PHOENIX
TECHNOLOGY SERVICES

February 19, 2013

Oil Conservation Division
State of New Mexico
811 S. First St.
Artesia, New Mexico 88210

RECEIVED
FEB 25 2013
NMOCD ARTESIA

Dear District 2 - Artesia

Attention: Regulatory Department

Re: Apache Corporation
Raven Federal 12H
Eddy Co., NM
API #30-015-40466
Job No. 1211107

Enclosed please find the Survey Data Certification, and the original Plat and one copy of the Survey Report performed on the above referenced Well by Phoenix Technology Services, Inc. (P-5 No. 664171). Other information required by your office is as follows:

Name & Title of Surveyor	Drainhole Number	Surveyed Depths		Dates Performed		Type of Survey
		From	To	Start	End	
Brad Hill	12H	521	10,516	01/16/13	02/13/13	MWD

A certified plat on which the bottom hole location is oriented both to the surface location and to the lease lines (or unit lines in case of pooling) is attached to the survey report. If any other information is required, please contact the undersigned at the letterhead address and phone number.

Best Regards,

Kelly Jo Walter

Kelly Jo Walter
Operations Administrator

Certified mail receipt number: 7011 1570 0001 4364 9407

1805 Brittmoore Rd. Houston, TX 77043 • Phone (713) 337-0600 • Fax (713) 337-0599
www.phxtech.com

Phoenix Technology Services
SURVEY DATA CERTIFICATION

PHOENIX TECHNOLOGY SERVICES

PHOENIX JOB NUMBER 1211107 OPERATOR Apache

WELL NAME Raven Federal Com #12H COUNTY & STATE Eddy, NM

API WELL NUMBER	30-015-40468

PROPOSED DIRECTION	269.61

TIE-IN DATA						
MEASURED DEPTH	VERTICAL DEPTH	INCLIN	AZIMUTH	N-S COORD	E-W COORD	DATA SOURCE
0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.00 ft	0.00 ft	Surface

FIRST SURVEY DATE	FIRST SURVEY DEPTH	INCLIN	AZIMUTH
16-Jan-13	521 ft	1.3	41.8

SURVEY INSTRUMENT TYPE
Phoenix MWD

LAST SURVEY DATE	LAST SURVEY DEPTH	INCLIN	AZIMUTH
13-Feb-13	10,516 ft	92.1	271.2

TO THE BEST OF MY KNOWLEDGE I CERTIFY THIS SURVEY DATA TO BE TRUE AND CORRECT.

PROJECTED TD SURVEY DATE	PROJECTED TD SURVEY DEPTH	INCLIN	AZIMUTH
13-Feb-13	10,573 ft	92.4	271.4

Brad Hill

PRINT YOUR NAME ABOVE

Brad Hill

SIGN YOUR NAME ABOVE

MAGNETIC DECLINATION OR TOTAL GRID

TOTAL CORRECTION USED	7.44
DECLINATION OR GRID	DECLINATION

2-13-13

TODAY'S DATE

MWD SUPERVISOR 1 Brad Hill DIRECTIONAL DRILLER 1 Tim Owens

MWD SUPERVISOR 2 Matt Dice DIRECTIONAL DRILLER 2 Ken Smith

1805 Brittmore Road Houston, Texas 77043 (713)3370609 (Voice), (713)337-0599 (Fax)

Apache CORPORATION

RECEIVED
FEB 25 2013
NMOCD ARTESIA

Apache Corporation

Eddy County, NM (NAD27 NME)
Raven Federal #12H
Wellbore #1 / Job #1211107

Survey: Phoenix MWD Surveys

Phoenix Final Survey Report

13 February, 2013

PHOENIX
TECHNOLOGY SERVICES

Phoenix Technology Services

Phoenix Final Survey Report

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #12H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3741.00usft (Basic 44)
Site:	Raven Federal	MD Reference:	KB @ 3741.00usft (Basic 44)
Well:	#12H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1211107	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Basic 44)	Database:	GCR DB

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	Latitude:	32° 51' 0.2430 N
From:	Map	Easting:	633,303.50 usft	Longitude:	103° 53' 57.3509 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.24 °

Well: #12H

Well Position	+N/-S	0.00 usft	Northing:	673,369.70 usft	Latitude:	32° 51' 1.5293 N
	+E/-W	0.00 usft	Easting:	633,303.50 usft	Longitude:	103° 53' 57.3446 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,728.00 usft

Wellbore: Wellbore #1 / Job #1211107

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	01/16/13	7.59	60.67	48,796

Design: Surveys (Basic 44)

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 02/13/13

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
521.00	10,573.00	Phoenix MWD Surveys (Wellbore #1 / Job	MWD	MWD - Standard

Company:	Apache Corporation	**Local Co-ordinate Reference:**	Well #12H
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Site:	Raven Federal	**MD Reference:**	KB @ 3741.00usft (Basic 44)
Well:	#12H	**North Reference:**	Grid
Wellbore:	Wellbore #1 / Job #1211107	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Basic 44)	**Database:**	GCR DB

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	673,369.70	633,303.50
521.00	1.30	41.80	3,220.04	520.96	4.41	3.94	-3.97	0.25	673,374.11	633,307.44
Phoenix First MWD Survey										
605.00	0.80	51.00	3,136.06	604.94	5.49	5.03	-5.07	0.63	673,375.19	633,308.53
689.00	0.70	71.20	3,052.07	688.93	6.02	5.97	-6.01	0.33	673,375.72	633,309.47
771.00	0.70	90.90	2,970.07	770.93	6.17	6.95	-6.99	0.29	673,375.87	633,310.45
855.00	0.60	112.20	2,886.08	854.92	6.00	7.87	-7.91	0.31	673,375.70	633,311.37
938.00	0.80	100.00	2,803.08	937.92	5.73	8.84	-8.88	0.30	673,375.43	633,312.34
1,022.00	0.80	136.60	2,719.09	1,021.91	5.21	9.82	-9.86	0.60	673,374.91	633,313.32
1,105.00	0.80	173.00	2,636.10	1,104.90	4.21	10.29	-10.32	0.60	673,373.91	633,313.79
1,189.00	1.20	181.50	2,552.11	1,188.89	2.75	10.34	-10.36	0.51	673,372.45	633,313.84
1,272.00	1.60	174.30	2,469.14	1,271.86	0.73	10.43	-10.43	0.53	673,370.43	633,313.93
1,356.00	2.20	190.10	2,385.18	1,355.82	-2.03	10.26	-10.25	0.94	673,367.67	633,313.76
1,439.00	2.50	204.00	2,302.25	1,438.75	-5.25	9.25	-9.21	0.77	673,364.45	633,312.75
1,523.00	2.30	213.50	2,218.33	1,522.67	-8.33	7.57	-7.52	0.53	673,361.37	633,311.07
1,607.00	1.80	217.90	2,134.38	1,606.62	-10.78	5.83	-5.76	0.62	673,358.92	633,309.33
1,690.00	1.80	240.00	2,051.42	1,689.58	-12.46	3.90	-3.82	0.83	673,357.24	633,307.40
1,773.00	1.70	268.60	1,968.46	1,772.54	-13.14	1.54	-1.45	1.05	673,356.56	633,305.04
1,857.00	1.80	272.90	1,884.50	1,856.50	-13.10	-1.02	1.11	0.20	673,356.60	633,302.48
1,940.00	2.20	272.60	1,801.55	1,939.45	-12.96	-3.91	4.00	0.48	673,356.74	633,299.59
2,025.00	2.60	276.60	1,716.62	2,024.38	-12.67	-7.46	7.55	0.51	673,357.03	633,296.04
2,108.00	2.70	276.60	1,633.71	2,107.29	-12.23	-11.27	11.35	0.12	673,357.47	633,292.23
2,192.00	2.40	285.30	1,549.79	2,191.21	-11.53	-14.93	15.01	0.58	673,358.17	633,288.57
2,275.00	2.50	291.20	1,466.87	2,274.13	-10.42	-18.30	18.37	0.33	673,359.28	633,285.20
2,359.00	2.20	305.60	1,382.94	2,358.06	-8.82	-21.32	21.38	0.79	673,360.88	633,282.18
2,443.00	1.60	339.70	1,298.98	2,442.02	-6.78	-23.03	23.08	1.49	673,362.92	633,280.47
2,526.00	1.50	349.40	1,216.01	2,524.99	-4.63	-23.64	23.67	0.34	673,365.07	633,279.86

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #12H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3741.00usft (Basic 44)
Site:	Raven Federal	MD Reference:	KB @ 3741.00usft (Basic 44)
Well:	#12H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1211107	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Basic 44)	Database:	GCR DB

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)
2,610.00	1.50	18.60	1,132.04	2,608.96	-2.50	-23.49	23.50	0.90	673,367.20	633,280.01
2,694.00	1.70	20.30	1,048.07	2,692.93	-0.29	-22.70	22.71	0.24	673,369.41	633,280.80
2,777.00	1.70	22.60	965.11	2,775.89	2.00	-21.80	21.79	0.06	673,371.70	633,281.70
2,861.00	1.50	33.90	881.14	2,859.86	4.06	-20.71	20.68	0.44	673,373.76	633,282.79
2,944.00	1.40	30.10	798.17	2,942.83	5.84	-19.60	19.56	0.17	673,375.54	633,283.90
3,028.00	1.40	33.90	714.19	3,026.81	7.58	-18.51	18.46	0.11	673,377.28	633,284.99
3,111.00	1.20	31.50	631.21	3,109.79	9.16	-17.49	17.43	0.25	673,378.86	633,286.01
3,195.00	1.50	39.00	547.24	3,193.76	10.77	-16.34	16.27	0.41	673,380.47	633,287.16
3,280.00	1.40	26.80	462.27	3,278.73	12.56	-15.17	15.09	0.38	673,382.26	633,288.33
3,364.00	1.50	25.30	378.29	3,362.71	14.47	-14.24	14.14	0.13	673,384.17	633,289.26
3,445.00	1.60	35.70	297.32	3,443.68	16.34	-13.13	13.01	0.37	673,386.04	633,290.37
3,545.00	1.60	34.70	197.36	3,543.64	18.63	-11.52	11.39	0.03	673,388.33	633,291.98
3,586.00	1.00	47.10	156.37	3,584.63	19.34	-10.93	10.80	1.61	673,389.04	633,292.57
3,628.00	0.40	157.70	114.37	3,626.63	19.45	-10.60	10.47	2.86	673,389.15	633,292.90
3,670.00	1.50	212.00	72.38	3,668.62	18.85	-10.84	10.71	3.11	673,388.55	633,292.66
3,753.00	2.20	226.50	-10.58	3,751.58	16.83	-12.57	12.46	1.01	673,386.53	633,290.93
3,836.00	1.90	221.90	-93.52	3,834.52	14.71	-14.65	14.55	0.41	673,384.41	633,288.85
3,920.00	2.00	220.50	-177.48	3,918.48	12.56	-16.53	16.44	0.13	673,382.26	633,286.97
4,003.00	2.30	238.00	-260.42	4,001.42	10.58	-18.88	18.81	0.87	673,380.28	633,284.62
4,087.00	3.30	264.80	-344.32	4,085.32	9.47	-22.72	22.65	1.93	673,379.17	633,280.78
4,171.00	4.00	273.50	-428.15	4,169.15	9.43	-28.05	27.99	1.06	673,379.13	633,275.45
4,255.00	4.00	273.90	-511.94	4,252.94	9.80	-33.90	33.83	0.03	673,379.50	633,269.60
4,339.00	3.80	273.70	-595.75	4,336.75	10.18	-39.60	39.53	0.24	673,379.88	633,263.90
4,422.00	3.00	268.60	-678.60	4,419.60	10.31	-44.51	44.44	1.03	673,380.01	633,258.99
4,507.00	2.20	251.90	-763.52	4,504.52	9.75	-48.29	48.22	1.29	673,379.45	633,255.21
4,591.00	1.10	170.60	-847.49	4,588.49	8.45	-49.69	49.63	2.75	673,378.15	633,253.81
4,675.00	1.20	159.50	-931.47	4,672.47	6.83	-49.25	49.20	0.29	673,376.53	633,254.25

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Well:	#12H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1211107	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Basic 44)	Database:	GCR DB

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)
4,758.00	1.40	168.40	-1,014.45	4,755.45	5.02	-48.74	48.71	0.34	673,374.72	633,254.76
4,842.00	1.30	163.30	-1,098.43	4,839.43	3.10	-48.26	48.24	0.19	673,372.80	633,255.24
4,925.00	1.50	169.30	-1,181.40	4,922.40	1.13	-47.79	47.78	0.30	673,370.83	633,255.71
5,009.00	1.30	169.70	-1,265.38	5,006.38	-0.88	-47.41	47.42	0.24	673,368.82	633,256.09
5,093.00	1.30	180.50	-1,349.36	5,090.36	-2.77	-47.25	47.27	0.29	673,366.93	633,256.25
5,177.00	2.00	269.80	-1,433.33	5,174.33	-3.73	-48.73	48.75	2.82	673,365.97	633,254.77
5,260.00	0.30	312.40	-1,516.31	5,257.31	-3.59	-50.34	50.36	2.16	673,366.11	633,253.16
5,344.00	0.30	12.60	-1,600.31	5,341.31	-3.23	-50.45	50.47	0.36	673,366.47	633,253.05
5,375.00	0.30	355.00	-1,631.31	5,372.31	-3.07	-50.44	50.46	0.30	673,366.63	633,253.06
5,440.00	0.30	13.00	-1,696.31	5,437.31	-2.73	-50.42	50.43	0.14	673,366.97	633,253.08
5,472.00	0.60	41.10	-1,728.31	5,469.31	-2.52	-50.29	50.30	1.14	673,367.18	633,253.21
5,505.00	0.70	281.80	-1,761.31	5,502.31	-2.35	-50.37	50.39	3.40	673,367.35	633,253.13
5,537.00	4.70	272.00	-1,793.27	5,534.27	-2.27	-51.87	51.89	12.54	673,367.43	633,251.63
5,569.00	9.00	272.60	-1,825.03	5,566.03	-2.11	-55.69	55.70	13.44	673,367.59	633,247.81
5,601.00	13.90	275.20	-1,856.38	5,597.38	-1.64	-62.02	62.03	15.39	673,368.06	633,241.48
5,633.00	19.20	276.00	-1,887.05	5,628.05	-0.75	-71.09	71.09	16.58	673,368.95	633,232.41
5,665.00	23.60	273.50	-1,916.84	5,657.84	0.20	-82.72	82.71	14.04	673,369.90	633,220.78
5,697.00	27.50	270.00	-1,945.70	5,686.70	0.59	-96.51	96.50	13.06	673,370.29	633,206.99
5,729.00	32.10	267.00	-1,973.46	5,714.46	0.14	-112.39	112.39	15.11	673,369.84	633,191.11
5,761.00	37.30	267.20	-1,999.76	5,740.76	-0.78	-130.58	130.58	16.25	673,368.92	633,172.92
5,793.00	41.70	268.00	-2,024.45	5,765.45	-1.62	-150.91	150.92	13.84	673,368.08	633,152.59
5,825.00	46.50	268.80	-2,047.42	5,788.42	-2.24	-173.17	173.18	15.10	673,367.46	633,130.33
5,858.00	51.70	269.40	-2,069.02	5,810.02	-2.62	-198.10	198.11	15.82	673,367.08	633,105.40
5,890.00	57.70	270.10	-2,087.51	5,828.51	-2.73	-224.20	224.22	18.83	673,366.97	633,079.30
5,922.00	64.00	270.30	-2,103.09	5,844.09	-2.63	-252.13	252.15	19.70	673,367.07	633,051.37
5,954.00	69.10	270.40	-2,115.82	5,856.82	-2.45	-281.48	281.49	15.94	673,367.25	633,022.02
5,986.00	73.10	270.20	-2,126.18	5,867.18	-2.30	-311.75	311.76	12.51	673,367.40	632,991.75

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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)
6,018.00	77.40	270.20	-2,134.32	5,875.32	-2.19	-342.69	342.69	13.44	673,367.51	632,960.81
6,050.00	82.90	270.10	-2,139.80	5,880.80	-2.11	-374.20	374.21	17.19	673,367.59	632,929.30
6,083.00	86.70	270.10	-2,142.79	5,883.79	-2.05	-407.06	407.07	11.52	673,367.65	632,896.44
6,115.00	90.10	269.70	-2,143.68	5,884.68	-2.10	-439.04	439.05	10.70	673,367.60	632,864.46
6,211.00	91.80	268.50	-2,142.09	5,883.09	-3.61	-535.01	535.03	2.17	673,366.09	632,768.49
6,308.00	89.90	267.70	-2,140.65	5,881.65	-6.83	-631.94	631.98	2.13	673,362.87	632,671.56
6,404.00	92.20	268.60	-2,138.89	5,879.89	-9.93	-727.87	727.92	2.57	673,359.77	632,575.63
6,500.00	90.70	268.80	-2,136.46	5,877.46	-12.10	-823.81	823.88	1.58	673,357.60	632,479.69
6,597.00	90.70	269.70	-2,135.28	5,876.28	-13.37	-920.80	920.87	0.93	673,356.33	632,382.70
6,693.00	89.90	270.10	-2,134.77	5,875.77	-13.54	-1,016.79	1,016.86	0.93	673,356.16	632,286.71
6,789.00	90.70	269.90	-2,134.27	5,875.27	-13.54	-1,112.79	1,112.86	0.86	673,356.16	632,190.71
6,885.00	89.20	270.30	-2,134.35	5,875.35	-13.37	-1,208.79	1,208.85	1.62	673,356.33	632,094.71
6,982.00	89.90	270.50	-2,135.12	5,876.12	-12.70	-1,305.78	1,305.84	0.75	673,357.00	631,997.72
7,078.00	90.60	270.20	-2,134.70	5,875.70	-12.11	-1,401.78	1,401.83	0.79	673,357.59	631,901.72
7,174.00	88.80	270.10	-2,135.20	5,876.20	-11.86	-1,497.77	1,497.82	1.88	673,357.84	631,805.73
7,270.00	89.20	269.70	-2,136.88	5,877.88	-12.03	-1,593.76	1,593.80	0.59	673,357.67	631,709.74
7,367.00	89.10	269.30	-2,138.31	5,879.31	-12.87	-1,690.74	1,690.79	0.43	673,356.83	631,612.76
7,463.00	89.80	269.60	-2,139.24	5,880.24	-13.79	-1,786.73	1,786.79	0.79	673,355.91	631,516.77
7,559.00	90.90	270.60	-2,138.65	5,879.65	-13.63	-1,882.73	1,882.78	1.55	673,356.07	631,420.77
7,656.00	91.60	268.60	-2,136.53	5,877.53	-14.30	-1,979.70	1,979.75	2.18	673,355.40	631,323.80
7,752.00	90.30	269.30	-2,134.94	5,875.94	-16.06	-2,075.67	2,075.73	1.54	673,353.64	631,227.83
7,847.00	90.00	269.40	-2,134.69	5,875.69	-17.14	-2,170.66	2,170.73	0.33	673,352.56	631,132.84
7,945.00	89.80	268.80	-2,134.86	5,875.86	-18.68	-2,268.65	2,268.72	0.65	673,351.02	631,034.85
8,041.00	88.70	269.10	-2,136.12	5,877.12	-20.44	-2,364.62	2,364.71	1.19	673,349.26	630,938.88
8,137.00	89.50	269.20	-2,137.63	5,878.63	-21.86	-2,460.60	2,460.69	0.84	673,347.84	630,842.90
8,233.00	90.40	270.10	-2,137.71	5,878.71	-22.45	-2,556.59	2,556.69	1.33	673,347.25	630,746.91
8,330.00	89.60	270.20	-2,137.71	5,878.71	-22.19	-2,653.59	2,653.68	0.83	673,347.51	630,649.91

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #12H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3741.00usft (Basic 44)
Site:	Raven Federal	MD Reference:	KB @ 3741.00usft (Basic 44)
Well:	#12H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1211107	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Basic 44)	Database:	GCR DB

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)
8,426.00	89.90	269.60	-2,138.13	5,879.13	-22.36	-2,749.59	2,749.68	0.70	673,347.34	630,553.91
8,522.00	89.80	269.20	-2,138.38	5,879.38	-23.37	-2,845.59	2,845.68	0.43	673,346.33	630,457.91
8,619.00	90.00	269.60	-2,138.55	5,879.55	-24.38	-2,942.58	2,942.68	0.46	673,345.32	630,360.92
8,715.00	90.50	270.20	-2,138.13	5,879.13	-24.55	-3,038.58	3,038.68	0.81	673,345.15	630,264.92
8,811.00	91.10	269.90	-2,136.79	5,877.79	-24.47	-3,134.57	3,134.66	0.70	673,345.23	630,168.93
8,907.00	91.50	269.40	-2,134.61	5,875.61	-25.05	-3,230.54	3,230.64	0.67	673,344.65	630,072.96
9,003.00	92.20	270.90	-2,131.52	5,872.52	-24.80	-3,326.49	3,326.58	1.72	673,344.90	629,977.01
9,100.00	90.70	269.40	-2,129.06	5,870.06	-24.55	-3,423.45	3,423.54	2.19	673,345.15	629,880.05
9,196.00	91.50	269.10	-2,127.22	5,868.22	-25.80	-3,519.42	3,519.52	0.89	673,343.90	629,784.08
9,292.00	91.40	269.10	-2,124.79	5,865.79	-27.31	-3,615.38	3,615.48	0.10	673,342.39	629,688.12
9,389.00	91.50	269.10	-2,122.33	5,863.33	-28.83	-3,712.34	3,712.45	0.10	673,340.87	629,591.16
9,485.00	92.00	269.80	-2,119.40	5,860.40	-29.76	-3,808.29	3,808.40	0.90	673,339.94	629,495.21
9,581.00	90.30	268.60	-2,117.48	5,858.48	-31.10	-3,904.25	3,904.38	2.17	673,338.60	629,399.25
9,678.00	91.30	269.00	-2,116.12	5,857.12	-33.13	-4,001.22	4,001.36	1.11	673,336.57	629,302.28
9,774.00	92.60	269.10	-2,112.85	5,853.85	-34.72	-4,097.15	4,097.29	1.36	673,334.98	629,206.35
9,870.00	92.00	270.00	-2,109.00	5,850.00	-35.47	-4,193.07	4,193.21	1.13	673,334.23	629,110.43
9,966.00	90.60	270.60	-2,106.82	5,847.82	-34.97	-4,289.04	4,289.18	1.59	673,334.73	629,014.46
10,063.00	91.40	271.10	-2,105.13	5,846.13	-33.53	-4,386.01	4,386.14	0.97	673,336.17	628,917.49
10,159.00	92.10	271.40	-2,102.20	5,843.20	-31.44	-4,481.95	4,482.06	0.79	673,338.26	628,821.55
10,255.00	90.20	271.60	-2,100.27	5,841.27	-28.92	-4,577.89	4,577.98	1.99	673,340.78	628,725.61
10,352.00	90.90	271.50	-2,099.34	5,840.34	-26.30	-4,674.85	4,674.92	0.73	673,343.40	628,628.65
10,448.00	91.60	271.00	-2,097.25	5,838.25	-24.21	-4,770.80	4,770.86	0.90	673,345.49	628,532.70
10,516.00	92.10	271.20	-2,095.05	5,836.05	-22.90	-4,838.75	4,838.80	0.79	673,346.80	628,464.75
Current MWD Survey										
10,573.00	92.40	271.40	-2,092.81	5,833.81	-21.61	-4,895.70	4,895.73	0.63	673,348.09	628,407.80
Projection to bit										

Phoenix Technology Services

Phoenix Final Survey Report

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #12H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3741.00usft (Basic 44)
Site:	Raven Federal	MD Reference:	KB @ 3741.00usft (Basic 44)
Well:	#12H	North Reference:	Grid
Wellbore:	Wellbore #1 / Job #1211107	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Basic 44)	Database:	GCR DB

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
521.00	520.96	4.41	3.94	Phoenix First MWD Survey
10,516.00	5,836.35	-22.92	-4,838.75	Current MWD Survey
10,573.00	5,834.11	-21.63	-4,895.69	Projection to bit

Checked By: _____ Approved By: _____ Date: _____

Project: Eddy County, NM (NAD27 NME)
Site: Raven Federal
Well: #12H
Wellbore: Wellbore #1 / Job #1211107
Design: Plan #3 / 01-16-2013

PHOENIX TECHNOLOGY SERVICES

Azimuths to Grid North
True North: -0.23°
Magnetic North: 7.35°

Magnetic Field
Strength: 48795.8snT
Dip Angle: 60.67°
Date: 01/16/2013
Model: IGRF2010_14

WELL DETAILS

Ground Level: 3728.00

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	673369.70	633303.50	32° 51' 1.5293 N	103° 53' 57.3446 W

SITE DETAILS: Raven Federal

Site Centre Northing: 673239.70
Easting: 633303.50

Positional Uncertainty: 0.00
Convergence: 0.24
Local North: Grid

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone Name: New Mexico East 3001

Local Origin: Well #12H, Grid North

Latitude: 32° 51' 1.5293 N
Longitude: 103° 53' 57.3446 W

Grid East: 633303.50
Grid North: 673369.70
Scale Factor: 1.000

Geomagnetic Model: IGRF2010_14
Sample Date: 16-Jan-13
Magnetic Declination: 7.59°
Dip Angle from Horizontal: 60.67°
Magnetic Field Strength: 48796

To convert a Magnetic Direction to a Grid Direction, Add 7.35°
To convert a Magnetic Direction to a True Direction, Add 7.59° East
To convert a True Direction to a Grid Direction, Subtract 0.24°

PROJECT DETAILS: Eddy County, NM (NAD27 NME)

Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001

System Datum: Mean Sea Level

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	3800.00	0.00	0.00	3800.00	0.00	0.00	0.00	0.00	0.00		Start Build 2.00
3	4050.00	5.00	269.61	4049.68	-0.07	-10.90	2.00	269.61	10.90		Start 300.00 hold at 4050.00 MD
4	4350.00	5.00	269.61	4348.54	-0.25	-37.05	0.00	0.00	37.05		Start Drop -2.00
5	4600.00	0.00	0.00	4598.22	-0.33	-47.95	2.00	180.00	47.95		Start 904.44 hold at 4600.00 MD
6	5504.44	0.00	0.00	5502.66	-0.33	-47.95	0.00	0.00	47.95		Start Build 15.00
7	6106.03	90.24	269.61	5884.63	-2.91	-431.51	15.00	269.61	431.52		Start 2207.48 hold at 6106.11 MD
8	10570.67	90.24	269.61	5866.00	-33.00	-4896.00	0.00	0.00	4896.11	PBHL-Raven #12H	TD at 10570.67

FORMATION TOP DETAILS

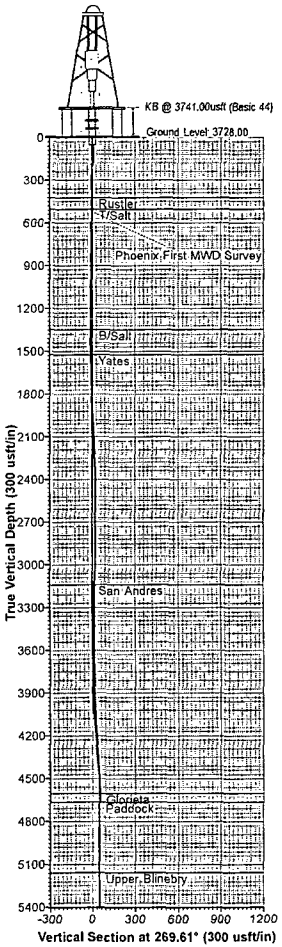
TVDPath	MDPath	Formation	DipAngle	DipDir
421.00	421.00	Rustler	0.00	269.61
502.00	502.00	T/Salt	0.00	269.61
1346.00	1346.00	B/Salt	0.00	269.61
1522.00	1522.00	Yates	0.00	269.61
3136.00	3136.00	San Andres	0.00	269.61
4601.00	4602.78	Glorieta	0.00	269.61
4663.00	4664.78	Paddock	0.00	269.61
5154.00	5155.78	Upper Blinebry	0.00	269.61

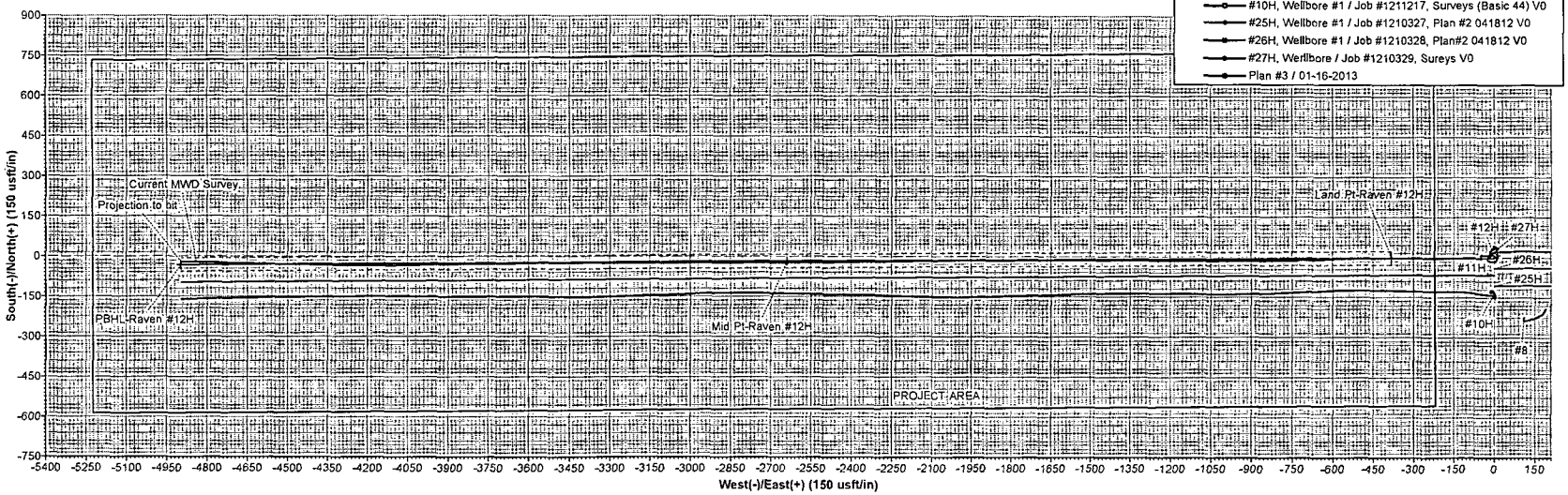
DESIGN TARGET DETAILS

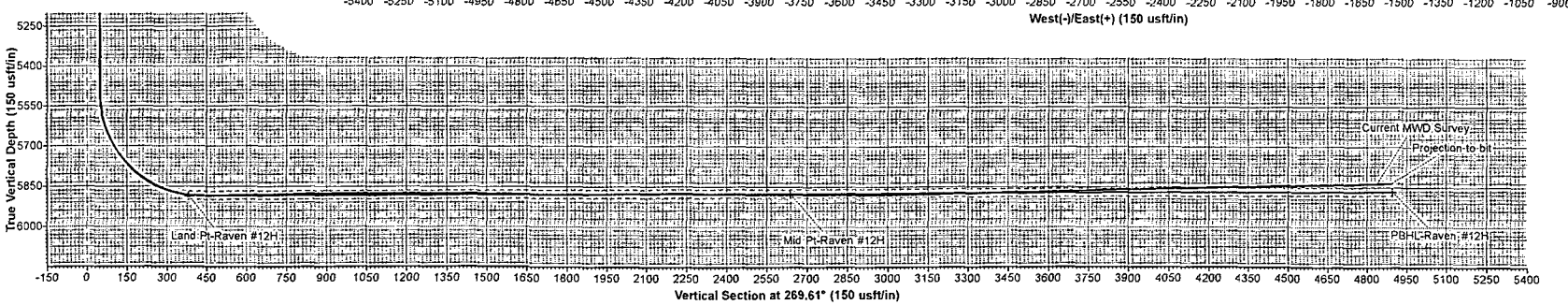
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
PBHL-Raven #12H	5866.00	-33.00	-4896.00	673336.70	628407.50	32° 51' 1.3982 N	103° 54' 54.7383 W	Rectangle (Sides: L30.00 W50.00)
- plan hits target center								
Mid Pt-Raven #12H	5876.00	-17.80	-2638.99	673351.90	630664.51	32° 51' 1.4595 N	103° 54' 28.2804 W	Point
- plan misses target center by 0.58usft at 8313.59usft MD (5875.42 TVD, -17.79 N, -2638.99 E)								
Land Pt-Raven #12H	5886.00	-2.60	-381.96	673367.10	632921.54	32° 51' 1.5191 N	103° 54' 1.8222 W	Point
- plan misses target center by 4.35usft at 6056.84usft MD (5881.67 TVD, -2.58 N, -382.44 E)								

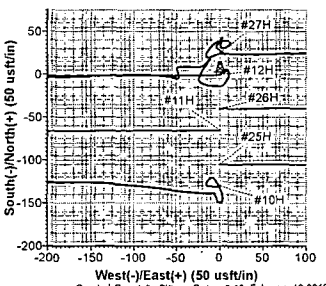
LEGEND

- #1H, OH, Actual Surveys V0
- #11H, Wellbore #1, Plan 1 05-01-2012 V0
- #12H, Wellbore #1 / Job #1211107, Surveys (Basic 44) V0
- #10H, Wellbore #1 / Job #1211217, Surveys (Basic 44) V0
- #25H, Wellbore #1 / Job #1210327, Plan #2 041812 V0
- #26H, Wellbore #1 / Job #1210328, Plan#2 041812 V0
- #27H, Wellbore / Job #1210329, Sureys V0
- Plan #3 / 01-16-2013









Created By: Julio Piña Date: 8:10, February 13 2013