



DEVON ENERGY

LEA COUNTY, NEW MEXICO (NAD 83 - GRID)

SEC. 15 T23S R33E

NORTH THISTLE 15-10 STATE COM #4H

JOB #2018-730-126

Design: FINAL SURVEYS

Standard Survey Report

29 July, 2019

HOBBS OCD
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Total Directional Services Survey Report



Company:	DEVON ENERGY	Local Co-ordinate Reference:	Well NORTH THISTLE 15-10 STATE COM #4H
Project:	LEA COUNTY, NEW MEXICO (NAD 83 - GRID)	TVD Reference:	KB @ 3743.10usft (CACTUS 126)
Site:	SEC. 15 T23S R33E	MD Reference:	KB @ 3743.10usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #4H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	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
From:	Map	Easting:	780,191.08 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32.298770
		Longitude:	-103.560301
		Grid Convergence:	0.41 °

Well	NORTH THISTLE 15-10 STATE COM #4H		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32.298770
		Longitude:	-103.560204
		Ground Level:	3,718.10 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	47,828.99227081

Design	FINAL SURVEYS			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth:
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	1.70

Survey Program	Date 2/3/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
185.00	20,028.00	FINAL SURVEYS (JOB #2018-730-126)	OWSG (Rev2) MWD	OWSG MWD - Standard

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
185.00	0.30	139.00	185.00	-0.37	0.32	-0.36	0.16	0.16	0.00
276.00	0.30	83.60	276.00	-0.52	0.71	-0.50	0.31	0.00	-60.88
368.00	0.40	105.10	368.00	-0.58	1.26	-0.54	0.18	0.11	23.37
460.00	0.40	109.60	459.99	-0.77	1.87	-0.71	0.03	0.00	4.89
552.00	0.60	91.20	551.99	-0.88	2.66	-0.81	0.28	0.22	-20.00
642.00	0.50	72.60	641.99	-0.78	3.50	-0.67	0.23	-0.11	-20.67
735.00	0.40	75.50	734.98	-0.57	4.20	-0.45	0.11	-0.11	3.12
826.00	0.50	99.60	825.98	-0.56	4.90	-0.42	0.23	0.11	26.48
918.00	0.40	92.20	917.98	-0.64	5.62	-0.47	0.13	-0.11	-8.04



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Site:	SEC. 15 T23S R33E	MD Reference:	KB @ 3743.10usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #4H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	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)
1,011.00	0.40	74.90	1,010.98	-0.57	6.26	-0.38	0.13	0.00	-18.60
1,102.00	0.60	86.10	1,101.97	-0.45	7.04	-0.24	0.24	0.22	12.31
1,195.00	0.80	67.90	1,194.97	-0.18	8.13	0.07	0.32	0.22	-19.57
1,287.00	0.70	58.50	1,286.96	0.36	9.20	0.63	0.17	-0.11	-10.22
1,346.00	0.80	55.30	1,345.95	0.78	9.85	1.07	0.18	0.17	-5.42
1,422.00	0.53	71.33	1,421.95	1.20	10.62	1.51	0.43	-0.35	21.10
SURFACE CASING									
1,433.00	0.50	75.00	1,432.95	1.23	10.71	1.54	0.43	-0.30	33.34
1,523.00	0.80	32.00	1,522.94	1.86	11.43	2.20	0.61	0.33	-47.78
1,617.00	0.80	32.60	1,616.93	2.97	12.13	3.33	0.01	0.00	0.64
1,712.00	0.80	17.30	1,711.92	4.16	12.68	4.54	0.22	0.00	-16.11
1,805.00	0.40	15.70	1,804.92	5.09	12.96	5.48	0.43	-0.43	-1.72
1,899.00	0.40	14.90	1,898.92	5.73	13.14	6.12	0.01	0.00	-0.85
1,993.00	0.50	339.80	1,992.91	6.43	13.08	6.82	0.31	0.11	-37.34
2,087.00	0.60	354.60	2,086.91	7.30	12.89	7.68	0.18	0.11	15.74
2,181.00	0.50	317.10	2,180.90	8.09	12.56	8.46	0.39	-0.11	-39.89
2,275.00	0.40	300.40	2,274.90	8.56	12.00	8.91	0.17	-0.11	-17.77
2,370.00	0.20	320.70	2,369.90	8.86	11.61	9.20	0.24	-0.21	21.37
2,464.00	0.30	291.40	2,463.90	9.07	11.28	9.41	0.17	0.11	-31.17
2,557.00	0.40	327.30	2,556.90	9.44	10.88	9.76	0.25	0.11	38.60
2,651.00	0.50	352.90	2,650.90	10.12	10.65	10.43	0.24	0.11	27.23
2,745.00	0.30	85.10	2,744.89	10.55	10.84	10.86	0.63	-0.21	98.09
2,839.00	0.90	136.80	2,838.89	10.03	11.59	10.37	0.80	0.64	55.00
2,933.00	1.90	141.70	2,932.86	8.27	13.06	8.65	1.07	1.06	5.21
3,027.00	3.00	135.20	3,026.77	5.30	15.76	5.77	1.21	1.17	-6.91
3,121.00	4.40	132.50	3,120.57	1.12	20.16	1.72	1.50	1.49	-2.87
3,215.00	5.80	132.00	3,214.20	-4.50	26.34	-3.71	1.49	1.49	-0.53
3,310.00	6.70	135.10	3,308.63	-11.63	33.82	-10.62	1.01	0.95	3.26
3,404.00	7.50	139.40	3,401.91	-20.18	41.69	-18.93	1.02	0.85	4.57
3,498.00	7.70	146.60	3,495.09	-30.09	49.15	-28.62	1.03	0.21	7.66
3,592.00	7.80	148.30	3,588.23	-40.78	55.96	-39.09	0.27	0.11	1.81
3,686.00	7.20	146.10	3,681.43	-51.09	62.60	-49.21	0.71	-0.64	-2.34
3,780.00	7.30	142.20	3,774.68	-60.70	69.55	-58.61	0.53	0.11	-4.15
3,874.00	8.10	139.60	3,867.83	-70.46	77.50	-68.13	0.93	0.85	-2.77
3,968.00	9.40	142.50	3,960.73	-81.60	86.47	-78.99	1.46	1.38	3.09
4,062.00	10.30	151.80	4,053.35	-95.09	95.11	-92.22	1.94	0.96	9.89
4,156.00	10.10	153.80	4,145.87	-109.90	102.72	-106.79	0.43	-0.21	2.13
4,250.00	9.60	153.80	4,238.48	-124.32	109.82	-121.00	0.53	-0.53	0.00
4,344.00	9.10	154.20	4,331.23	-138.05	116.52	-134.52	0.54	-0.53	0.43
4,438.00	9.00	151.90	4,424.06	-151.23	123.21	-147.50	0.40	-0.11	-2.45
4,532.00	9.30	149.40	4,516.87	-164.25	130.54	-160.30	0.53	0.32	-2.66
4,626.00	8.00	149.70	4,609.79	-176.44	137.71	-172.26	1.38	-1.38	0.32
4,720.00	7.60	146.80	4,702.92	-187.29	144.41	-182.91	0.60	-0.43	-3.09
4,814.00	7.80	143.10	4,796.08	-197.59	151.65	-192.99	0.57	0.21	-3.94



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4,909.00	7.90	141.60	4,890.19	-207.86	159.57	-203.02	0.24	0.11	-1.58
5,003.00	8.00	142.10	4,983.28	-218.08	167.60	-213.00	0.13	0.11	0.53
5,097.00	7.90	147.40	5,076.38	-228.69	175.10	-223.38	0.79	-0.11	5.64
5,191.00	8.00	149.00	5,169.48	-239.74	181.95	-234.22	0.26	0.11	1.70
5,285.00	7.20	148.10	5,262.65	-250.34	188.43	-244.63	0.86	-0.85	-0.96
5,323.00	6.70	148.80	5,300.37	-254.26	190.84	-248.48	1.33	-1.32	1.84
5,376.00	6.60	149.00	5,353.02	-259.52	194.01	-253.63	0.19	-0.19	0.38
5,381.00	6.64	148.99	5,357.98	-260.01	194.31	-254.12	0.74	0.74	-0.12
INT CASING POINT									
5,470.00	7.30	148.90	5,446.32	-269.26	199.88	-263.20	0.74	0.74	-0.11
5,564.00	8.40	147.40	5,539.44	-280.16	206.66	-273.89	1.19	1.17	-1.60
5,658.00	8.70	145.90	5,632.40	-291.83	214.35	-285.33	0.40	0.32	-1.60
5,751.00	7.70	150.60	5,724.45	-303.08	221.35	-296.37	1.29	-1.08	5.05
5,845.00	7.30	153.30	5,817.64	-313.91	227.12	-307.01	0.57	-0.43	2.87
5,939.00	7.40	152.40	5,910.87	-324.61	232.61	-317.55	0.16	0.11	-0.96
6,033.00	7.40	151.80	6,004.09	-335.30	238.28	-328.07	0.08	0.00	-0.64
6,127.00	6.60	151.70	6,097.39	-345.40	243.70	-338.00	0.85	-0.85	-0.11
6,221.00	6.00	151.50	6,190.82	-354.47	248.60	-346.92	0.64	-0.64	-0.21
6,315.00	5.80	150.60	6,284.32	-362.93	253.28	-355.23	0.23	-0.21	-0.96
6,409.00	5.70	150.70	6,377.85	-371.13	257.90	-363.30	0.11	-0.11	0.11
6,503.00	5.90	149.10	6,471.37	-379.35	262.66	-371.37	0.27	0.21	-1.70
6,598.00	5.70	148.60	6,565.88	-387.57	267.63	-379.44	0.22	-0.21	-0.53
6,692.00	5.80	147.40	6,659.41	-395.55	272.62	-387.27	0.17	0.11	-1.28
6,788.00	6.10	146.30	6,754.89	-403.88	278.06	-395.44	0.33	0.31	-1.15
6,882.00	5.10	143.40	6,848.44	-411.39	283.32	-402.79	1.11	-1.06	-3.09
6,977.00	3.90	142.60	6,943.15	-417.35	287.80	-408.61	1.26	-1.26	-0.84
7,071.00	2.90	146.30	7,036.98	-421.87	291.07	-413.03	1.09	-1.06	3.94
7,166.00	1.30	134.50	7,131.91	-424.62	293.17	-415.72	1.74	-1.68	-12.42
7,260.00	1.00	116.20	7,225.89	-425.73	294.66	-416.78	0.50	-0.32	-19.47
7,354.00	1.10	124.20	7,319.88	-426.60	296.15	-417.61	0.19	0.11	8.51
7,448.00	1.20	132.10	7,413.86	-427.77	297.62	-418.73	0.20	0.11	8.40
7,542.00	1.30	132.50	7,507.84	-429.15	299.14	-420.06	0.11	0.11	0.43
7,635.00	1.40	130.30	7,600.81	-430.60	300.78	-421.46	0.12	0.11	-2.37
7,729.00	1.60	140.40	7,694.78	-432.35	302.50	-423.16	0.35	0.21	10.74
7,823.00	1.20	139.20	7,788.75	-434.11	303.98	-424.88	0.43	-0.43	-1.28
7,918.00	0.50	135.10	7,883.74	-435.15	304.92	-425.89	0.74	-0.74	-4.32
8,011.00	0.60	150.50	7,976.74	-435.86	305.44	-426.59	0.19	0.11	16.56
8,106.00	0.70	155.40	8,071.73	-436.82	305.93	-427.53	0.12	0.11	5.16
8,200.00	0.80	167.00	8,165.72	-437.99	306.32	-428.68	0.19	0.11	12.34
8,294.00	0.30	293.30	8,259.72	-438.53	306.24	-429.23	1.07	-0.53	134.36
8,388.00	0.80	297.40	8,353.71	-438.13	305.43	-428.85	0.53	0.53	4.36
8,482.00	0.80	281.50	8,447.70	-437.70	304.20	-428.46	0.24	0.00	-16.91
8,576.00	0.70	276.10	8,541.70	-437.50	302.99	-428.30	0.13	-0.11	-5.74



Total Directional Services Survey Report



Company: DEVON ENERGY
Project: LEA COUNTY, NEW MEXICO (NAD 83 - GRID)
Site: SEC. 15 T23S R33E
Well: NORTH THISTLE 15-10 STATE COM #4H
Wellbore: JOB #2018-730-126
Design: FINAL SURVEYS

Local Co-ordinate Reference: Well NORTH THISTLE 15-10 STATE COM #4H
TVD Reference: KB @ 3743.10usft (CACTUS 126)
MD Reference: KB @ 3743.10usft (CACTUS 126)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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)
8,670.00	1.00	267.10	8,635.69	-437.48	301.60	-428.32	0.35	0.32	-9.57
8,764.00	1.10	249.10	8,729.67	-437.85	299.94	-428.74	0.36	0.11	-19.15
8,858.00	1.20	240.80	8,823.65	-438.65	298.24	-429.59	0.21	0.11	-8.83
8,952.00	0.70	221.20	8,917.64	-439.56	297.00	-430.54	0.63	-0.53	-20.85
9,046.00	0.30	227.10	9,011.63	-440.16	296.44	-431.15	0.43	-0.43	6.28
9,070.00	0.30	223.20	9,035.63	-440.25	296.35	-431.24	0.09	0.00	-16.25
9,138.00	1.00	314.10	9,103.63	-439.97	295.80	-430.98	1.54	1.03	133.68
KOP (NT 15-10 State Com 4H)									
9,140.00	1.15	319.39	9,105.63	-439.94	295.78	-430.95	8.81	7.29	264.48
KOP: 9140ft md, 35.1ft FSL & 2340.8ft FEL of Sec 15									
9,215.42	7.64	346.47	9,180.79	-434.48	294.11	-425.55	8.81	8.62	35.91
KOP - NORTH THISTLE 15-10 STATE COM #4H (P2)									
9,232.00	9.10	347.20	9,197.19	-432.13	293.56	-423.21	8.81	8.79	4.38
9,233.79	9.30	347.48	9,198.97	-431.85	293.50	-422.94	11.45	11.18	15.39
KOP - NORTH THISTLE 15-10 STATE COM #4H (P4)									
9,234.10	9.33	347.52	9,199.27	-431.81	293.49	-422.89	11.45	11.19	15.01
KOP - NORTH THISTLE 15-10 STATE COM #4H (P3)									
9,279.00	14.40	351.90	9,243.19	-422.72	291.92	-413.85	11.45	11.28	9.75
9,326.00	19.80	353.70	9,288.10	-409.01	290.22	-400.20	11.54	11.49	3.83
9,331.24	20.08	353.73	9,293.02	-407.23	290.02	-398.43	5.32	5.32	0.65
KOP - NORTH THISTLE 15-10 STATE COM #4H									
9,420.00	24.80	354.20	9,375.04	-373.55	286.48	-364.86	5.32	5.32	0.52
9,420.55	24.85	354.23	9,375.54	-373.32	286.45	-364.64	8.52	8.23	5.20
FTP (NT 15-10 State Com 4H)									
9,420.60	24.85	354.23	9,375.59	-373.30	286.45	-364.61	8.52	8.23	5.19
FTP: 9420.6ft md, 100ft FSL & 2376.9ft FEL of Sec 15									
9,463.65	28.41	356.20	9,414.06	-354.07	284.86	-345.45	8.52	8.27	4.58
FTP - NORTH THISTLE 15-10 STATE COM #4H (P3) - FTP - NORTH THISTLE 15-10 STATE COM #4H (P4)									
9,470.13	28.95	356.46	9,419.75	-350.97	284.66	-342.35	8.52	8.30	3.98
FTP - NORTH THISTLE 15-10 STATE COM #4H (P2)									
9,514.00	32.60	358.00	9,457.44	-328.55	283.60	-319.98	8.52	8.33	3.51
9,608.00	41.40	359.40	9,532.44	-272.06	282.38	-263.54	9.40	9.36	1.49
9,702.00	51.10	0.10	9,597.36	-204.24	282.12	-195.76	10.33	10.32	0.74
FTP - NORTH THISTLE 15-10 STATE COM #4H									
9,796.00	63.50	2.60	9,648.05	-125.32	284.10	-116.82	13.38	13.19	2.66
9,891.00	70.10	5.10	9,685.46	-38.26	290.01	-29.62	7.36	6.95	2.63
9,985.00	75.50	5.00	9,713.25	51.15	297.91	59.99	5.75	5.74	-0.11
10,001.71	76.66	4.67	9,717.27	67.32	299.27	76.19	7.23	6.97	-2.00
HZ - NORTH THISTLE 15-10 STATE COM #4H									
10,015.99	77.66	4.38	9,720.44	81.20	300.37	90.09	7.23	6.97	-1.98
HZ LP - NORTH THISTLE 15-10 STATE COM #4H (P2)									
10,019.53	77.91	4.31	9,721.19	84.64	300.63	93.55	7.23	6.97	-1.97
HZ LP - NORTH THISTLE 15-10 STATE COM #4H (P3) - HZ LP - NORTH THISTLE 15-10 STATE COM #4H (P4)									
10,051.00	80.10	3.70	9,727.19	115.46	302.79	124.41	7.23	6.97	-1.95
10,145.00	84.50	4.00	9,739.78	208.38	309.05	217.47	4.69	4.68	0.32



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Company:	DEVON ENERGY	Local Co-ordinate Reference:	Well NORTH THISTLE 15-10 STATE COM #4H
Project:	LEA COUNTY, NEW MEXICO (NAD 83 - GRID)	TVD Reference:	KB @ 3743.10usft (CACTUS 126)
Site:	SEC. 15 T23S R33E	MD Reference:	KB @ 3743.10usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #4H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	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)
10,202.00	88.94	5.56	9,743.04	265.07	313.79	274.28	8.26	7.79	2.74
HZ LANDING POINT									
10,240.00	91.90	6.60	9,742.76	302.85	317.82	312.17	8.26	7.79	2.73
10,334.00	92.90	3.90	9,738.83	396.36	326.41	405.89	3.06	1.06	-2.87
10,428.00	93.40	1.00	9,733.66	490.13	330.42	499.73	3.13	0.53	-3.09
10,522.00	91.10	358.80	9,729.97	584.04	330.26	593.60	3.38	-2.45	-2.34
10,616.00	88.80	358.90	9,730.05	678.02	328.37	687.48	2.45	-2.45	0.11
10,710.00	88.40	358.60	9,732.35	771.96	326.32	781.33	0.53	-0.43	-0.32
10,802.00	88.50	358.10	9,734.84	863.89	323.67	873.13	0.55	0.11	-0.54
10,893.00	88.90	357.50	9,736.90	954.80	320.18	963.90	0.79	0.44	-0.66
10,986.00	89.60	357.90	9,738.12	1,047.72	316.45	1,056.66	0.87	0.75	0.43
11,077.00	89.90	358.40	9,738.52	1,138.67	313.51	1,147.49	0.64	0.33	0.55
11,169.00	90.50	358.60	9,738.20	1,230.64	311.10	1,239.34	0.69	0.65	0.22
11,260.00	88.80	358.40	9,738.75	1,321.60	308.72	1,330.20	1.88	-1.87	-0.22
11,352.00	89.30	358.60	9,740.28	1,413.56	306.31	1,422.04	0.59	0.54	0.22
11,444.00	89.00	358.80	9,741.64	1,505.52	304.22	1,513.90	0.39	-0.33	0.22
11,536.00	89.80	359.20	9,742.61	1,597.50	302.62	1,605.79	0.97	0.87	0.43
11,629.00	90.80	359.50	9,742.12	1,690.49	301.56	1,698.71	1.12	1.08	0.32
11,719.00	90.70	359.70	9,740.94	1,780.48	300.94	1,788.64	0.25	-0.11	0.22
11,812.00	90.00	359.00	9,740.37	1,873.47	299.88	1,881.56	1.06	-0.75	-0.75
11,904.00	90.40	359.30	9,740.05	1,965.46	298.52	1,973.47	0.54	0.43	0.33
11,995.00	88.60	359.80	9,740.85	2,056.45	297.80	2,064.40	2.05	-1.98	0.55
12,089.00	88.60	359.60	9,743.14	2,150.42	297.31	2,158.31	0.21	0.00	-0.21
12,183.00	88.50	359.30	9,745.52	2,244.39	296.41	2,252.21	0.34	-0.11	-0.32
12,277.00	90.60	0.10	9,746.26	2,338.38	295.91	2,346.14	2.39	2.23	0.85
12,371.00	91.40	0.20	9,744.62	2,432.36	296.16	2,440.09	0.86	0.85	0.11
12,465.00	92.70	0.80	9,741.26	2,526.30	296.98	2,534.01	1.52	1.38	0.64
12,559.00	92.40	0.80	9,737.07	2,620.20	298.29	2,627.91	0.32	-0.32	0.00
12,654.00	91.60	0.80	9,733.76	2,715.13	299.62	2,722.84	0.84	-0.84	0.00
12,748.00	92.10	1.40	9,730.72	2,809.06	301.42	2,816.78	0.83	0.53	0.64
12,842.00	88.60	0.70	9,730.15	2,903.03	303.14	2,910.76	3.80	-3.72	-0.74
12,936.00	88.90	0.80	9,732.20	2,997.00	304.37	3,004.72	0.34	0.32	0.11
13,030.00	88.30	0.50	9,734.50	3,090.96	305.44	3,098.68	0.71	-0.64	-0.32
13,124.00	90.40	0.80	9,735.56	3,184.94	306.51	3,192.65	2.26	2.23	0.32
13,218.00	91.20	0.10	9,734.25	3,278.93	307.24	3,286.62	1.13	0.85	-0.74
13,312.00	89.80	359.90	9,733.43	3,372.93	307.24	3,380.57	1.50	-1.49	-0.21
13,331.66	89.63	359.88	9,733.53	3,392.58	307.21	3,400.22	0.86	-0.85	-0.11
IP #1 - NORTH THISTLE 15-10 STATE COM #4H (P2)									
13,331.75	89.63	359.88	9,733.53	3,392.68	307.21	3,400.31	0.00	0.00	0.00
IP #1 - NORTH THISTLE 15-10 STATE COM #4H (P4)									
13,331.80	89.63	359.88	9,733.53	3,392.72	307.21	3,400.35	2.77	-2.75	-0.34
IP #1 - NORTH THISTLE 15-10 STATE COM #4H (P3)									
13,406.00	89.00	359.80	9,734.41	3,466.92	307.00	3,474.51	0.86	-0.85	-0.11
13,500.00	90.50	0.50	9,734.82	3,560.91	307.24	3,568.48	1.76	1.60	0.74



Total Directional Services
Survey Report



Company:	DEVON ENERGY	Local Co-ordinate Reference:	Well NORTH THISTLE 15-10 STATE COM #4H
Project:	LEA COUNTY, NEW MEXICO (NAD 83 - GRID)	TVD Reference:	KB @ 3743.10usft (CACTUS 126)
Site:	SEC. 15 T23S R33E	MD Reference:	KB @ 3743.10usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #4H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	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)
13,594.00	89.80	359.40	9,734.58	3,654.91	307.16	3,662.43	1.39	-0.74	-1.17
13,688.00	90.70	359.40	9,734.17	3,748.91	306.18	3,756.35	0.96	0.96	0.00
13,782.00	88.70	358.60	9,734.66	3,842.88	304.54	3,850.24	2.29	-2.13	-0.85
13,876.00	89.20	358.80	9,736.38	3,936.84	302.40	3,944.09	0.57	0.53	0.21
13,970.00	89.80	358.40	9,737.20	4,030.81	300.11	4,037.95	0.77	0.64	-0.43
14,064.00	89.10	358.30	9,738.11	4,124.77	297.40	4,131.79	0.75	-0.74	-0.11
14,158.00	90.30	359.00	9,738.60	4,218.74	295.19	4,225.65	1.48	1.28	0.74
14,252.00	85.00	358.00	9,742.45	4,312.59	292.73	4,319.39	5.74	-5.64	-1.06
14,346.00	86.10	359.60	9,749.74	4,406.28	290.77	4,412.98	2.06	1.17	1.70
14,439.00	87.30	359.80	9,755.10	4,499.13	290.28	4,505.77	1.31	1.29	0.22
14,533.00	89.20	359.40	9,757.97	4,593.08	289.63	4,599.66	2.07	2.02	-0.43
14,627.00	90.50	359.70	9,758.21	4,687.07	288.89	4,693.59	1.42	1.38	0.32
14,721.00	91.00	359.60	9,756.98	4,781.06	288.31	4,787.52	0.54	0.53	-0.11
14,751.80	91.58	359.99	9,756.29	4,811.85	288.20	4,818.29	2.28	1.90	1.26
SEC 15/10 X-OVER: 14751.8ft md, 0ft FSL & 2347.8ft FEL of Sec 10									
14,816.00	92.80	0.80	9,753.83	4,876.00	288.65	4,882.43	2.28	1.89	1.26
14,911.00	91.90	1.10	9,749.94	4,970.91	290.22	4,977.34	1.00	-0.95	0.32
15,005.00	90.20	0.60	9,748.22	5,064.88	291.61	5,071.31	1.89	-1.81	-0.53
15,100.00	88.90	0.50	9,748.96	5,159.87	292.53	5,166.29	1.37	-1.37	-0.11
15,110.62	88.92	0.57	9,749.16	5,170.48	292.62	5,176.90	0.67	0.21	0.64
IP #2 - NORTH THISTLE 15-10 STATE COM #4H (P2)									
15,110.96	88.92	0.57	9,749.17	5,170.83	292.63	5,177.24	0.00	0.00	0.00
IP #2 - NORTH THISTLE 15-10 STATE COM #4H (P3) - IP #2 - NORTH THISTLE 15-10 STATE COM #4H (P4)									
15,194.00	89.10	1.10	9,750.60	5,253.84	293.84	5,260.26	0.68	0.21	0.64
15,289.00	89.60	1.40	9,751.68	5,348.82	295.91	5,355.25	0.61	0.53	0.32
15,384.00	90.10	1.30	9,751.93	5,443.79	298.15	5,450.25	0.54	0.53	-0.11
15,478.00	89.70	1.20	9,752.09	5,537.77	300.20	5,544.24	0.44	-0.43	-0.11
15,572.00	89.60	1.30	9,752.67	5,631.74	302.25	5,638.24	0.15	-0.11	0.11
15,666.00	90.20	1.50	9,752.83	5,725.71	304.55	5,732.24	0.67	0.64	0.21
15,760.00	90.30	0.90	9,752.42	5,819.69	306.51	5,826.23	0.65	0.11	-0.64
15,854.00	93.10	1.90	9,749.63	5,913.61	308.81	5,920.18	3.16	2.98	1.06
15,948.00	92.10	2.20	9,745.37	6,007.45	312.17	6,014.08	1.11	-1.06	0.32
16,041.00	91.80	2.50	9,742.20	6,100.32	315.98	6,107.02	0.46	-0.32	0.32
16,134.00	91.50	1.50	9,739.53	6,193.22	319.22	6,199.98	1.12	-0.32	-1.08
16,228.00	90.10	0.60	9,738.21	6,287.20	320.95	6,293.96	1.77	-1.49	-0.96
16,322.00	87.80	358.50	9,739.94	6,381.17	320.21	6,387.87	3.31	-2.45	-2.23
16,416.00	87.30	358.60	9,743.96	6,475.05	317.83	6,481.64	0.54	-0.53	0.11
16,510.00	89.10	359.00	9,746.91	6,568.98	315.86	6,575.47	1.96	1.91	0.43
16,604.00	88.00	358.00	9,749.29	6,662.91	313.41	6,669.29	1.58	-1.17	-1.06
16,698.00	88.70	358.10	9,751.99	6,756.82	310.21	6,763.06	0.75	0.74	0.11
16,792.00	88.70	357.40	9,754.13	6,850.72	306.52	6,856.81	0.74	0.00	-0.74
16,828.18	88.82	357.55	9,754.91	6,886.86	304.93	6,892.88	0.53	0.32	0.43
IP #3 - NORTH THISTLE 15-10 STATE COM #4H (P2)									
16,828.61	88.82	357.56	9,754.92	6,887.29	304.91	6,893.31	0.53	0.32	0.43



Total Directional Services
Survey Report



Company:	DEVON ENERGY	Local Co-ordinate Reference:	Well NORTH THISTLE 15-10 STATE COM #4H
Project:	LEA COUNTY, NEW MEXICO (NAD 83 - GRID)	TVD Reference:	KB @ 3743.10usft (CACTUS 126)
Site:	SEC. 15 T23S R33E	MD Reference:	KB @ 3743.10usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #4H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	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)
IP #3 - NORTH THISTLE 15-10 STATE COM #4H (P3) - IP #3 - NORTH THISTLE 15-10 STATE COM #4H (P4)									
16,886.00	89.00	357.80	9,756.01	6,944.62	302.58	6,950.55	0.53	0.32	0.43
16,980.00	90.70	358.60	9,756.26	7,038.57	299.63	7,044.37	2.00	1.81	0.85
17,073.00	90.60	358.80	9,755.20	7,131.54	297.52	7,137.23	0.24	-0.11	0.22
17,168.00	90.30	359.40	9,754.46	7,226.52	296.03	7,232.13	0.71	-0.32	0.63
17,262.00	91.40	359.20	9,753.06	7,320.51	294.88	7,326.04	1.19	1.17	-0.21
17,356.00	91.10	358.70	9,751.01	7,414.47	293.16	7,419.91	0.62	-0.32	-0.53
17,449.00	91.30	358.90	9,749.06	7,507.43	291.21	7,512.77	0.30	0.22	0.22
17,543.00	89.80	358.00	9,748.16	7,601.38	288.67	7,606.61	1.86	-1.60	-0.96
17,637.00	90.60	357.70	9,747.83	7,695.32	285.14	7,700.39	0.91	0.85	-0.32
17,731.00	91.30	357.30	9,746.28	7,789.21	281.04	7,794.13	0.86	0.74	-0.43
17,826.00	90.60	358.50	9,744.70	7,884.13	277.56	7,888.90	1.46	-0.74	1.26
17,920.00	90.60	0.90	9,743.72	7,978.12	277.07	7,982.83	2.55	0.00	2.55
18,014.00	89.10	0.10	9,743.96	8,072.11	277.89	8,076.81	1.81	-1.60	-0.85
18,108.00	91.10	1.70	9,743.80	8,166.09	279.37	8,170.79	2.72	2.13	1.70
18,202.00	91.40	1.40	9,741.75	8,260.04	281.91	8,264.77	0.45	0.32	-0.32
18,296.00	91.90	1.50	9,739.04	8,353.97	284.29	8,358.73	0.54	0.53	0.11
18,390.00	89.90	1.20	9,737.56	8,447.92	286.50	8,452.71	2.15	-2.13	-0.32
18,484.00	89.40	1.80	9,738.14	8,541.89	288.96	8,546.71	0.83	-0.53	0.64
18,578.00	89.40	2.30	9,739.12	8,635.82	292.32	8,640.70	0.53	0.00	0.53
18,672.00	90.10	1.70	9,739.53	8,729.77	295.60	8,734.70	0.98	0.74	-0.64
18,766.00	90.30	1.60	9,739.20	8,823.73	298.31	8,828.69	0.24	0.21	-0.11
18,860.00	90.20	1.40	9,738.79	8,917.69	300.77	8,922.69	0.24	-0.11	-0.21
18,954.00	90.50	1.90	9,738.22	9,011.65	303.48	9,016.69	0.62	0.32	0.53
19,048.00	92.80	2.70	9,735.51	9,105.53	307.25	9,110.64	2.59	2.45	0.85
19,142.00	94.60	3.20	9,729.45	9,199.21	312.07	9,204.42	1.99	1.91	0.53
19,236.00	92.70	2.00	9,723.46	9,292.91	316.33	9,298.21	2.39	-2.02	-1.28
19,330.00	91.70	1.50	9,719.86	9,386.80	319.20	9,392.14	1.19	-1.06	-0.53
19,424.00	89.80	0.20	9,718.63	9,480.77	320.59	9,486.11	2.45	-2.02	-1.38
19,518.00	89.50	1.20	9,719.20	9,574.76	321.74	9,580.10	1.11	-0.32	1.06
19,612.00	89.80	0.80	9,719.77	9,668.75	323.38	9,674.09	0.53	0.32	-0.43
19,706.00	89.30	0.00	9,720.51	9,762.74	324.04	9,768.06	1.00	-0.53	-0.85
19,800.00	89.10	359.70	9,721.82	9,856.73	323.79	9,862.00	0.38	-0.21	-0.32
19,894.00	88.90	358.60	9,723.47	9,950.70	322.40	9,955.89	1.19	-0.21	-1.17
19,936.40	88.96	358.60	9,724.26	9,993.08	321.36	9,998.22	0.13	0.13	0.00
LTP: 19936.4ft md, 100ft FNL & 2314.8ft FEL of Sec 10									
19,936.41	88.96	358.60	9,724.26	9,993.09	321.36	9,998.23	0.00	0.00	0.00
LTP (NT 15-10 State Com 4H)									
19,936.81	88.96	358.60	9,724.27	9,993.49	321.35	9,998.63	0.00	0.00	0.00
LTP -NORTH THISTLE 15-10 STATE COM #4H (P2)									
19,936.96	88.96	358.60	9,724.27	9,993.64	321.35	9,998.78	0.00	0.00	0.00
LTP -NORTH THISTLE 15-10 STATE COM #4H (P4) - LTP -NORTH THISTLE 15-10 STATE COM #4H (P3)									
19,937.32	88.96	358.60	9,724.28	9,994.01	321.34	9,999.14	0.00	0.00	0.00
LTP -NORTH THISTLE 15-10 STATE COM #4H									
19,970.00	89.00	358.60	9,724.86	10,026.67	320.54	10,031.77	0.14	0.14	0.00



Total Directional Services
Survey Report



Company:	DEVON ENERGY	Local Co-ordinate Reference:	Well NORTH THISTLE 15-10 STATE COM #4H
Project:	LEA COUNTY, NEW MEXICO (NAD 83 - GRID)	TVD Reference:	KB @ 3743.10usft (CACTUS 126)
Site:	SEC. 15 T23S R33E	MD Reference:	KB @ 3743.10usft (CACTUS 126)
Well:	NORTH THISTLE 15-10 STATE COM #4H	North Reference:	Grid
Wellbore:	JOB #2018-730-126	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	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)
LAST SURVEY FEB 2, 2019									
20,016.82	89.00	358.60	9,725.67	10,073.47	319.40	10,078.51	0.00	0.00	0.00
BHL - NORTH THISTLE 15-10 STATE COM #4H (P2)									
20,016.96	89.00	358.60	9,725.68	10,073.61	319.39	10,078.65	0.00	0.00	0.00
BHL - NORTH THISTLE 15-10 STATE COM #4H (P4) - BHL - NORTH THISTLE 15-10 STATE COM #4H (P3)									
20,028.00	89.00	358.60	9,725.87	10,084.64	319.12	10,089.67	0.00	0.00	0.00
EXTRAP TO TD: 20028ft md, 8.6ft FNL & 2316.9ft FEL of Sec 10 - BHL (NT 15-10 State Com 4H)									

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
KOP (NT 15-10 State Co - actual wellpath hits target center - Point	0.00	0.00	9,103.63	-439.97	295.80	472,846.34	780,516.86	32.297555	-103.559257
FTP (NT 15-10 State Co - actual wellpath hits target center - Point	0.00	0.00	9,375.54	-373.32	286.45	472,912.99	780,507.51	32.297738	-103.559286
LTP (NT 15-10 State Co - actual wellpath hits target center - Point	0.00	0.00	9,724.26	9,993.09	321.36	483,279.14	780,542.42	32.326230	-103.558931

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,422.00	1,421.95	1.20	10.62	SURFACE CASING
5,381.00	5,357.98	-260.01	194.31	INT CASING POINT
9,140.00	9,105.63	-439.94	295.78	KOP: 9140ft md, 35.1ft FSL & 2340.8ft FEL of Sec 15
9,420.60	9,375.59	-373.30	286.45	FTP: 9420.6ft md, 100ft FSL & 2376.9ft FEL of Sec 15
10,202.00	9,743.04	265.07	313.79	HZ LANDING POINT
14,751.80	9,756.29	4,811.85	288.20	SEC 15/10 X-OVER: 14751.8ft md, 0ft FSL & 2347.8ft FEL of Sec 10
19,936.40	9,724.26	9,993.08	321.36	LTP: 19936.4ft md, 100ft FNL & 2314.6ft FEL of Sec 10
19,970.00	9,724.86	10,026.67	320.54	LAST SURVEY FEB 2, 2019
20,028.00	9,725.87	10,084.64	319.12	EXTRAP TO TD: 20028ft md, 8.6ft FNL & 2316.9ft FEL of Sec 10

Checked By: _____	Approved By: _____	Date: _____
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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 #4H

Total Job No: 2019-046-126

API No: 30-025-45395

Start Depth: 130 feet MD

End Depth: 20,028 feet MD

Start Date: January 17, 2019

End Date: February 3, 2019

I, Trey Beeson, certify that; I am employed by Total Directional Services, LLC. on 1/17/2019 through 2/03/2019. I conducted or supervised the taking of the MWD surveys from a measured depth of 130 feet to a measured depth of 20,028 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 #4H, API No: 30-025-45395 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.