

30-015-40913



NM OIL CONSERVATION
ARTESIA DISTRICT

JAN 07 2015

RECEIVED

Apache Corporation

Eddy County, NM (NAD27 NME)
Raven Federal
#16H

WB1 / Job #1411573

Design: Surveys (Capstar 119)

Standard Survey Report

23 April, 2015



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #16H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3756.00usft (Capstar 119)
Site:	Raven Federal	MD Reference:	KB @ 3756.00usft (Capstar 119)
Well:	#16H	North Reference:	Grid
Wellbore:	WB1 / Job #1411573	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	Database:	Compass 5000 GCR

Project	Eddy 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	Raven Federal		
Site Position:		Northing:	673,239.70 usft
From:	Map	Easting:	633,303.50 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 51' 0.24298 N
		Longitude:	103° 53' 57.35087 W
		Grid Convergence:	0.24 °

Well	#16H		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 51' 14.95823 N
		Longitude:	103° 54' 11.67616 W
		Ground Level:	3,745.00 usft

Wellbore	WB1 / Job #1411573				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	4/6/2015	7.68	60.80	48,579

Design	Surveys (Capstar 119)				
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	269.62	

Survey Program	Date 4/23/2015				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
153.31	4,370.69	Phoenix Gyro Survey (WB1 / Job #141157	NS-GYRO-MS	North sensing gyrocompassing m/s	
4,415.00	8,322.00	Phoenix MWD Survey (WB1 / Job #14115	PHX+MWD+HDGM	PHX+MWD+HDGM	

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)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
153.31	0.75	138.94	153.31	-0.76	0.66	-0.65	0.49	0.49	0.00	
281.11	1.95	216.28	281.08	-3.14	-0.08	0.10	1.51	0.94	60.52	
408.91	0.54	203.33	408.84	-5.45	-1.60	1.64	1.12	-1.10	-10.13	
536.71	1.35	204.67	536.62	-7.37	-2.47	2.52	0.63	0.63	1.05	
664.51	1.94	209.60	664.37	-10.62	-4.17	4.24	0.47	0.46	3.86	
792.31	2.02	226.34	792.10	-14.05	-6.87	6.96	0.46	0.06	13.10	
920.11	1.78	231.39	919.82	-16.85	-10.05	10.16	0.23	-0.19	3.95	
1,047.91	1.83	219.17	1,047.56	-19.67	-12.89	13.02	0.30	0.04	-9.56	
1,175.71	1.71	208.51	1,175.30	-22.92	-15.08	15.24	0.27	-0.09	-8.34	

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Well:	#16H	North Reference:	Grid
Wellbore:	WB1 / Job #1411573	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	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)
1,303.51	1.29	184.85	1,303.06	-26.03	-16.12	16.29	0.58	-0.33	-18.51
1,431.31	1.05	167.54	1,430.83	-28.61	-15.99	16.17	0.33	-0.19	-13.54
1,559.10	1.30	158.32	1,558.60	-31.10	-15.20	15.40	0.24	0.20	-7.21
1,686.90	1.64	146.38	1,686.35	-33.97	-13.65	13.87	0.36	0.27	-9.34
1,814.70	1.69	137.66	1,814.10	-36.89	-11.37	11.61	0.20	0.04	-6.82
1,942.50	1.39	138.19	1,941.85	-39.43	-9.06	9.33	0.24	-0.23	0.41
2,070.30	1.11	165.20	2,069.62	-41.79	-7.71	7.99	0.50	-0.22	21.13
2,198.10	1.38	176.53	2,197.39	-44.52	-7.31	7.60	0.28	0.21	8.87
2,325.90	1.27	183.80	2,325.16	-47.47	-7.31	7.62	0.16	-0.09	5.69
2,453.70	0.79	223.10	2,452.94	-49.53	-8.00	8.33	0.65	-0.38	30.75
2,581.50	0.91	245.92	2,580.73	-50.58	-9.53	9.87	0.28	0.09	17.86
2,709.30	1.21	256.00	2,708.50	-51.32	-11.77	12.11	0.28	0.23	7.89
2,837.10	1.53	249.43	2,836.27	-52.25	-14.67	15.02	0.28	0.25	-5.14
2,964.90	1.52	251.23	2,964.02	-53.39	-17.88	18.23	0.04	-0.01	1.41
3,092.70	1.28	259.08	3,091.78	-54.21	-20.88	21.24	0.24	-0.19	6.14
3,220.50	1.05	262.33	3,219.56	-54.64	-23.44	23.81	0.19	-0.18	2.54
3,348.30	0.82	256.66	3,347.34	-55.00	-25.49	25.86	0.19	-0.18	-4.44
3,476.09	0.72	275.66	3,475.12	-55.14	-27.18	27.55	0.21	-0.08	14.87
3,603.89	0.85	276.06	3,602.91	-54.96	-28.92	29.29	0.10	0.10	0.31
3,731.69	0.95	260.62	3,730.69	-55.03	-30.91	31.28	0.20	0.08	-12.08
3,859.49	0.92	259.93	3,858.47	-55.38	-32.97	33.33	0.03	-0.02	-0.54
3,987.29	0.87	265.75	3,986.26	-55.63	-34.95	35.31	0.08	-0.04	4.55
4,115.09	0.64	277.42	4,114.05	-55.61	-36.62	36.99	0.22	-0.18	9.13
4,242.89	0.62	284.66	4,241.84	-55.34	-38.00	38.36	0.06	-0.02	5.67
4,370.69	0.50	293.83	4,369.63	-54.94	-39.18	39.54	0.12	-0.09	7.18
Tie-on to Phoenix Gyro Survey									
4,415.00	1.20	280.50	4,413.94	-54.78	-39.81	40.17	1.63	1.58	-30.08
First Phoenix MWD Survey									
4,457.00	6.20	273.30	4,455.84	-54.57	-42.51	42.87	11.93	11.90	-17.14
4,500.00	12.90	274.80	4,498.22	-54.04	-49.62	49.98	15.59	15.58	3.49
4,543.00	19.50	275.70	4,539.49	-52.92	-61.56	61.90	15.36	15.35	2.09
4,585.00	25.50	275.70	4,578.27	-51.32	-77.54	77.88	14.29	14.29	0.00
4,628.00	29.10	276.90	4,616.48	-49.15	-97.14	97.46	8.47	8.37	2.79
4,670.00	32.10	276.50	4,652.63	-46.66	-118.37	118.68	7.16	7.14	-0.95
4,713.00	35.10	274.90	4,688.44	-44.31	-142.05	142.34	7.27	6.98	-3.72
4,755.00	39.80	272.50	4,721.77	-42.69	-167.52	167.80	11.72	11.19	-5.71
4,798.00	44.60	271.70	4,753.62	-41.64	-196.38	196.65	11.23	11.16	-1.86
4,841.00	48.80	273.10	4,783.10	-40.32	-227.63	227.90	10.05	9.77	3.26
4,883.00	52.60	275.30	4,809.70	-37.92	-260.04	260.28	9.91	9.05	5.24
4,926.00	56.90	276.30	4,834.51	-34.36	-294.96	295.19	10.18	10.00	2.33
4,968.00	60.60	275.80	4,856.30	-30.58	-330.66	330.86	8.87	8.81	-1.19
5,011.00	65.60	275.30	4,875.75	-26.88	-368.82	368.99	11.67	11.63	-1.16
5,053.00	70.20	274.40	4,891.54	-23.59	-407.56	407.73	11.13	10.95	-2.14

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Wellbore:	WB1 / Job #1411573	Survey Calculation Method:	Minimum Curvature
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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)
5,096.00	76.00	275.70	4,904.04	-19.97	-448.55	448.67	13.79	13.49	3.02
5,139.00	80.30	275.10	4,912.87	-16.01	-490.44	490.53	10.09	10.00	-1.40
5,167.00	82.20	274.70	4,917.13	-13.65	-518.01	518.09	6.93	6.79	-1.43
5,210.00	89.00	274.10	4,920.42	-10.36	-560.73	560.79	15.87	15.81	-1.40
5,252.00	90.40	272.50	4,920.64	-7.94	-602.66	602.70	5.06	3.33	-3.81
5,295.00	88.50	269.90	4,921.06	-7.04	-645.64	645.67	7.49	-4.42	-6.05
5,337.00	88.60	269.20	4,922.12	-7.37	-687.62	687.66	1.68	0.24	-1.67
5,423.00	92.30	268.70	4,921.44	-8.95	-773.59	773.63	4.34	4.30	-0.58
5,550.00	92.40	269.70	4,916.24	-10.72	-900.47	900.52	0.79	0.08	0.79
5,678.00	91.60	271.30	4,911.77	-9.60	-1,028.38	1,028.42	1.40	-0.63	1.25
5,805.00	92.20	270.00	4,907.56	-8.16	-1,155.30	1,155.33	1.13	0.47	-1.02
5,933.00	92.90	269.00	4,901.86	-9.28	-1,283.17	1,283.20	0.95	0.55	-0.78
6,061.00	91.30	269.10	4,897.17	-11.40	-1,411.06	1,411.10	1.25	-1.25	0.08
6,188.00	92.50	268.40	4,892.96	-14.17	-1,537.96	1,538.02	1.09	0.94	-0.55
6,316.00	90.30	269.60	4,889.84	-16.40	-1,665.89	1,665.96	1.96	-1.72	0.94
6,444.00	89.50	270.40	4,890.06	-16.40	-1,793.89	1,793.96	0.88	-0.63	0.63
6,572.00	90.50	270.20	4,890.06	-15.73	-1,921.88	1,921.95	0.80	0.78	-0.16
6,699.00	91.70	270.00	4,887.62	-15.51	-2,048.86	2,048.92	0.96	0.94	-0.16
6,827.00	93.10	269.50	4,882.26	-16.07	-2,176.74	2,176.80	1.16	1.09	-0.39
6,955.00	91.10	269.70	4,877.57	-16.96	-2,304.64	2,304.71	1.57	-1.56	0.16
7,083.00	92.30	269.40	4,873.77	-17.96	-2,432.58	2,432.65	0.97	0.94	-0.23
7,210.00	91.30	270.70	4,869.78	-17.85	-2,559.51	2,559.58	1.29	-0.79	1.02
7,338.00	90.40	271.90	4,867.89	-14.95	-2,687.46	2,687.50	1.17	-0.70	0.94
7,466.00	91.70	271.50	4,865.54	-11.15	-2,815.38	2,815.40	1.06	1.02	-0.31
7,593.00	90.90	271.00	4,862.66	-8.38	-2,942.32	2,942.31	0.74	-0.63	-0.39
7,721.00	91.30	271.00	4,860.20	-6.15	-3,070.28	3,070.25	0.31	0.31	0.00
7,849.00	90.30	269.40	4,858.41	-5.70	-3,198.26	3,198.22	1.47	-0.78	-1.25
7,977.00	91.60	268.60	4,856.29	-7.94	-3,326.22	3,326.20	1.19	1.02	-0.63
8,105.00	92.80	268.00	4,851.38	-11.73	-3,454.06	3,454.06	1.05	0.94	-0.47
8,232.00	94.00	267.70	4,843.85	-16.49	-3,580.75	3,580.78	0.97	0.94	-0.24
8,254.00	94.20	267.80	4,842.27	-17.35	-3,602.67	3,602.71	1.02	0.91	0.45
Last Phoenix MWD Survey									
8,322.00	94.20	267.80	4,837.29	-19.95	-3,670.44	3,670.49	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)	
4,370.69	4,369.63	-54.94	-39.18	Tie-on to Phoenix Gyro Survey
4,415.00	4,413.94	-54.78	-39.81	First Phoenix MWD Survey
8,254.00	4,842.27	-17.35	-3,602.67	Last Phoenix MWD Survey
8,322.00	4,837.29	-19.95	-3,670.44	Projection to TD

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Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3756.00usft (Capstar 119)
Site:	Raven Federal	MD Reference:	KB @ 3756.00usft (Capstar 119)
Well:	#16H	North Reference:	Grid
Wellbore:	WB1 / Job #1411573	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 119)	Database:	Compass 5000 GCR

Checked By: _____ Approved By: _____ Date: _____

WELL NAME: RAVEN FEDERAL 16H
APR 30-015-40913
SPUD DATE: 4/11/2015
PRODUCING FORMATION: YESO PADDOCK
FIELD: CEDAR LAKE (BP)
COUNTY: EDDY
STATE: NEW MEXICO
WORKING INTEREST: 60.00%

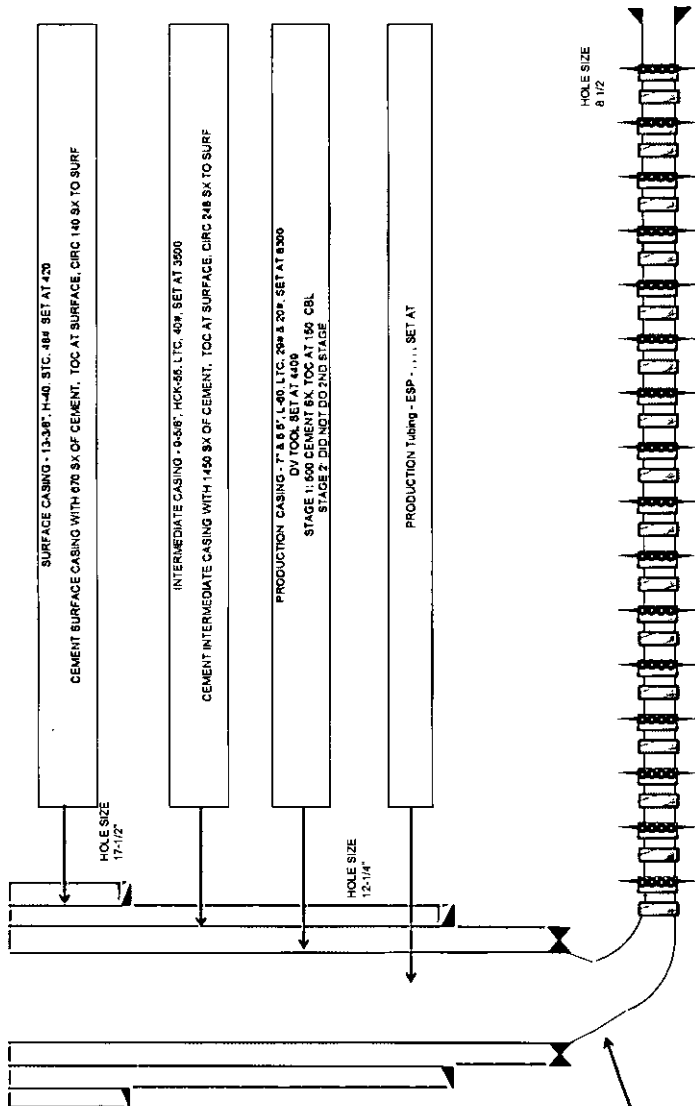
SURFACE LOC: 727 FNL & 1000' FEL
SECTION: 7
TOWNSHIP: 17-S
RANGE: 31-E
SURVEY: JOHN WEST SURVEYING CO
BOTTOM HOLE LOC: 727 FNL & 1337' FEL
SECTION: 7
TOWNSHIP: 17-S

RANGE: 31-E
SURVEY: JOHN WEST SURVEYING CO
DRILL RIG: CAPSTAR 110
RIG RELEASE: 4/23/2015

KB (ft): 3,754.00
GL (ft): 3,745.00
KBIGL DIFF (ft): 11.00
TMD (ft): 8,322.00
TO OF PILOT HOLE (ft): N/A
FC DEPTH (ft): 8,291.00
P8MO (ft): 8,322.00
RDV DEPTH (ft): N/A
ORD VALVE (ft): N/A
DEEPEST TWO (ft): 4,922.00

TAPERED CASING STRING:

7" 20# L-80 TO X-OVER @ 4,412'
TAPERING TO 5" 20# L-80 SET @ 8,300'



PACKERS & SLEEVES
TOP PERF (MD): 5,235
BOTTOM PERF (MD): 8,291

TMD (ft): 8,322
FC DEPTH (ft): 8,291
P8MO (ft): 8,322
RDV DEPTH (ft): N/A
ORD VALVE (ft): N/A

KOP (ft): 4,417
LATERAL LENGTH (ft): 3,077
TO OF PILOT HOLE (ft): N/A

PACKERS & SLEEVES - 11 STAGES			
TOTAL ACID (bbl)	1.932	TOTAL LTR (bbl)	49,000
TOTAL ACID (bbl)	1.932	TOTAL LTR (bbl)	49,000
PRODUCTION METHOD	PUMPING	LIFT TYPE	ESP
SETTING DEPTH	0	SETTING DEPTH	0
CROSSOVER SUB @ 4,417'			

COMPLETION	STIMULATION	STATUS	COMMENTS

LAST UPDATED BY: HALLARI GOULD
LAST UPDATED: 10/23/2015