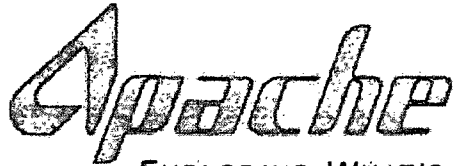


30-015-40466



EXPLORING WHAT'S POSSIBLE

Apache Corporation

Eddy County, NM (Nad27)

Raven Federal

Raven Federal #10H

Raven Federal #10H

Survey: Phoenix MWD Surveys

Apache

02 January, 2013

NM OIL CONSERVATION
ARTESIA DISTRICT

JUL 22 2015

RECEIVED



PHOENIX
TECHNOLOGY SERVICES

Company:	Apache Corporation	Local Co-ordinate Reference:	Well Raven Federal #10H
Project:	Eddy County, NM (Nad27)	TVD Reference:	Well @ 3741.00usft (Original Well Elev + .14' KB)
Site:	Raven Federal	MD Reference:	Well @ 3741.00usft (Original Well Elev + .14' KB)
Well:	Raven Federal #10H	North Reference:	Grid
Wellbore:	Raven Federal #10H	Survey Calculation Method:	Minimum Curvature
Design:	Raven Federal #10H Surveys	Database:	GCR DB v5000

Project:	Eddy County, NM (Nad27)	System Datum:	Mean Sea Level
Map System:	US State Plane 1927 (Exact solution)		
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' 0.2430 N
		Longitude:	103° 53' 57.3509 W
		Grid Convergence:	0.24 °

Well:	Raven Federal #10H					
Well Position	+N/-S	0.00 usft	Northing:	673,239.70 usft	Latitude:	32° 51' 0.2430 N
	+E/-W	0.00 usft	Easting:	633,303.50 usft	Longitude:	103° 53' 57.3509 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,727.00 usft

Wellbore						Raven.Federal.#10H					
Magnetics		Model Name		Sample Date		Declination (°)		Dip Angle (°)		Field Strength (nT)	
		IGRF2010_14		04/30/12		7.68		60.69		48,867	

Design: Raven Federal #10H Surveys				
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	269.61

Survey Program		Date - 01/02/13		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
486.00	9,601.00	Phoenix MWD Surveys (Raven Federal #1	MWD	MWD - Standard

Company:	Apache Corporation	Local Co-ordinate Reference:	Well Raven Federal #10H
Project:	Eddy County, NM (Nad27)	TVD Reference:	Well @ 3741.00usft (Original Well Elev +14' KB)
Site:	Raven Federal	MD Reference:	Well @ 3741.00usft (Original Well Elev +14' KB)
Well:	Raven Federal #10H	North Reference:	Grid
Wellbore:	Raven Federal #10H	Survey Calculation Method:	Minimum Curvature
Design:	Raven Federal #10H Surveys	Database:	GCR DB:v5000

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (%/100usft)	Northing (usft)	Easting (usft)	
0.00	0.00	0.00	-3,741.00	0.00	0.00	0.00	0.00	0.00	673,239.70	633,303.50	
100.00	0.23	268.40	-3,641.00	100.00	-0.01	-0.20	0.20	0.23	673,239.69	633,303.30	
200.00	0.45	268.40	-3,541.00	200.00	-0.02	-0.79	0.79	0.23	673,239.68	633,302.71	
300.00	0.68	268.40	-3,441.01	299.99	-0.05	-1.78	1.78	0.23	673,239.65	633,301.72	
400.00	0.91	268.40	-3,341.02	399.98	-0.09	-3.16	3.16	0.23	673,239.61	633,300.34	
486.00	1.10	268.40	-3,255.03	485.97	-0.13	-4.66	4.66	0.23	673,239.57	633,298.84	
First Phoenix MWD Survey: 486'											
500.00	1.10	270.50	-3,241.03	499.97	-0.13	-4.93	4.93	0.29	673,239.57	633,298.57	
600.00	1.20	275.27	-3,141.05	599.95	0.00	-6.92	6.92	0.14	673,239.70	633,296.58	
700.00	1.33	275.18	-3,041.08	699.92	0.24	-9.10	9.10	0.13	673,239.94	633,294.40	
800.00	1.46	270.59	-2,941.11	799.89	0.25	-11.61	11.60	0.17	673,239.95	633,291.89	
900.00	1.11	294.29	-2,841.14	899.86	0.59	-13.91	13.90	0.63	673,240.29	633,289.59	
1,000.00	0.99	330.33	-2,741.15	999.85	1.80	-15.13	15.12	0.66	673,241.50	633,288.37	
1,100.00	1.09	10.69	-2,641.17	1,099.83	3.50	-15.44	15.41	0.72	673,243.20	633,288.06	
1,200.00	1.58	32.71	-2,541.19	1,199.81	5.57	-14.49	14.45	0.70	673,245.27	633,289.01	
1,300.00	1.92	39.50	-2,441.24	1,299.76	8.18	-12.64	12.58	0.40	673,247.88	633,290.86	
1,400.00	1.65	60.21	-2,341.29	1,399.71	10.27	-10.33	10.26	0.69	673,249.97	633,293.17	
1,500.00	1.03	108.79	-2,241.32	1,499.68	10.79	-8.00	7.93	1.24	673,250.49	633,295.50	
1,600.00	1.09	137.72	-2,141.34	1,599.66	9.64	-6.63	6.56	0.53	673,249.34	633,296.87	
1,700.00	1.73	144.96	-2,041.37	1,699.63	7.67	-5.12	5.07	0.66	673,247.37	633,298.38	
1,800.00	1.99	147.93	-1,941.42	1,799.58	5.03	-3.27	3.24	0.28	673,244.73	633,300.23	
1,900.00	2.51	155.13	-1,841.50	1,899.50	1.60	-1.52	1.51	0.59	673,241.30	633,301.98	
2,000.00	2.73	156.02	-1,741.61	1,999.39	-2.72	0.43	-0.41	0.23	673,236.98	633,303.93	
2,100.00	2.79	158.04	-1,641.73	2,099.27	-7.11	2.31	-2.26	0.12	673,232.59	633,305.81	
2,200.00	1.81	166.13	-1,541.81	2,199.19	-10.96	3.63	-3.55	1.03	673,228.74	633,307.13	
2,300.00	1.19	181.97	-1,441.84	2,299.16	-13.33	3.91	-3.81	0.74	673,226.37	633,307.41	
2,400.00	1.44	191.12	-1,341.87	2,399.13	-15.67	3.65	-3.55	0.33	673,224.03	633,307.15	



Phoenix Technology Services

Apache



Company:	Apache Corporation	Local Co-ordinate Reference:	Well Raven Federal #10H
Project:	Eddy County, NM (Nad27)	TVD Reference:	Well @ 3741.00usft (Original Well Elev + 14' KB)
Site:	Raven Federal	MD Reference:	Well @ 3741.00usft (Original Well Elev + 14' KB)
Well:	Raven Federal #10H	North Reference:	Grid
Wellbore:	Raven Federal #10H	Survey Calculation Method:	Minimum Curvature
Design:	Raven Federal #10H Surveys	Database:	GCR DB v5000

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
2,500.00	1.15	197.68	-1,241.90	2,499.10	-18.00	3.02	-2.89	0.33	673,221.70	633,306.52
2,600.00	0.31	253.71	-1,141.91	2,599.09	-19.12	2.46	-2.33	1.01	673,220.58	633,305.96
2,700.00	0.30	314.73	-1,041.91	2,699.09	-18.94	2.01	-1.88	0.31	673,220.76	633,305.51
2,800.00	0.30	304.72	-941.91	2,799.09	-18.59	1.62	-1.50	0.05	673,221.11	633,305.12
2,900.00	0.30	298.51	-841.91	2,899.09	-18.37	1.16	-1.03	0.03	673,221.33	633,304.66
3,000.00	0.23	298.88	-741.91	2,999.09	-18.10	0.76	-0.63	0.07	673,221.60	633,304.26
3,100.00	0.29	282.93	-641.91	3,099.09	-17.97	0.37	-0.25	0.09	673,221.73	633,303.87
3,200.00	0.29	283.11	-541.91	3,199.09	-17.85	-0.14	0.26	0.00	673,221.85	633,303.36
3,300.00	0.22	269.10	-441.91	3,299.09	-17.84	-0.54	0.67	0.09	673,221.86	633,302.96
3,400.00	0.40	260.38	-341.92	3,399.08	-17.79	-1.05	1.17	0.19	673,221.91	633,302.45
3,500.00	0.38	239.40	-241.92	3,499.08	-18.08	-1.76	1.88	0.14	673,221.62	633,301.74
3,600.00	0.30	294.10	-141.92	3,599.08	-18.31	-2.22	2.34	0.32	673,221.39	633,301.28
3,700.00	0.82	359.04	-41.93	3,699.07	-17.39	-2.42	2.54	0.75	673,222.31	633,301.08
3,800.00	0.86	352.76	58.06	3,799.06	-15.88	-2.51	2.61	0.10	673,223.82	633,300.99
3,900.00	0.74	340.95	158.05	3,899.05	-14.53	-2.82	2.92	0.20	673,225.17	633,300.68
4,000.00	0.70	349.14	258.05	3,999.05	-13.37	-3.21	3.30	0.11	673,226.33	633,300.29
4,100.00	0.70	341.84	358.04	4,099.04	-12.18	-3.47	3.55	0.09	673,227.52	633,300.03
4,200.00	0.76	331.18	458.03	4,199.03	-10.99	-4.03	4.10	0.15	673,228.71	633,299.47
4,300.00	0.60	334.51	558.02	4,299.02	-9.97	-4.54	4.60	0.16	673,229.73	633,298.96
4,400.00	0.62	331.54	658.02	4,399.02	-9.04	-5.02	5.08	0.04	673,230.66	633,298.48
4,500.00	0.97	305.55	758.01	4,499.01	-7.98	-5.60	5.66	0.49	673,231.72	633,297.90
4,600.00	18.92	273.12	856.31	4,597.31	-7.50	-21.04	21.09	18.11	673,232.20	633,282.46
4,700.00	35.88	276.60	944.33	4,685.33	-2.49	-67.46	67.47	17.03	673,237.21	633,236.04
4,800.00	45.89	274.14	1,019.89	4,760.89	3.83	-132.46	132.43	10.14	673,243.53	633,171.04
4,900.00	57.35	268.38	1,081.71	4,822.71	4.25	-210.81	210.78	12.30	673,243.95	633,092.69
5,000.00	69.55	271.22	1,126.31	4,867.31	4.27	-300.08	300.05	12.46	673,243.97	633,003.42
5,100.00	84.22	272.61	1,149.49	4,890.49	6.85	-397.01	396.96	14.74	673,246.55	632,906.49



EXPLORING WHAT'S POSSIBLE

Phoenix Technology Services

Apache



Company:	Apache Corporation	Local Co-ordinate Reference:	Well Raven Federal #10H
Project:	Eddy County, NM (Nad27)	TVD Reference:	Well @ 3741.00usft (Original Well Elev + 14' KB)
Site:	Raven Federal	MD Reference:	Well @ 3741.00usft (Original Well Elev + 14' KB)
Well:	Raven Federal #10H	North Reference:	Grid
Wellbore:	Raven Federal #10H	Survey Calculation Method:	Minimum Curvature
Design:	Raven Federal #10H Surveys	Database:	GCR'DB v5000

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
5,200.00	88.80	269.43	1,154.51	4,895.51	8.72	-496.83	496.76	5.57	673,248.42	632,806.67
5,300.00	91.09	267.72	1,154.76	4,895.76	5.97	-596.78	596.73	2.86	673,245.67	632,706.72
5,400.00	93.20	267.09	1,150.87	4,891.87	1.27	-696.59	696.57	2.21	673,240.97	632,606.91
5,500.00	92.99	267.87	1,144.99	4,885.99	-3.38	-796.31	796.31	0.81	673,236.32	632,507.19
5,600.00	91.74	268.36	1,140.82	4,881.82	-6.54	-896.17	896.19	1.34	673,233.16	632,407.33
5,700.00	91.80	269.38	1,137.86	4,878.86	-8.58	-996.10	996.14	1.01	673,231.12	632,307.40
5,800.00	90.05	271.85	1,136.23	4,877.23	-7.40	-1,096.07	1,096.10	3.03	673,232.30	632,207.43
5,900.00	89.67	270.68	1,136.93	4,877.93	-5.24	-1,196.04	1,196.05	1.23	673,234.46	632,107.46
6,000.00	90.38	269.78	1,136.77	4,877.77	-4.90	-1,296.04	1,296.04	1.14	673,234.80	632,007.46
6,100.00	90.75	269.11	1,135.76	4,876.76	-5.89	-1,396.03	1,396.04	0.77	673,233.81	631,907.47
6,200.00	91.06	268.48	1,134.19	4,875.19	-7.99	-1,495.99	1,496.01	0.70	673,231.71	631,807.51
6,300.00	91.48	268.48	1,132.01	4,873.01	-10.89	-1,595.93	1,595.97	0.42	673,228.81	631,707.57
6,400.00	90.31	268.64	1,129.83	4,870.83	-13.27	-1,695.87	1,695.92	1.18	673,226.43	631,607.63
6,500.00	89.85	268.15	1,130.33	4,871.33	-15.94	-1,795.84	1,795.90	0.67	673,223.76	631,507.66
6,600.00	90.64	268.38	1,129.91	4,870.91	-19.26	-1,895.78	1,895.87	0.82	673,220.44	631,407.72
6,700.00	90.40	269.97	1,128.71	4,869.71	-20.94	-1,995.75	1,995.85	1.61	673,218.76	631,307.75
6,800.00	91.26	270.42	1,127.64	4,868.64	-20.24	-2,095.74	2,095.83	0.98	673,219.46	631,207.76
6,900.00	91.84	272.16	1,124.75	4,865.75	-18.35	-2,195.68	2,195.75	1.83	673,221.35	631,107.82
7,000.00	89.98	271.93	1,122.81	4,863.81	-14.36	-2,295.57	2,295.62	1.88	673,225.34	631,007.93
7,100.00	90.39	270.66	1,122.87	4,863.87	-12.04	-2,395.54	2,395.57	1.33	673,227.66	630,907.96
7,200.00	90.68	270.87	1,121.87	4,862.87	-10.86	-2,495.53	2,495.55	0.36	673,228.84	630,807.97
7,300.00	91.56	271.47	1,119.96	4,860.96	-8.84	-2,595.49	2,595.49	1.07	673,230.86	630,708.01
7,400.00	90.61	271.10	1,118.00	4,859.00	-6.55	-2,695.44	2,695.43	1.02	673,233.15	630,608.06
7,500.00	89.78	270.71	1,117.66	4,858.66	-4.90	-2,795.43	2,795.40	0.92	673,234.80	630,508.07
7,600.00	89.42	267.91	1,118.48	4,859.48	-6.28	-2,895.40	2,895.38	2.83	673,233.42	630,408.10
7,700.00	90.81	267.99	1,117.99	4,858.99	-9.85	-2,995.34	2,995.33	1.39	673,229.85	630,308.16
7,800.00	89.42	267.83	1,118.14	4,859.14	-13.45	-3,095.27	3,095.29	1.41	673,226.25	630,208.23



Phoenix Technology Services
Apache



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Site:	Raven Federal	MD Reference:	Well @ 3741.00usft (Original Well Elev + 14' KB)
Well:	Raven Federal #10H	North Reference:	Grid
Wellbore:	Raven Federal #10H	Survey Calculation Method:	Minimum Curvature
Design:	Raven Federal #10H Surveys	Database:	GCR DB v5000

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
7,900.00	90.46	267.67	1,117.80	4,858.80	-17.64	-3,195.18	3,195.22	1.06	673,222.06	630,108.32
8,000.00	89.23	268.88	1,118.58	4,859.58	-20.41	-3,295.13	3,295.19	1.73	673,219.29	630,008.37
8,100.00	89.96	269.29	1,118.74	4,859.74	-22.35	-3,395.11	3,395.18	0.84	673,217.35	629,908.39
8,200.00	89.05	270.79	1,120.13	4,861.13	-21.99	-3,495.09	3,495.16	1.75	673,217.71	629,808.41
8,300.00	90.13	270.60	1,120.75	4,861.75	-20.48	-3,595.08	3,595.13	1.10	673,219.22	629,708.42
8,400.00	90.93	269.73	1,119.85	4,860.85	-20.41	-3,695.07	3,695.12	1.19	673,219.29	629,608.43
8,500.00	91.91	269.60	1,117.40	4,858.40	-21.04	-3,795.04	3,795.09	0.98	673,218.66	629,508.46
8,600.00	91.47	270.18	1,113.72	4,854.72	-21.52	-3,894.97	3,895.02	0.73	673,218.18	629,408.53
8,700.00	90.69	270.70	1,112.58	4,853.58	-20.36	-3,994.95	3,995.00	0.94	673,219.34	629,308.55
8,800.00	91.73	270.34	1,110.47	4,851.47	-19.47	-4,094.92	4,094.96	1.10	673,220.23	629,208.58
8,900.00	90.73	269.75	1,107.52	4,848.52	-19.28	-4,194.88	4,194.91	1.17	673,220.42	629,108.62
9,000.00	90.02	269.34	1,107.59	4,848.59	-20.23	-4,294.87	4,294.91	0.81	673,219.47	629,008.63
9,100.00	91.01	269.04	1,106.78	4,847.78	-21.58	-4,394.86	4,394.90	1.03	673,218.12	628,908.64
9,200.00	92.16	269.31	1,104.01	4,845.01	-23.22	-4,494.80	4,494.86	1.18	673,216.48	628,808.70
9,300.00	91.35	269.36	1,100.45	4,841.45	-24.23	-4,594.73	4,594.79	0.81	673,215.47	628,708.77
9,400.00	91.36	268.54	1,098.48	4,839.48	-25.92	-4,694.70	4,694.77	0.82	673,213.78	628,608.80
9,500.00	92.69	268.54	1,095.09	4,836.09	-28.68	-4,794.60	4,794.68	1.33	673,211.02	628,508.90
9,543.00	93.10	268.60	1,092.88	4,833.88	-29.74	-4,837.53	4,837.62	0.96	673,209.96	628,465.97
Last Phoenix MWD Survey, 9543'										
9,600.00	93.10	268.60	1,089.79	4,830.79	-31.13	-4,894.43	4,894.53	0.00	673,208.57	628,409.07
9,601.00	93.10	268.60	1,089.74	4,830.74	-31.16	-4,895.43	4,895.53	0.00	673,208.54	628,408.07
Projection to Bit, 9601'										

Company:	Apache Corporation	Local Co-ordinate Reference:	Well Raven Federal #10H
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Site:	Raven Federal	MD Reference:	Well @ 3741.00usft (Original Well Elev + 14' KB)
Well:	Raven Federal #10H	North Reference:	Grid
Wellbore:	Raven Federal #10H	Survey Calculation Method:	Minimum Curvature
Design:	Raven Federal #10H Surveys	Database:	GCR DB v5000

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
486.00	485.97	-0.13	-4.66	First Phoenix MWD Survey, 486'
9,543.00	4,833.88	-29.74	-4,837.53	Last Phoenix MWD Survey, 9543'
9,601.00	4,830.74	-31.16	-4,895.43	Projection to Bit, 9601'

Checked By: _____	Approved By: _____	Date: _____
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