



19 May 2016

Companies Announcements Office  
Australian Securities Exchange Limited  
10<sup>th</sup> Floor, 20 Bridge Street  
SYDNEY NSW 2000

Dear Sir/Madam

## **PEP11 Ocean Bottom Seismographs**

MEC Resources Ltd (ASX: MMR) is pleased to advise the following update in relation to the planned seismic program within PEP11, in the offshore Sydney Basin.

Ocean bottom seismographs or nodes are being considered for deployment in association with the planned seismic program in PEP11. Application has been made to Geoscience Australia for their potential use in PEP11.

Geoscience Australia is now home to a new generation of broadband Ocean Bottom Seismographs (OBS). Each OBS is a precise and highly advanced instrument, engineered to withstand extreme ocean depths down to 6000 m and can remain on the seafloor continuously recording for up to 12 months. Geoscience Australia's brochure on OBS is attached to this release.

An OBS can be deployed prior to or during acquisition of traditional seismic surveys. They have the benefit of a direct coupling with the seabed, thereby eliminating the noise associated with seismic wave travel through the water column, leading to improved data quality. In conjunction with surface towed seismic surveys, an OBS program can yield a much more robust image of the subsurface than previously known. Forces driving the ocean bottom node technology include the exceptional data quality achieved by this type of acquisition.

Ocean bottom seismic is vastly gaining in momentum as a potential exploration tool, and are becoming an increasingly popular technique to acquire reservoir imaging data. "Ocean bottom seismic is now comparable to where 3D seismic was 30 years ago."\* The potential benefit of using OBS is that "producing higher quality data improves the quality of drilling targets."\*

Further advice will be provided on the potential integration of OBS into the planned seismic survey in PEP11 as it becomes available.

PEP11 is held 85% and operated by Asset Energy Pty Ltd. Asset Energy Pty Ltd is a wholly owned subsidiary of Advent Energy Ltd, an investee entity of MEC Resources Ltd. Bounty Oil & Gas NL (ASX: BUY) holds the remaining 15% of PEP11.

Yours faithfully,

A handwritten signature in black ink that reads "D. Breeze".

David Breeze  
Executive Director

**MEC Resources Ltd**

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*\*Shuki Ronen, Chief Geophysicist, Seabed Geosolutions, May 2014, from: <http://www.oqj.com/articles/2014/05/otc-ocean-bottom-seismic-improves-resolution-for-offshore-subsurface.html>, last accessed 18 May 2016.*

**Notes:**

In accordance with ASX listing requirements, the geological information supplied in this report has been based on information provided by geologists who have had in excess of five years' experience in their field of activity.

All Mineral Resource and Reserve Statements have been previously published by the companies concerned. Summary data has been used. Please refer to relevant ASX releases for details and attribution. Unless otherwise stated all resource and reserve reporting complies with the relevant standards.

Resources quoted in this report equal 100% of the resource and may not represent MEC's investees' equity share.

**About MEC Resources**

ASX listed MEC Resources (ASX: MMR) invests into exploration companies targeting potentially large energy and mineral resources.

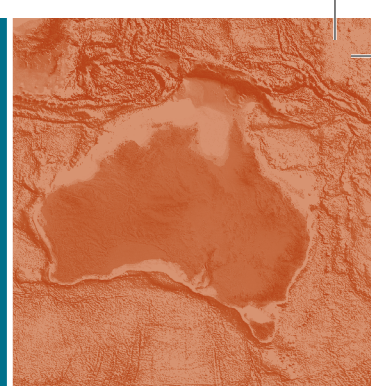
The Company has been registered by the Australian Federal Government as a Pooled Development Fund enabling most MEC shareholders to receive tax free capital gains on their shares and tax free dividends.

**About Advent Energy**

Advent Energy Ltd is an unlisted oil and gas exploration company held by major shareholders MEC Resources (ASX: MMR), BPH Energy (ASX: BPH), Grandbridge (ASX: GBA) and Talbot Group Investments. Advent holds a strong portfolio of near term development and exploration assets spanning highly prospective acreage onshore and offshore Australia in proven petroleum basins. Advent Energy's asset base also incorporates both conventional and unconventional petroleum targets.



# Introducing the Australian National Fleet of Ocean Bottom Seismographs



Geoscience Australia is now home to a new generation of broadband Ocean Bottom Seismographs (OBS). The OBS Fleet is part of AuScope's Australian Geophysical Observing System (AGOS)—an initiative of the Australian Government being funded through the Education Investment Fund (EIF). These instruments will greatly contribute to the understanding of the crust beneath oceanic basins surrounding Australia. This information will provide key input into determining the potential prospectivity of energy resources in our offshore basins. Australia's OBS National Fleet is managed by ANSIR—Research Facilities for Earth Sounding, maintained by Geoscience Australia and funded through AuScope.

## The Ocean Bottom Seismograph

Designed and built by Guralp Systems, each OBS is a precise and highly advanced instrument. Engineered to withstand extreme ocean depths down to 6000 m, an OBS can remain on the seafloor continuously recording for up to 12 months. An OBS incorporates:

- CMG-6T-OBS 3-component broadband (0.0167 Hz–100 Hz) seismometer, with a titanium housing
- hydrophone (1Hz–30KHz) attached to the fourth channel
- high precision CMG Real Time clock with accuracy of better than a microsecond.

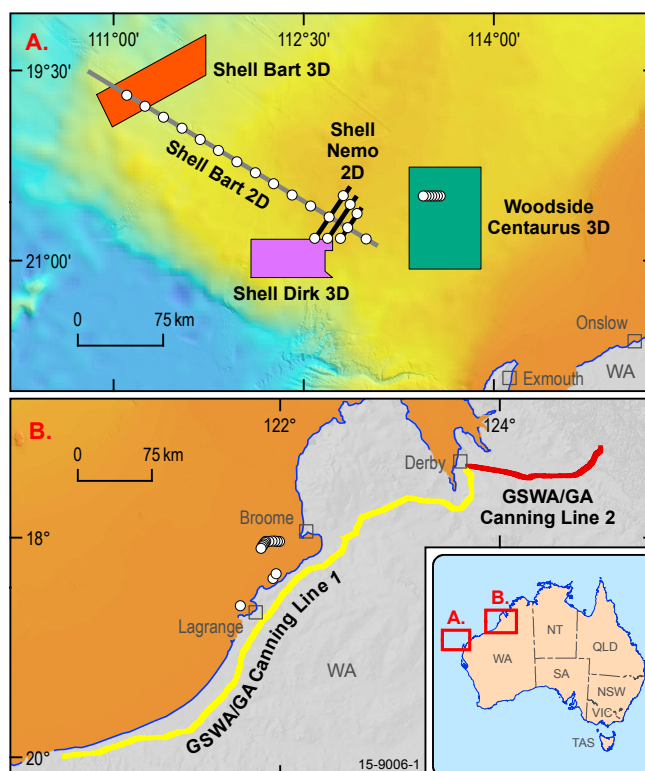
An OBS is capable of recording data on four channels with a maximum sampling frequency of 1000 sps. Data are recorded onto on-board flash memory and transferred from the OBS upon recovery of the instrument. After deployment, the instrument is pinged from several locations to establish its location and depth through a triangulation procedure.

An OBS can be deployed prior to or during acquisition of 2D/3D seismic surveys and be used to 'eavesdrop' on the signal supplied by the source vessel. Alternatively, an OBS can be deployed to monitor the Earth's background noise wave-field for research purposes, including earthquake analysis and geo-hazard research.



OBS being prepared for deployment as CCG's Viking vision is shooting the BART 3D reflection survey.

## OBS surveys 2014–15



- |  |  |  |                           |
|--|--|--|---------------------------|
|  | Shell Bart 3D                          |  | Shell Nemo 2D             |
|  | Shell Dirk 3D                          |  | Shell Bart 2D             |
|  | Woodside Centaurus 3D operational area |  | GSWA/GA Canning Coastal 1 |
|  |  |  | GSWA/GA Canning Coastal 2 |
|  |  |  | OBS site                  |

Map showing OBS surveys conducted during 2014–15.

## The Shell DAB survey: breathing new life into Australian ocean bottom seismography

During the summer of 2014–15 Shell conducted the Dirk-Adventure-Bart (DAB), marine seismic survey over the Exmouth Plateau. As well as a number of 3D surveys, the DAB survey included:

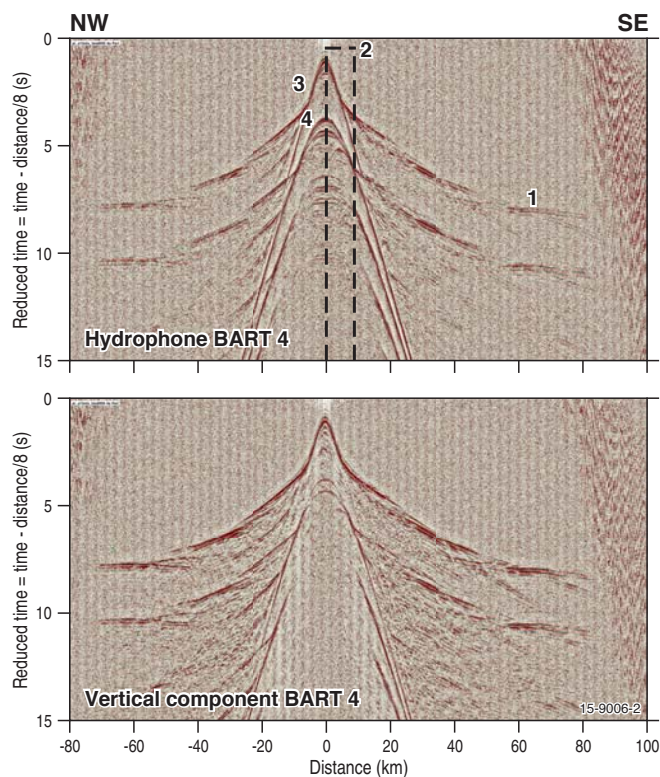
- a 280 km long 2D OBS line, known as the BART 2D Line
- three, up to 55 km long 2D OBS lines, known as the NEMO 2D Lines.

The OBS 2D surveys incorporated a total of 20 OBS deployments, with a maximum depth of 2400 m. The instruments were deployed for long periods of time, including a record duration of 47 days for some instruments on the BART 2D line. A shot interval of 45–65 seconds was utilised for all four 2D OBS lines. Shots from the BART 3D and DIRK 3D seismic surveys were also recorded by the OBS instruments. Processing of this data is ongoing.

## Results

Analysis of the OBS data recorded from the BART 2D line has provided valuable information for future OBS surveys. The accompanying image shows processed results from the BART 4 OBS, situated within the BART 2D line at a water depth of 1980 m. The signal-noise ratio at large offsets is very high, allowing recovery of information from much deeper crustal features, in particular Moho refractions.

The limited offset capability of streamer based surveys means that these features are typically not recovered during marine seismic acquisition. Thus, from combined interpretation of reflection and refraction phases, OBS surveys have the capability to image the velocity distribution of the whole crust. Also of note, is the comparison of data quality between the hydrophone and the vertical component seismometer. The hydrophone records considerably less information and appears to be more sensitive to water-born multiples than the seismometer.



OBS data from site BART 4, Shell/CGG DAB survey, Australian NW Margin, 2014–15. 1. Pn-upper mantle (Moho) refractions; 2. Typical streamer length and observable offsets; 3. Direct water wave; 4. Water wave multiple.

## Significance

A number of key findings from recent surveys for the future of OBS technology development include:

- The possibility to image whole crust and upper mantle velocity distributions and unequivocally define the Moho boundary from analysis of both reflected and refracted phases, generated by an industry standard airgun array with certain specifications.
- Extension of 3D imaging capability, utilising OBS-recorded signal from 3D surveys at larger offsets than achievable with streamer survey configurations.
- Analysis of background noise and understanding the interaction of broadband airgun generated signal and the ocean/Earth system.

## Other uses/future

Future usage of OBS instruments will benefit both the industry and academic research. Some notable possibilities include:

- passive seismology and plate tectonic reconstructions
- earthquake and geo-hazard studies
- monitoring of energy from construction on the ocean floor and its impact on marine life
- monitoring sub-seafloor CO<sub>2</sub> injection for long term storage.

## How do you access it?

Access to the OBS Fleet is open to industry, academia and government organisations. For industry seismic surveys, incorporation of OBS deployments is a low-cost add-on to work programs, leading to significant extension of the range of source-receiver offsets and opening up possibilities for analysis of S-waves, converted phases, seismic anisotropy, fluid saturation and more accurate hydrocarbon maturation modelling. Application to utilise Australia's OBS Fleet is via a simple process through ANSIR, [www.ansir.org.au](http://www.ansir.org.au)

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### For further information

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