

Project: Cummins
 Site: AB Section 32
 Well: Westerman A4-786
 Wellbore: Wellbore #1
 Design: Plan #1



Noble Energy

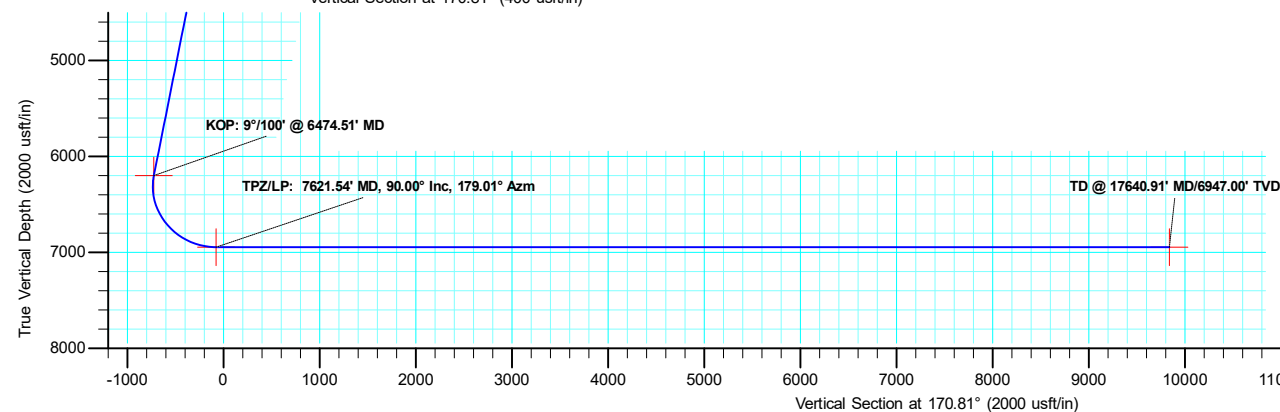
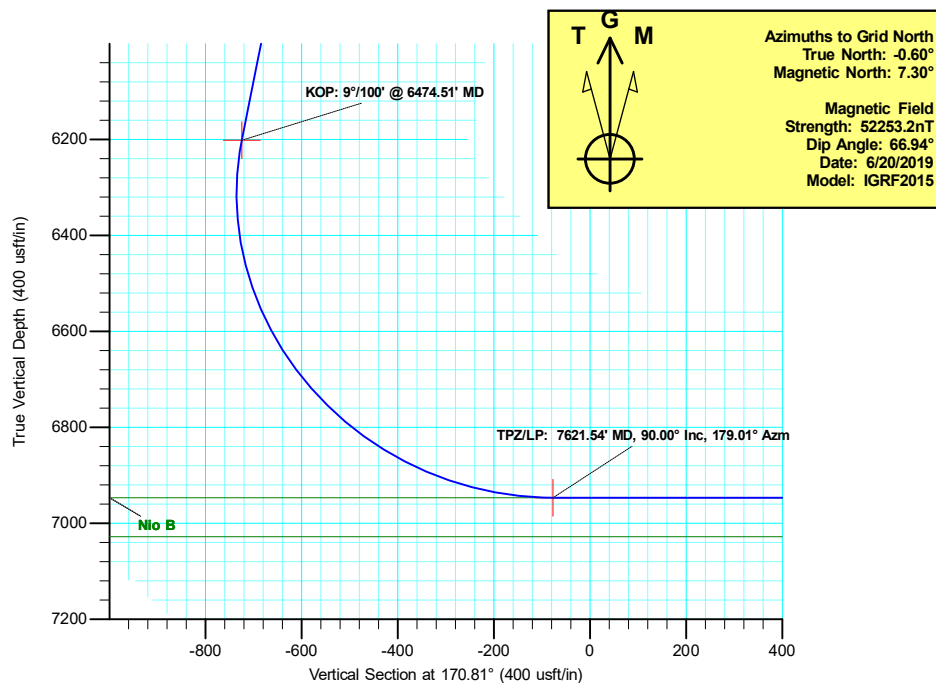
Geodetic System: US State Plane 1983
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: Colorado Northern Zone
 System Datum: Mean Sea Level

SECTION DETAILS

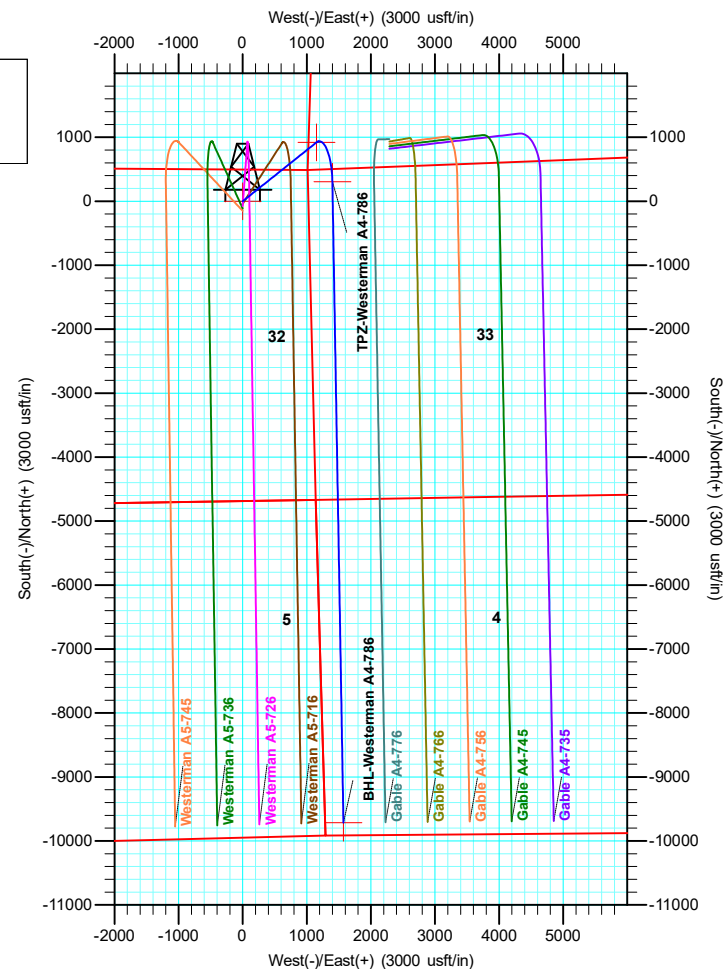
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	2000.00	0.00	0.00	2000.00	0.00	0.00	0.00	0.00	0.00	
3	3100.23	22.00	51.36	3073.38	130.32	163.00	2.00	51.36	-102.61	
4	6474.51	22.00	51.36	6201.86	919.84	1150.45	0.00	0.00	-724.24	
5	7621.54	90.00	179.01	6947.00	304.32	1399.48	9.00	125.58	-76.85	TPZ-Westerman A4-786
6	17640.91	90.00	179.01	6947.00	-9713.57	1571.92	0.00	0.00	9839.93	BHL-Westerman A4-786

WELL DETAILS: Westerman A4-786

+N/-S	+E/-W	Northing	Ground Level: Easting	4812.00 Latitude	Longitude
0.00	0.00	1439182.55	3258883.16	40.535224	-104.568597



SHL: 496 FNL/ 1026 FEL Sec. AB32
 TPZ: 200 FNL/ 381 FWL Sec. AB33
 BHL: 200 FSL/ 286 FWL Sec. A4



Plan: Plan #1 (Westerman A4-786/Wellbore #1)

Created By: Keith Noack Date: 10:28, June 21 2019



Noble Energy

Cummins

AB Section 32

Westerman A4-786

Wellbore #1

Plan: Plan #1

Standard Planning Report

21 June, 2019

Database:	Local	Local Co-ordinate Reference:	Well Westerman A4-786
Company:	Noble Energy	TVD Reference:	KB @ 4842.00usft
Project:	Cummins	MD Reference:	KB @ 4842.00usft
Site:	AB Section 32	North Reference:	Grid
Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

Project	Cummins, Weld County Colorado		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site	AB Section 32				
Site Position:		Northing:	1,437,026.14 usft	Latitude:	40.529357
From:	Lat/Long	Easting:	3,257,086.37 usft	Longitude:	-104.575142
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.60 °

Well		Westerman A4-786				
Well Position	+N-S	2,156.41 usft	Northing:	1,439,182.55 usft	Latitude:	40.535224
	+E-W	1,796.79 usft	Easting:	3,258,883.16 usft	Longitude:	-104.568597
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	4,812.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	6/20/2019	7.90	66.94	52,253.20821737

Design	Plan #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	170.81

Plan Survey Tool Program	Date	6/20/2019		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	17,640.91	Plan #1 (Wellbore #1)	2_MWD+IFR1+MS A008Mb: IFR dec & multi-st

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,100.23	22.00	51.36	3,073.38	130.32	163.00	2.00	2.00	0.00	51.36	
6,474.51	22.00	51.36	6,201.86	919.84	1,150.45	0.00	0.00	0.00	0.00	
7,621.54	90.00	179.01	6,947.00	304.32	1,399.48	9.00	5.93	11.13	125.58	TPZ-Westerman A4
17,640.91	90.00	179.01	6,947.00	-9,713.57	1,571.92	0.00	0.00	0.00	0.00	BHL-Westerman A4

Database:	Local	Local Co-ordinate Reference:	Well Westerman A4-786
Company:	Noble Energy	TVD Reference:	KB @ 4842.00usft
Project:	Cummins	MD Reference:	KB @ 4842.00usft
Site:	AB Section 32	North Reference:	Grid
Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SHL-Westerman A4-786									
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
Build: 2°/100' @ 2000.00' MD									
2,100.00	2.00	51.36	2,099.98	1.09	1.36	-0.86	2.00	2.00	0.00
2,200.00	4.00	51.36	2,199.84	4.36	5.45	-3.43	2.00	2.00	0.00
2,300.00	6.00	51.36	2,299.45	9.80	12.26	-7.72	2.00	2.00	0.00
2,400.00	8.00	51.36	2,398.70	17.41	21.78	-13.71	2.00	2.00	0.00
2,500.00	10.00	51.36	2,497.47	27.18	33.99	-21.40	2.00	2.00	0.00
2,600.00	12.00	51.36	2,595.62	39.09	48.90	-30.78	2.00	2.00	0.00
2,700.00	14.00	51.36	2,693.06	53.14	66.46	-41.84	2.00	2.00	0.00
2,800.00	16.00	51.36	2,789.64	69.30	86.68	-54.57	2.00	2.00	0.00
2,900.00	18.00	51.36	2,885.27	87.56	109.51	-68.94	2.00	2.00	0.00
3,000.00	20.00	51.36	2,979.82	107.89	134.94	-84.95	2.00	2.00	0.00
3,100.23	22.00	51.36	3,073.38	130.32	163.00	-102.61	2.00	2.00	0.00
Hold: 22.00° Inc, 51.36° Azm									
3,200.00	22.00	51.36	3,165.88	153.67	192.19	-120.99	0.00	0.00	0.00
3,300.00	22.00	51.36	3,258.60	177.06	221.46	-139.41	0.00	0.00	0.00
3,400.00	22.00	51.36	3,351.31	200.46	250.72	-157.84	0.00	0.00	0.00
3,500.00	22.00	51.36	3,444.03	223.86	279.98	-176.26	0.00	0.00	0.00
3,600.00	22.00	51.36	3,536.75	247.26	309.25	-194.68	0.00	0.00	0.00
3,700.00	22.00	51.36	3,629.46	270.66	338.51	-213.10	0.00	0.00	0.00
3,800.00	22.00	51.36	3,722.18	294.05	367.78	-231.53	0.00	0.00	0.00
3,900.00	22.00	51.36	3,814.89	317.45	397.04	-249.95	0.00	0.00	0.00
4,000.00	22.00	51.36	3,907.61	340.85	426.31	-268.37	0.00	0.00	0.00
4,100.00	22.00	51.36	4,000.32	364.25	455.57	-286.79	0.00	0.00	0.00
4,200.00	22.00	51.36	4,093.04	387.65	484.83	-305.22	0.00	0.00	0.00
4,300.00	22.00	51.36	4,185.75	411.05	514.10	-323.64	0.00	0.00	0.00
4,400.00	22.00	51.36	4,278.47	434.44	543.36	-342.06	0.00	0.00	0.00
4,500.00	22.00	51.36	4,371.18	457.84	572.63	-360.49	0.00	0.00	0.00
4,600.00	22.00	51.36	4,463.90	481.24	601.89	-378.91	0.00	0.00	0.00
4,700.00	22.00	51.36	4,556.61	504.64	631.16	-397.33	0.00	0.00	0.00
4,800.00	22.00	51.36	4,649.33	528.04	660.42	-415.75	0.00	0.00	0.00
4,900.00	22.00	51.36	4,742.05	551.43	689.68	-434.18	0.00	0.00	0.00

Database:	Local	Local Co-ordinate Reference:	Well Westerman A4-786
Company:	Noble Energy	TVD Reference:	KB @ 4842.00usft
Project:	Cummins	MD Reference:	KB @ 4842.00usft
Site:	AB Section 32	North Reference:	Grid
Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,000.00	22.00	51.36	4,834.76	574.83	718.95	-452.60	0.00	0.00	0.00
5,100.00	22.00	51.36	4,927.48	598.23	748.21	-471.02	0.00	0.00	0.00
5,200.00	22.00	51.36	5,020.19	621.63	777.48	-489.44	0.00	0.00	0.00
5,300.00	22.00	51.36	5,112.91	645.03	806.74	-507.87	0.00	0.00	0.00
5,400.00	22.00	51.36	5,205.62	668.42	836.00	-526.29	0.00	0.00	0.00
5,500.00	22.00	51.36	5,298.34	691.82	865.27	-544.71	0.00	0.00	0.00
5,600.00	22.00	51.36	5,391.05	715.22	894.53	-563.14	0.00	0.00	0.00
5,700.00	22.00	51.36	5,483.77	738.62	923.80	-581.56	0.00	0.00	0.00
5,800.00	22.00	51.36	5,576.48	762.02	953.06	-599.98	0.00	0.00	0.00
5,900.00	22.00	51.36	5,669.20	785.42	982.33	-618.40	0.00	0.00	0.00
6,000.00	22.00	51.36	5,761.91	808.81	1,011.59	-636.83	0.00	0.00	0.00
6,100.00	22.00	51.36	5,854.63	832.21	1,040.85	-655.25	0.00	0.00	0.00
6,200.00	22.00	51.36	5,947.34	855.61	1,070.12	-673.67	0.00	0.00	0.00
6,300.00	22.00	51.36	6,040.06	879.01	1,099.38	-692.09	0.00	0.00	0.00
6,400.00	22.00	51.36	6,132.78	902.41	1,128.65	-710.52	0.00	0.00	0.00
6,474.51	22.00	51.36	6,201.86	919.84	1,150.45	-724.24	0.00	0.00	0.00
KOP: 9°/100' @ 6474.51' MD - KOP-Westerman A4-786									
6,500.00	20.75	56.63	6,225.60	925.31	1,157.95	-728.44	9.00	-4.92	20.68
6,550.00	18.84	68.69	6,272.66	933.12	1,172.88	-733.77	9.00	-3.82	24.13
6,600.00	17.84	82.67	6,320.14	937.03	1,188.00	-735.21	9.00	-1.99	27.97
6,650.00	17.92	97.36	6,367.75	937.02	1,203.24	-732.77	9.00	0.15	29.38
6,700.00	19.05	111.14	6,415.19	933.09	1,218.49	-726.45	9.00	2.27	27.54
6,750.00	21.07	122.89	6,462.18	925.26	1,233.65	-716.30	9.00	4.04	23.51
6,800.00	23.76	132.39	6,508.41	913.58	1,248.65	-702.38	9.00	5.37	19.00
6,850.00	26.90	139.92	6,553.61	898.13	1,263.38	-684.77	9.00	6.29	15.07
6,900.00	30.37	145.92	6,597.49	878.99	1,277.75	-663.59	9.00	6.93	12.00
6,950.00	34.06	150.77	6,639.80	856.30	1,291.68	-638.96	9.00	7.38	9.69
7,000.00	37.90	154.75	6,680.26	830.17	1,305.07	-611.03	9.00	7.69	7.97
7,050.00	41.86	158.09	6,718.62	800.79	1,317.85	-579.98	9.00	7.92	6.69
7,100.00	45.90	160.95	6,754.65	768.32	1,329.94	-546.00	9.00	8.08	5.72
7,150.00	50.01	163.44	6,788.14	732.97	1,341.27	-509.29	9.00	8.21	4.98
7,200.00	54.16	165.65	6,818.86	694.96	1,351.75	-470.10	9.00	8.30	4.41
7,250.00	58.34	167.64	6,846.63	654.52	1,361.33	-428.64	9.00	8.37	3.97
7,300.00	62.56	169.45	6,871.29	611.90	1,369.96	-385.19	9.00	8.43	3.63
7,350.00	66.79	171.13	6,892.67	567.36	1,377.57	-340.01	9.00	8.47	3.36
7,400.00	71.05	172.71	6,910.65	521.18	1,384.11	-293.38	9.00	8.51	3.15
7,450.00	75.31	174.20	6,925.12	473.65	1,389.56	-245.58	9.00	8.53	2.99
7,500.00	79.59	175.64	6,935.98	425.05	1,393.87	-196.92	9.00	8.55	2.88
7,550.00	83.87	177.04	6,943.18	375.68	1,397.02	-147.68	9.00	8.56	2.80
7,600.00	88.15	178.42	6,946.65	325.85	1,398.99	-98.18	9.00	8.57	2.76
7,621.54	90.00	179.01	6,947.00	304.32	1,399.48	-76.85	9.00	8.57	2.74
TPZ/LP: 7621.54' MD, 90.00° Inc, 179.01° Azm - TPZ-Westerman A4-786									
7,700.00	90.00	179.01	6,947.00	225.87	1,400.83	0.81	0.00	0.00	0.00
7,800.00	90.00	179.01	6,947.00	125.89	1,402.55	99.78	0.00	0.00	0.00
7,900.00	90.00	179.01	6,947.00	25.90	1,404.27	198.76	0.00	0.00	0.00
8,000.00	90.00	179.01	6,947.00	-74.08	1,405.99	297.74	0.00	0.00	0.00
8,100.00	90.00	179.01	6,947.00	-174.07	1,407.71	396.71	0.00	0.00	0.00
8,200.00	90.00	179.01	6,947.00	-274.05	1,409.43	495.69	0.00	0.00	0.00
8,300.00	90.00	179.01	6,947.00	-374.04	1,411.15	594.66	0.00	0.00	0.00
8,400.00	90.00	179.01	6,947.00	-474.02	1,412.87	693.64	0.00	0.00	0.00
8,500.00	90.00	179.01	6,947.00	-574.01	1,414.60	792.62	0.00	0.00	0.00
8,600.00	90.00	179.01	6,947.00	-673.99	1,416.32	891.59	0.00	0.00	0.00
8,700.00	90.00	179.01	6,947.00	-773.98	1,418.04	990.57	0.00	0.00	0.00
8,800.00	90.00	179.01	6,947.00	-873.96	1,419.76	1,089.55	0.00	0.00	0.00

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Project:	Cummins	MD Reference:	KB @ 4842.00usft
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Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

Planned 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)
8,900.00	90.00	179.01	6,947.00	-973.95	1,421.48	1,188.52	0.00	0.00	0.00
9,000.00	90.00	179.01	6,947.00	-1,073.93	1,423.20	1,287.50	0.00	0.00	0.00
9,100.00	90.00	179.01	6,947.00	-1,173.92	1,424.92	1,386.47	0.00	0.00	0.00
9,200.00	90.00	179.01	6,947.00	-1,273.91	1,426.64	1,485.45	0.00	0.00	0.00
9,300.00	90.00	179.01	6,947.00	-1,373.89	1,428.36	1,584.43	0.00	0.00	0.00
9,400.00	90.00	179.01	6,947.00	-1,473.88	1,430.09	1,683.40	0.00	0.00	0.00
9,500.00	90.00	179.01	6,947.00	-1,573.86	1,431.81	1,782.38	0.00	0.00	0.00
9,600.00	90.00	179.01	6,947.00	-1,673.85	1,433.53	1,881.35	0.00	0.00	0.00
9,700.00	90.00	179.01	6,947.00	-1,773.83	1,435.25	1,980.33	0.00	0.00	0.00
9,800.00	90.00	179.01	6,947.00	-1,873.82	1,436.97	2,079.31	0.00	0.00	0.00
9,900.00	90.00	179.01	6,947.00	-1,973.80	1,438.69	2,178.28	0.00	0.00	0.00
10,000.00	90.00	179.01	6,947.00	-2,073.79	1,440.41	2,277.26	0.00	0.00	0.00
10,100.00	90.00	179.01	6,947.00	-2,173.77	1,442.13	2,376.23	0.00	0.00	0.00
10,200.00	90.00	179.01	6,947.00	-2,273.76	1,443.85	2,475.21	0.00	0.00	0.00
10,300.00	90.00	179.01	6,947.00	-2,373.74	1,445.57	2,574.19	0.00	0.00	0.00
10,400.00	90.00	179.01	6,947.00	-2,473.73	1,447.30	2,673.16	0.00	0.00	0.00
10,500.00	90.00	179.01	6,947.00	-2,573.71	1,449.02	2,772.14	0.00	0.00	0.00
10,600.00	90.00	179.01	6,947.00	-2,673.70	1,450.74	2,871.11	0.00	0.00	0.00
10,700.00	90.00	179.01	6,947.00	-2,773.68	1,452.46	2,970.09	0.00	0.00	0.00
10,800.00	90.00	179.01	6,947.00	-2,873.67	1,454.18	3,069.07	0.00	0.00	0.00
10,900.00	90.00	179.01	6,947.00	-2,973.65	1,455.90	3,168.04	0.00	0.00	0.00
11,000.00	90.00	179.01	6,947.00	-3,073.64	1,457.62	3,267.02	0.00	0.00	0.00
11,100.00	90.00	179.01	6,947.00	-3,173.62	1,459.34	3,366.00	0.00	0.00	0.00
11,200.00	90.00	179.01	6,947.00	-3,273.61	1,461.06	3,464.97	0.00	0.00	0.00
11,300.00	90.00	179.01	6,947.00	-3,373.59	1,462.79	3,563.95	0.00	0.00	0.00
11,400.00	90.00	179.01	6,947.00	-3,473.58	1,464.51	3,662.92	0.00	0.00	0.00
11,500.00	90.00	179.01	6,947.00	-3,573.56	1,466.23	3,761.90	0.00	0.00	0.00
11,600.00	90.00	179.01	6,947.00	-3,673.55	1,467.95	3,860.88	0.00	0.00	0.00
11,700.00	90.00	179.01	6,947.00	-3,773.53	1,469.67	3,959.85	0.00	0.00	0.00
11,800.00	90.00	179.01	6,947.00	-3,873.52	1,471.39	4,058.83	0.00	0.00	0.00
11,900.00	90.00	179.01	6,947.00	-3,973.51	1,473.11	4,157.80	0.00	0.00	0.00
12,000.00	90.00	179.01	6,947.00	-4,073.49	1,474.83	4,256.78	0.00	0.00	0.00
12,100.00	90.00	179.01	6,947.00	-4,173.48	1,476.55	4,355.76	0.00	0.00	0.00
12,200.00	90.00	179.01	6,947.00	-4,273.46	1,478.27	4,454.73	0.00	0.00	0.00
12,300.00	90.00	179.01	6,947.00	-4,373.45	1,480.00	4,553.71	0.00	0.00	0.00
12,400.00	90.00	179.01	6,947.00	-4,473.43	1,481.72	4,652.68	0.00	0.00	0.00
12,500.00	90.00	179.01	6,947.00	-4,573.42	1,483.44	4,751.66	0.00	0.00	0.00
12,600.00	90.00	179.01	6,947.00	-4,673.40	1,485.16	4,850.64	0.00	0.00	0.00
12,700.00	90.00	179.01	6,947.00	-4,773.39	1,486.88	4,949.61	0.00	0.00	0.00
12,800.00	90.00	179.01	6,947.00	-4,873.37	1,488.60	5,048.59	0.00	0.00	0.00
12,900.00	90.00	179.01	6,947.00	-4,973.36	1,490.32	5,147.56	0.00	0.00	0.00
13,000.00	90.00	179.01	6,947.00	-5,073.34	1,492.04	5,246.54	0.00	0.00	0.00
13,100.00	90.00	179.01	6,947.00	-5,173.33	1,493.76	5,345.52	0.00	0.00	0.00
13,200.00	90.00	179.01	6,947.00	-5,273.31	1,495.49	5,444.49	0.00	0.00	0.00
13,300.00	90.00	179.01	6,947.00	-5,373.30	1,497.21	5,543.47	0.00	0.00	0.00
13,400.00	90.00	179.01	6,947.00	-5,473.28	1,498.93	5,642.45	0.00	0.00	0.00
13,500.00	90.00	179.01	6,947.00	-5,573.27	1,500.65	5,741.42	0.00	0.00	0.00
13,600.00	90.00	179.01	6,947.00	-5,673.25	1,502.37	5,840.40	0.00	0.00	0.00
13,700.00	90.00	179.01	6,947.00	-5,773.24	1,504.09	5,939.37	0.00	0.00	0.00
13,800.00	90.00	179.01	6,947.00	-5,873.22	1,505.81	6,038.35	0.00	0.00	0.00
13,900.00	90.00	179.01	6,947.00	-5,973.21	1,507.53	6,137.33	0.00	0.00	0.00
14,000.00	90.00	179.01	6,947.00	-6,073.19	1,509.25	6,236.30	0.00	0.00	0.00
14,100.00	90.00	179.01	6,947.00	-6,173.18	1,510.97	6,335.28	0.00	0.00	0.00
14,200.00	90.00	179.01	6,947.00	-6,273.16	1,512.70	6,434.25	0.00	0.00	0.00

Database:	Local	Local Co-ordinate Reference:	Well Westerman A4-786
Company:	Noble Energy	TVD Reference:	KB @ 4842.00usft
Project:	Cummins	MD Reference:	KB @ 4842.00usft
Site:	AB Section 32	North Reference:	Grid
Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
14,300.00	90.00	179.01	6,947.00	-6,373.15	1,514.42	6,533.23	0.00	0.00	0.00	
14,400.00	90.00	179.01	6,947.00	-6,473.14	1,516.14	6,632.21	0.00	0.00	0.00	
14,500.00	90.00	179.01	6,947.00	-6,573.12	1,517.86	6,731.18	0.00	0.00	0.00	
14,600.00	90.00	179.01	6,947.00	-6,673.11	1,519.58	6,830.16	0.00	0.00	0.00	
14,700.00	90.00	179.01	6,947.00	-6,773.09	1,521.30	6,929.13	0.00	0.00	0.00	
14,800.00	90.00	179.01	6,947.00	-6,873.08	1,523.02	7,028.11	0.00	0.00	0.00	
14,900.00	90.00	179.01	6,947.00	-6,973.06	1,524.74	7,127.09	0.00	0.00	0.00	
15,000.00	90.00	179.01	6,947.00	-7,073.05	1,526.46	7,226.06	0.00	0.00	0.00	
15,100.00	90.00	179.01	6,947.00	-7,173.03	1,528.19	7,325.04	0.00	0.00	0.00	
15,200.00	90.00	179.01	6,947.00	-7,273.02	1,529.91	7,424.01	0.00	0.00	0.00	
15,300.00	90.00	179.01	6,947.00	-7,373.00	1,531.63	7,522.99	0.00	0.00	0.00	
15,400.00	90.00	179.01	6,947.00	-7,472.99	1,533.35	7,621.97	0.00	0.00	0.00	
15,500.00	90.00	179.01	6,947.00	-7,572.97	1,535.07	7,720.94	0.00	0.00	0.00	
15,600.00	90.00	179.01	6,947.00	-7,672.96	1,536.79	7,819.92	0.00	0.00	0.00	
15,700.00	90.00	179.01	6,947.00	-7,772.94	1,538.51	7,918.90	0.00	0.00	0.00	
15,800.00	90.00	179.01	6,947.00	-7,872.93	1,540.23	8,017.87	0.00	0.00	0.00	
15,900.00	90.00	179.01	6,947.00	-7,972.91	1,541.95	8,116.85	0.00	0.00	0.00	
16,000.00	90.00	179.01	6,947.00	-8,072.90	1,543.67	8,215.82	0.00	0.00	0.00	
16,100.00	90.00	179.01	6,947.00	-8,172.88	1,545.40	8,314.80	0.00	0.00	0.00	
16,200.00	90.00	179.01	6,947.00	-8,272.87	1,547.12	8,413.78	0.00	0.00	0.00	
16,300.00	90.00	179.01	6,947.00	-8,372.85	1,548.84	8,512.75	0.00	0.00	0.00	
16,400.00	90.00	179.01	6,947.00	-8,472.84	1,550.56	8,611.73	0.00	0.00	0.00	
16,500.00	90.00	179.01	6,947.00	-8,572.82	1,552.28	8,710.70	0.00	0.00	0.00	
16,600.00	90.00	179.01	6,947.00	-8,672.81	1,554.00	8,809.68	0.00	0.00	0.00	
16,700.00	90.00	179.01	6,947.00	-8,772.79	1,555.72	8,908.66	0.00	0.00	0.00	
16,800.00	90.00	179.01	6,947.00	-8,872.78	1,557.44	9,007.63	0.00	0.00	0.00	
16,900.00	90.00	179.01	6,947.00	-8,972.76	1,559.16	9,106.61	0.00	0.00	0.00	
17,000.00	90.00	179.01	6,947.00	-9,072.75	1,560.89	9,205.58	0.00	0.00	0.00	
17,100.00	90.00	179.01	6,947.00	-9,172.74	1,562.61	9,304.56	0.00	0.00	0.00	
17,200.00	90.00	179.01	6,947.00	-9,272.72	1,564.33	9,403.54	0.00	0.00	0.00	
17,300.00	90.00	179.01	6,947.00	-9,372.71	1,566.05	9,502.51	0.00	0.00	0.00	
17,400.00	90.00	179.01	6,947.00	-9,472.69	1,567.77	9,601.49	0.00	0.00	0.00	
17,500.00	90.00	179.01	6,947.00	-9,572.68	1,569.49	9,700.47	0.00	0.00	0.00	
17,600.00	90.00	179.01	6,947.00	-9,672.66	1,571.21	9,799.44	0.00	0.00	0.00	
17,640.91	90.00	179.01	6,947.00	-9,713.57	1,571.92	9,839.93	0.00	0.00	0.00	
TD @ 17640.91' MD/6947.00' TVD - BHL-Westerman A4-786										

Database:	Local	Local Co-ordinate Reference:	Well Westerman A4-786
Company:	Noble Energy	TVD Reference:	KB @ 4842.00usft
Project:	Cummins	MD Reference:	KB @ 4842.00usft
Site:	AB Section 32	North Reference:	Grid
Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

Design Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
SHL-Westerman A4-7 - plan hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,439,182.55	3,258,883.16	40.535224	-104.568597
KOP-Westerman A4-7 - plan hits target center - Point	0.00	0.00	6,201.86	919.84	1,150.45	1,440,102.39	3,260,033.61	40.537716	-104.564424
TPZ-Westerman A4-7 - plan hits target center - Point	0.00	0.00	6,947.00	304.32	1,399.48	1,439,486.87	3,260,282.64	40.536019	-104.563551
BHL-Westerman A4-7 - plan hits target center - Point	0.00	0.00	6,947.00	-9,713.57	1,571.92	1,429,468.99	3,260,455.08	40.508517	-104.563312

Formations						
Measured Depth	Vertical Depth		Name	Lithology	Dip	Dip Direction
(usft)	(usft)				(°)	(°)
7,621.54	6,947.00	Nio B			0.00	

Plan Annotations					
Measured Depth	Vertical Depth	Local Coordinates			
(usft)	(usft)	+N/-S	+E/-W	Comment	
(usft)	(usft)	(usft)	(usft)		
2,000.00	2,000.00	0.00	0.00	Build: 2°/100' @ 2000.00' MD	
3,100.23	3,073.38	130.32	163.00	Hold: 22.00° Inc, 51.36° Azm	
6,474.51	6,201.86	919.84	1,150.45	KOP: 9°/100' @ 6474.51' MD	
7,621.54	6,947.00	304.32	1,399.48	TPZ/LP: 7621.54' MD, 90.00° Inc, 179.01° Azm	
17,640.91	6,947.00	-9,713.57	1,571.92	TD @ 17640.91' MD/6947.00' TVD	



Noble Energy

Cummins

AB Section 32

Westerman A4-786

Wellbore #1

Plan #1

Anticollision Summary Report

21 June, 2019

Company:	Noble Energy	Local Co-ordinate Reference:	Well Westerman A4-786
Project:	Cummins	TVD Reference:	KB @ 4842.00usft
Reference Site:	AB Section 32	MD Reference:	KB @ 4842.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Local
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Reference	Plan #1		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum ellipse separation of 1,000.00 usft	Error Surface:	Pedal Curve
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program		Date	6/20/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	17,640.91	Plan #1 (Wellbore #1)	2_MWD+IFR1+MS	A008Mb: IFR dec & multi-station analysis	

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
A Section 04						
BARRELL #41-4 (SI) - Wellbore #1 - No Surveys	13,069.08	6,955.00	4,087.04	3,756.26	12.356	CC
BARRELL #41-4 (SI) - Wellbore #1 - No Surveys	13,100.00	6,955.00	4,087.16	3,756.11	12.346	ES
BARRELL #41-4 (SI) - Wellbore #1 - No Surveys	13,500.00	6,955.00	4,109.70	3,775.35	12.292	SF
BARRELL #42-4 (PA) - Wellbore #1 - No Surveys	14,374.51	6,945.00	4,270.42	3,930.44	12.561	CC
BARRELL #42-4 (PA) - Wellbore #1 - No Surveys	14,400.00	6,945.00	4,270.50	3,930.29	12.553	ES
BARRELL #42-4 (PA) - Wellbore #1 - No Surveys	14,800.00	6,945.00	4,291.56	3,947.98	12.491	SF
DILLARD A #4-4 (SI) - Wellbore #1 - As-Drilled	13,230.74	6,919.94	297.20	219.11	3.806	CC, ES, SF
ERICKSON #14-4 (PR) - Wellbore #1 - No Surveys	17,377.61	6,970.00	552.68	188.54	1.518	CC, ES
ERICKSON #14-4 (PR) - Wellbore #1 - No Surveys	17,400.00	6,970.00	553.13	188.59	1.517	SF
ERICKSON #24-4 (PR) - Wellbore #1 - No Surveys	17,375.34	6,965.00	1,865.17	1,501.25	5.125	CC
ERICKSON #24-4 (PR) - Wellbore #1 - No Surveys	17,400.00	6,965.00	1,865.33	1,501.13	5.122	ES
ERICKSON #24-4 (PR) - Wellbore #1 - No Surveys	17,500.00	6,965.00	1,869.33	1,504.13	5.119	SF
ERICKSON #34-4 (PR) - Wellbore #1 - As-Drilled	17,465.69	6,976.65	3,112.35	3,002.01	28.206	CC
ERICKSON #34-4 (PR) - Wellbore #1 - As-Drilled	17,500.00	6,976.50	3,112.54	3,001.85	28.120	ES
ERICKSON #34-4 (PR) - Wellbore #1 - As-Drilled	17,640.91	6,975.89	3,117.28	3,005.28	27.832	SF
ERICKSON A #4-12 (SI) - Wellbore #1 - No Surveys	15,869.79	6,965.00	344.12	-8.05	0.977	Level 1, CC, ES, SF
ERICKSON A #4-5 (PR) - Wellbore #1 - No Surveys	14,374.48	6,937.00	430.78	91.12	1.268	Level 3, CC, ES, SF
LAWLEY #31-4 (PR) - Wellbore #1 - No Surveys	13,203.06	6,965.00	2,843.42	2,511.28	8.561	CC, ES
LAWLEY #31-4 (PR) - Wellbore #1 - No Surveys	13,400.00	6,965.00	2,850.23	2,516.32	8.536	SF
LAWLEY #32-4 (PR) - Wellbore #1 - No Surveys	14,317.37	6,965.00	2,766.63	2,426.29	8.129	CC, ES
LAWLEY #32-4 (PR) - Wellbore #1 - No Surveys	14,500.00	6,965.00	2,772.66	2,430.61	8.106	SF
LAWLEY #33-4 (PR) - Wellbore #1 - No Surveys	16,090.42	6,975.00	3,147.10	2,792.82	8.883	CC
LAWLEY #33-4 (PR) - Wellbore #1 - No Surveys	16,100.00	6,975.00	3,147.11	2,792.74	8.881	ES
LAWLEY #33-4 (PR) - Wellbore #1 - No Surveys	16,300.00	6,975.00	3,154.07	2,797.85	8.854	SF
LAWLEY #43-4 (PR) - Wellbore #1 - No Surveys	16,075.95	6,955.00	4,284.43	3,931.06	12.125	CC
LAWLEY #43-4 (PR) - Wellbore #1 - No Surveys	16,100.00	6,955.00	4,284.49	3,930.90	12.117	ES
LAWLEY #43-4 (PR) - Wellbore #1 - No Surveys	16,500.00	6,955.00	4,305.36	3,948.34	12.059	SF
LAWLEY #44-4D (PR) - Wellbore #1 - As-Drilled	17,031.82	6,924.32	4,265.32	4,152.19	37.703	CC
LAWLEY #44-4D (PR) - Wellbore #1 - As-Drilled	17,100.00	6,924.26	4,265.86	4,152.11	37.502	ES
LAWLEY #44-4D (PR) - Wellbore #1 - As-Drilled	17,640.91	6,923.79	4,308.59	4,190.70	36.548	SF

Company:	Noble Energy	Local Co-ordinate Reference:	Well Westerman A4-786
Project:	Cummins	TVD Reference:	KB @ 4842.00usft
Reference Site:	AB Section 32	MD Reference:	KB @ 4842.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Local
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
A Section 05						
DYER #13-5 (PA) - Wellbore #1 - As-Drilled	15,720.83	6,882.39	5,079.65	4,983.20	52.667	CC, ES
DYER #13-5 (PA) - Wellbore #1 - As-Drilled	16,700.00	6,882.20	5,173.16	5,071.67	50.969	SF
DYER USX A #05-14 (PR) - Wellbore #1 - No Surveys	17,203.62	6,881.00	3,658.87	3,299.66	10.186	CC, ES
DYER USX A #05-14 (PR) - Wellbore #1 - No Surveys	17,400.00	6,881.00	3,664.14	3,303.86	10.170	SF
ERICKSON #5-43 (PR) - Wellbore #1 - No Surveys	17,160.66	6,898.00	2,470.96	2,111.41	6.872	CC, ES
ERICKSON #5-43 (PR) - Wellbore #1 - No Surveys	17,200.00	6,898.00	2,471.27	2,111.53	6.870	SF
GRADY DYER #14-5 (PA) - Wellbore #1 - No Surveys	17,196.99	6,860.00	5,163.16	4,804.85	14.409	CC
GRADY DYER #14-5 (PA) - Wellbore #1 - No Surveys	17,200.00	6,860.00	5,163.17	4,804.83	14.409	ES
GRADY DYER #14-5 (PA) - Wellbore #1 - No Surveys	17,600.00	6,860.00	5,178.87	4,818.16	14.357	SF
GRADY DYER #23-5 (PA) - Wellbore #1 - No Surveys	16,051.40	6,875.00	3,803.97	3,453.99	10.869	CC, ES
GRADY DYER #23-5 (PA) - Wellbore #1 - No Surveys	16,300.00	6,875.00	3,812.08	3,460.77	10.851	SF
OWL CREEK #7 (SI) - Wellbore #1 - No Surveys	15,819.03	6,932.00	985.74	635.28	2.813	CC, ES, SF
OWL CREEK #7-5 (SI) - Wellbore #1 - No Surveys	17,196.33	6,936.00	956.02	594.67	2.646	CC, ES, SF
ROUSE USX A #05-01 (SI) - Wellbore #1 - No Surveys	13,063.73	6,911.00	820.51	491.53	2.494	CC, ES, SF
ROUSE USX A #05-02 (SI) - Wellbore #1 - No Surveys	13,404.47	6,901.00	2,216.24	1,885.20	6.695	CC, ES
ROUSE USX A #05-02 (SI) - Wellbore #1 - No Surveys	13,500.00	6,901.00	2,218.30	1,886.88	6.693	SF
ROUSE USX A #05-03 (SI) - Wellbore #1 - No Surveys	13,412.60	6,876.00	3,491.31	3,161.21	10.576	CC, ES
ROUSE USX A #05-03 (SI) - Wellbore #1 - No Surveys	13,600.00	6,876.00	3,496.34	3,165.28	10.561	SF
ROUSE USX A #05-04 (SI) - Wellbore #1 - As-Drilled	13,387.71	6,836.46	5,014.72	4,936.11	63.791	CC
ROUSE USX A #05-04 (SI) - Wellbore #1 - As-Drilled	13,400.00	6,836.29	5,014.74	4,936.05	63.733	ES
ROUSE USX A #05-04 (SI) - Wellbore #1 - As-Drilled	14,600.00	6,820.88	5,159.14	5,074.66	61.066	SF
ROUSE USX A #05-05 (SI) - Wellbore #1 - No Surveys	14,732.60	6,851.00	5,133.75	4,794.84	15.148	CC, ES
ROUSE USX A #05-05 (SI) - Wellbore #1 - No Surveys	15,200.00	6,851.00	5,154.99	4,813.37	15.090	SF
ROUSE USX A #05-06 (SI) - Wellbore #1 - As-drilled	14,763.94	6,957.92	3,465.89	3,376.23	38.658	CC
ROUSE USX A #05-06 (SI) - Wellbore #1 - As-drilled	14,800.00	6,957.77	3,466.08	3,376.22	38.575	ES
ROUSE USX A #05-06 (SI) - Wellbore #1 - As-drilled	15,200.00	6,956.12	3,493.21	3,401.56	38.116	SF
ROUSE USX A #05-07 (SI) - Wellbore #1 - No Surveys	14,748.20	6,907.00	2,304.26	1,962.99	6.752	CC, ES
ROUSE USX A #05-07 (SI) - Wellbore #1 - No Surveys	14,800.00	6,907.00	2,304.84	1,963.34	6.749	SF
ROUSE USX A #05-08 (SI) - Wellbore #1 - No Surveys	14,741.78	6,931.00	981.03	638.85	2.867	CC, ES, SF
ROUSE-USX A #5-17 (SI) - Wellbore #1 - As-Drilled	13,938.11	6,951.65	1,440.31	1,357.01	17.291	CC, ES
ROUSE-USX A #5-17 (SI) - Wellbore #1 - As-Drilled	14,000.00	6,951.10	1,441.64	1,358.22	17.281	SF
ROUSE-USX A #5-19 (SI) - Wellbore #1 - No Surveys	13,901.70	6,864.00	4,373.21	4,039.99	13.124	CC, ES
ROUSE-USX A #5-19 (SI) - Wellbore #1 - No Surveys	14,200.00	6,864.00	4,383.37	4,048.50	13.090	SF
A Section 08						
ERICKSON A #8-1(PR) - Wellbore #1 - No Surveys	17,640.91	6,936.00	1,359.16	1,007.34	3.863	CC, ES, SF
ERICKSON A #8-17(PR) - Wellbore #1 - No Surveys	17,640.91	6,942.00	2,142.68	1,796.22	6.184	CC, ES, SF
ERICKSON A #8-2 - Wellbore #1 - No Surveys	17,640.91	6,917.00	2,536.28	2,174.44	7.010	CC, ES, SF
ERICKSON A #8-7(PR) - Wellbore #1 - No Surveys	17,640.91	6,916.00	3,096.56	2,749.77	8.929	CC, ES, SF
ERICKSON A #8-8(PR) - Wellbore #1 - No Surveys	17,640.91	6,954.00	2,346.95	2,021.09	7.202	CC, ES, SF
FRANCEN #23-8(PR) - Wellbore #1 - No Surveys	17,640.91	6,890.00	5,367.95	5,021.57	15.497	CC, ES, SF
FRANCEN #24-8(PR) - Wellbore #1 - No Surveys	17,640.91	6,881.00	6,165.21	5,828.65	18.318	CC, ES, SF
FRANCIS #11-8(SI) - Wellbore #1 - No Surveys	17,640.91	6,865.00	5,243.31	4,881.06	14.475	CC, ES, SF
FRANCIS #21-8(SI) - Wellbore #1 - No Surveys	17,640.91	6,885.00	3,902.68	3,539.84	10.756	CC, ES, SF
FRANCIS #22-8(SI) - Wellbore #1 - No Surveys	17,640.91	6,890.00	4,533.49	4,178.31	12.764	CC, ES, SF
GRADY #1(DA) - Wellbore #1 - No Surveys	17,640.91	6,874.00	5,586.64	5,227.90	15.573	CC, ES, SF
MILE HIGH SHEEP #8-32(PR) - Wellbore #1 - No Surveys	17,640.91	6,876.00	6,400.51	6,048.24	18.169	CC, ES, SF
MILE HIGH SHEEP #8-33(SI) - Wellbore #1 - As-Drilled	17,640.91	6,861.11	6,866.48	6,770.97	71.890	CC, ES, SF
MILE-HI SHEEP #8-35(PR) - Wellbore #1 - No Surveys	17,640.91	6,884.00	6,238.67	5,890.98	17.943	CC, ES, SF
UHRICH #33-8(PA) - Wellbore #1 - As-Drilled	17,640.91	6,904.63	4,368.49	4,285.58	52.690	CC, ES, SF
UHRICH #34-8(PA) - Wellbore #1 - No Surveys	17,640.91	6,878.00	5,590.43	5,264.52	17.153	CC, ES, SF
UHRICH #43-8(PR) - Wellbore #1 - No Surveys	17,640.91	6,935.00	3,826.85	3,509.71	12.067	CC, ES, SF
UHRICH #44-8(PR) - Wellbore #1 - NO Surveys	17,640.91	6,906.00	5,193.50	4,879.11	16.519	CC, ES, SF

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

Company:	Noble Energy	Local Co-ordinate Reference:	Well Westerman A4-786
Project:	Cummins	TVD Reference:	KB @ 4842.00usft
Reference Site:	AB Section 32	MD Reference:	KB @ 4842.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Local
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Summary						
Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
A Section 09						
HOWARD LAKE #11-9(SI) - Wellbore #1 - No Surveys	17,640.91	6,955.00	1,125.57	815.90	3.635	CC, ES, SF
HOWARD LAKE #12-9(SI) - Wellbore #1 - No Surveys	17,640.91	6,965.00	2,186.30	1,877.76	7.086	CC, ES, SF
HOWARD LAKE #21-9(SI) - Wellbore #1 - No Surveys	17,640.91	6,995.00	1,839.01	1,488.33	5.244	CC, ES, SF
HOWARD LAKE #41-9(PA) - Wellbore #1 - No Surveys	17,640.91	6,955.00	4,554.71	4,193.06	12.594	CC, ES, SF
HOWARD LAKE #42-9(SI) - Wellbore #1 - No Surveys	17,640.91	6,955.00	4,975.11	4,621.74	14.079	CC, ES, SF
Howard USX #A09-09D - Wellbore #1 - As-Drilled	17,640.91	7,100.00	5,564.51	5,465.87	56.411	CC, ES, SF
Howard USX #A09-14D - Wellbore #1 - As-Drilled	17,640.91	7,226.41	5,091.84	5,010.36	62.489	CC, ES, SF
Howard USX #A09-15D(PR) - Wellbore #1 - As-Drilled	17,640.91	6,914.06	5,661.43	5,585.91	74.971	CC, ES, SF
Howard USX #A09-23(SI) - Wellbore #1 - No Surveys	17,640.91	6,952.00	5,639.39	5,304.22	16.825	CC, ES, SF
HOWARD USX A #09-02D(PR) - Wellbore #1 - As-Drilled	17,640.91	7,399.35	3,003.84	2,858.35	20.647	CC, ES, SF
HOWARD USX A #09-06D(SI) - Wellbore #1 - As-Drilled	17,640.91	7,079.00	2,808.24	2,730.64	36.189	CC, ES, SF
HOWARD USX A #09-19(SI) - Wellbore #1 - As-Drilled	17,640.91	7,004.27	1,927.62	1,858.74	27.983	CC, ES, SF
HOWARD USX A #9-10(PR) - Wellbore #1 - No Surveys	17,640.91	6,959.00	4,591.16	4,258.00	13.781	CC, ES, SF
HOWARD USX A #9-11(PR) - Wellbore #1 - As-Drilled	17,640.91	6,794.25	3,793.12	3,727.50	57.809	CC, ES, SF
HOWARD USX A #9-13 - Wellbore #1 - As-Drilled	17,640.91	6,858.21	4,929.64	4,876.02	91.943	CC, ES, SF
HOWARD USX A #9-16 - Wellbore #1 - As-Drilled	17,640.91	7,000.00	6,499.51	6,419.65	81.386	CC, ES, SF
HOWARD USX A #9-7(PA) - Wellbore #1 - As-Drilled	17,640.91	7,100.00	3,832.91	3,730.04	37.259	CC, ES, SF
OWL CREEK #5(PA) - Wellbore #1 - No Surveys	17,640.91	6,962.00	4,307.78	3,945.22	11.882	CC, ES, SF

Company:	Noble Energy	Local Co-ordinate Reference:	Well Westerman A4-786
Project:	Cummins	TVD Reference:	KB @ 4842.00usft
Reference Site:	AB Section 32	MD Reference:	KB @ 4842.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Local
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
AB Section 28						
Gable A4-735 - Wellbore #1 - Plan #1	3,841.60	3,023.13	2,299.06	2,275.76	98.662	CC, ES
Gable A4-735 - Wellbore #1 - Plan #1	17,640.91	18,076.16	3,282.67	3,103.97	18.370	SF
Gable A4-745 - Wellbore #1 - Plan #1	3,853.03	3,028.79	2,308.56	2,285.19	98.807	CC
Gable A4-745 - Wellbore #1 - Plan #1	3,900.00	3,059.27	2,308.77	2,285.14	97.727	ES
Gable A4-745 - Wellbore #1 - Plan #1	17,640.91	17,720.17	2,625.36	2,446.29	14.662	SF
Gable A4-756 - Wellbore #1 - Plan #1	7,078.75	6,459.84	1,914.62	1,864.97	38.561	CC
Gable A4-756 - Wellbore #1 - Plan #1	17,640.91	17,599.68	1,970.70	1,792.57	11.063	ES, SF
Gable A4-766 - Wellbore #1 - Plan #1	7,618.75	7,396.22	1,299.32	1,248.08	25.361	CC
Gable A4-766 - Wellbore #1 - Plan #1	17,640.91	17,418.37	1,312.70	1,134.21	7.355	ES, SF
Gable A4-776 - Wellbore #1 - Plan #1	7,620.54	7,458.49	654.68	604.26	12.984	CC
Gable A4-776 - Wellbore #1 - Plan #1	17,640.91	17,478.86	661.33	484.20	3.734	ES, SF
HOFFNER #1(PA) - HOFFNER #1 - As-Drilled	6,913.60	6,608.64	497.34	449.10	10.310	CC, ES
HOFFNER #1(PA) - HOFFNER #1 - As-Drilled	6,950.00	6,638.49	498.37	449.90	10.283	SF
MOJACK #1-28(PR) - MOJACK #1-28 - No Surveys	6,821.59	6,586.06	6,297.78	6,140.92	40.147	CC
MOJACK #1-28(PR) - MOJACK #1-28 - No Surveys	6,850.00	6,611.60	6,298.25	6,140.78	39.997	ES
MOJACK #1-28(PR) - MOJACK #1-28 - No Surveys	7,250.00	6,904.62	6,402.70	6,238.48	38.989	SF
MOJACK #2-28(PR) - MOJACK #2-28 - No Surveys	6,768.73	6,527.59	5,391.50	5,235.82	34.632	CC
MOJACK #2-28(PR) - MOJACK #2-28 - No Surveys	6,800.00	6,556.40	5,392.14	5,235.77	34.485	ES
MOJACK #2-28(PR) - MOJACK #2-28 - No Surveys	7,150.00	6,836.13	5,485.02	5,322.19	33.686	SF
Mojack #I-28HN (SI) - Mojack #I-28HN - As-Drilled	7,200.00	11,666.00	2,516.56	2,407.13	22.996	SF
Mojack #I-28HN (SI) - Mojack #I-28HN - As-Drilled	7,316.89	11,666.00	2,509.94	2,401.20	23.082	CC, ES
Mojack #J-28HN(SI) - Mojack #J-28HN - As-Drilled	7,250.00	11,650.00	2,827.26	2,717.65	25.795	SF
Mojack #J-28HN(SI) - Mojack #J-28HN - As-Drilled	7,340.49	11,650.00	2,823.41	2,714.17	25.845	CC, ES
Mojack #K-28HN (SI) - Mojack #K-28HN - As-Drilled	7,300.00	11,603.00	3,147.23	3,037.41	28.656	SF
Mojack #K-28HN (SI) - Mojack #K-28HN - As-Drilled	7,345.30	11,603.00	3,146.34	3,036.63	28.680	CC, ES
Mojack #L-28HN (PR) - Mojack #L-28HN - As-Drilled	7,300.00	11,601.00	3,487.66	3,376.71	31.432	SF
Mojack #L-28HN (PR) - Mojack #L-28HN - As-Drilled	7,356.65	11,601.00	3,486.34	3,375.45	31.438	CC, ES
Mojack #M-28HN (PR) - Mojack #M-28HN - As-Drilled	12,121.80	16,917.00	3,756.01	3,532.72	16.822	CC, ES
Mojack #M-28HN (PR) - Mojack #M-28HN - As-Drilled	12,400.00	16,917.00	3,766.29	3,541.08	16.723	SF
MOJACK #N-28HC (PR) - MOJACK #N-28HC OH - As-C	7,508.20	12,174.00	4,271.28	4,151.69	35.714	CC, ES
MOJACK #N-28HC (PR) - MOJACK #N-28HC OH - As-C	7,550.00	12,174.00	4,271.96	4,152.29	35.698	SF
MOJACK #N-28HC (PR) - MOJACK #N-28HC ST01 - As	7,590.29	12,423.00	4,110.17	3,987.57	33.524	CC
MOJACK #N-28HC (PR) - MOJACK #N-28HC ST01 - As	12,200.00	17,023.00	4,160.54	3,937.01	18.612	ES
MOJACK #N-28HC (PR) - MOJACK #N-28HC ST01 - As	12,500.00	17,023.00	4,176.94	3,951.20	18.503	SF
Mojack #O-28HN (PR) - Mojack #O-28HN - As-Drilled	12,015.44	16,797.00	4,442.85	4,222.27	20.142	CC
Mojack #O-28HN (PR) - Mojack #O-28HN - As-Drilled	12,100.00	16,797.00	4,443.66	4,222.22	20.067	ES
Mojack #O-28HN (PR) - Mojack #O-28HN - As-Drilled	12,500.00	16,797.00	4,469.20	4,244.65	19.903	SF
Mojack #P-28HN (PR) - Mojack #P-28HN - As-Drilled	12,121.56	17,043.00	4,755.03	4,531.98	21.318	CC
Mojack #P-28HN (PR) - Mojack #P-28HN - As-Drilled	12,200.00	17,043.00	4,755.68	4,531.77	21.240	ES
Mojack #P-28HN (PR) - Mojack #P-28HN - As-Drilled	12,700.00	17,043.00	4,790.08	4,562.00	21.001	SF
Mojack AB30-615 - Wellbore #1 - Plan #1	7,141.88	10,382.63	267.32	199.51	3.942	CC
Mojack AB30-615 - Wellbore #1 - Plan #1	7,150.00	10,380.90	267.48	198.86	3.898	ES
Mojack AB30-615 - Wellbore #1 - Plan #1	7,200.00	10,370.71	275.81	202.87	3.782	SF
Mojack AB30-625 - Wellbore #1 - Plan #1	6,918.05	10,136.24	776.90	703.42	10.573	CC, ES
Mojack AB30-625 - Wellbore #1 - Plan #1	7,000.00	10,114.57	786.08	711.01	10.471	SF
Mojack AB30-635 - Wellbore #1 - Plan #1	6,819.41	9,969.53	1,376.92	1,302.43	18.484	CC, ES
Mojack AB30-635 - Wellbore #1 - Plan #1	6,900.00	9,946.60	1,384.14	1,308.95	18.409	SF
Mojack AB30-645 - Wellbore #1 - Plan #1	6,777.41	9,892.22	2,014.01	1,939.57	27.058	CC, ES
Mojack AB30-645 - Wellbore #1 - Plan #1	6,850.00	9,871.05	2,019.32	1,944.44	26.968	SF
Mojack AB30-655 - Wellbore #1 - Plan #1	6,737.66	9,843.41	2,642.83	2,568.07	35.351	CC, ES
Mojack AB30-655 - Wellbore #1 - Plan #1	6,800.00	9,824.89	2,646.55	2,571.49	35.262	SF
Mojack AB30-665 - Wellbore #1 - Plan #1	6,727.12	9,900.76	3,297.44	3,222.65	44.091	CC, ES
Mojack AB30-665 - Wellbore #1 - Plan #1	6,800.00	9,879.08	3,302.33	3,227.22	43.966	SF

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

Company:	Noble Energy	Local Co-ordinate Reference:	Well Westerman A4-786
Project:	Cummins	TVD Reference:	KB @ 4842.00usft
Reference Site:	AB Section 32	MD Reference:	KB @ 4842.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Local
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
AB Section 28						
Mojack AB30-675 - Wellbore #1 - Plan #1	6,710.34	10,030.86	3,942.18	3,866.76	52.275	CC, ES
Mojack AB30-675 - Wellbore #1 - Plan #1	6,800.00	10,004.12	3,949.39	3,873.62	52.117	SF
Mojack AB30-685 - Wellbore #1 - Plan #1	6,702.00	10,213.94	4,546.78	4,470.84	59.877	CC, ES
Mojack AB30-685 - Wellbore #1 - Plan #1	6,900.00	10,200.00	4,581.31	4,504.25	59.454	SF
RICH #3-28(TA) - RICH #3-28 - No Surveys	6,713.31	6,468.74	4,626.31	4,471.75	29.932	CC, ES
RICH #3-28(TA) - RICH #3-28 - No Surveys	7,050.00	6,759.61	4,707.77	4,546.44	29.180	SF
RICH #4-28(SI) - RICH #4-28 - No Surveys	6,653.25	6,388.83	4,261.72	4,108.64	27.839	CC, ES
RICH #4-28(SI) - RICH #4-28 - No Surveys	7,000.00	6,698.25	4,354.28	4,193.96	27.161	SF
ROBEL #12-28(PR) - ROBEL #12-28 - As-Drilled	6,693.28	6,528.55	1,677.85	1,629.16	34.461	CC
ROBEL #12-28(PR) - ROBEL #12-28 - As-Drilled	6,700.00	6,535.09	1,677.89	1,629.15	34.431	ES
ROBEL #12-28(PR) - ROBEL #12-28 - As-Drilled	6,800.00	6,622.31	1,686.84	1,637.51	34.195	SF
ROBEL #14-28(PR) - ROBEL #14-28 - As-Drilled	7,171.45	6,976.54	1,750.45	1,695.89	32.082	CC, ES
ROBEL #14-28(PR) - ROBEL #14-28 - As-Drilled	7,350.00	7,062.02	1,766.85	1,711.23	31.770	SF
Robel #19-28(PR) - Robel #19-28 - No Surveys	6,789.76	6,509.01	1,258.23	1,102.92	8.101	CC
Robel #19-28(PR) - Robel #19-28 - No Surveys	6,800.00	6,518.40	1,258.30	1,102.77	8.090	ES
Robel #19-28(PR) - Robel #19-28 - No Surveys	6,900.00	6,607.48	1,266.54	1,108.90	8.034	SF
Weld County #16-28(PR) - Weld County #16-28 - No Surveys	7,379.35	6,933.64	4,467.59	4,302.82	27.113	CC
Weld County #16-28(PR) - Weld County #16-28 - No Surveys	7,400.00	6,940.64	4,467.74	4,302.81	27.088	ES
Weld County #16-28(PR) - Weld County #16-28 - No Surveys	7,500.00	6,965.97	4,472.81	4,307.30	27.024	SF
Weld County #20-28(SI) - Weld County #20-28 - As-Drilled	7,118.25	6,968.94	3,884.19	3,828.67	69.961	CC, ES
Weld County #20-28(SI) - Weld County #20-28 - As-Drilled	7,400.00	7,115.86	3,917.03	3,860.41	69.178	SF
Weld County #9-28(PR) - Weld County #9-28 - As-Drilled	7,046.58	7,044.04	4,748.40	4,690.22	81.617	CC
Weld County #9-28(PR) - Weld County #9-28 - As-Drilled	7,050.00	7,047.99	4,748.41	4,690.22	81.603	ES
Weld County #9-28(PR) - Weld County #9-28 - As-Drilled	7,200.00	7,160.74	4,757.91	4,699.37	81.282	SF

Company:	Noble Energy	Local Co-ordinate Reference:	Well Westerman A4-786
Project:	Cummins	TVD Reference:	KB @ 4842.00usft
Reference Site:	AB Section 32	MD Reference:	KB @ 4842.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Local
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
AB Section 29						
DILLARD - USX AB #29-17(SI) - DILLARD - USX AB #29	6,565.61	6,335.09	3,722.77	3,675.49	78.730	CC, ES
DILLARD - USX AB #29-17(SI) - DILLARD - USX AB #29	6,850.00	6,604.41	3,783.87	3,734.67	76.902	SF
Dillard USX #AB29-02(SI) - Dillard USX #AB29-02 - As-C	6,552.50	6,354.07	4,723.47	4,567.56	30.297	CC, ES
Dillard USX #AB29-02(SI) - Dillard USX #AB29-02 - As-C	6,900.00	6,621.46	4,813.44	4,651.25	29.677	SF
DILLARD USX AB #29-7(SI) - DILLARD USX AB #29-7 -	6,504.68	6,257.96	3,552.80	3,506.05	76.000	CC, ES
DILLARD USX AB #29-7(SI) - DILLARD USX AB #29-7 -	6,850.00	6,569.39	3,632.33	3,583.29	74.064	SF
FAULKNER-USX AB #29-25(SI) - FAULKNER-USX AB #	2,035.84	2,017.99	2,616.87	2,602.92	187.598	CC
FAULKNER-USX AB #29-14(SI) - FAULKNER-USX AB #	2,100.00	2,095.27	2,617.02	2,602.57	181.144	ES
FAULKNER-USX AB #29-14(SI) - FAULKNER-USX AB #	7,100.00	6,643.87	3,679.38	3,630.41	75.142	SF
FAULKNER-USX AB #29-25(SI) - FAULKNER-USX AB #	2,000.00	1,947.99	3,458.90	3,413.00	75.363	CC
FAULKNER-USX AB #29-25(SI) - FAULKNER-USX AB #	2,200.00	2,147.83	3,461.17	3,410.57	68.404	ES
FAULKNER-USX AB #29-25(SI) - FAULKNER-USX AB #	7,150.00	6,736.13	4,405.88	4,245.02	27.390	SF
FAULKNER-USX AB #29-6(SI) - FAULKNER-USX AB #2	4,535.57	4,444.78	4,313.40	4,210.12	41.764	CC
FAULKNER-USX AB #29-6(SI) - FAULKNER-USX AB #2	5,400.00	5,231.75	4,327.25	4,198.77	33.679	ES
FAULKNER-USX AB #29-6(SI) - FAULKNER-USX AB #2	6,800.00	6,550.82	4,455.64	4,286.07	26.276	SF
HEINZE - USX AB #29-10(PR) - HEINZE - USX AB #29-	4,926.06	4,768.75	2,472.76	2,360.40	22.007	CC
HEINZE - USX AB #29-10(PR) - HEINZE - USX AB #29-	5,200.00	5,022.73	2,474.89	2,356.18	20.849	ES
HEINZE - USX AB #29-10(PR) - HEINZE - USX AB #29-	6,750.00	6,464.97	2,602.59	2,446.84	16.710	SF
HEINZE #44-29(PR) - HEINZE #44-29 - No Surveys	5,428.31	5,209.86	336.41	211.84	2.701	CC
HEINZE #44-29(PR) - HEINZE #44-29 - No Surveys	5,500.00	5,276.33	337.48	211.31	2.675	ES
HEINZE #44-29(PR) - HEINZE #44-29 - No Surveys	5,600.00	5,369.04	342.50	214.11	2.668	SF
HEINZE USX AB #29-09D(PR) - HEINZE USX AB #29-0	1,354.37	1,338.44	1,452.54	1,443.43	159.522	CC
HEINZE USX AB #29-09D(PR) - HEINZE USX AB #29-0	1,400.00	1,369.00	1,452.78	1,443.40	154.781	ES
HEINZE USX AB #29-09D(PR) - HEINZE USX AB #29-0	6,650.00	6,756.09	1,690.76	1,626.84	26.451	SF
HEINZE USX AB #29-15(PR) - HEINZE USX AB #29-15	729.45	710.47	1,453.80	1,449.34	326.124	CC
HEINZE USX AB #29-15(PR) - HEINZE USX AB #29-15	2,500.00	2,468.18	1,459.16	1,442.09	85.484	ES
HEINZE USX AB #29-15(PR) - HEINZE USX AB #29-15	6,650.00	6,361.14	2,111.68	2,064.94	45.183	SF
OWL CREEK #13(SI) - OWL CREEK #13 - No Surveys	3,851.10	3,743.54	6,174.30	6,085.65	69.646	CC
OWL CREEK #13(SI) - OWL CREEK #13 - No Surveys	4,900.00	4,716.04	6,186.79	6,074.37	55.032	ES
OWL CREEK #13(SI) - OWL CREEK #13 - No Surveys	7,100.00	6,728.65	6,486.79	6,325.65	40.257	SF

Company:	Noble Energy	Local Co-ordinate Reference:	Well Westerman A4-786
Project:	Cummins	TVD Reference:	KB @ 4842.00usft
Reference Site:	AB Section 32	MD Reference:	KB @ 4842.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Local
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
AB Section 32						
CECIL #32-32 (PR) - Wellbore #1 - No Surveys	2,000.00	1,927.00	4,412.35	4,328.33	52.518	CC
CECIL #32-32 (PR) - Wellbore #1 - No Surveys	2,100.00	2,026.98	4,414.09	4,325.72	49.950	ES
CECIL #32-32 (PR) - Wellbore #1 - No Surveys	11,100.00	6,874.00	4,745.43	4,431.54	15.118	SF
CECIL #32-34 (PR) - Wellbore #1 - No Surveys	11,934.54	6,879.00	3,817.66	3,497.80	11.936	CC, ES
CECIL #32-34 (PR) - Wellbore #1 - No Surveys	12,200.00	6,879.00	3,826.88	3,505.72	11.916	SF
LAW #1 (PA) - Wellbore #1 - No Surveys	2,000.00	1,927.00	3,527.26	3,443.25	41.983	CC
LAW #1 (PA) - Wellbore #1 - No Surveys	10,633.71	6,874.00	3,635.62	3,324.13	11.671	ES
LAW #1 (PA) - Wellbore #1 - No Surveys	10,800.00	6,874.00	3,639.42	3,327.21	11.657	SF
LEY #1-32(PA) - LEY #1-32 - No Surveys	2,000.00	1,948.99	3,507.73	3,461.81	76.394	CC
LEY #1-32(PA) - LEY #1-32 - No Surveys	2,100.00	2,048.97	3,509.14	3,460.87	72.697	ES
LEY #1-32(PA) - LEY #1-32 - No Surveys	8,200.00	6,895.99	4,913.78	4,749.16	29.848	SF
MCCRORY #1 (DA) - Wellbore #1 - No Surveys	2,000.00	1,973.00	915.31	829.45	10.661	CC
MCCRORY #1 (DA) - Wellbore #1 - No Surveys	2,400.00	2,371.70	923.42	820.20	8.946	ES
MCCRORY #1 (DA) - Wellbore #1 - No Surveys	4,200.00	4,066.04	1,240.17	1,062.41	6.976	SF
NC Farms #10-32 (SI) - Wellbore #1 - As-Drilled	10,400.00	7,365.10	2,416.26	2,337.59	30.715	SF
NC Farms #10-32 (SI) - Wellbore #1 - As-Drilled	10,518.11	7,366.44	2,413.37	2,335.04	30.811	CC, ES
NC Farms #15-32(SI) - Wellbore #1 - As-Drilled	11,944.50	7,103.22	2,312.22	2,240.63	32.296	CC, ES
NC Farms #15-32(SI) - Wellbore #1 - As-Drilled	12,100.00	7,105.82	2,317.44	2,245.59	32.255	SF
NC Farms #16-32(PR) - Wellbore #1 - As-Drilled	11,914.63	6,968.69	983.82	913.80	14.050	CC, ES, SF
NC Farms #20-32 (SI) - Wellbore #1 - As-Drilled	11,296.05	7,128.88	1,633.93	1,562.10	22.747	CC, ES, SF
NC Farms #9-32 (SI) - Wellbore #1 - As-Drilled	10,647.50	7,191.87	1,011.27	936.56	13.536	CC, ES, SF
SCOTT #32-13 (SI) - Wellbore #1 - No Surveys	2,000.00	1,952.00	1,916.87	1,831.86	22.547	CC
SCOTT #32-13 (SI) - Wellbore #1 - No Surveys	2,100.00	2,051.98	1,918.53	1,829.16	21.467	ES
SCOTT #32-13 (SI) - Wellbore #1 - No Surveys	9,500.00	6,899.00	2,475.09	2,168.39	8.070	SF
SCOTT #32-14 (PR) - Wellbore #1 - No Surveys	9,167.75	6,924.00	818.94	512.56	2.673	CC, ES, SF
WESTERMAN #32-11 (SI) - Wellbore #1 - No Surveys	3,023.14	2,970.53	87.91	-41.49	0.679	Level 1, CC, ES, SF
Westerman A5-716 - Wellbore #1 - Plan #1	2,698.95	2,707.92	27.94	9.47	1.513	CC
Westerman A5-716 - Wellbore #1 - Plan #1	2,700.00	2,708.98	27.94	9.47	1.513	ES, SF
Westerman A5-726 - Wellbore #1 - Plan #1	2,508.22	2,521.15	65.32	47.97	3.764	CC, ES
Westerman A5-726 - Wellbore #1 - Plan #1	2,600.00	2,613.63	66.89	48.90	3.719	SF
Westerman A5-736 - Wellbore #1 - Plan #1	2,361.34	2,375.50	108.72	92.29	6.618	CC
Westerman A5-736 - Wellbore #1 - Plan #1	2,400.00	2,414.75	108.92	92.22	6.523	ES
Westerman A5-736 - Wellbore #1 - Plan #1	2,500.00	2,515.46	111.86	94.45	6.427	SF
Westerman A5-745 - Wellbore #1 - Plan #1	2,229.51	2,239.87	149.46	133.94	9.631	CC
Westerman A5-745 - Wellbore #1 - Plan #1	2,300.00	2,312.11	149.79	133.78	9.352	ES
Westerman A5-745 - Wellbore #1 - Plan #1	2,500.00	2,513.22	158.28	140.84	9.076	SF

Company:	Noble Energy	Local Co-ordinate Reference:	Well Westerman A4-786
Project:	Cummins	TVD Reference:	KB @ 4842.00usft
Reference Site:	AB Section 32	MD Reference:	KB @ 4842.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Local
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
AB Section 33						
CHRISTIANSEN #31-33 (PA) - Wellbore #1 - No Surveys	8,034.10	6,975.00	2,946.69	2,641.16	9.645	CC, ES
CHRISTIANSEN #31-33 (PA) - Wellbore #1 - No Surveys	8,100.00	6,975.00	2,947.43	2,641.79	9.644	SF
CHRISTIANSEN #41-33 (PA) - Wellbore #1 - As-Drilled	8,032.32	6,974.54	4,352.33	4,301.58	85.758	CC, ES
CHRISTIANSEN #41-33 (PA) - Wellbore #1 - As-Drilled	9,800.00	7,004.05	4,697.49	4,640.30	82.141	SF
CHRISTIANSEN #42-33 (PA) - Wellbore #1 - As-Drilled	9,375.23	6,932.55	4,217.97	4,163.53	77.473	CC
CHRISTIANSEN #42-33 (PA) - Wellbore #1 - As-Drilled	9,400.00	6,932.43	4,218.05	4,163.48	77.301	ES
CHRISTIANSEN #42-33 (PA) - Wellbore #1 - As-Drilled	11,100.00	6,923.96	4,556.98	4,493.01	71.231	SF
HOWE USX AB #33-4 (SI) - Wellbore #1 - No Surveys	8,105.16	6,940.00	458.46	154.24	1.507	CC, ES, SF
HOWE-USX AB #33-6 (SI) - Wellbore #1 - No Surveys	9,151.95	6,962.00	1,744.10	1,436.26	5.666	CC, ES
HOWE-USX AB #33-6 (SI) - Wellbore #1 - No Surveys	9,200.00	6,962.00	1,744.76	1,436.65	5.663	SF
OWL CREEK #10-2 (SI) - Wellbore #1 - No Surveys	10,613.67	6,971.00	4,268.37	3,953.11	13.539	CC, ES
OWL CREEK #10-2 (SI) - Wellbore #1 - No Surveys	11,000.00	6,971.00	4,285.81	3,967.87	13.480	SF
ROUSE USX AB #33-11 (SI) - Wellbore #1 - No Surveys	10,585.53	6,953.00	1,577.88	1,263.50	5.019	CC
ROUSE USX AB #33-11 (SI) - Wellbore #1 - No Surveys	10,600.00	6,953.00	1,577.94	1,263.44	5.017	ES
ROUSE USX AB #33-11 (SI) - Wellbore #1 - No Surveys	10,700.00	6,953.00	1,582.02	1,266.66	5.016	SF
ROUSE USX AB #33-13 (SI) - Wellbore #1 - No Surveys	12,082.08	6,928.00	245.81	-77.00	0.761	Level 1, CC, ES, SF
ROUSE USX AB #33-14(SI) - Wellbore #1 - No Surveys	11,834.76	6,952.00	1,797.34	1,475.22	5.580	CC, ES
ROUSE USX AB #33-14(SI) - Wellbore #1 - No Surveys	11,900.00	6,952.00	1,798.52	1,475.78	5.573	SF
ROUSE-USX AB #33-25(SI) - Wellbore #1 - As-Drilled	11,238.14	6,910.38	1,180.37	1,116.13	18.373	CC, ES
ROUSE-USX AB #33-25(SI) - Wellbore #1 - As-Drilled	11,400.00	6,915.48	1,191.41	1,125.63	18.111	SF
SPAUR USX AB #33-07 (SI) - Wellbore #1 - No Surveys	9,479.28	6,982.00	2,770.46	2,460.52	8.939	CC
SPAUR USX AB #33-07 (SI) - Wellbore #1 - No Surveys	9,500.00	6,982.00	2,770.54	2,460.48	8.935	ES
SPAUR USX AB #33-07 (SI) - Wellbore #1 - No Surveys	9,600.00	6,982.00	2,773.09	2,462.45	8.927	SF
SPAUR USX AB #33-17 (SI) - Wellbore #1 - No Surveys	8,766.03	6,978.00	3,453.37	3,146.19	11.242	CC, ES
SPAUR USX AB #33-17 (SI) - Wellbore #1 - No Surveys	8,900.00	6,978.00	3,455.97	3,148.26	11.231	SF
WEST IRRIGATION USX AB #33-23 (TA) - Wellbore #1 -	11,269.81	6,979.00	3,595.53	3,276.00	11.252	CC
WEST IRRIGATION USX AB #33-23 (TA) - Wellbore #1 -	11,300.00	6,979.00	3,595.66	3,275.89	11.244	ES
WEST IRRIGATION USX AB #33-23 (TA) - Wellbore #1 -	11,600.00	6,979.00	3,610.66	3,288.59	11.211	SF
WEST IRRIGATION-USX AB #33-10 (SI) - Wellbore #1 -	10,811.89	6,974.00	2,761.19	2,444.66	8.723	CC, ES
WEST IRRIGATION-USX AB #33-10 (SI) - Wellbore #1 -	11,000.00	6,974.00	2,767.59	2,449.61	8.704	SF
WEST IRRIGATION-USX AB #33-15 (SI) - Wellbore #1 -	11,829.98	6,962.00	2,846.00	2,523.52	8.825	CC, ES
WEST IRRIGATION-USX AB #33-15 (SI) - Wellbore #1 -	12,000.00	6,962.00	2,851.07	2,527.15	8.802	SF

Company:	Noble Energy	Local Co-ordinate Reference:	Well Westerman A4-786
Project:	Cummins	TVD Reference:	KB @ 4842.00usft
Reference Site:	AB Section 32	MD Reference:	KB @ 4842.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Local
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Reference Depths are relative to KB @ 4842.00usft

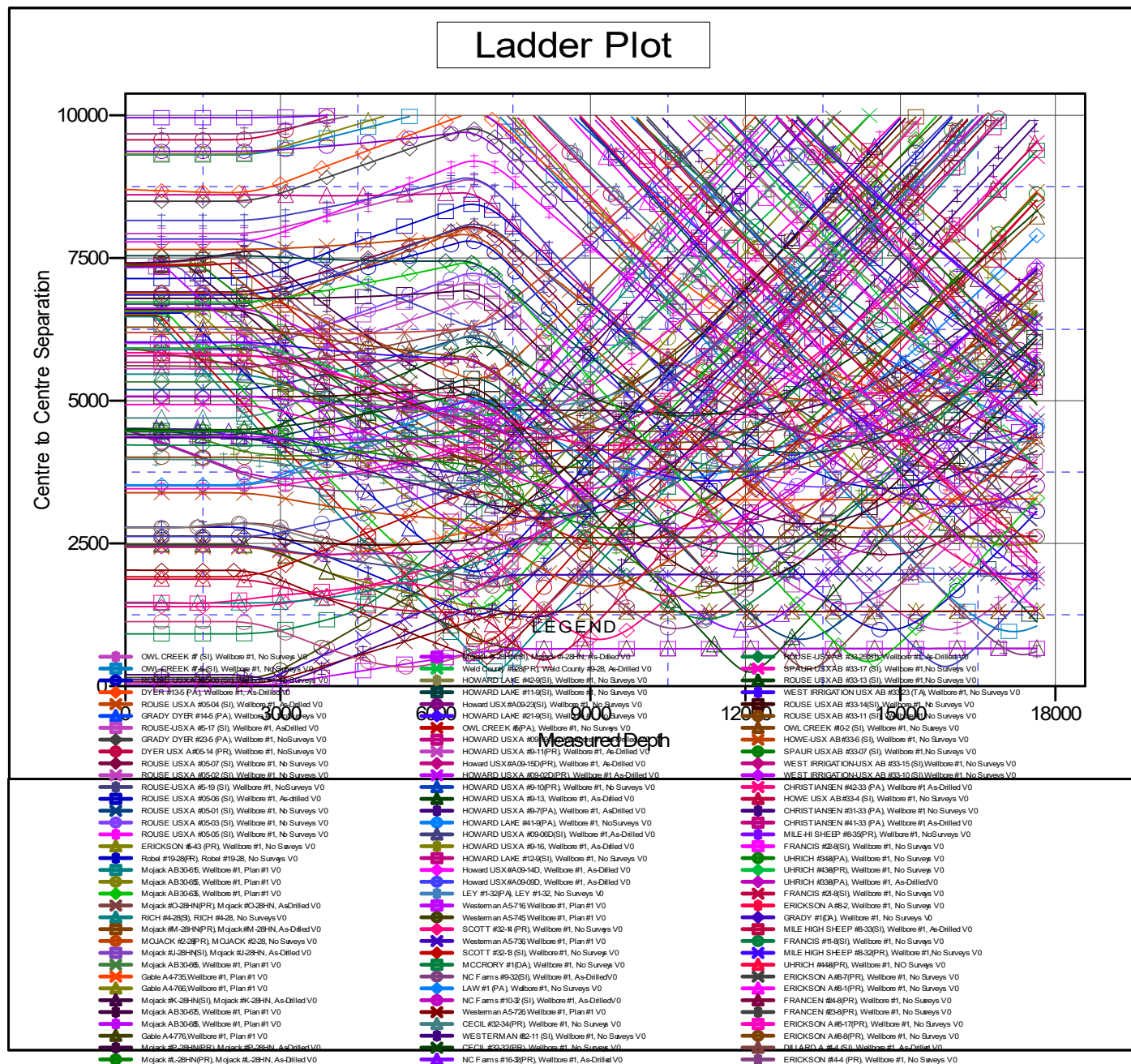
Offset Depths are relative to Offset Datum

Central Meridian is -105.500000

Coordinates are relative to: Westerman A4-786

Coordinate System is US State Plane 1983, Colorado Northern Zone

Grid Convergence at Surface is: 0.60°



CC - Min centre to center distance or convergent point. SF - min separation factor. ES - min ellipse separation

Company:	Noble Energy	Local Co-ordinate Reference:	Well Westerman A4-786
Project:	Cummins	TVD Reference:	KB @ 4842.00usft
Reference Site:	AB Section 32	MD Reference:	KB @ 4842.00usft
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Westerman A4-786	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Local
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Reference Depths are relative to KB @ 4842.00usft
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000

Coordinates are relative to: Westerman A4-786
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.60°

