



HOBBSOCD

APR 24 2015

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Apache Corporation (873)

Lea County, NM (NAD27 NME)

WBDU

#168W

30-025-41548

UL G 16-215-37E

1860' FAL + 2230' FEL

WB1 / Job #1411970

Design: Surveys (Capstar 118)

Standard Survey Report

20 November, 2014



MAY 07 2015

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Company:	Apache Corporation	Local Co-ordinate Reference:	Well #168W
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB @ 3493.00usft (Capstar 118)
Site:	WBDU	MD Reference:	KB @ 3493.00usft (Capstar 118)
Well:	#168W	North Reference:	Grid
Wellbore:	WB1 / Job #1411970	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 118)	Database:	Compass 5000 GCR

Project	Lea County, NM (NAD27 NME)		
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	WBDU				
Site Position:		Northing:	538,109.00 usft	Latitude:	32° 28' 26.39792 N
From:	Map	Easting:	858,688.20 usft	Longitude:	103° 10' 12.95694 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.62 °

Well	#168W					
Well Position	+N/-S	0.00 usft	Northing:	540,647.20 usft	Latitude:	32° 28' 51.37814 N
	+E/-W	0.00 usft	Easting:	859,914.90 usft	Longitude:	103° 9' 58.31589 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	3,482.00 usft	

Wellbore	WB1 / Job #1411970				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2014	11/14/2014	7.15	60.40	48,434

Design	Surveys (Capstar 118)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	149.07	

Survey Program	Date	11/20/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	1,244.00	SDI Gyro Survey (WB1 / Job #1411970)	Scientific Gyro	Scientific Drilling Intl. Standard Wireline Keeper	
1,244.00	6,986.00	Phoenix MWD Survey (WB1 / Job #14119)	PHX+MWD+BGGM	PHX+MWD+BGGM v3:standard declination	

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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.52	122.39	100.00	-0.24	0.38	0.41	0.52	0.52	0.00
189.00	0.36	102.58	189.00	-0.52	1.00	0.96	0.25	-0.18	-22.26
279.00	0.43	99.82	278.99	-0.64	1.61	1.37	0.08	0.08	-3.07
369.00	0.31	101.03	368.99	-0.74	2.18	1.76	0.13	-0.13	1.34
459.00	0.18	136.58	458.99	-0.89	2.51	2.06	0.22	-0.14	39.50
549.00	0.30	158.38	548.99	-1.21	2.70	2.43	0.17	0.13	24.22
649.00	0.49	168.13	648.99	-1.88	2.88	3.09	0.20	0.19	9.75
734.00	0.60	152.59	733.98	-2.63	3.16	3.88	0.22	0.13	-18.28
819.00	0.76	154.05	818.98	-3.53	3.61	4.88	0.19	0.19	1.72

Company: Apache Corporation
Project: Lea County, NM (NAD27 NME)
Site: WBDU
Well: #168W
Wellbore: WB1 / Job #1411970
Design: Surveys (Capstar 118)

Local Co-ordinate Reference: Well #168W
TVD Reference: KB @ 3493.00usft (Capstar 118)
MD Reference: KB @ 3493.00usft (Capstar 118)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Compass 5000 GCR

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)
904.00	0.91	156.10	903.97	-4.65	4.13	6.12	0.18	0.18	2.41
989.00	0.96	160.04	988.96	-5.94	4.65	7.49	0.10	0.06	4.64
1,074.00	0.87	156.62	1,073.95	-7.20	5.15	8.82	0.12	-0.11	-4.02
1,159.00	0.87	179.05	1,158.94	-8.44	5.42	10.02	0.40	0.00	26.39
1,244.00	0.79	186.32	1,243.93	-9.67	5.36	11.05	0.16	-0.09	8.55
Tie-on to SDI Gyro Survey									
1,339.00	0.50	183.60	1,338.92	-10.73	5.26	11.91	0.31	-0.31	-2.86
First Phoenix MWD Survey									
1,381.00	0.40	169.10	1,380.92	-11.06	5.28	12.20	0.36	-0.24	-34.52
1,467.00	0.80	176.20	1,466.92	-11.95	5.38	13.02	0.47	0.47	8.26
1,552.00	2.30	156.60	1,551.88	-14.11	6.09	15.23	1.85	1.76	-23.06
1,595.00	2.30	153.70	1,594.85	-15.67	6.82	16.95	0.27	0.00	-6.74
1,680.00	2.40	151.20	1,679.78	-18.76	8.43	20.43	0.17	0.12	-2.94
1,766.00	2.40	150.80	1,765.70	-21.91	10.18	24.03	0.02	0.00	-0.47
1,851.00	1.10	131.00	1,850.66	-24.00	11.66	26.58	1.66	-1.53	-23.29
1,979.00	1.20	132.70	1,978.64	-25.72	13.57	29.04	0.08	0.08	1.33
2,064.00	2.50	130.00	2,063.59	-27.51	15.65	31.64	1.53	1.53	-3.18
2,149.00	2.90	125.70	2,148.49	-29.96	18.81	35.37	0.53	0.47	-5.06
2,235.00	2.60	125.30	2,234.40	-32.36	22.17	39.15	0.35	-0.35	-0.47
2,320.00	2.30	127.00	2,319.32	-34.50	25.11	42.50	0.36	-0.35	2.00
2,406.00	2.80	118.90	2,405.23	-36.55	28.33	45.91	0.72	0.58	-9.42
2,491.00	2.00	130.20	2,490.16	-38.51	31.28	49.11	1.09	-0.94	13.29
2,576.00	1.80	126.90	2,575.11	-40.27	33.48	51.75	0.27	-0.24	-3.88
2,662.00	2.00	138.10	2,661.06	-42.20	35.56	54.47	0.49	0.23	13.02
2,747.00	1.80	137.90	2,746.02	-44.29	37.44	57.24	0.24	-0.24	-0.24
2,833.00	1.40	139.20	2,831.98	-46.09	39.04	59.60	0.47	-0.47	1.51
2,918.00	1.80	136.80	2,916.95	-47.85	40.63	61.93	0.48	0.47	-2.82
3,003.00	1.60	139.60	3,001.91	-49.73	42.31	64.40	0.25	-0.24	3.29
3,089.00	2.10	165.30	3,087.87	-52.16	43.49	67.10	1.11	0.58	29.88
3,174.00	1.80	169.60	3,172.82	-54.98	44.13	69.84	0.39	-0.35	5.06
3,302.00	1.50	152.80	3,300.77	-58.45	45.25	73.40	0.44	-0.23	-13.13
3,430.00	1.90	142.80	3,428.71	-61.63	47.30	77.18	0.39	0.31	-7.81
3,588.00	1.70	142.10	3,586.63	-65.57	50.33	82.11	0.13	-0.13	-0.44
3,686.00	1.50	138.90	3,684.59	-67.68	52.06	84.82	0.22	-0.20	-3.27
3,814.00	2.00	140.70	3,812.53	-70.67	54.58	88.67	0.39	0.39	1.41
3,943.00	1.80	136.60	3,941.46	-73.88	57.40	92.88	0.19	-0.16	-3.18
4,071.00	2.60	155.90	4,069.37	-78.00	59.96	97.73	0.84	0.63	15.08
4,199.00	2.70	151.30	4,197.23	-83.29	62.60	103.62	0.18	0.08	-3.59
4,327.00	1.90	154.80	4,325.13	-87.85	64.95	108.74	0.63	-0.63	2.73
4,455.00	1.80	148.70	4,453.06	-91.49	66.90	112.87	0.17	-0.08	-4.77
4,583.00	2.30	167.70	4,580.98	-95.72	68.49	117.31	0.65	0.39	14.84
4,712.00	2.40	164.90	4,709.87	-100.86	69.74	122.36	0.12	0.08	-2.17
4,840.00	2.30	163.40	4,837.77	-105.91	71.17	127.43	0.09	-0.08	-1.17

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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)
4,968.00	2.20	157.20	4,965.67	-110.63	72.86	132.35	0.21	-0.08	-4.84
5,096.00	2.40	159.70	5,093.56	-115.41	74.74	137.42	0.17	0.16	1.95
5,224.00	2.10	161.30	5,221.47	-120.15	76.42	142.34	0.24	-0.23	1.25
5,354.00	2.00	165.60	5,351.38	-124.60	77.75	146.84	0.14	-0.08	3.31
5,480.00	1.80	167.50	5,477.31	-128.66	78.73	150.83	0.17	-0.16	1.51
5,608.00	1.30	151.80	5,605.27	-131.90	79.85	154.19	0.51	-0.39	-12.27
5,735.00	1.30	159.00	5,732.23	-134.52	81.05	157.04	0.13	0.00	5.67
5,863.00	2.20	143.60	5,860.17	-137.85	83.02	160.92	0.79	0.70	-12.03
5,991.00	2.00	140.70	5,988.09	-141.56	85.90	165.58	0.18	-0.16	-2.27
6,119.00	2.90	147.90	6,115.97	-146.03	89.03	171.02	0.74	0.70	5.63
6,248.00	2.50	145.00	6,244.83	-151.10	92.38	177.09	0.33	-0.31	-2.25
6,376.00	2.40	143.50	6,372.71	-155.54	95.57	182.54	0.09	-0.08	-1.17
6,504.00	2.40	143.90	6,500.60	-159.86	98.75	187.88	0.01	0.00	0.31
6,632.00	2.30	145.20	6,628.49	-164.13	101.79	193.11	0.09	-0.08	1.02
6,760.00	1.80	143.60	6,756.41	-167.86	104.45	197.68	0.39	-0.39	-1.25
6,888.00	1.30	143.40	6,884.36	-170.64	106.51	201.12	0.39	-0.39	-0.16
6,938.00	1.20	150.10	6,934.35	-171.55	107.11	202.21	0.35	-0.20	13.40
Last Phoenix MWD Survey									
6,986.00	1.20	150.10	6,982.34	-172.42	107.61	203.22	0.00	0.00	0.00
Projection to TD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,244.00	1,243.93	-9.67	5.36	Tie-on to SDI Gyro Survey
1,339.00	1,338.92	-10.73	5.26	First Phoenix MWD Survey
6,938.00	6,934.35	-171.55	107.11	Last Phoenix MWD Survey
6,986.00	6,982.34	-172.42	107.61	Projection to TD

Checked By: _____ Approved By: _____ Date: _____