

Results of Directional Survey

API number:	30-025-41600	DD	
OGRID:		Operator:	APACHE CORP
		Property:	NORTHEAST DRINKARD UNIT # 544

surface	ULSTR:	E	15	T	21S	R	37E
				1355	FNL	1190	FWL

BH Loc	ULSTR:	E	15	T	21S	R	37E
6954	MD	6947.6	TVD	1362	FNL	946	FWL

Top Perf/OH	ULSTR:	E	15	T	21S	R	37E
5568	MD	5563.1	TVD	1362	FNL	1010	FWL

Bot Perf/OH	ULSTR:	E	15	T	21S	R	37E
6684	MD	6678.0	TVD	1363	FNL	961	FWL

	MD	N/S	E/W	VD
	5516	-6.80	-178.57	5511.11
TOP PERFS/OH	5568	-7.05	-180.41	5563.08
	5644	-7.41	-183.09	5639.03
	6791	-7.54	-234.87	6784.83
BOT PERFS/OH	6684	-7.73	-228.63	6678.01
	6899	-7.35	-241.17	6892.65

NEXT TO LAST	6899	-7.35	-241.17	6892.65
LAST READING	6954	-7.31	-244.34	6947.56
TD	6954	-7.31	-244.34	6947.56

Surface Location	1355	FN	1190	FW
Projected BHL	1362	FN	946	FW
Location of				
Top Perfs/OH	1362	FN	1010	FW
Bottom Perfs/OH	1363	FN	961	FW

SUMMARY of Subsurface Locations

Surface Location	E-15-21S-37E	1355	FN	1190	FW	Vert. Depth
Top Perfs/OH	E-15-21S-37E	1362	FN	1010	FW	5563.08
Bottom Perfs/OH	E-15-21S-37E	1363	FN	961	FW	6678.01
Projected TD	E-15-21S-37E	1362	FN	946	FW	6947.56

APR 28 2014



HOBBS OCD

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RECEIVED

Apache Corporation (873)

Lea County, NM (NAD27 NME)

Northeast Drinkard Unit 30-025-41600
#544

WB1/Job #1410085

UL E 15-215-37E
1355' FWL + 1190' FWL

Survey: Phoenix MWD Survey

Standard Survey Report

15 February, 2014



PHOENIX
TECHNOLOGY SERVICES

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #544
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB @ 3459.00usft (Capstar 132)
Site:	Northeast Drinkard Unit	MD Reference:	KB @ 3459.00usft (Capstar 132)
Well:	#544	North Reference:	Grid
Wellbore:	WB1/Job #1410085	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 120)	Database:	Compass 5000 GCR DB

Project	Lea 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	Northeast Drinkard Unit		
Site Position:		Northing:	536,097.47 usft
From:	Map	Easting:	866,927.15 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 28' 5.59737 N
		Longitude:	103° 8' 37.06135 W
		Grid Convergence:	0.64 °

Well	#544		
Well Position	+N/-S	0.00 usft	Northing: 541,190.10 usft
	+E/-W	0.00 usft	Easting: 863,328.50 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 28' 56.37826 N
		Longitude:	103° 9' 18.40240 W
		Ground Level:	3,446.00 usft

Wellbore	WB1/Job #1410085				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2013	1/9/2014	7.20	60.42	48,548

Design	Surveys (Capstar 120)				
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	269.23	

Survey Program	Date 2/15/2014				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
45.00	1,196.00	Gyrodata Gyro Survey (WB1/Job #141008	CB-GYRO-MS	Camera based gyro multishot	
1,196.00	6,954.00	Phoenix MWD Survey (WB1/Job #141008	MWD	MWD - Standard	

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)	
1,196.00	0.64	206.81	1,195.98	-3.63	-2.67	2.72	0.00	0.00	0.00	
Tie-on to Gyrodata Survey										
1,311.00	1.00	194.00	1,310.97	-5.17	-3.20	3.27	0.35	0.31	-11.14	
First Phoenix MWD Survey										
1,439.00	0.90	191.10	1,438.95	-7.24	-3.66	3.76	0.09	-0.08	-2.27	
1,565.00	1.50	259.90	1,564.93	-8.51	-5.48	5.59	1.15	0.48	54.60	
1,692.00	1.50	282.70	1,691.88	-8.43	-8.74	8.85	0.47	0.00	17.95	
1,819.00	0.30	312.30	1,818.87	-7.84	-10.60	10.71	0.98	-0.94	23.31	
1,948.00	0.30	34.60	1,947.86	-7.34	-10.66	10.76	0.31	0.00	63.80	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #544
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Site:	Northeast Drinkard Unit	MD Reference:	KB @ 3459.00usft (Capstar 132)
Well:	#544	North Reference:	Grid
Wellbore:	WB1/Job #1410085	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 120)	Database:	Compass 5000 GCR DB

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)
2,076.00	1.30	65.20	2,075.85	-6.45	-9.15	9.24	0.82	0.78	23.91
2,203.00	1.10	53.50	2,202.82	-5.12	-6.86	6.93	0.25	-0.16	-9.21
2,330.00	1.60	272.10	2,329.81	-4.33	-7.66	7.71	2.01	0.39	-111.34
2,458.00	3.20	269.00	2,457.69	-4.33	-13.02	13.07	1.25	1.25	-2.42
2,585.00	3.60	273.80	2,584.47	-4.13	-20.54	20.59	0.39	0.31	3.78
2,712.00	2.80	274.10	2,711.27	-3.64	-27.61	27.66	0.63	-0.63	0.24
2,840.00	2.50	279.00	2,839.13	-2.98	-33.49	33.52	0.29	-0.23	3.83
2,968.00	3.10	260.10	2,966.98	-3.14	-39.65	39.69	0.85	0.47	-14.77
3,095.00	2.50	265.20	3,093.83	-3.96	-45.80	45.85	0.51	-0.47	4.02
3,223.00	3.70	271.40	3,221.64	-4.09	-52.71	52.76	0.97	0.94	4.84
3,350.00	3.00	275.20	3,348.42	-3.69	-60.11	60.16	0.58	-0.55	2.99
3,477.00	3.40	264.90	3,475.22	-3.73	-67.17	67.22	0.55	0.31	-8.11
3,605.00	3.30	265.00	3,603.01	-4.38	-74.62	74.68	0.08	-0.08	0.08
3,733.00	2.90	262.50	3,730.82	-5.13	-81.51	81.57	0.33	-0.31	-1.95
3,860.00	2.80	261.10	3,857.66	-6.03	-87.75	87.83	0.10	-0.08	-1.10
3,987.00	2.70	269.20	3,984.52	-6.55	-93.81	93.89	0.32	-0.08	6.38
4,115.00	3.70	270.30	4,112.31	-6.57	-100.96	101.03	0.78	0.78	0.86
4,242.00	3.90	268.60	4,239.03	-6.65	-109.37	109.45	0.18	0.16	-1.34
4,369.00	3.70	269.10	4,365.76	-6.82	-117.79	117.87	0.16	-0.16	0.39
4,497.00	3.70	266.00	4,493.49	-7.18	-126.04	126.12	0.16	0.00	-2.42
4,624.00	3.60	270.50	4,620.23	-7.43	-134.11	134.20	0.24	-0.08	3.54
4,752.00	3.00	272.00	4,748.02	-7.28	-141.48	141.56	0.47	-0.47	1.17
4,879.00	2.80	271.10	4,874.86	-7.10	-147.90	147.98	0.16	-0.16	-0.71
5,006.00	2.80	270.90	5,001.70	-6.99	-154.10	154.18	0.01	0.00	-0.16
5,134.00	2.80	271.10	5,129.55	-6.88	-160.35	160.43	0.01	0.00	0.16
5,261.00	2.90	270.00	5,256.39	-6.82	-166.67	166.74	0.09	0.08	-0.87
5,389.00	2.80	271.30	5,384.24	-6.75	-173.03	173.11	0.09	-0.08	1.02
5,516.00	2.20	267.20	5,511.11	-6.80	-178.57	178.64	0.49	-0.47	-3.23
5,644.00	1.90	256.80	5,639.03	-7.41	-183.09	183.17	0.37	-0.23	-8.13
5,771.00	2.20	277.80	5,765.95	-7.56	-187.55	187.64	0.63	0.24	16.54
5,898.00	2.30	276.30	5,892.86	-6.94	-192.50	192.58	0.09	0.08	-1.18
6,026.00	3.00	280.00	6,020.72	-6.08	-198.35	198.42	0.56	0.55	2.89
6,154.00	2.50	272.30	6,148.57	-5.39	-204.44	204.49	0.48	-0.39	-6.02
6,281.00	2.50	265.50	6,275.45	-5.49	-209.97	210.02	0.23	0.00	-5.35
6,409.00	2.60	264.80	6,403.32	-5.98	-215.64	215.70	0.08	0.08	-0.55
6,536.00	2.90	263.00	6,530.18	-6.63	-221.70	221.77	0.25	0.24	-1.42
6,664.00	2.80	263.70	6,658.02	-7.37	-228.02	228.10	0.08	-0.08	0.55
6,791.00	3.40	272.60	6,784.83	-7.54	-234.87	234.95	0.60	0.47	7.01
6,899.00	3.30	270.70	6,892.65	-7.35	-241.17	241.25	0.14	-0.09	-1.76
Last Phoenix MWD Survey									
6,954.00	3.30	270.70	6,947.56	-7.31	-244.34	244.42	0.00	0.00	0.00
Projection to TD									

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Well:	#544	North Reference:	Grid
Wellbore:	WB1/Job #1410085	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 120)	Database:	Compass 5000 GCR DB

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,196.00	1,195.98	-3.63	-2.67	Tie-on to Gyrodata Survey
1,311.00	1,310.97	-5.17	-3.20	First Phoenix MWD Survey
6,899.00	6,892.65	-7.35	-241.17	Last Phoenix MWD Survey
6,954.00	6,947.56	-7.31	-244.34	Projection to TD

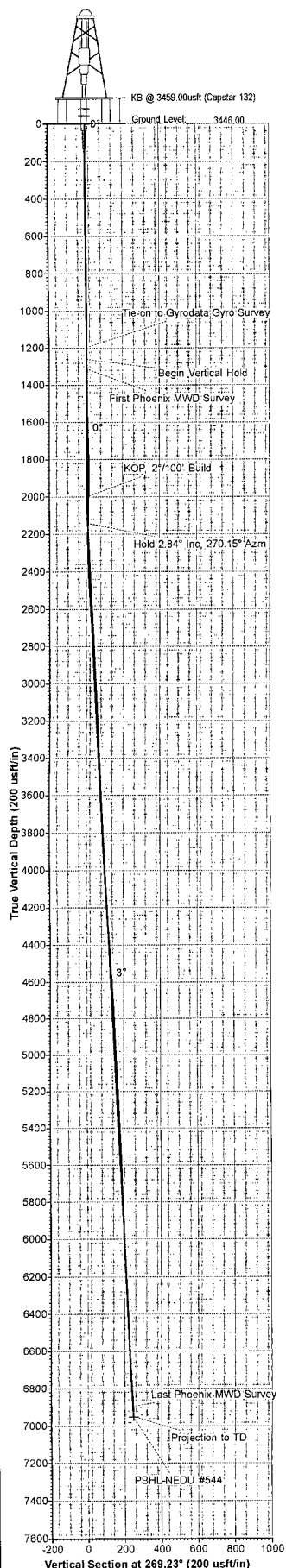
Checked By: _____ Approved By: _____ Date: _____

Phoenix Technology Services									
Apache Corporation	Unit #544	Lea County, NM	WB1/job #1410085	Phoenix MWD Survey	Surface Loc.:	Northings (Y)	Eastings (X)	KB Elev:	GL Elev:
Survey Type	Information:	45 -	1196 -	H	H				
Measured Sub-Sea	Vertical	Local	Coordinate UTM	Coordinate Vertical	Dogleg Eastings	Section Rate			
Depth (ft)	Azlm. (ft)	Depth (ft)	Depth (+N/-S) (ft)	(+E/-W) (ft)	Northings (ft)	(-100ft)			
1196 GYRODAT GYRO	6954 PHOENIX MWD	SURVEY :	MWD						
1196 -	45 -	1196 -							
1196	0.64	206.81	-2263.02	1195.98	-3.63	-2.67	541186.5	863325.8	2.72
1311	1	194	-2148.03	1310.97	-5.17	-3.2	541184.9	863325.3	3.27
1439	0.9	191.1	-2020.05	1438.95	-7.24	-3.66	541182.9	863324.8	3.76
1565	1.5	259.9	-1894.07	1564.93	-8.51	-5.48	541181.6	863323	5.59
1692	1.5	282.7	-1767.12	1691.88	-8.43	-8.74	541181.7	863319.8	8.85
1819	0.3	312.3	-1640.13	1818.87	-7.84	-10.6	541182.3	863317.9	10.71
1948	0.3	34.6	-1511.14	1947.86	-7.34	-10.66	541182.8	863317.8	10.76
2076	1.3	65.2	-1383.15	2075.85	-6.45	-9.15	541183.7	863319.4	9.24
2203	1.1	53.5	-1256.18	2202.82	-5.12	-6.86	541185	863321.6	6.93
2330	1.6	272.1	-1129.19	2329.81	-4.33	-7.66	541185.8	863320.8	7.71
2458	3.2	269	-1001.31	2457.69	-4.33	-13.02	541185.8	863315.5	13.07
2585	3.6	273.8	-874.53	2584.47	-4.13	-20.54	541186	863308	20.59
2712	2.8	274.1	-747.73	2711.27	-3.64	-27.61	541186.5	863300.9	27.66
2840	2.5	279	-619.87	2839.13	-2.98	-33.49	541187.1	863295	33.52
2968	3.1	260.1	-492.02	2966.98	-3.14	-39.65	541187	863288.9	39.69
3095	2.5	265.2	-365.17	3093.83	-3.96	-45.8	541186.1	863282.7	45.85
3223	3.7	271.4	-237.36	3221.64	-4.09	-52.71	541186	863275.8	52.76
3350	3	275.2	-110.58	3348.42	-3.69	-60.11	541186.4	863268.4	60.16
3477	3.4	264.9	3475.22	-3.73	-67.17	541186.4	863261.3	67.22	5.5
3605	3.3	265	3603.01	-4.38	-74.62	541185.7	863253.9	74.68	0.08
3733	2.9	262.5	3730.82	-5.13	-81.51	541185	863247	81.57	0.33
3860	2.8	261.1	398.66	3857.66	-6.03	-87.75	541184.1	863240.8	87.83
3987	2.7	269.2	3984.52	-6.55	-93.81	541183.6	863234.7	93.89	0.32
4115	3.7	270.3	4112.31	-6.57	-100.96	541183.5	863227.5	101.03	0.78
4242	3.9	268.6	4239.03	-6.65	-109.37	541183.5	863219.1	109.45	0.18
4369	3.7	269.1	4365.76	-6.82	-117.79	541183.3	863210.7	117.87	0.16
4497	3.7	266	4493.49	-7.18	-126.04	541182.9	863202.5	126.12	0.14
4624	3.6	270.5	4620.23	-7.43	-134.11	541182.7	863194.4	134.2	0.26
4752	3	272	4748.02	-7.28	-141.48	541182.8	863187	141.56	0.47
4879	2.8	271.1	4874.86	-7.1	-147.9	541183	863180.6	147.98	0.16
5006	2.8	270.9	5001.7	-6.99	-154.1	541183.1	863174.4	154.18	0.01
5134	2.8	271.1	5129.55	-6.88	-160.35	541183.2	863168.2	160.43	0.01
5261	2.9	270	5256.39	-6.82	-166.67	541183.3	863161.8	166.74	0.09
5389	2.8	271.3	5384.24	-6.75	-173.03	541183.4	863155.5	173.11	0.09
5516	2.2	267.2	5511.11	-6.8	-178.57	541183.3	863149.9	178.64	0.49
5771	2.2	277.8	5765.95	-7.56	-187.55	541182.5	863141	187.64	0.63
5644	1.9	256.8	5639.03	-7.41	-183.09	541182.7	863145.4	183.17	0.37
5898	2.3	276.3	5892.86	-6.94	-192.5	541183.2	863136	192.58	0.09
6026	3	280	6020.72	-6.08	-198.35	541184	863130.2	198.42	0.56
6154	2.5	272.3	6269.57	-5.39	-204.44	541184.7	863124.1	204.49	0.48
6281	2.5	265.5	6275.45	-5.49	-209.97	541184.6	863118.5	210.02	0.23
6409	2.6	264.8	6403.32	-5.98	-215.64	541184.1	863112.9	215.7	0.08
6536	2.9	263	6530.18	-6.63	-221.7	541183.5	863106.8	221.77	0.25
6664	2.8	263.7	6658.02	-7.37	-228.02	541182.7	863100.5	228.1	0.08
6791	3.4	272.6	6784.83	-7.54	-234.87	541182.6	863093.6	234.95	0.6
6899	3.3	270.7	6892.65	-7.35	-241.17	541182.8	863087.3	241.25	0.14
6954	3.3	270.7	6947.56	-7.31	-244.34	541182.8	863084.2	244.42	0.14
0 Tie-on									
Gyrodata Survey	MWD	Phoenix Survey	to	Phoenix	Gyrodata Survey	0 Tie-on	First	0.35	0.09
Gyrodata Survey									
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Project: Lea County, NM (NAD27 NME)
Site: Northeast Drinkard Unit
Well: #544
Wellbore: WB1/Job #1410085
Design: Plan #3 02-11-14
Rig: Capstar 132



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 #544, Grid North
Latitude: 32° 28' 56.37826 N
Longitude: 103° 9' 18.40240 W
Grid East: 863328.50
Grid North: 541190.10
Scale Factor: 1.000
Geomagnetic Model: BGGM2013
Sample Date: 09-Jan-14
Magnetic Declination: 7.20°
Dip Angle from Horizontal: 60.42°
Magnetic Field Strength: 48548
Azimuths to Grid North
True North: -0.63°
Magnetic North: 6.56°
Magnetic Field
Strength: 48548.4nT
Dip Angle: 60.42°
Date: 1/9/2014
Model: BGGM2013



WELL DETAILS											
				Ground Level	3446.00						
+N-S	+E-W	Northing	Easting	Latitude	Longitude						
0.00	0.00	541190.10	863328.50	32° 28' 56.37826 N	103° 9' 18.40240 W						

SECTION DETAILS											
Sec	MD	Inc	Azi	TVD	+N-S	+E-W	Deg	TFace	VSec	Target	Annotation
1	1196.00	0.54	206.81	1195.98	-3.63	-2.67	0.00	0.00	2.72		Tie-on to Gyrodatta Gyro Survey
2	1260.00	0.00	0.00	1259.98	-3.95	-2.83	1.00	180.00	2.88		Begin Vertical Hold
3	2000.00	0.00	0.00	1999.98	-3.95	-2.83	0.00	0.00	2.88		KOP 2°/100' Build
4	2142.08	2.84	270.15	2142.00	-3.94	-6.35	2.00	270.15	6.40		Hold 2.84° Inc, 270.15° Azm
5	6956.00	2.84	270.15	6950.00	-3.30	-245.00	0.00	0.00	245.02	PBHL-NEDU #544	TD at 6956.00

DESIGN TARGET DETAILS									
Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude	Shape	
PBHL-NEDU #544	6950.00	-3.30	-245.00	541186.80	863083.5032° 28' 56.37238 N	103° 9' 21.26251 W		Circle (Radius: 25.00)	
- plan hits target center									

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 #544, Grid North
Latitude: 32° 28' 56.37826 N
Longitude: 103° 9' 18.40240 W
Grid East: 863328.50
Grid North: 541190.10
Scale Factor: 1.000
Geomagnetic Model: BGGM2013
Sample Date: 09-Jan-14
Magnetic Declination: 7.20°
Dip Angle from Horizontal: 60.42°
Magnetic Field Strength: 48548
To convert a Magnetic Direction to a Grid Direction, Add 6.56°
To convert a Magnetic Direction to a True Direction, Add 7.20° East
To convert a True Direction to a Grid Direction, Subtract 0.63°

LEGEND

- #544, WB1/Job #1410085, Surveys (Capstar 120) V0
- Plan #3 02-11-14

HOBBS OCD

APR 11 2014

RECEIVED

