

A Gyrodata Directional Survey

Final Definitive Survey

for

APACHE CORPORATION

Lease: Warhead 0405 A Well: 9HL, 12.25 Inch Bit
Location: H&P436, Upton County, Texas

Job Number: MD0819GDM762

Run Date: 30 Aug 2019

Report Generated: 13 Sep 2019 08:32

Surveyor: Dustin Hall

Calculation Method: MINIMUM CURVATURE

Survey surface coordinates obtained from: Well Plan/Plot

Survey Latitude: 31.316928 deg. N

Longitude: 101.814715 deg. W

Azimuth Correction:

Gyro: 0.76000 deg to Grid North

Depth Reference: Rotary Table

Air Gap (RKB to Ground / RKB to MSL): 26.00

Ground Elevation (Ground to MSL / MSL to Mudline): 2663.00

Vertical Section Calculated from Well Head Location

Closure Calculated from Well Head Location

Horizontal Coordinates Calculated from Well Head Location

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MEASURED DEPTH feet	INCL deg.	AZIMUTH deg.	DOGLEG SEVERITY deg./ 100 ft.	VERTICAL DEPTH feet	CLOSURE DIST. feet	AZIMUTH deg.	HORIZONTAL COORDINATES feet
0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.00 N 0.00 E

0 TO 8478.5 FT RATE GYROSCOPIC MULTISHOT SURVEY RUN INSIDE 5 INCH DRILLPIPE
ALL MEASURED DEPTHS AND COORDINATES REFERENCED TO H&P DRILLING RIG #436 WITH R.K.B. HEIGHT OF 26 FT

78.21	0.06	30.02	0.08	78.21	0.0	30.0	0.04 N 0.02 E
168.03	0.24	82.24	0.23	168.03	0.3	66.2	0.10 N 0.23 E
257.39	0.40	95.23	0.20	257.39	0.7	82.3	0.10 N 0.73 E
348.73	0.56	99.69	0.18	348.73	1.5	90.2	0.01 S 1.48 E
437.64	0.61	107.84	0.11	437.63	2.4	95.4	0.22 S 2.36 E
527.28	0.59	116.70	0.11	527.27	3.3	100.1	0.58 S 3.23 E
615.66	0.57	116.76	0.02	615.64	4.1	103.7	0.98 S 4.03 E
709.93	0.58	118.20	0.02	709.91	5.1	106.2	1.42 S 4.87 E
801.57	0.60	121.02	0.04	801.54	6.0	108.3	1.88 S 5.69 E
891.67	0.60	124.65	0.04	891.64	6.9	110.3	2.39 S 6.48 E
982.18	0.58	126.02	0.03	982.14	7.8	112.1	2.93 S 7.24 E
1076.48	0.60	126.33	0.02	1076.44	8.8	113.6	3.51 S 8.02 E
1170.87	0.61	119.66	0.08	1170.82	9.7	114.6	4.05 S 8.86 E
1264.97	0.64	114.74	0.07	1264.92	10.8	114.8	4.52 S 9.77 E
1359.21	0.65	112.15	0.03	1359.15	11.8	114.7	4.94 S 10.74 E
1453.44	0.57	124.85	0.17	1453.37	12.8	114.9	5.41 S 11.62 E

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1547.61	0.64	127.83	0.08	1547.54	13.8	115.8	6.00 S 12.42 E
1641.88	0.60	128.56	0.04	1641.80	14.8	116.6	6.63 S 13.23 E
1736.04	0.57	124.24	0.06	1735.96	15.7	117.2	7.20 S 14.00 E
1829.94	0.84	107.90	0.36	1829.85	16.9	117.0	7.67 S 15.04 E
1924.04	1.36	90.34	0.65	1923.93	18.6	115.1	7.89 S 16.81 E
2018.45	2.33	81.12	1.07	2018.29	21.2	111.0	7.60 S 19.83 E
2113.20	2.92	79.53	0.63	2112.94	25.1	105.9	6.87 S 24.11 E
2207.87	3.51	73.97	0.70	2207.47	29.8	100.9	5.63 S 29.26 E
2301.89	4.26	71.80	0.81	2301.27	35.5	96.0	3.74 S 35.34 E
2396.14	4.73	70.75	0.51	2395.23	42.4	91.9	1.37 S 42.34 E
2490.58	5.43	71.67	0.75	2489.30	50.3	88.5	1.32 N 50.26 E
2584.91	5.52	75.28	0.38	2583.20	59.0	86.2	3.88 N 58.89 E
2679.14	5.84	79.76	0.58	2676.96	68.2	85.1	5.88 N 67.99 E
2773.31	6.51	81.91	0.76	2770.59	78.3	84.5	7.49 N 77.99 E
2867.63	7.17	83.87	0.74	2864.24	89.6	84.3	8.87 N 89.13 E
2962.10	7.01	87.00	0.44	2957.98	101.2	84.4	9.80 N 100.75 E
3056.83	7.32	92.88	0.84	3051.98	113.0	85.0	9.80 N 112.55 E
3151.17	7.08	95.46	0.43	3145.57	124.7	85.9	8.94 N 124.33 E
3245.60	6.81	94.61	0.31	3239.31	135.9	86.7	7.94 N 135.71 E
3340.00	6.44	95.62	0.41	3333.08	146.7	87.3	6.97 N 146.56 E
3434.04	7.20	96.98	0.83	3426.45	157.8	87.9	5.74 N 157.66 E
3528.69	8.14	96.96	0.99	3520.25	170.3	88.6	4.20 N 170.20 E

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3623.17	7.47	96.26	0.71	3613.86	183.0	89.1	2.72 N 182.95 E
3717.79	6.46	99.22	1.13	3707.78	194.3	89.6	1.20 N 194.32 E
3812.44	6.16	100.23	0.35	3801.85	204.6	90.2	0.56 S 204.58 E
3906.83	5.63	97.29	0.65	3895.75	214.2	90.5	2.04 S 214.15 E
4001.12	4.01	98.96	1.72	3989.70	222.0	90.8	3.14 S 221.99 E
4095.75	3.52	100.92	0.54	4084.13	228.1	91.1	4.21 S 228.11 E
4189.72	2.72	99.65	0.85	4177.96	233.2	91.3	5.13 S 233.14 E
4283.81	2.05	102.32	0.72	4271.96	237.1	91.4	5.86 S 236.98 E
4378.34	2.26	102.37	0.22	4366.43	240.5	91.6	6.62 S 240.45 E
4472.45	1.98	101.94	0.30	4460.47	244.0	91.7	7.35 S 243.86 E
4566.69	2.03	98.45	0.14	4554.65	247.2	91.8	7.94 S 247.10 E
4660.87	1.97	97.06	0.08	4648.78	250.5	91.9	8.38 S 250.36 E
4755.19	1.85	96.11	0.13	4743.04	253.6	92.0	8.74 S 253.48 E
4849.61	1.63	93.35	0.25	4837.42	256.5	92.0	8.98 S 256.34 E
4943.67	1.51	92.28	0.13	4931.45	259.1	92.0	9.11 S 258.91 E
5037.45	1.47	92.08	0.04	5025.19	261.5	92.0	9.20 S 261.35 E
5131.74	1.37	90.25	0.12	5119.45	263.8	92.0	9.25 S 263.68 E
5226.03	1.34	89.57	0.04	5213.72	266.1	92.0	9.25 S 265.91 E
5320.21	1.29	88.38	0.06	5307.87	268.2	92.0	9.21 S 268.07 E
5414.52	1.27	89.17	0.03	5402.16	270.3	91.9	9.16 S 270.18 E
5508.80	1.23	85.38	0.10	5496.42	272.4	91.9	9.07 S 272.23 E
5602.89	1.19	83.64	0.06	5590.49	274.4	91.9	8.88 S 274.21 E

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5696.75	0.49	168.27	1.33	5684.34	275.4	91.9	9.16 S 275.26 E
5791.23	1.09	220.81	0.93	5778.81	274.9	92.1	10.24 S 274.75 E
5885.47	1.20	226.64	0.17	5873.03	273.7	92.4	11.60 S 273.45 E
5979.71	0.98	226.55	0.23	5967.25	272.5	92.7	12.83 S 272.15 E
6074.00	0.80	220.82	0.21	6061.53	271.5	92.9	13.88 S 271.13 E
6168.48	0.44	193.24	0.48	6156.01	271.0	93.1	14.73 S 270.62 E
6263.03	0.48	153.56	0.33	6250.55	271.2	93.3	15.44 S 270.71 E
6357.27	0.55	132.99	0.21	6344.79	271.7	93.4	16.10 S 271.22 E
6451.72	0.61	126.98	0.09	6439.24	272.5	93.5	16.71 S 271.95 E
6546.14	0.77	113.43	0.24	6533.65	273.5	93.6	17.27 S 272.94 E
6640.51	0.92	103.25	0.22	6628.01	274.8	93.7	17.69 S 274.25 E
6734.57	0.97	96.57	0.13	6722.06	276.4	93.7	17.96 S 275.78 E
6828.75	0.97	92.45	0.07	6816.22	278.0	93.7	18.08 S 277.37 E
6922.93	0.96	88.78	0.07	6910.39	279.5	93.7	18.10 S 278.95 E
7017.38	1.43	85.29	0.50	7004.82	281.5	93.7	17.99 S 280.92 E
7111.39	1.80	86.25	0.39	7098.79	284.1	93.6	17.79 S 283.56 E
7205.87	1.82	81.55	0.16	7193.22	287.1	93.5	17.48 S 286.53 E
7300.04	1.70	79.16	0.15	7287.35	289.9	93.4	16.99 S 289.38 E
7394.32	1.55	78.67	0.16	7381.59	292.5	93.2	16.48 S 292.00 E
7488.19	1.64	74.01	0.17	7475.43	295.0	93.1	15.86 S 294.54 E
7582.59	1.52	71.17	0.15	7569.79	297.4	92.9	15.09 S 297.02 E

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7676.76	1.32	72.19	0.21	7663.93	299.6	92.7	14.35 S 299.24 E
7771.16	1.29	71.16	0.04	7758.31	301.6	92.6	13.67 S 301.28 E
7865.84	1.22	69.70	0.08	7852.96	303.5	92.5	12.98 S 303.23 E
7959.90	1.16	71.66	0.08	7947.00	305.3	92.3	12.33 S 305.07 E
8054.48	1.12	71.13	0.04	8041.56	307.1	92.2	11.73 S 306.86 E
8148.84	1.08	72.50	0.05	8135.91	308.8	92.1	11.17 S 308.58 E
8243.11	1.07	74.58	0.04	8230.16	310.5	92.0	10.67 S 310.27 E
8337.32	1.05	76.45	0.04	8324.35	312.1	91.9	10.23 S 311.96 E
8431.62	1.21	76.01	0.17	8418.64	313.9	91.8	9.79 S 313.77 E
8478.50	1.21	77.38	0.06	8465.51	314.9	91.7	9.56 S 314.73 E

Final Station Closure: Distance: 314.88 ft Az: 91.74 deg.



Gyrodata Incorporated
10504 WCR 72
Midland, TX 79707

Main: 432-561-8458
Fax: 432-563-7982

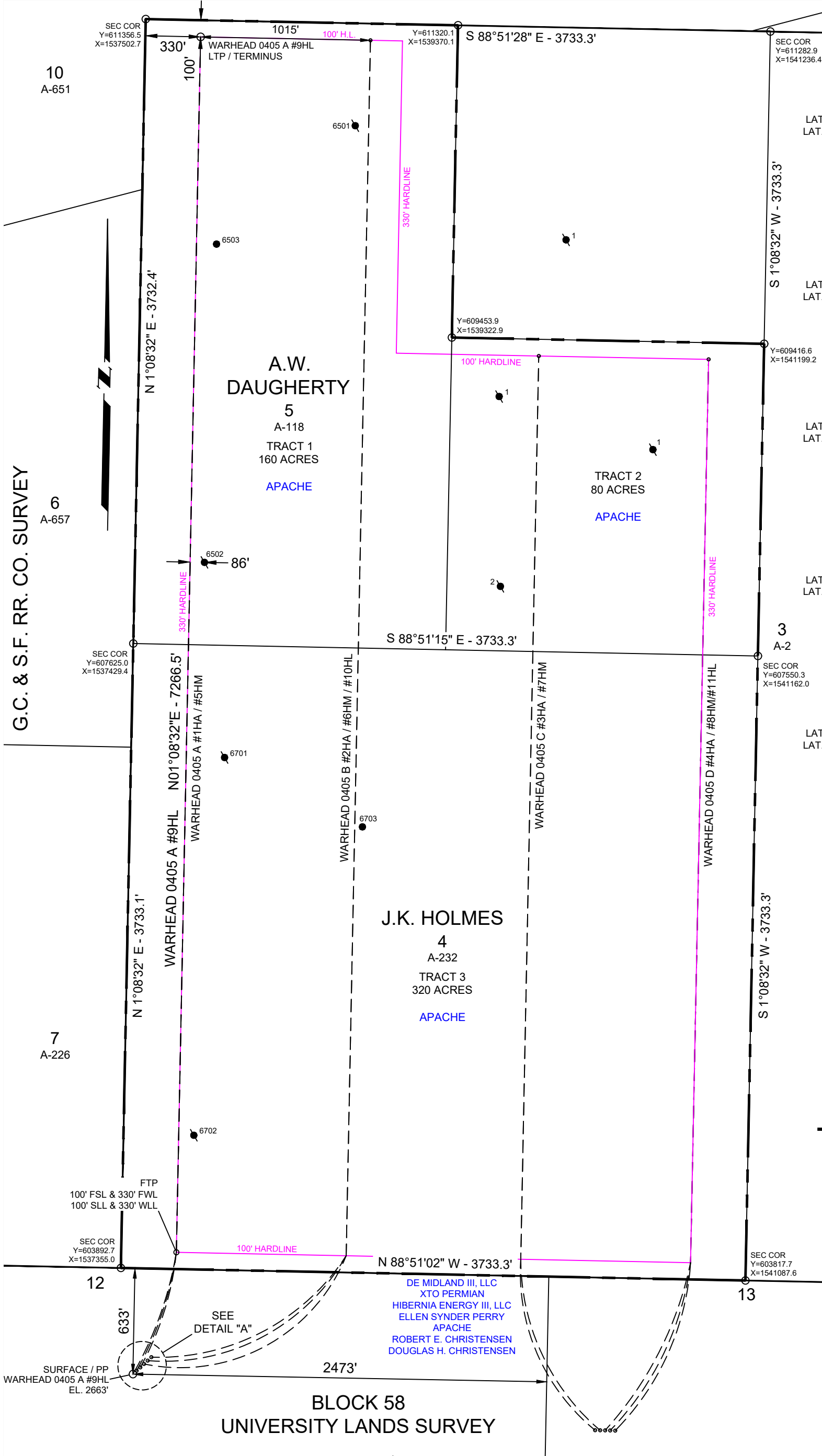
State of Texas
County of Upton

I, John Macer, certify that; I am employed by Gyrodata Inc.; that I am authorized and qualified to review the Gyroscopic Multishot survey from a depth of 0 feet to a depth of 8,478.5 feet conducted on the day(s) of 08/29/19 through 08/30/19; that this survey was conducted at the request APACHE CORPORATION for the WARHEAD 0405 A Well 9HL API No. 42-461-41212 in UPTON COUNTY, TEXAS; that the data is true, correct, complete, and within the limitations of the tool as set forth by Gyrodata Inc.; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Gyrodata Inc.

A handwritten signature in dark ink, appearing to read "John Macer", is written over a solid horizontal line.

John Macer
Operations Coordinator

G.C. & S.F. RR. CO. SURVEY



SURFACE HOLE LOCATION COORDINATES NAD 27 TX-C ZONE
X = 1537427.3 Y = 603258.4
LAT.: 31°19'00.942" N LONG.: 101°48'52.974" W
LAT.: 31.316928344° N LONG.: 101.814714989° W
GROUND ELEVATION:
2663'
SECTION LINE PERPENDICULARS:
633' FNL & 2473' FEL
LEASE LINE PERPENDICULARS:
OFF LEASE

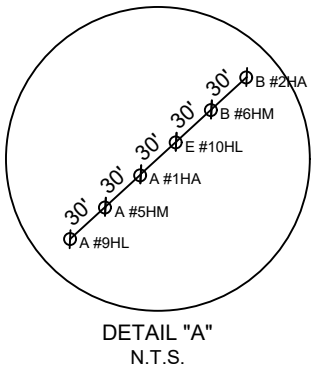
PENTRATION POINT COORDINATES NAD 27 TX-C ZONE
X = 1537427.3 Y = 603258.4
LAT.: 31°19'00.942" N LONG.: 101°48'52.974" W
LAT.: 31.316928344° N LONG.: 101.814714989° W
SECTION LINE PERPENDICULARS:
633' FNL & 2473' FEL
LEASE LINE PERPENDICULARS:
OFF LEASE

FIRST TAKE POINT COORDINATES NAD 27 TX-C ZONE
X = 1537687.0 Y = 603986.0
LAT.: 31°19'08.178" N LONG.: 101°48'50.093" W
LAT.: 31.318938268° N LONG.: 101.813914655° W
SECTION LINE PERPENDICULARS:
100' FSL & 330' FWL
LEASE LINE PERPENDICULARS:
100' SLL & 330' WLL
ON LEASE

LAST TAKE POINT COORDINATES NAD 27 TX-C ZONE
X = 1537831.8 Y = 611250.8
LAT.: 31°20'20.097" N LONG.: 101°48'49.538" W
LAT.: 31.338915726° N LONG.: 101.813760486° W
SECTION LINE PERPENDICULARS:
100' FNL & 330' FWL
LEASE LINE PERPENDICULARS:
100' NLL & 330' WLL
ON LEASE

TERMINUS POINT COORDINATES NAD 27 TX-C ZONE
X = 1537831.8 Y = 611250.8
LAT.: 31°20'20.097" N LONG.: 101°48'49.538" W
LAT.: 31.338915726° N LONG.: 101.813760486° W
SECTION LINE PERPENDICULARS:
100' FNL & 330' FWL
LEASE LINE PERPENDICULARS:
100' NLL & 330' WLL
ON LEASE

STACKED LATERAL INFORMATION
WARHEAD 0405 A #9HL PARENT WELL

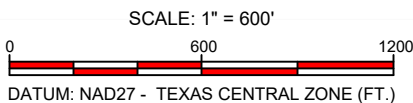


APACHE CORPORATION
WARHEAD 0405 LEASE
560 AC. (CALLED)

CHEVRON USA, INC
DE MIDLAND III, LLC
APACHE
ROBERT E. CHRISTENSEN
DOUGLAS H. CHRISTENSEN
ELLEN S. PERRY

THIS PLAT IS PREPARED FOR TEXAS RAILROAD COMMISSION PERMITTING PURPOSES ONLY.
NO CLAIM IS HEREBY MADE REGARDING CURRENT OR ACTUAL SURFACE/MINERAL FEE OWNERSHIP OR LESSOR.
I CERTIFY THAT THE ABOVE PLAT IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

Albert E. Fuller



APACHE CORPORATION	
WARHEAD 0405 A #9HL	
633' FNL & 2473' FEL	
SECTION 12, BLOCK 58	
UNIVERSITY LANDS SURVEY	
UPTON COUNTY, TEXAS	
DATE: 04/30/2019	USGS QUAD: SEVEN MILE CORNER SE
N 49° E - 9.8 MI. FROM RANKIN, TX	

REV# -	BY	DATE REVISED
0 -	GMV	04/23/19 PRELIM
1 -	GMV	04/25/19 GENERAL REVISION
2 -	GMV	04/30/19 FINAL

ALBERT E. FULLER
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 4842
3600 W. Baumann Cell - (432) 559-6718
Midland, TX 79703 Email - al@aefuller.com



October 17, 2019

Railroad Commission of Texas
Oil and Gas Division
P.O. Box 12967
Capitol Station
Austin, Texas 78711

Attention: Regulatory Department,

Re: Apache Corporation
Warhead 0405 A 9HL
Upton County, TX
API #42-461-41212
Job No. 65301

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	
Christopher Maulding	9HL	8,684	16,922	9/29/19	10/9/19	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,

Brittany Carley

Brittany Carley
Operations Administrator



Apache Corporation

Upton County, Texas (NAD27 TC)

Warhead 0405

A 9HL

OH / 65301

Survey: Phoenix MWD Surveys - SQC FDIR

Standard Survey Report

11 October, 2019

Company:	Apache Corporation	Local Co-ordinate Reference:	Well A 9HL
Project:	Upton County, Texas (NAD27 TC)	TVD Reference:	RKB @ 2689.00usft (H&P 436)
Site:	Warhead 0405	MD Reference:	RKB @ 2689.00usft (H&P 436)
Well:	A 9HL	North Reference:	Grid
Wellbore:	OH / 65301	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (H&P 436)	Database:	USA Compass

Project	Upton County, Texas (NAD27 TC)		
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	Warhead 0405		
Site Position:		Northing:	603,339.00 usft
From:	Map	Easting:	1,537,515.30 usft
Position Uncertainty:	1.00 usft	Slot Radius:	13-3/16 "
		Latitude:	31° 19' 1.751340 N
		Longitude:	101° 48' 51.972124 W
		Grid Convergence:	-0.76 °

Well	A 9HL		
Well Position	+N/-S	0.00 usft	Northing: 603,258.40 usft
	+E/-W	0.00 usft	Easting: 1,537,427.30 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	31° 19' 0.942040 N
		Longitude:	101° 48' 52.974180 W
		Ground Level:	2,663.00 usft

Wellbore	OH / 65301		
Magnetics	Model Name	Sample Date	Declination (°)
	User Defined	9/30/2019	6.26
			Dip Angle (°) 59.54
			Field Strength (nT) 47,596.00000000

Design	Surveys (H&P 436)		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0.00	0.00	0.00
			Direction (°) 2.90

Survey Program	Date	10/9/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
78.20	8,478.50	Gyrodata Gyro Surveys (OH / 65301)	GYD_CT_C011Ga	Gyrodata continuous
8,684.00	16,994.00	Phoenix MWD Surveys - SQC FDIR (OH /	MWD+IFR1+FDIR	OWSG MWD + IFR1 + FDIR Correction

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)	
8,478.50	1.21	77.38	8,465.51	-9.56	314.73	6.36	0.00	0.00	0.00	
Tie In										
8,684.00	0.97	88.34	8,670.97	-9.04	318.59	7.08	0.15	-0.12	5.33	
First Phoenix MWD Survey										
8,778.00	3.17	350.56	8,764.92	-6.45	318.96	9.68	3.66	2.34	-104.02	
8,826.00	7.14	2.79	8,812.72	-2.16	318.88	13.96	8.54	8.27	25.48	
8,873.00	10.67	358.21	8,859.14	5.11	318.89	21.22	7.65	7.51	-9.74	
8,967.00	17.71	354.53	8,950.22	28.07	317.25	44.07	7.55	7.49	-3.91	
9,014.00	23.25	352.14	8,994.23	44.39	315.30	60.27	11.92	11.79	-5.09	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well A 9HL
Project:	Upton County, Texas (NAD27 TC)	TVD Reference:	RKB @ 2689.00usft (H&P 436)
Site:	Warhead 0405	MD Reference:	RKB @ 2689.00usft (H&P 436)
Well:	A 9HL	North Reference:	Grid
Wellbore:	OH / 65301	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (H&P 436)	Database:	USA Compass

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)
9,061.00	28.61	351.22	9,036.49	64.71	312.31	80.42	11.44	11.40	-1.96
9,108.00	34.46	352.52	9,076.53	89.04	308.86	104.54	12.53	12.45	2.77
9,155.00	40.79	353.95	9,113.73	117.52	305.51	132.81	13.59	13.47	3.04
9,204.00	47.46	355.75	9,148.89	151.48	302.48	166.58	13.85	13.61	3.67
9,250.00	53.49	358.00	9,178.15	186.89	300.58	201.84	13.64	13.11	4.89
9,297.00	57.65	2.26	9,204.73	225.63	300.70	240.54	11.58	8.85	9.06
9,344.00	62.71	1.45	9,228.09	266.37	302.01	281.30	10.87	10.77	-1.72
9,392.00	67.25	0.79	9,248.39	309.85	302.86	324.76	9.54	9.46	-1.38
9,439.00	71.66	359.57	9,264.88	353.85	302.99	368.71	9.69	9.38	-2.60
9,486.00	77.23	359.18	9,277.48	399.11	302.49	413.89	11.88	11.85	-0.83
9,533.00	80.75	359.45	9,286.45	445.23	301.94	459.92	7.51	7.49	0.57
9,580.00	84.68	358.26	9,292.41	491.83	301.01	506.42	8.73	8.36	-2.53
9,655.00	87.88	358.40	9,297.28	566.63	298.83	581.01	4.27	4.27	0.19
9,749.00	87.67	358.18	9,300.93	660.52	296.03	674.64	0.32	-0.22	-0.23
9,815.53	87.99	358.05	9,303.45	726.97	293.84	740.89	0.52	0.48	-0.19
FTP: 9815.53' MD, 87.99° Inc, 358.05° Azm									
9,844.00	88.13	358.00	9,304.41	755.40	292.86	769.24	0.52	0.48	-0.19
9,938.00	89.87	358.04	9,306.05	849.33	289.62	862.88	1.85	1.85	0.04
10,033.00	90.11	357.86	9,306.07	944.27	286.22	957.53	0.32	0.25	-0.19
10,127.00	90.55	358.38	9,305.52	1,038.22	283.13	1,051.20	0.72	0.47	0.55
10,222.00	91.08	359.34	9,304.17	1,133.19	281.24	1,145.95	1.15	0.56	1.01
10,316.00	92.40	1.31	9,301.32	1,227.13	281.78	1,239.81	2.52	1.40	2.10
10,410.00	93.19	1.75	9,296.73	1,320.99	284.28	1,333.67	0.96	0.84	0.47
10,505.00	91.78	1.34	9,292.62	1,415.86	286.84	1,428.55	1.55	-1.48	-0.43
10,599.00	91.50	1.56	9,289.93	1,509.79	289.22	1,522.48	0.38	-0.30	0.23
10,693.00	91.64	1.89	9,287.35	1,603.71	292.05	1,616.43	0.38	0.15	0.35
10,788.00	92.93	2.79	9,283.56	1,698.56	295.92	1,711.34	1.66	1.36	0.95
10,883.00	92.05	2.36	9,279.44	1,793.37	300.19	1,806.25	1.03	-0.93	-0.45
10,977.00	90.32	1.78	9,277.49	1,887.28	303.58	1,900.22	1.94	-1.84	-0.62
11,072.00	90.04	1.11	9,277.19	1,982.25	305.98	1,995.19	0.76	-0.29	-0.71
11,166.00	90.53	1.47	9,276.73	2,076.23	308.09	2,089.15	0.65	0.52	0.38
11,260.00	88.64	0.51	9,277.41	2,170.21	309.72	2,183.09	2.26	-2.01	-1.02
11,355.00	87.33	359.98	9,280.75	2,265.14	310.12	2,277.92	1.49	-1.38	-0.56
11,449.00	87.47	359.29	9,285.01	2,359.04	309.52	2,371.67	0.75	0.15	-0.73
11,543.00	88.24	359.75	9,288.53	2,452.97	308.74	2,465.44	0.95	0.82	0.49
11,638.00	88.21	359.83	9,291.47	2,547.93	308.39	2,560.26	0.09	-0.03	0.08
11,732.00	89.22	0.09	9,293.58	2,641.90	308.32	2,654.11	1.11	1.07	0.28
11,826.00	88.84	359.69	9,295.17	2,735.89	308.14	2,747.97	0.59	-0.40	-0.43
11,920.00	89.62	0.57	9,296.43	2,829.88	308.36	2,841.85	1.25	0.83	0.94
12,015.00	88.58	359.39	9,297.93	2,924.86	308.32	2,936.71	1.66	-1.09	-1.24
12,109.00	90.34	359.78	9,298.81	3,018.85	307.64	3,030.55	1.92	1.87	0.41
12,203.00	91.16	1.67	9,297.58	3,112.83	308.83	3,124.46	2.19	0.87	2.01
12,298.00	90.77	1.17	9,295.98	3,207.79	311.19	3,219.42	0.67	-0.41	-0.53
12,392.00	91.18	1.64	9,294.38	3,301.75	313.49	3,313.37	0.66	0.44	0.50

Company:	Apache Corporation	Local Co-ordinate Reference:	Well A 9HL
Project:	Upton County, Texas (NAD27 TC)	TVD Reference:	RKB @ 2689.00usft (H&P 436)
Site:	Warhead 0405	MD Reference:	RKB @ 2689.00usft (H&P 436)
Well:	A 9HL	North Reference:	Grid
Wellbore:	OH / 65301	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (H&P 436)	Database:	USA Compass

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)
12,487.00	89.57	1.70	9,293.76	3,396.70	316.26	3,408.35	1.70	-1.69	0.06
12,581.00	89.44	3.00	9,294.57	3,490.62	320.11	3,502.34	1.39	-0.14	1.38
12,676.00	87.67	1.85	9,296.97	3,585.50	324.13	3,597.30	2.22	-1.86	-1.21
12,770.00	87.44	1.38	9,300.98	3,679.37	326.78	3,691.19	0.56	-0.24	-0.50
12,865.00	87.61	1.18	9,305.08	3,774.26	328.90	3,786.06	0.28	0.18	-0.21
12,959.00	89.22	0.52	9,307.68	3,868.21	330.29	3,879.96	1.85	1.71	-0.70
13,053.00	90.64	0.57	9,307.80	3,962.20	331.19	3,973.88	1.51	1.51	0.05
13,147.00	90.54	359.87	9,306.83	4,056.20	331.55	4,067.77	0.75	-0.11	-0.74
13,241.00	91.32	0.10	9,305.30	4,150.19	331.52	4,161.64	0.87	0.83	0.24
13,336.00	92.18	1.34	9,302.40	4,245.13	332.72	4,256.52	1.59	0.91	1.31
13,431.00	89.94	1.91	9,300.64	4,340.07	335.41	4,351.48	2.43	-2.36	0.60
13,525.00	90.31	2.17	9,300.44	4,434.01	338.76	4,445.46	0.48	0.39	0.28
13,620.00	90.15	2.08	9,300.06	4,528.94	342.28	4,540.46	0.19	-0.17	-0.09
13,714.00	89.18	2.09	9,300.61	4,622.88	345.70	4,634.44	1.03	-1.03	0.01
13,809.00	89.87	2.13	9,301.39	4,717.81	349.20	4,729.43	0.73	0.73	0.04
13,904.00	89.85	1.82	9,301.63	4,812.75	352.47	4,824.42	0.33	-0.02	-0.33
13,998.00	90.64	1.16	9,301.22	4,906.72	354.91	4,918.39	1.10	0.84	-0.70
14,093.00	92.14	0.96	9,298.92	5,001.67	356.67	5,013.31	1.59	1.58	-0.21
14,187.00	91.02	1.63	9,296.33	5,095.61	358.79	5,107.23	1.39	-1.19	0.71
14,281.00	87.81	1.77	9,297.29	5,189.55	361.58	5,201.20	3.42	-3.41	0.15
14,375.00	87.67	1.36	9,300.99	5,283.44	364.15	5,295.10	0.46	-0.15	-0.44
14,470.00	88.98	1.01	9,303.77	5,378.38	366.11	5,390.01	1.43	1.38	-0.37
14,564.00	89.53	0.16	9,304.99	5,472.37	367.07	5,483.93	1.08	0.59	-0.90
14,658.00	89.90	359.98	9,305.46	5,566.37	367.19	5,577.81	0.44	0.39	-0.19
14,752.00	90.18	0.02	9,305.40	5,660.37	367.19	5,671.69	0.30	0.30	0.04
14,847.00	90.72	359.32	9,304.65	5,755.36	366.64	5,766.54	0.93	0.57	-0.74
14,941.00	91.23	0.54	9,303.05	5,849.34	366.52	5,860.39	1.41	0.54	1.30
15,035.00	91.59	1.40	9,300.74	5,943.30	368.11	5,954.31	0.99	0.38	0.91
15,129.00	92.16	3.15	9,297.66	6,037.17	371.84	6,048.25	1.96	0.61	1.86
15,224.00	90.76	3.59	9,295.24	6,131.98	377.43	6,143.21	1.54	-1.47	0.46
15,318.00	89.90	2.83	9,294.70	6,225.82	382.69	6,237.21	1.22	-0.91	-0.81
15,412.00	89.13	2.51	9,295.49	6,319.72	387.07	6,331.20	0.89	-0.82	-0.34
15,507.00	90.46	2.66	9,295.83	6,414.62	391.35	6,426.20	1.41	1.40	0.16
15,601.00	90.53	2.74	9,295.02	6,508.51	395.78	6,520.20	0.11	0.07	0.09
15,695.00	88.13	1.89	9,296.12	6,602.42	399.58	6,614.18	2.71	-2.55	-0.90
15,790.00	88.35	0.59	9,299.04	6,697.35	401.63	6,709.09	1.39	0.23	-1.37
15,884.00	89.10	0.05	9,301.13	6,791.33	402.16	6,802.97	0.98	0.80	-0.57
15,978.00	89.47	359.63	9,302.30	6,885.32	401.89	6,896.83	0.60	0.39	-0.45
16,073.00	90.70	0.38	9,302.16	6,980.31	401.90	6,991.71	1.52	1.29	0.79
16,167.00	91.07	2.23	9,300.71	7,074.27	404.04	7,085.65	2.01	0.39	1.97
16,262.00	89.01	1.99	9,300.64	7,169.20	407.54	7,180.64	2.18	-2.17	-0.25
16,356.00	88.32	0.64	9,302.83	7,263.15	409.70	7,274.58	1.61	-0.73	-1.44
16,450.00	87.98	0.19	9,305.87	7,357.10	410.38	7,368.44	0.60	-0.36	-0.48

Company:	Apache Corporation	Local Co-ordinate Reference:	Well A 9HL
Project:	Upton County, Texas (NAD27 TC)	TVD Reference:	RKB @ 2689.00usft (H&P 436)
Site:	Warhead 0405	MD Reference:	RKB @ 2689.00usft (H&P 436)
Well:	A 9HL	North Reference:	Grid
Wellbore:	OH / 65301	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (H&P 436)	Database:	USA Compass

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)	
16,545.00	88.83	358.60	9,308.51	7,452.05	409.37	7,463.22	1.90	0.89	-1.67	
16,639.00	89.36	357.62	9,310.00	7,545.99	406.27	7,556.88	1.19	0.56	-1.04	
16,733.00	90.23	357.89	9,310.33	7,639.92	402.59	7,650.50	0.97	0.93	0.29	
16,828.00	91.21	358.20	9,309.14	7,734.85	399.35	7,745.15	1.08	1.03	0.33	
16,922.00	92.18	358.22	9,306.36	7,828.76	396.42	7,838.79	1.03	1.03	0.02	
Final Phoenix MWD Survey										
16,994.00	92.18	358.22	9,303.63	7,900.68	394.18	7,910.50	0.00	0.00	0.00	
PTD: 16994.00' MD, 92.18° Inc, 358.22° Azm										

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
8,478.50	8,465.51	-9.56	314.73	Tie In	
8,684.00	8,670.97	-9.04	318.59	First Phoenix MWD Survey	
9,815.53	9,303.45	726.97	293.84	FTP: 9815.53' MD, 87.99° Inc, 358.05° Azm	
16,922.00	9,306.36	7,828.76	396.42	Final Phoenix MWD Survey	
16,994.00	9,303.62	7,900.68	394.18	PTD: 16994.00' MD, 92.18° Inc, 358.22° Azm	

SURVEY DATA CERTIFICATION



PHOENIX
TECHNOLOGY SERVICES

Job #: 65301
 Client: Apache Corporation
 County & State: Upton County, Texas
 Well: Warhead 0405 A 9HL
 API No: 42-461-41212
 Proposed Direction: 2.90°

TIE-IN DATA

MD	TVD	INC	AZM	N/-S	E/-W	DATA SOURCE
8478.50 ft	8465.51 ft	1.21°	77.38°	9.56 S	314.73 E	Gyro Surveys
Data Source Company:						GyroData

SURVEY DATA

First Survey Date	First Survey Depth	INC	AZM
29-Sep-19	8,684 ft	0.97°	88.34°

Last Survey Date	Last Survey Depth	INC	AZM
9-Oct-19	16,922 ft	92.18°	358.22°

Survey Instrument Type
Velocity UTX Tool

Projected TD Survey Date	Projected TD Survey Depth	INC	AZM
9-Oct-19	16,994 ft	92.18°	358.22°

CORRECTION INFORMATION

Magnetic Declination Used	6.27	degrees
Grid Convergence Used	-0.76	degrees
Total Correction	7.03	degrees

Corrected to True/Grid North
Grid North

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

Christopher Maulding

Signature

10/10/2019

Date