May 2012

Out of our depth:

Deep-sea oil exploration in New Zealand

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Contents

Cover:

A view from an altitude of 3200 ft of the oil on the sea surface, originated by the leaking of the Deepwater Horizon wellhead disaster. The BP leased oil platform exploded April 20 and sank after burning, leaking an estimate of more than 200,000 gallons of crude oil per day from the broken pipeline into the sea.
© Daniel Beltrá / Greenpeace

Right:

A penguin lies in oil spilt from the wreck of the Rena
© GEMZ Photography

The inability of the authorities to cope with the effects of the recent oil spill from the *Rena* cargo ship, despite the best efforts of Maritime New Zealand, has brought into sharp focus the environmental risks involved in the Government's decision to open up vast swathes of the country's coastal waters for deep-sea oil drilling.

The *Rena* accident highlighted the devastation that can be caused by what in global terms is actually still a relatively small oil spill at 350 tonnes and shows the difficulties of mounting a clean-up operation even when the source of the leaking oil is so close to shore. It raised the spectre of the environmental catastrophe that could occur if an accident on the scale of the Deepwater Horizon disaster in the Gulf of Mexico were to occur in New Zealand's remote waters.

The potential dangers of deep-sea drilling, the exploration of oil below water depths of 200 metres, have been understood for years. But until recently such dangers were only ever academic as the extraction of deep-sea oil was regarded as prohibitively expensive. In the last few years, however, a combination of declining global oil reserves from traditional sources[1] and rising oil prices worldwide has driven companies to seek out ever riskier sources of oil in order to maintain their revenue streams. And sadly, successive New Zealand governments of different political stripes, have shown themselves only too willing to assist.

Oil-smeared protestors walk past the Beehive in central Wellington to protest Energy and Resources Minister Gerry Brownlee's reckless determination to dig and drill for more dirty fossil fuels, while ignoring the impacts on climate change.

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A sea change in Government strategy

Spurred on by the oil crisis of the 1970s, eight exploratory offshore wells were drilled by the Hunt Petroleum Company in the Great South Basin between 1976-84[2]. Although indications of oil were found, a combination of factors, including technological limitations and high extraction costs, persuaded the company not to proceed.

The current National Government has enthusiastically embraced the cause of mineral exploitation and deep-sea oil exploration. In a speech to the New Zealand Petroleum Conference in 2010[3], energy minister Gerry Brownlee bemoaned the fact that only one of New Zealand's offshore basins, Taranaki, currently had active oil producing fields and hailed the previous year as having seen "the largest exploration programme ever undertaken in New Zealand".

"For far too long," he said, "New Zealand has not taken advantage of the wealth hidden in our hills, in our oceans, and in the ground".

In their eagerness to attract international participation in the rush for oil, the Government has been keen to offer inducements to industry operators. Bob Gaudin, president of Texan company Grande Energy, which has a deep-sea oil exploration permit off the east coast of the South Island, admits: "It is difficult to find a place as industry friendly as New Zealand with as favourable an economic and political climate[4]."

The Government, for example, has recently extended until the end of 2014 an exemption from tax on the profits of non-resident operators of offshore rigs and seismic vessels[5].

Since 2004, the Government has also been acquiring and making available scientific data about New Zealand's oil reserves for free, including a recent $25m programme[6] paid for by taxpayers to complete seismic surveys over new frontier basins and to rework old seismic data.

Another incentive was the introduction of tax changes. Issues the industry considered were hindering exploration – including amortisation rates and GST treatments on the costs of site restoration – were fixed[7]. The Government also sweetened royalty rates for a five-year window, lowering payments on any discoveries made before the end of 2009[8]. The gas production rate, for instance, decreased from 5 per cent to 1 per cent, while oil rates have also fallen — for the first 150pj (petajoules) of petroleum produced from an offshore discovery, the royalty rate fell from 20 per cent to 15 per cent[9].

Oil covers a section of Papamoa beach as a result of the container ship Rena running aground on the Astrolabe Reef about 20km from Tauranga, on October 5th, 2011.

© Greenpeace / Simon Grant

Safety concerns

2

But while the Government has been bending over backwards to assist the oil companies' efforts to locate New Zealand's deep-sea oil reserves, they have shown a noticeable lack of interest in environmental protection efforts. In a country whose clean green reputation is a key component of its lucrative tourism and food export industries, and in which according to Statistics NZ, 65% of the population live within five kilometres of the coast[10] it might be assumed that environmental considerations would be paramount.

But as was learnt from the experience of the Pike River mine disaster, in which 29 miners were killed in November 2009, the Government has shown itself to be extremely lax about industry safety concerns. At the time of the Pike River explosion, for example, there was only one mines safety inspector operating in the whole of the South Island[11].

Until recently New Zealand had just one inspector to oversee safety in its oil exploration industry[12]. In 2011, the Government announced that it would increase the number of petroleum inspectors to three, although it has not stated when these additional inspectors will begin work. Even with these changes, the safety arrangements will still be inadequate. These oil well inspectors will need to monitor health and safety on at least seven installations, as well as all onshore petroleum and geothermal facilities, to guard against accident. In comparison, Australia has one inspector for every three installations; Britain has one inspector for every two; and Norway has one per installation.

A Government-ordered review from the Ministry of Economic Development condemned the situation, stating: "This represents a serious risk to the adequacy of the existing regulatory regime to anticipate or prevent a major pollution incident from offshore petroleum operations."[13]

"When a failure happens at such depths, regaining control is a formidable engineering challenge - and the costs of failure, we now know, can be catastrophically high."

The risks of deep-sea oil

3

Fire boat response crews battle the blazing remnants of the off shore oil rig Deepwater Horizon. © The United States Coast Guard

On 20 April 2010, the world was forced to wake up to the inherent dangers of deep-sea oil drilling and the unique difficulties of containing a deep-water spill when BP's Deepwater Horizon rig suffered a catastrophic blowout that killed 11 crew members. Over the next three months the spill ran unchecked, disgorging 660,000 tonnes of oil into the Gulf of Mexico, devastating both wildlife and local fishing and tourism. In March 2012 BP agreed to pay $7.9 billion USD to settle claims from 110,000 individuals and businesses affected by the spill but total costs have been estimated to run to over $37 billion USD[14].

The danger of offshore drilling, even when including work in shallow waters, is no secret. From 2001 to 2010, for example, the US Minerals Management Service reported 858 fires and explosions, 1,349 injuries, and 69 deaths on offshore rigs in the Gulf of Mexico alone[15]. But even though the risks of deep-water drilling are many times greater, in New Zealand, drilling has been licensed in water depths of up to 3,100 metres — more than twice that in which Deepwater Horizon was exploring when the disaster occurred[16].

The final report to the President of the USA by the National Commission on the Deepwater Horizon disaster 'Deep Water' stated; "But drilling in deepwater brings new risks, not yet completely addressed by the reviews of where it is safe to drill, what could go wrong, and how to respond if something does go awry. The drilling rigs themselves bristle with potentially dangerous machinery. The deepwater environment is cold, dark, distant, and under high pressures—and the oil and gas reservoirs, when found, exist at even higher pressures, compounding the risks if a well gets out of control. The Deepwater Horizon and Macondo well vividly illustrated all of those very real risks. When a failure happens at such depths, regaining control is a formidable engineering challenge—and the costs of failure, we now know, can be catastrophically high."[17]

The report went on to conclude that; "The risk-management challenges presented by nuclear power are in some respects analogous to those presented by deepwater drilling: the dependence on highly sophisticated and complex technologies, the low probability/catastrophic consequences nature of the risks generated, and the related tendency for a culture of complacency to develop over time in the absence of major accidents."[18]

"The risk-management challenges presented by nuclear power are in some respects analogous to those presented by deepwater drilling."

The Government continues to compare future deepwater oil drilling to current petroleum production off Taranaki where the deepest production well is at a depth of 120 metres. This is misleading given that deepwater drilling is comparable to the risks associated with nuclear power given the complexity of the technology and the catastrophic and long lasting impacts once something goes wrong.

i) Technical limitations and inexperience

A major reason it took so long to stop the Deepwater Horizon leak was the extreme depths of water the oil companies were drilling in. The rig was operating in 1,544m of water, with the well reaching down another 4,051m below the sea floor[19].

"The technical demands of drilling are magnified enormously with depth," says Tim Robertson at the Alaska-based consulting firm Nuka Research and Planning Group[20]. At depths of below 200m, for example, it is no longer possible to use divers, and operators are therefore dependent on robotic instruments[21], which are prone to technical failure[22] and which make it harder to assess and fix any problems that might occur[23].

The inexperience of oil companies at operating at these depths is a major problem. BP's Chief Executive Tony Hayward has admitted: "The energy industry is clearly working at the frontiers of geology, geography and technology."[24] BP chief operating officer Doug Suttles acknowledged a month after the Deepwater Horizon blowout that while techniques were theoretically available for plugging the leak, "the challenge is… that they haven't been done in 5,000 feet of water"[25].

As a result the company was unprepared for the conditions that scuppered their early efforts to stem the flow of oil — including ice formation inside the original containment dome due to freezing deep-water temperatures. The fact that BP used ten different techniques to try to stem the oil flow[26] in the weeks after the disaster reveals how little oil companies really know.

ii) Human error

A 'blowout' on an oil rig occurs when some combination of pressurised natural gas, oil, mud and water escapes from a well, shoots up the drill pipe to the surface, expands and ignites. Wells are equipped with structures called blowout preventers that sit on the wellhead and are supposed to shut off that flow and tamp the well. Deepwater Horizon's blowout preventer failed. Two switches — one manual and an automatic backup — failed to start it.

When such catastrophic mechanical failures happen, they're almost always traced to flaws in the broader system: the workers on the platform, the corporate hierarchies they work for, and the government bureaucracies that oversee what they do. A study of 600 major equipment failures in offshore drilling structures done by Robert Bea, an engineering professor at the University of California, Berkeley, found that 80% were due to "human and organisational factors", and 50% of those due to flaws in the engineering design of equipment or processes[27].

iii) Treacherous conditions

It is not just Greenpeace that understands the dangers of deep-sea oil drilling. When Exxon and its partner Todd pulled out of their exploration bid in the Great South Basin off the South Island of New Zealand, they did so having decided the area was too risky to proceed in. Todd Energy Managing Director Richard Tweedie said: "The joint venture's interpretation of the data indicates the acreage has a high technical risk, and this is further amplified by the remote location and the harsh operating environment."[28]

These harsh operating environments, in the form of vast swells, ice and storms, pose a major challenge to deep-sea drilling. Oil companies long ago stopped using platforms firmly anchored to the ocean floor. Now semi-submersible drilling rigs float on top of the ocean, with risers made of special steel or extremely strong composites leading down into the depths, as normal piping would burst there under its own weight.

At a depth of 1,500 metres, the water is about 5 degrees Celsius[29], while the oil that comes out of the ground is almost at boiling temperatures. The result is extreme stress on the materials. Strong deep-water currents often put stress on the risers. In addition, the oil must be kept as hot as possible, to prevent the natural gas it contains from freezing together with seawater into compounds called gas hydrates, which can plug the pipes.

The National Commission's report to the President focused on these technical limits and concluded that;

"Drilling in extreme water depths poses special challenges. Risers connecting a drilling vessel to the blowout preventer on the seafloor have to be greatly lengthened, and they are exposed to strong ocean currents encountered in the central Gulf. Managing higher volumes of mud and drilling fluid in these long risers makes drillers' jobs more demanding. Connecting and maintaining blowout preventers thousands of feet beneath the surface can only be performed by remote-operating vehicles."[30]

"The joint venture's interpretation of the data indicates the acreage has a high technical risk, and this is further amplified by the remote location and the harsh operating environment."

Todd Energy Managing Director Richard Tweedie, when Exxon and its partner Todd Energy pulled out of their exploration bid in the Great Southern Basin off the South Island of New Zealand.

Oil escaping from the Montara H1-ST1 Well

© Nopsema/ Asia-Pacific Applied Science Association

But above all it is the enormous pressure in the underground reservoirs that makes the work so dangerous. Oil companies are drilling into rock layers where every square centimetre is subject to pressure equivalent to the weight of a medium-sized car. Drilling into such an oil or gas reservoir presents a risk of the fuels shooting upward in an explosive and uncontrolled way.

iv) The isolation of deep-sea rigs

As well as the technical and climactic challenges of deep-sea drilling, the location of the rigs in terms of their distance from land make it harder for additional rescue personnel to promptly reach the areas in emergency situations. The Deepwater Horizon was able to call upon all the resources of the Gulf of Mexico's oil industry to assist with the clean-up attempts, and some 6,000 boats assisted in that effort[31].

The rigs in New Zealand by contrast are located in far more isolated locations a long way from any comparable centre of industry assistance and the country would never be able to muster support on the same level.

For example there are only 3 drilling rigs in South East Asian and Australian waters that can technically drill relief wells to the depths of water within the Raukumara permit granted to Petrobras in 2010[32]. These rigs are between 8,000 and 9,000 km sailing distance from New Zealand[33]. This means that any blowout could release up to 75,000 barrels of oil each day[34] for the 4 to 6 weeks that these rigs would take to arrive on site to even begin drilling relief wells. The drilling of such relief wells to a depth of 3-4 km under the sea bed would take an additional month or two in the best case. The release of oil from a New Zealand blowout could significantly surpass the 4.9 million barrels of oil released by the Deepwater Horizon disaster in the Gulf of Mexico. New Zealand is one of the most isolated regions in the world from the established petroleum infrastructure around the world and therefore is uniquely at risk from a catastrophic blowout.

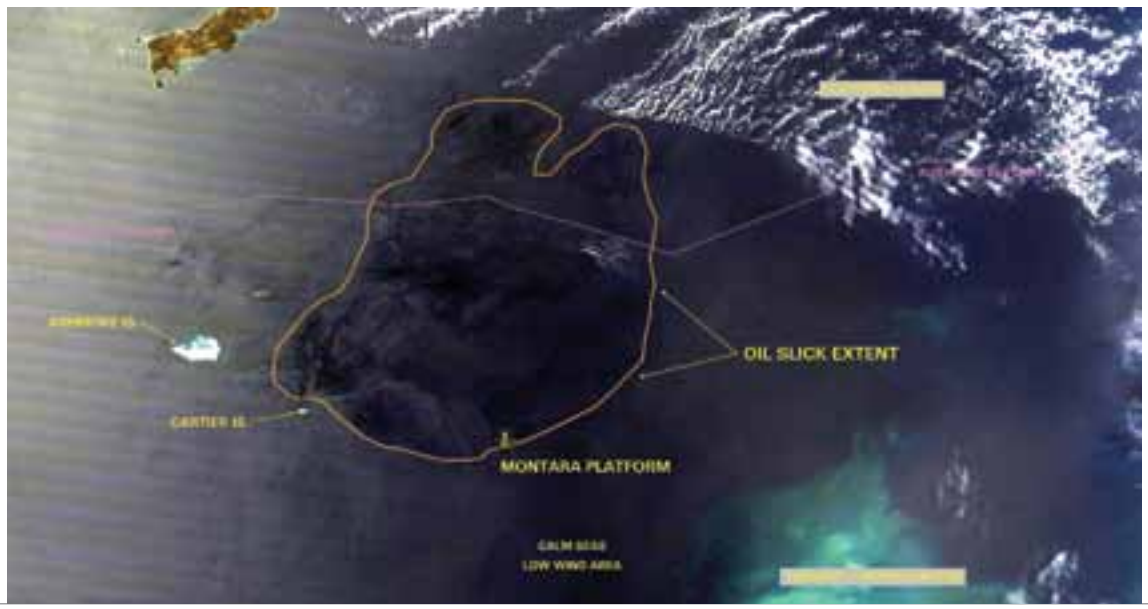
Accidents occur even in heavily developed oil and gas regions. In the North Sea in March 2012 a leak at the Elgin production platform began spewing up to 200,000 cubic metres of gas into the air per day. At the time of writing, the leak had not been brought under control. Even in the North Sea, one of the oldest and most established oil and gas regions on the planet, it could take 6 months and cost up to US $3 billion to drill two relief wells down 4 kilometres to intercept the gas pocket and stop the leak[35].

v) Case study: the Montara blowout 2009.

The difficulties faced in attempts to stem the flow of oil following one of Australia's worst oil spills[36], in the Montara oil field off the coast of Western Australia, in 2009, further underline the problems."

The Montara rig was situated in water at a depth of only 80 metres[37] when the blowout occurred and yet it still took two and a half months to plug the leak. Given that the Australian Department of Resources, Energy and Tourism estimates that the Montara oil leak could have been as high as 2,000 barrels of oil per day[38] this equates to one *Rena*-type spill every day for 74 days in a row[39].

A big delay was the three-week wait for an appropriate jackup rig, to be moved from Indonesia to drill the relief well. PTTEP, the



Detail from NASA / MODIS image taken from the Terra satellite on September 24, 2009, showing slicks and sheen from the Montara / West Atlas offshore oil well blowout. Orange line delineates a 9,870 square mile region of ocean partially covered by patchy, discontinuous oil slicks and sheen as seen within the area of sunglint on this image. © Skytruth

An oil spill from the Ixtoc 1's offshore drilling rig. The accident started on 3 June 1979 and the oil eruption was only stopped on 23 March 1980, after 295 days.

© Corbis

Thai-based operator of the well said it refused the offer of a more accessible semi-submersible rig because a more stable type of rig was needed for the 'well kill' operation[40]. BP was able to get the first relief well rig into place somewhat more quickly, beginning 11 days after the Deepwater Horizon explosion.

Drilling the relief well then took three and a half weeks and it took a further 4 weeks to locate the precise site of the leak in order to plug it.[41]

The devastating results of the leak on the Timor Sea are an alarming wake-up call for New Zealand. Undersea pictures and videos taken by experts from the Australia and the Surabaya Institute of Technology (ITS) in October 2011 have revealed that around 64,000 hectares (158,000 acre) of coral reefs in the Sawu Sea had been destroyed by both the oil spill and chemical substances — the chemical Corexit 9500 — that were used to submerge the oil in the clean-up efforts[42].

vi) Case study: IXTOC 1 blowout 1979.

In 1979, the Sedco 135F was drilling the IXTOC I well in 50m of water for PEMEX, the state-owned Mexican petroleum company, in the offshore region of Bahia de Campeche, Mexico. On June 3rd mud circulation was lost (mud is, in essence, a densely weighted drilling fluid used to lubricate the drill bit, clean the drilled rock from the hole and provide a column of hydrostatic pressure to prevent influxes) so the decision was made to pull the drill string and plug the well. Without the hydrostatic pressure of the mud column, oil and gas were able to flow unrestricted to the surface, which is what happened as the crew were working on the lower part of the drillstring. The Blow Out Preventor was closed on the pipe but could not cut the thicker drill collars, allowing oil and gas to flow to surface where it ignited and engulfed the Sedco 135F in flames. The rig collapsed and sank onto the wellhead area on the seabed, littering the seabed with large debris such as the rig's derrick and 3000m of pipe.

The well was initially flowing at a rate of 30,000 barrels per day, which was reduced to around 10,000 bpd by attempts to plug the well. Two relief wells were drilled to relieve pressure and the well was eventually killed nine months later on 23 March 1980. Due to the massive contamination caused by the spill from the blowout (by 12 June, the oil slick measured 180km by 80km), nearly 500 aerial missions were flown, spraying dispersants over the water. Prevailing winds caused extensive damage along the US coast with the Texas coast suffering the greatest.

The IXTOC I accident was the biggest single spill ever before Deepwater Horizon, with an estimated 3.5 million barrels of oil released.[43]

vii) Overview of blowout accident statistics.

Offshore drilling blowouts have occurred on a regular basis around the world as deeper depths of drilling have increased.

According to Risk Assessment Data from the International Association of Oil & Gas Producers[44] between 1970 and 2007 there were 498 blowouts worldwide of which 128 led to significant oil pollution.

According to the US National Commission report to The President, between 1996 and 2009, in the U.S. Gulf of Mexico, there were 79 reported loss of well control accidents - when hydrocarbons flowed uncontrolled either underground or at the surface.[45]

In 2009 alone according to the US Bureau of Safety and Environmental Enforcement (BSEE), there were 834 incidents on rigs in the Gulf of Mexico, including 6 loss of well control accidents, 145 fires and explosions and 11 significant oil pollution incidents.[46]

Even in Norway, regarded as one of the most regulated offshore drilling environments, there have been 80 to 100 precursor events each year that could have led to a blowout, corresponding to slightly less than one precursor event per installation per year.[47]

The Norwegian offshore drilling industry in 2010 reported 29 acute discharges of crude oil of which 28 were below 10 tonnes each and one fell into the 10–100 tonne category. The total volume discharged was 86.5 tonnes.

Rescue ships work in the area surrounding the badly damaged P-36 oil rig, following an explosion on March 15, 2001, that killed 10 workers. The Petrobras-owned rig, which was the world's largest, later sank.

© Reuters

International oil companies in the dock

During his address to the New Zealand Petroleum Conference in 2010, Energy and Resources minister Gerry Brownlee said: "The most exciting developments [in deep-sea oil exploration] of the last twelve months have been the entry of Petrobras and Anadarko into New Zealand.[48]"

And yet the companies he was so enthusiastically embracing — Petrobras, Brazil's state oil company, and Texan oil giant Anadarko — along with two other multinationals that are also now operating in New Zealand, Shell and Austrian oil giant OMV, have a dismal record when it comes to issues of safety and environmental protection.

Anadarko, for example, which now has interests in Taranaki and the Canterbury Basin, had a 25% ownership of the concession in which the Deepwater Horizon was operating and has just admitted its associated liability by paying US$4bn in compensation[49].

In the case of Petrobras, the Brazilian oil workers union and others have documented 282 fatalities among staff and contract workers during the past 15 years in accidents at oil rigs and refineries[50]. Petrobras has suffered 27 oil rig blowouts since 1980, two of them in the past 10 years[51]. In 2007, it took six weeks to plug a leaking well on land near the Espirito Santo Basin on Brazil's eastern coast[52]. In 2001, the world's largest production platform, owned by the company, was operating in waters approximately 1,360 metres deep when an explosion on board killed 11 workers. The platform later sank, spilling 9500 barrels or 1 ½ million litres of oil into the sea. In 2000, a broken Petrobras pipeline resulted iresulted in the biggest oil spill in Brazil in 25 years — when four million litres spilled in the Iguacu River. In November 2011, a well in the Frade Field part owned by Petrobras (30%)[53] began leaking. Up to 3,000 barrels of oil poured from the well 370 kilometres off Rio de Janeiro, Brazil and it began leaking again in March 2012[54]. The operator is facing a $100 million USD fine for the first leak.

Cecilia Teela searching the oil-covered shore of Bodo Creek, Nigeria, where she used to collect periwrinkles. Today, she has to travel to a neighbouring state to make a living. © Amnesty International

Shell's atrocious record on oil spills worldwide is well known. Aside from its ugly environmental history in the Niger Delta[55], it was responsible in August 2011 for the worst oil spill in Europe's North Sea for a decade[56]. A subsequent investigation by the Sunday Herald newspaper in Scotland found that Shell had been officially censured 25 times in the past six years for breaking safety rules, giving it one of the worst safety records of any major oil company in the UK[57].

In December, 40,000 barrels of oil was spilled while being transferred from a Shell oil rig to a tanker off the Nigerian coast[58], one of the worst in the area in a decade. Local community groups say that the amount of oil could be much larger as Shell has a history of under reports its spill figures[59].

Shell has now set its sights firmly set on the Arctic, one of the last remote and pristine places on the planet. Shell is demonstrating the extreme risks it is prepared to take in its search for oil by positioning itself as the first major oil company to move into the region. Ice conditions off the coast of Alaska are often treacherous. For much of the year the region is covered in sea ice, cloaked in dense banks of fog, and battered by fierce storms and bitter sub-zero temperatures[60].

A US Geological Survey (USGS) report on Alaskan oil drilling recently concluded that "there is no comprehensive method for clean-up of spilled oil in sea ice" and that recovery systems normally used to collect oil faced "severe limitations" due to extreme conditions[61]. A memo prepared for Canadian regulators[62] suggested drilling a relief well in the Arctic's Beaufort Sea could take up to two years because of the impossibility of drilling during the harsh Arctic winter, while the US Government estimated a one in-five chance of a major spill occurring over the lifetime of activity in just one block of leases in the Arctic Ocean near Alaska[63].

Austrian oil and gas giant OMV, meanwhile, recently accepted responsibility for a spill that saw oil washed up on Kapiti Coast[64]. In November 2010, OMV apologised for causing two further oil spills in the Maari oil field, 80km off the Taranaki coast[65].

In the light of such appalling records, added to the well-documented dangers of deep-sea oil drilling, New Zealanders must ask themselves whether they are willing to trust the fate of their country in the hands of such companies.

Greenpeace activists on inflatables alongside the oil survey ship Orient Explorer disrupt the seismic testing by Brazilian oil giant Petrobras in Raukumara Basin, off East Cape, North Island.

© Greenpeace / Dave Lashlie

Where is deep-sea oil exploration taking place in New Zealand?

At present the Government has issued permits for deep-sea oil exploration at six major offshore sites, covering a total area of 130,831 sq km, which is larger than whole of the North Island (111,583 sq km[66]). These areas are located off the coasts of some of New Zealand's most pristine environments, including the East Cape and Bay of Plenty, Stewart Island and Raglan.

Three deep-sea sites have been designated around the North Island: the Northland Basin and the Taranaki Basin off the west coast, and the Raukumara Basin, situated north of the East Cape.

A further three are located around the South Island: the West Coast Basin off the central west coast, the Great South Basin off the southern tip of the South Island, and the Canterbury Basin, which runs parallel to Canterbury south of Christchurch.

The larger sites have been subdivided into separate permit areas. A permit grants oil companies permission to undertake seismic surveys and exploratory drilling in their hunt for oil. Seismic surveys use energy waves directed at the ocean floor to assess the composition of the different layers of rock beneath the surface[67]. There are two main types of survey — 2D and 3D. In simplistic terms, 2D provides a general understanding of a region's geographical structure, while the far more expensive 3D survey covers a specific area, usually with known geological targets generated by previous 2D exploration.

While individual companies have won exclusive rights to some permits, in other cases they have been secured as joint ventures by a coalition of partners, often with one company taking a majority share as overall operator. To obtain information about an individual permit, you can enter the oil permit number on the New Zealand Petroleum and Minerals website at www.nzpam.govt.nz

Numerous international oil companies are currently involved in deep-sea exploratory work, including Shell, Anadarko, Petrobras and OMV, but the Government is likely to open up further areas of New Zealand's deep sea waters soon and remains keen to entice further bidders. A recent oil meeting in Wellington organised by New Zealand Petroleum and Minerals, for example, received delegates from oil giant Chevron, ENI from Italy, US outfit Conoco-Philips, the China's National Offshore Oil Corp, Korea's KoGas and the Norwegian state oil company Statol[68].

A Greenpeace activist next to a buoy holds a banner reading "Stop deep sea oil" in front of the oil survey ship Orient Explorer to disrupt the seismic testing by Brazilian oil giant Petrobras in Raukumara Basin, off East Cape, North Island. Floating behind the ship, the airgun arrays release thousands of high-decibel explosions to map deposits beneath the sea floor.

© Malcolm Pullman / Greenpeace

In January 2012 the Government announced further proposed petroleum exploration permit blocks covering over 40,000 square kilometres within New Zealand waters. Significantly, proposed block permits in the Pegasus Basin, adjacent to the Wellington and Kaikoura coastlines are for exploration in water depths up to 2,700m, nearly double the depth of the Deepwater Horizon site in the Gulf of Mexico.

Permit areas that are likely to be auctioned off by the Government over the next few years include further areas in the Pegasus Basin; the Challenger Plateau, to the west of New Zealand and south of the Taranaki Basin; the Bounty Trough located to the south-east of the country, and further Northland and Reinga blocks to the north-east of the North Island.

1) The Northland Basin

This single permit area (PEP 38619[a]) to the east of the deep-sea Taranaki oil explorations sites, is operated by Origin Energy Resources NZ, which in 2011 had its licence for the permit extended until April 2016.[69] Following preliminary 2D and 3D testing in the basin[70], two exploratory wells have been drilled[71], although Origin claims neither was assessed to have encountered commercial hydrocarbons[72]. While these first two wells were only in water depths of 120 metres, the basin itself reaches depths of up to 1,400 metres.[73]

2) The Taranaki Basin (off the coast of Raglan)

Three permits have been granted for deep-sea oil exploration in the Taranaki Basin in depths between 230m and 1,800m[74]. The three permits are operated separately by Texan independent Anadarko (PEP 38451[b]), Austrian giant OMV (PEP 381200[c]) and New Zealand Oil and Gas (PEP 51988[d]).

The Anadarko permit, which was renewed for a second period of five years at the end of October 2011[75], saw a 5,690km 2D survey completed during the September 2009 quarter[76]. Two key sites, the Romney prospect and Coopworth prospect were 3D surveyed in 2011 by the Polarcus Alima seismic survey ship[77].

That same year Anadarko announced it had postponed a planned drilling programme in the area as it was unable to find a rig early enough in the summer season of 2011[78]. As a result, Anadarko is expected to assess the data before committing to drill its first exploratory well, probably during the summer of 2012-13[79].

NZOG's permit was granted in January 2010 and its terms require it to acquire technical information in the first two years of the permit's life and then either commit to drilling an exploration well or surrender the permit[80].

OMV's Taranaki permit, which began in September 2007[81], requires it to acquire 2D seismic information in the first two years of the lease[82].

3) The Raukumara Basin

This single permit area (PEP 52707[e]) was granted in June 2010[83] for five years to Brazilian oil company Petrobras. Covering water depths up to 3,100 metres[84], it was the focus of flotilla protests in early 2011 by Te Whanau a Apanui and Greenpeace and the legality of the permit is being challenged by a judicial review[85]. Petrobras completed a 3,300km 2D survey earlier in 2011[86] but has yet to do any 3D studies.

4) The West Coast Basin

This single permit area (PEP 38527[f]) operated by the New Zealand arm of Texan company Grande Energy runs for five years until September 2012 and lies in water depths of up to 1,300m[87].

5) The Great South Basin

"Below 40 degrees south there is no law; below 50 degrees south there is no God," according to an old whalers' saying. The Great South Basin lies within these latitudes, known as the 'furious fifties' and 'screaming sixties', which are subject to incessant storms, waves the size of 6-storey buildings and the ever-present danger of icebergs.

FOOTNOTES

a Petroleum exploration permit 38619 covers 4,473km

b The original permit 38451 commencing in October 2006 covered 32,830 sq km but under the terms of oil exploration contracts, the permit holder must give up 50% of the permit area in order to renew its rights. The new permit, valid until 30 September 2016, now covers 16,380 sq km. The operator is Anadarko (50% share), along with Hyundai Hysco (33.3%), Global Resource Holdings, LLLP (11.11%) and Randall C Thompson (5.56%).

c Permit 381200 covers 1,311 sq km and is wholly owned by OMV.

d Wholly owned by NZOG, permit 51988 covers 1,138 sq km.

e Wholly owned by Petrobras, permit 52707 covers 12,330 sq km.

f Wholly owned and operated by Grande Energy, permit 38527 covers 11,810 sq km.

There are currently three deep-sea oil permits located in the Basin, which lie in water depths ranging up to 1,700m[88]. They lie offshore from Stewart Island, 85% of which has been designated as Rakiura National Park[89].

Two of these permits (PEP 50119 and 20120[g]) were operated by OMV until the end of the seismic acquisition programme. The *Polarcus Alima* survey ship completed 3D surveying in April 2012[90]. Shell took over as operator for the ongoing exploration of the permits on the 1st April 2012[91]. Exploratory drilling could start as soon as summer 2013/2014.

The third permit (PEP 50122) has water depths up to 700m[92] is operated by Greymouth Gas Taranaki, which has done 2D seismic surveys of the area[93].

6) The Canterbury Basin

There are four deep-sea oil exploration permits in the Canterbury Basin, covering depths of up to 2,000m[94].

Two permits (PEPs 38262 and 38264[h]) were originally exclusively held by Origin Energy, but the company announced in February 2010[95] that it was farming out the operation and a 50% share in both to Anadarko. Anadarko completed its seismic acquisition data between February 23 and March 28[96] 2011. In August 2011, it announced it had postponed its planned two-well deepwater exploration programme off Taranaki and Canterbury by about a year until the 2012-13 summer, when it hopes to drill the potentially huge Carrack-Caravel twin structure[97] in permit 38262.

A third deepwater permit (PEP 38259[i]) is operated by AWE New Zealand and contains the Barque prospect. Under the terms of the licence, an exploratory well was supposed to have been drilled by August 2011, but an application has been made to allow more time to assess the cost of drilling and evaluating the prospect[98].

A fourth permit (PEP 52717[j]) is expected to be formally signed off for exploration imminently as a joint venture between New Zealand Oil and Gas and AWE among others.

FOOTNOTES

g Permit 50119 covers 23,860 sq km and 50120 covers 8,353 sq km. Until the operation of the permits is handed over to Shell, OMV remains the operator of both, with a 36% share, alongside PTTEP New Zealand (36%) and Mitsui E&P Australia (28%). After the transfer, Shell will take 50%, OMV and PTTEP will retain 18% each and Mistui Australia 14%.

h Permit 38262, which has been extended for five years by Anadarko and Origin, covers 6,742 sq km, while permit 38264, which expires in November 2011 covers 23,790km.

i Permit 38259, which expires in August 2013 and covers 1,658sq km, is operated by AWE (25%), which is a joint owner alongside NZOG (40%), Beach Petroleum (20%) and Roc Oil (15%).

j Permit 52717 covers 3,246 sq km and once formally granted will be operated by NZOG (with a 40% share), along with owners AWE (25%), Beach Petroelum (20%) and Roc Oil (15%).

Coming to a beach near you?

The deep sea oil drilling plans for NZ

November 2011

Drilling expected 2012
Exploration underway
Permit awarded - not yet active
Designated for exploration

Northeast Slope Basin

Northland / Reinga Basin
Maximum Depth: 1800m

Raukumara Basin
Maximum Depth: 3100m

Deepwater Taranaki
Maximum Depth: 1800m

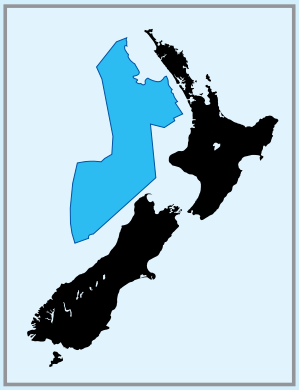
Challenger Plateau & Lord Howe Rise

West Coast Basin
Maximum Depth: 2000m

Pegasus Basin

Canterbury Basin
Maximum Depth: 1500m

Great South Basin
Maximum Depth: 1400m



The blue shows the size of the area closed to fishing following the Deepwater Horizon oil spill

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