NuStim Rock Properties Track Descriptions

Track #	Curve Name	Description
9	YMS(NSCALC)	Young's Modulus (psi)

Young's Modulus is a measure of the stiffness of the rock. It can be obtained from the measurement of dynamic modulus using sonic log measurements. Calculations of Young's Modulus based on the petrophysical properties of an interval are correlated to core or sonic log measurements, allowing for good predictions in intervals where sonic and core data are not available. This property impacts both the NuStim fracture and production models. Typical Young's Moduli range from 100,000 to 10,000,000 psi.

9	BIOTSCON	Biot's Constant (dimensionless)

Biot's constant indicates the degree to which the pore pressure is allowed to impact the stress of an interval. This constant can be obtained from laboratory measurements and is often calculated by measuring the stress in a pay zone at varying pore pressures. This value is held constant for a localized area, and ranges from 0 to 1.

9	PR_NSC	Poisson's Ratio (dimensionless)

Poisson's ratio is a rock property which governs the NuStim fracture growth model. It is a component of the stress profile. Poisson's ratio is defined as the ratio of lateral strain to longitudinal strain. It can be obtained from core measurements or indirectly obtained from sonic log measurements. Calculations of Poisson's ratio based on the petrophysical properties of an interval are correlated to core or sonic log measurements, allowing for good predictions in intervals where sonic and core data are not available. Poisson's ratio values typically range from 0.15 to 0.4.

10	NSFRWA	Fracture Width (inches)

This curve represents the width of the created fracture, in inches.

10	STRESS_NSC	In-situ Stress (psi)

Stress is a measurement of the minimum least principle stress of the formation. It is derived from the measurements of Poisson's ratio, Young's Modulus, Biot's Constant, pore pressure, and overburden pressure. Stress is calibrated with NuFIT and fracture history matching techniques. This property governs the NuStim fracture model growth predictions.

Track #	Curve Name	Description
11	MAXFPC	Fracture Proppant Concentration Distribution (lb/ft^2)

This represents the distribution of proppant concentration throughout the fracture. The value shown represents the maximum value for overlapping fractures by vertical distribution.

11	MAXNSFFE	Fracture Length (ft)

This curve represents the lateral extent of the created fracture, or fracture half-length.

11	NSFRWA	Fracture Width (inches)

This curve represents the width of the created fracture, in inches.

12	POREP	Pore Pressure (psi)

The pore pressure is the measurement of the interstitial pressure of the fluids in the formation. Pore pressure is a component of the stress profile and impacts both the NuStim fracture and production model results. This property is calibrated with NuFIT.

12	BHTP	Bottomhole Treating Pressure (psi)

The bottomhole treating pressure is the pressure needed to create a hydraulic fracture in the formation. It is equal to the closure stress plus the net (delta) pressure. This property is obtained from NuFIT and fracture history matching techniques. Along with fluid, perforation, and near-wellbore friction, the bottomhole treating pressure dictates the wellhead treating pressure during pumping of a hydraulic fracturing operation.

12	TOUGHNESS	Toughness (psi-inch$^{1/2}$)

Fracture toughness is a material property that reflects the rock's resistance for an existing fracture to propagate. This property impacts the NuStim fracture model. Toughness values for rocks typically vary from 500 to 1,500 psi-inch$^{1/2}$.

13	ACTIVATI	Activation Energy (kcal/mol)

Activation energy is the amount of energy needed to initiate a chemical reaction. It is used for modeling the effectiveness of acidizing treatments.

13	RXNORDER	Reaction Order (dimensionless)

This describes the rate of the acid reaction. It is a variable of lithology and is used in modeling acidizing treatments.

Track #	Curve Name	Description
13	SPECHEAT	Specific Heat (Btu/lb-^{o}F)

Specific heat is the amount of heat per unit mass required to raise the temperature by one degree. This property is used for thermal modeling of the frac fluid and is driven by the textural petrophysical model. It is used along with fracture growth predictions vs. time to model the thermal degradation of the fracture fluid viscosity.

13	T	Temperature (^{o}F)

Temperature, measured either from log measurements or calculated from the area temperature gradient. Temperature is used in fracture thermal modeling and fluid property calculations. It impacts both the NuStim fracture and production models.