PHOTO: Lloyd Homer, GNS Science

PROSPECTING AND EXPLORATION

New Zealand Petroleum & Minerals

New Zealand Government

THIS FACT-SHEET PROVIDES A BRIEF INTRODUCTION TO **PROSPECTING** AND **EXPLORATION** OF CROWN-OWNED MINERALS IN NEW ZEALAND.

PROSPECTING AND EXPLORATION

Prospecting and exploration activities are used to identify the location and size of mineral deposits or petroleum fields, and what the economics of mining these resources may be.

In order to carry out either prospecting or exploration activities for Crown-owned minerals, a person or company must first obtain a permit from the Government. They must also get any necessary land access arrangements and any necessary resource consents under the Resource Management Act 1991 before they may start work.

FOR MORE INFORMATION ON THESE PERMIT TYPES, SEE FACT-SHEETS:

+ **Permits and Land Access**

PROSPECTING PERMITS

+ Prospecting permit holders may carry out what is usually low impact work, to search for minerals in their permit area.
+ Low impact work includes activities such as mapping, taking rock chip and soil samples by hand, and aerial surveys.
+ Prospecting permits are given for up to two years initially and may be extended up to a maximum of four years.

EXPLORATION PERMITS

+ Exploration permit holders may carry out a number of different activities to explore mineralised areas in greater detail and to determine whether it is economically viable to mine the mineral they are interested in.
+ Exploration permits are granted for up to five years initially. The permit may be extended beyond five years (to a maximum of ten years) subject to the relinquishment of 50 percent of the permit area.

PROSPECTING AND EXPLORATION ACTIVITIES

GEOLOGICAL MAPPING

A geological map of an area of prospective petroleum or minerals sites can be compiled from existing geological information maps and/or new field work. In the case of petroleum and many minerals, the maps are of geological features beneath the earth's surface.

GEOCHEMICAL SURVEYS ('GENERAL SAMPLING')

Geochemical surveys involve sampling of rocks, soils, and stream sediments, which are then analysed for mineral elements. The results of studies on these samples are then mapped to show the areas where concentrations of minerals may lie in the permit area.

GEOPHYSICAL SURVEYS

These surveys can be used to explore for minerals or petroleum without physically going under the surface of the earth. For this reason, the various techniques used are referred to as 'remote sensing'. Remote sensing can be done on the ground, by air, or even by satellite.

- Gravity surveys can be done by air or on land. The earth's gravity field is affected by the density of different kinds of rocks. Surveys to map these differences can be used by mineral explorers and developers to help locate certain rock formations.
- Seismic surveys are generally used when exploring for petroleum (oil and gas), but can be used for coal and other mineral exploration. Seismic surveys may be done on land (for example from a truck), or offshore by boat. These surveys create seismic waves (vibrations) which are reflected from layers of rock within the earth and are recorded. The information collected from such surveys can tell explorers about the nature of the rocks under the surface of the earth.
- 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.
- Electromagnetic surveys measure the electrical conductivity of different rocks. Certain mineral types 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.
- Radiometric surveys measure the natural radiation of different mineral types in the earth's surface and are another surveying tool used to identify particular rock types.

EXPLORATION DRILLING

Drilling is an important tool to explore for petroleum, coal and other mineral deposits. Motorised drilling rigs can range from small auger-drills that can be carried in an explorer's backpack right through to truck-mounted or platform-mounted rigs (offshore or onshore), which can reach depths of several thousand metres. The rock core or cuttings that are brought to the surface by drilling are examined and information about any minerals is recorded.

As drilling can be very expensive it is generally only used where other exploration methods have shown there are positive signs of minerals in the earth.

EXCAVATIONS

Excavation includes digging trenches or pits. Trenches may be dug when areas of earth containing minerals are shown to be present and need to be further tested. Mechanical excavators may be used to dig trenches or pits, which are back-filled once they have been tested.

BULK SAMPLING

This is often the last stage in exploration for mineral deposits. A bulk sample can take the form of a relatively large pit or cutting. The purpose of taking a bulk sample is to confirm the quality and grade of a mineral deposit on a larger scale than is possible with other exploration methods.

CONTACT

NEW ZEALAND PETROLEUM & MINERALS

FREEPHONE (NZ ONLY)
0508 263 782

INTERNATIONAL
+64 3 962 6179

EMAIL
nzpam@med.govt.nz

WEB
www.nzpam.govt.nz

FACSIMILE
+64 4 471 0187

ADDRESS
PO Box 1473
Wellington 6140
New Zealand