

# **US ROCKIES REGION PLANNING**

**COLORADO NORTHERN ZONE - 83**

**WELD\_HOWARD 17-32 PAD**

**Howard 2-32**

**Howard 2-32**

**Plan: Howard 2-32 (wp02)**

## **Standard Planning Report**

**12 May, 2011**



Project: COLORADO NORTHERN ZONE - 83  
 Site: WELD\_HOWARD 17-32 PAD  
 Well: Howard 2-32  
 Wellbore: Howard 2-32  
 Section:  
 SHL:  
 Design: Howard 2-32 (wp02)  
 Latitude: 40.010452  
 Longitude: -104.910695  
 GL: 5047.00  
 KB: 15' RKB + 5047' GL @ 5062.00ft

#### FORMATION TOP DETAILS

TVDPath	MDPath	Formation
3912.00	3950.82	PK Depth
4879.00	4929.88	SX Depth
7372.00	7448.61	NIO Depth
7820.00	7896.61	CD Depth
7898.00	7974.61	GH Depth
8250.00	8326.61	J Depth



Azimuths to True North  
 Magnetic North: 8.92°

Magnetic Field  
 Strength: 52918.9snT  
 Dip Angle: 66.71°  
 Date: 5/9/2011  
 Model: IGRF2010

#### WELL DETAILS: Howard 2-32

+N/-S	+E/-W	Northing	Ground Level: Easting	5047.00 Latitude	Longitude	Slot
0.00	0.00	1247202.69	3165069.39	40.010452	-104.910695	

#### CASING DETAILS

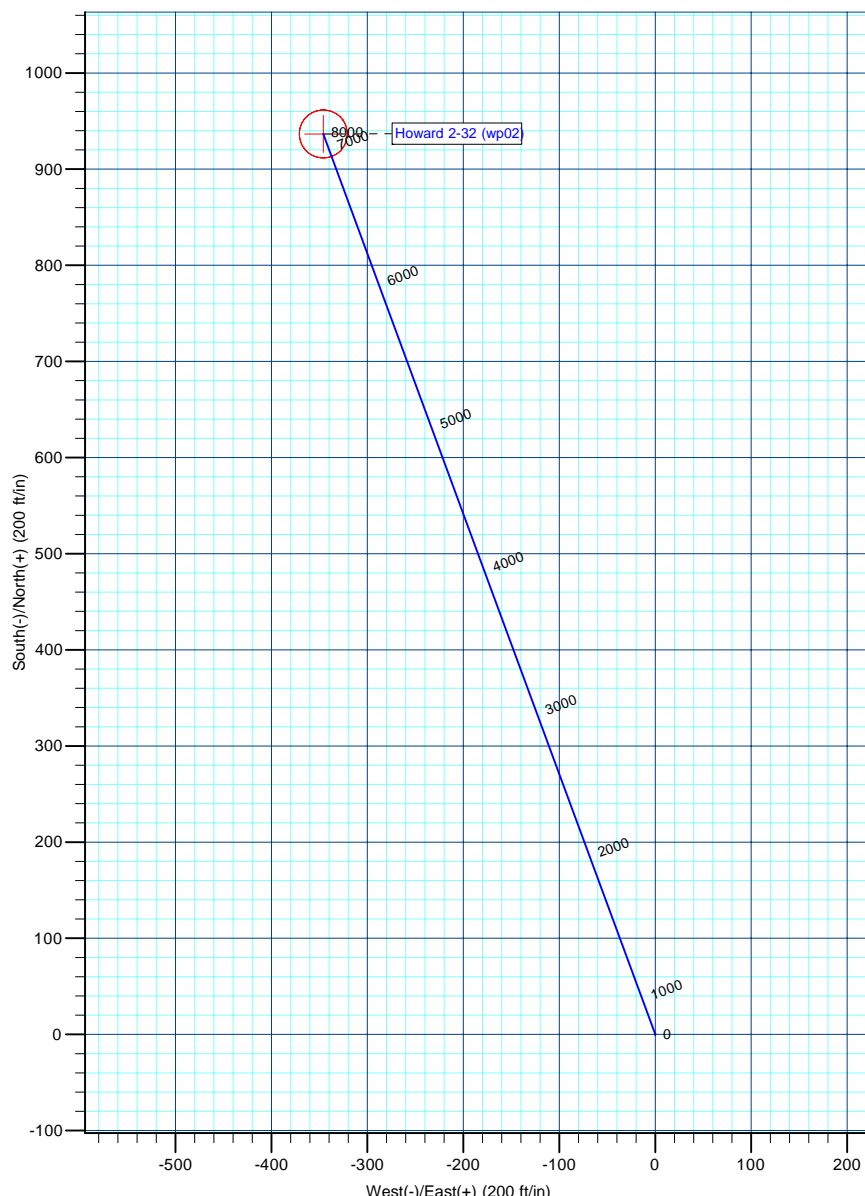
TVD	MD	Name	Size
1150.00	1154.37	8 5/8"	8-5/8

#### DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Howard 2-32 BHL	8385.00	936.59	-345.92	1248136.96	3164717.25	40.013023	-104.911930	Circle (Radius: 25.00)

#### SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.38	500.00	0.00	0.00	0.00	0.38	0.00
950.15	9.00	339.73	948.30	33.11	-12.23	2.00	339.73	35.29
6847.16	9.00	339.73	6772.66	898.75	-331.95	0.00	0.00	958.09
7361.61	0.00	0.38	7285.00	936.59	-345.92	1.75	180.00	998.43
8461.61	0.00	0.38	8385.00	936.59	-345.92	0.00	0.00	998.43



<b>Database:</b>	edm5000p	<b>Local Co-ordinate Reference:</b>	Well Howard 2-32
<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	15' RKB + 5047' GL @ 5062.00ft
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	15' RKB + 5047' GL @ 5062.00ft
<b>Site:</b>	WELD_HOWARD 17-32 PAD	<b>North Reference:</b>	True
<b>Well:</b>	Howard 2-32	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Howard 2-32		
<b>Design:</b>	Howard 2-32 (wp02)		

<b>Project</b>	COLORADO NORTHERN ZONE - 83		
<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		

Site						WELD_HOWARD 17-32 PAD											
Site Position:						Northing:			1,247,203.06 ft			Latitude:			40.010452		
From:			Lat/Long			Easting:			3,165,119.53 ft			Longitude:			-104.910516		
Position Uncertainty:			0.00 ft			Slot Radius:			0 "			Grid Convergence:			0.38		

Well	Howard 2-32					
Well Position	+N-S	-0.03 ft	Northing:	1,247,202.69 ft	Latitude:	40.010452
	+E-W	-50.14 ft	Easting:	3,165,069.40 ft	Longitude:	-104.910695
Position Uncertainty		0.00 ft	Wellhead Elevation:		Ground Level:	5,047.00 ft

<b>Wellbore</b>	Howard 2-32				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	5/9/2011	8.92	66.71	52,919

<b>Design</b>	Howard 2-32 (wp02)			
<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) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>
	0.00	0.00	0.00	339.73

<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	
500.00	0.00	0.38	500.00	0.00	0.00	0.00	0.00	0.00	0.38	
950.15	9.00	339.73	948.30	33.11	-12.23	2.00	2.00	0.00	339.73	
6,847.16	9.00	339.73	6,772.66	898.75	-331.95	0.00	0.00	0.00	0.00	
7,361.61	0.00	0.38	7,285.00	936.59	-345.92	1.75	-1.75	0.00	180.00	
8,461.61	0.00	0.38	8,385.00	936.59	-345.92	0.00	0.00	0.00	0.00	Howard 2-32 BHL

<b>Database:</b>	edm5000p	<b>Local Co-ordinate Reference:</b>	Well Howard 2-32
<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	15' RKB + 5047' GL @ 5062.00ft
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	15' RKB + 5047' GL @ 5062.00ft
<b>Site:</b>	WELD_HOWARD 17-32 PAD	<b>North Reference:</b>	True
<b>Well:</b>	Howard 2-32	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Howard 2-32		
<b>Design:</b>	Howard 2-32 (wp02)		

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	0.38	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.38	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.38	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.38	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.38	500.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Start Build 2.00</b>									
600.00	2.00	339.73	599.98	1.64	-0.60	1.75	2.00	2.00	0.00
700.00	4.00	339.73	699.84	6.55	-2.42	6.98	2.00	2.00	0.00
800.00	6.00	339.73	799.45	14.72	-5.44	15.69	2.00	2.00	0.00
900.00	8.00	339.73	898.70	26.15	-9.66	27.88	2.00	2.00	0.00
950.15	9.00	339.73	948.30	33.11	-12.23	35.29	2.00	2.00	0.00
<b>Start 5897.01 hold at 950.15 MD</b>									
1,000.00	9.00	339.73	997.54	40.43	-14.93	43.09	0.00	0.00	0.00
1,100.00	9.00	339.73	1,096.30	55.10	-20.35	58.74	0.00	0.00	0.00
1,154.37	9.00	339.73	1,150.00	63.09	-23.30	67.25	0.00	0.00	0.00
<b>8 5/8"</b>									
1,200.00	9.00	339.73	1,195.07	69.78	-25.77	74.39	0.00	0.00	0.00
1,300.00	9.00	339.73	1,293.84	84.46	-31.20	90.04	0.00	0.00	0.00
1,400.00	9.00	339.73	1,392.61	99.14	-36.62	105.69	0.00	0.00	0.00
1,500.00	9.00	339.73	1,491.38	113.82	-42.04	121.34	0.00	0.00	0.00
1,600.00	9.00	339.73	1,590.14	128.50	-47.46	136.99	0.00	0.00	0.00
1,700.00	9.00	339.73	1,688.91	143.18	-52.88	152.63	0.00	0.00	0.00
1,800.00	9.00	339.73	1,787.68	157.86	-58.30	168.28	0.00	0.00	0.00
1,900.00	9.00	339.73	1,886.45	172.54	-63.73	183.93	0.00	0.00	0.00
2,000.00	9.00	339.73	1,985.22	187.22	-69.15	199.58	0.00	0.00	0.00
2,100.00	9.00	339.73	2,083.98	201.90	-74.57	215.23	0.00	0.00	0.00
2,200.00	9.00	339.73	2,182.75	216.58	-79.99	230.88	0.00	0.00	0.00
2,300.00	9.00	339.73	2,281.52	231.26	-85.41	246.53	0.00	0.00	0.00
2,400.00	9.00	339.73	2,380.29	245.94	-90.84	262.17	0.00	0.00	0.00
2,500.00	9.00	339.73	2,479.06	260.62	-96.26	277.82	0.00	0.00	0.00
2,600.00	9.00	339.73	2,577.82	275.29	-101.68	293.47	0.00	0.00	0.00
2,700.00	9.00	339.73	2,676.59	289.97	-107.10	309.12	0.00	0.00	0.00
2,800.00	9.00	339.73	2,775.36	304.65	-112.52	324.77	0.00	0.00	0.00
2,900.00	9.00	339.73	2,874.13	319.33	-117.94	340.42	0.00	0.00	0.00
3,000.00	9.00	339.73	2,972.90	334.01	-123.37	356.07	0.00	0.00	0.00
3,100.00	9.00	339.73	3,071.66	348.69	-128.79	371.71	0.00	0.00	0.00
3,200.00	9.00	339.73	3,170.43	363.37	-134.21	387.36	0.00	0.00	0.00
3,300.00	9.00	339.73	3,269.20	378.05	-139.63	403.01	0.00	0.00	0.00
3,400.00	9.00	339.73	3,367.97	392.73	-145.05	418.66	0.00	0.00	0.00
3,500.00	9.00	339.73	3,466.74	407.41	-150.47	434.31	0.00	0.00	0.00
3,600.00	9.00	339.73	3,565.50	422.09	-155.90	449.96	0.00	0.00	0.00
3,700.00	9.00	339.73	3,664.27	436.77	-161.32	465.61	0.00	0.00	0.00
3,800.00	9.00	339.73	3,763.04	451.45	-166.74	481.25	0.00	0.00	0.00
3,900.00	9.00	339.73	3,861.81	466.13	-172.16	496.90	0.00	0.00	0.00
3,950.82	9.00	339.73	3,912.00	473.59	-174.92	504.86	0.00	0.00	0.00
<b>PK Depth</b>									
4,000.00	9.00	339.73	3,960.58	480.80	-177.58	512.55	0.00	0.00	0.00
4,100.00	9.00	339.73	4,059.34	495.48	-183.00	528.20	0.00	0.00	0.00
4,200.00	9.00	339.73	4,158.11	510.16	-188.43	543.85	0.00	0.00	0.00
4,300.00	9.00	339.73	4,256.88	524.84	-193.85	559.50	0.00	0.00	0.00
4,400.00	9.00	339.73	4,355.65	539.52	-199.27	575.15	0.00	0.00	0.00
4,500.00	9.00	339.73	4,454.42	554.20	-204.69	590.79	0.00	0.00	0.00
4,600.00	9.00	339.73	4,553.18	568.88	-210.11	606.44	0.00	0.00	0.00

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<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	15' RKB + 5047' GL @ 5062.00ft
<b>Site:</b>	WELD_HOWARD 17-32 PAD	<b>North Reference:</b>	True
<b>Well:</b>	Howard 2-32	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Howard 2-32		
<b>Design:</b>	Howard 2-32 (wp02)		

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)
4,700.00	9.00	339.73	4,651.95	583.56	-215.54	622.09	0.00	0.00	0.00
4,800.00	9.00	339.73	4,750.72	598.24	-220.96	637.74	0.00	0.00	0.00
4,900.00	9.00	339.73	4,849.49	612.92	-226.38	653.39	0.00	0.00	0.00
4,929.88	9.00	339.73	4,879.00	617.30	-228.00	658.06	0.00	0.00	0.00
<b>SX Depth</b>									
5,000.00	9.00	339.73	4,948.26	627.60	-231.80	669.04	0.00	0.00	0.00
5,100.00	9.00	339.73	5,047.02	642.28	-237.22	684.69	0.00	0.00	0.00
5,200.00	9.00	339.73	5,145.79	656.96	-242.64	700.33	0.00	0.00	0.00
5,300.00	9.00	339.73	5,244.56	671.64	-248.07	715.98	0.00	0.00	0.00
5,400.00	9.00	339.73	5,343.33	686.32	-253.49	731.63	0.00	0.00	0.00
5,500.00	9.00	339.73	5,442.10	700.99	-258.91	747.28	0.00	0.00	0.00
5,600.00	9.00	339.73	5,540.86	715.67	-264.33	762.93	0.00	0.00	0.00
5,700.00	9.00	339.73	5,639.63	730.35	-269.75	778.58	0.00	0.00	0.00
5,800.00	9.00	339.73	5,738.40	745.03	-275.17	794.23	0.00	0.00	0.00
5,900.00	9.00	339.73	5,837.17	759.71	-280.60	809.87	0.00	0.00	0.00
6,000.00	9.00	339.73	5,935.94	774.39	-286.02	825.52	0.00	0.00	0.00
6,100.00	9.00	339.73	6,034.71	789.07	-291.44	841.17	0.00	0.00	0.00
6,200.00	9.00	339.73	6,133.47	803.75	-296.86	856.82	0.00	0.00	0.00
6,300.00	9.00	339.73	6,232.24	818.43	-302.28	872.47	0.00	0.00	0.00
6,400.00	9.00	339.73	6,331.01	833.11	-307.70	888.12	0.00	0.00	0.00
6,500.00	9.00	339.73	6,429.78	847.79	-313.13	903.77	0.00	0.00	0.00
6,600.00	9.00	339.73	6,528.55	862.47	-318.55	919.41	0.00	0.00	0.00
6,700.00	9.00	339.73	6,627.31	877.15	-323.97	935.06	0.00	0.00	0.00
6,800.00	9.00	339.73	6,726.08	891.83	-329.39	950.71	0.00	0.00	0.00
6,847.16	9.00	339.73	6,772.66	898.75	-331.95	958.09	0.00	0.00	0.00
<b>Start Drop -1.75</b>									
6,900.00	8.08	339.73	6,824.91	906.11	-334.67	965.94	1.75	-1.75	0.00
7,000.00	6.33	339.73	6,924.12	917.87	-339.01	978.48	1.75	-1.75	0.00
7,100.00	4.58	339.73	7,023.66	926.79	-342.30	987.98	1.75	-1.75	0.00
7,200.00	2.83	339.73	7,123.45	932.84	-344.54	994.44	1.75	-1.75	0.00
7,300.00	1.08	339.73	7,223.39	936.04	-345.72	997.85	1.75	-1.75	0.00
7,361.61	0.00	0.38	7,285.00	936.59	-345.92	998.43	1.75	-1.75	0.00
<b>Start 1100.00 hold at 7361.61 MD</b>									
7,400.00	0.00	0.38	7,323.39	936.59	-345.92	998.43	0.00	0.00	0.00
7,448.61	0.00	0.38	7,372.00	936.59	-345.92	998.43	0.00	0.00	0.00
<b>NIO Depth</b>									
7,500.00	0.00	0.38	7,423.39	936.59	-345.92	998.43	0.00	0.00	0.00
7,600.00	0.00	0.38	7,523.39	936.59	-345.92	998.43	0.00	0.00	0.00
7,700.00	0.00	0.38	7,623.39	936.59	-345.92	998.43	0.00	0.00	0.00
7,800.00	0.00	0.38	7,723.39	936.59	-345.92	998.43	0.00	0.00	0.00
7,896.61	0.00	0.38	7,820.00	936.59	-345.92	998.43	0.00	0.00	0.00
<b>CD Depth</b>									
7,900.00	0.00	0.38	7,823.39	936.59	-345.92	998.43	0.00	0.00	0.00
7,974.61	0.00	0.38	7,898.00	936.59	-345.92	998.43	0.00	0.00	0.00
<b>GH Depth</b>									
8,000.00	0.00	0.38	7,923.39	936.59	-345.92	998.43	0.00	0.00	0.00
8,100.00	0.00	0.38	8,023.39	936.59	-345.92	998.43	0.00	0.00	0.00
8,200.00	0.00	0.38	8,123.39	936.59	-345.92	998.43	0.00	0.00	0.00
8,300.00	0.00	0.38	8,223.39	936.59	-345.92	998.43	0.00	0.00	0.00
8,326.61	0.00	0.38	8,250.00	936.59	-345.92	998.43	0.00	0.00	0.00
<b>J Depth</b>									
8,400.00	0.00	0.38	8,323.39	936.59	-345.92	998.43	0.00	0.00	0.00
8,461.61	0.00	0.38	8,385.00	936.59	-345.92	998.43	0.00	0.00	0.00

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<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	15' RKB + 5047' GL @ 5062.00ft
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	15' RKB + 5047' GL @ 5062.00ft
<b>Site:</b>	WELD_HOWARD 17-32 PAD	<b>North Reference:</b>	True
<b>Well:</b>	Howard 2-32	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Howard 2-32		
<b>Design:</b>	Howard 2-32 (wp02)		

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)
Howard 2-32 BHL									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Howard 2-32 BHL - hit/miss target - Shape - plan hits target center - Circle (radius 25.00)	0.00	0.38	8,385.00	936.59	-345.92	1,248,136.95	3,164,717.26	40.013023	-104.911930

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
1,154.37	1,150.00	8 5/8"	8-5/8	11	

Formations						
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)	
3,950.82	3,912.00	PK Depth				
4,929.88	4,879.00	SX Depth				
7,448.61	7,372.00	NIO Depth				
7,896.61	7,820.00	CD Depth				
7,974.61	7,898.00	GH Depth				
8,326.61	8,250.00	J Depth				

Plan Annotations				
Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Comment
500.00	500.00	0.00	0.00	Start Build 2.00
950.15	948.30	33.11	-12.23	Start 5897.01 hold at 950.15 MD
6,847.16	6,772.66	898.75	-331.95	Start Drop -1.75
7,361.61	7,285.00	936.59	-345.92	Start 1100.00 hold at 7361.61 MD
8,461.61	8,385.00	936.59	-345.92	TD at 8461.61