

Quantification of Wellbore Fracture Intensity and the Correlation to Historic Wellbore and Field Performance

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An important aspect of correlating fracture intensity observed in wellbores and historical production and performance is measured fracture intensity. This paper addresses a way of quantifying fracture intensity from core or image log interpretations and how these quantifications can be correlated with such measures as cumulative production, maximum well rate, production logging tool response, and reservoir engineering measures such as productivity index and wellbore skin. The method involves a boxcar moving average technique passed through the linear fracture occurrence dataset of fixed averaging window size and sampling interval. The result is a Fracture Intensity Curve with depth. A mixture of statistical representations of that basic data can aid in interpreting the fracture distribution data with respect to historic production data in individual wells and within the field in general. These have been incorporated into spreadsheet routines for easy generation of Fracture Intensity Curves and the statistics of the Fracture Intensity calculation population. Historical results in multiple fields indicate that Average Fracture Intensity and Mean Fracture Intensity from the boxcar averaging technique correlate best with historic cumulative production volumes and maximum well rate, while Fracture Intensity Height corresponds best with Permeability Height (K_h) and the Fracture Intensity Curve with depth correlates best with Production Logging Tool (PLT) runs and the position of interpreted faults and fracture swarms. Examples will be shown from the Middle East and South America.