Poster 2

The study of overpressures in NW Borneo

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A study of pressure data from exploration and appraisal wells from across the NW Borneo Margin has been part of a Regional Study undertaken by SSB/SSPC over the last year. The study of the relationship between formation strength, acquifer overpressure and hydrocarbon column length provides important information for the prediction of the presence of oil and gas accumulations.

During the course of the study, some 106 RFT data from Sabah and 225 RFT data from Sarawak have been compiled. In addition leak-off pressure data from some 111 exploration, appraisal and development wells have been compiled. The formation pressure data and LOT data have been analysed to determine regional pressure trends in the geological provinces of offshore NW Sabah and Sarawak.

These trends are used in the following way:

¥ Estimating the maximum hydrocarbon column length in prospect volumetric calculation. This is easily achieved by extrapolating a hydrocarbon gradient from the base of the formation pressure until it intersects the lower bound envelope. Moreover the comparison between aquifer overpressure and minimum horizontal stress in discovered fields can demonstrate the dependency of hydrocarbon column length on aquifer overpressure and minimum horizontal stress within individual provinces.

¥ Predicting trap integrity. A prospect having higher predicted formation pressure than the lower bound envelope would indicate that the trap has been breached. In this case the formation pressure is greater than the seal strength of the overlying seal thus fracturing it. In contrast, prospects with predicted formation pressures lying below the lower bound envelope would have pressure space to accommodate hydrocarbons. The closer the fluid pressure is to the minimum in-situ stress, the greater the likelihood that a prospect will not be hydrocarbon bearing. Consequently the prediction of the level of acquifer overpressure is of considerable importance in hydrocarbon exploration.

In general the deeper the exploration target the higher the probability that overpressures will be encountered. In Tertiary deltas, rapid sedimentation is considered to be the chief cause of overpressures (undercompaction overpressures). In this regard it is interesting to note the relationship between porosity trend across different provinces with depth. The deviation of observed porosity from those expected for a hydrostatically pressured rock would mark the first onset of overpressures. Overpressures are quite common throughout offshore NW Borneo especially in Inboard Belt, Outboard Belt, Champion-Timbalai Trend, Padas-Tulak trend and Nosong-Tapir trend in the East Baram Delta. Integration of analyses of regional pressures against depth in other offshore areas of the margin is ongoing.

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