Initial Application Part I

Received 4/26/21

This application is placed in file for record. It MAY or MAY NOT have been reviewed to be determined Administratively Complete

Revised March 23, 2017

ORJMY-210105-C-1080

RECEIVED: 4/26/21	REVIEWER:	TYPE: SWD	APP NO: pBL2121740106

ABOVE THIS TABLE FOR OCD DIVISION USE ONLY

NEW MEXICO OIL CONSERVATION DIVISION
- Geological & Engineering Bureau –
1220 South St. Francis Drive, Santa Fe, NM 87505

ADMINISTRATIVE APPLICATION CHECKLIST

THIS CHECKLIST IS MANDATORY FOR ALL ADMINISTRATIVE APPLICATIONS FOR EXCEPTIONS TO DIVISION RULES AND REGULATIONS WHICH REQUIRE PROCESSING AT THE DIVISION LEVEL IN SANTA FE

Applicant: Legacy Reserves LP **OGRID Number:** 240974
Well Name: Lea Unit #10D **API:** 30-025-20506
Pool: Proposed: Lea: Devonian **Pool Code:** 37590

SUBMIT ACCURATE AND COMPLETE INFORMATION REQUIRED TO PROCESS THE TYPE OF APPLICATION INDICATED BELOW

1) **TYPE OF APPLICATION:** Check those which apply for [A]
A. Location – Spacing Unit – Simultaneous Dedication
☐ NSL ☐ NSP (PROJECT AREA) ☐ NSP (PRORATION UNIT) ☐ SD

SWD-2443

B. Check one only for [I] or [II]
[I] Commingling – Storage – Measurement
☐ DHC ☐ CTB ☐ PLC ☐ PC ☐ OLS ☐ OLM
[II] Injection – Disposal – Pressure Increase – Enhanced Oil Recovery
☐ WFX ☐ PMX ☒ SWD ☐ IPI ☐ EOR ☐ PPR

FOR OCD ONLY
☐ Notice Complete
☐ Application Content Complete

2) **NOTIFICATION REQUIRED TO:** Check those which apply.
A. ☒ Offset operators or lease holders
B. ☐ Royalty, overriding royalty owners, revenue owners
C. ☒ Application requires published notice
D. ☒ Notification and/or concurrent approval by SLO
E. ☒ Notification and/or concurrent approval by BLM
F. ☒ Surface owner
G. ☒ For all of the above, proof of notification or publication is attached, and/or,
H. ☐ No notice required

3) **CERTIFICATION:** I hereby certify that the information submitted with this application for administrative approval is **accurate** and **complete** to the best of my knowledge. I also understand that **no action** will be taken on this application until the required information and notifications are submitted to the Division.

Note: Statement must be completed by an individual with managerial and/or supervisory capacity.

12/16/2020
Date

Matthew Dickson
Print or Type Name

(432) 212-5698
Phone Number

Signature

mdickson@legacyreserves.com
e-mail Address

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL
RESOURCES DEPARTMENT

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

FORM C-108
Revised June 10, 2003

APPLICATION FOR AUTHORIZATION TO INJECT

I. PURPOSE: _____Secondary Recovery _____Pressure Maintenance _____X___Disposal _____Storage
Application qualifies for administrative approval? _____X_____Yes _____No

II. OPERATOR: _____Legacy Reserves LP _____

ADDRESS: __303 W. Wall Street, Suite 1800, Midland, Texas 79701_____

CONTACT PARTY: ___Randall Hicks (agent)_____PHONE: _202 266 5004_____

III. WELL DATA: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.

IV. Is this an expansion of an existing project? _____Yes ____X_____No
If yes, give the Division order number authorizing the project: _____

V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.

VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected;
2. Whether the system is open or closed;
3. Proposed average and maximum injection pressure;
4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,
5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).

*VIII. Attach appropriate geologic data on the injection zone including appropriate lithologic detail, geologic name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such sources known to be immediately underlying the injection interval.

IX. Describe the proposed stimulation program, if any.

*X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted).

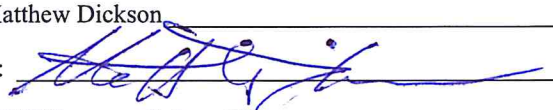
*XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.

XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water.

XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.

XIV. Certification: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

NAME: ___Matthew Dickson_____TITLE: _____

SIGNATURE:  _____DATE: _Dec. 16, 2020_____

E-MAIL ADDRESS: ___mdickson@legacyreserves.com_____

* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be resubmitted. Please show the date and circumstances of the earlier submittal: _____

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate District Office

III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

(1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.

(2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.

(3) A description of the tubing to be used including its size, lining material, and setting depth.

(4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District Offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

(1) The name of the injection formation and, if applicable, the field or pool name.

(2) The injection interval and whether it is perforated or open-hole.

(3) State if the well was drilled for injection or, if not, the original purpose of the well.

(4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.

(5) Give the depth to and the name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

(1) The name, address, phone number, and contact party for the applicant;

(2) The intended purpose of the injection well; with the exact location of single wells or the Section, Township, and Range location of multiple wells;

(3) The formation name and depth with expected maximum injection rates and pressures; and,

(4) A notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505, within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.

Side 1

INJECTION WELL DATA SHEET

OPERATOR: Legacy Reserves LP

WELL NAME & NUMBER: Lea Unit #10 SWD

WELL LOCATION: 1980' FNL & 1980' FWL F 13 20S 34E
FOOTAGE LOCATION | UNIT LETTER | SECTION | TOWNSHIP | RANGE

WELLBORE SCHEMATIC

WELL CONSTRUCTION DATA

Surface Casing

Hole Size: See Attachments Casing Size:

Cemented with: sx. *or* ft^3

Top of Cement: Method Determined:

Intermediate Casing

Hole Size: Casing Size:

Cemented with: sx. *or* ft^3

Top of Cement: Method Determined:

Production Casing

Hole Size: Casing Size:

Cemented with: sx. *or* ft^3

Top of Cement: Method Determined:

Total Depth:

Injection Interval

feet to

(Perforated or Open Hole; indicate which)

INJECTION WELL DATA SHEET

Tubing Size: ___See Attachments _____Lining Material: _____

Type of Packer: _____

Packer Setting Depth: _____

Other Type of Tubing/Casing Seal (if applicable): _____

Additional Data

1. Is this a new well drilled for injection? _____Yes ____X___No

   If no, for what purpose was the well originally drilled? ___Oil and Gas Production_____

   _____

2. Name of the Injection Formation: ____Devonian_____

3. Name of Field or Pool (if applicable): _____

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. _____

   _____See Attachments_____

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area: _____See Attachments _____

   _____

   _____

   _____

III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include

1. Lease name; Well No.; Location by Section, Township and Range; and footage location within the section

Lease Name: Lea Unit #10
Unit Letter F, Section 13, T20S R34E, 1,980 FNL, 1,980 FWL

Kenneth Smith, Inc. owns the surface upon which the SWD is located

2. Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined

The attached Wellbore Data Sheet provides all of the design specifics required and a tabulation of these data are shown on the diagram. The well was originally drilled in 1963. Well boring diagrams are provided showings both its current status and with modifications to convert it to an SWD.
The formation tops for the Lea Unit #10 SWD were established during the drilling of the well and were provided by Geologist Mark McGraw.

Lea Unit #10 Sec13 Twp 20S Rge 34E		
	GL	3654
Geologist	KB	3677
Mark McGraw		
	MD	SS
Rustler	1703	1974
Salt	2059	1618
Salt Base	3299	378
Yates	3494	183
Seven Rivers	3626	51
Capitan Reef	3900	-223
Delaware	5198	-1521
Bell Canyon	5539	-1862
Cherry Canyon	6508	-2831
Brushy Canyon	7115	-3438
Bone Spring	8241	-4564
Avalon	8818	-5141
1st Bone Spring	9486	-5809
2nd Bone Spring	10044	-6367
3rd Bone Spring	10763	-7086
Wolfcamp	11024	-7347
Strawn	11993	-8316
Atoka	12279	-8602
Morrow	12663	-8986
Mississippian	13506	-9829
Woodford	14098	-10421
Devonian	14278	-10601

3. A description of the tubing to be used including its size, lining material, and setting depth

3-1/2" internal plastic coated tubing with setting depth of 14,308'.

4. The name, model, and setting depth of the packer used or a description of any other seal system or assembly used

An Arrowset 1-X Nickel Coated Injection Packer will be set at 14,280'.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well.

Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

(1) The name of the injection formation and, if applicable, the field or pool name

The proposed injection interval is the Devonian formation in an open-hole interval.

(2) The injection interval and whether it is perforated or open-hole.

The depth interval of the open-hole injection is 14,308-14,438 (130 feet).

(3) State if the well was drilled for injection or, if not, the original purpose of the well.

The well was originally drilled for oil production.

(4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations

The Bone Spring perforated intervals are: 9519'-9.606'; 9,625'-9,657'; 10,181'-10,186'; and 10,192-10,212. They will be Isolated and squeezed off in the redevelopment of the well. This will be done in two stages using 100 sacks of cement for each stage.

The Pennsylvanian perforated intervals are: 12,880'-12,897'; 12,908'-12,913'; and 13,100'-13,114'. They were squeezed off in August 1974. 80 sacks of Class"H" cement with 0.8% Halad 9 were used in the interval. W.O.C. was for 24 hours with the perfs then tested for 30 minutes at 3,000 psi successfully. The cement was drilled through the interval of 12,749 – 13,119'. An earlier Marathon Oil Company well boring diagram and the Sundry Notice for the squeeze of the Pennsylvanian perforated intervals are included as OCD attachments.

(5) Give the depth to and the name of the next higher and next lower oil or gas zone in the area of the well, if any.

Overlying Oil & Gas Zone (Using KB of 3627'):

Brushy Canyon	7115
Avalon	8818
1st Bone Spring	9486
2nd Bone Spring	10044
3rd Bone Spring	10763
Wolfcamp	11024
Morrow	12663

Underlying Oil & Gas Zones:
There are no underlying oil and gas zones.

IV. Is this an expansion of an existing project

No.

V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review

Plate 1a identifies all OCD listed wells and API numbers and shows circles with radii of 0.5 (2640'), 1.0 (5280'), and 2.0 miles (10,560'). Note that where numerous wells are closely spaced, the API number may not be labeled for clarity. New wells, active wells, plugged wells, and canceled wells have color-coded symbols. Plate 1b shows only new and active wells and circles with radii of 0.5 (2640') and 1.0 miles (5280').

Plate 2 identifies the leases within a 1-mile radius of the proposed SWD as well as leases within the 0.5-mile radius area of review.

- Plate 2a presents the lease numbers for the SLO and BLM oil and gas leases. Also shown is mineral rights owned by the U.S. that are unleased at this time.
- Plate 2b presents land ownership for the same area and identifies the oil and gas mineral rights ownership.

Table 1 and Table 2 identify all affected persons within a 1 mile radius

- Table 1 lists all of the Oil and Gas Well Operators shown on Plate 1a within the circle having a 0.5-mile radius.
- Table 2 lists all lease numbers, lessees, lessors/mineral interests and surface owners (affected persons) within the 1.0-mile radius shown on Plate 2a.

VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail

Table 1 shows that there are no wells that penetrate the proposed injection zone within the 0.5-mile radius AOR.

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected

Proposed Maximum Injection Rate: 20,000 bbl/day
Proposed Average Injection Rate: 9,000 bbl/day

2. Whether the system is open or closed

This will be a closed system. The Lea Unit #10 will receive produced water only from closed containments which are registered or permitted under Rule 34.

3. Proposed average and maximum injection pressure

Proposed Maximum Injection Pressure: 2,800 psi
Proposed Average Injection Pressure: 1,850 psi

4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water

The attached Table 3 "Produced Water Chemistry of Nearby Wells" provides the requisite analyses from all wells within T 20S, R 34E. The 1st, 2nd, and 3rd Bone Spring Formations will provide most of the produced water to the proposed SWD. At the time of writing, we are unaware of any problems associated with disposal of produced water derived from any of these formations into the Devonian injection zone.

5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).

Table 4 presents formational water quality data from the Go-Tech site for Devonian-Fusselman-Montoya producing wells. As stated above, we are unaware of any problems associated with disposal of produced water derived from the 1st, 2nd, and 3rd Bone Spring Formations into the Devonian injection zone.

*VIII. Attach appropriate geologic data on the injection zone including appropriate lithologic detail, geologic name, thickness, and depth.

The proposed injection interval is the Devonian Formation in an open-hole interval. The proposed injection interval in the Pre-Mississippian Carbonates is well cemented and will provide the necessary open hole integrity while allowing salt water to be injected. Because of the competency of the rock, the open hole section has very little chance of collapsing.

As indicated in Section III.A.2, the depth to the top of the Devonian is 14,278. The injection interval is 14,308-14,438 (130 feet), within the Devonian.

Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such sources known to be immediately underlying the injection interval.

The locations of all water supply wells listed in public databases are shown in Plate 3b.

In this area of Lea County, the Chinle and/or Alluvium yield water to wells from 100-200 feet below the ground surface (bgs) to a depth of about 600 feet. The upper portion of the Rustler Formation yields fresh water to wells in Lea County and in the area of the Lea Unit #10. The depth interval of this potential source of fresh water is about 1700 to 1975 feet.

The OSE database contains no well information (e.g. driller's logs) for nearby wells. The closest wells with reported depths to water around the Lea Unit #10 are described below.

- The closest well is the Nate Well, about 0.56 miles to the east-northeast. Elevation of the water table was reported as 3,610' in 1968. Hence, the depth to water is about 48' as the Nate Well is at an elevation of 3,657'.

- Wells MISC-119 and USGS-15524 are about 1.7 miles east–northeast of the Lea Unit #10. Water elevations were reported as 3,636' and 3,659 feet respectively. Corresponding depths to water are 47' and about 37'.

- The Linam Well (USGS-15838) is about 1.75 miles to the northeast. A water table elevation of 3,622 feet was reported in 1996. Given the elevation of 3,679 feet, the depth to water is about 52'.

- USGS-15487 is 1.32 miles west of the Lea Unit #10.. The water table elevation was reported as 3,503 in 1996. With the elevation of 3,648', the depth to water is about 55'.

- The North Well (MISC-112) is located 1.68 miles southwest of Lea Unit #10. The water table elevation was reported as 3,441' in 1971. The depth to water is 214' given the well's elevation of 3,655'.

- The Herman Well (USGS-15973) is 2.77 miles to the southeast at an elevation of 3,730'. Elevation of the water table was reported as 3,663.71' in 1996. Hence, the depth to water is about 67 feet.

With the exception of The North Well, the five relatively shallow wells may access water in reworked Ogallala material mapped as eolian or older alluvial deposits on top of the Chinle formation (Plate 3b). The North Well's depth to water is consistent with accessing water from the Chinle formation.

At the Lea Unit #10, the Capitan Reef is at a depth of 3,900' to 5,198'. There are no wells accessing it for water within the area of review.

The location of nearby mapped surface water bodies are shown in Plate 4. The closest surface water bodies are intermittent ponds located about 1,300 feet to the southeast and about 3,700 feet to the north-northeast immediately south of a tank battery. The closest mapped water course is 2.5 miles to the south. More than 3 miles to the south, playas are present in a density of several per section.

IX. Describe the proposed stimulation program, if any

A cleanup acid job may be used to remove residual mud and drill cuttings from the formation. However, no other formation stimulation is currently planned.

*X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted)

Logs will be submitted to OCD upon redevelopment of the well.

*XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken

No active water supply wells with water chemistry data were identified within one mile of the proposed SWD. Data from various sources permit a conclusion that groundwater from the Alluvium and within the Chinle Formation is potable. In this area, groundwater in the underlying Rustler formation may be relatively brackish.

XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water

Randall T. Hicks, a Professional Geologist with decades of experience in hydrogeology, affirms, on behalf of Legacy Reserves LLC, that

- The USGS has mapped quaternary faults in New Mexico and no such faults are mapped in the area of the proposed Lea Unit #10 SWD[1] (Plate 5).
- The Texas Bureau of Economic Geology has mapped older faults (e.g. basement and Woodford) in New Mexico and the closest mapped fault is about 1.25-miles to the southwest[2] with another north-south oriented fault about 6.4 miles to the east (Plate 6).
- With respect to migration of produced water from the injection zone to underground sources of drinking water via faults or other natural conduits, the following conditions were considered
    - The lowest underground source of drinking water is the middle and upper Rustler Formation. The Rustler Formation is encountered from 1,680' below ground level to 2,036' feet below ground level.
    - While there are no wells accessing the Capitan Reef, the Lea Unit #10 passes through the Reef in the depth interval of 3,900'- 5,198'
    - More than 12,000 feet of sedimentary rock separates the bottom of the Rustler Formation and the top of the injection zone. More than 9000' feet of sedimentary rock separates the bottom of the Capitan Reef from the top

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[1] https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf

[2] Bureau of Economic Geology (Accessed April 2019). University of Texas at Austin. Basement Faults (Ewing 1990, Tectonic Map of Texas); Precambrian Faults (Frenzel et al. 1988, Figure 6); Woodord Faults (Comer 1991, plate 1). Http://www.beg.utexas.edu/resprog/permianbasin/gis.htm

of the injection zone. Many of the formations that lie between the injection zone and the bottom of the Capitan Reef and the lowermost aquifer (above the Reef) are permeable and contain oil, gas or water at various pressures. Any excursion of injected fluids from the Devonian disposal zone would undoubtedly enter these permeable formations prior to moving into the Capitan Reef or the Rustler Formation.

  - There is no evidence that the pressure regime in the oil and gas reservoirs is sufficient to cause the upward migration of formation water through the overlying oil and gas zones into the Capitan Reef or further through the bedded salt and into the Rustler or Chinle aquifers.

- There is no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water

HOBBS OCD

District I
1625 N French Dr , Hobbs, NM 88240
Phone (575) 393-6161 Fax (575) 393-0720
District II
811 S First St , Artesia, NM 88210
Phone (575) 748-1283 Fax (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone (505) 334-6178 Fax (505) 334-6170
District IV
1220 S. St Francis Dr , Santa Fe, NM 87505
Phone (505) 476-3460 Fax (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

OCT 05 2011
RECEIVED

Form C-102
Revised August 1, 2011
Submit one copy to appropriate District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name
30-025-20506	37570	LEA; BONE SPRING

[4] Property Code	[5] Property Name	[6] Well Number
302802	LEA UNIT	10

[7] OGRID No.	[8] Operator Name	[9] Elevation
240974	LEGACY RESERVES OPERATING LP	3654' GL

[10] Surface Location

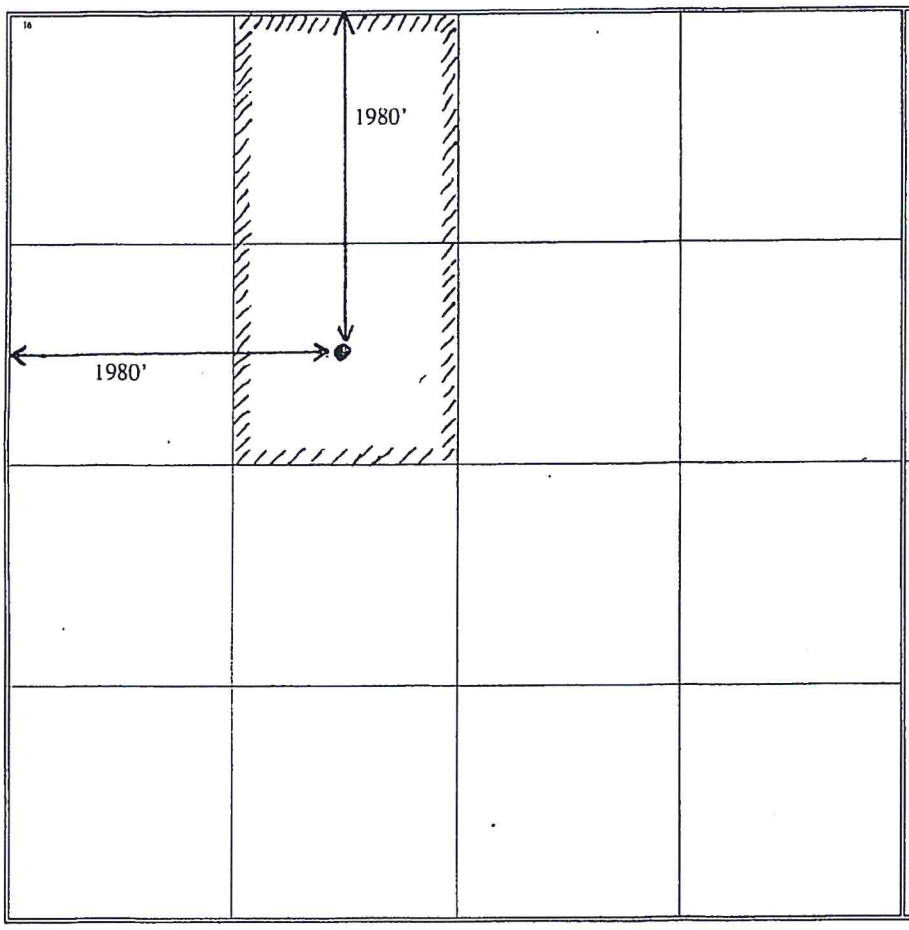
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
F	13	20S	34E		1980	NORTH	1980	WEST	LEA

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
80			

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.



[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division

10/05/11
Signature Date

D. PATRICK DARDEN, P.E.
Printed Name

pdarden@legacylp.com
E-mail Address

[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief

Date of Survey

Signature and Seal of Professional Surveyor

Certificate Number

OCT 05 2011

Lea Unit #10

FIELD: Bone Spring
COUNTY: Lea
STATE: New Mexico

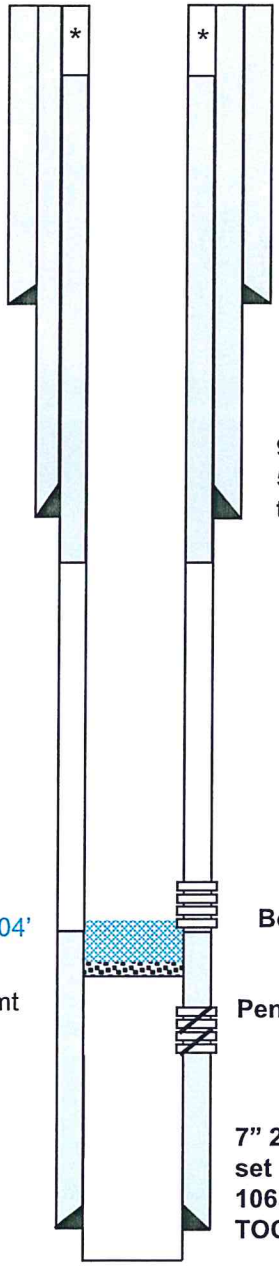
GL: 3654
KB: 3677'
SPUD DATE: 01/01/63

Current Status April 2020

API No: 30-025-20506

Location:

SHL: 1980' FNL & 1980' FWL, Sec 13, T20S, R34E



*** 7" csg repair @ 472' pulled and re-installed 7" w/ csg bowl and lead seal 1974**

13-3/8", 48# H-40 csg set @ 855', cmt'd w/ 800 sx, TOC @ surf.

9-5/8" 36# J-55, 40# J-55/N-80 csg set @ 5161', cmt'd w/ 13,920 sx, TOC @ surf. DV toll plus perfs to circulate cmt to surface

Sand Fill @ 10,304'

CIBP @ 12,850'
Capped w/ 35' cmt

Bone Spring Perfs @ 9519'-9606', 9625'-9657', 10181'-10186', 10192'-10212'

Penn Perfs @ 12,890'-12,897', 12,908'-12,913', 13,100'-13,114'. All sqz 1974

7" 26# S-95/P-110, 29# N-80/P-110/S-95 csg set @ 14,308', cmt'd w/ 1125 sx, TOC @ 10650' TS. DV tool @ 5530' cmt with 350 sx. TOC @ 1710' by CBL

Devonian Open Hole @ 14,308'-14,438'
TD 14,438'

Lea Unit #10

FIELD: Bone Spring
COUNTY: Lea
STATE: New Mexico

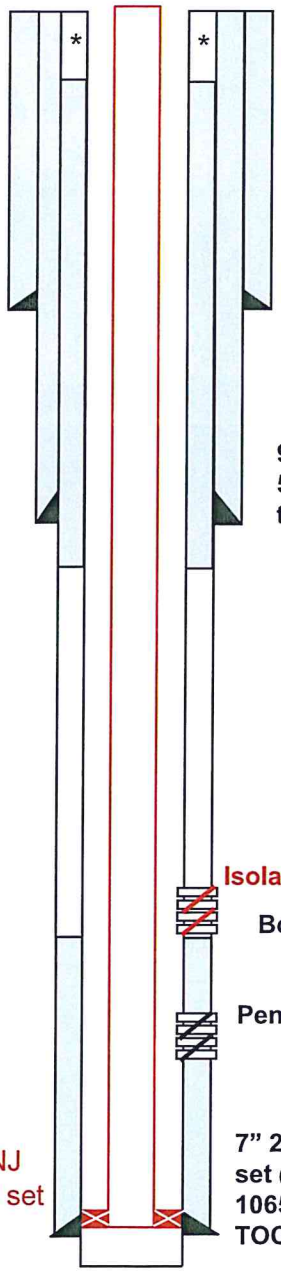
GL: 3654
KB: 3677'
SPUD DATE: 01/01/63

SWD Conversion (Plan A)

API No: 30-025-20506

Location:

SHL: 1980' FNL & 1980' FWL, Sec 13, T20S, R34E



*** 7" csg repair @ 472' pulled and re-installed 7" w/ csg bowl and lead seal 1974**

13-3/8", 48# H-40 csg set @ 855', cmt'd w/ 800 sx, TOC @ surf.

9-5/8" 36# J-55, 40# J-55/N-80 csg set @ 5161', cmt'd w/ 13,920 sx, TOC @ surf. DV toll plus perfs to circulate cmt to surface

Isolate & Squeeze Off Bone Spring Perfs

Bone Spring Perfs @ 9519'-9606', 9625'-9657', 10181'-10186', 10192'-10212'

Penn Perfs @ 12,890'-12,897', 12,908'-12,913', 13,100'-13,114'. All sqz 1974

3-1/2" IPC INJ tubing w/ PKR set @ 14,280'

7" 26# S-95/P-110, 29# N-80/P-110/S-95 csg set @ 14,308', cmt'd w/ 1125 sx, TOC @ 10650' TS. DV tool @ 5530' cmt with 350 sx. TOC @ 1710' by CBL

Devonian Open Hole @ 14,308'-14,438'
TD 14,438'

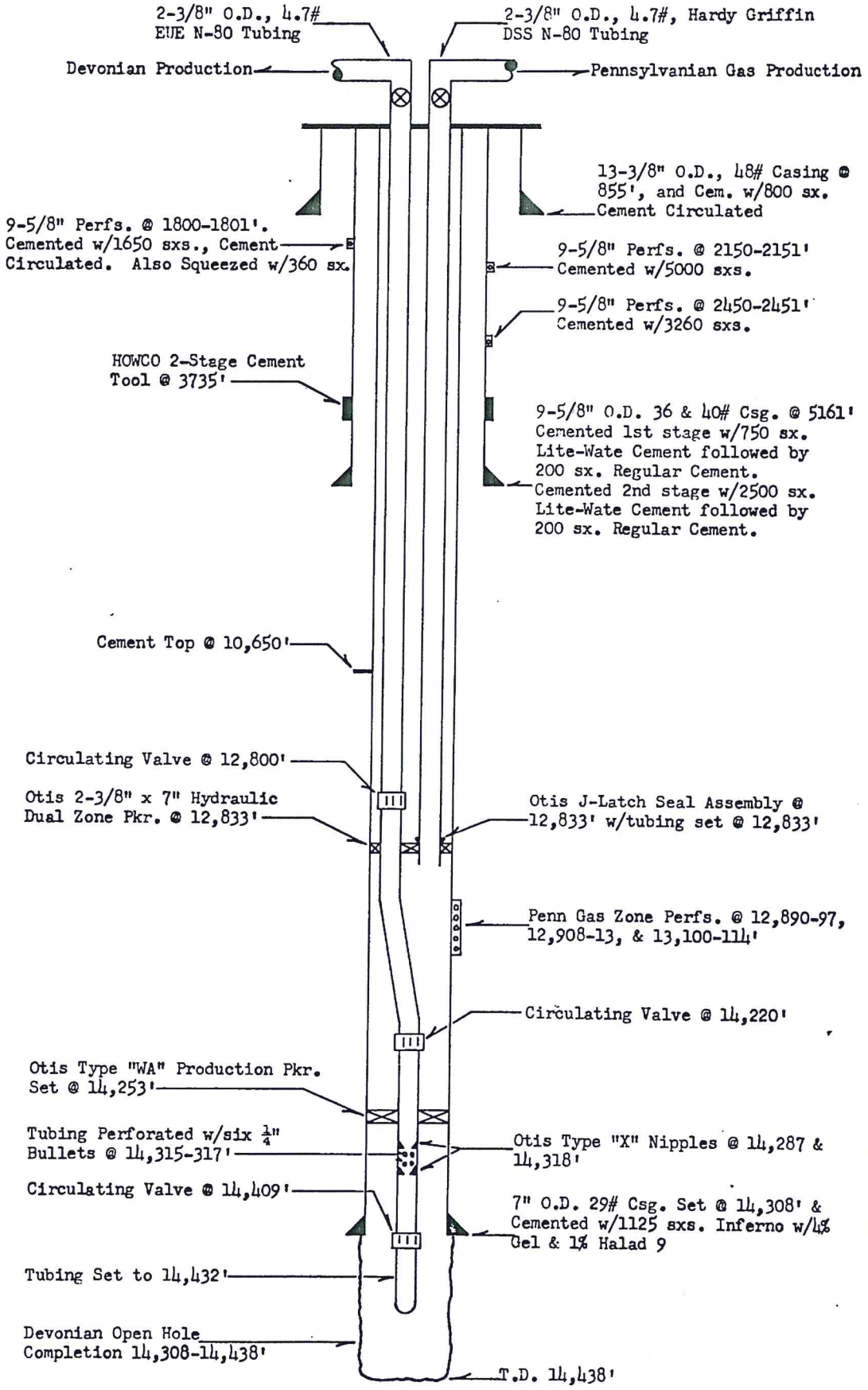
MARATHON OIL COMPANY

"Diagrammatic Sketch ... Mechanical Equipment Used in ... l Completion"

Lea Unit, Well No. 10

Unit F, Sec. 13, T-20-S, R-34-E

Lea County, New Mexico



Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instruction reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: NM ~~03085~~ 053434

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: - - -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL [X] GAS WELL [ ] OTHER

7. UNIT AGREEMENT NAME: Lea Unit

2. NAME OF OPERATOR: Marathon Oil Company

8. FARM OR LEASE NAME: Lea Unit

3. ADDRESS OF OPERATOR: P. O. Box 2409, Hobbs, New Mexico 88240

9. WELL NO.: 10

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 1980' FNL & 1980' FWL

10. FIELD AND POOL, OR WILDCAT: Devonian

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec. 13, T-20S, R-34E

14. PERMIT NO.	15. ELEVATIONS (Show whether DF, RT, GR, etc.)	12. COUNTY OR PARISH	13. STATE
Current	3674' DF	Lea	New Mexico

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	[ ]	PULL OR ALTER CASING	[ ]	WATER SHUT-OFF	[ ]	REPAIRING WELL	[ ]
FRACTURE TREAT	[ ]	MULTIPLE COMPLETE	[ ]	FRACTURE TREATMENT	[ ]	ALTERING CASING	[ ]
SHOOT OR ACIDIZE	[ ]	ABANDON*	[ ]	SHOOTING OR ACIDIZING	[ ]	ABANDONMENT*	[ ]
REPAIR WELL	[ ]	CHANGE PLANS	[ ]	(Other) Abandon Penn & Recomplete			[X]
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Pulling out of hole with 2 7/8" tubing and Otis dual production packer, packer hung at 465'. Ran impression block which showed casing parted at 465'. Finished out of hole with 2 7/8". Pulled 2 3/8" tubing out of hole. Pulled Series 1500 spool. Caught 7" casing with spear. Pulled slips free with 125,000#. Pulled out with cut-off joint and 10 joints of 7". Set 7" bridge plug at 750'. Ran in hole with 7" X 8 1/4" double slip, lead seal casing bowl on 11 joints 7", N-80, 29#, 8R casing. Set at 472'. Pulled 110,000# tension and set OCT slips. Nippled up and tested to 1000#. Held O.K.

Went in hole and squeezed Penn perfs 12,890-13,114' with 80 sacks Class "H" cement with .8% Halad 9. W.O.C. 24 hours and tested perfs to 3000# psi for 30 minutes. Held O.K. Drilled cement 12,749-13,118'.

Ran 3 1/2" tubing with 12 gas-lift valves and Otis packer. Set packer at 5403'.

On 24-hour test 5-10-74, well produced 220 BO and 1,185 BW by gas lift. Prior to workover to abandon Penn gas perfs and single well as Devonian completion with 3 1/2" tubing, well was producing 98 BOPD and 714 BWPD.

18. I hereby certify that the foregoing is true and correct

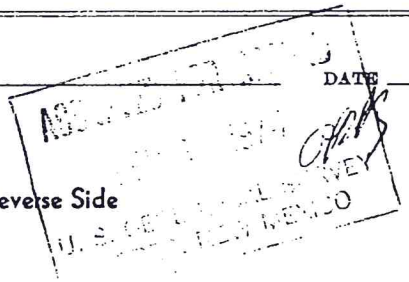
SIGNED C. L. Hutchings, TITLE Operations Superintendent DATE August 27, 1974

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side



R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Since 1996
Artesia ▲ Carlsbad ▲ Durango ▲ Midland

November 19, 2020

Hobbs News Sun
201 N. Thorp
P.O. Box 850
Hobbs, N.M. 88240

LEGAL NOTICE

Legacy Reserves LP, 303 W.Wall Street, Ste. 1800, Midland, TX 79701is filing Form C-108 (Application for Authorization to Inject) with the New Mexico Oil Conservation Division seeking administrative approval for a salt water disposal well. The proposed well, the Lea Unit #10 SWD will be located 1,980 feet from the North line and 1,980 feet from the West line, Section 13, Township 20 South, Range 34 East, Lea County, New Mexico.
Produced water from Legacy Reserves LP operations will be disposed into the Devonian Formation at a depth of 14,308 feet to 14,438 feet at a maximum surface pressure of 2,800 psi and an average injection rate of 9,000 barrels per day. The proposed SWD well is located approximately 23 miles northwest of Eunice, New Mexico.

Interested parties wishing to object to the proposed application must file with the New Mexico Oil Conservation Division, 1220 S. St. Francis Dr., Santa Fe, NM 87505 (505) 476-3460 within 15 days of the date of this notice.

Additional information can be obtained by contacting Mr. Randall Hicks, agent for Legacy Reserves LP, at 505-238-9515.

Sincerely,
R.T. Hicks Consultants

Randall Hicks
Principal

Affidavit of Publication

STATE OF NEW MEXICO
COUNTY OF LEA

I, Daniel Russell, Publisher of the Hobbs News-Sun, a newspaper published at Hobbs, New Mexico, solemnly swear that the clipping attached hereto was published in the regular and entire issue of said newspaper, and not a supplement thereof for a period of 1 issue(s).

Beginning with the issue dated
November 22, 2020
and ending with the issue dated
November 22, 2020.

Publisher

Sworn and subscribed to before me this
22nd day of November 2020.

Business Manager

My commission expires
January 29, 2023
(Seal)

OFFICIAL SEAL
GUSSIE BLACK
Notary Public
State of New Mexico
My Commission Expires 1-29-23

This newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Laws of 1937 and payment of fees for said

LEGAL NOTICE
November 22, 2020

Legacy Reserves LP, 303 W.Wall Street, Ste. 1800, Midland, TX 79701is filing Form C-108 (Application for Authorization to Inject) with the New Mexico Oil Conservation Division seeking administrative approval for a salt water disposal well. The proposed well, the Lea Unit #10 SWD will be located 1,980 feet from the North line and 1,980 feet from the West line, Section 13, Township 20 South, Range 34 East, Lea County, New Mexico.
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Additional information can be obtained by contacting Mr. Randall Hicks, agent for Legacy Reserves LP, at 505-238-9515.

Sincerely,
R.T. Hicks Consultants
Randall Hicks
Principal
#36018

67115764 00248638

RANDALL HICKS
R.T. HICKS CONSULTANTS, LTD
901 RIO GRANDE BLVD NM
SUITE F-142
ALBUQUERQUE, NM 87104

R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Since 1996
Artesia ▲ Carlsbad ▲ Durango ▲ Midland

November 19, 2020

NOTIFICATION TO INTERESTED PARTIES
Via U.S. Certified Mail – Return Receipt Requested

To Whom It May Concern:

Legacy Reserves LP, Midland, Texas, has made application to the New Mexico Oil Conservation Division to modify for salt water disposal, the **Lea Unit #10 SWD.** The proposed operation will be for produced water disposal from Legacy Reserves LP operations. As indicated in the notice below, the well is in Section 13, Township 20 South, Range 34 East, Lea County, New Mexico.

The published notice states that the interval will be from 14,308 feet to 14,438 feet into the Devonian Formation.

LEGAL NOTICE

Legacy Reserves LP, 303 W.Wall Street, Ste. 1800, Midland, TX 79701is filing Form C-108 (Application for Authorization to Inject) with the New Mexico Oil Conservation Division seeking administrative approval for a salt water disposal well. The proposed well, the Lea Unit #10 SWD will be located 1,980 feet from the North line and 1,980 feet from the West line, Section 13, Township 20 South, Range 34 East, Lea County, New Mexico.
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Interested parties wishing to object to the proposed application must file with the New Mexico Oil Conservation Division, 1220 S. St. Francis Dr., Santa Fe, NM 87505 (505) 476-3460 within 15 days of the date of this notice.

You have been identified as a party who may be interested as an offset lessee or operator. **IF YOU WOULD LIKE AN ELECTRONIC COPY OF THE ENTIRE PERMIT PACKAGE, PLEASE SEND YOUR REQUEST TO** r@rthicksconsult.com (request a read receipt to avoid your email becoming stuck in spam).

Thank you for your attention in this matter.

Sincerely,
R.T. Hicks Consultants

Randall Hicks
Principal

Legacy Reserves Operating, LP
Lea Unit #10 SWD
303 W. Wall St.
Suite 1800
Midland, TX 79701

Marathon Oil Permian LLC
Lea Unit #10 SWD
5555 San Felipe St.
Houston, TX 77056

Kenneth Smith Inc.
Lea Unit #10 SWD
267 Smith Ranch Rd.
Hobbs, NM 88240

Bureau of Land Management
Lea Unit #10 SWD
620 E. Greene Street
Carlsbad, NM 88220-6292

New Mexico State Land Office
Lea Unit #10 SWD
310 Old Santa Fe Trail
Santa Fe, NM 87501

7017 3380 0000 5188 3990

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Carlsbad, NM 88220

Certified Mail Fee	$3.55
Extra Services & Fees (check box, add fee as appropriate)	
Return Receipt (hardcopy)	$2.85
Return Receipt (electronic)	$0.00
Certified Mail Restricted Delivery	$0.00
Adult Signature Required	$0.00
Adult Signature Restricted Delivery	$
Postage	$0.55
Total Postage and	$6.95

Sent To
Street and Apt. No.
City, State, ZIP+4

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

0104 01

DEC 17 2020

Postmark Here

Bureau of Land Management
Lea Unit #10 SWD
620 E. Greene Street
Carlsbad, NM 88220-6292

7017 3380 0000 5188 3983

U.S. Postal Service™
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Midland, TX 79701

Certified Mail Fee	$3.55
Extra Services & Fees (check box, add fee as appropriate)	
Return Receipt (hardcopy)	$2.85
Return Receipt (electronic)	$0.00
Certified Mail Restricted Delivery	$0.00
Adult Signature Required	$0.00
Adult Signature Restricted Delivery	$
Postage	$0.55
Total Postage and	$6.95

Sent To
Street and Apt. No.
City, State, ZIP+4

PS Form 3800, April 2015 See Reverse for Instructions

0104 01

DEC 17 2020

Legacy Reserves Operating LP
Lea Unit #10 SWD
303 W. Wall St.
Suite 1800
Midland, TX 79701

7017 3380 0000 5188 3969

U.S. Postal Service™
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Houston, TX 77056

Certified Mail Fee	$3.55
Extra Services & Fees (check box, add fee as appropriate)	
Return Receipt (hardcopy)	$2.85
Return Receipt (electronic)	$0.00
Certified Mail Restricted Delivery	$0.00
Adult Signature Required	$0.00
Adult Signature Restricted Delivery	$
Postage	$0.55
Total Postage and	$6.95

Sent To
Street and Apt. No.
City, State, ZIP+4

PS Form 3800, April 2015 See Reverse for Instructions

0104 01

DEC 17 2020

Postmark Here

Marathon Oil Permian LLC
Lea Unit #10 SWD
5555 San Felipe St.
Houston, TX 77056

7017 3380 0000 5188 4003

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®

Santa Fe, NM 87501

Certified Mail Fee	$3.55
Extra Services & Fees (check box, add fee as appropriate)	
Return Receipt (hardcopy)	$2.85
Return Receipt (electronic)	$0.00
Certified Mail Restricted Delivery	$0.00
Adult Signature Required	$0.00
Adult Signature Restricted Delivery	$
Postage	$0.55
Total Postage and	$6.95

Sent To
Street and Apt. No.
City, State, ZIP+4

PS Form 3800, April 2015 See Reverse for Instructions

0104 01

DEC 17 2020

Postmark Here

New Mexico State Land Office
Lea Unit #10 SWD
310 Old Santa Fe Trail
Santa Fe, NM 87501

7017 3380 0000 5188 3976

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®

Hobbs, NM 88240

Certified Mail Fee	$3.55
Extra Services & Fees (check box, add fee as appropriate)	
Return Receipt (hardcopy)	$2.85
Return Receipt (electronic)	$0.00
Certified Mail Restricted Delivery	$0.00
Adult Signature Required	$0.00
Adult Signature Restricted Delivery	$
Postage	$0.55
Total Postage and	$6.95

Sent To
Street and Apt. No.
City, State, ZIP+4

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

0104 01

DEC 17 2020

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Kenneth Smith Inc
Lea Unit #10 SWD
267 Smith Ranch Rd.
Hobbs, NM 88240

Table 1
New Mexico Oil and Gas Producers within 0.5 miles radius of Lea Unit #10

API	OGRID	OGRID Name	Well Type	Status	Well Name	District	UL-S-T-R	Vertical Depth	Pool ID
30-025-20338	240974	LEGACY RESERVES OPERATING, LP	Gas	T	LEA UNIT #011	Hobbs	N-13-20S-34E	14,454	[37570] LEA, BONE SPRING; [37584] LEA, DELAWARE, NORTHEAST; [80040] LEA, PENN (GAS)
30-025-38008	20165	SAMSON RESOURCES CO	Oil	C	LEA FEDERAL UNIT #026C	Hobbs	C-13-20S-34E	0	
30-025-40699	240974	LEGACY RESERVES OPERATING, LP	Oil	A	LEA UNIT #031H	Hobbs	N-12-20S-34E	10,981	[37570] LEA, BONE SPRING
30-025-20038	240974	LEGACY RESERVES OPERATING, LP	Oil	A	LEA UNIT #003	Hobbs	J-13-20S-34E	14,435	[37570] LEA, BONE SPRING; [37590] LEA, DEVONIAN
30-025-02432	240974	LEGACY RESERVES OPERATING, LP	Oil	A	LEA UNIT #009	Hobbs	B-13-20S-34E	14,408	[37570] LEA, BONE SPRING; [37584] LEA, DELAWARE, NORTHEAST; [37590] LEA, DEVONIAN
30-025-40698	240974	LEGACY RESERVES OPERATING, LP	Oil	P	LEA UNIT #030H	Hobbs	M-12-20S-34E	10,977	[37570] LEA, BONE SPRING
30-025-42343	240974	LEGACY RESERVES OPERATING, LP	Oil	A	LEA UNIT #033H	Hobbs	C-13-20S-34E	10,905	[37570] LEA, BONE SPRING

Township	Range	Section	Unit Letter	Lease Number	Lessee(O & G Minerals)	Lessor (O & G Minerals)	Surface Owner	UPC
20S	34E	11	J	NMNM 0006531A	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	11	H	NMNM 0006531A	LEGACY RESERVES OPERATING LP	BLM (U.S.)	BLM (U.S.)	4207115399641
20S	34E	11	N	NMNM 0000631	COG OPERATING LLC	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	11	I	NMNM 0006531A	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	11	O	NMNM 0006531A	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	11	P	NMNM 0006531A	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	12	H	NMNM 0002127B	LEGACY RESERVES OPERATING LP	BLM (U.S.)	BLM (U.S.)	4207115399641
20S	34E	12	K	NMNM 0002127B	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	12	L	NMNM 0002127B	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	12	G	NMNM 0002127B	LEGACY RESERVES OPERATING LP	BLM (U.S.)	BLM (U.S.)	4207115399641
20S	34E	12	P	NMNM 0001747	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	12	N	NMNM 0002127B	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	12	E	NMNM 0002127B	LEGACY RESERVES OPERATING LP	BLM (U.S.)	BLM (U.S.)	4207115399641
20S	34E	12	J	NMNM 0001747	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	12	F	NMNM 0002127B	LEGACY RESERVES OPERATING LP	BLM (U.S.)	BLM (U.S.)	4207115399641
20S	34E	12	M	NMNM 0002127B	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	12	O	NMNM 0001747	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	12	I	NMNM 0001747	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	13	J	NMNM 0003085	LEGACY RESERVES OPERATING LP HOG PARTNERSHIP LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	N	NMNM 0053434	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	K	NMNM 0003085	LEGACY RESERVES OPERATING LP HOG PARTNERSHIP LP	BLM (U.S.)	MARATHON OIL CO	4203117216309
20S	34E	13	D	NMNM 0053434	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	P	NMNM 0003085A	BP AMERICA PRODUCTION CO LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	I	NMNM 0003085A	BP AMERICA PRODUCTION CO LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	M	NMNM 0048579	FINLEY JAMES D	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	A	NMNM 0053434	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	E	NMNM 0053434	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	B	NMNM 0053434	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	F	NMNM 0053434	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	H	NMNM 0053434	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	L	NMNM 0048579	FINLEY JAMES D	BLM (U.S.)	AMERICAN POWER DEVELOPMENT LLC	4203117770309
20S	34E	13	O	NMNM 0003085	LEGACY RESERVES OPERATING LP HOG PARTNERSHIP LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	G	NMNM 0053434	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	13	C	NMNM 0053434	LEGACY RESERVES OPERATING LP	BLM (U.S.)	SMITH, KENNETH INC	4203117286256
20S	34E	14	G	NMNM 0080262	LEGACY RESERVES OPERATING LP FINLEY JAMES D COG OPERATING LLC	BLM (U.S.)	BLM (U.S.)	4207115399641
20S	34E	14	J	NMNM 123523	MEWBOURNE OIL CO	BLM (U.S.)	SMITH, KENNETH INC	4203116828709

20S	34E	14	H	NMNM 0080262	LEGACY RESERVES OPERATING LP FINLEY JAMES D COG OPERATING LLC	BLM (U.S.)	BLM (U.S.)	4207115399641
20S	34E	14	B	NMNM 0080262	LEGACY RESERVES OPERATING LP FINLEY JAMES D COG OPERATING LLC	BLM (U.S.)	BLM (U.S.)	4207115399641
20S	34E	14	K	NMNM 078273	READ & STEVENS INC	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	14	I	NMNM 123523	MEWBOURNE OIL CO	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	14	P	NMNM 123523	MEWBOURNE OIL CO	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	14	F	NMNM 078273	READ & STEVENS INC	BLM (U.S.)	BLM (U.S.)	4207115399641
20S	34E	14	N	NMNM 078273	READ & STEVENS INC	BLM (U.S.)	S & S INC	4203116828709
20S	34E	14	A	NMNM 0053434	LEGACY RESERVES OPERATING LP	BLM (U.S.)	BLM (U.S.)	4207115399641
20S	34E	14	C	NMNM 078273	READ & STEVENS INC	BLM (U.S.)	BLM (U.S.)	4207115399641
20S	34E	14	O	NMNM 123523	MEWBOURNE OIL CO	BLM (U.S.)	SMITH, KENNETH INC	4203116828709
20S	34E	23	A	NMNM 123524	MEWBOURNE OIL CO	BLM (U.S.)	BLM (U.S.)	4202118267266
20S	34E	23	B	NMNM 123524	MEWBOURNE OIL CO	BLM (U.S.)	BLM (U.S.)	4202118267266
20S	34E	23	H	NMNM 123524	MEWBOURNE OIL CO	BLM (U.S.)	BLM (U.S.)	4202118267266
20S	34E	24	F	NMNM 0001747	LEGACY RESERVES OPERATING LP	BLM (U.S.)	S & S INC	4207117598130
20S	34E	24	C	NMNM 0001747	LEGACY RESERVES OPERATING LP	BLM (U.S.)	S & S INC	4207117598130
20S	34E	24	B	NMNM 0001747	LEGACY RESERVES OPERATING LP	BLM (U.S.)	S & S INC	4207117598130
20S	34E	24	E	NMNM 0001747	LEGACY RESERVES OPERATING LP	BLM (U.S.)	S & S INC	4207117598130
20S	34E	24	G	NMNM 0001747	LEGACY RESERVES OPERATING LP	BLM (U.S.)	S & S INC	4207117598130
20S	34E	24	H	NMNM 0001747A	LEGACY RESERVES OPERATING LP HOG PARTNERSHIP LP	BLM (U.S.)	BLM (U.S.)	4207117598130
20S	34E	24	D	NMNM 0048579	FINLEY JAMES D	BLM (U.S.)	S & S INC	4207117598130
20S	34E	24	A	NMNM 0001747A	LEGACY RESERVES OPERATING LP HOG PARTNERSHIP LP	BLM (U.S.)	S & S INC	4207117598130
20S	35E	18	L	NMLC 0065375A	LEGACY RESERVES OPERATING LP	BLM (U.S.)	PEARL VALLEY LIMITED PARTNERSHIP	4204116922586
20S	35E	18	C	NMLC 0065375A	LEGACY RESERVES OPERATING LP	BLM (U.S.)	PEARL VALLEY LIMITED PARTNERSHIP	4204116922586
20S	35E	18	F	NMLC 0066147D	COG OPERATING LLC LEGACY RESERVES OPERATING LP	BLM (U.S.)	PEARL VALLEY LIMITED PARTNERSHIP	4204116922586
20S	35E	18	N	NMLC 0065375A	LEGACY RESERVES OPERATING LP	BLM (U.S.)	PEARL VALLEY LIMITED PARTNERSHIP	4204116922586
20S	35E	18	D	NMLC 0065375A	LEGACY RESERVES OPERATING LP	BLM (U.S.)	PEARL VALLEY LIMITED PARTNERSHIP	4204116922586
20S	35E	18	K	NMLC 0065375A	LEGACY RESERVES OPERATING LP	BLM (U.S.)	PEARL VALLEY LIMITED PARTNERSHIP	4204116922586
20S	35E	18	E	NMLC 0066147A	COG OPERATING LLC MARATHON OIL CO	BLM (U.S.)	PEARL VALLEY LIMITED PARTNERSHIP	4204116922586
20S	35E	18	M	NMLC 0065375A	LEGACY RESERVES OPERATING LP	BLM (U.S.)	PEARL VALLEY LIMITED PARTNERSHIP	4204116922586
20S	35E	19	D	OG55880002	LEGACY RESERVES OPERATING, LP	State (N.M.)	PEARL VALLEY LIMITED PARTNERSHIP	4204118442779

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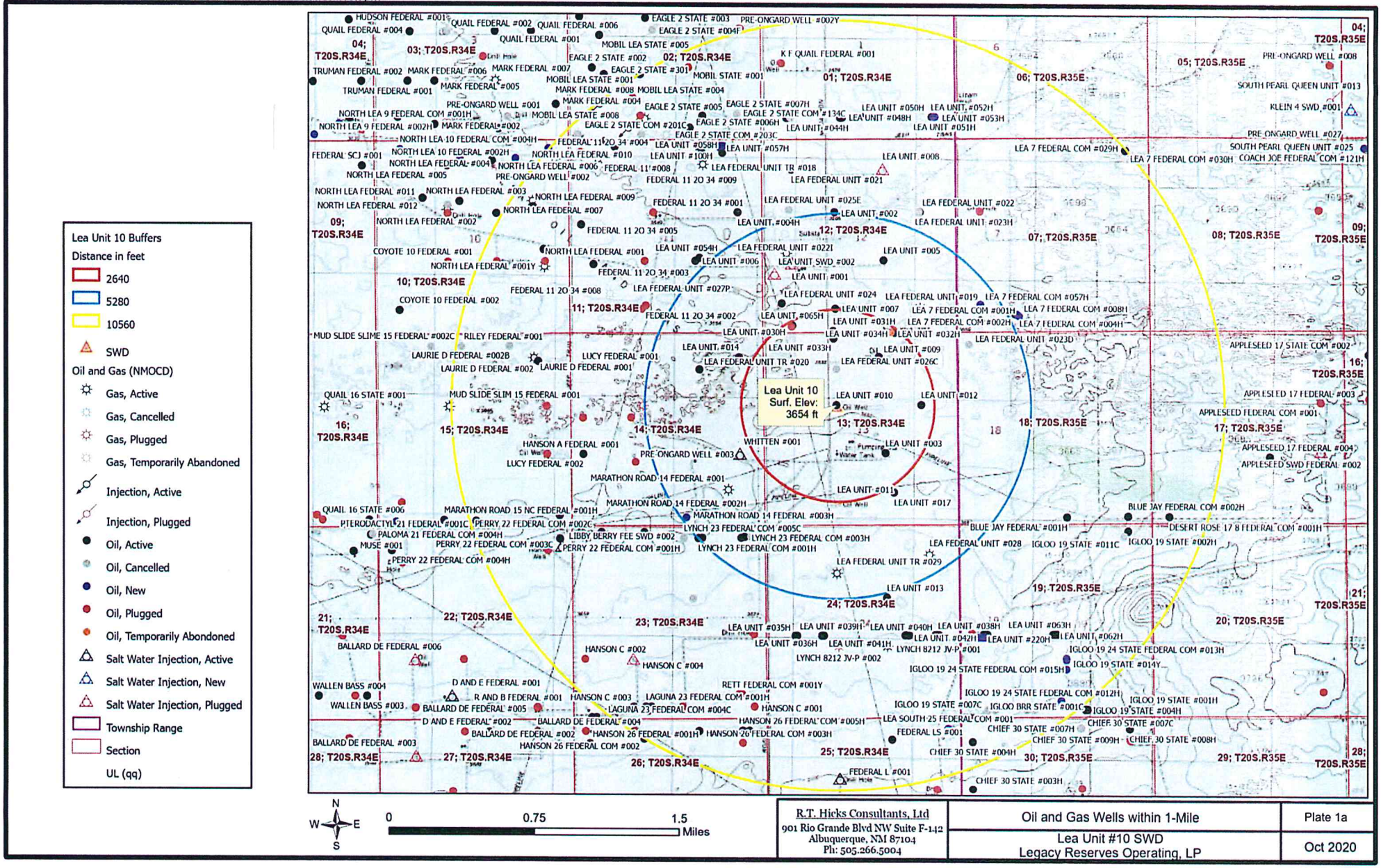

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Oil and Gas Wells within 1-Mile

Plate 1a

Lea Unit #10 SWD
Legacy Reserves Operating, LP

Oct 2020

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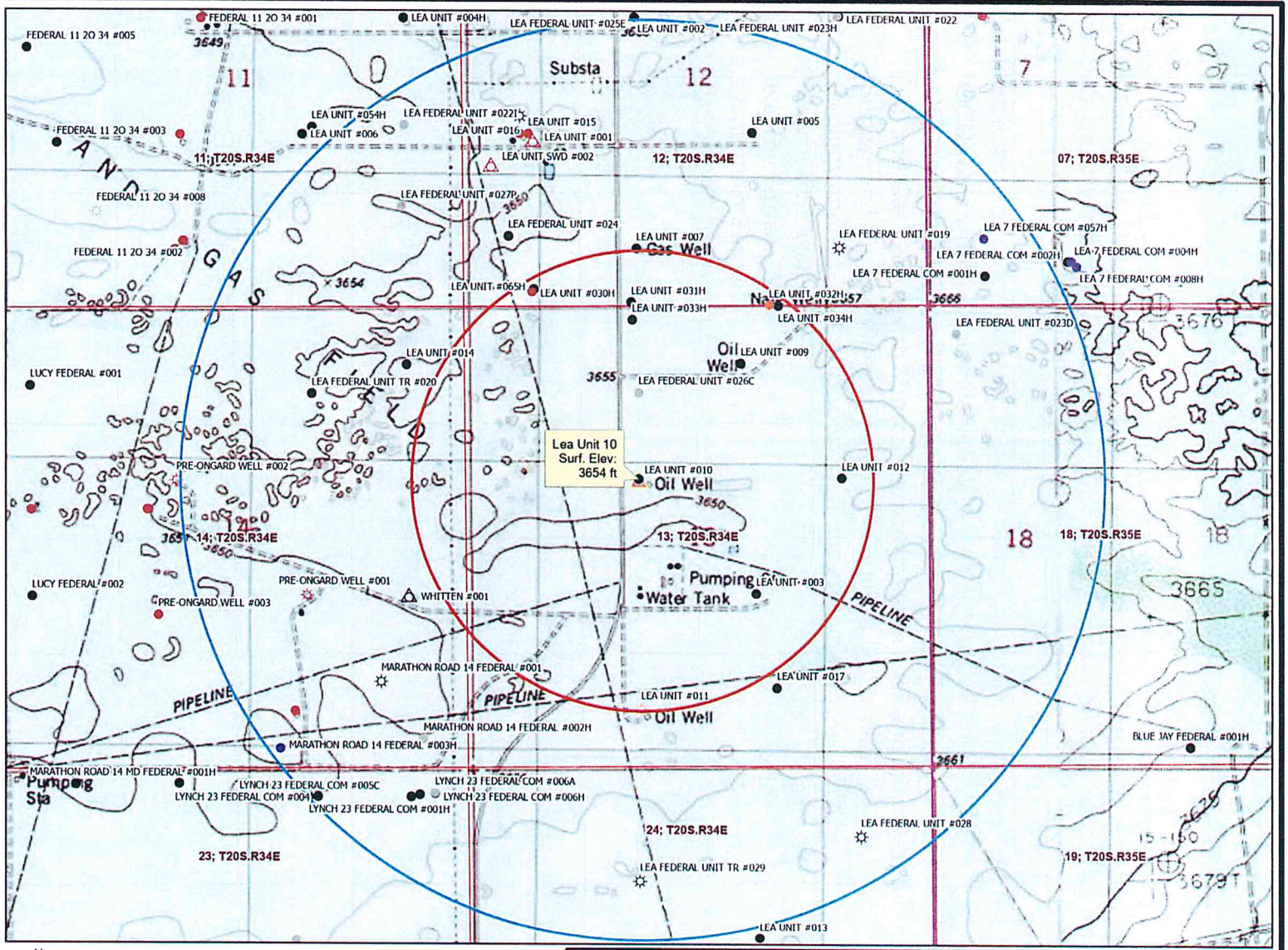

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Oil and Gas Wells within 1 Mile Lea Unit #10 SWD Legacy Reserves Operating, LP	Plate 1b Oct 2020

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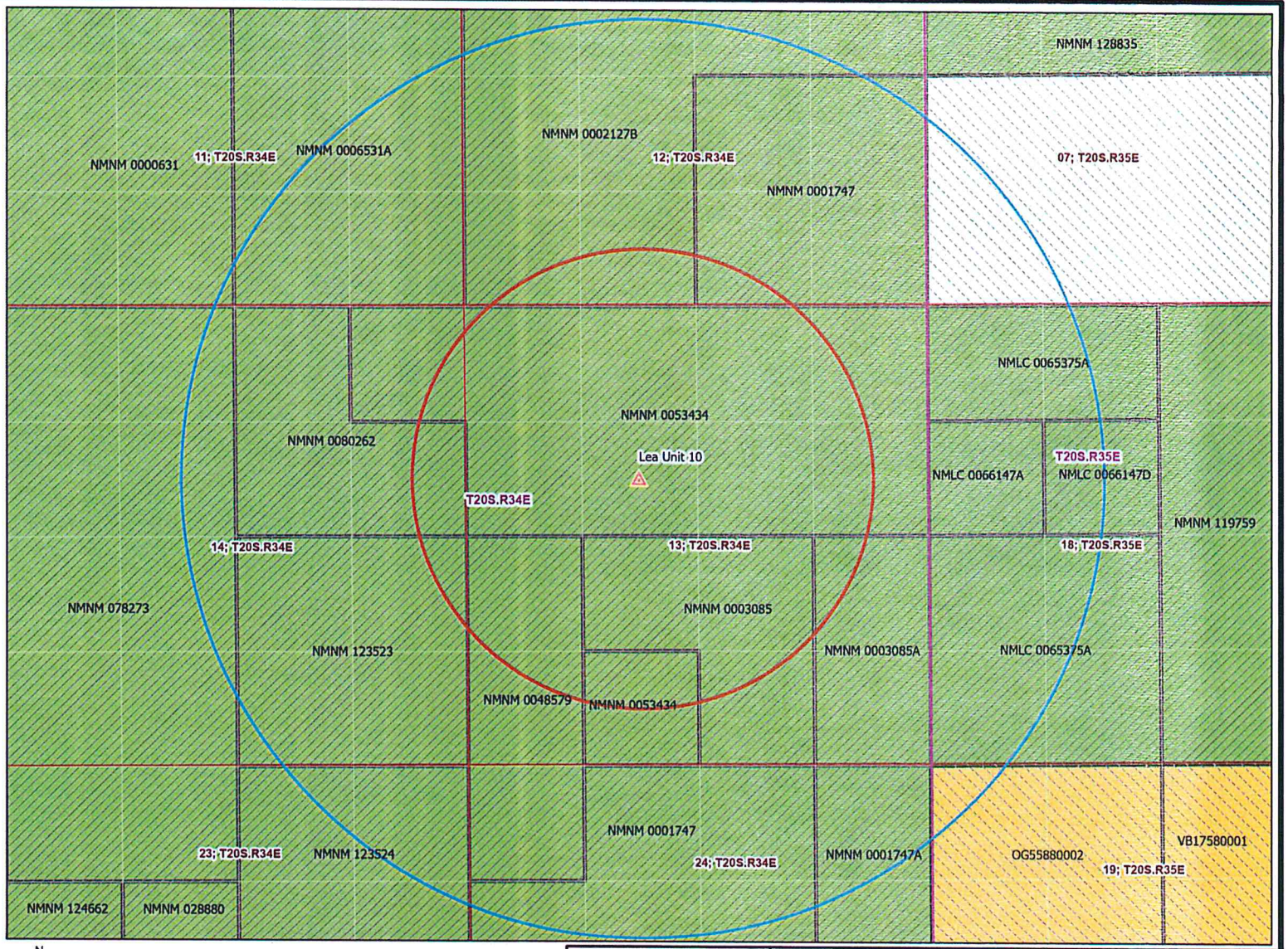

Lea Unit 10 Buffers
Distance in feet
- 2640
- 5280
- 10560
- SWD
- Township Range
- Section
- UL (qq)

Mineral Ownership (BLM Dataset)
- All minerals are owned by the U.S. (BLM)
- No minerals are owned by the U.S. (BLM)
- SLO Leases
- BLM Leases

N W E S

0 2,000 4,000 Feet

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Oil and Gas Leases with Mineral Ownership within 1 Mile
Lea Unit #10 SWD
Legacy Reserves Operating, LP

Plate 2a
Oct 2020

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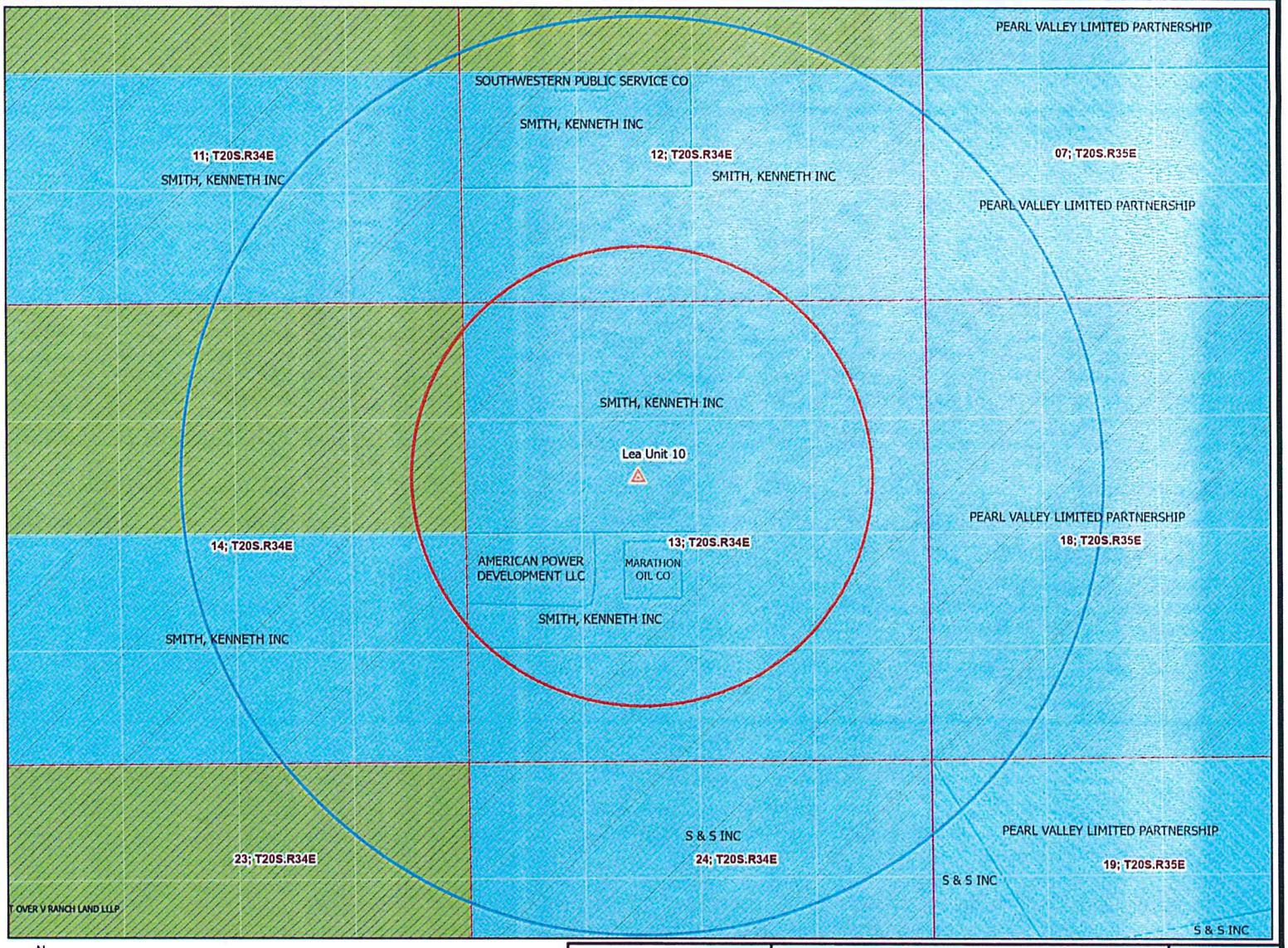

Lea Unit 10 Buffers
Distance in feet
- 2640
- 5280
- 10560
- SWD
- Township Range
- Section
- UL (qq)

Mineral Ownership (BLM Dataset)
- All minerals are owned by the U.S. (BLM)
- No minerals are owned by the U.S. (BLM)

NM Land Ownership
- BLM
- Private

N W E S

0 2,000 4,000 Feet

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Surface and Mineral Ownership within 1 Mile

Lea Unit #10 SWD
Legacy Reserves Operating, LP

Plate 2b

Oct 2020

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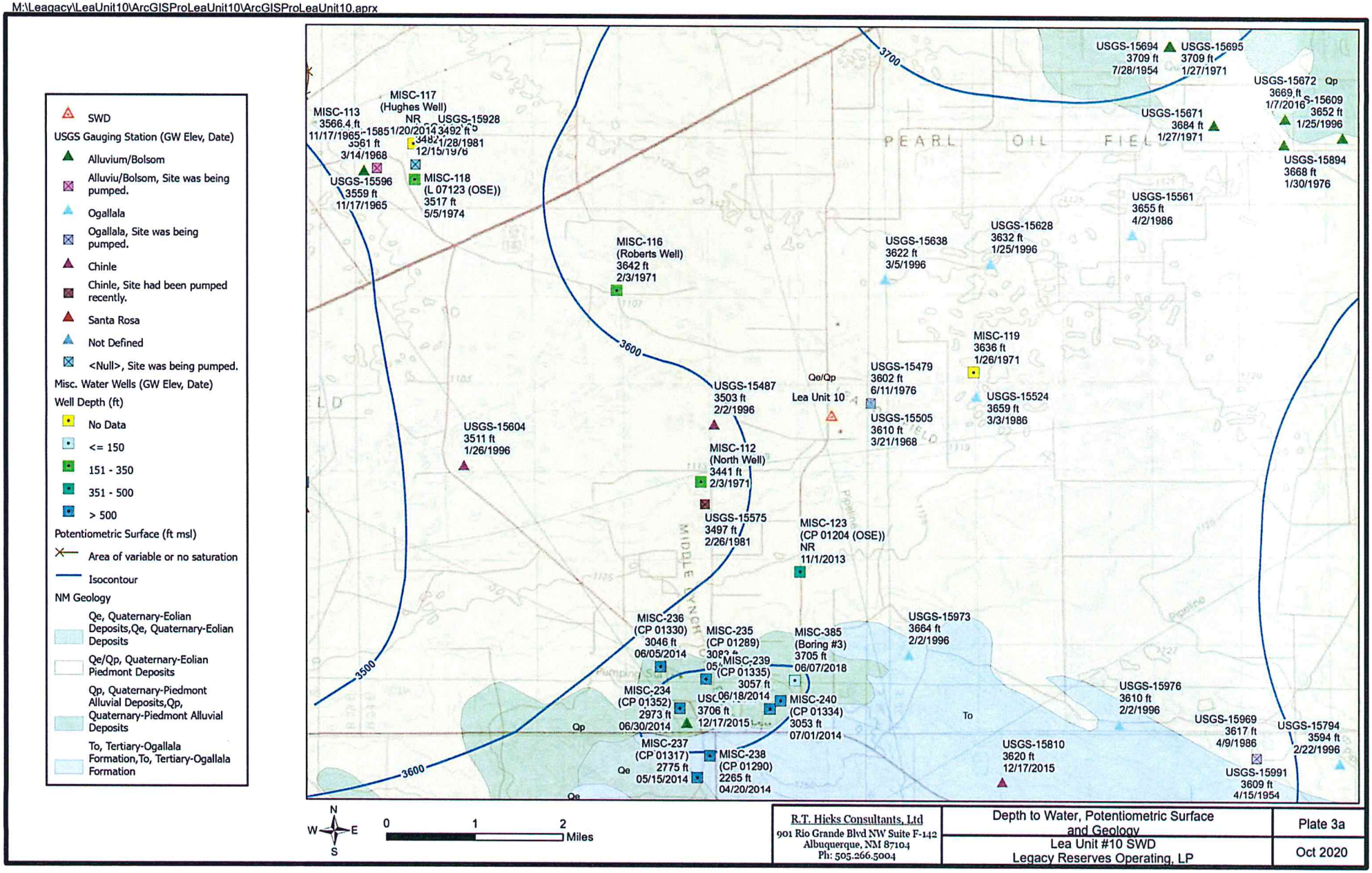

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Depth to Water, Potentiometric Surface and Geology Lea Unit #10 SWD Legacy Reserves Operating, LP	Plate 3a Oct 2020

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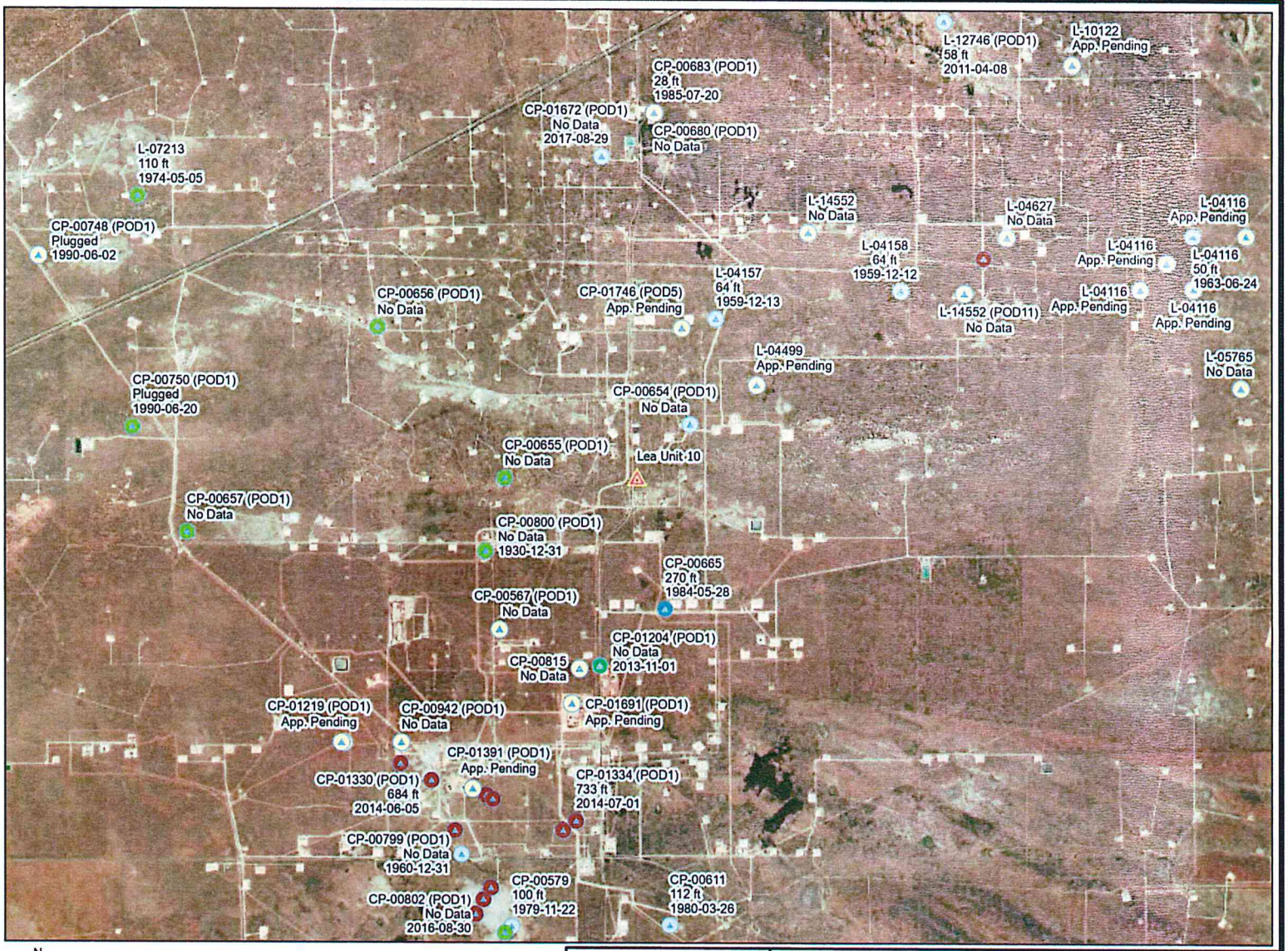

SWD
OSE Water Wells (DTW/Date)
Well Depth (ft)
- <=150
- 151-350
- 351-500
- 501-1000
- <1000
- Other

N
W E
S

0 1 2 Miles

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Nearby OSE Water Wells

Lea Unit #10 SWD
Legacy Reserves Operating, LP

Plate 3b

Oct 2020

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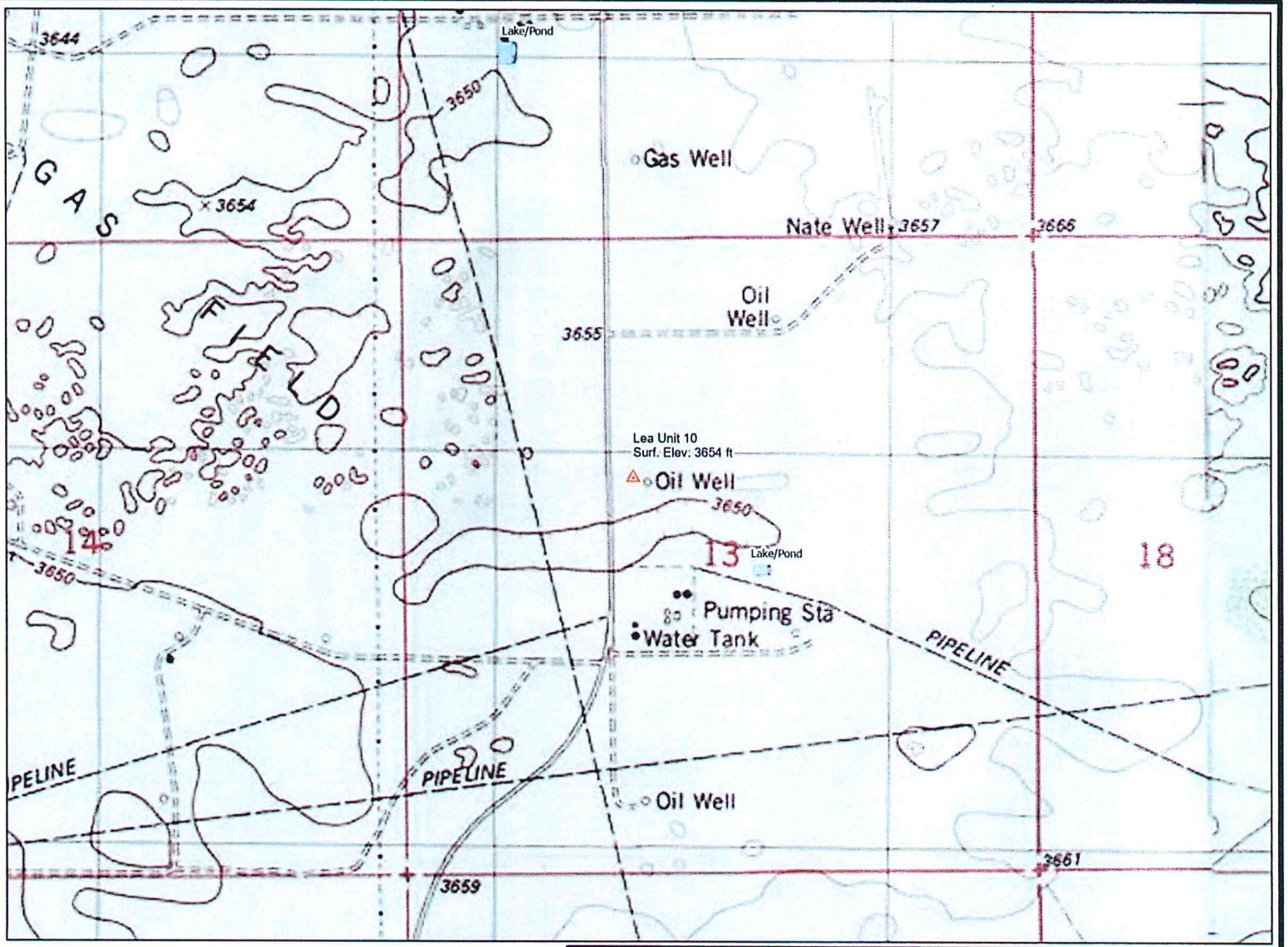

SWD
Water Bodies (1306)
Lake/Pond

N
W E
S

0 0.25 0.5 Miles

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Nearby Surface Water
Lea Unit #10 SWD
Legacy Reserves Operating, LP

Plate 4
Oct 2020

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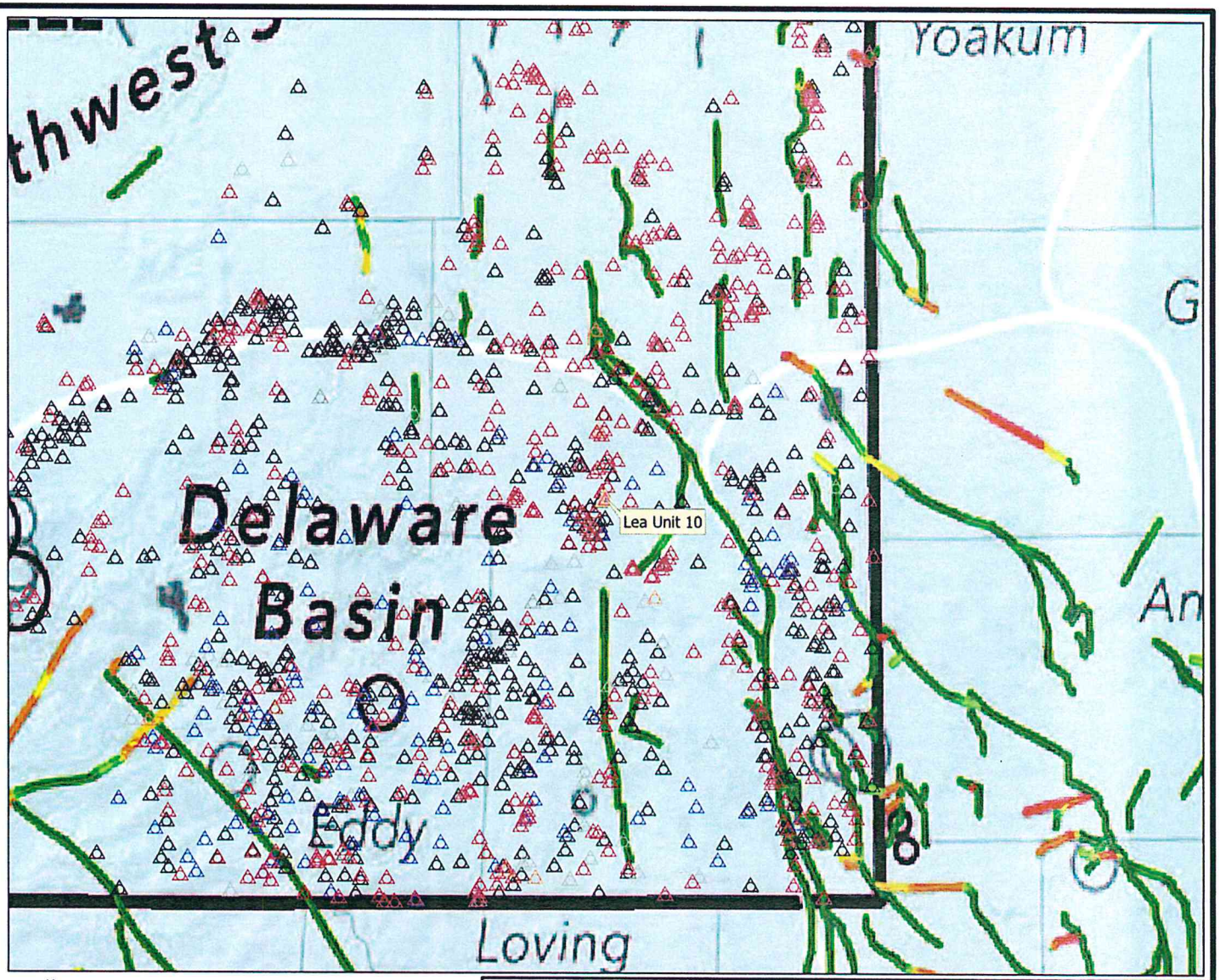

SWD

Oil and Gas (NMOCD)

- Salt Water Injection, Active
- Salt Water Injection, Cancelled
- Salt Water Injection, New
- Salt Water Injection, Plugged
- Salt Water Injection, Temporarily Abandoned

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+

Seismic and Fault Slip Potential-
Ewing et al. (1990), Green and Jones (1997), Ruppel et al. (2005), and the USGS Quaternary Faults and Folds Database (Crone and Wheeler, 2000).

N W E S

0 5 10 Miles

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Seismicity with Fault Slip Potential

Lea Unit #10 SWD
Legacy Reserves Operating, LP

Plate 5

Oct 2020

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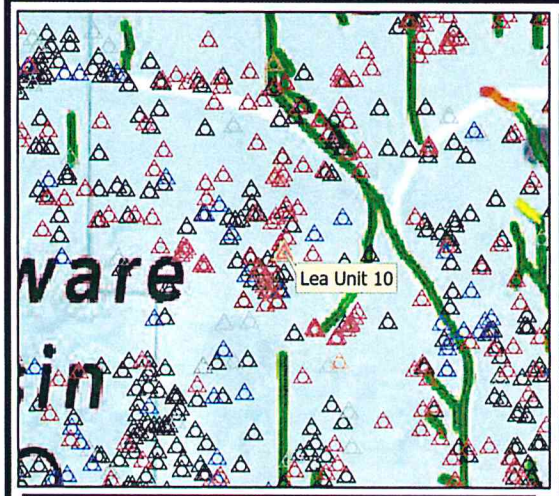


SWD

WellGIS

Oil and Gas (NMOCD)

- Salt Water Injection, Active
- Salt Water Injection, Cancelled
- Salt Water Injection, New
- Salt Water Injection, Plugged
- Salt Water Injection, Temporarily Abandoned

Fault Slip Potential (%)

- <5
- 5 - 10
- 10 -15
- 20 - 25
- 30 - 35
- 35 - 40

- Fault - Woodford
- Fault - Precambrian
- Fault - Basement
- Township Range

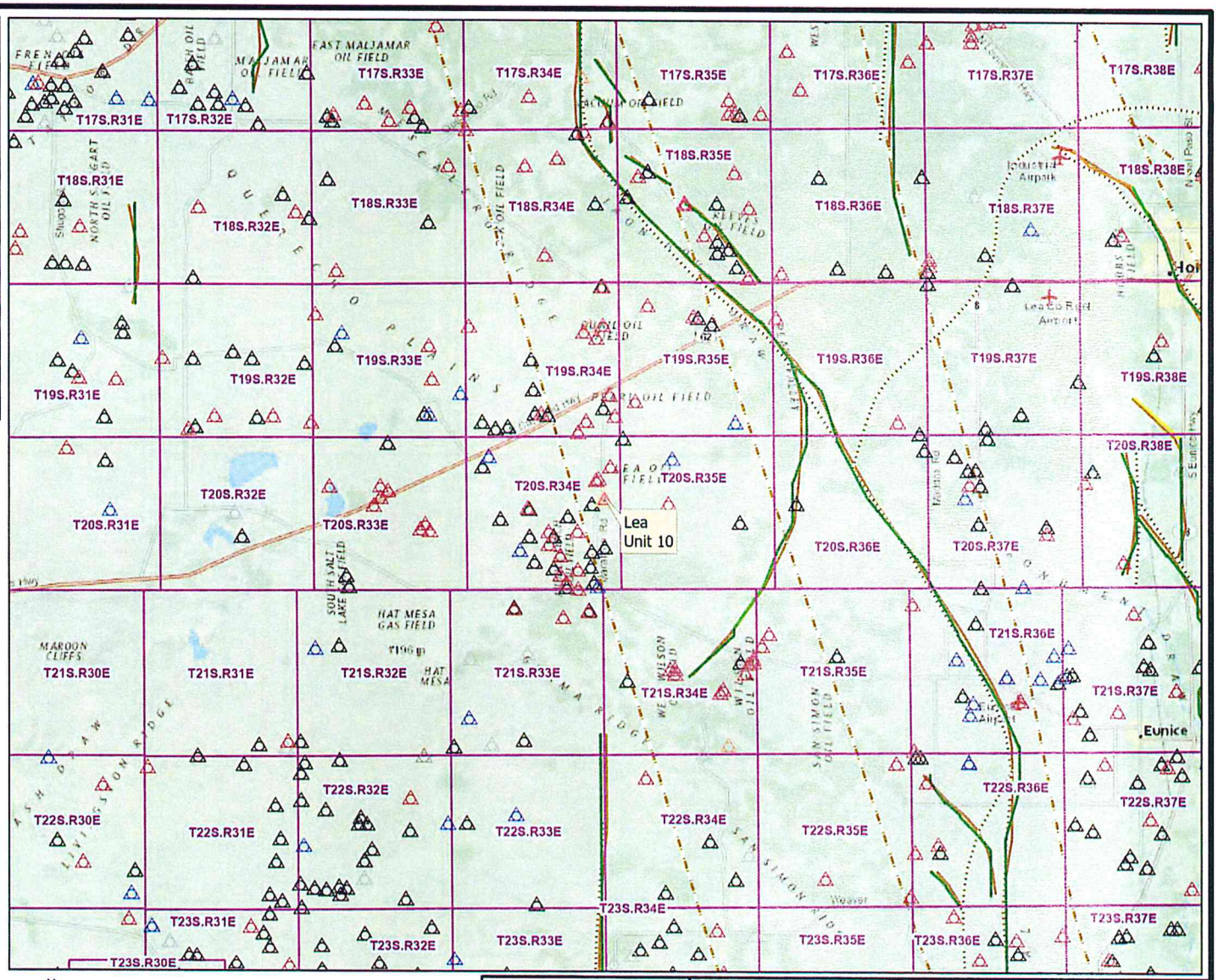
Seismicity:

- 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+

Seismic and Fault Slip Potential-
Ewing et al. (1990), Green and Jones (1997), Ruppel et al. (2005), and the USGS Quaternary Faults and Folds Database (Crone and Wheeler, 2000).



N W E S

0 5 10 Miles

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Fault Slip Potential	Plate 6
Lea Unit #10 SWD Legacy Reserves Operating, LP	Oct 2020

Leagcy Reserves LLC
Lea Unit #10

Table 3
Produced Water Analysis from T 20S, R 34E

October, 2020

well name	api	latitude	longitude	section	township	range	unit	ftgns	ftgew	county	state	sampledate	ph	tds_mgL	barium_mgL	sodium_mgL	calcium_mgL	iron_mgL	magnesium_mgL	manganese_mgL	chloride_mgL	carbonate_mgL	bicarbonate_mgL	sulfate_mgL
MOBIL LEA STATE #001	3002531696	32.5999107	-103.5331573	2	20S	34E	K	1800S	1980W	LEA	NM	5/9/2000 0:00	6.3	152064		51632.2	13149.5	5.525			102148		404.43	690.625
MOBIL LEA STATE #003	3002532105	32.5976906	-103.5367584	2	20S	34E	M	990S	870W	LEA	NM	5/9/2000 0:00	5.5	296822		87727.9	45355	8.8125			215237		143.35	293.75
MOBIL LEA STATE #005	3002532466	32.6028633	-103.5367584	2	20S	34E	E	2440N	870W	LEA	NM	5/9/2000 0:00	5.5	340838		125179	29657	3.67775			245270		229.13	146.875
HANSON A FEDERAL #001	3002502436	32.5713348	-103.5416641	15	20S	34E	I	1980S	660E	LEA	NM	1/2/1900 0:00				0	0	0	0		0	0	0	0
PERRY FEDERAL #001	3002508462	32.552269	-103.5426865	22	20S	34E	P	330S	990E	LEA	NM			19994							10950		532	811
WEST LYNCH FEDERAL #001	3002526625	32.5522652	-103.5963821	19	20S	34E	O	330S	1650E	LEA	NM	6/18/1999 0:00	6.6	24816.5	0.3978	8847.48	297.84	17.34	284.58		14918.5	0	456.96	170.34
WALLEN FEDERAL #001	3002523861	32.5649757	-103.5899887	20	20S	34E	D	330N	330W	LEA	NM	2/23/1998 0:00	7.83	33296.1	2.056	10688.1	1247.99	5.14	512.972		20219.7	0	424.56	454.376
TEXACO FEDERAL #001	3002502407	32.6077957	-103.5202942	1	20S	34E	D	660N	660W	LEA	NM			156332							97500		465	332
K F QUAIL FEDERAL #001	3002502408	32.6006813	-103.5206299	1	20S	34E	L	2086S	556W	LEA	NM			187065							114800		146	220
ELLIOTT #001	3002502423	32.5822411	-103.5331192	11	20S	34E	N	660S	1980W	LEA	NM			12243							4268		462	3552
ELLIOTT #001	3002502423	32.5822411	-103.5331192	11	20S	34E	N	660S	1980W	LEA	NM			12946							4440		681	3532
LEA UNIT #004H	3002502424	32.5895081	-103.524559	11	20S	34E	H	1980N	660E	LEA	NM			29436							16720		634	1142
LEA UNIT #001	3002502427	32.5858536	-103.520256	12	20S	34E	L	1980S	660W	LEA	NM			16150							7600		185	2750
LEA UNIT #001	3002502427	32.5858536	-103.520256	12	20S	34E	L	1980S	660W	LEA	NM			214787							132700		208	1816
LEA UNIT #001	3002502427	32.5858536	-103.520256	12	20S	34E	L	1980S	660W	LEA	NM			16595							8000		170	2500
LEA UNIT #001	3002502427	32.5858536	-103.520256	12	20S	34E	L	1980S	660W	LEA	NM			15429										
LEA UNIT #001	3002502427	32.5858536	-103.520256	12	20S	34E	L	1980S	660W	LEA	NM			180701							108300		1016	670
LEA UNIT #005	3002502429	32.5858536	-103.5116501	12	20S	34E	J	1980S	1980E	LEA	NM			202606							118100		5196	992
LEA UNIT #005	3002502429	32.5858536	-103.5116501	12	20S	34E	J	1980S	1980E	LEA	NM			121800										
LEA UNIT #008	3002502431	32.5927162	-103.511673	12	20S	34E	B	810N	1980E	LEA	NM			44800							25320		1401	1038
LEA UNIT #008	3002502431	32.5927162	-103.511673	12	20S	34E	B	810N	1980E	LEA	NM			35094							19020		1272	1096
LEA UNIT #008	3002502431	32.5927162	-103.511673	12	20S	34E	B	810N	1980E	LEA	NM			33414							18570		227	1961
LEA UNIT #008	3002502431	32.5927162	-103.511673	12	20S	34E	B	810N	1980E	LEA	NM			42216							24000		1256	920
LEA UNIT #008	3002502431	32.5927162	-103.511673	12	20S	34E	B	810N	1980E	LEA	NM			147229							89640		108	1038
LEA UNIT #009	3002502432	32.578598	-103.5121155	13	20S	34E	B	660N	2130E	LEA	NM			45778							26440		1145	729
R AND B FEDERAL #001	3002502449	32.5522652	-103.5469742	22	20S	34E	O	330S	2310E	LEA	NM			20395							9800		1360	2020
CRUCES FEDERAL #005	3002502461	32.5377388	-103.5254669	26	20S	34E	P	330S	992E	LEA	NM			33638							18020		184	2243
CRUCES FEDERAL #005	3002502461	32.5377388	-103.5254669	26	20S	34E	P	330S	992E	LEA	NM			26851							14960		143	1120
CRUCES FEDERAL #005	3002502461	32.5377388	-103.5254669	26	20S	34E	P	330S	992E	LEA	NM			27892							15690		448	1304
WILLS A FEDERAL #001	3002502478	32.5504608	-103.5899506	29	20S	34E	D	330N	330W	LEA	NM			31894							17830		588	1640
NEAL #001	3002502511	32.5268326	-103.5297165	35	20S	34E	J	1650S	2310E	LEA	NM			18174							7932		46	3647
NEAL #002	3002502512	32.5285072	-103.525444	35	20S	34E	I	2260S	992E	LEA	NM			33605							16240		576	4523
NEAL #002	3002502512	32.5285072	-103.525444	35	20S	34E	I	2260S	992E	LEA	NM			31991							16580		410	3430
BALLARD DE FEDERAL #006	3002521346	32.5558891	-103.5534439	22	20S	34E	L	1650S	990W	LEA	NM	6/2/1965 0:00	7.92	15685							5925		1003	3450
MUSE #001	3002502439	32.564064	-103.5588226	21	20S	34E	A	660N	660E	LEA	NM	4/26/1957 0:00	7	9610							3760		295	2340
WEST LYNCH FEDERAL #001	3002526625	32.5522652	-103.5963821	19	20S	34E	O	330S	1650E	LEA	NM	1/13/1998 0:00	8.02	4910.55	0.05005	0	12.012	4061.06	3.003	33.033	268.268	0	423.42	111.111

Table 4 - Chemistry of Produced Water from Formations

wellname	api	section	township	range	unit	county	state	field	formation	depth	samplesource	sampledate	ph	specificgravity	specificgravity_temp_F	tds_mgL	resistivity_ohm_cm	resistivity_ohm_cm_temp_F	conductivity	conductivity_temp_F	sodium_mgL	calcium_mgL	magnesium_mgL	chloride_mgL	bicarbonate_mgL	sulfate_mgL
MCKITTRICK FED #1	3001500135	25	22S	25E	G	EDDY	NM		DEVONIAN		DST					16200								8762	290	1175
MCKITTRICK FED #1	3001500135	25	22S	25E	G	EDDY	NM		DEVONIAN		DST					17510								9389	664	982
CARNERO PEAK UT #001	3001510053	31	22S	25E	A	EDDY	NM		DEVONIAN		DST					14601								7236	515	1487
CARNERO PEAK UT #001	3001510053	31	22S	25E	A	EDDY	NM		DEVONIAN		DST					15780								8126	336	1467
CARNERO PEAK UT #001	3001510053	31	22S	25E	A	EDDY	NM		DEVONIAN		DST					15580								7853	487	1488
BANDANA POINT UT #001	3001500044	13	23S	23E	O	EDDY	NM	BANDANA POINT	DEVONIAN		DST					15500								8020	500	1190
TORTOISE ASB COM #001	3001510490	29	23S	24E	G	EDDY	NM		DEVONIAN		DST					17861								7760	490	3100
TORTOISE ASB COM #001	3001510490	29	23S	24E	G	EDDY	NM		DEVONIAN		DST					15601								7780	476	1600
REMUDA BASIN UNIT #001	3001503691	24	23S	29E	J	EDDY	NM	REMUDA	DEVONIAN		SWAB					64582								37500	610	1700
REMUDA BASIN UNIT #001	3001503691	24	23S	29E	J	EDDY	NM	REMUDA	DEVONIAN		SWAB					56922								29000	1740	4980
BELL LAKE UNIT #006	3002508483	6	23S	34E	O	LEA	NM	BELL LAKE NORTH	DEVONIAN		HEATER TREATER		7			71078								42200	500	1000
ANTELOPE RIDGE UNIT #003	3002521082	34	23S	34E	K	LEA	NM	ANTELOPE RIDGE	DEVONIAN		UNKNOWN	14/11/1967 0:00	6,9			80187								47900	476	900
ANTELOPE RIDGE UNIT #003	3002521082	34	23S	34E	K	LEA	NM	ANTELOPE RIDGE	DEVONIAN		UNKNOWN	14/11/1967 0:00	6,9			80187								47900	476	900
CLINE FEDERAL #001	3002510717	14	23S	37E	K	LEA	NM	CLINE	DEVONIAN		PRODUCTION TEST					118979								71280	462	2593
E C HILL B FEDERAL #001	3002510945	34	23S	37E	A	LEA	NM	TEAGUE	DEVONIAN		UNKNOWN					112959								67390	288	2765
E C HILL D FEDERAL #001	3002510947	34	23S	37E	H	LEA	NM	TEAGUE	DEVONIAN		UNKNOWN					35639										
E C HILL D FEDERAL #004	3002510950	34	23S	37E	A	LEA	NM	TEAGUE	DEVONIAN		UNKNOWN					236252								147000	129	781
HUAPACHE #003	3001500020	22	24S	22E	F	EDDY	NM		DEVONIAN		DST					3110								48	246	2020
JURNEGAN POINT #001	3001510280	5	24S	25E	M	EDDY	NM	WILDCAT	DEVONIAN		DST	14/12/1964 0:00	7			229706								136964	198	2511
JURNEGAN POINT #001	3001510280	5	24S	25E	M	EDDY	NM	WILDCAT	DEVONIAN		DST	14/12/1964 0:00	7			203100								121100	175	2220
WHITE CITY PENN GAS COM UNIT 1 #001	3001500408	29	24S	26E	A	EDDY	NM		DEVONIAN		DST	01/03/1960 0:00	7	1,012	60		0,36	75	25596	64	6072	1002	132	10120	653	1336
STATE B COM #001	3002509716	36	24S	36E	C	LEA	NM	CUSTER	DEVONIAN		UNKNOWN					176234								107400	128	1004
ELLIOTT H FEDERAL #001	3002512272	31	24S	38E	H	LEA	NM	DOLLARHIDE	DEVONIAN		WELLHEAD					58687										
ELLIOTT H FEDERAL #001	3002512272	31	24S	38E	H	LEA	NM	DOLLARHIDE	DEVONIAN		WELLHEAD					57018										
WEST DOLLARHIDE DEVONIAN UNIT #104	3002512297	32	24S	38E	I	LEA	NM	DOLLARHIDE	DEVONIAN		WELLHEAD					50858										
WESTATES FEDERAL #004	3002511389	1	25S	37E	E	LEA	NM	JUSTIS NORTH	FUSSELMAN		DST	17/06/1961 0:00	6			80880								30200	183	980
WESTATES FEDERAL #004	3002511389	1	25S	37E	E	LEA	NM	JUSTIS NORTH	FUSSELMAN		DST					84900								46200	340	3050
WESTATES FEDERAL #004	3002511389	1	25S	37E	E	LEA	NM	JUSTIS NORTH	FUSSELMAN		DST					72200								48600	840	2650
WESTATES FEDERAL #004	3002511389	1	25S	37E	E	LEA	NM	JUSTIS NORTH	FUSSELMAN		DST					80900								41000	370	2960
WESTATES FEDERAL #004	3002511389	1	25S	37E	E	LEA	NM	JUSTIS NORTH	FUSSELMAN		DST					77600								46200	340	3050
WESTATES FEDERAL #004	3002511389	1	25S	37E	E	LEA	NM	JUSTIS NORTH	FUSSELMAN		DST					135000								44000	550	3240
WESTATES FEDERAL #004	3002511389	1	25S	37E	E	LEA	NM	JUSTIS NORTH	FUSSELMAN		DST					114000								77000	650	5810
WESTATES FEDERAL #004	3002511389	1	25S	37E	E	LEA	NM	JUSTIS NORTH	FUSSELMAN		DST					135000								65000	280	5110
WESTATES FEDERAL #008	3002511393	1	25S	37E	E	LEA	NM	JUSTIS NORTH	FUSSELMAN		UNKNOWN					91058								77000	500	5320
WESTATES FEDERAL #008	3002511393	1	25S	37E	E	LEA	NM	JUSTIS NORTH	FUSSELMAN		UNKNOWN					86847								51020	376	4783
STATE NJ A #001	3002511398	2	25S	37E	A	LEA	NM	JUSTIS NORTH	DEVONIAN		DST					105350								50450	363	2544
NEW MEXICO BM STATE #002	3002511407	2	25S	37E	I	LEA	NM	JUSTIS NORTH	MONTOYA		UNKNOWN					77770								59300	660	4950
HALE STATE #003	3002512581	2	25S	37E	H	LEA	NM	JUSTIS NORTH	MONTOYA		WELLHEAD					64916								45500	1800	2400
SOUTH JUSTIS UNIT #016F	3002511556	13	25S	37E	F	LEA	NM	JUSTIS	FUSSELMAN		UNKNOWN					57675								37000	813	2500
LEARCY MCBUFFINGTON #008	3002511569	13	25S	37E	N	LEA	NM	203MNTY, 259FSLM	FUSSELMAN	7052		02/01/1900 0:00	7,6	1,037	78	67909			81429	67		2603	684	34030	595	1211
LEARCY MCBUFFINGTON #008	3002511569	13	25S	37E	N	LEA	NM	JUSTIS	MONTOYA		UNKNOWN					67898								38887	742	2489
A B COATES C FEDERAL #014	3002511736	24	25S	37E	G	LEA	NM	JUSTIS	MONTOYA		UNKNOWN					39261								38880	742	2489
SOUTH JUSTIS UNIT #023C	3002511760	25	25S	37E	C	LEA	NM	JUSTIS	FUSSELMAN		SEPARATOR					63817								22840	871	1030
CARLSON A #002	3002511764	25	25S	37E	I	LEA	NM	JUSTIS	FUSSELMAN		DST					208280								35870	360	3442
STATE Y #009	3002511777	25	25S	37E	A	LEA	NM	JUSTIS	FUSSELMAN		DST	17/03/1961 0:00	7,3			219570								124000	510	3400
STATE Y #009	3002511777	25	25S	37E	A	LEA	NM	JUSTIS	FUSSELMAN		DST	18/03/1961 0:00	6,8			163430								129000	960	4630
CARLSON B 25 #004	3002511784	25	25S	37E	P	LEA	NM	JUSTIS	FUSSELMAN		SEPARATOR					184030								96000	290	3780
COPPER #001	3002511818	28	25S	37E	J	LEA	NM	CROSBY	DEVONIAN		UNKNOWN					27506								112900	68	1806
ARNOTT RAMSAY NCT-B #003	3002511863	32	25S	37E	A	LEA	NM	CROSBY	DEVONIAN	8797		02/01/1900 0:00		1,142	70							17244	5345	15270	1089	1079
ARNOTT RAMSAY NCT-B #003	3002511863	32	25S	37E	A	LEA	NM	CROSBY	DEVONIAN		UNKNOWN					158761								100382	476	
WEST DOLLARHIDE DEVONIAN UNIT #110	3002512386	5	25S	38E	B	LEA	NM	DOLLARHIDE	DEVONIAN		UNKNOWN					56776										
FARNSWORTH FEDERAL #006	3002511950	4	26S	37E	A	LEA	NM	CROSBY	DEVONIAN		UNKNOWN					31931								20450	302	591

R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Since 1996

April 22, 2021

New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

RE: Legacy Reserves LP; Lea Unit #10 SWD
Unit Letter F, Section 13, T20S R34E, Lea County

Dear Sir or Madam:

On behalf of Legacy Reserves LP, R.T. Hicks Consultants is providing data and an opinion regarding the probability that injection of wastewater in the above referenced well at the proposed rates will cause seismic events of sufficient magnitude to create damage. We are in the process of developing an evaluation of the nature of the confining layers and nearby faults that are not shown in public databases. One key point that is not emphasized sufficiently in the application is the base of the proposed injection zone is 1900 feet above the top of the Ellenburger. Thus, the thickness of the underlying confining layer is significantly greater than other Devonian SWDs. Another important element of the proposed supplemental information is the nature of the 130-foot injection zone at the top of the Devonian. The injection zone is the reservoir from which oil wells have produced crude, natural gas, and water. In part, Legacy will be re-filling the depleted production zone with injected water from their production elsewhere.

We believe presentation of data and interpretations in the forthcoming supplemental submission is critical to determining the utility of employing the Stanford FSP tool to predict the potential of induced seismicity.

We relied upon the following data to develop our opinions presented herein:

- Data on the thickness and lithology of the Simpson Group from the Texas Bureau of Economic Geology[1]
- State of stress in the Permian Basin, Texas and New Mexico: Implications for induced seismicity, Jens-Erik Lund Snee and Mark D. Zoback, The Leading Edge, February 2018[2]
- Plate 5, which is reproduced from the Snee and Zoback publication, which uses the following references
    - Crone, A. J., and R. L. Wheeler, 2000, Data for Quaternary faults, liquefaction features, and possible tectonic features in the Central and Eastern United States, east of the Rocky Mountain front; U.S. Geological Survey Open-File Report.

[1] http://www.beg.utexas.edu/resprog/permianbasin/PBGSP_members/writ_synth/Simpson.pdf
[2] https://scits.stanford.edu/sites/default/files/3702_tss_lundsnee_v2.pdf

  - Ewing, T. E., R. T. Budnik, J. T. Ames, and D. M. Ridner, 1990, Tectonic map of Texas: Bureau of Economic Geology, University of Texas at Austin.
  - Green, G. N., and G. E. Jones, 1997, e digital geologic map of New Mexico in ARC/INFO format: U.S. Geological Survey Open-File Report.
  - Ruppel, S. C., R. H. Jones, C. L. Breton, and J. A. Kane, 2005, Preparation of maps depicting geothermal gradient and Precambrian structure in the Permian Basin: USGS Order no. 04CRSA0834 and Requisition no. 04CRPR01474.
  - NMOCD database of oil and gas wells
- Plate 5, which shows the distribution of active and new SWD wells in the area of the proposed AWR Disposal SWD well
- Stratigraphic and lithologic information from two deep wells in the Delaware Basin
- The USGS database of quaternary faults in New Mexico[3].

The USGS database did not identify any Quaternary faults in southern Lea County.

Plate 5 reproduces Figure 3 of the 2018 publication of Snee and Zoback and shows

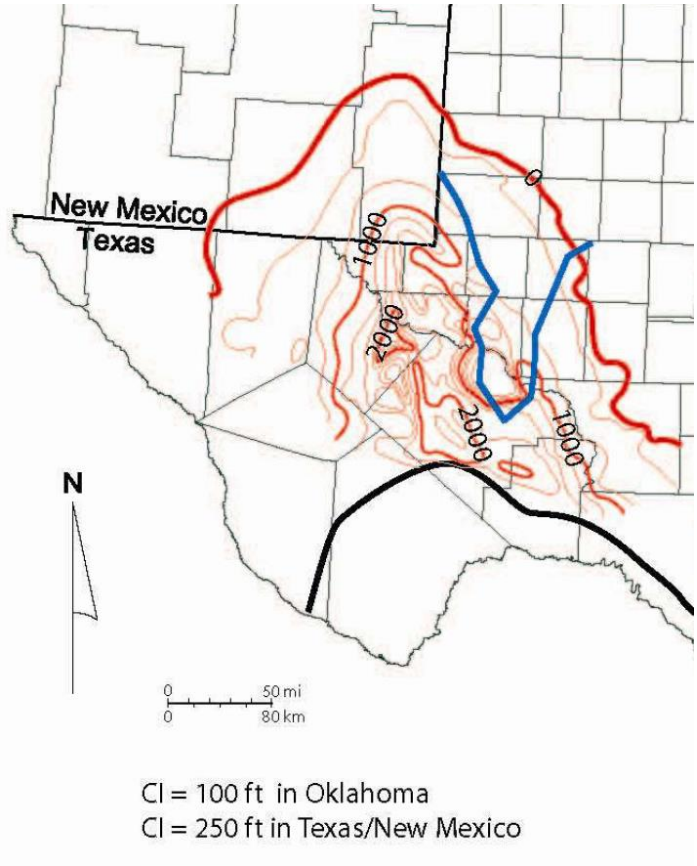
1. Fault traces based upon the references provided above for which Dr. Snee and Dr. Zoback provide a value of the fault slip potential (FSP)
2. The closest areas of documented seismic activity include a magnitude 3.0-3.9 earthquake that occurred since 2005 about 28 miles southwest of the proposed Lea Unit #10. There was an event of magnitude 2.0 – 2.9 reported about 35 miles south of the Lea Unit #10 between 1970 and 2004. There was an event of magnitude 2.0 – 2.9 and an event of magnitude 3.0-3.9 reported about 31 miles to the south between 1970 and 2004. Figure 5 also shows two seismic events about 35 miles southeast.
3. Although Plate 5 does not show faults that may be identified in confidential seismic data owned by oil and gas operators, the closest mapped basement fault that was re-activated during Woodford time is about 8 miles to the east and southeast of the Lea Unit #10. This fault exhibits a low FSP (less than 10% to the east and less than 15% to the southeast) based upon the modeling and analysis of Snee and Zoback referenced above (also see Plate 6)
4. Other mapped faults in southern Lea County shown on Plate 5 also show a low FSP.

Plate 6 reproduces the major elements of Plate 5 in the inset map and also shows additional faulting information. Along with the more recent faulting shown on Plate 5, it also includes Pre-Cambrian and basement faulting. As can be seen, the Lea Unit #10 is about 1.25 miles northeast of a northwest to southeast oriented Precambrian fault and is 6.4 miles southwest of a similar parallel Precambrian fault. These faults were not re-activated during Woodford time according to the work of Snee and Zoback.

Within T 20S, R 34E and T 20S R35E, T19 S R 34E, T19S R 35E, T21S R34E and T21S R35E, the OCD database shows ten (10) Devonian SWD wells. The closest of these wells is about 9,000 feet southwest of the Lea Unit #10. Ten wells within 144 square miles is not a high injection density.

[3] https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf

Figure 4 from the referenced Bureau of Economic Geology (The Middle-Upper Ordovician Simpson Group of the Permian Basin: Deposition, Diagenesis, And Reservoir Development) is attached to this letter and the portion of that figure for the Delaware Basin is shown to the right. In southern Lea County the mapped thickness appears to be 500-1500 feet thick (note one contour line appears to be missing on the map). This unit, which is clay-rich carbonate interbedded with shale and sandstone, provides an excellent permeability/pressure barrier between the injection zone and the basement faults that were re-activated during Woodford time.



Data from the Amoco Federal CW Com 1 (30-025-28119) show that the thickness of the Simpson in the Antelope Ridge area of Lea County (Section 3 24S 34E) is about 450 feet thick with. This is consistent with Figure 4 of the BEG paper (probably because this well was used to produce the isopach map).

We contend that the data permit conclusion that faults near the Lea Unit #10 would be dominantly north-south normal faults, as is common in Lea County. The data on Plate 6 permit a conclusion that faults near the Lea Unit #10 SWD are also most likely to exhibit a low FSP, like the mapped faults shown on Plate 5.

Given the density of active Devonian SWDs near the proposed Lea Unit #10 SWD well and the high likelihood that any unmapped faults in the area would exhibit a low FSP, the probability that injection into the Lea Unit #10 SWD would cause an increase in pore pressure to trigger a seismic event of sufficient magnitude to cause damage is very low.

The users of this letter should recognize the uncertainties of using seismic maps of the Permian Basin to determine probability that injection of wastewater into a single SWD well could cause seismic events of sufficient magnitude to cause damage. However, on a regional basis injection by numerous wells into the Devonian interval will raise the hydrostatic pressure. If pressure increases sufficiently, fluid could migrate from the injection zone along fault planes, up and down. Downward fluid migration will be intercepted first by the sandstone units of the Simpson Group. After fluid pressure increases in these sandstones, fluid would migrate downward into the Ellenberger Formation, which lies beneath the Simpson Group. This downward migration will next enter the permeable units of the Ellenberger and, over time, increase the fluid pressure. After fluid pressure in the Ellenberger is sufficiently large to cause downward migration along fault planes or other conduits, the migrating fluid will, in some areas, enter a thinner horizon of granite wash. Downward migrating fluids from the injection zone could then enter basement fault planes if the pressure in the granite wash horizon is sufficient and reduce the frictional resistance (lubricate the faults). Reduction in the frictional force in faults due to fluid invasion can and has caused seismic events.

In my opinion, the probability that injection into the Lea Unit #10 SWD will measurably contribute to the events described above and will cause a seismic event resulting in damage is so low as to be nil. Nevertheless, additional data and interpretation regarding the Simpson and Ellenburger Groups will be useful to OCD in the evaluation of the findings in this letter.

Sincerely,
R.T. Hicks Consultants

Randall T. Hicks
Principal

Copy: Legacy Reserves LP

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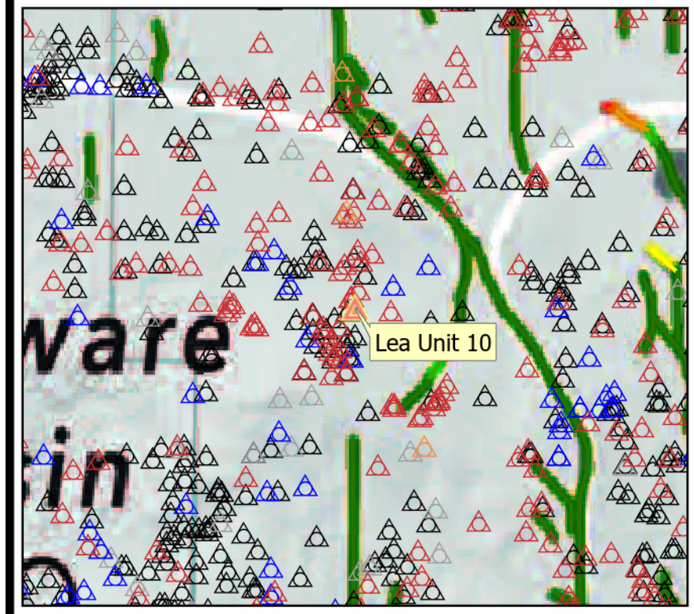


SWD

WellGIS

Oil and Gas (NMOCD)

- Salt Water Injection, Active
- Salt Water Injection, Cancelled
- Salt Water Injection, New
- Salt Water Injection, Plugged
- Salt Water Injection,Temporarily Abandoned

Fault Slip Potential (%)

- <5
- 5 - 10
- 10 -15
- 20 - 25
- 30 - 35
- 35 - 40
- Fault - Woodford
- Fault - Precambrian
- Fault - Basement
- Township Range

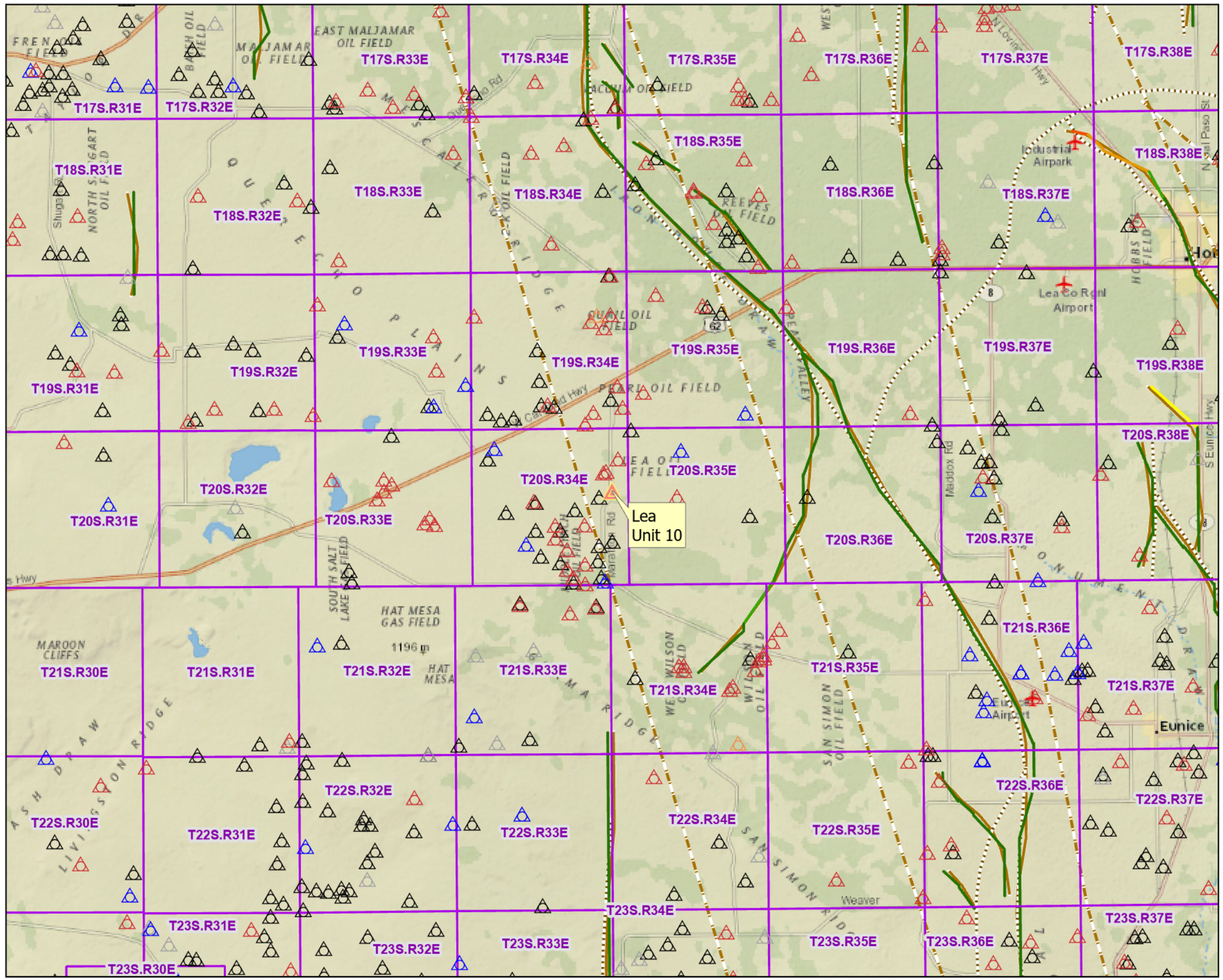
Seismicity:

- 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+

Seismic and Fault Slip Potential-
Ewing et al. (1990), Green and Jones (1997), Ruppel et al. (2005), and the USGS Quaternary Faults and Folds Database (Crone and Wheeler, 2000).



N W E S

0 5 10 Miles

R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
Ph: 505.266.5004

Fault Slip Potential	Plate 6
Lea Unit #10 SWD Legacy Reserves Operating, LP	Oct 2020

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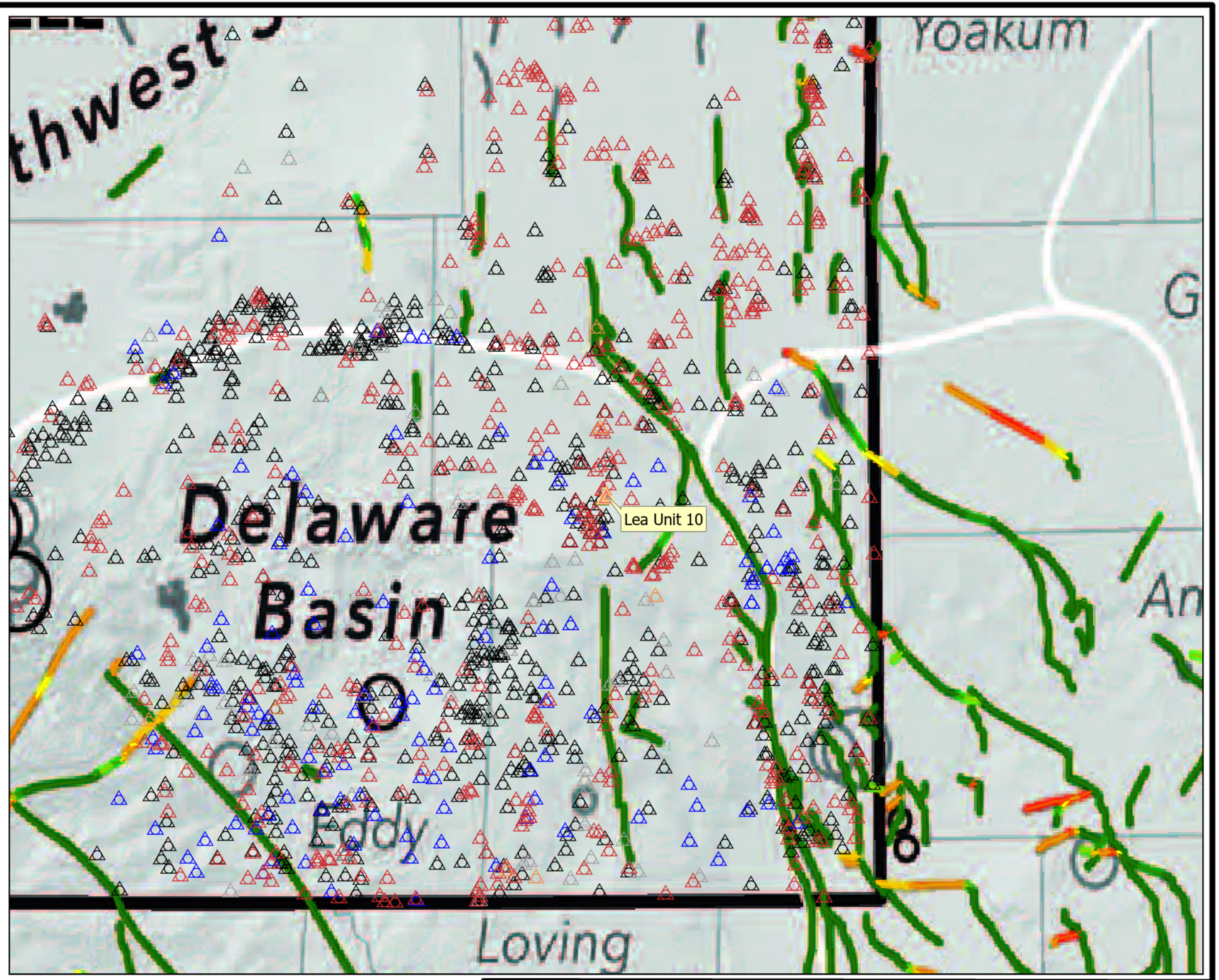

SWD

Oil and Gas (NMOCD)

- Salt Water Injection, Active
- Salt Water Injection, Cancelled
- Salt Water Injection, New
- Salt Water Injection, Plugged
- Salt Water Injection,Temporarily Abandoned

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+

Seismic and Fault Slip Potential-
Ewing et al. (1990), Green and Jones (1997), Ruppel et al. (2005), and the USGS Quaternary Faults and Folds Database (Crone and Wheeler, 2000).

N W E S

0 5 10 Miles

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Seismicity with Fault Slip Potential	Plate 5
Lea Unit #10 SWD Legacy Reserves Operating, LP	Oct 2020

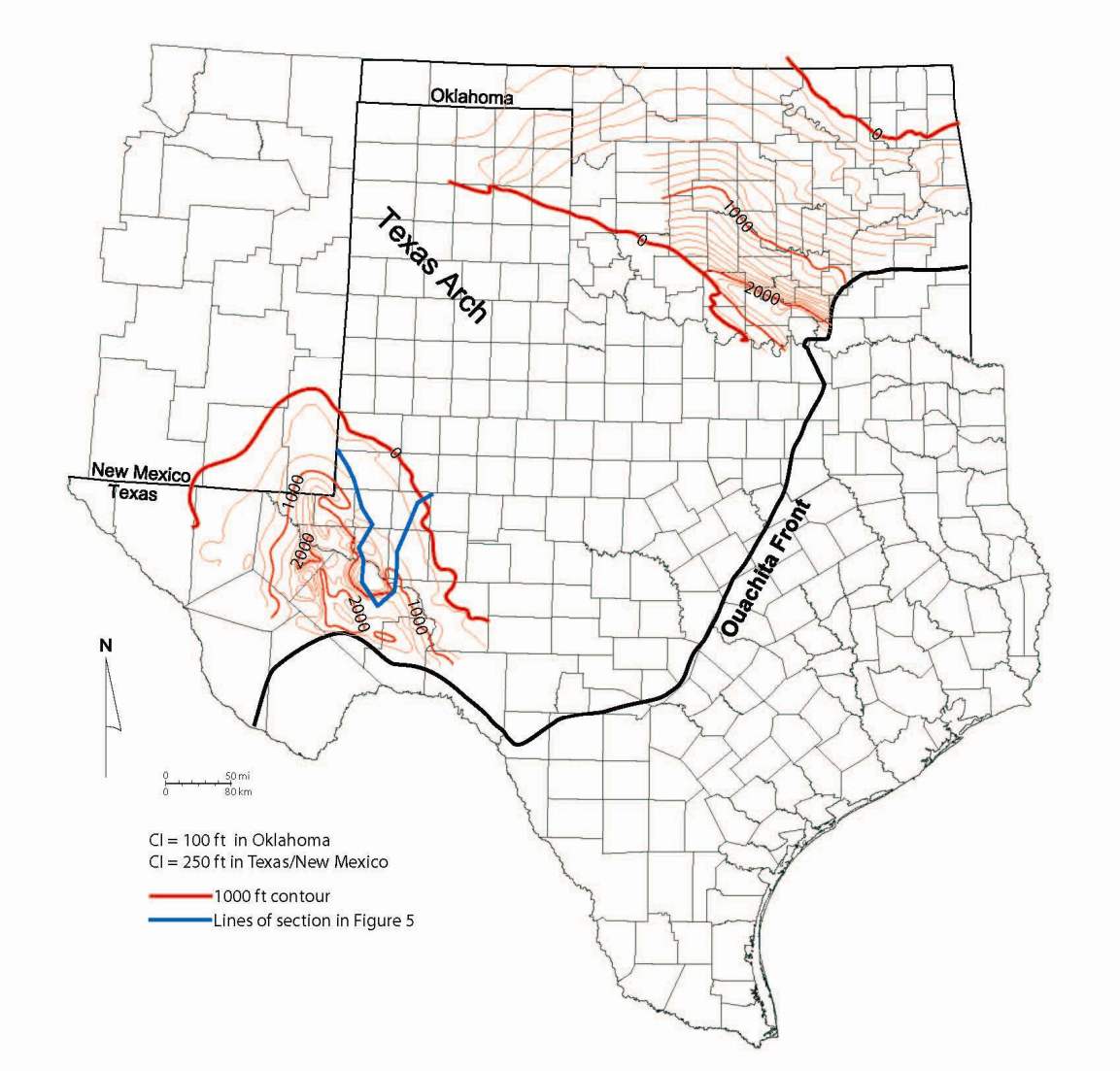

Figure 4. Thickness map of Simpson Group modified from Texas Water Development Board (1972), Frenzel and others (1988), and Northcutt and Johnson (1997). Thousand-foot contour lines and locations of figure 5 cross sections shown in heavy red and blue lines, respectively. Note that contour interval is 100 ft for Oklahoma and 250 ft for Texas and New Mexico.

Lea Unit #10

API #3002520506

Lat 32.574585 Lon -103.515465

1980 FNL & 1980 FWL

Sec 13, T20S, R34E, Lea, NM

TD: 14,438' KB 23'
Surface: 13 3/8", 48#, H-40 @ 853'
Intermediate: 9 5/8", 36/40#, J-55/N-80 @ 5,161'
Production: 7", 26#, N-80 @ 14,308'

Perfs: 9,519' – 9,606' Bone Spring
9,625' – 9,657' Bone Spring
10,181' – 10,186' Bone Spring
10,192' – 10,212' Bone Spring
CIBP @ 12,850' w/35' cmt. on top = 12,815'
12,890' – 13,114' Penn
14,308' – 14,438' Devonian (Squeezed w/80 sx Class H)

Issue: Squeeze off Bone Spring perfs and drill out. Then open up Devonian open hole to get inj. rate.

Proposal:

1. Hot oil well 48 hrs. before rigging up.
2. MIRU PU
3. POH LD rods and pump.
4. POH LD production tbg.
5. Pick up work string w/BP perf. sub on btm. Hydrotest tbg. to 6,000 PSI. RIH to btm. Needs to be at least 10,212' in order to squeeze btm. perfs.
6. POH w/tbg.
7. RIH w/packer to 9,519'. Load annulus and test to 500 PSI. If it doesn't hold, find leak and notify Midland.
8. If casing tests good, POH w/pkr.
9. RIH w/threaded 7" cement retainer w/3 jts. FG tbg. on btm. to 10,130'. Pump 70 BW dn. tbg. and set retainer @ 10,130'. End of FG should be 10,222'. Sting out and back into retainer.
10. RU WTC equipment.
11. Attempt to load annulus and monitor. Squeeze perfs 10,181' – 10,212' w/400 sx as per WTC procedure.
12. Reverse to clean fluid if possible. If not, pump 20 bbls dn. tbg. and POH, LD stinger.
13. RIH w/threaded 7" cement retainer w/6 jts. FG tbg. on btm. to 9,460'. Reverse 20 bbls. through retainer. Shut in BOP and est. rate into perfs. Set retainer @ 9,460'. End of FG should be 9,646'. Sting out and back into retainer. Pressure annulus to 300 PSI and monitor.
14. Squeeze perfs 9,519 – 9,657 w/200 sx as per WTC procedure.
15. Reverse to clean fluid. POH, LD stinger.
16. WOC 24 hrs.
17. RIH w/6 1/8" bit w/6 – 4 ¼" DCs and WS.
18. Drill out CR @ 9,460' and cmt. down below 9,657'. Test to 500 PSI. Notify Midland and resqueeze if needed.
19. Drill out CR @ 10,130' and cmt. down below 10,212'. Test to 500 PSI. Notify Midland and resqueeze if needed.
20. Drill cement from 12,815' to CIBP @ 12,850'. Drill out CIBP.
21. Run bit through perfs. 12,890' – 13,114'.
22. Press test Penn squeezed perfs 12,890' – 13,114' to 300 PSI. Contact Midland with results.
23. Drill cement out of open hole to 14,438'.
24. POH LD bit and DC's.
25. RIH w/7" pkr. & set @ 14,210'. Perform step rate test to est. rate (10 BPM). Contact Midland with results.
26. RU acid pump and perform 15% NEFE acid job according to results.
27. POOH & laid down work string and tools.
28. PU and RIH w/3 ½" nickel coated AS1 pkr. w/2.81" profile nipple and on/off tool on 3 ½" L-80 IPC tbg.

29. Set pkr. @ 14,210’.
30. Test annulus to 500 PSI f/30 mins.
31. Release on/off tool.
32. Circulate packer fluid.
33. Reset on/off tool and retest.
34. RDMO PU.
35. Turn over to production.