



Apache Corporation

Eddy County, NM (Nad27)

Raven Federal

Raven Federal #10H

Raven Federal #10H

Survey: Phoenix MWD Surveys

Apache

02 January, 2013



15 10466



EXPLORING WHAT'S POSSIBLE

Phoenix Technology Services Apache

PHOENIX
TECHNOLOGY SERVICES

Company: Apache Corporation Project: Eddy County, NM (Nad27) Site: Raven Federal Wellbore: Raven Federal #10H Design: Raven Federal #10H Surveys		Local Co-ordinate Reference: Well @ 3741.00usft (Original Well Elev + 14' KB) Well @ 3741.00usft (Original Well Elev + 14' KB) Grid Minimum Curvature GCR DB v5000	
Project: Eddy County, NM (Nad27) Map System: US State Plane 1927 (Exact solution) Geo Datum: NAD 1927 (NADCON CONUS) Map Zone: New Mexico East 3001		System Datum: Mean Sea Level	
Site: Raven Federal Site Position: Northing: 873,239.70 usft Easting: 633,303.50 usft Slot Radius: 13-3/16" Position Uncertainty: 0.00 usft		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 +E/-W 0.00 usft 0.00 usft Position Uncertainty: 0.00 usft		Latitude: 32° 51' 0.2430 N Longitude: 103° 53' 57.3509 W Ground Level: 3,727.00 usft	
Wellbore: Raven Federal #10H Magnetics: Model Name Sample Date 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		Direction: 269.61	
Vertical Section: Depth From (TVD) (usft) 0.00 +N/-S (usft) 0.00 +E/-W (usft) 0.00			
Survey Program: From (usft) To (usft) Date 01/02/13 486.00 9,601.00 Phoenix MWD Surveys (Raven Federal #1) MWD		Description: MWD - Standard	



EXPLORING WHAT'S POSSIBLE

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Apache



PHOENIX
TECHNOLOGY SERVICES

Company				Local Coordinate Reference				Well Raven Federal #10H			
Project				TVD Reference				Well @ 3741.00usft (Original Well Elev + 14' KB)			
Site				MD Reference				Well @ 3741.00usft (Original Well Elev + 14' KB)			
Well				North Reference				Grid			
Wellbore				Survey Calculation Method				Minimum Curvature			
Design				Database				GCR DB v5000			
Survey	MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V-Sec (usft)	D Leg (°/100usft)	Northing (usft)	Easting (usft)
	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		-3,641.00	100.00	-0.01	-0.20	0.20	0.23	673,239.69	633,303.30
	200.00	0.45		-3,541.00	200.00	-0.02	-0.79	0.79	0.23	673,239.68	633,302.71
	300.00	0.68		-3,441.01	299.99	-0.05	-1.78	1.78	0.23	673,239.65	633,301.72
	400.00	0.91		-3,341.02	399.98	-0.09	-3.16	3.16	0.23	673,239.61	633,300.34
	486.00	1.10		-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		-3,241.03	499.97	-0.13	-4.93	4.93	0.29	673,239.57	633,298.57
	600.00	1.20		-3,141.05	599.95	0.00	-6.92	6.92	0.14	673,239.70	633,296.58
	700.00	1.33		-3,041.08	699.92	0.24	-9.10	9.10	0.13	673,239.94	633,294.40
	800.00	1.46		-2,941.11	799.89	0.25	-11.61	11.60	0.17	673,239.95	633,291.89
	900.00	1.11		-2,841.14	899.86	0.59	-13.91	13.90	0.63	673,240.29	633,289.59
	1,000.00	0.99		-2,741.15	999.85	1.80	-15.13	15.12	0.66	673,241.50	633,288.37
	1,100.00	1.09		-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		-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		-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		-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		-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		-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		-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		-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		-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		-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		-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		-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		-1,441.84	2,299.16	-13.33	3.81	-3.81	0.74	673,226.37	633,307.41
	2,400.00	1.44		-1,341.87	2,399.13	-15.67	3.85	-3.55	0.33	673,224.03	633,307.15



EXPLORING WHAT'S POSSIBLE

Phoenix Technology Services Apache



Company: Apache Corporation Eddy County, NM (Nad27) Project: Raven Federal Site: Raven Federal #10H Well: Raven Federal #10H Wellbore: Raven Federal #10H Surveys Design:				Local Co-ordinate Reference: TVD Reference: MD Reference: North Reference: Survey Calculation Method: Database:				Well Raven Federal #10H Well @ 3741.00usft (Original Well Elev + 14' KB) Well @ 3741.00usft (Original Well Elev + 14' KB) Grid Minimum Curvature GCR DB v5000			
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (1/100usft)	Northing (usft)	Easting (usft)	
2,500.00	1.15	197.88	-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	3,099.08	-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:				Local Co-ordinate Reference:				Well Raven Federal #10H			
Project:				TVD Reference:				Well @ 3741.00usft (Original Well Elev + 14' KB)			
Site:				MD Reference:				Well @ 3741.00usft (Original Well Elev + 14' KB)			
Well:				North Reference:				Grid			
Wellbore:				Survey Calculation Method:				Minimum Curvature			
Design:				Database:				GCR DB v5000			
MD (usft)	Inc. (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	NIS (usft)	E/W (usft)	V. Sec (usft)	Dleg (°/100usft)	North (usft)	East (usft)	Original (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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	630,807.97
7,300.00	91.55	271.47	1,119.96	4,860.96	-8.84	-2,595.49	2,595.49	1.07	673,230.86	630,708.01	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	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	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	630,408.10
7,700.00	90.61	267.99	1,117.99	4,858.99	-9.85	-2,995.34	2,995.33	1.39	673,229.85	630,308.16	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	630,208.23



EXPLORING WHAT'S POSSIBLE

Phoenix Technology Services

Apache



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			
Survey	MD (usft)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	NIS (usft)	V/Sec (usft)	DLeg (7100usft)	Northing (usft)	Easting (usft)
	7,900.00	90.46	1,117.80	4,858.80	-17.64	3,195.18	1.06	673,222.06	630,108.32
	8,000.00	89.23	1,118.58	4,859.58	-20.41	3,295.13	1.73	673,219.29	630,008.37
	8,100.00	89.96	1,118.74	4,859.74	-22.35	3,395.11	0.84	673,217.35	629,908.39
	8,200.00	89.05	1,120.13	4,861.13	-21.99	3,495.09	1.75	673,217.71	629,808.41
	8,300.00	90.13	1,120.75	4,861.75	-20.48	3,595.08	1.10	673,219.22	629,708.42
	8,400.00	90.93	1,119.85	4,860.85	-20.41	3,695.07	1.19	673,219.29	629,608.43
	8,500.00	91.91	1,117.40	4,858.40	-21.04	3,795.04	0.98	673,218.66	629,508.46
	8,600.00	91.47	1,113.72	4,854.72	-21.52	3,894.97	0.73	673,218.18	629,408.53
	8,700.00	90.69	1,112.58	4,853.58	-20.36	3,994.95	0.94	673,219.34	629,308.55
	8,800.00	91.73	1,110.47	4,851.47	-19.47	4,094.92	1.10	673,220.23	629,208.58
	8,900.00	90.73	1,107.52	4,848.52	-19.28	4,194.88	1.17	673,220.42	629,108.62
	9,000.00	90.02	1,107.59	4,848.59	-20.23	4,294.87	0.81	673,219.47	629,008.63
	9,100.00	91.01	1,106.78	4,847.78	-21.58	4,394.86	1.03	673,218.12	628,908.64
	9,200.00	92.16	1,104.01	4,845.01	-23.22	4,494.80	1.18	673,216.48	628,808.70
	9,300.00	91.35	1,100.45	4,841.45	-24.23	4,594.73	0.81	673,215.47	628,708.77
	9,400.00	91.36	1,098.48	4,839.48	-25.92	4,694.70	0.82	673,213.78	628,608.80
	9,500.00	92.69	1,095.09	4,836.09	-28.68	4,794.60	1.33	673,211.02	628,508.90
	9,543.00	93.10	1,092.88	4,833.88	-29.74	4,837.53	0.96	673,209.96	628,465.97
Last Phoenix MWD Survey, 9543'									
	9,600.00	93.10	1,089.79	4,830.79	-31.13	4,894.43	0.00	673,208.57	628,409.07
	9,601.00	93.10	1,089.74	4,830.74	-31.16	4,895.43	0.00	673,208.54	628,408.07
Projection to Bit, 9601'									



EXPLORING WHAT'S POSSIBLE

Phoenix Technology Services

Apache



Company: Apache Corporation	Well: Raven Federal #10H
Project: Eddy County, NM (Nad27)	Well @ 3741.00usft (Original Well Elev + 14' KB)
Site: Raven Federal	Well @ 3741.00usft (Original Well Elev + 14' KB)
Well: Raven Federal #10H	Grid
Wellbore: Raven Federal #10H	Minimum Curvature
Design: Raven Federal #10H Surveys	GCR DB v5000

Survey Annotations				Local Co-ordinate Reference:	
				TVD Reference:	MD Reference:
				North Reference:	Survey Calculation Method:
				Database:	
Measured Depth (usft)	Vertical Depth (usft)	N/S (usft)	E/W (usft)		

486.00	485.97	-0.13	-4.86	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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Submit within 45 days of well completion	State of New Mexico Energy, Minerals and Natural Resources Oil Conservation Division 1220 S. St Francis Dr. Santa Fe, NM 87505		Revised November 6, 2013			
			1. WELL API NO. 30-015-40466			
			2. Well Name: RAVEN FEDERAL COM #010H			
			3. Well Number: 010H			
HYDRAULIC FRACTURING FLUID DISCLOSURE <input checked="" type="checkbox"/> Original <input type="checkbox"/> Amendment			4. Surface Hole Location: Unit:E Lot:E Section:8 Township:17S Range:31E Feet from:2218 N/S Line:N Feet from:220 E/W Line:W			
			5. Bottom Hole Location: Unit:E Lot:E Section:8 Township:17S Range:31E Feet from:2218 N/S Line:N Feet from:220 E/W Line:W			
			6. latitude: longitude: 32.8501644852288 -103.899910778643			
			7. County: Eddy			
8. Operator Name and Address: APACHE CORP 303 Veterans Airpark Lane Suite 3000 Midland 79705			9. OGRID: 873	10. Phone Number: 432-818-1062		
11. Last Fracture Date: 4/25/2015 Frac Performed by: Elite			12. Production Type: O			
13. Pool Code(s): 96831			14. Gross Fractured Interval: 5,573 ft to 9,595 ft			
15. True Vertical Depth (TVD): 4,831 ft			16. Total Volume of Fluid Pumped: 2,953,314 gals			
17. Total Volume of Re-Use Water Pumped: N/A			18. Percent of Re-Use Water in Fluid Pumped: Not Disclosed			
19. HYDRAULIC FLUID COMPOSITION AND CONCENTRATION:						
Trade Name	Supplier	Purpose	Ingredients	(CAS #) Chemical Abstract Service #	Maximum Ingredient Concentration in Additive (% by mass)	Maximum Ingredient Concentration in HF Fluid (% by mass)
Water	Customer	Carrier/Base Fluid	Water	7732-18-5	100%	87.07681%
Sand (Proppant)	US Silica	Proppant	Silica Substrate	14808-60-7	100%	7.04946%
RCS (Proppant)	Momentive	Proppant	Silica Substrate	14808-60-7	100%	2.37819%
Hydrochloric Acid (15%)	CNR	Acidizing	Hydrochloric Acid	7647-01-0	38.8%	1.25158%
Claymax	Chemplex	Clay Stabilizer	Choline Chloride	67-48-1	62%	0.00587%
4-N-1 Plus	Chemplex	Iron Control, Corr Inhib, Surfactant	Acetic Acid	64-19-7	80%	0.01951%
			Methanol	67-56-1	10%	0.00244%
Plexcide 24L	Chemplex	Biocide	Tetrahydro-3,Dimethyl-2H	533-74-4	24%	0.00579%
Plexset 730	Chemplex	Activator	Secondary Alcohol Ethoxylate	84133-50-6	50%	0.0355%
Plexslick 953	Chemplex	Friction Reducer	Alcohol Ethoxylate Surfactants	Proprietary	8%	0.00734%
			Hydrotreated Petroleum Distillate	64742-47-8	30%	0.02753%
			Polyacrylamide-co-Acrylic Acid	9003-06-9	32%	0.02936%
Greenhib 679	Chemplex	Scale Inhibitor	Glycerine	56-81-5	35%	0.01717%
			Proprietary	Proprietary	35%	0.01717%
			Water	7732-18-5	30%	0.01472%
20. I, as Operator, hereby certify that the information shown on this disclosure form is true and complete to the best of my knowledge and belief.						
Signature: <u>Signed Electronically</u>		Printed Name: <u>Fatima Vasquez</u>		Title: <u>Regulatory Analyst</u>		
Date: <u>6/5/2015</u>						
E-mail Address: <u>fatima.vasquez@apachecorp.com</u>						

NMOCD does not require the reporting of information beyond MSDS data as described in 29 CFR 1910.1200. NMOCD does not require the reporting or disclosure of proprietary, trade secret or confidential business information.

APACHE CORPORATION

WELLBORE DIAGRAM AND INFORMATION

Well Name: Raven Federal #10H

Date: 4/24/2013

County: Eddy

Field: Cedar Lake

State: New Mexico

Spud Date: 12/9/2012

Surface: 2,218' FNL & 220' FWL
Lot E, Section 8, T-17-S, R-31-E
Eddy County, New Mexico

BHL:

Elevation: 3,728'
KB: 13'
TMD: 9,601'
API #: 30-015-40466

