Fracture Characterization of Malampaya Field, Offshore Northwest Philippines

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Malampaya field produces gas from an isolated Oligocene-Miocene carbonate buildup (Nido Fm.) located offshore North-West Palawan, the Philippines. Proved reserves are approximately 2.6 Tscf. This carbonate reservoir exhibits matrix properties ranging from low to high porosity and permeability (phi<5%, kmatrix<0.01mD to phi>35%, kmatrix>1000mD). Natural fractures, which are present throughout the reservoir, were studied as part of an overall reservoir characterization effort for the purpose of flow-simulation modeling.

Fractures were interpreted mainly from FMI logs and lost circulation data. A majority of fractures are open, steeply dipping, and their predominant strike orientation is NW-SE. They are dominantly extension fractures of tectonic origin. A minority of fractures are interpreted to be effective for fluid flow based on lost-circulation events. Faults are rare, of small displacement, and none are interpreted to be effective for fluid transport in the flow simulations. Rock matrix properties appear to play a major role in controlling fracture occurrence; low-porosity rock is more fracture-prone than high-porosity rock, hence some strata defined as “baffles” based on matrix properties may have high vertical permeability due to fractures.

Neural net software was used to distribute effective-fracture density (fracture surface area per unit volume rock) throughout the upscaled simulation grid, and this model was then used as soft control for SGS ColCok interpolation. Variables selected for neural net prediction are matrix porosity, petrophysical rock type, and stratigraphic layer. Grid cell effective-permeability tensors were computed using Chevron-proprietary software. This abstract is based on Chevron work and may not reflect the Operator’s view.