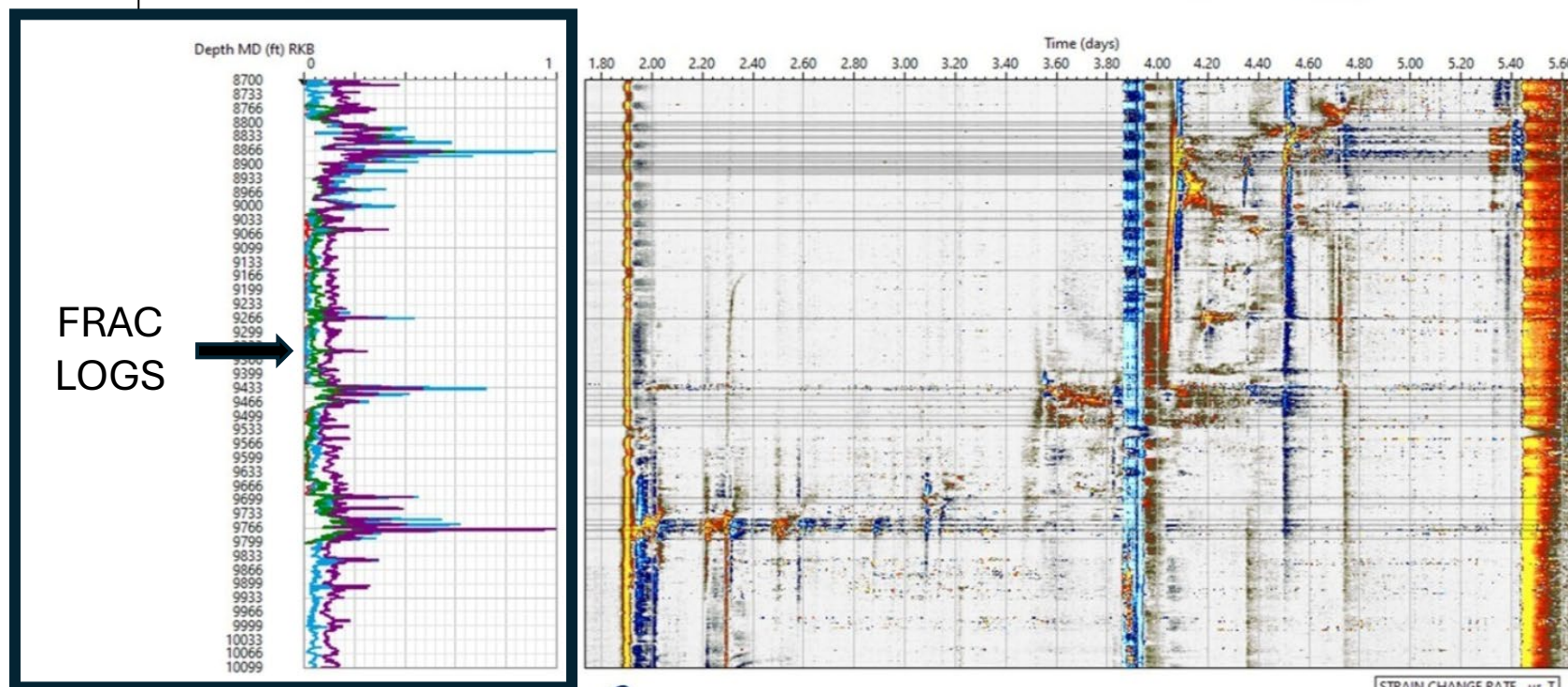


Frac Log Explanation

Stages 3R – 10 Cross Well Strain Measured at 16B during 16A Frac Stimulation



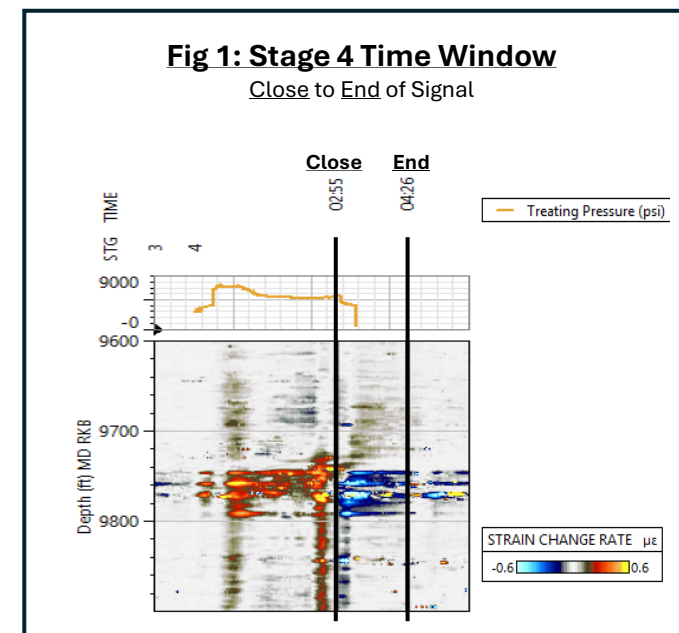
Frac Logs

Description: A Frac Log is a visual representation of energy peaks recorded along the measured depth (MD) of a well during the fracture process. It is produced by integrating (summing) energy values at each MD of the well using specified strain windows.

Purpose: To be used as a tool to assist in identifying frac hits along a well

Process:

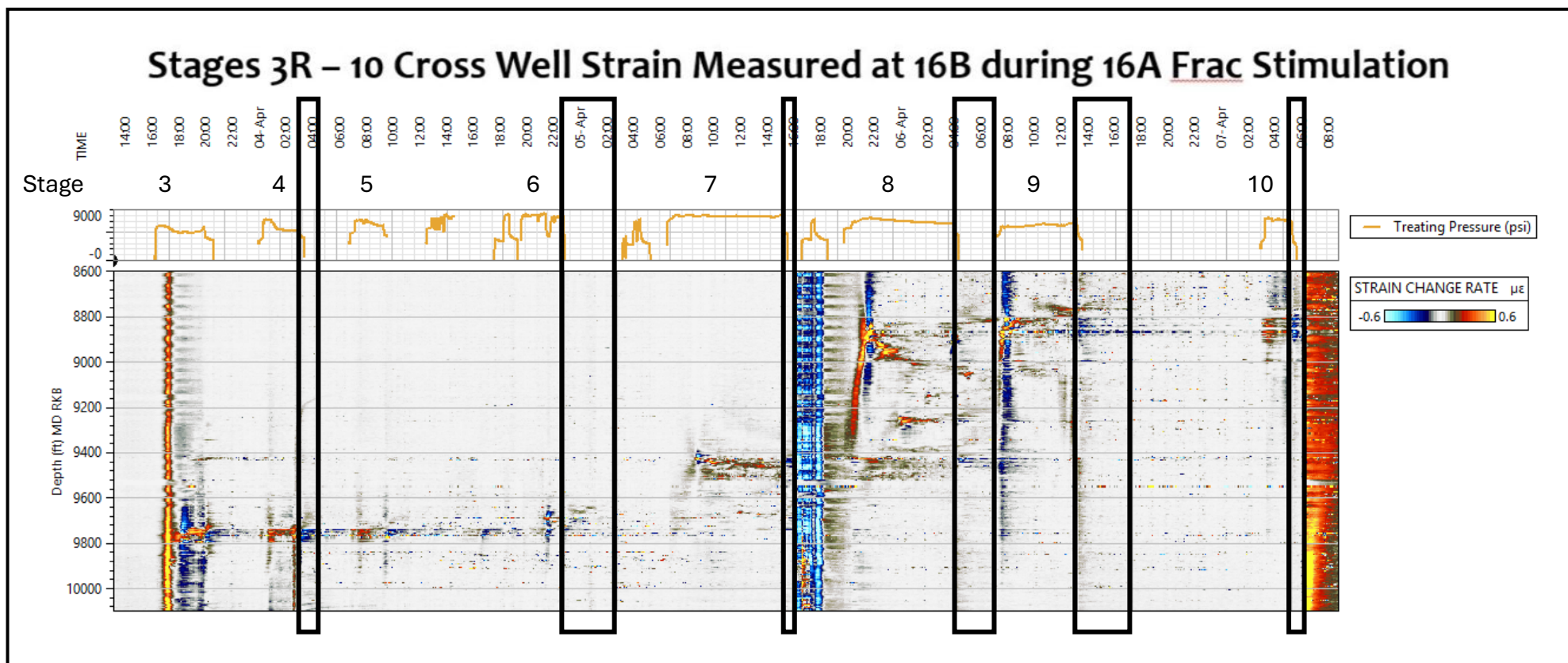
1. Create Strain Windows from each stage
 - Strain Windows use Time Windows from pump Close to End of signal (Fig 1). These windows include peak negative (contraction) energy after close. They provide a cleaner signal for integration than pre-close
 - Multiple methods were used to compile Strain Windows (for comparison and validity purposes)
 - Each method produced a separate Frac Log
2. For each Strain Window method:
 - Align strain windows from each stage by MD.
 - Integrate (sum) the Strain Change Rate (SCR) energy across each measured depth (MD) of the well.



Time Windows

Time windows were selected from Close to End of signal per stage.

As Stages 3, 4, and 5 were so similar (reactivations), stage 4 was chosen to integrate.
Stages 3 & 5 were not integrated.

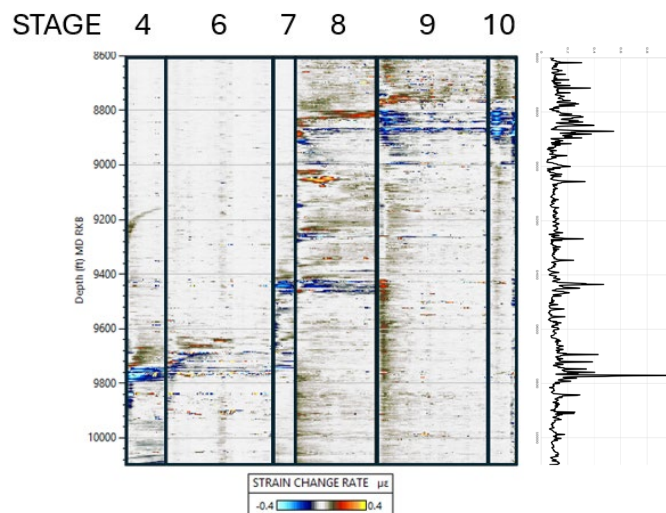


Frac Log Sample Set / Strain Window Method 1 & 2 Integrate ABSOLUTE Values

Method 1 (Fig 2a): (Positive/Negative Values: Full Depth Windows)

Method 2 (Fig 2b): (Positive/Negative Values: Trimmed Depth Windows)

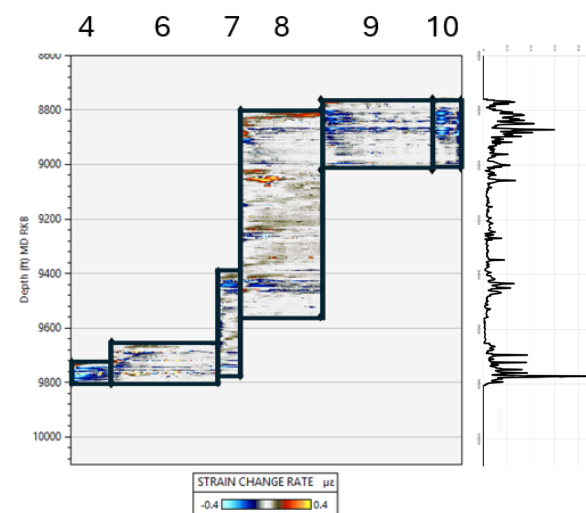
Fig 2a:
FULL DEPTH
Strain Window per Stage
Absolute Values
Integrated across MDs



Integrate ABSOLUTE Values
Across Depth Slices (MD)

FRAC
LOG

Fig 2b:
TRIMMED DEPTH
Strain Window per Stage
Absolute Values
Integrated across MDs



Integrate ABSOLUTE Values
Across Depth Slices (MD)

FRAC
LOG

Strain Windows
Extracted and
Concatenated
before Integration

Frac Log Sample Set / Strain Window Method 3 & 4

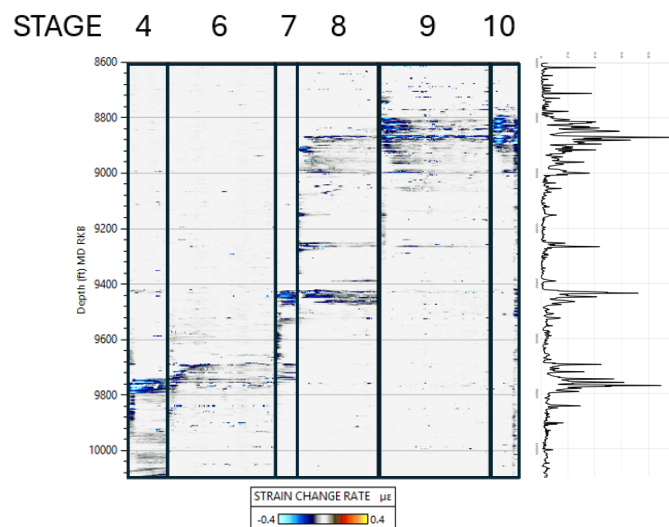
Integrate NEGATIVE Values

(Remove positive values before integration)

Method 3 (Fig 3a): (Negative Values: Full Depth Windows)

Method 4 (Fig 3b): (Negative Values: Trimmed Depth Windows)

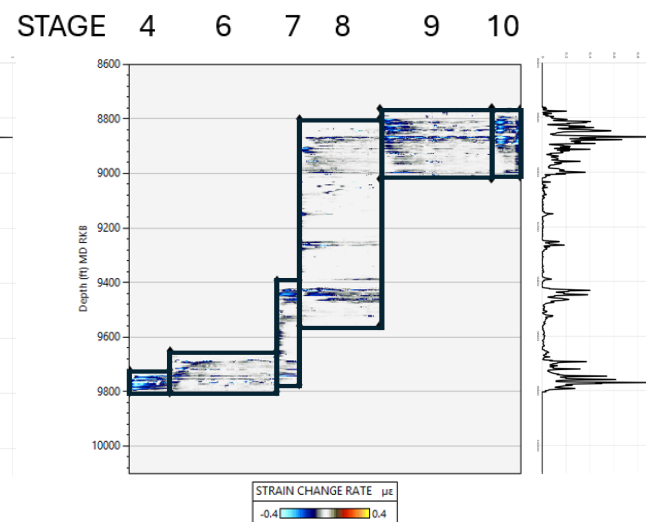
Fig 3a:
FULL DEPTH
Strain Window per Stage
Negative Values
Integrated across MDs



Integrate **NEGATIVE** Values
Across Depth Slices (MD)
(Convert to Positive Values for Log)

**FRAC
LOG**

Fig 3b:
TRIMMED DEPTH
Strain Window per Stage
Negative Values
Integrated across MDs



Integrate **NEGATIVE** Values
Across Depth Slices (MD)
(Convert to Positive Values for Log)

**FRAC
LOG**

Strain Windows
Extracted and
Concatenated
before Integration

The Frac Logs produced from each Method were combined for Comparison and Validity Purposes

