

Project: Wells Ranch  
 Site: A Section 21  
 Well: Harper A21-664  
 Wellbore: Original Drilling  
 Design: APD - Rev 1

# Northern Region - DJ Basin

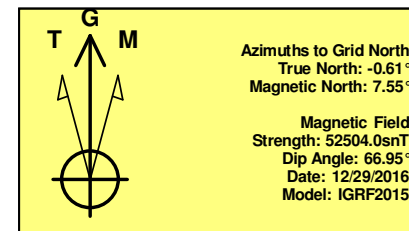
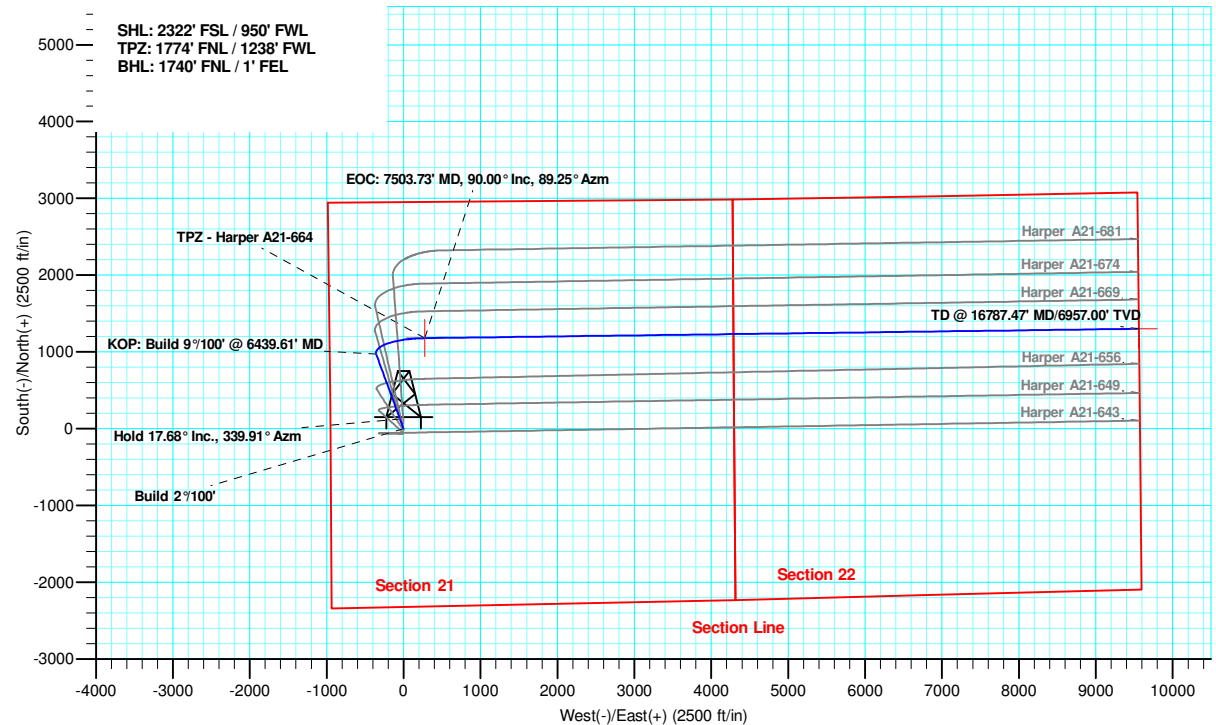
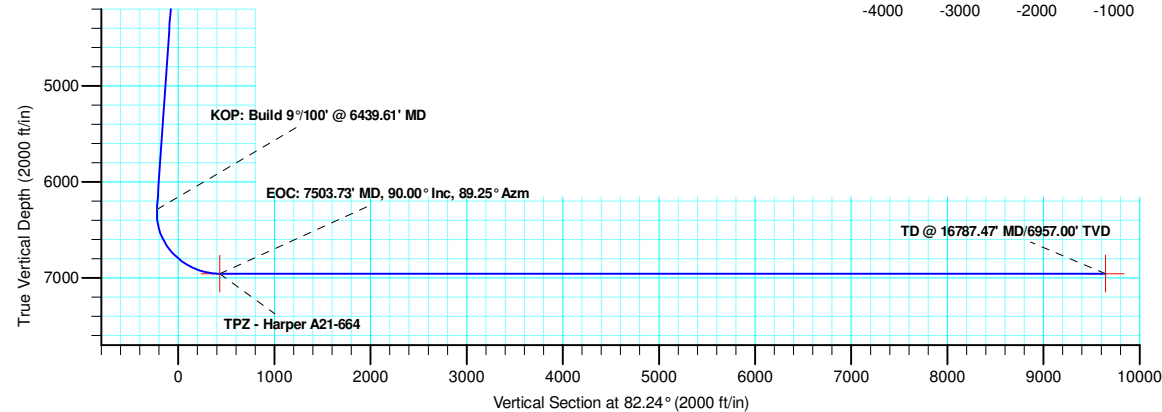
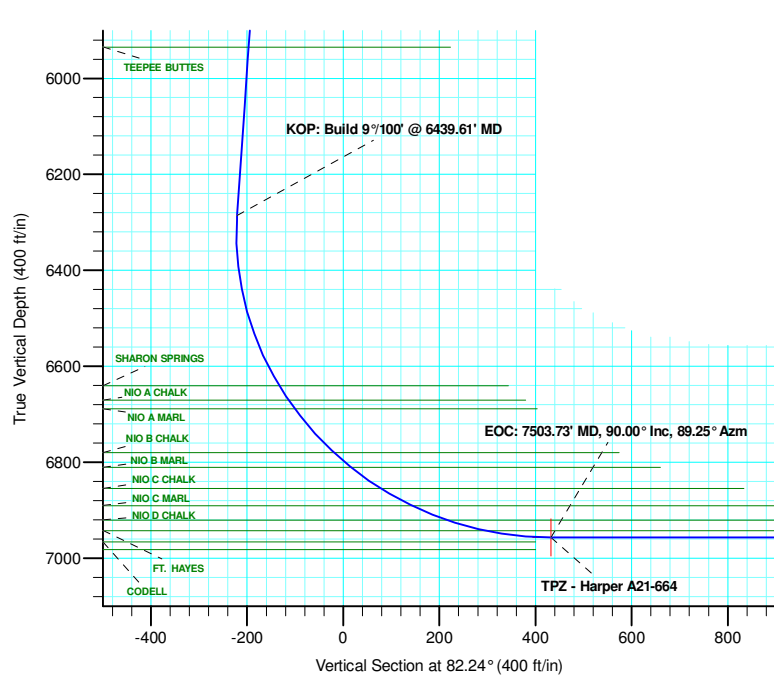
Geodetic System: US State Plane 1983  
 Datum: North American Datum 1983  
 Ellipsoid: GRS 1980  
 Zone: Colorado Northern Zone  
 System Datum: Mean Sea Level

## 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	2600.00	0.00	0.00	2600.00	0.00	0.00	0.00	0.00	0.00	
3	3483.97	17.68	339.91	3470.01	127.07	-46.47	2.00	339.91	-28.90	
4	6439.61	17.68	339.91	6286.06	970.08	-354.74	0.00	0.00	-220.59	
5	7503.73	90.00	89.25	6957.00	1180.16	275.95	9.00	108.49	432.69	TPZ - Harper A21-664
6	16787.47	90.00	89.25	6957.00	1301.85	9558.89	0.00	0.00	9647.14	BHL - Harper A21-664

## WELL DETAILS: Harper A21-664

+N/-S	+E/-W	Northing	Ground Level: Easting	4742.00 Latitude	Longitude	Slot
0.00	0.00	1415673.51	3261196.55	40.4706298	-104.5611701	



Plan: APD - Rev 1 (Harper A21-664/Original Drilling)

Created By: Shelly C. Peterkin Date: 20:15, January 30 2018

# **Northern Region - DJ Basin**

**Wells Ranch**

**A Section 21**

**Harper A21-664**

**Original Drilling**

**Plan: APD - Rev 1**

## **Standard Planning Report**

**30 January, 2018**

# Noble Energy, Inc.

## Planning Report

<b>Database:</b>	EDMP	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Company:</b>	Northern Region - DJ Basin	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Project:</b>	Wells Ranch	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site:</b>	A Section 21	<b>North Reference:</b>	Grid
<b>Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Drilling		
<b>Design:</b>	APD - Rev 1		

<b>Project</b>	Wells Ranch, Weld County Colorado		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Northern Zone		

<b>Site</b>	A Section 21			
<b>Site Position:</b>		<b>Northing:</b>	1,414,202.83 usft	<b>Latitude:</b> 40.4665920
<b>From:</b>	Lat/Long	<b>Easting:</b>	3,261,231.91 usft	<b>Longitude:</b> -104.5610990
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13.200 in	<b>Grid Convergence:</b> 0.61 °

<b>Well</b>	Harper A21-664			
<b>Well Position</b>	<b>+N/-S</b>	1,470.69 ft	<b>Northing:</b>	1,415,673.51 usft
	<b>+E/-W</b>	-35.36 ft	<b>Easting:</b>	3,261,196.56 usft
<b>Position Uncertainty</b>		0.00 ft	<b>Wellhead Elevation:</b>	<b>Ground Level:</b> 4,742.00 ft

<b>Wellbore</b>	Original Drilling				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	12/29/2016	8.16	66.95	52,503.95187890

<b>Design</b>	APD - Rev 1			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PLAN	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>
	0.00	0.00	0.00	82.24

<b>Plan Sections</b>										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,483.97	17.68	339.91	3,470.01	127.07	-46.47	2.00	2.00	0.00	339.91	
6,439.61	17.68	339.91	6,286.06	970.08	-354.74	0.00	0.00	0.00	0.00	
7,503.73	90.00	89.25	6,957.00	1,180.16	275.95	9.00	6.80	10.27	108.49	TPZ - Harper A21-664
16,787.47	90.00	89.25	6,957.00	1,301.85	9,558.89	0.00	0.00	0.00	0.00	BHL - Harper A21-664

# Noble Energy, Inc.

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<b>Project:</b>	Wells Ranch	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site:</b>	A Section 21	<b>North Reference:</b>	Grid
<b>Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Drilling		
<b>Design:</b>	APD - Rev 1		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
504.00	0.00	0.00	504.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>PIERRE</b>									
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
691.00	0.00	0.00	691.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>UPPER PIERRE AQUIFER TOP</b>									
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
1,531.00	0.00	0.00	1,531.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>UPPER PIERRE AQUIFER BASE</b>									
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
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Build 2°/100'</b>									
2,700.00	2.00	339.91	2,699.98	1.64	-0.60	-0.37	2.00	2.00	0.00
2,800.00	4.00	339.91	2,799.84	6.55	-2.40	-1.49	2.00	2.00	0.00
2,900.00	6.00	339.91	2,899.45	14.74	-5.39	-3.35	2.00	2.00	0.00
3,000.00	8.00	339.91	2,998.70	26.18	-9.58	-5.95	2.00	2.00	0.00
3,100.00	10.00	339.91	3,097.47	40.88	-14.95	-9.29	2.00	2.00	0.00
3,200.00	12.00	339.91	3,195.62	58.79	-21.50	-13.37	2.00	2.00	0.00
3,300.00	14.00	339.91	3,293.06	79.92	-29.23	-18.17	2.00	2.00	0.00
3,400.00	16.00	339.91	3,389.64	104.23	-38.11	-23.70	2.00	2.00	0.00
3,483.97	17.68	339.91	3,470.01	127.07	-46.47	-28.90	2.00	2.00	0.00
<b>Hold 17.68° Inc., 339.91° Azm</b>									
3,500.00	17.68	339.91	3,485.28	131.64	-48.14	-29.93	0.00	0.00	0.00
3,600.00	17.68	339.91	3,580.56	160.17	-58.57	-36.42	0.00	0.00	0.00
3,686.53	17.68	339.91	3,663.00	184.85	-67.59	-42.03	0.00	0.00	0.00
<b>PARKMAN</b>									
3,700.00	17.68	339.91	3,675.84	188.69	-69.00	-42.91	0.00	0.00	0.00
3,800.00	17.68	339.91	3,771.11	217.21	-79.43	-49.39	0.00	0.00	0.00
3,900.00	17.68	339.91	3,866.39	245.73	-89.86	-55.88	0.00	0.00	0.00
4,000.00	17.68	339.91	3,961.67	274.25	-100.29	-62.36	0.00	0.00	0.00
4,100.00	17.68	339.91	4,056.94	302.78	-110.72	-68.85	0.00	0.00	0.00

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## Planning Report

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<b>Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Drilling		
<b>Design:</b>	APD - Rev 1		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,200.00	17.68	339.91	4,152.22	331.30	-121.15	-75.33	0.00	0.00	0.00
4,265.89	17.68	339.91	4,215.00	350.09	-128.02	-79.61	0.00	0.00	0.00
<b>SUSSEX</b>									
4,300.00	17.68	339.91	4,247.50	359.82	-131.58	-81.82	0.00	0.00	0.00
4,400.00	17.68	339.91	4,342.78	388.34	-142.01	-88.31	0.00	0.00	0.00
4,500.00	17.68	339.91	4,438.05	416.86	-152.44	-94.79	0.00	0.00	0.00
4,600.00	17.68	339.91	4,533.33	445.39	-162.87	-101.28	0.00	0.00	0.00
4,700.00	17.68	339.91	4,628.61	473.91	-173.30	-107.76	0.00	0.00	0.00
4,800.00	17.68	339.91	4,723.88	502.43	-183.73	-114.25	0.00	0.00	0.00
4,900.00	17.68	339.91	4,819.16	530.95	-194.16	-120.73	0.00	0.00	0.00
5,000.00	17.68	339.91	4,914.44	559.47	-204.59	-127.22	0.00	0.00	0.00
5,041.52	17.68	339.91	4,954.00	571.32	-208.92	-129.91	0.00	0.00	0.00
<b>SHANNON</b>									
5,100.00	17.68	339.91	5,009.71	588.00	-215.02	-133.71	0.00	0.00	0.00
5,200.00	17.68	339.91	5,104.99	616.52	-225.45	-140.19	0.00	0.00	0.00
5,300.00	17.68	339.91	5,200.27	645.04	-235.88	-146.68	0.00	0.00	0.00
5,400.00	17.68	339.91	5,295.55	673.56	-246.31	-153.16	0.00	0.00	0.00
5,500.00	17.68	339.91	5,390.82	702.08	-256.74	-159.65	0.00	0.00	0.00
5,600.00	17.68	339.91	5,486.10	730.60	-267.17	-166.13	0.00	0.00	0.00
5,700.00	17.68	339.91	5,581.38	759.13	-277.60	-172.62	0.00	0.00	0.00
5,800.00	17.68	339.91	5,676.65	787.65	-288.03	-179.10	0.00	0.00	0.00
5,900.00	17.68	339.91	5,771.93	816.17	-298.46	-185.59	0.00	0.00	0.00
6,000.00	17.68	339.91	5,867.21	844.69	-308.89	-192.08	0.00	0.00	0.00
6,071.15	17.68	339.91	5,935.00	864.99	-316.31	-196.69	0.00	0.00	0.00
<b>TEEPEE BUTTES</b>									
6,100.00	17.68	339.91	5,962.49	873.21	-319.32	-198.56	0.00	0.00	0.00
6,200.00	17.68	339.91	6,057.76	901.74	-329.75	-205.05	0.00	0.00	0.00
6,300.00	17.68	339.91	6,153.04	930.26	-340.18	-211.53	0.00	0.00	0.00
6,400.00	17.68	339.91	6,248.32	958.78	-350.61	-218.02	0.00	0.00	0.00
6,439.61	17.68	339.91	6,286.06	970.08	-354.74	-220.59	0.00	0.00	0.00
<b>KOP: Build 9°/100' @ 6439.61' MD</b>									
6,450.00	17.40	342.88	6,295.96	973.04	-355.74	-221.18	9.00	-2.64	28.55
6,500.00	16.74	358.08	6,343.78	987.40	-358.18	-221.66	9.00	-1.32	30.41
6,550.00	17.24	13.43	6,391.62	1,001.81	-356.70	-218.25	9.00	0.98	30.70
6,600.00	18.79	27.13	6,439.19	1,016.19	-351.31	-210.96	9.00	3.11	27.39
6,650.00	21.18	38.33	6,486.20	1,030.45	-342.03	-199.85	9.00	4.77	22.39
6,700.00	24.15	47.12	6,532.34	1,044.50	-328.93	-184.97	9.00	5.94	17.59
6,750.00	27.52	53.99	6,577.35	1,058.26	-312.08	-166.42	9.00	6.74	13.73
6,800.00	31.15	59.41	6,620.94	1,071.64	-291.59	-144.31	9.00	7.27	10.85
6,823.67	32.94	61.59	6,641.00	1,077.81	-280.66	-132.65	9.00	7.56	9.21
<b>SHARON SPRINGS</b>									
6,850.00	34.97	63.78	6,662.84	1,084.56	-267.59	-118.79	9.00	7.71	8.32
6,860.00	35.75	64.56	6,671.00	1,087.08	-262.38	-113.28	9.00	7.81	7.74
<b>NIO A CHALK</b>									
6,882.44	37.52	66.19	6,689.00	1,092.65	-250.21	-100.47	9.00	7.88	7.28
<b>NIO A MARL</b>									
6,900.00	38.92	67.38	6,702.80	1,096.93	-240.22	-90.00	9.00	7.96	6.77
6,950.00	42.96	70.41	6,740.56	1,108.69	-209.66	-58.13	9.00	8.08	6.05
7,000.00	47.07	73.00	6,775.90	1,119.76	-176.09	-23.37	9.00	8.22	5.19
7,006.04	47.57	73.29	6,780.00	1,121.05	-171.84	-18.98	9.00	8.28	4.80
<b>NIO B CHALK</b>									
7,050.00	51.23	75.27	6,808.60	1,130.08	-139.71	14.07	9.00	8.33	4.50
7,053.84	51.55	75.43	6,811.00	1,130.83	-136.81	17.05	9.00	8.37	4.25

# Noble Energy, Inc.

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Planned Survey									
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<b>NIO B MARL</b>									
7,100.00	55.43	77.29	6,838.46	1,139.57	-100.76	53.94	9.00	8.40	4.02
7,130.13	57.98	78.41	6,855.00	1,144.86	-76.14	79.05	9.00	8.45	3.71
<b>NIO C CHALK</b>									
7,150.00	59.66	79.11	6,865.29	1,148.18	-59.47	96.02	9.00	8.47	3.54
7,200.00	63.91	80.78	6,888.92	1,155.86	-16.10	140.03	9.00	8.51	3.34
7,204.76	64.32	80.93	6,891.00	1,156.54	-11.86	144.31	9.00	8.53	3.20
<b>NIO C MARL</b>									
7,250.00	68.18	82.33	6,909.22	1,162.55	29.09	185.71	9.00	8.54	3.10
7,283.86	71.08	83.33	6,921.00	1,166.51	60.59	217.45	9.00	8.56	2.95
<b>NIO D CHALK</b>									
7,300.00	72.47	83.80	6,926.05	1,168.23	75.82	232.77	9.00	8.58	2.87
7,350.00	76.76	85.19	6,939.31	1,172.85	123.79	280.93	9.00	8.59	2.79
7,367.04	78.23	85.65	6,943.00	1,174.17	140.37	297.54	9.00	8.60	2.72
<b>FT. HAYES</b>									
7,400.00	81.06	86.54	6,948.92	1,176.38	172.72	329.89	9.00	8.61	2.68
7,450.00	85.37	87.85	6,954.83	1,178.81	222.30	379.34	9.00	8.61	2.63
7,503.73	90.00	89.25	6,957.00	1,180.16	275.95	432.69	9.00	8.62	2.60
<b>EOC: 7503.73' MD, 90.00° Inc, 89.25° Azm</b>									
7,600.00	90.00	89.25	6,957.00	1,181.42	372.21	528.23	0.00	0.00	0.00
7,700.00	90.00	89.25	6,957.00	1,182.73	472.20	627.49	0.00	0.00	0.00
7,800.00	90.00	89.25	6,957.00	1,184.04	572.19	726.74	0.00	0.00	0.00
7,900.00	90.00	89.25	6,957.00	1,185.36	672.18	826.00	0.00	0.00	0.00
8,000.00	90.00	89.25	6,957.00	1,186.67	772.18	925.25	0.00	0.00	0.00
8,100.00	90.00	89.25	6,957.00	1,187.98	872.17	1,024.50	0.00	0.00	0.00
8,200.00	90.00	89.25	6,957.00	1,189.29	972.16	1,123.76	0.00	0.00	0.00
8,300.00	90.00	89.25	6,957.00	1,190.60	1,072.15	1,223.01	0.00	0.00	0.00
8,400.00	90.00	89.25	6,957.00	1,191.91	1,172.14	1,322.26	0.00	0.00	0.00
8,500.00	90.00	89.25	6,957.00	1,193.22	1,272.13	1,421.52	0.00	0.00	0.00
8,600.00	90.00	89.25	6,957.00	1,194.53	1,372.12	1,520.77	0.00	0.00	0.00
8,700.00	90.00	89.25	6,957.00	1,195.84	1,472.12	1,620.03	0.00	0.00	0.00
8,800.00	90.00	89.25	6,957.00	1,197.15	1,572.11	1,719.28	0.00	0.00	0.00
8,900.00	90.00	89.25	6,957.00	1,198.46	1,672.10	1,818.53	0.00	0.00	0.00
9,000.00	90.00	89.25	6,957.00	1,199.77	1,772.09	1,917.79	0.00	0.00	0.00
9,100.00	90.00	89.25	6,957.00	1,201.09	1,872.08	2,017.04	0.00	0.00	0.00
9,200.00	90.00	89.25	6,957.00	1,202.40	1,972.07	2,116.29	0.00	0.00	0.00
9,300.00	90.00	89.25	6,957.00	1,203.71	2,072.06	2,215.55	0.00	0.00	0.00
9,400.00	90.00	89.25	6,957.00	1,205.02	2,172.06	2,314.80	0.00	0.00	0.00
9,500.00	90.00	89.25	6,957.00	1,206.33	2,272.05	2,414.05	0.00	0.00	0.00
9,600.00	90.00	89.25	6,957.00	1,207.64	2,372.04	2,513.31	0.00	0.00	0.00
9,700.00	90.00	89.25	6,957.00	1,208.95	2,472.03	2,612.56	0.00	0.00	0.00
9,800.00	90.00	89.25	6,957.00	1,210.26	2,572.02	2,711.82	0.00	0.00	0.00
9,900.00	90.00	89.25	6,957.00	1,211.57	2,672.01	2,811.07	0.00	0.00	0.00
10,000.00	90.00	89.25	6,957.00	1,212.88	2,772.00	2,910.32	0.00	0.00	0.00
10,100.00	90.00	89.25	6,957.00	1,214.19	2,872.00	3,009.58	0.00	0.00	0.00
10,200.00	90.00	89.25	6,957.00	1,215.50	2,971.99	3,108.83	0.00	0.00	0.00
10,300.00	90.00	89.25	6,957.00	1,216.82	3,071.98	3,208.08	0.00	0.00	0.00
10,400.00	90.00	89.25	6,957.00	1,218.13	3,171.97	3,307.34	0.00	0.00	0.00
10,500.00	90.00	89.25	6,957.00	1,219.44	3,271.96	3,406.59	0.00	0.00	0.00
10,600.00	90.00	89.25	6,957.00	1,220.75	3,371.95	3,505.84	0.00	0.00	0.00
10,700.00	90.00	89.25	6,957.00	1,222.06	3,471.94	3,605.10	0.00	0.00	0.00
10,800.00	90.00	89.25	6,957.00	1,223.37	3,571.94	3,704.35	0.00	0.00	0.00
10,900.00	90.00	89.25	6,957.00	1,224.68	3,671.93	3,803.61	0.00	0.00	0.00

# Noble Energy, Inc.

## Planning Report

<b>Database:</b>	EDMP	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Company:</b>	Northern Region - DJ Basin	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Project:</b>	Wells Ranch	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site:</b>	A Section 21	<b>North Reference:</b>	Grid
<b>Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Drilling		
<b>Design:</b>	APD - Rev 1		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
11,000.00	90.00	89.25	6,957.00	1,225.99	3,771.92	3,902.86	0.00	0.00	0.00
11,100.00	90.00	89.25	6,957.00	1,227.30	3,871.91	4,002.11	0.00	0.00	0.00
11,200.00	90.00	89.25	6,957.00	1,228.61	3,971.90	4,101.37	0.00	0.00	0.00
11,300.00	90.00	89.25	6,957.00	1,229.92	4,071.89	4,200.62	0.00	0.00	0.00
11,400.00	90.00	89.25	6,957.00	1,231.23	4,171.88	4,299.87	0.00	0.00	0.00
11,500.00	90.00	89.25	6,957.00	1,232.54	4,271.87	4,399.13	0.00	0.00	0.00
11,600.00	90.00	89.25	6,957.00	1,233.86	4,371.87	4,498.38	0.00	0.00	0.00
11,700.00	90.00	89.25	6,957.00	1,235.17	4,471.86	4,597.63	0.00	0.00	0.00
11,800.00	90.00	89.25	6,957.00	1,236.48	4,571.85	4,696.89	0.00	0.00	0.00
11,900.00	90.00	89.25	6,957.00	1,237.79	4,671.84	4,796.14	0.00	0.00	0.00
12,000.00	90.00	89.25	6,957.00	1,239.10	4,771.83	4,895.40	0.00	0.00	0.00
12,100.00	90.00	89.25	6,957.00	1,240.41	4,871.82	4,994.65	0.00	0.00	0.00
12,200.00	90.00	89.25	6,957.00	1,241.72	4,971.81	5,093.90	0.00	0.00	0.00
12,300.00	90.00	89.25	6,957.00	1,243.03	5,071.81	5,193.16	0.00	0.00	0.00
12,400.00	90.00	89.25	6,957.00	1,244.34	5,171.80	5,292.41	0.00	0.00	0.00
12,500.00	90.00	89.25	6,957.00	1,245.65	5,271.79	5,391.66	0.00	0.00	0.00
12,600.00	90.00	89.25	6,957.00	1,246.96	5,371.78	5,490.92	0.00	0.00	0.00
12,700.00	90.00	89.25	6,957.00	1,248.27	5,471.77	5,590.17	0.00	0.00	0.00
12,800.00	90.00	89.25	6,957.00	1,249.59	5,571.76	5,689.43	0.00	0.00	0.00
12,900.00	90.00	89.25	6,957.00	1,250.90	5,671.75	5,788.68	0.00	0.00	0.00
13,000.00	90.00	89.25	6,957.00	1,252.21	5,771.75	5,887.93	0.00	0.00	0.00
13,100.00	90.00	89.25	6,957.00	1,253.52	5,871.74	5,987.19	0.00	0.00	0.00
13,200.00	90.00	89.25	6,957.00	1,254.83	5,971.73	6,086.44	0.00	0.00	0.00
13,300.00	90.00	89.25	6,957.00	1,256.14	6,071.72	6,185.69	0.00	0.00	0.00
13,400.00	90.00	89.25	6,957.00	1,257.45	6,171.71	6,284.95	0.00	0.00	0.00
13,500.00	90.00	89.25	6,957.00	1,258.76	6,271.70	6,384.20	0.00	0.00	0.00
13,600.00	90.00	89.25	6,957.00	1,260.07	6,371.69	6,483.45	0.00	0.00	0.00
13,700.00	90.00	89.25	6,957.00	1,261.38	6,471.69	6,582.71	0.00	0.00	0.00
13,800.00	90.00	89.25	6,957.00	1,262.69	6,571.68	6,681.96	0.00	0.00	0.00
13,900.00	90.00	89.25	6,957.00	1,264.00	6,671.67	6,781.22	0.00	0.00	0.00
14,000.00	90.00	89.25	6,957.00	1,265.32	6,771.66	6,880.47	0.00	0.00	0.00
14,100.00	90.00	89.25	6,957.00	1,266.63	6,871.65	6,979.72	0.00	0.00	0.00
14,200.00	90.00	89.25	6,957.00	1,267.94	6,971.64	7,078.98	0.00	0.00	0.00
14,300.00	90.00	89.25	6,957.00	1,269.25	7,071.63	7,178.23	0.00	0.00	0.00
14,400.00	90.00	89.25	6,957.00	1,270.56	7,171.63	7,277.48	0.00	0.00	0.00
14,500.00	90.00	89.25	6,957.00	1,271.87	7,271.62	7,376.74	0.00	0.00	0.00
14,600.00	90.00	89.25	6,957.00	1,273.18	7,371.61	7,475.99	0.00	0.00	0.00
14,700.00	90.00	89.25	6,957.00	1,274.49	7,471.60	7,575.24	0.00	0.00	0.00
14,800.00	90.00	89.25	6,957.00	1,275.80	7,571.59	7,674.50	0.00	0.00	0.00
14,900.00	90.00	89.25	6,957.00	1,277.11	7,671.58	7,773.75	0.00	0.00	0.00
15,000.00	90.00	89.25	6,957.00	1,278.42	7,771.57	7,873.01	0.00	0.00	0.00
15,100.00	90.00	89.25	6,957.00	1,279.73	7,871.57	7,972.26	0.00	0.00	0.00
15,200.00	90.00	89.25	6,957.00	1,281.05	7,971.56	8,071.51	0.00	0.00	0.00
15,300.00	90.00	89.25	6,957.00	1,282.36	8,071.55	8,170.77	0.00	0.00	0.00
15,400.00	90.00	89.25	6,957.00	1,283.67	8,171.54	8,270.02	0.00	0.00	0.00
15,500.00	90.00	89.25	6,957.00	1,284.98	8,271.53	8,369.27	0.00	0.00	0.00
15,600.00	90.00	89.25	6,957.00	1,286.29	8,371.52	8,468.53	0.00	0.00	0.00
15,700.00	90.00	89.25	6,957.00	1,287.60	8,471.51	8,567.78	0.00	0.00	0.00
15,800.00	90.00	89.25	6,957.00	1,288.91	8,571.51	8,667.04	0.00	0.00	0.00
15,900.00	90.00	89.25	6,957.00	1,290.22	8,671.50	8,766.29	0.00	0.00	0.00
16,000.00	90.00	89.25	6,957.00	1,291.53	8,771.49	8,865.54	0.00	0.00	0.00
16,100.00	90.00	89.25	6,957.00	1,292.84	8,871.48	8,964.80	0.00	0.00	0.00
16,200.00	90.00	89.25	6,957.00	1,294.15	8,971.47	9,064.05	0.00	0.00	0.00
16,300.00	90.00	89.25	6,957.00	1,295.46	9,071.46	9,163.30	0.00	0.00	0.00

# Noble Energy, Inc.

## Planning Report

<b>Database:</b>	EDMP	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Company:</b>	Northern Region - DJ Basin	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Project:</b>	Wells Ranch	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site:</b>	A Section 21	<b>North Reference:</b>	Grid
<b>Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Drilling		
<b>Design:</b>	APD - Rev 1		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
16,400.00	90.00	89.25	6,957.00	1,296.77	9,171.45	9,262.56	0.00	0.00	0.00
16,500.00	90.00	89.25	6,957.00	1,298.09	9,271.45	9,361.81	0.00	0.00	0.00
16,600.00	90.00	89.25	6,957.00	1,299.40	9,371.44	9,461.06	0.00	0.00	0.00
16,700.00	90.00	89.25	6,957.00	1,300.71	9,471.43	9,560.32	0.00	0.00	0.00
16,787.47	90.00	89.25	6,957.00	1,301.85	9,558.89	9,647.14	0.00	0.00	0.00
TD @ 16787.47' MD/6957.00' TVD									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
TPZ - Harper A21-664 - hit/miss target - Shape - Point	0.00	0.01	6,957.00	1,180.16	275.95	1,416,853.67	3,261,472.51	40.4738611	-104.5601333
BHL - Harper A21-664 - plan hits target center - Point	0.00	0.00	6,957.00	1,301.85	9,558.89	1,416,975.36	3,270,755.43	40.4739203	-104.5267636

Formations					
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
504.00	504.00	PIERRE		0.00	
691.00	691.00	UPPER PIERRE AQUIFER TOP		0.00	
1,531.00	1,531.00	UPPER PIERRE AQUIFER BASE		0.00	
3,686.53	3,663.00	PARKMAN		0.00	
4,265.89	4,215.00	SUSSEX		0.00	
5,041.52	4,954.00	SHANNON		0.00	
6,071.15	5,935.00	TEEPEE BUTTES		0.00	
6,823.67	6,641.00	SHARON SPRINGS		0.00	
6,860.00	6,671.00	NIO A CHALK		0.00	
6,882.44	6,689.00	NIO A MARL		0.00	
7,006.04	6,780.00	NIO B CHALK		0.00	
7,053.84	6,811.00	NIO B MARL		0.00	
7,130.13	6,855.00	NIO C CHALK		0.00	
7,204.76	6,891.00	NIO C MARL		0.00	
7,283.86	6,921.00	NIO D CHALK		0.00	
7,367.04	6,943.00	FT. HAYES		0.00	

# Noble Energy, Inc.

## Planning Report

<b>Database:</b>	EDMP	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Company:</b>	Northern Region - DJ Basin	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Project:</b>	Wells Ranch	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site:</b>	A Section 21	<b>North Reference:</b>	Grid
<b>Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Original Drilling		
<b>Design:</b>	APD - Rev 1		

Plan Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
2,600.00	2,600.00	0.00	0.00	Build 2°/100'
3,483.97	3,470.01	127.07	-46.47	Hold 17.68° Inc., 339.91° Azm
6,439.61	6,286.06	970.08	-354.74	KOP: Build 9°/100' @ 6439.61' MD
7,503.73	6,957.00	1,180.16	275.95	EOC: 7503.73' MD, 90.00° Inc, 89.25° Azm
16,787.47	6,957.00	1,301.85	9,558.89	TD @ 16787.47' MD/6957.00' TVD

# **Northern Region - DJ Basin**

**Wells Ranch**

**A Section 21**

**Harper A21-664**

**Original Drilling**

**APD - Rev 1**

## **Anticollision Summary Report**

**30 January, 2018**

**Noble Energy, Inc.**  
Anticollision Summary Report

<b>Company:</b>	Northern Region - DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Project:</b>	Wells Ranch	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Reference Site:</b>	A Section 21	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site Error:</b>	0.00 ft	<b>North Reference:</b>	Grid
<b>Reference Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Original Drilling	<b>Database:</b>	EDMP
<b>Reference Design:</b>	APD - Rev 1	<b>Offset TVD Reference:</b>	Offset Datum

<b>Reference</b>	APD - Rev 1		
<b>Filter type:</b>	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
<b>Interpolation Method:</b>	Stations	<b>Error Model:</b>	ISCWSA
<b>Depth Range:</b>	Unlimited	<b>Scan Method:</b>	Closest Approach 3D
<b>Results Limited by:</b>	Maximum center-center distance of 10,000.00 ft	<b>Error Surface:</b>	Pedal Curve
<b>Warning Levels Evaluated at:</b>	2.00 Sigma	<b>Casing Method:</b>	Not applied

<b>Survey Tool Program</b>	<b>Date</b>	1/30/2018		
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
0.00	16,787.47	APD - Rev 1 (Original Drilling)	2_MWD+IFR1+MS	A008Mb: IFR dec & multi-station analysis

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
A Section 15						
Kerbs 12-15 - Original Drilling - Original Drilling - As Drille	11,961.18	7,094.41	4,904.65	4,813.52	53.822	CC
Kerbs 12-15 - Original Drilling - Original Drilling - As Drille	12,000.00	7,094.66	4,904.80	4,813.21	53.549	ES
Kerbs 12-15 - Original Drilling - Original Drilling - As Drille	13,700.00	7,105.54	5,203.74	5,095.68	48.157	SF
Kerbs 14-15 - Original Drilling - Original Drilling - As Drille	11,993.78	6,949.83	2,270.78	2,179.66	24.921	CC
Kerbs 14-15 - Original Drilling - Original Drilling - As Drille	12,000.00	6,949.81	2,270.78	2,179.59	24.899	ES
Kerbs 14-15 - Original Drilling - Original Drilling - As Drille	12,400.00	6,948.55	2,306.82	2,211.42	24.179	SF
Kerbs 22-15 - Original Drilling - Original Drilling - As Drille	13,714.05	7,073.63	4,915.88	4,804.36	44.078	CC
Kerbs 22-15 - Original Drilling - Original Drilling - As Drille	13,800.00	7,074.03	4,916.63	4,804.04	43.667	ES
Kerbs 22-15 - Original Drilling - Original Drilling - As Drille	15,200.00	7,080.66	5,135.55	5,009.41	40.712	SF
Kerbs 23-15 - Original Drilling - Original Drilling - As Drille	13,706.07	7,001.25	3,584.32	3,473.05	32.215	CC, ES
Kerbs 23-15 - Original Drilling - Original Drilling - As Drille	14,500.00	7,007.70	3,671.19	3,551.82	30.754	SF
Kerbs 24-15 - Original Drilling - Original Drilling - As Drille	13,721.70	6,953.11	2,230.71	2,119.39	20.038	CC, ES
Kerbs 24-15 - Original Drilling - Original Drilling - As Drille	14,100.00	6,956.37	2,262.56	2,147.35	19.638	SF
Kerbs 33-15 - Original Drilling - Original Drilling - As Drille	14,839.78	6,970.69	3,732.04	3,607.33	29.926	CC
Kerbs 33-15 - Original Drilling - Original Drilling - As Drille	14,900.00	6,972.88	3,732.53	3,607.05	29.746	ES
Kerbs 33-15 - Original Drilling - Original Drilling - As Drille	15,600.00	6,998.40	3,808.58	3,676.05	28.737	SF
Kerbs 34-15 - Original Drilling - Original Drilling - As Drille	14,800.73	6,946.37	2,350.19	2,221.37	18.244	CC, ES
Kerbs 34-15 - Original Drilling - Original Drilling - As Drille	15,100.00	6,946.90	2,369.17	2,237.08	17.937	SF
Kerbs 43-15 - Original Drilling - Original Drilling - As Drille	16,055.21	7,010.76	3,554.64	3,415.29	25.508	CC
Kerbs 43-15 - Original Drilling - Original Drilling - As Drille	16,100.00	7,011.92	3,554.92	3,414.99	25.405	ES
Kerbs 43-15 - Original Drilling - Original Drilling - As Drille	16,700.00	7,027.49	3,612.61	3,466.66	24.752	SF
Kerbs 44-15 - Original Drilling - Original Drilling - As Drille	15,944.87	6,912.24	2,221.53	2,083.64	16.111	CC
Kerbs 44-15 - Original Drilling - Original Drilling - As Drille	16,000.00	6,912.16	2,222.21	2,083.60	16.033	ES
Kerbs 44-15 - Original Drilling - Original Drilling - As Drille	16,200.00	6,911.89	2,236.13	2,095.48	15.898	SF
Kerbs USX A15-12D - Original Drilling - Original Drilling	12,249.19	7,820.02	3,775.65	3,663.44	33.646	CC
Kerbs USX A15-12D - Original Drilling - Original Drilling	12,300.00	7,820.02	3,775.99	3,662.85	33.373	ES
Kerbs USX A15-12D - Original Drilling - Original Drilling	13,500.00	7,820.02	3,977.44	3,846.85	30.456	SF
McDaniel 32-15 - Original Drilling - Original Drilling - As D	14,812.52	6,995.52	5,041.37	4,916.89	40.499	CC
McDaniel 32-15 - Original Drilling - Original Drilling - As D	14,900.00	6,996.94	5,042.13	4,916.55	40.151	ES
McDaniel 32-15 - Original Drilling - Original Drilling - As D	16,200.00	7,018.00	5,228.77	5,090.52	37.820	SF
McDaniel 42-15 - Original Drilling - Original Drilling - As D	16,191.37	6,964.07	5,158.84	5,017.85	36.590	CC
McDaniel 42-15 - Original Drilling - Original Drilling - As D	16,300.00	6,965.34	5,159.99	5,017.63	36.246	ES
McDaniel 42-15 - Original Drilling - Original Drilling - As D	16,787.47	6,971.02	5,193.16	5,045.30	35.122	SF
Speicher 31-15 - Original Drilling - Original Drilling	15,051.50	6,650.01	6,411.93	6,285.33	50.646	CC
Speicher 31-15 - Original Drilling - Original Drilling	15,100.00	6,650.01	6,412.11	6,284.90	50.406	ES
Speicher 31-15 - Original Drilling - Original Drilling	16,787.47	6,650.01	6,642.77	6,498.35	45.995	SF
Speicher 41-15 - Original Drilling - Original Drilling	16,084.96	6,900.01	6,364.03	6,224.50	45.611	CC

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

**Noble Energy, Inc.**  
Anticollision Summary Report

<b>Company:</b>	Northern Region - DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Project:</b>	Wells Ranch	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Reference Site:</b>	A Section 21	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site Error:</b>	0.00 ft	<b>North Reference:</b>	Grid
<b>Reference Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Original Drilling	<b>Database:</b>	EDMP
<b>Reference Design:</b>	APD - Rev 1	<b>Offset TVD Reference:</b>	Offset Datum

**Summary**

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Between Ellipses (ft)	Separation Factor	Warning
A Section 15						
Speicher 41-15 - Original Drilling - Original Drilling	16,200.00	6,900.01	6,365.07	6,224.10	45.153	ES
Speicher 41-15 - Original Drilling - Original Drilling	16,787.47	6,900.01	6,402.69	6,254.96	43.342	SF
Tye USX A15-03D - Original Drilling - Original MWD	13,467.31	7,063.06	6,551.58	6,440.61	59.040	CC
Tye USX A15-03D - Original Drilling - Original MWD	13,500.00	7,063.25	6,551.66	6,440.31	58.838	ES
Tye USX A15-03D - Original Drilling - Original MWD	15,900.00	7,084.01	6,988.63	6,855.14	52.354	SF
Tye USX A15-04D - Original Drilling - Original Drilling	12,187.05	7,450.83	6,491.72	6,378.76	57.470	CC
Tye USX A15-04D - Original Drilling - Original Drilling	12,300.00	7,451.78	6,492.70	6,378.60	56.900	ES
Tye USX A15-04D - Original Drilling - Original Drilling	14,300.00	7,468.57	6,826.92	6,696.90	52.510	SF
A Section 20						
Foe 16-20 - Original Drilling - Original Drilling - As Drilled	2,649.85	2,606.10	2,347.06	2,328.85	128.910	CC
Foe 16-20 - Original Drilling - Original Drilling - As Drilled	2,700.00	2,656.16	2,347.26	2,328.69	126.459	ES
Foe 16-20 - Original Drilling - Original Drilling - As Drilled	6,750.00	6,516.26	3,040.39	2,993.20	64.421	SF
Foe 33-20 - Original Drilling - Original Drilling - As Drilled	4,825.52	4,731.69	2,900.95	2,867.43	86.533	CC
Foe 33-20 - Original Drilling - Original Drilling - As Drilled	5,200.00	5,096.36	2,902.16	2,865.92	80.090	ES
Foe 33-20 - Original Drilling - Original Drilling - As Drilled	6,650.00	6,420.15	2,997.85	2,951.33	64.441	SF
Foe 34-20 (PA) - Original Drilling - Original Drilling - As D	2,600.00	2,528.00	3,480.93	3,421.28	58.358	CC
Foe 34-20 (PA) - Original Drilling - Original Drilling - As D	2,900.00	2,827.45	3,484.43	3,417.73	52.237	ES
Foe 34-20 (PA) - Original Drilling - Original Drilling - As D	6,800.00	6,548.94	3,961.47	3,805.71	25.432	SF
Foe 43-20 - Original Drilling - Original Drilling - As Drilled	4,102.79	4,025.29	1,475.82	1,447.48	52.072	CC
Foe 43-20 - Original Drilling - Original Drilling - As Drilled	4,200.00	4,115.86	1,476.24	1,447.22	50.867	ES
Foe 43-20 - Original Drilling - Original Drilling - As Drilled	6,550.00	6,367.36	1,660.45	1,614.43	36.083	SF
Linda Rae 1 - Original Drilling - Original Drilling - As Drille	6,442.53	6,277.16	7,229.53	7,181.33	149.989	CC
Linda Rae 1 - Original Drilling - Original Drilling - As Drille	6,450.00	6,284.27	7,229.57	7,181.26	149.667	ES
Linda Rae 1 - Original Drilling - Original Drilling - As Drille	7,150.00	6,856.13	7,564.30	7,508.06	134.504	SF
Simmons 42-20D - Original Drilling - Original Drilling - As	6,513.49	6,380.13	1,234.87	1,189.07	26.962	CC, ES
Simmons 42-20D - Original Drilling - Original Drilling - As	6,600.00	6,462.69	1,240.99	1,194.60	26.752	SF
Snider 1-20EG - Original Drilling - Original Drilling - As D	2,901.81	2,849.29	4,598.12	4,578.19	230.614	CC
Snider 1-20EG - Original Drilling - Original Drilling - As D	3,100.00	3,042.01	4,598.56	4,577.25	215.781	ES
Snider 1-20EG - Original Drilling - Original Drilling - As D	6,950.00	6,559.30	4,951.24	4,903.38	103.459	SF
Stump A20-11 - Original Drilling - Original Drilling - As Dr	6,448.06	6,300.00	4,325.39	4,280.08	95.461	CC
Stump A20-11 - Original Drilling - Original Drilling - As Dr	6,450.00	6,300.00	4,325.39	4,280.07	95.445	ES
Stump A20-11 - Original Drilling - Original Drilling - As Dr	6,750.00	6,524.92	4,394.15	4,346.96	93.124	SF
Stump A20-12 - Original Drilling - Original Drilling - As Dr	6,463.03	6,238.50	5,198.41	5,153.30	115.224	CC, ES
Stump A20-12 - Original Drilling - Original Drilling - As Dr	6,800.00	6,800.00	5,284.05	5,235.80	109.523	SF
Stump A20-13 - Original Drilling - Original Drilling - As Dr	4,269.23	4,211.36	5,820.66	5,791.05	196.529	CC
Stump A20-13 - Original Drilling - Original Drilling - As Dr	4,500.00	4,400.00	5,821.76	5,790.61	186.915	ES
Stump A20-13 - Original Drilling - Original Drilling - As Dr	6,950.00	6,718.79	6,065.59	6,017.15	125.216	SF
Winter 20-19 - Original Drilling - Original Drilling - As Dril	6,455.81	6,329.13	7,307.62	7,259.26	151.112	CC, ES
Winter 20-19 - Original Drilling - Original Drilling - As Dril	6,900.00	6,785.96	7,450.13	7,398.91	145.442	SF
Winter 24-19 - Original Drilling - Original Drilling - As Dril	6,483.76	6,596.13	6,932.24	6,871.04	113.272	CC, ES
Winter 24-19 - Original Drilling - Original Drilling - As Dril	6,850.00	6,926.02	7,034.97	6,971.89	111.524	SF
Winter 39-19 - Original Drilling - Original Drilling - As Dril	5,668.25	5,569.16	6,305.99	6,265.53	155.862	CC
Winter 39-19 - Original Drilling - Original Drilling - As Dril	6,450.00	6,397.07	6,307.11	6,260.97	136.717	ES
Winter 39-19 - Original Drilling - Original Drilling - As Dril	6,900.00	6,748.57	6,459.81	6,411.08	132.588	SF
Winter 40-19 - Original Drilling - Original Drilling - As Dril	6,474.94	6,629.10	5,876.50	5,809.73	88.010	CC, ES
Winter 40-19 - Original Drilling - Original Drilling - As Dril	6,700.00	6,856.35	5,915.07	5,847.33	87.323	SF

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

**Noble Energy, Inc.**  
Anticollision Summary Report

<b>Company:</b>	Northern Region - DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Project:</b>	Wells Ranch	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Reference Site:</b>	A Section 21	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site Error:</b>	0.00 ft	<b>North Reference:</b>	Grid
<b>Reference Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Original Drilling	<b>Database:</b>	EDMP
<b>Reference Design:</b>	APD - Rev 1	<b>Offset TVD Reference:</b>	Offset Datum

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
A Section 21						
Culbreath 23-21 - Original Drilling - Original Drilling - As D	2,373.30	2,333.43	1,306.95	1,290.68	80.349	CC
Culbreath 23-21 - Original Drilling - Original Drilling - As D	2,600.00	2,554.37	1,307.52	1,289.67	73.257	ES
Culbreath 23-21 - Original Drilling - Original Drilling - As D	8,600.00	6,909.74	1,449.52	1,393.25	25.756	SF
Culbreath 33-21 (PA) - Original Drilling - Original Drilling	9,515.10	6,903.00	1,564.60	1,386.08	8.764	CC, ES
Culbreath 33-21 (PA) - Original Drilling - Original Drilling	9,600.00	6,903.00	1,566.90	1,387.74	8.746	SF
Harper A21-618 - Original Drilling - APD - Rev 1	2,000.00	1,985.00	1,473.16	1,459.34	106.603	CC, ES
Harper A21-618 - Original Drilling - APD - Rev 1	16,787.47	16,198.56	2,895.75	2,651.00	11.831	SF
Harper A21-626 - Original Drilling - APD - Rev 1	2,756.85	2,815.13	1,438.77	1,419.29	73.839	CC
Harper A21-626 - Original Drilling - APD - Rev 1	2,800.00	2,858.28	1,439.07	1,419.28	72.702	ES
Harper A21-626 - Original Drilling - APD - Rev 1	16,787.47	16,268.46	2,368.02	2,122.92	9.662	SF
Harper A21-631 - Original Drilling - APD - Rev 1	3,003.18	3,170.50	1,364.28	1,342.74	63.350	CC, ES
Harper A21-631 - Original Drilling - APD - Rev 1	16,787.47	16,211.86	1,998.65	1,754.63	8.190	SF
Harper A21-637 - Original Drilling - APD - Rev 1	3,217.94	3,470.23	1,256.45	1,233.19	54.020	CC, ES
Harper A21-637 - Original Drilling - APD - Rev 1	16,787.47	16,342.35	1,618.96	1,374.27	6.616	SF
Harper A21-643 - Original Drilling - APD - Rev 1	2,000.00	1,999.00	70.27	56.40	5.067	CC
Harper A21-643 - Original Drilling - APD - Rev 1	2,100.00	2,098.61	70.53	55.96	4.839	ES
Harper A21-643 - Original Drilling - APD - Rev 1	2,400.00	2,402.76	76.70	60.00	4.594	SF
Harper A21-649 - Original Drilling - APD - Rev 1	2,600.00	2,600.00	48.79	30.62	2.685	CC, ES
Harper A21-649 - Original Drilling - APD - Rev 1	2,700.00	2,700.02	50.24	31.34	2.659	SF
Harper A21-656 - Original Drilling - APD - Rev 1	2,600.00	2,600.00	22.01	3.83	1.211	Level 3, CC, ES, SF
Harper A21-669 - Original Drilling - APD - Rev 1	2,400.00	2,401.00	24.44	7.70	1.460	Level 3, CC, ES, SF
Harper A21-674 - Original Drilling - APD - Rev 1	2,200.00	2,201.00	44.73	29.42	2.922	CC, ES
Harper A21-674 - Original Drilling - APD - Rev 1	2,300.00	2,299.41	46.48	30.47	2.903	SF
Harper A21-681 - Original Drilling - APD - Rev 1	2,000.00	2,002.00	68.01	54.13	4.900	CC, ES
Harper A21-681 - Original Drilling - APD - Rev 1	16,787.47	16,757.16	1,180.47	932.81	4.766	SF
Kona A19-616 - Kona A19-616 - Kona A19-616 - As Drille	788.27	769.30	1,469.30	1,464.93	336.652	CC
Kona A19-616 - Kona A19-616 - Kona A19-616 - As Drille	1,000.00	972.37	1,469.84	1,464.17	259.016	ES
Kona A19-616 - Kona A19-616 - Kona A19-616 - As Drille	8,800.00	6,423.00	3,332.30	3,283.92	68.886	SF
Kona A19-624 - Kona A19-624 - Kona A19-624 - As Drille	2,709.53	2,745.63	1,436.30	1,420.39	90.273	CC, ES
Kona A19-624 - Kona A19-624 - Kona A19-624 - As Drille	8,400.00	8,400.00	2,671.70	2,620.01	51.688	SF
Kona A19-636 - Kona A19-636 - Kona A19-636 - As Drille	3,013.77	3,207.00	1,337.48	1,318.55	70.652	CC, ES
Kona A19-636 - Kona A19-636 - Kona A19-636 - As Drille	6,600.00	7,909.00	1,752.12	1,702.05	34.998	SF
Kona A19-646 - Original Drilling - Original Drilling - As Dr	1,417.07	1,417.09	154.71	145.11	16.103	CC
Kona A19-646 - Original Drilling - Original Drilling - As Dr	2,600.00	2,599.77	160.03	143.93	9.942	ES
Kona A19-646 - Original Drilling - Original Drilling - As Dr	2,800.00	2,800.00	164.67	147.61	9.650	SF
Kona A19-662 - Original Drilling - Original Drilling - As Dr	7,141.88	7,224.98	122.66	76.42	2.653	CC
Kona A19-662 - Original Drilling - Original Drilling - As Dr	7,150.00	7,220.52	122.87	76.26	2.636	ES, SF
Kona A19-670 - Kona A19-670 - Original Drilling - As Dril	1,543.76	1,545.77	163.87	153.36	15.593	CC
Kona A19-670 - Kona A19-670 - Original Drilling - As Dril	1,900.00	1,901.56	164.35	151.32	12.613	ES
Kona A19-670 - Kona A19-670 - Original Drilling - As Dril	7,600.00	7,045.99	508.26	460.67	10.680	SF
Kona A19-685 - Original Drilling - Original Drilling - As Dr	1,693.81	1,694.89	147.37	135.81	12.742	CC
Kona A19-685 - Original Drilling - Original Drilling - As Dr	2,358.61	2,359.79	149.74	134.68	9.945	ES
Kona A19-685 - Original Drilling - Original Drilling - As Dr	2,500.00	2,495.69	152.38	136.71	9.725	SF
McKee 12-21 (PA) - Original Drilling - Original Drilling - A	5,672.17	5,536.86	93.60	-37.57	0.714	Level 1, CC
McKee 12-21 (PA) - Original Drilling - Original Drilling - A	5,700.00	5,563.38	93.98	-37.85	0.713	Level 1, ES, SF
McKee 21-21 (PA) - Original Drilling - Original Drilling - A	8,438.86	6,955.00	889.81	719.30	5.219	CC, ES
McKee 21-21 (PA) - Original Drilling - Original Drilling - A	8,500.00	6,955.00	891.91	720.88	5.215	SF
McKee 22-21 - Original Drilling - Original Drilling - As Dril	8,249.65	6,933.06	311.26	257.10	5.747	CC, ES, SF
McKee 31-21 - Original Drilling - Original Drilling - As Dril	9,483.20	7,004.18	1,256.05	1,191.88	19.576	CC
McKee 31-21 - Original Drilling - Original Drilling - As Dril	9,500.00	7,003.79	1,256.16	1,191.81	19.520	ES
McKee 31-21 - Original Drilling - Original Drilling - As Dril	9,700.00	6,999.23	1,274.61	1,208.29	19.220	SF
McKee 32-21 - Original Drilling - Original Drilling - As Dril	9,493.74	6,920.96	283.11	218.89	4.409	CC, ES, SF
McKee 41-21 - Original Drilling - Original Drilling - As Dril	10,784.88	6,892.84	1,207.34	1,129.74	15.559	CC

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

**Noble Energy, Inc.**  
Anticollision Summary Report

<b>Company:</b>	Northern Region - DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Project:</b>	Wells Ranch	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Reference Site:</b>	A Section 21	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site Error:</b>	0.00 ft	<b>North Reference:</b>	Grid
<b>Reference Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Original Drilling	<b>Database:</b>	EDMP
<b>Reference Design:</b>	APD - Rev 1	<b>Offset TVD Reference:</b>	Offset Datum

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
A Section 21						
McKee 41-21 - Original Drilling - Original Drilling - As Dril	10,800.00	6,893.03	1,207.43	1,129.64	15.521	ES
McKee 41-21 - Original Drilling - Original Drilling - As Dril	10,900.00	6,894.26	1,212.82	1,133.87	15.364	SF
McKee 42-21 - Original Drilling - Original Drilling - As Dril	10,851.11	6,901.39	458.48	380.40	5.872	CC, ES, SF
Sexton 43-21 (PA) - Original Drilling - Original Drilling - A	10,805.22	6,895.00	1,336.37	1,144.73	6.973	CC, ES
Sexton 43-21 (PA) - Original Drilling - Original Drilling - A	10,900.00	6,895.00	1,339.72	1,147.37	6.965	SF
Wells Trust 13-21 - Original Drilling - Original Drilling - As	100.00	56.98	633.16	632.93	2,802.171	CC
Wells Trust 13-21 - Original Drilling - Original Drilling - As	2,600.00	2,556.41	642.25	624.41	35.990	ES
Wells Trust 13-21 - Original Drilling - Original Drilling - As	3,483.97	3,424.60	729.93	705.91	30.387	SF
Wells Trust 14-21 - Original Drilling - Original Drilling - As	2,540.74	2,482.82	1,797.24	1,779.85	103.375	CC
Wells Trust 14-21 - Original Drilling - Original Drilling - As	2,600.00	2,541.96	1,797.26	1,779.46	100.946	ES
Wells Trust 14-21 - Original Drilling - Original Drilling - As	7,050.00	6,757.90	2,868.09	2,819.21	58.672	SF
Wells Trust 24-21 - Original Drilling - Original Drilling - As	2,620.28	2,564.25	1,697.26	1,679.32	94.561	CC, ES
Wells Trust 24-21 - Original Drilling - Original Drilling - As	8,300.00	6,907.68	2,887.84	2,834.03	53.666	SF

**Noble Energy, Inc.**  
Anticollision Summary Report

<b>Company:</b>	Northern Region - DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Project:</b>	Wells Ranch	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Reference Site:</b>	A Section 21	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site Error:</b>	0.00 ft	<b>North Reference:</b>	Grid
<b>Reference Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Original Drilling	<b>Database:</b>	EDMP
<b>Reference Design:</b>	APD - Rev 1	<b>Offset TVD Reference:</b>	Offset Datum

**Summary**

Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
<b>Offset Well - Wellbore - Design</b>						
A Section 22						
Carpio 22-01 - Original Drilling - Original Drilling - As Dril	16,112.30	6,844.68	2,693.05	2,553.49	19.297	CC, ES
Carpio 22-01 - Original Drilling - Original Drilling - As Dril	16,400.00	6,849.22	2,708.37	2,566.31	19.064	SF
Carpio 22-04-19 - Original Drilling - Original Drilling - As D	14,623.11	6,981.78	2,116.79	1,991.80	16.937	CC, ES
Carpio 22-04-19 - Original Drilling - Original Drilling - As D	14,800.00	6,981.31	2,124.16	1,997.67	16.793	SF
Carpio 22-41 - Original Drilling - Original Drilling - As Dril	16,267.15	6,876.10	1,667.07	1,505.97	10.348	CC, ES
Carpio 22-41 - Original Drilling - Original Drilling - As Dril	16,400.00	6,875.58	1,672.36	1,510.29	10.319	SF
Carpio 22-43 - Original Drilling - Original Drilling - As Dril	14,792.91	6,924.30	2,720.24	2,596.22	21.933	CC
Carpio 22-43 - Original Drilling - Original Drilling - As Dril	14,800.00	6,924.44	2,720.25	2,596.15	21.919	ES
Carpio 22-43 - Original Drilling - Original Drilling - As Dril	16,500.00	16,500.00	3,211.33	3,052.16	20.176	SF
Carpio 22-45 - Original Drilling - Original Drilling - As Dril	15,761.40	6,942.41	2,270.55	2,134.69	16.712	CC
Carpio 22-45 - Original Drilling - Original Drilling - As Dril	15,800.00	6,942.86	2,270.88	2,134.62	16.666	ES
Carpio 22-45 - Original Drilling - Original Drilling - As Dril	16,000.00	6,945.16	2,283.05	2,145.24	16.567	SF
Eisenstat 22-11 (PA) - Original Drilling - Original Drilling -	16,133.90	6,909.00	1,312.43	1,058.08	5.160	CC, ES
Eisenstat 22-11 (PA) - Original Drilling - Original Drilling -	16,200.00	6,909.00	1,314.10	1,058.91	5.150	SF
Eisenstat 22-13 - Original Drilling - Original Drilling - As D	14,672.79	6,923.07	587.21	464.61	4.790	CC, ES, SF
Eisenstat 22-15 - Original Drilling - Original Drilling - As D	15,481.41	6,916.80	645.56	513.22	4.878	CC
Eisenstat 22-15 - Original Drilling - Original Drilling - As D	15,500.00	6,916.86	645.83	513.20	4.870	ES, SF
Eisenstat 22-21 - Original Drilling - Original Drilling - As D	13,675.81	6,950.25	906.51	795.84	8.191	CC
Eisenstat 22-21 - Original Drilling - Original Drilling - As D	13,700.00	6,950.10	906.83	795.82	8.168	ES, SF
Eisenstat 22-23 - Original Drilling - Original Drilling - As D	12,270.43	6,922.15	74.03	-20.18	0.786	Level 1, CC, ES, SF
Gill Land Assoc. 1 (PA) - Original Drilling - Original Drillin	16,129.23	6,910.00	206.34	-47.97	0.811	Level 1, CC, ES, SF
Gill Land Assoc. 22-02 (PA) - Original Drilling - Original D	13,453.59	6,920.00	245.96	23.51	1.106	Level 2, CC, ES, SF
Gill Land Assoc. 22-03 - Original Drilling - Original Drilling	12,163.32	6,929.19	1,040.29	947.25	11.182	CC, ES
Gill Land Assoc. 22-03 - Original Drilling - Original Drilling	12,300.00	6,929.12	1,049.23	954.72	11.102	SF
Gill Land Assoc. 22-04 (PA) - Original Drilling - Original D	14,744.64	6,918.00	1,077.22	839.43	4.530	CC, ES
Gill Land Assoc. 22-04 (PA) - Original Drilling - Original D	14,800.00	6,918.00	1,078.64	840.13	4.523	SF
Gruen 22-01 - Original Drilling - Original Drilling - As Drill	12,110.05	6,880.17	1,527.13	1,435.04	16.583	CC, ES
Gruen 22-01 - Original Drilling - Original Drilling - As Drill	12,300.00	6,881.24	1,538.90	1,445.46	16.470	SF
Gruen 22-02 - Original Drilling - Original Drilling - As Drill	13,413.92	6,885.51	2,807.53	2,700.15	26.146	CC, ES
Gruen 22-02 - Original Drilling - Original Drilling - As Drill	13,900.00	6,877.35	2,849.29	2,737.97	25.596	SF
Gruen 22-31 - Original Drilling - Original Drilling - As Drill	13,433.60	6,921.81	1,507.99	1,400.20	13.990	CC, ES
Gruen 22-31 - Original Drilling - Original Drilling - As Drill	13,600.00	6,921.34	1,517.14	1,408.23	13.929	SF
Gruen 22-33 - Original Drilling - Original Drilling - As Drill	12,151.64	6,812.80	2,785.06	2,692.85	30.204	CC
Gruen 22-33 - Original Drilling - Original Drilling - As Drill	12,200.00	6,814.00	2,785.47	2,692.77	30.046	ES
Gruen 22-33 - Original Drilling - Original Drilling - As Drill	12,700.00	6,826.48	2,838.49	2,741.70	29.326	SF
Gruen 22-35 - Original Drilling - Original Drilling - As Drill	12,761.63	6,865.23	2,249.31	2,149.52	22.541	CC
Gruen 22-35 - Original Drilling - Original Drilling - As Drill	12,800.00	6,865.31	2,249.64	2,149.47	22.459	ES
Gruen 22-35 - Original Drilling - Original Drilling - As Drill	13,100.00	6,865.87	2,274.62	2,172.15	22.198	SF
Ottinger 22-01 - Original Drilling - Original Drilling - As Dr	14,787.29	6,904.27	1,396.97	1,273.16	11.283	CC
Ottinger 22-01 - Original Drilling - Original Drilling - As Dr	14,800.00	6,904.30	1,397.03	1,273.10	11.273	ES
Ottinger 22-01 - Original Drilling - Original Drilling - As Dr	14,900.00	6,904.57	1,401.51	1,276.92	11.249	SF

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

**Noble Energy, Inc.**  
Anticollision Summary Report

<b>Company:</b>	Northern Region - DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Project:</b>	Wells Ranch	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Reference Site:</b>	A Section 21	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site Error:</b>	0.00 ft	<b>North Reference:</b>	Grid
<b>Reference Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Original Drilling	<b>Database:</b>	EDMP
<b>Reference Design:</b>	APD - Rev 1	<b>Offset TVD Reference:</b>	Offset Datum

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
A Section 23						
Cecil 23-13 - Original Drilling - Original Drilling - As Drille	16,787.47	6,803.90	3,014.89	2,962.00	57.007	CC, ES, SF
Champlin 23-02 (PA) - Original Drilling - Original Drilling -	16,787.47	6,869.00	1,517.55	1,264.41	5.995	CC, ES, SF
Champlin 23-03 - Original Drilling - Original Drilling - As D	16,787.47	6,811.06	3,183.53	3,052.91	24.372	CC, ES, SF
Champlin Amoco A 1 #308 - Original Drilling - Original Dr	16,787.47	6,844.00	3,143.98	2,896.89	12.724	CC, ES, SF
Cooper 23-1-17 - Original Drilling - Original Drilling - As Dr	16,787.47	6,817.51	4,211.54	4,138.71	57.831	CC, ES, SF
Cooper 23-1-19 - Original Drilling - Original Drilling - As D	16,787.47	6,805.12	2,882.69	2,821.10	46.799	CC, ES, SF
Cooper 23-12 - Original Drilling - Original Drilling - As Dr	16,787.47	6,827.92	3,525.01	3,455.33	50.590	CC, ES, SF
Cooper 23-1-20 - Original Drilling - Original Drilling - As D	16,787.47	6,792.96	2,898.77	2,831.80	43.284	CC, ES, SF
Cooper 23-15 - Original Drilling - Original Drilling - As Dri	16,787.47	6,797.50	4,033.50	3,977.37	71.857	CC, ES, SF
Foss 41-23D - Original Drilling - Original Drilling - As Drill	16,787.47	7,042.60	4,779.11	4,706.10	65.458	CC, ES, SF
Foss 42-23 - Original Drilling - Original Drilling - As Drille	16,787.47	6,828.43	4,433.88	4,378.81	80.510	CC, ES, SF
J&L Farms 23-11 - Original Drilling - Original Drilling - As	16,787.47	6,870.68	1,291.62	1,155.42	9.483	CC, ES, SF
J&L Farms 23-12 - Original Drilling - Original Drilling - As	16,787.47	6,900.50	516.02	412.82	5.000	CC, ES, SF
J&L Farms 23-21 - Original Drilling - Original Drilling - As	16,787.47	6,819.83	2,564.15	2,471.21	27.589	CC, ES, SF
J&L Farms 23-22 - Original Drilling - Original Drilling - As	16,787.47	6,888.31	1,905.09	1,850.51	34.905	CC, ES, SF
McIntosh 33-23 - Original Drilling - Original Drilling - As D	16,787.47	6,903.36	3,678.96	3,590.69	41.680	CC, ES, SF
McIntosh 34-23 - Original Drilling - Original Drilling - As D	16,787.47	6,830.24	4,392.07	4,285.06	41.046	CC, ES, SF
McIntosh 43-23 - Original Drilling - Original Drilling - As D	16,787.47	6,753.26	4,979.95	4,910.33	71.529	CC, ES, SF
McIntosh 44-23 - Original Drilling - Original Drilling - As D	16,787.47	6,755.39	5,667.11	5,572.31	59.779	CC, ES, SF
Schroeder 23-31 - Original Drilling - Original Drilling - As	16,787.47	6,807.47	2,731.74	2,625.80	25.785	CC, ES, SF
Schroeder 23-33 - Original Drilling - Original Drilling - As	16,787.47	6,842.40	3,023.90	2,877.11	20.599	CC, ES, SF
A Section 24						
Larson A23-622 - Original Drilling - APD - Rev 0	16,780.17	17,335.78	2,592.75	2,469.42	21.022	CC
Larson A23-622 - Original Drilling - APD - Rev 0	16,787.47	17,335.78	2,592.76	2,469.35	21.009	ES, SF
Larson A23-627 - Original Drilling - APD - Rev 0	16,780.89	17,349.62	2,255.46	2,132.01	18.270	CC
Larson A23-627 - Original Drilling - APD - Rev 0	16,787.47	17,349.62	2,255.47	2,131.95	18.260	ES, SF
Larson A23-633 - Original Drilling - APD - Rev 0	16,787.47	17,290.63	1,910.21	1,787.12	15.518	CC, ES, SF
Larson A23-639 - Original Drilling - APD - Rev 0	16,782.92	17,360.95	1,508.00	1,385.01	12.261	CC
Larson A23-639 - Original Drilling - APD - Rev 0	16,787.47	17,356.39	1,508.01	1,384.96	12.255	ES, SF
Larson A23-645 - Original Drilling - APD - Rev 0	16,782.36	18,115.79	1,109.90	987.47	9.066	CC
Larson A23-645 - Original Drilling - APD - Rev 0	16,787.47	18,110.68	1,109.92	987.44	9.061	ES, SF
Larson A23-651 - Original Drilling - APD - Rev 0	16,785.21	18,052.30	808.07	687.07	6.678	CC
Larson A23-651 - Original Drilling - APD - Rev 0	16,787.47	18,050.04	808.07	687.04	6.677	ES, SF
Larson A23-656 - Original Drilling - APD - Rev 0	16,787.47	18,064.73	501.49	382.35	4.209	CC, ES, SF
Larson A23-662 - Original Drilling - APD - Rev 0	16,787.47	18,064.80	191.14	108.94	2.325	CC, ES, SF
Larson A23-668 - Original Drilling - APD - Rev 0	16,787.47	17,470.08	348.13	228.08	2.900	CC, ES, SF
Larson A23-672 - Original Drilling - APD - Rev 0	16,787.47	17,459.11	615.99	495.24	5.102	CC, ES, SF
Larson A23-678 - Original Drilling - APD - Rev 0	16,787.47	17,179.62	988.16	863.83	7.948	CC, ES, SF
Larson A23-683 - Original Drilling - APD - Rev 0	16,787.47	17,320.24	1,304.92	1,180.66	10.501	CC, ES, SF

**Noble Energy, Inc.**  
Anticollision Summary Report

<b>Company:</b>	Northern Region - DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Project:</b>	Wells Ranch	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Reference Site:</b>	A Section 21	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site Error:</b>	0.00 ft	<b>North Reference:</b>	Grid
<b>Reference Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Original Drilling	<b>Database:</b>	EDMP
<b>Reference Design:</b>	APD - Rev 1	<b>Offset TVD Reference:</b>	Offset Datum

**Summary**

Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
A Section 27						
Howard 02-27 (PA) - Original Drilling - Original Drilling - A	14,818.08	6,925.00	4,079.67	3,840.87	17.084	CC
Howard 02-27 (PA) - Original Drilling - Original Drilling - A	14,900.00	6,925.00	4,080.50	3,840.80	17.023	ES
Howard 02-27 (PA) - Original Drilling - Original Drilling - A	15,400.00	6,925.00	4,120.97	3,876.65	16.868	SF
Howard 03-27 - Original Drilling - Original Drilling - As Dr	13,408.09	6,886.62	4,162.88	4,055.53	38.778	CC, ES
Howard 03-27 - Original Drilling - Original Drilling - As Dr	14,400.00	6,874.25	4,279.41	4,163.50	36.920	SF
Howard 04-27 (PA) - Original Drilling - Original Drilling - A	12,167.78	6,885.00	4,049.99	3,843.25	19.590	CC
Howard 04-27 (PA) - Original Drilling - Original Drilling - A	12,200.00	6,885.00	4,050.12	3,843.03	19.558	ES
Howard 04-27 (PA) - Original Drilling - Original Drilling - A	12,800.00	6,885.00	4,099.04	3,886.27	19.266	SF
Howard 08-27 - Original Drilling - Original Drilling - As Dr	16,110.07	6,840.64	5,478.43	5,338.90	39.262	CC
Howard 08-27 - Original Drilling - Original Drilling - As Dr	16,200.00	6,840.76	5,479.17	5,338.62	38.983	ES
Howard 08-27 - Original Drilling - Original Drilling - As Dr	16,787.47	6,841.50	5,520.15	5,373.71	37.697	SF
Howard 10-27 - Original Drilling - Original Drilling - As Dr	14,879.50	6,803.07	6,787.45	6,662.90	54.494	CC
Howard 10-27 - Original Drilling - Original Drilling - As Dr	15,000.00	6,803.22	6,788.52	6,662.60	53.909	ES
Howard 10-27 - Original Drilling - Original Drilling - As Dr	16,787.47	6,805.54	7,050.52	6,908.21	49.543	SF
Howard 15-27 - Original Drilling - Original Drilling - As Dr	14,714.39	7,014.90	7,948.07	7,827.27	65.796	CC
Howard 15-27 - Original Drilling - Original Drilling - As Dr	14,800.00	7,013.75	7,948.53	7,826.74	65.269	ES
Howard 15-27 - Original Drilling - Original Drilling - As Dr	16,787.47	6,987.08	8,213.93	8,072.81	58.206	SF
Howard 4B-27 (DA) - Original Drilling - Original Drilling - A	12,159.34	3,765.00	5,143.60	5,026.47	43.913	CC
Howard 4B-27 (DA) - Original Drilling - Original Drilling - A	12,200.00	3,765.00	5,143.76	5,026.23	43.765	ES
Howard 4B-27 (DA) - Original Drilling - Original Drilling - A	13,900.00	3,765.00	5,430.15	5,297.28	40.870	SF
Howard A27-01 - Original Drilling - Original Drilling - As D	16,146.58	6,866.10	4,085.53	3,945.44	29.163	CC
Howard A27-01 - Original Drilling - Original Drilling - As D	16,200.00	6,866.21	4,085.88	3,945.20	29.043	ES
Howard A27-01 - Original Drilling - Original Drilling - As D	16,787.47	6,867.32	4,135.49	3,989.58	28.342	SF
Howard A27-05 - Original Drilling - Original Drilling - As D	12,176.46	6,813.79	5,450.99	5,358.31	58.813	CC
Howard A27-05 - Original Drilling - Original Drilling - As D	12,200.00	6,813.99	5,451.05	5,358.10	58.650	ES
Howard A27-05 - Original Drilling - Original Drilling - As D	14,100.00	6,830.30	5,780.41	5,670.92	52.797	SF
Howard A27-06 - Original Drilling - Original Drilling - As D	13,553.80	6,984.95	5,410.39	5,295.67	47.161	CC
Howard A27-06 - Original Drilling - Original Drilling - As D	13,600.00	6,984.75	5,410.59	5,295.31	46.934	ES
Howard A27-06 - Original Drilling - Original Drilling - As D	15,200.00	6,977.84	5,655.29	5,524.87	43.362	SF
Howard A27-07 - Original Drilling - Original Drilling - As D	14,904.34	6,904.88	5,485.57	5,360.31	43.795	CC
Howard A27-07 - Original Drilling - Original Drilling - As D	15,000.00	6,905.45	5,486.40	5,360.07	43.429	ES
Howard A27-07 - Original Drilling - Original Drilling - As D	16,400.00	6,913.76	5,685.80	5,547.32	41.059	SF
Howard A27-09 - Original Drilling - Original Drilling - As D	16,007.86	6,819.00	6,851.37	6,713.12	49.556	CC
Howard A27-09 - Original Drilling - Original Drilling - As D	16,100.00	6,819.48	6,851.99	6,712.68	49.183	ES
Howard A27-09 - Original Drilling - Original Drilling - As D	16,787.47	6,823.05	6,895.58	6,749.00	47.043	SF
Howard A27-16 - Original Drilling - Original Drilling - As D	16,281.42	6,935.52	8,120.69	7,978.60	57.151	CC
Howard A27-16 - Original Drilling - Original Drilling - As D	16,400.00	6,935.27	8,121.56	7,978.09	56.610	ES
Howard A27-16 - Original Drilling - Original Drilling - As D	16,787.47	6,934.46	8,136.44	7,988.66	55.057	SF
Howard A27-17D - Original Drilling - Original Drilling - As	15,559.84	6,965.49	4,675.28	4,537.89	34.029	CC
Howard A27-17D - Original Drilling - Original Drilling - As	15,600.00	6,965.48	4,675.46	4,537.67	33.933	ES
Howard A27-17D - Original Drilling - Original Drilling - As	16,400.00	6,965.17	4,750.17	4,606.20	32.994	SF

**Noble Energy, Inc.**  
Anticollision Summary Report

<b>Company:</b>	Northern Region - DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Project:</b>	Wells Ranch	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Reference Site:</b>	A Section 21	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site Error:</b>	0.00 ft	<b>North Reference:</b>	Grid
<b>Reference Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Original Drilling	<b>Database:</b>	EDMP
<b>Reference Design:</b>	APD - Rev 1	<b>Offset TVD Reference:</b>	Offset Datum

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
A Section 28						
Ankenney 28-01 (PA) - Original Drilling - Original Drilling	10,849.43	6,862.00	5,564.21	5,372.75	29.062	CC
Ankenney 28-01 (PA) - Original Drilling - Original Drilling	10,900.00	6,862.00	5,564.44	5,372.46	28.984	ES
Ankenney 28-01 (PA) - Original Drilling - Original Drilling	12,200.00	6,862.00	5,725.77	5,521.55	28.037	SF
Wardlaw 16-28 - Original Drilling - Original Drilling - As D	2,600.00	2,493.00	7,829.96	7,771.01	132.830	CC
Wardlaw 16-28 - Original Drilling - Original Drilling - As D	2,700.00	2,592.98	7,831.69	7,770.39	127.750	ES
Wardlaw 16-28 - Original Drilling - Original Drilling - As D	13,500.00	6,850.00	8,693.25	8,476.93	40.188	SF
Wardlaw 20-28 - Original Drilling - Original Drilling - As D	2,600.00	2,488.00	7,107.16	7,048.31	120.773	CC
Wardlaw 20-28 - Original Drilling - Original Drilling - As D	2,700.00	2,587.98	7,108.89	7,047.69	116.149	ES
Wardlaw 20-28 - Original Drilling - Original Drilling - As D	12,800.00	6,845.00	7,949.61	7,740.64	38.041	SF
Webster 09-28 - Original Drilling - Original Drilling - As D	2,600.00	2,503.00	6,546.76	6,487.61	110.686	CC
Webster 09-28 - Original Drilling - Original Drilling - As D	2,700.00	2,602.98	6,548.46	6,486.96	106.471	ES
Webster 09-28 - Original Drilling - Original Drilling - As D	12,600.00	6,860.00	7,041.67	6,833.90	33.893	SF

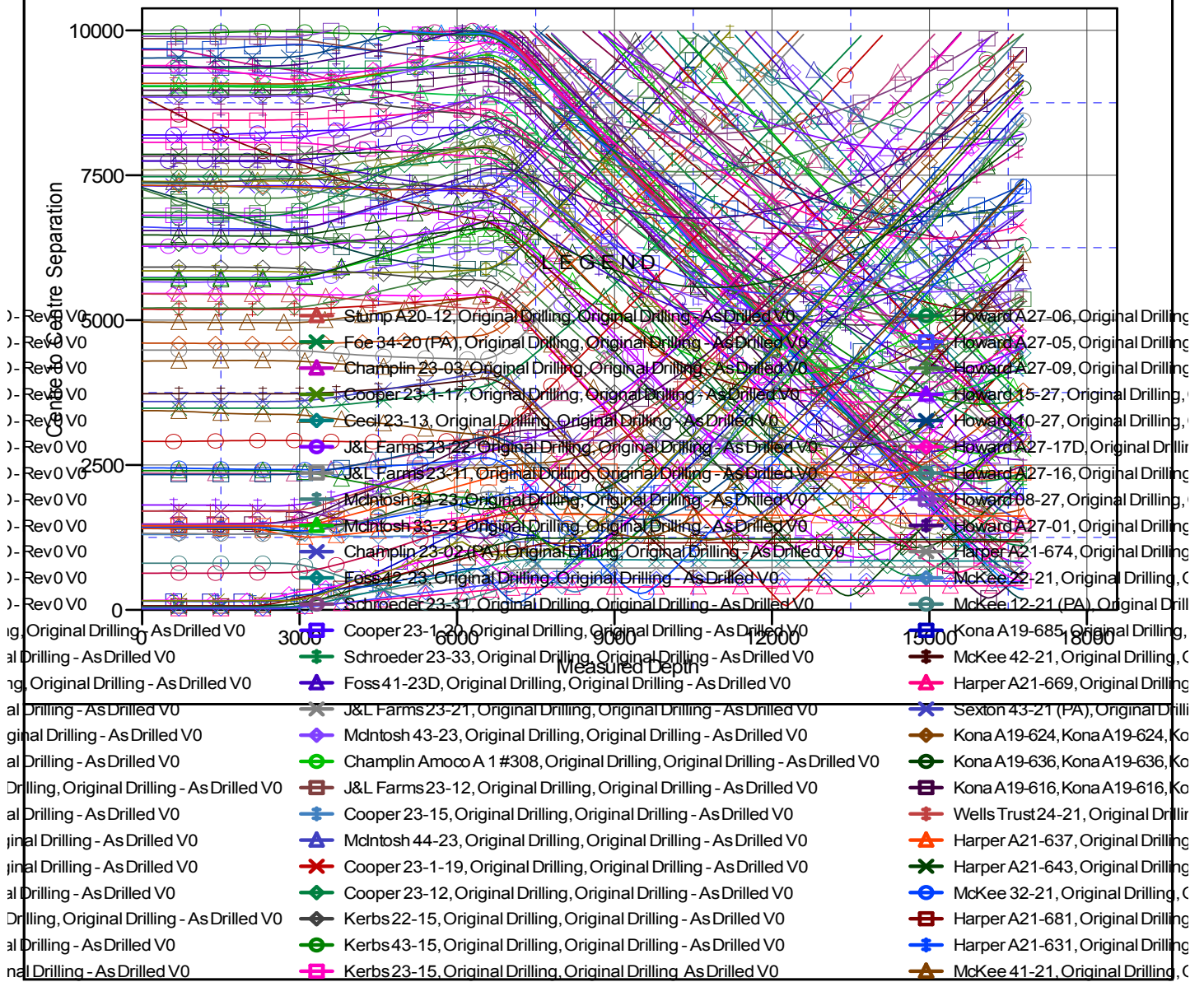
**Noble Energy, Inc.**  
**Anticollision Summary Report**

<b>Company:</b>	Northern Region - DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Project:</b>	Wells Ranch	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Reference Site:</b>	A Section 21	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site Error:</b>	0.00 ft	<b>North Reference:</b>	Grid
<b>Reference Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Original Drilling	<b>Database:</b>	EDMP
<b>Reference Design:</b>	APD - Rev 1	<b>Offset TVD Reference:</b>	Offset Datum

Reference Depths are relative to WELL @ 4772.00ft (Original Well Elev)  
Offset Depths are relative to Offset Datum  
Central Meridian is -105.5000000

Coordinates are relative to: Harper A21-664  
Coordinate System is US State Plane 1983, Colorado Northern Zone  
Grid Convergence at Surface is: 0.61°

## Ladder Plot



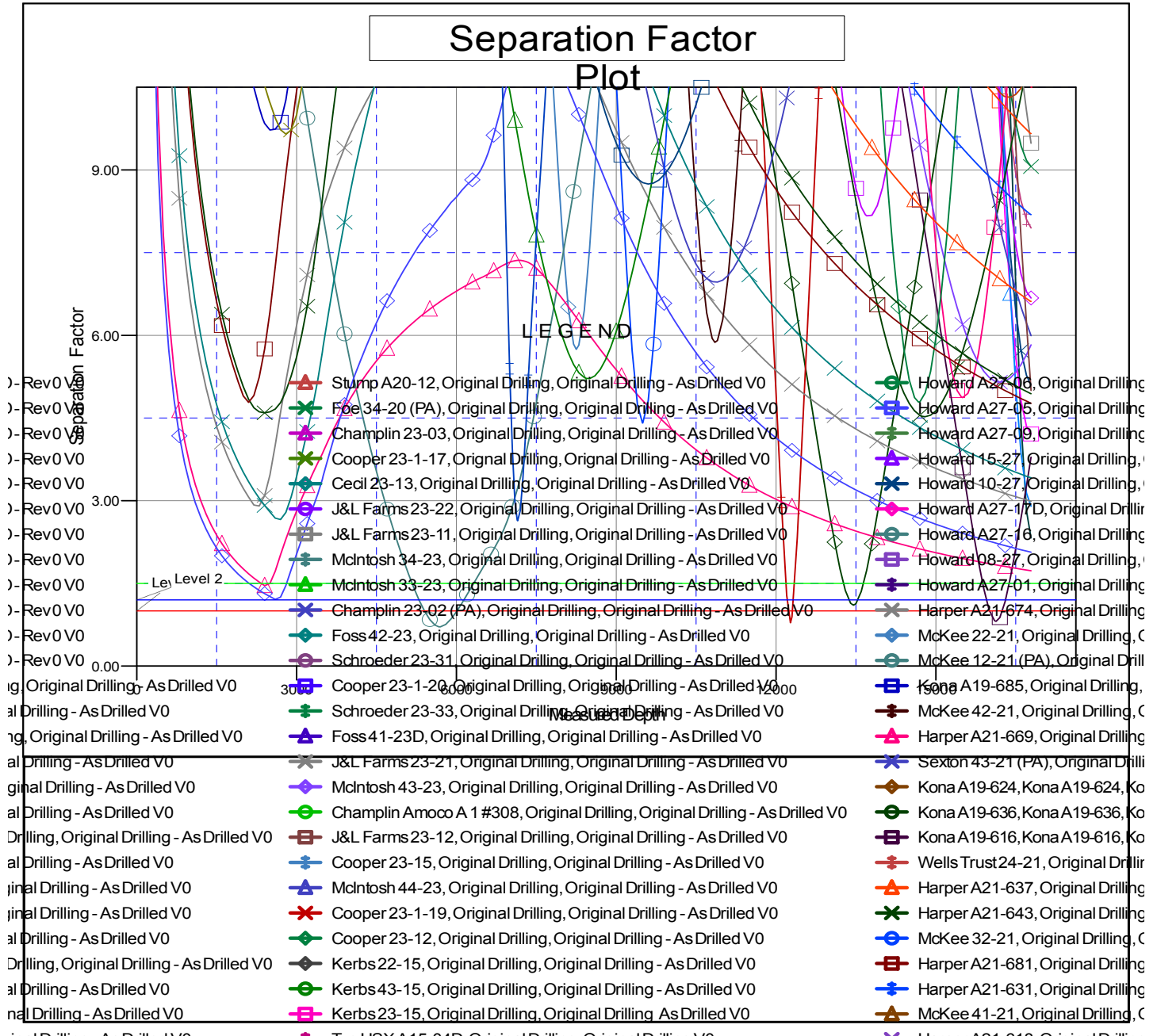
CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

**Noble Energy, Inc.**  
**Anticollision Summary Report**

<b>Company:</b>	Northern Region - DJ Basin	<b>Local Co-ordinate Reference:</b>	Well Harper A21-664
<b>Project:</b>	Wells Ranch	<b>TVD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Reference Site:</b>	A Section 21	<b>MD Reference:</b>	WELL @ 4772.00ft (Original Well Elev.)
<b>Site Error:</b>	0.00 ft	<b>North Reference:</b>	Grid
<b>Reference Well:</b>	Harper A21-664	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 ft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Original Drilling	<b>Database:</b>	EDMP
<b>Reference Design:</b>	APD - Rev 1	<b>Offset TVD Reference:</b>	Offset Datum

Reference Depths are relative to WELL @ 4772.00ft (Original Well Elev)  
Offset Depths are relative to Offset Datum  
Central Meridian is -105.5000000

Coordinates are relative to: Harper A21-664  
Coordinate System is US State Plane 1983, Colorado Northern Zone  
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