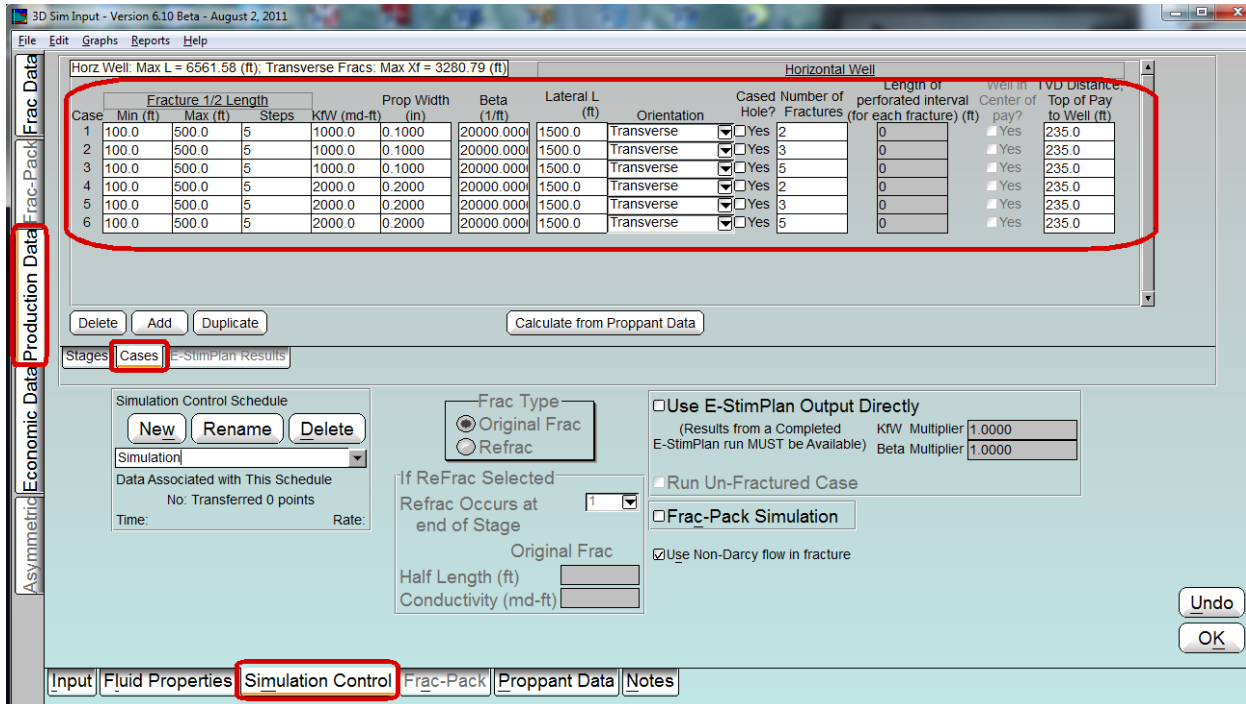


Changes – StimPlan/E-StimPlan 6.10

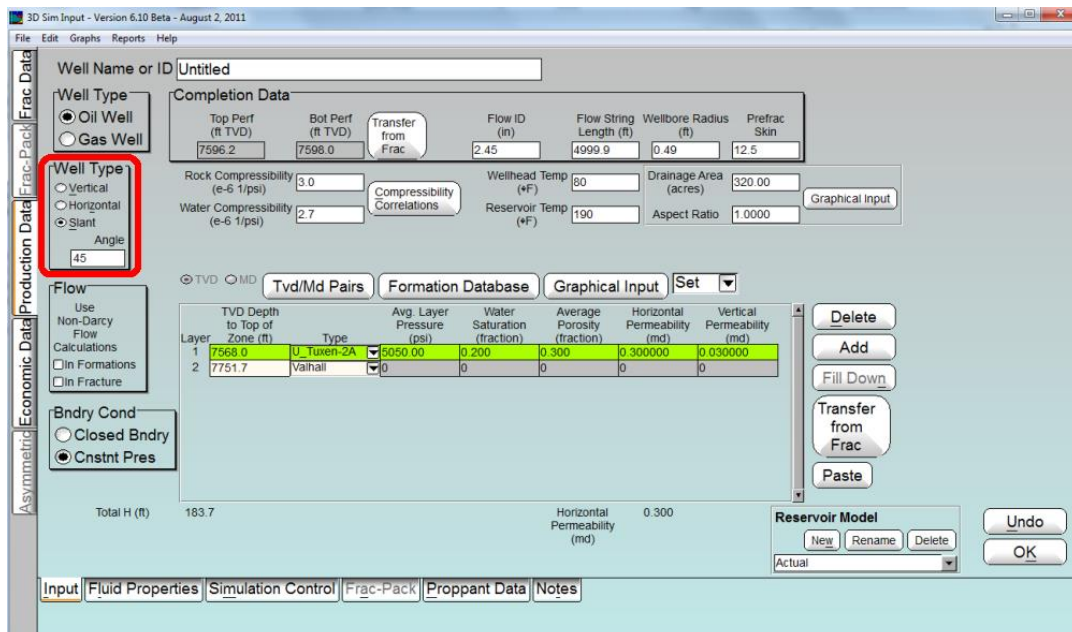
SEPTEMBER 2011

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_{fW} (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.



- 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.



- 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

Well ID: Tg-338

Set Shift Import Paste Tvd/Md Pairs Fill Down

TVD MD

Layer	TVD Depth to Top of Zone (ft)	Type	Stress Difference (psi)	Stress Gradient from Surface (psi/ft)	Stress at Top of Zone (psi)	Proppant Embedment (lb/ft ²)
7	7268.0	Silty	-7.0	0.539	3917.4	20000
8	7274.2	Silty	0.1	0.539	3920.8	20000
9	7294.2	Silty	0.2	0.539	3931.6	20000
10	7495.3	Silty	1.8	0.539	4040.0	20000
11	7613.1	Gas	1.1	0.539	4103.5	20000
12	7631.1	Silty	0.1	0.539	4113.2	20000
13	7676.4	Gas	0.4	0.539	4137.6	20000
14	7705.6	Silty	0.2	0.539	4153.3	20000
15	7715.5	Silty	0.1	0.539	4158.6	20000
16	7732.8	Silty	0.2	0.539	4168.0	20000
17	7771.6	Silty	0.4	0.539	4188.9	20000
18	7801.7	Silty	945.5	0.660	5150.4	20000

Modulus

Modulus is a pure rock property, the "stiffness" of the rock, and the best data comes from triaxial compression tests on core samples. Typical values might include:

Sandstone 10e6 psi 10e4 MPa
 Moderate to high k, 15+% Porosity, Semi-consolidated 0.5 - 2 0.35 - 1.4
 Moderate k, 12% Porosity, Consolidated 2 - 3 1.4 - 2
 Low k, <10% Porosity, Quartz Cemented 4 - 5 2.7 - 3.4
 Tight, <6% Porosity, Calcite Cement 5 - 6 3.4 - 4.1

Limestone
 Moderate to high k, 15+% Porosity 3 - 4 2 - 2.8
 Moderate k, 10 - 12% Porosity 4 - 5 2.8 - 3.4
 Low k, <10% Porosity 5 - 6 3.4 - 4.1
 Tight, <6% Porosity 6 - 8 4.1 - 5.5

Additional discussion is found in this file
[Help_Modulus](#)

Fluid Loss

Calculate Layer Fluid Loss

Allow Natural Fracture Fluid Loss
 Allow Natural Fracture Network

Spurt Time (min) Use Detailed Fluid Loss Loss Controlled by "Fines"
 0.00 "Base" Fines Conc. 0.000000
 Cw (ft/sqrt(min)) 0.00000

Fracture Orientation
 Transverse Longitudinal

Geologic Model
 New Rename Delete
 Actual
 Natural Fracture Network Data

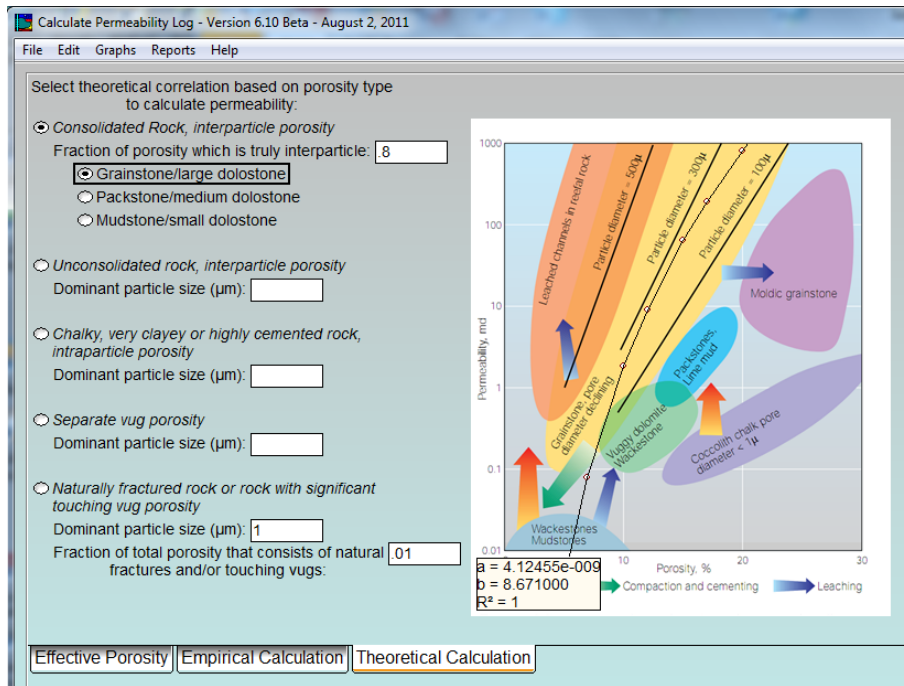
Undo
OK

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_{rw} ”. 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.