



Total Directional
Services, LLC
USA Operations

Final MWD Survey Certification

Leah County, NM

Client: DEVON

Well Name: North Thistle 3-34 State Com 6H

Total Job No: 2018-772-540

API No: 30-025-45075

Start Date: 12/21/2018

End Date: 01/11/2019

Measured Start Depth: 0 feet

Measured End Depth: 19856 feet

Vertical Section from well center at TD: 10175.51feet

HOBBS OCD
JUN 14 2019
RECEIVED

I, Syon Elijah, certify that; I am employed by Total Directional Services, LLC and we conducted or supervised the taking of these open hole MWD surveys at the request of this client. This 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 have reviewed this report and find that it conforms to the principals and procedures as set forth by Total Directional Services, LLC.

Date: 01/12/19

Signed: *Syon Elijah*



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Vertical Section from well center at TD: 10175.51feet

I, Alexander Dellahoussey, certify that; I am employed by Total Directional Services, LLC and we conducted or supervised the taking of these open hole MWD surveys at the request of this client. This 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 have reviewed this report and find that it conforms to the principals and procedures as set forth by Total Directional Services, LLC.

Date: 01/12/19

Signed: *Alexander Delahoussey*

DEVON ENERGY (US)

LEA COUNTY, NEW MEXICO (NAD83-GRID)

SEC. 3 T23S R33E

NORTH THISTLE 3-34 STATE COM #6H

JOB # 2018-772-540

25 January, 2019

Survey: FINAL SURVEYS





Project: LEA COUNTY, NEW MEXICO (NAD83-GRID)
Site: SEC. 3 T23S R33E
Well: NORTH THISTLE 3-34 STATE COM #6H
Wellbore: JOB # 2018-772-540
Design: FINAL SURVEYS

ANNOTATIONS

TVD	MD	Inc	Azi	+N-S	+E-W	VSec	Departure	Annotation
1014.9	1015.0	0.56	36.18	6.9	8.2	7.1	9.6	13 5/8" CASING
5152.3	5155.0	5.71	110.66	-25.8	82.0	-26.5	100.5	9 5/8" CASING
9083.4	9109.0	3.77	98.82	-254.1	416.8	-239.1	522.8	KOP @ 9109' MD; 72' FSL & 439' FEL SEC 3
9588.0	19797.9	89.93	357.79	10121.1	365.2	10127.7	10612.1	LTP @ 19798' MD, 100' FNL & 400' FEL SEC 34
9588.0	19798.0	89.93	357.79	10121.2	365.2	10127.8	10612.2	LAST SURVEY @ 19798' MD
9588.1	19856.0	89.93	357.79	10179.1	363.0	10185.8	10970.2	PROJECTION TO TD 19856' MD; 42' FNL & 402' FEL SEC 34

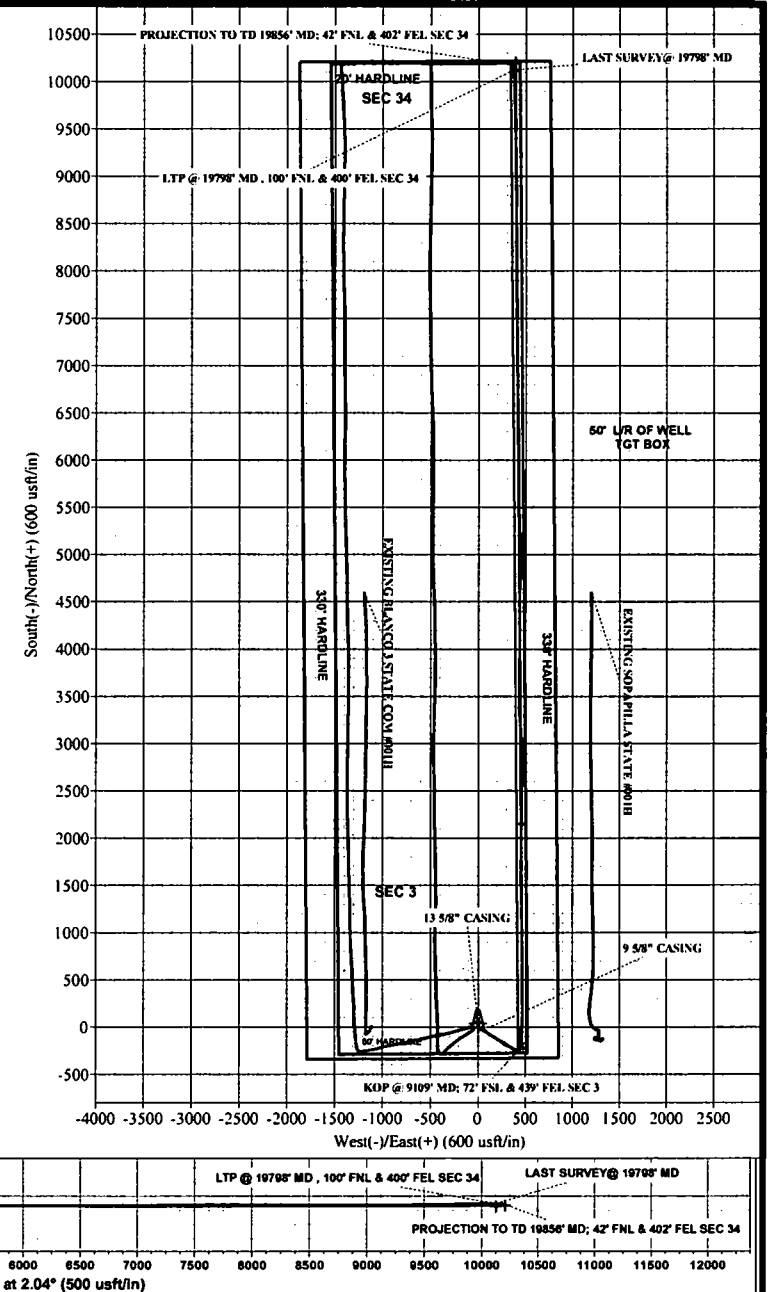
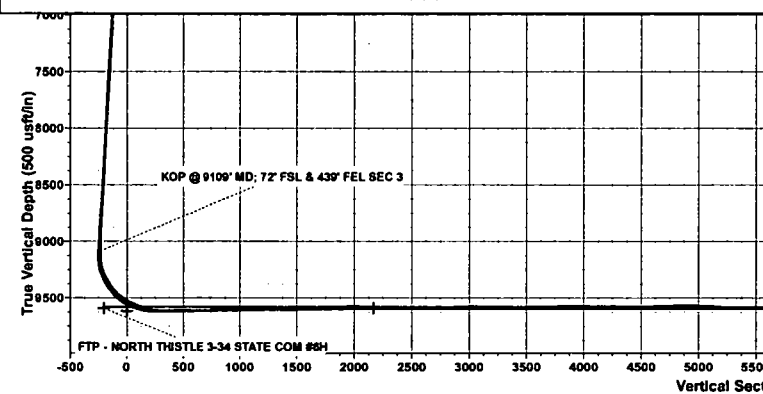
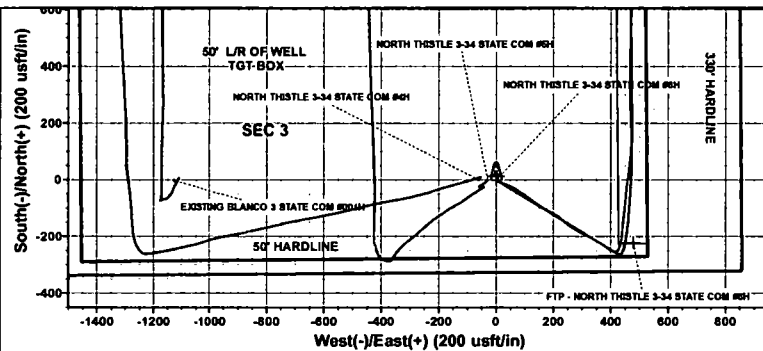
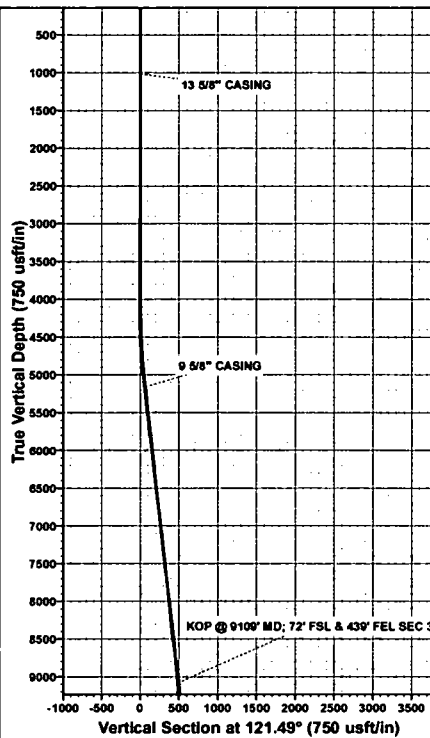
AS DRILLED LOCAL COORDINATES:

SHL: 326ft FSL & 856ft FEL of Sec 3

BHL: 42ft FNL & 402ft FEL of Sec 34

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N-S	+E-W	Latitude	Longitude
BHL - NORTH THISTLE 3-34 STATE COM #6H	9581.0	10201.2	384.7	32° 21' 19.552 N	103° 33' 10.697 W
FTP - NORTH THISTLE 3-34 STATE COM #6H	9591.0	-222.3	478.4	32° 19' 38.408 N	103° 33' 10.490 W
LAT T1 - NORTH THISTLE 3-34 STATE COM #6H	9591.0	2154.2	456.3	32° 19' 59.925 N	103° 33' 10.545 W
LTP - NORTH THISTLE 3-34 STATE COM #6H	9591.0	10121.1	385.4	32° 21' 18.780 N	103° 33' 10.696 W



Survey Report



Company:	DEVON ENERGY (US)	Local Co-ordinate Reference:	Well NORTH THISTLE 3-34 STATE COM #6H
Project:	LEA COUNTY, NEW MEXICO (NAD83-GR)	TVD Reference:	KB 30' @ 3601.0usft (H&P 540)
Site:	SEC. 3 T23S R33E	MD Reference:	KB 30' @ 3601.0usft (H&P 540)
Well:	NORTH THISTLE 3-34 STATE COM #6H	North Reference:	Grid
Wellbore:	JOB # 2018-772-540	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	Database 1

Project	LEA COUNTY, NEW MEXICO (NAD83-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. 3 T23S R33E		
Site Position:		Northing:	483,714.90 usft
From:	Map	Easting:	781,891.10 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 19' 38.643 N
		Longitude:	103° 33' 16.396 W
		Grid Convergence:	0.42 °

Well	NORTH THISTLE 3-34 STATE COM #6H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32° 19' 38.642 N
		Longitude:	103° 33' 16.046 W
		Ground Level:	3,571.0 usft

Wellbore	JOB # 2018-772-540		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2015	23/01/2019	6.78
			Dip Angle (°)
			60.14
			Field Strength (nT)
			47,835

Design	FINAL SURVEYS		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction (°)
			2.04

Survey Program	Date 23/01/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
178.0	19,856.0	FINAL SURVEYS (JOB # 2018-772-540)	OWSG (Rev2) MWD
			Description
			OWSG MWD - Standard

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	3,601.0	0.0	0.0	0.0	0.00	0.00	0.00
178.0	0.30	52.10	178.0	3,423.0	0.3	0.4	0.3	0.17	0.17	0.00
269.0	0.50	72.70	269.0	3,332.0	0.6	0.9	0.6	0.27	0.22	22.64
450.0	0.50	57.00	450.0	3,151.0	1.2	2.4	1.3	0.08	0.00	-8.67
539.0	0.50	38.80	539.0	3,062.0	1.7	2.9	1.8	0.18	0.00	-20.45
630.0	0.70	30.80	630.0	2,971.0	2.5	3.5	2.6	0.24	0.22	-8.79
721.0	0.80	39.60	721.0	2,880.0	3.5	4.1	3.6	0.17	0.11	9.67
812.0	0.90	30.80	812.0	2,789.0	4.6	4.9	4.8	0.18	0.11	-9.67
940.0	0.70	24.80	940.0	2,661.0	6.2	5.8	6.4	0.17	-0.16	-4.69
13 5/8" CASING										
1,015.0	0.56	38.18	1,014.9	2,586.1	6.9	6.2	7.1	0.25	-0.19	15.17
1,051.0	0.50	43.80	1,050.9	2,550.1	7.1	6.4	7.3	0.25	-0.16	21.17
1,141.0	0.60	41.10	1,140.9	2,460.1	7.8	7.0	8.0	0.11	0.11	-3.00

Survey Report



Company:	DEVON ENERGY (US)	Local Co-ordinate Reference:	Well NORTH THISTLE 3-34 STATE COM #6H
Project:	LEA COUNTY, NEW MEXICO (NAD83-GF)	TVD Reference:	KB 30' @ 3601.0usft (H&P 540)
Site:	SEC. 3 T23S R33E	MD Reference:	KB 30' @ 3601.0usft (H&P 540)
Well:	NORTH THISTLE 3-34 STATE COM #6H	North Reference:	Grid
Wellbore:	JOB # 2018-772-540	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	Database 1

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,231.0	0.10	282.00	1,230.9	2,370.1	8.1	7.2	8.4	0.73	-0.56	-132.33
1,416.0	0.30	246.20	1,415.9	2,185.1	8.0	6.6	8.2	0.12	0.11	-19.35
1,510.0	0.20	224.00	1,509.9	2,091.1	7.8	6.3	8.0	0.15	-0.11	-23.62
1,604.0	0.20	226.60	1,603.9	1,997.1	7.5	6.0	7.7	0.01	0.00	2.77
1,698.0	0.20	227.70	1,697.9	1,903.1	7.3	5.8	7.5	0.00	0.00	1.17
1,793.0	0.20	215.00	1,792.9	1,808.1	7.1	5.6	7.2	0.05	0.00	-13.37
1,887.0	0.18	177.44	1,886.9	1,714.1	6.8	5.5	7.0	0.13	-0.02	-39.96
1,981.0	0.22	177.26	1,980.9	1,620.1	6.4	5.5	6.6	0.04	0.04	-0.19
2,169.0	0.26	169.88	2,168.9	1,432.1	5.7	5.6	5.9	0.03	0.02	-3.93
2,263.0	0.40	154.23	2,262.9	1,338.1	5.2	5.8	5.4	0.18	0.15	-16.65
2,357.0	0.31	141.14	2,356.9	1,244.1	4.7	6.1	4.9	0.13	-0.10	-13.93
2,452.0	0.26	103.08	2,451.9	1,149.1	4.4	6.4	4.6	0.20	-0.05	-40.06
2,546.0	0.40	340.65	2,545.9	1,055.1	4.7	6.5	4.9	0.62	0.15	-130.24
2,641.0	0.44	343.02	2,640.9	960.1	5.3	6.3	5.6	0.05	0.04	2.49
2,735.0	0.53	346.01	2,734.9	866.1	6.1	6.1	6.3	0.10	0.10	3.18
2,829.0	0.53	346.98	2,828.9	772.1	7.0	5.9	7.2	0.01	0.00	1.03
2,924.0	0.70	295.82	2,923.9	677.1	7.6	5.3	7.8	0.58	0.18	-53.85
3,018.0	0.84	293.45	3,017.9	583.1	8.2	4.1	8.3	0.15	0.15	-2.52
3,112.0	0.79	298.99	3,111.9	489.1	8.7	2.9	8.8	0.10	-0.05	5.89
3,206.0	0.75	302.42	3,205.9	395.1	9.4	1.8	9.4	0.06	-0.04	3.65
3,300.0	0.31	100.27	3,299.9	301.1	9.7	1.6	9.7	1.11	-0.47	167.93
3,488.0	0.62	100.27	3,487.9	113.1	9.4	3.1	9.5	0.16	0.16	0.00
3,582.0	0.48	116.97	3,581.9	19.1	9.1	3.9	9.3	0.22	-0.15	17.77
3,677.0	0.48	130.06	3,676.9	-75.9	8.7	4.6	8.9	0.12	0.00	13.78
3,771.0	0.57	148.61	3,770.9	-169.9	8.0	5.1	8.2	0.20	0.10	19.73
3,866.0	0.66	163.28	3,865.9	-264.9	7.1	5.5	7.3	0.19	0.09	15.44
3,960.0	1.01	189.39	3,959.9	-358.9	5.8	5.6	6.0	0.54	0.37	27.78
4,054.0	1.32	168.56	4,053.8	-452.8	3.9	5.6	4.1	0.55	0.33	-22.16
4,148.0	1.27	157.92	4,147.8	-546.8	1.9	6.2	2.1	0.26	-0.05	-11.32
4,243.0	2.11	149.93	4,242.8	-641.8	-0.6	7.5	-0.3	0.92	0.88	-8.41
4,337.0	2.02	145.62	4,336.7	-735.7	-3.5	9.3	-3.1	0.19	-0.10	-4.59
4,431.0	2.29	126.28	4,430.6	-829.6	-6.0	11.8	-5.5	0.82	0.29	-20.57
4,525.0	2.99	118.72	4,524.5	-923.5	-8.2	15.4	-7.7	0.83	0.74	-8.04
4,620.0	3.21	113.80	4,619.4	-1,018.4	-10.5	20.0	-9.8	0.36	0.23	-5.18
4,714.0	3.38	110.02	4,713.2	-1,112.2	-12.5	25.1	-11.6	0.29	0.18	-4.02
4,808.0	4.44	108.18	4,807.0	-1,206.0	-14.6	31.1	-13.5	1.14	1.13	-1.96
4,902.0	5.36	110.99	4,900.7	-1,299.7	-17.3	38.7	-15.9	1.01	0.98	2.99
4,996.0	5.85	113.36	4,994.2	-1,393.2	-20.8	47.2	-19.1	0.58	0.52	2.52
5,090.0	6.37	120.57	5,087.7	-1,486.7	-25.3	56.1	-23.3	0.99	0.55	7.67
9 5/8" CASING										
5,155.0	5.71	119.66	5,152.3	-1,551.3	-28.8	62.0	-26.5	1.03	-1.02	-1.40
5,180.0	5.45	119.25	5,177.2	-1,576.2	-30.0	64.1	-27.7	1.03	-1.02	-1.64
5,274.0	6.11	124.61	5,270.7	-1,669.7	-35.0	72.1	-32.4	0.91	0.70	5.70
5,368.0	5.80	124.79	5,364.2	-1,763.2	-40.5	80.1	-37.7	0.33	-0.33	0.19
5,462.0	5.80	121.19	5,457.8	-1,856.8	-45.7	88.1	-42.5	0.39	0.00	-3.83
5,557.0	6.90	124.00	5,552.2	-1,951.2	-51.4	96.9	-47.9	1.20	1.16	2.96
5,651.0	7.52	126.37	5,645.4	-2,044.4	-58.2	106.5	-54.4	0.73	0.66	2.52
5,745.0	7.82	123.56	5,738.6	-2,137.6	-65.4	116.8	-61.2	0.51	0.32	-2.99
5,839.0	6.55	129.45	5,831.8	-2,230.8	-72.3	126.3	-67.8	1.56	-1.35	6.27
5,934.0	5.10	125.40	5,926.4	-2,325.4	-78.2	133.9	-73.4	1.59	-1.53	-4.26
6,028.0	4.18	121.71	6,020.0	-2,419.0	-82.4	140.2	-77.4	1.03	-0.98	-3.93
6,122.0	5.27	123.91	6,113.7	-2,512.7	-86.6	146.7	-81.4	1.18	1.16	2.34
6,216.0	5.41	122.15	6,207.3	-2,606.3	-91.4	154.1	-85.9	0.23	0.15	-1.87

Survey Report



Company:	DEVON ENERGY (US)	Local Co-ordinate Reference:	Well NORTH THISTLE 3-34 STATE COM #6H
Project:	LEA COUNTY, NEW MEXICO (NAD83-GF)	TVD Reference:	KB 30' @ 3601.0usft (H&P 540)
Site:	SEC. 3 T23S R33E	MD Reference:	KB 30' @ 3601.0usft (H&P 540)
Well:	NORTH THISTLE 3-34 STATE COM #6H	North Reference:	Grid
Wellbore:	JOB # 2018-772-540	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	Database 1

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,310.0	6.33	123.91	6,300.8	-2,699.8	-96.7	162.1	-90.8	1.00	0.98	1.87
6,405.0	6.68	123.65	6,395.2	-2,794.2	-102.6	171.1	-96.5	0.37	0.37	-0.27
6,499.0	6.77	119.60	6,488.6	-2,887.6	-108.4	180.4	-101.9	0.51	0.10	-4.31
6,593.0	6.77	117.23	6,581.9	-2,980.9	-113.7	190.2	-106.8	0.30	0.00	-2.52
6,687.0	6.73	114.68	6,675.3	-3,074.3	-118.5	200.1	-111.3	0.32	-0.04	-2.71
6,781.0	7.12	121.10	6,768.6	-3,167.6	-123.8	210.1	-116.2	0.92	0.41	6.83
6,875.0	5.89	129.90	6,862.0	-3,261.0	-129.9	218.8	-122.0	1.68	-1.31	9.36
6,969.0	5.67	132.17	6,955.5	-3,354.5	-136.1	225.9	-128.0	0.34	-0.23	2.41
7,064.0	5.67	128.83	7,050.0	-3,449.0	-142.2	233.1	-133.8	0.35	0.00	-3.52
7,158.0	5.58	133.93	7,143.6	-3,542.6	-148.3	240.0	-139.7	0.54	-0.10	5.43
7,252.0	5.85	131.12	7,237.1	-3,636.1	-154.6	246.9	-145.7	0.41	0.29	-2.99
7,346.0	6.64	124.96	7,330.5	-3,729.5	-160.9	254.9	-151.7	1.10	0.84	-6.55
7,441.0	6.77	121.01	7,424.9	-3,823.9	-166.9	264.2	-157.4	0.50	0.14	-4.16
7,535.0	6.73	121.71	7,518.2	-3,917.2	-172.7	273.7	-162.8	0.10	-0.04	0.74
7,629.0	5.58	120.39	7,611.7	-4,010.7	-177.9	282.3	-167.7	1.23	-1.22	-1.40
7,723.0	5.93	121.80	7,705.2	-4,104.2	-182.8	290.4	-172.3	0.40	0.37	1.50
7,817.0	7.38	115.56	7,798.6	-4,197.6	-187.9	300.0	-177.1	1.72	1.54	-6.64
7,911.0	7.12	113.80	7,891.8	-4,290.8	-192.9	310.7	-181.7	0.36	-0.28	-1.87
8,005.0	6.81	114.77	7,985.2	-4,384.2	-197.6	321.1	-186.0	0.35	-0.33	1.03
8,099.0	5.14	118.99	8,078.6	-4,477.6	-201.9	329.9	-190.0	1.84	-1.78	4.49
8,193.0	4.66	126.81	8,172.3	-4,571.3	-206.3	336.6	-194.1	0.87	-0.51	8.32
8,288.0	4.97	125.32	8,267.0	-4,666.0	-211.0	343.1	-198.6	0.35	0.33	-1.57
8,382.0	6.73	117.23	8,360.5	-4,759.5	-215.8	351.3	-203.2	2.06	1.87	-8.61
8,476.0	6.51	116.35	8,453.8	-4,852.8	-220.7	360.9	-207.7	0.26	-0.23	-0.94
8,570.0	7.12	122.24	8,547.2	-4,946.2	-226.2	370.6	-212.8	0.99	0.65	6.27
8,664.0	7.03	127.07	8,640.5	-5,039.5	-232.8	380.2	-219.1	0.64	-0.10	5.14
8,759.0	5.89	129.45	8,734.9	-5,133.9	-239.4	388.6	-225.4	1.23	-1.20	2.51
8,853.0	5.67	120.31	8,828.4	-5,227.4	-244.8	396.3	-230.5	1.01	-0.23	-9.72
8,948.0	5.80	114.77	8,922.9	-5,321.9	-249.2	404.7	-234.6	0.60	0.14	-5.83
9,042.0	4.44	115.30	9,016.5	-5,415.5	-252.7	412.3	-237.8	1.45	-1.45	0.56
KOP @ 9109' MD; 72' FSL & 439' FEL SEC 3										
9,109.0	3.77	98.82	9,083.4	-5,482.4	-254.1	416.8	-239.1	2.02	-1.01	-24.59
9,120.0	3.69	95.61	9,094.3	-5,493.3	-254.2	417.5	-239.2	2.02	-0.68	-29.20
9,161.0	5.98	64.67	9,135.2	-5,534.2	-253.4	420.8	-238.3	8.28	5.59	-75.46
9,208.0	10.82	35.23	9,181.7	-5,580.7	-248.8	425.5	-233.5	13.46	10.30	-62.64
9,255.0	15.83	21.43	9,227.4	-5,626.4	-239.2	430.4	-223.7	12.55	10.66	-29.36
9,302.0	20.93	12.38	9,272.0	-5,671.0	-225.0	434.6	-209.4	12.40	10.85	-19.26
9,349.0	25.94	8.51	9,315.1	-5,714.1	-206.7	437.9	-190.9	11.15	10.66	-8.23
9,444.0	36.14	4.29	9,396.4	-5,795.4	-158.0	443.1	-142.1	10.97	10.74	-4.44
9,538.0	48.36	5.78	9,465.9	-5,864.9	-95.2	448.7	-79.2	13.04	13.00	1.59
9,632.0	58.48	6.84	9,521.8	-5,920.8	-20.3	457.1	-4.0	10.80	10.77	1.13
9,726.0	68.85	6.75	9,563.5	-5,962.5	63.3	467.0	79.9	11.03	11.03	-0.10
9,820.0	75.45	0.78	9,592.3	-5,991.3	152.4	472.8	169.2	9.26	7.02	-6.35
9,914.0	81.07	355.94	9,611.4	-6,010.4	244.4	470.1	261.0	7.82	5.98	-5.15
9,982.0	90.31	0.07	9,616.5	-6,015.5	312.1	467.8	328.5	14.87	13.59	6.07
10,059.0	91.91	0.78	9,615.0	-6,014.0	389.0	468.3	405.5	2.27	2.08	0.92
10,153.0	92.48	0.95	9,611.4	-6,010.4	483.0	469.8	499.4	0.63	0.61	0.18
10,247.0	90.24	0.42	9,609.2	-6,008.2	576.9	470.9	593.3	2.45	-2.38	-0.56
10,342.0	90.11	0.60	9,608.9	-6,007.9	671.9	471.7	688.3	0.23	-0.14	0.19
10,436.0	91.65	359.11	9,607.5	-6,006.5	765.9	471.5	782.2	2.28	1.64	-1.59
10,530.0	91.25	358.58	9,605.1	-6,004.1	859.8	469.6	876.0	0.71	-0.43	-0.56
10,624.0	91.34	359.46	9,603.0	-6,002.0	953.8	468.0	969.9	0.94	0.10	0.94
10,718.0	90.73	358.75	9,601.3	-6,000.3	1,047.8	466.5	1,063.7	1.00	-0.65	-0.76

Survey Report



Company:	DEVON ENERGY (US)	Local Co-ordinate Reference:	Well NORTH THISTLE 3-34 STATE COM #6H
Project:	LEA COUNTY, NEW MEXICO (NAD83-GF)	TVD Reference:	KB 30' @ 3601.0usft (H&P 540)
Site:	SEC. 3 T23S R33E	MD Reference:	KB 30' @ 3601.0usft (H&P 540)
Well:	NORTH THISTLE 3-34 STATE COM #6H	North Reference:	Grid
Wellbore:	JOB # 2018-772-540	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	Database 1

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,813.0	90.29	358.67	9,600.4	-5,999.4	1,142.7	464.4	1,158.6	0.47	-0.46	-0.08
10,907.0	91.08	358.23	9,599.3	-5,998.3	1,236.7	461.8	1,252.4	0.96	0.84	-0.47
10,997.0	92.53	358.14	9,596.5	-5,995.5	1,326.6	459.0	1,342.1	1.61	1.61	-0.10
11,089.0	92.53	357.26	9,592.4	-5,991.4	1,418.4	455.3	1,433.8	0.96	0.00	-0.96
11,180.0	91.91	358.84	9,588.9	-5,987.9	1,509.3	452.2	1,524.5	1.86	-0.68	1.74
11,270.0	89.85	359.90	9,587.5	-5,986.5	1,599.3	451.2	1,614.4	2.57	-2.29	1.18
11,361.0	91.16	0.34	9,586.7	-5,985.7	1,690.3	451.4	1,705.3	1.52	1.44	0.48
11,450.0	93.27	1.21	9,583.3	-5,982.3	1,779.2	452.6	1,794.2	2.56	2.37	0.98
11,541.0	91.87	0.95	9,579.2	-5,978.2	1,870.1	454.3	1,885.1	1.56	-1.54	-0.29
11,632.0	90.81	1.30	9,577.1	-5,976.1	1,961.1	456.1	1,976.1	1.23	-1.16	0.38
11,723.0	88.31	1.48	9,577.8	-5,976.8	2,052.0	458.3	2,067.1	2.75	-2.75	0.20
11,813.0	87.96	1.04	9,580.7	-5,979.7	2,142.0	460.3	2,157.0	0.62	-0.39	-0.49
11,904.0	87.60	1.74	9,584.2	-5,983.2	2,232.9	462.5	2,247.9	0.86	-0.40	0.77
11,994.0	88.66	359.11	9,587.1	-5,986.1	2,322.8	463.2	2,337.8	3.15	1.18	-2.92
12,086.0	93.10	359.98	9,585.7	-5,984.7	2,414.8	462.4	2,429.7	4.92	4.83	0.95
12,181.0	88.97	359.98	9,584.0	-5,983.0	2,509.7	462.4	2,524.6	4.35	-4.35	0.00
12,275.0	88.79	359.90	9,585.9	-5,984.9	2,603.7	462.3	2,618.5	0.21	-0.19	-0.09
12,369.0	90.51	0.69	9,586.4	-5,985.4	2,697.7	462.8	2,712.5	2.01	1.83	0.84
12,463.0	90.95	0.25	9,585.2	-5,984.2	2,791.7	463.6	2,806.4	0.66	0.47	-0.47
12,557.0	92.18	359.90	9,582.7	-5,981.7	2,885.7	463.7	2,900.3	1.36	1.31	-0.37
12,651.0	91.56	359.46	9,579.6	-5,978.6	2,979.6	463.2	2,994.2	0.81	-0.66	-0.47
12,745.0	87.96	355.68	9,580.0	-5,979.0	3,073.5	459.2	3,087.9	5.55	-3.83	-4.02
12,839.0	86.95	353.57	9,584.2	-5,983.2	3,167.0	450.4	3,181.0	2.49	-1.07	-2.24
12,934.0	88.31	353.30	9,588.1	-5,987.1	3,261.3	439.5	3,274.9	1.46	1.43	-0.28
13,028.0	90.68	356.38	9,588.9	-5,987.9	3,354.9	431.1	3,368.1	4.13	2.52	3.28
13,122.0	91.82	358.14	9,586.9	-5,985.9	3,448.7	426.6	3,461.7	2.23	1.21	1.87
13,217.0	92.18	0.34	9,583.6	-5,982.6	3,543.7	425.3	3,556.6	2.35	0.38	2.32
13,311.0	91.03	359.72	9,580.9	-5,979.9	3,637.6	425.4	3,650.5	1.39	-1.22	-0.66
13,405.0	92.88	3.41	9,577.7	-5,976.7	3,731.5	427.9	3,744.4	4.39	1.97	3.93
13,500.0	91.60	3.32	9,574.0	-5,973.0	3,826.3	433.5	3,839.3	1.35	-1.35	-0.09
13,594.0	89.98	2.36	9,572.7	-5,971.7	3,920.1	438.2	3,933.3	2.00	-1.72	-1.02
13,688.0	87.25	0.86	9,575.0	-5,974.0	4,014.1	440.8	4,027.2	3.31	-2.90	-1.60
13,782.0	89.41	0.34	9,577.7	-5,976.7	4,108.0	441.8	4,121.1	2.36	2.30	-0.55
13,876.0	89.54	0.07	9,578.6	-5,977.6	4,202.0	442.1	4,215.1	0.32	0.14	-0.29
13,971.0	89.23	359.28	9,579.6	-5,978.6	4,297.0	441.6	4,310.0	0.89	-0.33	-0.83
14,065.0	89.19	359.19	9,580.9	-5,979.9	4,391.0	440.3	4,403.9	0.10	-0.04	-0.10
14,159.0	91.03	0.69	9,580.7	-5,979.7	4,485.0	440.2	4,497.8	2.53	1.96	1.60
14,254.0	91.96	1.04	9,578.2	-5,977.2	4,579.9	441.7	4,592.8	1.05	0.98	0.37
14,348.0	93.32	2.09	9,573.9	-5,972.9	4,673.8	444.2	4,686.7	1.83	1.45	1.12
14,442.0	90.68	1.74	9,570.6	-5,969.6	4,767.7	447.4	4,780.6	2.83	-2.81	-0.37
14,536.0	89.80	1.92	9,570.2	-5,969.2	4,861.6	450.4	4,874.6	0.96	-0.94	0.19
14,630.0	89.63	359.63	9,570.7	-5,969.7	4,955.6	451.6	4,968.6	2.44	-0.18	-2.44
14,724.0	87.12	357.87	9,573.4	-5,972.4	5,049.5	449.6	5,062.4	3.26	-2.67	-1.87
14,818.0	85.45	357.35	9,579.5	-5,978.5	5,143.3	445.7	5,155.9	1.86	-1.78	-0.55
14,913.0	87.34	357.17	9,585.4	-5,984.4	5,238.0	441.2	5,250.3	2.00	1.99	-0.19
15,007.0	88.66	357.70	9,588.7	-5,987.7	5,331.8	437.0	5,344.0	1.51	1.40	0.56
15,101.0	90.22	358.05	9,589.6	-5,988.6	5,425.7	433.5	5,437.7	1.70	1.66	0.37
15,195.0	90.57	357.79	9,589.0	-5,988.0	5,519.7	430.1	5,531.5	0.46	0.37	-0.28
15,290.0	90.31	359.81	9,588.2	-5,987.2	5,614.6	428.1	5,626.3	2.14	-0.27	2.13
15,384.0	90.48	359.46	9,587.6	-5,986.6	5,708.6	427.5	5,720.2	0.41	0.18	-0.37
15,478.0	90.13	359.54	9,587.1	-5,986.1	5,802.6	426.6	5,814.1	0.38	-0.37	0.09
15,573.0	90.48	0.25	9,586.6	-5,985.6	5,897.6	426.5	5,909.1	0.83	0.37	0.75
15,667.0	90.57	0.51	9,585.7	-5,984.7	5,991.6	427.1	6,003.0	0.29	0.10	0.28

Survey Report



Company:	DEVON ENERGY (US)	Local Co-ordinate Reference:	Well NORTH THISTLE 3-34 STATE COM #6H
Project:	LEA COUNTY, NEW MEXICO (NAD83-GF)	TVD Reference:	KB 30' @ 3601.0usft (H&P 540)
Site:	SEC. 3 T23S R33E	MD Reference:	KB 30' @ 3601.0usft (H&P 540)
Well:	NORTH THISTLE 3-34 STATE COM #6H	North Reference:	Grid
Wellbore:	JOB # 2018-772-540	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	Database 1

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
15,761.0	90.75	0.51	9,584.6	-5,983.6	6,085.6	427.9	6,097.0	0.19	0.19	0.00
15,855.0	89.69	358.67	9,584.3	-5,983.3	6,179.6	427.3	6,190.9	2.26	-1.13	-1.96
15,950.0	90.13	358.40	9,584.4	-5,983.4	6,274.6	424.8	6,285.7	0.54	0.46	-0.28
16,044.0	90.40	358.31	9,584.0	-5,983.0	6,368.5	422.1	6,379.5	0.30	0.29	-0.10
16,138.0	90.66	358.31	9,583.1	-5,982.1	6,462.5	419.4	6,473.3	0.28	0.28	0.00
16,233.0	89.43	358.75	9,583.1	-5,982.1	6,557.4	416.9	6,568.1	1.38	-1.29	0.46
16,327.0	90.13	358.67	9,583.4	-5,982.4	6,651.4	414.8	6,662.0	0.75	0.74	-0.09
16,421.0	90.48	359.02	9,582.9	-5,981.9	6,745.4	412.9	6,755.8	0.53	0.37	0.37
16,515.0	90.75	358.84	9,581.9	-5,980.9	6,839.4	411.2	6,849.7	0.35	0.29	-0.19
16,609.0	90.22	358.67	9,581.1	-5,980.1	6,933.4	409.1	6,943.5	0.59	-0.56	-0.18
16,703.0	90.66	358.23	9,580.4	-5,979.4	7,027.3	406.6	7,037.3	0.66	0.47	-0.47
16,797.0	90.57	359.46	9,579.4	-5,978.4	7,121.3	404.7	7,131.2	1.31	-0.10	1.31
16,892.0	90.66	359.81	9,578.4	-5,977.4	7,216.3	404.1	7,226.1	0.38	0.09	0.37
16,986.0	90.13	359.54	9,577.7	-5,976.7	7,310.3	403.5	7,320.0	0.63	-0.56	-0.29
17,080.0	91.71	0.07	9,576.2	-5,975.2	7,404.3	403.2	7,413.9	1.77	1.68	0.56
17,174.0	90.31	359.37	9,574.6	-5,973.6	7,498.2	402.8	7,507.8	1.67	-1.49	-0.74
17,268.0	89.78	359.11	9,574.5	-5,973.5	7,592.2	401.5	7,601.7	0.63	-0.56	-0.28
17,362.0	88.81	358.75	9,575.6	-5,974.6	7,686.2	399.8	7,695.6	1.10	-1.03	-0.38
17,457.0	90.22	358.93	9,576.4	-5,975.4	7,781.2	397.8	7,790.4	1.50	1.48	0.19
17,551.0	90.15	358.75	9,576.1	-5,975.1	7,875.2	395.9	7,884.3	0.21	-0.07	-0.19
17,645.0	90.64	358.67	9,575.5	-5,974.5	7,969.1	393.8	7,978.1	0.53	0.52	-0.09
17,740.0	90.33	0.60	9,574.7	-5,973.7	8,064.1	393.2	8,073.0	2.06	-0.33	2.03
17,834.0	90.99	0.42	9,573.6	-5,972.6	8,158.1	394.0	8,167.0	0.73	0.70	-0.19
17,928.0	88.92	0.95	9,573.7	-5,972.7	8,252.1	395.2	8,260.9	2.27	-2.20	0.56
18,023.0	88.00	0.78	9,576.2	-5,975.2	8,347.1	396.6	8,355.9	0.98	-0.97	-0.18
18,116.0	89.14	0.42	9,578.5	-5,977.5	8,440.0	397.6	8,448.8	1.29	1.23	-0.39
18,210.0	91.69	1.04	9,577.9	-5,976.9	8,534.0	398.8	8,542.8	2.79	2.71	0.66
18,305.0	92.35	1.21	9,574.5	-5,973.5	8,628.9	400.6	8,637.7	0.72	0.69	0.18
18,399.0	90.15	0.16	9,572.5	-5,971.5	8,722.9	401.8	8,731.7	2.59	-2.34	-1.12
18,493.0	89.10	359.90	9,573.1	-5,972.1	8,816.9	401.8	8,825.6	1.15	-1.12	-0.28
18,588.0	88.31	359.63	9,575.2	-5,974.2	8,911.9	401.4	8,920.5	0.88	-0.83	-0.28
18,682.0	90.07	358.58	9,576.6	-5,975.6	9,005.8	400.0	9,014.4	2.18	1.87	-1.12
18,777.0	90.15	358.67	9,576.4	-5,975.4	9,100.8	397.7	9,109.2	0.13	0.08	0.09
18,871.0	90.15	358.14	9,576.1	-5,975.1	9,194.8	395.1	9,203.0	0.56	0.00	-0.56
18,965.0	90.81	357.79	9,575.3	-5,974.3	9,288.7	391.7	9,296.8	0.79	0.70	-0.37
19,059.0	90.55	357.70	9,574.2	-5,973.2	9,382.6	388.0	9,390.5	0.29	-0.28	-0.10
19,153.0	90.95	359.11	9,573.0	-5,972.0	9,476.6	385.4	9,484.3	1.56	0.43	1.50
19,248.0	91.03	358.84	9,571.4	-5,970.4	9,571.6	383.7	9,579.1	0.30	0.08	-0.28
19,342.0	90.64	358.23	9,570.0	-5,969.0	9,665.5	381.3	9,673.0	0.77	-0.41	-0.65
19,436.0	90.95	358.05	9,568.7	-5,967.7	9,759.5	378.3	9,766.7	0.38	0.33	-0.19
19,530.0	91.12	357.96	9,567.0	-5,966.0	9,853.4	375.0	9,860.5	0.20	0.18	-0.10
19,624.0	90.55	358.05	9,565.6	-5,964.6	9,947.3	371.7	9,954.2	0.61	-0.61	0.10
19,718.0	89.45	357.79	9,565.6	-5,964.6	10,041.2	368.3	10,048.0	1.20	-1.17	-0.28
LTP @ 19798' MD, 100' FNL & 400' FEL SEC 34										
19,797.9	89.93	357.79	9,566.0	-5,965.0	10,121.1	365.2	10,127.7	0.60	0.60	0.00
LAST SURVEY @ 19798' MD										
19,798.0	89.93	357.79	9,566.0	-5,965.0	10,121.2	365.2	10,127.8	0.60	0.60	0.00
PROJECTION TO TD 19856' MD; 42' FNL & 402' FEL SEC 34										
19,856.0	89.93	357.79	9,566.1	-5,965.1	10,179.1	363.0	10,185.6	0.00	0.00	0.00

Survey Report



Company:	DEVON ENERGY (US)	Local Co-ordinate Reference:	Well NORTH THISTLE 3-34 STATE COM #6H
Project:	LEA COUNTY, NEW MEXICO (NAD83-GF)	TVD Reference:	KB 30' @ 3601.0usft (H&P 540)
Site:	SEC. 3 T23S R33E	MD Reference:	KB 30' @ 3601.0usft (H&P 540)
Well:	NORTH THISTLE 3-34 STATE COM #6H	North Reference:	Grid
Wellbore:	JOB # 2018-772-540	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	Database 1

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
FTP - NORTH THISTLE - survey misses target center by 180.8usft at 9538.0usft MD (9465.9 TVD, -95.2 N, 448.7 E) - Point	0.00	0.00	9,591.0	-222.3	478.4	483,492.68	782,399.45	32° 19' 36.408 N	103° 33' 10.490 W
LTP - NORTH THISTLE - survey misses target center by 32.1usft at 19797.2usft MD (9566.0 TVD, 10120.4 N, 365.2 E) - Point	0.00	0.00	9,591.0	10,121.1	385.4	493,835.81	782,306.47	32° 21' 18.760 N	103° 33' 10.696 W
0' VS - NORTH THISTLE - survey misses target center by 466.8usft at 9643.4usft MD (9527.7 TVD, -10.6 N, 458.2 E) - Point	0.00	0.00	9,616.0	0.0	0.0	483,715.00	781,921.10	32° 19' 38.642 N	103° 33' 16.046 W
BHL - NORTH THISTLE - survey misses target center by 34.3usft at 19856.0usft MD (9566.1 TVD, 10179.1 N, 363.0 E) - Rectangle (sides W10,425.0 H100.0 D0.0)	0.00	0.00	9,581.0	10,201.2	384.7	493,915.90	782,305.80	32° 21' 19.552 N	103° 33' 10.697 W
LAT T1 - NORTH THIST - survey misses target center by 10.7usft at 11825.5usft MD (9581.1 TVD, 2154.5 N, 460.5 E) - Point	0.00	0.00	9,591.0	2,154.2	456.3	485,869.15	782,377.42	32° 19' 59.925 N	103° 33' 10.545 W

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/S (usft)	+E/W (usft)	
1,015.0	1,014.9	6.9	6.2	13 5/8" CASING
5,155.0	5,152.3	-28.8	62.0	9 5/8" CASING
9,109.0	9,083.4	-254.1	416.8	KOP @ 9109' MD; 72' FSL & 439' FEL SEC 3
19,797.9	9,566.0	10,121.1	365.2	LTP @ 19798' MD, 100' FNL & 400' FEL SEC 34
19,798.0	9,566.0	10,121.2	365.2	LAST SURVEY @ 19798' MD
19,856.0	9,566.1	10,179.1	363.0	PROJECTION TO TD 19856' MD; 42' FNL & 402' FEL SEC 34

Checked By: _____ Approved By: _____ Date: _____