3D Seismic Survey Script

The South West Hub is a government industry partnership progressing carbon capture and storage in the South West of Western Australia.

The process of carbon capture and storage, takes carbon dioxide from industrial emission streams and stores it deep underground - this underground storage is known as geosequestration.

Early in 2014 the South West Hub achieved a major step in understanding the structure of the underground through the most complex 3D Seismic Survey undertaken in Australia.

3D Seismic Surveying uses low frequency sound waves to collect data about the stratigraphy.

International Seismic firm Geokinetics conducted the survey in the Harvey and Waroona shires, targeting a potential carbon dioxide reservoir in the Lesueur Sandstone formation.

Geokinetics is an international exploration company based in Queensland which was contracted to carry out the 3D Seismic Survey.

During six-weeks the survey covered more than 100 square kilometres.

Purpose built vehicles called vibroseis trucks are used to conduct the survey.

The vehicles work in pairs, travelling across paddocks and road verges in a grid pattern designed to maximise coverage.

The survey allows scientists to understand the properties of formations created hundreds of millions of years ago, like the Lesueur Sandstone which was formed during the Triassic Period 250 to 200 million years ago.

The Lesueur Sandstone is accessible in the Harvey-Waroona area, where it lies between one point four (1.4) and three (3) kilometres below the surface. The Lesueur has been identified by scientists as one of the best potential co2 reservoirs in WA, because of the sandstone’s porosity and permeability.

Importantly, the principal freshwater aquifer for the South West region, the Yarragadee Aquifer, does not exist in this area, having been eroded millions of years ago.

The 3D Seismic Surveying crew makes an early start to the day, with a toolbox meeting to discuss the day’s activities.

Everyone involved in the project undergoes a detailed safety induction.

For the experienced Geokinetics team, this is one of the most complex surveys they have completed.

There are many landowners within the survey area and each one has met with the Land Access Team to discuss where the survey team can go, and where they can’t go near sensitive plants and animals, conservation areas and landowner assets.

Vibroseis trucks are quite wide. To ensure the most efficient survey, more than 300 new gates were installed for ease of movement through properties.

As well as building and installing gates, local contracting company Wagerup Civil was on hand for rehabilitation work.

In order to minimise the environmental impact of the survey and respect landowner requirements, the survey team took great care to use brush down protocols, and to shut the gates behind them.

# Inset: Department of Mines and Petroleum Coordinator Carbon Strategy Dominque Van Gent

The movement of the vibroseis trucks and other equipment is coordinated from here.

Inside the Recorder, technicians use GPS to keep track of all moving equipment and thousands of geophones and recorders placed across the survey area.

When the vibroseis trucks are in place they activate the low frequency sound signals which originate from the base plates.

Geophones and recorders are placed at points across the survey area to pick up the echoes of the seismic waves after they bounce off the various underground formations.

Each geophone is connected to a recorder which has its own battery.

# Inset: CSIRO Geologist Dr Linda Stalker

The 2014 3D Seismic Survey successfully generated high quality data that will help scientists gain a deeper understanding of the underground.

This will assist both the South West Hub carbon capture and storage project and the community to make informed decisions in the future.

The Department of Mines and Petroleum thanks the Harvey and Waroona communities and shire councils; as well as the Geokinetics team, the KD.1 land access team and contractors GHD, Umwelt and Wagerup Civil for contributing to the success of the survey.

And finally, special thanks go to the landowners, who opened their farm gates and allowed the survey to proceed.

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