



Apache Corporation

Crane County, TX

Sec 46, Blk 30, University Lands Survey

NMU # 4659BH

Wellbore #1

Survey: MWD

DDC Survey Report

27 June, 2012





Date: 2/1/13

Railroad Commission of Texas
Oil and Gas Division
1701 North Congress Avenue
Austin, Texas 78711

Attention: Pam Johns

Re: Apache Corporation
North McElroy Unit #4659BH
RRC Lease / ID No.
UL
Abstract #N/A
Crane County, Texas
API No. 42-103-35976

Enclosed, please find the original and one copy of the survey performed on the referenced well by The Directional Drilling Company (DDC). (P5#851499). Other information required by your office is as follows:

<u>Name & Title of Surveyor</u>	<u>Drainhole Number</u>	<u>Surveyed Depths</u>	<u>Dates Performed</u>	<u>Type of Survey</u>
Josh Wesilick	Original Hole	2167' – 7980'	6/16/12 - 6/27/12	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.

Larry Wright

Enclosures

Cc: Apache Corporation

Company:	Apache Corporation	Local Co-ordinate Reference:	Well NMU # 4659BH
Project:	Crane County, TX	TVD Reference:	WELL @ 2554.0usft (Capstar #119)
Site:	Sec 46, Blk 30, University Lands Survey	MD Reference:	WELL @ 2554.0usft (Capstar #119)
Well:	NMU # 4659BH	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Crane County, TX		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Texas Central 4203		

Site	Sec 46, Blk 30, University Lands Survey		
Site Position:		Northing:	650,633.00 usft
From:	Map	Easting:	1,373,549.00 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	31° 26' 24.344 N
		Longitude:	102° 20' 31.823 W
		Grid Convergence:	-1.03 °

Well	NMU # 4659BH		
Well Position	+N-S	0.0 usft	Northing: 650,633.00 usft
	+E-W	0.0 usft	Easting: 1,373,549.00 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	31° 26' 24.344 N
		Longitude:	102° 20' 31.823 W
		Ground Level:	2,545.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	6/7/2012	6.84	59.64	48,179

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)	
	0.0	0.0	0.0	254.08	

Survey Program	Date 6/27/2012				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
97.9	2,167.0	Gyro (Wellbore #1)	Good_gyro	Good Gyro	
2,194.0	7,980.0	MWD (Wellbore #1)	MWD default	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)	
TIE IN @ 2167' MD / 2167' TVD										
2,167.0	0.28	66.05	2,166.9	-4.5	8.5	-7.0	0.00	0.00	0.00	
2,194.0	0.30	12.80	2,193.9	-4.4	8.6	-7.1	0.96	0.07	-197.22	
2,225.0	0.90	271.50	2,224.9	-4.3	8.4	-6.9	3.24	1.94	-326.77	
2,256.0	3.00	258.20	2,255.9	-4.5	7.4	-5.8	6.88	6.77	-42.90	
2,287.0	5.40	258.90	2,286.8	-4.9	5.1	-3.6	7.74	7.74	2.26	
2,318.0	8.20	260.10	2,317.6	-5.6	1.5	0.1	9.04	9.03	3.87	
2,348.0	11.00	259.10	2,347.2	-6.5	-3.4	5.1	9.35	9.33	-3.33	
2,380.0	13.60	256.40	2,378.4	-8.0	-10.1	11.9	8.32	8.13	-8.44	
2,412.0	16.30	254.30	2,409.3	-10.1	-18.0	20.1	8.60	8.44	-6.56	



DDC Survey Report



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Well:	NMU # 4659BH	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User 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)	
2,444.0	18.80	250.80	2,439.9	-13.0	-27.2	29.8	8.48	7.81	-10.94	
2,475.0	21.70	247.60	2,468.9	-16.8	-37.3	40.4	10.01	9.35	-10.32	
2,507.0	25.10	246.10	2,498.3	-21.8	-48.9	53.0	10.79	10.63	-4.69	
2,539.0	28.50	246.40	2,526.9	-27.6	-62.1	67.3	10.63	10.63	0.94	
2,570.0	31.80	246.90	2,553.7	-33.8	-76.4	82.8	10.68	10.65	1.61	
2,603.0	35.30	247.60	2,581.2	-40.8	-93.2	100.9	10.67	10.61	2.12	
2,634.0	37.90	248.00	2,606.0	-47.8	-110.4	119.2	8.42	8.39	1.29	
2,665.0	39.90	248.50	2,630.2	-55.0	-128.4	138.6	6.53	6.45	1.61	
2,697.0	41.00	249.20	2,654.5	-62.5	-147.8	159.3	3.72	3.44	2.19	
2,729.0	42.20	249.00	2,678.4	-70.1	-167.7	180.5	3.77	3.75	-0.63	
2,761.0	44.00	248.70	2,701.8	-78.0	-188.0	202.2	5.66	5.63	-0.94	
2,792.0	46.30	248.50	2,723.7	-86.0	-208.5	224.1	7.43	7.42	-0.65	
2,823.0	48.80	248.00	2,744.6	-94.5	-229.7	246.9	8.15	8.06	-1.61	
2,855.0	51.50	247.50	2,765.1	-103.8	-252.5	271.3	8.52	8.44	-1.56	
2,887.0	54.20	246.60	2,784.4	-113.7	-276.0	296.6	8.73	8.44	-2.81	
2,919.0	56.60	246.20	2,802.6	-124.3	-300.1	322.7	7.57	7.50	-1.25	
2,950.0	59.10	246.20	2,819.1	-134.9	-324.1	348.7	8.06	8.06	0.00	
2,981.0	61.30	246.20	2,834.5	-145.7	-348.7	375.3	7.10	7.10	0.00	
3,013.0	63.50	246.80	2,849.3	-157.0	-374.7	403.4	7.07	6.88	1.88	
3,109.0	69.70	246.90	2,887.4	-191.7	-455.7	490.8	6.46	6.46	0.10	
3,141.0	72.20	247.60	2,897.9	-203.4	-483.6	520.8	8.08	7.81	2.19	
3,172.0	74.90	248.50	2,906.6	-214.5	-511.2	550.4	9.14	8.71	2.90	
3,204.0	76.70	249.40	2,914.5	-225.6	-540.1	581.3	6.25	5.63	2.81	
3,235.0	78.60	249.70	2,921.1	-236.2	-568.5	611.5	6.20	6.13	0.97	
3,267.0	81.00	249.60	2,926.8	-247.1	-598.0	642.9	7.51	7.50	-0.31	
3,299.0	83.10	249.70	2,931.2	-258.2	-627.7	674.5	6.57	6.56	0.31	
3,330.0	86.10	249.70	2,934.1	-268.9	-656.7	705.2	9.68	9.68	0.00	
3,362.0	89.10	249.60	2,935.5	-280.0	-686.6	737.1	9.38	9.38	-0.31	
3,394.0	90.60	249.40	2,935.6	-291.2	-716.6	769.0	4.73	4.69	-0.63	
3,425.0	90.50	249.20	2,935.3	-302.1	-745.6	799.9	0.72	-0.32	-0.65	
3,489.0	90.40	248.70	2,934.8	-325.1	-805.3	863.6	0.80	-0.16	-0.78	
3,552.0	90.00	249.00	2,934.5	-347.9	-864.1	926.4	0.79	-0.63	0.48	
3,615.0	89.90	249.60	2,934.6	-370.1	-923.0	989.2	0.97	-0.16	0.95	
3,678.0	90.40	251.00	2,934.4	-391.4	-982.3	1,052.0	2.36	0.79	2.22	
3,741.0	90.50	250.50	2,933.9	-412.1	-1,041.8	1,114.9	0.81	0.16	-0.79	
3,804.0	90.50	251.50	2,933.4	-432.7	-1,101.4	1,177.8	1.59	0.00	1.59	
3,867.0	90.00	252.90	2,933.1	-451.9	-1,161.4	1,240.8	2.36	-0.79	2.22	
3,930.0	90.00	254.00	2,933.1	-469.9	-1,221.7	1,303.8	1.75	0.00	1.75	
3,994.0	90.80	255.20	2,932.7	-486.8	-1,283.4	1,367.8	2.25	1.25	1.88	
4,057.0	90.80	255.40	2,931.8	-502.8	-1,344.4	1,430.7	0.32	0.00	0.32	
4,121.0	91.10	254.70	2,930.7	-519.3	-1,406.2	1,494.7	1.19	0.47	-1.09	
4,184.0	91.10	254.00	2,929.5	-536.3	-1,466.9	1,557.7	1.11	0.00	-1.11	
4,247.0	90.90	255.40	2,928.4	-553.0	-1,527.6	1,620.7	2.24	-0.32	2.22	

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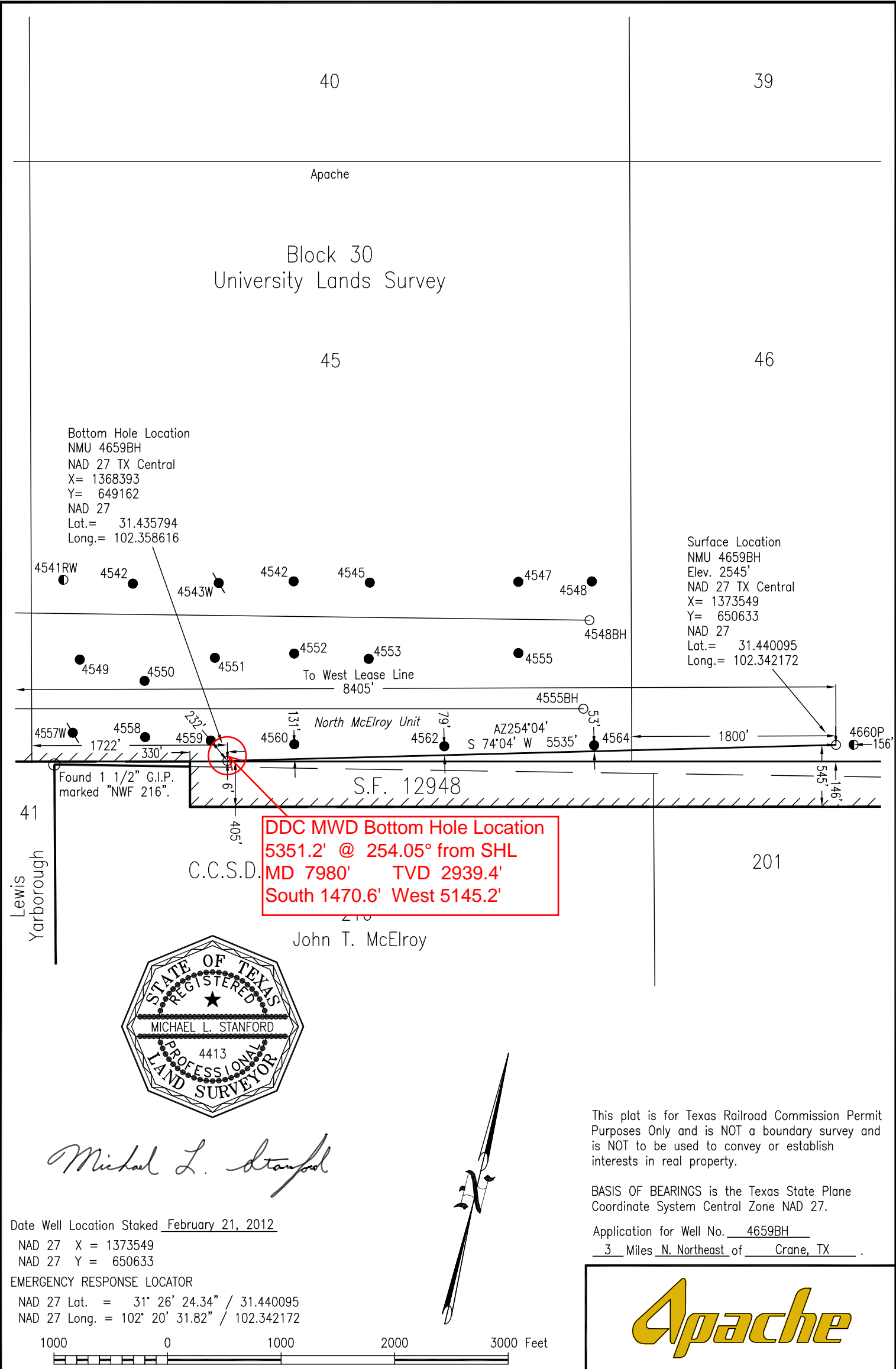
Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
4,311.0	90.60	256.80	2,927.6	-568.3	-1,589.7	1,684.6	2.24	-0.47	2.19	
4,375.0	91.00	257.00	2,926.7	-582.8	-1,652.1	1,748.6	0.70	0.63	0.31	
4,438.0	91.70	256.60	2,925.2	-597.2	-1,713.4	1,811.5	1.28	1.11	-0.63	
4,502.0	90.80	255.90	2,923.8	-612.4	-1,775.5	1,875.4	1.78	-1.41	-1.09	
4,565.0	90.50	255.40	2,923.1	-628.0	-1,836.6	1,938.4	0.93	-0.48	-0.79	
4,628.0	89.80	254.80	2,922.9	-644.2	-1,897.4	2,001.4	1.46	-1.11	-0.95	
4,691.0	89.70	255.00	2,923.2	-660.6	-1,958.3	2,064.4	0.35	-0.16	0.32	
4,755.0	90.40	255.40	2,923.1	-677.0	-2,020.1	2,128.4	1.26	1.09	0.63	
4,818.0	89.30	255.60	2,923.3	-692.8	-2,081.1	2,191.3	1.77	-1.75	0.32	
4,880.0	88.50	255.40	2,924.5	-708.3	-2,141.1	2,253.3	1.33	-1.29	-0.32	
4,943.0	88.80	255.60	2,926.0	-724.1	-2,202.1	2,316.3	0.57	0.48	0.32	
5,006.0	89.20	255.70	2,927.1	-739.7	-2,263.1	2,379.2	0.65	0.63	0.16	
5,070.0	89.30	255.90	2,927.9	-755.4	-2,325.2	2,443.2	0.35	0.16	0.31	
5,133.0	89.40	256.10	2,928.6	-770.6	-2,386.3	2,506.2	0.35	0.16	0.32	
5,196.0	89.40	256.30	2,929.3	-785.6	-2,447.5	2,569.1	0.32	0.00	0.32	
5,259.0	89.50	256.40	2,929.9	-800.5	-2,508.7	2,632.1	0.22	0.16	0.16	
5,322.0	89.80	257.10	2,930.3	-814.9	-2,570.0	2,695.0	1.21	0.48	1.11	
5,386.0	90.20	256.40	2,930.3	-829.6	-2,632.3	2,758.9	1.26	0.63	-1.09	
5,449.0	89.30	255.20	2,930.6	-845.1	-2,693.4	2,821.9	2.38	-1.43	-1.90	
5,512.0	88.90	254.30	2,931.5	-861.6	-2,754.2	2,884.9	1.56	-0.63	-1.43	
5,576.0	88.60	254.80	2,932.9	-878.7	-2,815.8	2,948.9	0.91	-0.47	0.78	
5,639.0	87.40	255.70	2,935.1	-894.7	-2,876.7	3,011.8	2.38	-1.90	1.43	
5,703.0	87.40	255.90	2,938.0	-910.4	-2,938.7	3,075.7	0.31	0.00	0.31	
5,766.0	87.70	257.00	2,940.7	-925.1	-2,999.9	3,138.6	1.81	0.48	1.75	
5,828.0	88.70	257.30	2,942.7	-938.9	-3,060.3	3,200.5	1.68	1.61	0.48	
5,889.0	89.90	257.10	2,943.4	-952.4	-3,119.8	3,261.4	1.99	1.97	-0.33	
5,950.0	90.60	257.00	2,943.2	-966.1	-3,179.2	3,322.3	1.16	1.15	-0.16	
6,012.0	90.10	257.00	2,942.8	-980.0	-3,239.7	3,384.2	0.81	-0.81	0.00	
6,074.0	90.30	257.10	2,942.6	-993.9	-3,300.1	3,446.1	0.36	0.32	0.16	
6,136.0	90.10	257.00	2,942.4	-1,007.8	-3,360.5	3,508.1	0.36	-0.32	-0.16	
6,197.0	90.40	256.80	2,942.1	-1,021.7	-3,419.9	3,569.0	0.59	0.49	-0.33	
6,258.0	90.20	256.60	2,941.8	-1,035.7	-3,479.3	3,629.9	0.46	-0.33	-0.33	
6,320.0	90.10	256.60	2,941.6	-1,050.1	-3,539.6	3,691.9	0.16	-0.16	0.00	
6,382.0	90.40	256.30	2,941.3	-1,064.6	-3,599.9	3,753.8	0.68	0.48	-0.48	
6,443.0	90.70	256.60	2,940.7	-1,078.9	-3,659.2	3,814.7	0.70	0.49	0.49	
6,505.0	88.60	254.50	2,941.1	-1,094.4	-3,719.2	3,876.7	4.79	-3.39	-3.39	
6,566.0	88.90	254.50	2,942.5	-1,110.6	-3,778.0	3,937.7	0.49	0.49	0.00	
6,627.0	89.30	254.80	2,943.4	-1,126.8	-3,836.8	3,998.7	0.82	0.66	0.49	
6,689.0	89.30	254.70	2,944.2	-1,143.1	-3,896.6	4,060.7	0.16	0.00	-0.16	
6,750.0	89.30	254.50	2,944.9	-1,159.3	-3,955.4	4,121.7	0.33	0.00	-0.33	
6,812.0	89.90	255.70	2,945.3	-1,175.2	-4,015.3	4,183.7	2.16	0.97	1.94	
6,873.0	90.20	256.60	2,945.3	-1,189.8	-4,074.5	4,244.6	1.56	0.49	1.48	
6,933.0	90.40	256.60	2,945.0	-1,203.7	-4,132.9	4,304.6	0.33	0.33	0.00	

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Survey									
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6,995.0	90.80	256.60	2,944.3	-1,218.1	-4,193.2	4,366.5	0.65	0.65	0.00
7,059.0	91.10	256.60	2,943.3	-1,232.9	-4,255.4	4,430.4	0.47	0.47	0.00
7,112.0	90.00	256.00	2,942.8	-1,245.5	-4,306.9	4,483.4	2.36	-2.08	-1.13
7,185.0	90.50	255.90	2,942.4	-1,263.2	-4,377.8	4,556.3	0.70	0.68	-0.14
7,248.0	90.40	255.60	2,941.9	-1,278.7	-4,438.8	4,619.3	0.50	-0.16	-0.48
7,312.0	90.80	255.90	2,941.3	-1,294.5	-4,500.8	4,683.3	0.78	0.63	0.47
7,375.0	90.20	255.60	2,940.7	-1,310.0	-4,561.9	4,746.3	1.06	-0.95	-0.48
7,439.0	89.80	254.80	2,940.7	-1,326.3	-4,623.8	4,810.2	1.40	-0.63	-1.25
7,500.0	89.70	254.50	2,941.0	-1,342.5	-4,682.6	4,871.2	0.52	-0.16	-0.49
7,564.0	89.90	254.50	2,941.2	-1,359.6	-4,744.3	4,935.2	0.31	0.31	0.00
7,627.0	90.00	254.50	2,941.3	-1,376.4	-4,805.0	4,998.2	0.16	0.16	0.00
7,691.0	90.00	254.30	2,941.3	-1,393.6	-4,866.6	5,062.2	0.31	0.00	-0.31
7,754.0	90.00	254.50	2,941.3	-1,410.6	-4,927.3	5,125.2	0.32	0.00	0.32
7,818.0	90.50	254.70	2,941.0	-1,427.6	-4,989.0	5,189.2	0.84	0.78	0.31
7,881.0	90.50	254.70	2,940.4	-1,444.2	-5,049.8	5,252.2	0.00	0.00	0.00
LAST MWD SURVEY @ 7927' MD / 2940' TVD									
7,927.0	90.60	254.50	2,940.0	-1,456.4	-5,094.1	5,298.2	0.49	0.22	-0.43
TD @ 7980' MD / 2939' TVD									
7,980.0	90.60	254.50	2,939.4	-1,470.6	-5,145.2	5,351.2	0.00	0.00	0.00

Survey Annotations					RANGE BEARING 5351.2' 254.05°
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
2,167.0	2,166.9	-4.5	8.5	TIE IN @ 2167' MD / 2167' TVD	
7,927.0	2,940.0	-1,456.4	-5,094.1	LAST MWD SURVEY @ 7927' MD / 2940' TVD	
7,980.0	2,939.4	-1,470.6	-5,145.2	TD @ 7980' MD / 2939' TVD	

Checked By: _____	Approved By: _____	Date: _____
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Apache Corporation North McElroy Unit No. 4659BH – 146' FSL & 1800' FWL Section 46, Block 30, University Lands Survey Crane County, Texas		STANFORD SURVEYING COMPANY P.O. BOX 8490 MIDLAND, TEXAS 79708-8490 432-699-5708	
DRAWN BY <u>Adam Welch</u>	REV. <u>03-01-2012</u> ABW DATE <u>02-28-2012</u>	SCALE <u>1" = 1000'</u>	FILE NAME <u>A-6598</u>