

**BEFORE THE OIL CONSERVATION DIVISION  
EXAMINER HEARING JULY 23, 2024**

**CASE NOS. 24279 & 24280**

*ANGEL RANCH SWD*

**EDDY COUNTY, NEW MEXICO**

**PERMIAN**  
RESOURCES

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**STATE OF NEW MEXICO  
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT  
OIL CONSERVATION DIVISION**

**APPLICATIONS OF RILEY PERMIAN  
OPERATING COMPANY, LLC,  
FOR APPROVAL OF A SALT WATER DISPOSAL WELL,  
EDDY COUNTY, NEW MEXICO.**

**CASE NOS. 24279-24280**

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SELF-AFFIRMED STATEMENT OF CHRIS CANTIN

1. My name is Chris Cantin. I work for Permian Resources Operating, LLC (“Permian”) an affiliate of Colgate Production, LLC (“Colgate”), as a Senior Geologist.

2. I have previously testified before the New Mexico Oil Conservation Division (“Division”) as an expert witness in petroleum geology. My credentials as a petroleum geologist have been accepted by the Division and made a matter of record.

3. I am familiar with the applications filed by Riley Permian Operating Company, LLC (“Riley”) in these cases and have conducted a study of the geology in the subject area around Riley’s proposed disposal wells.

4. **Permian Resources Exhibit A-1** is a regional locator map identifying the subject area and its relation to Permian’s acreage. The subject area is shown in the Northwest portion on the Delaware basin highlighted by a red box.

5. **Permian Resources Exhibit A-2** is a map displaying all Third Bone Spring wells marked as red solid lines. Riley’s proposed SWDs can be seen as pink stars within Permian’s prospective drilling units. Green triangles indicate Permian’s current activity in the immediate area along with red dashed lines displaying future Third Bone Spring locations.

6. **Permian Resources Exhibit A-3** displays three structure maps using 20-foot contour intervals. The brown dashed lines show interpreted faults in both the Mississippian and Cisco formations that is seen in the structure mapping and can be confirmed utilizing seismic . The

black dashed line is a known deep-seated fault identified and published by the University of Texas Bureau of Economic Geology in 2021. Exhibit A-3 demonstrates the following:

1. Mississippian subsea structure indicates an abrupt change in structure across the proposed SWDs trending in a SW to NE direction that in my opinion is indicative of deeper faulting in the area;
2. The top of Cisco Structure map shows a similar feature continuing through the area that was also likely set up by deeper faulting; and
3. In contrast, the base of Third Bone Spring subsea structure map appears to be more consistent with no obvious indication of impact from deeper features.

7. **Permian Resources Exhibit A-4** displays an A to A' cross-section in proximity to the subject SWDs. The logs in the cross-section contain Gamma Ray, Deep Resistivity, Density Porosity and Neutron Porosity. The location of the cross-section wells can be identified on the Locator Map by stars and their corresponding colors in the cross-section. The cross-section shows the Cisco injection zone marked within a blue dashed box and the Third Bone Spring prospective targets as red arrows. The vertical separation between the Cisco formation to the base of the Third Bone Spring interval is approximately 400 feet – 500 feet.

8. With the indication of my interpreted faults and the fault published by the Bureau of Economic Geology in the immediate area, including within the target injection zone, I believe the proposed SWD locations to be at a high risk of fracturing between the Third Bone Spring interval and Cisco formation and is not an intact barrier that will prevent injected produced water from entering the Third Bone Spring as the Cisco is pressured up through injection. This will water out the Third Bone Spring interval over time, causing waste and impairing Permian Resource's correlative rights.



9. Because there is not likely a intact geologic seal that will effectively contain the proposed injection, and injection will water out production in the Third Bone Spring overlying the proposed injection, Riley’s applications must be denied. Granting either application will likely cause waste and impair correlative rights.

10. **Permian Resources Exhibits A-1 through A-4** were either prepared by me or compiled under my direction and supervision.

11. I affirm under penalty of perjury under the laws of the State of New Mexico that the foregoing statements are true and correct. I understand that this self-affirmed statement will be used as written testimony in this case. This statement is made on the date next to my signature below.

Chris Cantin

07/16/2024

Date

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Case Nos. 24279-24280

**PERMIAN**  
RESOURCES

# Riley Permian Angel Ranch SWD Protest

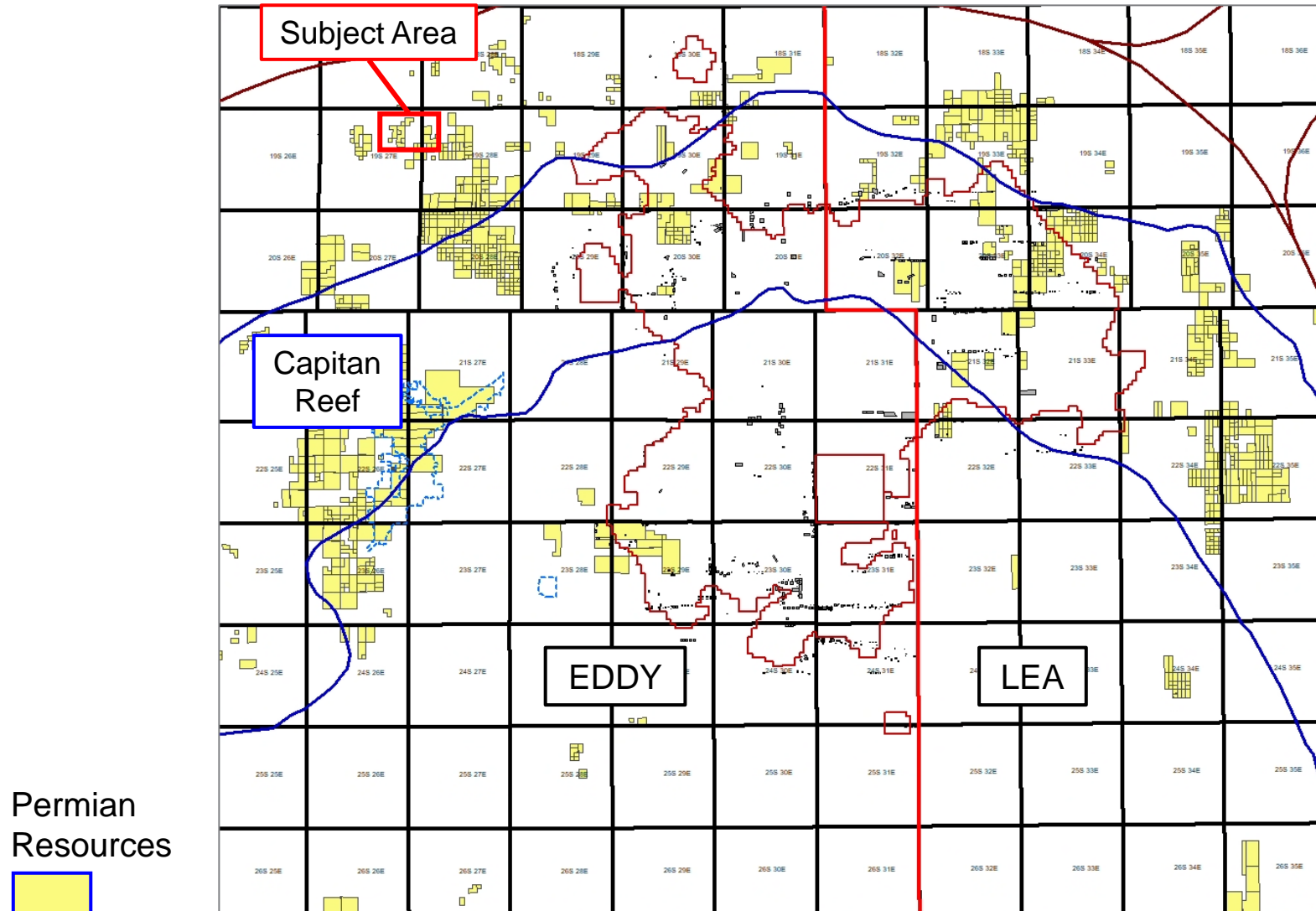






# Locator Map

Exhibit A-1

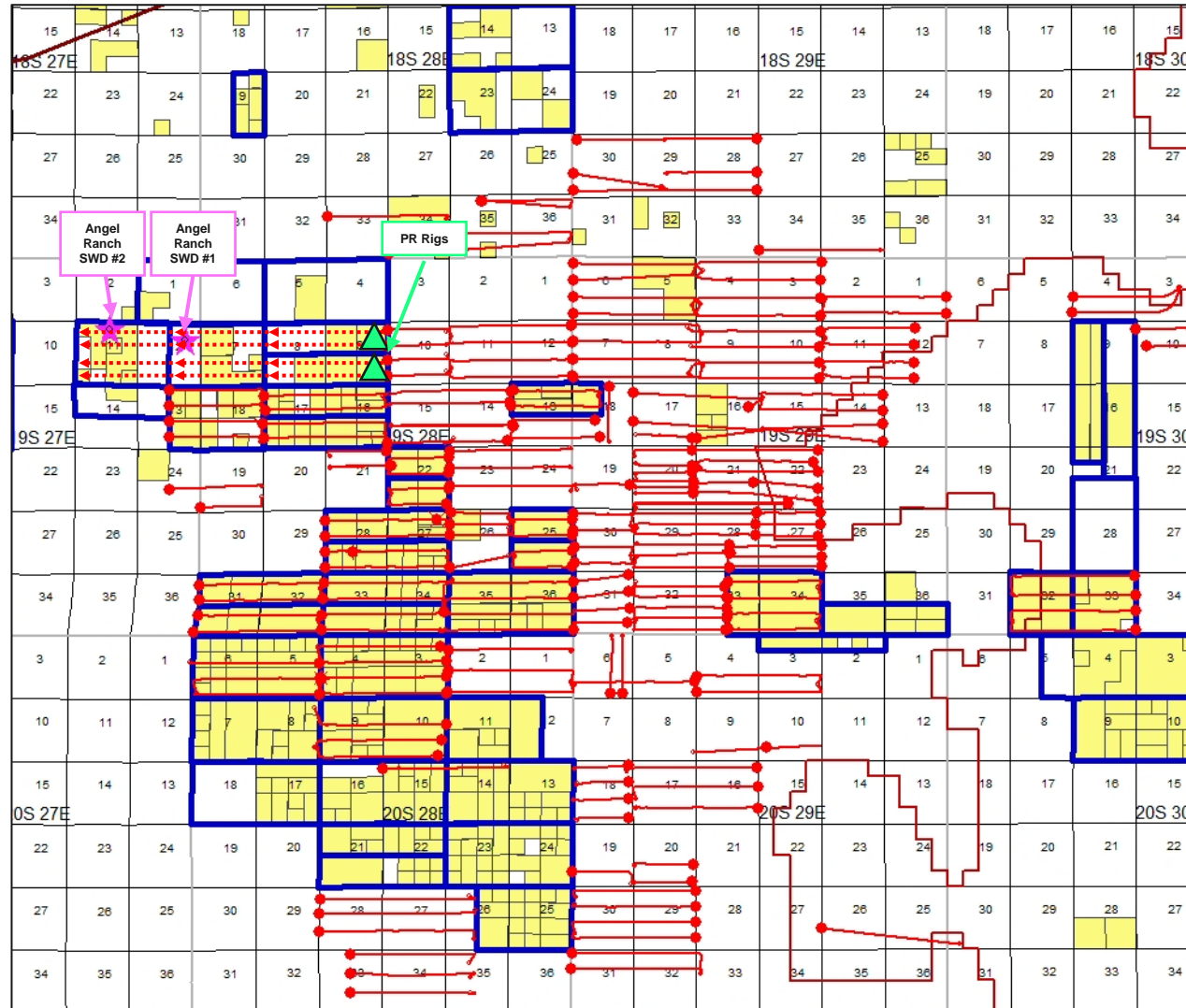


BEFORE THE OIL CONSERVATION DIVISION  
Santa Fe, New Mexico  
Exhibit No. A-1  
Submitted by: Permian Resources Operating, LLC  
Hearing Date: July 23, 2024  
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# Third Bone Spring Activity Map

Exhibit A-2



BEFORE THE OIL CONSERVATION DIVISION  
 Santa Fe, New Mexico  
 Exhibit No. A-2  
 Submitted by: Permian Resources Operating, LLC  
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# Mapping

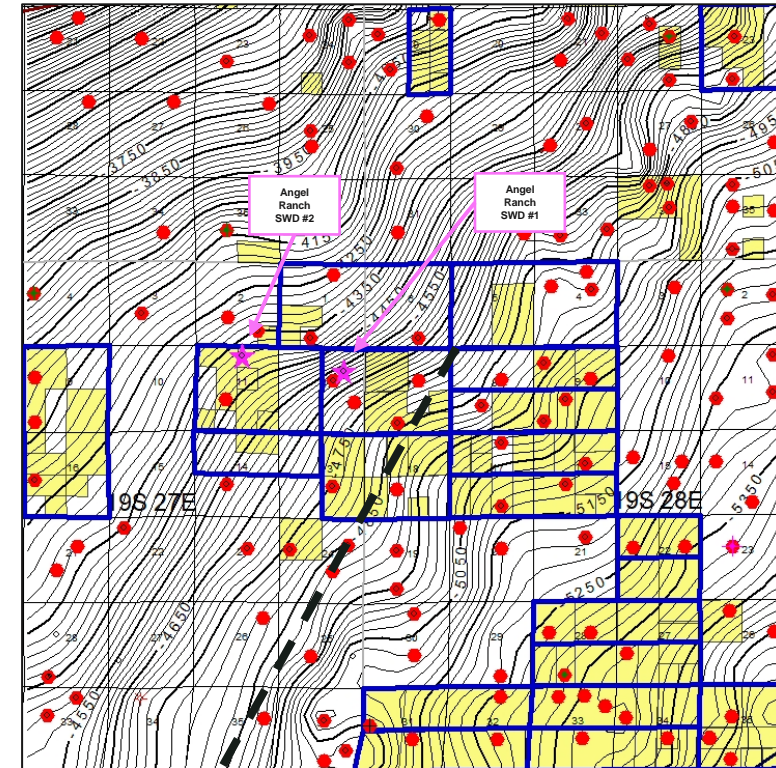
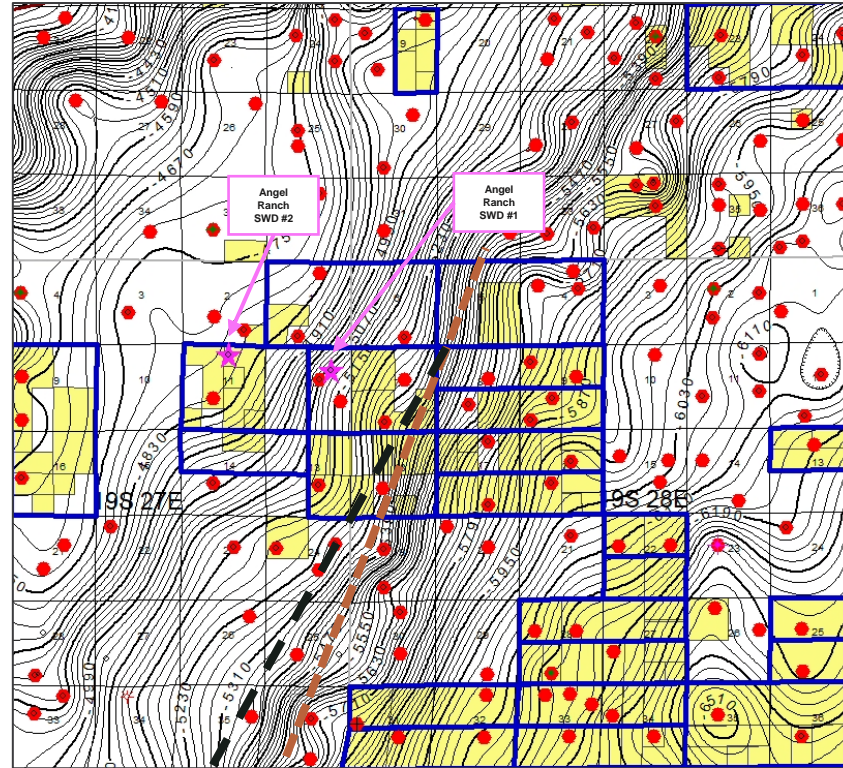
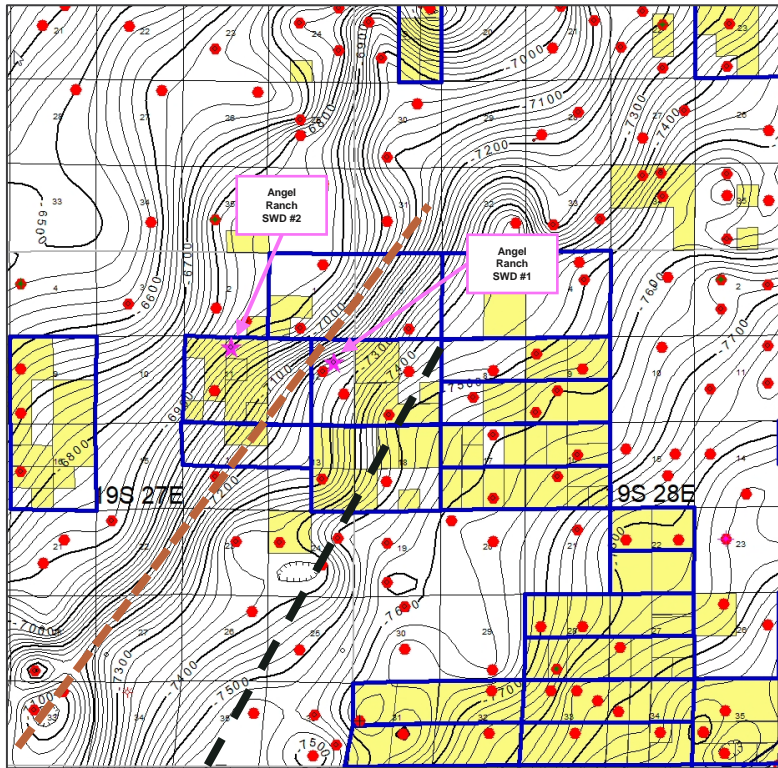
## Structure: Mississippian, Cisco, and Wolfcamp

### Exhibit A-3

1) Top of Mississippian Structure ( 20' CI)

2) Top of Cisco Structure ( 20' CI)

3) Base of Third Bone Spring Structure ( 20' CI)

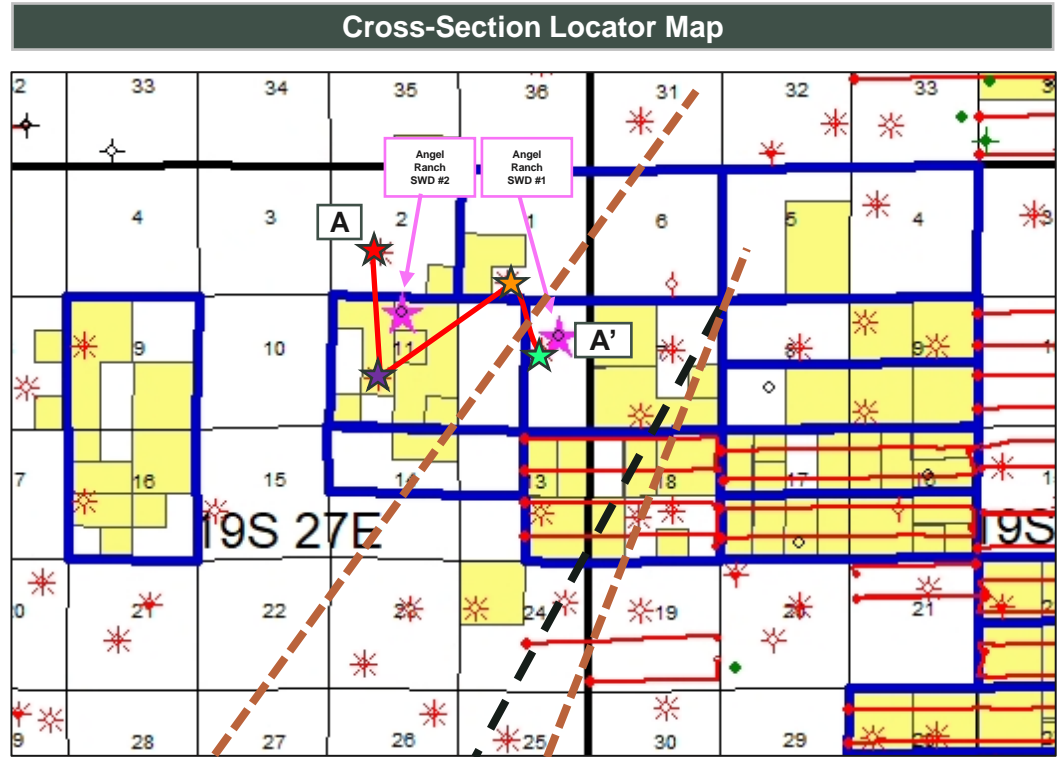
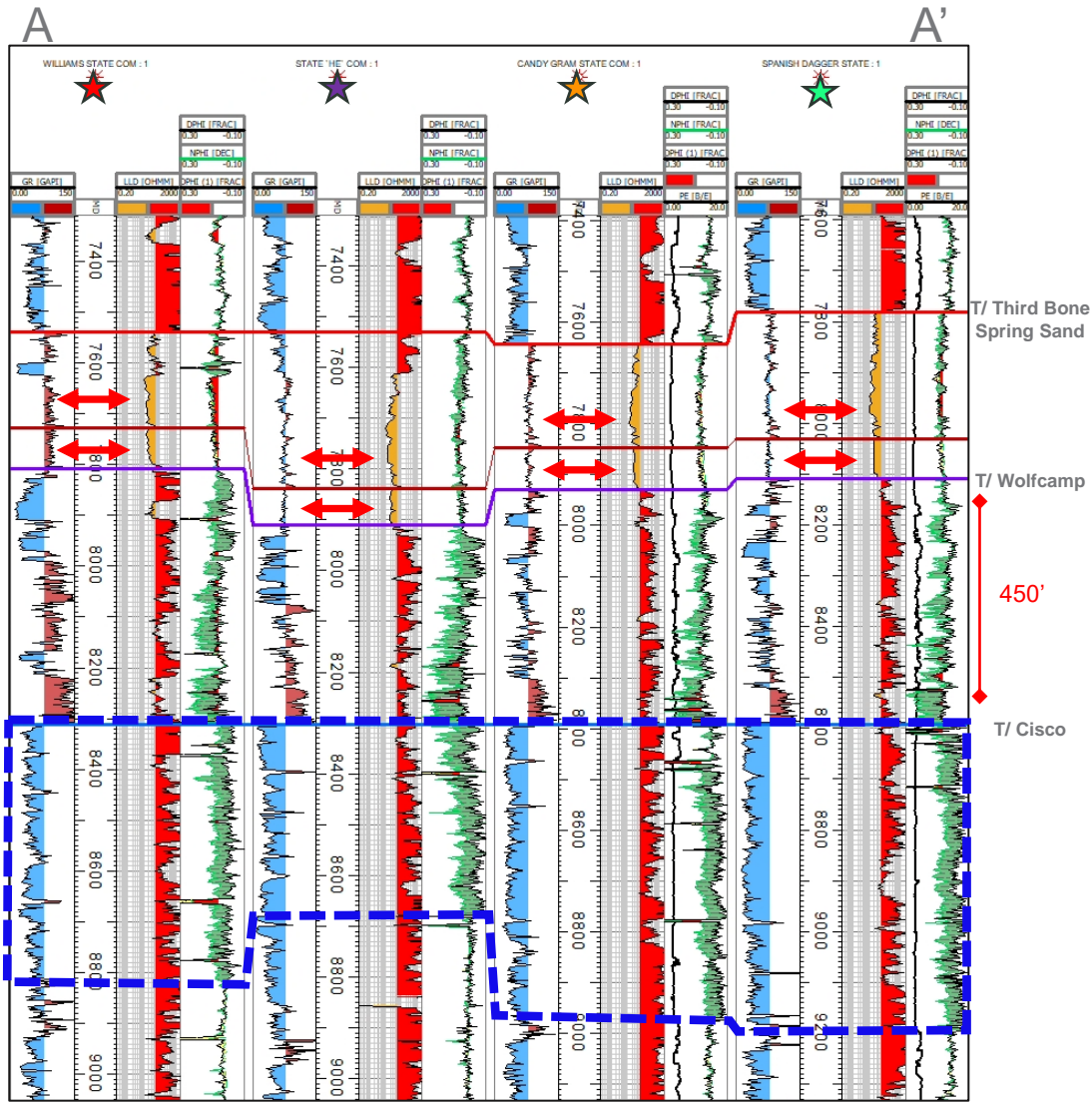


BEFORE THE OIL CONSERVATION DIVISION  
 Santa Fe, New Mexico  
 Exhibit No. A-3  
 Submitted by: Permian Resources Operating, LLC  
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# Angel Ranch SWD #1 and #2 Cross-Section A-A'

Exhibit A-4



SWD Interval  
 TBSG Targets  
 SWD Proposal  
 Interpreted Fault  
 BEG mapped Fault

BEFORE THE OIL CONSERVATION DIVISION  
 Santa Fe, New Mexico  
 Exhibit No. A-4  
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