

NUSTIM™ SERVICE – SOUTH TEXAS™

OPERATOR CHALLENGE:

A South Texas operator was faced with **costly completions in the Wilcox formation**. The wells in this area are typically completed with **massive multi-stage hydraulic fracture stimulation treatments**. Due to concerns over

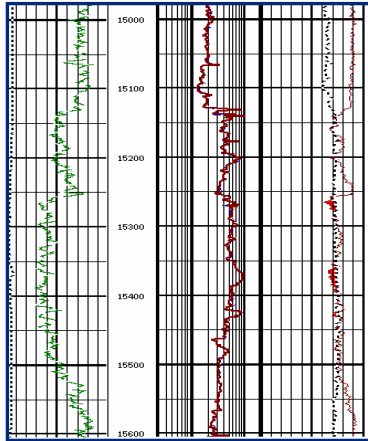


Figure 1: Conventional log data for the Wilcox interval.

rising completion costs, the operator began to **question the efficiency of the historical completion method** in this field. NuTech was challenged with determining an optimal completion strategy for a particular well (Fig. 1) that would **maximize the cost-to-economic benefit realized** by the operator.

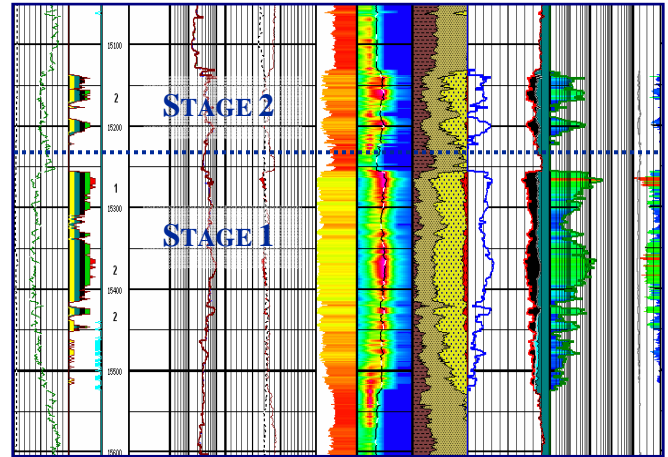


Figure 2: NuLook Textural Vision analysis of Wilcox interval.

NuList Parameters:		Wilcox			
Pay Ft	AVE Rank	PHIE _{AVE}	Perm _{ABS}	Perm _{ABS} Ft	Hyd-Por Ft
33 Ft	2.5	15.4%	0.272 md	8.98 md Ft	2.3 md Ft
142 Ft	2.1	15.9%	0.558 md	79.3 md Ft	11.2 md Ft

The operator provided the real-time fracture treatment data acquired on location and the resulting production responses for an offset well that had been completed in two stages in the Wilcox formation. Both stages involved large fracture stimulation treatments (655,000 lbs & 309,000 lbs of Bauxite, respectively). This data would provide the basis for the **calibration** of the NuStim process in order to **evaluate the completion strategy for the new well and increase economic success**.

NUTECH SOLUTION:

NuTech Energy Alliance applied its **NuLook Textural Vision™ (NTV) and NuStim™ processes** to the data set to properly evaluate the Wilcox intervals and guide the operator to a **unique solution**. In this case, the cyclical NuStim process (Fig. 3) was applied with the following methodology:

- NuLook Textural Vision analysis of offset well, providing a quantified reservoir description
- Determination of reservoir calibration coefficients based on the pressure matched fracture dimensions and the production responses from the offset well
- Identification of unique reservoir characteristics
- NuLook Textural Vision analysis of new drill well (Fig. 2)
- Application of reservoir calibration coefficients determined from offset well
- Determination of optimal treatments for each stage, Lower and Upper Wilcox, and production predictions
- Recommendations regarding job execution
- Comparison of actual to predicted results

The post-completion analysis of the offset well provided the calibration needed to increase the accuracy of the NuStim process. By matching the production responses in concert with the pressure matched fracture dimensions for both intervals in the offset, the calibration coefficients were easily quantified and an **exact simulation of the past well production and treatment responses was created**. In the case of the Lower Wilcox interval, **significant depletion was identified**. Applying this information and the calibration coefficients to the new completion well, the NuStim process identified optimal fracture treatments for both intervals in the new well, as requested by the operator. Additionally, the process identified a second option to **effectively stimulate both intervals in one stage** (Fig. 4); allowing for **significant reductions in completion expenses**.

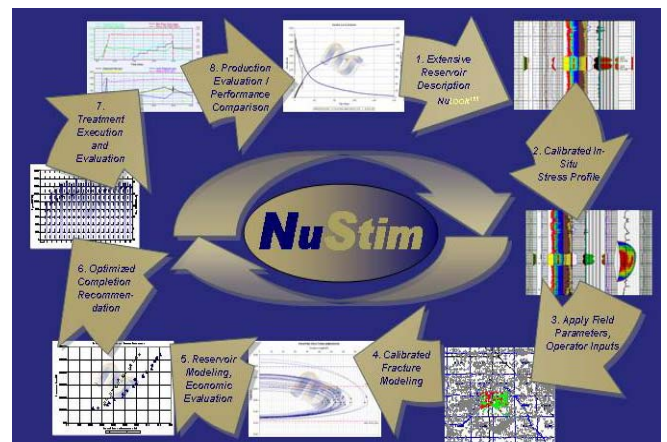


Figure 3: NuStim process flow diagram.

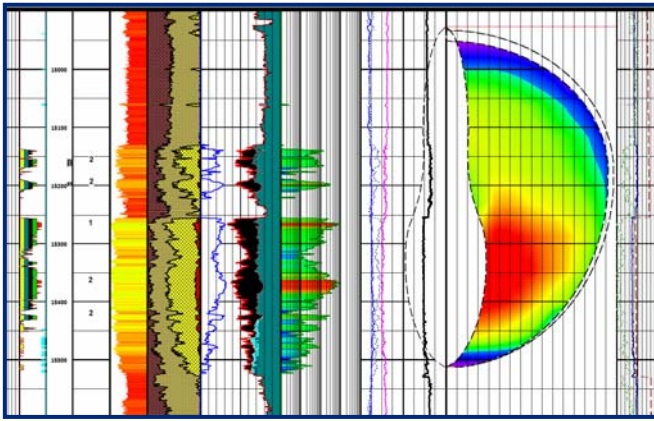


Figure 4: NuStim log depicting optimal stimulation of the Wilcox.

THE RESULTS:

By honoring the fracture treatment and production response data in concert with the NuLook Textural Vision analysis, an accurate reservoir characterization was achieved. Based on the reservoir uniqueness and incorporation of the operator's completion cost, **economic comparisons were made** for thirty treatment scenarios per fracturing stage. As shown in Fig. 5, scenario 17 presented the highest NPV (\$45.6MM) over 4 years and was therefore the recommended scenario. Scenario 17 provides an additional \$149,000 over the next highest scenario. The combined predicted 4 year NPV for the optimal two stage completion is \$41.7MM.

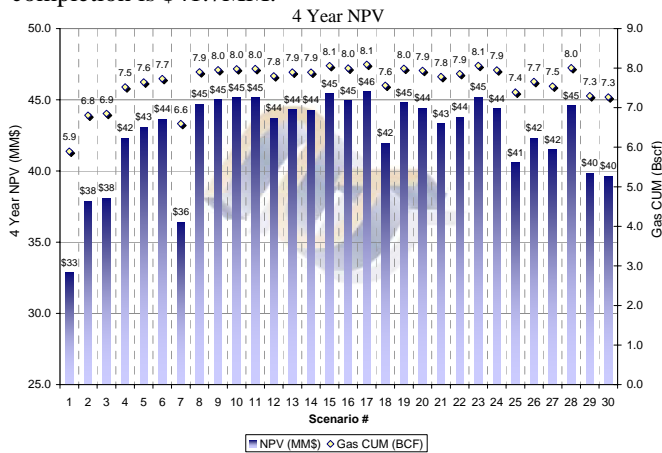


Figure 5: NPV Comparative Analysis.

By completing the well in one stage, as suggested by the NuStim analysis, the operator will realize an **additional \$3,834,000** over 4 yrs over the optimal two stage completion (Fig. 7), and several million dollars more than that when compared to the typical field completion strategy. The operator followed the NuStim recommendations and stimulated the well in one stage. After completion, the initial production predictions of 19.8 MMscfd **matched the actual post-frac IP** of 19.5 MMscfd **within 98% accuracy** (Fig. 6).

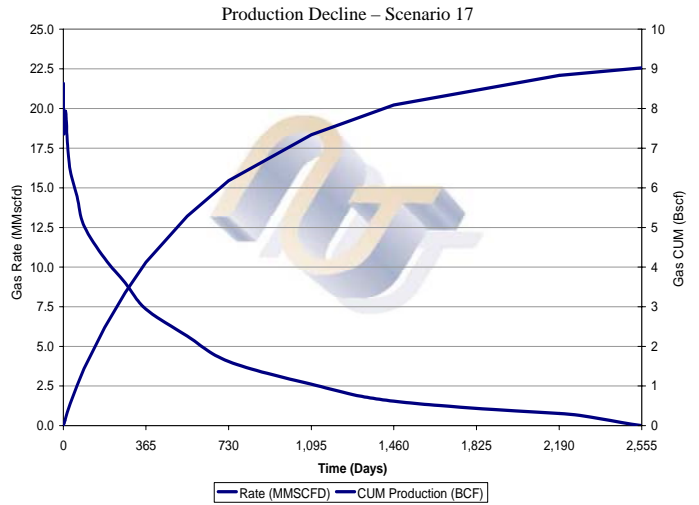


Figure 6: Production decline prediction for stimulation of the Wilcox.

CONCLUSIONS:

By utilizing the practical petrophysical and completion optimization processes NuLook Textural Vision and NuStim, the operator was able to **identify an optimal completion strategy for this unique well**, reducing costs and adding significant value.

NuTech understands that only by incorporating all available data from the well and the field, can one identify a unique solution. Through the NuStim process, NuTech provided the operator a completion recommendation which **honored all available data and evolved to a well-specific solution**. Once calibrated in the area, the NuStim process provided this unique solution **prior to the completion of the well**.

With the power of NuLook, NuStim breaks down the description of the reservoir beyond any completion design product on the market. By describing the reservoir at 0.5 ft increments, a **more accurate fracture and reservoir model** may be developed and utilized. This dramatically **increased level of detail enhances the completion design** and adds significant value to NuTech clients worldwide.

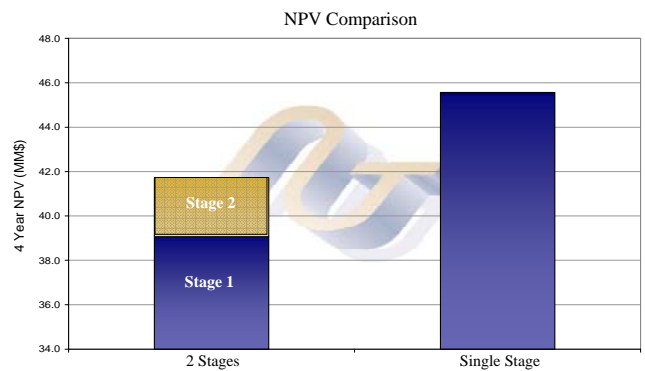


Figure 7: NPV comparative analysis for optimal 2 stage completion scenario vs. NuStim recommended scenario.



For more information about how NuStim and NuLook TEXTURAL VISION can impact your bottom line, contact your local NuTECH representative.