Changes – StimPlan/E-StimPlan 6.10

SEPTEMBER 2011

StimPlan

• Comprehensive input for Numerical Production Model – Historically, the Numerical Production model could simulate a range of x_f values, for several different values of $k_f w$ (with all other values being fixed). For multi-fractured horizontal wells this was sometimes a significant restriction. Thus, the input was modified to allow multiple cases varying any variable.

30	🕎 3D Sim Input - Version 6.10 Beta - August 2, 2011						
<u>F</u> ile	Eile Edit Graphs Reports Help						
g	Horz Well: Max L = 6561.58 (ft); Transverse Fracs: Max Xf = 3280.79 (ft)	tal Well					
uction Data Frac-Pack Frac Da	Construint Prop Width (n) Base State Lateral L (n) Case Mumber (n) Case Mumber Hole? Case Mumber Fracture 1/2 Length (n) Prop Width (n) Base State Lateral L (n) Case Mumber (n) Case Mumber Hole? Fracture 1/2 Fracture (n) Case Mumber Hole? Case Mumber Fracture (n) Case Mumber Hole? Fracture Hole? Fracture Hole? Fracture Fracture (n) Fracture Hole? Fracture Hole	Of perforated interval Center of Top of Pay of perforated interval Center of Top of Pay es (for each fracture) (ff) pay 0 Yes 235.0 0 Yes 235.0					
ğ	Delete Add Duplicate Calculate from Proppant Data						
à	Stages Cases E-StimPlan Results						
Asymmetric Economic Data	Simulation Control Schedule New Rename Delete Simulation Data Associated with This Schedule No: Transferred 0 points Time: Rate: Frac Type Original Frac If ReFrac Selected Refrac Occurs at end of Stage Original Frac Original Frac Use E-StimPlan Out (Results from a Complete E-StimPlan run MUST be Avai - Run Un-Fractured Ca Frac-Pack Simulation ØUge Non-Darcy flow in fract	but Directly d KTW Multiplier 1.0000 lable) Beta Multiplier 1.0000 ase n ure					
		<u>ok</u>					
	Input Fluid Properties Simulation Control Frac-Pack Proppant Data Notes						

• Slant Hole Production Simulation – Ability to simulate production from an unstimulated, deviated well (i.e., slant hole) drilled through multiple formations. The extra flow area of the deviated well acts as a stimulation, and in some instances of moderate to high permeability formations, is compared to a near vertical well with small propped fracture treatments.

💆 30 Sim Input - Version 6.10 Beta - August 2, 2011							
File	Edit Graphs Reports Help						
Data	Well Name or ID	Untitled					
ac	Well Type	Completion Data					
ack F	● Oil Well ○ Gas Well	Top Perf Bot Perf (ft TVD) (ft					
-P		7596.2 7598.0 Frac 2.45 4999.9 0.49 12.5					
Fra	⊙Vertical	Rock Compressibility 3.0 Weilhead Temp 80 Drainage Area 320.00 (*F) (*F) 80 Compressibility (*F)					
ata	O Horizontal	Water Compressibility 2.7 Correlations Reservoir Temp 190 Aspect Ratio 1.0000					
0	Angle						
ctio	45						
npo	Flow	Tvd/Md Pairs Formation Database Graphical Input					
P	Use Non-Darcy	TVD Depth Avg. Layer Water Average Horizontal Vertical To on f Pressure Saturation Provide Permeability Permeability					
Dat	Flow Calculations	Layer Zone (ft) Type (psi) (fraction) (fraction) (md) (md)					
nic	In Formations	2 7751.7 Valhall ▼0 0 0 0 0 0 0 Fill Davis					
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ШŬ	Bndry Cond	from					
ittio	Closed Bndry	Frac					
nu	Cristiti Pres	Paste					
SVI							
	Total H (ft)	183.7 Horizontal 0.300 Reservoir Model	Undo				
		(md) <u>New Rename Delete</u>	ОК				
	Input Eluid Broport	tice Simulation Control Error Dock Dronnent Data Nates					
	Linbar Linia Lober						

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• Extensive New User Help – The "User Help" has been extensively upgraded (although this process is still ongoing). One major new feature is "pop-up" help items such as seen before. These will "pop-up" once per StimPlan session if the cursor is hovered over an input field (unless "pop-ups" are deactivated in the "Help" menu.

3D Sim Input - Version 6.10 Beta - August 2, 2011					
ac Data	Well ID: Tg-338	Set Shift Import Paste Tvd/Md Pairs			
Economic DataProduction DataFrac-PackFre	● TVD ● MD TVD Depth to Top of Stress Difference Stress Gradient Stress Gradient	Modulus Fill Down Modulus is a pure rock property, the "stiffness" of the rock, and the best data comes from traixial compression tests on core samples. Typical values might include: Fill Down Sandstone 10e6 psi 10e4 MPa Proppant inbedment (L0ff'2) Moderate to high K, 15+% Porosity, Semi-consolidated 0.5 - 2 0.35 - 1.4 20000 Moderate K, 12% Porosity, Consolidated 2 - 3 1.4 - 2 20000 Low K, <10% Porosity, Calcitle Cemented			
metrid	Top (ft) Bottom (ft) Top (ft) Bottom (ft) 7611.5 7709.9 7611.5 7709.9 OPTIONAL Input (Only for KftW Calculations) Allow Natural F	racture Fluid Loss racture Network Actual Geologic Model New Rename Delete Actual			
Asym	Iop of Pay (IT) Bottom of Pay (IT) Spurt Time (min) 0.0 0.0 0.00	Ise Detailed Loss Controlled by "Fines" Tuid Loss Conc. 0.000000 Cw (ft/sqrt(min)) 0.00000 Under Conc. 0.000000 Cw (ft/sqrt(min)) 0.00000 Under Conc. 0.000000 Cw (ft/sqrt(min)) 0.00000 CW (ft/sqrt(min)) 0.0000			
	Well Data Reservoir Geologic Layering Acidizing Nat	Frac Loss Fluid Data Proppant Data Pump Schedule Detail Fl Loss Friction Data Notes			

• Database Files – Greatly expanded fluid and proppant database files.

Analysis/Logs Modules

• New Log Calculations – "Logs" now includes calculations modules for generating an "Effective porosity log from Neutron/Density logs, and for generating both empirical (using laboratory porosity/permeability data) and theoretical permeability logs using effective porosity versus permeability correlations.



E-StimPlan

- Water Fracs Allowed input for a stress sensitive "Unpropped k_f w". This can be transferred to several sophisticated reservoir models for post-frac simulations of water fracs.
- Stress Sensitive Propped (and Unpropped) Fracture Conductivity When passing fracture data directly from E-StimPlan to the Numerical Reservoir Model, the Numerical Reservoir Model includes the effects of drawdown on conductivity reduction in the fracture.