PHASE II
ENVIRONMENTAL SAMPLING ASSESSMENT

EnerVest Operating, LLC

Abalone “AMB” State #1 Tank Battery

(Saltwater and oil release from separator)

Section 26, T14S – R33E – API #30-025-01153
Lea County, NM
Coordinates: Latitude 33.08115 Longitude -103.59174

February 24TH, 2012

A Report For:
New Mexico Oil Conservation Division, Hobbs District
&
EnerVest Operating LLC
Mr. Elroy Ardoin

Prepared by:
Baseline Solutions LLC
Andy Price
1030 Andrews Hwy, Suite 207
Midland, Texas 79701

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EXECUTIVE SUMMARY

EnerVest Operating, LLC of Houston Texas, contracted Baseline Solutions to conduct an environmental sampling investigation at a spill site west of Lovington, New Mexico. The site is approximately 2 miles east of hwy 457 and the Saunders Plant (please see app. E). The location name is the Abalone AMB State #1 Tank Battery
The release occurred on December 9th, 2010. An estimated 100bbls of produced water with some oil was released from a hole that developed at the bottom of the separator. Remediation action was taken and 55bbls was recovered with a transport pump truck. This left an estimated 45bbl release. The spill area included the section within the tank battery dike which is 12yds X 11yds, the caliche pad area in front of the tank battery which is an estimated 12yds X 36yds, and the area across the location to the east side which about 10yds X 15yds. A sampling investigation was conducted to delineate the extent of contamination. Site location is described as:

- API #30-025-01153 - Section 26, T14S – R33E
- Lea County, NM
- Coordinates: Latitude 33.08115 Longitude -103.59174

A summary of the lab analysis data, research and observations gathered during the sampling investigation is as follows:

Abalone AMB State #1 Tank Battery

Sample field code	Chloride PPM		Sample field code	TPH PPM
A-S - surface	10,800		A-S - surface	<50.0
B-S - surface	10,300		B-S - surface	67.1
C-S - surface	27,500		C-S - surface	266
D-S - surface	31,500		D-S - surface	811
A - 3' depth	1,040		A - 3' depth	<50.0
B - 2' depth	969		B - 2' depth	<50.0
C - 1' depth	1,580		C - 1' depth	<50.0
D - 2' depth	<200		D - 2' depth	<50.0

NMOCD acceptable level for Chlorides is 250ppm or less.
NMOCD acceptable level for Total Petroleum Hydrocarbons (TPH) is 1000ppm or less.

Contaminated Area Delineated: Soil borings with field and laboratory analysis indicate the saltwater/oil spill to be an approximate averaged surface area of 714 square yards, and an average depth of 1ft. to 2ft.

OCD Site Ranking: No Surface hydrology issues were identified for surface run-off due to topographical gradient and rain fall average. Subsurface hydrology data indicates groundwater for this area to be at an estimated average depth of 96ft. **The OCD site ranking is considered to be 10 or less (please see section 5 in the body of this report).**

Conclusion:

- Chloride & TPH contamination for spill area has an average depth of 1' to 2'.
- According to NMOCD guidelines – this site is considered to have a ranking of 10.

Recommendation: Conduct "Dig & Haul" remediation for spill area to an average depth of 1ft to 2 ft. Perform field screening with formal lab analysis to insure proper abatement.

1.0 INTRODUCTION

EnerVest Operating, LLC of Houston Texas, contracted Baseline Solutions to conduct an environmental sampling investigation at a spill site approximately 2 miles east of hwy 457 and the Saunders Plant. The location name is the Abalone AMB State #1 Tank Battery
The release occurred on December 9th, 2010. An estimated 100bbls of produced water with some oil was released from a hole that developed at the bottom of the separator. Remediation action was taken with a transport pump truck. Approximately 55bbls was recovered. This left an estimated 45bbl release. The spill area included the section within the tank battery dike which is 12yds X 11yds, the caliche pad area in front of the tank battery which is an estimated 12yds X 36yds, and the area across the location to the east side which about 10yds X 15yds. A sampling investigation was conducted to delineate the extent of contamination. Site location is described as:

- API #30-025-01153
- Section 26, T14S – R33E
- Lea County, NM
- Coordinates: Latitude 33.08115 Longitude -103.59174

2.0 PURPOSE

The purpose of this investigation was to quantify the level of Chlorides and Total Petroleum Hydrocarbons (TPH), and delineate the area of contamination for spill site.

3.0 PROCEDURES AND METHODS

The procedures and methods for this project were conducted according to EPA protocol and conducted in a professional manner within parameters established by regulatory and industry standards.

A. Sampling Methods and Procedures

- Visual site reconnaissance of entire property with photos
- Grab samples were taken and screened for Chlorides with an Electrical Conductivity Meter (Milwaukee Model SM802). This process is used to identify any elevated levels for chlorides for a specific depth and area.
- Grab samples were taken and screened for Total Petroleum Hydrocarbons (TPH), with a Photoionization Detector (Mini Rae Plus - model # PGM-76IS). This process is used to identify any elevated levels for TPH for a specific depth and area.
- The parameter of the spill area was delineated first by visual reconnaissance and screening surface samples and then with soil borings.
- A site grid was developed from data collected with grab sample screening.
- Grid samples were taken and combined within specific areas which made up the identified composite samples.
- Samples were systematically taken from soil borings at surface and 1ft intervals. Samples were screened with an EC meter and PID detector.
- Sampling Grid: Areas were identified as A, B, C, D, .
    - **Chlorides:** Highest chloride levels were 31,500**ppm** at surface level. Acceptable levels for chlorides are expected to be reached at 1’ to 2’ depths depending on each grid area.

- **TPH:** Highest TPH levels were 266**ppm** at surface level. Acceptable levels for TPH are expected to be reached at 1' to 2' depths depending on each grid area.
- Lab Samples: Composite samples were taken from grid areas A, B, C, D.
- Decontamination procedures were maintained
- All samples were kept on ice until delivered to lab
- A field log was maintained
- A formal chain of custody was maintained
- Composite samples were delivered to Trace Analysis in Midland, TX - an EPA approved lab.

4.0 INVESTIGATION RESULTS

Lab results are listed below (please see app. B).

NMOCD acceptable level for Chlorides is 250ppm or less and TPH levels at 1000ppm or less.

Sample field code	Chloride PPM		Sample field code	TPH PPM
A-S - surface	10,800		A-S - surface	<50.0
B-S - surface	10,300		B-S - surface	67.1
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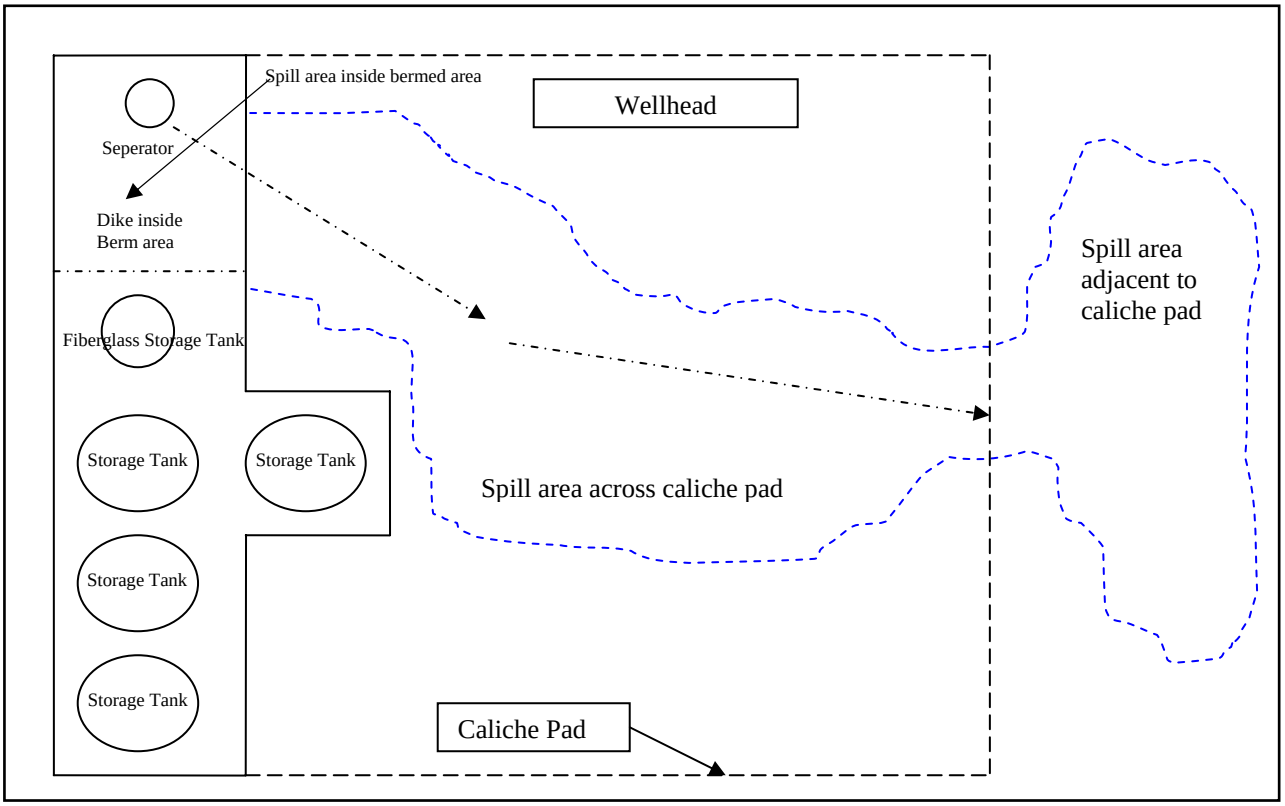
D - 2' depth	<200		D - 2' depth	<50.0



5.0 NMOCD SITE RANKING (see app. D)

SITE RANKING – According to NMOCD "Spill Clean up Guidelines" for "Unsaturated Contaminated Soils"

The general site characteristics obtained during the site assessment were used to determine the appropriate soil remediation action level. A risk based approach was taken for the site evaluation. Site soils were contaminated by saltwater and petroleum constituents. The site was scored according to the ranking criteria below to determine the relative threat (if any), to public health, fresh waters and the environment.

Ranking Criteria

- **Depth to ground water is an estimated 96'**, according to available information within the USGS web site database. Measurements were taken from the nearest water well on record. (Please see app. C)

ID	TWN	RNG	SEC	DES	DEPTH	YR	MO	DY	SPC_X	SPC_Y	NAD27_LAT	NAD27_LON
910	14S	33E	27	NENWNESWNENE	96.00	1981	03	24	725863.985	757703.535	33.0808027	103.5959554

- **Depth To Ground Water**

<50 feet	20
50 - 99	**10**
>100	

- **Wellhead Protection Area**

<1000 feet from a water source, or;
<200 feet from private domestic water source

Yes	20
No	**0**

- **Distance To Surface Water Body**

<200 horizontal feet	20
200 - 1000 horizontal feet	10
>1000 horizontal feet	**0**

From NMOCD "Spill Clean up Guidelines"

Recommended remediation action level. The total ranking score determines the degree of remediation that may be required at any given site. The total ranking score is the sum of all ranking criteria listed in Section IV.A.2.a.

Total Ranking Score for this spill site is considered to be 10.

Recommended remediation action is to conduct **"dig and haul"** operations with soil being disposed of at the nearest NMOCD approved disposal site.

6.0 REGULATORY REVIEW

A. The NMOCD form C141 was submitted on December 8, 2010. This sampling investigation is intended to be in compliance with New Mexico Oil Conservation Division:

- Rule 116 RELEASE NOTIFICATION AND CORRECTIVE ACTION [1-1-50...2-1-96; A, 3-15-97]
  1. 116.D. CORRECTIVE ACTION: The responsible person must complete Division approved corrective action for releases which endanger public health or the environment. Releases will be addressed in accordance with a remediation plan submitted to and approved by the Division or with an

  abatement plan submitted in accordance with Rule 19 (19 NMAC 15.A. 19). [3-15-97]
- Rule 19 (19 NMAC 15.A. 19). [3-15-97].

7.0 CONCLUSIONS / RECOMMENDATIONS

Conclusion:

- Chloride & TPH contamination for spill area has an average depth of 1' to 2'.
- According to NMOCD guidelines – this site is considered to have a ranking of 10.

Recommendation:

- **Conduct "Dig & Haul"** remediation for spill area to an estimated average depth of 1ft to 2 ft. Perform field screening with formal lab analysis to insure proper abatement. Deliver excavated soil to the nearest approved NMOCD disposal site.

- **Complete Closing Report** in compliance with OCD requirements.
  - Lab analysis insuring chloride contamination has been removed to less than 250ppm
  - Lab analysis insuring TPH removed to less than 1000ppm
  - List OCD approved disposal site where contaminated soil disposed of.
  - Grade site to match original topography and reseed with appropriate seed mix.
  - Submit formal closing report to NMOCD office in Hobbs, NM

8.0 Limitations

This report was prepared exclusively for use by EnerVest Operating. The contents of the report shall not be disseminated to, or used by any other party without EnerVest Operating written consent.

Baseline Solutions hereby gives notice that any statement or opinion in this report shall not be construed to create any warranty or representation that the real property on which the investigation was conducted is free of pollution or complies with any or all applicable regulatory or statutory requirements, or that the property is fit for any particular purpose.

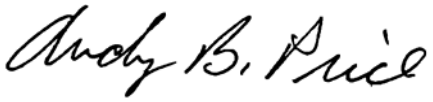
Unless otherwise indicated in this report, no attempt was made to check on the compliance of present or past owners of the site with federal, state or local laws and regulations.

The conclusions presented in this report were based on the services described, and not on specific tasks or procedures beyond the scope of described services or the time and budgetary constraints imposed by EnerVest Operating.

Person or entity considering use, acquisition, or other involvement or activity concerning the property shall be solely responsible for determining the adequacy of the property for any and all uses for which that person or entity shall use the property. Any person or entity considering the use, acquisition, or other involvement or activity concerning the property which is the subject of this report should enter into any use, occupation, acquisition, or the like on sole reliance of its own judgment and on its own personal investigation of such property, and not in reliance on any representation made by Baseline Solutions regarding such property, the character quality, or its value. Baseline Solutions performed environmental services in a professional manner using that degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. Baseline Solutions shall not be responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed at the time the environmental services were conducted.

QUALIFICATIONS AND SIGNATURE OF ENVIRONMENTAL PROFESSIONAL

Prepared By:
Andy B. Price



Registered Environmental Professional Registry #9116

APPENDIXES

A. Site Photos
B. Lab Report
C. Hydrology
D. OCD Form C141 – Spill Report
E. Maps

Soon after spill occurrance

Soon after spill occurrance


Soon after spill occurrance


Gradient east of tank battery and across loctions
Soon after spill occurrance


Spill direction
Origin of spill
Sampling Investigation


Origin of spill - separator developed a leak. The dike and separator were repaired immediately.
Sampling Investigation


Sampling Investigation


Sampling Investigation


Sampling Investigation

Sampling Investigation


Sampling Investigation

Sampling Investigation

Sampling Investigation

Summary Report

Andy Price
EnerVest Operating LLC
1001 Fannin Street
Suite 800
Houston, TX 77002

Report Date: March 17, 2011

Work Order: 11030720

Project Location: Sec. 26 T14S-R33E, Lea County, NM
Project Name: Abalone State #1
Project Number: Abalone State #1

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
259733	A-S	soil	2011-03-04	08:05	2011-03-04
259734	B-S	soil	2011-03-04	08:15	2011-03-04
259735	C-S	soil	2011-03-04	08:30	2011-03-04
259736	D-S	soil	2011-03-04	08:40	2011-03-04
259737	A-1	soil	2011-03-04	09:00	2011-03-04
259738	B-1	soil	2011-03-04	09:20	2011-03-04
259739	C-1	soil	2011-03-04	09:45	2011-03-04
259740	D-1	soil	2011-03-04	10:15	2011-03-04

Sample - Field Code	TPH DRO - NEW DRO (mg/Kg)	TPH GRO GRO (mg/Kg)
259733 - A-S	<50.0	<2.00
259734 - B-S	**67.1**	<2.00
259735 - C-S	**266**	<2.00
259736 - D-S	**811**	<2.00
259737 - A-1	<50.0	<2.00
259738 - B-1	<50.0	<2.00
259739 - C-1	<50.0	<2.00
259740 - D-1	<50.0	<2.00

Sample: 259733 - A-S

Param	Flag	Result	Units	RL
Chloride		**11800**	mg/Kg	4.00

Sample: 259734 - B-S

Param	Flag	Result	Units	RL
Chloride		**10300**	mg/Kg	4.00

Sample: 259735 - C-S

Param	Flag	Result	Units	RL
Chloride		**27500**	mg/Kg	4.00

Sample: 259736 - D-S

Param	Flag	Result	Units	RL
Chloride		**31500**	mg/Kg	4.00

Sample: 259737 - A-1

Param	Flag	Result	Units	RL
Chloride		**1040**	mg/Kg	4.00

Sample: 259738 - B-1

Param	Flag	Result	Units	RL
Chloride		**969**	mg/Kg	4.00

Sample: 259739 - C-1

Param	Flag	Result	Units	RL
Chloride		**1580**	mg/Kg	4.00

Sample: 259740 - D-1

Param	Flag	Result	Units	RL
Chloride		<200	mg/Kg	4.00

News updated November, 2011

Groundwater levels for New Mexico

NM

Search Results -- 1 sites found

Search Criteria

Agency code = usgs
site_no list =
- 330439103354101

Minimum number of levels = 1

Save file of selected sites to local disk for future upload

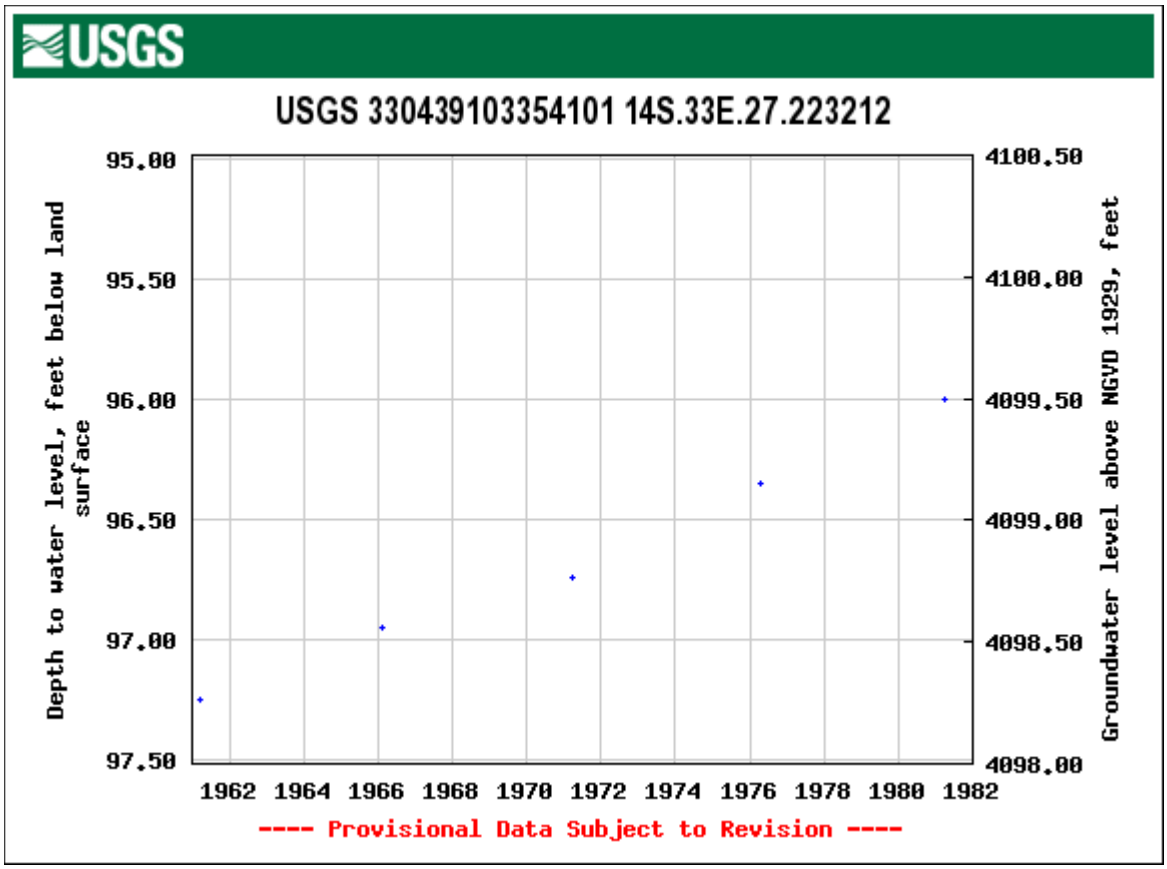
USGS 330439103354101 14S.33E.27.223212

Lea County, New Mexico
Latitude 33°04'51", Longitude 103°35'46" NAD27
Land-surface elevation 4,195.50 feet above NGVD29
This well is completed in the Ogallala Formation (121OGLL) local aquifer.

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period

Date	Time	Water level, feet below land surface	Water level, feet above specific vertical datum	Referenced vertical datum	Status	Measuring Agency
1961-03-13		97.25				
1966-02-17		96.95				
1971-03-24		96.74				
1976-04-08		96.35				
1981-03-24		96.00				


USGS
USGS 330439103354101 14S.33E.27.223212
Depth to water level, feet below land surface
95.00
95.50
96.00
96.50
97.00
97.50
Groundwater level above NGVD 1929, feet
4100.50
4100.00
4099.50
4099.00
4098.50
4098.00
1962 1964 1966 1968 1970 1972 1974 1976 1978 1980 1982
---- Provisional Data Subject to Revision ----

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised October 10, 2003

Submit 2 Copies to appropriate District Office in accordance with Rule 116 on back side of form

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company – EnerVest Operating LLC	Contact – Elroy Ardoin
Address –1001 Fannin Street, Suite 800, Houston, TX 77002	Telephone No. (713) 495 6534
Facility Name – Abalone AMB State #1 Tank Battery	Facility Type – Tank Battery

Surface Owner – State of NM	Mineral Owner	API No. 30-025-01153

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	South Line	Feet from the	East/West Line	County
D	26	14S	33E					Lea

Latitude N 32.78634 Longitude W 104.05161

NATURE OF RELEASE

Type of Release - Saltwater and Oil	Volume of Release estimated 100bbls	Volume Recovered 55bbls
Source of Release – Hole in bottom of separator	Date and Hour of Occurrence ? 12/8/2010 – before 3:00PM	Date and Hour of Discovery 12/8/2010 - 3:00PM
Was Immediate Notice Given? ☐ Yes ☒ No ☐ Not Required	If YES, To Whom? Larry Johnson – NMOCD Hobbs Office	
By Whom? Andy Price – Contract Environmental Consultant for EnerVest Operating	Date and Hour – 12/9/10 2:30PM	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

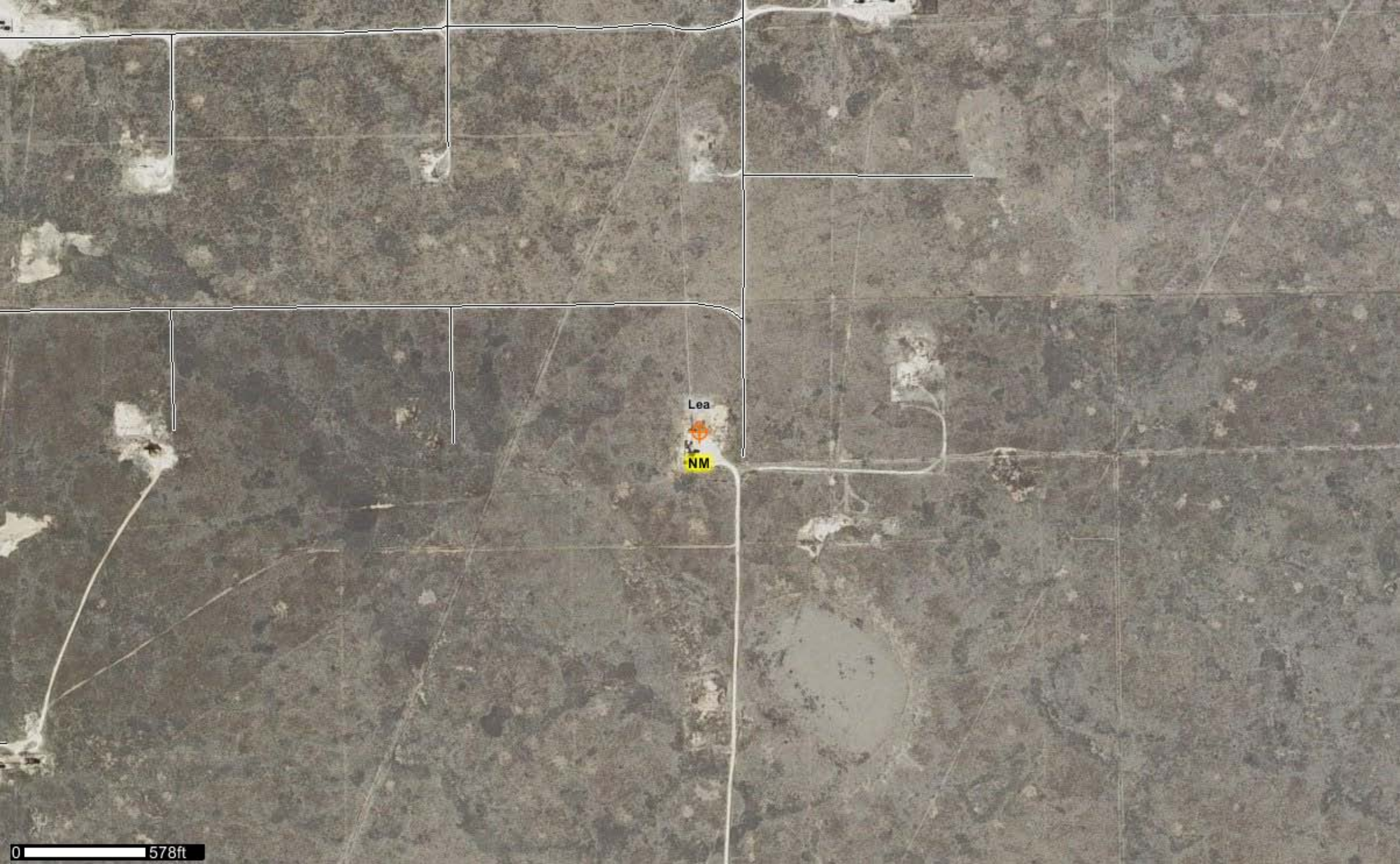
Describe Cause of Problem and Remedial Action Taken.* A hole in the bottom of the separator was the source of the release. The spill was partially contained within the tank battery dike area. An estimated 100bbls was spilled with 45bbls being recovered. The faulty separator was repaired immediately. Repairs began immediately on the leaking separator. No further remedial action has been taken yet.

Describe Area Affected and Cleanup Action Taken.*
The spill area included the section within the tank battery dike which is 12yds X 11yds, the caliche pad area in front of the tank battery which is an estimated 15yds X 40yds area outside the berm, and the area across the location to the east side which about 12yds X 15yds.
Remediation action taken was to recover about 45 bbls of freestanding produced water with some oil into a transport.
A sampling investigation will be conducted to delineate the extent of contamination. A sampling report will be submitted to OCD with a remediation plan to be implemented **upon NMOCD approval.**
The most likely remediation plan to be recommended will be to conduct "dig & haul" operation with lab analysis. A closing report will then be submitted to OCD.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: Andy B. Price	OIL CONSERVATION DIVISION	
Printed Name: Andy Price	Approved by District Supervisor:	
Title: Contract Environmental Consultant for EnerVest Operating	Approval Date:	Expiration Date:
E-mail Address: andyprice@grandecom.net	Conditions of Approval:	Attached ☐
Date: 12/21/2010 Phone: (432) 352-6400		

* Attach Additional Sheets If Necessary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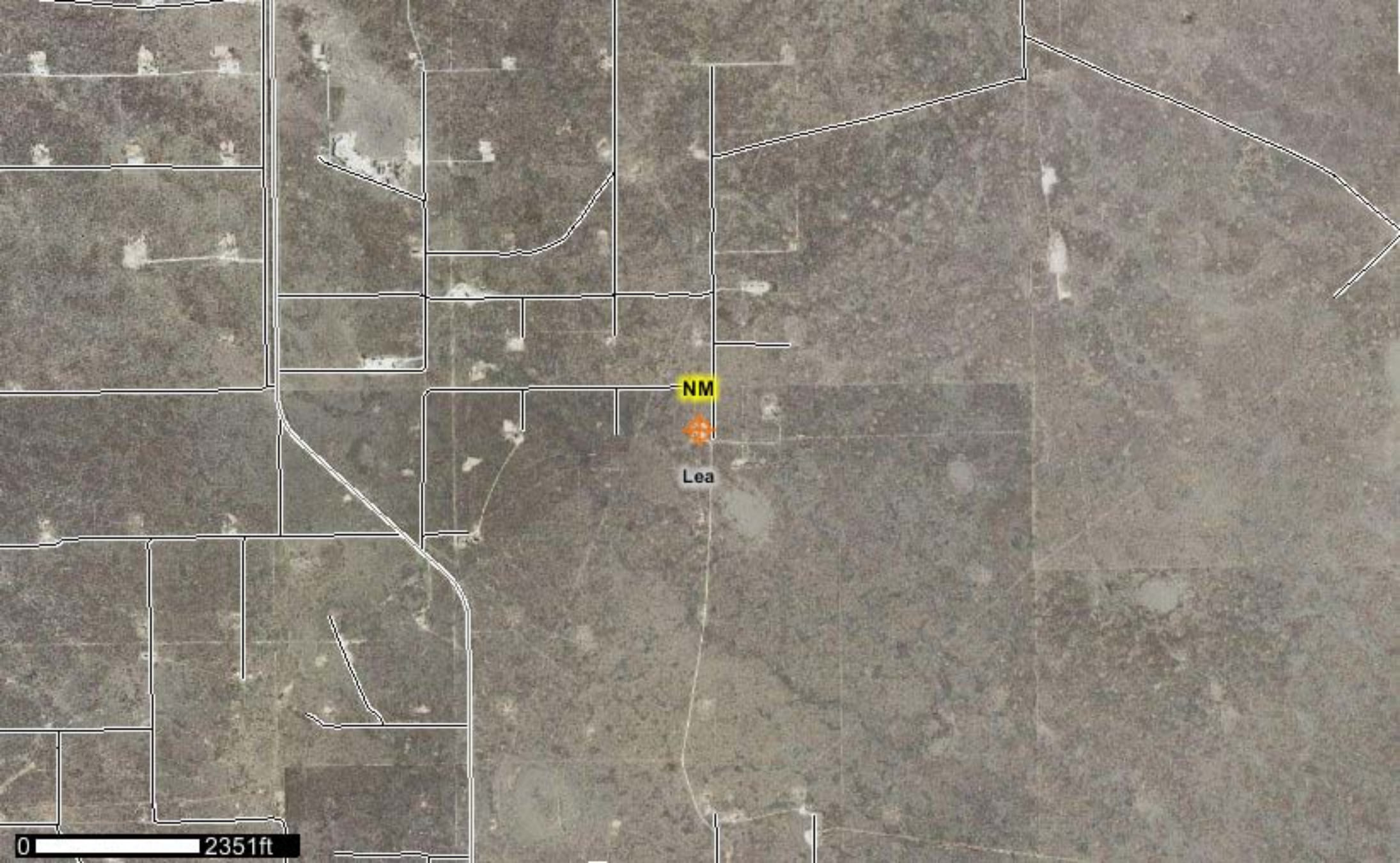
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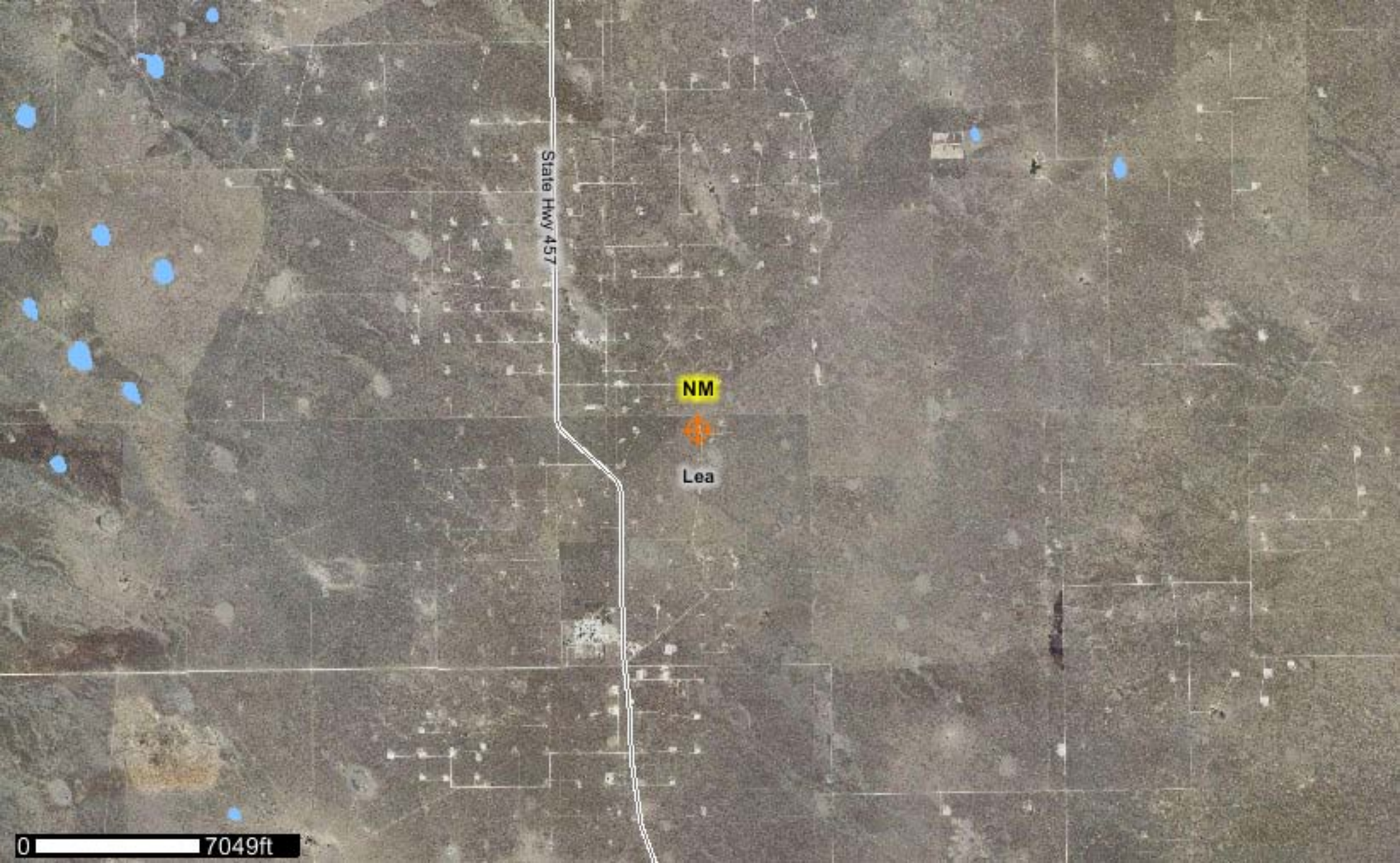
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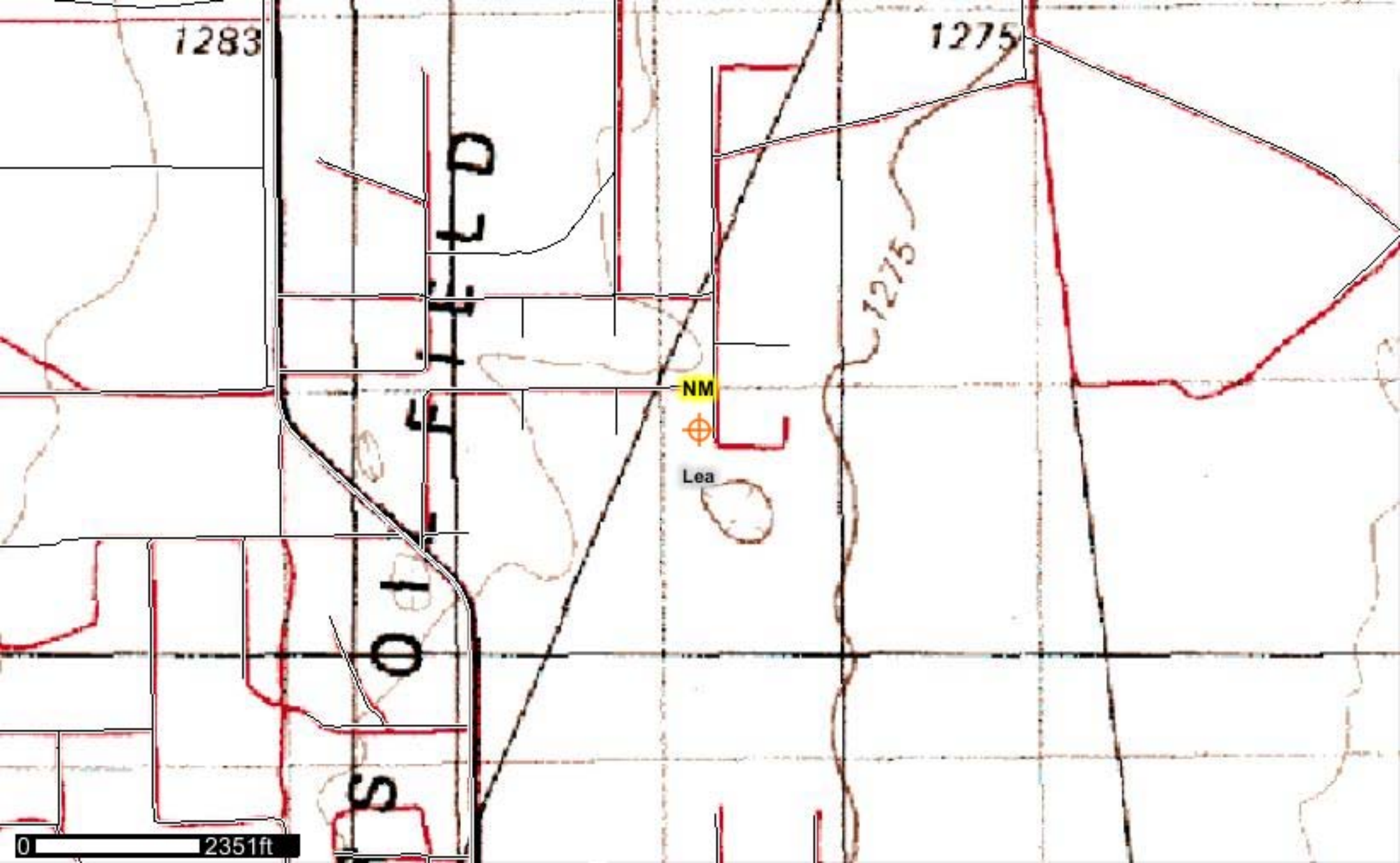
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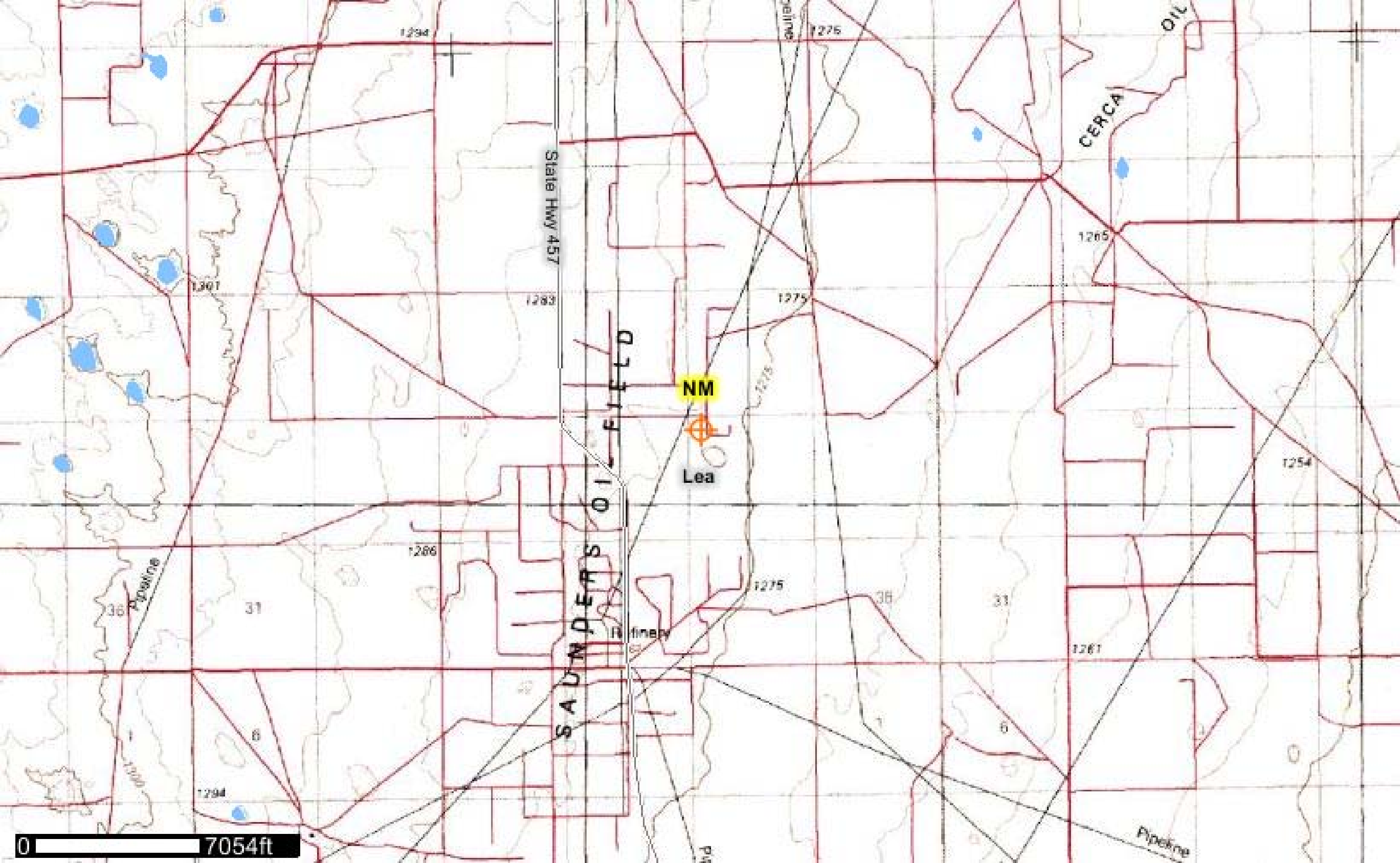

State Hwy 457
SAUNDERS OIL FIELD
CERCA OIL
NM
Lea
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Pipeline
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1294
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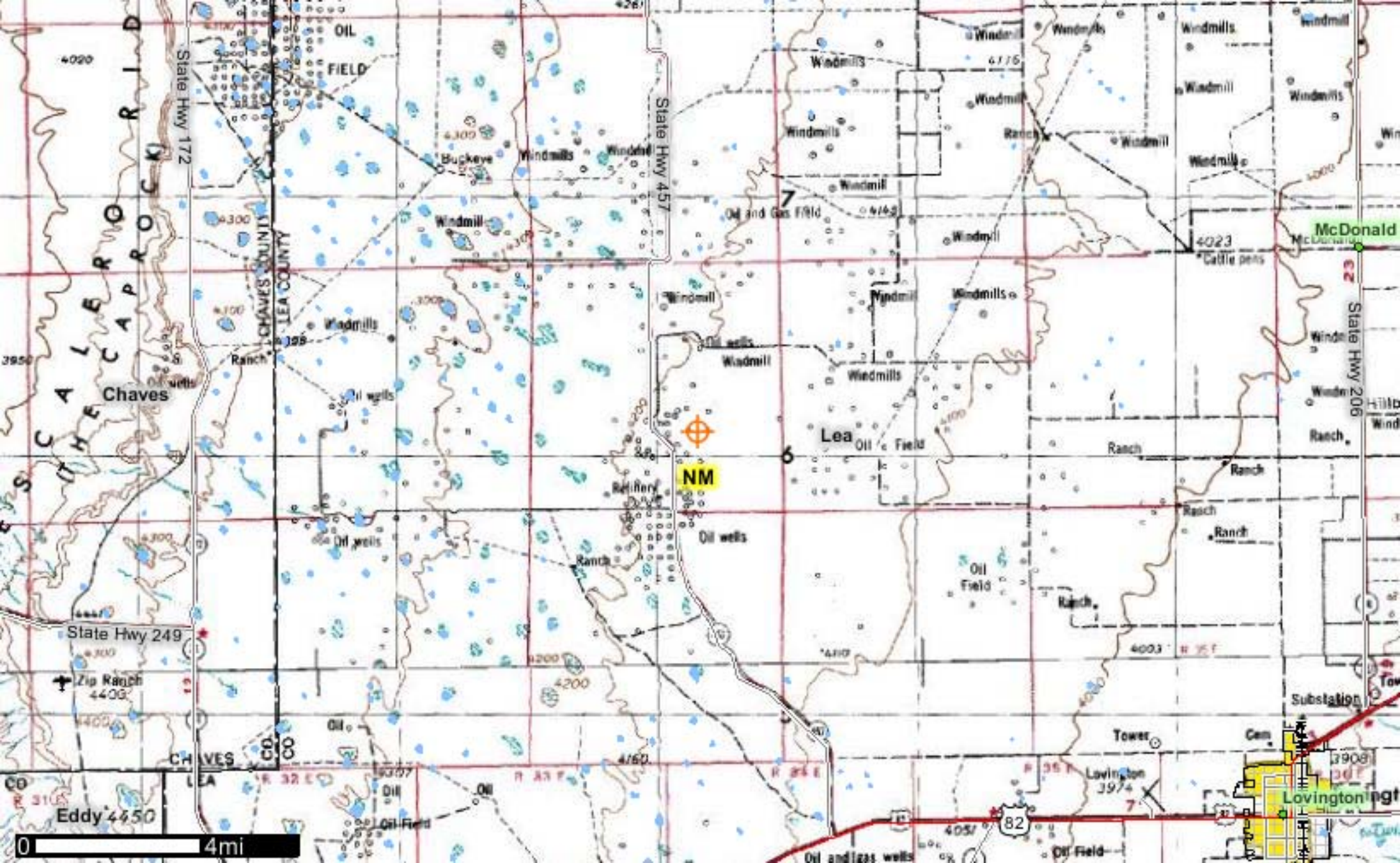
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State Hwy 457
State Hwy 206
State Hwy 249
CHAVES COUNTY
LEA COUNTY
Chaves
Lea
NM
Eddy
McDonald
Lovington
Buckeye
Zip Ranch
Oil and Gas Field
Oil Field
Refinery
Substation
Tower
Windmills
Windmill
Ranch
Oil wells
Cattle pens
0
4mi