Goetze, Phillip, EMNRD

From: Goetze, Phillip, EMNRD
Sent: Wednesday, July 5, 2017 10:51 AM
To: Mike Pippin (mike@pippinllc.com)
Cc: Jones, William V, EMNRD; McMillan, Michael, EMNRD; Lowe, Leonard, EMNRD
Subject: Response Provided by HollyFrontier to Limerock's IPI Application
Attachments: 2017-06-27 Lime Rock Pressure Application Protest with attachments.pdf

RE: Federal T SWD No. 1 (API 30-015-26404) SWD-1135

Mr. Pippin:

As per our discussion, the attached document is HollyFrontier's written response regarding the IPI application for the referenced well. HollyFrontier has requested that the application be denied. The Division is currently considering the report submitted by HollyFrontier and will provide a decision in this matter shortly. Please contact me with any additional questions concerning this subject. PRG

Phillip Goetze, PG
Engineering Bureau, Oil Conservation Division
New Mexico Energy, Minerals and Natural Resources Department
1220 South St. Francis Drive, Santa Fe, NM 87505
Direct: 505.476.3466
E-mail: phillip.goetze@state.nm.us

HOLLYFRONTIER

June 27, 2017

Mr. David Catanach
Division Director
NMOCD
1220 South St. Francis Drive
Santa Fe, NM 87501

Via Email and Federal Express

RE: REQUEST BY HOLLYFRONTIER TO DENY LIME ROCK'S REQUEST TO INCREASE INJECTION PRESSURES AT FEDERAL T SWD#1 (API # 30-015-26404)

Dear Director Catanach,

On May 8, 2017 Lime Rock Resources II-A L.P. (Lime Rock) requested from the New Mexico Oil Conservation Department (NMOCD) an injection pressure increase for their existing permitted (Order SWD-1135, approved July 16, 2008) salt water disposal well (Federal T SWD #1; API # 3001526404). Their request asks for an increase from the original maximum allowable operating pressure (MAOP) of 1,480 psig to 2,681 psig. Lime Rock's injection pressure increase (IPI) request is based on and relies on the results of a step rate test performed on this well on May 3, 2017. For the reasons detailed below, HollyFrontier Navajo Refining LLC (HFNR) objects to the requested pressure increase and respectfully requests that NMOCD deny Lime Rock's request.

BACKGROUND

On June 23, 2004 Navajo Refining Company (now HFNR) received from the NMOCD their Approval for Discharge Permit UIC-CLI-008-3 for a Class I non-hazardous waste disposal well (WDW-3; API # 3001526575) to dispose of wastewater from the Navajo Refinery in Artesia, New Mexico. This well is located 790 FSL and 2250 FWL of Section 1, T18S, R27E in Eddy County, New Mexico.

As seen in Figure 1, there are only approximately 2,500 feet separating HNFR's WDW-3 from Lime Rock's Federal T SWD #1, and both wells have completions in the same Cisco zone. The Federal T SWD #1 perforations in the Cisco Formation range from 7,685' to 8,060', and the WDW-3 Cisco perforations run from 7,666' to 8,620'. This overlap allows pressure fronts (and fluids) to migrate from the Lime Rock SWD to HNFR's WDW-3, potentially impairing the function of WDW-3.

HNFR's permit has a maximum allowable operational pressure (MAOP) of 1,550 psig, with no specific limit on the amounts of wastewater injected. From 2008 to 2016, the well (WDW-3; API# 3001526575) has injected an average of approximately 152,000 barrels of wastewater per month. The WDW-3 well is a group of three Class I wells operated by HNFR (WDW-1; API # 3001527592 and WDW-2; API # 3001520894) that also receive non-hazardous wastewater from the HFNR Refinery.

HollyFrontier Navajo Refining LLC
501 East Main • Artesia, NM 88210
(575) 748-3311 • http://www.hollyfrontier.com

These three wells are the Refinery's approved method of disposing their non-hazardous wastewaters, and if reservoir capacity is reached, or pressures exceed MAOPs, HFNR would face significant curtailment of its operations at the plant or a possible shut down.

BASIS OF OBJECTIONS

1: The May 2017 Step Rate Test (SRT) is Not Valid and Cannot Serve as Justification for the Requested IPI Because the Injection Zone in This Well was Extensively Hydrofractured in August 2008

NMOCD records show that on August 13, 2008 the zone from 7,893' to 8,060' was fractured with 5,040 gallons of 15% HCl, 120,372 gallons of Spectra Star 2500, and 167,552 pounds of propant (sand). On August 16, the zone from 7,758' to 8,060' was fractured with 4,500 gallons of 15% HCl, 119,255 gallons of Spectra Star 2500, and 106,750 pounds of sand (see Attachment A).

These fracture jobs are also noted in the well diagram submitted as part of Lime Rock's May 2017 pressure increase application (see Attachment B).

It is clear that the reason that Lime Rock observed that "The formation pressure did not break at a maximum surface pressure of 2681 psi (bottom hole pressure of 4140 psi)..." during their SRT is that the formation had already been broken during the hydrofracturing work done in 2008. For these reasons the step rate test results and conclusions are invalid and cannot form a defensible technical basis for Lime Rock's IPI request.

2: HFNR Has Priority of use of this Shared Injection Zone in the Cisco Reservoir

Well WDW-3 was approved in June 2004 as a Class I non-hazardous well and began operations in January 2008. The well was originally spudded in December 1990 by Mewbourne Oil Company and was advanced to 10,120 feet and completed as a Morrow gas well. For economical reasons Mewbourne temporarily shut in the well in 1993. In September 2000 the wellbore was purchased by Navajo Refining as a potential disposal well. Following the 2004 approval of their Class I injection application, Navajo re-completed the well in October 2006 as an injection well, and commenced injection in January 2008. By the end of 2008, Navajo had injected approximately 2,021,000 barrels, and in 2009 over 2,385,000 barrels.

The Devon Federal T SWD #1 was approved as a SWD well in July 2008, over 4 years after the approval of WDW-3. This well was first spudded in June of 1990 Mewbourne Oil Company and was advanced to 10,141 feet and completed as a Morrow gas well. For economical reasons Mewbourne temporarily shut in this well in 1994. The well was acquired by Devon Energy Production in April of 2008, was approved as an SWD in Order SWD-1135 in July of 2008, and re-completed by Devon in August of 2008. Throughout 2008 Devon only injected a total of 190 barrels and in 2009 did not operate the well until September, and only injected 513,281 barrels in that year.

It is clear from this history that Navajo (now HFNR) received NMOCD approval to inject in the Wolfcamp, Cisco and Canyon zones in 2004, four years prior to the Devon (now Lime Rock) 2008 application. Further, HFNR commenced significant injection rates and volumes in January 2008, while Devon only began significant injection in September 2009, 20 months later.

3: Significantly Higher Effort and Expense by the Regulators and the Operator are Required to Permit a Class I Non-Hazardous Well versus a Standard Class II SWD Well

The NMOCD, USEPA Region 6, and HFNR spent significant technical effort, professional time, and costs to perform the analyses required to permit this Class I non-hazardous injection well. This level of investment far exceeds the efforts required to permit a SWD such as Federal T SWD#1.

4: WDW-3 Is Critical to the HFNR Refinery Operations

HFNR operates, in addition to WDW-3, two additional Class I disposal wells (WDW-1 and WDW-2), all permitted under the NMOCD UIC program. These wells accept non-exempt, non-hazardous wastewaters from the Refinery, at average total amounts of approximately 15,000 barrels per day, roughly equally distributed among the 3 wells. HFNR has no other current options for disposing of this wastewater, and loss of service of even one of these wells would severely reduce refinery throughput leading to losses of jobs, and diminished revenues for HFNR, contracted operators, and the State.

5: Both the Lime Rock and HFNR Injection Wells Share the Same, Continuous Reservoir

Figure 2 is a cross-section showing the geology of injection zones of WDW-3 and Federal T SWD#1. There is clearly an overlap of the injection zones in the Cisco Formation, the lithologies of the Cisco are very similar, and it is clear that there are no stratigraphic or structural barriers between the wells. This direct connection will ensure that increased injection pressure in the Federal T SWD #1 will result in the migration of a pressure wave to WDW-3 that will negatively affect HFNR's ability to stay within their approved MAOP of 1,550 psig surface.

6: Increased Injection Pressure by Lime Rock will Raise Reservoir Pressure at WDW-3

Lime Rock proposes to increase the MAOP of their Federal T SWD #1 from 1,480 to 2,681 psig, an increase of approximately 1,200 psig, or over 180% of the current limit. Currently, the HFNR well WDW-3 has seen an annual injection average of 1,315 psig, only 235 psig below their MAOP of 1,550 psig. Only approximately 20% of Lime Rock's requested increase would push reservoir pressures above HFNR's MAOP, making WDW-3 inoperable. If the requested pressure increase is approved, the overlapping perforations in the Cisco Formation, 7,685' to 8,060' in the Federal T SWD #1, and 7,666' to 8,620' in the WDW-3, will allow pressure fronts (and fluids) to migrate from the Lime Rock SWD to HFNR's WDW-3, impairing or precluding successful injection in the WDW-3.

CONCLUSIONS

In summary, HFNR respectfully requests the NMOCD deny Lime Rock's application for an injection pressure increase for their Federal T SWD #1 for the reasons detailed above. However, should NMOCD see fit to grant this pressure increase, HFNR requests that a corresponding pressure increase be immediately granted to wells WDW-1, WDW-2, and WDW-3, that are completed in the same injection zone.

If you have any questions or require additional information regarding our request to deny Lime Rock's application please contact me at 575-746-5487 or our technical consultants on this matter Alberto Gutierrez, RG & James C. Hunter, RG at 505-842-8000.

Sincerely,

Scott M. Denton
Environmental Manager
HollyFrontier Navajo Refining LLC

cc: NMOCD – P. Goetze
Geolex – A. Gutierrez
HFNR – R. Dade

FIGURES

Figure 1:

HollyFrontier Class 1 Wells: Active Disposal Wells Within One-Mile AORs (All three Class 1 wells)

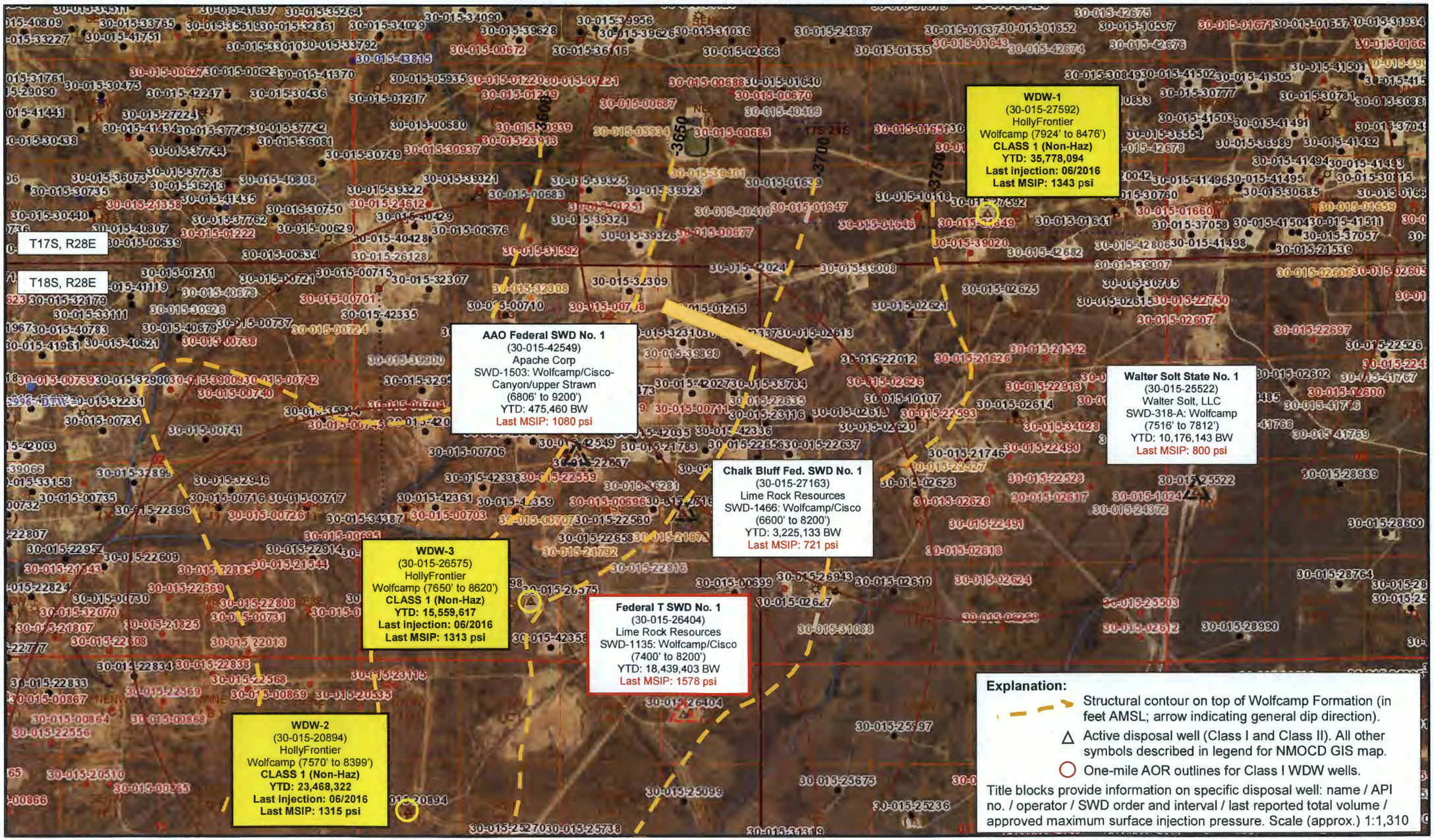
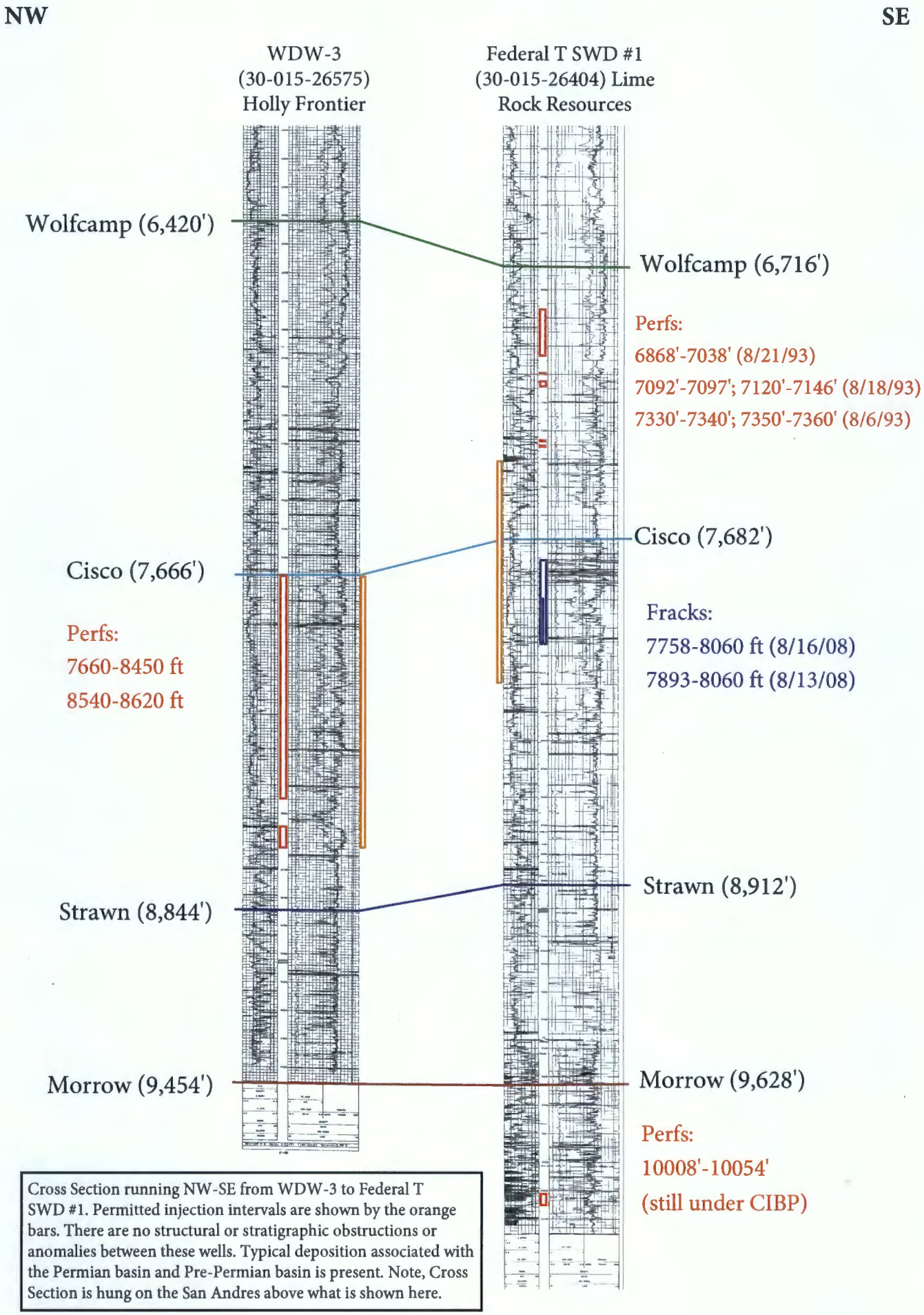


Figure 2: Cross Section between WDW-3 and Federal T SWD #1



Cross Section running NW-SE from WDW-3 to Federal T SWD #1. Permitted injection intervals are shown by the orange bars. There are no structural or stratigraphic obstructions or anomalies between these wells. Typical deposition associated with the Permian basin and Pre-Permian basin is present. Note, Cross Section is hung on the San Andres above what is shown here.

ATTACHMENT A

BLM FORM 3160-5 REPORTING THE RECOMPLETION AND HYDROFRACTURING OF FEDERAL T SWD#1

Form 3160-5
(February 2005)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APROVED
OMB NO. 1004-0137
EXPIRES: March 31, 2007

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well ☐ Oil Well ☐ Gas Well ☑ Other **SWD conversion. Admin Order SWD-1135**	5 Lease Serial No **NM-42410**
2. Name of Operator **DEVON ENERGY PRODUCTION COMPANY, LP**	6. If Indian, Allottee or Tribe Name
3a. Address **20 North Broadway, Oklahoma City, OK 73102**	3b. Phone No. (include area code) **405-552-8198**
4 Location of Well (Footage, Sec., T., R., M , or Survey Description) **660 FNL 990 FEL A 12 18S 27E**	7. Unit or CA Agreement Name and No.
	8 Well Name and No **Federal T 1**
	9 API Well No **30-015-26404**
	10. Field and Pool, or Exploratory Area **L.Wolfcamp and Cisco**
	11. County or Parish, State **Eddy NM**

12. CHECK APPROPRIATE BOX(es) TO INDICATE NATURE OF NOTICE, REPORT OR OTHER DATA

TYPE OS SUBMISSION	TYPE OF ACTION			
☐ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☑ Subsequent Report	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☑ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13 Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work and approximate duration thereof If the proposal deepen directionally or recomplete horizontally, give subsurface location and measured and true vertical depths of all pertinent markers and zones Attach the Bond under which the work will be performed or provide the Bond No on file with BLM/BIA Required subsequent reports shall be filed within 30 days following completion of the involved operations If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 shall be filed once testing has been completed Final Abandonment Notices shall be filed only after all requirement, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection)

Converted to SWD. Administrative Order SWD-1135
8/04/08 RU unit. ND wellhead and NU BOP. TIH with bit and drill collars.
8/05/08 Drill CIBP at 6800' and 7078'.
8/06/08 Drilled through cement at 7525', CIBP at 7300' and cement at 7560' and CIBP at 7595'.
8/07/08 Ran step rate test; pumped 50 bbls at ½ bbl/min – 0# psi, pumped 50 bbls at 1 bbl/min -20# psi, pumped 50 bbls at 2 bbls/min – 75# psi, pumped 50 bbls at 3 bbls/min – 170# psi, pumped 50 bbls at 4 bbls/min – 250 psi.
8/08/08 Trucked in and established injection in the Wolfcamp at 150 BWPD at 170 psi.
8/11/08 Drilled cement retainers at 7745', and 7780'.
8/12/08 Drilled cement retainer at 7820' and 8000'. Circulate hole and TOH with tubing and bit.
8/13/08 Perforate Cisco from 7893' – 8060', total 140 holes. TIH and set packer at 7688'. Frac with 5,040 gals 15% HCl + 120,372 gals Spectra Star 2500 + 167,552 # 20/40 White sand.
8/14/08 TIH with retrievable tool and latch onto packer. Release packer and TOOH with packer and tubing. RU wireline and perforate Cisco from 7758'-7840'; 228 total holes
8/15/08 TIH with packer and set at 7582'. NU frac valve.
8/16/08 Frac 7758'-8060' with 4500 gals 15% Spearhead acid + 119,255 gals Spectra 2500 + 106,750 # 20/40 100% White sand. RD.
8/18/08 Release packer. TOOH with packer and tubing
8/20/08 TIH with bailer and bailed sand. Bailed sand to 8460'. TOOH with tubing. ND BOP and NU flange. Waiting on tubing.
9/15/08 TIH with packer and tubing. Set packer at 6789'. ND BOP and NU tree Ran MIT test to 500 # for 30 minutes – ok, notified Mike Bratcher with OCD TOOH with tubing. RIH with 3 ½" IPC tubing and set at 6789'. Injection line installation in progress.

14. I hereby certify that the foregoing is true and correct
Name: Norvella Adams — Title **Sr. Staff Engineering Technician**

Signature — Date 9/17/2008

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by /S/ DAVID R. GLASS — Title — Date SEP 29 2008

ACCEPTED FOR RECORD
DAVID R. GLASS
PETROLEUM ENGINEER

Accepted for record
NMOCD

Conditions of approval, if any are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct or operations thereon.

Office

Title 18 U S C Section 1001 and Title 43 U S C Section 1212 make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction

ATTACHMENT B

WELL COMPLETION DIAGRAM PROVIDED IN LIME ROCK'S REQUEST FOR PRESSURE INCREASE SHOWNING ZONES OF HYDROFRACTURING IN FEDERAL T SWD#1

DEVON ENERGY PRODUCTION COMPANY LP

Well Name: FEDERAL T #1	Field: NORTH ILLINOIS CAMP MORROW	
Location: 660' FNL & 990' FEL; SEC 12-T18S-R27E	County: EDDY	State: NM
Elevation: 3634' KB; 3618' GL	Spud Date: 6/28/90	Compl Date: 9/13/90
API#: 30-015-26404 / Prepared by: Norvella Adams	Date: 9/17/08	Rev:

Current Schematic
L. Wolfcamp and Cisco SWD

17-1/2" Hole
13-3/8", 68#, LTC, @ 472'
Cmt'd w/450 Sx. Circ to surface

12-1/4" Hole
8-5/8", J55, 32#, STC, @ 2,589'
Cmt'd w/900 Sx. Circ to surface

WOLFCAMP *(8/21/93)*
6,869' - 7,038'

WOLFCAMP *(8/18/93)*
7,092' - 7,097'; 7,120' - 7,146'

WOLFCAMP *(8/16/93)*
7,330' - 7,340'; 7,350' - 7,360'

SWD Perforations:
CISCO *(8/1/93)*
7,685' - 7,695'

CISCO (8/14/08)
7758'-7840' (228 holes)

CISCO (8/13/08)
7893'-8060' (140 holes)

4" Liner top @ 9,055'

7-7/8" Hole
5-1/2", N80, 17#, LTC, @ 9,473'
Cmt'd w/430 Sx

MORROW *(9/14/90)*
10,008' - 10,014'
10,038' - 10,054'

4-3/4" Hole
4" 10.46#, L80 Liner @ 9,055' - 10,141'
Cmt'd w/80 Sx

10,141' TD

Formation Tops

Morrow 9,600-10,250'
Atoka 9,230'- 9,700'
Upper Wolfcamp 6,400' - 7,200'
Abo 5,600' - 6,200'
Yeso 3,300' 0 3,900'
San Andres 2,000' - 2,800'
Queen 1,450' - 1,650'

3-1/2", 9.3 #, N80, Injection tubing @ 6789'

5-1/2" IPC Packer @ 6,789'

Frac 7758'-7840' with 4500 gals 15% Spearhead acid and 113,255 gals Spectra Star 2500 + 106,750 # 100% 20/40 White sand.

Frac 7893'-8060' with 5040 gals 15% HCl acid and 120,372 gals Spectra Star 2500 + 167,512 # 100% 20/40 White sand

35' cement. 9,005' PBD
CIBP @ 9,040' *(7/21/93)*

CIBP @ 9,950' *(7/19/93)*

10,100' PBD

Goetze, Phillip, EMNRD

From: Goetze, Phillip, EMNRD
Sent: Friday, May 19, 2017 11:33 AM
To: Dade, Lewis (Randy)
Cc: Chavez, Carl J, EMNRD; Mike Pippin (mike@pippinllc.com); Jones, William V, EMNRD; McMillan, Michael, EMNRD
Subject: Lime Rock's IPI Application for the Federal T SWD No. 1
Attachments: HollyFrontier Class I Renewals V2.pdf; Lime Rock IPI Appl_Fed T SWD #1.pdf

RE: Federal T SWD No. 1 (API 30-015-26404) SWD-1135

Greetings Mr. Dade:

Hope all is well with you. The Division is forwarding an application for injection pressure increase submitted by Lime Rock for its Federal T SWD No. 1. A copy of the application is attached. Lime Rock is requesting an increase of the surface injection to 2681 psi. The Division has not completed its evaluation of the test data; however, the Division is providing the opportunity for input by HollyFrontier regarding the application for this disposal well and the operation of HollyFrontier's Class I wells that are in proximity to the Federal T. The Division has identified the closest well as being the WDW-3 that is approximately 2,510 feet northwest of the Federal T.

This request is based on the injection interval being common between the HollyFrontier's WDW wells and the Federal T SWD No. 1. Additionally, since HollyFrontier's wells are classified as Class I (Non-Haz), the Division must consider the potential of an approval for a pressure increase and the limitations for Class I wells as stipulated in 40 CFR 146.13. Please submit these documents to your technical staff for consideration and comment. Please contact me with any questions regarding this matter. Thank you. PRG

Phillip Goetze, PG
Engineering Bureau, Oil Conservation Division
New Mexico Energy, Minerals and Natural Resources Department
1220 South St. Francis Drive, Santa Fe, NM 87505
Direct 505.476.3466
E-mail: phillip.goetze@state.nm.us

DATE IN: 5/11/2017	SUSPENSE	ENGINEER	LOGGED IN: 5/12/17	TYPE: IPI	APP NO.: pMAM1713255697

ABOVE THIS LINE FOR DIVISION USE ONLY

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

FEDERAL T SWD #1 **Order: SWD-1135**

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

Application Acronyms:

[NSL-Non-Standard Location] [NSP-Non-Standard Proration Unit] [SD-Simultaneous Dedication]
[DHC-Downhole Commingling] [CTB-Lease Commingling] [PLC-Pool/Lease Commingling]
[PC-Pool Commingling] [OLS - Off-Lease Storage] [OLM-Off-Lease Measurement]
[WFX-Waterflood Expansion] [PMX-Pressure Maintenance Expansion]
[SWD-Salt Water Disposal] [IPI-Injection Pressure Increase]
[EOR-Qualified Enhanced Oil Recovery Certification] [PPR-Positive Production Response]

[1] **TYPE OF APPLICATION** - Check Those Which Apply for [A]

Lime Rock Resources II-A, L.P. 277558 WCV Federal T SWD #1 30-015-26404

[A] Location - Spacing Unit - Simultaneous Dedication
☐ NSL ☐ NSP ☐ SD

Check One Only for [B] or [C]

[B] Commingling - Storage - Measurement
☐ DHC ☐ CTB ☐ PLC ☐ PC ☐ OLS ☐ OLM

[C] Injection - Disposal - Pressure Increase - Enhanced Oil Recovery
☐ WFX ☐ PMX ☐ SWD ☒ IPI ☐ EOR ☐ PPR

[D] Other: Specify _____

[2] **NOTIFICATION REQUIRED TO:** - Check Those Which Apply, or ☐ Does Not Apply

[A] ☐ Working, Royalty or Overriding Royalty Interest Owners

[B] ☐ Offset Operators, Leaseholders or Surface Owner

Pool - SWD; WOLFCAMP - Cisco 96136

[C] ☐ Application is One Which Requires Published Legal Notice

[D] ☐ Notification and/or Concurrent Approval by BLM or SLO
U.S. Bureau of Land Management - Commissioner of Public Lands, State Land Office

[E] ☐ For all of the above, Proof of Notification or Publication is Attached, and/or,

[F] ☐ Waivers are Attached

[3] **SUBMIT ACCURATE AND COMPLETE INFORMATION REQUIRED TO PROCESS THE TYPE OF APPLICATION INDICATED ABOVE.**

[4] **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.

Mike Pippin	Mike Pippin	Petroleum Engineer	ay 8, 2017
Print or Type Name	Signature	Title	Date

mike@pippinllc.com
e-mail Address

LIME ROCK RESOURCES II-A, L.P.
Mike Pippin
3104 N. Sullivan Avenue
Farmington, NM 87401
505-327-4573 (phone) mike@pippinllc.com

May 8, 2017

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

RE: Injection Pressure Increase Request
Administrative Order SWD-1135
FEDERAL T SWD #1
API#: 30-015-26404
Unit Letter "A" Section 12 T18S R27E
Eddy County, New Mexico

Dear Mr. Goetze,

By administrative order SWD-1135, dated July 16, 2008, the NMOCD authorized water injection into Federal T SWD #1 (API No. 30-015-26404) for the disposal of produced water. The order provides for a wellhead injection pressure of "no more than 1480 psi". On 9/16/08, this well was converted to SWD & soon started produced water injection. Lime Rock believes that this maximum pressure of 1480 psi is significantly below the formation frac pressure.

The disposal formation in this well is extremely tight. On 5/3/17, a step rate test was run to determine the actual formation frac pressure. The formation pressure did not break at a maximum surface pressure of 2681 psi (bottom hole pressure of 4140 psi), which indicates that the formation frac pressure was not exceeded at that point. Therefore, the actual formation frac pressure is higher than a surface pressure of 2681 psi. A summary of the step rate test data from Renegade Services is attached along with a wellbore diagram.

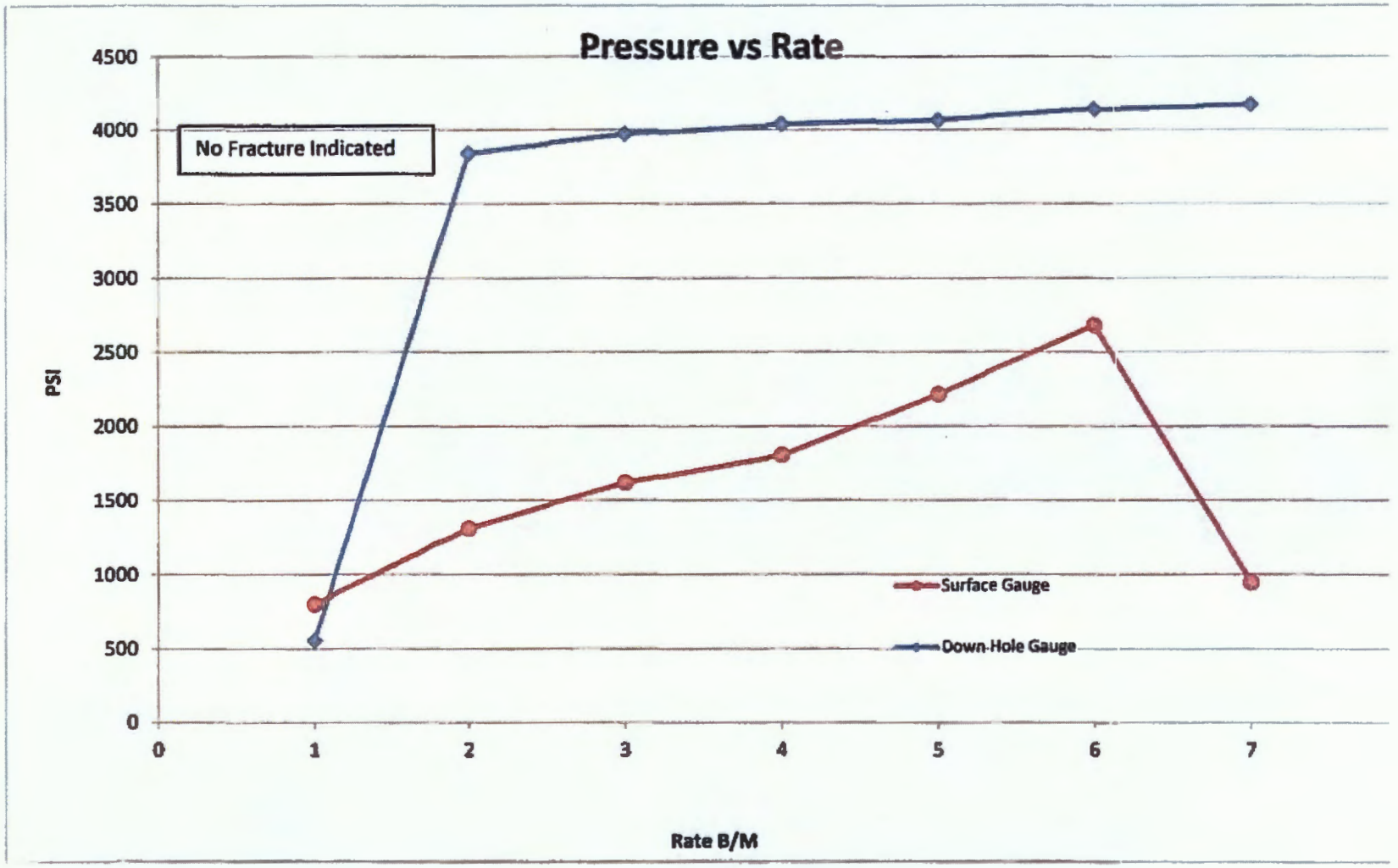
Lime Rock Resources therefore requests that the maximum wellhead injection pressure be increased to at least 2681 psi.

Please contact me at 505-327-4573 should you have any questions.

Very truly yours,

Mike Pippin P.E.
Petroleum Engineer

Enclosures


Pressure vs Rate
No Fracture Indicated
PSI
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0
1
2
3
4
5
6
7
Rate B/M
Surface Gauge
Down-Hole Gauge

RENEGADE SERVICES

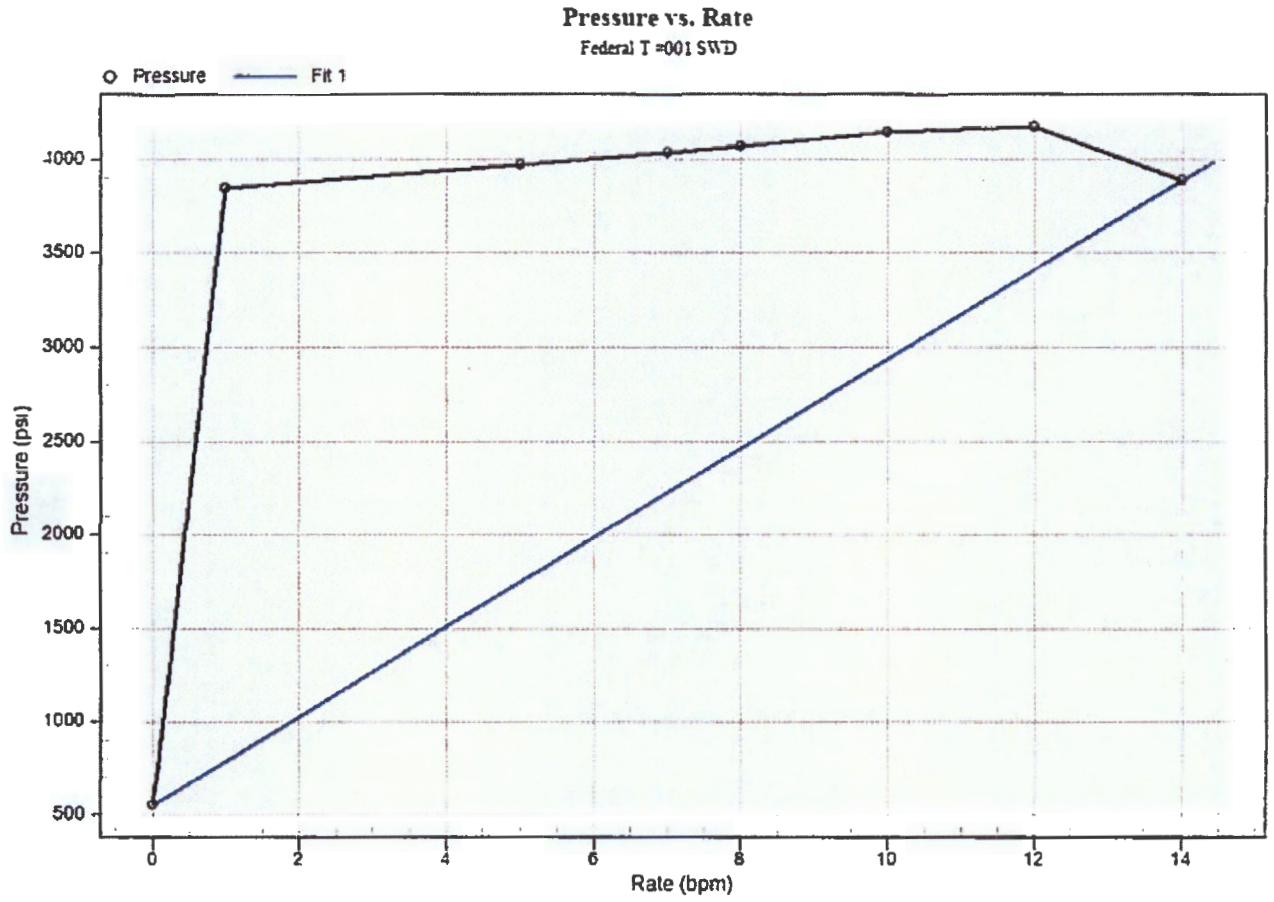
STEP RATE TEST

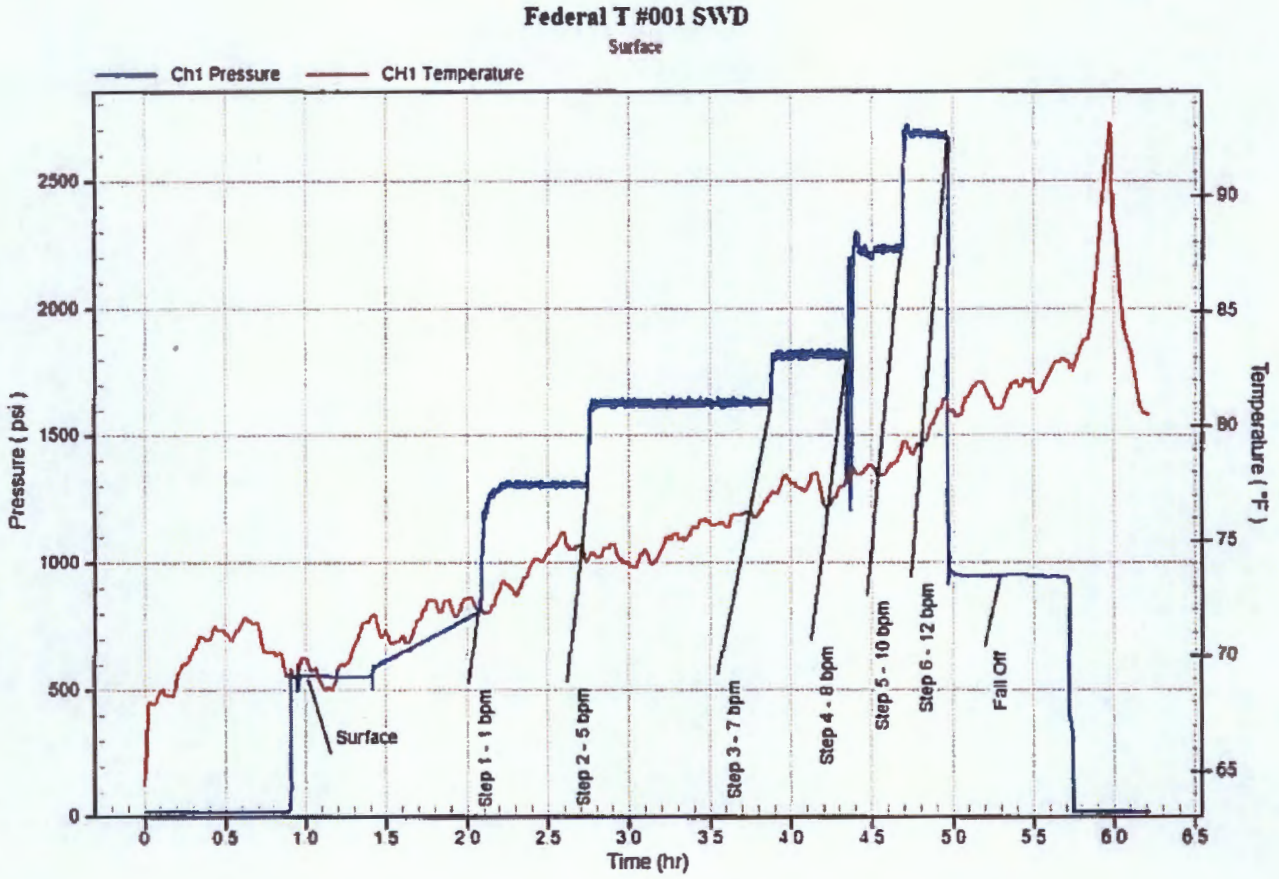
	RATE B/D	Date	Time	BH PRESS	SURF. PRESS	Comments
Step 1	1	5/3/2017	11:20 AM	558.57	801.96	
Step 2	2	5/3/2017	12:01 PM	3842.09	1311.16	
Step 3	3	5/3/2017	1:09 PM	3970.7	1619.11	
Step 4	4	5/3/2017	1:37 PM	4035.19	1803.03	
Step 5	5	5/3/2017	1:56 PM	4066.6	2219.85	
Step 6	6	5/3/2017	2:13 PM	4140.96	2681.72	
Fall Off	Fall Off	5/3/2017	2:32 PM	4169.81	944.2	

Company:	Lime Rock Resources		Recorded By:	J. Gable
Well:	Federal T #001 SWD			
Field:	LLU		Truck Number:	113
County:	Eddy, County		District:	Levelland
State:	New Mexico			
Seat Nipple Depth:	N/A			
Perforations:				
Plug Back Depth	N/A			

JOB INFORMATION SHEET

Company Information		
Company Name:	Lime Rock Resources	
Well Information		
Well Name:	Federal T #001 SWD	
Location:	Eddy County, NM	
Field – Pool.	Federal T	
Status:	SWD	
Test Information		
Type of Test:	Step Rate Test	
Gauge Depth:	6750 ft	
Temperature @ Run Depth	100.03 degF	
Surface Temperature:	68.51 degF	
Gauge Information		
	Top Recorder	Bottom Recorder
Serial Number:	79810	
Calibration Date:	10/21/16	
Pressure Range:	10000 psi	
Comments		


Pressure vs. Rate
Federal T #001 SWD
Pressure
Fit 1
4000
3500
3000
2500
2000
1500
1000
500
Pressure (psi)
0
2
4
6
8
10
12
14
Rate (bpm)


Federal T #001 SWD
Surface
Ch1 Pressure
CH1 Temperature
Pressure (psi)
Temperature (°F)
Time (hr)
Surface
Step 1 - 1 bpm
Step 2 - 5 bpm
Step 3 - 7 bpm
Step 4 - 8 bpm
Step 5 - 10 bpm
Step 6 - 12 bpm
Fall Off

DEVON ENERGY PRODUCTION COMPANY LP

Well Name FEDERAL T #1	Field NORTH ILLINOIS CAMP MORROW		
Location 660' FNL & 990' FEL, SEC 12-T18S-R27E	County EDDY	State NM	
Elevation 3634' KB; 3618' GL	Spud Date 6/28/90	Compl Date 9/13/90	
API# 30-015-26404 | Prepared by Norvella Adams	Date 9/17/08	Rev	

Current Schematic
L. Wolfcamp and Cisco SWD

17-1/2" Hole
13-3/8", 68#, LTC, @ 472'
Cmt'd w/ 450 Sx Circ to surface

12-1/4" Hole
8-5/8", J55, 32#, STC, @ 2,589'
Cmt'd w/900 Sx Circ to surface

WOLFCAMP *(8/21/93)*
6,868' - 7,038'

WOLFCAMP *(8/18/93)*
7,092' - 7,097'; 7,120' - 7,146'

WOLFCAMP *(8/16/93)*
7,330' - 7,340'; 7,350' - 7,360'

SWD Perforations:
CISCO *(8/1/93)*
7,685' - 7,695'

CISCO (8/14/08)
7758'-7840' (228 holes)

CISCO (8/13/08)
7893'-8060' (140 holes)

4" Liner top @ 9,055'

7-7/8" Hole
5-1/2", N80, 17#, LTC, @ 9,473'
Cmt'd w 430 Sx

MORROW *(9/14/90)*
10,008' - 10,014'
10,038' - 10,054'

4-3/4" Hole
4" 10.46#, L80 Liner @ 9,055' - 10,141'
Cmt'd w/80 Sx

10,141' TD

Formation Tops

Morrow 9,600-10,250'
Atoka 9,230'- 9,700'
Upper Wolfcamp 6,400' - 7,200'
Abo 5,600' - 6,200'
Yeso 3,300' 0 3,900'
San Andres 2,000' - 2,800'
Queen 1,450' - 1,650'

3-1/2", 9.3 #, N80, Injection tubing @ 6789'

5-1/2" IPC Packer @ 6,789'

Frac 7758'-7840' with 4500 gals 15% Spearhead acid and 119,255 gals Spectra Star 2500 + 106,750 # 100% 20/40 White sand.

Frac 7893'-8060' with 5040 gals 15% HCl acid and 120,372 gals Spectra Star 2500 + 167,552 # 100% 20/40 White sand

35' cement 9,005' PBD
CIBP @ 9,040' *(7/21/93)*

CIBP @ 9,950' *(7/19/93)*

10,100' PBD

HollyFrontier Class 1 Wells: Active Disposal Wells Within One-Mile AORs (All three Class 1 wells)