INTEGRATED CHARACTERIZATION AND SIMULATION OF THE FRACTURED TENSLEEP RESERVOIR AT TEAPOT DOME FOR CO_2 INJECTION DESIGN

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Characterization of naturally fractured reservoirs is a recurring challenge to many oil and gas companies. This paper describes the application of the Continuous Fracture Modeling (CFM) technology and the use of a multitude of post stack attributes to improve the characterization and simulation of the Tensleep reservoir at the Teapot Dome. Description of Paper: The methodology presented in this paper uses the integration of geophysical, geologic, and engineering data simultaneously to improve the reservoir description. At the root of the reservoir characterization lays the more and more accurate seismic data collected on most of the reservoirs around the world. The initial use of this seismic information is made possible through the use of volumetric curvatures, high-resolution post-stack inversion, and spectral decomposition. These geophysical processes allows a better imaging of the distribution of the faults and geology in the reservoir. The multitude of seismic attributes are added to seismically constrained geologic models and geomechanical attributes to create CFM models of fracture density. The derived fracture density models are used to estimate a meaningful permeability used as input into reservoir simulators. Results, Observations, and Conclusions: Illustration on the Tensleep reservoir (Teapot Dome, WY) using the seismically driven reservoir characterization where wells have been hidden to validate the methodology. The resulting porosity and permeability model that takes into account the effect of the fractures is used as input into a reservoir simulator to validate dynamically the reservoir model. Applications: This study demonstrates the successful use of all available G&G reservoir data in an integrated approach. Technical Contributions: Efficient use of seismic data in fractured reservoir characterization. Quantitative use of seismic attributes derived from volumetric curvature, high-resolution post stack seismic inversions and spectral decomposition in deriving improved fracture models.