Sequoia 3D Seismic Survey

ConocoPhillips

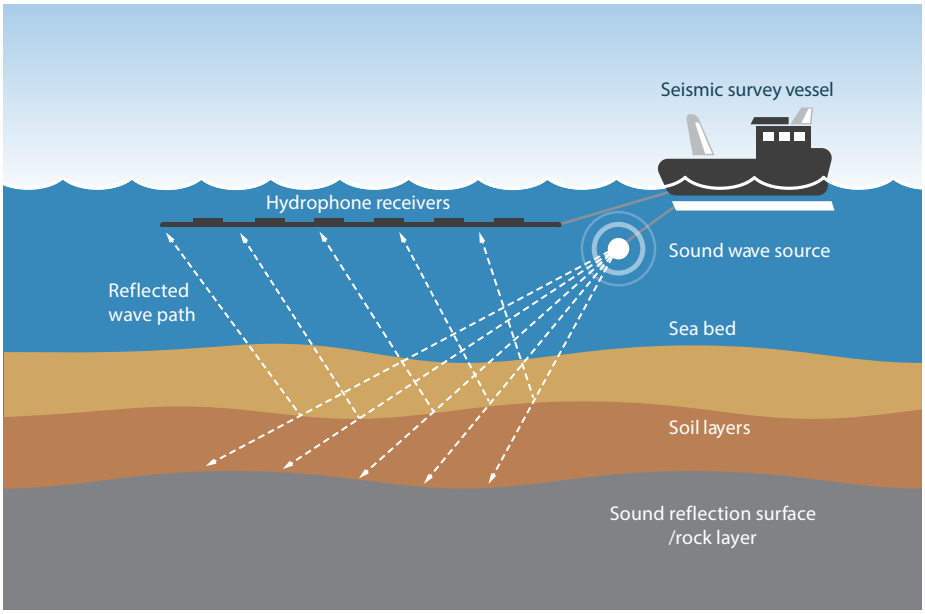
How we will undertake a 3D seismic survey | September 2020

ConocoPhillips Australia is planning to undertake a three-dimensional (3D) marine seismic survey (the Sequoia 3D seismic survey) in Exploration Permit T/49P in waters 14km (7.5nm) west of Tasmania's King Island. The survey will use ConocoPhillips' proprietary Compressive Seismic Imaging (CSI) Technology which acquires similar information to conventional seismic but with fewer samples and in less time.

Marine seismic surveys

A marine seismic survey is used for initial exploration for oil and gas and is essential for identifying geological features that could contain oil or gas deposits. A seismic survey vessel will tow an acoustic source and hydrophone receivers with the vessel sending sound waves into the rock layers beneath the sea floor and recording the time it takes for each wave to bounce back, as well as measuring the strength of each returning wave.

Once acquired, high performance computing is used to process the data which is then analysed by geophysicists to create a 3D map of the subsea structures to identify potential natural gas reservoirs.



About CSI Technology

ConocoPhillips developed Compressive Seismic Imaging (CSI) technology for marine seismic surveys on the back of our long history and global experience with seismic acquisition. The technology has been successfully used and proven across our global operations, including Australia, over the last decade. Our proprietary CSI Technology generates the same information as conventional seismic surveying, however, processing of the CSI acquired data results in a higher resolution product.

To obtain the same higher resolution data set using conventional methods would require the seismic acquisition vessel to be in the water towing a greater number of streamers for a longer period of time. ConocoPhillips's CSI approach therefore significantly reduces the duration, risk and impact of the seismic acquisition program.

Further due to CSI's higher quality data, subsurface uncertainty is potentially reduced when compared with conventional seismic techniques. This has the potential to reduce the number of future seismic surveys required for the development of a gas project in the area.

How will we use CSI?

For the Sequoia 3D Seismic Survey ConocoPhillips Australia will use a marine seismic vessel towing 14 approximately 6km longstreamers with a non-uniform distribution behind the vessel.

At the defined non-uniform intervals, the acoustic source will transmit sound waves into the geological structures beneath the seabed, which reflect the sound signals to the hydrophone receivers. We will then process the data using our CSI processing techniques to generate a data set that is much higher resolution than what could be acquired using conventional methods.

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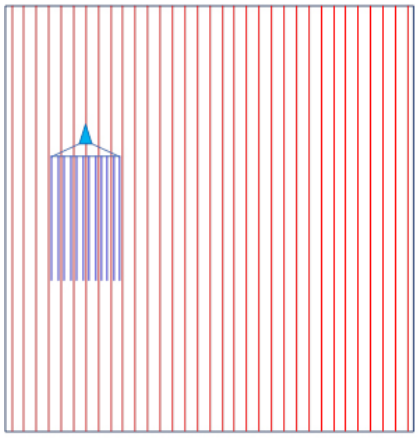
How does CSI work?

CSI applies compressive sensing technology which is a mathematical sampling theory first used by the medical industry to speed up imaging processes such as MRIs. CSI enables geophysicists to reconstruct a higher quality, more accurate picture with less data compared to conventional seismic technology.

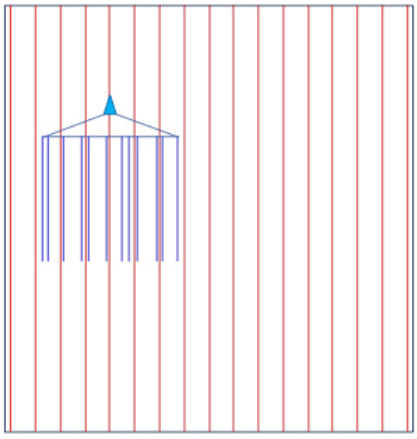
As shown on the diagram below instead of uniform sampling, which involves data gathered from a regular dense grid, CSI uses algorithm processes to achieve a fuller picture and improved outcomes from non-uniform or irregular grid with less data collection points.

Conventional Survey



Conventional Survey: 2x number of sail lines, 2x number of sources, ~2x longer to acquire. More effort, more time.

CSI Survey



CSI Survey: Half as much effort and time for same quality as conventional survey.

Understanding how CSI Technology works

If several people in a room were talking at once, the CSI algorithm would use sensing devices to listen to low-definition random samples of the voices making up the entire conversation. The CSI algorithm would be able to use those random low-definition samples to reconstruct the recording to a high-definition recording of the complete conversation.

How is CSI more efficient?

During CSI data processing the data acquired is reconstructed to look like it was acquired with twice as many streamers than deployed. This is due to the streamers being deployed in a non-uniform pattern rather than a regular pattern. Using ConocoPhillips's proprietary CSI processing we are able to use the data acquired from the non-uniform streamers to reconstruct a higher resolution data set that looks like it was acquired with twice as many streamers spaced much closer together.

Comparing technologies

If we compare CSI technology to conventional acquisition and processing technology to obtain a similarly sized survey and obtain the same high resolution data, a conventional survey design would require the seismic acquisition vessel to be in T/49P for longer while sailing a greater distance.

	CSI Technology	Conventional Technology
Indicative Survey Size	2840km^2	2840km^2
Indicative Survey Duration	60 days	98 days
Indicative timing	Sept – Oct 2021	Aug – Oct 2021
Number of streamers	14	16
Indicative Distance Travelled (sail line kms)	5,700 km	10,000 km

Contact Us

ConocoPhillips Australia seeks to understand different stakeholder opinions, interests and activities that may be relevant, or need to be taken into account when preparing the Environmental Plan for the Sequoia 3D seismic survey. You are invited to provide feedback, request a meeting and ask questions on the proposed Sequoia 3D seismic survey by contacting us in one of the following ways:

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