



Total Directional
Services, LLC

USA Operations

State of Texas Railroad Commission

Lea County, New Mexico

Client: Devon Energy (US)

Well Name: NORTH THISTLE 15-10 STATE COM #3H

Total Job No: 2018-730-126

API No: 30-025-45394

Start Depth: 130 feet MD

End Depth: 20,156 feet MD

Start Date: December 25, 2018

End Date: January 15, 2019

HOBBS OCD
AUG 29 2019
RECEIVED

I, Trey Beeson, certify that; I am employed by Total Directional Services, LLC. on 12/25/2018 through 1/15/2019. I conducted or supervised the taking of the MWD surveys from a measured depth of 130 feet to a measured depth of 20,156 feet. The data is true, correct, complete and within the limitations of the tool as set forth by Total Directional Services, LLC. I am authorized and qualified to make this report, and these surveys were conducted at the request of Devon Energy (US) for the well: NORTH THISTLE 15-10 STATE COM #3H, API No: 30-025-45394 in Lea County, New Mexico. I have reviewed this report and find that it conforms to the principals and procedures as set forth by Total Directional Services, LLC.



DEVON ENERGY

LEA COUNTY, NEW MEXICO (NAD 83 - GRID)

SEC. 15 T23S R33E

NORTH THISTLE 15-10 STATE COM #3H

JOB #2018-730-126

Design: JOB #2018-730-126

Standard Survey Report

29 July, 2019





Total Directional Services

Survey Report



Company:	DEVON ENERGY	Local Co-ordinate Reference:	Well NORTH THISTLE 15-10 STATE COM #3H
Project:	LEA COUNTY, NEW MEXICO (NAD 83 - GRID)	TVD Reference:	KB @ 3742.90usft (CACTUS 126)
Site:	SEC. 15 T23S R33E	MD Reference:	KB @ 3742.90usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #3H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	JOB #2018-730-126	Database:	EDM 5000.15 Single User Db

Project LEA COUNTY, NEW MEXICO (NAD 83 - GRID)

Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		Using geodetic scale factor

Site SEC. 15 T23S R33E

Site Position:		Northing:	473,286.14 usft	Latitude:	32.298770
From:	Map	Easting:	780,191.08 usft	Longitude:	-103.560301
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.41 °

Well NORTH THISTLE 15-10 STATE COM #3H

Well Position	+N-S	0.00 usft	Northing:	473,286.14 usft	Latitude:	32.298770
	+E-W	0.00 usft	Easting:	780,191.08 usft	Longitude:	-103.560301
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,717.90 usft	

Wellbore JOB #2018-730-126

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	12/10/2018	6.79	60.11	47,828.98371416

Design JOB #2018-730-126

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	357.10	

Survey Program Date 1/20/2019

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
179.00	20,156.00	FINAL SURVEYS (JOB #2018-730-126)	OWSG (Rev2) MWD	OWSG 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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
179.00	0.90	169.00	178.99	-1.38	0.27	-1.39	0.50	0.50	0.00
270.00	1.20	165.70	269.98	-3.00	0.64	-3.03	0.34	0.33	-3.63
454.00	1.20	171.10	453.94	-6.78	1.41	-6.84	0.06	0.00	2.93
637.00	1.10	164.90	636.90	-10.36	2.17	-10.46	0.09	-0.05	-3.39
729.00	1.10	157.80	728.88	-12.03	2.73	-12.16	0.15	0.00	-7.72
821.00	1.00	161.30	820.87	-13.61	3.32	-13.76	0.13	-0.11	3.80
913.00	1.00	153.10	912.85	-15.09	3.94	-15.27	0.16	0.00	-8.91
1,005.00	0.90	153.30	1,004.84	-16.45	4.63	-16.66	0.11	-0.11	0.22
1,096.00	1.10	141.70	1,095.83	-17.77	5.49	-18.03	0.31	0.22	-12.75



Total Directional Services

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Site:	SEC. 15 T2S R33E	MD Reference:	KB @ 3742.90usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #3H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	JOB #2018-730-126	Database:	EDM 5000.15 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)
1,189.00	0.90	140.00	1,188.81	-19.03	6.52	-19.34	0.22	-0.22	-1.83
1,281.00	1.00	145.80	1,280.80	-20.25	7.43	-20.60	0.15	0.11	6.30
1,342.00	1.00	136.70	1,341.79	-21.08	8.10	-21.46	0.26	0.00	-14.92
1,410.00	0.92	146.91	1,409.78	-21.97	8.80	-22.39	0.28	-0.12	15.02
13 3/8" SURFACE CASING									
1,434.00	0.90	150.90	1,433.78	-22.30	9.00	-22.72	0.28	-0.08	16.61
1,525.00	1.10	162.80	1,524.76	-23.75	9.60	-24.21	0.32	0.22	13.08
1,619.00	0.80	163.30	1,618.75	-25.24	10.06	-25.72	0.32	-0.32	0.53
1,713.00	0.60	177.90	1,712.74	-26.37	10.27	-26.85	0.28	-0.21	15.53
1,807.00	0.80	188.70	1,806.74	-27.51	10.19	-27.99	0.25	0.21	11.49
1,901.00	0.60	172.70	1,900.73	-28.64	10.15	-29.12	0.30	-0.21	-17.02
1,996.00	0.60	190.90	1,995.73	-29.62	10.12	-30.10	0.20	0.00	19.16
2,090.00	0.30	196.10	2,089.72	-30.34	9.96	-30.81	0.32	-0.32	5.53
2,184.00	0.40	195.30	2,183.72	-30.90	9.80	-31.35	0.11	0.11	-0.85
2,278.00	0.40	230.30	2,277.72	-31.42	9.46	-31.86	0.26	0.00	37.23
2,372.00	0.40	215.70	2,371.72	-31.90	9.02	-32.31	0.11	0.00	-15.53
2,466.00	0.30	192.80	2,465.71	-32.41	8.77	-32.81	0.18	-0.11	-24.36
2,560.00	0.10	150.10	2,559.71	-32.72	8.76	-33.12	0.25	-0.21	-45.43
2,654.00	0.10	76.70	2,653.71	-32.77	8.88	-33.18	0.13	0.00	-78.09
2,748.00	0.10	271.40	2,747.71	-32.75	8.88	-33.15	0.21	0.00	-175.85
2,842.00	0.10	29.90	2,841.71	-32.67	8.84	-33.08	0.18	0.00	126.06
2,936.00	0.10	52.90	2,935.71	-32.55	8.94	-32.96	0.04	0.00	24.47
3,030.00	0.10	49.70	3,029.71	-32.45	9.07	-32.87	0.01	0.00	-3.40
3,124.00	0.10	32.30	3,123.71	-32.33	9.18	-32.75	0.03	0.00	-18.51
3,218.00	0.20	46.80	3,217.71	-32.15	9.34	-32.58	0.11	0.11	15.43
3,312.00	0.40	11.00	3,311.71	-31.71	9.52	-32.15	0.28	0.21	-38.09
3,406.00	0.40	36.60	3,405.71	-31.13	9.78	-31.58	0.19	0.00	27.23
3,500.00	0.30	279.60	3,499.71	-30.82	9.73	-31.28	0.64	-0.11	-124.47
3,595.00	1.20	242.40	3,594.70	-31.24	8.61	-31.64	1.03	0.95	-39.16
3,689.00	2.60	236.60	3,688.65	-32.87	5.95	-33.13	1.50	1.49	-6.17
3,783.00	3.30	244.50	3,782.52	-35.21	1.73	-35.25	0.86	0.74	8.40
3,877.00	4.20	246.80	3,876.32	-37.73	-3.87	-37.49	0.97	0.96	2.45
3,971.00	5.00	244.40	3,970.02	-40.86	-10.73	-40.26	0.88	0.85	-2.55
4,065.00	6.60	246.80	4,063.53	-44.76	-19.39	-43.72	1.72	1.70	2.55
4,159.00	7.60	244.30	4,156.81	-49.58	-29.96	-48.00	1.11	1.06	-2.66
4,253.00	7.70	242.70	4,249.97	-55.16	-41.16	-53.01	0.25	0.11	-1.70
4,346.00	6.90	242.70	4,342.22	-60.58	-51.66	-57.90	0.86	-0.86	0.00
4,441.00	6.90	238.80	4,436.53	-66.16	-61.61	-62.96	0.49	0.00	-4.11
4,535.00	7.00	233.10	4,529.84	-72.52	-71.02	-68.84	0.74	0.11	-6.06
4,628.00	7.60	230.90	4,622.09	-79.80	-80.32	-75.64	0.71	0.65	-2.37
4,722.00	8.30	233.50	4,715.18	-87.76	-90.60	-83.07	0.84	0.74	2.77
4,816.00	7.80	231.30	4,808.26	-95.78	-101.03	-90.56	0.62	-0.53	-2.34
4,910.00	8.20	227.10	4,901.34	-104.33	-110.92	-98.60	0.75	0.43	-4.47
5,004.00	8.30	226.50	4,994.37	-113.57	-120.75	-107.32	0.14	0.11	-0.64



Total Directional Services Survey Report



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Site:	SEC. 15 T23S R33E	MD Reference:	KB @ 3742.90usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #3H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	JOB #2018-730-126	Database:	EDM 5000.15 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)
5,098.00	7.30	226.30	5,087.50	-122.36	-129.99	-115.64	1.06	-1.06	-0.21
5,192.00	8.10	230.80	5,180.65	-130.68	-139.44	-123.46	1.07	0.85	4.79
5,286.00	8.70	233.90	5,273.64	-139.05	-150.32	-131.28	0.80	0.64	3.30
5,323.00	8.60	233.20	5,310.22	-142.36	-154.80	-134.35	0.39	-0.27	-1.89
5,370.00	8.47	231.80	5,356.70	-146.60	-160.33	-138.31	0.52	-0.28	-2.99
9 5/8" INT CASING									
5,472.00	8.20	228.60	5,457.63	-156.06	-171.69	-147.18	0.52	-0.26	-3.13
5,566.00	8.10	227.80	5,550.68	-164.94	-181.62	-155.55	0.16	-0.11	-0.85
5,661.00	8.30	226.10	5,644.71	-174.19	-191.52	-164.29	0.33	0.21	-1.79
5,755.00	8.20	225.50	5,737.73	-183.59	-201.19	-173.19	0.14	-0.11	-0.64
5,850.00	7.70	225.30	5,831.82	-192.82	-210.55	-181.93	0.53	-0.53	-0.21
5,944.00	7.70	232.00	5,924.97	-201.12	-219.98	-189.75	0.95	0.00	7.13
6,038.00	7.50	234.90	6,018.15	-208.53	-229.97	-196.64	0.46	-0.21	3.09
6,132.00	7.30	233.80	6,111.37	-215.58	-239.80	-203.19	0.26	-0.21	-1.17
6,226.00	8.00	235.00	6,204.53	-222.86	-249.98	-209.95	0.76	0.74	1.28
6,320.00	7.90	237.20	6,297.63	-230.11	-260.77	-216.64	0.34	-0.11	2.34
6,413.00	8.40	237.10	6,389.69	-237.27	-271.85	-223.23	0.54	0.54	-0.11
6,508.00	8.70	237.00	6,483.63	-244.95	-283.70	-230.30	0.32	0.32	-0.11
6,602.00	8.40	235.30	6,576.59	-252.73	-295.31	-237.48	0.42	-0.32	-1.81
6,695.00	8.70	232.10	6,668.55	-260.92	-306.44	-245.10	0.60	0.32	-3.44
6,789.00	8.70	230.10	6,761.47	-269.84	-317.50	-253.46	0.32	0.00	-2.13
6,884.00	8.70	228.70	6,855.38	-279.19	-328.41	-262.24	0.22	0.00	-1.47
6,978.00	9.00	227.80	6,948.26	-288.83	-339.20	-271.32	0.35	0.32	-0.96
7,072.00	7.80	236.50	7,041.25	-297.29	-349.97	-279.22	1.86	-1.28	9.26
7,166.00	7.60	237.60	7,134.40	-304.14	-360.54	-285.53	0.26	-0.21	1.17
7,260.00	7.40	238.20	7,227.60	-310.66	-370.93	-291.52	0.23	-0.21	0.64
7,354.00	7.40	236.00	7,320.82	-317.23	-381.09	-297.57	0.30	0.00	-2.34
7,448.00	7.30	234.00	7,414.05	-324.13	-390.94	-303.96	0.29	-0.11	-2.13
7,542.00	7.00	233.20	7,507.31	-331.07	-400.36	-310.42	0.34	-0.32	-0.85
7,636.00	6.60	231.70	7,600.65	-337.85	-409.19	-316.74	0.47	-0.43	-1.60
7,730.00	7.20	227.90	7,693.97	-345.15	-417.80	-323.59	0.80	0.64	-4.04
7,824.00	7.40	227.30	7,787.21	-353.20	-426.62	-331.19	0.23	0.21	-0.64
7,918.00	7.30	225.70	7,880.44	-361.48	-435.34	-339.02	0.24	-0.11	-1.70
8,012.00	6.80	223.30	7,973.73	-369.70	-443.43	-346.82	0.62	-0.53	-2.55
8,106.00	6.20	220.30	8,067.12	-377.62	-450.53	-354.37	0.73	-0.64	-3.19
8,200.00	5.90	217.50	8,160.60	-385.32	-456.75	-361.75	0.45	-0.32	-2.98
8,294.00	5.80	214.20	8,254.11	-393.08	-462.36	-369.22	0.37	-0.11	-3.51
8,388.00	5.40	213.60	8,347.66	-400.70	-467.48	-376.56	0.43	-0.43	-0.64
8,482.00	4.80	215.20	8,441.29	-407.59	-472.20	-383.21	0.66	-0.64	1.70
8,576.00	4.30	212.60	8,534.99	-413.78	-476.36	-389.18	0.58	-0.53	-2.77
8,670.00	4.30	210.60	8,628.73	-419.78	-480.05	-394.99	0.16	0.00	-2.13
8,764.00	4.00	218.20	8,722.48	-425.39	-483.88	-400.40	0.67	-0.32	8.09
8,859.00	2.80	233.70	8,817.32	-429.37	-487.79	-404.17	1.58	-1.26	16.32



Total Directional Services

Survey Report



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Design:	JOB #2018-730-126	Database:	EDM 5000.15 Single User Db

Survey

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8,953.00	1.90	239.00	8,911.24	-431.53	-490.98	-406.17	0.98	-0.96	5.64
9,047.00	1.50	233.90	9,005.19	-433.06	-493.31	-407.58	0.45	-0.43	-5.43
9,141.00	1.40	239.60	9,099.16	-434.36	-495.30	-408.78	0.19	-0.11	6.06
9,235.00	1.30	231.30	9,193.14	-435.61	-497.12	-409.94	0.23	-0.11	-8.83
9,310.00	1.33	288.89	9,268.12	-435.86	-498.60	-410.11	1.69	0.03	76.78
KOP (9310ft md, 43ft FSL & 2110ft FWL of Sec 10)									
9,328.01	1.50	299.00	9,286.12	-435.68	-499.01	-409.91	1.69	0.97	56.18
KOP (NT 15-10 State Com 3H)									
9,338.45	2.16	324.45	9,296.56	-435.45	-499.24	-409.67	9.85	6.29	243.71
KOP - NORTH THISTLE 15-10 STATE COM #3H									
9,344.03	2.61	332.03	9,302.13	-435.26	-499.36	-409.47	9.85	8.09	135.99
KOP - NORTH THISTLE 15-10 STATE COM #3H (P2)									
9,423.00	10.10	355.60	9,380.57	-426.75	-500.74	-400.91	9.85	9.49	29.84
9,518.00	18.90	356.00	9,472.46	-403.05	-502.45	-377.15	9.26	9.26	0.42
9,585.48	25.22	354.67	9,534.97	-377.81	-504.55	-351.83	9.39	9.36	-1.98
FTP (NT 15-10 State Com 3H)									
9,586.00	25.26	354.66	9,535.44	-377.59	-504.57	-351.61	9.39	9.37	-1.50
FTP (9586ft md, 100ft FSL & 2107ft FWL of Sec 15)									
9,612.00	27.70	354.30	9,558.71	-366.05	-505.69	-340.03	9.39	9.37	-1.38
9,659.00	32.60	355.50	9,599.34	-342.54	-507.77	-316.45	10.50	10.43	2.55
9,706.00	37.30	356.30	9,637.85	-315.70	-509.68	-289.54	10.05	10.00	1.70
9,762.38	43.41	358.43	9,680.80	-279.25	-511.32	-253.06	11.10	10.83	3.78
FTP - NORTH THISTLE 15-10 STATE COM #3H									
9,800.00	47.50	359.60	9,707.18	-252.45	-511.77	-226.27	11.10	10.88	3.11
9,847.00	55.90	1.60	9,736.29	-215.60	-511.35	-189.49	18.18	17.87	4.26
9,895.00	64.30	3.40	9,760.19	-174.07	-509.51	-148.11	17.80	17.50	3.75
9,989.00	82.30	4.90	9,787.10	-84.65	-502.96	-59.13	19.21	19.15	1.60
10,045.00	81.50	5.20	9,794.99	-29.42	-498.08	-4.22	1.52	-1.43	0.54
10,124.81	85.91	3.84	9,803.73	49.64	-491.83	74.43	5.79	5.53	-1.70
HZ LP - NORTH THISTLE 15-10 STATE COM #3H									
10,126.49	86.01	3.81	9,803.85	51.31	-491.72	76.09	5.79	5.53	-1.69
HZ LP - NORTH THISTLE 15-10 STATE COM #3H (P2)									
10,139.00	86.70	3.60	9,804.65	63.77	-490.92	88.49	5.79	5.53	-1.69
10,233.00	89.70	2.30	9,807.60	157.59	-486.08	181.94	3.48	3.19	-1.38
10,327.00	92.60	1.40	9,805.71	251.51	-483.05	275.59	3.23	3.09	-0.96
HZ LANDING POINT									
10,421.00	94.30	359.30	9,800.06	345.33	-482.47	369.26	2.87	1.81	-2.23
10,516.00	94.20	358.00	9,793.01	440.04	-484.71	463.97	1.37	-0.11	-1.37
10,610.00	92.00	358.30	9,787.93	533.84	-487.74	557.81	2.36	-2.34	0.32
10,701.00	92.00	358.50	9,784.76	624.75	-490.27	648.73	0.22	0.00	0.22
10,792.00	92.80	358.60	9,780.95	715.64	-492.58	739.82	0.89	0.88	0.11
10,885.00	90.60	358.30	9,778.19	808.56	-495.09	832.55	2.39	-2.37	-0.32
10,976.00	90.70	358.40	9,777.15	899.52	-497.71	923.52	0.16	0.11	0.11
11,069.00	90.80	358.40	9,775.94	992.47	-500.31	1,016.49	0.11	0.11	0.00
11,159.00	90.60	358.00	9,774.84	1,082.42	-503.13	1,106.46	0.50	-0.22	-0.44



Total Directional Services
Survey Report



Company:	DEVON ENERGY	Local Co-ordinate Reference:	Well NORTH THISTLE 15-10 STATE COM #3H
Project:	LEA COUNTY, NEW MEXICO (NAD 83 - GRID)	TVD Reference:	KB @ 3742.90usft (CACTUS 126)
Site:	SEC. 15 T23S R33E	MD Reference:	KB @ 3742.90usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #3H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	JOB #2018-730-126	Database:	EDM 5000.15 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)
11,251.00	90.60	357.10	9,773.87	1,174.33	-507.07	1,198.45	0.98	0.00	-0.98
11,343.00	91.60	356.50	9,772.11	1,266.17	-512.20	1,290.43	1.27	1.09	-0.65
11,435.00	89.90	357.60	9,770.90	1,358.04	-516.93	1,382.42	2.20	-1.85	1.20
11,528.00	90.80	357.70	9,770.34	1,450.96	-520.75	1,475.41	0.97	0.97	0.11
11,618.00	89.50	0.10	9,770.10	1,540.93	-522.47	1,565.36	3.03	-1.44	2.67
11,711.00	87.70	359.70	9,772.37	1,633.90	-522.64	1,658.22	1.98	-1.94	-0.43
11,803.00	89.40	0.80	9,774.70	1,725.86	-522.24	1,750.05	2.20	1.85	1.20
11,894.00	90.90	1.00	9,774.46	1,816.85	-520.81	1,840.84	1.66	1.65	0.22
11,988.00	91.70	0.80	9,772.33	1,910.81	-519.33	1,934.61	0.88	0.85	-0.21
12,082.00	91.60	0.10	9,769.62	2,004.77	-518.59	2,028.41	0.75	-0.11	-0.74
12,176.00	90.90	359.80	9,767.57	2,098.75	-518.67	2,122.27	0.81	-0.74	-0.32
12,271.00	91.40	1.30	9,765.67	2,193.72	-517.76	2,217.08	1.66	0.53	1.58
12,365.00	91.90	1.30	9,762.96	2,287.66	-515.63	2,310.79	0.53	0.53	0.00
12,459.00	91.90	0.60	9,759.84	2,381.59	-514.07	2,404.52	0.74	0.00	-0.74
12,553.00	92.30	0.20	9,756.40	2,475.53	-513.42	2,498.31	0.60	0.43	-0.43
12,647.00	90.90	1.00	9,753.77	2,569.48	-512.43	2,592.09	1.72	-1.49	0.85
12,741.00	89.20	2.30	9,753.69	2,663.44	-509.73	2,685.79	2.28	-1.81	1.38
12,836.00	89.40	2.70	9,754.85	2,758.34	-505.58	2,780.36	0.47	0.21	0.42
12,929.00	90.00	2.70	9,755.34	2,851.23	-501.20	2,872.92	0.65	0.65	0.00
13,023.00	90.50	2.80	9,754.93	2,945.12	-496.69	2,966.46	0.54	0.53	0.11
13,118.00	91.00	3.40	9,753.68	3,039.98	-491.56	3,060.93	0.82	0.53	0.63
13,212.00	90.00	3.10	9,752.86	3,133.82	-486.23	3,154.39	1.11	-1.06	-0.32
13,306.00	87.50	1.50	9,754.91	3,227.71	-482.45	3,247.97	3.16	-2.66	-1.70
13,400.00	87.70	2.30	9,758.85	3,321.58	-479.34	3,341.55	0.88	0.21	0.85
13,436.39	87.62	1.40	9,760.34	3,357.91	-478.17	3,377.79	2.48	-0.22	-2.47
WYPNT 1 - NORTH THISTLE 15-10 STATE COM #3H (P2)									
13,493.00	87.50	0.00	9,762.75	3,414.47	-477.48	3,434.24	2.48	-0.21	-2.47
13,588.00	89.10	0.60	9,765.56	3,509.42	-476.98	3,529.04	1.80	1.68	0.63
13,681.00	89.20	359.40	9,766.94	3,602.41	-476.98	3,621.91	1.29	0.11	-1.29
13,775.00	90.40	359.50	9,767.27	3,696.41	-477.88	3,715.83	1.28	1.28	0.11
13,869.00	88.80	358.70	9,767.93	3,790.39	-479.36	3,809.77	1.90	-1.70	-0.85
13,963.00	90.40	357.60	9,768.58	3,884.33	-482.39	3,903.74	2.07	1.70	-1.17
14,058.00	89.10	356.50	9,769.00	3,979.20	-487.28	3,998.74	1.79	-1.37	-1.16
14,151.00	90.60	356.20	9,769.24	4,072.01	-493.20	4,091.73	1.64	1.61	-0.32
14,245.00	92.30	357.70	9,766.86	4,165.84	-498.20	4,185.69	2.41	1.81	1.60
14,339.00	93.10	359.90	9,762.44	4,259.71	-500.17	4,279.54	2.49	0.85	2.34
14,433.00	92.60	0.10	9,757.76	4,353.59	-500.17	4,373.30	0.57	-0.53	0.21
14,527.00	90.10	0.10	9,755.55	4,447.56	-500.00	4,467.14	2.66	-2.66	0.00
14,621.00	90.30	0.40	9,755.22	4,541.56	-499.59	4,561.00	0.38	0.21	0.32
14,715.00	89.10	359.70	9,755.71	4,635.55	-499.51	4,654.87	1.48	-1.28	-0.74
14,809.00	89.00	0.10	9,757.27	4,729.54	-499.68	4,748.75	0.44	-0.11	0.43
14,887.50	88.92	359.60	9,758.70	4,808.03	-499.88	4,827.14	0.64	-0.11	-0.63
SEC 15/10 X-OVER PNT (14887.5ft md, 0ft FSL & 2155ft FWL of Sec 10)									



Total Directional Services Survey Report



Company:	DEVON ENERGY	Local Co-ordinate Reference:	Well NORTH THISTLE 15-10 STATE COM #3H
Project:	LEA COUNTY, NEW MEXICO (NAD 83 - GRID)	TVD Reference:	KB @ 3742.90usft (CACTUS 126)
Site:	SEC. 15 T23S R33E	MD Reference:	KB @ 3742.90usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #3H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	JOB #2018-730-126	Database:	EDM 5000.15 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)
14,904.00	88.90	359.50	9,759.01	4,824.52	-500.01	4,843.63	0.64	-0.11	-0.63
14,998.00	89.20	359.50	9,760.57	4,918.51	-500.83	4,937.53	0.32	0.32	0.00
15,094.00	89.20	359.30	9,761.91	5,014.49	-501.83	5,033.44	0.21	0.00	-0.21
15,188.00	89.10	359.20	9,763.30	5,108.47	-503.06	5,127.37	0.15	-0.11	-0.11
15,283.00	89.60	359.60	9,764.38	5,203.46	-504.06	5,222.28	0.67	0.53	0.42
15,377.00	89.40	359.40	9,765.20	5,297.45	-504.88	5,316.20	0.30	-0.21	-0.21
15,472.00	89.70	359.90	9,765.95	5,392.45	-505.46	5,411.10	0.61	0.32	0.53
15,565.00	89.80	0.50	9,766.35	5,485.45	-505.13	5,503.96	0.65	0.11	0.65
15,660.00	89.90	0.60	9,766.60	5,580.44	-504.22	5,598.79	0.15	0.11	0.11
15,753.00	90.10	0.30	9,766.60	5,673.44	-503.49	5,691.63	0.39	0.22	-0.32
15,847.00	90.20	0.00	9,766.36	5,767.44	-503.25	5,785.50	0.34	0.11	-0.32
15,941.00	91.50	0.70	9,764.96	5,861.42	-502.67	5,879.34	1.57	1.38	0.74
16,035.00	91.50	359.80	9,762.50	5,955.39	-502.26	5,973.16	0.96	0.00	-0.96
16,129.00	91.10	0.60	9,760.37	6,049.36	-501.93	6,067.00	0.95	-0.43	0.85
16,223.00	89.70	359.90	9,759.71	6,143.36	-501.52	6,160.85	1.67	-1.49	-0.74
16,317.00	90.60	359.70	9,759.47	6,237.36	-501.85	6,254.75	0.98	0.96	-0.21
16,401.99	89.87	359.06	9,759.12	6,322.34	-502.77	6,339.67	1.14	-0.86	-0.75
WYPNT 2 - NORTH THISTLE 15-10 STATE COM #3H (P2)									
16,410.00	89.80	359.00	9,759.14	6,330.35	-502.91	6,347.67	1.14	-0.86	-0.75
16,504.00	89.90	358.90	9,759.39	6,424.33	-504.63	6,441.62	0.15	0.11	-0.11
16,598.00	90.10	359.50	9,759.39	6,518.32	-505.94	6,535.56	0.67	0.21	0.64
16,692.00	90.20	0.20	9,759.14	6,612.32	-506.19	6,629.45	0.75	0.11	0.74
16,786.00	89.90	0.20	9,759.06	6,706.32	-505.86	6,723.31	0.32	-0.32	0.00
16,880.00	89.80	0.00	9,759.31	6,800.32	-505.70	6,817.19	0.24	-0.11	-0.21
16,974.00	89.10	359.90	9,760.21	6,894.32	-505.78	6,911.06	0.75	-0.74	-0.11
17,068.00	89.20	0.20	9,761.60	6,988.31	-505.70	7,004.93	0.34	0.11	0.32
17,162.00	91.00	359.30	9,761.44	7,082.30	-506.11	7,098.83	2.14	1.91	-0.96
17,256.00	91.20	359.40	9,759.63	7,176.28	-507.17	7,192.74	0.24	0.21	0.11
17,350.00	91.70	359.20	9,757.26	7,270.24	-508.32	7,286.64	0.57	0.53	-0.21
17,444.00	91.80	359.00	9,754.38	7,364.18	-509.80	7,380.54	0.24	0.11	-0.21
17,538.00	91.40	359.30	9,751.76	7,458.14	-511.19	7,474.44	0.53	-0.43	0.32
17,632.00	91.60	359.30	9,749.30	7,552.10	-512.34	7,568.34	0.21	0.21	0.00
17,726.00	91.30	358.80	9,746.92	7,646.05	-513.90	7,662.25	0.62	-0.32	-0.53
17,820.00	90.20	358.60	9,745.69	7,740.02	-516.03	7,756.21	1.19	-1.17	-0.21
17,914.00	90.20	359.50	9,745.36	7,834.00	-517.59	7,850.15	0.96	0.00	0.96
18,008.00	91.00	359.40	9,744.38	7,927.99	-518.49	7,944.07	0.86	0.85	-0.11
18,102.00	90.80	359.20	9,742.90	8,021.98	-519.64	8,037.98	0.30	-0.21	-0.21
18,196.00	90.30	357.80	9,742.00	8,115.94	-522.10	8,131.95	1.58	-0.53	-1.49
18,290.00	90.10	358.90	9,741.67	8,209.90	-524.80	8,225.93	1.19	-0.21	1.17
18,384.00	90.10	1.20	9,741.51	8,303.89	-524.72	8,319.80	2.45	0.00	2.45
18,478.00	90.00	1.20	9,741.42	8,397.87	-522.75	8,413.55	0.11	-0.11	0.00
18,572.00	90.50	0.80	9,741.01	8,491.85	-521.11	8,507.34	0.68	0.53	-0.43
18,666.00	91.20	0.90	9,739.62	8,585.83	-519.72	8,601.12	0.75	0.74	0.11
18,760.00	91.30	0.10	9,737.57	8,679.80	-518.90	8,694.94	0.86	0.11	-0.85



Total Directional Services Survey Report



Company:	DEVON ENERGY	Local Co-ordinate Reference:	Well NORTH THISTLE 15-10 STATE COM #3H
Project:	LEA COUNTY, NEW MEXICO (NAD 83 - GRID)	TVD Reference:	KB @ 3742.90usft (CACTUS 126)
Site:	SEC. 15 T23S R33E	MD Reference:	KB @ 3742.90usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #3H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	JOB #2018-730-126	Database:	EDM 5000.15 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)
18,854.00	91.90	359.60	9,734.95	8,773.77	-519.14	8,788.79	0.83	0.64	-0.53
18,948.00	90.20	359.70	9,733.22	8,867.75	-519.72	8,882.68	1.81	-1.81	0.11
19,042.00	90.60	359.20	9,732.57	8,961.74	-520.62	8,976.60	0.68	0.43	-0.53
19,136.00	90.00	0.30	9,732.07	9,055.73	-521.03	9,070.49	1.33	-0.64	1.17
19,230.00	90.40	359.20	9,731.75	9,149.73	-521.44	9,164.39	1.25	0.43	-1.17
19,324.00	90.40	0.50	9,731.09	9,243.73	-521.69	9,258.28	1.38	0.00	1.38
19,418.00	91.60	0.70	9,729.45	9,337.71	-520.70	9,352.09	1.29	1.28	0.21
19,512.00	91.50	1.50	9,726.91	9,431.65	-518.90	9,445.82	0.86	-0.11	0.85
19,606.00	91.00	359.20	9,724.86	9,525.62	-518.32	9,539.64	2.50	-0.53	-2.45
19,700.00	91.30	358.60	9,722.97	9,619.59	-520.13	9,633.58	0.71	0.32	-0.64
19,794.00	91.60	357.90	9,720.59	9,713.51	-523.00	9,727.53	0.81	0.32	-0.74
19,888.00	91.90	358.60	9,717.72	9,807.42	-525.87	9,821.47	0.81	0.32	0.74
19,982.00	92.00	357.90	9,714.52	9,901.32	-528.74	9,915.39	0.75	0.11	-0.74
20,066.20	92.62	357.81	9,711.13	9,985.40	-531.88	9,999.52	0.74	0.74	-0.11
LTP - NORTH THISTLE 15-10 STATE COM #3H									
20,066.70	92.62	357.81	9,711.10	9,985.90	-531.90	10,000.02	0.74	0.74	-0.11
LTP - NORTH THISTLE 15-10 STATE COM #3H (P2)									
20,067.20	92.63	357.81	9,711.08	9,986.39	-531.92	10,000.52	0.74	0.74	-0.11
LTP (20067.2ft md, 100ft FNL & 2164ft FWL of Sec 10)									
20,067.73	92.63	357.81	9,711.06	9,986.92	-531.94	10,001.04	0.00	0.00	0.00
LTP (NT 15-10 State Com 3H)									
20,077.00	92.70	357.80	9,710.63	9,996.18	-532.30	10,010.30	0.79	0.78	-0.11
20,098.00	92.80	357.50	9,709.62	10,017.13	-533.16	10,031.28	1.50	0.48	-1.43
LAST SURVEY									
20,145.91	92.80	357.50	9,707.28	10,064.94	-535.25	10,079.13	0.00	0.00	0.00
BHL - NORTH THISTLE 15-10 STATE COM #3H - BHL - NORTH THISTLE 15-10 STATE COM #3H (P2)									
20,156.00	92.80	357.50	9,706.79	10,075.01	-535.68	10,089.21	0.00	0.00	0.00
EXTRAPOLATION TO TD (20156ft md, 12.3ft FNL & 2161.6ft FWL of Sec 10)									

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
KOP (NT 15-10 State Cc	0.00	0.00	9,286.12	-435.68	-499.01	472,850.47	779,692.08	32.297583	-103.561926
- actual wellpath hits target center									
- Point									
FTP (NT 15-10 State Co	0.00	0.00	9,534.97	-377.81	-504.55	472,908.34	779,686.54	32.297742	-103.561943
- actual wellpath hits target center									
- Point									
LTP (NT 15-10 State Coi	0.00	0.00	9,711.06	9,986.92	-531.94	483,272.81	779,659.15	32.326230	-103.561790
- actual wellpath hits target center									
- Point									



Total Directional Services
Survey Report



Company:	DEVON ENERGY	Local Co-ordinate Reference:	Well NORTH THISTLE 15-10 STATE COM #3H
Project:	LEA COUNTY, NEW MEXICO (NAD 83 - GRID)	TVD Reference:	KB @ 3742.90usft (CACTUS 126)
Site:	SEC. 15 T23S R33E	MD Reference:	KB @ 3742.90usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #3H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	JOB #2018-730-126	Database:	EDM 5000.15 Single User Db

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,410.00	1,409.78	-21.97	8.80	13 3/8" SURFACE CASING
5,370.00	5,356.70	-146.60	-160.33	9 5/8" INT CASING
9,310.00	9,268.12	-435.86	-498.60	KOP (9310ft md, 43ft FSL & 2110ft FWL of Sec 10)
9,586.00	9,535.44	-377.59	-504.57	FTP (9586ft md, 100ft FSL & 2107ft FWL of Sec 15)
10,327.00	9,805.71	251.51	-483.05	HZ LANDING POINT
14,887.50	9,758.70	4,808.03	-499.88	SEC 15/10 X-OVER PNT (14887.5ft md, 0ft FSL & 2155ft FWL of Sec 10)
20,067.20	9,711.08	9,986.39	-531.92	LTP (20067.2ft md, 100ft FNL & 2164ft FWL of Sec 10)
20,098.00	9,709.62	10,017.13	-533.16	LAST SURVEY
20,156.00	9,706.79	10,075.01	-535.68	EXTRAPOLATION TO TD (20156ft md, 12.3ft FNL & 2161.6ft FWL of Sec 10)

Checked By: _____	Approved By: _____	Date: _____
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