



NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 12 2015

RECEIVED

30-025-42055

Apache Corporation

Lea County, NM

Sec 6, T18S, R35E

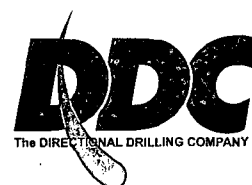
Warn State AC #27

Wellbore #1

Survey: MWD Survey

DDC Survey Report

26 January, 2015



MAR 26 2015



Survey Certification Sheet

Apache Corporation
Company

WT-141340
Job Number

1/26/15
Date

Sec6, T18S, R35E
Lease

Warn State AC #27
Well Name

Lea, NM
County & State

API: 30-025-42055

Surveyed from a depth of: 5504 feet to 10517 feet MD

Type of Survey: MWD

Directional Supervisor/Surveyor: Mike Farish

The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by **The Directional Drilling Company (DDC)**. This report represents a true and correct Directional survey of this well based on the original data obtained at the well site. Wellbore Coordinates are calculated using minimum curvature.

Bryon Reed
MWD General Manager

Bryon Reed

Digitally signed by Bryon Reed
DN: cn=Bryon Reed, o=DDC, ou,
email=Bryon.reed@directionaldril
lers.com, c=US
Date: 2015.01.26 14:24:17 -06'00'



HP
Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well Warn State AC #27
Project:	Lea County, NM	TVD Reference:	Well @ 3991.5usft (Performance #3)
Site:	Sec 6,T18S, R35E	MD Reference:	Well @ 3991.5usft (Performance #3)
Well:	Warn State AC #27	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Project	Lea County, NM		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Sec 6,T18S, R35E		
Site Position:	Map	Northing:	649,655.00 usft
From:		Easting:	756,923.20 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 46' 59.529 N
		Longitude:	103° 29' 50.507 W
		Grid Convergence:	0.45 °

Well	Warn State AC #27		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 46' 59.529 N
		Longitude:	103° 29' 50.507 W
		Ground Level:	3,972.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	12/28/2014	7.15
			Dip Angle
			(°)
			60.62
			Field Strength
			(nT)
			48,601

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			276.94

Survey Program	Date 1/8/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
86.0	5,504.0	Gyro (Wellbore #1)	Good_gyro
5,594.0	10,517.0	MWD Survey (Wellbore #1)	MWD default
			Description
			Good Gyro
			MWD - Standard

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)
Tie-In @ 5504' MD / 5503' TVD									
5,504.0	0.83	72.73	5,503.3	-31.3	25.1	-28.7	0.00	0.00	0.00
5,594.0	0.80	37.30	5,593.3	-30.6	26.1	-29.6	0.55	-0.03	-39.37
5,658.0	0.90	35.80	5,657.3	-29.8	26.6	-30.0	0.16	0.16	-2.34
5,721.0	1.10	39.60	5,720.3	-29.0	27.3	-30.6	0.33	0.32	6.03
5,785.0	1.10	41.50	5,784.3	-28.0	28.1	-31.3	0.06	0.00	2.97
5,848.0	1.10	49.90	5,847.3	-27.2	29.0	-32.0	0.26	0.00	13.33
5,912.0	0.90	50.30	5,911.2	-26.5	29.8	-32.8	0.31	-0.31	0.63
5,975.0	1.20	50.40	5,974.2	-25.8	30.7	-33.6	0.48	0.48	0.16



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Well:	Warn State AC #27	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,038.0	1.20	48.00	6,037.2	-24.9	31.7	-34.5	0.08	0.00	-3.81
6,102.0	0.40	326.10	6,101.2	-24.3	32.1	-34.8	1.89	-1.25	-127.97
6,165.0	1.50	272.30	6,164.2	-24.0	31.1	-33.8	2.07	1.75	-85.40
6,228.0	2.60	274.90	6,227.2	-23.9	28.9	-31.6	1.75	1.75	4.13
6,292.0	4.40	281.10	6,291.0	-23.3	25.0	-27.7	2.87	2.81	9.69
6,355.0	5.70	281.30	6,353.8	-22.2	19.6	-22.1	2.06	2.06	0.32
6,418.0	6.30	282.80	6,416.5	-20.8	13.2	-15.6	0.98	0.95	2.38
6,482.0	6.90	284.00	6,480.0	-19.1	6.0	-8.3	0.96	0.94	1.88
6,545.0	7.00	285.00	6,542.6	-17.2	-1.4	-0.7	0.25	0.16	1.59
6,608.0	6.80	278.70	6,605.1	-15.7	-8.8	6.8	1.24	-0.32	-10.00
6,672.0	6.70	275.00	6,668.7	-14.8	-16.2	14.3	0.70	-0.16	-5.78
6,735.0	6.90	276.80	6,731.2	-14.0	-23.7	21.8	0.46	0.32	2.86
6,799.0	6.70	272.80	6,794.8	-13.4	-31.2	29.4	0.80	-0.31	-6.25
6,862.0	5.70	275.70	6,857.4	-12.9	-38.0	36.2	1.66	-1.59	4.60
6,925.0	5.50	278.00	6,920.1	-12.1	-44.1	42.3	0.48	-0.32	3.65
6,989.0	5.50	280.90	6,983.8	-11.1	-50.1	48.4	0.43	0.00	4.53
7,052.0	5.60	281.50	7,046.5	-9.9	-56.1	54.5	0.18	0.16	0.95
7,116.0	5.80	284.40	7,110.2	-8.5	-62.3	60.8	0.55	0.31	4.53
7,179.0	5.80	277.80	7,172.9	-7.3	-68.5	67.2	1.06	0.00	-10.48
7,243.0	6.10	271.40	7,236.5	-6.8	-75.1	73.8	1.14	0.47	-10.00
7,306.0	6.30	271.30	7,299.2	-6.6	-81.9	80.6	0.32	0.32	-0.16
7,370.0	6.70	275.50	7,362.8	-6.2	-89.2	87.8	0.97	0.63	6.56
7,433.0	6.90	279.50	7,425.3	-5.2	-96.6	95.2	0.82	0.32	6.35
7,497.0	7.10	279.70	7,488.8	-3.9	-104.3	103.0	0.31	0.31	0.31
7,560.0	6.70	279.10	7,551.4	-2.7	-111.7	110.6	0.65	-0.63	-0.95
7,624.0	6.40	282.30	7,615.0	-1.3	-118.9	117.9	0.74	-0.47	5.00
7,687.0	6.80	284.30	7,677.5	0.4	-125.9	125.1	0.73	0.63	3.17
7,750.0	6.90	284.60	7,740.1	2.2	-133.2	132.5	0.17	0.16	0.48
7,813.0	5.30	277.30	7,802.7	3.6	-139.8	139.2	2.82	-2.54	-11.59
7,876.0	5.10	278.40	7,865.5	4.3	-145.4	144.9	0.35	-0.32	1.75
7,940.0	5.10	278.90	7,929.2	5.2	-151.0	150.6	0.07	0.00	0.78
8,003.0	5.10	275.30	7,992.0	5.9	-156.6	156.2	0.51	0.00	-5.71
8,067.0	4.80	280.20	8,055.7	6.6	-162.1	161.7	0.81	-0.47	7.66
8,130.0	5.80	275.60	8,118.5	7.4	-167.8	167.5	1.72	1.59	-7.30
8,193.0	6.50	275.90	8,181.1	8.1	-174.5	174.2	1.11	1.11	0.48
8,256.0	6.40	277.10	8,243.7	8.9	-181.6	181.3	0.27	-0.16	1.90
8,320.0	6.40	276.40	8,307.3	9.7	-188.7	188.5	0.12	0.00	-1.09
8,383.0	6.20	279.10	8,369.9	10.7	-195.5	195.4	0.57	-0.32	4.29
8,447.0	6.10	279.70	8,433.6	11.8	-202.3	202.2	0.19	-0.16	0.94
8,510.0	6.00	280.60	8,496.2	12.9	-208.8	208.8	0.22	-0.16	1.43



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Well:	Warn State AC #27	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
8,574.0	6.00	279.50	8,559.9	14.1	-215.4	215.5	0.18	0.00	-1.72	
8,637.0	5.80	281.10	8,622.5	15.3	-221.8	222.0	0.41	-0.32	2.54	
8,700.0	5.70	282.50	8,685.2	16.6	-227.9	228.3	0.27	-0.16	2.22	
8,763.0	5.70	283.80	8,747.9	18.0	-234.0	234.5	0.20	0.00	2.06	
8,827.0	5.40	284.50	8,811.6	19.5	-240.0	240.6	0.48	-0.47	1.09	
8,890.0	5.20	285.80	8,874.3	21.0	-245.7	246.4	0.37	-0.32	2.06	
8,954.0	5.10	284.90	8,938.1	22.5	-251.2	252.1	0.20	-0.16	-1.41	
9,017.0	4.90	287.90	9,000.8	24.1	-256.5	257.5	0.52	-0.32	4.76	
9,081.0	5.40	273.90	9,064.6	25.1	-262.1	263.2	2.11	0.78	-21.88	
9,144.0	5.70	267.80	9,127.3	25.2	-268.2	269.2	1.05	0.48	-9.68	
9,207.0	5.80	270.30	9,190.0	25.1	-274.5	275.5	0.43	0.16	3.97	
9,270.0	5.60	271.50	9,252.6	25.2	-280.7	281.7	0.37	-0.32	1.90	
9,334.0	5.70	271.90	9,316.3	25.4	-287.0	288.0	0.17	0.16	0.63	
9,397.0	6.70	277.60	9,379.0	26.0	-293.8	294.8	1.86	1.59	9.05	
9,460.0	6.90	276.90	9,441.5	26.9	-301.2	302.2	0.34	0.32	-1.11	
9,523.0	6.50	287.70	9,504.1	28.5	-308.3	309.5	2.09	-0.63	17.14	
9,586.0	6.30	289.10	9,566.7	30.7	-315.0	316.4	0.40	-0.32	2.22	
9,649.0	5.80	282.90	9,629.4	32.5	-321.4	322.9	1.30	-0.79	-9.84	
9,712.0	5.80	283.30	9,692.0	34.0	-327.6	329.3	0.06	0.00	0.63	
9,776.0	5.20	285.30	9,755.7	35.5	-333.5	335.4	0.98	-0.94	3.13	
9,839.0	5.00	288.70	9,818.5	37.1	-338.9	340.9	0.58	-0.32	5.40	
9,902.0	5.40	284.10	9,881.2	38.7	-344.4	346.5	0.92	0.63	-7.30	
9,966.0	5.90	280.70	9,944.9	40.0	-350.5	352.8	0.94	0.78	-5.31	
10,029.0	6.40	282.70	10,007.6	41.4	-357.1	359.5	0.86	0.79	3.17	
10,092.0	6.00	286.30	10,070.2	43.1	-363.7	366.2	0.89	-0.63	5.71	
10,155.0	6.60	283.80	10,132.8	44.9	-370.4	373.1	1.05	0.95	-3.97	
10,217.0	7.30	281.80	10,194.3	46.6	-377.7	380.5	1.19	1.13	-3.23	
10,281.0	7.00	281.60	10,257.8	48.2	-385.5	388.5	0.47	-0.47	-0.31	
10,344.0	6.60	281.70	10,320.4	49.7	-392.8	395.9	0.64	-0.63	0.16	
10,407.0	5.70	281.80	10,383.0	51.1	-399.4	402.6	1.43	-1.43	0.16	
10,468.0	4.50	278.80	10,443.8	52.0	-404.7	408.1	2.01	-1.97	-4.92	
TD @ 10517' MD / 10492.6' TVD										
10,517.0	4.50	278.80	10,492.6	52.6	-408.5	411.9	0.00	0.00	0.00	

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
5,504.0	5,503.3	-31.3	25.1	Tie-In @ 5504' MD / 5503' TVD	
10,517.0	10,492.6	52.6	-408.5	TD @ 10517' MD / 10492.6' TVD	



HP
Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well Warn State AC #27
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Site:	Sec 6,T18S, R35E	MD Reference:	Well @ 3991.5usft (Performance #3)
Well:	Warn State AC #27	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Checked By: _____ Approved By: _____ Date: _____