



Company: Noble Energy, Inc
Project: Weld County, CO NAD83
Site: Bernhardt Pad
Well: Bernhardt 13-12
Wellbore: OH
Design: Plan #4

PROJECT DETAILS: Weld County, CO NAD83

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



Azimuths to True North
Magnetic North: 8.68°

Magnetic Field
Strength: 52619.95nT
Dip Angle: 66.87°
Date: 6/10/2015
Model: HDGM

WELL DETAILS: Bernhardt 13-12

Plan: Plan #4 (Bernhardt 13-12/OH)

Created By: Janie Collins Date: 14:45, September 23 2015

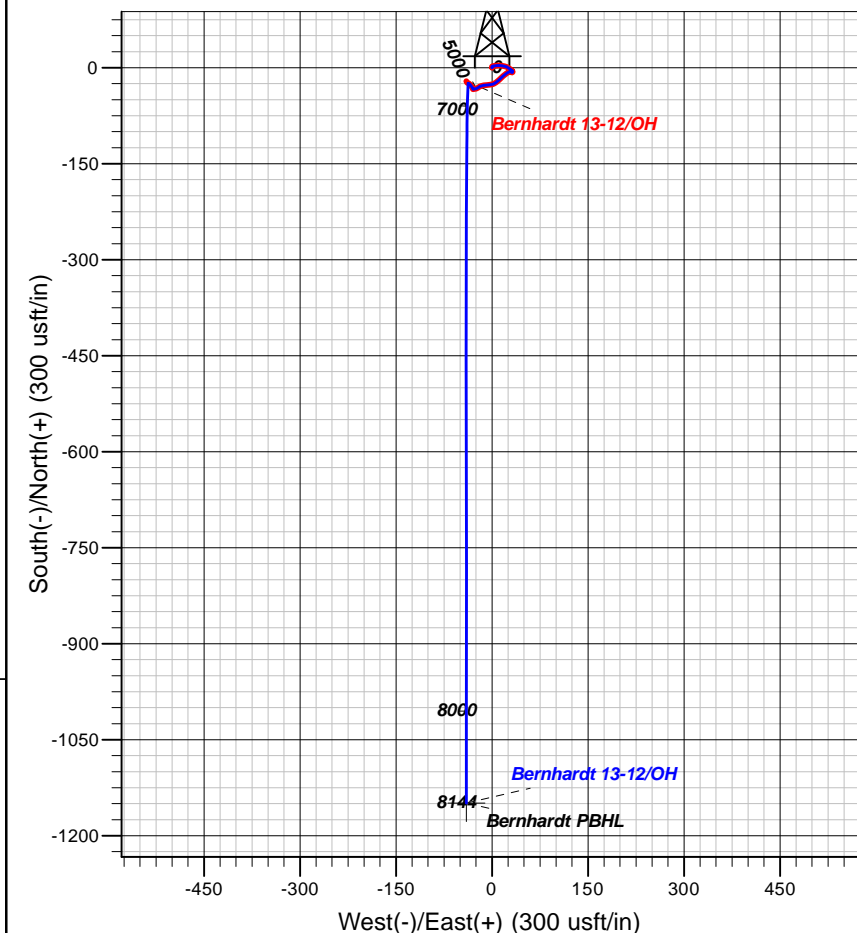
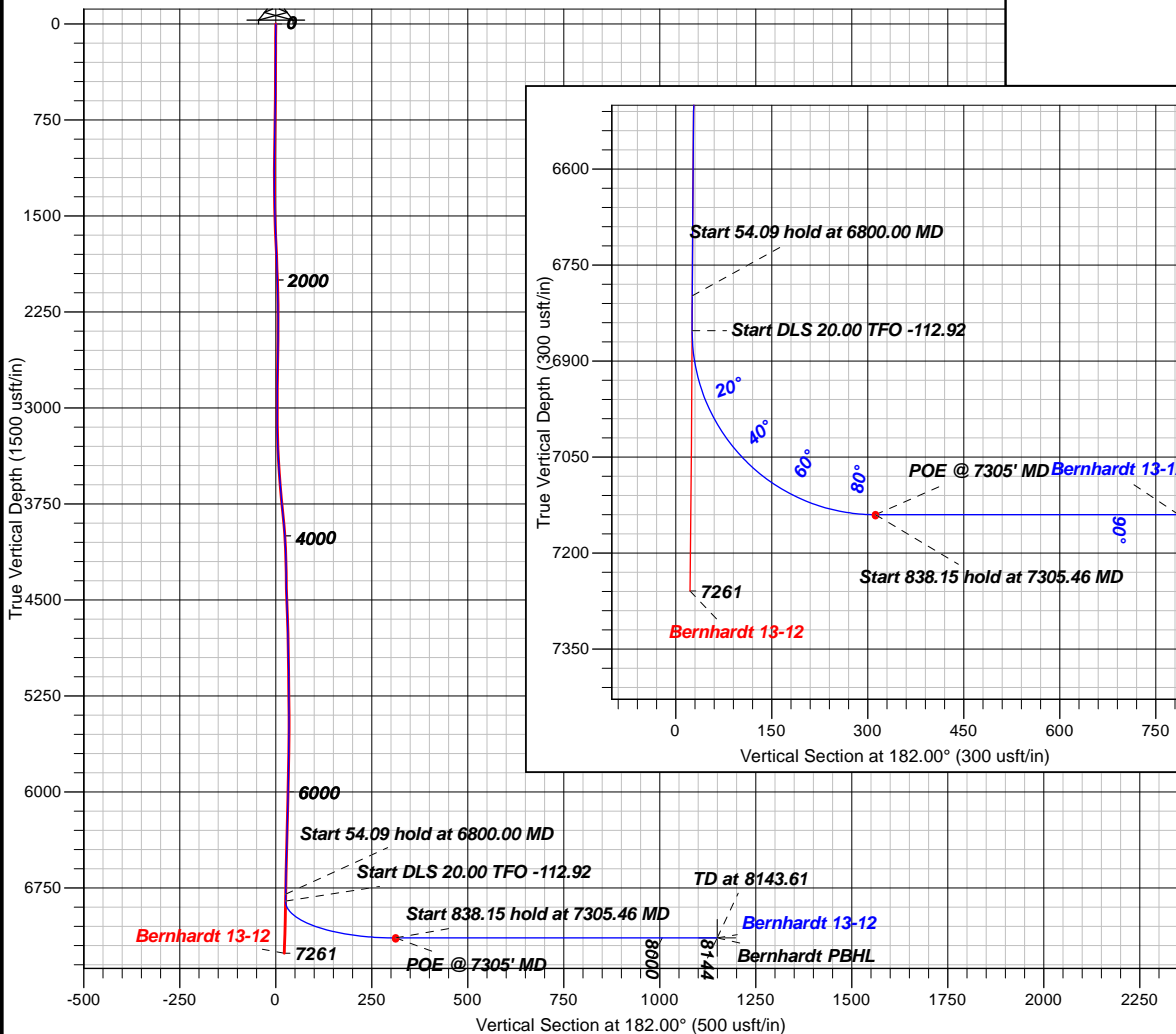
GL 4751' & RKB 11' @ 4762.00usft
+N/-S +E/-W Northing Easting Latitude Longitude
0.00 0.00 1358947.16 3184942.20 40.3168120 -104.8367670

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Bernhardt PBHL	7140.00	-1149.00	-40.10	1357797.89	3184910.69	40.3136579	-104.8369108

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target	Annotation
6800.00	0.70	292.91	6798.12	-24.62	-36.50	0.00	0.00	25.88		Start 54.09 hold at 6800.00 MD
6854.09	0.70	292.91	6852.20	-24.37	-37.11	0.00	0.00	25.65		Start DLS 20.00 TFO -112.92
7305.46	90.00	179.99	7140.03	-310.85	-40.28	20.00	-112.92	312.07		POE @ 7305' MD
8143.61	90.00	179.99	7140.00	-1149.00	-40.10	0.00	0.00	1149.70	Bernhardt PBHL	TD at 8143.61





Noble Energy, Inc

Weld County, CO NAD83

Bernhardt Pad

Bernhardt 13-12

OH

Plan: Plan #4

Standard Planning Report

23 September, 2015



www.scientificdrilling.com



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Bernhardt 13-12
Company:	Noble Energy, Inc	TVD Reference:	GL 4751' & RKB 11' @ 4762.00usft
Project:	Weld County, CO NAD83	MD Reference:	GL 4751' & RKB 11' @ 4762.00usft
Site:	Bernhardt Pad	North Reference:	True
Well:	Bernhardt 13-12	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #4		

Project	Weld County, CO NAD83		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site	Bernhardt Pad				
Site Position:		Northing:	1,358,947.16 usft	Latitude:	40.3168120
From:	Lat/Long	Easting:	3,184,942.20 usft	Longitude:	-104.8367670
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	0.43

Well	Bernhardt 13-12					
Well Position	+N/-S	0.00 usft	Northing:	1,358,947.16 usft	Latitude:	40.3168120
	+E/-W	0.00 usft	Easting:	3,184,942.20 usft	Longitude:	-104.8367670
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,751.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	6/10/2015	8.68	66.87	52,620

Design	Plan #4			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	6,800.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	182.00

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
6,800.00	0.70	292.91	6,798.12	-24.62	-36.50	0.00	0.00	0.00	0.00	
6,854.09	0.70	292.91	6,852.20	-24.37	-37.11	0.00	0.00	0.00	0.00	
7,305.46	90.00	179.99	7,140.03	-310.85	-40.28	20.00	19.78	-25.02	-112.92	
8,143.61	90.00	179.99	7,140.00	-1,149.00	-40.10	0.00	0.00	0.00	0.00	Bernhardt PBHL

Database:	Grand Junction District	Local Co-ordinate Reference:	Well Bernhardt 13-12
Company:	Noble Energy, Inc	TVD Reference:	GL 4751' & RKB 11' @ 4762.00usft
Project:	Weld County, CO NAD83	MD Reference:	GL 4751' & RKB 11' @ 4762.00usft
Site:	Bernhardt Pad	North Reference:	True
Well:	Bernhardt 13-12	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #4		

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
100.00	0.07	327.77	100.00	0.05	-0.03	-0.04	0.07	0.07	0.00
200.00	0.17	343.54	200.00	0.24	-0.11	-0.23	0.11	0.11	15.78
300.00	0.16	355.33	300.00	0.53	-0.16	-0.53	0.04	-0.01	11.79
400.00	0.17	353.81	400.00	0.82	-0.19	-0.81	0.01	0.01	-1.52
500.00	0.17	249.75	500.00	0.93	-0.33	-0.92	0.27	0.00	-104.06
600.00	0.19	37.51	600.00	0.96	-0.42	-0.95	0.35	0.01	147.77
700.00	0.42	358.27	700.00	1.45	-0.29	-1.44	0.30	0.23	-39.24
800.00	0.77	60.70	799.99	2.17	0.20	-2.18	0.68	0.35	62.42
900.00	1.20	80.98	899.98	2.68	1.85	-2.74	0.55	0.43	20.28
1,000.00	1.57	81.26	999.95	3.03	4.25	-3.17	0.37	0.37	0.29
1,100.00	2.10	86.22	1,099.90	3.37	7.41	-3.63	0.55	0.53	4.95
1,200.00	2.37	93.50	1,199.82	3.38	11.33	-3.78	0.39	0.27	7.28
1,300.00	2.41	96.08	1,299.73	3.02	15.51	-3.55	0.12	0.05	2.58
1,400.00	2.16	102.67	1,399.65	2.39	19.46	-3.07	0.37	-0.26	6.58
1,500.00	1.80	114.94	1,499.59	1.32	22.74	-2.11	0.55	-0.35	12.27
1,600.00	1.66	120.96	1,599.55	-0.11	25.38	-0.78	0.23	-0.15	6.03
1,700.00	1.48	127.31	1,699.51	-1.64	27.66	0.67	0.25	-0.17	6.34
1,800.00	1.13	127.93	1,799.48	-3.05	29.47	2.02	0.36	-0.36	0.62
1,900.00	0.89	137.67	1,899.47	-4.21	30.77	3.14	0.29	-0.23	9.74
2,000.00	0.71	145.40	1,999.46	-5.30	31.64	4.20	0.21	-0.18	7.73
2,100.00	0.47	169.97	2,099.45	-6.23	32.07	5.10	0.34	-0.24	24.56
2,200.00	0.44	210.45	2,199.45	-6.96	31.95	5.84	0.32	-0.03	40.48
2,300.00	0.44	271.01	2,299.45	-7.31	31.36	6.22	0.45	0.00	60.56
2,400.00	0.50	273.66	2,399.44	-7.24	30.52	6.17	0.06	0.06	2.65
2,500.00	0.45	303.58	2,499.44	-7.02	29.74	5.98	0.25	-0.06	29.92
2,600.00	0.48	311.74	2,599.44	-6.51	29.12	5.49	0.07	0.03	8.16
2,700.00	0.40	330.16	2,699.43	-5.93	28.62	4.93	0.16	-0.08	18.42
2,800.00	0.70	70.99	2,799.43	-5.41	28.96	4.40	0.87	0.30	100.83
2,900.00	0.84	76.07	2,899.42	-5.05	30.33	3.99	0.16	0.14	5.08
3,000.00	0.24	100.71	2,999.41	-4.89	31.31	3.79	0.63	-0.60	24.64
3,100.00	0.62	268.59	3,099.41	-4.97	30.99	3.88	0.86	0.38	167.89
3,200.00	1.07	255.13	3,199.40	-5.19	29.50	4.16	0.48	0.44	-13.47
3,300.00	1.68	241.77	3,299.37	-6.10	27.32	5.14	0.68	0.61	-13.35
3,400.00	2.08	236.41	3,399.32	-7.81	24.50	6.95	0.44	0.40	-5.37
3,500.00	2.24	237.97	3,499.25	-9.88	21.33	9.13	0.17	0.16	1.57
3,600.00	2.33	231.03	3,599.17	-12.17	18.07	11.53	0.29	0.08	-6.94
3,700.00	2.64	227.86	3,699.07	-14.99	14.81	14.47	0.34	0.32	-3.16
3,800.00	2.48	223.66	3,798.97	-18.13	11.57	17.71	0.25	-0.17	-4.21
3,900.00	2.45	226.77	3,898.88	-21.16	8.56	20.85	0.14	-0.03	3.11
4,000.00	2.47	237.50	3,998.79	-23.80	5.20	23.60	0.46	0.02	10.74
4,100.00	2.54	253.20	4,098.69	-25.62	1.27	25.56	0.69	0.08	15.69
4,200.00	2.54	262.70	4,198.60	-26.52	-3.07	26.61	0.42	-0.01	9.51
4,300.00	2.37	263.19	4,298.50	-27.01	-7.34	27.25	0.16	-0.16	0.48
4,400.00	2.43	263.69	4,398.42	-27.49	-11.48	27.88	0.06	0.06	0.50
4,500.00	2.22	255.48	4,498.33	-28.18	-15.50	28.71	0.39	-0.21	-8.21
4,600.00	1.81	246.42	4,598.27	-29.32	-18.84	29.96	0.52	-0.41	-9.06
4,700.00	1.05	233.71	4,698.24	-30.52	-21.06	31.23	0.82	-0.76	-12.71
4,800.00	0.82	230.57	4,798.23	-31.51	-22.29	32.27	0.24	-0.23	-3.14
4,900.00	0.65	253.78	4,898.22	-32.15	-23.37	32.94	0.34	-0.17	23.21
5,000.00	0.72	244.23	4,998.21	-32.53	-24.48	33.36	0.13	0.07	-9.55
5,100.00	0.67	261.73	5,098.20	-32.92	-25.63	33.80	0.22	-0.04	17.50
5,200.00	0.69	267.44	5,198.20	-33.02	-26.81	33.93	0.07	0.02	5.71
5,300.00	0.78	255.83	5,298.19	-33.19	-28.07	34.15	0.17	0.08	-11.61

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Project:	Weld County, CO NAD83	MD Reference:	GL 4751' & RKB 11' @ 4762.00usft
Site:	Bernhardt Pad	North Reference:	True
Well:	Bernhardt 13-12	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #4		

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)
5,400.00	0.52	253.85	5,398.18	-33.50	-29.19	34.50	0.26	-0.26	-1.98
5,500.00	0.25	287.69	5,498.18	-33.58	-29.83	34.60	0.34	-0.27	33.84
5,600.00	0.29	65.20	5,598.18	-33.39	-29.82	34.41	0.50	0.05	137.51
5,700.00	0.39	0.87	5,698.18	-32.96	-29.51	33.97	0.37	0.10	-64.33
5,800.00	0.44	323.09	5,798.17	-32.28	-29.74	33.30	0.27	0.05	-37.77
5,900.00	0.59	322.92	5,898.17	-31.59	-30.30	32.62	0.15	0.15	-0.18
6,000.00	0.64	317.53	5,998.16	-30.76	-30.98	31.82	0.08	0.05	-5.39
6,100.00	0.53	308.25	6,098.16	-30.05	-31.72	31.14	0.14	-0.11	-9.28
6,200.00	0.31	336.62	6,198.16	-29.53	-32.22	30.63	0.29	-0.22	28.37
6,300.00	0.73	329.48	6,298.15	-28.76	-32.59	29.88	0.43	0.42	-7.14
6,400.00	0.56	322.39	6,398.14	-27.77	-33.25	28.91	0.19	-0.17	-7.09
6,500.00	0.80	317.90	6,498.14	-26.90	-33.99	28.07	0.24	0.23	-4.49
6,600.00	0.56	323.51	6,598.13	-25.96	-34.79	27.15	0.24	-0.23	5.61
6,700.00	0.65	308.42	6,698.13	-25.22	-35.49	26.45	0.18	0.09	-15.09
6,800.00	0.70	292.91	6,798.12	-24.62	-36.50	25.88	0.19	0.05	-15.51
Start 54.09 hold at 6800.00 MD									
6,854.09	0.70	292.91	6,852.20	-24.37	-37.11	25.65	0.00	0.00	0.00
Start DLS 20.00 TFO -112.92									
6,900.00	8.93	184.09	6,897.93	-27.82	-37.62	29.12	19.99	17.93	-237.04
6,927.65	14.45	182.49	6,925.00	-33.41	-37.92	34.72	20.01	19.98	-5.80
Sharon Springs Mrkr									
6,944.30	17.78	182.00	6,941.00	-38.03	-38.10	39.34	20.00	19.98	-2.95
Niobrara - Niobrara A									
6,971.00	23.12	181.50	6,966.00	-47.35	-38.38	48.66	20.00	19.99	-1.87
Niobrara A Marl									
7,000.00	28.91	181.15	6,992.05	-60.07	-38.67	61.38	19.99	19.98	-1.18
7,066.46	42.21	180.70	7,046.00	-98.63	-39.27	99.94	20.00	20.00	-0.69
Niobrara B									
7,088.88	46.69	180.59	7,062.00	-114.32	-39.45	115.63	20.00	20.00	-0.46
Nio B Top Marl									
7,100.00	48.91	180.55	7,069.46	-122.56	-39.53	123.86	19.97	19.97	-0.41
7,200.00	68.91	180.24	7,120.84	-207.76	-40.09	209.03	20.00	20.00	-0.31
7,206.17	70.14	180.22	7,123.00	-213.54	-40.11	214.81	20.05	20.05	-0.26
Nio C									
7,300.00	88.91	180.00	7,139.97	-305.39	-40.28	306.61	20.00	20.00	-0.23
7,305.46	90.00	179.99	7,140.03	-310.85	-40.28	312.07	20.05	20.05	-0.23
POE @ 7305' MD - Start 838.15 hold at 7305.46 MD									
7,400.00	90.00	179.99	7,140.02	-405.39	-40.26	406.55	0.00	0.00	0.00
7,500.00	90.00	179.99	7,140.02	-505.39	-40.24	506.49	0.00	0.00	0.00
7,600.00	90.00	179.99	7,140.02	-605.39	-40.22	606.43	0.00	0.00	0.00
7,700.00	90.00	179.99	7,140.01	-705.39	-40.20	706.37	0.00	0.00	0.00
7,800.00	90.00	179.99	7,140.01	-805.39	-40.17	806.30	0.00	0.00	0.00
7,900.00	90.00	179.99	7,140.01	-905.39	-40.15	906.24	0.00	0.00	0.00
8,000.00	90.00	179.99	7,140.00	-1,005.39	-40.13	1,006.18	0.00	0.00	0.00
8,100.00	90.00	179.99	7,140.00	-1,105.39	-40.11	1,106.12	0.00	0.00	0.00
8,143.61	90.00	179.99	7,140.00	-1,149.00	-40.10	1,149.70	0.00	0.00	0.00
TD at 8143.61 - Bernhardt PBHL									

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Company:	Noble Energy, Inc	TVD Reference:	GL 4751' & RKB 11' @ 4762.00usft
Project:	Weld County, CO NAD83	MD Reference:	GL 4751' & RKB 11' @ 4762.00usft
Site:	Bernhardt Pad	North Reference:	True
Well:	Bernhardt 13-12	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #4		

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
Bernhardt PBHL	0.00	0.00	7,140.00	-1,149.00	-40.10	1,357,797.89	3,184,910.69	40.3136579	-104.8369108
- plan hits target center									
- Point									

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
6,927.65	6,925.00	Sharon Springs Mrkr		0.00	0.00	
6,944.30	6,941.00	Niobrara		0.00	0.00	
6,944.30	6,941.00	Niobrara A		0.00	0.00	
6,971.00	6,966.00	Niobrara A Marl		0.00	0.00	
7,066.46	7,046.00	Niobrara B		0.00	0.00	
7,088.88	7,062.00	Nio B Top Marl		0.00	0.00	
7,206.17	7,123.00	Nio C		0.00	0.00	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
6,800.00	6,798.12	-24.62	-36.50	Start 54.09 hold at 6800.00 MD	
6,854.09	6,852.20	-24.37	-37.11	Start DLS 20.00 TFO -112.92	
7,305.46	7,140.03	-310.85	-40.28	POE @ 7305' MD	
7,305.46	7,140.03	-310.85	-40.28	Start 838.15 hold at 7305.46 MD	
8,143.61	7,140.00	-1,149.00	-40.10	TD at 8143.61	