of it containing oil or gas. Consequently, in frontier basins there is the potential for better returns for a well, but more wells are needed to ensure a statistically valid return. From the local wells promised over the next five years, it is clear that, there is a reasonable expectation of a return in the Taranaki Basin both offshore and onshore. In the frontier basins there is very little chance of the proposed exploration level finding anything. The corollary is that any further work that is added to improve the understanding of the petroleum system of a basin the lower the risk and the better return on that research investment.

²² As discussed in section 5 subsection D of this paper.

²³ Ernst & Young 1994, 71.

XII SYNTHESIS

In this section the five exploration permitting provisions⁸² will be analysed in the context of their potential to encourage or hinder exploration.

A Allocation

The industry support the allocation of exploration permits by staged work programmes, especially over cash bonus or pure cash bidding⁸³.

Cash Bonus Bidding (CBB) is a market based method which allocates a right to a bidder willing to make the highest advance payment. It is referred to as a cash "bonus" because it is a payment made in addition to any ex post royalty. In terms of efficiency CBB was considered to be advantageous because it awards the permit to the operator who values it the most, assists in sharing the risk between the Crown and the permit holder and there would be no inducement to excess or premature expenditure. CBB was considered inefficient because it would divert funds in fixed exploration budgets from exploration activity, it may disadvantage small innovative explorers and payments, and may deter investment if the highest bidder over bids.

CBB ensures a fair financial return to the Crown because a payment is made in exchange for the right, however the fullness of the bid is dependent on the level of competition and resource knowledge. Industry consider this allocation method inappropriate because of the diversion of funds. Most petroleum countries who New Zealand competes with for exploration funds do not use CBB, and there is a lack of information available (because of New Zealand's low level of exploration data collected) on which to make a rational assessment of the bid required.

A First Acceptable Offer (now referred to as an Acceptable Frontier Offer) is a first come first served allocation method, by which the Crown requires a commitment by the applicant to undertake work, and awards the permit if the proposal is acceptable. This mechanism was considered efficient because work committed voluntarily is likely to be in line with the explorer's financial resources. However, this allocation mechanism

⁸² As discussed in section 5 subsection D of this paper.

⁸³ Ernst & Young 1994, 71.

does not flush out other prospective bidders in the way a competitive allocation mechanism would and negotiation about the acceptability of the work programme may lead to agreement to undertake more work or earlier work than is otherwise warranted. Because this allocation is considered to foster an earlier or greater exploration rate, the Crown benefits from enhanced knowledge, but any financial return to the Crown is uncertain because it is wholly dependent upon a successful outcome. Industry support this allocation mechanism.

CBB, under a blocks offer was chosen, to be applied in competitive areas and areas which have exploration activity and the licence or permit had since expired or been surrendered, such as the Taranaki Basin. The AFO allocation mechanism was chosen for petroleum rights in New Zealand because of the low competition and frontier nature of New Zealand's petroleum basins, such as the East Coast Basin. Although the AFO allocation mechanism was not expected to be the allocation method used in most circumstances,

*"Allocation of petroleum exploration permits by staged work programme or cash bonus bidding in accordance with a petroleum Exploration Permit Block Offer is expected to be the allocation method used in most instances for petroleum exploration permits"*⁸⁴.

New Zealand is a frontier area and this "first past the post"⁸⁵ allocation provision was proved successful prior to 1977 and was the allocation method at the time of the Maui and Kapuni discoveries.

The industry support the AFO system because it allows an explorer to obtain a permit in an area of their choice (with the exception of areas which are already under licence or permit or are excluded from permitting as provided for in the Minerals Programme for Petroleum⁸⁶) within a short time frame. Also application evaluation is totally based on the proposed work programme, and technical and financial resources of the explorer which gives the explorer some certainty in receiving a permit if the requirements of the application are known and adhered to.

⁸⁴ See: *Minerals Programme for Petroleum* para 5.2.64, 30. Emphasis added.

⁸⁵ "First past the post" is the term used by Ernst & Young 1994 to describe the allocation method for petroleum prior to 1977.

⁸⁶ See: ch 4, paras 4.2-4.10 in the *Minerals programmes for Petroleum*, 11-12.

B Application

Under the AFO system one problem with the application mechanism is the problem which would arise if two applications are received for exactly the same area at exactly the same time, or outside the working hours of the Crown Minerals office. Because the AFO system works on a first come first served basis, one of those applications would have to be identified as the first application. However an application is not considered to have been received until processing of the application has commenced.

A recent legal opinion⁸⁷ is to process both the applications, treating them as arriving at the same time and placing them in the same priority, and using the work programmes to decide which applicant should receive the exploration permit.

The application processing time can vary from approximately three months to what ever time it takes for all matters required by the Minister of Energy to be met. One aspect which has lengthened this processing time is consultation with iwi as required by section 4 of the CMA and chapter three of the *Minerals Programme for Petroleum*.

The potential short processing time of the exploration permit is attractive to explorers.

C Work Programme

A major component of the AFO allocation system is the commitment to undertake work at a certain stage in the term of the exploration permit. Paragraph 5.2.70 of the *Minerals Programme for Petroleum* states

(a) *Within 12 months of the commencement date of the proposed permit:*

- i *the completion of such detailed exploration work as is necessary to determine an exploration well drilling location; and*
- ii *either a commitment to undertake exploration well drilling as per (b) below, or the surrender of the permit; and*

⁸⁷ This opinion is that of the Ministry of Commerce.

(b) Within 24 months of the commencement date of the proposed permit, the drilling of an exploration well.

These requirements are considered very rigid by the industry and may hinder exploration investment⁸⁸. The Crown sees these drilling commitments necessary to ensure the exploration rate is at certain level and once a permit has expired and if no hydrocarbons were discovered the area can be opened up again for further exploration.

D Crown Share

The ad volarem royalty regime which collects a fixed per centage of the wellhead value of production, is considered effective because it is responsive to changes in commodity prices. However this regime is non-responsive to project costs and as a result may deter project development forcing the premature closure of projects. The ad volarem regime ensures some payment is made for any petroleum extracted and the Crown share reflects the changes in commodity prices. However, if used alone AVR's will under-recover rent from most projects developed. The industry is supportive of simple and low AVR's.

The Accounting Profits Royalty (APR), which collects a fixed per centage of profits calculated in a prescribed manner responds to changes in project profitability and is considered relatively efficient. It ensures the Crown recovers a higher share of rents from more profitable projects, however it also has the potential adverse equity concerns because the Crown is treated as the residual rent claimant. Oil companies are generally prepared to contemplate a profits related royalty if it were a replacement for high AVR's per carried interest, but are hesitant otherwise.

Reducing royalty amounts may increase activity in the same way tax reductions do in an economy overall. This approach was introduced in the United Kingdom in the 1980s with great success. What ever the royalty, it must be internationally competitive and offset any advantages apparent in other countries.

⁸⁸ Personal communication with the Petroleum Exploration Association of New Zealand.

By comparison the royalty rate range in Australia is 10-12.5 per cent⁸⁹, 12.5 per cent⁹⁰ in onshore North America, 12.5-16.667 per cent⁹¹ in offshore North America and 10-35 per cent⁹² in Canada (Petroconsultants 1998).

Industry questioned whether it was appropriate for the Crown to charge a royalty on petroleum when the fisheries resource no longer had a royalty applied⁹³. Because it is a finite resource it should have a fee payable for diminishing the quantity of a scarce resource instead of a royalty. The payments made could be used toward future energy research. However an actual royalty to the Crown, as well as being controversial⁹⁴, is also questioned when the Government receives a total return (not only the direct royalty payable) via taxes and other associated agencies, such as regional councils. In deciding on a fair financial return to the Crown and wanting to continue investment in the Crown Mineral Estate the royalties could be reduced or considered in light of the Crown receiving a net return which may not be so attractive to encourage exploration.

E Access to land

The biggest criticism of the current permitting regime for petroleum exploration permits is that the permit does not include a right to access land to carry out exploration activities. An amendment to this section of the CMA, to grant access to explorers is considered by industry necessary to increase exploration.

The overall criticism of the Draft Minerals Programme for Petroleum was that the proposed regime was fundamentally the same as the current one which had been in effect since 1986. The regime since 1986 was considered unsuccessful and since it was introduction exploration activity had decreased by 73 per cent⁹⁵. The industry at

⁸⁹ The royalty range reflects the difference in onshore or offshore extraction. Although Australian petroleum is governed by seven different state petroleum Acts, the fiscal terms are the same throughout. The acts are listed in the Australia-far East & Australasia section of Ernst & Young 1998.

⁹⁰ This royalty rate can increase to 20 per cent if oil price exceeds US\$18.35 per barrel.

⁹¹ This royalty rate variation reflects the difference in water depth. Greater the depth to the sea floor the less the royalty charge is.

⁹² The royalty rate applied depends on the production price, production rate, and date of discovery.

⁹³ Ernst & Young 1994, 81.

⁹⁴ The controversy began with the resumption of ownership of all petroleum in its natural condition to the Crown in 1937 with the enactment of the Petroleum Act and is still raised today by surface land owners, and Maori as a breach of the Treaty of Waitangi.

⁹⁵ Ernst & Young 1994, 80.

the time anticipated the proposed regime under the Draft Mineral Programme would further reduce exploration activity⁹⁶. However the result of the effectiveness of the Minerals Programme for Petroleum is much rosier and exploration activity has increased since its introduction in 1995.

The CMA and the Minerals Programme for Petroleum allow a favoured investment environment for exploration in New Zealand. The APG allocation system in particular encourages exploration.

Exploration activity has increased significantly since 1995 which marks the introduction of the Minerals Programme, the APG system, and a period of time to witness the effect of the CMA.

There are however aspects of the explorative regime that could be amended to encourage exploration at an increased rate compared to the present. This increased rate is necessary to ensure the petroleum resource is efficiently managed and exploration is not wasteful. This increased rate is also necessary to meet the goals of Government, to achieve self sufficiency of liquid fuels by 2010, continue investment in the Crown Minerals Sector, and supply gas and oil to meet the current, increasing, and predicted future demands.

The current explorative permitting regime has the capacity to increase exploration, however, amendments to it are considered to be desirable if the regime, proposed amendments include:

- (a) improvement of access to land;
- (b) to allow greater exploration periods;
- (c) a variable royalty rate, depending on whether the exploration is offshore, onshore, and
- (d) exploration placed on royalty payments for a specified term.

The current explorative permitting regime does not represent consideration to the wider energy sector, and New Zealand's economy as a whole, however, in the governing statute the aspects on the supply of gas and oil, which together are the largest component of New Zealand's energy sector.

⁹⁶ Ernst & Young 1994, 80.

XIII CONCLUSION

The major legislative elements of the current petroleum exploration permitting regime, the CMA and the Minerals Programme for Petroleum, allow a favoured investment environment for exploration in New Zealand. The AFO allocation system in particular encourages exploration.

Exploration activity has increased significantly since 1995 which marks the introduction of the Minerals Programme, the AFO system, and a period of time to witness the affects of the CMA.

There are however aspects of the exploration regime that could be amended to encourage exploration at an increased rate compared to the present. This increased rate is necessary to ensure the petroleum resource is efficiently managed and exploration is not wasteful. This increased rate is also necessary to meet the goals of Government, to achieve self sufficiency of liquid fuels by 2010, continue investment in the Crown Minerals Estate, and supply gas and oil to meet the current increasing, and predicted future demands.

The current exploration permitting regime has the capacity to increase exploration, however, because parts of it are considered to be inhibitors of the regime, proposed amendments include:

- (a) improvement of access to land;
- (b) an increased term on exploration permits;
- (c) a variation in royalty rate, depending on whether the exploration is offshore; or onshore; and
- (d) a moratorium placed on royalty payments for a specified term.

The current exploration permitting regime does not express consideration to the wider energy market, and New Zealand's economy in general, however is the governing doctrine that impacts on the supply of gas and oil, which together are the largest component of New Zealand's energy sector.

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