

State of New Mexico
Energy, Minerals and Natural Resources Department



Oil Conservation Division
UIC Program

Copy of Division e-mail correspondence to Apache concerning the use of dual-packer systems in waterflood operations at:

1. **East Blinebry Drinkard Unit (EBDU):**
Hearing Order No. R-12394 / Case No. 13503
2. **West Blinebry Drinkard Unit (WBDU):**
Hearing Order No. R-12981 / Case No. 14126
3. **Northeast Drinkard Unit (NEDU):**
Hearing Order No. R-8541 / Case No. 9232

Submitted for the record by P. Goetze, Engineering Bureau, 05/10/2017

From: Goetze, Phillip, EMNRD
Sent: Wednesday, May 10, 2017 10:10 AM
To: 'Gaines, Dean'
Cc: Brown, Maxey G, EMNRD; Jones, William V, EMNRD; McMillan, Michael, EMNRD; Lowe, Leonard, EMNRD
Subject: Use of Dual Packer System in the WBDU, EBDU and NEDU Waterfloods
Attachments: OCD Example WBDU #137 Dual.pdf

Dean:

After some discussion and numerous delays, the Bureau has had some time to review your request: Can a dual packer system be used as an alternative completion for the injection wells in the three referenced waterflood operations?

Currently, Division has approved the use of dual-packer strings in injection operations in the Vacuum Glorieta West Unit operated by Chevron. The use of the dual-packer system allowed Chevron to better concentrate the injection pressure to a producing interval while isolating a shallower interval with no contribution to the waterflood. In this case, the use of the dual-packer system in several wells resulted in an administrative issue regarding the "100-foot" packer setting limitation for these wells. Chevron was requested by Division to apply for a WFX order for the wells utilizing dual packers and the Division issued WFX-940 to resolve the setting depths.

With regards to the use of dual-packer sets in the WBDU, the Unitized Interval (as defined in the Unit Agreement and corresponding hearing order No. R-12981; Ordering Paragraph (3)) includes the entire stratigraphic Blinebry-Tubb-Drinkard interval as represented by the North Eunice Blinebry-Tubb-Drinkard Pool. So injection into entire interval is allowed under the authority of R-12981. In the example provided, WBDU #137 (30-025-39574) would have an upper packer (for MIT compliance of the well and isolation of inactive perfs) located at 5716 feet and the second packer (for injection control of the active WF perfs) at 6480 feet. Based on the well diagram, the upper packer is located below the limit provided in order WFX-857 (below 5560 feet) and the remaining packer system is within interval provided in WFX-857 (5560 feet to 6570 feet).

The only compliance issue becomes the "100-foot" setting distance. Using the language in R-12981 [Ordering Paragraph (12) with "*a seal bore assembly set within 100 feet of the uppermost injection perforation*" versus WFX-857 wording of "*packer located within the 100 feet of the injection intervals*"] and after discussion with District personnel who are responsible for UIC inspections, the upper or first packer would be the packer setting to assess compliance with the order. The distance between this packer's setting depth and the uppermost active perforations would be the test for setting within 100 feet (see attachment for example of WBDU #137). The uppermost active perforations will be the Blinebry perfs which are still "active", in this usage – have not been sealed off by casing or squeezed with cement, even though the EOR activities are focused on the deeper Drinkard perforations. So for the example provided with WBDU #137, no exception would be for the 100-foot distance.

As for the EBDU and NEDU waterfloods:

- The Northeast Drinkard Unit has the same general description of the "Unitized Interval" (with a different type log for correlation) and the same pool. Order No. R-8541 gives the packer setting depth "as near as practicable to the uppermost perforations". In most instances, the Division will insist on the 100-foot distance for use in assessing compliance. 
- The East Blinebry Drinkard Unit also has the same general description of the "Unitized Interval" (again a different type log for correlation) and the same pool. Order No. R-12394 gives the packer setting depth as limited to the 100-foot distance to the uppermost perfs or open-hole.

Summary: Division would approve the use of dual packer assembly (without additional remedial cementing or casing) in all three EOR projects as long as the existing well construction can be used with compromise to the well's integrity and the use is within the limits of the respective Unitized Interval. Where there is an issue with the packer setting and distance to the uppermost perforations, these will be handled on a case-by-case basis with the opportunity for the issuance of Packer Setting Depth Exception letters by Division to resolve these items. Additionally, the Division is recommending the following guidance with dual-packer assembly use:

1. The dual-packer assembly must be set within the defined interval (Unitized Interval) for each respective EOR project. If the upper packer is not within the upper limit of the Unitized Interval, then an exception through an order or letter request must be submitted to the Director (hopefully following discussion between Apache and the Division to review the situation).
2. The MIT requirements [for testing prior to returning to operation] are still in effect if either packer is re-seated or relocated.
3. Apache shall provide a final construction diagram with the installation of any dual-packer assembly approved by District.

Remember, this application of packers is effective for those wells under the Division's authority. The BLM may have another opinion, based on Onshore No. 2, on this subject. If you have any questions about the content or specific concerns, please contact me at your convenience. And sorry about the delay. PRG

Phillip Goetze, PG

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From: Gaines, Dean [mailto:Dean.Gaines@apachecorp.com]
Sent: Thursday, March 30, 2017 3:55 PM
To: Goetze, Phillip, EMNRD <Phillip.Goetze@state.nm.us>
Subject: FW: Dual packer system WBDU

Good afternoon Phillip,

Please take a look at our engineers comments and WBD. Let me know your thoughts on us running a dual packer system at WBDU, NEDU, and EBDU vs liners or trying to squeeze off the Blinbry & Tubb.

Hope you are doing well and enjoying spring in the mountains (I'm a bit jealous as the sand has been blowing here).

As always, thank you for your time and advise.

DEAN GAINES

direct 432-818-1803 | mobile 432-661-0160

From: Hasselbach, Kris
Sent: Monday, March 27, 2017 4:36 PM

To: Gaines, Dean <Dean.Gaines@apachecorp.com>
Cc: Fisher, Reesa <Reesa.Fisher@apachecorp.com>
Subject: Dual packer system WBDU

Dean,

I know we discussed this briefly but I wanted to remind you about trying to run a dual packer assembly in the well that I've attached. I've also added a possible configuration which is how Tommy is running his in the GCDU. A mechanically set packer would be set above the Blinbry and the lower packer would be hydraulically set above the Drinkard. None of the Blinbry/Tubb would be squeezed and therefore all of them would be active according to the injection permit. This design would save money since we wouldn't have to squeeze any perms. This is not a federal well but if we could get away with this downhole design on a federal well, that would be a huge benefit (Assuming the casing is new or in good condition). Let me know what you think!

Thanks,

Kris

KRIS HASSELBACH

PRODUCTION ENGINEER I

Permian Region

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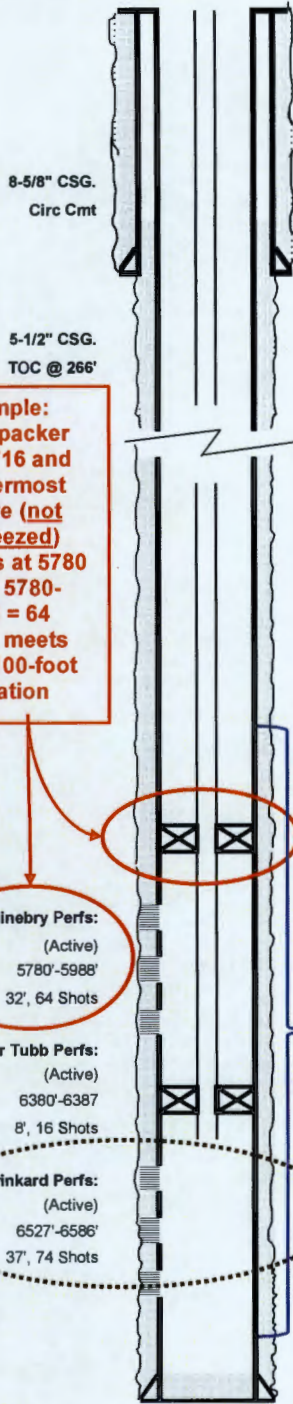
U.S.A.

Apache Corporation

WBDU #137W



WELL DIAGRAM (CURRENT CONFIGURATION)



Example:
Top packer
at 5716 and
uppermost
active (not
squeezed)
perfs at 5780
feet: 5780-
5716 = 64
feet; meets
the 100-foot
limitation

PACKER ASSEMBLY

5716 feet

Blinebry Perfs:
(Active)
5780'-5988'
32', 64 Shots

Lwr Tubb Perfs:
(Active)
6380'-6387
8', 16 Shots

Drinkard Perfs:
(Active)
6527'-6586'
37', 74 Shots

**"Unitized
Interval"**
(WFX-857:
5560 to 6750)

6480 feet

Target waterflood formation within Unitized Interval

PBTD: 6,866.0

TD: 6,914.0

WELL NAME: WBDU #137W		API: 30-025-39574			
LOCATION: 680' FSL, 2130' FEL, Unit 0, Sec 4, T-21S, R-37E		COUNTY: Lea Co., NM			
SPUD/TD DATE: 1/9/2010 - 1/15/2010		COMP. DATE: 2/5/2010			
PREPARED BY: Kris Hasselbach		DATE: 1/4/2017			
TD (ft): 6,914.0	KB Elev. (ft): 3482.0	KB to Ground (ft) 11.0			
PBTD (ft): 6,866.0	Ground Elev. (ft): 3471.0				
CASING/TUBING	SIZE (IN)	WEIGHT (LB/FT)	GRADE	DEPTHS (FT)	
Surface Casing	8 5/8" (Cmt. w/ 650 sx., Circ.)	24.00	K-55	0.00	1,307.00
Prod Casing	5 1/2" (Cmt. w/ 1500sx) TOC @ 266'	17.00	K-55/L-80	0.00	6,914.00
Injection Tubing	2-3/8" IPC	4.70	J-55	0.00	5,716.00

INJECTION TBG STRING

ITEM	DESCRIPTION	LENGTH (FT)	Btm (FT)
1	175 JTS 2-3/8" IPC Tubing		
2	Baker Lok-set packer w/on-off tool		5,716.00
3	Hydraulic Set Packer		6,480.00
4	EOT		6,510.00
5			
6			
7			
8			
9			
10			

PERFORATIONS

Form.	Intervals	FT	SPF
Blinebry	5780, 84-90, 94-97, 5803, 10-14, 64-69, 5966-70, 86-88	32	2
Lwr Tubb	6380-87 (Out of Zone)	8	2
Drinkard	6527, 66, 6633, 36, 40, 44-50, 56, 82-88, 6704, 06, 11, 24-30, 48, 51, 61, 63, 70, 77, 86	37	2

MAVERICK

OIL TOOLS

Apache

GCDU #121 W

Company Rep.
Sales Rep.

Bo Langley
Brad Birchfield

24-Jun-16

Proposed Installation			
Installation	Description	OD	ID
	2.375" Tubing	2.375	1.995
	7" x 2.375" Overshot SS seal body Nickel J-body	6.000	1.995
	2.875" SS 1.875" Stinger	2.620	1.875
	7" x 2.875" Nickel Plated AS1x Mechanical set packer Right hand set / right hand release	6.000	2.000
	Perfs		
	558' of wrapped 2.375" tubing	2.375	1.995
	5" x 2.375" DLH Hyd set nickel plated packer Hyd set / shear release	4.125	1.995
	6' 2.375" sub nickel plated	2.375	1.995
	2.375" Ball drop Pump out Plug 1.50" Ball to set Hyd packer	3.72	1.995
Filename: GCDU # 121W			