Propped Fracs Are Collapsing – What Are the Causes and Ramifications?

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Abstract

Although most engineers have historically presumed that propped fracs are highly conductive and durable, the evidence is overwhelming that fractures are collapsing and losing connection with the reservoir over time. This presentation will refer to newly available examples in the Eagle Ford, Marcellus, Bakken, and Niobrara that demonstrate progressive collapse of fractures during the first weeks and years of production.

While the data are compelling that our fracs as currently designed are not durable, what is less clear is the mechanism. This presentation will list approximately 20 different mechanisms that have been postulated that may contribute to fracture degradation. Fractures likely collapse due to a combination of proppant embedment, insufficient proppant concentration, salt or scale deposition, proppant crush, fluid damage and a host of other causes. Likely, the severity of each damage mechanisms will vary in different formations and with different frac designs.

The ramifications of fracture collapse are many. The most obvious are that to harvest the recoverable reserves, we will be forced to either a) drill closely spaced (adjacent) wells, stack laterals (vertical downspacing), refrac wells, or learn to improve our initial frac designs.

However, another more subtle ramification is our basic failure to understand the resource potential. When engineers presume that a highly conductive, durable frac has been created, a steep decline curve is commonly attributed to low reservoir quality or insufficient reservoir contact area. After we recognize that our fractures are collapsing and only draining limited portions of the available reserves, we discover the formation is capable of much greater productivity and longevity.