Additional Information

Seismic Analysis

Seismicity and Faults in the Vicinity of the Proposed Solaris Water Midstream, LLC Blue Duck State SWD No. 1 Devonian Disposal wells in Eddy County, New Mexico

The proposed Blue Duck State SWD No. 1 (Blue Duck) well is located in Eddy County, New Mexico. The proposed well is located in Township 19 South, Range 29 East, Section 32, fifteen miles north of Carlsbad. The proposed well is located near the Northwest Shelf of the Delaware Basin.

Seismicity:

Historically, the area near the proposed Devonian disposal wells has not seen any major seismic activity. A search of the USGS Earthquake Hazards Program Earthquake Catalog revealed the nearest event to be located 21.0 miles south of the proposed location, where a magnitude 3.9 earthquake was recorded on November 28, 1974 at a depth of 5 kilometers. Review of the USGS Earthquake Hazard map indicates a very low risk of seismic activity. The USGS surface geologic map of the area shows no Quaternary-aged faulting, also indicating no recent tectonic activity. In addition to a search of the USGS Earthquake Hazards Program Earthquake Catalog, a seismic event research was conducted on the Bureau of Economic Geology's Seismic Monitoring Program, TexNet. TexNet's seismic history dates from January 1, 2017 to present date. A 15-kilometer radius of investigation detected no seismic events during this time period.

Faulting:

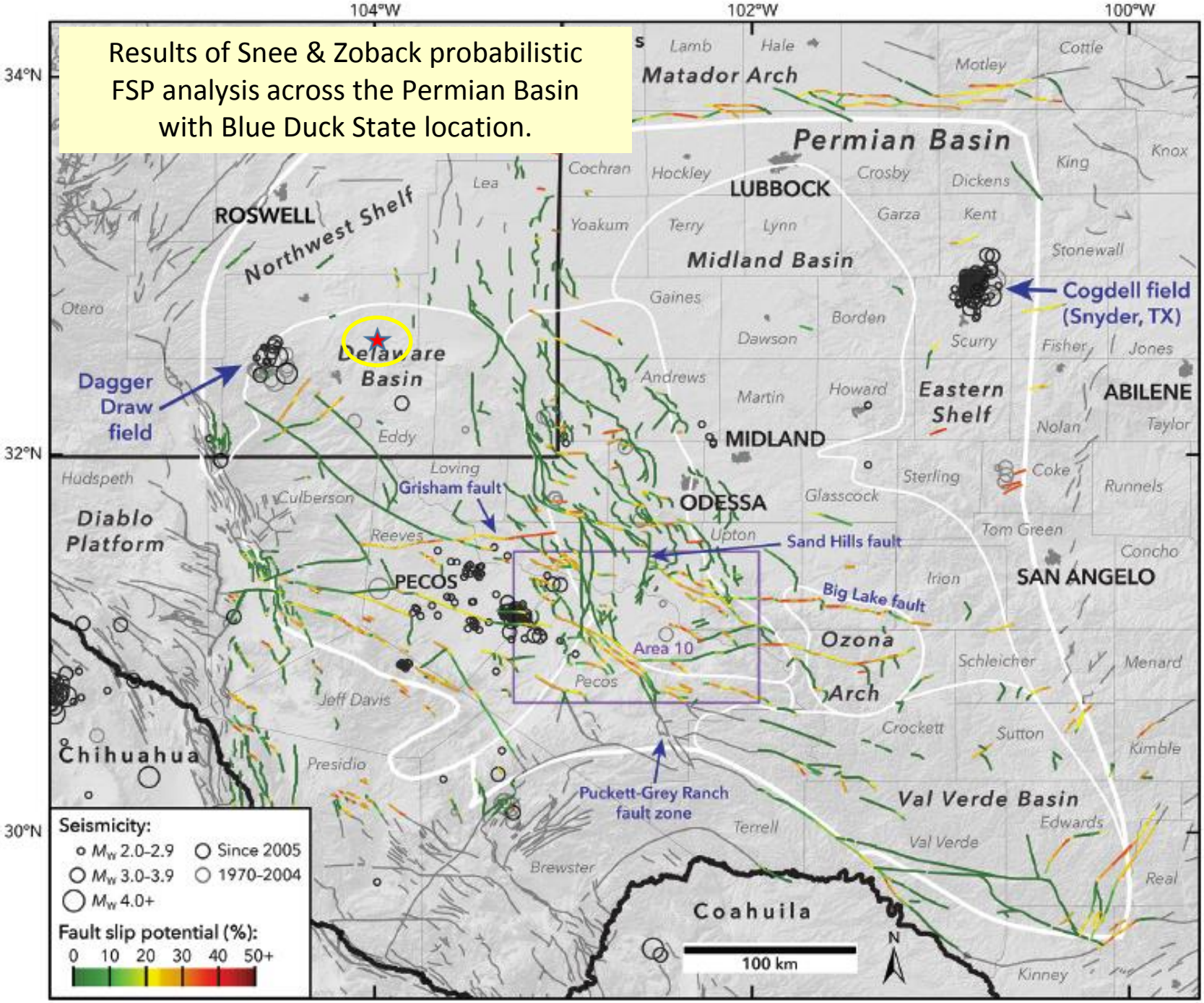
The USGS surface geologic map, a USGS published Devonian structure map, and subscription Geomap regional subsurface structure maps at the three following subsurface horizons: 1. Yates, San Andreas, 2. Permo-Pennsylvanian Lime, Strawn Lime, and 3. Siluro-Devonian. The first-quarter 2020 edition Geopmap subsurface maps were reviewed for faults. The nearest faults mapped at the Siluro-Devonian level were 8.8 and 11.5 miles southeast of the proposed locations. These faults terminate at the Permo-Pennsylvanian Lime and Strawn Lime levels indicated by no fault present in the same region on the map.

The Snee and Zoback paper "State of Stress in the Permian Basin, Texas and New Mexico: Implications for Induced Seismicity" was also reviewed to evaluate the presence of faults and fault slip potential risk. These regional maps show no faulting in the area of the proposed wells. Faulting in the New Mexico portion of the Delaware Basin generally shows less than a 10% probability of fault slip movement.

The distance from the proposed wells to the closest mapped faults yields an extremely low probability that the faults will become critically stressed by injection into the referenced wells.

Parker Jessee

Geologist, Lonquist & Co. LLC


Results of Snee & Zoback probabilistic FSP analysis across the Permian Basin with Blue Duck State location.
104°W
102°W
100°W
34°N
32°N
30°N
Matador Arch
Permian Basin
LUBBOCK
ROSWELL
Northwest Shelf
Midland Basin
Cogdell field (Snyder, TX)
Delaware Basin
Dagger Draw field
Eastern Shelf
ABILENE
MIDLAND
ODESSA
Grisham fault
Sand Hills fault
Diablo Platform
PECOS
Big Lake fault
SAN ANGELO
Ozona Arch
Area 10
Chihuahua
Puckett-Grey Ranch fault zone
Val Verde Basin
Coahuila
100 km
N
Seismicity:
M_w 2.0–2.9
M_w 3.0–3.9
M_w 4.0+
Since 2005
1970–2004
Fault slip potential (%):
0 10 20 30 40 50+

UNITED STATES GEOLOGICAL SURVEY

15 KM SEISMIC EVENT SEARCH (1900 – 2019)

Basic Options

Magnitude

- ○ 2.5+
- ○ 4.5+
- ◉ Custom

Minimum: 2

Maximum:

Date & Time

- ○ Past 7 Days
- ○ Past 30 Days
- ◉ Custom

Start (UTC): 1900-01-01 00:00:00

End (UTC): 2020-07-14 23:59:59

Geographic Region

- ○ World
- ○ Conterminous U.S.[1]
- ◉ Custom

Custom Circle

- 32.617239 Latitude
- -104.093061 Longitude
- 15 Radius (km)

Draw Rectangle on Map

- Advanced Options

Geographic Region

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

North:

West:

East:

South:

Circle

Center Latitude: 32.617239

Center Longitude: -104.093061

Outer Radius (km): 15

Depth (km)

Minimum:

Maximum:

Azimuthal Gap

Minimum:

Maximum:

Review Status

- ◉ Any
- ○ Automatic
- ○ Reviewed

USGS

Search Results

0 of – earthquakes in map area.

Click for more information

There are no events in the current feed.

Didn't find what you were looking for?

- Check your Settings.
- Which earthquakes are included on the map and list?
- Felt something not shown – report it here.

Zoom to...

Caution

The current selection does not currently include any earthquakes.

Earthquakes happen around the world all the time. Change your options to view more earthquakes.

Continue

3000 km
2000 mi

Earthquakes loading

Unavailable

UNITED STATES GEOLOGICAL SURVEY

25 KM SEISMIC EVENT SEARCH (1900 – 2019)

Basic Options

Magnitude

- ○ 2.5+
- ○ 4.5+
- ◉ Custom

Minimum: 2

Maximum:

Date & Time

- ○ Past 7 Days
- ○ Past 30 Days
- ◉ Custom

Start (UTC): 1900-01-01 00:00:00

End (UTC): 2020-07-14 23:59:59

Geographic Region

- ○ World
- ○ Conterminous U.S.[1]
- ◉ Custom

Custom Circle

- 32.617239 Latitude
- -104.093061 Longitude
- 25 Radius (km)

Draw Rectangle on Map

- Advanced Options

Geographic Region

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

North:

West:

East:

South:

Circle

Center Latitude: 32.617239

Center Longitude: -104.093061

Outer Radius (km): 25

Depth (km)

Minimum:

Maximum:

Azimuthal Gap

Minimum:

Maximum:

Review Status

- ◉ Any
- ○ Automatic
- ○ Reviewed

USGS

Search Results

0 of – earthquakes in map area.

Click for more information

There are no events in the current feed.

Didn't find what you were looking for?

- Check your Settings.
- Which earthquakes are included on the map and list?
- Felt something not shown – report it here.

Zoom to...

Caution

The current selection does not currently include any earthquakes.

Earthquakes happen around the world all the time. Change your options to view more earthquakes.

Continue

Earthquakes loading

UNITED STATES GEOLOGICAL SURVEY

35 KM SEISMIC EVENT SEARCH (1900 – 2019)

Basic Options

Magnitude

- ○ 2.5+
- ○ 4.5+
- ◉ Custom

Minimum

2

Maximum

Date & Time

- ○ Past 7 Days
- ○ Past 30 Days
- ◉ Custom

Start (UTC)

1900-01-01 00:00:00

End (UTC)

2020-07-14 23:59:59

Geographic Region

- ○ World
- ○ Conterminous U.S.[1]
- ◉ Custom

Custom Circle

- 32.617239 Latitude
- -104.093061 Longitude
- 35 Radius (km)

Draw Rectangle on Map

- Advanced Options

Geographic Region

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

North

West

East

South

Circle

Center Latitude

32.617239

Center Longitude

-104.093061

Outer Radius (km)

35

Depth (km)

Minimum

Maximum

Azimuthal Gap

Minimum

Maximum

Review Status

- ◉ Any
- ○ Automatic
- ○ Reviewed

USGS

Search Results

1 of 1 earthquakes in map area.

Click for more information

Last Updated	2020-07-14 14:26:22 (UTC)

Download

Search Parameters

starttime	1900-01-01 00:00:00
endtime	2020-07-14 23:59:59
latitude	32.617239
longitude	-104.093061
maxradiuskm	35
minmagnitude	2
orderby	time

Modify Search

3.9 New Mexico
1974-11-28 03:35:20 (UTC) 5.0 km

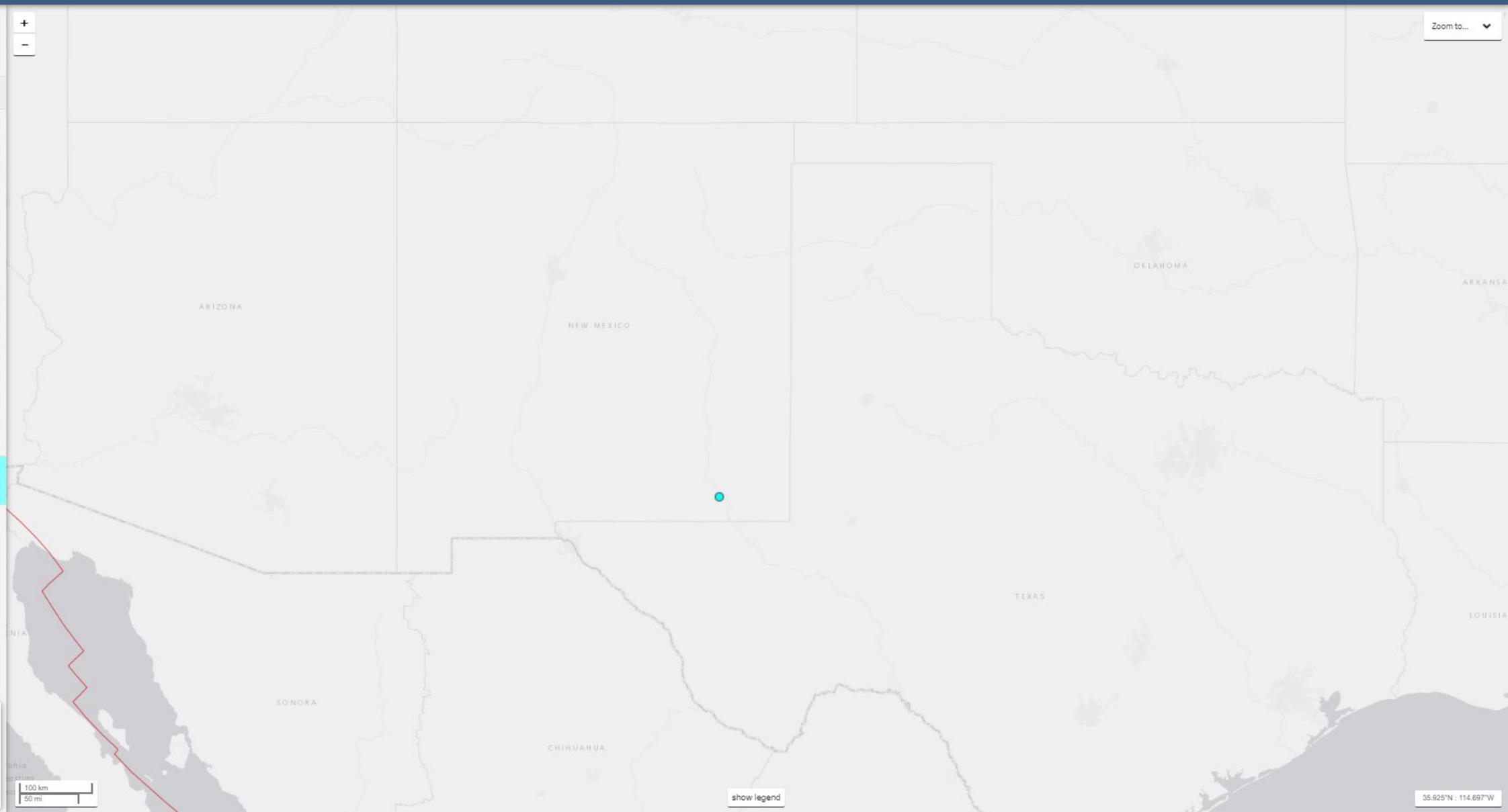
Didn't find what you were looking for?

- Check your Settings.
- Which earthquakes are included on the map and list?
- Felt something not shown – report it here.

M 3.9 - New Mexico

x

Time	1974-11-28 03:35:20 (UTC)
Location	32.311°N 104.143°W
Depth	5.0 km



BUREAU OF ECONOMIC GEOLOGY

THE UNIVERSITY OF TEXAS AT AUSTIN

15 KM SEISMIC EVENT SEARCH (2017 – 2019)

TexNet Earthquake Catalog

Show Table | Station List | Download Data | Area of Interest... | Measure | Contact Us | Important Links | Important Information

Filters

841 Events Matched Show Table

☐ Require Focal Mechanism

Magnitude Range

2 – 9

☑ Lock Magnitude

Select time period...

Since 2017-01-01

Earliest Date

12/31/2016

Latest Date

7/14/2020

Earthquakes - Final

MagnitudeCategory

- 1.5 < Magnitude <= 2.0
- 2.0 < Magnitude <= 2.5
- 2.5 < Magnitude <= 3.0
- 3.0 < Magnitude <= 3.5
- 3.5 < Magnitude <= 4.0
- 4.0 < Magnitude <= 5.5
- Magnitude > 5.5

Rectangular AOI

Latitude Max

Longitude Min

Longitude Max

Latitude Min

Submit Rectangle

Circular AOI

Center Latitude

32.617239

Center Longitude

-104.093061

Radius

15

Radius Units

Kilometers Miles

Select Circle

XY -103.324988°, 33.526883°

12/31/2016 – 7/14/2020

12/31/2016

Mar 2017 Jun 2017 Sep 2017 Dec 2017 Mar 2018 Jun 2018 Sep 2018 Dec 2018 Mar 2019 Jun 2019 Sep 2019 Dec 2019 Mar 2020 Jun 2020

7/14/2020

Powered by Esri

TexNet Earthquake Catalog

Show Table | Station List | Download Data | Area of Interest... | Measure | Contact Us | Important Links | Important Information

Filters

0 Events Matched Show Table

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Magnitude Range

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☑ Lock Magnitude

Select time period...

Since 2017-01-01

Earliest Date

12/31/2016

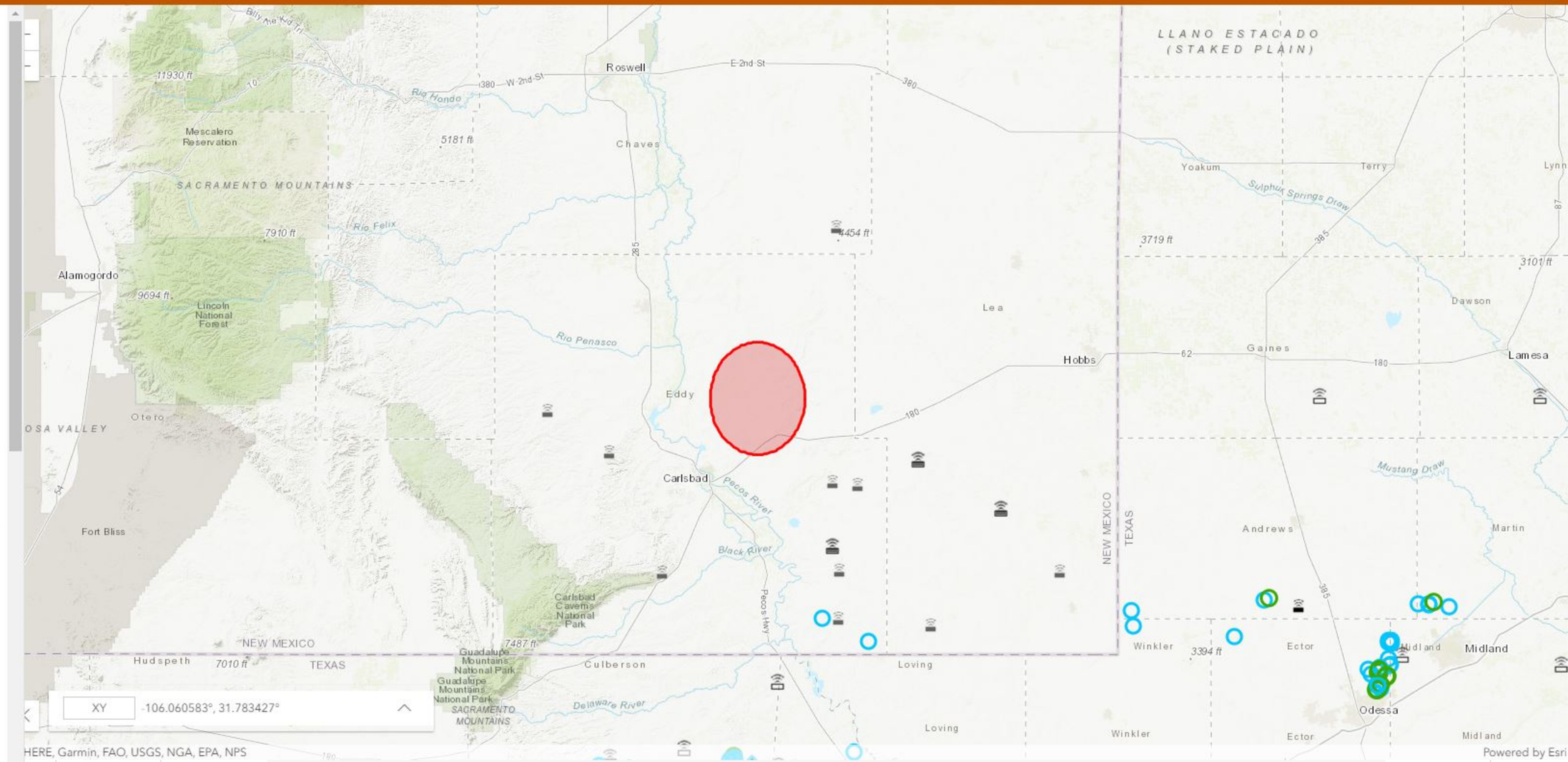
Latest Date

7/14/2020

Earthquakes - Final

MagnitudeCategory

- 1.5 < Magnitude <= 2.0
- 2.0 < Magnitude <= 2.5
- 2.5 < Magnitude <= 3.0
- 3.0 < Magnitude <= 3.5
- 3.5 < Magnitude <= 4.0
- 4.0 < Magnitude <= 5.5
- Magnitude > 5.5



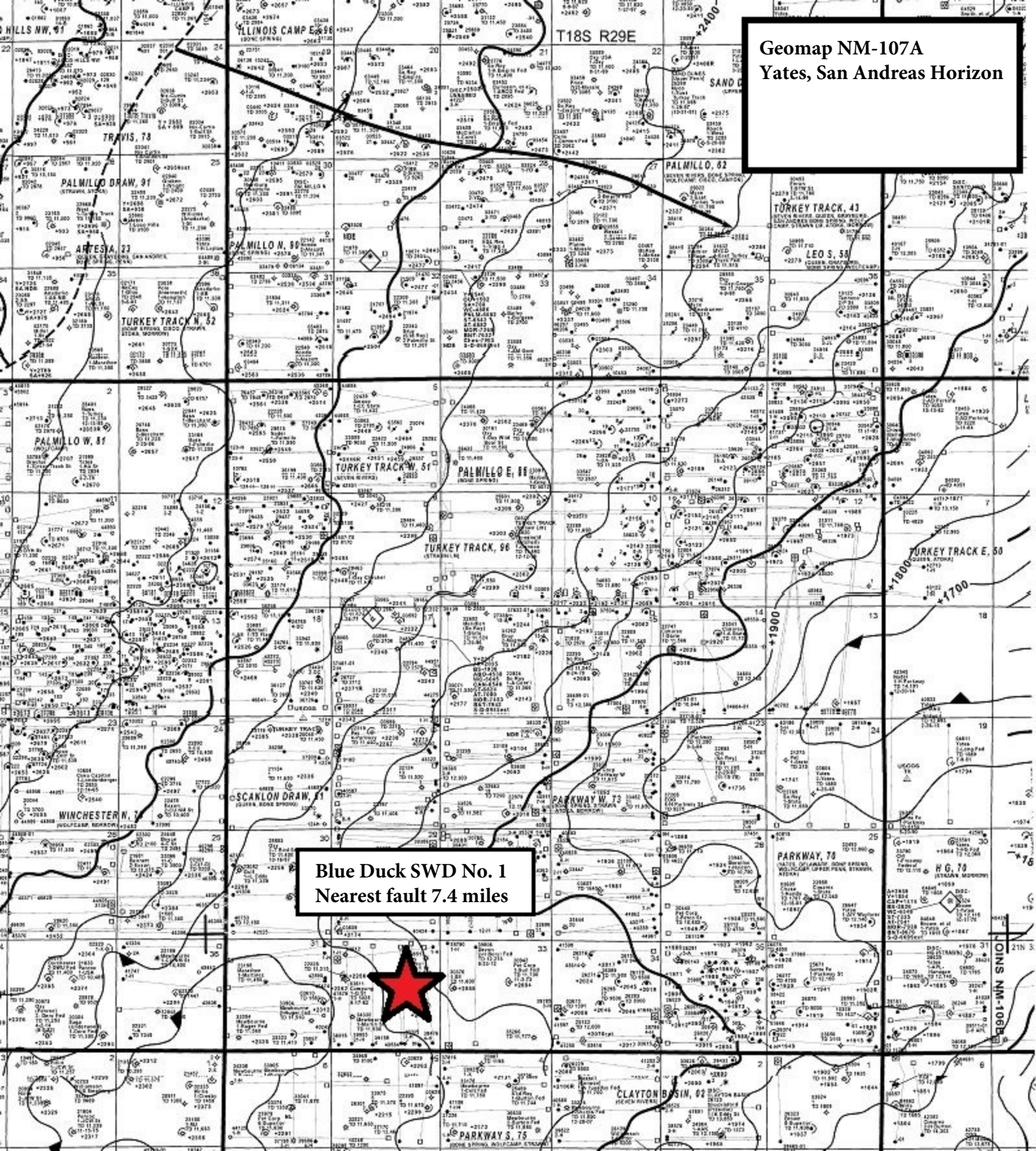
12/31/2016 – 7/14/2020 | 12/31/2016

Mar 2017 | Jun 2017 | Sep 2017 | Dec 2017 | Mar 2018 | Jun 2018 | Sep 2018 | Dec 2018 | Mar 2019 | Jun 2019 | Sep 2019 | Dec 2019 | Mar 2020 | Jun 2020

7/14/2020

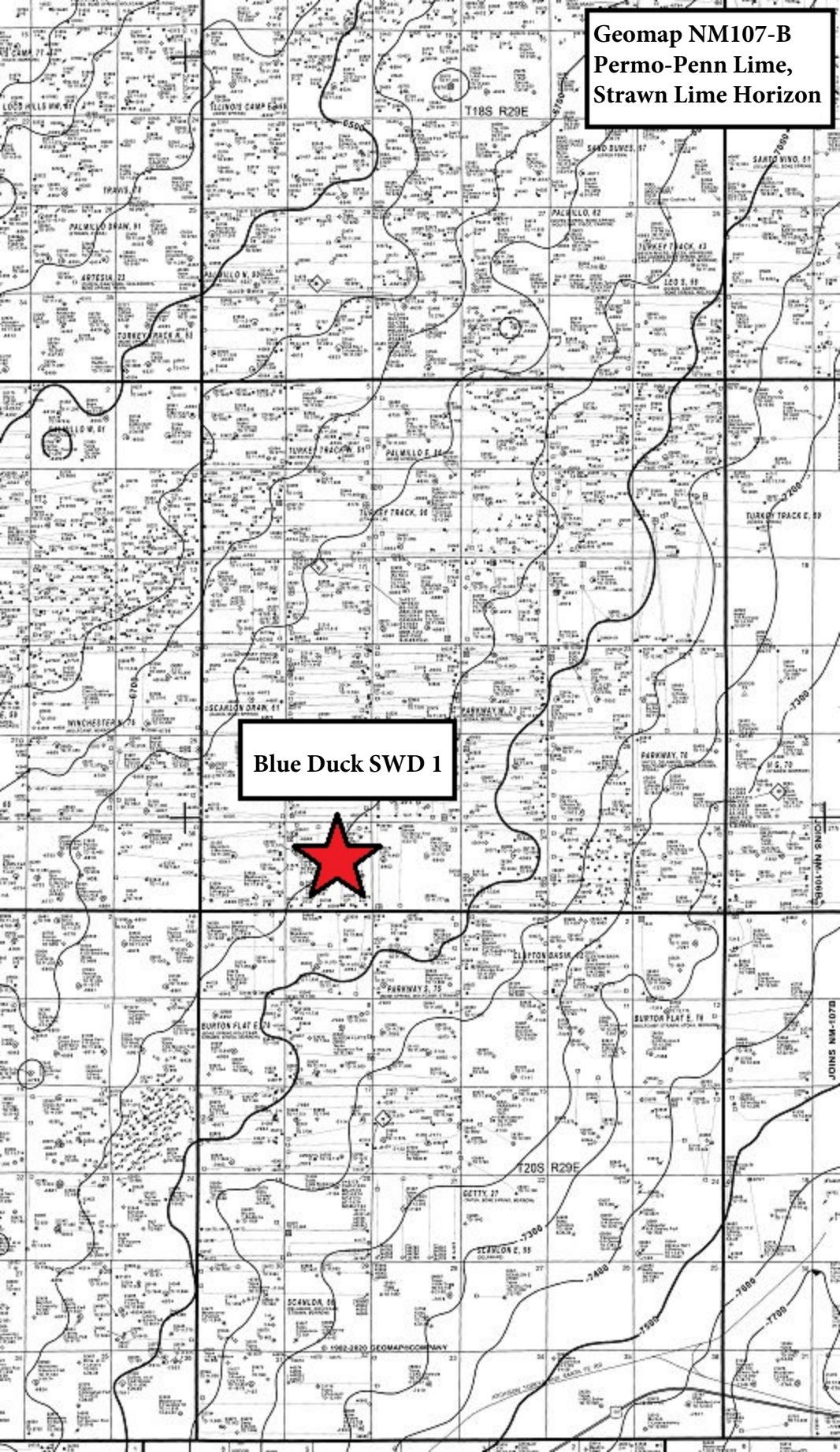
GEOMAP NM-107A

SAN ANDREAS, YATES HORIZON


Geomap NM-107A
Yates, San Andreas Horizon
Blue Duck SWD No. 1
Nearest fault 7.4 miles
T18S R29E
ILLINOIS CAMP E, 96
TRAVIS, 78
PALMILLO DRAW, 91
ARTESIA, 23
TURKEY TRACK N, 52
PALMILLO N, 90
PALMILLO, 62
TURKEY TRACK, 43
LEO S, 58
PALMILLO W, 81
TURKEY TRACK W, 51
PALMILLO E, 88
TURKEY TRACK, 96
TURKEY TRACK E, 50
SCANLON DRAW, 61
WINCHESTER N, 7
PARKWAY W, 73
PARKWAY, 76
H G, 70
PARKWAY S, 75
CLAYTON BASIN, 02
+2400
+1800
+1700
+1900
NM-107B

GEOMAP NM-107B

PERMO-PENN LIM, STRAWN LIME HORIZON


Geomap NM107-B
Permo-Penn Lime,
Strawn Lime Horizon
Blue Duck SWD 1
T18S R29E
T20S R29E
ILLINOIS CAMP FAULT
PALMILLO DRAW, 91
ARTESIA, 23
TURKEY TRACK N, 51
PALMILLO N, 50
PALMILLO, 62
TURKEY TRACK, 43
LEO S, 59
SANTO NINO, 51
SAND DUNES, 67
TURKEY TRACK, 50
PALMILLO E, 50
TURKEY TRACK E, 59
SCANLON DRAW, 61
PARKWAY W, 71
PARKWAY, 70
M G, 70
WINCHESTER, 70
BURTON FLAT E, 71
PARKWAY S, 75
BURTON FLAT E, 76
GETTY, 27
SCANLON E, 55
SCANLON, 55
7500
7400
7300
7200
7100
7000
6900
6800
6700
6600
6500
JOINS NM-106B
JOINS NM-107B
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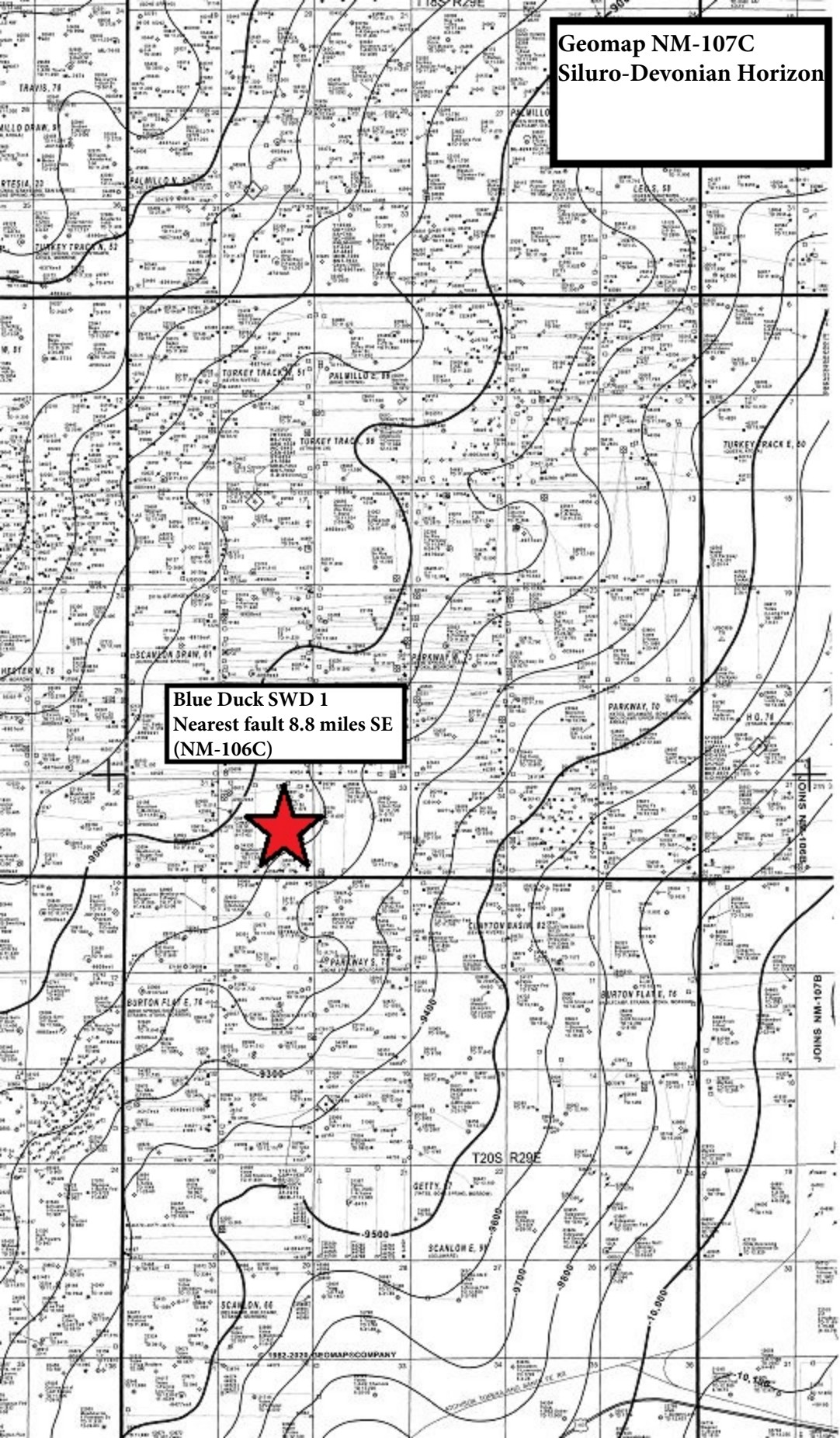
GEOMAP NM-107C

SILURO-DEVONIAN HORIZON


Geomap NM-107C
Siluro-Devonian Horizon
Blue Duck SWD 1
Nearest fault 8.8 miles SE
(NM-106C)
T18S R29E
T20S R29E
TRAVIS, 78
TURKEY TRACK N, 52
TURKEY TRACK E, 60
SCANLON SPRN, 61
PARKWAY, 70
BURTON FLAT E, 76
GETTY
SCANLON E, 9
SCANLON, 66
JOINS NM-106B
JOINS NM-107B
9000
9400
9500
9600
9700
9800
10,000
10,100
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