



NABORS DRILLING TECHNOLOGIES USA, INC.

515 West Greens Road

Houston, TX 77067

Phone: 281.874.0035

Fax: 281.872.5205

Thursday, March 22, 2018

HOBBS OCD

State of New Mexico
County of Lea County

OCT 01 2018

RECEIVED

Subject: **Survey Certification Letter**

Survey Company: **NABORS DRILLING TECH USA, INC.**

Job Number: **T4423**

Survey Job Type: **Nabors MWD**

Customer: **Devon Energy Corporation**

Well Name: **Thistle Unit 116H**

Rig Name: **Nabors X20**

Surface: **32.17475147 N / 103.332571535 W**

A.P.I. No: **30-025-44420**

Location: **Lea County, New Mexico**

RKB Height: **32'**

Distance to Bit: **65'**

Surveyor Name	Surveyor Title	Borehole Number	Start Depth	End Depth	Start Date	End Date	Type of	TD Straight
								Line Projection
Patrick Agube	MWD Supervisor	OH	1430'	16887'	12/30/13	03/22/18	MWD	16958'

The data and calculations for this survey have been checked by me and conform to the calibration standards and operational procedures set forth by NABORS DRILLING TECHNOLOGIES USA, INC. I am authorized and qualified to review the data, calculations and these reports; the reports represents true and correct Directional Surveys of this well based on the original data, the minimum curvature method, corrected to Grid North and obtained at the well site.

Patrick Agube

MWD Supervisor

NABORS DRILLING TECHNOLOGIES USA, INC.



devon

Devon Energy Corporation

**Lea Co., NM
Thistle Unit
116H
OH**

HOBBS OCD

OCT 01 2018

RECEIVED

Design: Surveys

Completion Report

23 March, 2018



devon

WELL DETAILS: 116H

Ground Elevation: 3713.30
RKB Elevation: KB=32' (Nabors X20) @ 3745.30ft (Nabors X20)
Rig Name: Nabors X20

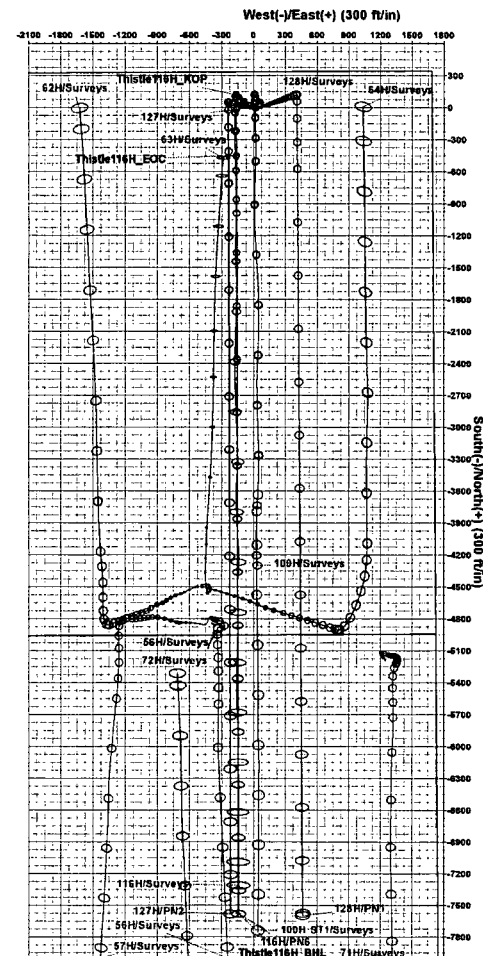
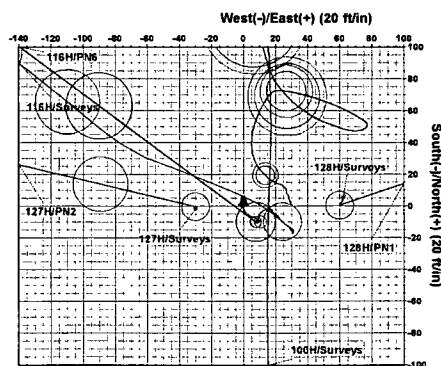
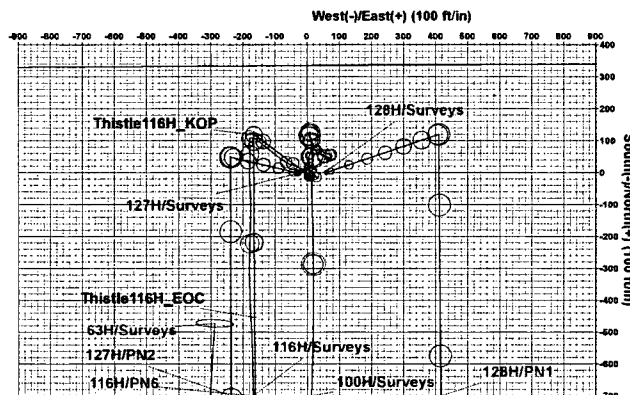
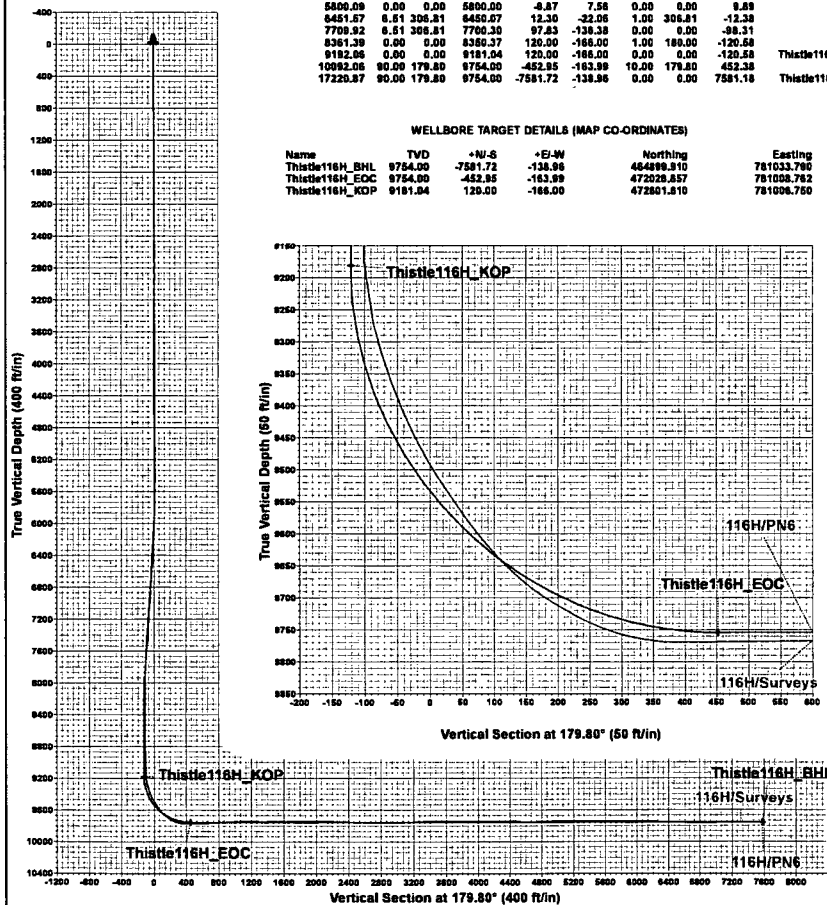
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	472461.610	781172.750	32° 17' 47.54147 N	103° 33' 25.71535 W

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSeal	
1377.00	0.74	226.53	1375.91	-9.65	7.79	0.00	0.00	9.68	
1426.33	0.00	0.00	1426.24	-9.87	7.59	1.50	186.00	9.89	
5800.09	0.00	0.00	5800.00	-9.87	7.58	0.00	0.00	9.89	
6451.67	8.51	306.81	6450.87	12.30	-22.06	1.00	306.81	-12.38	
7709.52	8.51	306.81	7709.30	97.63	-138.38	0.00	0.00	-98.31	
8361.39	0.00	0.00	8360.37	120.00	-166.00	1.00	186.00	-120.58	Thistle116H_KOP
9182.06	0.00	0.00	9181.04	120.00	-166.00	0.00	0.00	-120.58	
10952.06	90.00	179.80	9754.00	-452.95	-163.99	10.00	179.80	452.38	Thistle116H_BHL
17220.57	90.00	179.80	9754.00	-7581.72	-138.99	0.00	0.00	7581.18	

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting
Thistle116H_BHL	9754.00	-7581.72	-138.99	464899.910	781033.780
Thistle116H_EOC	9754.00	-452.95	-163.99	472029.857	781008.762
Thistle116H_KOP	9181.04	120.00	-166.00	472861.610	781006.760



PROJECT DETAILS: Lea Co., NM
Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GR8 1980
Zone: New Mexico Eastern Zone

System Datum: Mean Sea Level
Local North: Grid

Project: Lea Co., NM
Site: Thistle Unit
Well: 116H
Wellbore: OH
Plan: PN6 (116H/OH)



Azimuths to Grid North
True North: -0.41°
Magnetic North: 6.45°

Magnetic Field
Strength: 48144.1anT
Dip Angle: 60.08°
Date: 2/22/2018
Model: USER DEFINED

Company: Devon Energy Corporation
Project: Lea Co., NM
Site: Thistle Unit
Well: 116H
Wellbore: OH
Design: Surveys

Local Co-ordinate Reference: Well 116H
TVD Reference: KB=32' (Nabors X20) @ 3745.30ft (Nabors X20)
MD Reference: KB=32' (Nabors X20) @ 3745.30ft (Nabors X20)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: RyanUSA_ODBC_32Bit

Project	Lea Co., NM
Map System:	US State Plane 1983
Geo Datum:	North American Datum 1983
Map Zone:	New Mexico Eastern Zone
System Datum:	Mean Sea Level

Site		Thistle Unit									
Site Position:		Northing:		472,481.790 usft		Latitude:		32° 17' 47.54325 N			
From:		Map		Easting:		781,172.750 usft		Longitude:		103° 33' 25.71533 W	
Position Uncertainty:		0.00 ft		Slot Radius:		13-3/16 "		Grid Convergence:		0.41 °	

Well	116H					
Well Position	+N/-S	0.00 ft	Northing:	472,481.610 usft	Latitude:	32° 17' 47.54147 N
	+E/-W	0.00 ft	Easting:	781,172.750 usft	Longitude:	103° 33' 25.71535 W
Position Uncertainty	0.00 ft	Wellhead Elevation:	ft	Ground Level:	3,713.30 ft	

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	2/22/2018	6.87	60.08	48,144.10000000

Design	Surveys			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(ft)	(ft)	(ft)	(°)
	0.00	0.00	0.00	179.80



Nabors
Completion Report



Company: Devon Energy Corporation
Project: Lea Co., NM
Site: Thistle Unit
Well: 116H
Wellbore: OH
Design: Surveys

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Survey Calculation Method: Minimum Curvature
Database: RyanUSA_ODBC_32Bit

Survey Program		Date 3/23/2018			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100.00	1,377.00	Survey #1 - VES (OH)	VES GyroFlex		
1,536.00	16,952.00	Survey #2 - NDS MWD (OH)	MWD+HRGM	OWSG MWD + HRGM	

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	V. Sec (ft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	DLeg (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.37	215.60	100.00	0.26	-0.26	-0.19	0.32	215.60	0.37
200.00	0.47	170.59	200.00	0.93	-0.93	-0.31	0.98	198.38	0.33
300.00	0.96	149.42	299.99	2.06	-2.06	0.18	2.06	174.87	0.55
400.00	0.86	158.04	399.98	3.48	-3.47	0.89	3.59	165.61	0.17
500.00	0.98	131.89	499.96	4.75	-4.74	1.81	5.07	159.12	0.43
600.00	1.05	124.97	599.95	5.85	-5.84	3.20	6.65	151.29	0.14
700.00	0.77	109.19	699.94	6.60	-6.58	4.58	8.02	145.16	0.37
800.00	0.49	99.84	799.93	6.90	-6.88	5.64	8.89	140.65	0.30
900.00	0.52	102.17	899.93	7.07	-7.04	6.50	9.59	137.29	0.04
1,000.00	0.54	113.96	999.92	7.36	-7.33	7.38	10.40	134.83	0.11
1,100.00	0.40	141.45	1,099.92	7.82	-7.80	8.02	11.19	134.17	0.26
1,200.00	0.38	167.70	1,199.92	8.42	-8.39	8.31	11.81	135.28	0.18
1,300.00	0.41	201.45	1,299.91	9.08	-9.05	8.25	12.25	137.64	0.23
1,377.00	0.74	226.63	1,376.91	9.68	-9.65	7.79	12.40	141.08	0.53
1,536.00	0.63	98.56	1,535.90	10.51	-10.48	7.91	13.13	142.97	0.78
1,627.00	0.19	81.51	1,626.90	10.57	-10.54	8.55	13.57	140.93	0.50
1,718.00	0.56	48.81	1,717.90	10.25	-10.22	9.04	13.64	138.52	0.45
1,812.00	0.31	38.44	1,811.90	9.75	-9.72	9.54	13.62	135.53	0.28
1,905.00	0.38	56.90	1,904.90	9.39	-9.35	9.95	13.66	133.22	0.14
1,999.00	0.31	107.17	1,998.89	9.29	-9.26	10.46	13.97	131.51	0.32



Nabors
Completion Report



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Well: 116H
Wellbore: OH
Design: Surveys

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MD Reference: KB=32' (Nabors X20) @ 3745.30ft (Nabors X20)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: RyanUSA_ODBC_32Bit

Survey

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	V. Sec (ft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	DLeg (°/100ft)
2,094.00	0.06	142.33	2,093.89	9.41	-9.37	10.73	14.25	131.13	0.28
2,188.00	0.25	195.41	2,187.89	9.65	-9.61	10.71	14.39	131.90	0.23
2,282.00	0.06	174.50	2,281.89	9.89	-9.86	10.66	14.52	132.76	0.21
2,376.00	0.13	318.81	2,375.89	9.86	-9.83	10.59	14.45	132.84	0.19
2,470.00	0.19	272.58	2,469.89	9.77	-9.74	10.37	14.22	133.20	0.15
2,564.00	0.13	322.33	2,563.89	9.68	-9.65	10.15	14.00	133.55	0.15
2,659.00	0.19	294.73	2,658.89	9.53	-9.50	9.94	13.75	133.69	0.10
2,752.00	0.31	283.13	2,751.89	9.41	-9.37	9.55	13.38	134.45	0.14
2,846.00	0.25	311.43	2,845.89	9.21	-9.18	9.15	12.96	135.09	0.16
2,940.00	0.19	0.65	2,939.89	8.92	-8.89	9.00	12.65	134.64	0.20
3,034.00	0.38	357.13	3,033.89	8.45	-8.42	8.99	12.32	133.14	0.20
3,128.00	0.44	358.01	3,127.89	7.78	-7.75	8.96	11.85	130.86	0.06
3,223.00	0.44	359.95	3,222.88	7.05	-7.02	8.95	11.37	128.12	0.02
3,317.00	0.38	37.39	3,316.88	6.44	-6.41	9.13	11.16	125.06	0.29
3,411.00	0.38	27.54	3,410.88	5.92	-5.89	9.47	11.15	121.87	0.07
3,506.00	0.63	26.14	3,505.87	5.17	-5.14	9.84	11.10	117.57	0.26
3,601.00	0.75	47.23	3,600.87	4.28	-4.25	10.53	11.36	111.97	0.29
3,695.00	0.88	51.63	3,694.86	3.42	-3.38	11.55	12.03	106.32	0.15
3,790.00	1.00	60.77	3,789.85	2.57	-2.52	12.84	13.09	101.12	0.20
3,884.00	0.94	77.47	3,883.83	2.01	-1.96	14.31	14.45	97.79	0.31
3,978.00	0.63	89.07	3,977.82	1.84	-1.78	15.58	15.68	96.52	0.37
4,072.00	0.63	98.03	4,071.82	1.90	-1.84	16.61	16.71	96.34	0.10
4,167.00	0.69	109.11	4,166.81	2.17	-2.11	17.67	17.79	96.80	0.15
4,261.00	0.25	194.01	4,260.81	2.55	-2.49	18.15	18.32	97.81	0.76
4,355.00	0.44	214.75	4,354.81	3.05	-2.99	17.90	18.14	99.47	0.24
4,450.00	0.81	132.13	4,449.80	3.80	-3.74	18.19	18.57	101.61	0.92
4,543.00	1.44	120.71	4,542.78	4.84	-4.77	19.68	20.25	103.63	0.72

Company: Devon Energy Corporation
Project: Lea Co., NM
Site: Thistle Unit
Well: 116H
Wellbore: OH
Design: Surveys

Local Co-ordinate Reference: Well 116H
TVD Reference: KB=32' (Nabors X20) @ 3745.30ft (Nabors X20)
MD Reference: KB=32' (Nabors X20) @ 3745.30ft (Nabors X20)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: RyanUSA_ODBC_32Bit

Survey

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	V. Sec (ft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	DLeg (°/100ft)
4,637.00	1.31	139.87	4,636.76	6.27	-6.20	21.39	22.27	106.16	0.51
4,732.00	1.38	143.38	4,731.73	8.03	-7.95	22.77	24.12	109.24	0.11
4,826.00	1.44	135.82	4,825.70	9.79	-9.70	24.27	26.14	111.79	0.21
4,920.00	1.56	125.28	4,919.67	11.38	-11.29	26.14	28.47	113.36	0.32
5,014.00	2.00	121.59	5,013.63	12.99	-12.89	28.58	31.35	114.27	0.48
5,109.00	0.81	137.41	5,108.60	14.35	-14.25	30.44	33.61	115.08	1.31
5,203.00	0.38	172.74	5,202.59	15.16	-15.05	30.93	34.40	115.94	0.58
5,297.00	0.31	168.70	5,296.59	15.71	-15.61	31.02	34.73	116.70	0.08
5,392.00	0.56	167.29	5,391.59	16.42	-16.31	31.17	35.18	117.62	0.26
5,487.00	0.69	235.14	5,486.58	17.20	-17.09	30.81	35.23	119.02	0.74
5,581.00	0.31	60.41	5,580.58	17.39	-17.29	30.56	35.12	119.49	1.06
5,675.00	1.50	344.83	5,674.57	16.08	-15.98	30.46	34.40	117.67	1.55
5,769.00	3.00	312.49	5,768.50	13.22	-13.13	28.33	31.22	114.86	2.03
5,864.00	4.13	309.50	5,863.31	9.35	-9.27	23.85	25.59	111.24	1.21
5,958.00	5.69	310.55	5,956.96	4.15	-4.09	17.70	18.17	103.00	1.66
6,053.00	7.50	297.54	6,051.34	-1.81	1.84	8.62	8.82	77.95	2.46
6,147.00	7.63	294.20	6,144.52	-7.24	7.24	-2.51	7.66	340.89	0.49
6,241.00	7.19	293.33	6,237.73	-12.17	12.12	-13.60	18.22	311.71	0.48
6,335.00	7.00	291.22	6,331.01	-16.61	16.53	-24.34	29.42	304.17	0.34
6,429.00	6.75	291.22	6,424.34	-20.72	20.60	-34.83	40.47	300.60	0.27
6,523.00	6.94	290.51	6,517.67	-24.75	24.59	-45.30	51.54	298.49	0.22
6,617.00	6.81	290.69	6,610.99	-28.74	28.55	-55.83	62.71	297.08	0.14
6,712.00	6.69	299.30	6,705.34	-33.48	33.25	-65.93	73.84	296.76	1.07
6,805.00	6.94	300.71	6,797.68	-39.03	38.77	-75.48	84.86	297.18	0.32
6,900.00	6.81	308.09	6,892.00	-45.47	45.17	-84.85	96.13	298.03	0.94
6,994.00	6.56	309.85	6,985.36	-52.38	52.05	-93.36	106.89	299.14	0.34
7,089.00	6.50	309.85	7,079.74	-59.33	58.97	-101.65	117.52	300.12	0.06



Nabors
Completion Report



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Local Co-ordinate Reference: Well 116H
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Survey Calculation Method: Minimum Curvature
Database: RyanUSA_ODBC_32Bit

Survey										
MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	V. Sec (ft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	DLeg (°/100ft)	
7,183.00	6.44	309.50	7,173.14	-66.12	65.74	-109.81	127.98	300.91	0.08	
7,277.00	6.38	308.79	7,266.56	-72.77	72.36	-117.94	138.37	301.53	0.11	
7,372.00	6.38	309.15	7,360.97	-79.44	79.00	-126.15	148.85	302.06	0.04	
7,466.00	6.25	308.44	7,454.40	-85.95	85.48	-134.21	159.12	302.49	0.16	
7,560.00	5.94	307.56	7,547.87	-92.12	91.62	-142.07	169.06	302.82	0.34	
7,655.00	5.69	307.04	7,642.38	-97.98	97.46	-149.73	178.65	303.06	0.27	
7,749.00	4.25	307.74	7,736.02	-102.94	102.40	-156.20	186.77	303.25	1.53	
7,843.00	3.44	303.87	7,829.81	-106.66	106.10	-161.30	193.07	303.34	0.90	
7,936.00	2.75	294.73	7,922.67	-109.17	108.59	-165.64	198.06	303.25	0.91	
8,031.00	2.13	275.92	8,017.59	-110.32	109.72	-169.47	201.89	302.92	1.06	
8,125.00	1.13	266.43	8,111.55	-110.45	109.85	-172.13	204.19	302.54	1.10	
8,220.00	0.88	257.82	8,206.53	-110.24	109.63	-173.78	205.47	302.25	0.31	
8,314.00	1.06	259.22	8,300.52	-109.93	109.32	-175.34	206.63	301.94	0.19	
8,408.00	1.31	245.86	8,394.50	-109.34	108.72	-177.17	207.87	301.53	0.39	
8,502.00	0.63	235.14	8,488.49	-108.61	107.98	-178.58	208.69	301.16	0.75	
8,596.00	0.25	172.91	8,582.48	-108.11	107.48	-178.98	208.77	300.99	0.59	
8,690.00	0.50	151.65	8,676.48	-107.54	106.92	-178.76	208.29	300.88	0.30	
8,783.00	0.56	173.79	8,769.48	-106.73	106.11	-178.52	207.67	300.73	0.23	
8,877.00	0.50	188.21	8,863.47	-105.87	105.25	-178.52	207.24	300.52	0.16	
8,971.00	0.75	197.52	8,957.47	-104.88	104.26	-178.77	206.95	300.25	0.29	
9,066.00	0.81	202.97	9,052.46	-103.67	103.04	-179.22	206.73	299.90	0.10	
9,103.00	0.81	199.28	9,089.46	-103.18	102.56	-179.41	206.65	299.75	0.14	
9,191.00	3.25	194.36	9,177.39	-100.18	99.55	-180.23	205.90	298.91	2.78	
9,191.59	3.31	193.98	9,177.98	-100.15	99.52	-180.24	205.89	298.91	11.00	
Thistle116H_KOP										
9,285.00	13.44	179.07	9,270.28	-86.64	86.01	-180.71	200.14	295.45	11.00	
9,330.00	16.94	173.44	9,313.71	-74.89	74.27	-179.88	194.61	292.43	8.43	



Nabors
Completion Report



Company: Devon Energy Corporation
Project: Lea Co., NM
Site: Thistle Unit
Well: 116H
Wellbore: OH
Design: Surveys

Local Co-ordinate Reference: Well 116H
TVD Reference: KB=32' (Nabors X20) @ 3745.30ft (Nabors X20)
MD Reference: KB=32' (Nabors X20) @ 3745.30ft (Nabors X20)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: RyanUSA_ODBC_32Bit

Survey										
MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	V. Sec (ft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	DLeg (°/100ft)	
9,379.00	19.44	176.43	9,360.26	-59.66	59.03	-178.56	188.06	288.29	5.44	
9,424.00	22.06	181.00	9,402.34	-43.73	43.11	-178.24	183.38	283.60	6.84	
9,474.00	25.88	183.99	9,448.02	-23.45	22.82	-179.16	180.61	277.26	8.01	
9,519.00	30.25	181.53	9,487.72	-2.31	1.68	-180.15	180.16	270.54	10.04	
9,567.00	33.31	178.01	9,528.52	22.95	-23.58	-180.01	181.55	262.54	7.45	
9,613.00	35.44	174.50	9,566.49	48.86	-49.49	-178.30	185.04	254.49	6.32	
9,660.00	39.31	177.66	9,603.83	77.32	-77.94	-176.38	192.83	246.16	9.19	
9,705.00	43.69	180.12	9,637.53	107.12	-107.74	-175.83	206.21	238.50	10.38	
9,754.00	49.38	181.18	9,671.23	142.67	-143.28	-176.25	227.14	230.89	11.72	
9,799.00	56.75	182.76	9,698.25	178.58	-179.21	-177.51	252.24	224.73	16.62	
9,849.00	61.00	182.06	9,724.09	221.33	-221.96	-179.30	285.33	218.93	8.58	
9,894.00	67.69	180.82	9,743.56	261.86	-262.49	-180.31	318.45	214.49	15.07	
9,942.00	76.06	180.47	9,758.48	307.43	-308.06	-180.82	357.21	210.41	17.45	
10,037.00	91.19	176.78	9,769.00	401.53	-402.16	-178.52	440.00	203.94	16.38	
10,088.72	90.74	176.88	9,768.13	453.17	-453.79	-175.66	486.60	201.16	0.89	
Thistle116H_EOC										
10,130.00	90.38	176.96	9,767.73	494.40	-495.01	-173.44	524.51	199.31	0.89	
10,224.00	90.69	178.72	9,766.85	588.34	-588.93	-169.90	612.95	196.09	1.90	
10,319.00	93.38	179.77	9,763.48	683.26	-683.85	-168.64	704.34	193.85	3.04	
10,413.00	93.06	178.36	9,758.20	777.10	-777.69	-167.11	795.44	192.13	1.54	
10,437.00	91.31	178.01	9,757.28	801.07	-801.66	-166.35	818.74	191.72	7.44	
10,531.00	94.06	178.89	9,752.88	894.94	-895.51	-163.81	910.37	190.37	3.07	
10,625.00	93.81	180.65	9,746.43	988.71	-989.29	-163.44	1,002.70	189.38	1.89	
10,720.00	91.19	181.53	9,742.28	1,083.59	-1,084.17	-165.24	1,096.69	188.67	2.91	
10,814.00	88.38	181.70	9,742.64	1,177.53	-1,178.12	-167.89	1,190.02	188.11	2.99	
10,888.00	88.31	181.18	9,744.77	1,251.47	-1,252.07	-169.75	1,263.52	187.72	0.71	
10,983.00	89.25	181.00	9,746.80	1,346.42	-1,347.03	-171.56	1,357.91	187.26	1.01	

Company: Devon Energy Corporation
Project: Lea Co., NM
Site: Thistle Unit
Well: 116H
Wellbore: OH
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Survey Calculation Method: Minimum Curvature
Database: RyanUSA_ODBC_32Bit

Survey

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	V. Sec (ft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	DLeg (°/100ft)
11,077.00	89.06	178.01	9,748.18	1,440.40	-1,441.00	-170.74	1,451.08	186.76	3.19
11,171.00	89.69	177.13	9,749.21	1,534.32	-1,534.91	-166.76	1,543.94	186.20	1.15
11,265.00	92.06	178.19	9,747.77	1,628.24	-1,628.81	-162.92	1,636.94	185.71	2.76
11,360.00	92.69	180.47	9,743.83	1,723.14	-1,723.72	-161.81	1,731.30	185.36	2.49
11,454.00	90.19	180.30	9,741.47	1,817.10	-1,817.68	-162.44	1,824.92	185.11	2.67
11,548.00	91.25	181.70	9,740.29	1,911.07	-1,911.65	-164.08	1,918.68	184.91	1.87
11,643.00	90.13	182.06	9,739.15	2,006.00	-2,006.60	-167.20	2,013.55	184.76	1.24
11,737.00	87.38	181.35	9,741.19	2,099.92	-2,100.52	-170.00	2,107.39	184.63	3.02
11,831.00	88.75	181.53	9,744.36	2,193.82	-2,194.44	-172.36	2,201.19	184.49	1.47
11,925.00	89.56	181.70	9,745.75	2,287.76	-2,288.39	-175.01	2,295.07	184.37	0.88
12,019.00	88.50	181.53	9,747.34	2,381.70	-2,382.34	-177.65	2,388.95	184.26	1.14
12,114.00	87.69	179.07	9,750.50	2,476.64	-2,477.27	-178.15	2,483.67	184.11	2.72
12,208.00	89.00	178.89	9,753.21	2,570.59	-2,571.22	-176.48	2,577.27	183.93	1.41
12,303.00	88.25	178.01	9,755.49	2,665.53	-2,666.15	-173.91	2,671.82	183.73	1.22
12,398.00	88.88	177.84	9,757.87	2,760.45	-2,761.06	-170.47	2,766.32	183.53	0.69
12,492.00	89.44	177.66	9,759.25	2,854.38	-2,854.98	-166.78	2,859.85	183.34	0.63
12,586.00	90.50	177.13	9,759.30	2,948.29	-2,948.88	-162.51	2,953.35	183.15	1.26
12,680.00	91.69	176.96	9,757.50	3,042.17	-3,042.74	-157.67	3,046.82	182.97	1.28
12,774.00	92.38	176.96	9,754.17	3,135.99	-3,136.54	-152.68	3,140.26	182.79	0.73
12,869.00	93.13	178.89	9,749.60	3,230.83	-3,231.37	-149.25	3,234.81	182.64	2.18
12,963.00	92.56	181.53	9,744.93	3,324.70	-3,325.24	-149.59	3,328.60	182.58	2.87
13,057.00	90.13	183.64	9,742.73	3,418.55	-3,419.11	-153.83	3,422.57	182.58	3.42
13,151.00	91.13	183.99	9,741.69	3,512.31	-3,512.89	-160.08	3,516.54	182.61	1.13
13,246.00	89.56	180.82	9,741.12	3,607.20	-3,607.79	-164.07	3,611.52	182.60	3.72
13,340.00	88.19	178.36	9,742.97	3,701.17	-3,701.76	-163.40	3,705.37	182.53	2.99
13,434.00	88.50	178.19	9,745.68	3,795.10	-3,795.68	-160.57	3,799.07	182.42	0.38
13,529.00	89.63	178.01	9,747.23	3,890.04	-3,890.61	-157.42	3,893.80	182.32	1.20



Nabors
Completion Report



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Project: Lea Co., NM
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Well: 116H
Wellbore: OH
Design: Surveys

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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: RyanUSA_ODBC_32Bit

Survey

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	V. Sec (ft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	DLeg (*/100ft)
13,622.00	90.13	177.31	9,747.43	3,982.97	-3,983.53	-153.62	3,986.50	182.21	0.92
13,717.00	90.50	176.25	9,746.90	4,077.84	-4,078.38	-148.29	4,081.08	182.08	1.18
13,811.00	91.81	177.66	9,745.01	4,171.70	-4,172.23	-143.29	4,174.69	181.97	2.05
13,905.00	91.75	181.18	9,742.09	4,265.64	-4,266.16	-142.34	4,268.53	181.91	3.74
14,000.00	91.44	183.46	9,739.44	4,360.50	-4,361.04	-146.19	4,363.49	181.92	2.42
14,094.00	86.44	180.82	9,741.18	4,454.37	-4,454.92	-149.70	4,457.43	181.92	6.01
14,189.00	84.88	179.77	9,748.37	4,549.09	-4,549.64	-150.19	4,552.12	181.89	1.98
14,283.00	90.88	179.07	9,751.85	4,642.98	-4,643.53	-149.23	4,645.93	181.84	6.43
14,378.00	94.31	178.54	9,747.55	4,737.85	-4,738.40	-147.26	4,740.68	181.78	3.65
14,471.00	91.88	179.95	9,742.53	4,830.70	-4,831.24	-146.03	4,833.45	181.73	3.02
14,566.00	90.38	181.88	9,740.65	4,925.66	-4,926.21	-147.55	4,928.41	181.72	2.57
14,660.00	92.38	181.88	9,738.39	5,019.57	-5,020.12	-150.63	5,022.38	181.72	2.13
14,754.00	89.19	181.53	9,737.10	5,113.49	-5,114.06	-153.43	5,116.36	181.72	3.41
14,849.00	89.25	181.53	9,738.39	5,208.44	-5,209.02	-155.97	5,211.35	181.72	0.06
14,942.00	89.94	181.70	9,739.05	5,301.39	-5,301.98	-158.59	5,304.35	181.71	0.76
15,036.00	88.75	179.59	9,740.13	5,395.37	-5,395.96	-159.65	5,398.32	181.69	2.58
15,130.00	89.25	179.24	9,741.77	5,489.35	-5,489.94	-158.69	5,492.23	181.66	0.65
15,224.00	89.63	178.54	9,742.69	5,583.33	-5,583.92	-156.86	5,586.12	181.61	0.85
15,318.00	90.06	177.13	9,742.94	5,677.28	-5,677.85	-153.31	5,679.92	181.55	1.57
15,412.00	90.50	177.31	9,742.48	5,771.18	-5,771.73	-148.75	5,773.65	181.48	0.51
15,506.00	91.50	177.49	9,740.84	5,865.08	-5,865.62	-144.49	5,867.40	181.41	1.08
15,600.00	89.06	180.30	9,740.38	5,959.05	-5,959.59	-142.68	5,961.29	181.37	3.96
15,694.00	90.06	180.30	9,741.10	6,053.04	-6,053.58	-143.17	6,055.27	181.35	1.06
15,788.00	87.31	179.77	9,743.26	6,147.01	-6,147.55	-143.23	6,149.22	181.33	2.98
15,883.00	87.81	180.30	9,747.30	6,241.92	-6,242.46	-143.29	6,244.10	181.31	0.77
15,976.00	88.13	180.47	9,750.60	6,334.86	-6,335.40	-143.91	6,337.03	181.30	0.39
16,071.00	89.38	180.82	9,752.66	6,429.82	-6,430.37	-144.98	6,432.00	181.29	1.37

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Survey

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	V. Sec (ft)	N/S (ft)	E/W (ft)	Closure Distance (ft)	Closure Azimuth (°)	DLeg (°/100ft)
16,165.00	87.69	180.65	9,755.07	6,523.78	-6,524.33	-146.19	6,525.97	181.28	1.81
16,259.00	87.44	179.95	9,759.06	6,617.69	-6,618.24	-146.68	6,619.87	181.27	0.79
16,354.00	87.94	179.77	9,762.89	6,712.61	-6,713.16	-146.45	6,714.76	181.25	0.56
16,448.00	90.13	179.77	9,764.47	6,806.59	-6,807.14	-146.07	6,808.71	181.23	2.33
16,542.00	91.31	179.42	9,763.29	6,900.58	-6,901.13	-145.40	6,902.66	181.21	1.31
16,637.00	92.13	179.77	9,760.44	6,995.54	-6,996.09	-144.73	6,997.58	181.19	0.94
16,731.00	93.44	179.95	9,755.87	7,089.42	-7,089.97	-144.50	7,091.44	181.17	1.41
16,825.00	91.69	179.59	9,751.66	7,183.33	-7,183.87	-144.13	7,185.32	181.15	1.90
16,887.00	90.69	179.59	9,750.38	7,245.31	-7,245.86	-143.68	7,247.28	181.14	1.61
16,952.00	90.69	179.59	9,749.59	7,310.31	-7,310.85	-143.22	7,312.25	181.12	0.00

PTB - Thistle116H_BHL

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N-S (ft)	+E-W (ft)	
16,952.00	9,749.59	-7,310.85	-143.22	PTB

Checked By: _____ Approved By: _____ Date: _____