

# Prospecting

Prospecting is often the very first stage in the search for mineral deposits. It includes low impact work to search for mineral deposits in a permitted area.

This can include mapping, taking rock chip and soil samples by hand and aerial and seismic surveys.

## Desk-top studies

Early-stage work under prospecting or exploration permits typically involves literature and data reviews relating to the permit area and any previous prospecting, exploration or mining history. Once field studies, such as rock and soil sampling, have occurred the results will be collected and models of the mineralisation will be created using specialised computer software.

## Geological mapping

A geological map of an area of prospective 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. This will have minimum-impact on the environment if the samples are taken by hand using a rock hammer or hand held drill (soil auger). Geochemical analysis is also done on drill samples. 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

Geophysical surveys are used to generate images of structures and layers underground. These surveys are used to explore for minerals without physically drilling or tunnelling into 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. In addition to searching for minerals, remote sensing is also used to identify other geological features such as faults and aquifers.

- Gravity surveys can be done by air or on land. The earth's gravitational 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, 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 sound waves which can travel kilometres into the earth and are reflected from layers of rock and recorded. The information collected from such surveys can tell explorers about the 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/) [<http://mbie17.cwp.govt.nz/our-industry/factsheets/>].
- 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 on the earth’s surface and are another surveying tool used to identify particular rock types.

**Last updated:** 19 January 2017

© 2017 New Zealand Petroleum & Minerals