

Total Directional
Services, LLC

USA Operations

P.O Box 831, Windsor, CO 80550 | P:970.686.8893 | F:970.686.8894 | www.totaldirectional.com

Final MWD Survey Certification

Leah County, NM

Client: DEVON

Well Name: North Thistle 3-34 State Com 5H

Total Job No: 2018-765-540

API No: 30-025-45074

Start Date: 12/16/2018

End Date: 12/20/2018

Measured Start Depth: 10,067 feet

Measured End Depth: 19926 feet

Vertical Section from well center at TD: 10213.57 feet

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: 06/12/19

Signed: *Syon Elijah*

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DEVON ENERGY (US)

LEA COUNTY, NEW MEXICO (NAD83-GRID)

SEC. 3 T23S R33E

**NORTH THISTLE 3-34 STATE COM #5H - Slot NORTH THISTLE
3-34 STATE COM #5H**

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 #5H
 Wellbore: JOB # 2018-765-540
 Design: FINAL SURVEYS

ANNOTATIONS

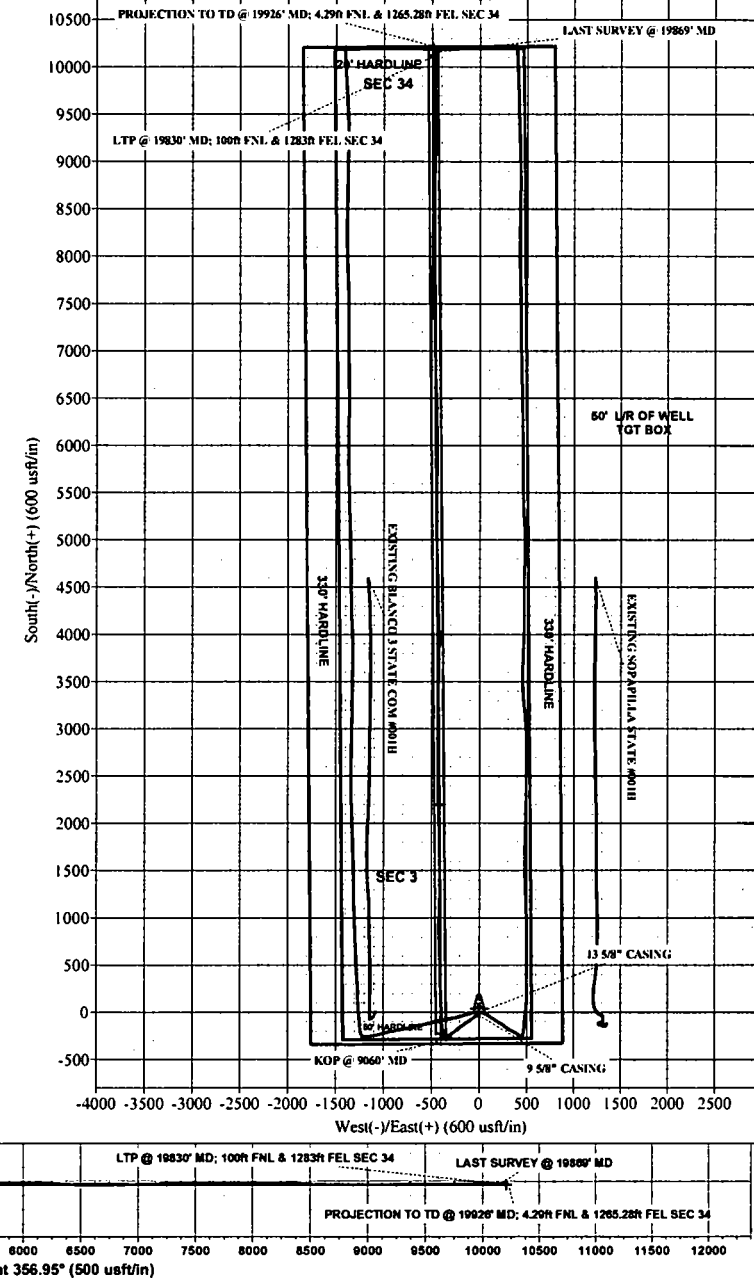
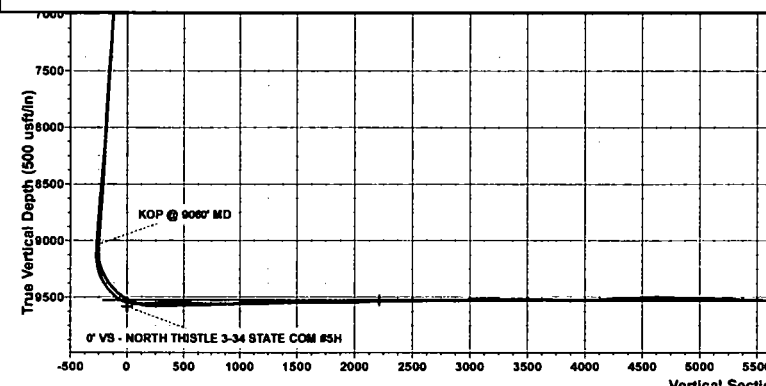
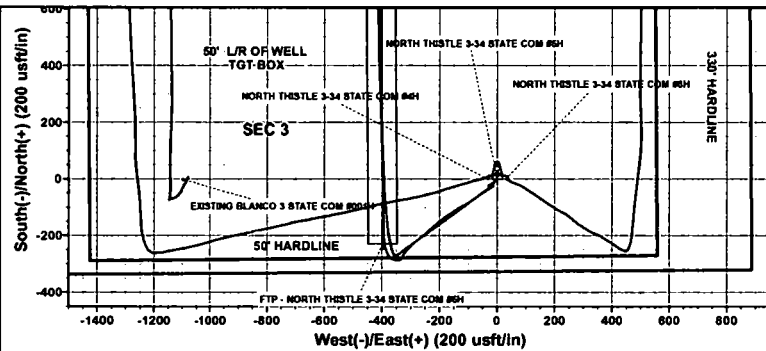
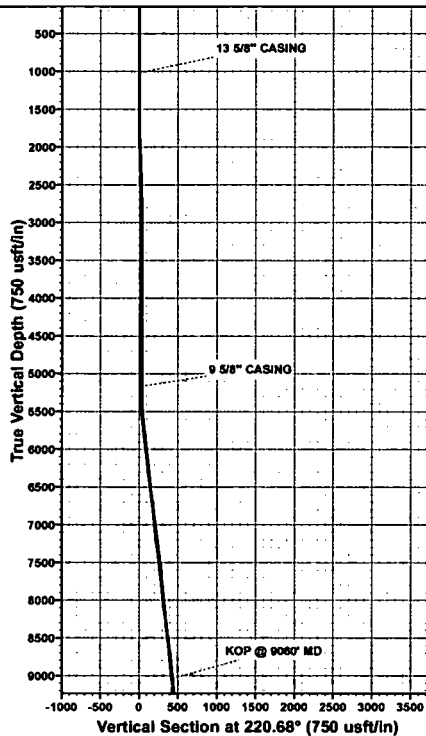
TVD	MD	Inc	Azi	+N/-S	+E/-W	VSec	Departure	Annotation
1014.00	1014.00	0.08	288.35	-0.80	-0.24	-0.89	2.82	13 5/8" CASING
5187.13	5188.00	0.58	80.90	-25.24	-13.08	-24.51	89.81	9 5/8" CASING
9034.88	9060.00	5.06	230.04	-283.97	-334.82	-265.78	489.83	KOP @ 9060' MD
9520.91	9830.23	91.13	359.57	10116.41	-489.98	10127.09	10929.16	LTP @ 19830' MD; 100R FNL & 1283R FEL SEC 34
9520.06	9889.00	91.40	359.50	10155.17	-470.29	10185.81	10987.92	LAST SURVEY @ 19889' MD
9518.88	9928.00	91.40	359.50	10212.15	-470.79	10222.73	11024.90	PROJECTION TO TD @ 19928' MD; 4.29R FNL & 1265.28R FEL SEC 34

AS DRILLED LOCAL COORDINATES:

SHL: 326R FSL & 886R FEL of Sec 3
 BHL: 4.29R FNL & 1265.28R FEL of Sec 34

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
0' VS - NORTH THISTLE 3-34 STATE COM #5H	9581.00	0.00	0.00	32.327401°N	103.554554°W
BHL - NORTH THISTLE 3-34 STATE COM #5H	9528.00	10198.45	-489.31	32.355438°N	103.555899°W
FTP - NORTH THISTLE 3-34 STATE COM #5H	10116.20	-228.80	-395.80	32.326780°N	103.555841°W
LTP - NORTH THISTLE 3-34 STATE COM #5H	9528.00	2198.42	-418.10	32.333448°N	103.555858°W
LTP - NORTH THISTLE 3-34 STATE COM #5H	10116.20	10118.41	-488.51	32.355218°N	103.555898°W



Survey Report



Company:	DEVON ENERGY (US)	Local Co-ordinate Reference:	Well NORTH THISTLE 3-34 STATE COM #5H - Slot NO
Project:	LEA COUNTY, NEW MEXICO (NAD83-GR)	TVD Reference:	KB 30' @ 3601.00usft (H&P 540)
Site:	SEC. 3 T23S R33E	MD Reference:	KB 30' @ 3601.00usft (H&P 540)
Well:	NORTH THISTLE 3-34 STATE COM #5H	North Reference:	Grid
Wellbore:	JOB # 2018-765-540	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:	0.00 usft	Slot Radius:	1.10 ft
		Latitude:	32.327401°N
		Longitude:	103.554554°W
		Grid Convergence:	0.42 °

Well	NORTH THISTLE 3-34 STATE COM #5H - Slot NORTH THISTLE 3-34 STATE COM #5H		
Well Position	+N-S	0.00 usft	Northing: 483,714.90 usft
	+E-W	0.00 usft	Easting: 781,891.10 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32.327401°N
		Longitude:	103.554554°W
		Ground Level:	3,571.00 usft

Wellbore	JOB # 2018-765-540		
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:	0.00
Vertical Section:	Depth From (TVD)	+N-S	+E-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction (°)
			356.95

Survey Program	Date 23/01/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
169.00	19,926.00	FINAL SURVEYS (JOB # 2018-765-540)	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)
0.00	0.00	0.00	0.00	3,601.00	0.00	0.00	0.00	0.00	0.00	0.00
169.00	0.16	280.51	169.00	3,432.00	0.04	-0.23	0.06	0.09	0.09	0.00
261.00	0.03	30.79	261.00	3,340.00	0.09	-0.35	0.11	0.19	-0.14	119.87
351.00	0.26	214.47	351.00	3,250.00	-0.06	-0.45	-0.04	0.32	0.26	-195.91
441.00	0.04	145.80	441.00	3,160.00	-0.26	-0.55	-0.23	0.28	-0.24	-76.30
533.00	0.26	174.70	533.00	3,068.00	-0.49	-0.51	-0.46	0.25	0.24	31.41
621.00	0.24	156.10	621.00	2,980.00	-0.86	-0.42	-0.83	0.09	-0.02	-21.14
712.00	0.20	194.66	712.00	2,889.00	-1.18	-0.38	-1.16	0.16	-0.04	42.37
804.00	0.31	39.89	804.00	2,797.00	-1.15	-0.26	-1.13	0.54	0.12	-168.23
935.00	0.09	255.07	935.00	2,666.00	-0.90	-0.13	-0.90	0.30	-0.17	-110.55
10 5/8" CASING										
1,014.00	0.08	288.35	1,014.00	2,587.00	-0.90	-0.24	-0.89	0.06	-0.01	42.12
1,073.00	0.09	312.54	1,073.00	2,528.00	-0.86	-0.32	-0.84	0.06	0.02	41.00

Survey Report



Company:	DEVON ENERGY (US)	Local Co-ordinate Reference:	Well NORTH THISTLE 3-34 STATE COM #5H - Slot NO
Project:	LEA COUNTY, NEW MEXICO (NAD83-GF)	TVD Reference:	KB 30' @ 3601.00usft (H&P 540)
Site:	SEC. 3 T23S R33E	MD Reference:	KB 30' @ 3601.00usft (H&P 540)
Well:	NORTH THISTLE 3-34 STATE COM #5H	North Reference:	Grid
Wellbore:	JOB # 2018-765-540	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)
1,163.00	0.10	321.39	1,163.00	2,438.00	-0.75	-0.42	-0.73	0.02	0.01	9.83
1,253.00	0.09	280.05	1,253.00	2,348.00	-0.68	-0.54	-0.65	0.08	-0.01	-45.93
1,345.00	0.10	126.30	1,345.00	2,256.00	-0.71	-0.54	-0.68	0.20	0.01	-167.12
1,438.00	0.23	123.67	1,438.00	2,163.00	-0.86	-0.32	-0.84	0.14	0.14	-2.83
1,532.00	0.24	75.21	1,531.99	2,069.01	-0.92	0.02	-0.92	0.21	0.01	-51.55
1,626.00	0.80	231.00	1,625.99	1,975.01	-1.28	-0.30	-1.26	1.09	0.60	165.73
1,720.00	1.78	231.68	1,719.97	1,881.03	-2.60	-1.95	-2.49	1.04	1.04	0.72
1,815.00	2.80	228.75	1,814.89	1,786.11	-5.04	-4.85	-4.78	1.08	1.07	-3.08
1,908.00	2.83	229.57	1,907.78	1,693.22	-8.03	-8.31	-7.58	0.05	0.03	0.88
2,003.00	2.57	230.34	2,002.67	1,598.33	-10.91	-11.73	-10.27	0.28	-0.27	0.81
2,097.00	2.36	229.52	2,096.59	1,504.41	-13.51	-14.83	-12.70	0.23	-0.22	-0.87
2,191.00	2.16	229.23	2,190.51	1,410.49	-15.92	-17.64	-14.96	0.21	-0.21	-0.31
2,285.00	2.03	229.66	2,284.45	1,316.55	-18.16	-20.25	-17.06	0.14	-0.14	0.46
2,379.00	1.77	231.58	2,378.40	1,222.60	-20.14	-22.66	-18.90	0.28	-0.28	2.04
2,474.00	1.42	238.48	2,473.36	1,127.64	-21.67	-24.81	-20.32	0.42	-0.37	7.26
2,568.00	1.30	239.19	2,567.33	1,033.67	-22.82	-26.72	-21.37	0.13	-0.13	0.76
2,663.00	0.95	243.15	2,662.32	938.68	-23.73	-28.35	-22.19	0.38	-0.37	4.17
2,757.00	0.88	242.43	2,756.30	844.70	-24.41	-29.68	-22.80	0.08	-0.07	-0.77
2,851.00	0.67	247.20	2,850.30	750.70	-24.96	-30.83	-23.29	0.23	-0.22	5.07
2,946.00	0.31	53.73	2,945.29	655.71	-25.02	-31.13	-23.33	1.03	-0.38	175.29
3,040.00	0.65	41.37	3,039.29	561.71	-24.47	-30.58	-22.81	0.38	0.36	-13.15
3,134.00	0.65	50.62	3,133.28	467.72	-23.74	-29.81	-22.12	0.11	0.00	9.84
3,228.00	0.53	46.15	3,227.28	373.72	-23.10	-29.09	-21.52	0.14	-0.13	-4.76
3,322.00	0.67	49.13	3,321.27	279.73	-22.44	-28.36	-20.90	0.15	0.15	3.17
3,416.00	0.73	60.31	3,415.27	185.73	-21.78	-27.42	-20.29	0.16	0.06	11.89
3,510.00	0.79	47.36	3,509.26	91.74	-21.04	-26.43	-19.61	0.19	0.06	-13.78
3,604.00	0.55	46.36	3,603.25	-2.25	-20.29	-25.62	-18.90	0.26	-0.26	-1.06
3,699.00	0.55	48.12	3,698.25	-97.25	-19.67	-24.95	-18.32	0.02	0.00	1.85
3,793.00	0.42	45.56	3,792.24	-191.24	-19.13	-24.37	-17.81	0.14	-0.14	-2.72
3,887.00	0.15	58.38	3,886.24	-285.24	-18.83	-24.02	-17.52	0.29	-0.29	13.64
3,982.00	0.27	134.51	3,981.24	-380.24	-18.92	-23.75	-17.63	0.29	0.13	80.14
4,076.00	0.52	129.84	4,075.24	-474.24	-19.35	-23.27	-18.08	0.27	0.27	-4.97
4,170.00	0.86	144.70	4,169.23	-568.23	-20.19	-22.53	-18.97	0.41	0.36	15.81
4,265.00	0.79	149.26	4,264.22	-663.22	-21.34	-21.79	-20.15	0.10	-0.07	4.80
4,359.00	0.54	184.27	4,358.22	-757.22	-22.34	-21.49	-21.16	0.50	-0.27	37.24
4,453.00	0.67	167.36	4,452.21	-851.21	-23.32	-21.40	-22.15	0.23	0.14	-17.99
4,547.00	0.87	135.54	4,546.20	-945.20	-24.36	-20.78	-23.22	0.49	0.21	-33.85
4,641.00	1.32	122.15	4,640.19	-1,039.19	-25.45	-19.36	-24.38	0.55	0.48	-14.24
4,736.00	1.42	116.75	4,735.16	-1,134.16	-26.56	-17.39	-25.60	0.17	0.11	-5.68
4,830.00	0.68	71.64	4,829.14	-1,228.14	-26.91	-15.82	-26.03	1.12	-0.79	-47.99
4,924.00	0.60	55.21	4,923.14	-1,322.14	-26.45	-14.88	-25.62	0.21	-0.09	-17.48
5,018.00	0.58	55.97	5,017.13	-1,416.13	-25.90	-14.09	-25.12	0.02	-0.02	0.81
5,112.00	0.34	54.61	5,111.13	-1,510.13	-25.48	-13.46	-24.72	0.26	-0.26	-1.45
9 5/8" CASING										
5,168.00	0.58	60.90	5,167.13	-1,566.13	-25.24	-13.08	-24.51	0.44	0.43	11.24
5,179.00	0.63	61.57	5,178.13	-1,577.13	-25.19	-12.98	-24.46	0.44	0.44	6.05
5,273.00	0.23	63.44	5,272.13	-1,671.13	-24.86	-12.35	-24.16	0.43	-0.43	1.99
5,367.00	1.52	229.48	5,366.12	-1,765.12	-25.58	-13.13	-24.85	1.86	1.37	176.64
5,461.00	3.19	238.15	5,460.03	-1,859.03	-27.77	-16.30	-26.87	1.81	1.78	9.22
5,555.00	5.14	238.85	5,553.78	-1,952.78	-31.33	-22.13	-30.11	2.08	2.07	0.74
5,650.00	6.91	238.80	5,648.25	-2,047.25	-36.49	-30.66	-34.81	1.86	1.86	-0.05
5,744.00	7.01	239.08	5,741.56	-2,140.56	-42.37	-40.42	-40.16	0.11	0.11	0.30
5,838.00	7.82	235.27	5,834.77	-2,233.77	-48.96	-50.59	-46.20	1.01	0.86	-4.05

Survey Report



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Project:	LEA COUNTY, NEW MEXICO (NAD83-GF)	TVD Reference:	KB 30' @ 3601.00usft (H&P 540)
Site:	SEC. 3 T23S R33E	MD Reference:	KB 30' @ 3601.00usft (H&P 540)
Well:	NORTH THISTLE 3-34 STATE COM #5H	North Reference:	Grid
Wellbore:	JOB # 2018-765-540	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)
5,932.00	7.61	234.55	5,927.92	-2,326.92	-56.21	-60.92	-52.89	0.25	-0.22	-0.77
6,026.00	7.18	234.37	6,021.14	-2,420.14	-63.25	-70.77	-59.39	0.46	-0.46	-0.19
6,121.00	6.70	233.00	6,115.44	-2,514.44	-70.04	-80.02	-65.69	0.53	-0.51	-1.44
6,215.00	6.58	232.47	6,208.81	-2,607.81	-76.62	-88.67	-71.80	0.14	-0.13	-0.56
6,309.00	6.76	241.49	6,302.18	-2,701.18	-82.54	-97.80	-77.23	1.13	0.19	9.60
6,403.00	6.98	242.99	6,395.51	-2,794.51	-87.78	-107.75	-81.92	0.30	0.23	1.60
6,498.00	6.95	242.07	6,489.80	-2,888.80	-93.09	-117.97	-86.69	0.12	-0.03	-0.97
6,592.00	7.50	236.52	6,583.06	-2,982.06	-99.14	-128.11	-92.19	0.94	0.59	-5.90
6,686.00	7.49	235.33	6,676.26	-3,075.26	-106.01	-138.27	-98.51	0.17	-0.01	-1.27
6,780.00	7.56	235.25	6,769.45	-3,168.45	-113.02	-148.39	-104.97	0.08	0.07	-0.09
6,874.00	7.42	236.37	6,862.64	-3,261.64	-119.90	-158.52	-111.31	0.22	-0.15	1.19
6,968.00	7.45	236.27	6,955.85	-3,354.85	-126.65	-168.64	-117.50	0.03	0.03	-0.11
7,062.00	7.50	235.48	7,049.05	-3,448.05	-133.51	-178.77	-123.82	0.12	0.05	-0.84
7,157.00	7.30	231.39	7,143.26	-3,542.26	-140.79	-188.59	-130.56	0.59	-0.21	-4.31
7,251.00	7.09	229.33	7,236.52	-3,635.52	-148.30	-197.66	-137.58	0.35	-0.22	-2.19
7,345.00	7.06	229.29	7,329.81	-3,728.81	-155.84	-206.44	-144.65	0.03	-0.03	-0.04
7,439.00	7.05	228.49	7,423.10	-3,822.10	-163.44	-215.14	-151.77	0.11	-0.01	-0.85
7,534.00	6.34	227.84	7,517.45	-3,916.45	-170.82	-223.39	-158.70	0.75	-0.75	-0.68
7,628.00	5.64	226.58	7,610.93	-4,009.93	-177.48	-230.59	-164.97	0.76	-0.74	-1.34
7,722.00	5.38	224.97	7,704.50	-4,103.50	-183.77	-237.06	-170.91	0.32	-0.28	-1.71
7,816.00	5.31	230.81	7,798.09	-4,197.09	-189.64	-243.55	-176.42	0.58	-0.07	6.21
7,910.00	5.42	232.03	7,891.68	-4,290.68	-195.12	-250.42	-181.53	0.17	0.12	1.30
8,004.00	5.37	230.76	7,985.26	-4,384.26	-200.63	-257.32	-186.67	0.14	-0.05	-1.35
8,099.00	5.17	230.96	8,079.86	-4,478.86	-206.14	-264.09	-191.81	0.21	-0.21	0.21
8,193.00	5.90	232.60	8,173.42	-4,572.42	-211.74	-271.22	-197.02	0.79	0.78	1.74
8,287.00	6.60	230.22	8,266.86	-4,666.86	-218.13	-279.21	-202.98	0.79	0.74	-2.53
8,381.00	7.50	227.83	8,360.15	-4,759.15	-225.71	-287.91	-210.08	1.01	0.96	-2.54
8,475.00	7.07	227.69	8,453.39	-4,852.39	-233.72	-296.73	-217.61	0.46	-0.46	-0.15
8,570.00	7.90	222.16	8,547.58	-4,946.58	-242.49	-305.44	-225.91	1.16	0.87	-5.82
8,664.00	6.93	218.78	8,640.80	-5,039.80	-251.70	-313.33	-234.69	1.13	-1.03	-3.60
8,758.00	6.00	215.56	8,734.20	-5,133.20	-260.12	-319.74	-242.75	1.06	-0.99	-3.43
8,853.00	5.68	208.51	8,828.71	-5,227.71	-268.29	-324.87	-250.64	0.83	-0.34	-7.42
8,947.00	5.17	210.57	8,922.29	-5,321.29	-276.03	-329.24	-258.13	0.58	-0.54	2.19
9,041.00	4.63	214.45	9,015.94	-5,414.94	-282.80	-333.54	-264.67	0.67	-0.57	4.13
KOP @ 9080' MD										
9,080.00	5.06	230.04	9,034.88	-5,433.88	-283.97	-334.62	-265.78	7.28	2.25	82.03
9,136.00	8.95	263.87	9,110.32	-5,509.32	-286.76	-343.07	-268.11	7.26	5.12	44.52
9,183.00	14.39	283.07	9,156.35	-5,555.35	-285.83	-352.40	-266.69	14.07	11.57	40.85
9,230.00	16.49	300.03	9,201.68	-5,600.68	-281.16	-363.88	-261.42	10.55	4.47	36.09
9,277.00	17.70	320.74	9,246.64	-5,645.64	-272.29	-374.18	-252.01	13.14	2.57	44.06
9,324.00	20.54	334.44	9,291.06	-5,690.06	-259.31	-382.27	-238.61	11.26	6.04	29.15
9,371.00	25.67	345.79	9,334.30	-5,733.30	-241.98	-388.33	-220.99	14.41	10.91	24.15
9,418.00	30.20	352.92	9,375.83	-5,774.83	-220.36	-392.29	-199.19	11.96	9.64	15.17
9,465.00	36.27	357.71	9,415.13	-5,814.13	-194.71	-394.30	-173.47	14.06	12.91	10.19
9,512.00	41.99	0.64	9,451.57	-5,850.57	-165.07	-394.68	-143.85	12.79	12.17	6.23
9,559.00	49.29	1.85	9,484.41	-5,883.41	-131.50	-393.93	-110.37	15.64	15.53	2.57
9,607.00	58.09	1.34	9,512.81	-5,911.81	-92.88	-392.87	-71.86	18.35	18.33	-1.06
9,654.00	67.61	0.40	9,534.23	-5,933.23	-51.11	-392.25	-30.18	20.33	20.26	-2.00
9,701.00	76.69	358.29	9,548.62	-5,947.62	-8.42	-392.78	14.47	19.78	19.32	-4.49
9,748.00	86.05	357.54	9,555.67	-5,954.67	39.96	-394.47	60.88	19.98	19.91	-1.60
9,795.00	89.80	357.80	9,557.37	-5,956.37	86.88	-396.38	107.84	8.00	7.98	0.55
9,889.00	94.37	358.17	9,553.95	-5,952.95	180.74	-399.68	201.73	4.88	4.86	0.39
9,973.00	92.97	357.33	9,548.57	-5,947.57	264.50	-402.97	285.55	1.94	-1.67	-1.00

Survey Report



Company:	DEVON ENERGY (US)	Local Co-ordinate Reference:	Well NORTH THISTLE 3-34 STATE COM #5H - Slot NO
Project:	LEA COUNTY, NEW MEXICO (NAD83-GF)	TVD Reference:	KB 30' @ 3601.00usft (H&P 540)
Site:	SEC. 3 T23S R33E	MD Reference:	KB 30' @ 3601.00usft (H&P 540)
Well:	NORTH THISTLE 3-34 STATE COM #5H	North Reference:	Grid
Wellbore:	JOB # 2018-765-540	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)
10,067.00	89.80	357.82	9,546.30	-5,945.30	358.38	-406.95	379.50	3.41	-3.37	0.52
10,162.00	88.91	359.18	9,547.37	-5,946.37	453.33	-409.44	474.46	1.71	-0.94	1.43
10,256.00	88.09	358.51	9,549.83	-5,948.83	547.28	-411.33	568.38	1.13	-0.87	-0.71
10,350.00	87.42	357.89	9,553.52	-5,952.52	641.16	-414.28	662.28	0.97	-0.71	-0.66
10,444.00	90.00	357.32	9,555.63	-5,954.63	735.05	-418.21	756.24	2.81	2.74	-0.61
10,539.00	90.95	358.43	9,554.84	-5,953.84	829.98	-421.73	851.22	1.54	1.00	1.17
10,633.00	92.44	0.61	9,552.06	-5,951.06	923.92	-422.52	945.08	2.81	1.59	2.32
10,727.00	91.68	1.43	9,548.68	-5,947.68	1,017.85	-420.85	1,038.78	1.19	-0.81	0.87
10,821.00	90.87	1.54	9,546.59	-5,945.59	1,111.79	-418.41	1,132.46	0.87	-0.86	0.12
10,915.00	92.05	2.88	9,544.20	-5,943.20	1,205.69	-414.79	1,226.03	1.90	1.26	1.43
11,010.00	89.69	1.51	9,542.76	-5,941.76	1,300.60	-411.15	1,320.62	2.87	-2.48	-1.44
11,098.00	89.75	0.89	9,543.19	-5,942.19	1,388.58	-409.31	1,408.37	0.71	0.07	-0.70
11,188.00	89.24	359.58	9,543.98	-5,942.98	1,478.57	-408.94	1,498.22	1.56	-0.57	-1.46
11,279.00	88.57	358.71	9,545.72	-5,944.72	1,569.54	-410.29	1,589.14	1.21	-0.74	-0.96
11,368.00	90.87	358.01	9,546.15	-5,945.15	1,658.50	-412.84	1,678.10	2.70	2.58	-0.79
11,459.00	89.94	358.67	9,545.51	-5,944.51	1,749.46	-415.48	1,769.07	1.25	-1.02	0.73
11,550.00	91.77	358.74	9,544.15	-5,943.15	1,840.42	-417.53	1,860.01	2.01	2.01	0.08
11,641.00	92.07	358.64	9,541.10	-5,940.10	1,931.34	-419.61	1,950.92	0.35	0.33	-0.11
11,731.00	92.02	358.56	9,537.89	-5,936.89	2,021.26	-421.81	2,040.83	0.10	-0.06	-0.09
11,822.00	91.77	358.13	9,534.88	-5,933.88	2,112.17	-424.44	2,131.75	0.55	-0.27	-0.47
11,912.00	91.60	357.81	9,532.24	-5,931.24	2,202.08	-427.62	2,221.70	0.40	-0.19	-0.36
12,004.00	90.56	359.00	9,530.50	-5,929.50	2,294.02	-430.18	2,313.65	1.72	-1.13	1.29
12,097.00	90.39	0.80	9,529.73	-5,928.73	2,387.01	-430.35	2,406.52	1.94	-0.18	1.94
12,191.00	90.48	0.49	9,529.02	-5,928.02	2,481.00	-429.29	2,500.32	0.34	0.10	-0.33
12,285.00	89.83	359.51	9,528.76	-5,927.76	2,575.00	-429.29	2,594.18	1.25	-0.69	-1.04
12,379.00	89.69	359.00	9,529.16	-5,928.16	2,668.99	-430.51	2,688.11	0.56	-0.15	-0.54
12,474.00	90.25	358.57	9,529.21	-5,928.21	2,763.97	-432.52	2,783.06	0.74	0.59	-0.45
12,568.00	91.46	359.05	9,527.80	-5,926.80	2,857.94	-434.48	2,877.00	1.38	1.29	0.51
12,662.00	93.48	359.52	9,523.75	-5,922.75	2,951.84	-435.65	2,970.83	2.21	2.15	0.50
12,756.00	92.30	0.11	9,519.01	-5,918.01	3,045.72	-435.95	3,064.59	1.40	-1.26	0.63
12,850.00	90.20	0.75	9,516.96	-5,915.96	3,139.69	-435.25	3,158.39	2.34	-2.23	0.68
12,944.00	88.35	1.54	9,518.15	-5,917.15	3,233.65	-433.37	3,252.12	2.14	-1.97	0.84
13,038.00	87.42	1.14	9,521.62	-5,920.62	3,327.56	-431.17	3,345.78	1.08	-0.99	-0.43
13,133.00	89.47	1.96	9,524.20	-5,923.20	3,422.49	-428.60	3,440.44	2.32	2.16	0.86
13,227.00	90.48	2.19	9,524.24	-5,923.24	3,516.43	-425.20	3,534.06	1.10	1.07	0.24
13,321.00	90.20	1.65	9,523.68	-5,922.68	3,610.37	-422.05	3,627.70	0.65	-0.30	-0.57
13,416.00	89.75	1.15	9,523.72	-5,922.72	3,705.34	-419.73	3,722.42	0.71	-0.47	-0.53
13,510.00	88.18	359.85	9,525.42	-5,924.42	3,799.32	-418.91	3,816.22	2.17	-1.67	-1.38
13,605.00	88.96	359.16	9,527.79	-5,926.79	3,894.28	-419.73	3,911.09	1.10	0.82	-0.73
13,699.00	91.54	359.88	9,527.38	-5,926.38	3,988.27	-420.52	4,004.99	2.85	2.74	0.77
13,793.00	92.61	359.50	9,523.98	-5,922.98	4,082.21	-421.02	4,098.82	1.21	1.14	-0.40
13,887.00	93.70	358.64	9,518.80	-5,917.80	4,176.05	-422.55	4,192.61	1.48	1.16	-0.91
13,981.00	92.91	359.03	9,513.39	-5,912.39	4,269.87	-424.46	4,286.40	0.94	-0.84	0.41
14,075.00	92.05	358.15	9,509.32	-5,908.32	4,363.75	-426.77	4,380.27	1.31	-0.91	-0.94
14,170.00	94.07	358.75	9,504.25	-5,903.25	4,458.58	-429.33	4,475.10	2.22	2.13	0.63
14,231.00	92.48	358.31	9,500.76	-5,899.76	4,519.46	-430.90	4,535.97	2.70	-2.61	-0.72
14,255.00	91.69	358.05	9,499.89	-5,898.89	4,543.43	-431.66	4,559.95	3.47	-3.29	-1.08
14,349.00	88.13	358.14	9,500.04	-5,899.04	4,637.36	-434.78	4,653.92	3.79	-3.79	0.10
14,443.00	88.00	358.05	9,503.21	-5,902.21	4,731.26	-437.90	4,747.85	0.17	-0.14	-0.10
14,538.00	88.13	357.79	9,506.42	-5,905.42	4,826.14	-441.35	4,842.78	0.31	0.14	-0.27
14,632.00	88.35	359.98	9,509.31	-5,908.31	4,920.07	-443.18	4,936.67	2.34	0.23	2.33
14,726.00	87.60	359.11	9,512.63	-5,911.63	5,014.01	-443.92	5,030.52	1.22	-0.80	-0.93
14,820.00	87.91	359.02	9,516.31	-5,915.31	5,107.92	-445.46	5,124.38	0.34	0.33	-0.10

Survey Report



Company:	DEVON ENERGY (US)	Local Co-ordinate Reference:	Well NORTH THISTLE 3-34 STATE COM #5H - Slot NO
Project:	LEA COUNTY, NEW MEXICO (NAD83-GF)	TVD Reference:	KB 30' @ 3601.00usft (H&P 540)
Site:	SEC. 3 T23S R33E	MD Reference:	KB 30' @ 3601.00usft (H&P 540)
Well:	NORTH THISTLE 3-34 STATE COM #5H	North Reference:	Grid
Wellbore:	JOB # 2018-765-540	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)
14,914.00	89.14	1.04	9,518.73	-5,917.73	5,201.89	-445.41	5,218.21	2.52	1.31	2.15
15,008.00	89.49	0.51	9,519.85	-5,918.85	5,295.87	-444.14	5,311.99	0.68	0.37	-0.56
15,102.00	89.67	0.42	9,520.54	-5,919.54	5,389.86	-443.37	5,405.81	0.21	0.19	-0.10
15,197.00	89.14	0.25	9,521.53	-5,920.53	5,484.86	-442.82	5,500.64	0.59	-0.56	-0.18
15,291.00	88.62	0.16	9,523.37	-5,922.37	5,578.84	-442.48	5,594.47	0.56	-0.55	-0.10
15,385.00	91.38	0.77	9,523.37	-5,922.37	5,672.82	-441.72	5,688.29	3.01	2.94	0.65
15,479.00	91.82	0.69	9,520.74	-5,919.74	5,766.78	-440.52	5,782.05	0.48	0.47	-0.09
15,574.00	90.68	359.81	9,518.67	-5,917.67	5,861.75	-440.11	5,876.86	1.52	-1.20	-0.93
15,668.00	90.99	359.81	9,517.30	-5,916.30	5,955.74	-440.42	5,970.74	0.33	0.33	0.00
15,762.00	89.89	359.90	9,516.58	-5,915.58	6,049.74	-440.66	6,064.61	1.17	-1.17	0.10
15,857.00	89.76	359.98	9,516.87	-5,915.87	6,144.74	-440.76	6,159.48	0.16	-0.14	0.08
15,951.00	88.00	358.75	9,518.71	-5,917.71	6,238.71	-441.80	6,253.37	2.28	-1.87	-1.31
16,045.00	87.56	359.37	9,522.35	-5,921.35	6,332.63	-443.34	6,347.24	0.81	-0.47	0.66
16,139.00	88.66	357.79	9,525.45	-5,924.45	6,426.54	-445.67	6,441.15	2.05	1.17	-1.68
16,234.00	88.44	357.26	9,527.85	-5,926.85	6,521.42	-449.77	6,536.11	0.60	-0.23	-0.56
16,328.00	90.64	357.61	9,528.61	-5,927.61	6,615.32	-453.97	6,630.10	2.37	2.34	0.37
16,422.00	89.54	357.00	9,528.46	-5,927.46	6,709.21	-458.39	6,724.09	1.34	-1.17	-0.65
16,516.00	91.43	358.84	9,527.66	-5,926.66	6,803.14	-461.81	6,818.07	2.81	2.01	1.96
16,610.00	92.04	358.31	9,524.82	-5,923.82	6,897.07	-464.14	6,911.99	0.86	0.65	-0.56
16,705.00	90.81	359.54	9,522.45	-5,921.45	6,992.02	-465.92	7,006.90	1.83	-1.29	1.29
16,799.00	90.77	359.46	9,521.16	-5,920.16	7,086.00	-466.74	7,100.80	0.10	-0.04	-0.09
16,893.00	90.95	359.19	9,519.75	-5,918.75	7,179.99	-467.85	7,194.71	0.35	0.19	-0.29
16,987.00	90.37	359.54	9,518.66	-5,917.66	7,273.97	-468.89	7,288.62	0.72	-0.62	0.37
17,081.00	89.23	358.84	9,518.99	-5,917.99	7,367.96	-470.22	7,382.54	1.42	-1.21	-0.74
17,175.00	88.97	359.11	9,520.47	-5,919.47	7,461.94	-471.90	7,476.47	0.40	-0.28	0.29
17,269.00	90.20	358.58	9,521.15	-5,920.15	7,555.91	-473.80	7,570.42	1.42	1.31	-0.56
17,363.00	90.64	358.75	9,520.46	-5,919.46	7,649.88	-475.99	7,664.37	0.50	0.47	0.18
17,458.00	90.33	359.11	9,519.66	-5,918.66	7,744.86	-477.76	7,759.31	0.50	-0.33	0.38
17,552.00	89.41	359.02	9,519.87	-5,918.87	7,838.85	-479.30	7,853.24	0.98	-0.98	-0.10
17,646.00	89.98	359.19	9,520.37	-5,919.37	7,932.84	-480.76	7,947.18	0.63	0.61	0.18
17,741.00	91.03	0.77	9,519.53	-5,918.53	8,027.83	-480.80	8,042.04	2.00	1.11	1.66
17,835.00	90.64	0.16	9,518.16	-5,917.16	8,121.81	-480.03	8,135.85	0.77	-0.41	-0.65
17,929.00	90.81	1.39	9,516.97	-5,915.97	8,215.80	-478.76	8,229.63	1.32	0.18	1.31
18,024.00	88.44	1.57	9,517.59	-5,916.59	8,310.76	-476.31	8,324.33	2.50	-2.49	0.19
18,118.00	88.44	1.13	9,520.15	-5,919.15	8,404.69	-474.10	8,418.01	0.47	0.00	-0.47
18,212.00	87.91	1.04	9,523.15	-5,922.15	8,498.63	-472.32	8,511.72	0.57	-0.56	-0.10
18,306.00	89.49	0.86	9,525.28	-5,924.28	8,592.59	-470.76	8,605.47	1.69	1.68	-0.19
18,401.00	89.85	1.04	9,525.83	-5,924.83	8,687.57	-469.18	8,700.23	0.42	0.38	0.19
18,495.00	89.41	0.95	9,526.43	-5,925.43	8,781.56	-467.55	8,794.00	0.48	-0.47	-0.10
18,587.00	90.00	1.30	9,526.91	-5,925.91	8,873.54	-465.74	8,885.75	0.75	0.64	0.38
18,776.00	91.10	1.40	9,525.09	-5,924.09	9,062.47	-461.29	9,074.18	0.58	0.58	0.05
18,870.00	89.90	1.10	9,524.27	-5,923.27	9,156.45	-459.24	9,167.91	1.32	-1.28	-0.32
18,964.00	90.70	1.50	9,523.78	-5,922.78	9,250.42	-457.11	9,261.64	0.95	0.85	0.43
19,059.00	89.70	359.80	9,523.45	-5,922.45	9,345.41	-456.03	9,356.44	2.08	-1.05	-1.79
19,153.00	90.60	358.70	9,523.20	-5,922.20	9,439.40	-457.26	9,450.36	1.51	0.96	-1.17
19,247.00	91.10	358.10	9,521.81	-5,920.81	9,533.35	-459.89	9,544.32	0.83	0.53	-0.64
19,341.00	88.90	358.10	9,521.81	-5,920.81	9,627.29	-463.00	9,638.29	2.34	-2.34	0.00
19,436.00	89.40	358.00	9,523.22	-5,922.22	9,722.23	-466.23	9,733.26	0.54	0.53	-0.11
19,530.00	90.00	359.50	9,523.71	-5,922.71	9,816.20	-468.29	9,827.21	1.72	0.64	1.60
19,624.00	90.40	359.50	9,523.38	-5,922.38	9,910.20	-469.11	9,921.12	0.43	0.43	0.00
19,718.00	90.60	0.00	9,522.56	-5,921.56	10,004.19	-469.52	10,015.00	0.57	0.21	0.53
19,812.00	91.00	359.60	9,521.25	-5,920.25	10,098.18	-469.84	10,108.88	0.60	0.43	-0.43

Survey Report



Company:	DEVON ENERGY (US)	Local Co-ordinate Reference:	Well NORTH THISTLE 3-34 STATE COM #5H - Slot NO
Project:	LEA COUNTY, NEW MEXICO (NAD83-GF)	TVD Reference:	KB 30' @ 3601.00usft (H& P 540)
Site:	SEC. 3 T23S R33E	MD Reference:	KB 30' @ 3601.00usft (H& P 540)
Well:	NORTH THISTLE 3-34 STATE COM #5H	North Reference:	Grid
Wellbore:	JOB # 2018-765-540	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)
LTP @ 19830' MD; 100ft FNL & 1283ft FEL SEC 34										
19,830.23	91.13	359.57	9,520.91	-5,919.91	10,116.41	-469.98	10,127.09	0.72	0.70	-0.18
LAST SURVEY @ 19869' MD										
19,869.00	91.40	359.50	9,520.06	-5,919.06	10,155.17	-470.29	10,165.81	0.72	0.70	-0.18
PROJECTION TO TD @ 19926' MD; 4.29ft FNL & 1265.28ft FEL SEC 34										
19,926.00	91.40	359.50	9,518.66	-5,917.66	10,212.15	-470.79	10,222.73	0.00	0.00	0.00

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									
LTP - NORTH THISTLE	0.00	0.00	10,116.20	10,116.41	-488.51	493,831.06	781,402.60	32.355216°N	103.555898°W
- survey misses target center by 595.47usft at 19819.31usft MD (9521.12 TVD, 10105.49 N, -469.90 E)									
- Point									
O' VS - NORTH THISTLE	0.00	0.00	9,581.00	0.00	0.00	483,714.90	781,891.10	32.327401°N	103.554554°W
- survey misses target center by 394.16usft at 9701.00usft MD (9548.62 TVD, -6.42 N, -392.78 E)									
- Point									
BHL - NORTH THISTLE	0.00	0.00	9,526.00	10,196.45	-489.31	493,911.10	781,401.80	32.355436°N	103.555899°W
- survey misses target center by 19.91usft at 19910.29usft MD (9519.05 TVD, 10196.44 N, -470.65 E)									
- Rectangle (sides W10,425.00 H100.00 D0.00)									
FTP - NORTH THISTLE	0.00	0.00	10,116.20	-228.80	-395.80	483,486.11	781,495.31	32.326780°N	103.555841°W
- survey misses target center by 607.84usft at 9663.35usft MD (9537.65 TVD, -42.41 N, -392.22 E)									
- Point									
LP 1 - NORTH THISTLE	0.00	0.00	9,526.00	2,196.42	-418.10	485,911.27	781,473.01	32.333446°N	103.555856°W
- survey misses target center by 11.29usft at 11906.20usft MD (9532.40 TVD, 2196.28 N, -427.40 E)									
- Point									

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,014.00	1,014.00	-0.90	-0.24	13 5/8" CASING
5,168.00	5,167.13	-25.24	-13.08	9 5/8" CASING
9,060.00	9,034.88	-283.97	-334.62	KOP @ 9060' MD
19,830.23	9,520.91	10,116.41	-469.98	LTP @ 19830' MD; 100ft FNL & 1283ft FEL SEC 34
19,869.00	9,520.06	10,155.17	-470.29	LAST SURVEY @ 19869' MD
19,926.00	9,518.66	10,212.15	-470.79	PROJECTION TO TD @ 19926' MD; 4.29ft FNL & 1265.28ft FEL SEC 34

Checked By: _____ Approved By: _____ Date: _____