

University 45 735HA Actual Gyro+MWD Survey Report

(Non-Def Survey)

Report Date: June 27, 2014 - 08:23 AM
Client: Approach Operating, LLC
Field: TX Crockett County (NAD 27)
Structure / Slot: Approach Operating, LLC University 45 735HA (Nabors M34) / University 45 735HA
Well: University 45 735HA
Borehole: Original Borehole
UWI / API#: Unknown / Unknown
Survey Name: University 45 735HA Actual Gyro+MWD
Survey Date: June 09, 2014
Tort / AHD / DDI / ERD Ratio: 226.538 ° / 7926.875 ft / 6.589 / 1.233
Coordinate Reference System: NAD27 Texas State Plane, Central Zone, US Feet
Location Lat / Long: N 30° 58' 39.51953", W 101° 16' 10.77669"
Location Grid N/E Y/X: N 478016.000 ftUS, E 1706581.000 ftUS
CRS Grid Convergence Angle: -0.4823 °
Grid Scale Factor: 0.99988184
Version / Patch: 2.7.1043.0

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 0.139 ° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: Nabors M34 RKB @ 22' Above GL
TVD Reference Elevation: 2704.000 ft above MSL
Seabed / Ground Elevation: 2682.000 ft above MSL
Magnetic Declination: 6.118 °
Total Gravity Field Strength: 998.4577mgn (9.80665 Based)
Gravity Model: GARM
Total Magnetic Field Strength: 47764.748 nT
Magnetic Dip Angle: 59.302 °
Declination Date: June 09, 2014
Magnetic Declination Model: BGGM 2014
North Reference: Grid North
Grid Convergence Used: -0.4823 °
Total Corr Mag North->Grid North: 6.6007 °
Local Coord Referenced To: Structure Reference Point

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (N/S ft)	EW (E/W ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	DeltaMD (ft)	Closure (ft)	Closure Azimuth (°)	TF (°)
SHL	0.00	0.00	0.10	0.00	0.00	N 0.00	E 0.00	N/A	N/A	N/A		0.00	0.00	302.29M
	122.00	1.56	302.29	121.98	0.88	N 0.89	W 1.40	1.28	1.28	0.00	122.00	1.66	302.29	309.19M
	222.00	1.72	309.19	221.94	2.55	N 2.56	W 3.72	0.25	0.16	6.90	100.00	4.52	304.58	307.82M
	322.00	1.73	307.82	321.90	4.42	N 4.44	W 6.07	0.04	0.01	-1.37	100.00	7.52	306.15	305.48M
	422.00	1.73	305.48	421.85	6.22	N 6.24	W 8.49	0.07	0.00	-2.34	100.00	10.54	306.29	299.12M
	522.00	1.59	299.12	521.81	7.76	N 7.79	W 10.94	0.23	-0.14	-6.36	100.00	13.43	305.46	294.03M
	622.00	1.63	294.03	621.77	9.01	N 9.04	W 13.45	0.15	0.04	-5.09	100.00	16.21	303.92	302.32M
	722.00	2.01	302.32	721.72	10.52	N 10.56	W 16.23	0.46	0.38	8.29	100.00	19.36	303.05	303.88M
	822.00	1.89	303.88	821.66	12.37	N 12.42	W 19.08	0.13	-0.12	1.56	100.00	22.76	303.06	304.45M
	922.00	1.57	304.45	921.62	14.06	N 14.11	W 21.58	0.32	-0.32	0.57	100.00	25.78	303.18	308.23M
	1022.00	1.27	308.23	1021.59	15.52	N 15.57	W 23.58	0.31	-0.30	3.78	100.00	28.26	303.44	310.51M
	1122.00	1.12	310.51	1121.57	16.83	N 16.89	W 25.19	0.16	-0.15	2.28	100.00	30.33	303.85	319.09M
	1197.00	0.71	319.09	1196.56	17.66	N 17.72	W 26.05	0.57	-0.55	11.44	75.00	31.51	304.22	311.63M
	1377.00	1.23	311.63	1376.53	19.78	N 19.85	W 28.23	0.30	0.29	-4.14	180.00	34.51	305.11	307M
	1567.00	1.32	307.00	1566.48	22.44	N 22.52	W 31.50	0.07	0.05	-2.44	190.00	38.72	305.56	295.26M
	1757.00	1.32	295.26	1756.43	24.68	N 24.77	W 35.23	0.14	0.00	-6.18	190.00	43.06	305.11	83.75M
	1947.00	0.70	83.75	1946.42	25.74	N 25.83	W 36.05	1.03	-0.33	78.15	190.00	44.35	305.62	87.9M
	2137.00	0.70	87.90	2136.40	25.92	N 26.00	W 33.74	0.03	0.00	2.18	190.00	42.59	307.62	101.56M
	2326.00	0.97	101.56	2325.38	25.65	N 25.72	W 31.02	0.18	0.14	7.23	189.00	40.29	309.67	107.88M
	2516.00	1.67	107.88	2515.33	24.48	N 24.55	W 26.81	0.38	0.37	3.33	190.00	36.35	312.48	125.69M
	2706.00	1.41	125.69	2705.26	22.28	N 22.33	W 22.27	0.29	-0.14	9.37	190.00	31.54	315.08	152.24M
	2896.00	0.62	152.24	2895.23	20.01	N 20.06	W 19.90	0.47	-0.42	13.97	190.00	28.25	315.24	166.14M
	3086.00	0.97	166.14	3085.22	17.54	N 17.59	W 19.03	0.21	0.18	7.32	190.00	25.92	312.74	175.27M
	3276.00	1.06	175.27	3275.19	14.23	N 14.28	W 18.50	0.10	0.05	4.81	190.00	23.37	307.65	274.42M
	3466.00	0.62	274.42	3465.17	12.56	N 12.60	W 19.38	0.69	-0.23	52.18	190.00	23.12	303.04	243.45M
	3656.00	0.18	243.45	3655.17	12.50	N 12.55	W 20.67	0.25	-0.23	-16.30	190.00	24.18	301.26	264.14M
	3845.00	0.35	264.14	3844.17	12.31	N 12.36	W 21.51	0.10	0.09	10.95	189.00	24.81	299.88	293.83M
	4035.00	0.62	293.83	4034.16	12.66	N 12.71	W 23.03	0.19	0.14	15.63	190.00	26.31	298.90	294.2M
	4225.00	1.58	294.20	4224.12	14.14	N 14.20	W 26.36	0.51	0.51	0.19	190.00	29.94	298.32	304.6M
	4415.00	1.41	304.60	4414.06	16.53	N 16.60	W 30.67	0.17	-0.09	5.47	190.00	34.88	298.43	323.61M
	4605.00	0.70	323.61	4604.02	18.79	N 18.87	W 33.29	0.41	-0.37	10.01	190.00	38.26	299.54	0.43M
	4795.00	0.53	0.43	4794.01	20.60	N 20.68	W 33.97	0.22	-0.09	19.38	190.00	39.77	301.33	22.87M
	4985.00	0.79	22.87	4984.00	22.68	N 22.77	W 33.45	0.19	0.14	11.81	190.00	40.46	304.24	27.05M
	5175.00	0.35	27.05	5173.99	24.41	N 24.49	W 32.68	0.23	-0.23	2.20	190.00	40.84	306.85	85.43M
	5365.00	0.44	85.43	5363.99	24.99	N 25.06	W 31.69	0.21	0.05	30.73	190.00	40.40	308.34	77.99M

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (N/S ft)	EW (E/W ft)	DLS (°/100ft)	BR (°/100ft)	TR (°/100ft)	DeltaMD (ft)	Closure (ft)	Closure Azimuth (°)	TF (°)
KOP 5660'	5554.00	0.70	77.99	5552.98	25.29	N 25.36	W 29.84	0.14	0.14	-3.94	189.00	39.16	310.37	51.88M
	5649.00	0.62	51.88	5647.97	25.73	N 25.80	W 28.86	0.32	-0.08	-27.48	95.00	38.71	311.79	7.34M
	5681.00	1.58	7.34	5679.97	26.27	N 26.34	W 28.67	3.81	3.00	-139.19	32.00	38.94	312.58	353.35M
	5713.00	3.43	353.35	5711.93	27.66	N 27.73	W 28.73	6.05	5.78	-43.72	32.00	39.93	313.99	354.48M
	5745.00	4.92	354.48	5743.85	29.98	N 30.05	W 28.97	4.66	4.66	3.53	32.00	41.74	316.05	355.69M
	5776.00	6.60	355.69	5774.69	33.08	N 33.15	W 29.23	5.43	5.42	3.90	31.00	44.20	318.59	0.77M
	5808.00	9.50	0.77	5806.37	37.55	N 37.63	W 29.33	9.32	9.06	15.88	32.00	47.71	322.06	9.56R
	5840.00	12.75	3.24	5837.77	43.72	N 43.79	W 29.10	10.26	10.16	7.72	32.00	52.58	326.40	HS
	5935.00	23.30	3.25	5927.98	73.03	N 73.10	W 27.44	11.11	11.11	0.01	95.00	78.08	339.43	14.75R
	6029.00	32.98	7.87	6010.78	117.06	N 117.11	W 22.87	10.55	10.30	4.91	94.00	119.33	348.95	76.44L
EOC 6790'	6124.00	34.03	1.36	6090.02	169.27	N 169.32	W 18.70	3.94	1.11	-6.85	95.00	170.35	353.70	10.82L
	6219.00	44.41	358.55	6163.52	229.25	N 229.29	W 18.91	11.08	10.93	-2.96	95.00	230.07	355.29	11.71R
	6314.00	53.20	0.81	6226.03	300.65	N 300.70	W 19.21	9.42	9.25	2.38	95.00	301.31	356.34	14.62R
	6409.00	63.40	3.76	6275.90	381.30	N 381.34	W 15.88	11.06	10.74	3.11	95.00	381.67	357.62	8.76L
	6504.00	71.23	2.49	6312.51	468.76	N 468.79	W 11.13	8.33	8.24	-1.34	95.00	468.92	358.64	4.27L
	6599.00	80.11	1.82	6336.00	560.65	N 560.68	W 7.68	9.37	9.35	-0.71	95.00	560.73	359.21	39.53L
	6694.00	82.92	359.49	6350.01	654.60	N 654.61	W 6.62	3.83	2.96	-2.45	95.00	654.65	359.42	1.57L
	6789.00	88.02	359.35	6357.51	749.26	N 749.28	W 7.58	5.37	5.37	-0.15	95.00	749.32	359.42	29.04L
	6884.00	88.20	359.25	6360.65	844.20	N 844.22	W 8.74	0.22	0.19	-0.11	95.00	844.27	359.41	132.01R
	6979.00	87.93	359.55	6363.86	939.14	N 939.16	W 9.73	0.42	-0.28	0.32	95.00	939.21	359.41	9.79R
	7074.00	90.48	359.99	6365.17	1034.12	N 1034.14	W 10.11	2.72	2.68	0.46	95.00	1034.19	359.44	32.46R
	7169.00	91.36	0.55	6363.65	1129.10	N 1129.13	W 9.66	1.10	0.93	0.59	95.00	1129.17	359.51	140.41L
	7264.00	90.84	0.12	6361.82	1224.08	N 1224.11	W 9.11	0.71	-0.55	-0.45	95.00	1224.14	359.57	171.57R
	7359.00	90.57	0.16	6360.66	1319.08	N 1319.10	W 8.88	0.29	-0.28	0.04	95.00	1319.13	359.61	114.3L
	7454.00	89.87	358.61	6360.29	1414.06	N 1414.09	W 9.90	1.79	-0.74	-1.63	95.00	1414.13	359.60	90R
	7549.00	89.87	359.99	6360.51	1509.05	N 1509.08	W 11.06	1.45	0.00	1.45	95.00	1509.12	359.58	162.79R
	7644.00	89.16	0.21	6361.31	1604.05	N 1604.08	W 10.89	0.78	-0.75	0.23	95.00	1604.12	359.61	104.55R
	7738.00	88.81	1.56	6362.98	1698.02	N 1698.05	W 9.44	1.48	-0.37	1.44	94.00	1698.08	359.68	16.7R
	7833.00	90.31	2.01	6363.71	1792.98	N 1793.00	W 6.48	1.65	1.58	0.47	95.00	1793.01	359.79	150.89L
	7928.00	88.55	1.03	6364.65	1887.94	N 1887.96	W 3.96	2.12	-1.85	-1.03	95.00	1887.96	359.88	41.29L
	8023.00	89.78	359.95	6366.03	1982.92	N 1982.94	W 3.15	1.72	1.29	-1.14	95.00	1982.94	359.91	72.59L
	8118.00	90.57	357.43	6365.74	2077.89	N 2077.90	W 5.32	2.78	0.83	-2.65	95.00	2077.91	359.85	99.64R
	8213.00	90.48	357.96	6364.87	2172.79	N 2172.82	W 9.14	0.57	-0.09	0.56	95.00	2172.84	359.76	125.95L
	8307.00	89.16	356.14	6365.17	2266.65	N 2266.69	W 13.98	2.39	-1.40	-1.94	94.00	2266.74	359.65	135.01L
	8402.00	88.55	355.53	6367.07	2361.36	N 2361.42	W 20.88	0.91	-0.64	-0.64	95.00	2361.51	359.49	61.63R
	8497.00	89.69	357.64	6368.53	2456.16	N 2456.23	W 26.53	2.52	1.20	2.22	95.00	2456.38	359.38	98.48R
	8590.00	89.34	359.99	6369.31	2549.13	N 2549.21	W 28.46	2.55	-0.38	2.53	93.00	2549.36	359.36	8.04R
	8682.00	92.24	0.40	6368.05	2641.11	N 2641.19	W 28.14	3.18	3.15	0.45	92.00	2641.34	359.39	90R
	8774.00	92.24	0.44	6364.45	2733.04	N 2733.11	W 27.47	0.04	0.00	0.04	92.00	2733.25	359.42	123.53R
	8866.00	91.71	1.24	6361.28	2824.98	N 2825.05	W 26.12	1.04	-0.58	0.87	92.00	2825.17	359.47	174.85L
	8959.00	89.60	1.05	6360.22	2917.95	N 2918.02	W 24.26	2.28	-2.27	-0.20	93.00	2918.12	359.52	151.59L
	9051.00	88.99	0.72	6361.35	3009.93	N 3010.00	W 22.84	0.75	-0.66	-0.36	92.00	3010.09	359.57	52.13R
	9145.00	89.34	1.17	6362.72	3103.92	N 3103.98	W 21.29	0.61	0.37	0.48	94.00	3104.05	359.61	153.95R
	9237.00	86.97	2.33	6365.68	3195.82	N 3195.88	W 18.49	2.87	-2.58	1.26	92.00	3195.93	359.67	130.66L
	9330.00	86.61	1.91	6370.89	3288.62	N 3288.67	W 15.05	0.59	-0.39	-0.45	93.00	3288.70	359.74	176.74L
	9423.00	86.26	1.89	6376.67	3381.40	N 3381.44	W 11.97	0.38	-0.38	-0.02	93.00	3381.46	359.80	21.37R
	9518.00	87.23	2.27	6382.06	3476.19	N 3476.22	W 8.53	1.10	1.02	0.40	95.00	3476.23	359.86	61.36L
	9613.00	89.25	358.58	6384.98	3571.12	N 3571.15	W 7.83	4.43	2.13	-3.88	95.00	3571.16	359.87	109.84L
	9708.00	88.81	357.36	6386.59	3666.04	N 3666.08	W 11.19	1.37	-0.46	-1.28	95.00	3666.09	359.83	102.62R
	9803.00	88.64	358.12	6388.71	3760.93	N 3760.98	W 14.94	0.82	-0.18	0.80	95.00	3761.01	359.77	44.46R
	9898.00	90.22	359.67	6389.65	3855.90	N 3855.95	W 16.77	2.33	1.66	1.63	95.00	3855.99	359.75	134.19R
	9993.00	89.52	0.39	6389.87	3950.90	N 3950.95	W 16.72	1.06	-0.74	0.76	95.00	3950.98	359.76	114.58L
	10088.00	88.72	358.64	6391.33	4045.87	N 4045.93	W 17.52	2.03	-0.84	-1.84	95.00	4045.97	359.75	50.04R
	10183.00	89.86	0.00	6392.50	4140.85	N 4140.91	W 18.65	1.87	1.20	1.43	95.00	4140.95	359.74	104.93L
	10278.00	89.78	359.70	6392.80	4235.85	N 4235.91	W 18.90	0.33	-0.08	-0.32	95.00	4235.95	359.74	119.06L
	10373.00	89.53	359.25	6393.37	4330.84	N 4330.90	W 19.77	0.54	-0.26	-0.47	95.00	4330.95	359.74	79.7R
	10468.00	90.13	2.55	6393.65	4425.82	N 4425.88	W 18.28	3.53	0.63	3.47	95.00	4425.92	359.76	176.84R
	10562.00	87.23	2.71	6395.82	4519.70	N 4519.74	W 13.97	3.09	-3.09	0.17	94.00	4519.77	359.82	162.03L
	10658.00	86.00	2.31	6401.49	4615.45	N 4615.48	W 9.77	1.35	-1.28	-0.42	96.00	4615.49	359.88	147.26L
	10753.00	85.38	1.91	6408.63	4710.12	N 4710.15	W 6.28	0.78	-0.65	-0.42	95.00	4710.15	359.92	34.03L

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	10848.00	87.23	0.66	6414.75	4804.90	N 4804.92	W 4.16	2.35	1.95	-1.32	95.00	4804.92	359.95	144.89L
	10943.00	86.35	0.04	6420.07	4899.75	N 4899.77	W 3.58	1.13	-0.93	-0.65	95.00	4899.77	359.96	39.93R
	11038.00	87.58	1.07	6425.10	4994.61	N 4994.63	W 2.66	1.69	1.29	1.08	95.00	4994.63	359.97	79.99R
	11133.00	87.67	1.58	6429.04	5089.50	N 5089.52	W 0.46	0.54	0.09	0.54	95.00	5089.52	359.99	3.5R
	11228.00	89.96	1.72	6431.00	5184.45	N 5184.45	E 2.27	2.42	2.41	0.15	95.00	5184.46	0.03	112.48R
	11323.00	89.60	2.59	6431.37	5279.38	N 5279.39	E 5.84	0.99	-0.38	0.92	95.00	5279.39	0.06	0.39L
	11417.00	92.51	2.57	6429.64	5373.27	N 5373.26	E 10.07	3.10	3.10	-0.02	94.00	5373.27	0.11	126.43L
	11512.00	91.89	1.73	6425.99	5468.14	N 5468.13	E 13.64	1.10	-0.65	-0.88	95.00	5468.14	0.14	131.91L
	11607.00	91.54	1.34	6423.15	5563.07	N 5563.05	E 16.18	0.55	-0.37	-0.41	95.00	5563.07	0.17	10.3R
	11702.00	91.98	1.42	6420.23	5658.01	N 5657.98	E 18.47	0.47	0.46	0.08	95.00	5658.01	0.19	147.7L
	11797.00	89.78	0.03	6418.77	5752.98	N 5752.95	E 19.67	2.74	-2.32	-1.46	95.00	5752.98	0.20	148.85L
	11892.00	88.11	359.02	6420.52	5847.95	N 5847.93	E 18.88	2.05	-1.76	-1.06	95.00	5847.96	0.18	31.89R
	11987.00	90.57	0.55	6421.61	5942.94	N 5942.91	E 18.52	3.05	2.59	1.61	95.00	5942.94	0.18	143.75L
	12082.00	89.52	359.78	6421.54	6037.93	N 6037.91	E 18.80	1.37	-1.11	-0.81	95.00	6037.94	0.18	83.38R
	12177.00	89.87	2.79	6422.04	6132.90	N 6132.87	E 20.93	3.19	0.37	3.17	95.00	6132.91	0.20	80.36R
	12272.00	89.96	3.32	6422.18	6227.78	N 6227.73	E 25.99	0.57	0.09	0.56	95.00	6227.79	0.24	172.09R
	12367.00	89.60	3.37	6422.55	6322.63	N 6322.57	E 31.53	0.38	-0.38	0.05	95.00	6322.65	0.29	77.91R
	12462.00	89.78	4.21	6423.06	6417.43	N 6417.36	E 37.81	0.90	0.19	0.88	95.00	6417.47	0.34	84.76L
	12557.00	89.96	2.25	6423.28	6512.29	N 6512.21	E 43.17	2.07	0.19	-2.06	95.00	6512.35	0.38	74.77L
	12652.00	90.48	0.34	6422.91	6607.27	N 6607.18	E 45.31	2.08	0.55	-2.01	95.00	6607.33	0.39	50.8L
	12747.00	91.01	359.69	6421.68	6702.26	N 6702.17	E 45.34	0.88	0.56	-0.68	95.00	6702.32	0.39	111.03L
	12842.00	90.31	357.87	6420.58	6797.22	N 6797.14	E 43.31	2.05	-0.74	-1.92	95.00	6797.27	0.37	57.28L
	12936.00	91.10	356.64	6419.43	6891.09	N 6891.02	E 38.81	1.56	0.84	-1.31	94.00	6891.13	0.32	17.63L
	13031.00	92.86	356.08	6416.15	6985.82	N 6985.77	E 32.79	1.94	1.85	-0.59	95.00	6985.84	0.27	147.92L
	13126.00	91.36	355.14	6412.65	7080.46	N 7080.42	E 25.52	1.86	-1.58	-0.99	95.00	7080.46	0.21	143.41L
	13221.00	87.67	352.40	6413.45	7174.84	N 7174.83	E 15.21	4.84	-3.88	-2.88	95.00	7174.85	0.12	98.41L
	13316.00	87.58	351.79	6417.39	7268.83	N 7268.84	E 2.16	0.65	-0.09	-0.64	95.00	7268.85	0.02	39.58R
	13411.00	89.25	353.17	6420.02	7362.94	N 7362.99	W 10.27	2.28	1.76	1.45	95.00	7362.99	359.92	58.49R
	13506.00	90.66	355.47	6420.09	7457.44	N 7457.51	W 19.67	2.84	1.48	2.42	95.00	7457.54	359.85	90R
	13601.00	90.66	356.58	6419.00	7552.19	N 7552.27	W 26.25	1.17	0.00	1.17	95.00	7552.32	359.80	126.44L
	13696.00	89.87	355.51	6418.56	7646.94	N 7647.05	W 32.81	1.40	-0.83	-1.13	95.00	7647.12	359.75	150.02L
	13791.00	87.67	354.24	6420.60	7741.51	N 7741.64	W 41.29	2.67	-2.32	-1.34	95.00	7741.75	359.69	34.88R
	13845.00	89.78	355.71	6421.80	7795.28	N 7795.41	W 46.02	4.76	3.91	2.72	54.00	7795.55	359.66	HS
Proj. to TD.	13897.00	89.78	355.71	6422.00	7847.12	N 7847.26	W 49.91	0.00	0.00	0.00	52.00	7847.42	359.64	

Survey Type: Non-Def Survey

Survey Error Model: ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma
Survey Program:

Description	Part	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
	1	0.000	22.000	Act Stns	12.250	12.250	SLB_MWD-STD-Depth Only	Original Borehole / University 45 735HA Actual Gyro+MWD
	1	22.000	13897.000	Act Stns	12.250	12.250	SLB_MWD-STD	Original Borehole / University 45 735HA Actual Gyro+MWD