



PHOENIX
TECHNOLOGY SERVICES

March 20, 2015

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

Dear District 2 - Artesia

Attention: Regulatory Department

Re: Apache Corporation
Crow Federal #42H
Eddy County, NM
API #30-015-42744
Job No. 1512794

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	Drain Hole Number	Surveyed Depths		Dates Performed		Type of Survey
		From	To	Start	End	
Jeff Broussard	42H	690	10,318	02/09/15	02/18/15	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,

Claudia Carreon

Claudia Carreon
Operations Administrator

JED 3/31/15
NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 30 2015

RECEIVED

Certified mail receipt number: 7014 2120 0004 3423 7286

Phoenix Technology Services
SURVEY DATA CERTIFICATION



PHOENIX
TECHNOLOGY SERVICES

PHOENIX JOB NUMBER

1512794

Energy Company

Apache

WELL NAME

Crow Federal #42H

COUNTY & STATE

Eddy, NM

API WELL NUMBER

30-015-42744

PROPOSED DIRECTION

269.59

TIE-IN DATA						
MEASURED DEPTH	VERTICAL DEPTH	INCLIN	AZIMUTH	N-S COORD	E-W COORD	DATA SOURCE
575.00 ft	574.99 ft	0.41	89.19	0.56 S	2.25 E	Gyro

FIRST SURVEY DATE	FIRST SURVEY DEPTH	INCLIN	AZIMUTH
9-Feb-15	690.00 ft	0.40	69.60

SURVEY INSTRUMENT
TYPE

Phoenix P-360

LAST SURVEY DATE	LAST SURVEY DEPTH	INCLIN	AZIMUTH
18-Feb-15	10,318.00 ft	92.30	268.50

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
18-Feb-15	10,387.00 ft	92.30	268.50

Jeff Broussard

PRINT YOUR NAME ABOVE

Jeff Broussard

SIGN YOUR NAME ABOVE

2/18/2015

TODAY'S DATE

MAGNETIC DECLINATION OR TOTAL GRID

TOTAL CORRECTION USED	7.27
DECLINATION OR GRID	GRID

MWD SUPERVISOR 1

Jeff Broussard

DIRECTIONAL DRILLER 1

Ian Hobbs

MWD SUPERVISOR 2

Burton Fowles

DIRECTIONAL DRILLER 2

Joshua Ashley

12329 Cutten Rd., Houston, Texas 77066

(713)3370609 (Voice), (713)337-0599 (Fax)



Apache Corporation

Eddy County, NM (NAD27 NME)

Crow Federal

#42H

WB1 / Job #1512794

Survey: Phoenix MWD Survey

Standard Survey Report

20 March, 2015



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #42H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3950.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3950.00usft (Capstar 114)
Well:	#42H	North Reference:	Grid
Wellbore:	WB1 / Job #1512794	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	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:	Crow Federal		
Site Position:		Northing:	671,130.90 usft
From:	Map	Easting:	643,906.80 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 50' 38.92796 N
		Longitude:	103° 51' 53.16689 W
		Grid Convergence:	0.25 °

Well:	#42H		
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' 44.95894 N
		Longitude:	103° 51' 56.08142 W
		Ground Level:	3,939.00 usft

Wellbore:	WB1 / Job #1512794		
Magnetics	Model Name	Sample Date	Declination
			(°)
	BGGM2014	2/4/2015	7.50
			Dip Angle
			(°)
			60.63
			Field Strength
			(nT)
			48,548

Design:	Surveys (Capstar 114)		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			269.59

Survey Program	Date: 3/20/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.00	575.00	Gyrodata Gyro Survey (WB1 / Job #15127	NS-GYRO-MS
575.00	10,387.00	Phoenix MWD Survey (WB1 / Job #15127	PHX+MWD+BGGM
			Description
			North sensing gyrocompassing m/s
			PHX+MWD+BGGM v3: standard declination

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)
575.00	0.41	89.18	574.99	-0.56	2.25	-2.25	0.00	0.00	0.00
Tie-on to Gyrodata Gyro Survey									
690.00	0.40	69.60	689.99	-0.41	3.04	-3.03	0.12	-0.01	-17.03
First Phoenix MWD Survey									
775.00	0.20	49.30	774.99	-0.21	3.43	-3.43	0.26	-0.24	-23.88
861.00	0.80	302.70	860.99	0.21	3.04	-3.04	1.02	0.70	-123.95
947.00	1.60	288.30	946.97	0.91	1.39	-1.40	0.99	0.93	-16.74
1,031.00	2.50	284.60	1,030.91	1.74	-1.49	1.48	1.08	1.07	-4.40
1,117.00	3.20	277.90	1,116.81	2.54	-5.69	5.67	0.90	0.81	-7.79

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #42H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3950.00usft.(Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3950.00usft (Capstar 114)
Well:	#42H	North Reference:	Grid
Wellbore:	WB1 / Job #1512794	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	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)
1,203.00	3.70	282.10	1,202.65	3.45	-10.78	10.75	0.65	0.58	4.88
1,288.00	3.90	278.10	1,287.46	4.44	-16.32	16.29	0.39	0.24	-4.71
1,374.00	4.40	279.60	1,373.24	5.40	-22.47	22.43	0.59	0.58	1.74
1,459.00	4.80	277.00	1,457.96	6.38	-29.21	29.17	0.53	0.47	-3.06
1,545.00	4.00	267.30	1,543.71	6.67	-35.78	35.73	1.27	-0.93	-11.28
1,630.00	3.50	264.00	1,628.53	6.26	-41.32	41.28	0.64	-0.59	-3.88
1,716.00	2.40	259.70	1,714.41	5.67	-45.71	45.66	1.30	-1.28	-5.00
1,802.00	1.60	277.80	1,800.36	5.51	-48.67	48.63	1.17	-0.93	21.05
1,887.00	1.20	283.80	1,885.34	5.88	-50.71	50.66	0.50	-0.47	7.06
1,972.00	0.70	267.20	1,970.32	6.07	-52.09	52.05	0.67	-0.59	-19.53
2,061.00	0.80	260.80	2,059.32	5.94	-53.25	53.20	0.15	0.11	-7.19
2,146.00	0.50	274.90	2,144.31	5.88	-54.20	54.16	0.40	-0.35	16.59
2,231.00	0.70	291.90	2,229.31	6.10	-55.05	55.01	0.31	0.24	20.00
2,317.00	0.90	287.00	2,315.30	6.50	-56.19	56.14	0.25	0.23	-5.70
2,403.00	1.00	280.00	2,401.29	6.82	-57.57	57.52	0.18	0.12	-8.14
2,488.00	0.80	262.80	2,486.28	6.88	-58.89	58.84	0.39	-0.24	-20.24
2,573.00	0.90	255.30	2,571.27	6.64	-60.13	60.08	0.18	0.12	-8.82
2,659.00	0.90	257.80	2,657.26	6.32	-61.44	61.39	0.05	0.00	2.91
2,747.00	1.20	265.30	2,745.24	6.10	-63.03	62.99	0.37	0.34	8.52
2,833.00	0.80	239.80	2,831.23	5.72	-64.45	64.41	0.68	-0.47	-29.65
2,918.00	1.00	235.40	2,916.22	5.00	-65.57	65.54	0.25	0.24	-5.18
3,004.00	1.00	230.20	3,002.21	4.10	-66.77	66.74	0.11	0.00	-6.05
3,089.00	1.00	241.90	3,087.19	3.27	-67.99	67.97	0.24	0.00	13.76
3,178.00	1.00	244.40	3,176.18	2.57	-69.38	69.36	0.05	0.00	2.81
3,263.00	1.10	249.70	3,261.16	1.97	-70.81	70.79	0.16	0.12	6.24
3,349.00	1.20	252.70	3,347.15	1.41	-72.44	72.43	0.14	0.12	3.49
3,448.00	0.90	243.20	3,446.13	0.76	-74.13	74.12	0.35	-0.30	-9.60
3,557.00	1.00	251.30	3,555.12	0.06	-75.79	75.79	0.15	0.09	7.43
3,643.00	0.90	249.50	3,641.10	-0.41	-77.14	77.14	0.12	-0.12	-2.09
3,728.00	0.70	237.80	3,726.10	-0.92	-78.20	78.21	0.30	-0.24	-13.76
3,814.00	0.90	233.40	3,812.09	-1.61	-79.19	79.20	0.24	0.23	-5.12
3,899.00	0.70	249.90	3,897.08	-2.18	-80.21	80.23	0.36	-0.24	19.41
3,985.00	0.70	239.70	3,983.07	-2.63	-81.16	81.18	0.14	0.00	-11.86
4,070.00	0.80	243.40	4,068.07	-3.16	-82.14	82.16	0.13	0.12	4.35
4,156.00	0.30	49.10	4,154.06	-3.28	-82.50	82.53	1.27	-0.58	192.67
4,326.00	0.60	52.90	4,324.06	-2.45	-81.46	81.47	0.18	0.18	2.24
4,411.00	0.40	45.20	4,409.05	-1.97	-80.89	80.90	0.25	-0.24	-9.06
4,497.00	0.30	55.50	4,495.05	-1.63	-80.49	80.50	0.14	-0.12	11.98
4,583.00	0.20	28.10	4,581.05	-1.37	-80.24	80.25	0.18	-0.12	-31.86
4,668.00	0.30	41.20	4,666.05	-1.07	-80.02	80.03	0.13	0.12	15.41
4,754.00	0.20	14.60	4,752.05	-0.76	-79.84	79.84	0.18	-0.12	-30.93
4,842.00	0.20	42.10	4,840.05	-0.50	-79.69	79.70	0.11	0.00	31.25
4,927.00	0.10	66.60	4,925.05	-0.36	-79.53	79.53	0.14	-0.12	28.82

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #42H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3950.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3950.00usft (Capstar 114)
Well:	#42H	North Reference:	Grid
Wellbore:	WB1 / Job #1512794	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	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)
5,013.00	0.30	35.70	5,011.05	-0.14	-79.33	79.32	0.26	0.23	-35.93
5,098.00	0.30	36.70	5,096.05	0.21	-79.06	79.06	0.01	0.00	1.18
5,163.00	0.00	7.80	5,161.05	0.35	-78.96	78.96	0.46	-0.46	0.00
5,221.00	1.40	259.60	5,219.04	0.22	-79.66	79.65	2.41	2.41	0.00
5,264.00	5.60	261.10	5,261.95	-0.20	-82.25	82.25	9.77	9.77	3.49
5,307.00	10.90	263.00	5,304.49	-1.02	-88.36	88.37	12.34	12.33	4.42
5,350.00	16.40	264.80	5,346.26	-2.06	-98.45	98.46	12.83	12.79	4.19
5,392.00	21.90	265.40	5,385.92	-3.23	-112.17	112.19	13.10	13.10	1.43
5,434.00	25.60	263.80	5,424.36	-4.84	-129.01	129.04	8.94	8.81	-3.81
5,477.00	29.20	262.70	5,462.53	-7.18	-148.65	148.70	8.45	8.37	-2.56
5,519.00	34.10	260.70	5,498.27	-10.38	-170.45	170.52	11.93	11.67	-4.76
5,562.00	39.70	260.10	5,532.65	-14.69	-195.89	195.99	13.05	13.02	-1.40
5,604.00	45.90	260.80	5,563.45	-19.42	-224.02	224.15	14.81	14.76	1.67
5,647.00	52.20	260.40	5,591.62	-24.72	-256.04	256.21	14.67	14.65	-0.93
5,690.00	55.10	262.70	5,617.10	-29.80	-290.30	290.50	8.00	6.74	5.35
5,731.00	57.50	265.00	5,639.85	-33.44	-324.20	324.44	7.49	5.85	5.61
5,772.00	60.80	268.00	5,660.88	-35.58	-359.33	359.57	10.21	8.05	7.32
5,815.00	66.00	270.20	5,680.12	-36.16	-397.76	398.00	12.93	12.09	5.12
5,857.00	69.30	272.80	5,696.10	-35.13	-436.58	436.82	9.72	7.86	6.19
5,900.00	75.10	275.00	5,709.24	-32.34	-477.40	477.62	14.34	13.49	5.12
5,943.00	80.90	276.50	5,718.17	-28.12	-519.23	519.42	13.91	13.49	3.49
5,986.00	87.20	276.10	5,722.63	-23.43	-561.72	561.87	14.68	14.65	-0.93
6,029.00	90.10	276.00	5,723.64	-18.90	-604.46	604.58	6.75	6.74	-0.23
6,115.00	91.60	275.60	5,722.37	-10.21	-690.01	690.07	1.81	1.74	-0.47
6,199.00	93.10	273.80	5,718.92	-3.33	-773.65	773.66	2.79	1.79	-2.14
6,285.00	92.40	270.40	5,714.79	-0.19	-859.48	859.46	4.03	-0.81	-3.95
6,370.00	92.70	270.70	5,711.01	0.63	-944.39	944.37	0.50	0.35	0.35
6,455.00	92.50	270.60	5,707.16	1.59	-1,029.30	1,029.26	0.26	-0.24	-0.12
6,541.00	92.30	270.70	5,703.56	2.57	-1,115.22	1,115.17	0.26	-0.23	0.12
6,629.00	92.00	270.70	5,700.25	3.64	-1,203.15	1,203.10	0.34	-0.34	0.00
6,715.00	91.30	268.40	5,697.78	2.96	-1,289.11	1,289.05	2.79	-0.81	-2.67
6,801.00	90.10	267.30	5,696.73	-0.26	-1,375.04	1,375.00	1.89	-1.40	-1.28
6,886.00	89.90	267.30	5,696.73	-4.27	-1,459.94	1,459.94	0.24	-0.24	0.00
6,972.00	89.60	266.90	5,697.10	-8.62	-1,545.83	1,545.85	0.58	-0.35	-0.47
7,057.00	90.10	267.40	5,697.32	-12.84	-1,630.73	1,630.78	0.83	0.59	0.59
7,143.00	90.80	268.40	5,696.65	-15.99	-1,716.66	1,716.73	1.42	0.81	1.16
7,228.00	91.20	268.00	5,695.17	-18.66	-1,801.61	1,801.70	0.67	0.47	-0.47
7,314.00	90.90	267.90	5,693.59	-21.74	-1,887.54	1,887.65	0.37	-0.35	-0.12
7,399.00	91.60	269.30	5,691.74	-23.82	-1,972.49	1,972.61	1.84	0.82	1.65
7,485.00	92.10	269.70	5,688.96	-24.57	-2,058.44	2,058.57	0.74	0.58	0.47
7,571.00	91.90	269.50	5,685.96	-25.17	-2,144.39	2,144.51	0.33	-0.23	-0.23
7,656.00	91.70	269.10	5,683.29	-26.20	-2,229.34	2,229.47	0.53	-0.24	-0.47
7,742.00	91.90	268.70	5,680.59	-27.85	-2,315.28	2,315.42	0.52	0.23	-0.47
7,828.00	91.90	268.40	5,677.73	-30.03	-2,401.21	2,401.36	0.35	0.00	-0.35

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #42H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3950.00usft (Capstar 114)
Site:	Crow Federal	MD Reference:	KB @ 3950.00usft (Capstar 114)
Well:	#42H	North Reference:	Grid
Wellbore:	WB1 / Job #1512794	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 114)	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)	
7,913.00	91.90	269.40	5,674.92	-31.66	-2,486.14	2,486.31	1.18	0.00	1.18	
7,999.00	91.80	269.10	5,672.14	-32.78	-2,572.09	2,572.26	0.37	-0.12	-0.35	
8,084.00	91.20	268.90	5,669.92	-34.27	-2,657.05	2,657.22	0.74	-0.71	-0.24	
8,170.00	91.80	269.70	5,667.66	-35.32	-2,743.01	2,743.19	1.16	0.70	0.93	
8,255.00	91.40	269.40	5,665.29	-35.99	-2,827.97	2,828.16	0.59	-0.47	-0.35	
8,341.00	90.60	269.40	5,663.79	-36.89	-2,913.96	2,914.15	0.93	-0.93	0.00	
8,426.00	89.90	268.80	5,663.42	-38.22	-2,998.94	2,999.14	1.08	-0.82	-0.71	
8,512.00	90.80	270.10	5,662.89	-39.05	-3,084.94	3,085.14	1.84	1.05	1.51	
8,597.00	91.90	270.60	5,660.89	-38.53	-3,169.91	3,170.10	1.42	1.29	0.59	
8,682.00	92.00	270.30	5,658.00	-37.86	-3,254.86	3,255.04	0.37	0.12	-0.35	
8,768.00	92.00	270.20	5,655.00	-37.49	-3,340.80	3,340.99	0.12	0.00	-0.12	
8,854.00	91.60	270.20	5,652.30	-37.19	-3,426.76	3,426.94	0.47	-0.47	0.00	
8,942.00	91.50	270.30	5,649.92	-36.80	-3,514.73	3,514.90	0.16	-0.11	0.11	
9,028.00	92.00	270.50	5,647.29	-36.20	-3,600.69	3,600.85	0.63	0.58	0.23	
9,114.00	91.90	270.40	5,644.36	-35.53	-3,686.63	3,686.79	0.16	-0.12	-0.12	
9,199.00	91.60	270.30	5,641.77	-35.01	-3,771.59	3,771.75	0.37	-0.35	-0.12	
9,285.00	91.70	270.20	5,639.29	-34.63	-3,857.55	3,857.70	0.16	0.12	-0.12	
9,370.00	91.40	270.10	5,636.99	-34.41	-3,942.52	3,942.67	0.37	-0.35	-0.12	
9,455.00	91.60	269.80	5,634.77	-34.48	-4,027.49	4,027.64	0.42	0.24	-0.35	
9,541.00	91.50	269.50	5,632.44	-35.01	-4,113.46	4,113.61	0.37	-0.12	-0.35	
9,627.00	91.30	268.80	5,630.34	-36.28	-4,199.43	4,199.58	0.85	-0.23	-0.81	
9,712.00	90.90	268.30	5,628.71	-38.43	-4,284.38	4,284.55	0.75	-0.47	-0.59	
9,798.00	90.80	268.00	5,627.43	-41.21	-4,370.33	4,370.51	0.37	-0.12	-0.35	
9,883.00	90.50	267.60	5,626.47	-44.47	-4,455.26	4,455.46	0.59	-0.35	-0.47	
9,968.00	91.60	268.70	5,624.91	-47.22	-4,540.20	4,540.42	1.83	1.29	1.29	
10,053.00	92.20	268.90	5,622.09	-49.00	-4,625.13	4,625.36	0.74	0.71	0.24	
10,138.00	92.10	268.50	5,618.90	-50.92	-4,710.05	4,710.29	0.48	-0.12	-0.47	
10,223.00	92.00	268.30	5,615.86	-53.30	-4,794.96	4,795.22	0.26	-0.12	-0.24	
10,318.00	92.30	268.50	5,612.30	-55.95	-4,889.86	4,890.13	0.38	0.32	0.21	
Last Phoenix MWD Survey										
10,387.00	92.30	268.50	5,609.53	-57.75	-4,958.78	4,959.07	0.00	0.00	0.00	
Projection to TD										

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
575.00	574.99	-0.56	2.25	Tie-on to Gyrodata Gyro Survey	
690.00	689.99	-0.41	3.04	First Phoenix MWD Survey	
10,318.00	5,612.30	-55.95	-4,889.86	Last Phoenix MWD Survey	
10,387.00	5,609.53	-57.75	-4,958.78	Projection to TD	

Checked By: _____ Approved By: _____ Date: _____

