Additional Information

Water analysis, seismic study, and Notice 5/20/20

Solaris Water Midstream, LLC - Ross Draw SWD #1
C-108 Item VII.4 - Produced Water Data
SOURCE ZONE

WOLFCAMP

Well Name	Snapping 2 State #014H
API	30-015-42688
Location	Sec. 2, T26S - R31E
Lat/Long	
County	Eddy Co., NM
Field	
Formation	Wolfcamp
Lab ID	
Sample ID	
Sample Date	10/7/2015
Analysis Date	
Sample Source	
Depth (if known)	
Water Type	

ph	7.3	barium_mgL	
ph_temp_F		magnesium_mgL	326.7
specificgravity		potassium_mgL	
specificgravity_temp_F		strontium_mgL	
tds_mgL	81366.4	manganese_mgL	
tds_mgL_180C		chloride_mgL	50281.2
alkalinity_as_caco3_mgL		carbonate_mgL	
hardness_as_caco3_mgL		bicarbonate_mgL	
hardness_mgL		sulfate_mgL	399.7
resistivity_ohm_cm	0.1004	hydroxide_mgL	
resistivity_ohm_cm_temp_F		h2s_mgL	
conductivity		co2_mgL	100
conductivity_temp_F		o2_mgL	
sodium_mgL	26319.4	anionremarks	
calcium_mgL	2687.4	generalinforemarks	
iron_mgL	26.1		

Remarks

**Produced water data: NMT Octane NM WAIDS database.*

C-108 Item VIII
Geological Data – Earthquake/Seismic Information

The study by Snee and Zoback "State of Stress in the Permian Basin, Texas and New Mexico: Implications for induced seismicity", was published in the February 2018 edition of the Leading Edge. The strike-slip probability was evaluated using probabilistic FSP (Fault Slip Potential) analysis of know faults in the Permian Basin. The study indicates there is less than a 10% probability of being critically stressed to the point of creating an induced seismicity event. Low probability is due to the relationship of the strike of this fault to the regional S_{HMax} orientation (N 35-45 degrees E) as shown below. Based on publicly available data for the subject area, it is reasonable to believe the risk of induced seismic activity due to disposal injection is low.

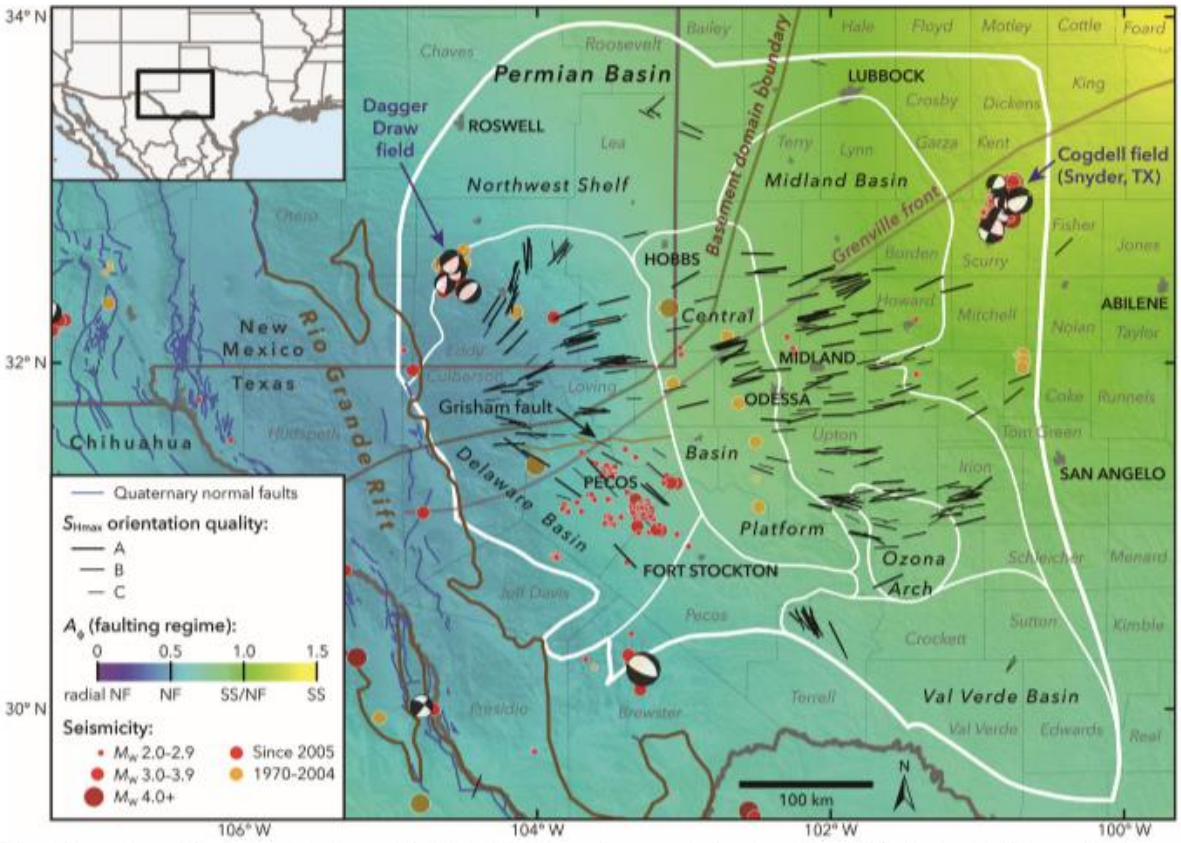


Figure 1. State of stress in the Permian Basin, Texas and New Mexico. Black lines are the measured orientations of S_{Hmax}, with line length scaled by data quality. The colored background is an interpolation of measured relative principal stress magnitudes (faulting regime) expressed using the A_ϕ parameter (see text for details) of Simpson (1997). Blue lines are fault traces known to have experienced normal-sense offset within the past 1.6 Ma, from the USGS Quaternary Faults and Folds Database (Crone and Wheeler, 2000). The boundary between the Shawnee and Mazatzal basement domains is from Lund et al. (2015), and the Precambrian Grenville Front is from Thomas (2006). The Permian Basin boundary is from the U.S. Energy Information Administration, and the subbasin boundaries are from the Texas Bureau of Economic Geology Permian Basin Geological Synthesis Project. Earthquakes are from the USGS National Earthquake Information Center, the TexNet Seismic Monitoring Program, and Gan and Frohlich (2013). Focal mechanisms are from Saint Louis University (Herrmann et al., 2011).

C-108 Item VIII
Geological Data – Earthquake/Seismic Information Cont.

Ross Draw SWD #1
Sec. 22, T26S-R29E
2,350' FSL & 2,460' FEL
32.0268713, -103.9710492
Eddy Co., NM

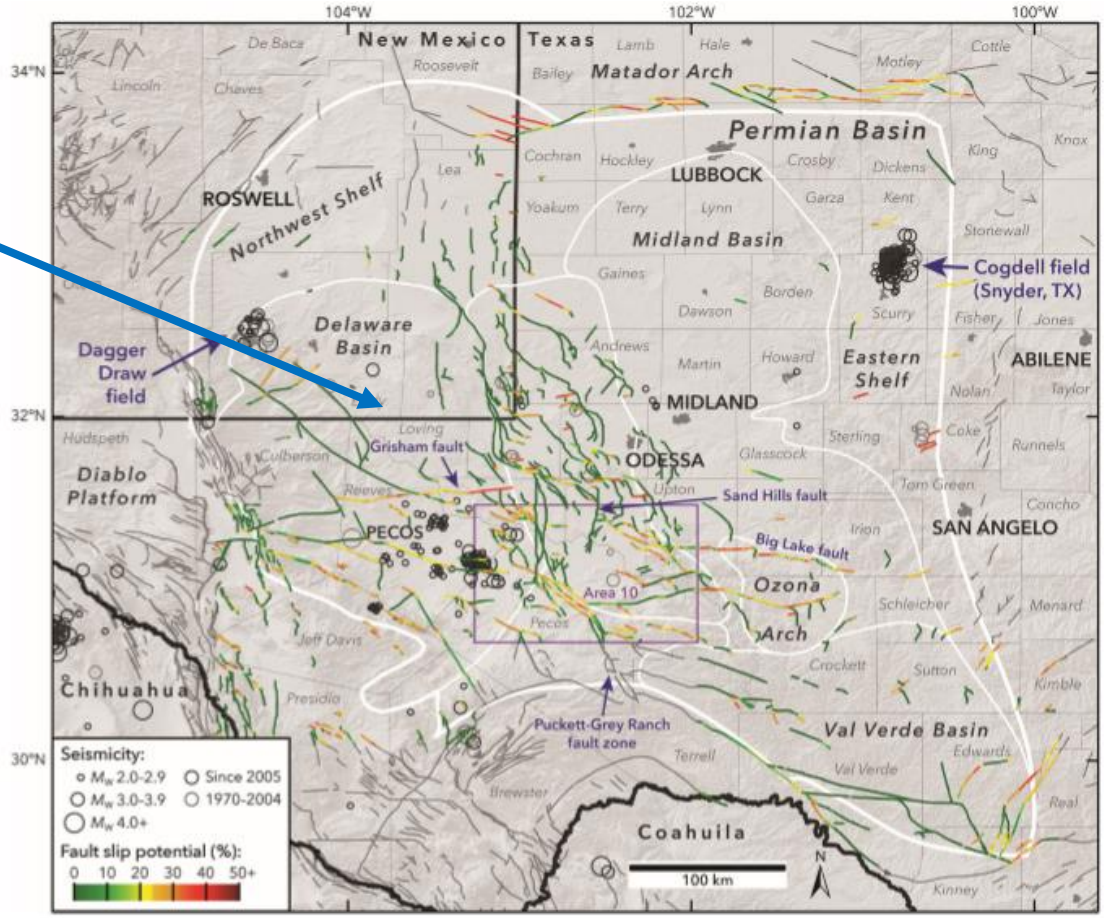
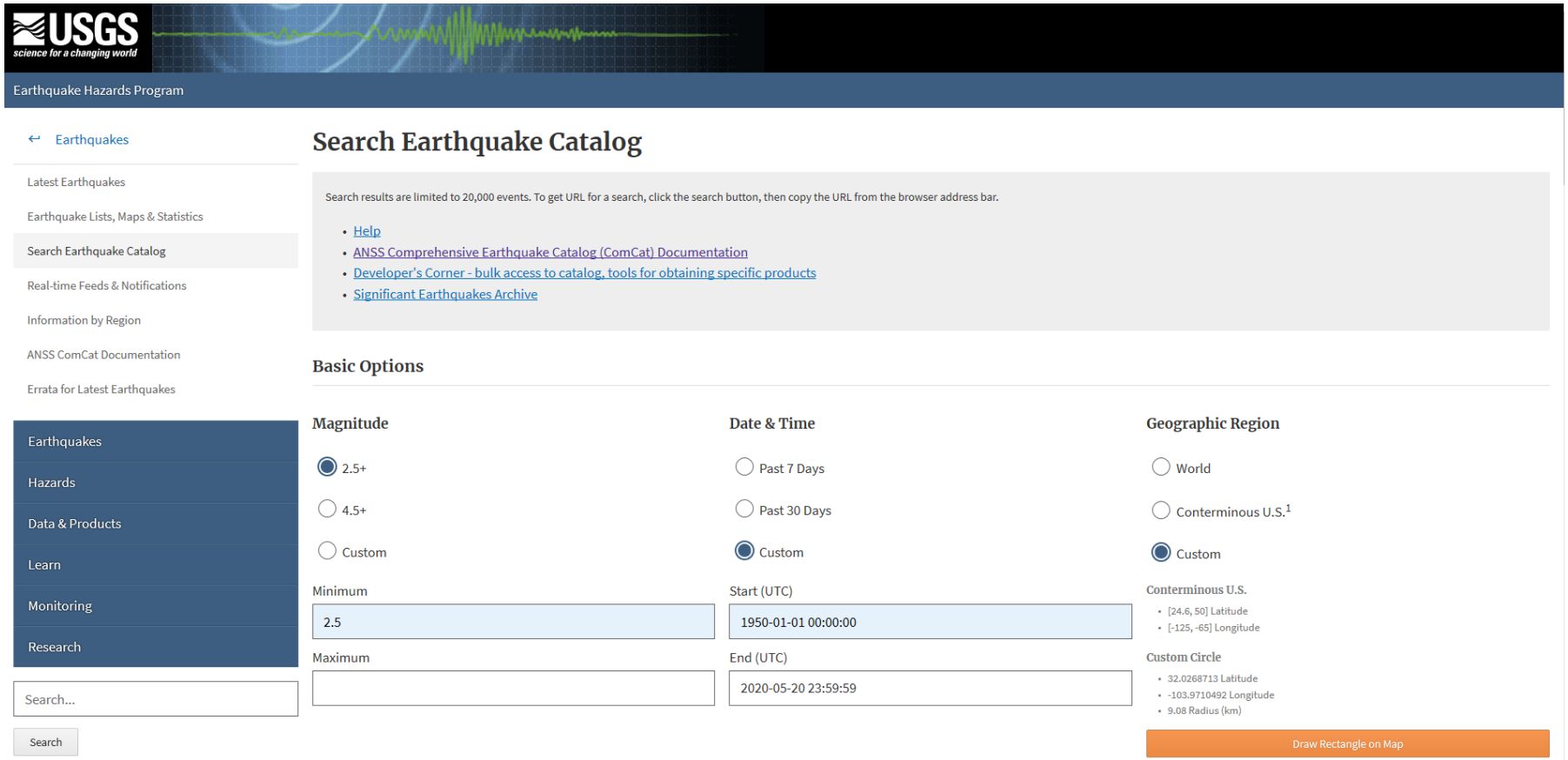


Figure 3. Results of our probabilistic FSP analysis across the Permian Basin. Data sources are as in Figures 1 and 2.

References:

Jens-Erik Lund Snee and Mark D. Zoback, 2018, State of stress in the Permian Basin, Texas and New Mexico: Implications for induced seismicity: The Leading Edge, February 2018

C-108 Item VIII
Geological Data – Earthquake/Seismic Information Cont.



C-108 Item VIII
Geological Data – Earthquake/Seismic Information Cont.

- Advanced Options

Geographic Region

Decimal degree coordinates. North must be greater than South. East must be greater than West.

North: 50

West: -125

East: -65

South: 24.6

Circle

Center Latitude: 32.0268713

Center Longitude: -103.9710492

Outer Radius (km): 9.08

Depth (km)

Minimum:

Maximum:

Azimuthal Gap

Minimum:

Maximum:

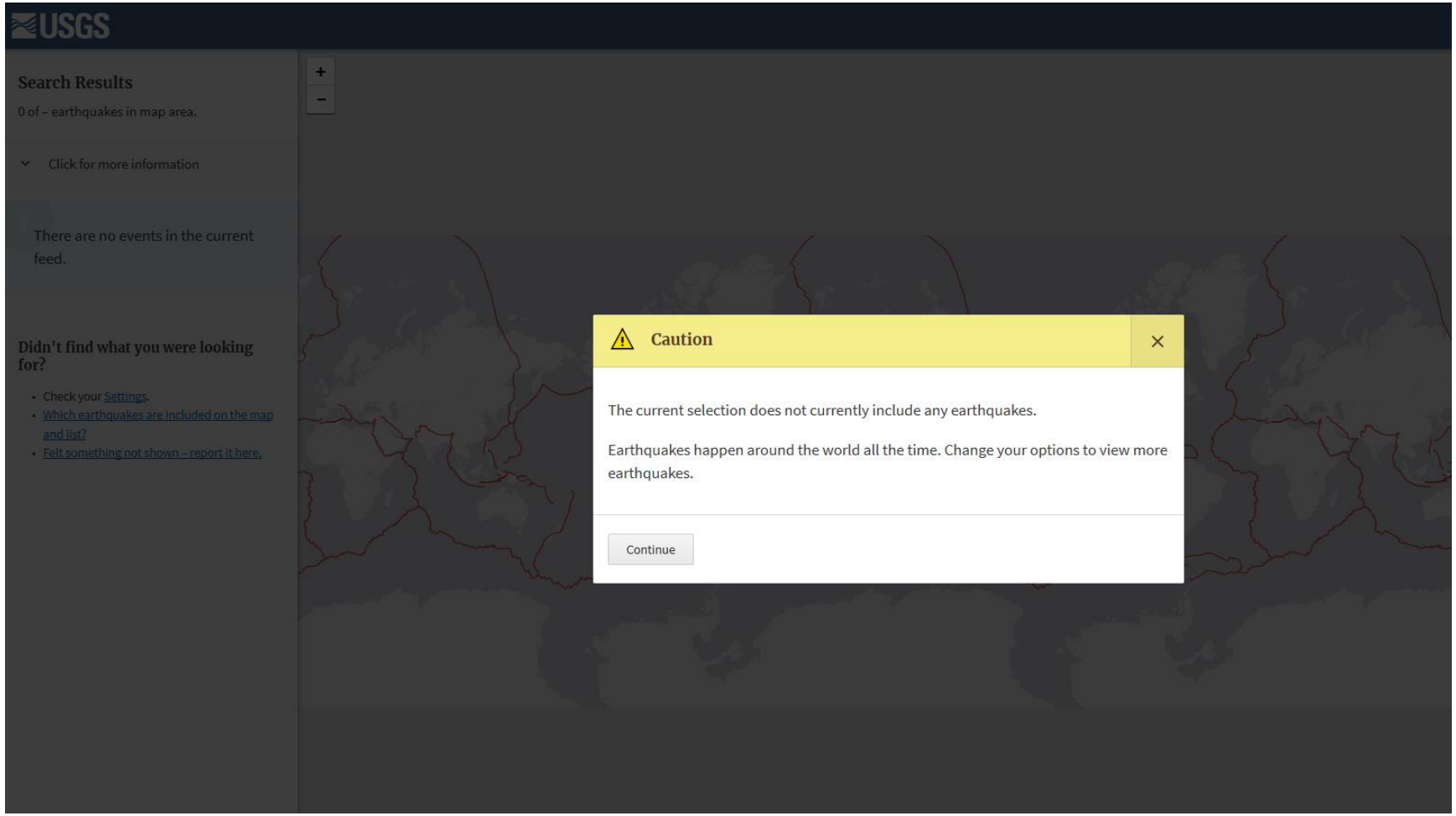
Review Status

- (•) Any
- ( ) Automatic
- ( ) Reviewed

- Event Type

- [x] Earthquakes
  - [x] Earthquake

C-108 Item VII
Geological Data – Earthquake/Seismic Information Cont.



Ross Draw SWD #1		
	Name	Address
Well Operator(s)	Robert H. Forrest, Jr. Oil, LLC	609 Elora Drive, Carlsbad, NM 88220
	Cimarex Energy Company	1700 Lincoln Street, Suite 3700, Denver, CO 80203-4537
	Stephens & Johnson Operating Company	P.O. Box 2249, Wichita Falls, TX 76307
	RKI (WPX Energy Permian, LLC)	3817 NW Expressway, Suite 950, Oklahoma City, OK 73112
	Proven Petroleum, Inc.	12081 W. Alameda Parkway, PMB 513, Lakewood, CO 80228
	COG Operating, LLC	600 West Illinois Avenue, Midland, TX 79701
	Oxy USA, Inc.	5 Greenway Plaza, Houston, TX 77046
Lessee(s)	Yates Petroleum Corporation	105 South 4th Street, Artesia, NM 88210
	Khody Land and Minerals Company	210 Park Avenue, Suite 900, Oklahoma City, OK 73102
	Read & Stevens, Inc.	400 Penn Plaza, Suite 1000, Roswell, NM 88201
	Sphere Oklahoma, Inc.	10 E. 3rd, 7th Floor, Tulsa, OK 74103
	XTO Holdings, LLC	22777 Springwoods Village Pkwy., Spring, TX 77389-1425
	Chesapeake Exploration, LLC	6100 N. Western, Oklahoma City, OK 73118
	Hebert & Sons	1802 W. Washington, Artesia, NM 88210
	Budd H. Hebert	608 W. Texas, Artesia, NM 88210
	S & J Operating Company	P.O. Box 2249, Wichita Falls, TX 76307
	QEP Energy Company	1050 17th Street, Suite 500, Denver, CO 80265-1050
	Warwick-Ares, LLC	6608 North Western Avenue, #417, Oklahoma City, OK 73116
	Mewbourne Oil Company	500 W. Texas, Suite 1020, Midland, TX 79701
	Occidental Permian, Ltd.	5 E. Greenway Plaza, #110, Houston, TX 77046-0521
	RKI Exploration & Production, LLC	3500 One Williams Center, Tulsa, OK 74172-0135
	EOG Resources, Inc.	333 Clay Street, #4200, Houston, TX 77002
	55 Services, Ltd.	113 Corporate Drive, Midland, TX 79705-2105
	OGX Production, LP	400 N. Marienfeld, #200, Midland, TX 79701
Mineral Owner(s)	Bureau of Land Management	620 E. Greene Street, Carlsbad, NM 88220
Surface Owner(s)	George Ross Ranch, LLC	4414 N. Central Expressway, Suite 580, Dallas, TX 75204
	Bureau of Land Management	620 E. Greene Street, Carlsbad, NM 88220