

Application

Part *II*

## **WELLBORE SCHEMATIC**

Permian Oilfield Partners, LLC.  
Marauder Federal SWD #1  
1311' FNL, 250' FEL  
Sec. 9, T26S, R35E, Lea Co. NM  
Lat 32.0614582° N, Lon 103.3647111° W  
GL 3146', RKB 3176'

### **Surface - (Conventional)**

Hole Size: 26"  
Casing: 20" - 94# H-40 STC Casing  
Depth Top: Surface  
Depth Btm: 959'  
Cement: 621 sks - Class C + Additives  
Cement Top: Surface - (Circulate)

### **Intermediate #1 - (Conventional)**

Hole Size: 17.5"  
Casing: 13.375" - 61# J-55 & 68# J-55 STC Casing  
Depth Top: Surface  
Depth Btm: 5268'  
Cement: 1714 sks - Lite Class C (50:50:10) + Additives  
Cement Top: Surface - (Circulate)

### **Intermediate #2 - (Conventional)**

Hole Size: 12.25"  
Casing: 9.625" - 40# L-80 & 40# HCL-80 BTC Casing  
Depth Top: Surface  
Depth Btm: 12707'  
Cement: 2153 sks - Lite Class C (60:40:0) + Additives  
Cement Top: Surface - (Circulate)  
ECP/DV Tool: 5368'

### **Intermediate #3 - (Liner)**

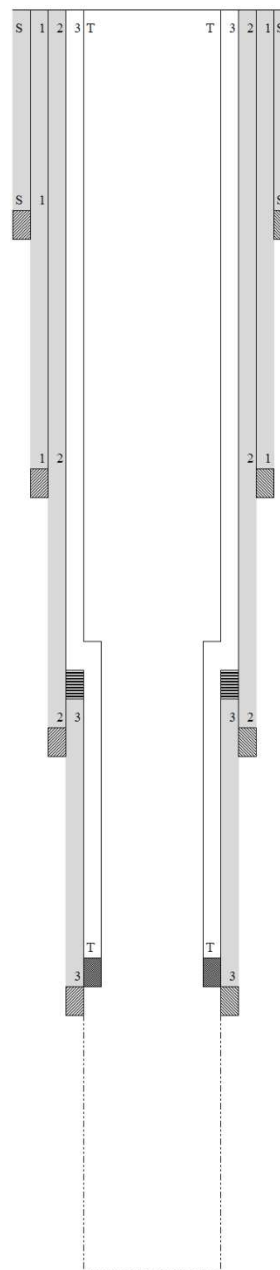
Hole Size: 8.5"  
Casing: 7.625" - 39# HCL-80 FJ Casing  
Depth Top: 12507'  
Depth Btm: 18231'  
Cement: 266 sks - Lite Class C (60:40:0) + Additives  
Cement Top: 12507' - (Volumetric)

### **Intermediate #4 - (Open Hole)**

Hole Size: 6.5"  
Depth: 20030'  
Inj. Interval: 18231' - 20030' (Open-Hole Completion)

### **Tubing - (Tapered)**

Tubing Depth: 18186'  
Tubing: 7" - 26# HCP-110 FJ Casing & 5.5" 17# HCL-80 FJ Casing (Fiberglass Lined)  
X/O Depth: 12507'  
X/O: 7" 26# HCP-110 FJ Casing - X - 5.5" 17# HCL-80 FJ Casing (Fiberglass Lined)  
Packer Depth: 18196'  
Packer: 5.5" - Perma-Pak or Equivalent (Inconel)



## 7" UFJ Tubing Inside of 9 5/8" 40# Casing

### Bowen Series 150 Releasing and Circulation Overshots

Maximum Catch Size 6 5/8" to 7 1/8" Inclusive

Maximum Catch Size (Spiral)		6 5/8"	6 3/4"	7"	7 1/8"
Maximum Catch Size (Basket)		5 7/8"	6 1/8"	6 5/8"	6 5/8"
Overshot O.D.		8 1/4"	7 7/8"	8 1/4"	8 5/8"
Type		F.S.	S.H.	S.H.	S.H.
Complete Assembly	Part No.	C-3032	C-5222	9217	C-5354
(Dressed Spiral Parts)	Weight	280	243	251	260

### Replacement Parts

Top Sub	Part No.	A-3033	A-5223	9218	A-5355
Bowl	Part No.	B-3034	B-5224	9219	B-5356
Packer	Part No.	A-1814	B-5225	9224	B-5357
Spiral Grapple	Part No.	N-84	B-5227	9222	B-5359
Spiral Grapple Control	Part No.	M-89	A-5228	9223	B-5360
Standard Guide	Part No.	A-1818	A-5229	9226	A-5361

### Basket Parts

Basket Grapple	Part No.	N-84	B-5227	9222	B-5359
Basket Grapple Control	Part No.	M-89	A-5228	9223	B-5360
Mill Control Packer	Part No.	A-1814-R	B-5225-R	9224-R	B-5357-R

A 8.125" O.D. Bowen Series 150 Overshot will be used to perform this overshot operation. Details on the overshot are listed above. Casing to tubing clearance dimensions are listed below.

7" 26# FJ Casing Inside 9.625" 40# BTC Casing													
Clearance (in)	Pipe Size (in)	Weight lb/ft	Grade	Conn.	Type	Body O.D. (in)	Coupling O.D. (in)	I.D. (in)	Drift (in)	Lined Wt. lb/ft	Lined I.D. (in)	Flare I.D. (in)	Lined Drift (in)
0.840	9 5/8	40.0	L-80	BTC	Casing	9.625	10.625	8.835	8.679	-	-	-	-
	7	26.0	HCP-110	FJ	Casing	7.000	7.000	6.276	6.151	28.500	6.080	5.940	5.815

\*Red Indicates Tubing

# **Fishing Procedure**

## **Overshot Fishing Procedure**

### **In the Event of a Connection Break**

#### **- If fishing neck is clean**

1. Trip in hole with overshot and engage fish.
2. Pick up 2 points over neutral weight.
3. Turn pipe 10-15 turns to the right to release the seal assembly from the packer.
4. Once released from packer, trip out of hole with fish.

A skirted mill may be substituted for a standard mill to ensure pipe stabilization and the casing is not damaged while milling

#### **- If dressing fishing neck is required**

1. Trip in hole with mill and dress fishing neck to allow for overshot to engage tubing.
2. Trip out of hole with mill.
3. Trip in hole with overshot and engage fish.
4. Pick up 2 points over neutral weight.
5. Turn pipe 10-15 turns to the right to release the seal assembly from the packer.
6. Once released from packer, trip out of hole with fish.

A skirted mill may be substituted for a standard mill to ensure pipe stabilization and the casing is not damaged while milling

### **In the Event of a Body Break**

#### **- If fishing neck is clean**

1. Trip in hole with overshot and engage fish.
2. Pick up 2 points over neutral weight.
3. Turn pipe 10-15 turns to the right to release the seal assembly from the packer.
4. Once released from packer, trip out of hole with fish.

#### **- If dressing fishing neck is required**

1. Trip in hole with mill and dress fishing neck to allow for overshot to engage tubing.
2. Trip out of hole with mill.
3. Trip in hole with overshot and engage fish.
4. Pick up 2 points over neutral weight.

5. Turn pipe 10-15 turns to the right to release the seal assembly from the packer.
6. Once released from packer, trip out of hole with fish.

A skirted mill may be substituted for a standard mill to ensure pipe stabilization and the casing is not damaged while milling

## **Spear Fishing Procedure**

**If an overshot cannot be used to retrieve the fish, a spear may be used.**

- Due to the use of insert lined tubing, the composite liner must be removed from the tubing before engaging the fish with a spear.
1. Trip in hole with spear sized to engage the I.D. of the insert liner.
  2. Engage the insert liner inside the tubing with spear.
  3. Pull the insert liner out of the tubing.
  4. Trip out of hole with insert liner.
  5. Trip in hole with spear sized to engage the I.D. of the tubing.
  6. Engage the tubing with spear.
  7. Pick up 2 points over neutral weight.
  8. Turn pipe 10-15 turns to the right to release the seal assembly from the packer.
  9. Once released from packer, trip out of hole with fish.

## **Inside Diameter Cutting Tool Fishing Procedure**

**If an overshot is required but a mill cannot be used to dress off a fishing neck, an inside diameter cutting tool may be used.**

- Due to the use of insert lined tubing, the composite liner must be removed from the tubing before engaging the fish with a spear.
1. Trip in hole with spear sized to engage the I.D. of the insert liner.
  2. Engage the insert liner inside the tubing with spear.
  3. Pull the insert liner out of the tubing.
  4. Trip out of hole with insert liner.
  5. Trip in hole with inside diameter cutting tool and cut the tubing below the damaged fishing neck.
  6. Trip out hole with cutting tool.
  7. Trip in hole with spear sized to engage the I.D. of the tubing.
  8. Engage the previously cut tubing segment with spear.
  9. Trip out hole with cut tubing segment and spear.
  10. Trip in hole with overshot and engage fish.
  11. Pick up 2 points over neutral weight.
  12. Turn pipe 10-15 turns to the right to release the seal assembly from the packer.
  13. Once released from packer, trip out of hole with fish.

## 5 1/2" UFJ Tubing Inside of 7 5/8" 39# Casing

### Series 150 Overshots

Tools are listed in order of maximum catch size.

The following table shows only a partial listing of available NOV Dowhole Bowen® overshots.

*NOTE: Nitralloy Grapples are available upon request.*

#### Bowen Series 150 Releasing and Circulation Overshots

Maximum Catch Size 4 1/4" to 5 1/2" inclusive

Maximum Catch Size (Spiral)		4 1/4"	4 1/2"	4 3/4"	4 7/8"	5"	5 1/8"	5 1/2"
Maximum Catch Size (Basket)		3 1/4"	4"	4 1/4"	4 1/2"	4 3/4"	4 7/8"	5 1/2"
Overshot O.D.		5 5/8"	5 7/8"	5 7/8"	5 7/8"	5 7/8"	6 1/8"	6 1/8"
Type		F.S.	S.H.	S.H.	S.F.S.	S.H.	F.S.	S.H.
Complete Assembly	Part No.	5896	5898	C-5168	8975	C-5171	C-4825	8825
(Dressed Spiral Parts)	Weight	130	130	133	138	140	192	185
<b>Replacement Parts</b>								
Top Sub	Part No.	5897	5899	A-5169	8976	A-5172	B-4826	8826
Bowl	Part No.	5898	5700	B-5170	8977	B-5173	B-4827	8817
Packer	Part No.	169	1140	B-2199	6114	L-5950	L-4505	8818
Spiral Grapple	Part No.	165	1135	B-2201	6112	B-4369	M-1071	8819
Spiral Grapple Control	Part No.	188	1137	B-2202	6113	B-4370	M-1072	8820
Standard Guide	Part No.	187	1143	B-2203	6121	B-4371	L-1074	8821
<b>Basket Parts</b>								
Basket Grapple	Part No.	165	1135	B-2201	6112	B-4369	M-1071	8819
Basket Grapple Control	Part No.	188	1137	B-2202	6113	B-4370	M-1072	8820
Mill Control Packer	Part No.	169-R	1140-R	B-2199-R	6114-R	L-5950-R	M-4505	L-8818-R

A (6.625" turned down to **6.500"** O.D.) Bowen Series 150 Overshot will be used to perform this overshot operation. Details on the overshot are listed above. Casing to tubing clearance dimensions are listed below.

5.5" 17# FJ Casing Inside 7.625" 39# FJ Casing													
Clearance (in)	Pipe Size (in)	Weight lb/ft	Grade	Conn.	Type	Body O.D. (in)	Coupling O.D. (in)	I.D. (in)	Drift (in)	Lined Wt. lb/ft	Lined I.D. (in)	Flare I.D. (in)	Lined Drift (in)
0.500	7 5/8	39.0	HCL-80	FJ	Casing	7.625	7.625	6.625	6.500	-	-	-	-
	5 1/2	17.0	HCL-80	FJ	Casing	5.500	5.500	4.892	4.767	18.500	4.520	4.400	4.275

\*Red Indicates Tubing

# **Fishing Procedure**

## **Overshot Fishing Procedure**

### **In the Event of a Connection Break**

#### **- If fishing neck is clean**

1. Trip in hole with overshot and engage fish.
2. Pick up 2 points over neutral weight.
3. Turn pipe 10-15 turns to the right to release the seal assembly from the packer.
4. Once released from packer, trip out of hole with fish.

A skirted mill may be substituted for a standard mill to ensure pipe stabilization and the casing is not damaged while milling

#### **- If dressing fishing neck is required**

1. Trip in hole with mill and dress fishing neck to allow for overshot to engage tubing.
2. Trip out of hole with mill.
3. Trip in hole with overshot and engage fish.
4. Pick up 2 points over neutral weight.
5. Turn pipe 10-15 turns to the right to release the seal assembly from the packer.
6. Once released from packer, trip out of hole with fish.

A skirted mill may be substituted for a standard mill to ensure pipe stabilization and the casing is not damaged while milling

### **In the Event of a Body Break**

#### **- If fishing neck is clean**

1. Trip in hole with overshot and engage fish.
2. Pick up 2 points over neutral weight.
3. Turn pipe 10-15 turns to the right to release the seal assembly from the packer.
4. Once released from packer, trip out of hole with fish.

#### **- If dressing fishing neck is required**

1. Trip in hole with mill and dress fishing neck to allow for overshot to engage tubing.
2. Trip out of hole with mill.
3. Trip in hole with overshot and engage fish.
4. Pick up 2 points over neutral weight.

5. Turn pipe 10-15 turns to the right to release the seal assembly from the packer.
6. Once released from packer, trip out of hole with fish.

A skirted mill may be substituted for a standard mill to ensure pipe stabilization and the casing is not damaged while milling

## **Spear Fishing Procedure**

**If an overshot cannot be used to retrieve the fish, a spear may be used.**

- Due to the use of insert lined tubing, the composite liner must be removed from the tubing before engaging the fish with a spear.
1. Trip in hole with spear sized to engage the I.D. of the insert liner.
  2. Engage the insert liner inside the tubing with spear.
  3. Pull the insert liner out of the tubing.
  4. Trip out of hole with insert liner.
  5. Trip in hole with spear sized to engage the I.D. of the tubing.
  6. Engage the tubing with spear.
  7. Pick up 2 points over neutral weight.
  8. Turn pipe 10-15 turns to the right to release the seal assembly from the packer.
  9. Once released from packer, trip out of hole with fish.

## **Inside Diameter Cutting Tool Fishing Procedure**

**If an overshot is required but a mill cannot be used to dress off a fishing neck, an inside diameter cutting tool may be used.**

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  3. Pull the insert liner out of the tubing.
  4. Trip out of hole with insert liner.
  5. Trip in hole with inside diameter cutting tool and cut the tubing below the damaged fishing neck.
  6. Trip out hole with cutting tool.
  7. Trip in hole with spear sized to engage the I.D. of the tubing.
  8. Engage the previously cut tubing segment with spear.
  9. Trip out hole with cut tubing segment and spear.
  10. Trip in hole with overshot and engage fish.
  11. Pick up 2 points over neutral weight.
  12. Turn pipe 10-15 turns to the right to release the seal assembly from the packer.
  13. Once released from packer, trip out of hole with fish.

## **Abandonment Procedure**

**If the tubing cannot be recovered and the well is to be abandoned.**

- The operator will ensure that all geologic formations are properly isolated.
- 1. Confirm the I.D. of the injection tubing is free from obstructions.
- 2. Run in hole with wireline set profile plug.
- 3. Set plug inside of packer assembly.  
(Plug will allow cement to fill the I.D. of the injection tubing and the tubing to casing annulus)
- 4. Run in hole with wireline conveyed perforating guns and perforate the tubing immediately above the packer.
- 5. Trip in hole with an overshot, spear, cement retainer or isolation tool that will provide a work string-to- injection tubing seal.
- 6. Engage the fish with sealing tool.
- 7. Confirm circulation down the tubing and up the tubing-to-casing annulus.
- 8. Cement the work string, injection tubing, injection tubing-to-casing annulus and work string-to-casing annulus to surface.
- 9. Confirm the entirety of the wellbore is cemented to surface and all zones are isolated.
- 10. ND wellhead and install permanent capping flange.



**Attachment to C-108**  
**Permian Oilfield Partners, LLC**  
**Marauder Federal SWD #1**  
**1311' FNL & 250' FEL**  
**Sec 9, T26S, R35E**  
**Lea County, NM**

July 13, 2019

**STATEMENT REGARDING SEISMICITY**

Examination of the USGS and TexNet seismic activity databases has shown minimal historic seismic activity in the area (< 30 miles) of our proposed above referenced SWD well as follows:

1. M2.6, 2017-05-03, 20.12 miles away @ 85.86 deg heading
2. M4.6, 1992-01-02, 24.42 miles away @ 39.00 deg heading
3. M3.3, 2001-06-02, 22.89 miles away @ 34.70 deg heading
4. M2.9, 1984-12-09, 18.01 miles away @ 321.71 deg heading

Permian Oilfield Partners does not own any 2D or 3D seismic data in the area of this proposed SWD well. Our fault interpretations are based on well to well correlations and publicly available data and software as follows:

1. USGS Quaternary Fault & Fold database shows no quaternary faults in the nearby area.
2. Based on offset well log data, we have not interpreted any faults in the immediate area.
3. Basement PreCambrian faults are documented in the Snee & Zoback paper, "State of stress in the Permian Basin, Texas and New Mexico: Implications for induced seismicity", published in the February 2018 issue of the SEG journal, The Leading Edge, along with a method for determining the probability of fault slip in the area.
4. Fault data was also correlated to the publicly available USGS GIS geologic units & structural features database, to Ewing's 1990 Tectonic map of Texas (via Ruppel's 2005 Preparation of Maps Depicting Geothermal Gradient and PreCambrian Structure in the Permian Basin), and to fault maps as published in the New Mexico Geological Society Special Publication 13A, "Energy and Mineral Resources of New Mexico: Petroleum Geology," by R. F. Broadhead, 2017.
5. Even though we do not propose to inject into the PreCambrian, Permian Oilfield Partners ran modeling to check for fault slip assuming the improbable occurrence of a total

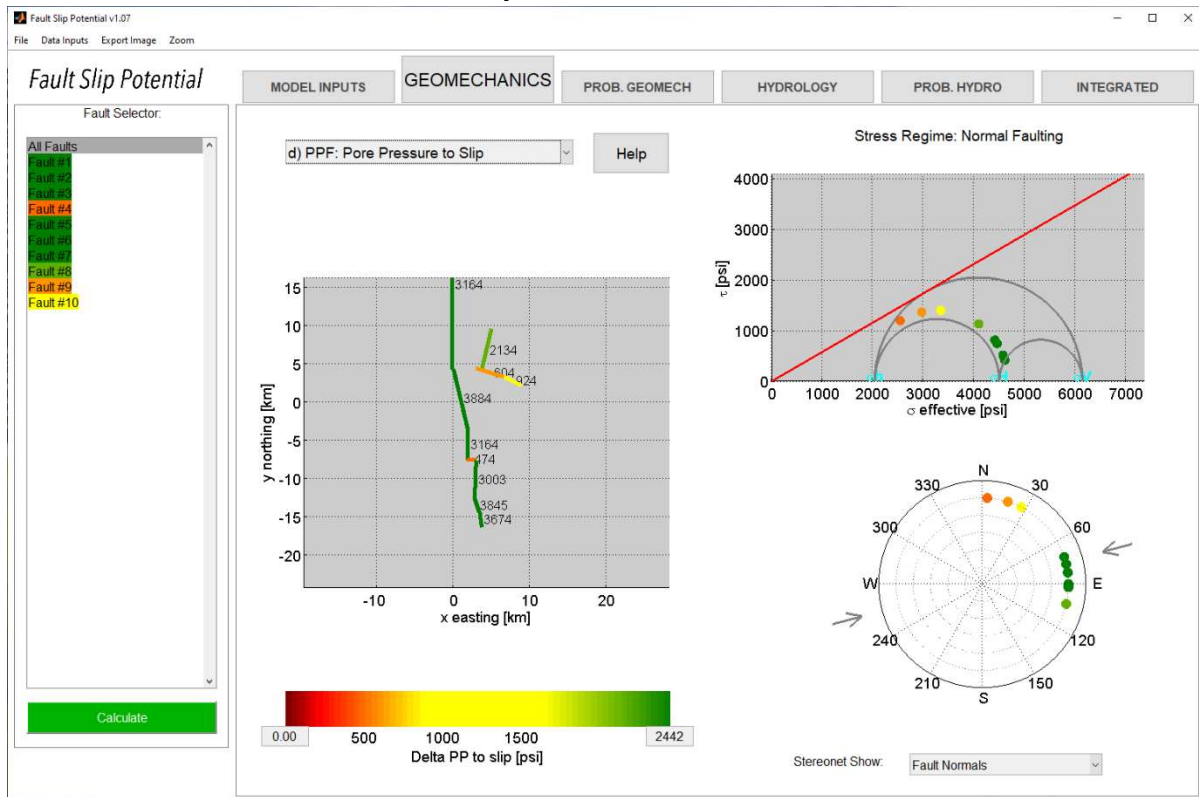
downhole well failure that would allow 100% of injected fluids to enter the PreCambrian. Software as discussed in #3 from the Stanford Center for Induced and Triggered Seismicity, "FSP 1.0: A program for probabilistic estimation of fault slip potential resulting from fluid injection", was used to calculate the probability of the PreCambrian fault being stressed so as to create an induced seismic event, with the following assumptions:

- a. Full proposed capacity of 50,000 BBL/day for 30 years
  - b. 12.5 mD average permeability, 3% average porosity, .75 psi/ft stress gradient, .47 psi/ft hydrostatic gradient
  - c. A-phi=0.60 & Max Horizontal Stress direction 75 deg N, as per Snee, Zoback paper noted above.
6. The distance from the proposed injection well to the nearest basement fault is approximately 12 km. The probability of an induced seismic event in the PreCambrian is calculated to be 0% after 5, 10, 20, & 30 years as per the FSP results screenshots below.
  7. The analysis below assumes an improbable well failure through the Montoya & Simpson barrier zones, through the Ellenburger & Cambrian permeable zones, into the PreCambrian. When the injected fluids stay in the Devonian-Silurian zone as per design, there will be very low probability of fault slip, since there are no known nearby faults within the Devonian-Silurian.

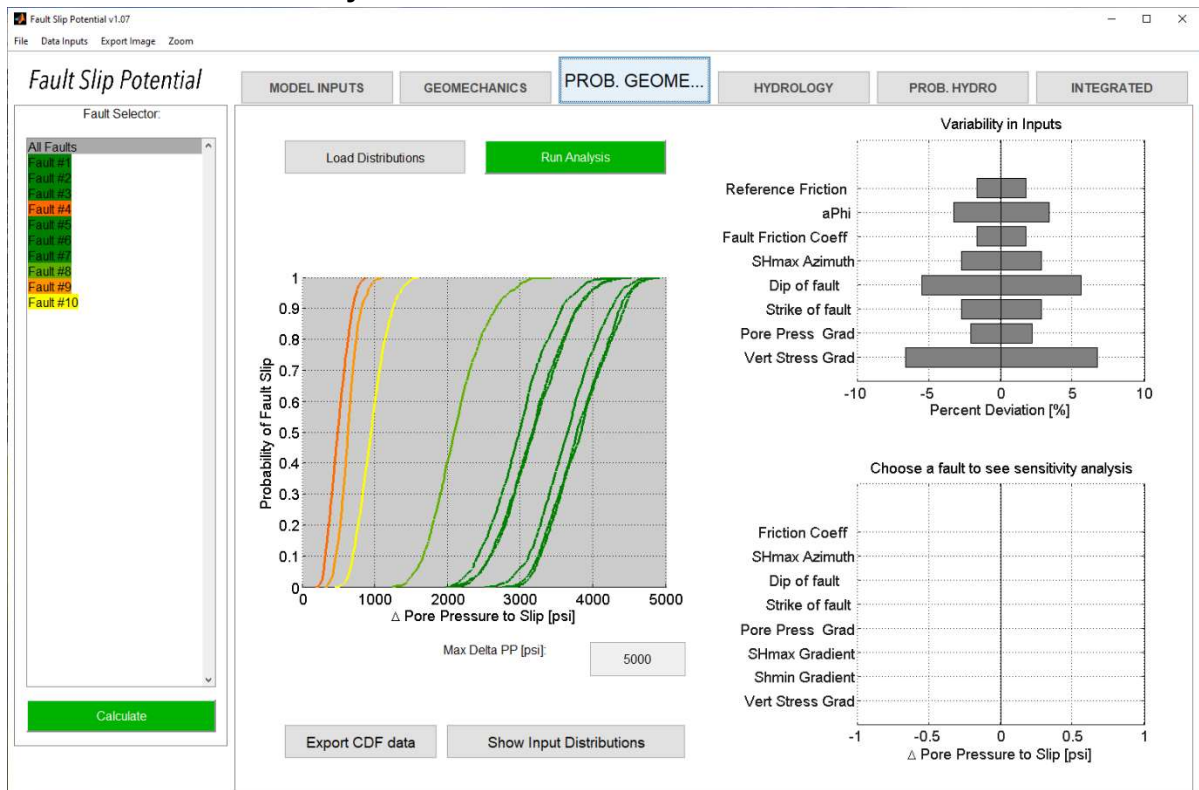
**Input assumptions:**

Rate (BBL/day)	50000
Interval height (ft)	1500
Average Porosity (%)	3
Vert stress gradient (psi/ft)	0.75
Hor stress direction (deg N)	75
Fault dip (deg)	75
Ref depth (ft)	21900
Initial res press gradient (psi/ft)	0.47
A phi	0.6
Friction coefficient	0.58
Weighted average perm	12.5
Fluid density (kg/m3)	1100
Dynamic viscosity	0.0003
Fluid compressibility (/Pa)	4 e-10
Rock compressibility (/Pa)	1.08 e-09

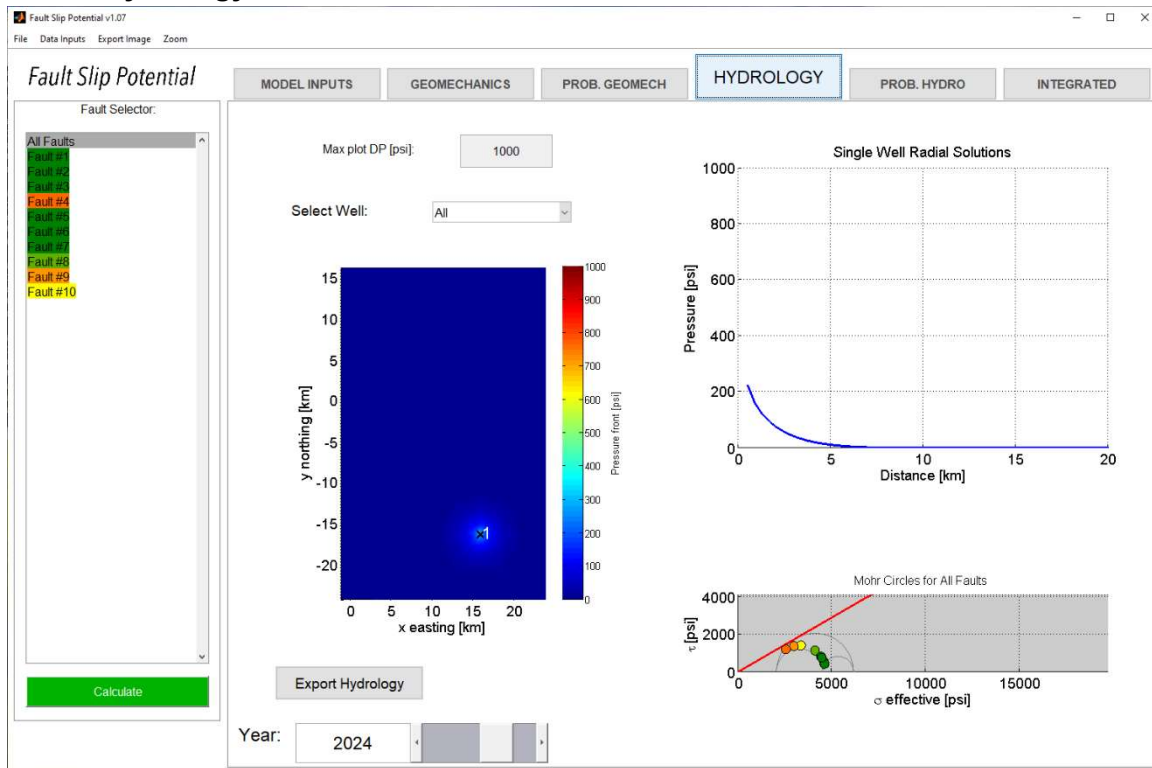
## Geomechanics Pore Pressure to Slip



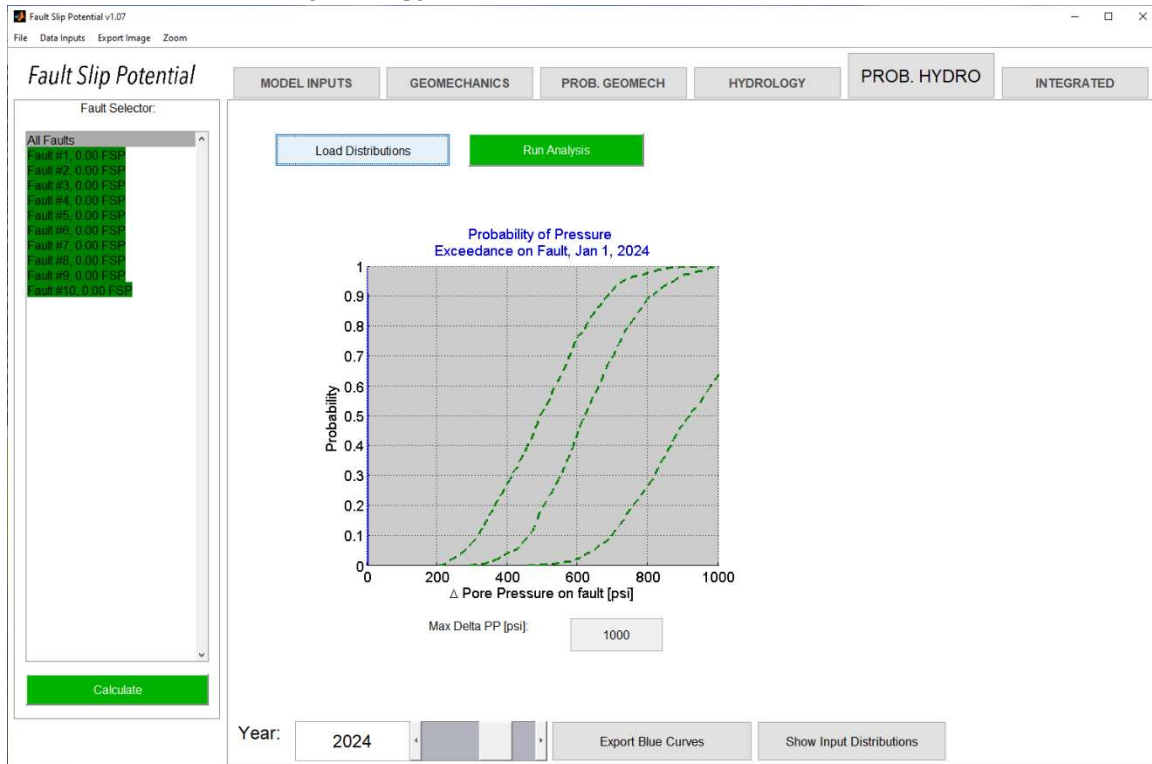
## GeoMechanics Variability



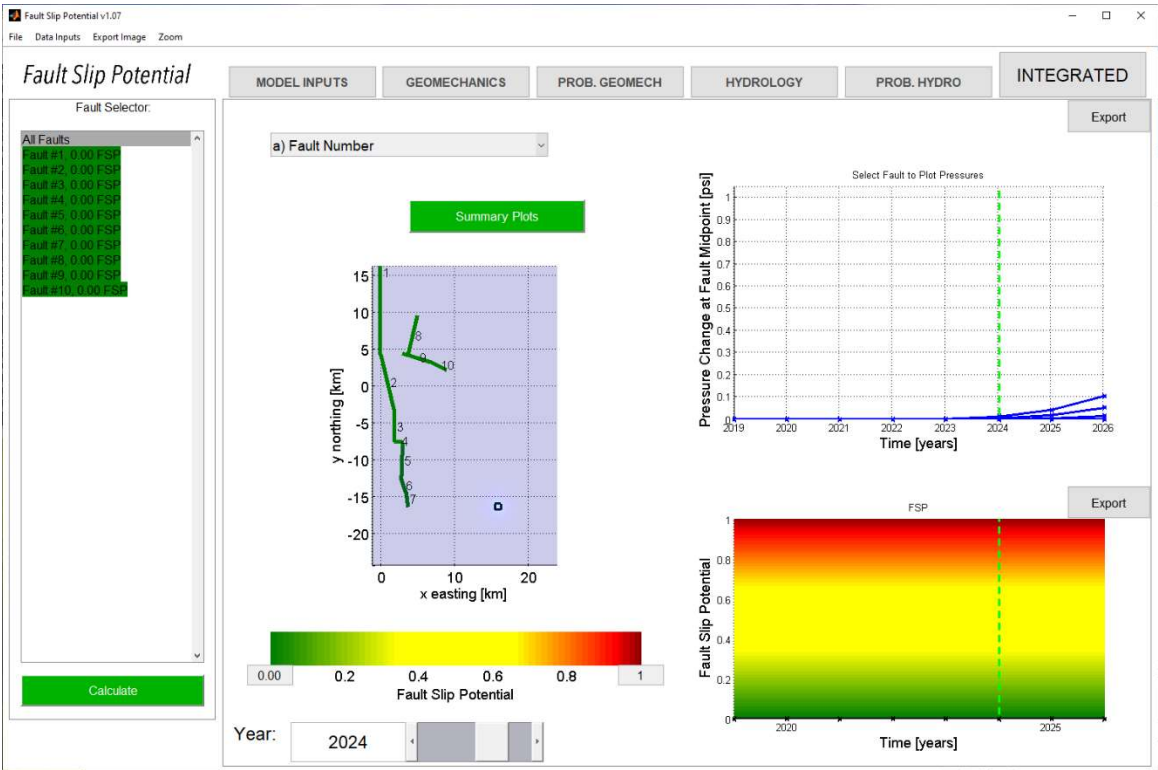
## Year 5 Hydrology



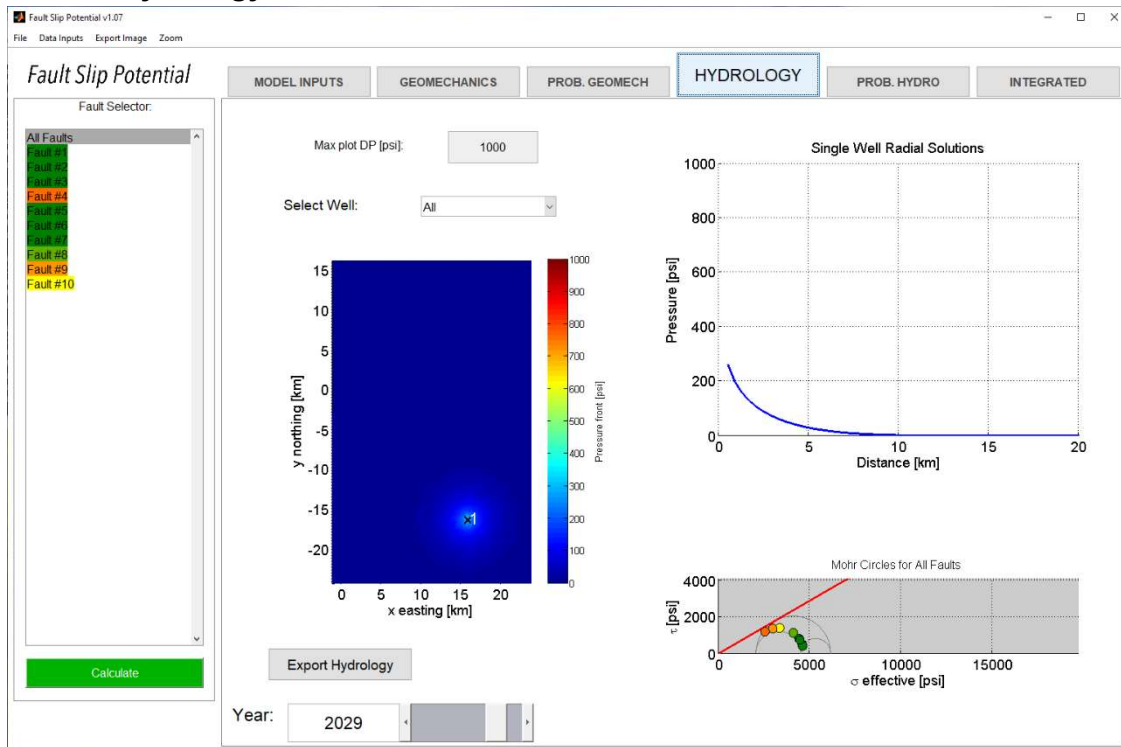
## Year 5 Probabilistic Hydrology (note no crossover between blue delta-press. & green fault slip press.)



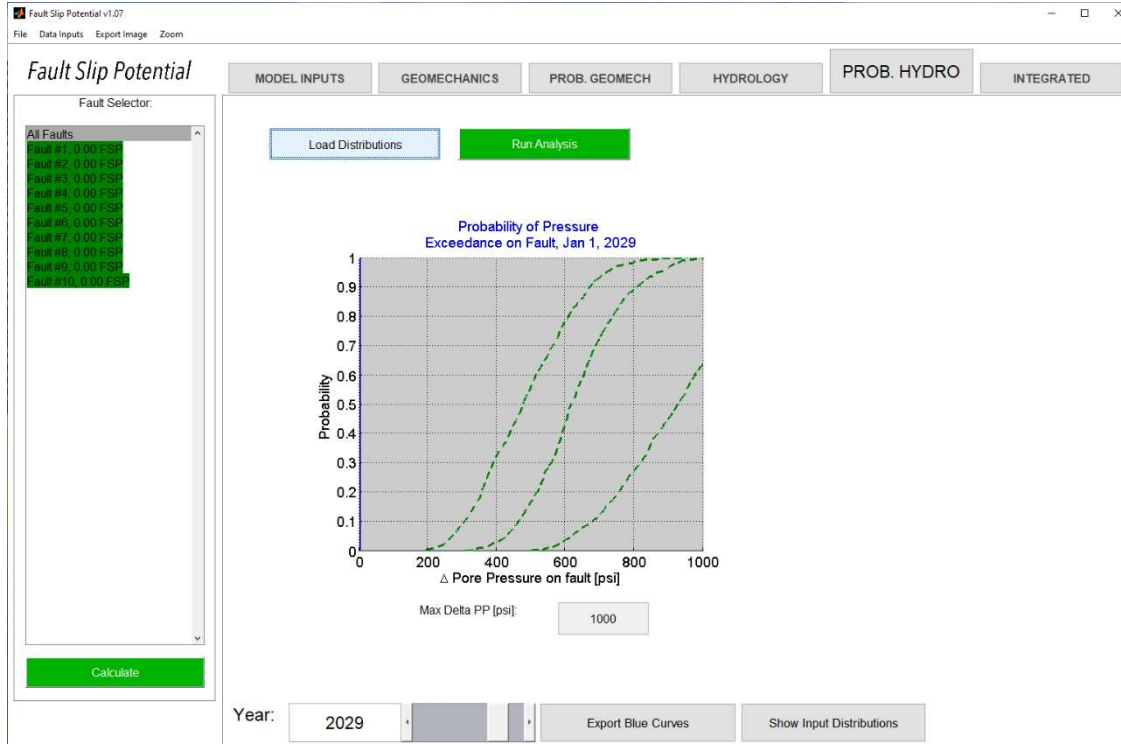
Year 5 Fault Slip Probability (0% for all fault segments after 5 years)



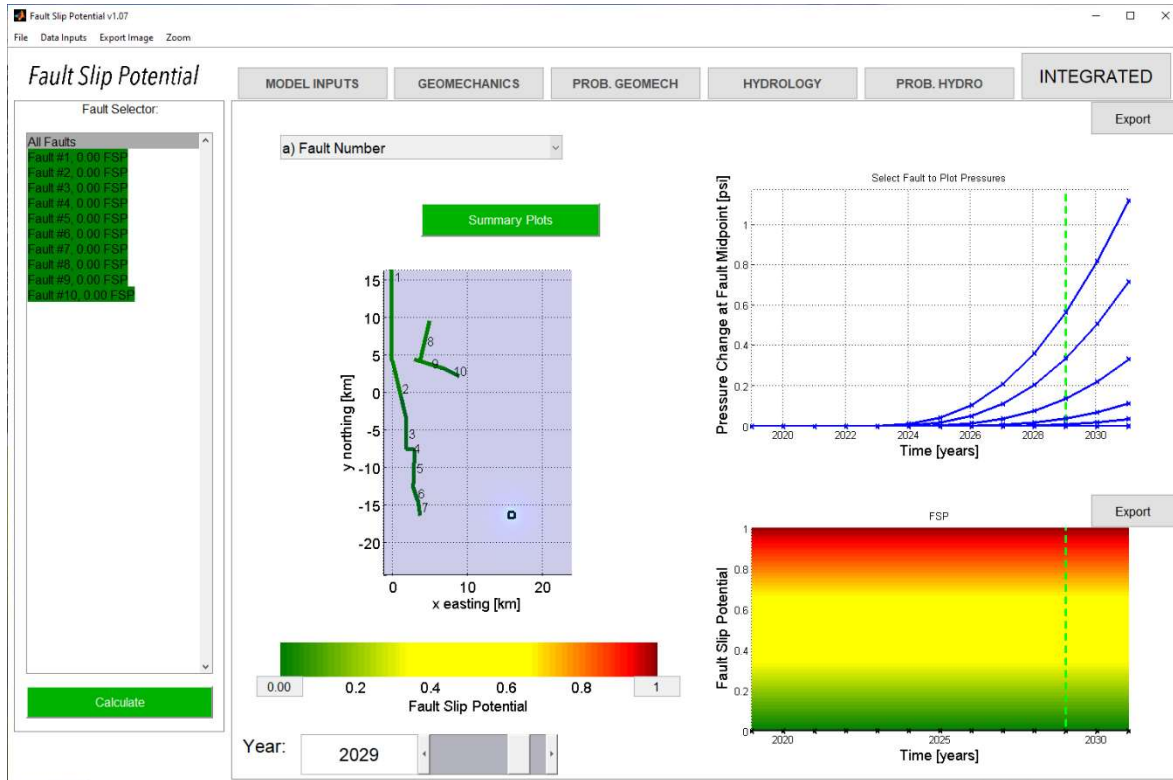
## Year 10 Hydrology



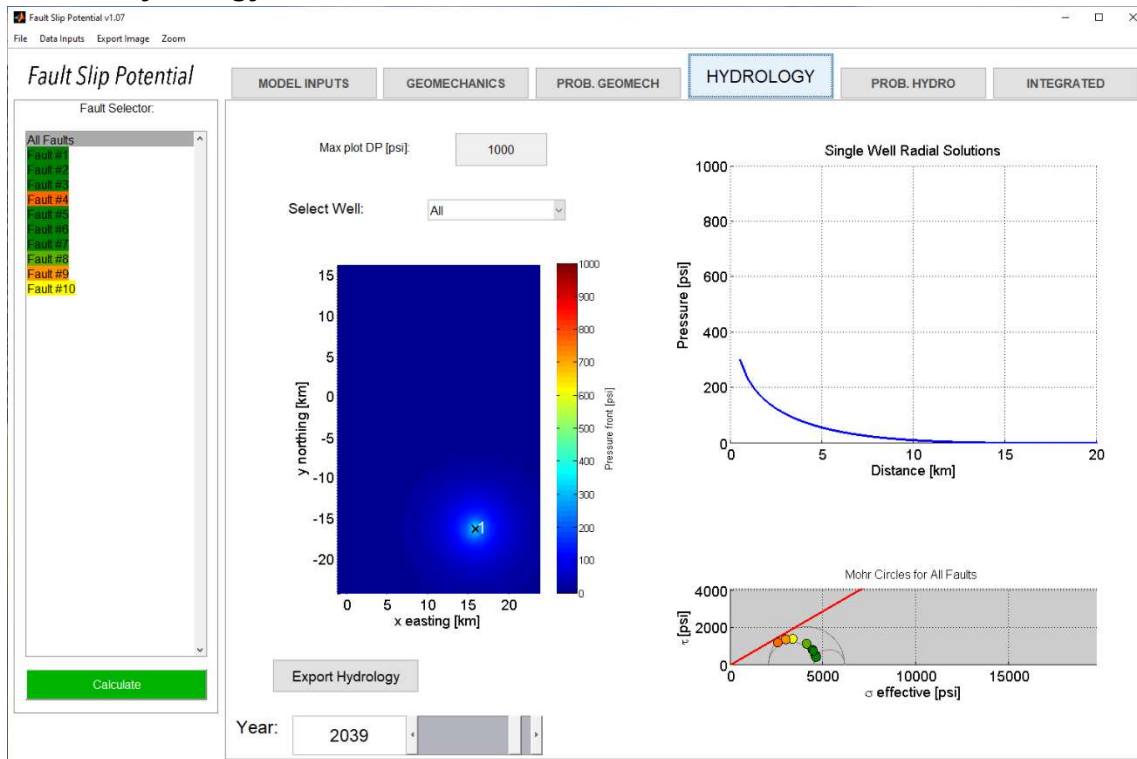
## Year 10 Probabilistic Hydrology (note no crossover between blue delta-press. & green fault slip press.)



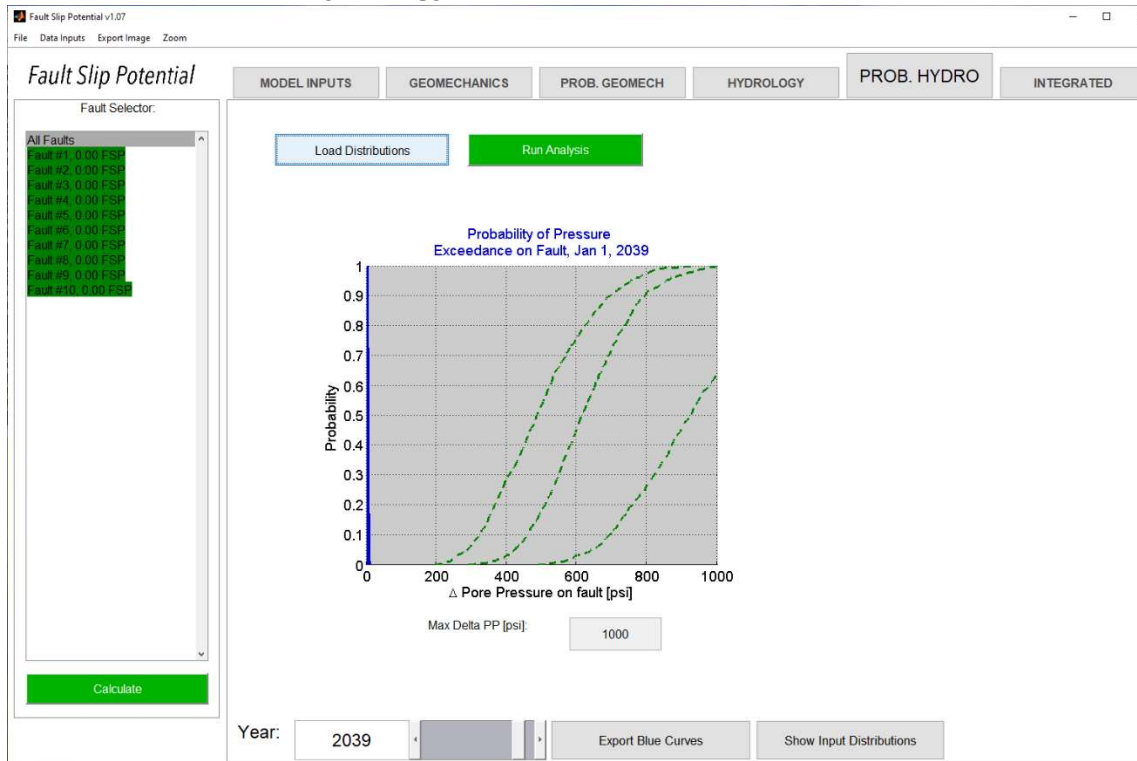
## Year 10 Fault Slip Probability (0% for all fault segments after 10 years)



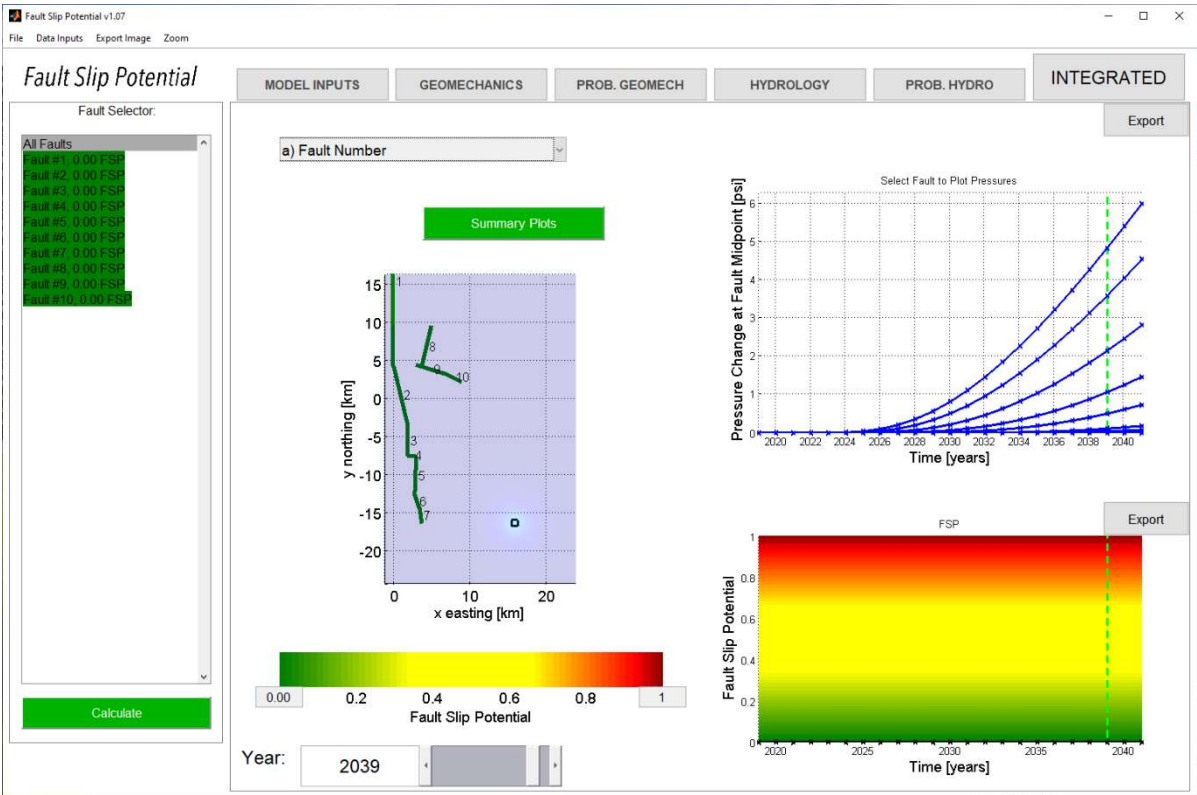
## Year 20 Hydrology



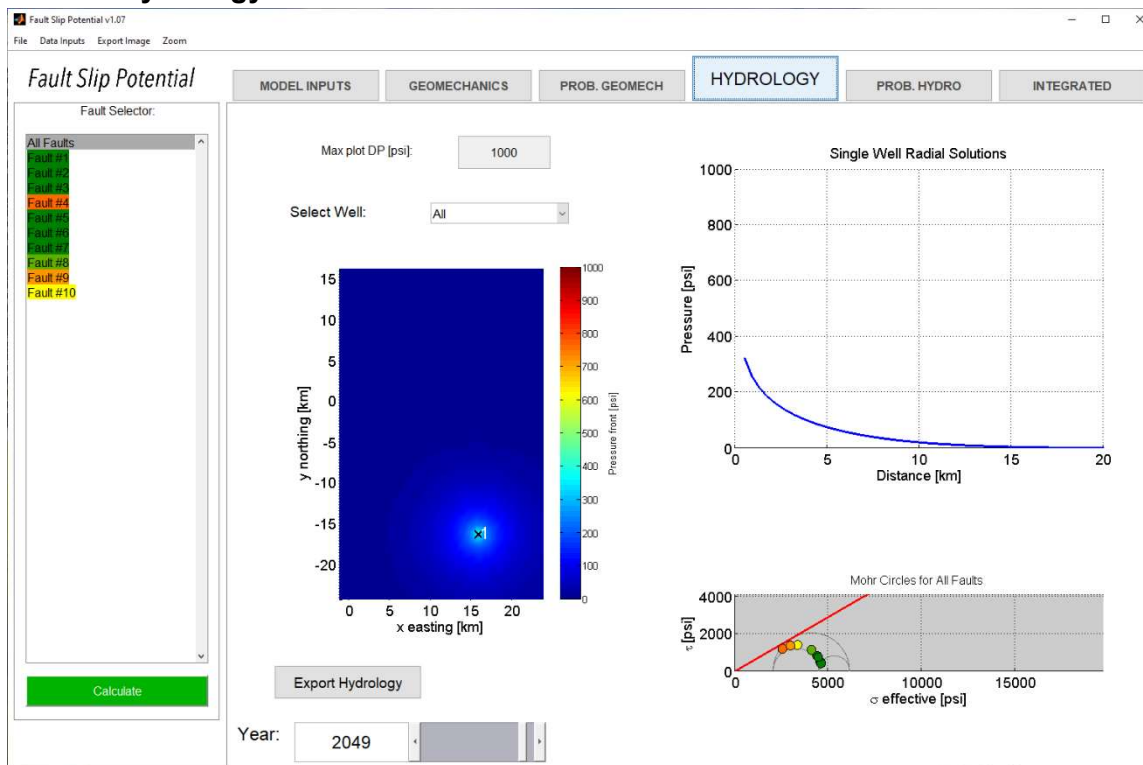
## Year 20 Probabilistic Hydrology (note no crossover between blue delta-press. & green fault slip press.)



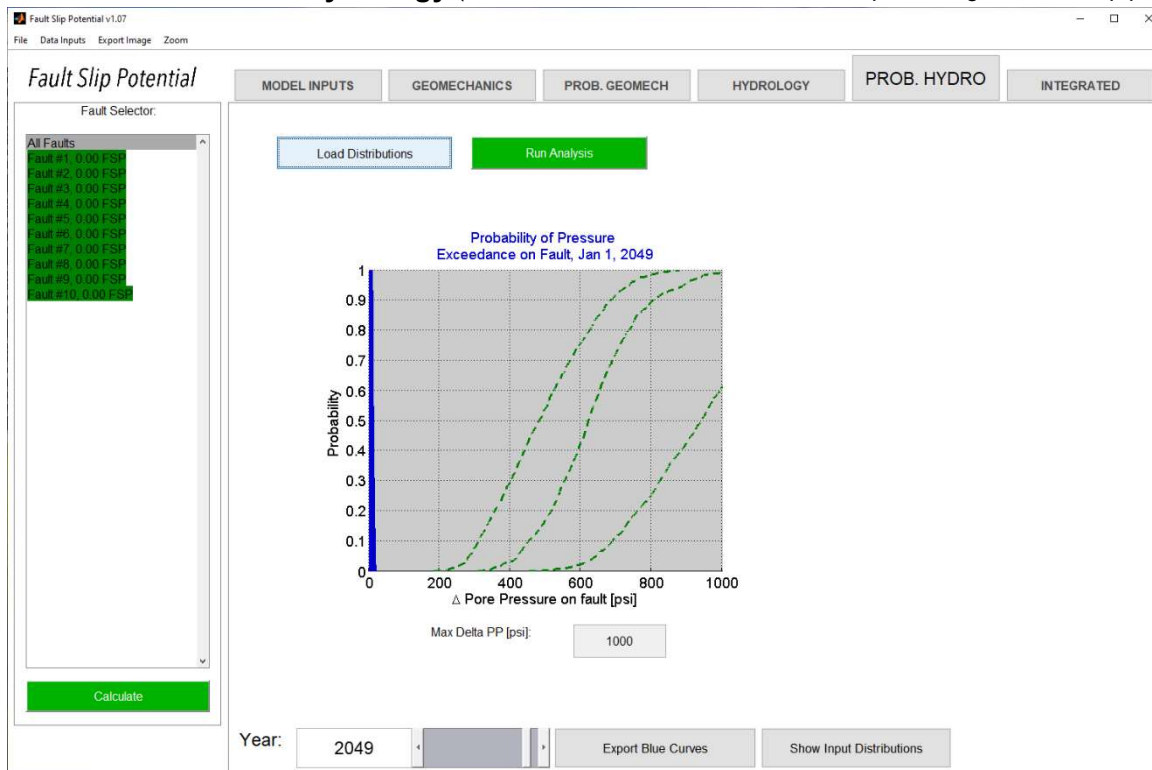
Year 20 Fault Slip Probability (0% for all fault segments after 20 years)



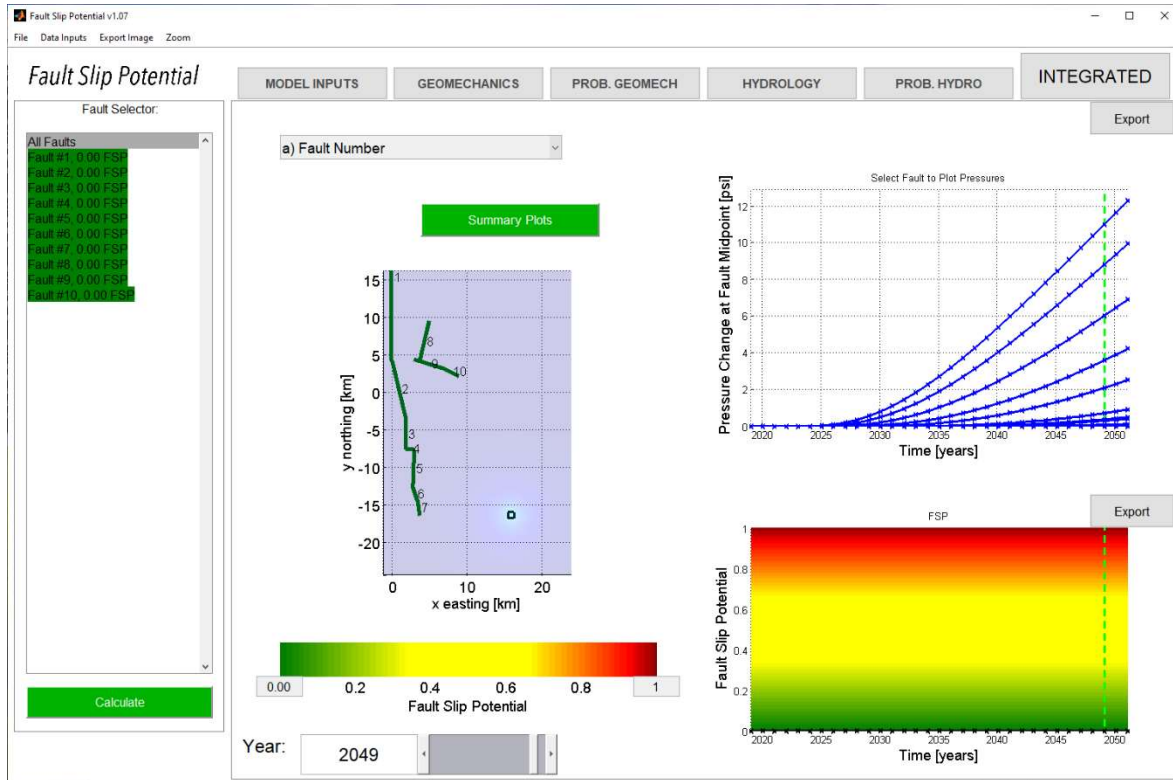
## Year 30 Hydrology



## Year 30 Probabilistic Hydrology (note no crossover between blue delta-press. & green fault slip press.)



**Year 30 Fault Slip Probability** (0% for all fault segments after 30 years. 11 psi fault delta pressure is much less than the 3674 psi required for fault slip in the closest fault segment #7)



As per NM OCD requirements (injection well to injection well spacing minimum of 1.5 miles), this proposed above referenced SWD well is located 6.08 miles away from the nearest active or permitted Devonian disposal well.

*Gay E. Fisher*

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