VINTAGE ENERGY
ABN 56 609 200 580

Vintage Energy Ltd
58 King William Road,
Goodwood, South Australia 5034
info@vintageenergy.com.au
www.vintageenergy.com.au

SEISMIC SURVEY OPERATIONS

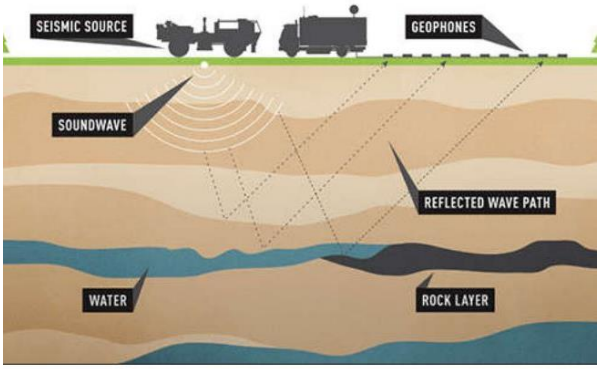
Seismic surveys require a mobile energy source to send sound waves deep into the ground and an array of recording devices planted in the ground in a pattern around the energy source. As the sound waves travel downward, they are partly reflected back to the surface at the boundaries between layers of different rock type.

The sensors on the surface detect the minute ground movements associated with the arrival of each reflected sound wave.

Seismic surveys generally use a vibrator truck for the energy source. Purpose built for such work, the trucks use hydraulic rams to vibrate a pad, after it has been lowered to the ground at the designated vibration station.

In a typical survey, the vibration stations are at intervals of 20 metres along the survey line and the pad is vibrated for 20 seconds at each station.

The vibrator trucks traverse the survey area along a series of pre-programmed 'source' lines. Where access allows, the 'source' lines are programmed to be straight and parallel. The spacing between these parallel 'source' lines can vary but is typically between 200 and 400 metres. Source lines detour around natural obstacles or areas where the passage of the vibrator truck would be detrimental to the current land use.



Recording sensors are installed along 'receiver lines,' which run at right angles to the 'source' lines where possible. The parallel receiver lines are typically spaced 400 metres apart and the sensors are installed at 20

metre intervals along each line. The sensors are delivered to their approximate locations either by light vehicle or quad bike or carried in by hand if vehicle access is not available.

A follow-up crew plants each sensor at its required GPS location, then activates it for recording the reflected sound waves while it is part of the active recording array. The sensor remains in place unattended, for typically a few weeks. Once the sensor is outside the active recording array, it is retrieved and the data it has recorded during this period is downloaded at the field data processing centre. The sensor is then re-deployed to become part of the active recording array in a different part of the survey area.

Survey operations are coordinated from a recording truck which is in communication with the vibrator trucks and the crew working the receiver lines. To maximise the rate of daily survey production, there can be several vibrator trucks operating simultaneously in different parts of the survey area.

The seismic survey method described above, where the sound wave energy is input at fixed intervals along source lines and the recording sensors are installed on lines running at right angles to the source lines, is referred to as a 3D (3 dimensional) survey and has been the most common type of survey for the last 20 years.

Protection of cultural heritage

Before an exploration license is issued, an agreement is reached with the Native Title Representative Group for access to and the conduct of exploration activities in the license area. Before undertaking a seismic survey, all stakeholders including the traditional owners of the land are consulted to ensure that areas of significance are not disturbed.

Ground disturbance

Physical impacts from seismic surveys are temporary, and mainly limited to the disturbance of vegetation caused by the traffic of survey vehicles along the source and receiver lines.

Before the survey begins, a line preparation crew navigates each of the programmed source and receiver lines to prepare each line for the safe and efficient passage of the survey vehicles. Line preparation is closely supervised by the company's Field Survey Manager to ensure disturbance of the ground is kept to a minimum.

In grazing country, pasture grass may need to be slashed to a level suitable for safe clearance by the light 4WD vehicles or quad bikes traversing the receiver lines.

To maximise the rate of line preparation, there can be several machines operating simultaneously in different parts of the survey area.

Each source line is traversed only once by a vibrator truck and the low-pressure balloon tyres fitted to the trucks ensure the impact on the ground is no greater than the impact from heavy farm machinery.

Ground disturbance along the receiver lines is also minor. Vehicle traffic along the receiver lines is more frequent than along the source lines but is limited to light 4WD vehicles or quad bikes.

With the topsoil undisturbed, vegetation along both the source and receiver lines rehabilitates back to its original condition within a short time frame, particularly in regions with reliable rainfall.

At the end of a survey, the company's Field Survey Manager contacts each landowner to discuss whether any sections of the survey lines on their property might require specific rehabilitation as a result of the survey operations.

Noise, dust and visual impacts

Noise levels from the vibrator trucks during recording operations are similar to those generated by the engines of heavy farm machinery. The vibrations of the hydraulic plate can only be heard within the close vicinity of the truck. Survey operations are conducted only during daylight hours.

Unsealed roads or tracks used for access through the survey area are watered when required to minimise dust disturbance. At the end of survey operations, their surfaces are restored to their original or improved condition.

From any given point within the survey area, line preparation and survey operations are visible on only a few days, and for up to a few hours on each day. Preparation of the survey lines typically occurs 2-3 weeks in advance of the recording crew requiring access to those lines and each machine typically prepares about one kilometre of line per hour on average. During the recording operations, the vibrator trucks proceed along the source lines at a similar rate.