



Liberty's Perspective on the "Battle of Local vs. White Sand"

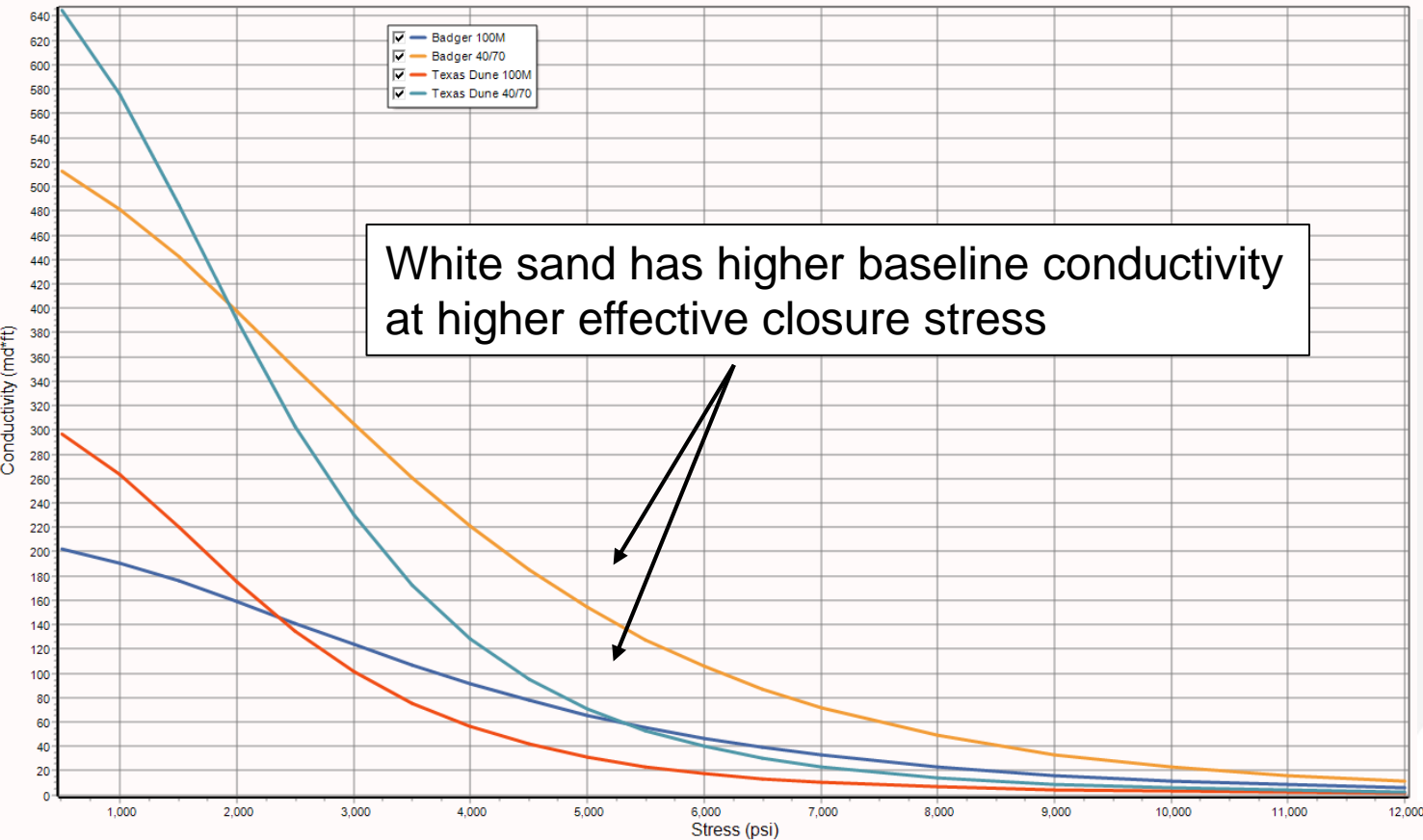
Liberty Engineering Perspective



Local vs White Sand Baseline Conductivity

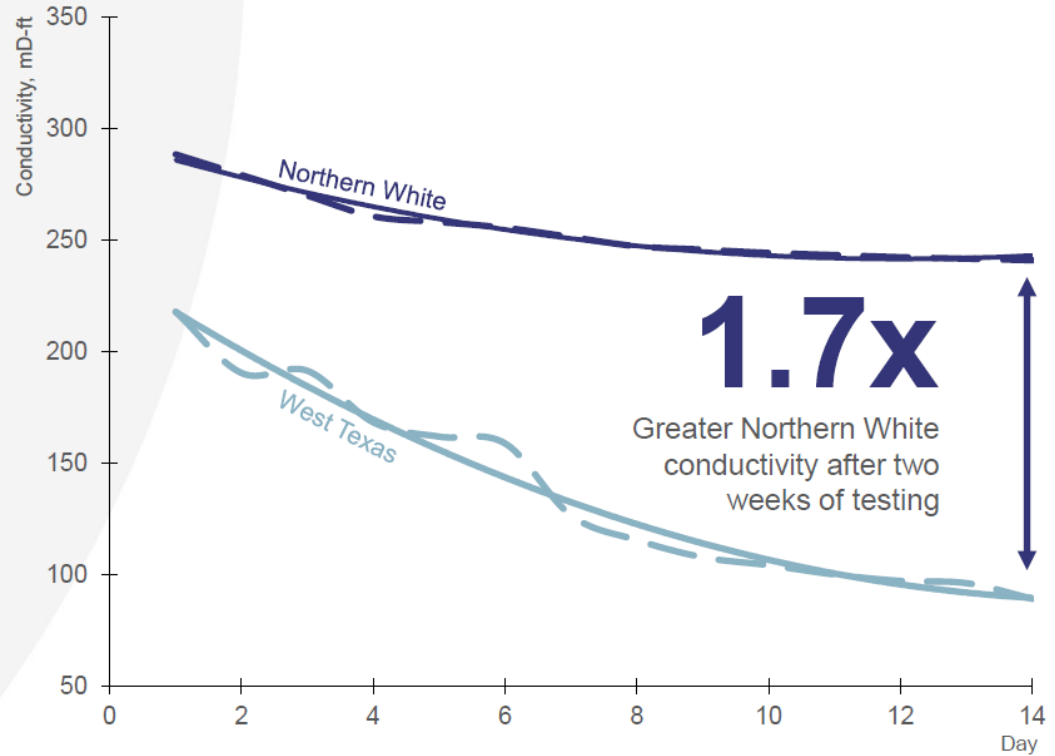
- Stimlab Predict-K at 1.0 lb/ft²

Baseline Proppant Conductivity

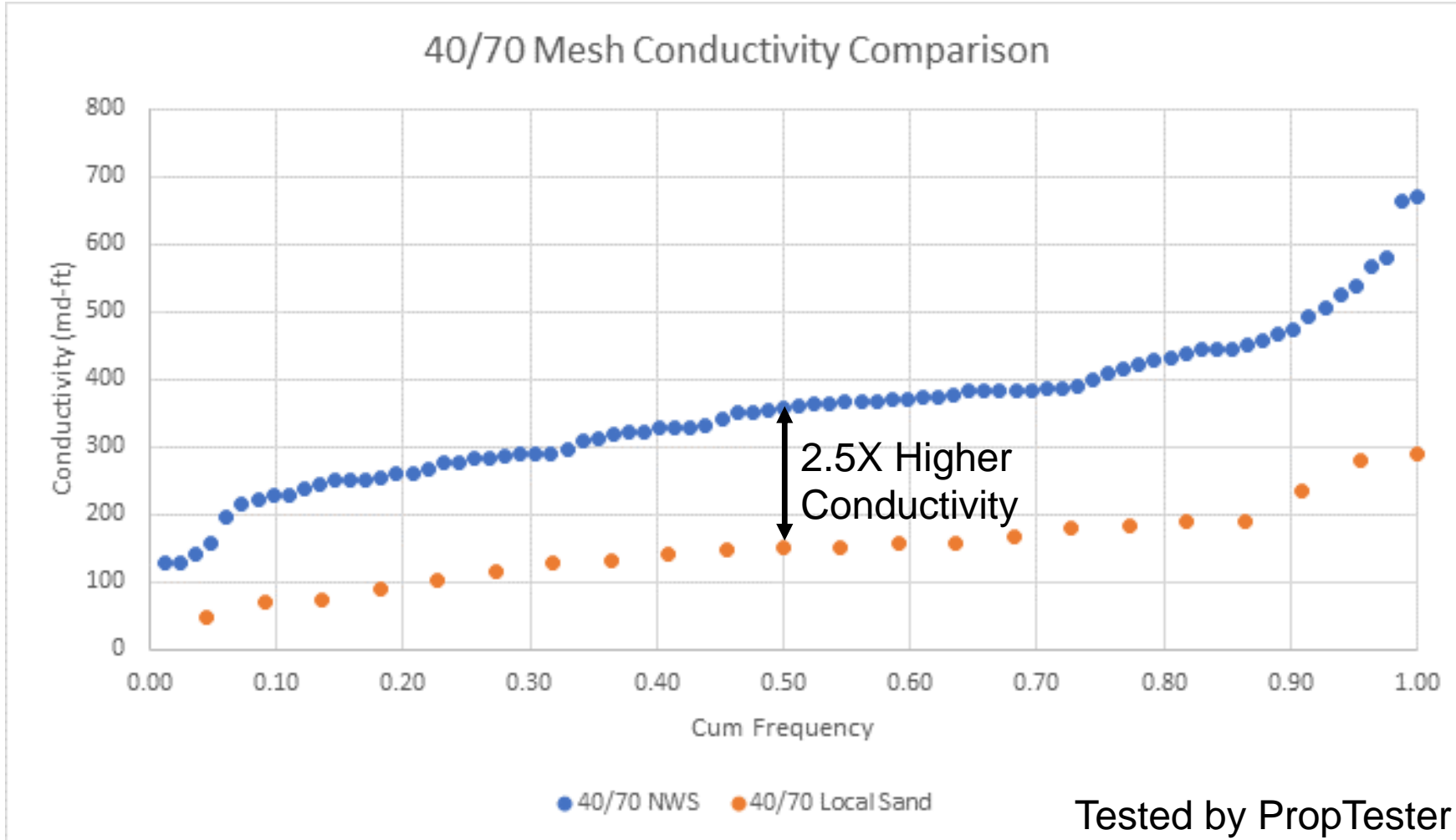


- 6,000 psi Hold (courtesy Covia)

100 Mesh 6k Continuous Hold Conductivity Testing

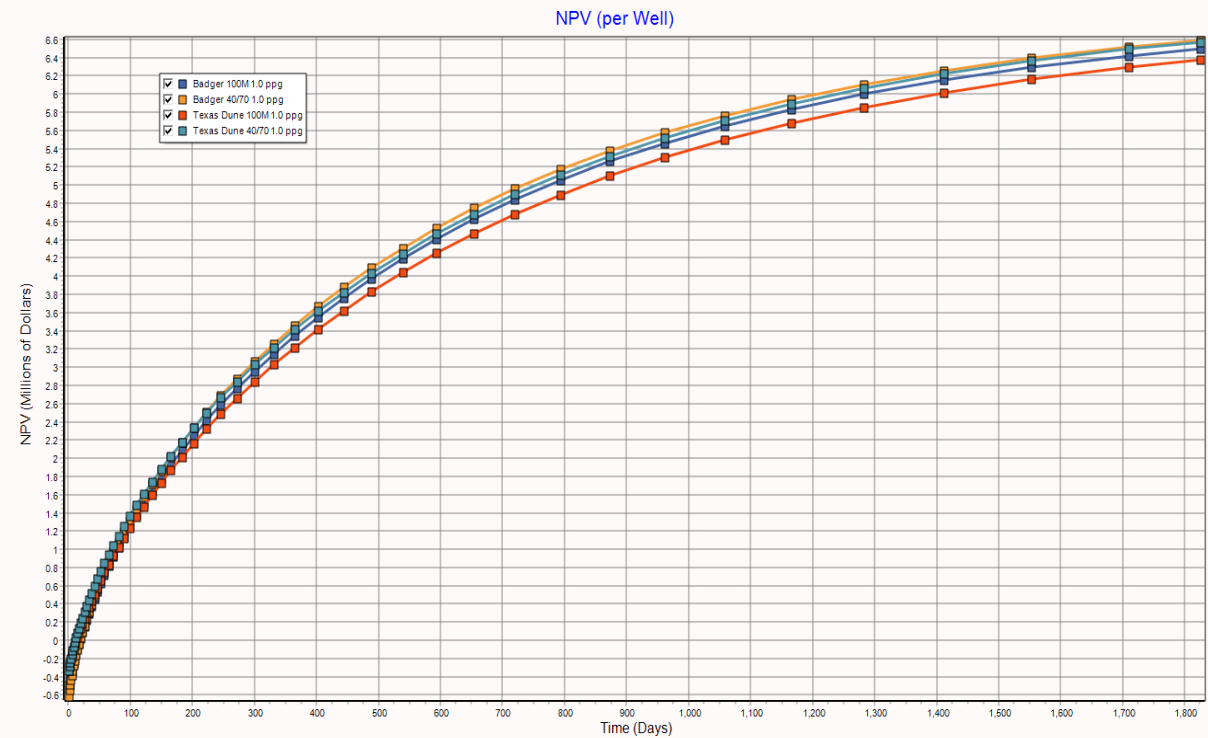
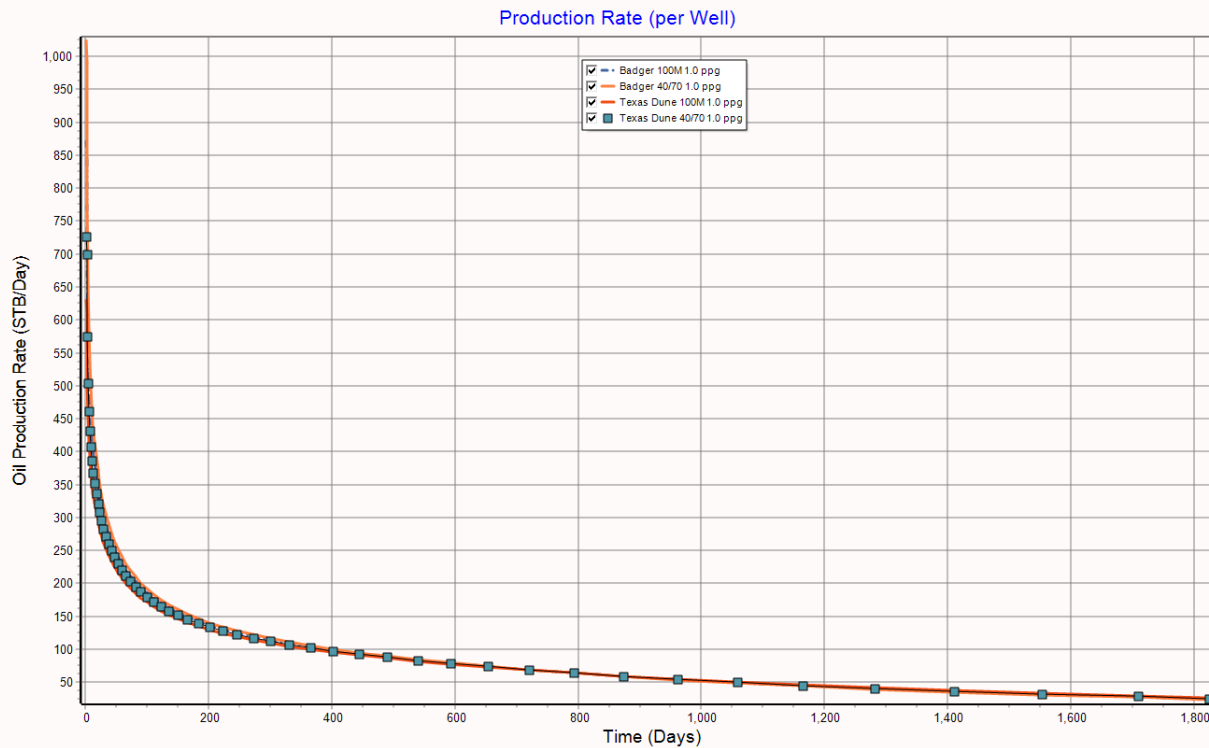


Liberty Field Sample Conductivities at 6,000 psi Closure Stress and 2 lbs/ft²



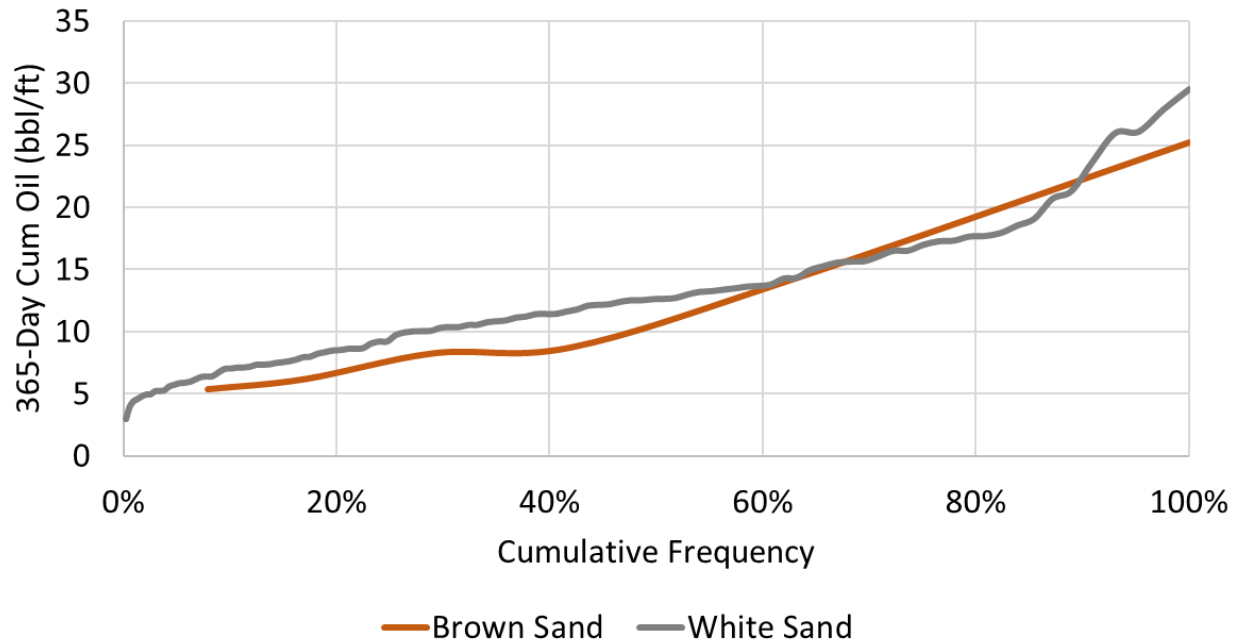
No Meaningful Production Impairment with Local Sand (Eagle Ford Assumptions)

$k = 0.0015$ md; Closure Stress = 8,100 psi, Surface Flowing Pressure = 800 psi

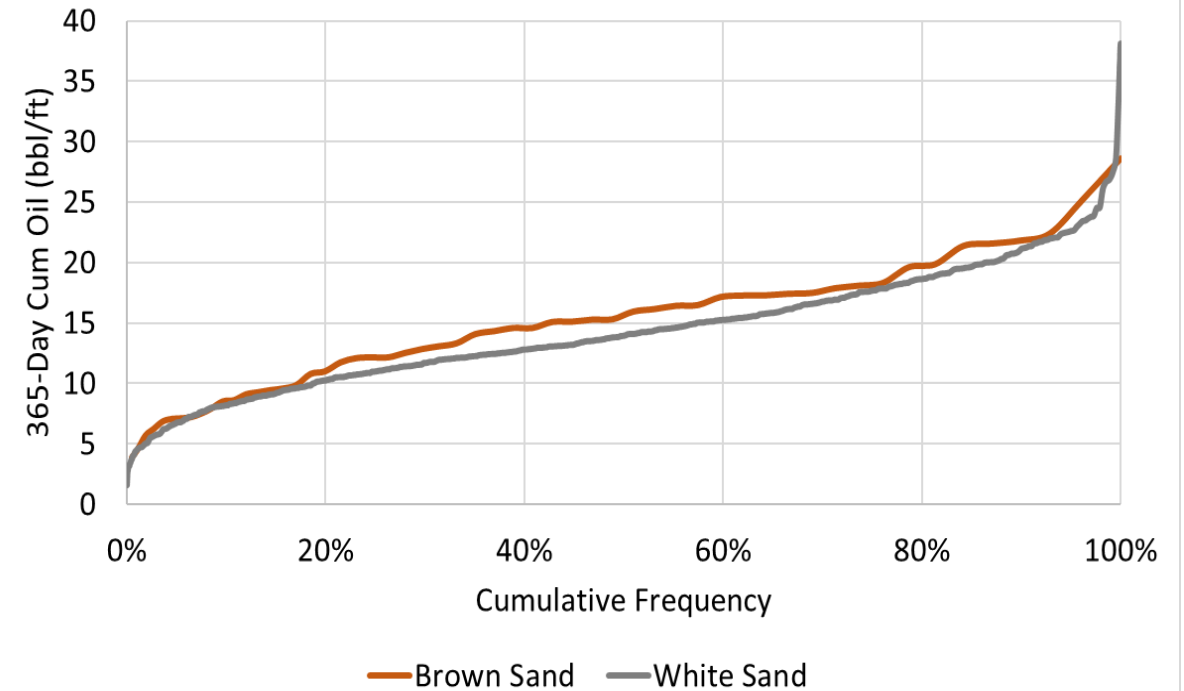


Midland Basin and Eagle Ford Production Comparisons

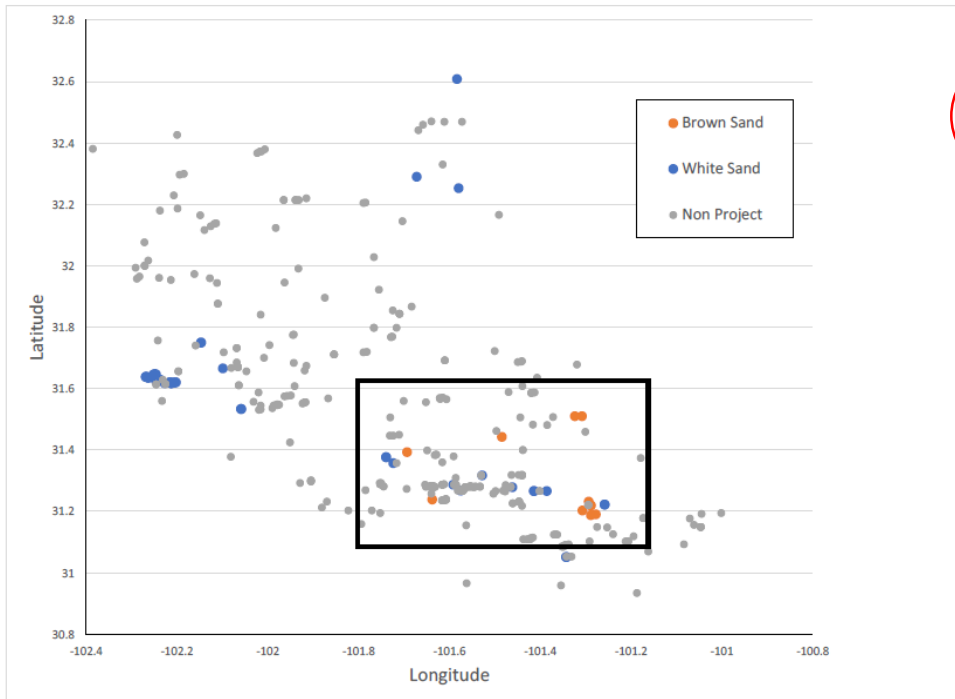
All Midland Basin Wolfcamp B Wells
(8000'-10000' TVD)



All Southwest Eagle Ford Oil Wells (8000'-11500' TVD)



Midland Basin Multi-Variate Analyses



Sand Type	All Brown	All White
Count of Sand Type	9	14
Average of 365 Day Oil (bbl)	87,151	80,574
Average of 365 Day Oil per FS	2,105	1,904
Average of 365 Day Oil per lb Prop	0.0067	0.0058
Average of 365 Day Oil/ft Lateral	12.24	9.97

Comparing production for closer proximity wells, there is no apparent benefit for using white sand vs brown sand. On average the all brown sand wells appear to outperform the all white sand per well, per frac stage, per lb of sand and per ft of lateral.

RF SHELLEY LLC
Well Performance Evaluation

Neural network predictions on a high quality dataset did not show any production uplift of white vs local sand wells

LOS MVA on a larger basin dataset also showed no impact of sand type on production

In Summary

- Lab conductivities of local sand are 1.7 to 2.5 times lower than white sand but local sand FcD is “good enough” in Unconventionals.
- Cumulative frequency production comparisons in two TX basins show no well performance differences between local vs white sand.
- Sand type is not a significant production driver in our advanced statistical analyses.



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