



Project: Mesa County, CO
 Site: Gunderson 20-03 Pad
 Well: Gunderson 20-05W
 Wellbore: Wellbore #1
 Design: Design #2
 Latitude: 39.266864
 Longitude: -107.795317
 Ground Level: 7146.0
 well @ 7176.0usft (H&P #522)



PROJECT DETAILS: Mesa County, CO

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

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Gunderson 20-05W, True North
 Vertical (TVD) Reference: well @ 7176.0usft (H&P #522)
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: well @ 7176.0usft (H&P #522)
 Calculation Method: Minimum Curvature

WELL DETAILS: Gunderson 20-05W

Ground Level: 7146.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1530298.06	2350220.96	39.266864	-107.795317

WELLBORE TARGET DETAILS (MAP CO-ORDINATES AND LAT/LONG)

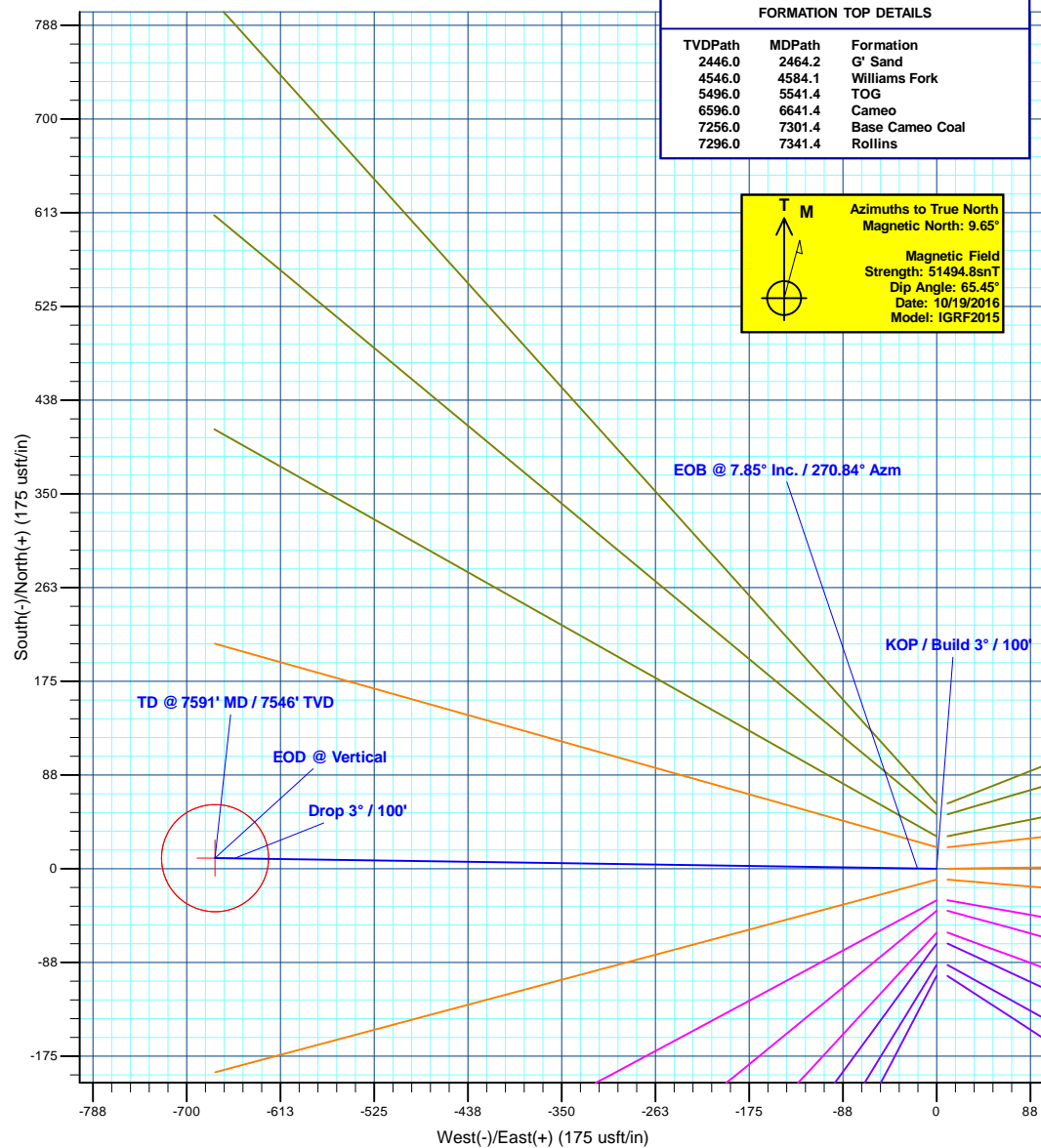
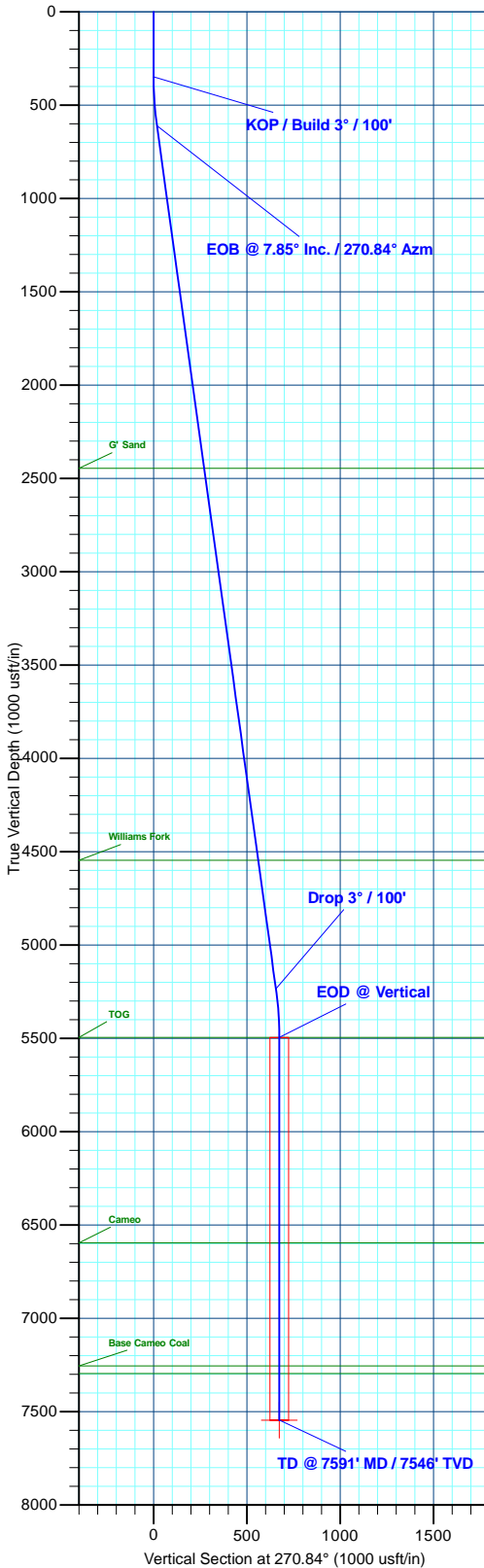
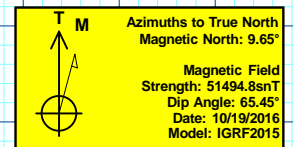
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL - Gunderson 20-05W	7546.0	9.8	-673.5	1530324.92	2349547.88	39.266891	-107.797696

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
350.0	0.00	0.00	350.0	0.0	0.0	0.00	0.00	0.0	KOP / Build 3° / 100'
611.8	7.85	270.84	611.0	0.3	-17.9	3.00	270.84	17.9	EOB @ 7.85° Inc. / 270.84° Azm
5279.6	7.85	270.84	5235.0	9.6	-655.6	0.00	0.00	655.7	Drop 3° / 100'
5541.4	0.00	0.00	5496.0	9.8	-673.5	3.00	180.00	673.6	EOD @ Vertical
7591.4	0.00	0.00	7546.0	9.8	-673.5	0.00	0.00	673.6	TD @ 7591' MD / 7546' TVD

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2446.0	2464.2	G' Sand
4546.0	4584.1	Williams Fork
5496.0	5541.4	TOG
6596.0	6641.4	Cameo
7256.0	7301.4	Base Cameo Coal
7296.0	7341.4	Rollins



Plan: Design #2 (Gunderson 20-05W/Wellbore #1)

Created By: Will Jircik Date: 12:51, November 15 2016



Laramie Energy, LLC

**Mesa County, CO
Gunderson 20-03 Pad
Gunderson 20-05W**

Wellbore #1

Plan: Design #2

QES Well Planning Report

15 November, 2016





Well Planning Report



Database:	EDM5002	Local Co-ordinate Reference:	Well Gunderson 20-05W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7176.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7176.0usft (H&P #522)
Site:	Gunderson 20-03 Pad	North Reference:	True
Well:	Gunderson 20-05W	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

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

Site		Gunderson 20-03 Pad			
Site Position:		Northing:	1,530,258.75 usft	Latitude:	39.266756
From:	Lat/Long	Easting:	2,350,219.97 usft	Longitude:	-107.795317
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.45 °

Well	Gunderson 20-05W					
Well Position	+N/-S	39.3 usft	Northing:	1,530,298.07 usft	Latitude:	39.266864
	+E/-W	0.0 usft	Easting:	2,350,220.96 usft	Longitude:	-107.795317
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,146.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	10/19/2016	9.65	65.45	51,495

Design	Design #2			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	270.84

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
350.0	0.00	0.00	350.0	0.0	0.0	0.00	0.00	0.00	0.00	
611.8	7.85	270.84	611.0	0.3	-17.9	3.00	3.00	0.00	270.84	
5,279.6	7.85	270.84	5,235.0	9.6	-655.6	0.00	0.00	0.00	0.00	
5,541.4	0.00	0.00	5,496.0	9.8	-673.5	3.00	-3.00	0.00	180.00	
7,591.4	0.00	0.00	7,546.0	9.8	-673.5	0.00	0.00	0.00	0.00	PBHL - Gunderson 20



Well Planning Report



Database:	EDM5002	Local Co-ordinate Reference:	Well Gunderson 20-05W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7176.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7176.0usft (H&P #522)
Site:	Gunderson 20-03 Pad	North Reference:	True
Well:	Gunderson 20-05W	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP / Build 3° / 100'									
350.0	0.00	0.00	350.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	1.50	270.84	400.0	0.0	-0.7	0.7	3.00	3.00	0.00
500.0	4.50	270.84	499.8	0.1	-5.9	5.9	3.00	3.00	0.00
600.0	7.50	270.84	599.3	0.2	-16.3	16.3	3.00	3.00	0.00
EOB @ 7.85° Inc. / 270.84° Azm									
611.8	7.85	270.84	611.0	0.3	-17.9	17.9	2.99	2.99	0.00
700.0	7.85	270.84	698.4	0.4	-30.0	30.0	0.00	0.00	0.00
800.0	7.85	270.84	797.4	0.6	-43.6	43.6	0.00	0.00	0.00
900.0	7.85	270.84	896.5	0.8	-57.3	57.3	0.00	0.00	0.00
1,000.0	7.85	270.84	995.5	1.0	-70.9	71.0	0.00	0.00	0.00
1,100.0	7.85	270.84	1,094.6	1.2	-84.6	84.6	0.00	0.00	0.00
1,200.0	7.85	270.84	1,193.7	1.4	-98.3	98.3	0.00	0.00	0.00
1,300.0	7.85	270.84	1,292.7	1.6	-111.9	111.9	0.00	0.00	0.00
1,400.0	7.85	270.84	1,391.8	1.8	-125.6	125.6	0.00	0.00	0.00
1,500.0	7.85	270.84	1,490.9	2.0	-139.3	139.3	0.00	0.00	0.00
8 5/8"									
1,530.0	7.85	270.84	1,520.6	2.1	-143.4	143.4	0.00	0.00	0.00
1,600.0	7.85	270.84	1,589.9	2.2	-152.9	152.9	0.00	0.00	0.00
1,700.0	7.85	270.84	1,689.0	2.4	-166.6	166.6	0.00	0.00	0.00
1,800.0	7.85	270.84	1,788.0	2.6	-180.2	180.3	0.00	0.00	0.00
1,900.0	7.85	270.84	1,887.1	2.8	-193.9	193.9	0.00	0.00	0.00
2,000.0	7.85	270.84	1,986.2	3.0	-207.6	207.6	0.00	0.00	0.00
2,100.0	7.85	270.84	2,085.2	3.2	-221.2	221.3	0.00	0.00	0.00
2,200.0	7.85	270.84	2,184.3	3.4	-234.9	234.9	0.00	0.00	0.00
2,300.0	7.85	270.84	2,283.3	3.6	-248.6	248.6	0.00	0.00	0.00
2,400.0	7.85	270.84	2,382.4	3.8	-262.2	262.2	0.00	0.00	0.00
G' Sand									
2,464.2	7.85	270.84	2,446.0	4.0	-271.0	271.0	0.00	0.00	0.00
2,500.0	7.85	270.84	2,481.5	4.0	-275.9	275.9	0.00	0.00	0.00
2,600.0	7.85	270.84	2,580.5	4.2	-289.5	289.6	0.00	0.00	0.00
2,700.0	7.85	270.84	2,679.6	4.4	-303.2	303.2	0.00	0.00	0.00
2,800.0	7.85	270.84	2,778.7	4.6	-316.9	316.9	0.00	0.00	0.00
2,900.0	7.85	270.84	2,877.7	4.8	-330.5	330.6	0.00	0.00	0.00
3,000.0	7.85	270.84	2,976.8	5.0	-344.2	344.2	0.00	0.00	0.00
3,100.0	7.85	270.84	3,075.8	5.2	-357.8	357.9	0.00	0.00	0.00
3,200.0	7.85	270.84	3,174.9	5.4	-371.5	371.6	0.00	0.00	0.00
3,300.0	7.85	270.84	3,274.0	5.6	-385.2	385.2	0.00	0.00	0.00
3,400.0	7.85	270.84	3,373.0	5.8	-398.8	398.9	0.00	0.00	0.00
3,500.0	7.85	270.84	3,472.1	6.0	-412.5	412.5	0.00	0.00	0.00
3,600.0	7.85	270.84	3,571.2	6.2	-426.2	426.2	0.00	0.00	0.00
3,700.0	7.85	270.84	3,670.2	6.4	-439.8	439.9	0.00	0.00	0.00
3,800.0	7.85	270.84	3,769.3	6.6	-453.5	453.5	0.00	0.00	0.00
3,900.0	7.85	270.84	3,868.3	6.8	-467.1	467.2	0.00	0.00	0.00
4,000.0	7.85	270.84	3,967.4	7.0	-480.8	480.9	0.00	0.00	0.00
4,100.0	7.85	270.84	4,066.5	7.2	-494.5	494.5	0.00	0.00	0.00
4,200.0	7.85	270.84	4,165.5	7.4	-508.1	508.2	0.00	0.00	0.00
4,300.0	7.85	270.84	4,264.6	7.6	-521.8	521.8	0.00	0.00	0.00
4,400.0	7.85	270.84	4,363.7	7.8	-535.5	535.5	0.00	0.00	0.00
4,500.0	7.85	270.84	4,462.7	8.0	-549.1	549.2	0.00	0.00	0.00



Well Planning Report



Database:	EDM5002	Local Co-ordinate Reference:	Well Gunderson 20-05W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7176.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7176.0usft (H&P #522)
Site:	Gunderson 20-03 Pad	North Reference:	True
Well:	Gunderson 20-05W	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

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)
Williams Fork									
4,584.1	7.85	270.84	4,546.0	8.2	-560.6	560.7	0.00	0.00	0.00
4,600.0	7.85	270.84	4,561.8	8.2	-562.8	562.8	0.00	0.00	0.00
4,700.0	7.85	270.84	4,660.8	8.4	-576.4	576.5	0.00	0.00	0.00
4,800.0	7.85	270.84	4,759.9	8.6	-590.1	590.2	0.00	0.00	0.00
4,900.0	7.85	270.84	4,859.0	8.8	-603.8	603.8	0.00	0.00	0.00
5,000.0	7.85	270.84	4,958.0	9.0	-617.4	617.5	0.00	0.00	0.00
5,100.0	7.85	270.84	5,057.1	9.2	-631.1	631.2	0.00	0.00	0.00
5,200.0	7.85	270.84	5,156.2	9.4	-644.7	644.8	0.00	0.00	0.00
Drop 3° / 100'									
5,279.6	7.85	270.84	5,235.0	9.6	-655.6	655.7	0.00	0.00	0.00
5,300.0	7.24	270.84	5,255.2	9.6	-658.3	658.4	2.99	-2.99	0.00
5,400.0	4.24	270.84	5,354.7	9.8	-668.3	668.4	3.00	-3.00	0.00
5,500.0	1.24	270.84	5,454.6	9.8	-673.1	673.2	3.00	-3.00	0.00
EOD @ Vertical - TOG									
5,541.4	0.00	0.00	5,496.0	9.8	-673.5	673.6	3.00	-3.00	215.29
5,600.0	0.00	0.00	5,554.6	9.8	-673.5	673.6	0.00	0.00	0.00
5,700.0	0.00	0.00	5,654.6	9.8	-673.5	673.6	0.00	0.00	0.00
5,800.0	0.00	0.00	5,754.6	9.8	-673.5	673.6	0.00	0.00	0.00
5,900.0	0.00	0.00	5,854.6	9.8	-673.5	673.6	0.00	0.00	0.00
6,000.0	0.00	0.00	5,954.6	9.8	-673.5	673.6	0.00	0.00	0.00
6,100.0	0.00	0.00	6,054.6	9.8	-673.5	673.6	0.00	0.00	0.00
6,200.0	0.00	0.00	6,154.6	9.8	-673.5	673.6	0.00	0.00	0.00
6,300.0	0.00	0.00	6,254.6	9.8	-673.5	673.6	0.00	0.00	0.00
6,400.0	0.00	0.00	6,354.6	9.8	-673.5	673.6	0.00	0.00	0.00
6,500.0	0.00	0.00	6,454.6	9.8	-673.5	673.6	0.00	0.00	0.00
6,600.0	0.00	0.00	6,554.6	9.8	-673.5	673.6	0.00	0.00	0.00
Cameo									
6,641.4	0.00	0.00	6,596.0	9.8	-673.5	673.6	0.00	0.00	0.00
6,700.0	0.00	0.00	6,654.6	9.8	-673.5	673.6	0.00	0.00	0.00
6,800.0	0.00	0.00	6,754.6	9.8	-673.5	673.6	0.00	0.00	0.00
6,900.0	0.00	0.00	6,854.6	9.8	-673.5	673.6	0.00	0.00	0.00
7,000.0	0.00	0.00	6,954.6	9.8	-673.5	673.6	0.00	0.00	0.00
7,100.0	0.00	0.00	7,054.6	9.8	-673.5	673.6	0.00	0.00	0.00
7,200.0	0.00	0.00	7,154.6	9.8	-673.5	673.6	0.00	0.00	0.00
7,300.0	0.00	0.00	7,254.6	9.8	-673.5	673.6	0.00	0.00	0.00
Base Cameo Coal									
7,301.4	0.00	0.00	7,256.0	9.8	-673.5	673.6	0.00	0.00	0.00
Rollins									
7,341.4	0.00	0.00	7,296.0	9.8	-673.5	673.6	0.00	0.00	0.00
7,400.0	0.00	0.00	7,354.6	9.8	-673.5	673.6	0.00	0.00	0.00
7,500.0	0.00	0.00	7,454.6	9.8	-673.5	673.6	0.00	0.00	0.00
TD @ 7591' MD / 7546' TVD									
7,591.4	0.00	0.00	7,546.0	9.8	-673.5	673.6	0.00	0.00	0.00



Well Planning Report



Database:	EDM5002	Local Co-ordinate Reference:	Well Gunderson 20-05W
Company:	Laramie Energy, LLC	TVD Reference:	well @ 7176.0usft (H&P #522)
Project:	Mesa County, CO	MD Reference:	well @ 7176.0usft (H&P #522)
Site:	Gunderson 20-03 Pad	North Reference:	True
Well:	Gunderson 20-05W	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

Design Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
PBHL - Gunderson 20-0	0.00	0.00	7,546.0	9.8	-673.5	1,530,324.93	2,349,547.88	39.266891	-107.797696
- plan hits target center									
- Circle (radius 50.0)									

Casing Points				
Measured Depth	Vertical Depth		Casing Diameter	Hole Diameter
(usft)	(usft)	Name	(")	(")
1,530.0	1,520.6	8 5/8"	8-5/8	11

Formations					
Measured Depth	Vertical Depth			Dip	Dip Direction
(usft)	(usft)	Name	Lithology	(°)	(°)
2,464.2	2,446.0	G' Sand		0.00	
4,584.1	4,546.0	Williams Fork		0.00	
5,541.4	5,496.0	TOG		0.00	
6,641.4	6,596.0	Cameo		0.00	
7,301.4	7,256.0	Base Cameo Coal		0.00	
7,341.4	7,296.0	Rollins		0.00	

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		
(usft)	(usft)	+N/-S	+E/-W	Comment
(usft)	(usft)	(usft)	(usft)	
350.0	350.0	0.0	0.0	KOP / Build 3° / 100'
611.8	611.0	0.3	-17.9	EOB @ 7.85° Inc. / 270.84° Azm
5,279.6	5,235.0	9.6	-655.6	Drop 3° / 100'
5,541.4	5,496.0	9.8	-673.5	EOD @ Vertical
7,591.4	7,546.0	9.8	-673.5	TD @ 7591' MD / 7546' TVD