Integrated Exploration Numerical Simulation Modeling System for Hydrocarbon Evaluation of the Offshore Hsinchu Area

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ABSTRACT

Quantitative modeling for evaluation of the hydrocarbon potential in the offshore Hsinchu area was performed based on the "Integrated Exploration Numerical Simulation Modeling System" developed by EDRU. Time-structural and depth-structural maps of nine horizons were constructed, and burial history based on well data was analyzed and compared. Furthermore, sediment transportation pattern and basin evolution were investigated through calculation of original stratigraphic thickness-the calculation has been adjusted by paleoshildometric data and estimated erosional magnitude.

The distribution of favorable source rocks and reservoirs as well as the paleostructures of the top of each stratigraphic unit were mapped. In addition, three exploration target horizons corresponding to the peak hydrocarbon generation periods were thoroughly studied:

1. The late Paleocene reservoir was filled by the hydrocarbons generated from late Oligocene to early Miocene.
2. The Eocene reservoir was filled by the HC generated from early Miocene to late Miocene, and
3. The Oligocene reservoir filled by the HC generated from late Miocene to late Pliocene.

These three targets were established by

(1) Tracing the distributions of source, reservoir and cap rocks;
(2) Estimation of hydrocarbon generation, leaking amount and migration route;

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(3) Locating structures through paleostructural maps reconstruction.

The estimated amounts of hydrocarbons in this area based on the present volume numerical simulation technique are as follows:

(1) 2.64 x 1010 m³ charge volume of gas in the Paleocene;
(2) 1.01 x 106 kL charge volume of condensates and 2.16x1010 m³ charge volume of gas in the Eocene. The following three exploration targets were suggested:
1. Eocene fan complex with an enclosure area of 30 km²,
2. fault-bounded trap east of the B-Fault with an enclosure area of 85 km²,
3. roll-over anticline structure west of the B-Fault with an enclosure area of 8 km².

Key words: Oil evaluation, Integrated exploration, Numerical simulation, Hsinchu, Offshore, Taiwan.