Brunei Shell's 1983 Shallow Water Seismic Campaign in Seria

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The Seria oilfield, discovered in 1929, is located in the western part of Brunei, and straddles the coast. Hydrocarbons occur within a highly faulted, elongate, asymmetrical, ENE-WSW trending anticline. In the western and central part of the field the dominant faults head to the north and in the east they head to the south. The structure is developed in Upper Miocene and Pliocene clastic sediments of the Baram depocentre.

The Seria field now produces 30,000 bbls oil/day and is in a late stage of primary depletion although infill drilling will sustain this for many years yet. Enhanced recovery utilizing water and gas injection is now actively underway. Major gaps in seismic coverage recently existed over that part of the field which lies in the surf zone, as the shallow water depths there do not permit conventional marine acquisition methods. In order to fill this gap and complete the structural picture of the field, Brunei Shell conducted a combined shallow marine and land seismic survey along the coastal strip in the summer of 1983. Use was made of Telseis, an acquisition system, developed by Fairfield Industries Inc., in which seismic signals received at hydrophones are relayed to the recording unit using FM radio transmission. The survey was carried out by Seismograph Services Ltd., with two Telseis engineers operating the Telseis equipment. Two sets of weighted marker buoys were prelaid by a topographical survey boat, indicating every other shotpoint and every received point. Weighted hydrophones, connected to a floating transmitter/aerial system were attached to the latter. Shot and receiver intervals were 50 m and 25 m respectively and 96 channels were recorded, resulting in a 24 fold coverage.

The shooting was done in broadside manner with a 100 m offset, using 10 lb dynamite charges at a depth of 1.25 m. In the case of a land-sea tie, an additional 24 shots were fired at sea into a 96 channel hydrophone spread on land, in all other cases 4 nine pattern shots on land sufficed fo coverage up to the beach. Recording was done on land, using a truck mounted base station, which housed the Telseis receivers, and the SN 348 analogue to digital converters and recording unit.

In total some 400 km of lines were shot in 80 days. Data quality was excellent. The success of such an operation depends heavily on weather. Possible problems for this kind of shallow water acquisition are drift of marker buoys, caused by wave action

currents, wave action noise, a too high surf for safe operation of the small boats, and possible interference by other radio transmitters. None of these affects the survey greatly, they will be discussed in detail in the paper. It is expected that the resulting seismic will help to resolve the complicated structural pattern on the crest of the Seria field, and that it will define new deep stratigraphic prospects on the flanks of the field. Examples of the processed results are shown in the paper.

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