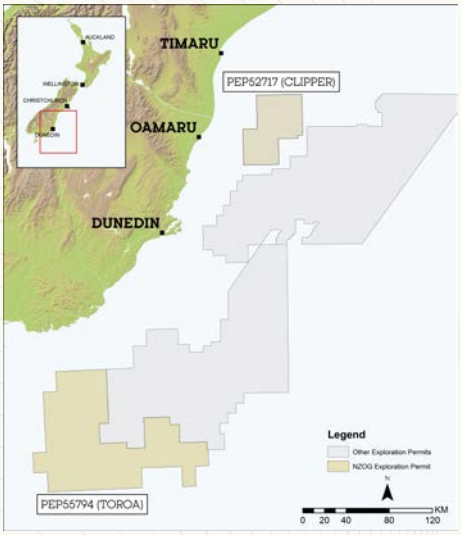
NEW ZEALAND OIL & GAS

OFFSHORE DRILLING: WHAT IS INVOLVED?

You asked us for more information on what is involved with drilling an exploration well, including the physical works, rig, size, depth and duration of drilling

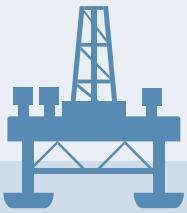
This note provides a high-level summary of what is involved in an exploration drilling programme. It should be considered in conjunction with other information sheets relating to environmental effects.



The goal of an exploration well is to confirm whether oil or gas is present. The data gathered also provides useful information to prepare for possible future production if the resource is found in commercial quantities.

The process of drilling an exploration well begins with selecting a rig or vessel that is fit for the surface and subsurface environments expected.

TYPES OF MOBILE OFFSHORE EXPLORATION DRILLING RIGS

	JACK-UP RIGS	SEMI-SUBMERSIBLE RIG	DRILL SHIPS
			
Description	Jack-up rigs are the most popular type of mobile offshore drilling equipment. The structure is 'bottom-supported' meaning three or four extendable 'legs' are planted into the seabed and used to lift (or 'jack-up') the platform out of the water.	Semi-submersible rigs have a platform-type deck that contains drilling equipment and other machinery. The structure is supported by pontoon-type columns that are submerged in the water. It is the most stable of any floating rig and is often used in harsh conditions because of its ability to withstand rough waters. Semi-submersibles can be anchored or in some cases dynamically positioned.	Drill ships are modern versions of traditional stationary drilling rigs. They are very similar to semi-submersibles with one major exception – they use no anchors and rely on dynamic positioning thrusters to maintain its position over the well.
Capability	• Shallow waters • Up to about 100 metres	• Approximately 100–500m water	• Deep waters • Between 300–3500 metres

WHAT DO THE PHYSICAL WORKS INVOLVE?

Having selected the preferred drilling rig or vessel, the next step is to drill the first section of a well.

A first large diameter hole (around 45-60 centimetres in diameter) is drilled from the surface to a few tens of meters depth in order to stabilize the base ground. This conductor hole is then consolidated with a casing, which is cemented to ensure cohesion between the formations and the casing itself. It also serves as a protection from groundwater. The well is cased with steel pipe, cemented in place and a blow-out preventer* installed.

Before any further drilling is carried out, the blow-out preventer and conduit casing are tested by pressurising the well with higher pressures than those expected in production. The safety system is function tested.

The hole is then drilled to the target zone. During drilling, the well diameter decreases at set depths, known as casing points. At each casing point the drill bit is pulled out of the well and steel casing (pipe) is inserted, then cemented in place. Pressure integrity and the blow-out preventers are tested. The well is then pressure-tested to ensure that the cement and casing are secure.

Casing is important as the pressure at the top of the well and bottom of the well can be considerably different. During drilling the pressure in the rock and the well need to be balanced. Balancing these pressures prevents fluids entering the wellbore in an uncontrolled way and protects the integrity of the surrounding rock. Drilling fluid (mud) is used to control these pressures.

Drilling mud also cools and lubricates the drill bit and, as it returns to the surface, it carries with it small rock fragments or chips (called cuttings) produced by drilling. These are separated from the drilling mud and analysed by geologists to determine the rock being drilled.

When the well reaches the target zone, fluids and gas are collected (if encountered) to evaluate the commercial potential of the zone. The well may also be wireline logged. This is a process where electrical tools are lowered down the well to help determine the geology and the presence or type of hydrocarbons.

SUMMARY FOR BARQUE:

Drilling the Barque prospect in the Clipper permit would likely involve:

- Either a semi-sub rig or a drill ship, being towed to site and in position for approximately 7 weeks.
- Drilling a single well initially, approximately 3000m deep, and ~20cm diameter.
- De-mobilisation of the semi-sub rig or drilling ship after drilling.
- Reinstating the wells by filling with concrete.
- Likely to be completed within 1-3 months.

*A separate information sheet on well-head control provides more specific information on blow-out prevention

WHAT HAPPENS AFTER AN EXPLORATION DRILL?

Once an exploration well has been drilled, the drill rig or ship is removed and the well is filled with cement designed and positioned to the specific conditions of that well and in accordance with stringent regulatory guidelines, to ensure the well is secure and safe.

Data from the exploration well is then further analysed, possibly over several years.

If the data shows commercial potential, further appraisal or production wells are then planned, and the process of obtaining resource consents and other development permits begins.

Assessing the data to reach a decision on the forward plan may take several weeks, months or years, depending on the complexity of the information established. It typically takes about 6-12 months.

READ MORE

www.energymix.co.nz/our-process/offshore-drilling/

www.nzpam.govt.nz/assets/Uploads/our-industry/factsheets/deep-sea-drilling.pdf

This note is one of a series of high level information sheets developed in response to specific questions from the New Zealand Oil & Gas Southern Community Panel http://southern.communitypanel.org.nz/. It is intentionally high level and not intended to form part of an environmental impact assessment. Such an assessment will be undertaken as part of any regularity process required for the development of the Clipper permit.

WHAT ARE THEY LOOKING FOR?

Geologists, petrophysicists and reservoir engineers analyse cuttings of the drilled rock and core samples taken from the target zones in the wells. This information will provide clues about the physical properties of the resource. They will start to build a picture of the characteristics of the resource, such as thickness, porosity and volume.

CHANCES OF SUCCESS OF EXPLORATION WELLS

The success rate for discovering hydrocarbons in commercial quantities are:

- New areas (with no previous exploration): 10 to 20%
- Geologically known areas: 20 to 30%
- Areas close to production zones: around 60%
- Barque is currently expected to have about a 20% chance of success (or 1 in 5).

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