

Goetze, Phillip, EMNRD

From: Goetze, Phillip, EMNRD
Sent: Wednesday, February 15, 2017 9:39 AM
To: 'Bartlett, Brent'
Cc: Brown, Maxey G, EMNRD; Jones, William V, EMNRD; Martin, Ed; McMillan, Michael, EMNRD; Whitaker, Mark A, EMNRD; Inge, Richard, EMNRD; Sanchez, Daniel J., EMNRD
Subject: Cottonwood Draw 32 State SWD No. 2 - Well Integrity and Proposed Operating Plan by Devon

RE: Cottonwood Draw 32 State SWD No. 2 (API 30-025-41524) Administrative Order SWD-1459

Brent:

The Santa Fe Bureau staff discussed the content of your presentation (Devon e-mail correspondence dated February 8, 2017) with Maxey Brown, District I Supervisor, and have come to the following conclusions and recommendations:

1. The Division is satisfied that Devon has provided sufficient testing and corresponding analysis to demonstrate that the integrity issue is isolated to the 7-inch liner; that gas entering the annulus is from the Pennsylvanian section and does not, at this time, affect the mechanical integrity of the well resulting in possible impacts of Underground Sources of Drinking Water (USDWs). Devon also provided an analysis of a sample of the annular gas which showed no detectable concentrations of hydrogen sulfide.
2. That Devon has proposed a plan of well control using a weighted annular fluid along with monitoring as a means to address the integrity issue while still having the disposal well available for use.
3. The Division views this proposed plan as only a temporary solution and shall limit it's application to this well to no more than two years following commencement of injection. Prior to the end of this period, Devon shall provide an alternative remedial solution that addresses the liner leakage.

The Division understands the ability to balance the annulus pressure to achieve 0 psi at surface is difficult and offers Devon the latitude to operate the well with an annular pressure that does not exceed 200 psi.

As such, Devon shall file a C-103 NOI with the District Supervisor for his approval containing the following items:

1. A description of the well control method to be used along with specifics on the final product to be used as the annular fluid;
2. Agreement that the well will be included in the SCADA system being operated by Devon;
3. A current well completion diagram showing the final configuration including the two packers;
4. Conduct a successful MIT with bradenhead measurements to be witnessed by Division personnel before commencing injection;
5. Provisions for reporting the well's performance and any annular issues which may indicate a degradation in well control (e.g. pressure changes not related to operation, equipment failures at the well head, annular fluid losses, annular fluid releases, etc.) first for the 30 days following the commencement of injection, then followed by quarterly reporting (using standard calendar-year quarter system). These reports may be submitted on a C-103 Sundry to the District Supervisor to be included into the well file.

Devon shall assure that all logs involving this well, including the CBL discussed in the presentation, are submitted to the District prior to commencing injection.

Though Devon's proposed plan has satisfied the requirements for the protection of USDWs under the New Mexico UIC program, the plan does raise issues concerning communication between formations with high potential for future horizontal development (lower Wolfcamp) that under rule (both NMAC and Oil and Gas Act) are to be isolated. Finally, the Division continues to express concern with Devon's recent experiences in the proper completion of their Devonian disposal wells. At this time, Devon is the only operator reporting similar well integrity issues for recently drilled Devonian

disposal wells, two of these being this well and the other being the Cotton Draw Unit SWD No. 84 (API 30-015-29728). The Division requests that Devon review its procedures with the intent to avoid future well integrity problems that require monitoring.

Thank you for the presentation and the rapid reply to our questions. The content of this e-mail along with Devon's submittals will be made part of the well file and the SWD order file. Please contact either Maxey or I regarding the content of this e-mail and any additional questions regarding this well. 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



Goetze, Phillip, EMNRD

From: Bartlett, Brent <Brent.Bartlett@dvn.com>
Sent: Wednesday, February 8, 2017 4:16 PM
To: Goetze, Phillip, EMNRD
Subject: Cotton Draw 32 State SWD #2 summary slides
Attachments: 32-2 summary slides.pptx

Mr. Goetze,

Please find the attached summary slides that we discussed this afternoon for your reference. I will plan on being available for your call and to discuss any other questions tomorrow morning at 9:30am OKC / 8:30am New Mexico time.

Thank you.

Brent Bartlett

Production Engineer-Delaware BU

Devon Energy

Brent.Bartlett@dvn.com

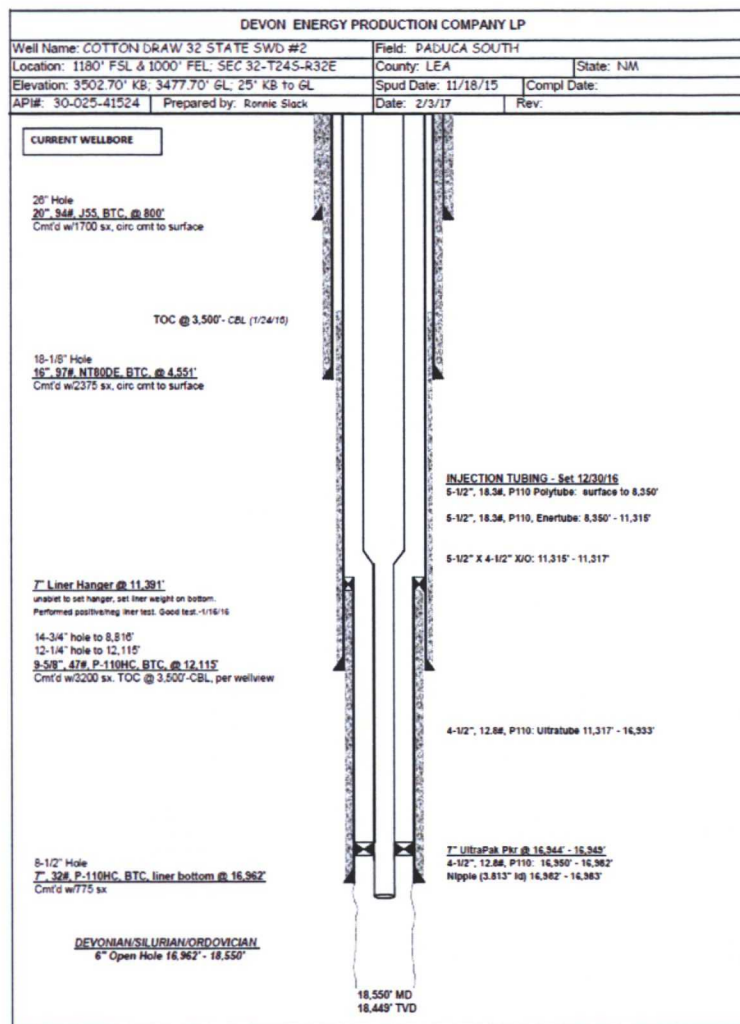
Office: 405.228.7233

Cell: 405.229.6221

Confidentiality Warning: This message and any attachments are intended only for the use of the intended recipient(s), are confidential, and may be privileged. If you are not the intended recipient, you are hereby notified that any review, retransmission, conversion to hard copy, copying, circulation or other use of all or any portion of this message and any attachments is strictly prohibited. If you are not the intended recipient, please notify the sender immediately by return e-mail, and delete this message and any attachments from your system.

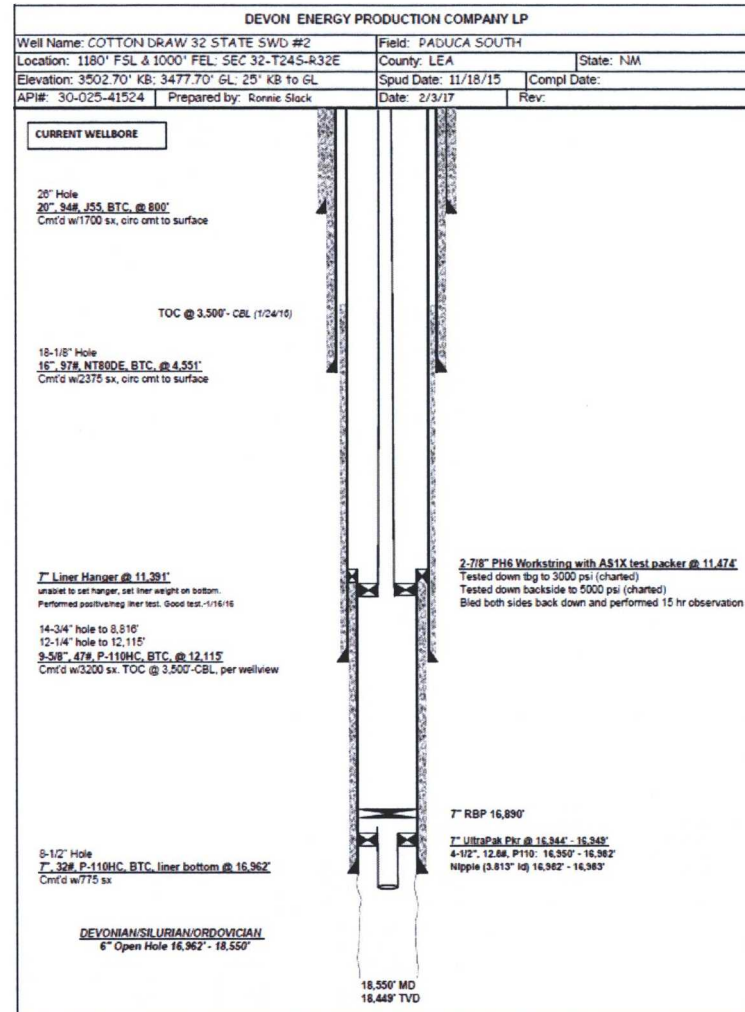
Cotton Draw 32 State SWD #2

- Pressure found on wellhead while working on facility.
- Bled down and had slight gas blow to tank.
- Pumped 390 bbls down tbg, with no pressure.
- Loaded casing w 4.3 bbls to perform MIT. Pumped 11 bbls total to pressure to 540 psi. Monitored for 32 minutes, ending pressure 565 psi.



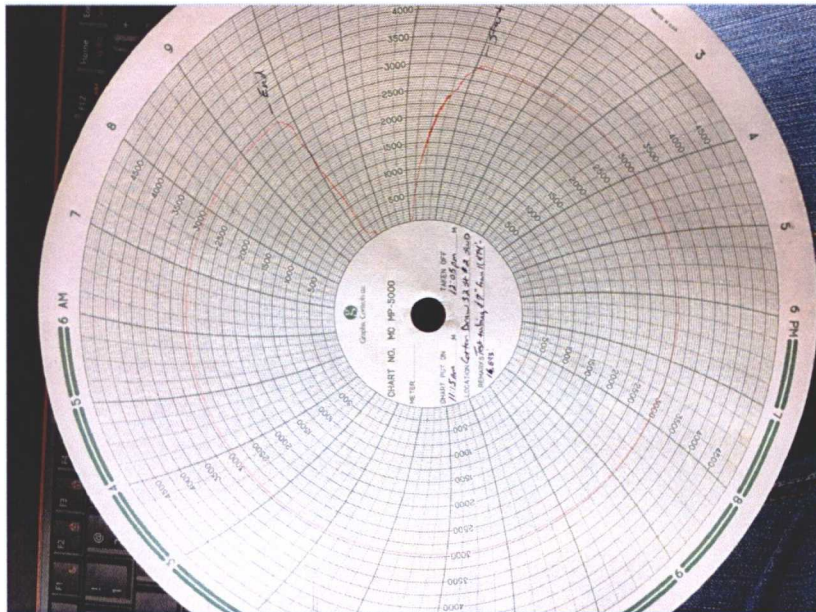
Cotton Draw 32 State SWD #2

- Tbg was pulled and 7" RBP set at 16,890'
- RIH with work string and test packer to top of 7" liner.
- Tested down tbg to test 7" liner to 3000 psi.
- Test down backside to test 9-5/8" csg and liner top packer to 5000 psi.
- Bled off and negative test for 15 hrs.
 - Tbg (Liner section) gained 355 psi
 - Backside gained 8 psi
- Confirmed pressure is coming from liner section and injection could not be established.

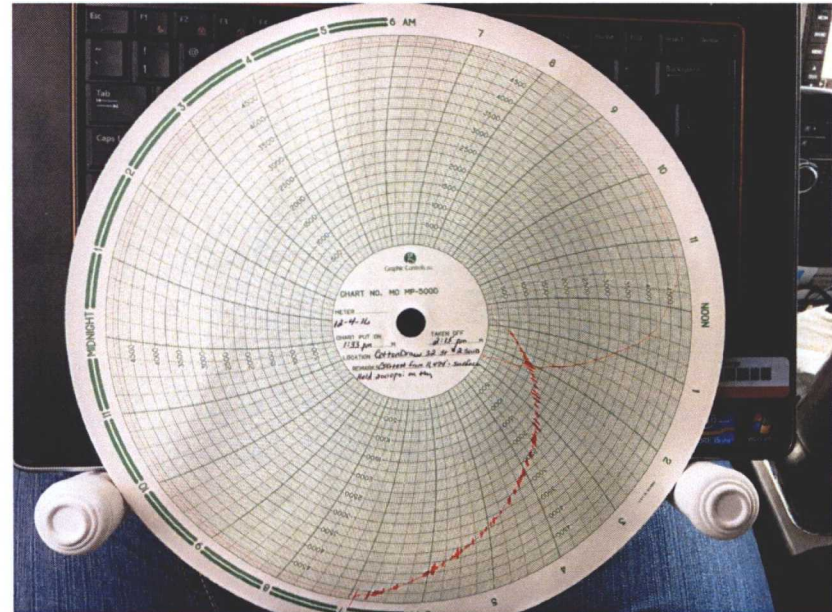


Cotton Draw 32 State SWD #2

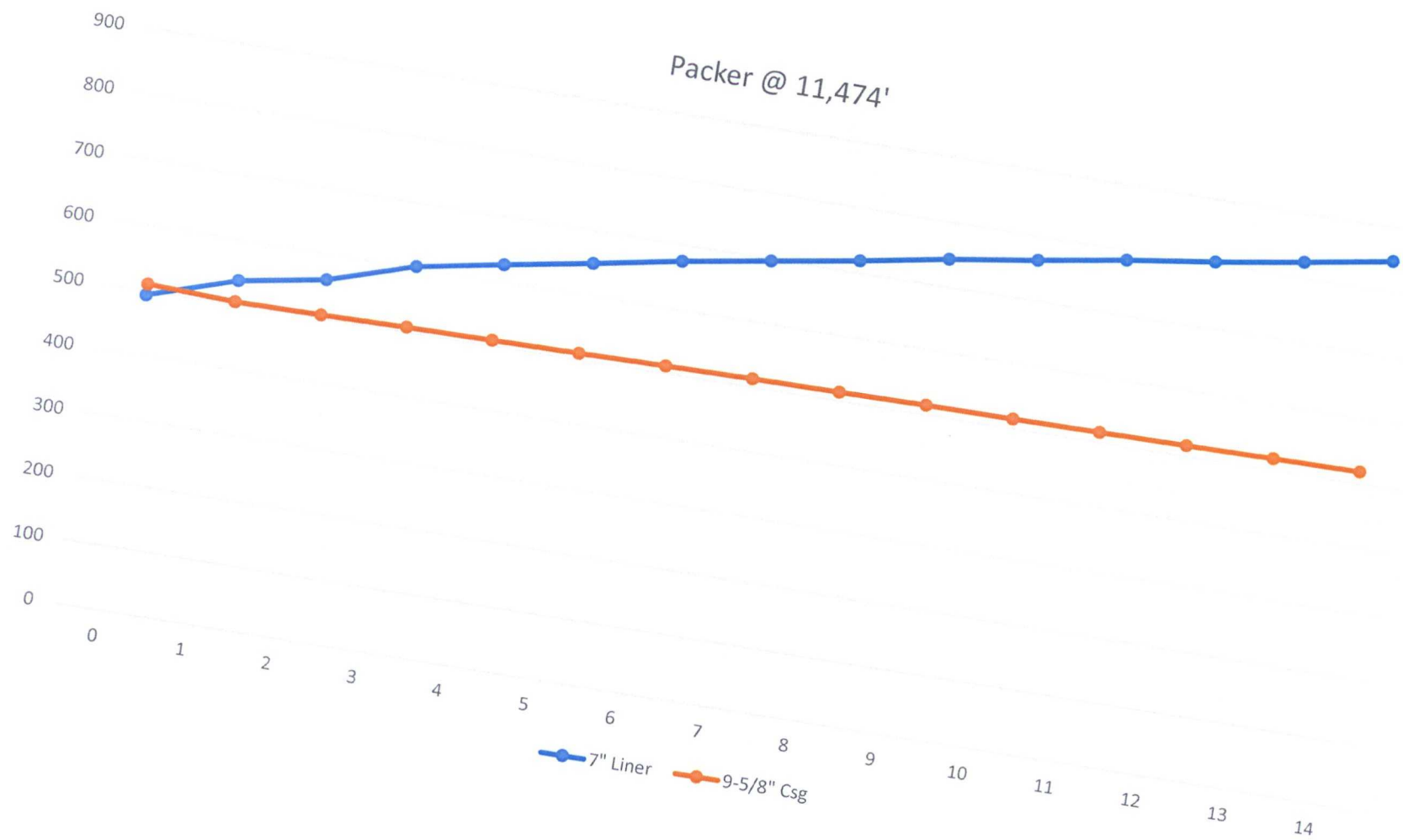
7" liner below Packer



9-5/8" Csg above Packer

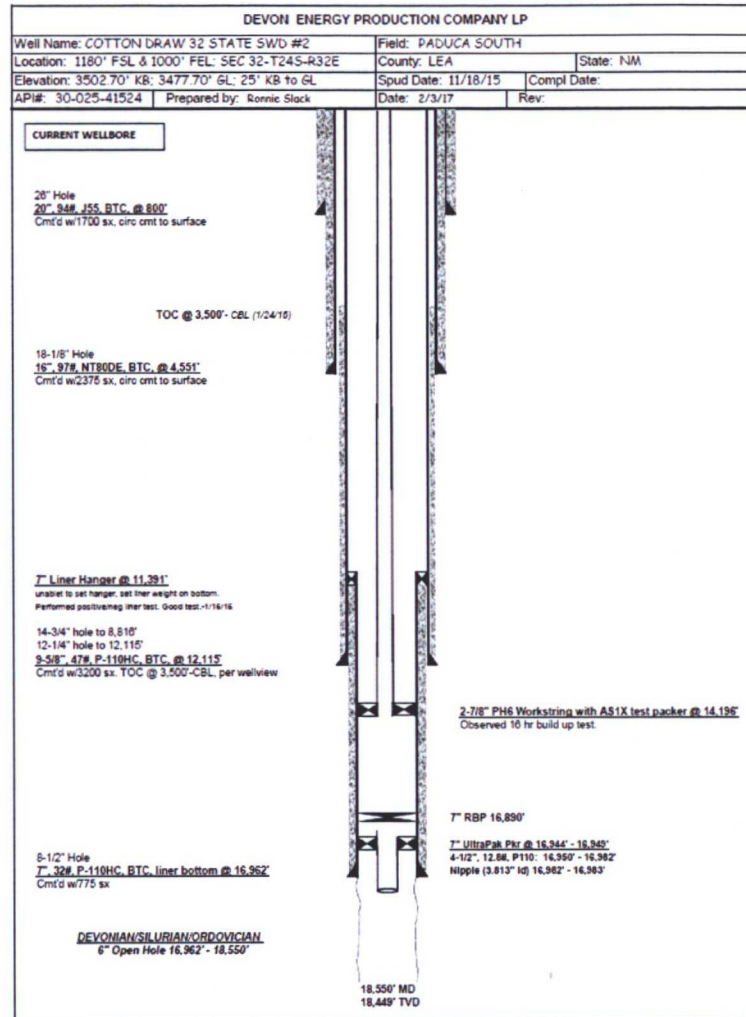


32-2- Build Up Test

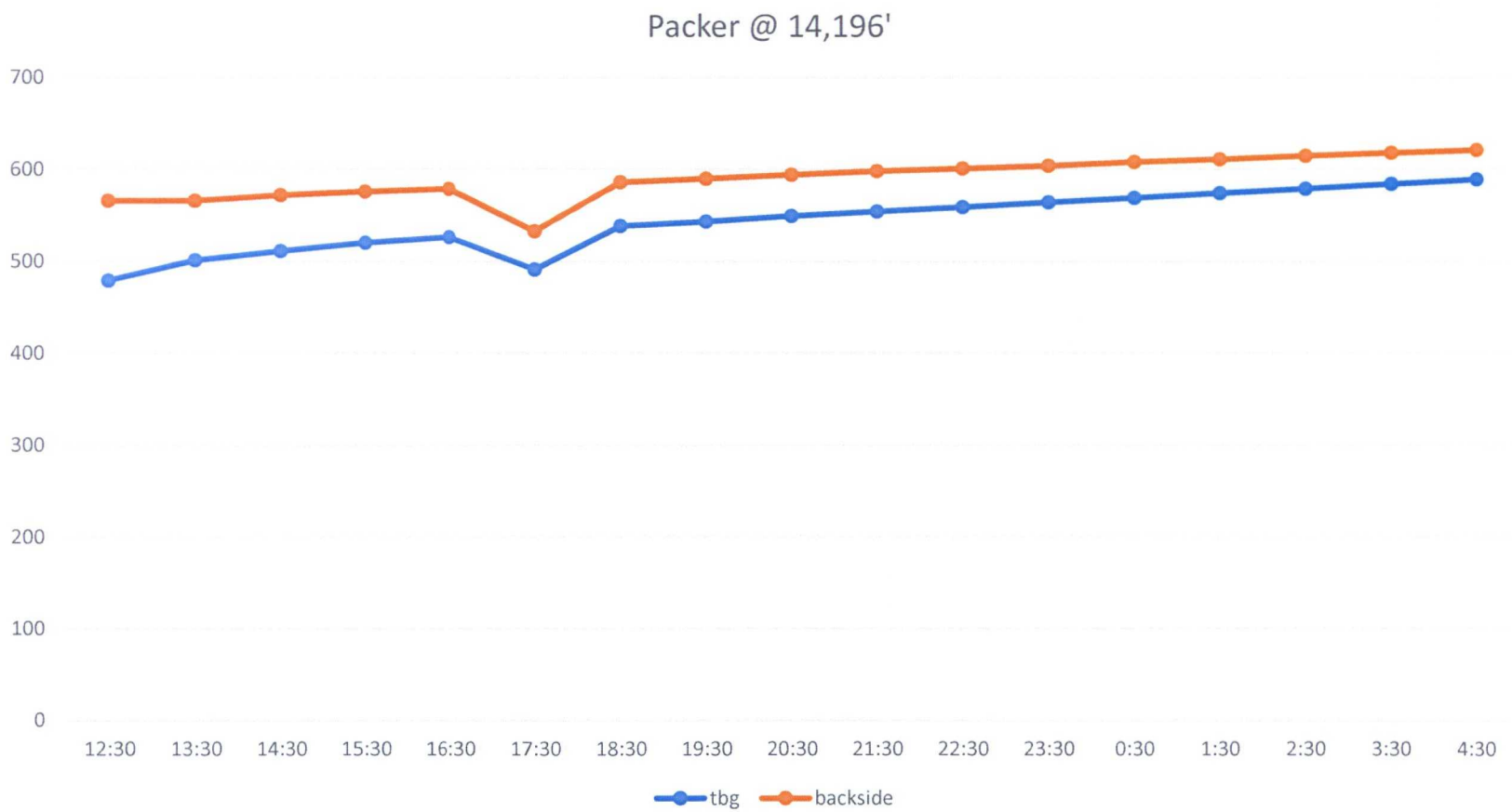


Cotton Draw 32 State SWD #2

- With build up confirmed in 7" liner section reset packer at 14,196'.
- Perform 16 hour build up.
- Saw pressure rise equally on both csg and tbg indicating multiple leaks.
- Believed to be from BTC connections used in liner sections which are not gas tight.

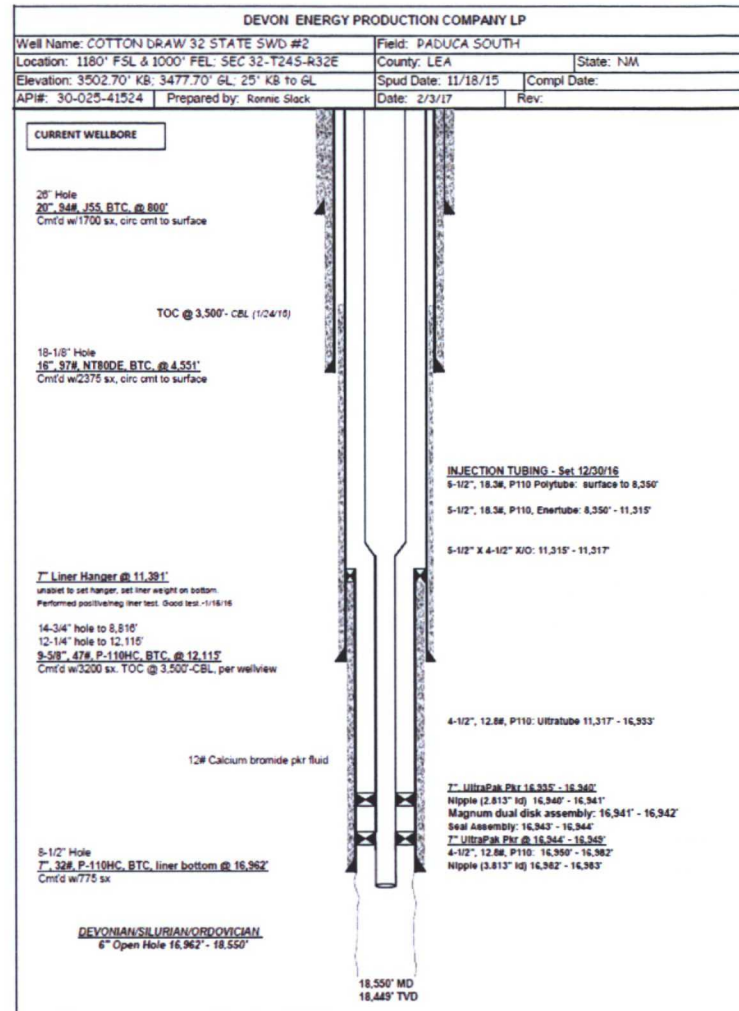


32-2- Build Up Test



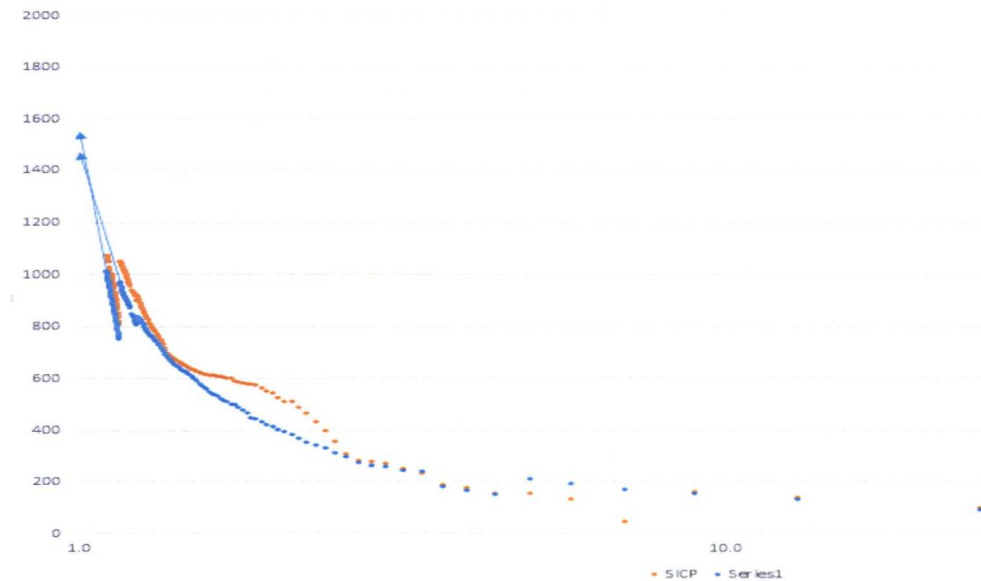
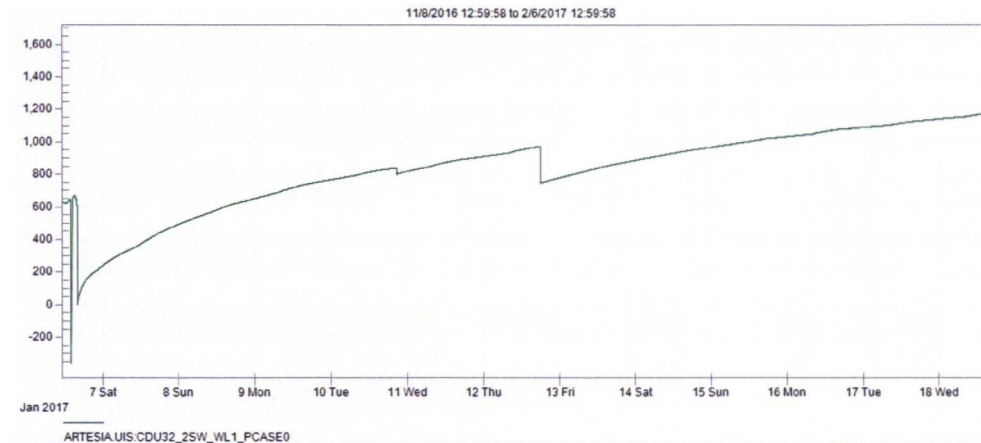
Cotton Draw 32 State SWD #2

- Made decision to run injection tbg back in hole.
- Had to run 2nd packer to be able to get packer fluid on backside due to profile nipple size and tbg ID restriction from lining.
- 2nd packer is stung into 1st packer with seal assembly.
- Dual disc sub ran in second packer assembly to displace packer fluid. (still in tact)
- 12 # Calcium Bromide packer fluid circulated around on the backside and rig down to observe pressure.



Cotton Draw 32 Sate SWD #2

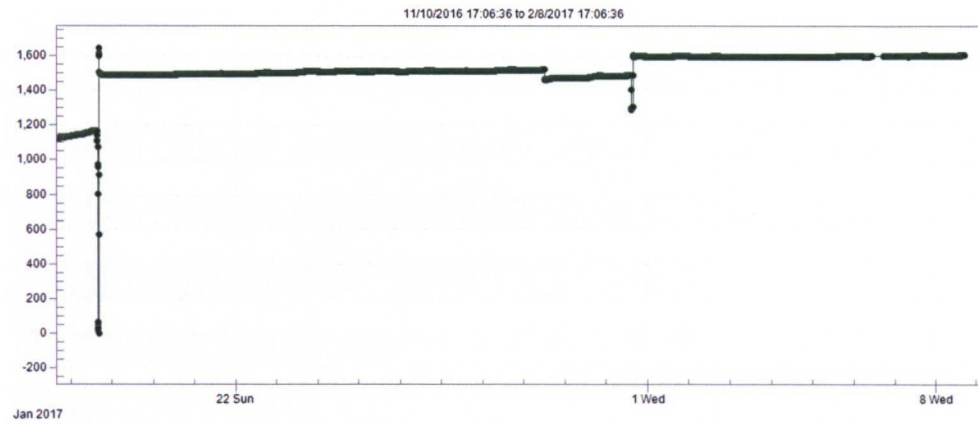
- Pressure continued to rise following workover.
- Bled off pressure, only gas. No fluid.
- Plotted data on Horner plot and determined a 1600 psi max pressure build.



Cotton Draw 32

Sate SWD #2

- To confirm max pressure projection from Horner plot, the well was bled off to remove any gas cap that had migrated and then 1500 psi was put on the well with a pump truck. Pressure remained constant
- Pressure was bled off and loaded and pressured to confirm fluid wasn't leaking off. (only took 1 bbl to load)
- 1600 additional psi would be equivalent to the hydrostatic of a 14.7 ppg fluid at the liner top. (11,391').
- This test shows that we have integrity and that heavy weight packer fluid would keep pressure in check.



Conclusion

- Devon is seeking approval to use 14.8 ppg Calcium Bromide brine (with oxygen scavenger, biocide, and corrosion inhibitor additives) as the annular packer fluid. We feel the diagnostic work done to date demonstrates casing integrity for any positive mechanical integrity testing concerns and still allows us the ability to monitor down to the injection packer(s) that are within the required proximity to the injection interval.

Goetze, Phillip, EMNRD

From: Bartlett, Brent <Brent.Bartlett@dvn.com>
Sent: Thursday, February 9, 2017 12:27 PM
To: Goetze, Phillip, EMNRD
Subject: Cotton Draw 32 State SWD #2 Gas Analysis
Attachments: COTTON DRAW 32-2 (WELLHEAD).pdf

Mr. Goetze,

During our phone call earlier today it was asked if we had a gas analysis from the backside pressure on our 32-2 SWD. I have found the analysis from the sample that was taken prior to our diagnostic work over efforts and wanted to pass it along. I'm not sure who on the call was requesting it but trust if it was someone else other than yourself you can get this to them since I don't have the email addresses of the others on the call.

Thanks.

Brent Bartlett

Production Engineer-Delaware BU

Devon Energy

Brent.Bartlett@dvn.com

Office: 405.228.7233

Cell: 405.229.6221

Confidentiality Warning: This message and any attachments are intended only for the use of the intended recipient(s), are confidential, and may be privileged. If you are not the intended recipient, you are hereby notified that any review, retransmission, conversion to hard copy, copying, circulation or other use of all or any portion of this message and any attachments is strictly prohibited. If you are not the intended recipient, please notify the sender immediately by return e-mail, and delete this message and any attachments from your system.

Natural Gas Analysis Report

AKM Measurement Services

Sample Information

Sample Information	
Sample Name	COTTON DRAW 32-2 (WELLHEAD)
Injection Date	2016-11-16 17:09:54

Component Results

Component Name	Norm%	GPM (Dry) (Gal. / 1000 cu.ft.)	
Nitrogen	0.7022	0.000	
Methane	93.7494	0.000	
CO2	0.0099	0.000	
Ethane	3.5493	0.951	
H2S	0.0000	0.000	
Propane	0.8521	0.235	
iso-Butane	0.1667	0.055	
n-Butane	0.2988	0.094	
iso-Pentane	0.1371	0.050	
n-Pentane	0.1420	0.052	
Hexanes Plus	0.3925	0.171	
Water	0.0000	0.000	
Total:	100.0000	1.608	

Results Summary

Result	Dry	Sat.	
Pressure Base (psia)	14.730		
Flowing Temperature (Deg. F)	82.0		
Flowing Pressure (psia)	168.0		
Gross Heating Value (BTU / Real cu.ft.)	1082.7	1064.2	
Relative Density (G), Real	0.6062	0.6067	
Total GPM	1.608	1.680	
Total Molecular Weight	17.521	17.530	