Prospecting

Prospecting is the very first stage in the search for oil and gas fields. Activities tend to cover large areas in an attempt to see if petroleum accumulations might be present.

Prospecting activities are minimum impact and typically include desktop studies; land or seafloor sampling and geophysical surveys – particularly seismic surveys. Exploration wells are not drilled at the prospecting stage.

Desk-top studies

Early-stage petroleum prospecting work typically involves literature and data reviews. Once field studies such as rock and soil sampling have occurred the results will be collected and models will be created using specialised computer software to visualise how the area has changed over both time and space.

Geological mapping

A geological map of an area of prospective petroleum sites can be compiled from existing geological information maps and/or new field work. The maps are of geological features at and beneath the earth’s surface.

Geochemical surveys ('General sampling')

Geochemical surveys involve sampling of rocks, soils, and stream sediments, which are then analysed. The chemical make-up of these samples is analysed and the results can reveal many things, such as where the petroleum originally came from, the hottest temperature it got to and whether it has been broken down by bacteria along the way.

Geophysical surveys

Geophysical surveys are used to generate images of underground structures and layers. These surveys are used to explore for spots that may contain oil and/or gas without physically drilling into the surface of the earth.

The main two types of geophysical surveys used in the search for petroleum are:

- Swath bathymetry - an acoustic mapping tool used to create a map of the seafloor. It is
effectively sonar, similar to a powerful fishfinder used in many vessels. Typically the soundwaves can only travel metres into the seafloor.

- Seismic surveys - may be done on land (for example from a truck), or offshore by boat. These surveys create sound waves which can travel kilometres into the earth and are reflected from layers of rock and recorded. The information collected tells geologists about the layering and nature of the rocks under the surface of the earth. For more information read our Offshore seismic surveying factsheet [http://mbie17.cwp.govt.nz/our-industry/factsheets/].

Other types of geophysical surveys include:

- Gravity surveys can be done by air or on land. As denser rocks have more gravitational ‘pull’ the earth’s gravitational field is affected to varying degrees in different places. Surveys to map these differences can be used to help locate certain rock formations.

- Magnetic surveys are commonly done by air using ‘magnetometers’, which measure small changes in the earth’s magnetic field caused by magnetic minerals in rocks. Finding where these changes occur can be used by mineral explorers to help locate where different kinds of rocks lie under the earth.

- Resistivity surveys measure the electrical conductivity of different rocks and the fluids within them. Certain minerals and fluids are more conductive than others and allow electrical current to pass through them more easily. Electromagnetic surveys are another tool to identify areas where certain rock types are present.

**Multi-Client seismic surveys**

In 2013 amendments were made to the Crown Minerals Act, which governs petroleum and minerals allocation in New Zealand, extending the confidentiality period for seismic data gathered through non-exclusive Petroleum Prospecting Permits from 5 to 15 years.

Since then there has been growing interest in offshore prospecting by multi-client companies, sometimes across whole petroleum basins. These companies gather data and sell it on the international market – essentially helping promote New Zealand as a petroleum exploration destination.


The Code has been voluntarily adopted by companies operating offshore in New Zealand’s territorial waters (within the 12 nautical mile limit) and over the extended continental shelf beyond the EEZ.

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