Case study Fracture Flow

New array acoustics system enables operator to locate fractures and streamline completion strategy

Well type: Gas producer

Case benefits

— Provided an accurate diagnosis of fracture flow in the well system
— Reduced gas-oil ratio leading to increased oil production
— Delivered a detailed and comprehensive identification of flow paths
— Confirmed the applicability of a new, streamlined completion strategy

New ChorusX answers transform the professional workflow, enabling analysts to diagnose well systems flows with greater ease and confidence. In this complex scenario, the Phase Map and Radial Map reveal the location of active fractures directly behind the frac ports. Conventional diagnostics would be unable to deliver this level of clarity and certainty.

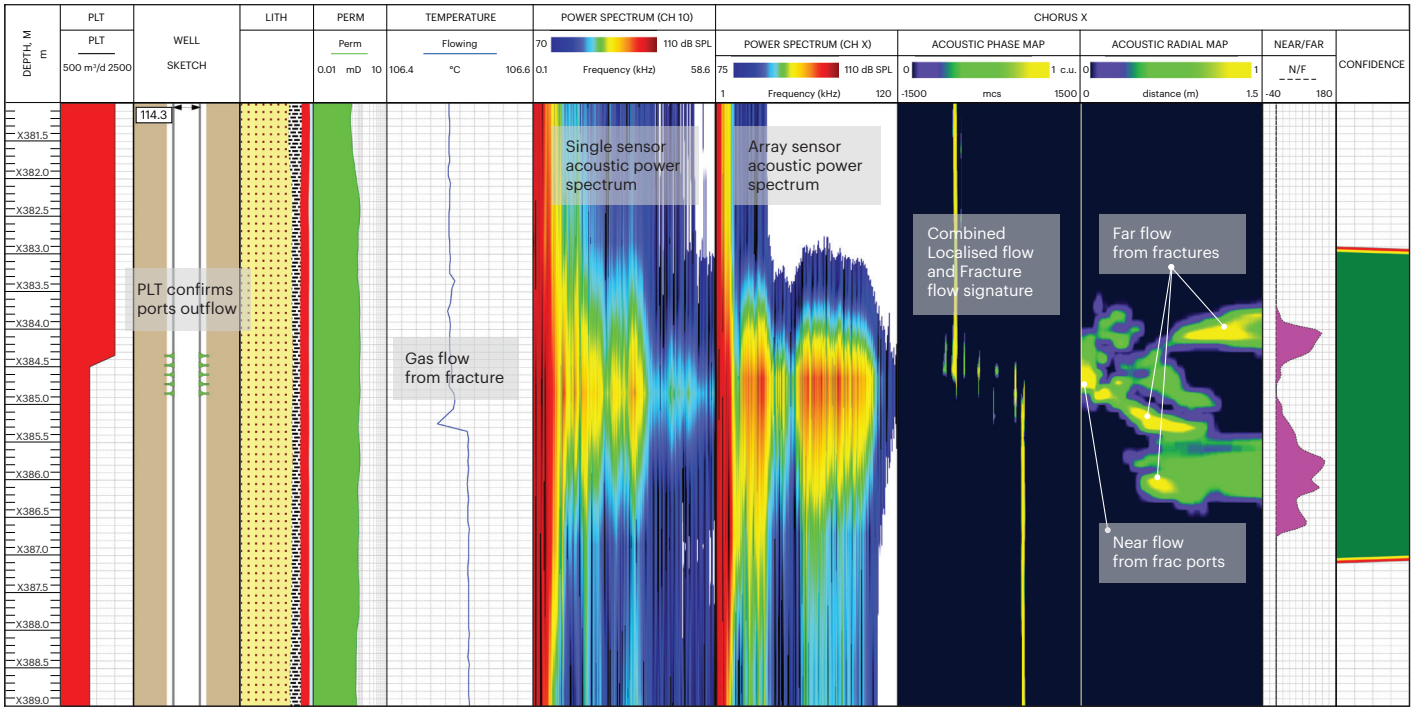
Challenge

The operator of a deep high-pressure low-permeability gas field wanted to assess the feasibility and effectiveness of completing a horizontal well with an uncemented liner that had 10 sliding sleeve valves/ports but, unusually, no isolation packers.

Completed in the standard way, this well would require 10 packers, adding significant cost and complexity to the completion. A successful strategy for packer removal would lower completion costs, increase installation efficiency, and reduce future maintenance challenges. These savings and efficiencies would multiply substantially for field-wide application.

The chief concerns about the new strategy were that lack of isolation during fracturing might prevent sufficient fracture force being focused on each target zone and whether the result would be one large fracture rather than multiple distributed fractures. Another challenge was to evaluate the success of the strategy by identifying and locating the fractures to establish their extent along the wellbore and assess the performance of each fracture group.

Conventional production diagnostics could only assess flow entering the wellbore at each port and would therefore not reveal fracture location or distribution, or even distinguish reservoir flow from port flow. Sophisticated post-fracture assessment was needed to determine whether the technique had been successful, and to fine-tune future operations.



Fracture Flow locates and quantifies flow before or after hydraulic fracturing.

Delivered by our True Flow System using Chorus technology Fracture Flow gives you the clarity and insight needed to manage well system performance effectively.

Solution

TGT's Fracture Flow diagnostics product is used to evaluate the effectiveness of hydraulic fracturing operations. In this well, the new ChorusX acoustic array platform was included in the survey programme to bring a wide range of additional benefits and fracture performance insights.

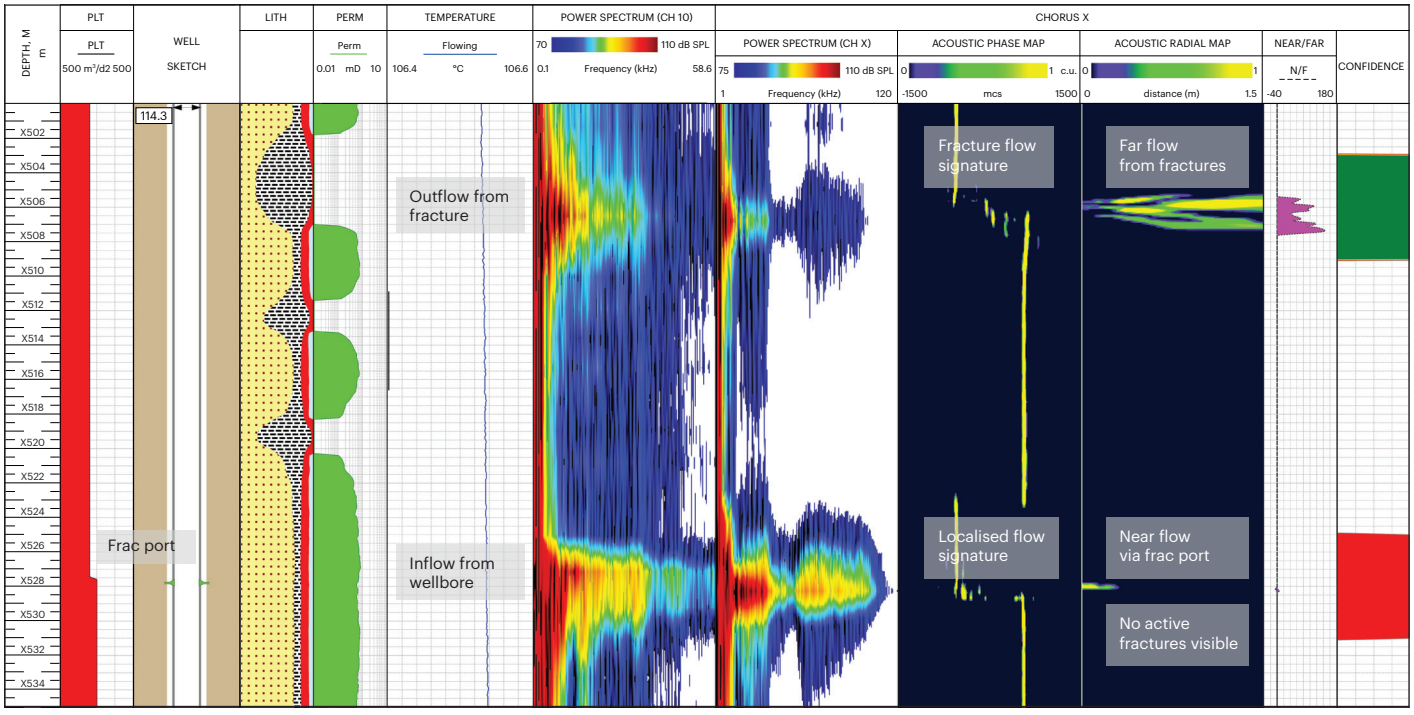
Using ChorusX, analysts located the precise depth and distribution of induced fractures and evaluated the relative contribution from each fracture along the entire reservoir section. ChorusX can distinguish between flow from fractures and flow through the sliding sleeve valves, even when the fractures are located at the same depth interval as the valves. This breakthrough enables the operator to distinguish between port flow and fracture flow, thus giving greater clarity and certainty to evaluations.

Result

TGT analysts used ChorusX data to identify and precisely locate fractures right along the reservoir section. The survey also provided an accurate flow geometry that displays the relative contribution that each fracture makes to production.

The Acoustic Radial Map serves as a high-resolution, near–far indicator for flow and can distinguish between port flow and reservoir fractures in the immediate vicinity of the ports. These innovative features are unavailable in even the most advanced single-sensor acoustics systems.

The Fracture Flow product with ChorusX technology proved the effectiveness and viability of the new, ultra-efficient completion technique in this geological setting. The results provided the operator with valuable insights that will enable them to optimise the fracturing parameters and the completion design for field-wide roll-out. This will deliver enormous savings in time, cost and resources, thereby helping operators access 'hard to recover' reserves in a more efficient and economic way.



Analysts can call on new ChorusX answers to resolve even the most complex flow scenarios. The Phase Map and Radial Map bring valuable insights that complement other measurements, leading to a more confident diagnosis. The top section of this ChorusX answer product identifies and locates active fractures, whereas the lower section confirms that no active fractures are present.