

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

CASE NOS. 24279 & 24280

ANGEL RANCH SWD

EDDY COUNTY, NEW MEXICO



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

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

CASE NO. 24279

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

CASE NO. 24280

**SELF-AFFIRMED STATEMENT OF ANDREW PARKER, SENIOR VICE
PRESIDENT OF GEOSCIENCES**

1. My name is Andrew Parker, and I am employed by MRC Energy Company, an affiliate of MRC Permian Company and Matador Production Company (collectively, “Matador”), as a Senior Vice President of Geosciences. I have previously testified before the New Mexico Oil Conservation Division as an expert witness in petroleum geology.

2. I have reviewed the above-referenced applications filed by Riley Permian Operating Company, LLC (“Riley”).

3. In Case Number 24279, Riley seeks approval of its Angel Ranch SWD #1, located in Section 12, Township 19 South, Range 27 East, NMPM, Eddy County, New Mexico, with a proposed injection interval listed in the Cisco formation at depths between 8,586’ and 9,210.’ I understand Riley is requesting average and maximum daily rates of injection of 15,000 BWPD and 20,000 BWPD, respectively, for this proposed SWD.

4. In Case Number 24280, Riley seeks approval of its Angel Ranch SWD #2, located in Section 11, Township 19 South, Range 27 East, NMPM, Eddy County, New Mexico, with a proposed injection interval listed in the Cisco formation at depths between 8,450’ and 8,975.’ I

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

**Submitted by: Matador Production Company
Hearing Date: July 23, 2024
Case Nos. 24279-24280**

understand Riley is requesting average and maximum daily rates of injection of 15,000 BWPD and 20,000 BWPD, respectively, for this proposed SWD.

5. Matador has objected to both of Riley's proposed SWDs for two primary reasons: (i) Matador is concerned that Riley's proposed SWDs would present a significant risk of negatively impacting (i.e., watering out) the prospective Third Bone Spring target on Matador's adjacent acreage, and (ii) Matador is concerned that Riley's proposed SWDs would lead to an unreasonable increased risk of induced seismicity in this area. Matador's concerns are similar for both of Riley's proposed SWDs, so I will address those concerns for both SWDs below.

6. **Matador Exhibit A-1** is a locator map identifying the location of Riley's two proposed SWDs in Sections 11 and 12, Township 19 South, Range 27 East, NMPM, Eddy County, New Mexico. A red box identifies the general area where the two proposed SWDs are located, with the SWD locations identified in small yellow squares.

7. **Matador Exhibit A-2** contains a subsea structure map that I prepared off the top of the Mississippi Lime formation. The contour intervals are 50 feet. I have also identified the locations of Riley's proposed Angel Ranch SWD #1 and Angel Ranch SWD #2 SWD with red and orange circles, respectively. The structure map shows the presence of a significant fault in this area, which I have shown using a red line on Exhibit A-2. As reflected on Exhibit A-2, this fault runs close to both of Riley's proposed SWD locations.

8. **Matador Exhibit A-3** contains a subsea structure map that I prepared off the top of the Cisco formation. The contour intervals are 50 feet. I have also identified the locations of Riley's proposed Angel Ranch SWD #1 and Angel Ranch SWD #2 SWD with red and orange circles, respectively. Although the fault identified in Exhibit A-2 is basement-rooted and offsets deeper stratigraphy, this structure map confirms the fault-propagated folding of the overlying

Cisco formation, which is the proposed injection interval for both of Riley's proposed SWDs. Fracturing associated with this fault-propagated folding through the Cisco and early Permian strata increases the risk of vertical communication between the water injection interval and the Third Bone Spring reservoir.

9. **Matador Exhibit A-4** is a structural cross-section that I prepared displaying open-hole logs run from the five representative wells denoted from A to A' on Exhibit A-2 and Exhibit A-3. The wells in the cross-section contain gamma ray, resistivity, and porosity logs. Highlighted in green is the Third Bone Spring target that Matador intends to be developed on its adjacent acreage in this area. Highlighted in blue is the injection interval that Riley has proposed for its two proposed SWD locations.

Matador's Concerns that Riley's SWDs Could Wash Out the Third Bone Spring Target

10. As shown on Exhibit A-4, there is only approximately 400 feet of vertical separation between Riley's proposed SWD injection interval and Matador's Third Bone Spring target it intends to develop using horizontal wells. I do not identify any clear geologic barriers between the proposed injection interval and Matador's horizontal target that would prevent vertical migration of the produced water Riley proposes to inject into its SWDs into the shallower Third Bone Spring.

11. For this reason, I am concerned that there is a significant risk that Riley's proposed SWDs and the resultant injection of produced water could cause water to migrate into Matador's Third Bone Spring target and negatively impact the Third Bone Spring target, which would cause more water and less hydrocarbons to be produced from the target and thereby result in waste of the oil and gas present in the target that would not be produced but that otherwise would have.

12. My concerns are further compounded by the presence of the fault identified in MRC Exhibit A-2 and A-3. Due to the fault, the vertical separation between Riley's proposed injection interval and Matador's Third Bone Spring target could be much closer than 400 feet in parts of this area. In addition, the fault could allow for easier flow of water from the injection interval into the Third Bone Spring target, causing the negative impacts described above.

Matador's Concerns that Riley's SWDs Present Induced Seismicity Risk

13. **Matador Exhibit A-5** shows recent seismic activity of magnitudes greater than 3.5 to the west of the proposed Angel Ranch SWD wells. The seismic response radii are highlighted in red (3-mile radius), orange (6-mile radius), and yellow (10-mile radius). The Angel Ranch SWD wells both fall within a 10-mile radius of recent activity. At the bottom of Exhibit A-5, moment tensor data from 2 recent events demonstrates that the orientation of failure is roughly southwest to northeast, which is also sub-parallel to the fault orientation mapped in the Angel Ranch SWD area. This demonstrates that the mapped fault orientation is prone to failure in the modern stress environment.

14. **Matador Exhibit A-6** further supports the statements from paragraph 12 with published basement-rooted faults from the University of Texas Bureau of Economic Geology. Seismic activity west of Angel Ranch is following a significant regional offset in the basement (light blue to darker blue), and the Angel Ranch SWD wells are situated near a well-documented regional basement fault that runs parallel to the offset to the west. These parallel basement-rooted features are similarly stressed and prone to failure. Additional moment tensor data posted on this regional map further demonstrates that faults oriented southwest to northeast (i.e. 35-55 degrees) are prone to failure, regardless of being in a strike-slip, normal or reverse faulting regime.

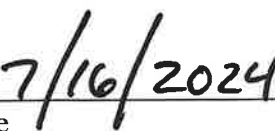
15. Accordingly, based on the fault identified in this area, the direction of the fault, and the previous seismic events in this area, Matador is concerned that the approval of Riley's two applications would lead to additional induced seismicity risk in this area.

16. Because there is not a clear, continuous geologic barrier that will effectively contain the proposed injection, and injection into the Cisco formation will water out production in the overlying Third Bone Spring interval, Riley's applications must be denied. The proposed injection will also likely give rise to an unreasonable increased risk for induced seismicity in this area. Approving either application will likely result in waste and impair correlative rights.

17. **Matador Exhibits A-1 through A-6** were either prepared by me or compiled under my direction and supervision.

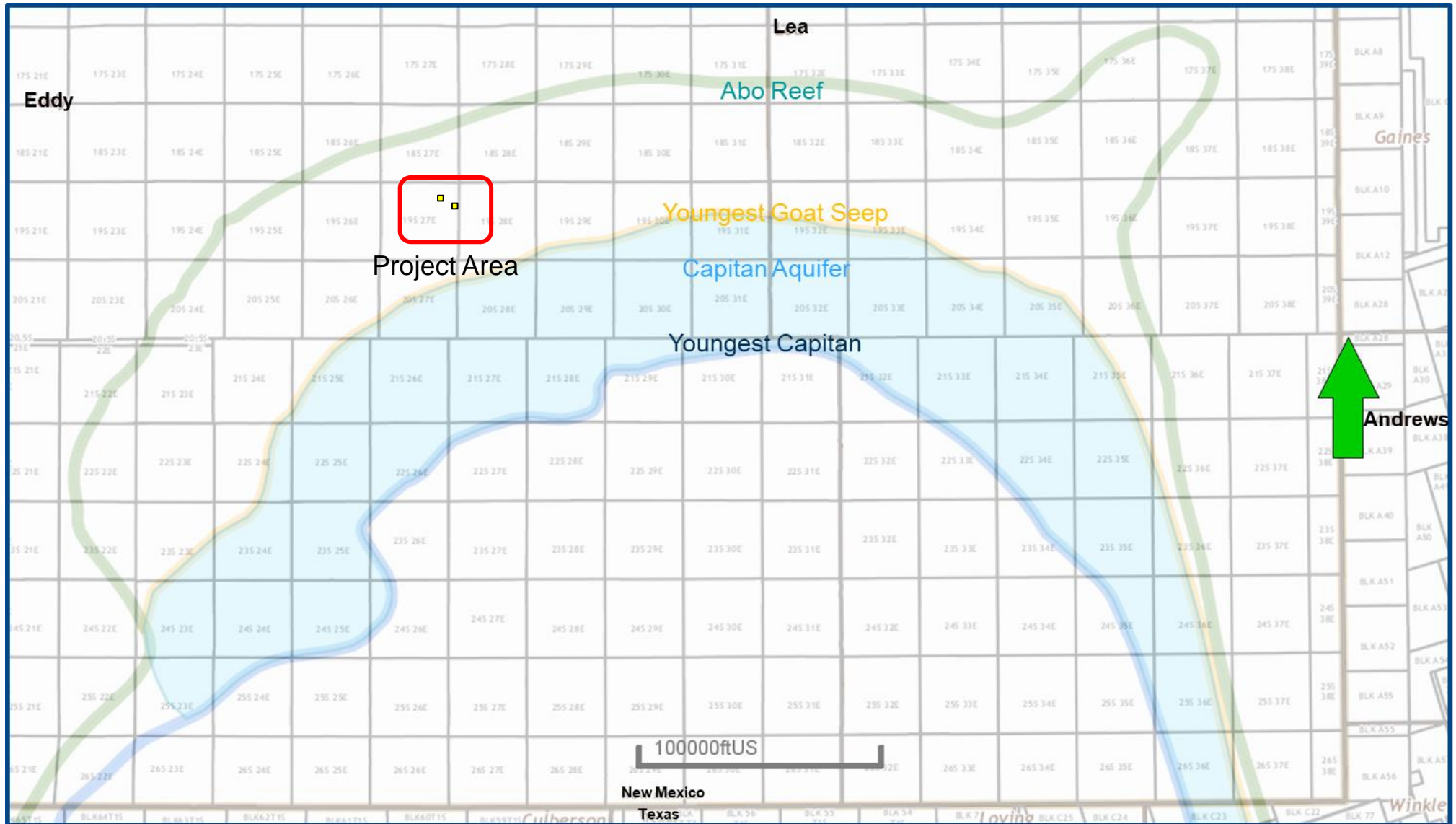
18. I affirm under penalty of perjury under the laws of the State of New Mexico that the foregoing statements are true and correct. I understand that this self-affirmed statement will be used as written testimony in this case. This statement is made on the date next to my signature below.


Andrew Parker


Date

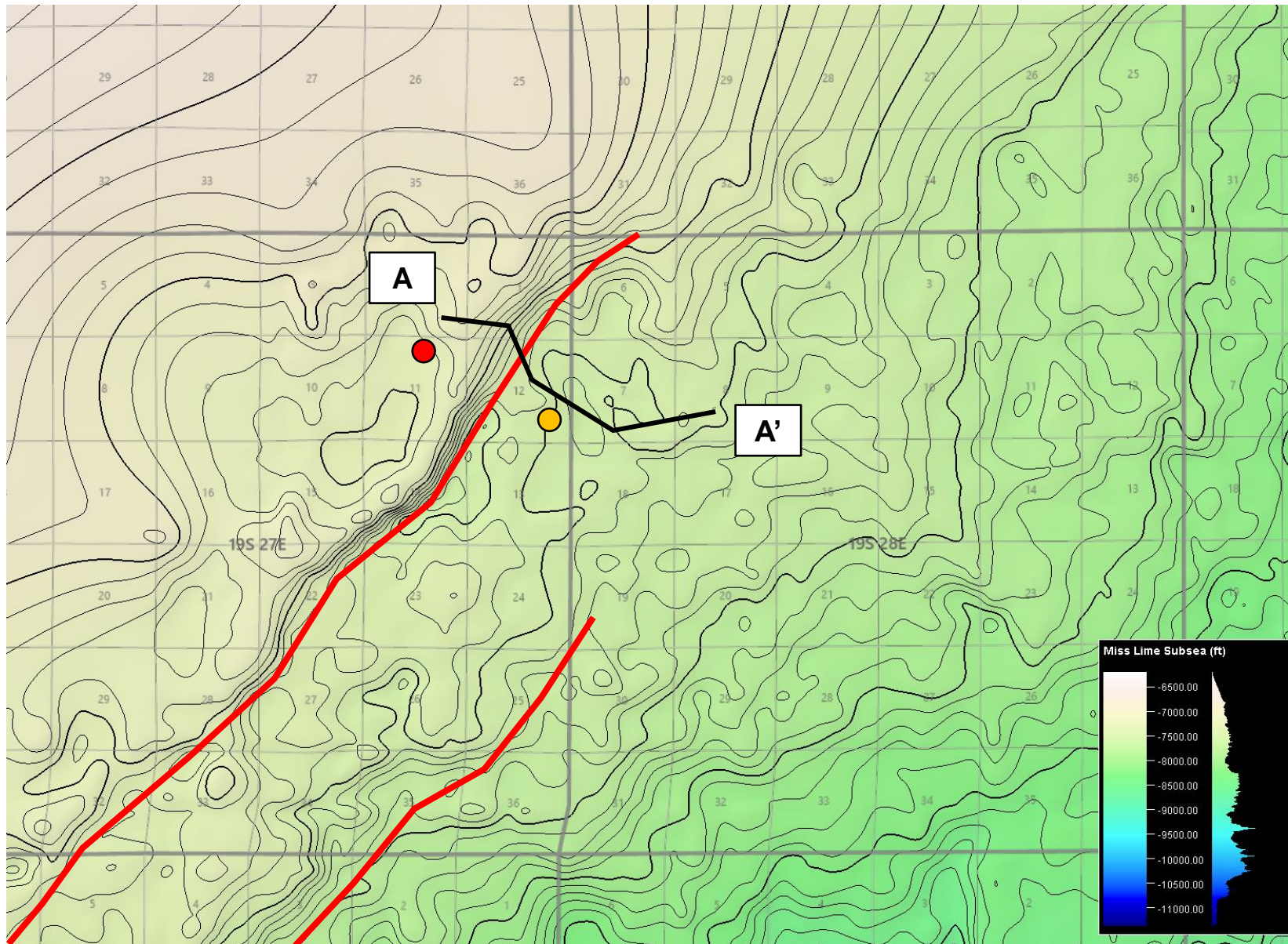
Locator Map

Exhibit A-1



Subsea Structure Map (Top Miss Lime) A – A' Reference Line

Exhibit A-2



Map Legend

Angel Ranch #1



Angel Ranch #2



Fault Traces



C. I. = 50 ft

BEFORE THE OIL CONSERVATION DIVISION

Santa Fe, New Mexico

Exhibit No. A-2

Submitted by: Matador Production Company

Hearing Date: July 23, 2024

Case Nos. 24279-24280

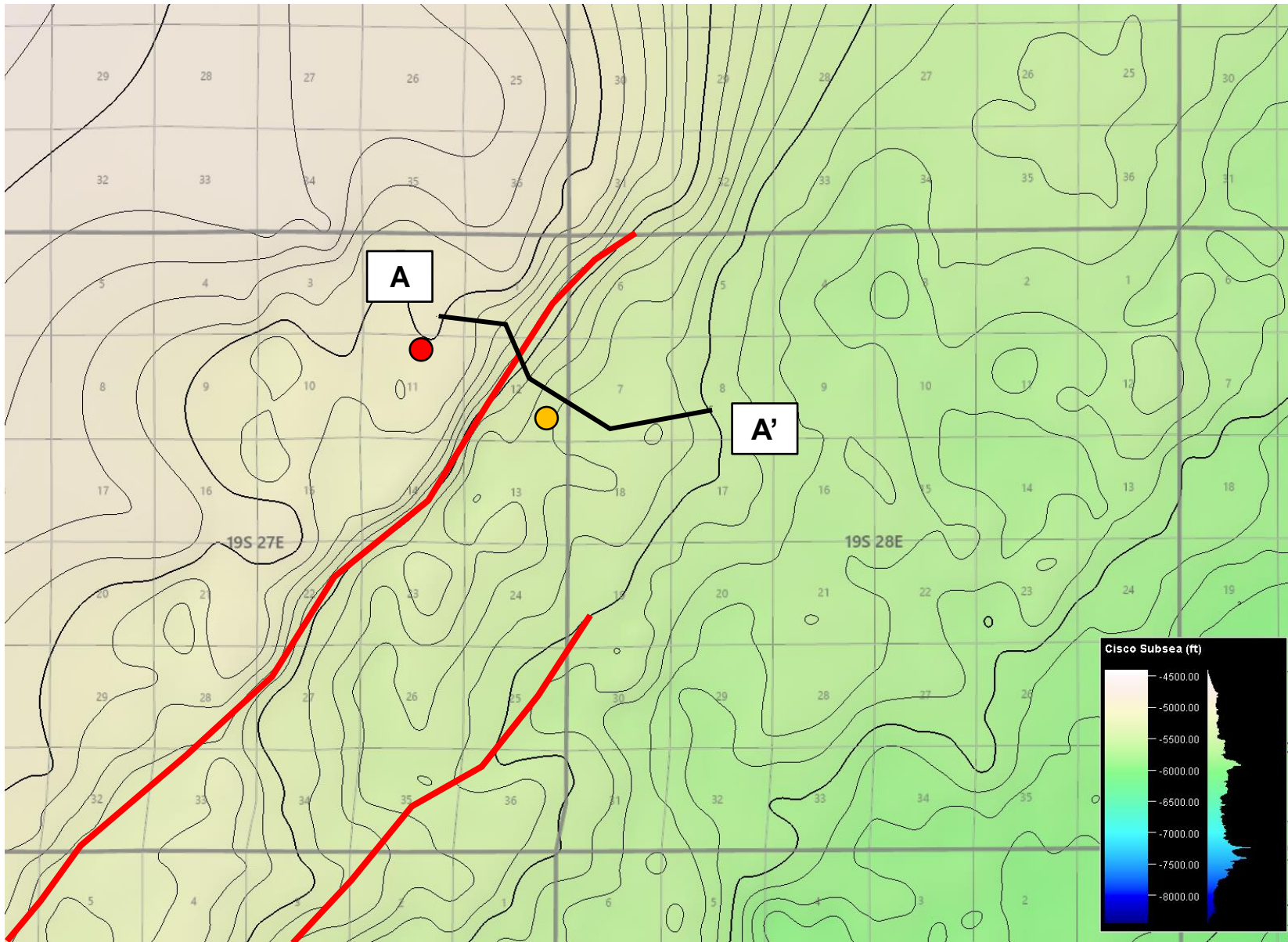


A-2

Subsea Structure Map (Top Cisco)

A – A' Reference Line

Exhibit A-3



Map Legend

Angel Ranch #1



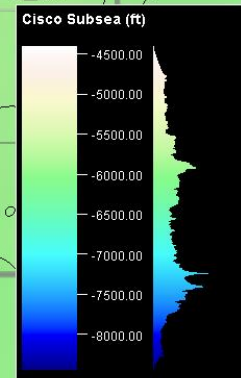
Angel Ranch #2



Fault Traces

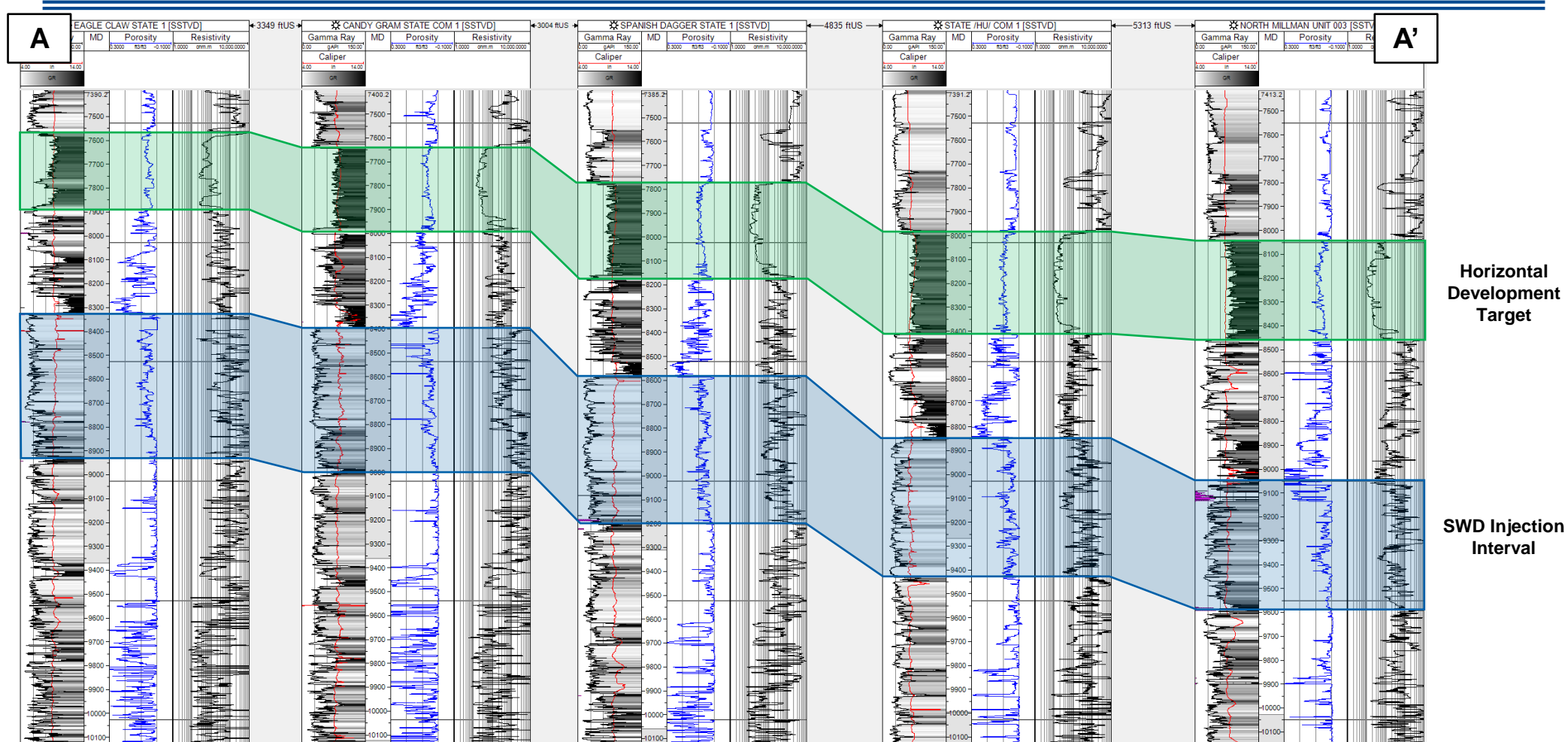


C. I. = 50 ft



Structural Cross-Section A – A'

Exhibit A-4



Horizontal Development Target

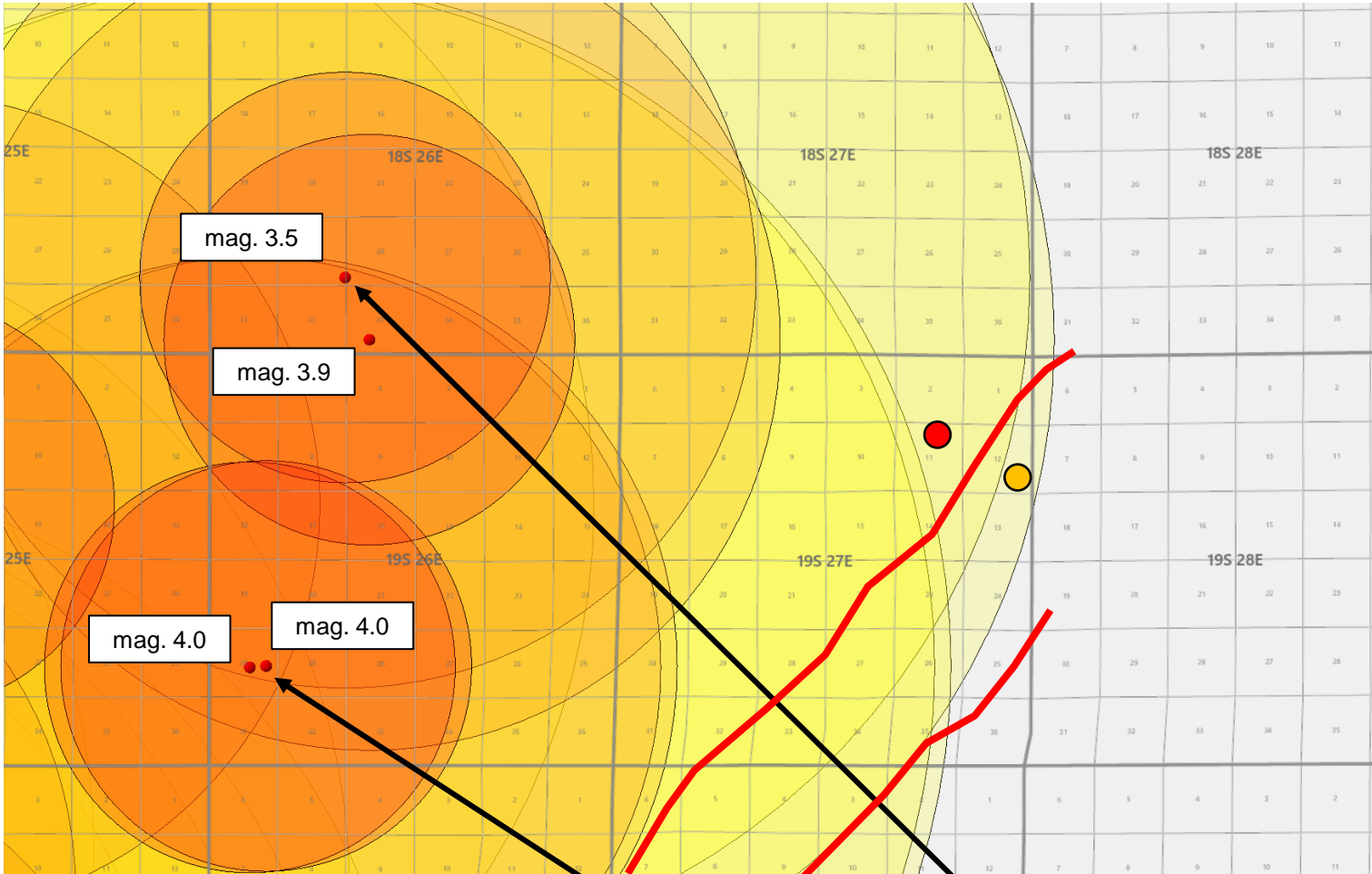
SWD Injection Interval

BEFORE THE OIL CONSERVATION DIVISION
 Santa Fe, New Mexico
 Exhibit No. A-4
 Submitted by: Matador Production Company
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USGS Earthquake Activity & Seismic Response Radii

Exhibit A-5



Map Legend

Angel Ranch #1



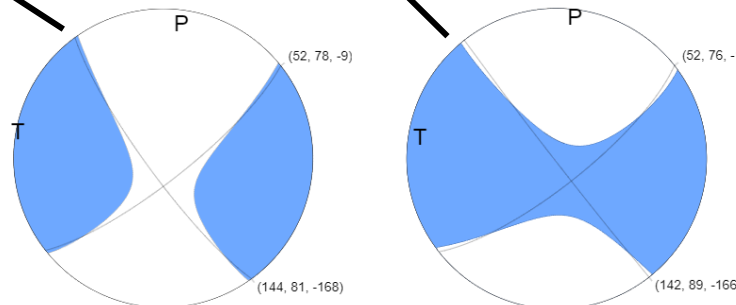
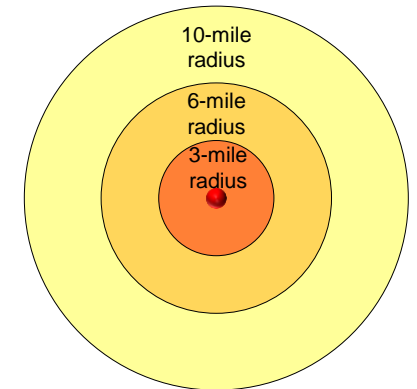
Angel Ranch #2



Fault Trace



USGS Earthquakes
Magnitude 3.5 or greater



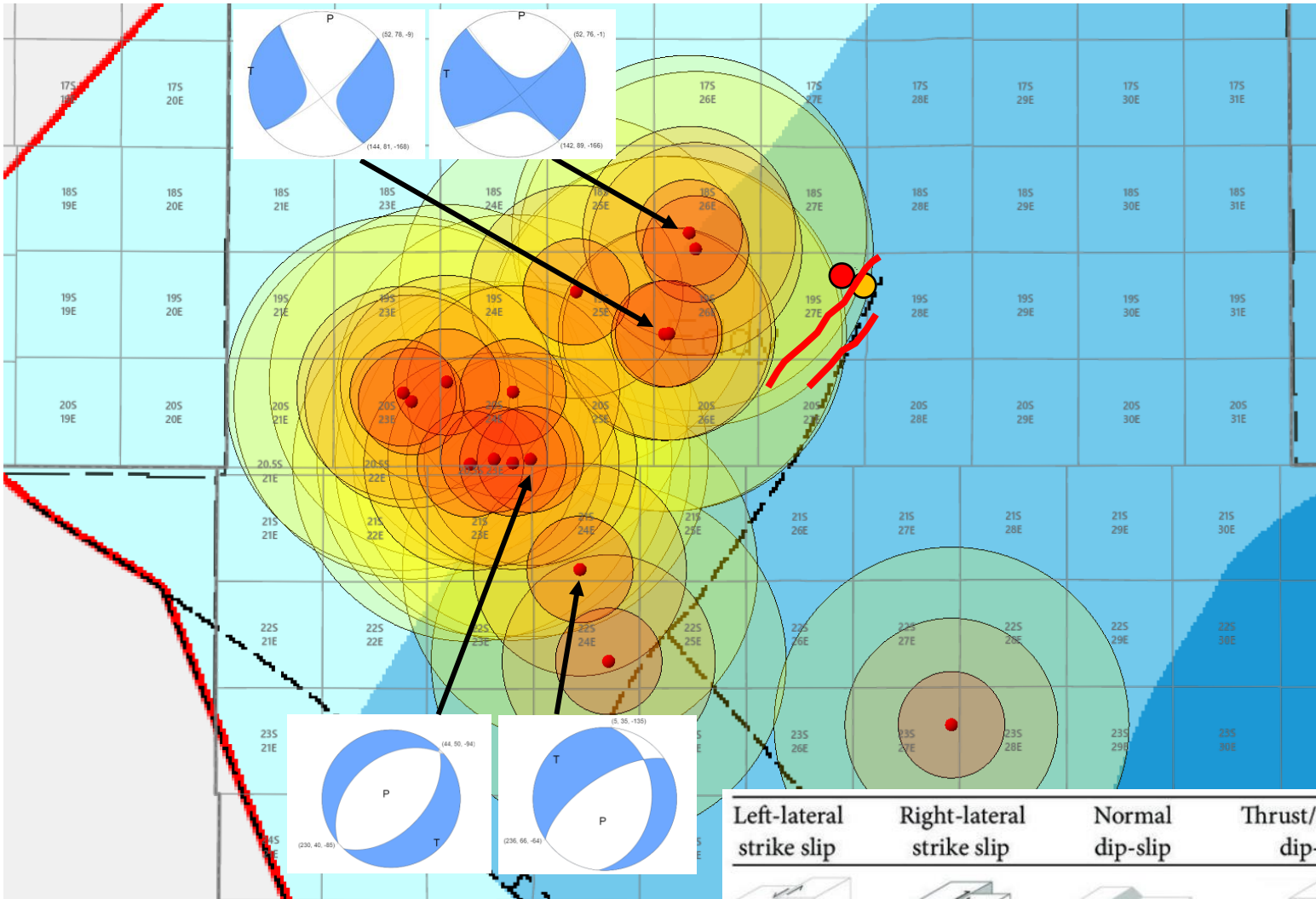
USGS Moment Tensor Data

BEFORE THE OIL CONSERVATION DIVISION
 Santa Fe, New Mexico
 Exhibit No. A-5
 Submitted by: Matador Production Company
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BEG Basement Faults with SRA Radii

Exhibit A-6



Map Legend

Angel Ranch #1



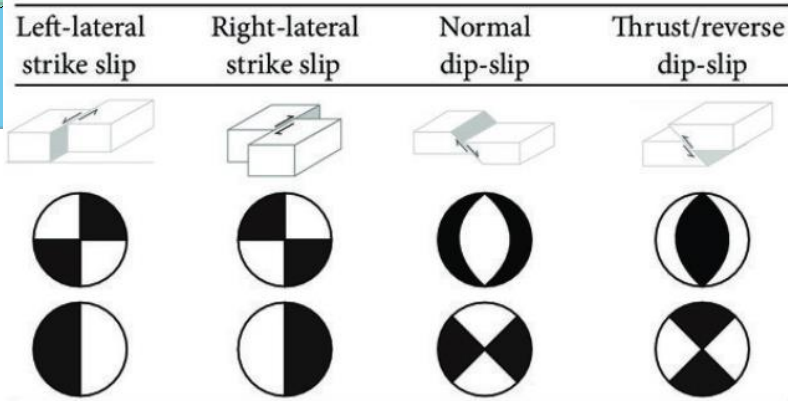
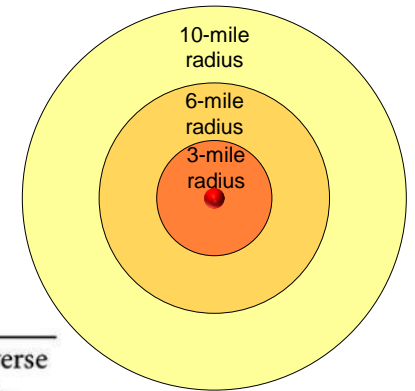
Angel Ranch #2



Fault Trace



**USGS Earthquakes
Magnitude 3.5 or greater**



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Santa Fe, New Mexico
Exhibit No. A-6
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