

Apache Corporation
303 Veterans Airpark Lane, #3000
Midland, TX 79705

Barnsdall Federal #020 *API #30-015-42364*
Eddy County, New Mexico *SL: A-27-175-29E* *715' FNL & 900' FEL*

202

2.02

0.25

0.44

0.88

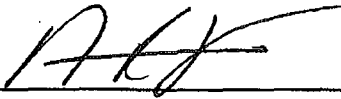
0.88

NM OIL CONSERVATION

ARTESIA DISTRICT

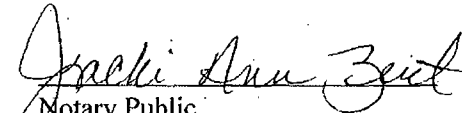
MAR 02 2015

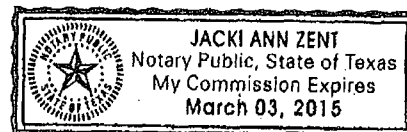
RECEIVED

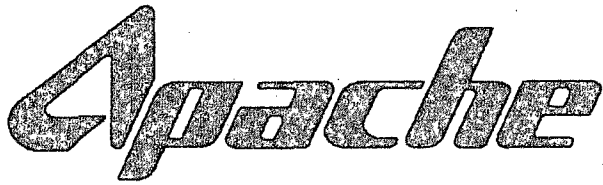


Archie Brown - General Manager

The attached instrument was acknowledged before me on the 4th day of September, 2014 by
Archie Brown - General Manager, CapStar Drilling, Inc.


Notary Public





NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 02 2015

RECEIVED

Apache Corporation

Eddy County, New Mexico

Sec 27, T17S, R29E

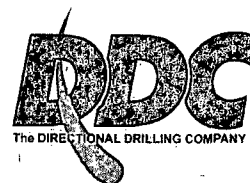
Barnsdall Federal #20

Wellbore #1

Design: Wellbore #1

DDC Survey Report

03 September, 2014





Survey Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well Barnsdall Federal #20
Project:	Eddy County New Mexico	TVD Reference:	Well @ 3599.0usft (Capstar #119)
Site:	Sec 27, T17S, R29E	MD Reference:	Well @ 3599.0usft (Capstar #119)
Well:	Barnsdall Federal #20	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM, Compass

Project	Eddy County New Mexico		
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 27, T17S, R29E		
Site Position:		Northing:	658,766.10 usft
From:	Map	Easting:	585,067.00 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 48' 38.629 N
		Longitude:	104° 3' 23.240 W
		Grid Convergence:	0.15 °

Well	Barnsdall Federal #20		
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° 48' 38.629 N
		Longitude:	104° 3' 23.240 W
		Ground Level:	3,588.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	8/11/2014	(°)
			7.47
			Dip/Angle
			(°)
			60.57
			Field Strength
			(nT)
			48,599

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
			(°)
			348.97

Survey Program	Date: 9/3/2014		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
32.0	187.0	GYRO (Wellbore #1)	Good_gyro
222.0	6,072.0	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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
32.0	0.43	237.13	32.0	-0.1	-0.1	0.0	1.34	1.34	0.00
61.0	0.26	246.79	61.0	-0.2	-0.3	-0.1	0.62	-0.59	33.31
94.0	0.47	292.11	94.0	-0.1	-0.4	0.0	1.03	0.64	137.33
125.0	0.17	320.23	125.0	0.0	-0.6	0.1	1.06	-0.97	90.71
156.0	1.23	2.29	156.0	0.3	-0.6	0.4	3.58	3.42	135.68
TIE IN @ 187 md / 187 TVD									
187.0	1.38	0.80	187.0	1.0	-0.6	1.1	0.50	0.48	-4.80
222.0	2.00	0.80	222.0	2.1	-0.6	2.1	1.77	1.77	0.00
404.0	2.60	14.70	403.8	9.2	0.5	9.0	0.45	0.33	7.64



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Well:	Barnsdall Federal #20	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM Compass

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)
557.0	2.70	16.80	556.7	16.0	2.4	15.3	0.09	0.07	1.37
747.0	3.20	24.50	746.4	25.1	5.9	23.5	0.34	0.26	4.05
840.0	3.30	25.10	839.3	29.9	8.1	27.8	0.11	0.11	0.65
934.0	4.10	20.00	933.1	35.5	10.4	32.9	0.92	0.85	-5.43
1,028.0	4.20	9.10	1,026.8	42.1	12.1	39.0	0.84	0.11	-11.60
1,123.0	4.40	357.50	1,121.6	49.2	12.5	45.9	0.94	0.21	-12.21
1,218.0	4.60	347.80	1,216.3	56.5	11.6	53.3	0.83	0.21	-10.21
1,313.0	3.60	343.20	1,311.0	63.1	9.9	60.1	1.11	-1.05	-4.84
1,407.0	3.60	341.70	1,404.8	68.7	8.1	65.9	0.10	0.00	-1.60
1,502.0	3.40	335.70	1,499.7	74.1	6.0	71.6	0.44	-0.21	-6.32
1,597.0	3.60	333.90	1,594.5	79.4	3.5	77.2	0.24	0.21	-1.89
1,691.0	3.20	338.10	1,688.3	84.5	1.3	82.7	0.50	-0.43	4.47
1,786.0	3.20	337.80	1,783.2	89.4	-0.7	87.9	0.02	0.00	-0.32
1,880.0	3.30	337.80	1,877.0	94.3	-2.7	93.1	0.11	0.11	0.00
1,976.0	3.50	337.80	1,972.8	99.6	-4.9	98.7	0.21	0.21	0.00
2,070.0	3.60	337.30	2,066.7	105.0	-7.1	104.4	0.11	0.11	-0.53
2,165.0	3.80	337.30	2,161.5	110.6	-9.5	110.4	0.21	0.21	0.00
2,259.0	3.30	335.00	2,255.3	116.0	-11.8	116.1	0.55	-0.53	-2.45
2,354.0	3.30	335.10	2,350.1	120.9	-14.1	121.4	0.01	0.00	0.11
2,448.0	3.60	337.40	2,444.0	126.1	-16.4	126.9	0.35	0.32	2.45
2,543.0	3.70	338.30	2,538.8	131.7	-18.7	132.8	0.12	0.11	0.95
2,638.0	4.00	338.80	2,633.6	137.6	-21.0	139.1	0.32	0.32	0.53
2,733.0	4.50	342.50	2,728.3	144.3	-23.3	146.1	0.60	0.53	3.89
2,828.0	3.70	339.70	2,823.0	150.7	-25.5	152.8	0.87	-0.84	-2.95
2,922.0	4.00	339.90	2,916.8	156.6	-27.7	159.0	0.32	0.32	0.21
3,015.0	3.30	338.30	3,009.6	162.2	-29.8	164.9	0.76	-0.75	-1.72
3,110.0	3.60	338.00	3,104.5	167.5	-31.9	170.5	0.32	0.32	-0.32
3,205.0	4.00	340.10	3,199.3	173.3	-34.2	176.7	0.45	0.42	2.21
3,300.0	4.60	341.30	3,294.0	180.1	-36.5	183.7	0.64	0.63	1.26
3,345.0	4.60	341.30	3,338.9	183.5	-37.7	187.3	0.00	0.00	0.00
3,428.0	5.20	342.90	3,421.5	190.2	-39.9	194.3	0.74	0.72	1.93
3,523.0	4.00	355.00	3,516.2	197.7	-41.4	201.9	1.62	-1.26	12.74
3,618.0	4.20	356.80	3,611.0	204.4	-41.9	208.7	0.25	0.21	1.89
3,712.0	3.90	12.60	3,704.8	211.0	-41.4	215.0	1.22	-0.32	16.81
3,807.0	2.80	16.60	3,799.6	216.4	-40.0	220.0	1.18	-1.16	4.21
3,902.0	3.30	348.00	3,894.5	221.3	-39.9	224.8	1.67	0.53	-30.11
3,997.0	3.60	348.00	3,989.3	226.8	-41.1	230.5	0.32	0.32	0.00
4,092.0	3.20	355.20	4,084.1	232.4	-42.0	236.1	0.62	-0.42	7.58
4,187.0	3.30	329.40	4,179.0	237.4	-43.6	241.4	1.53	0.11	-27.16
4,281.0	3.50	327.90	4,272.8	242.2	-46.5	246.6	0.23	0.21	-1.60
4,376.0	3.30	333.60	4,367.7	247.1	-49.2	251.9	0.41	-0.21	6.00
4,471.0	3.60	339.50	4,462.5	252.3	-51.5	257.5	0.49	0.32	6.21
4,565.0	3.70	338.30	4,556.3	257.9	-53.6	263.4	0.13	0.11	-1.28



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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 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)	
4,660.0	3.80	340.40	4,651.1	263.7	-55.8	269.5	0.18	0.11	2.21	
4,755.0	3.80	338.80	4,745.9	269.6	-58.0	275.7	0.11	0.00	-1.68	
4,850.0	4.10	344.60	4,840.7	275.8	-60.1	282.2	0.53	0.32	6.11	
4,945.0	4.20	340.60	4,935.4	282.4	-62.1	289.0	0.32	0.11	-4.21	
5,039.0	4.40	340.80	5,029.1	289.0	-64.5	296.0	0.21	0.21	0.21	
5,134.0	4.20	332.00	5,123.9	295.5	-67.3	303.0	0.72	-0.21	-9.26	
5,228.0	4.50	342.20	5,217.6	302.1	-70.0	309.9	0.88	0.32	10.85	
5,323.0	3.50	348.30	5,312.4	308.5	-71.8	316.5	1.14	-1.05	6.42	
5,418.0	3.30	349.90	5,407.2	314.0	-72.8	322.1	0.23	-0.21	1.68	
5,513.0	3.40	351.00	5,502.0	319.5	-73.7	327.7	0.13	0.11	1.16	
5,607.0	3.70	0.80	5,595.9	325.3	-74.1	333.4	0.72	0.32	10.43	
5,702.0	3.30	0.80	5,690.7	331.1	-74.1	339.1	0.42	-0.42	0.00	
5,797.0	4.10	13.50	5,785.5	337.1	-73.2	344.9	1.20	0.84	13.37	
5,892.0	4.40	13.50	5,880.2	344.0	-71.6	351.3	0.32	0.32	0.00	
5,987.0	4.60	13.80	5,974.9	351.2	-69.8	358.1	0.21	0.21	0.32	
TD @ 6072' MD / 6060' TVD										
6,072.0	4.60	13.60	6,059.7	357.8	-68.2	364.3	0.02	0.00	-0.24	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
187.0	187.0	1.0	-0.6	TIE IN @ 187' md / 187' TVD	
6,072.0	6,059.7	357.8	-68.2	TD @ 6072' MD / 6060' TVD	

Checked By: _____ Approved By: _____ Date: _____