Case History: Hydraulic Fracturing treatment Workflow, Design, and Guidelines

NESR

Brown Field Rejuvenation (Maximizing Production & Recovery)

GPC 2022 Workshop

Agenda

- NESR Overview
- Fracturing Capabilities
  - Frac Equipment
  - Fluid System and Proppant
  - Lab Capabilities
  - DST String
- Case Study

National Energy Services Reunited Corp.

Open Technology Platform

Strategic partnerships for R&D and portfolio expansion

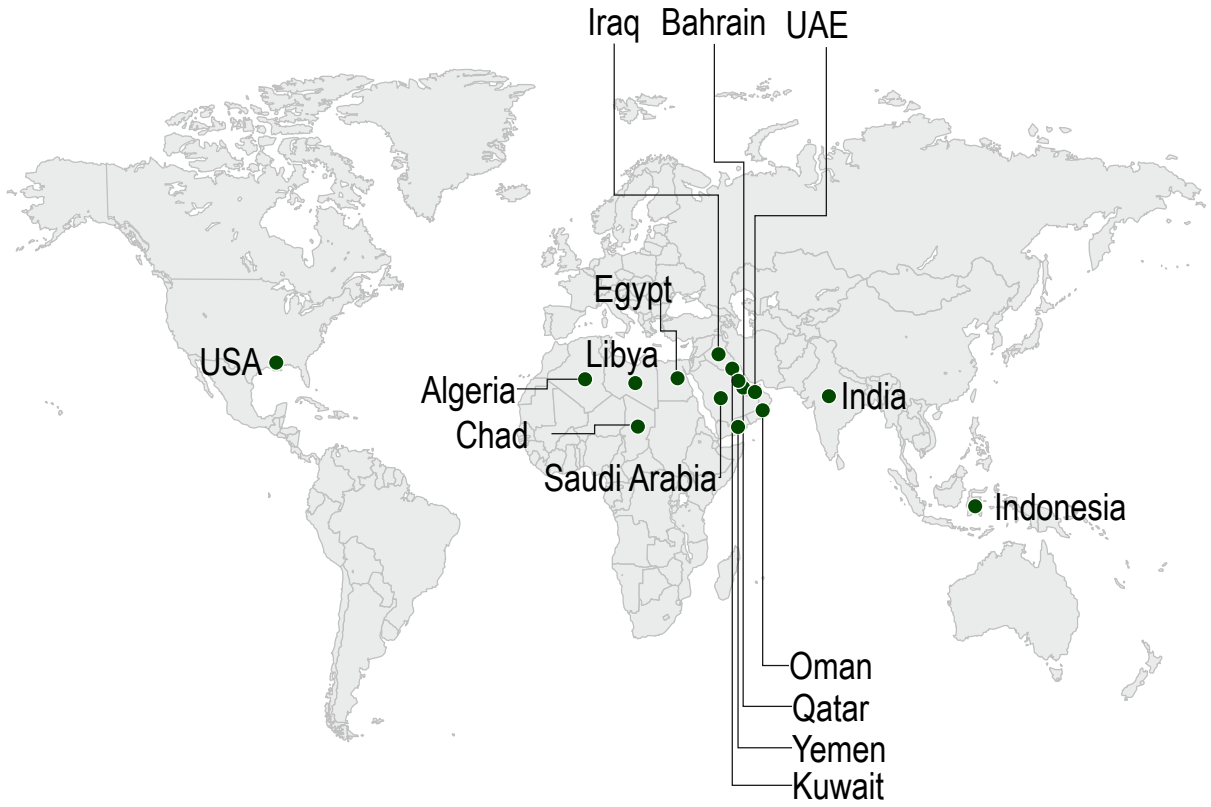
NPS

NESR

G·ENERGY
Gulf Energy SAOC | الشركة الخليجية للطاقة ش.م.ع.م

- Started as a SPAC in May 2017
- Merging of National Petroleum Services (NPS) and Gulf Energy closed June 2018
- NASDAQ-listed national oilfield services company

NESR – Largest Indigenous OFS in the Region



- Offices in Houston and all across MENA
- First and only listed MEA OFS on NASDAQ
- Operations Bases: 15 Countries
- 5,500+ Employees
- 20 Product Lines
- Clients Portfolio: 30+ Customers
  - Major IOCs | NOCs | Independents
- Major Operations
  - KSA | Oman | Iraq | Algeria | UAE | Egypt | Kuwait | Qatar
- Top Tier service provider in the region

SAPESCO Overview

SAPESCO has experience over 30 years in major 6 business lines and over than 500 employees supporting all operations Type

3 Operating Yard Centers in Cairo, R/S & Salam Base

- Main Contracts & Services Provided:
  - CT, N2 & Stimulation Services
  - Wire Line Services (Cased hole & Perforations)
  - Slick Line Services
  - Well Testing Services
  - Tubing Running Services (TRS)
  - Pipeline & Process Services (PPS-Industrial Services)

- Newly added services & Approved by EGPC in 2021
  - Cementing Services (equipment & Lab available in country)
  - Drilling Fluids
  - Directional Drilling
  - Thru-Tubing Services
  - Fishing & Milling Tools
  - Downhole Tools (DHT)
  - Production Chemicals (over than 8 Major Contracts)

Equipment Specifications

Frac Pumps: **(15,000 HHP)**

- 6 x 2500 HHP (14.7 BPM @ 6,600 PSI)
- 3512 C CAT engine - TH55 CAT Transmission
- GD Quint PE - GD Quint SS FE

SnS Hydration Unit:

- Capacity: 200 bbls
- Discharge Rate: 120 bpm
- Liquid additive pumps: 4

Data Van :

- Intelligent Pump control system
- AcquFRAC control system
- UPS backup battery in place

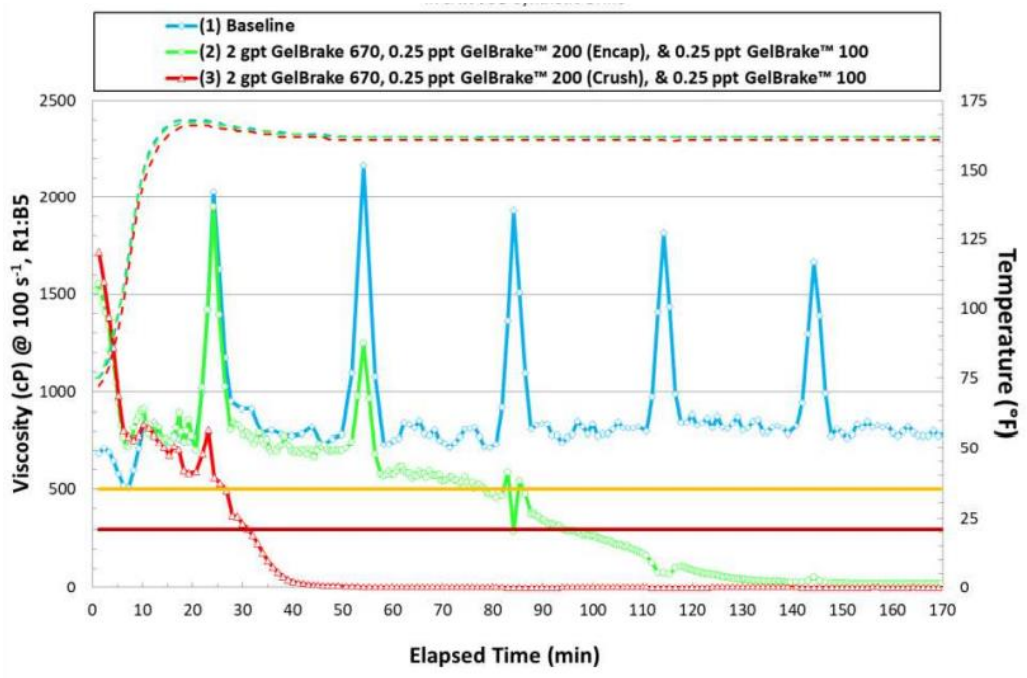
SnS Blender:

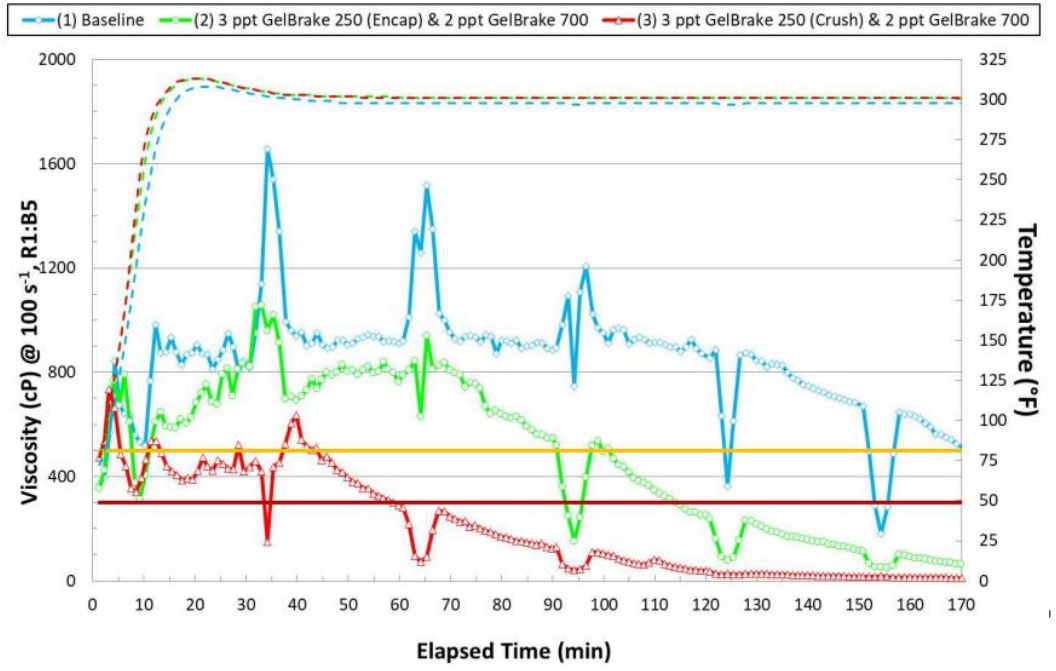
- Discharge Rate: 120 BPM
- Capable of pumping sand rate: 33,000 lbs / min (3 x 12'' augers)
- 4 Liquid additive pumps

Guar Borate Crosslinked Fluids

- Slurried Gel with liquid only additives (except for live and encapsulated breakers)
- Tested Temperature: 160-300°F
- Fluid recipe optimized for water and in-situ conditions
- Enough chemicals in country for 15 jobs

30 ppt @ 160F

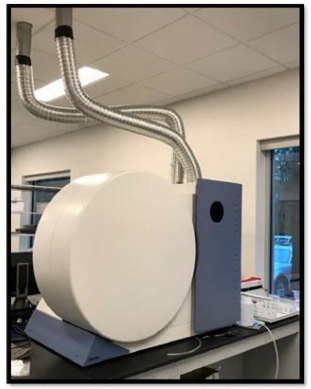




40 ppt @ 300F

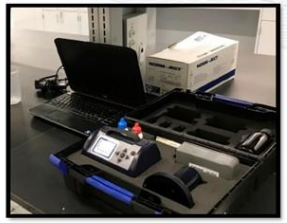
Lab capabilities

Water Analysis Technologies

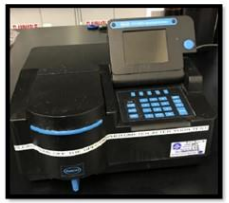


Inductively Coupled Plasma
Optical Emission Spectroscopy (ICP-OES)

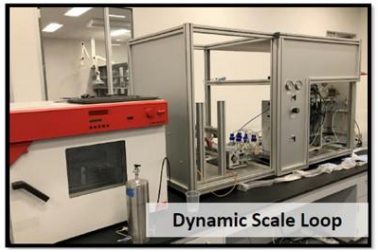
Anton Paar™ DMA 4200



OSP™ Lifecheck Luminometer



Hach™ DR/4000V

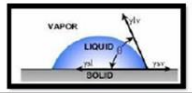


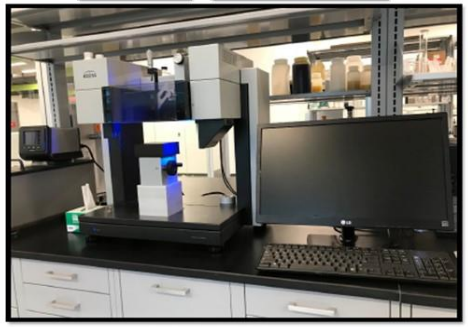
Dynamic Scale Loop

12/16/2019

Innospec Inc.

Flowback Surfactant Technology





Kruss™ DSA 100
(surface and interfacial tension, contact angle/wettability, surface free energy)

Turbiscan
(Particle Size, Formulation Stability, Emulsions)

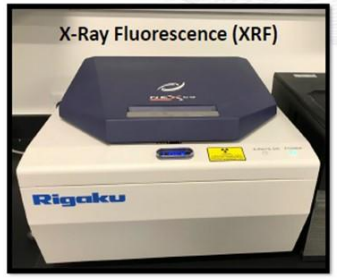
Organic Synthesis

Amott Cells
(Spontaneous Imbibition)

Solids and Unknown Sample Identification

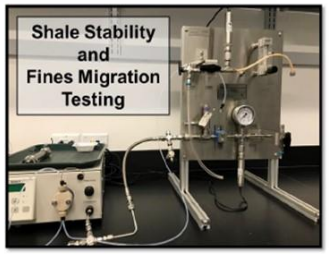
Fourier-Transform Infrared Spectrometer

X-Ray Diffraction (XRD)



Shale Dispersion / Roller Oven

Capillary Suction Test (CST)



Rheology and Friction Reduction Tools

Grace™ 3600/5600 Rheometers
And Constant Speed Blenders

Anton Paar™ MCR 302
Oscillatory Rheometer

Friction Flow Loop with Chiller

Unconventional | Completions Experience

KSA Key Achievements and Milestones

- Stages since Nov 2019: **3118**
- Max Stages pumped per day: **13 Stages / day**
- Bbl of Fluid: **24 MM bbl**
- Proppant Pumped: **1.080 MM lbs**
- Pumping hours: **20 hrs**

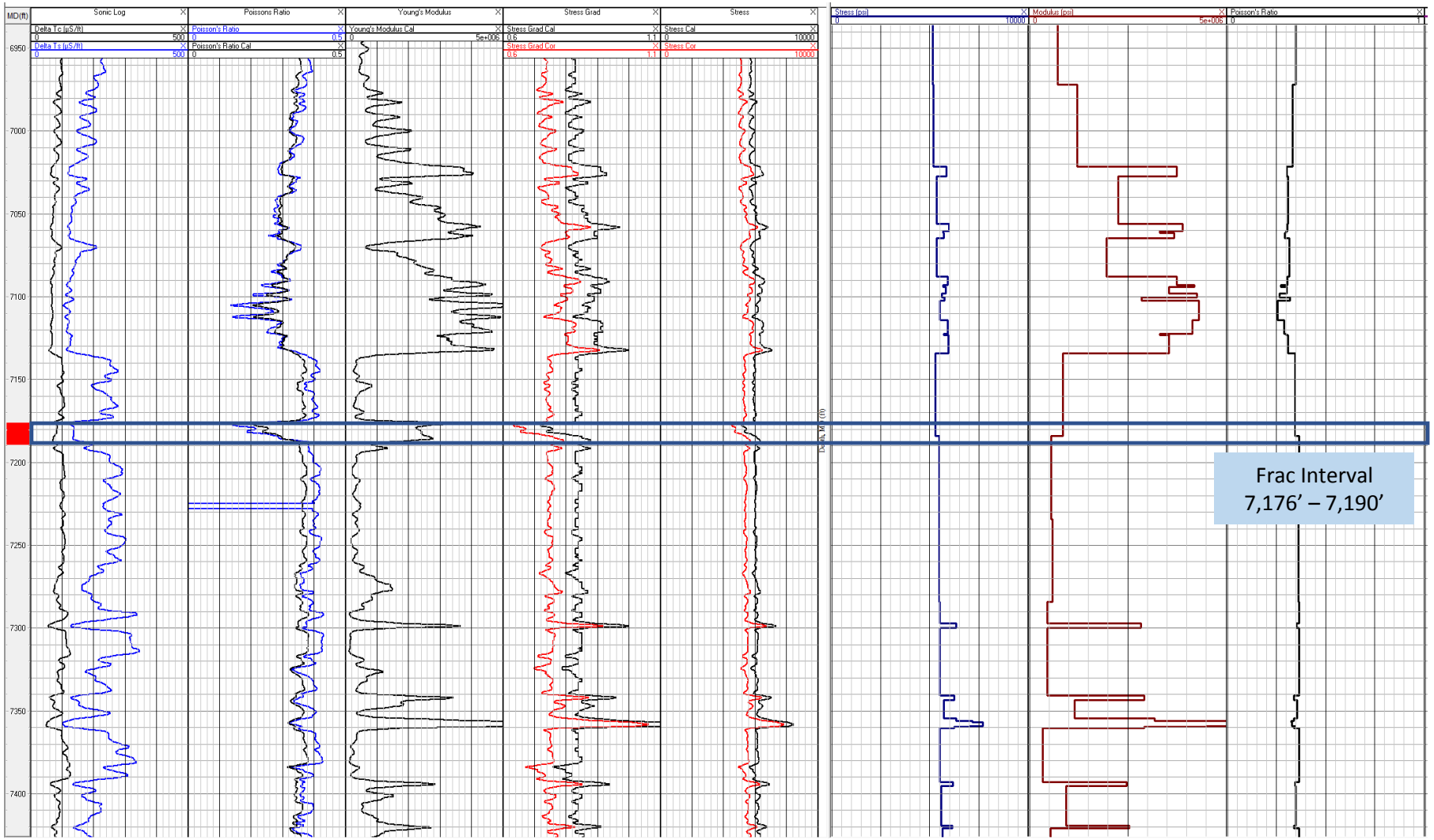
Client Testimony

*" NESR has been the only company that was able to bring **from US land efficiencies and actually implement it in KSA,** everyone else said it could not be done "*

Customer KPIs & Feedback

Performance Indicators	Customer Target	Achieved	Comments
▪ Stage count per day on zipper wells (stages):	5	7	✓ *Max achieved 12 stages per day*
▪ Stage Count per day on single wells (stages):	2	4	✓ *Max achieved 6 stages per day*
▪ Time between stages on zipper wells (hrs):	4	1	✓ *Optimized maintenance and chemical Mngt*
▪ Time to run in Hole (hrs):	1.5	1	✓ *Min Achieved 45 mins*
▪ Time to come out of hole (hrs):	1.5	1	✓ *Min Achieved 45 mins*
▪ Mobilization time of sites (days):	< 4	< 3	✓ *Between areas 2 days, out of area 3 days*
▪ Rig-up and pressure test Time (days):	2	< 2	✓ *Rig-up for 92 Bpm to 2 wells (150 ft spacing)*

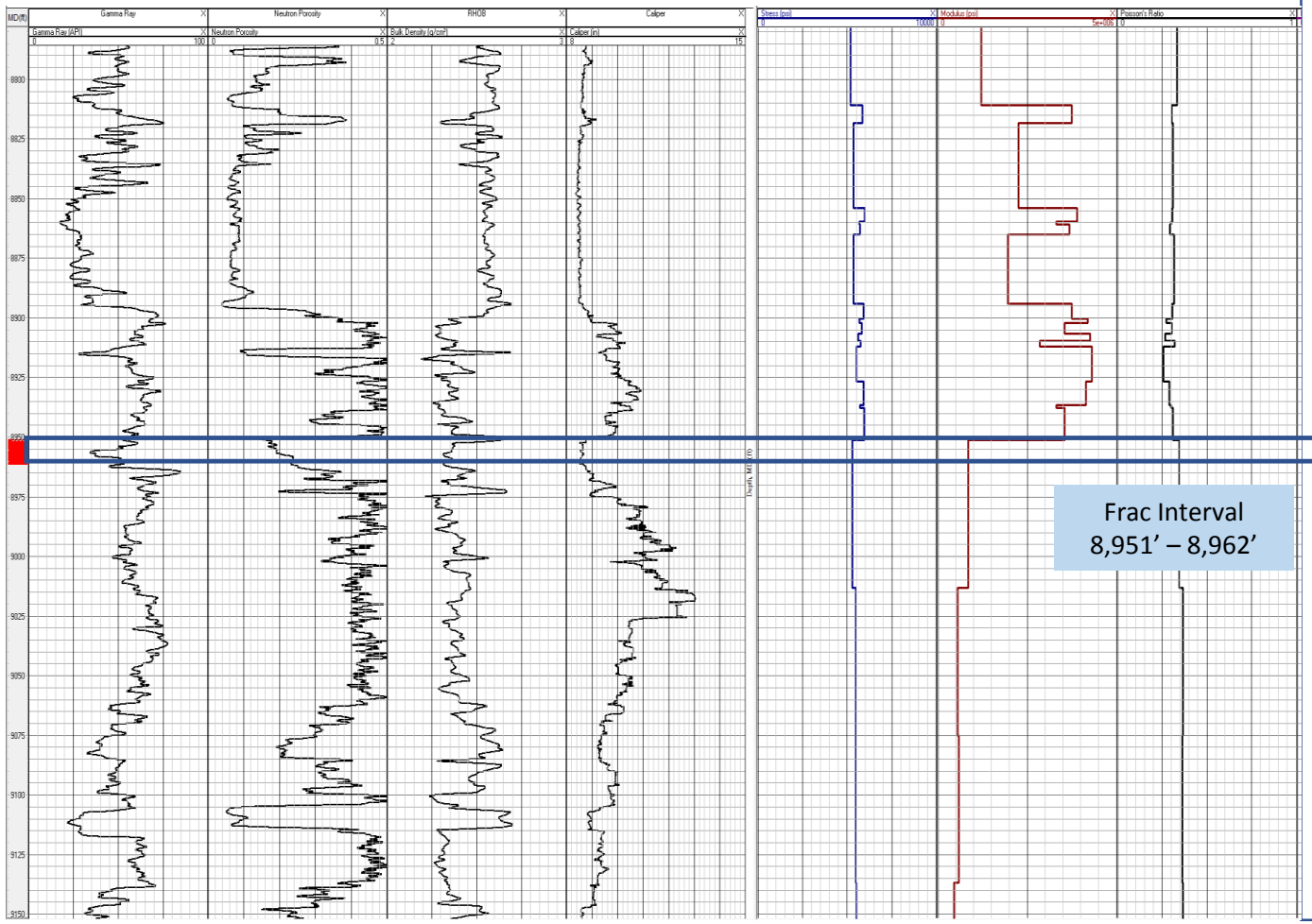
Case Study: Well # 1

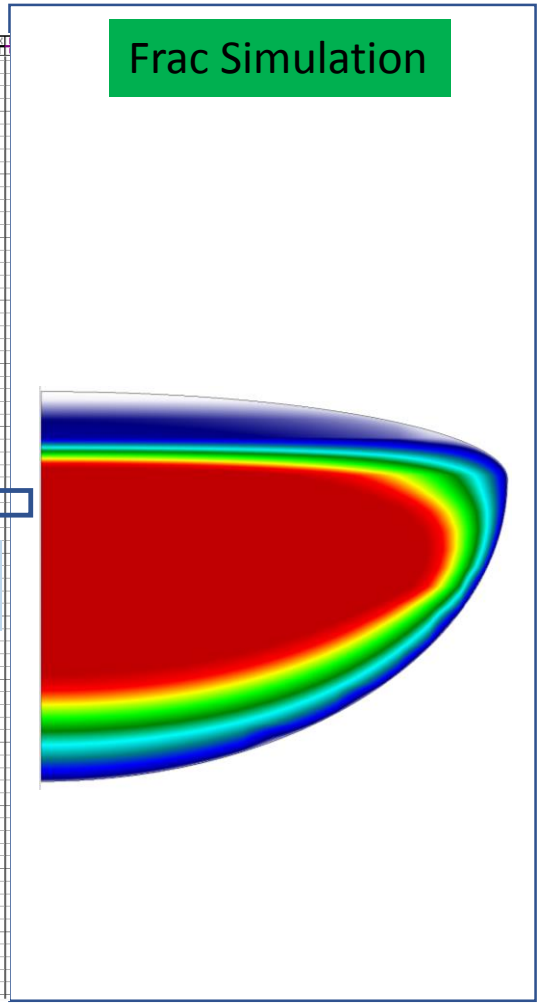


Notes:

- Stress were calculated based on Sonic Log Data
- Reservoir pressure gradient is estimated based on 3,000 psi based on the Frac Interval of 7,176' – 7,190'
- Bulk density were estimated from Offset well data
- The stress corrected were shifted from the stress calculated based on the closure observed from Minifrac done in well-1X. The stress calculated were 632 psi difference from the closure observed from Minifrac

Case Study: Well # 1

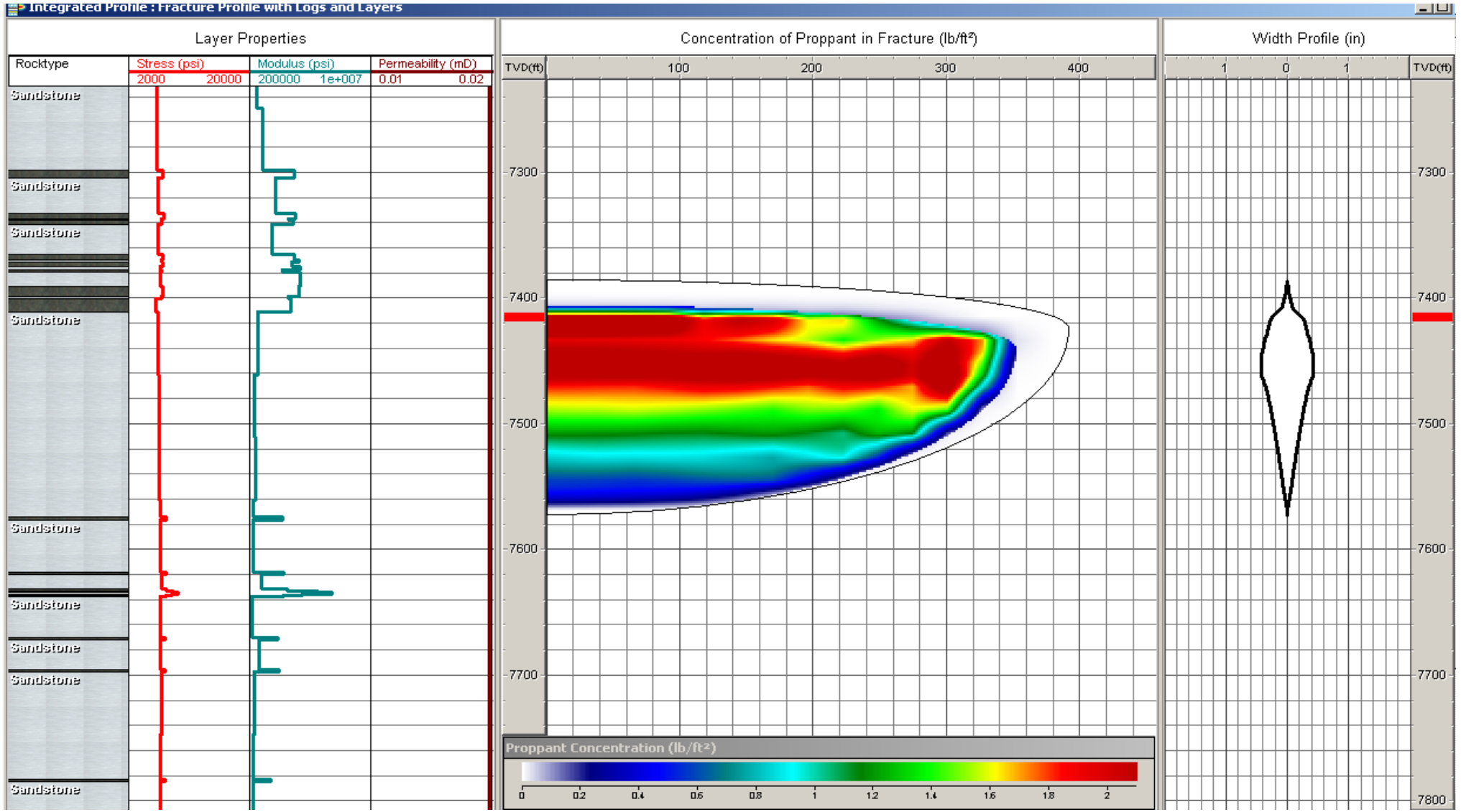




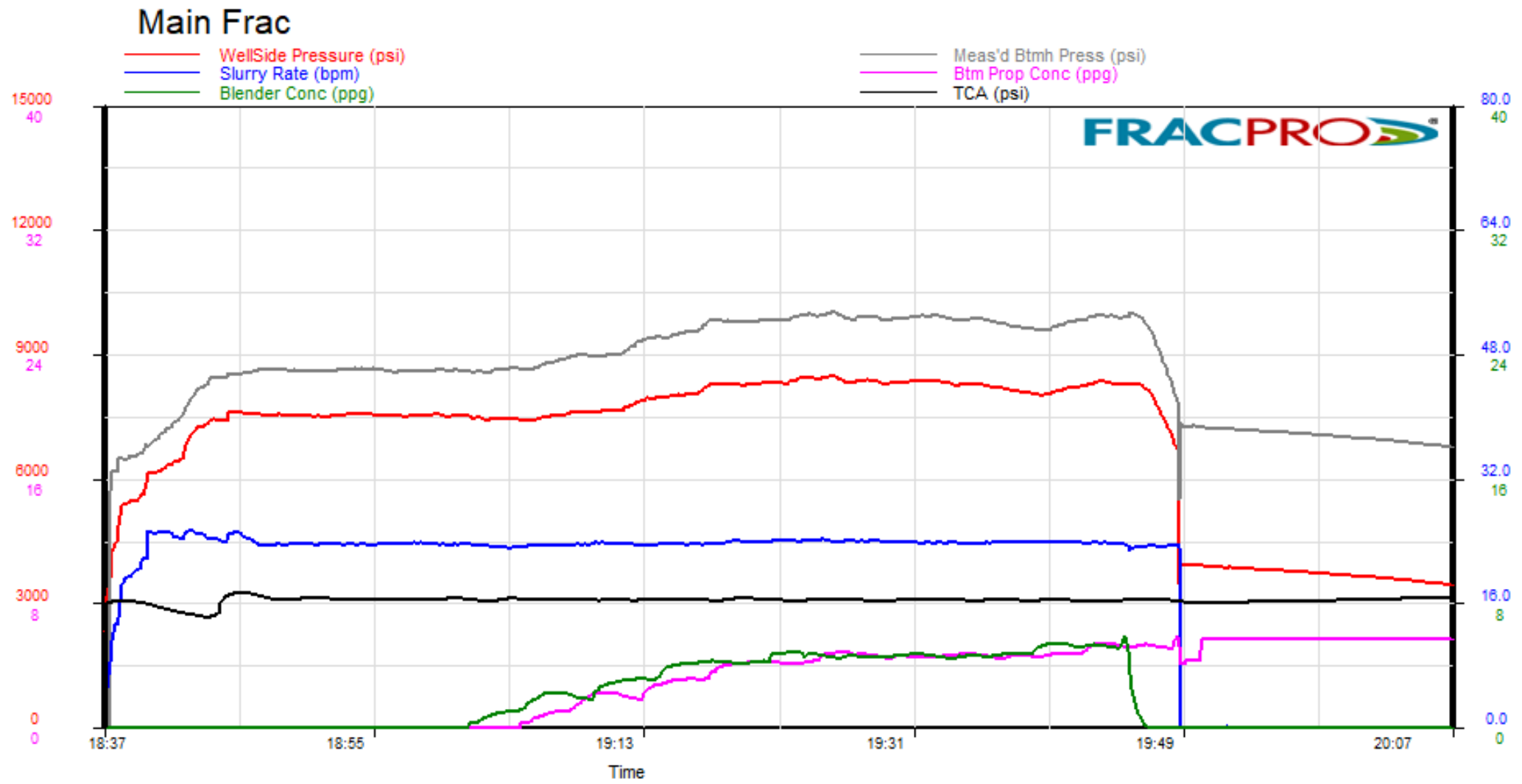
Notes:

- Sonic log was not available for the well 1.
- Stress data was interpolated from offset well 1X and stress profile was correlated with the Gamma-Ray

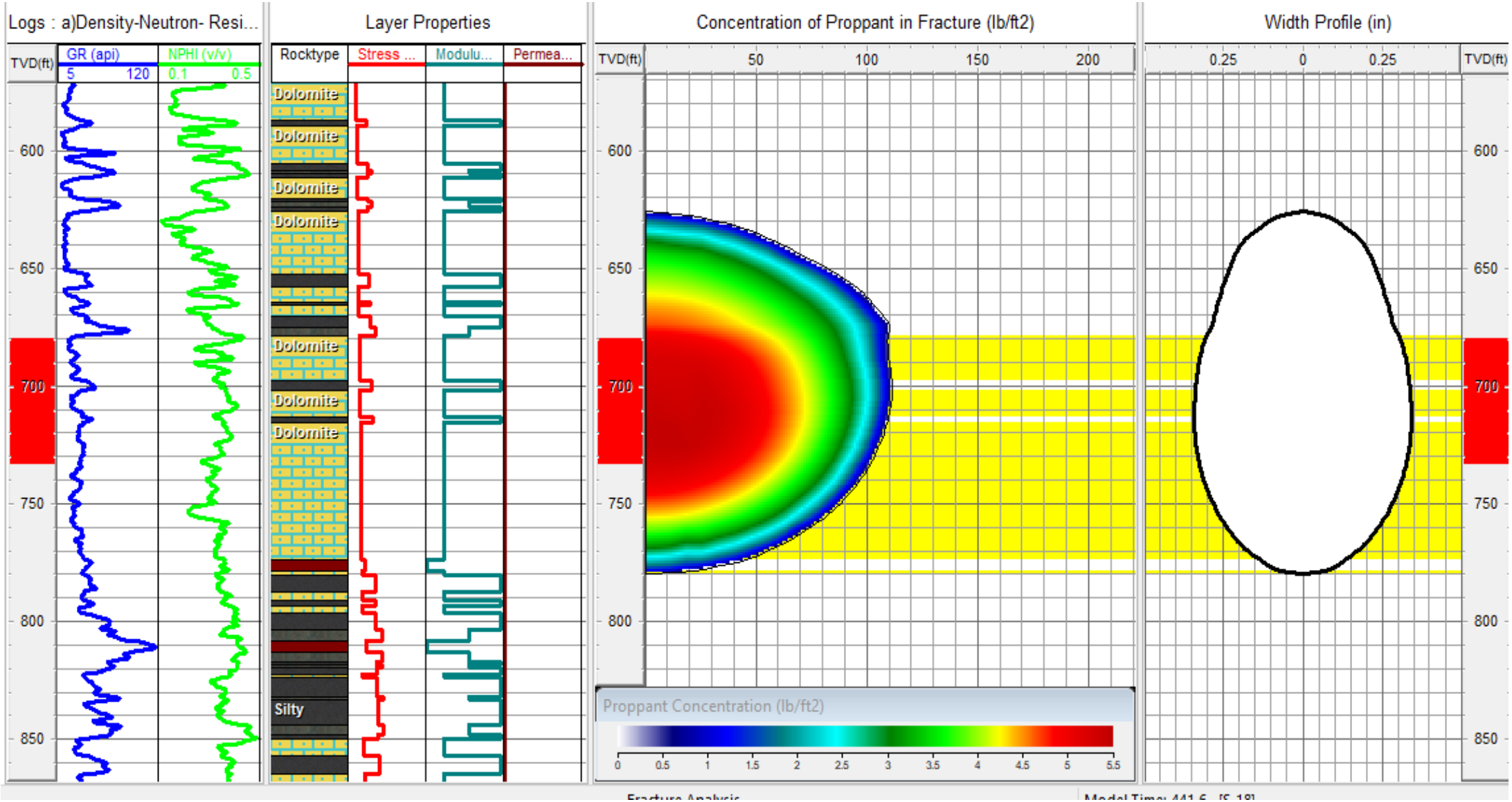
Case Study: Well # 1



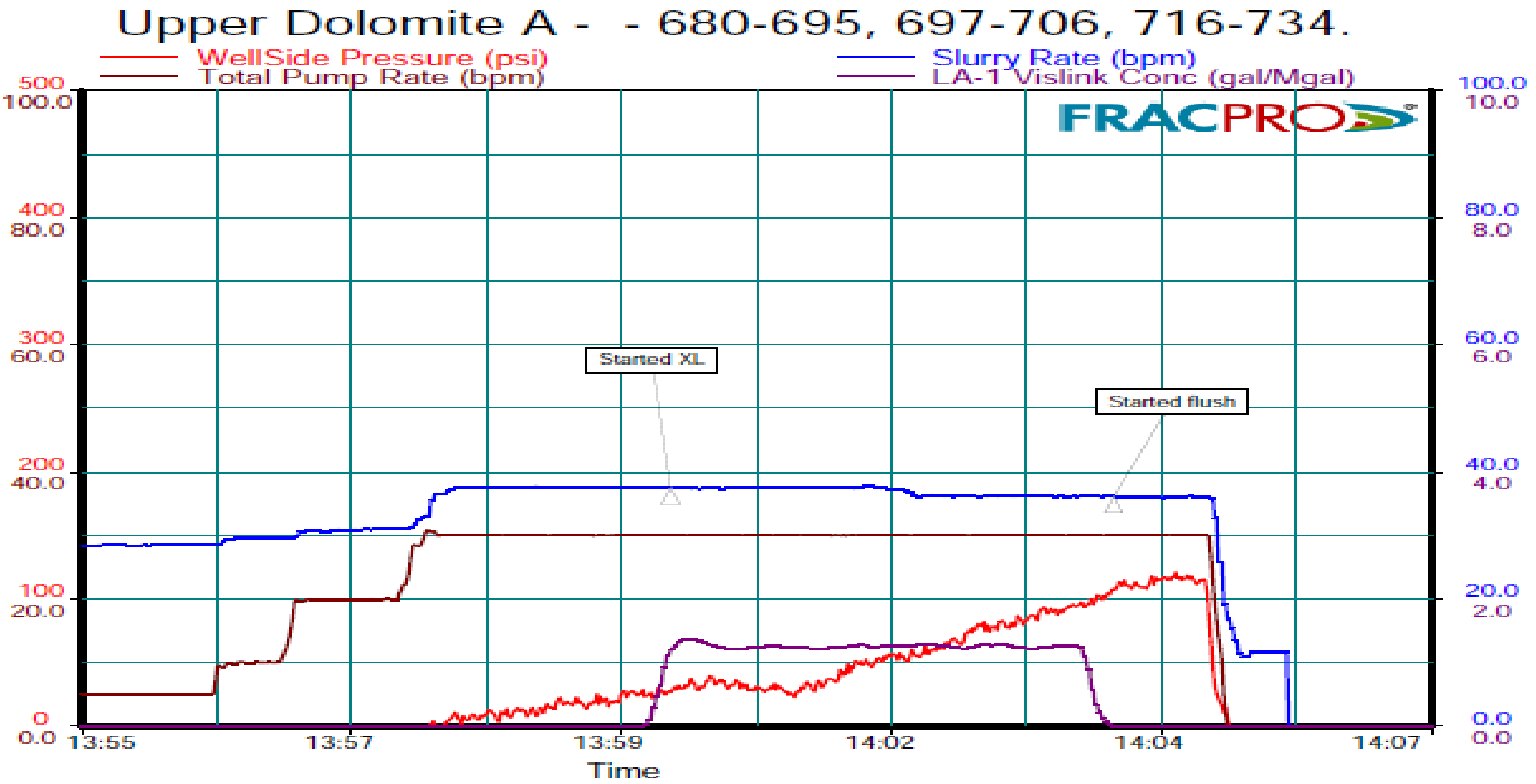
Case Study: Well # 1



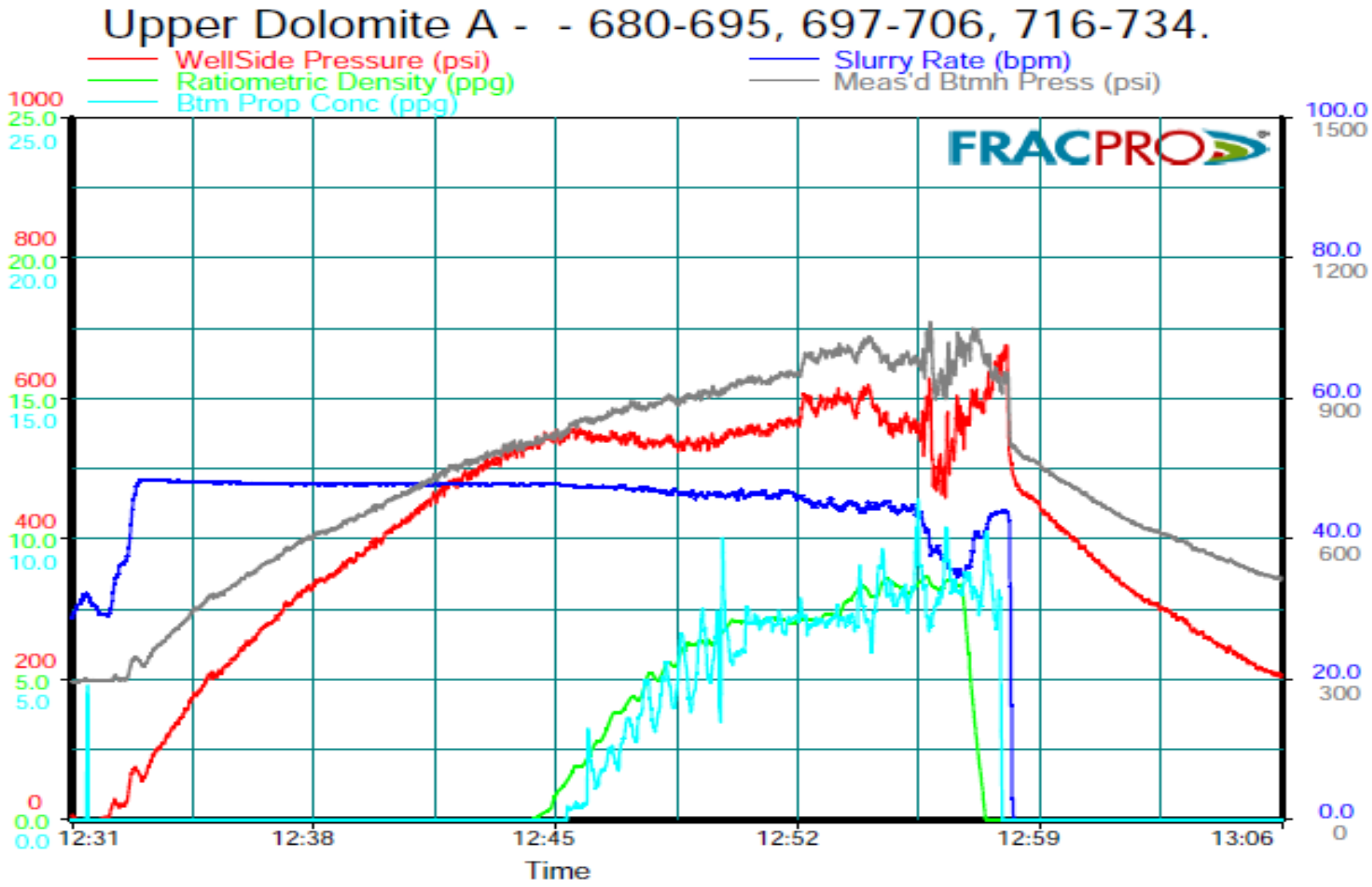
Case Study: Well # 2



Case Study: Well # 2



Case Study: Well # 2



Any Question ??