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Mitigating Wellbore Communication with Post-stack Fracture attributes

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The industry success in the Permian Basin continues to evolve. While rig counts and production are at all-time highs, well bore communication problems have emerged. This challenge in development threatens production rates and planned reserve additions while wasting time and money.

Permian Basin operators have identified the following challenges:

- Prior success has driven toward factory style drilling to maximize laterals on each lease, and these wells require expensive stimulation to produce from these rocks.
- Recent completions are communicating with existing producers driving overall production down and sometimes losing wells.
- Fractured Reservoir Characterization in their fields is critical for drilling, but time consuming and requires wide azimuth data that is not commonly available.
- A solution is needed now, even in areas where wide azimuth data is not available.

This project, in the Permian Basin, examines two wellbore communication situations. In the first case, a Wolfcamp A completion fracs down 1,000 feet into an already existing Wolfcamp C producer. The second case examines two laterals that communicate from completions within the same Wolfcamp zone. Post-stack 3D seismic fracture attributes are used to understand the likely causes of these wellbore communication cases. A key to this analysis is the ability to co-render 4 attributes at the same time and create a fracture story plot along each wellbore. The fracture story plot co -renders volumes of the amplitude data, the fault enhance attribute, the discrete fracture network, and the fracture density attribute.

This post-stack attribute workflow provides extracted seismic information which can positively impact fractured reservoir exploration and development decisions. Physically, fractures or fracture swarms scatter some of the seismic energy, creating an amplitude change that can be detected as an indication of fractures. Because of the subtle nature of the amplitude effects, detection and resolution of fractures in these volumes depends on minimizing the noise in the seismic volume. The resulting, calculated fracture attributes accurately image discrete fracture networks below l/28 for improved reservoir understanding even in narrow azimuth data.

These fracture attributes are used to explain the cases of wellbore communication and then to create a strategy for future well spacing and completion stage placement.