

**AAPG HEDBERG CONFERENCE**  
**“Variations in Fluvial-Deltaic and Coastal Reservoirs Deposited in Tropical Environments”**  
**APRIL 29-MAY 2, 2009 – JAKARTA, INDONESIA**

**Possible Inorganic Origin of the High CO<sub>2</sub> Gas Reservoirs in the Platong and the Erawan Gas Fields, Gulf of Thailand**

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Oil and gas exploration in the Gulf of Thailand was initiated in 1969 and the first exploration well, Surat-1 was drilled by Conoco (now ConocoPhillips) and Mitsui Oil Exploration Co., Ltd. (MOECO) in 1971. First commercial gas was on stream from the Erawan gas field in 1981. At present more than 20 oil and gas fields are producing hydrocarbons from fluvial to deltaic sandstones of Miocene age. However, some of fields such as Erawan, Platong and Pailin have some high CO<sub>2</sub> reservoirs.

The Erawan gas field is located in the central part of the Pattani Trough in the Gulf of Thailand. The origin of carbon dioxide and nitrogen in natural gases produced from the Erawan gas field is discussed on the basis of carbon isotopic data and several lines of geological evidence. Maximum content of carbon dioxide and nitrogen in natural gases recovered from three delineation wells at the northwestern part of the Erawan gas field, are 59.72% and 21.38% respectively. As a result of carbon isotopic studies of methane, ethane and carbon dioxide in 11 gas samples from those wells, the natural gases are divided into two groups, named as Group A and Group B. Group A is characterized by heavy methane (-30 to -33% PDB) on carbon isotopic composition, and by high content of carbon dioxide and nitrogen. Gases of this group are a mixture of inorganic gases and organic origin gases. The inorganic gases, consisting mainly of carbon dioxide, nitrogen and heavy methane, have migrated into the present reservoirs from the Pre-Tertiary basement through the east dipping faults that cut the basement. Group B is characterized by normal content of carbon dioxide and nitrogen and by lighter methane (-38 to -41% PDB) by carbon isotopic composition. Gases of this group have been generated from the organic matter in the Tertiary sediments by thermal maturation. Origin of the high CO<sub>2</sub> found in the western part of the Erawan field is interpreted to be of inorganic origin on the basis of carbon isotopic study of methane, ethane and CO<sub>2</sub>.

The Platong gas field was discovered by the Platong-1 well in 1976 and commercial production was initiated in 1985. The clean up tests before production started showed that some production wells were non-commercial due to the presence of high CO<sub>2</sub> in some reservoirs and led the operator to modify the production profile. The origin of the high CO<sub>2</sub> was interpreted to be of hydrothermal origin based on geological phenomenon such as abundance of pyrite in the cuttings and samples of fresh water taken in the tests. E-logs of shale near the high CO<sub>2</sub> shows high density and relatively low neutron porosity. Difference in shale density between high CO<sub>2</sub> zones and normal CO<sub>2</sub> zones is 0.08gm/cc on average. Resistivity of shale zone in high CO<sub>2</sub> zones is

relatively higher compared to that of low CO<sub>2</sub> zones due to low salinity water in shales probably derived from hydrothermal origin.

In addition to the Erawan and Platong fields there are many other gas fields such as Pailin, Bongkot and Arthit which have high CO<sub>2</sub> producing zones in the Gulf of Thailand. However, the origin of the CO<sub>2</sub> seems to be different in each case.