Abstract

The Sangu Field in the Bay of Bengal, Bangladesh produces gas from tens to hundreds of millidarcy sandstones of Pliocene-age. Santos is planning a drilling programme in the Bay of Bengal area in 4Q 2013.

The depositional environment of the reservoir rocks is very similar to the modern depositional setting in the Bay of Bengal. Two distinctively different reservoir rock “packages” are observed: heterolithics (interbedded sands and shales) and massive clean sandstone beds.

Integrated sedimentological and ichnological analysis of seven cored wells Sangu 1, 2, 3, 3Z, 4, 5 and Semutang 5 by Gowland and Taylor 1998, has defined 10 facies associations based on lithofacies and ichnofabrics. Most of the facies association represent sediments developed in a typical siliciclastic tidal flat and comprise intertidal mixed flat, subtidal mud flat, subtidal mixed flat, subtidal sand flat, tidal channel, tidal sand shoal (two types), offshore transition zone, shelfal muds. They were deposited as heterolithic units and are thinly bedded.

The massive fine-grained sandstone in the section is interpreted as having been deposited by high-density turbidity currents. A deep-water origin would not be consistent with the associated tidal deposits, raising the possibility that the turbidites occupy a shelfal setting and were sourced directly from major distributaries during peak discharge. Such an event could be attributed to the monsoon season, when massive volumes of suspended sand load can evolve into concentrated sediment flows dispersed across the shelf. After such flows terminated, the newly formed sediment substrate was available for reworking by tidal currents. Thus, the concept of suspended load dominated flows is proposed (hyperpycnal flow by Bates 1953).

The massive fine-grained sandstones, deposited from high-density currents have proven to be a good gas producer. Individual sands with
relatively small area and thickness are capable of producing significant amount of gas. However, the heterolithic, thinly bedded sands are the main producers in Sangu field. The minimum limit of producing sand thickness is poorly understood. Besides bed geometry, the high clay mineral content affects the conventional log interpretation.

Two significant issues have to be addressed in the future drilling campaign. Firstly, better understanding of massive sand distribution and calibration of sand geometries interpreted on seismic is required. Secondly, any potentially bypassed thinly bedded pay in the tidal-dominated delta sands should be appropriately characterized. For that reason, use of Image Logs, Nuclear Magnetic Resonance, Wireline Pressure Tester and Rotary Sidewall Coring has been proposed.
Depositional environment, thin bed potential, evaluation strategy at offshore fields, Bay of Bengal, Bangladesh

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Summary

- The Bay of Bengal gas-field produces gas from time to 100 million years old. Santos is planning a drilling program in the Bay of Bengal area in 2005.
- The surveyed area includes four offshore fields: Sangu, Semutang, South Sangu, and Magnama.

Depositional Setting

- The depositional environment in the study area is characterized by a complex series of depositional settings, including fluvial, deltaic, and shallow marine environments.
- The study area is located in the northern part of the Bay of Bengal, where the sedimentary sequence is dominated by fluvial-deltaic deposits.

Core Intervals

- The core intervals consist of fine-grained sandstones, siltstones, and mudstones, with occasional limestone and dolostone layers.
- The core intervals are characterized by high gamma-ray and resistivity values, indicating the presence of gas-bearing zones.

Thin Bed Potential

- Thin bed potential is an important aspect of gas reservoirs in the Bay of Bengal area. Santos is evaluating the potential for thin bed gas accumulations.
- Santos is conducting a detailed investigation of the thin bed potential in the study area, focusing on the identification of potential gas-bearing thin beds.

Evaluation Program

- Santos has developed an evaluation program to identify potential gas reservoirs in the Bay of Bengal area.
- The program includes the following steps:
  1. Hydrocarbon field mapping and identification of potential gas reservoirs.
  2. Petrophysical evaluation of core intervals to identify gas-bearing thin beds.
  3. Wireline log analysis to identify potential gas accumulations.
  4. Formation testing to evaluate the permeability and porosity of potential gas reservoirs.

References

- Avila et al., 2011
- Bates, C., 1953
- Zavala et al., 2011
- Various other references cited in the text.