Additional Information

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Mewbourne Oil Company

Boomerang 6 Fee SWD #1

FSP Analysis

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1.0 Summary

The location of Boomerang 6 Fee SWD #1 ("Boomerang SWD"), the 13 offsetting active and permitted injection wells, and published faults within 6 miles of the Boomerang 6 Fee SWD #1 in Eddy County, New Mexico are shown on Figure 1. The Boomerang SWD permit application is targeting the Devonian formation which is a porous dolomitic limestone at a measured depth of 13,970' to 14,855' (Figure 2). The proposed average injection rate 25,000 barrels per day is equal to an average of 760,417 barrels per month which was forecasted for this FSP analysis.

The FSP models included utilize Woodford and Basement level fault traces documented by the Texas Bureau of Economic Geology (BEG) Integrated Synthesis of the Permian Basin http://www.beg.utexas.edu/resprog/permianbasin/gis.htm.

Injection fluids will be confined to the Devonian formation which is approximately 650 ft above the top of the Ellenburger. **None of the FSP models run utilizing these fault traces, proposed injection interval reservoir properties, and surrounding fluid injection data demonstrated evidence these faults would slip.**

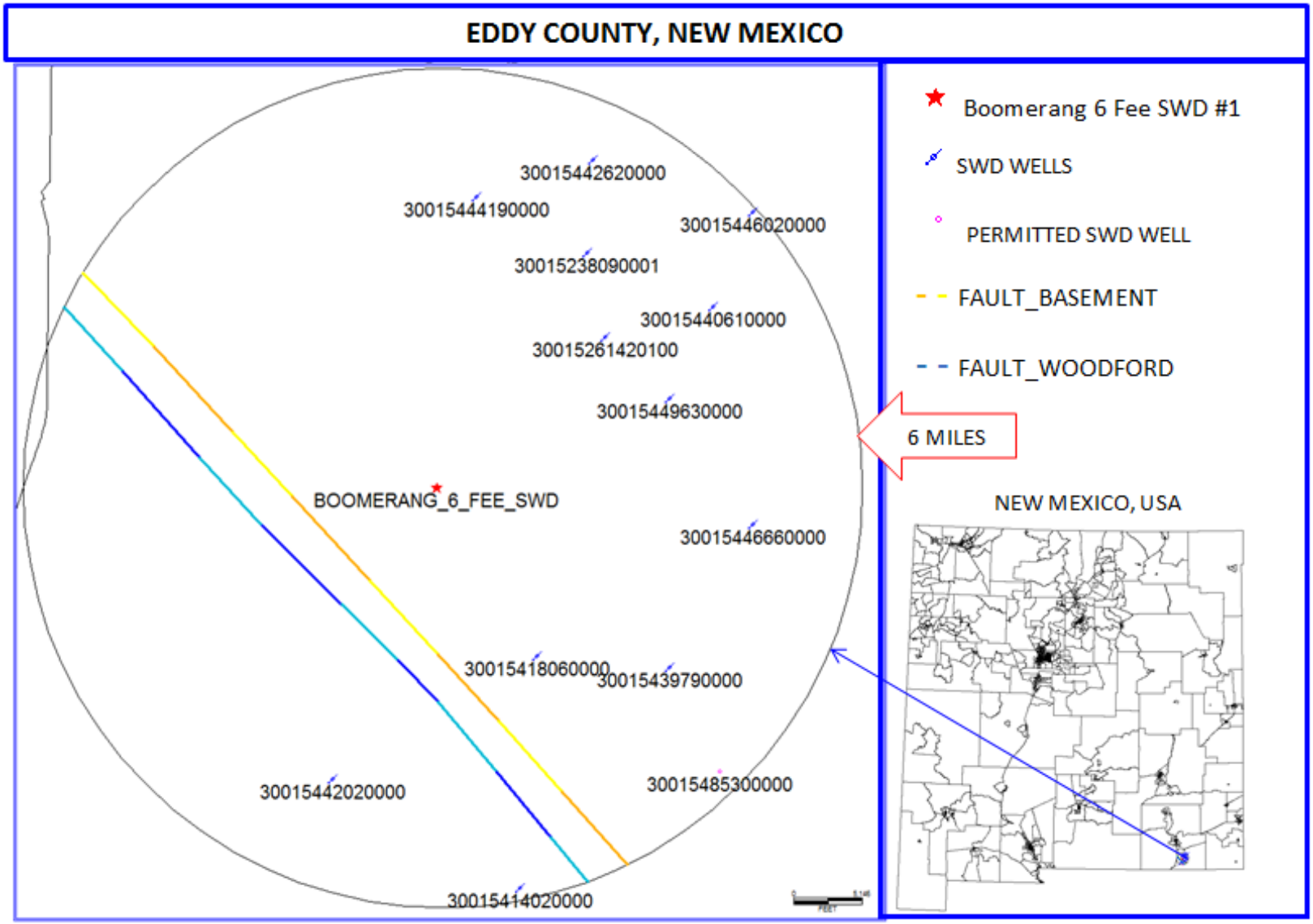


Figure 1 - Proposed location and FSP analysis area of interest ("AOI").

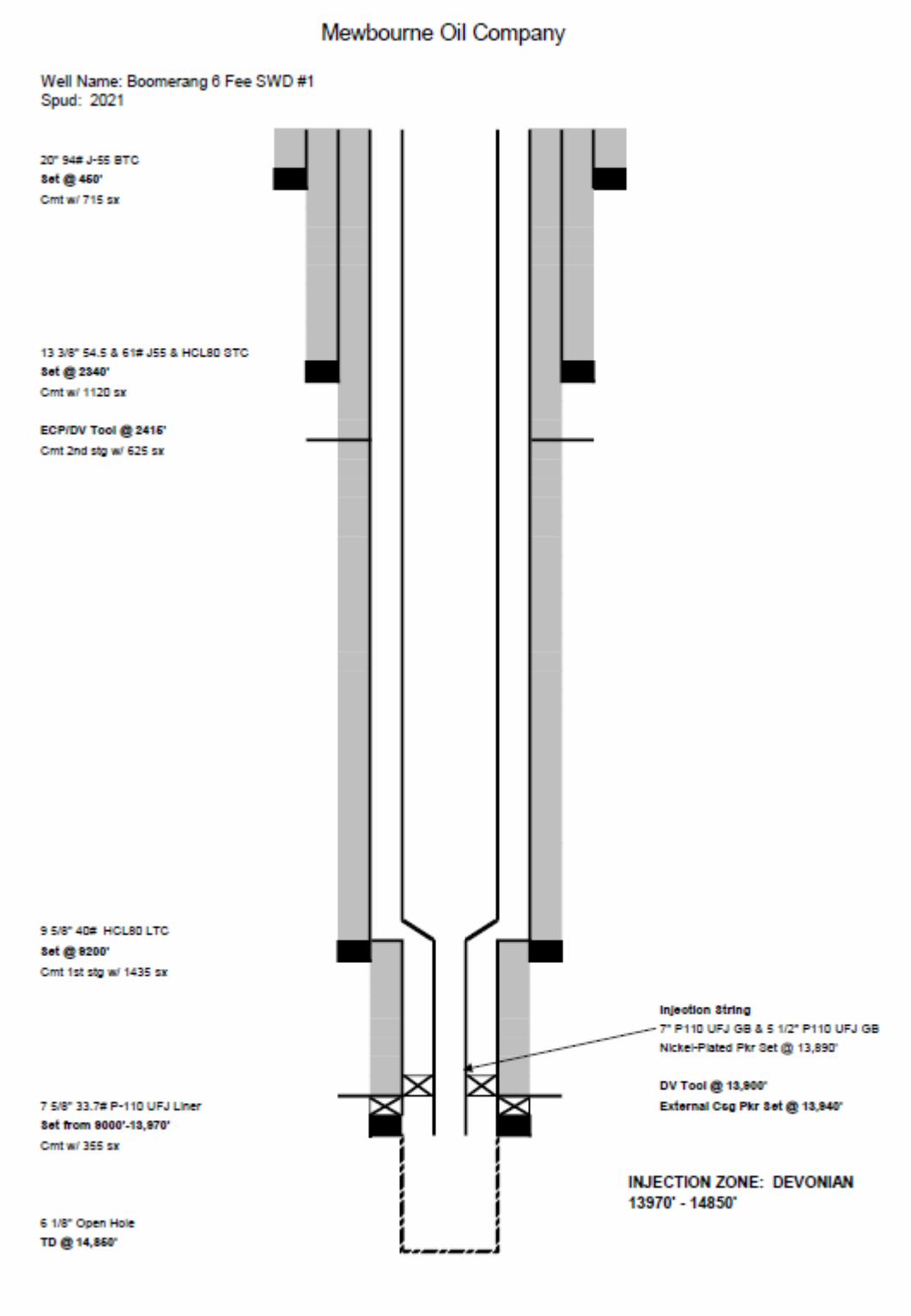


Figure 2 - Injection Target: Devonian

System	Series	Group/Formation	General Lithology
Tertiary		Ogallala	fluvial and lacustrine clastics
Cretaceous		Fredericksburg	limestone sandstone
		Paluxy	
Triassic		Dockum	fluvial-deltaic and lacustrine clastics
Permian	Ochoan	Dewey Lake	sandstone
		Rustler	salt, anhydrite
		Salado	salt
	Guadalupian	Tansill	anhydrite
		Yates	sandstone
		Seven Rivers	anhydrite
		Queen	sandstone
		San Andres-Grayburg	dolomite-sandstone
	Leonardian	Clear Fork	limestone-dolomite
		Wichita	
	Wolfcampian	Wolfcamp	shelf limestones, minor shale
Pennsylvanian		Cisco	
		Canyon	
		Strawn	
		Atokan	shale
		Chester	
Mississippian		Mississippian Lime	limestone
Devonian		Woodford	shale
		Devonian	limestone
Silurian		Silurian	shale, limestone
Ordovician		Montoya	limestone
		Simpson	shale, limestone
		Ellenburger	dolomite
PRECAMBRIAN			igneous, metamorphic

*(Bassett and Bentley, 1982)

Figure 3 - Stratigraphic column of the Delaware Basin with the proposed injection interval (Devonian section) indicated by the red arrow.

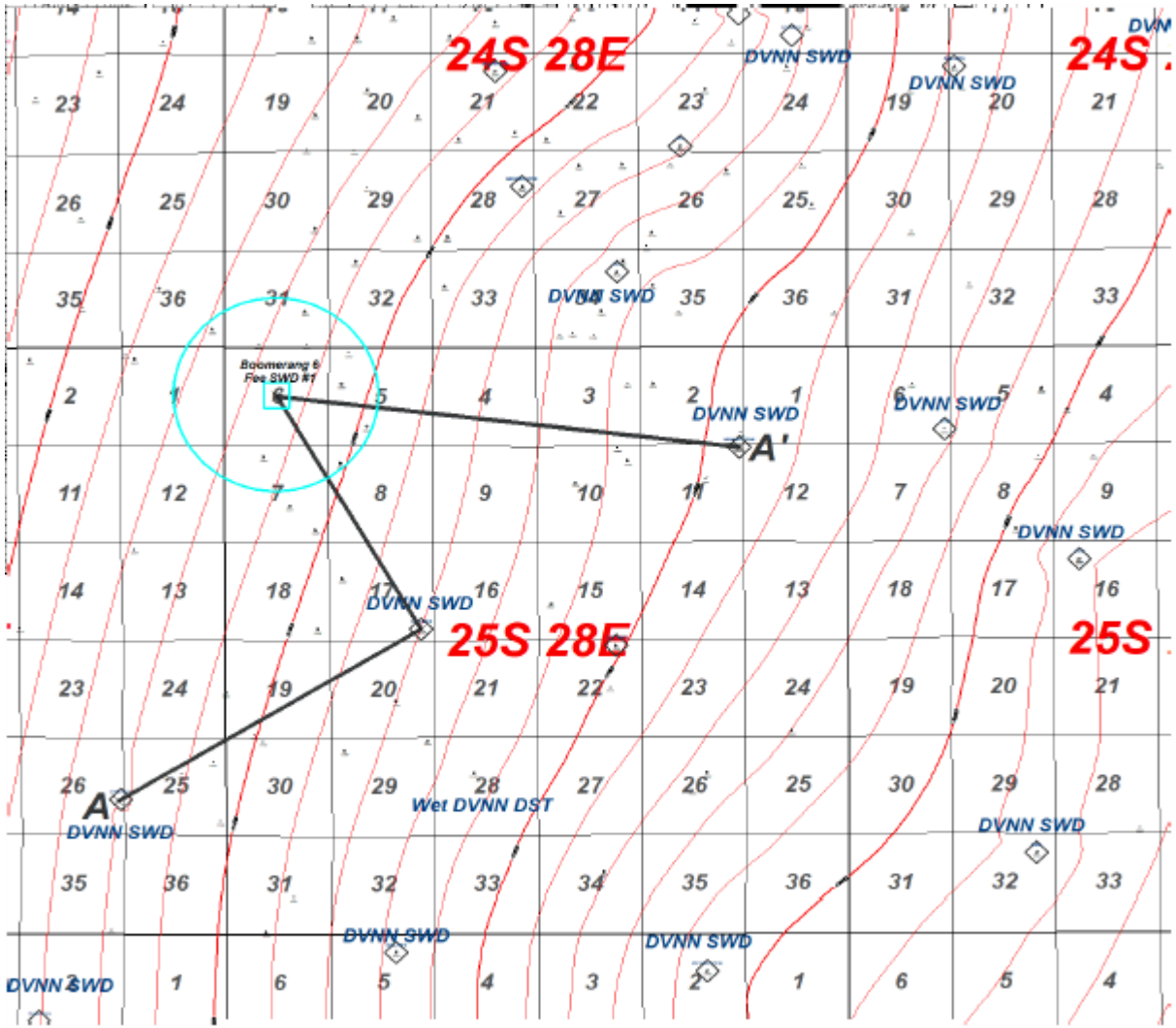


Figure 4 - Cross section index map

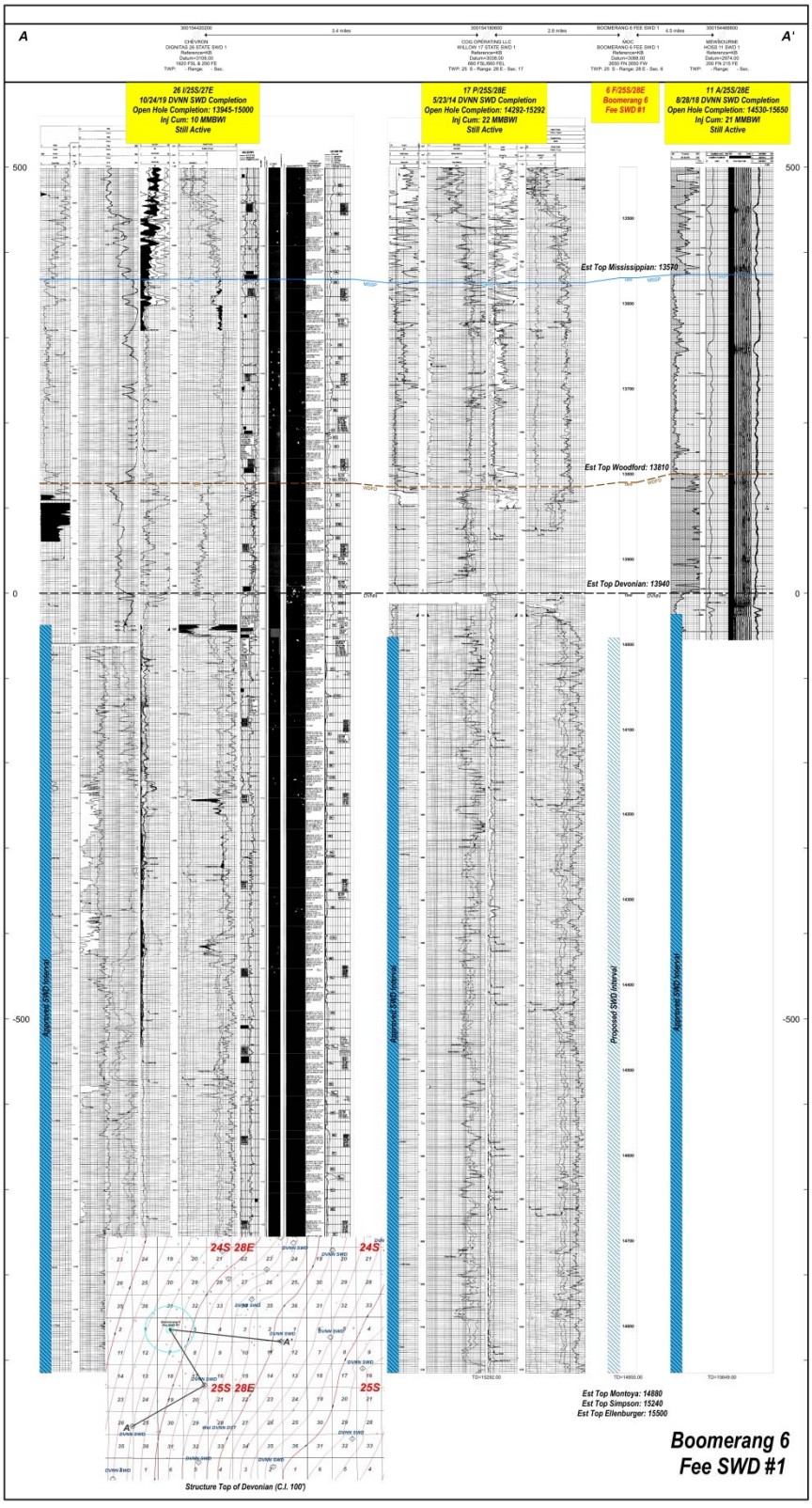


Figure 5 - Structural Cross Section – Proposed injection interval in light blue.

2.0 FSP Analysis MODEL 1 – Basement Faults - All injectors

SCITS software (v 2.0) was used for the Fault Slip Potential (FSP) analysis.

Analysis includes:

- Fluid injection history from DrillingInfo within the 6 miles AOI.
- Proposed average injection rate (25,000 bpd) for Boomerang 6 Fee SWD #1.
- Proposed injection interval reservoir parameters and average depth.
- Local stress information and pressure gradients.
- Known fault locations within AOI with faults segmented to a maximum length of 3 km.

Two FSP models were run, including year-end analysis 20 years into the future.

- Model #1: includes permitted injection wells in the AOI plus the proposed injection interval (14 wells total).
- Model #2: includes only the proposed injection interval.

In summary, the proposed fluid injection does not significantly increase the risk that these faults will slip.

Figure 6 shows the location of existing fluid injection wells and the proposed Boomerang 6 Fee SWD #1 in relation to faults documented within the AOI. The Basement fault traces utilized on this models are shown on **Figure 8**.

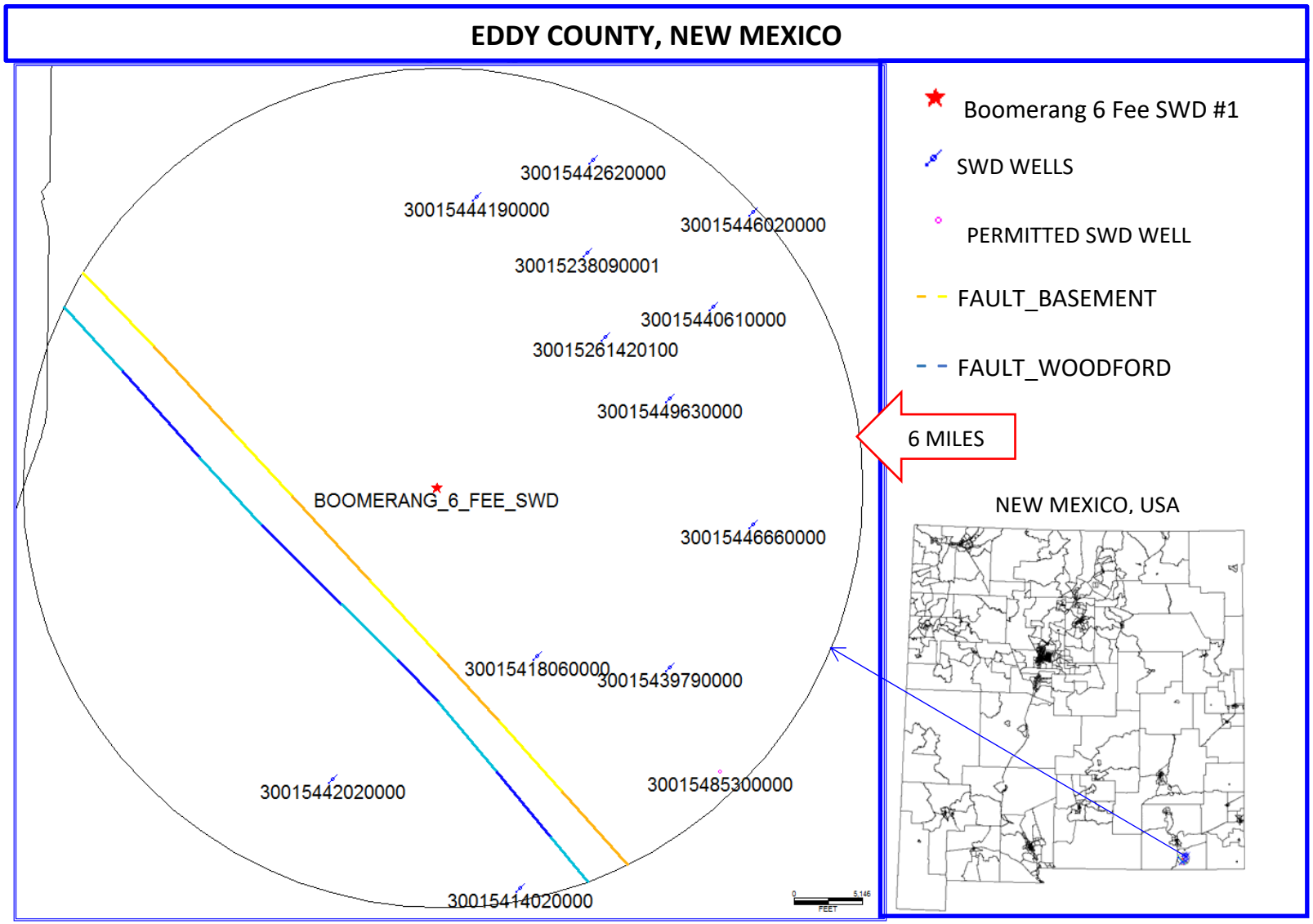
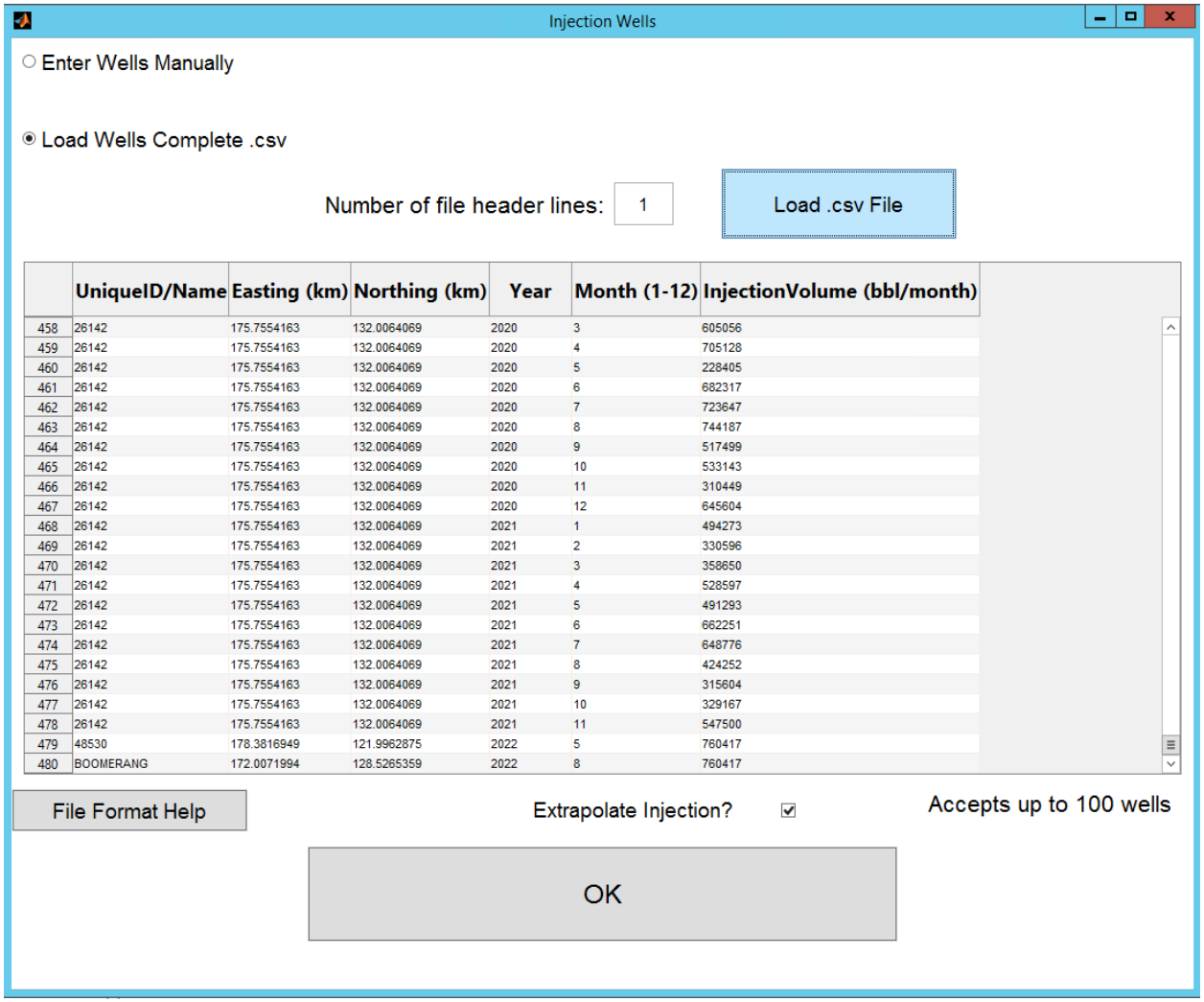


Figure 6 - FSP Analysis Injection Wells

Partial View of 14 Wells



	UniqueID/Name	Easting (km)	Northing (km)	Year	Month (1-12)	InjectionVolume (bbl/month)
458	26142	175.7554163	132.0064069	2020	3	605056
459	26142	175.7554163	132.0064069	2020	4	705128
460	26142	175.7554163	132.0064069	2020	5	228405
461	26142	175.7554163	132.0064069	2020	6	682317
462	26142	175.7554163	132.0064069	2020	7	723647
463	26142	175.7554163	132.0064069	2020	8	744187
464	26142	175.7554163	132.0064069	2020	9	517499
465	26142	175.7554163	132.0064069	2020	10	533143
466	26142	175.7554163	132.0064069	2020	11	310449
467	26142	175.7554163	132.0064069	2020	12	645604
468	26142	175.7554163	132.0064069	2021	1	494273
469	26142	175.7554163	132.0064069	2021	2	330596
470	26142	175.7554163	132.0064069	2021	3	358650
471	26142	175.7554163	132.0064069	2021	4	528597
472	26142	175.7554163	132.0064069	2021	5	491293
473	26142	175.7554163	132.0064069	2021	6	662251
474	26142	175.7554163	132.0064069	2021	7	648776
475	26142	175.7554163	132.0064069	2021	8	424252
476	26142	175.7554163	132.0064069	2021	9	315604
477	26142	175.7554163	132.0064069	2021	10	329167
478	26142	175.7554163	132.0064069	2021	11	547500
479	48530	178.3816949	121.9962875	2022	5	760417
480	BOOMERANG	172.0071994	128.5265359	2022	8	760417

Figure 7 - FSP injection wells input Model 1

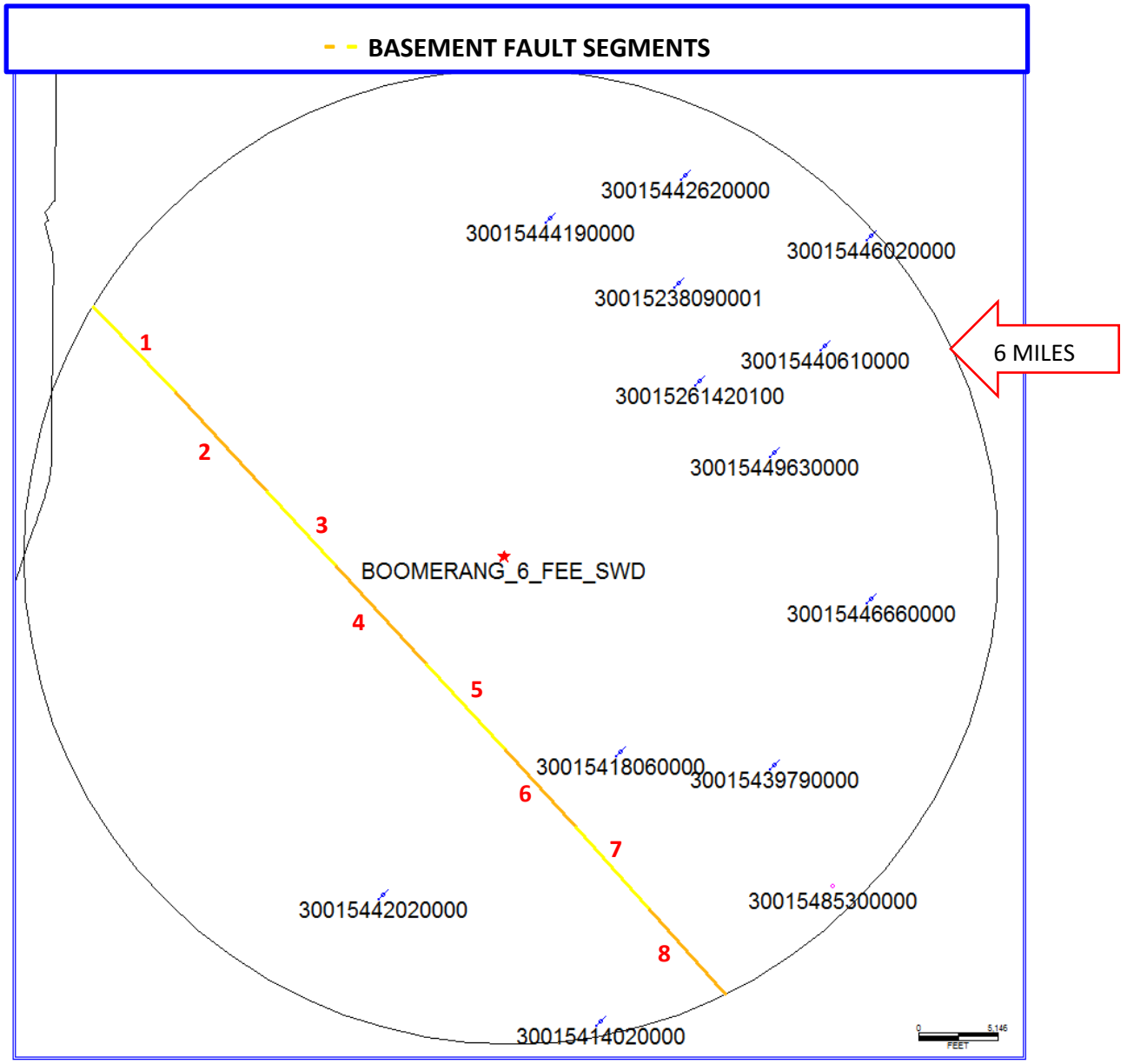
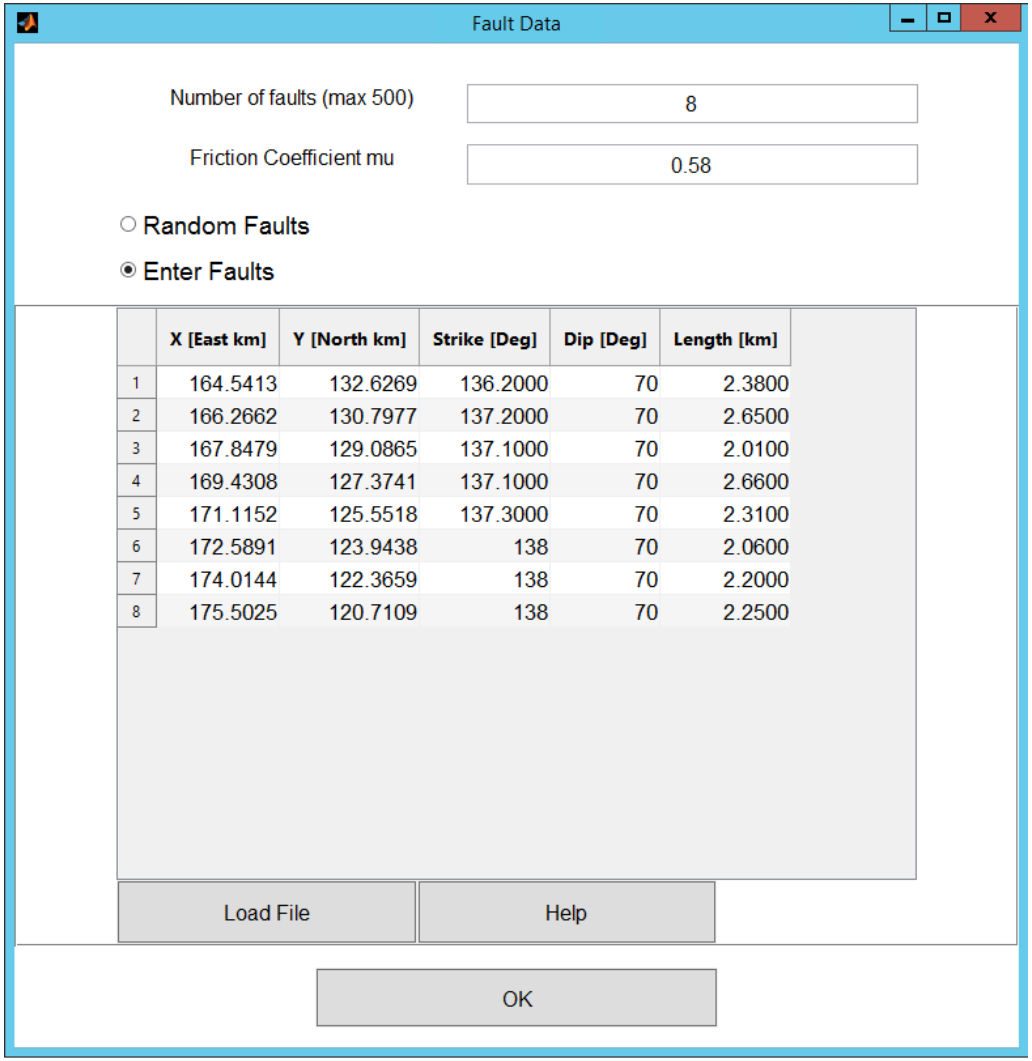


Figure 8 – Basement Fault segments (8) used in FSP Analysis Models 1 and 2

Basement Fault Segments

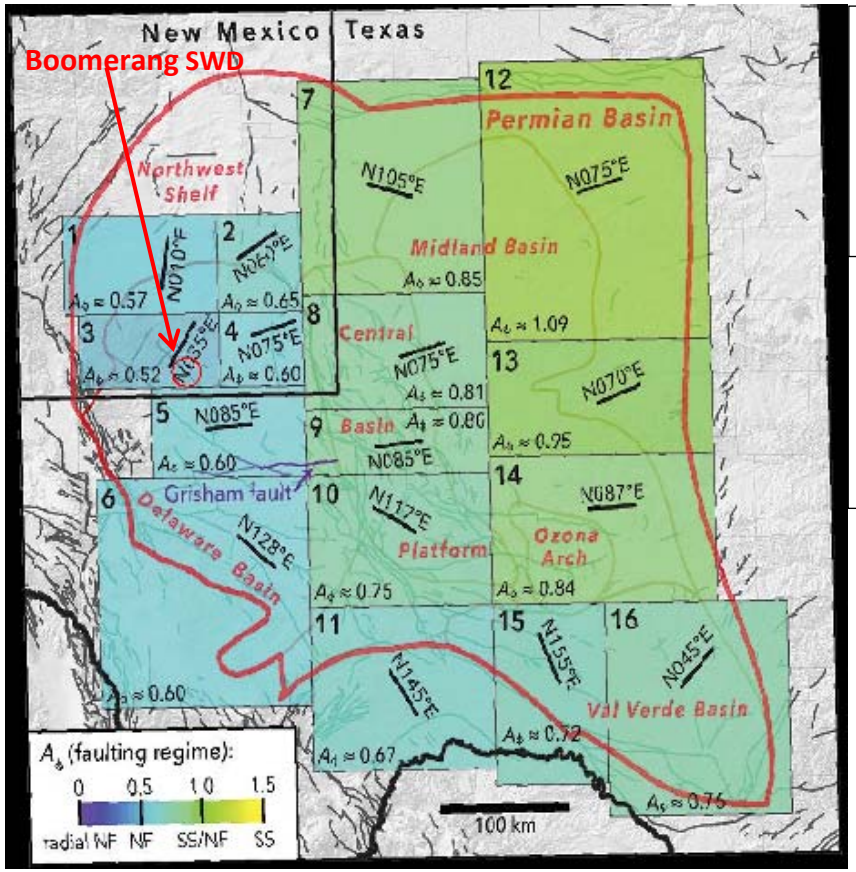


	X [East km]	Y [North km]	Strike [Deg]	Dip [Deg]	Length [km]
1	164.5413	132.6269	136.2000	70	2.3800
2	166.2662	130.7977	137.2000	70	2.6500
3	167.8479	129.0865	137.1000	70	2.0100
4	169.4308	127.3741	137.1000	70	2.6600
5	171.1152	125.5518	137.3000	70	2.3100
6	172.5891	123.9438	138	70	2.0600
7	174.0144	122.3659	138	70	2.2000
8	175.5025	120.7109	138	70	2.2500

Figure 9 - FSP Fault input for Models 1 and 2

State of stress in the Permian Basin, Texas and New Mexico: Implications for induced seismicity

Jens-Erik Lund Snee[1] and Mark D. Zoback[1] February 2018 THE LEADING EDGE



"The $A\phi$ parameter describes the ratio between the principal stress magnitudes using a single, readily interpolated value that ranges smoothly from 0 (the most extensional possible condition of radial normal faulting) to 3 (the most compressive possible condition of radial reverse faulting)." (Snee & Zoback)

Shmax azimuth direction (N35°E) is taken from the mapped Area **3** corresponding to this FSP analysis published by Snee and Zoback. The maximum horizontal stress gradient is derived from the A Phi parameter (0.52) also for Area **3**

Figure 10 - Local Stress Parameters used (Snee and Zoback, 2018) Models 1 thru 10

Shmax azimuth direction (N035°E) is taken from the mapped Area **3** corresponding to this FSP analysis published by Snee and Zoback (Figure 10). The maximum horizontal stress gradient is derived from the A Phi parameter (0.52) also for Area **3**. The same stress parameters are used for all models (1 thru 4).

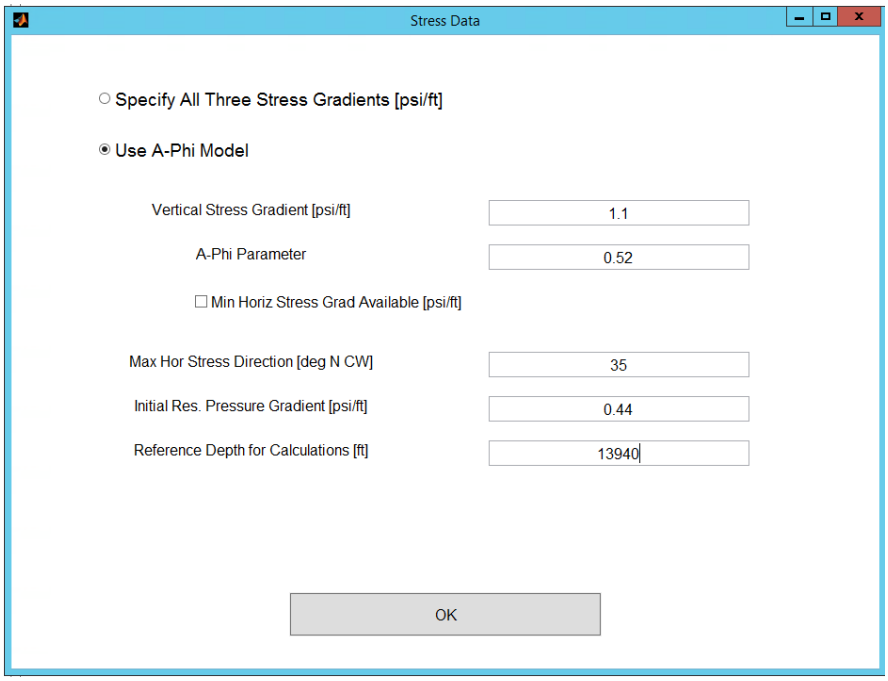


Figure 11 - FSP Stress & Reservoir depth input Models 1 thru 4

The following reservoir parameters were utilized for the AOI as input to FSP models 1 thru 4.

Hydrology and well parameters data was provided by Mewbourne Oil Company.

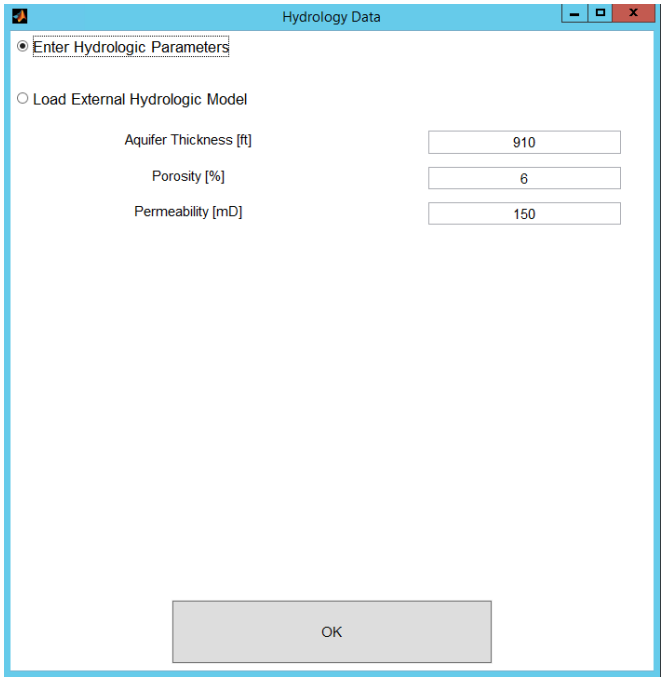


Figure 12 - Injection Interval (reservoir parameters) FSP Input Models 1 thru 4.

Model 1 – Basement

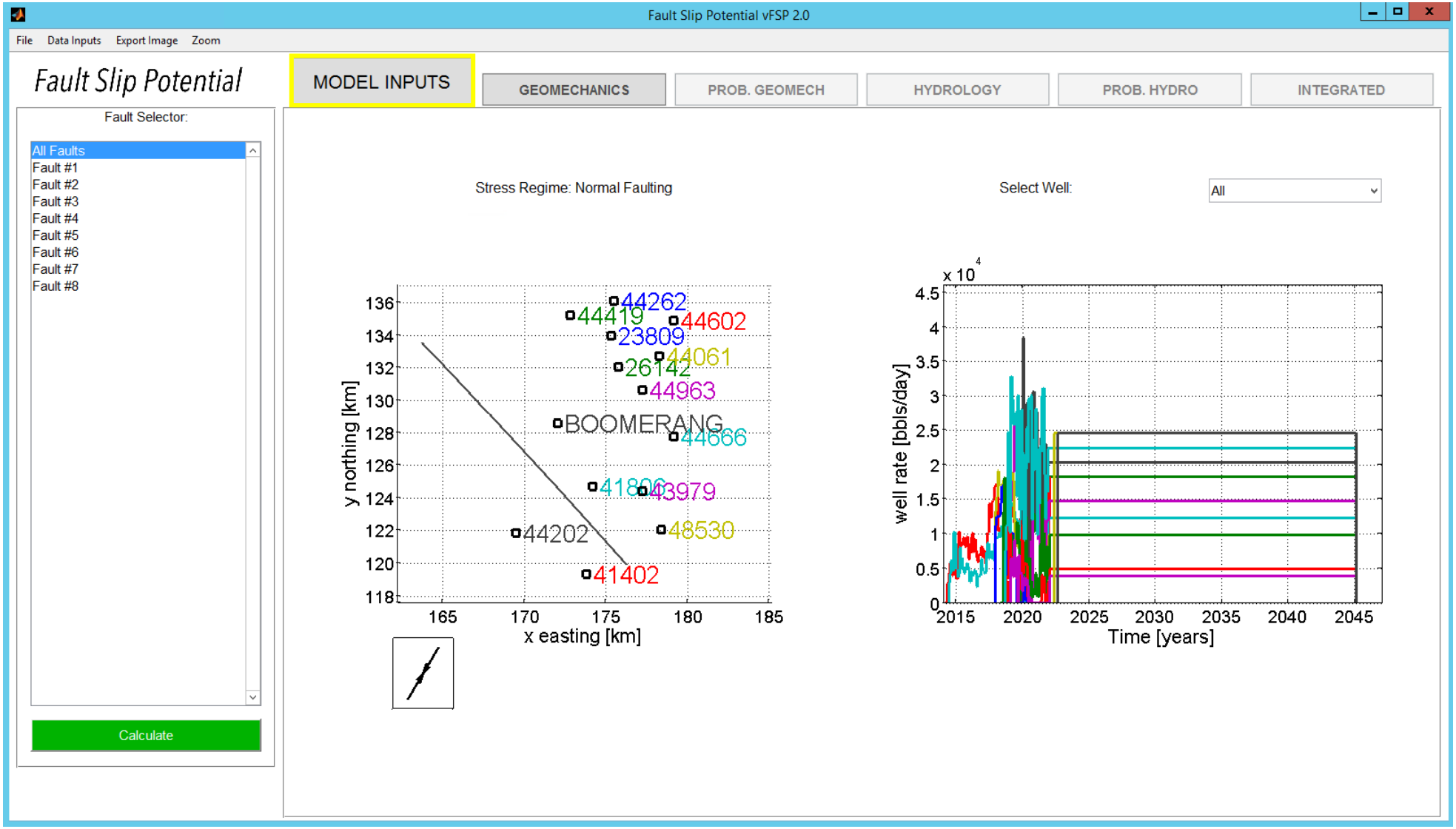


Figure 13 - FSP Model 1 Input: 14 injectors and 8 Basement fault segments

Model 1 & 2

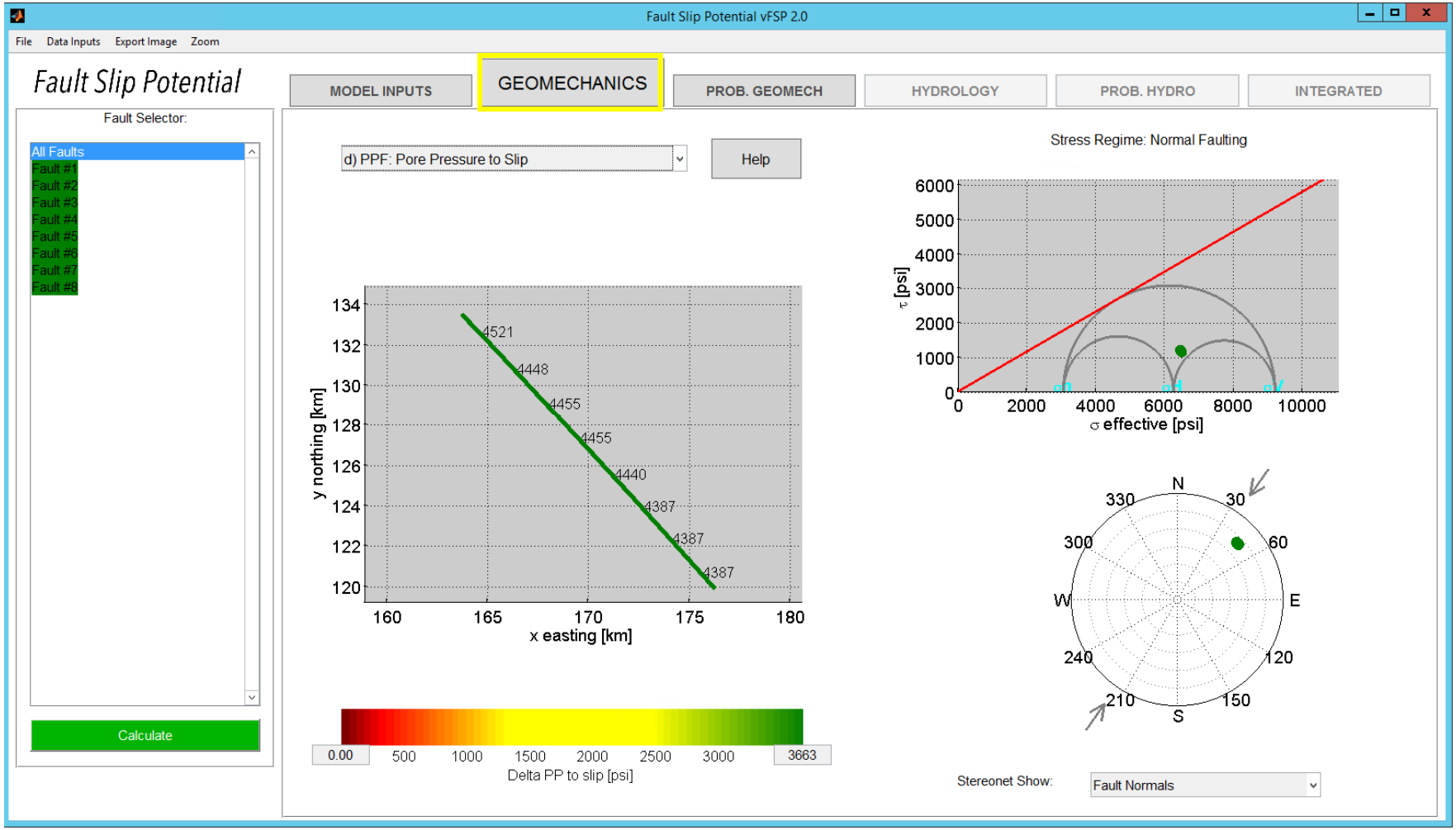


Figure 14 - FSP Geomechanics Tab, Model 1 and 2

Demonstrates pore pressure to slip (psi) for each fault segment, direction of SHmax, and a Mohr diagram with frictional slip line shown in red. Faults are colored according to the color scale.

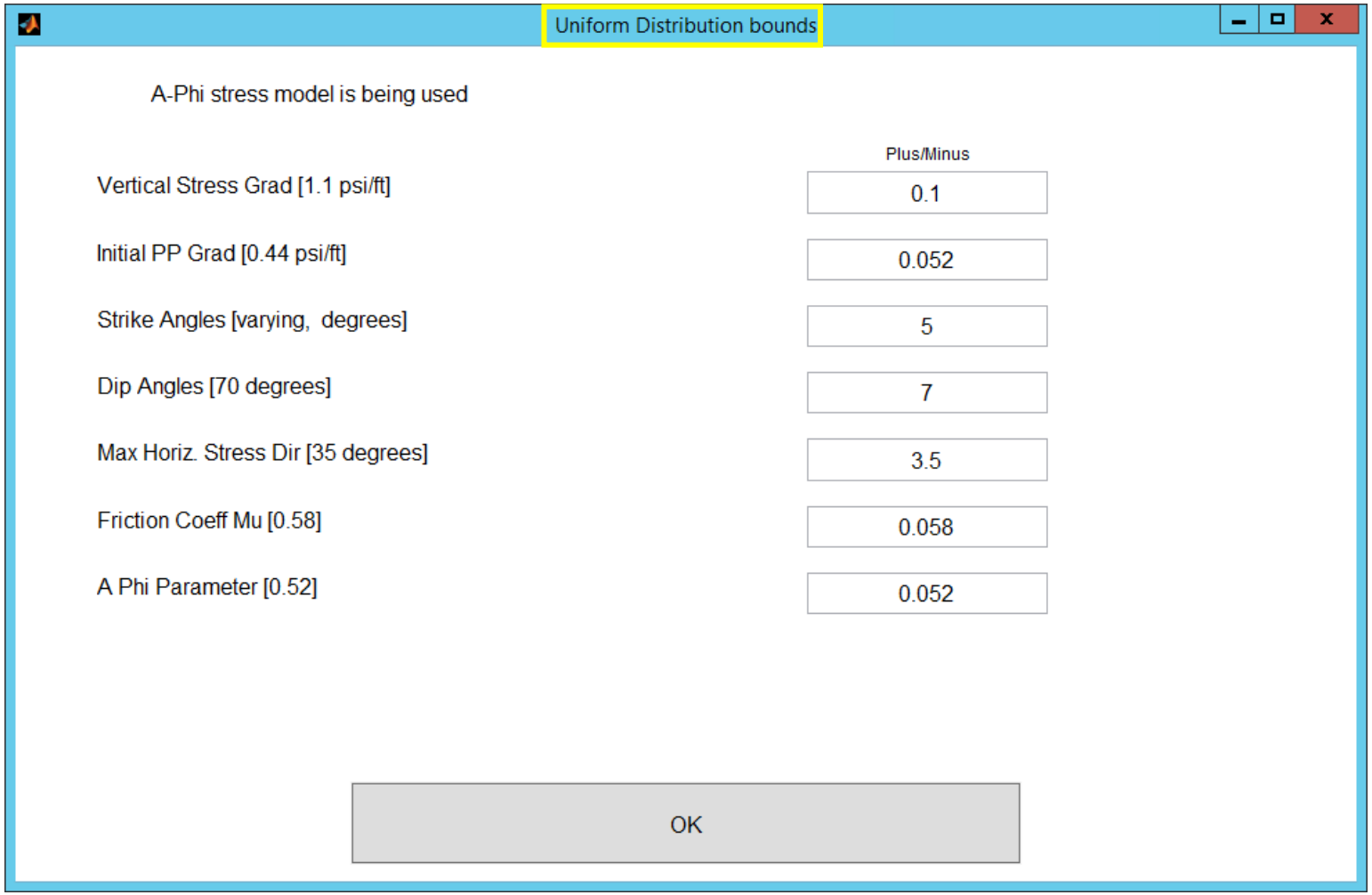


Figure 15 - Input for Probabilistic Geomechanics Tab

The FSP program performs a probabilistic Monte Carlo analysis based on user specified variability of input parameters for both Geomechanical and Hydrology calculations.

Model 1 & 2

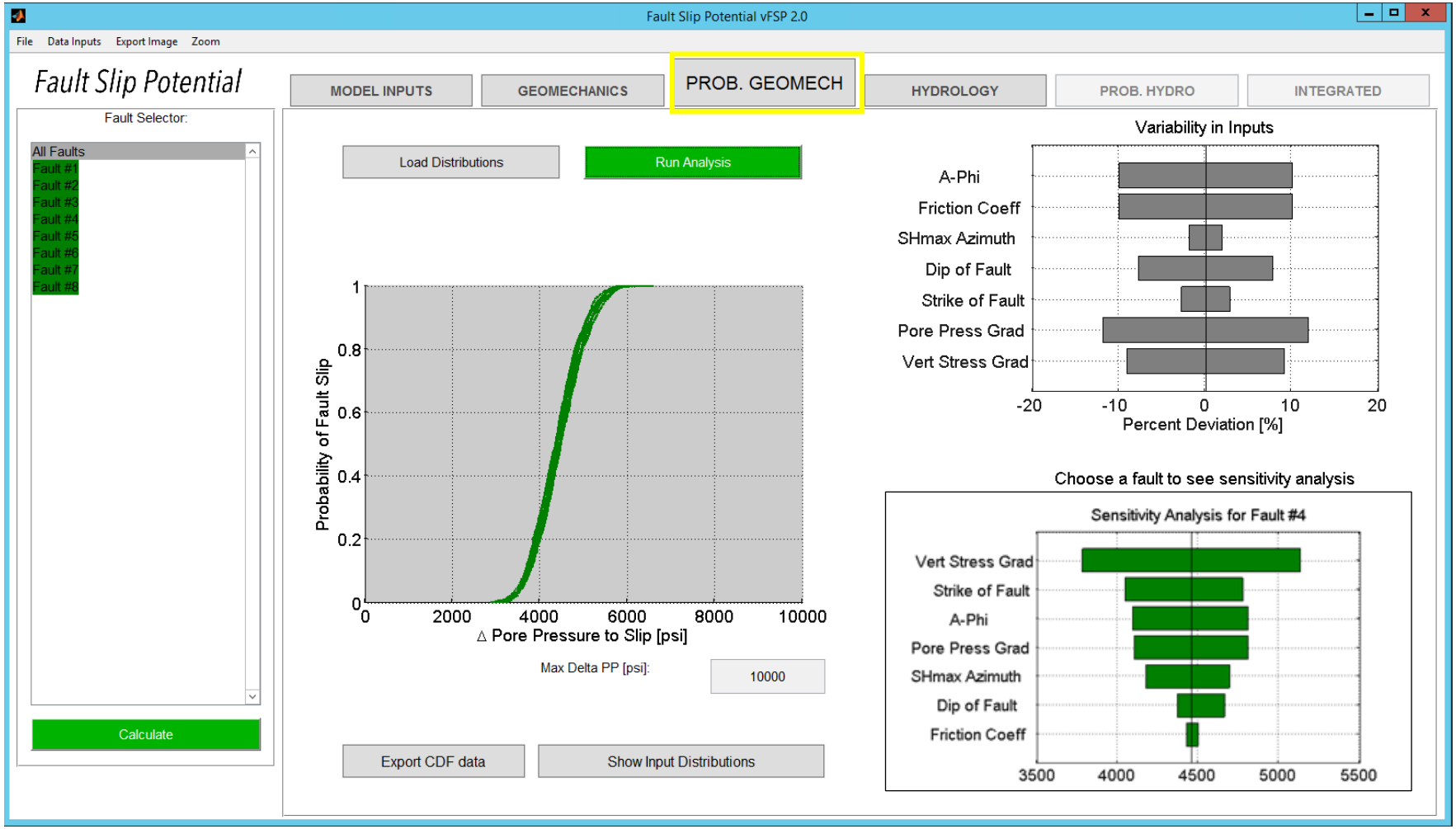


Figure 16 - FSP Probabilistic Geomechanics Tab, Model 1 and 2

The software propagates the relative uncertainties through the model, producing a distribution of pore pressures to slip.

Model 1 – Initial conditions before Boomerang SWD well is completed

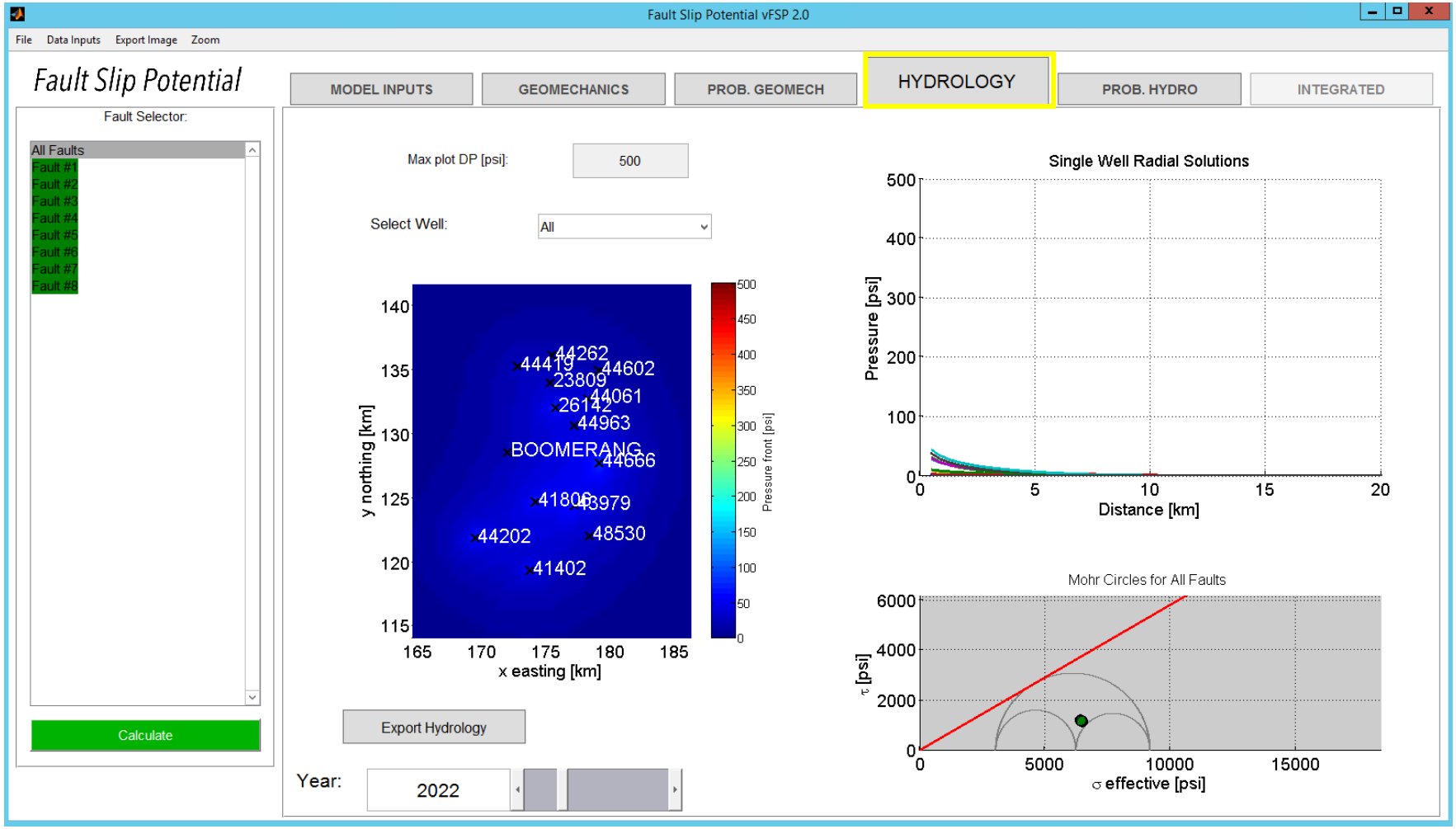


Figure 17 - FSP Hydrology Tab Before Proposed Completion

The software demonstrates pressure change as a function of distance from each of the 14 injection wells in Model #1.

Model 1 - Conditions in 2042 after Boomerang SWD well is completed

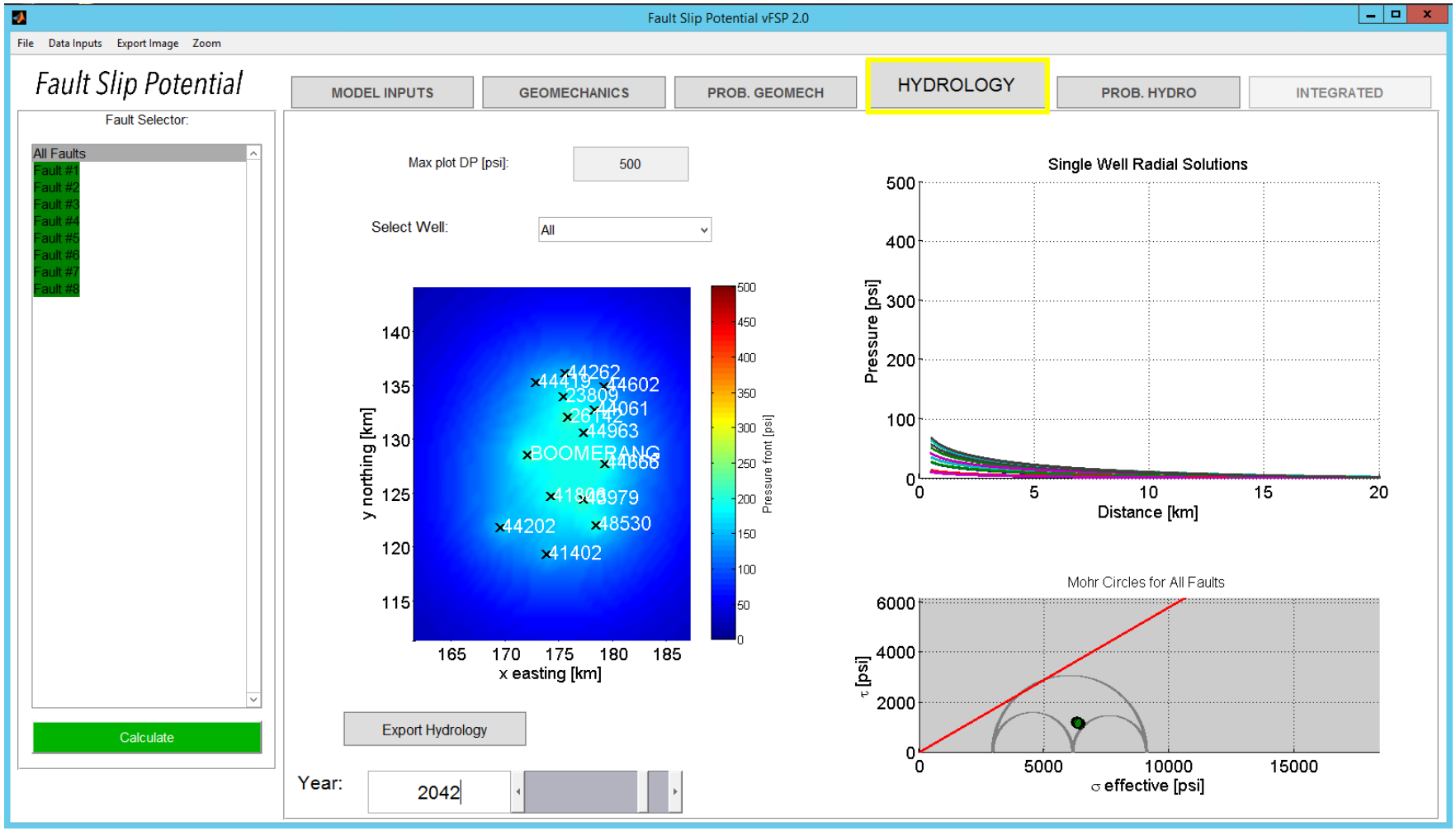


Figure 18 - Model 1 FSP Hydrology Tab

The software projects pressure changes away from each injector 20 years after completion.

Probabilistic analysis input utilized for this internal radial flow-based model

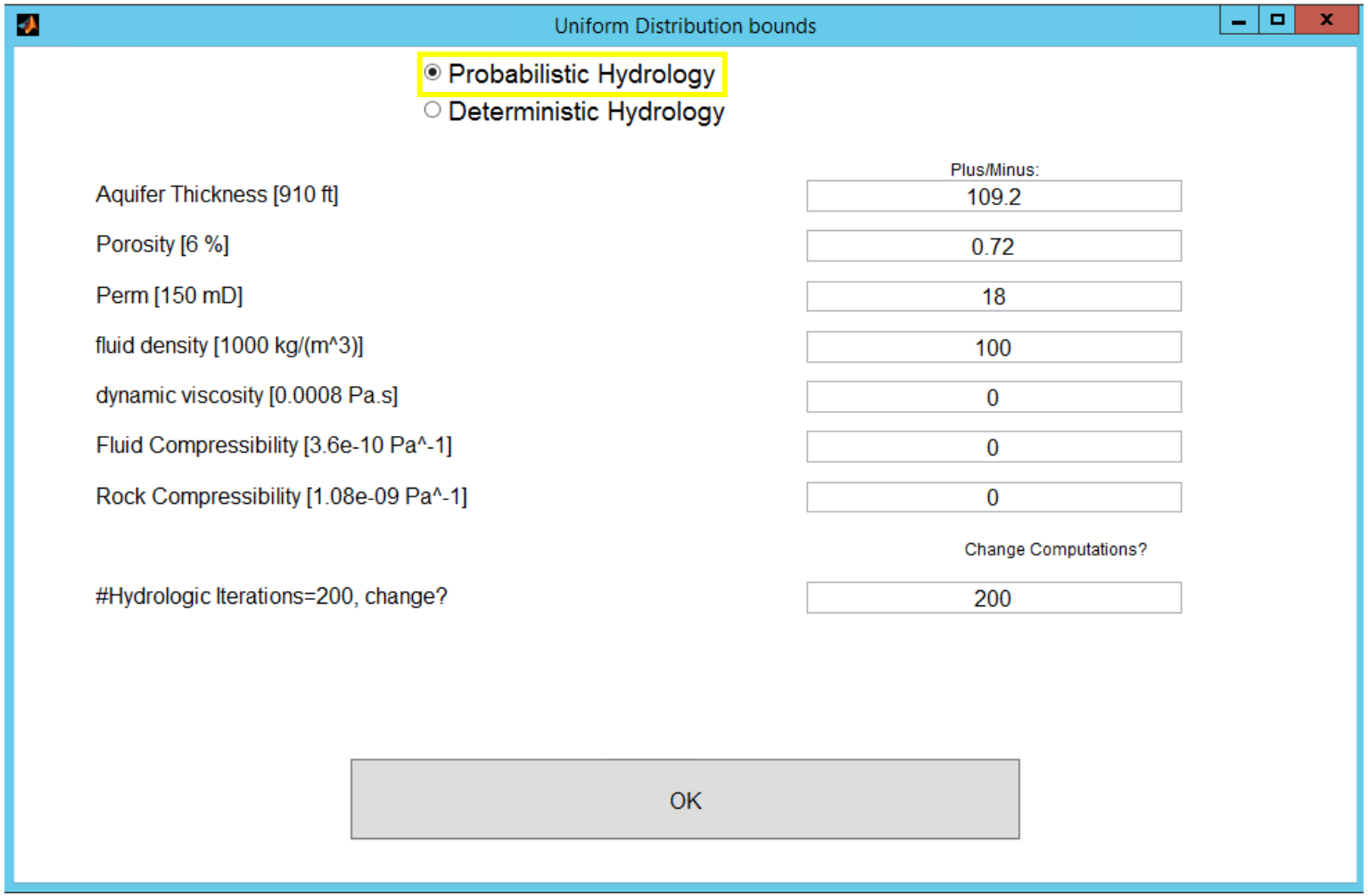


Figure 19 - Probabilistic Hydrology tab parameters Models 1 - 4

Model 1 – Initial Conditions before Boomerang SWD well is completed

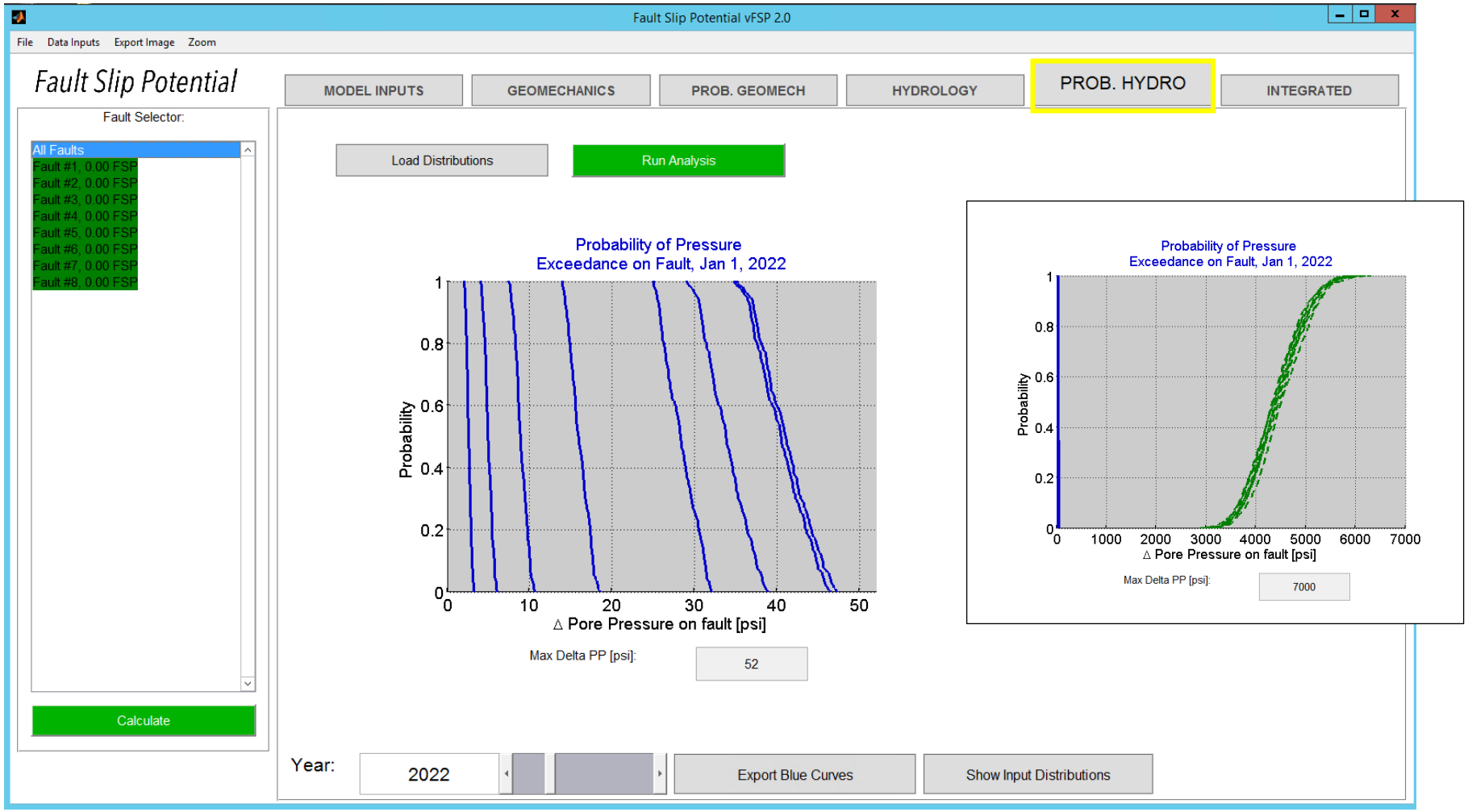


Figure 20 - Model 1 Probabilistic Hydrology Tab, before completion

The Probabilistic Hydrology tabs combine hydrology with the Probabilistic Geomechanical cumulative distribution function (CDF) of the pore pressure to slip.

Model 1 – Conditions in 2042 after Boomerang SWD well is completed

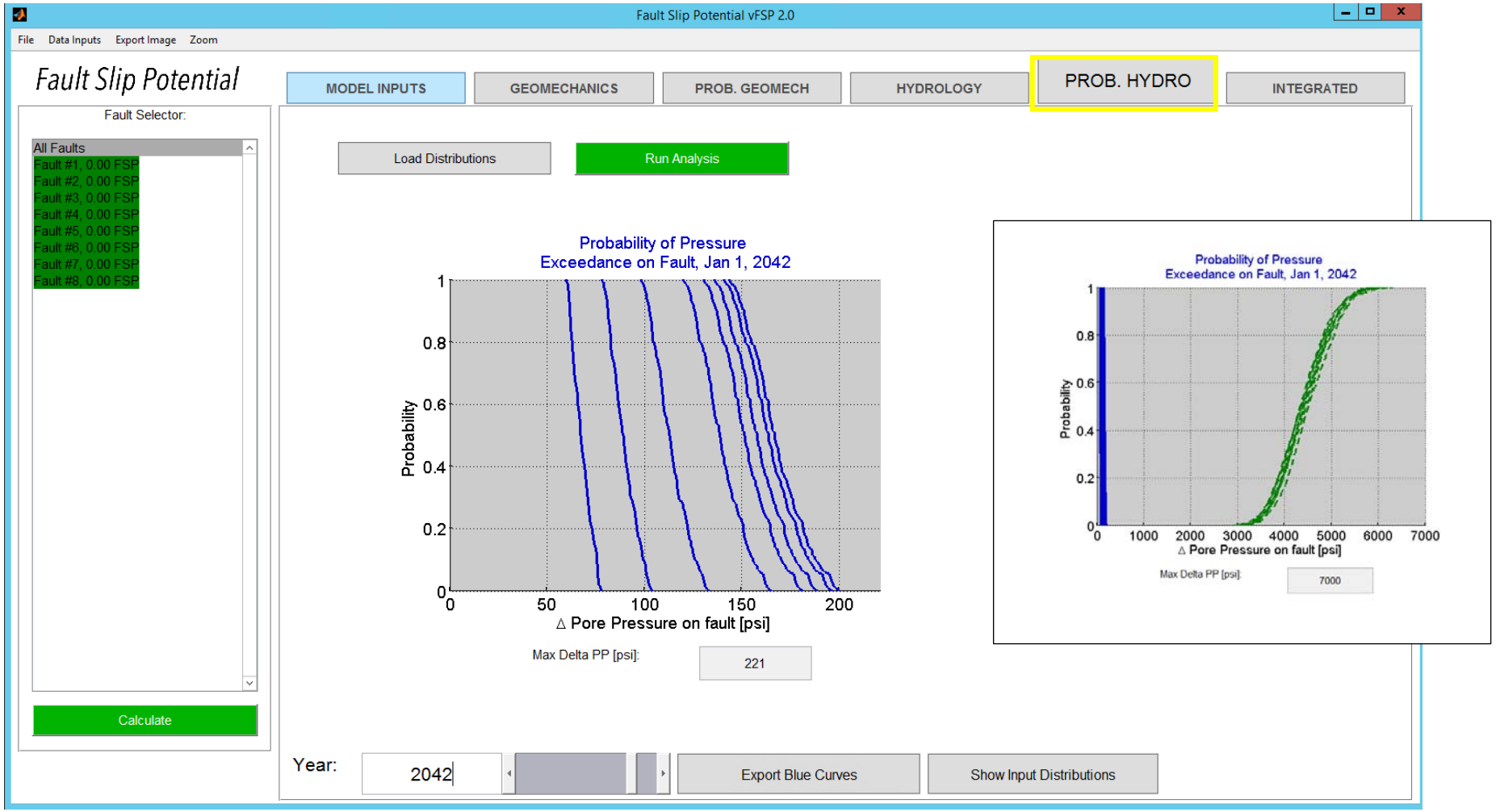


Figure 21 - Model 1 Probabilistic Hydrology Tab, 20 years after completion

The following integrated tabs show the combined results of probabilistic geomechanics and hydrology models run for all 8 Basement fault segments.

Model 1 – Initial Conditions before Boomerang SWD well is completed

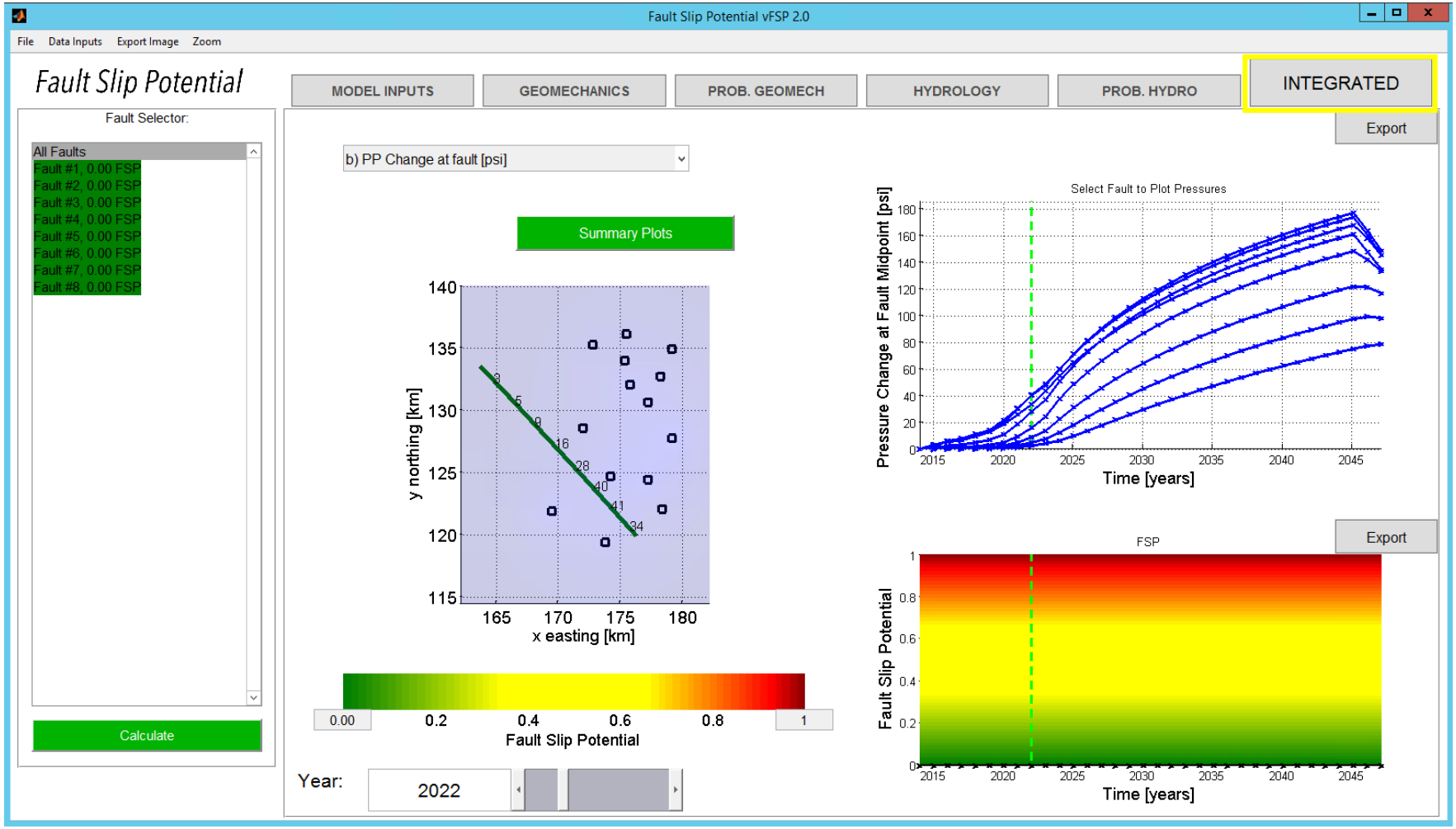


Figure 22 - Model 1 Integrated Tab, Initial Conditions before Boomerangis completed

Pore Pressure change (psi) is posted for each fault segment.

Model 1 – Initial Conditions before Boomerang SWD well is completed

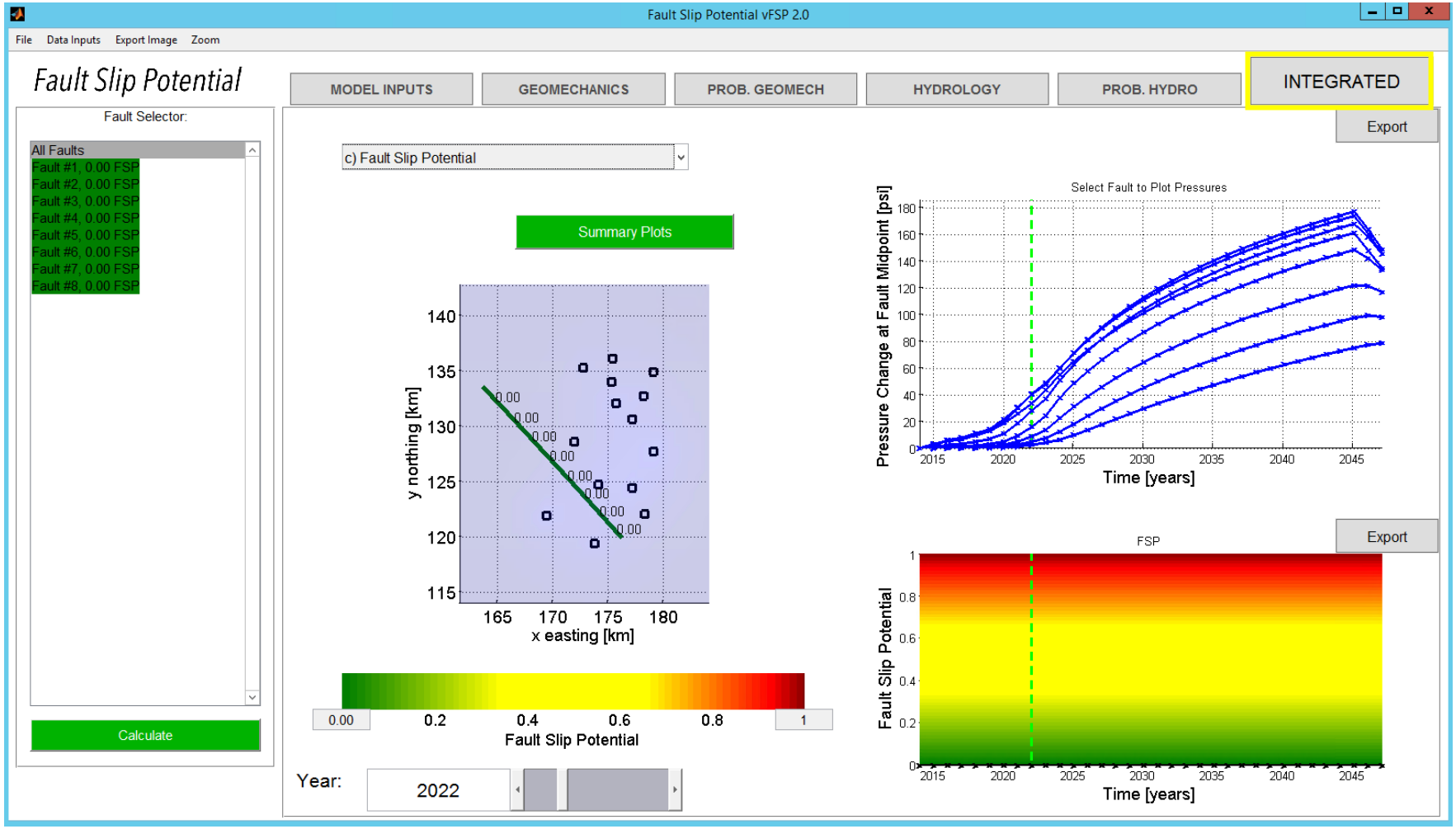


Figure 23 - Model 1 Integrated Tab, Initial Conditions

Fault Slip Potential for each fault segment is posted as a percentage likelihood.

Model 1 – Conditions in 2042 after Boomerang SWD well is completed

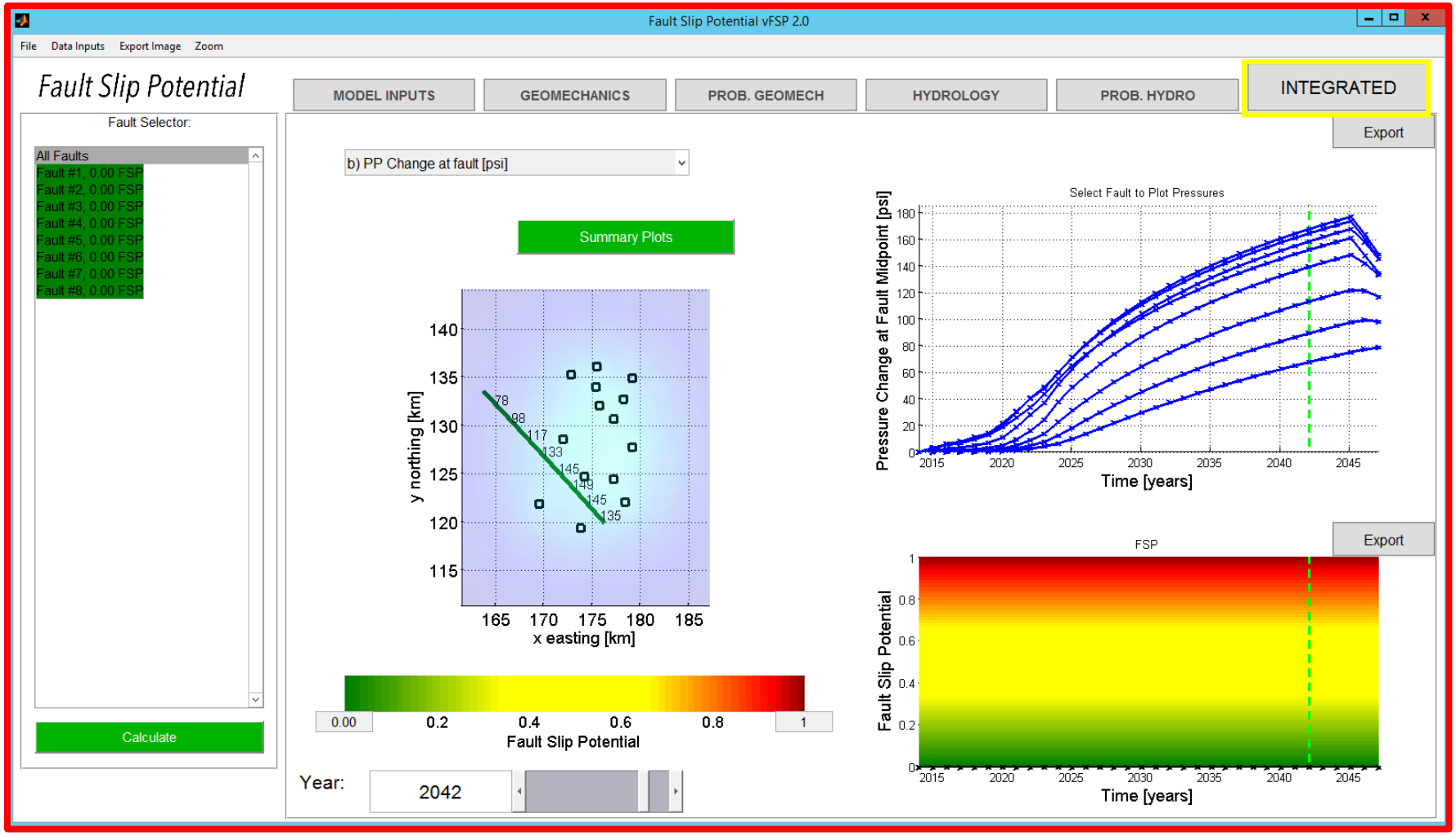


Figure 24 - Model 1 Integrated Tab, 20 years after completion

Pore Pressure change (psi) is posted for each fault segment.

Model 1 – Conditions in 2042 after Boomerang SWD well is completed

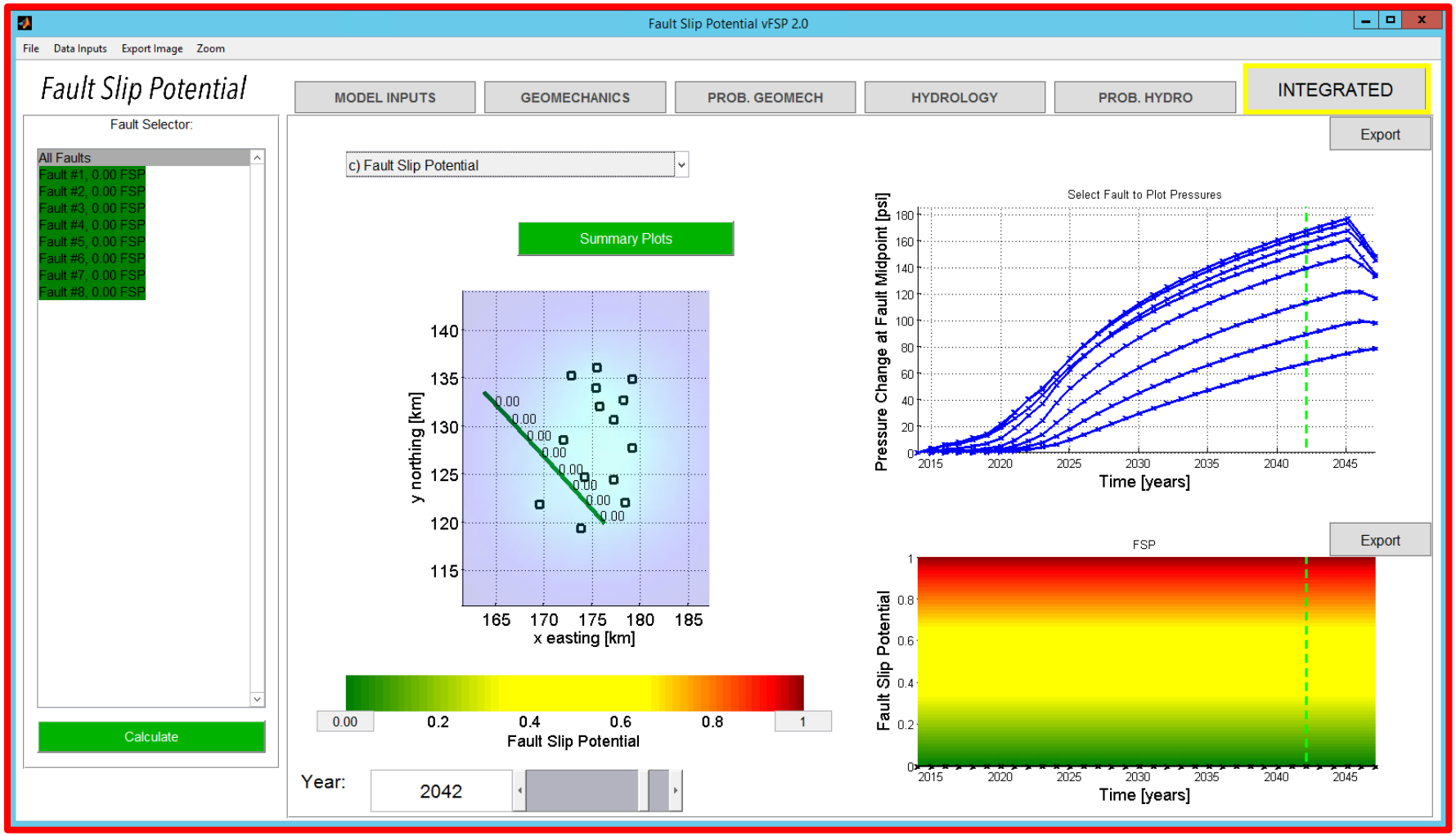


Figure 25 - Model 1 Integrated Tab, 20 years after completion

Fault Slip Potential for each fault segment is posted as a percentage likelihood.

3.0 FSP Analysis MODEL 2 – Basement Faults - only Boomerang SWD well

Model #2 only incorporates the proposed Boomerang 6 Fee SWD #1 well with proposed injection rate of 25,000 barrels per day, or an average of 760,417 barrels per month.

All other parameters remain consistent as Model #1 such as faults, stress regime, reservoir, and probabilistic parameters. Below is the only change regarding Model #1 with respect to injector data.

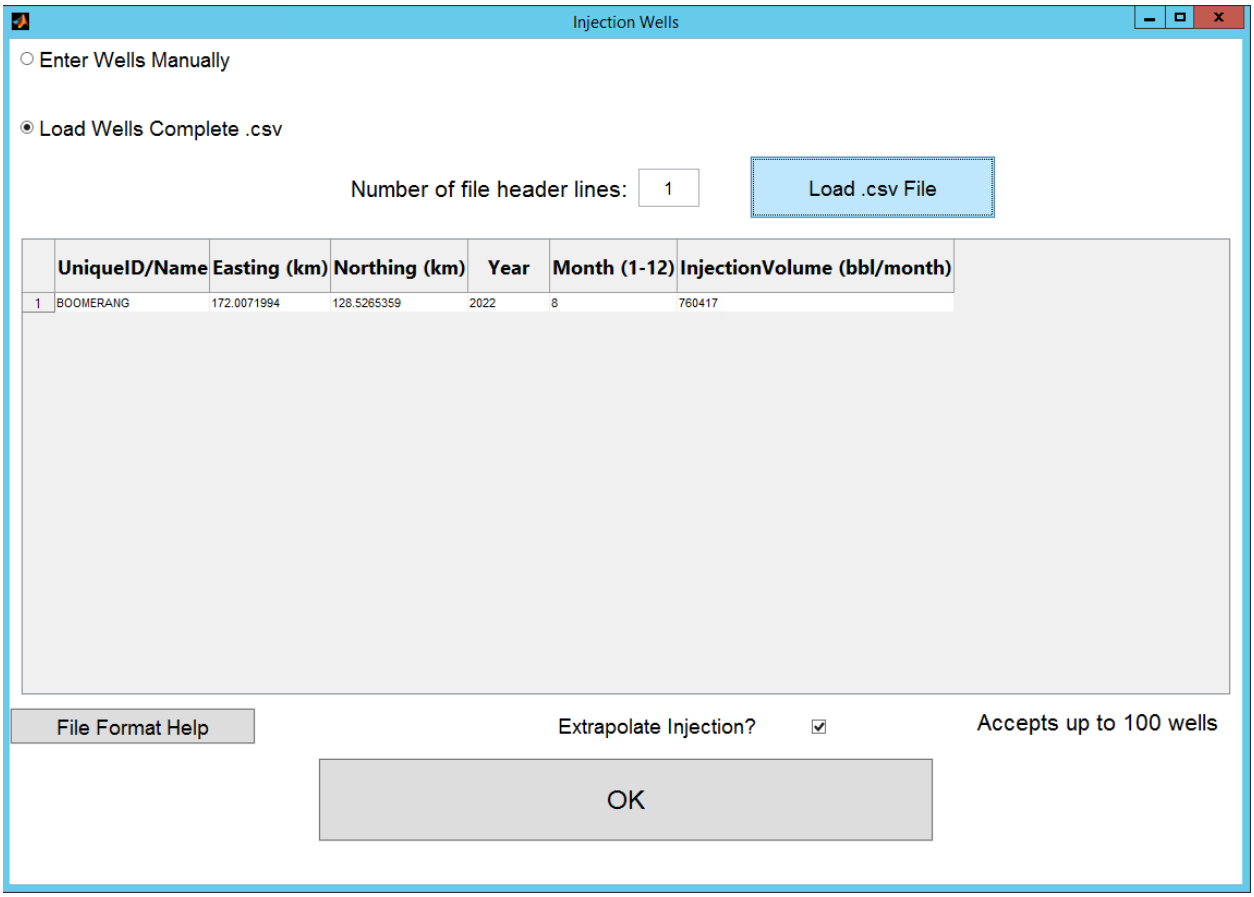


Figure 26 - Model 2 Injector Input

Model 2 - Basement

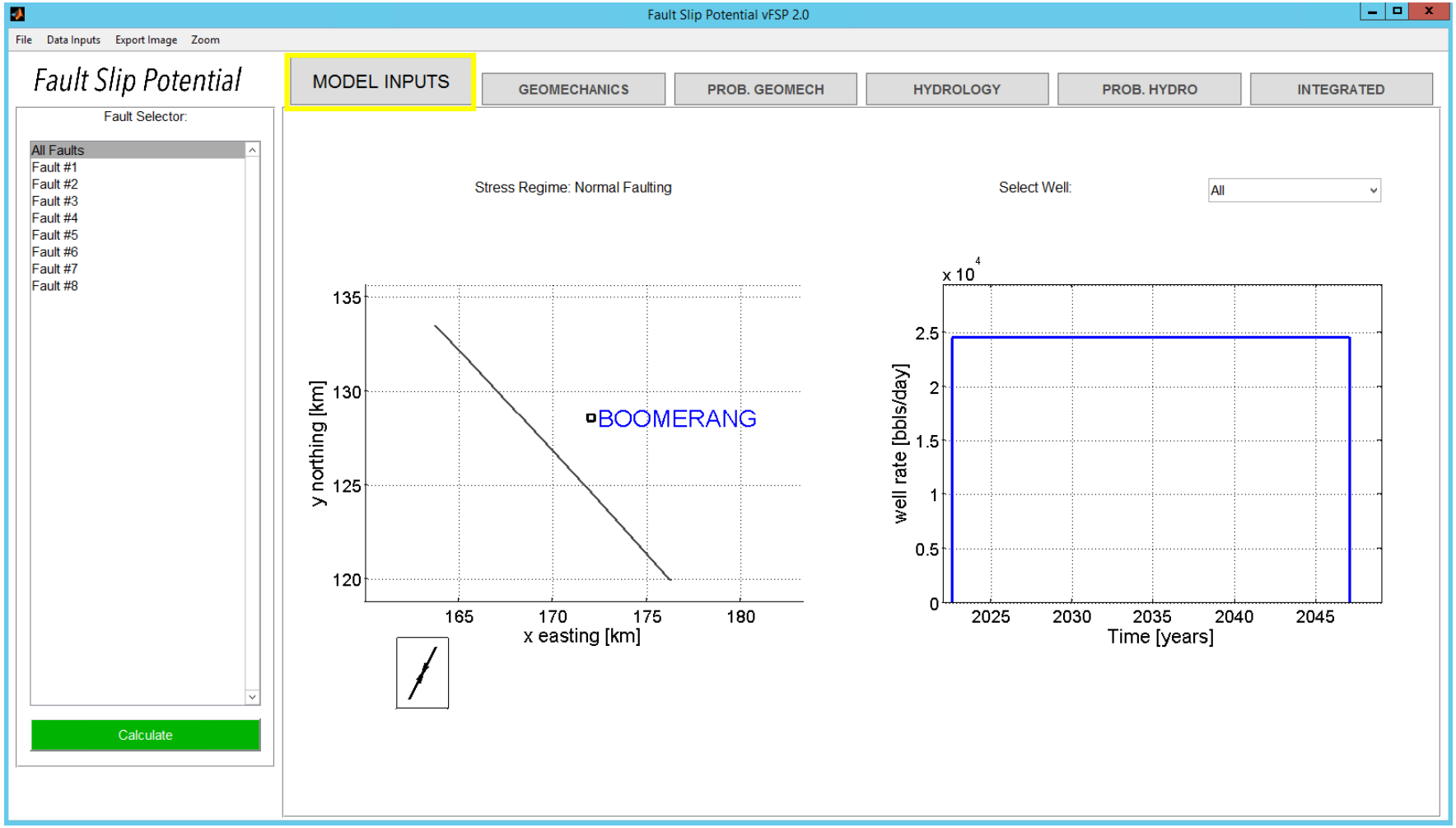


Figure 27 - Model 2 Inputs Tab

The following FSP result tabs are for the second model which includes only the proposed injection well.

Model 2 – Initial conditions before Boomerang SWD well is completed

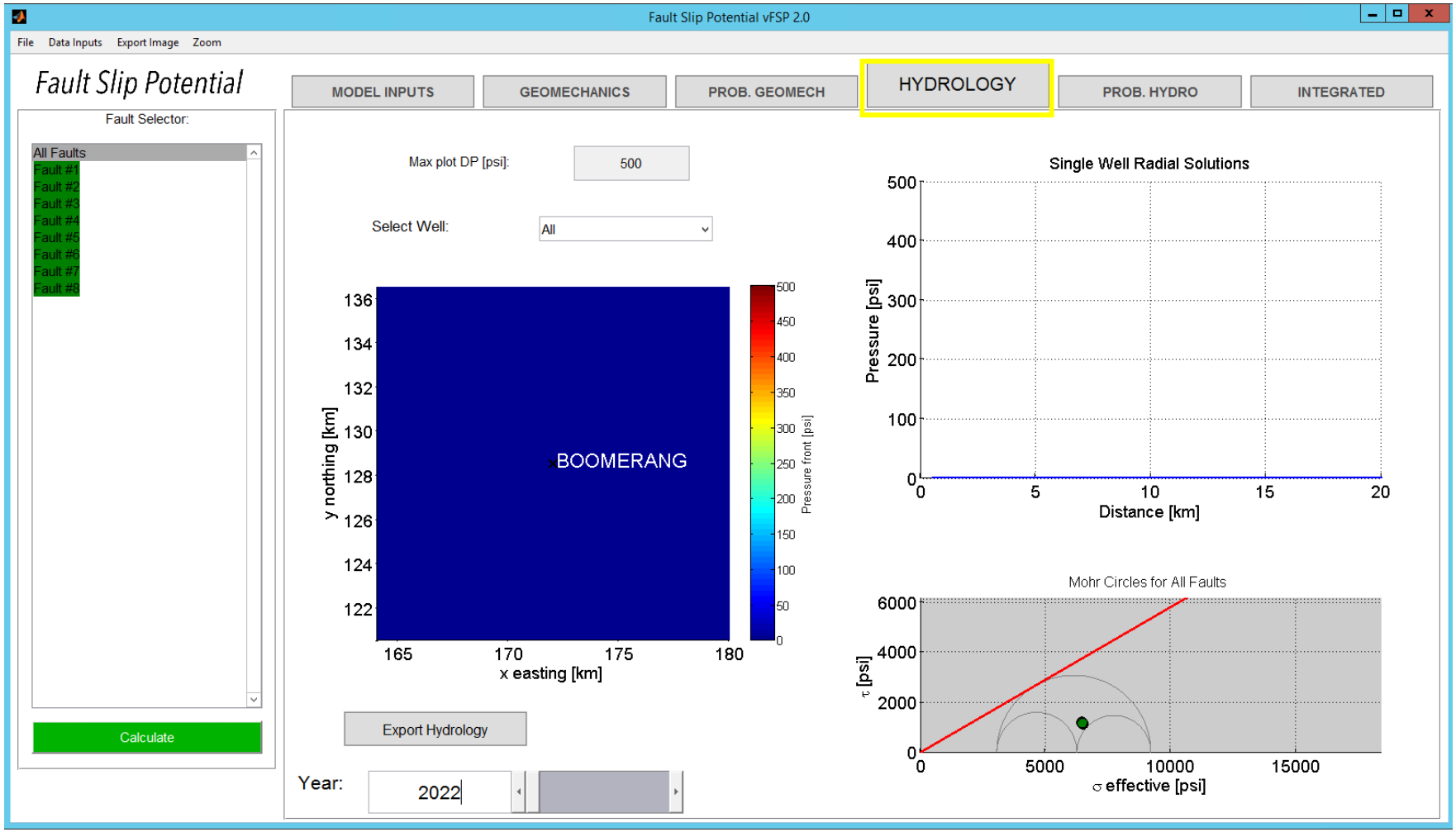


Figure 28 - Model 2 Hydrology Tab, Initial Conditions

Model 2 - Conditions in 2042 after Boomerang SWD well is completed.

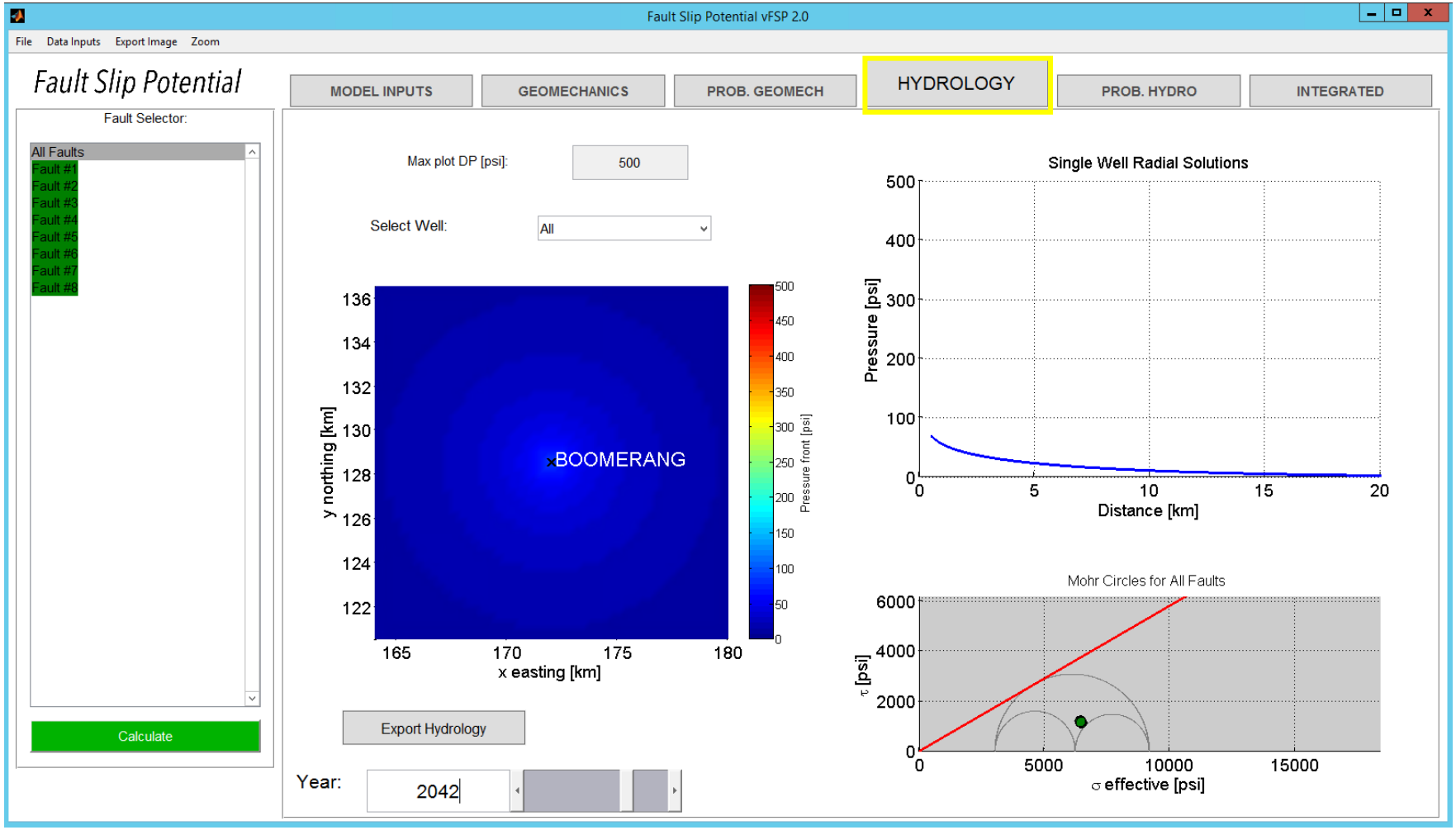


Figure 29 - Model 2 Hydrology Results, 20 years after Completion

Model 2 – Initial Conditions before Boomerang SWD well is completed

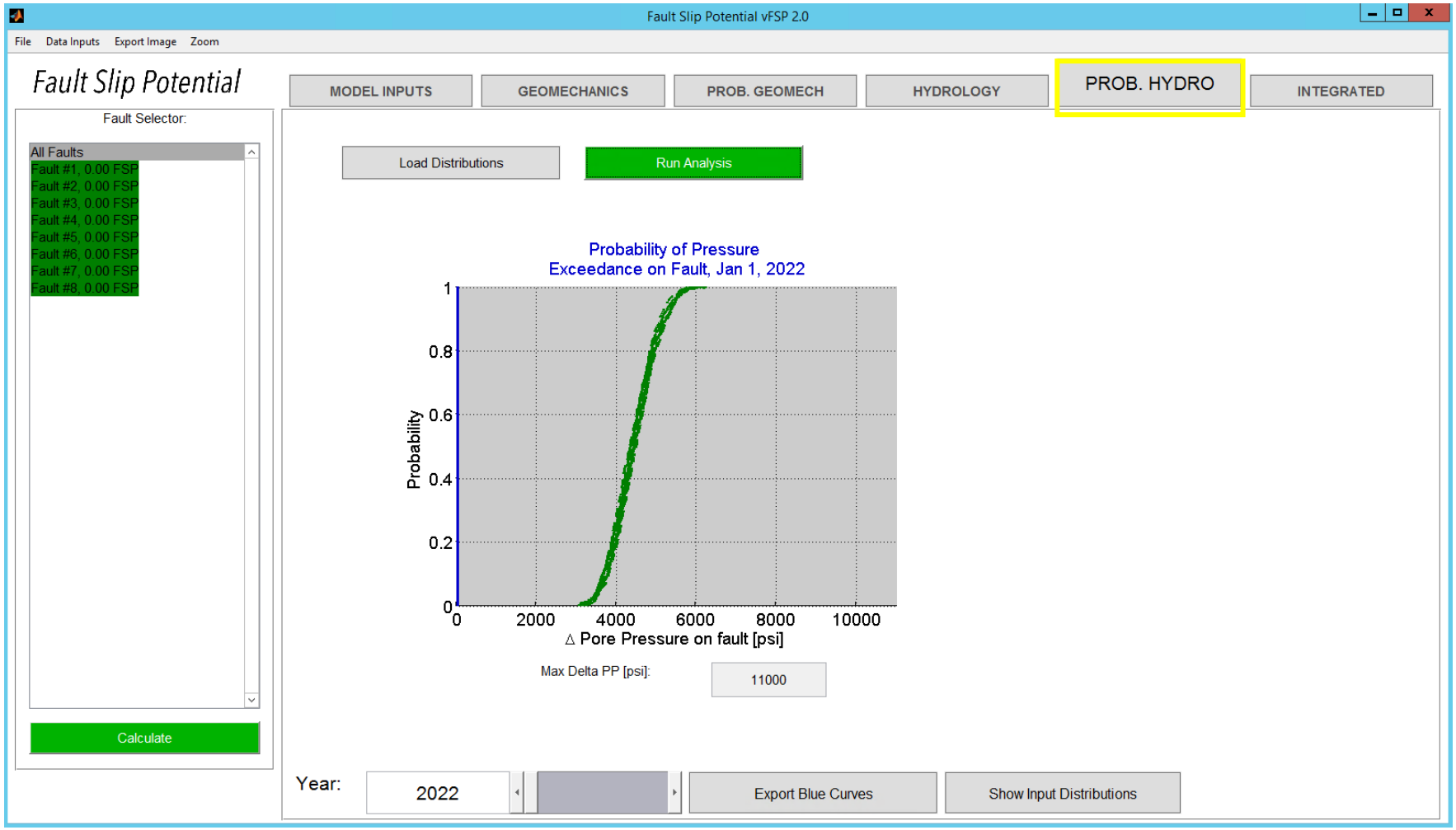


Figure 30 - Model 2 Probabilistic Hydrology Results Tab, Initial Conditions

Model 2 – Conditions in 2042 after Boomerang SWD well is completed

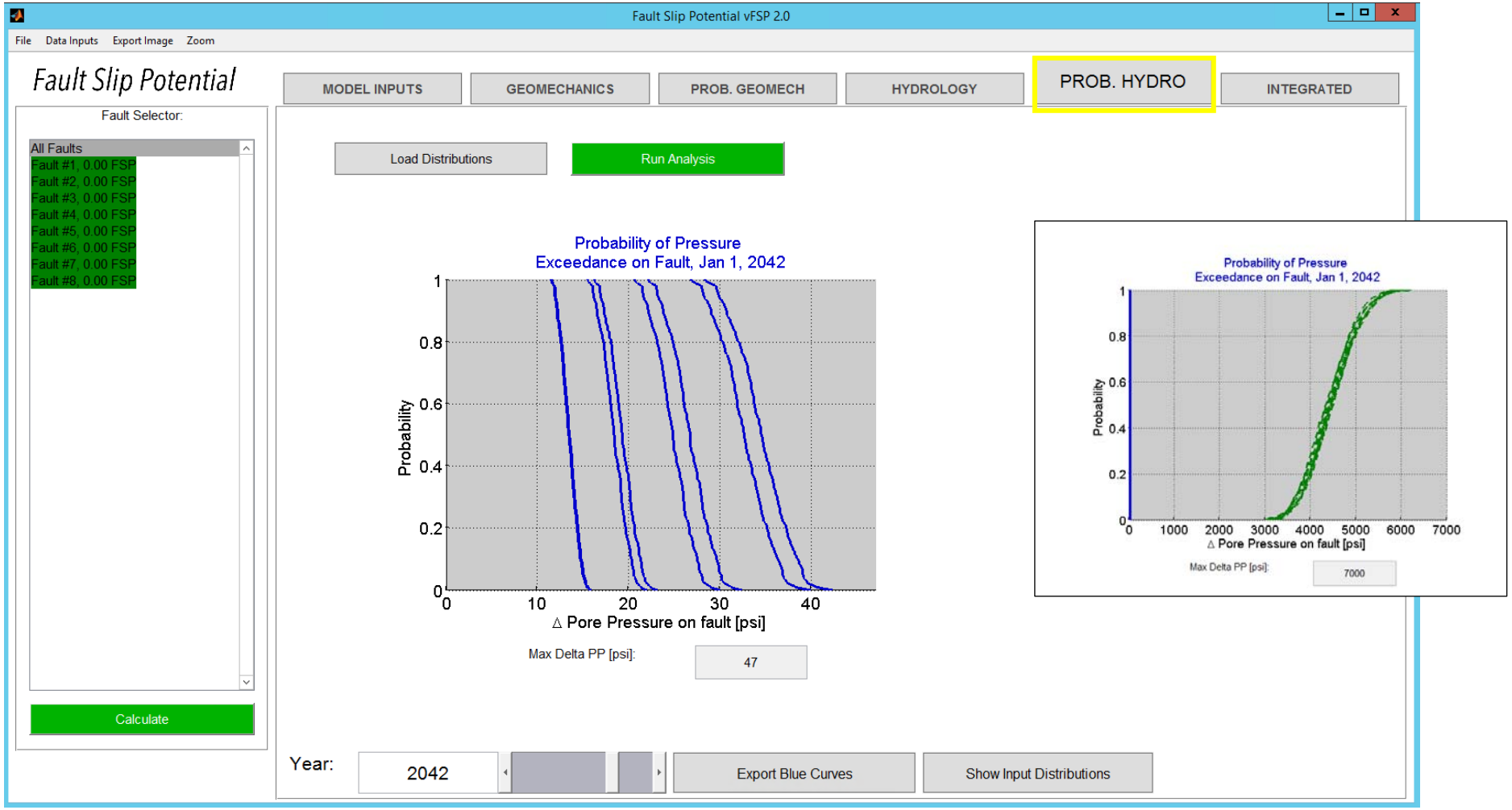


Figure 31 - Model 2 Probabilistic Hydrology Results Tab, 20 years after completion

Only includes proposed injector, held constant at the permitted rate.

Model 2 – Initial Conditions before Boomerang SWD well is completed

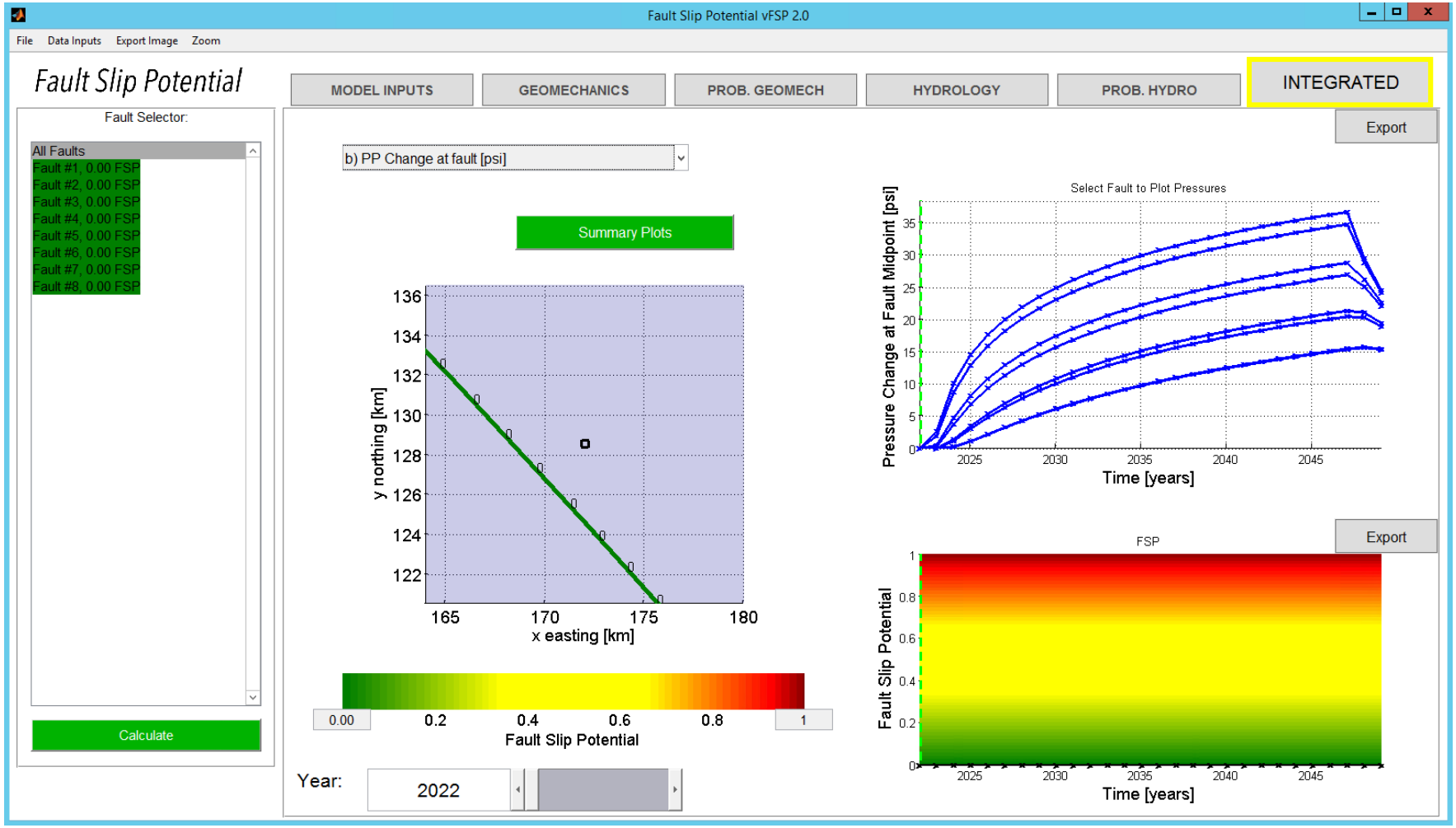


Figure 32 - Model 2 Integrated Results Tab, Initial Conditions

Pore Pressure change (psi) is posted for each fault segment.

Model 2 – Initial Conditions before Boomerang SWD well is completed

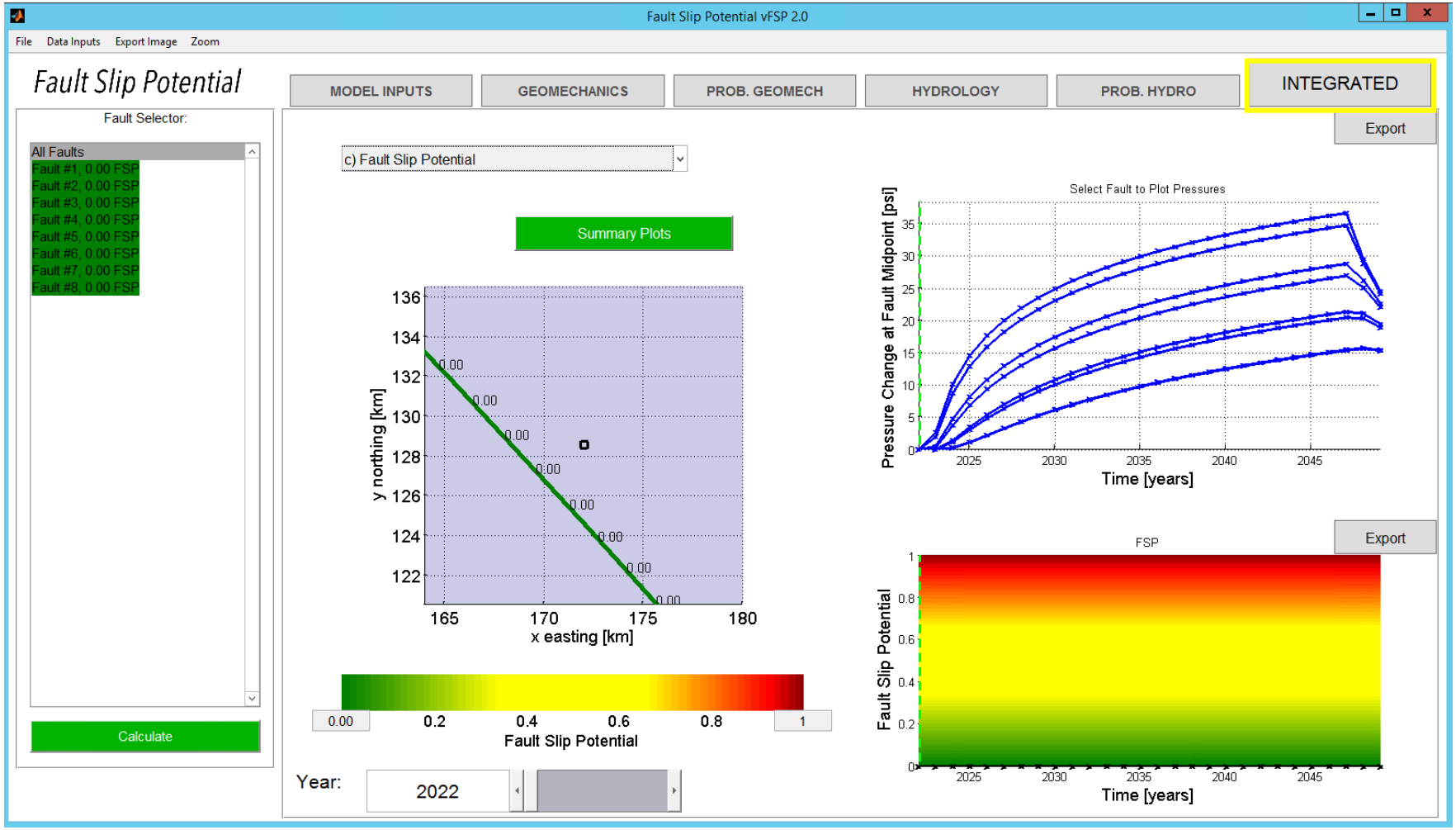


Figure 33 - Model 2 Integrated Results Tab, Initial Conditions

Fault Slip Potential for each fault segment is posted as a percentage likelihood.

Model 2 – Conditions in 2042 after Boomerang SWD well is completed

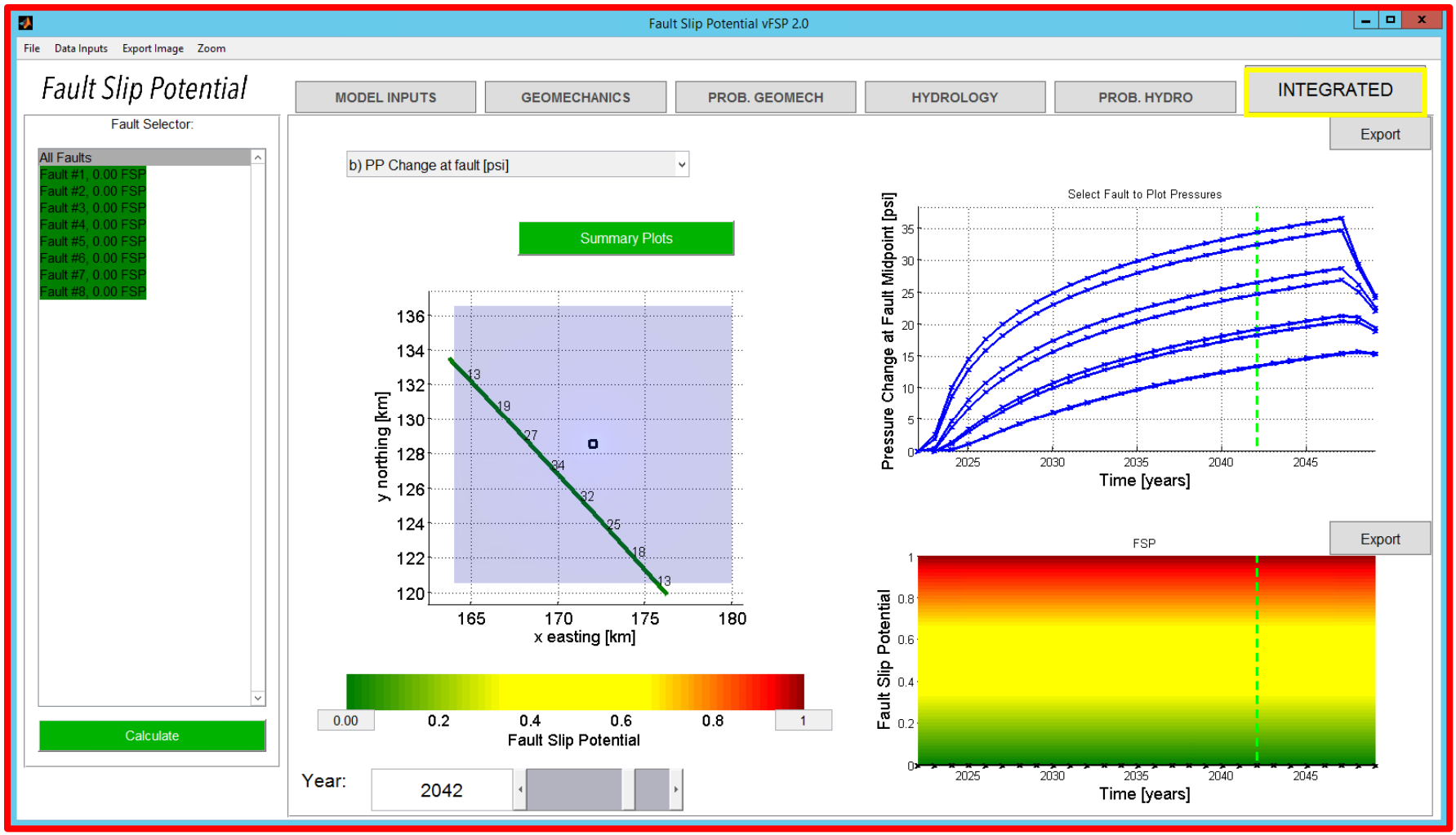


Figure 34 - Model 2 Integrated Results Tab, 20 years after completion

Pore Pressure change (psi) is posted for each fault segment.

Model 2 – Conditions in 2042 after Boomerang SWD well is completed

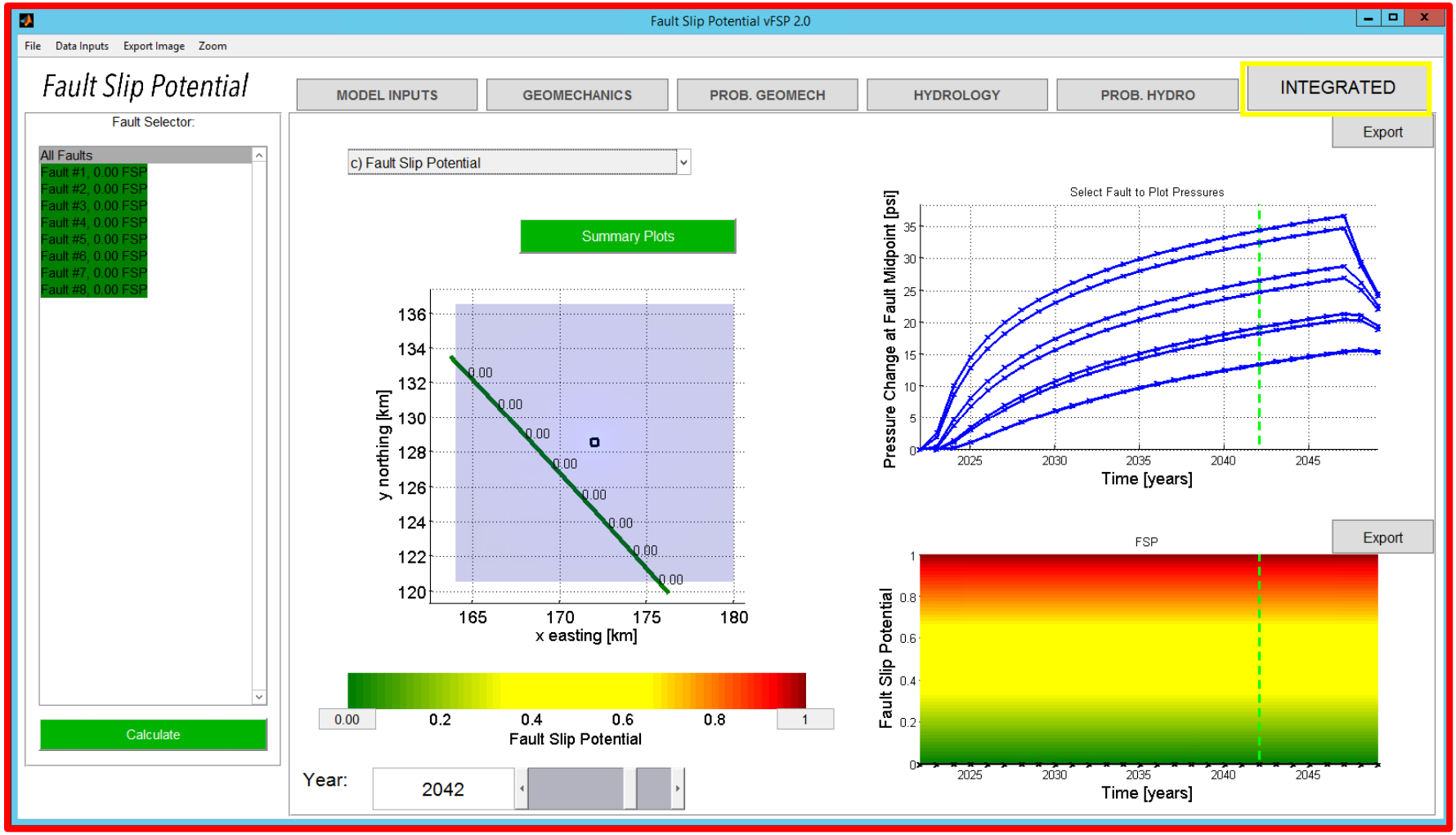


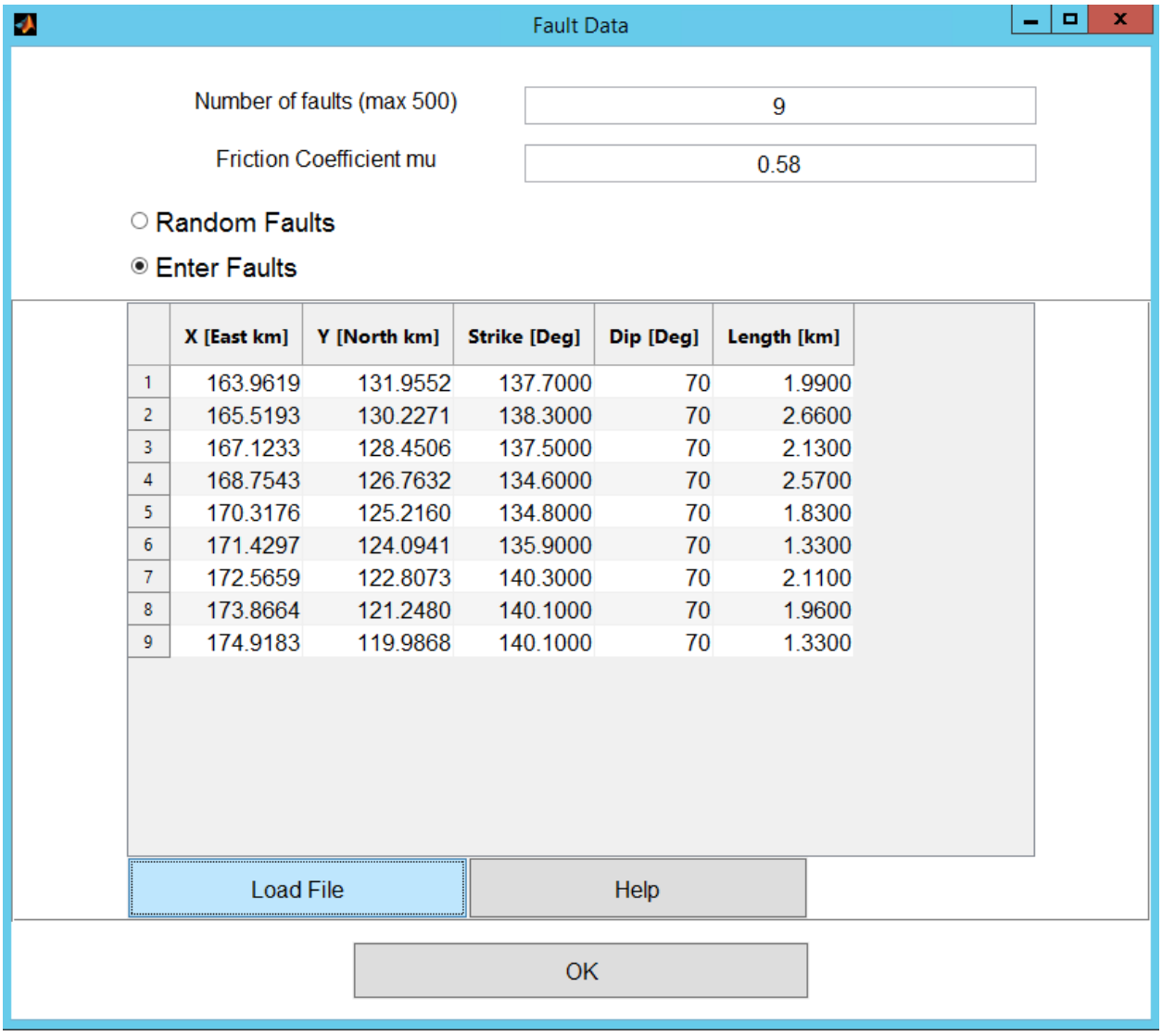
Figure 35 - Model 2 Integrated Results Tab, 20 years after completion

Fault Slip Potential for each fault segment is posted as ain percentage likelihood.

4.0 FSP Analysis MODELS 3 and 4 – Woodford Faults

Models #3 and #4 analyze Woodford fault traces within the AOI which utilize the same methodology as previous models. Input parameters for stress regime, reservoir, and probabilistic ranges are consistent with Models 1 & 2. Therefore, the following figures (36 to 45) illustrate the Precambrian fault traces used as input, and the FSP results tabs.

Model #3 incorporates all 14 injection wells, whereas Model #4 only uses the planned Boomerang 6 Fee SWD #1 completion with proposed average injection rate of 25,000 barrels per day, or an average of 760,417 barrels per month.



	X [East km]	Y [North km]	Strike [Deg]	Dip [Deg]	Length [km]
1	163.9619	131.9552	137.7000	70	1.9900
2	165.5193	130.2271	138.3000	70	2.6600
3	167.1233	128.4506	137.5000	70	2.1300
4	168.7543	126.7632	134.6000	70	2.5700
5	170.3176	125.2160	134.8000	70	1.8300
6	171.4297	124.0941	135.9000	70	1.3300
7	172.5659	122.8073	140.3000	70	2.1100
8	173.8664	121.2480	140.1000	70	1.9600
9	174.9183	119.9868	140.1000	70	1.3300

Figure 36 - FSP Fault input for Models 3 and 4

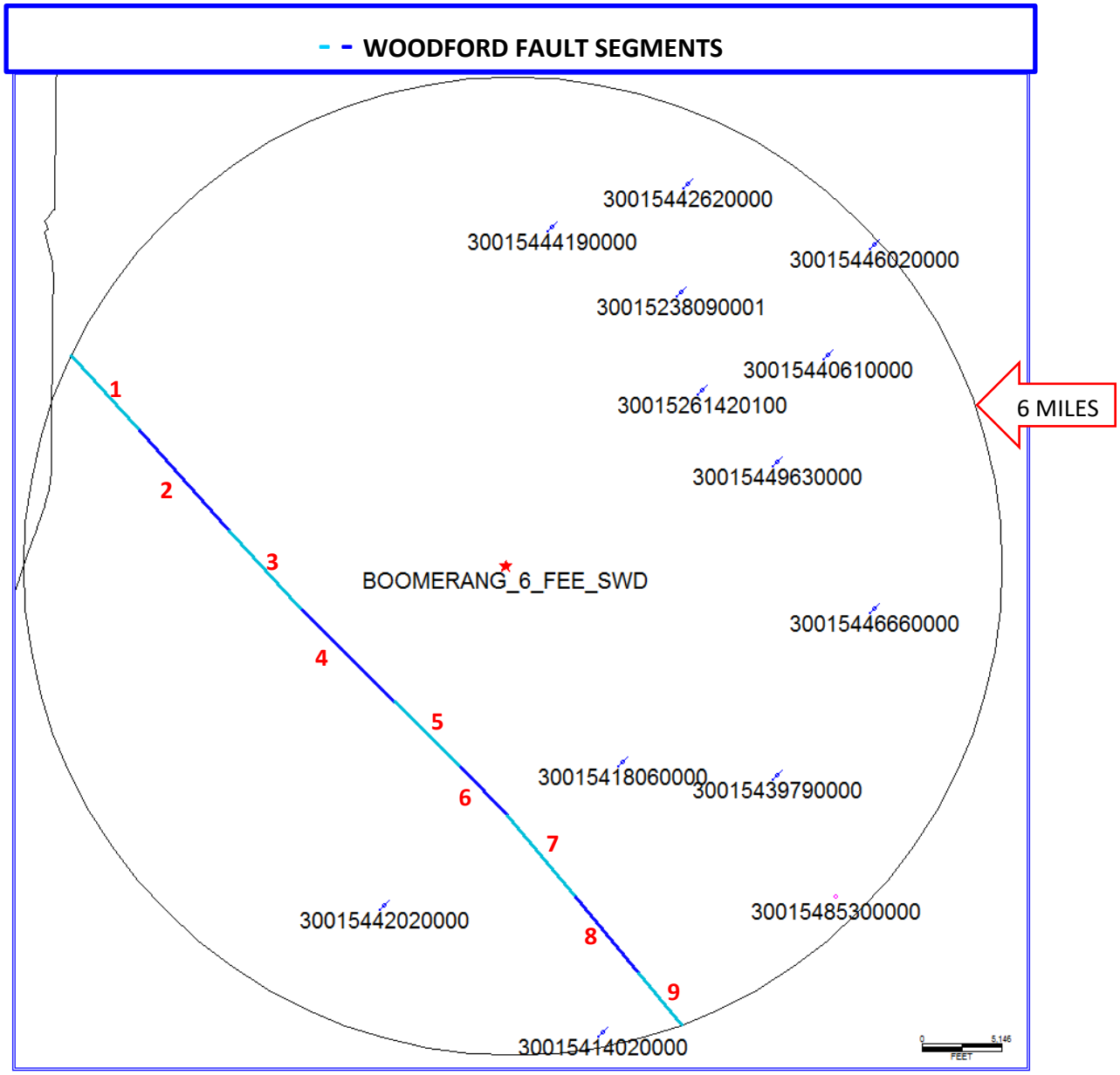


Figure 37 - Woodford fault segments (9) used in FSP Analysis Models 3 and 4

Model 3 - Woodford

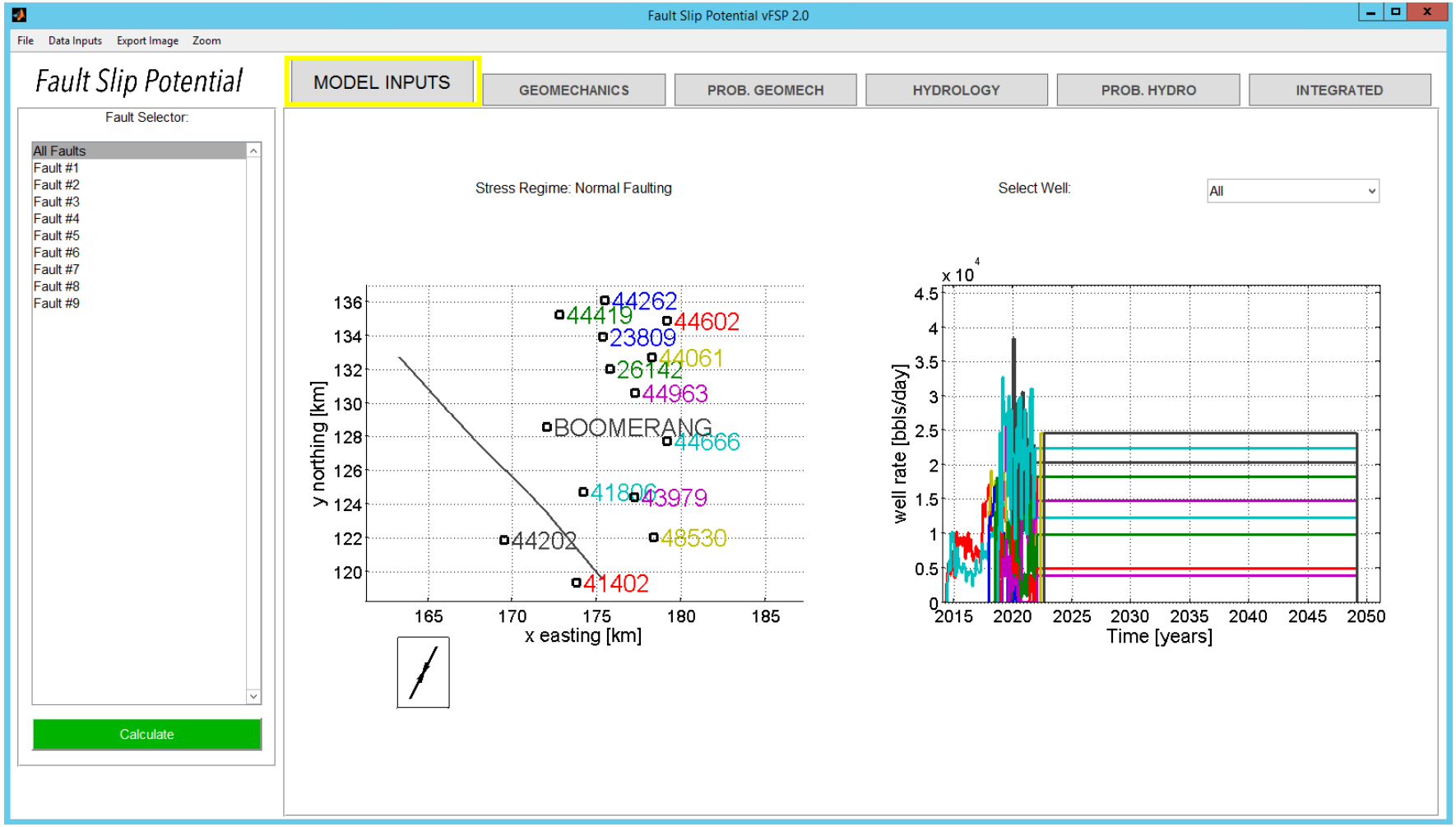


Figure 38 - FSP Model 3 Input: 14 injectors and 9 Woodford fault segments

Model 4 - Woodford

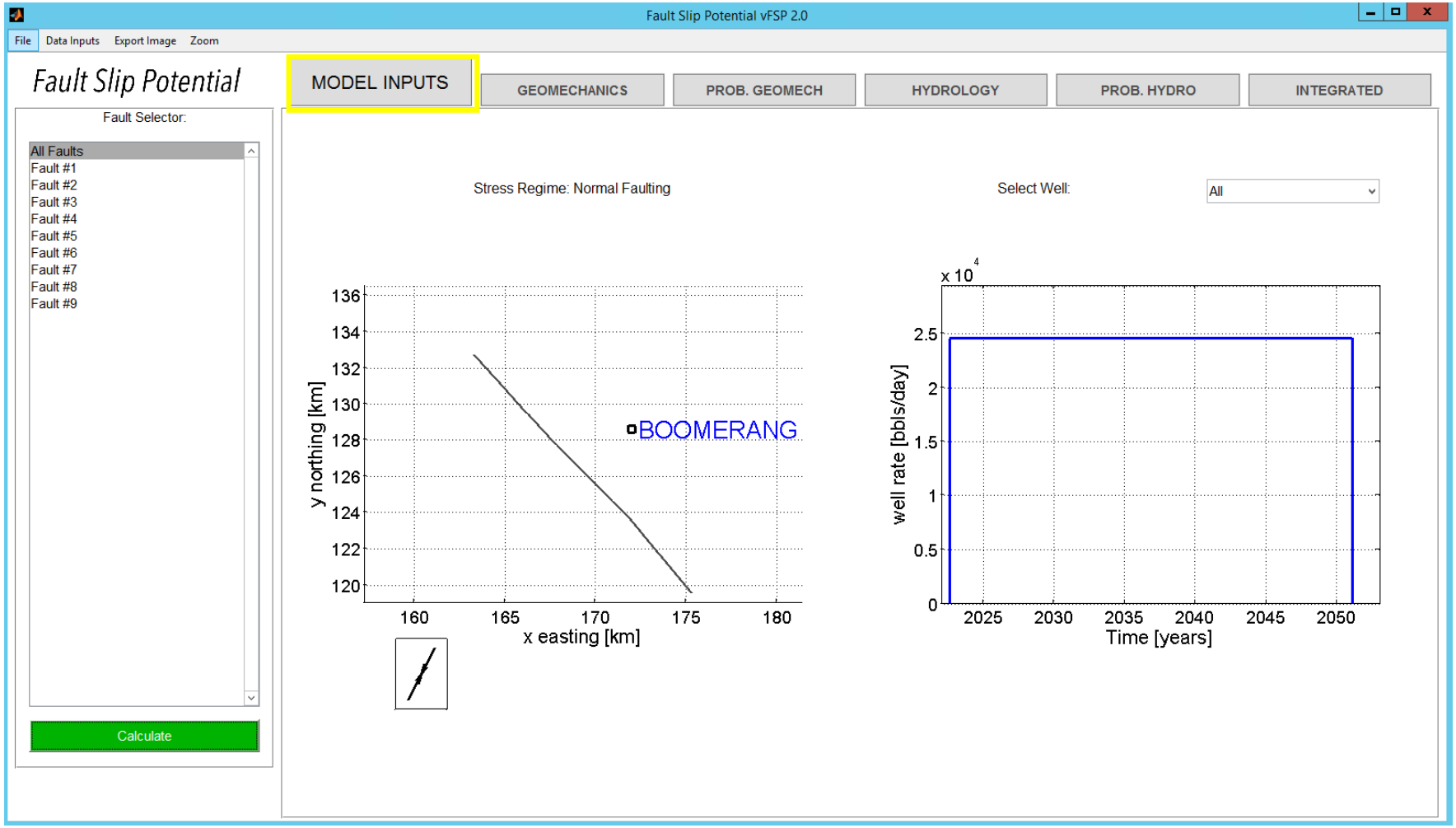


Figure 39 - FSP Model 4 Input: Only injector and 9 Woodford fault segments

Model 3 and 4

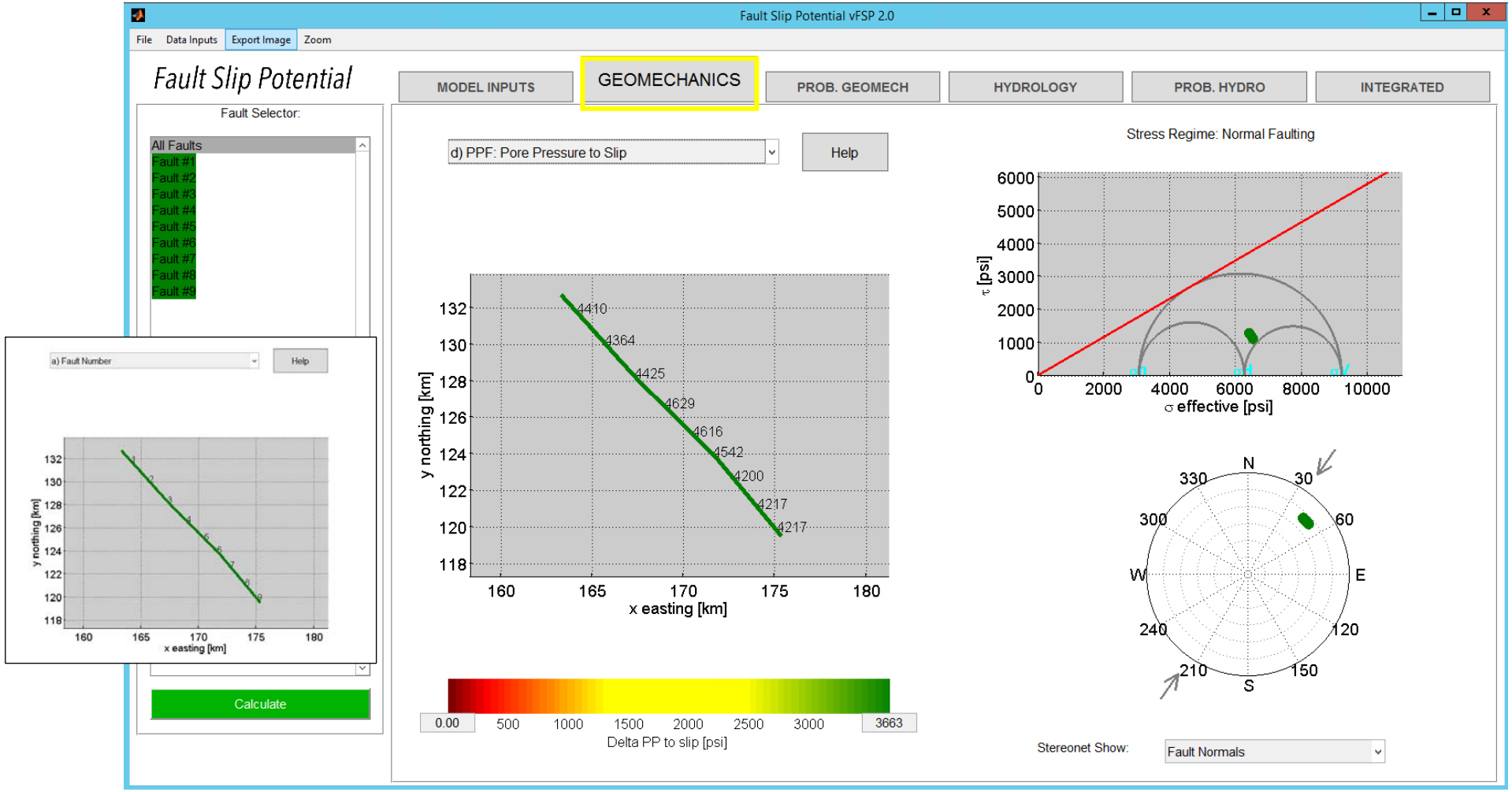


Figure 40 - FSP Geomechanics Tab, Model 3 and 4

Demonstrates pore pressure to slip (psi) for each fault segment, direction of SHmax, and a Mohr diagram with frictional slip line shown in red. Faults are colored according to the color scale.

Model 3 and 4

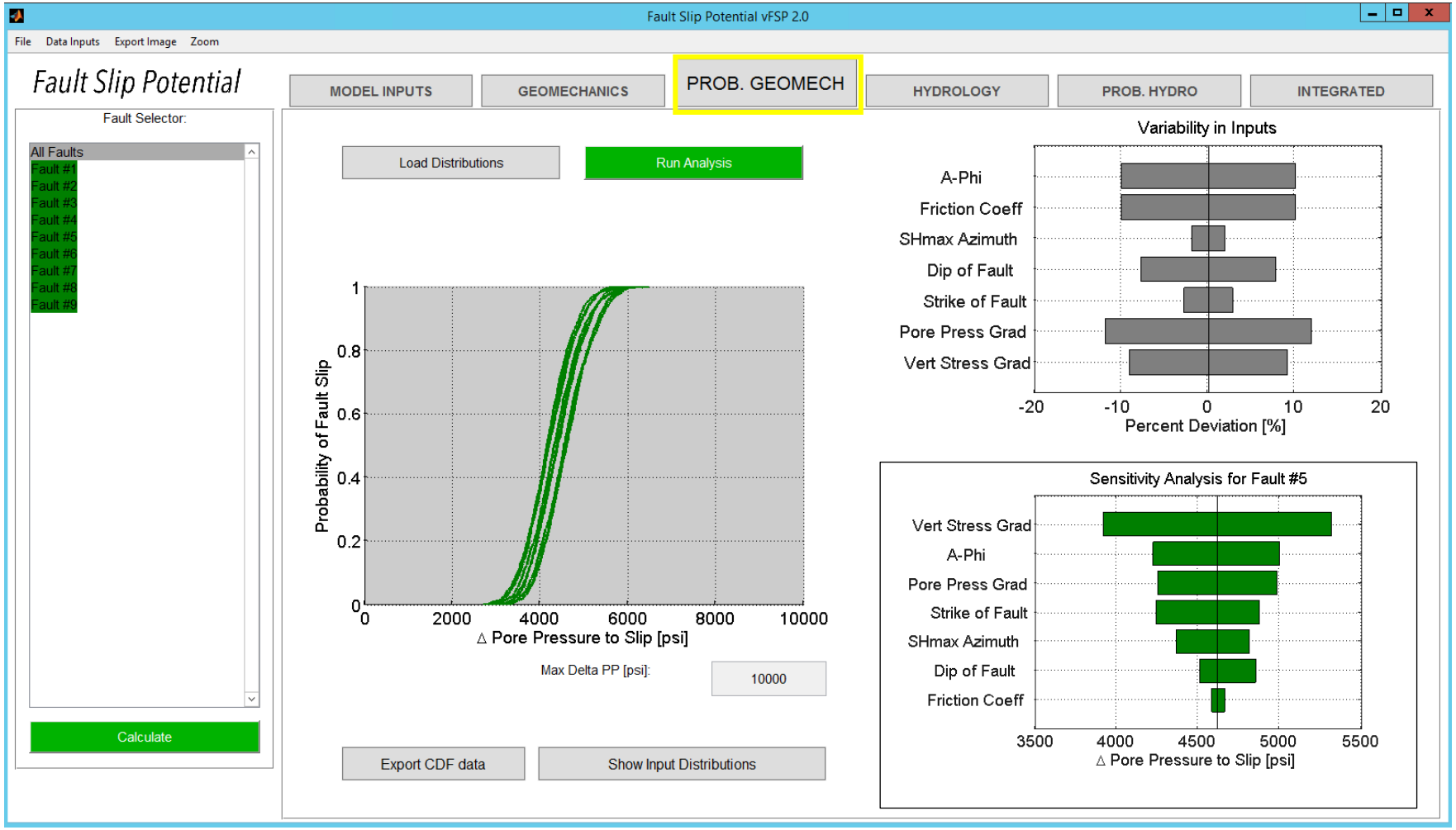


Figure 41 - FSP Probabilistic Geomechanics Tab, Model 3 and 4

Propagates the relative uncertainties through the model producing a distribution of pore pressures to slip.

The following page shows the integrated tabs which combined results of probabilistic geomechanics and hydrology models run for all 9 Woodford fault segments.

Model 3 – Initial Conditions before Boomerang SWD well is completed

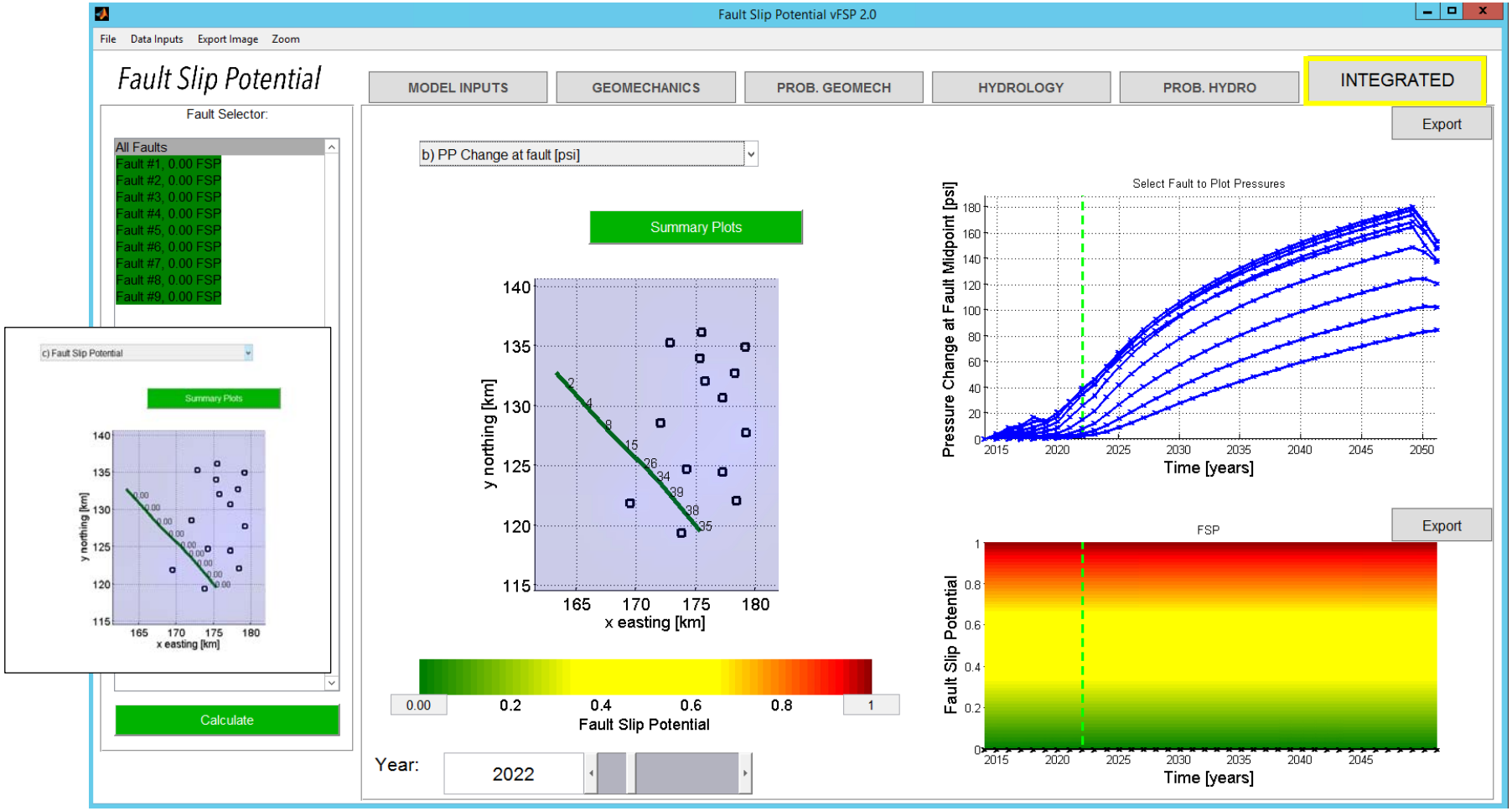


Figure 42 - Model 3 Integrated Tab, Initial Conditions

Pore Pressure change (psi) is posted for each fault segment.

Model 3 – Conditions in 2042 after Boomerang SWD well is completed

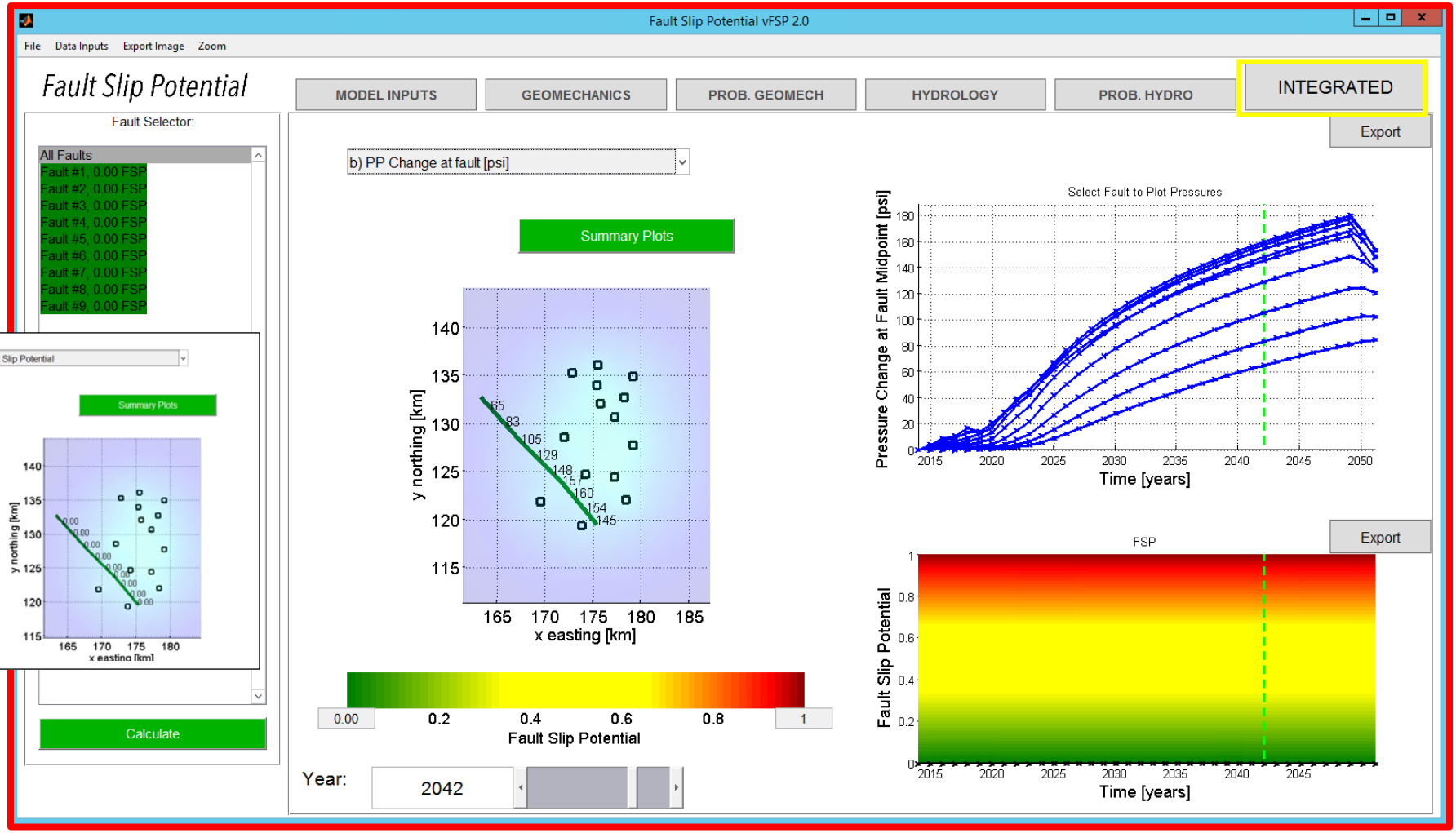


Figure 43 - Model 3 Integrated Tab, 20 years after completion.

Pore Pressure change (psi) is posted for each fault segment.

Model 4 – Initial Conditions before Boomerang SWD well is completed

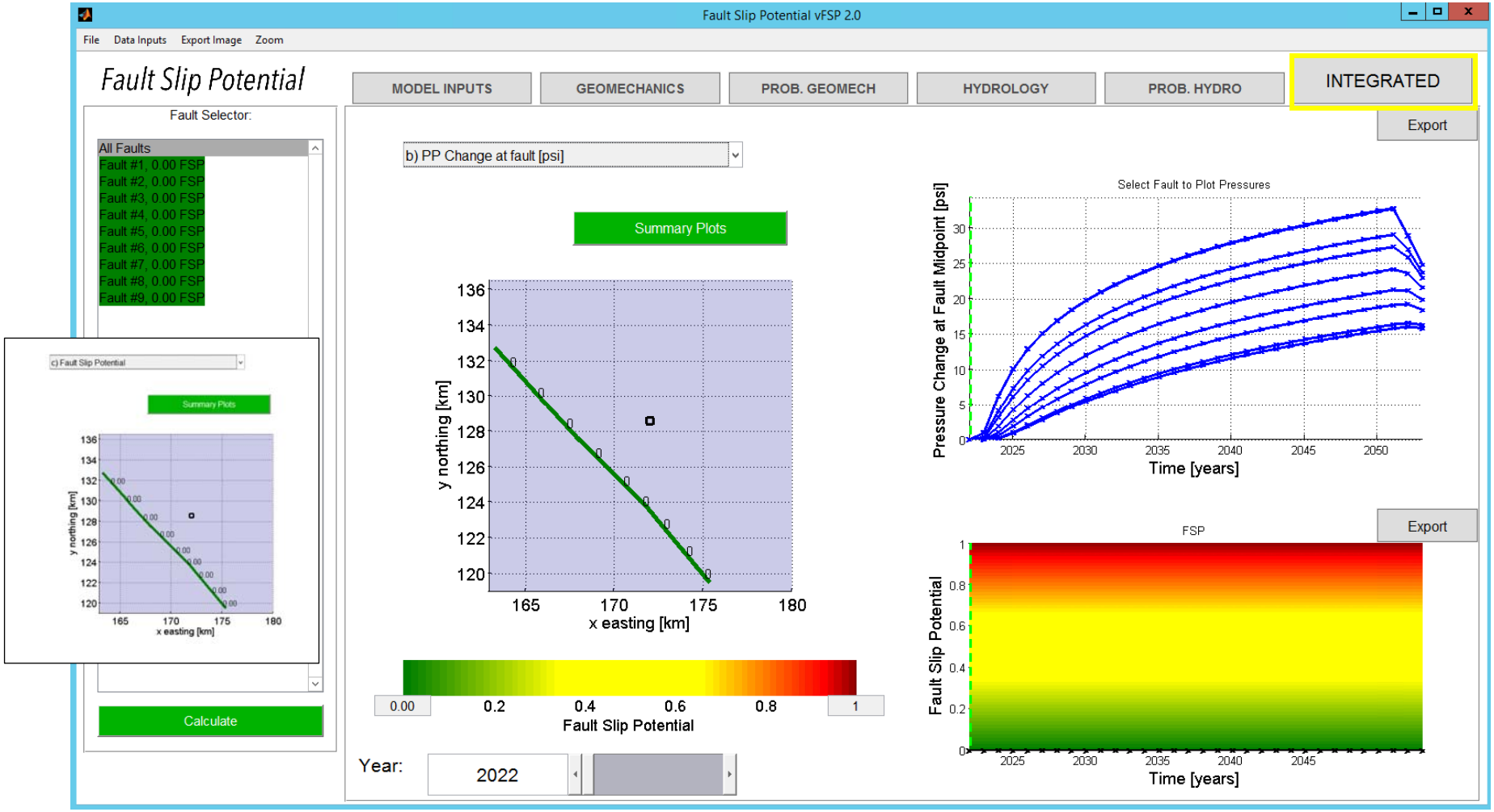


Figure 44 - Model 4 Integrated Tab, Initial Conditions

Pore Pressure change (psi) is posted for each fault segment.

Model 4 – Conditions in 2042 after Boomerang SWD well is completed

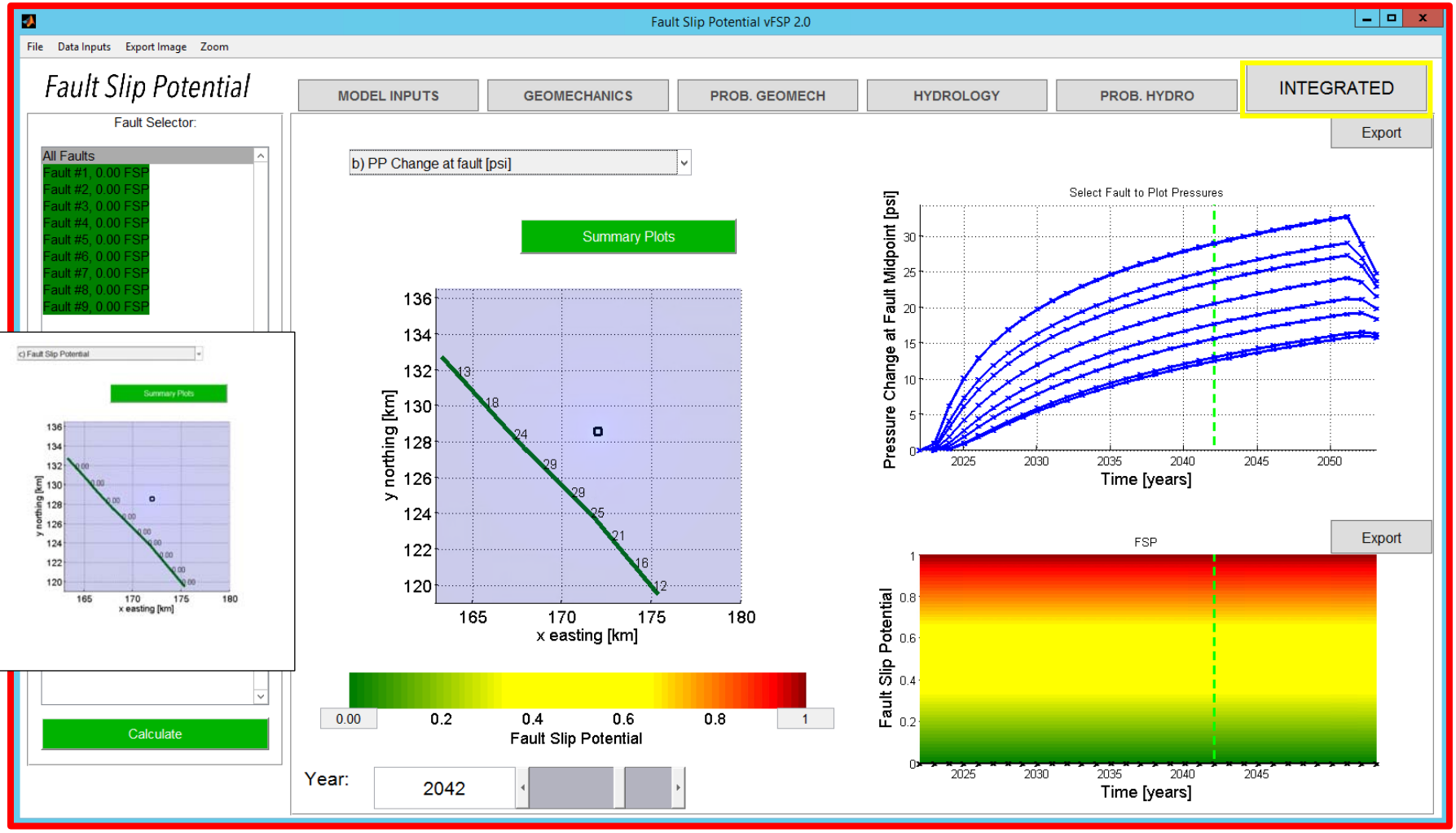


Figure 45 - Model 4 Integrated Tab, 20 years after completion

Pore Pressure change (psi) is posted for each fault segmet.

5.0 MODEL 1 FSP Analysis Results

Model 1 13 Injection Wells, Boomerang SWD & Basement faults					
Fault	**Pore Pressure to Slip**	**PP Change 2022**	**FSP 2022**	**PP Change 2042**	**FSP 2042**
1	4521	3	0.00	78	0.00
2	4448	5	0.00	98	0.00
3	4455	9	0.00	117	0.00
4	4455	16	0.00	133	0.00
5	4440	28	0.00	145	0.00
6	4387	40	0.00	149	0.00
7	4387	41	0.00	145	0.00
8	4387	34	0.00	135	0.00

Table 1 - Model 1 FSP Results per fault segment

6.0 MODEL 2 FSP Analysis Results

Model 2 Boomerang SWD & Basement faults					
Fault	**Pore Pressure to Slip**	**PP Change 2022**	**FSP 2022**	**PP Change 2042**	**FSP 2042**
1	4521	0	0.00	13	0.00
2	4448	0	0.00	19	0.00
3	4455	0	0.00	27	0.00
4	4440	0	0.00	34	0.00
5	4387	0	0.00	32	0.00
6	4387	0	0.00	25	0.00
7	4387	0	0.00	18	0.00
8	4387	0	0.00	13	0.00

Table 2 - Model 2 FSP Results per fault segment

7.0 MODEL 3 and 4 FSP Analysis Results

Model 3 13 Injection Wells, Boomerang SWD & Woodford faults					
Fault	**Pore Pressure to Slip**	**PP Change 2022**	**FSP 2022**	**PP Change 2042**	**FSP 2042**
1	4410	2	0.00	65	0.00
2	4364	4	0.00	83	0.00
3	4425	8	0.00	105	0.00
4	4629	15	0.00	129	0.00
5	4616	26	0.00	148	0.00
6	4542	34	0.00	157	0.00
7	4200	39	0.00	160	0.00
8	4217	38	0.00	154	0.00
9	4217	35	0.00	145	0.00

Model 4 Boomerang SWD & Woodford faults					
Fault	**Pore Pressure to Slip**	**PP Change 2022**	**FSP 2022**	**PP Change 2042**	**FSP 2042**
1	4410	0	0.00	13	0.00
2	4364	0	0.00	18	0.00
3	4425	0	0.00	24	0.00
4	4629	0	0.00	29	0.00
5	4616	0	0.00	29	0.00
6	4542	0	0.00	25	0.00
7	4200	0	0.00	21	0.00
8	4217	0	0.00	16	0.00
9	4217	0	0.00	12	0.00

Table 3 - Model 3 & 4 FSP Results per fault segment.

8.0 Recorded Seismicity

Between 1/1/1900 and 1/06/2021 **0 earthquakes** with magnitudes 2 or greater were recorded by **USGS** within the Boomerang 6 Fee SWD #1 FSP AOI (6 miles).

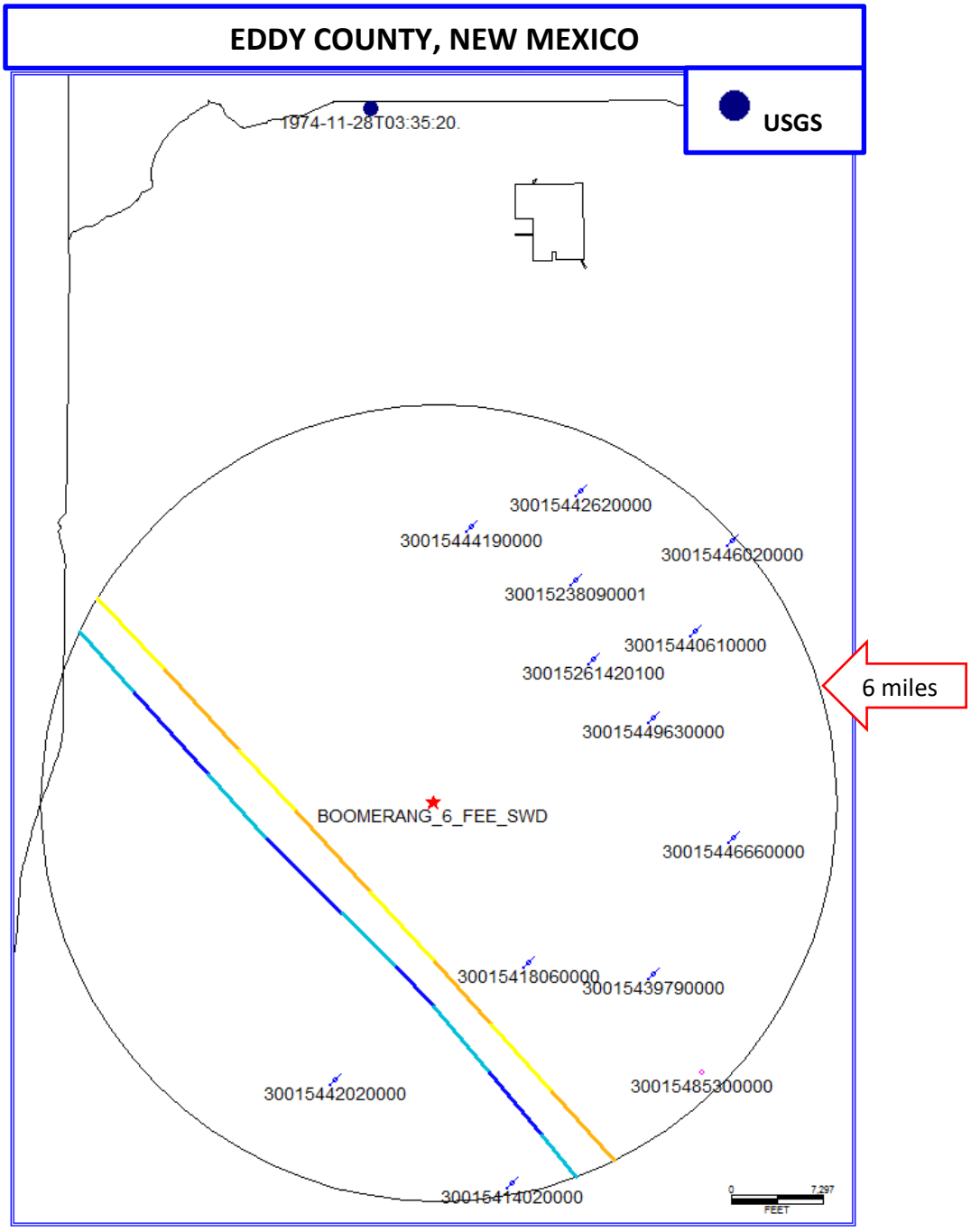


Figure 46 – USGS reported seismicity

0 Earthquakes with magnitude of 2 or greater inside the the Boomerang 6 Fee SWD #1 FSP ANALYSIS AREA

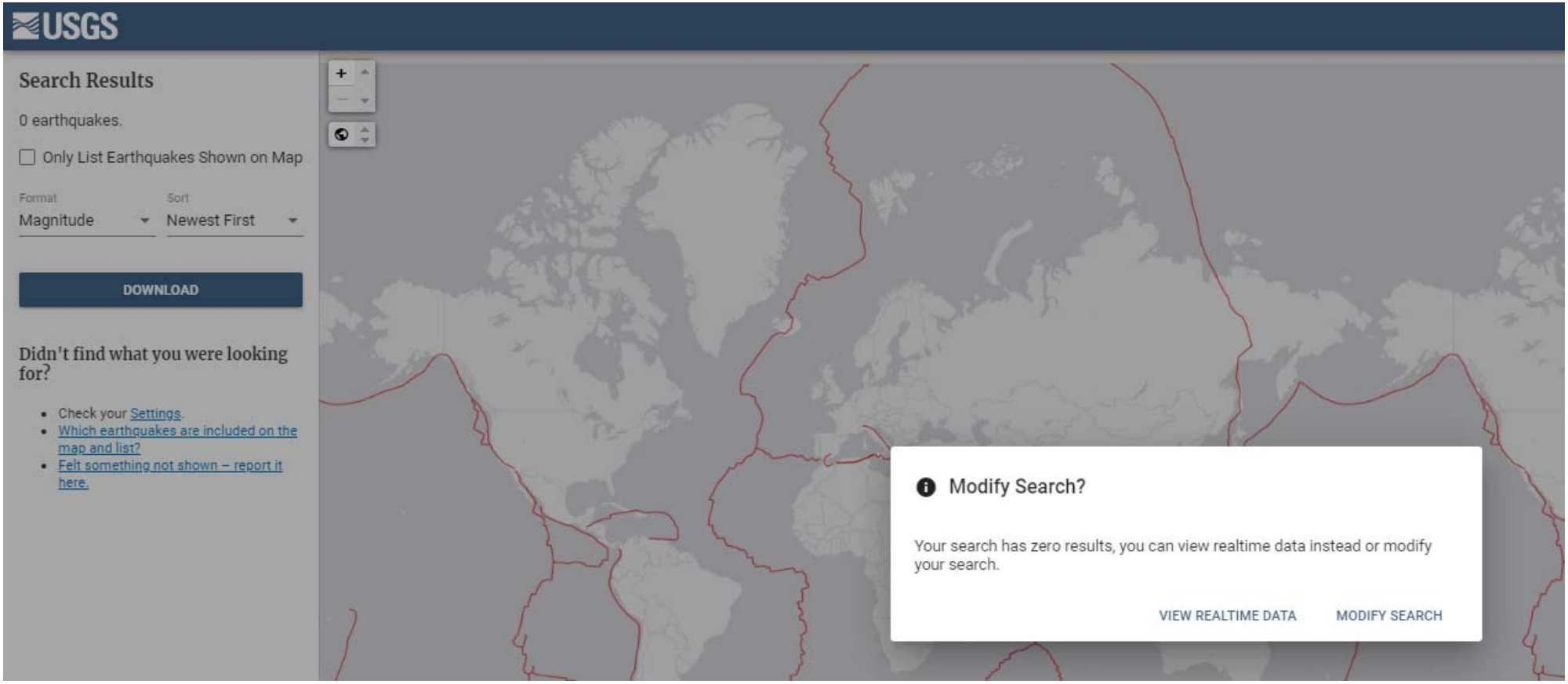


Figure 47 - USGS Earthquake catalog within Boomerang 6 Fee SWD #1 FSP AOI

9.0 Conclusion

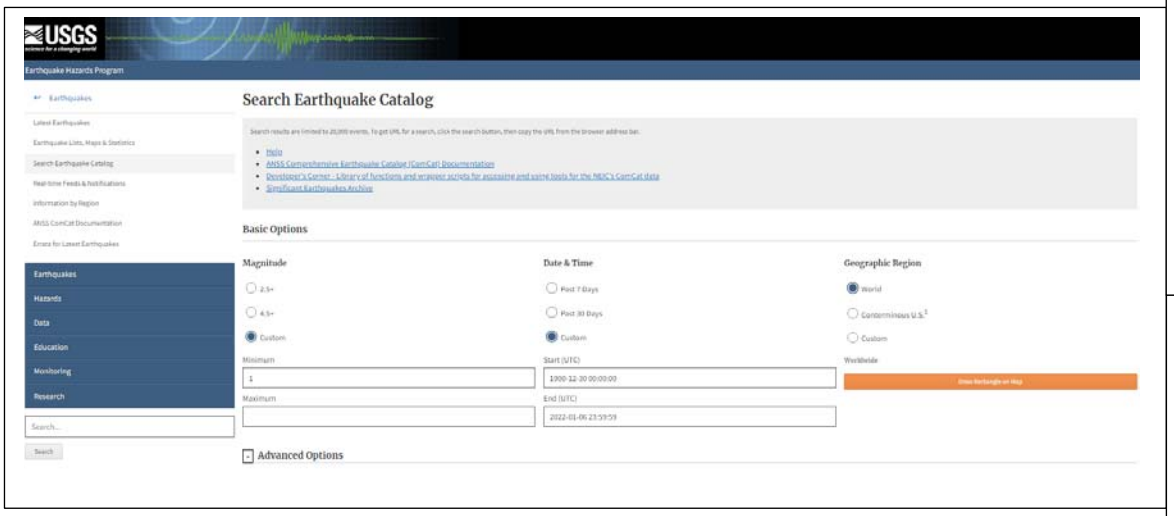
Four (4) FSP models were run within Boomerang SWD AOI analyzing the following fault traces.

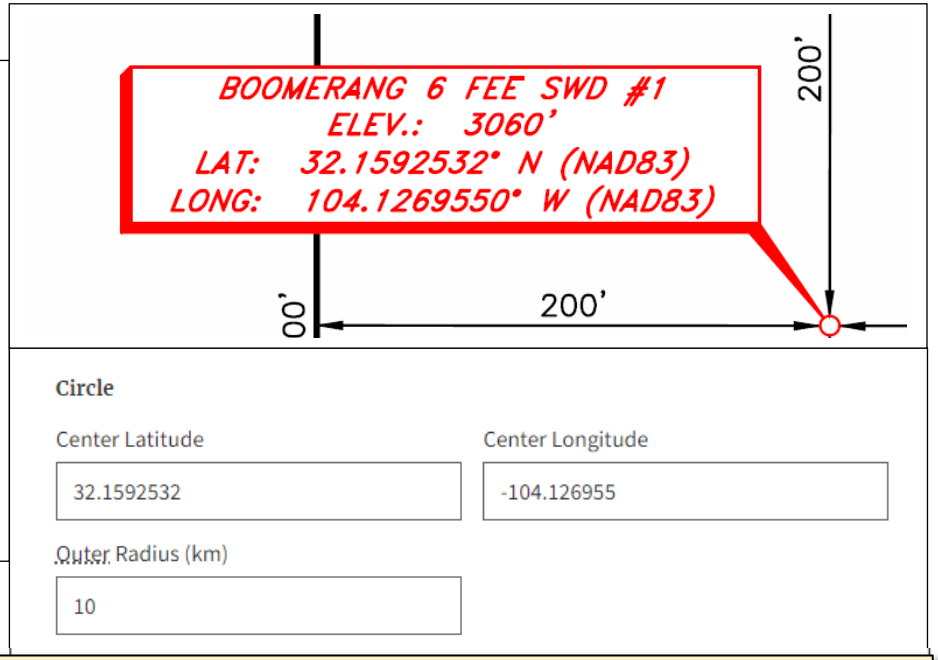
- Precambrian
- Woodford

Two models were run for each set of fault traces, the first included all currently active injectors and select permitted injectors within the 6-mile AOI (including the proposed Boomerang 6 Fee SWD #1 location), and the second model per fault set only includes the proposed SWD well. The reservoir and stress parameters for the proposed injection interval do not increase the potential for the faults analyzed to slip.

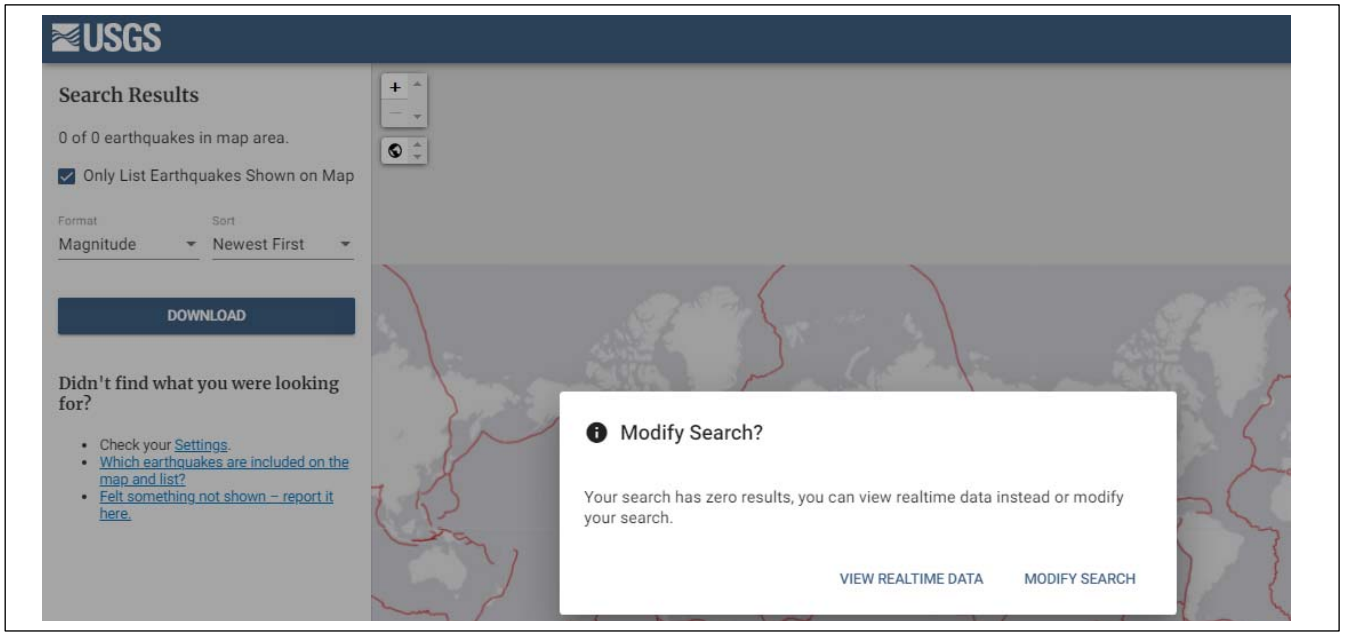
In our opinion the proposed BOOMERANG6 FEE SWD #1 injection well does not pose a risk of increasing seismicity within this FSP AOI.

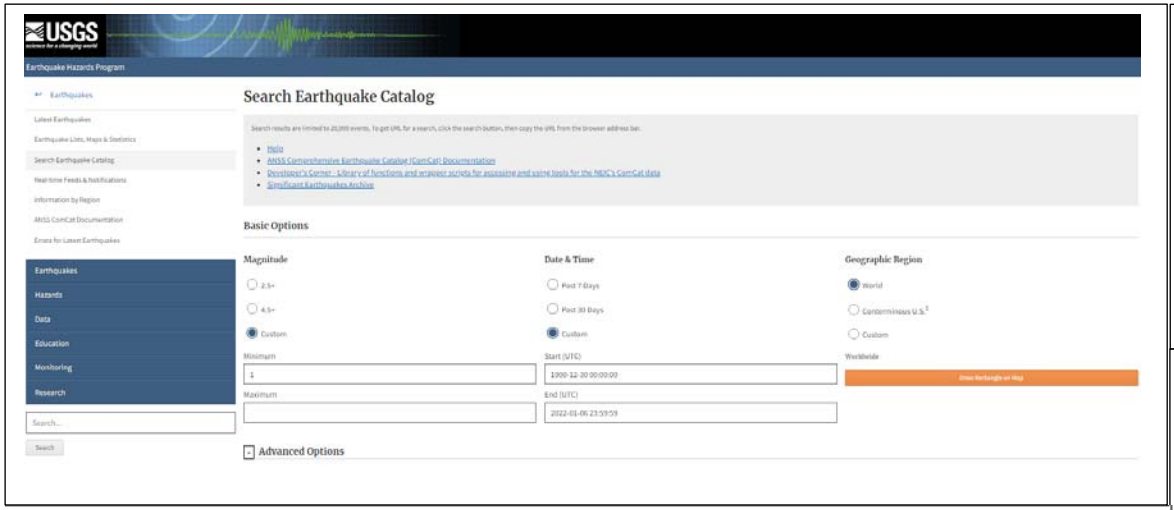
Appendix 1 - Earthquake Backup

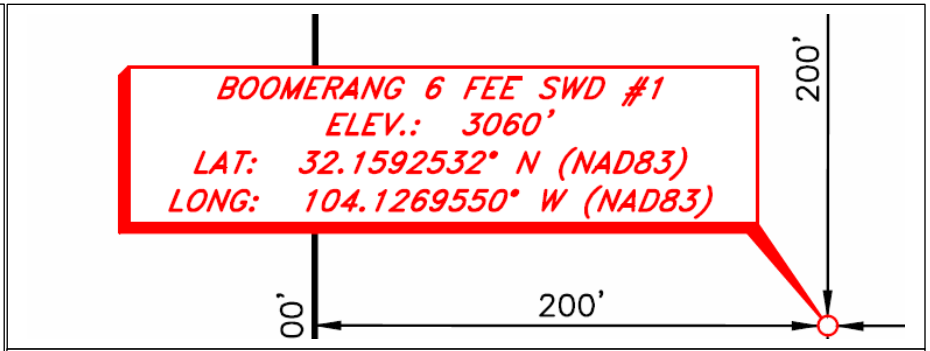




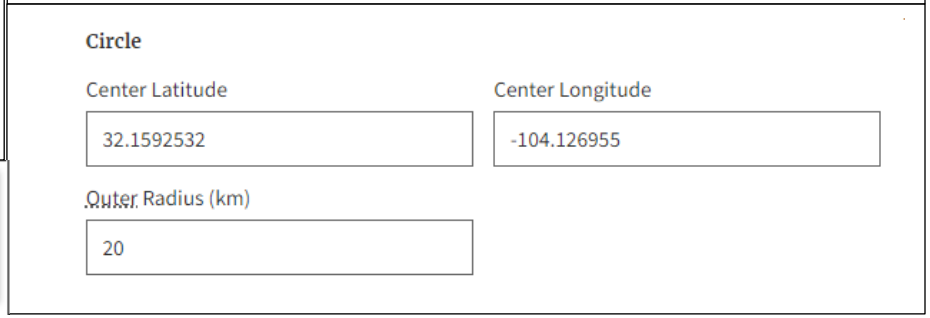
0 Earthquakes with magnitude of 2 or greater inside the Boomerang 6 Fee SWD #1 FSP ANALYSIS AREA

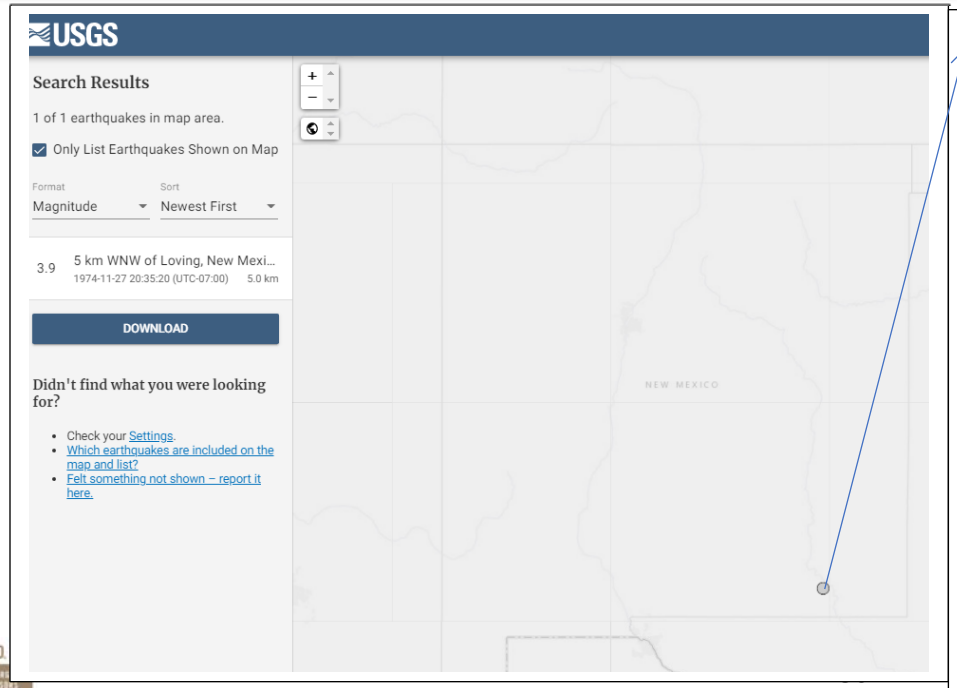


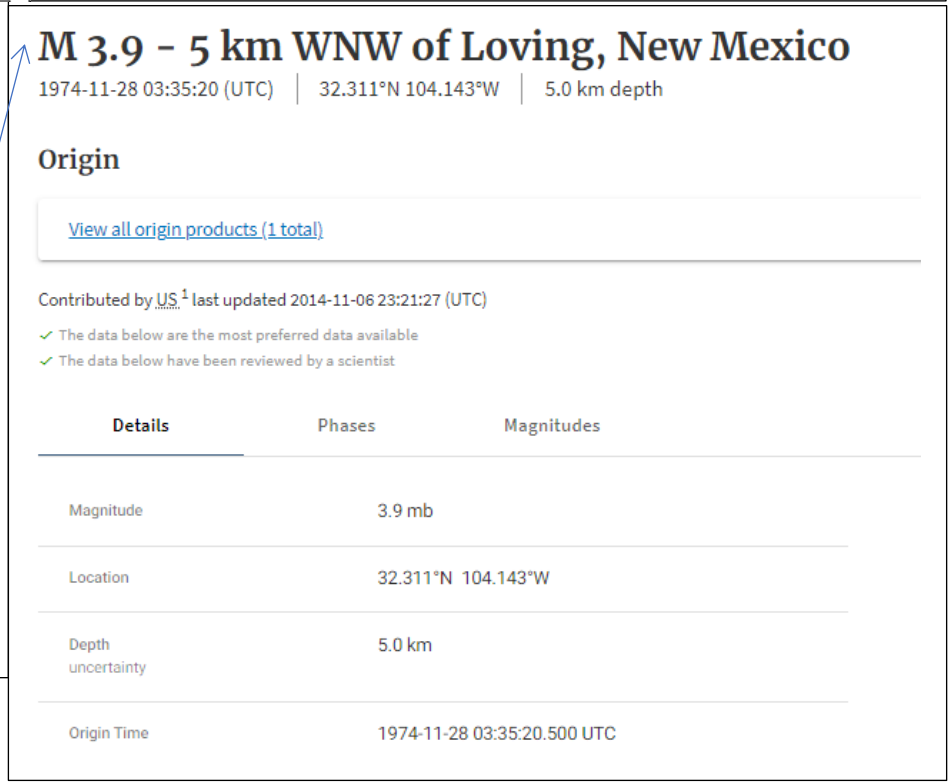




One USGS earthquake within 20 km of the Boomerang 6 Fee SWD #1







Boomerang 6 Fee SWD #1

The closest earthquake is 1974-11-28 03:35:20, Lat 32.3108793, Long -104.1425000, Mag 3.9 and it's *16.9 km* (10.5 miles) away from Boomerang 6 Fee SWD #1