

# **US ROCKIES REGION PLANNING**

**COLORADO NORTHERN ZONE - 83**

**WELD\_HOWARD 17-32 PAD**

**Howard 21-32**

**Howard 21-32**

**Plan: Howard 21-32 (wp01)**

## **Standard Planning Report**

**10 May, 2011**



Project: COLORADO NORTHERN ZONE - 83  
Site: WELD\_HOWARD 17-32 PAD  
Well: Howard 21-32  
Wellbore: Howard 21-32  
Section:  
SHL:  
Design: Howard 21-32 (wp01)  
Latitude: 40.010452  
Longitude: -104.910766  
GL: 5047.00  
KB: 15' RKB + 5047 @ 5062.00ft

## FORMATION TOP DETAILS

TVDPath	MDPath	Formation
3912.00	3988.61	PK Depth
4866.00	4965.46	SX Depth
7416.00	7528.72	NIO Depth
7858.00	7970.72	CD Depth
7928.00	8040.72	GH Depth
8258.00	8370.72	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 21-32

+N/-S	+E/-W	Northing	Ground Level: Easting	5047.00 Latitude	Longitude	Slot
0.00	0.00	1247202.52	3165049.51	40.010452	-104.910766	

## CASING DETAILS

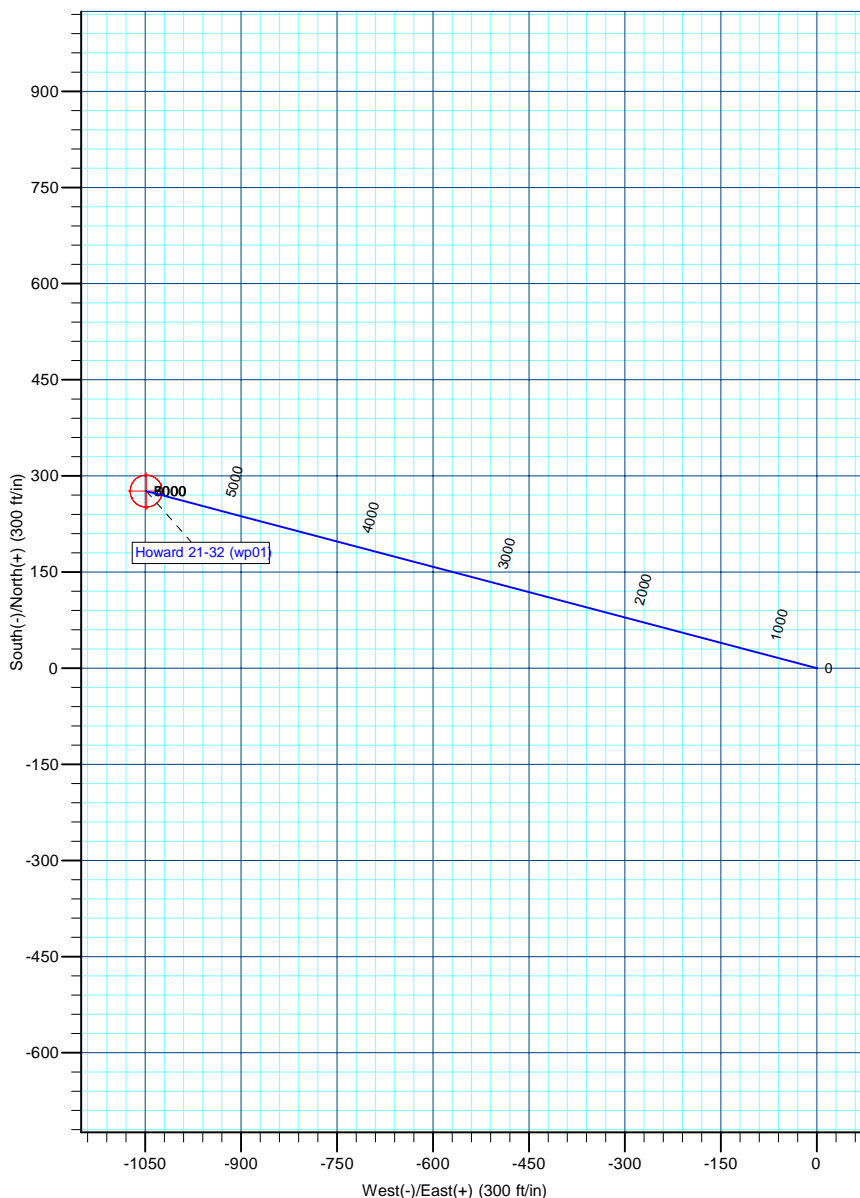
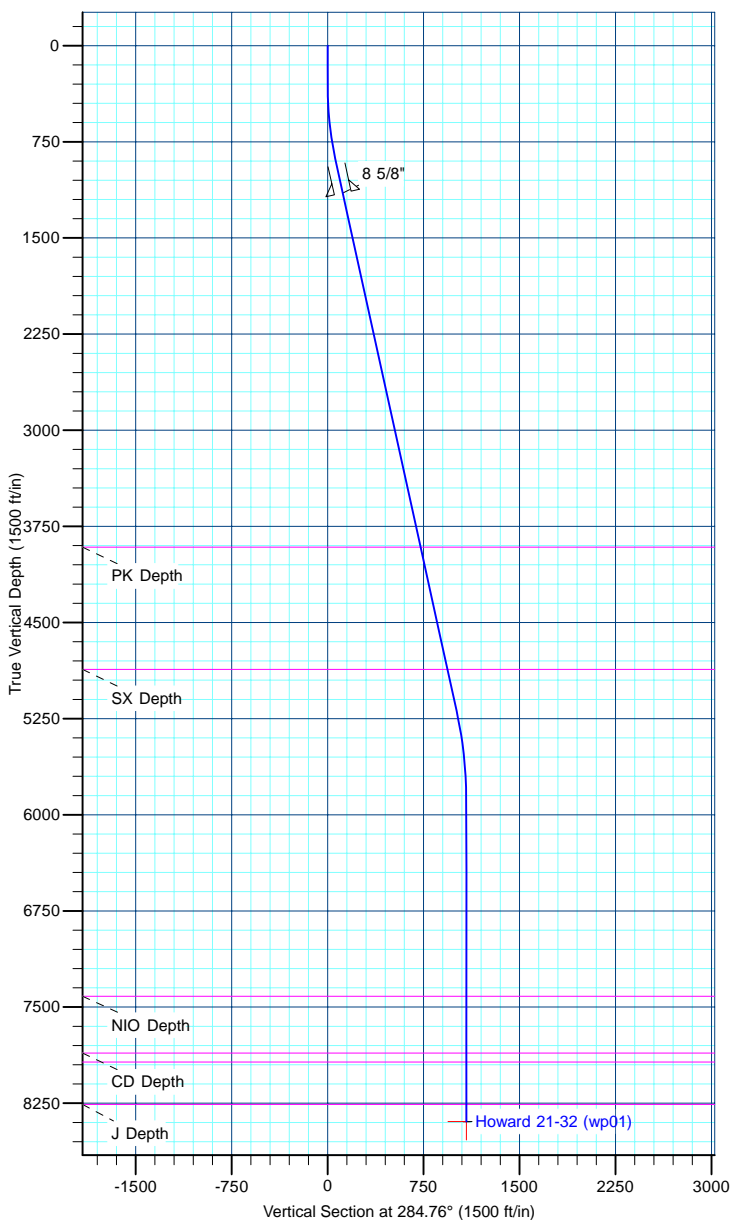
TVD	MD	Name	Size
1150.00	1160.45	8 5/8"	8-5/8

## DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Howard 21-32 BHL	8392.00	276.21	-1048.44	1247471.76	3163999.25	40.011210	-104.914509	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
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00
920.87	12.42	284.76	916.02	17.07	-64.80	2.00	284.76	67.02
5295.15	12.42	284.76	5187.98	256.70	-974.38	0.00	0.00	1007.63
6004.72	0.00	0.00	5892.00	276.21	-1048.44	1.75	180.00	1084.22
8504.72	0.00	0.00	8392.00	276.21	-1048.44	0.00	0.00	1084.22



<b>Database:</b>	edm5000p	<b>Local Co-ordinate Reference:</b>	Well Howard 21-32
<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	15' RKB + 5047 @ 5062.00ft
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	15' RKB + 5047 @ 5062.00ft
<b>Site:</b>	WELD_HOWARD 17-32 PAD	<b>North Reference:</b>	True
<b>Well:</b>	Howard 21-32	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Howard 21-32		
<b>Design:</b>	Howard 21-32 (wp01)		

<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 21-32					
Well Position	+N-S	-0.07 ft	Northing:	1,247,202.52 ft	Latitude:	40.010452
	+E-W	-70.03 ft	Easting:	3,165,049.51 ft	Longitude:	-104.910766
Position Uncertainty		0.00 ft	Wellhead Elevation:		Ground Level:	5,047.00 ft

<b>Wellbore</b>	Howard 21-32				
<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 21-32 (wp01)			
<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	284.76

<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	
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	
920.87	12.42	284.76	916.02	17.07	-64.80	2.00	2.00	0.00	284.76	
5,295.15	12.42	284.76	5,187.98	256.70	-974.38	0.00	0.00	0.00	0.00	
6,004.72	0.00	0.00	5,892.00	276.21	-1,048.44	1.75	-1.75	0.00	180.00	
8,504.72	0.00	0.00	8,392.00	276.21	-1,048.44	0.00	0.00	0.00	0.00	Howard 21-32 BHL

<b>Database:</b>	edm5000p	<b>Local Co-ordinate Reference:</b>	Well Howard 21-32
<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	15' RKB + 5047 @ 5062.00ft
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	15' RKB + 5047 @ 5062.00ft
<b>Site:</b>	WELD_HOWARD 17-32 PAD	<b>North Reference:</b>	True
<b>Well:</b>	Howard 21-32	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Howard 21-32		
<b>Design:</b>	Howard 21-32 (wp01)		

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	2.00	284.76	399.98	0.44	-1.69	1.75	2.00	2.00	0.00
500.00	4.00	284.76	499.84	1.78	-6.75	6.98	2.00	2.00	0.00
600.00	6.00	284.76	599.45	4.00	-15.18	15.69	2.00	2.00	0.00
700.00	8.00	284.76	698.70	7.10	-26.96	27.88	2.00	2.00	0.00
800.00	10.00	284.76	797.47	11.09	-42.09	43.52	2.00	2.00	0.00
900.00	12.00	284.76	895.62	15.95	-60.54	62.60	2.00	2.00	0.00
920.87	12.42	284.76	916.02	17.07	-64.80	67.02	2.00	2.00	0.00
1,000.00	12.42	284.76	993.30	21.41	-81.26	84.03	0.00	0.00	0.00
1,100.00	12.42	284.76	1,090.96	26.89	-102.05	105.53	0.00	0.00	0.00
1,160.45	12.42	284.76	1,150.00	30.20	-114.62	118.53	0.00	0.00	0.00
8 5/8"									
1,200.00	12.42	284.76	1,188.62	32.36	-122.85	127.04	0.00	0.00	0.00
1,300.00	12.42	284.76	1,286.28	37.84	-143.64	148.54	0.00	0.00	0.00
1,400.00	12.42	284.76	1,383.94	43.32	-164.43	170.04	0.00	0.00	0.00
1,500.00	12.42	284.76	1,481.60	48.80	-185.23	191.55	0.00	0.00	0.00
1,600.00	12.42	284.76	1,579.26	54.28	-206.02	213.05	0.00	0.00	0.00
1,700.00	12.42	284.76	1,676.92	59.75	-226.81	234.55	0.00	0.00	0.00
1,800.00	12.42	284.76	1,774.59	65.23	-247.61	256.06	0.00	0.00	0.00
1,900.00	12.42	284.76	1,872.25	70.71	-268.40	277.56	0.00	0.00	0.00
2,000.00	12.42	284.76	1,969.91	76.19	-289.20	299.06	0.00	0.00	0.00
2,100.00	12.42	284.76	2,067.57	81.67	-309.99	320.57	0.00	0.00	0.00
2,200.00	12.42	284.76	2,165.23	87.15	-330.78	342.07	0.00	0.00	0.00
2,300.00	12.42	284.76	2,262.89	92.62	-351.58	363.57	0.00	0.00	0.00
2,400.00	12.42	284.76	2,360.55	98.10	-372.37	385.08	0.00	0.00	0.00
2,500.00	12.42	284.76	2,458.21	103.58	-393.16	406.58	0.00	0.00	0.00
2,600.00	12.42	284.76	2,555.87	109.06	-413.96	428.08	0.00	0.00	0.00
2,700.00	12.42	284.76	2,653.53	114.54	-434.75	449.59	0.00	0.00	0.00
2,800.00	12.42	284.76	2,751.19	120.01	-455.55	471.09	0.00	0.00	0.00
2,900.00	12.42	284.76	2,848.85	125.49	-476.34	492.59	0.00	0.00	0.00
3,000.00	12.42	284.76	2,946.51	130.97	-497.13	514.10	0.00	0.00	0.00
3,100.00	12.42	284.76	3,044.17	136.45	-517.93	535.60	0.00	0.00	0.00
3,200.00	12.42	284.76	3,141.84	141.93	-538.72	557.10	0.00	0.00	0.00
3,300.00	12.42	284.76	3,239.50	147.40	-559.51	578.61	0.00	0.00	0.00
3,400.00	12.42	284.76	3,337.16	152.88	-580.31	600.11	0.00	0.00	0.00
3,500.00	12.42	284.76	3,434.82	158.36	-601.10	621.61	0.00	0.00	0.00
3,600.00	12.42	284.76	3,532.48	163.84	-621.90	643.11	0.00	0.00	0.00
3,700.00	12.42	284.76	3,630.14	169.32	-642.69	664.62	0.00	0.00	0.00
3,800.00	12.42	284.76	3,727.80	174.80	-663.48	686.12	0.00	0.00	0.00
3,900.00	12.42	284.76	3,825.46	180.27	-684.28	707.62	0.00	0.00	0.00
3,988.61	12.42	284.76	3,912.00	185.13	-702.70	726.68	0.00	0.00	0.00
PK Depth									
4,000.00	12.42	284.76	3,923.12	185.75	-705.07	729.13	0.00	0.00	0.00
4,100.00	12.42	284.76	4,020.78	191.23	-725.86	750.63	0.00	0.00	0.00
4,200.00	12.42	284.76	4,118.44	196.71	-746.66	772.13	0.00	0.00	0.00
4,300.00	12.42	284.76	4,216.10	202.19	-767.45	793.64	0.00	0.00	0.00
4,400.00	12.42	284.76	4,313.76	207.66	-788.24	815.14	0.00	0.00	0.00
4,500.00	12.42	284.76	4,411.42	213.14	-809.04	836.64	0.00	0.00	0.00
4,600.00	12.42	284.76	4,509.09	218.62	-829.83	858.15	0.00	0.00	0.00
4,700.00	12.42	284.76	4,606.75	224.10	-850.63	879.65	0.00	0.00	0.00
4,800.00	12.42	284.76	4,704.41	229.58	-871.42	901.15	0.00	0.00	0.00

<b>Database:</b>	edm5000p	<b>Local Co-ordinate Reference:</b>	Well Howard 21-32
<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	15' RKB + 5047 @ 5062.00ft
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	15' RKB + 5047 @ 5062.00ft
<b>Site:</b>	WELD_HOWARD 17-32 PAD	<b>North Reference:</b>	True
<b>Well:</b>	Howard 21-32	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Howard 21-32		
<b>Design:</b>	Howard 21-32 (wp01)		

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)
4,900.00	12.42	284.76	4,802.07	235.05	-892.21	922.66	0.00	0.00	0.00
4,965.46	12.42	284.76	4,866.00	238.64	-905.83	936.73	0.00	0.00	0.00
<b>SX Depth</b>									
5,000.00	12.42	284.76	4,899.73	240.53	-913.01	944.16	0.00	0.00	0.00
5,100.00	12.42	284.76	4,997.39	246.01	-933.80	965.66	0.00	0.00	0.00
5,200.00	12.42	284.76	5,095.05	251.49	-954.59	987.17	0.00	0.00	0.00
5,295.15	12.42	284.76	5,187.98	256.70	-974.38	1,007.63	0.00	0.00	0.00
5,300.00	12.33	284.76	5,192.71	256.97	-975.38	1,008.67	1.75	-1.75	0.00
5,400.00	10.58	284.76	5,290.71	262.03	-994.59	1,028.53	1.75	-1.75	0.00
5,500.00	8.83	284.76	5,389.28	266.32	-1,010.90	1,045.39	1.75	-1.75	0.00
5,600.00	7.08	284.76	5,488.31	269.85	-1,024.28	1,059.23	1.75	-1.75	0.00
5,700.00	5.33	284.76	5,587.72	272.60	-1,034.74	1,070.05	1.75	-1.75	0.00
5,800.00	3.58	284.76	5,687.42	274.58	-1,042.26	1,077.82	1.75	-1.75	0.00
5,900.00	1.83	284.76	5,787.30	275.79	-1,046.82	1,082.54	1.75	-1.75	0.00
6,000.00	0.08	284.76	5,887.28	276.21	-1,048.44	1,084.21	1.75	-1.75	0.00
6,004.72	0.00	0.00	5,892.00	276.21	-1,048.44	1,084.22	1.75	-1.75	0.00
6,100.00	0.00	0.00	5,987.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
6,200.00	0.00	0.00	6,087.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
6,300.00	0.00	0.00	6,187.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
6,400.00	0.00	0.00	6,287.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
6,500.00	0.00	0.00	6,387.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
6,600.00	0.00	0.00	6,487.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
6,700.00	0.00	0.00	6,587.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
6,800.00	0.00	0.00	6,687.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
6,900.00	0.00	0.00	6,787.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
7,000.00	0.00	0.00	6,887.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
7,100.00	0.00	0.00	6,987.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
7,200.00	0.00	0.00	7,087.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
7,300.00	0.00	0.00	7,187.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
7,400.00	0.00	0.00	7,287.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
7,500.00	0.00	0.00	7,387.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
7,528.72	0.00	0.00	7,416.00	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
<b>NIO Depth</b>									
7,600.00	0.00	0.00	7,487.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
7,700.00	0.00	0.00	7,587.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
7,800.00	0.00	0.00	7,687.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
7,900.00	0.00	0.00	7,787.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
7,970.72	0.00	0.00	7,858.00	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
<b>CD Depth</b>									
8,000.00	0.00	0.00	7,887.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
8,040.72	0.00	0.00	7,928.00	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
<b>GH Depth</b>									
8,100.00	0.00	0.00	7,987.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
8,200.00	0.00	0.00	8,087.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
8,300.00	0.00	0.00	8,187.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
8,370.72	0.00	0.00	8,258.00	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
<b>J Depth</b>									
8,400.00	0.00	0.00	8,287.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
8,500.00	0.00	0.00	8,387.28	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
8,504.72	0.00	0.00	8,392.00	276.21	-1,048.44	1,084.22	0.00	0.00	0.00
<b>Howard 21-32 BHL</b>									

<b>Database:</b>	edm5000p	<b>Local Co-ordinate Reference:</b>	Well Howard 21-32
<b>Company:</b>	US ROCKIES REGION PLANNING	<b>TVD Reference:</b>	15' RKB + 5047 @ 5062.00ft
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>MD Reference:</b>	15' RKB + 5047 @ 5062.00ft
<b>Site:</b>	WELD_HOWARD 17-32 PAD	<b>North Reference:</b>	True
<b>Well:</b>	Howard 21-32	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Howard 21-32		
<b>Design:</b>	Howard 21-32 (wp01)		

Design Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
Howard 21-32 BHL	0.00	0.00	8,392.00	276.21	-1,048.44	1,247,471.76	3,163,999.25	40.011210	-104.914509
- plan hits target center									
- Circle (radius 25.00)									

Casing Points					
Measured Depth	Vertical Depth			Casing Diameter	Hole Diameter
(ft)	(ft)		Name	(")	(")
1,160.45	1,150.00	8 5/8"		8-5/8	11

Formations						
Measured Depth	Vertical Depth				Dip	Dip Direction
(ft)	(ft)		Name	Lithology	(°)	(°)
3,988.61	3,912.00	PK Depth				
4,965.46	4,866.00	SX Depth				
7,528.72	7,416.00	NIO Depth				
7,970.72	7,858.00	CD Depth				
8,040.72	7,928.00	GH Depth				
8,370.72	8,258.00	J Depth				