



Project: Weld County, CO  
Site: Sec 7-T9N-R57W  
Well: Cottonwood #07M-0602  
Wellbore: Hz  
Design: APD

PROJECT DETAILS: Weld County, CO  
Geodetic System: US State Plane 1983  
Datum: North American Datum 1983  
Ellipsoid: GRS 1980  
Zone: Colorado Northern Zone  
System Datum: Mean Sea Level



Azimuths to True North  
Magnetic North: 7.70°  
Magnetic Field  
Strength: 52630.3snT  
Dip Angle: 67.25°  
Date: 1/26/2017  
Model: MVHD

#### WELL DETAILS: Cottonwood #07M-0602

+N/-S	+E/-W	Northing	Easting	4628.00	Latitude	Longitude	Slot
0.00	0.00	1524122.81	3471006.46		40° 45' 34.950 N	103° 47' 58.960 W	

#### SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	
3	970.01	13.40	195.95	963.92	-74.99	-21.43	2.00	195.95	-74.17	
4	4035.12	13.40	195.95	3945.58	-758.01	-216.57	0.00	0.00	-749.68	
5	4705.13	0.00	0.00	4609.50	-833.00	-238.00	2.00	180.00	-823.85	
6	4905.13	0.00	0.00	4809.50	-833.00	-238.00	0.00	0.00	-823.85	
7	5904.94	90.00	360.00	5446.00	-196.50	-238.00	9.00	360.00	-187.77	
8	10996.44	90.00	360.00	5446.00	4895.00	-238.00	0.00	0.00	4900.40	
9	11067.28	90.00	358.58	5446.00	4965.83	-238.88	2.00	-90.00	4971.22	PBHL Cottonwood 07M-0602
10	16245.71	90.00	358.58	5446.00	10142.68	-366.92	0.00	0.00	10149.31	PBHL Cottonwood 07M-0602

#### FORMATION TOP DETAILS

TVDPath	MDPath	Formation
1200.00	1212.70	Upper Pierre
3500.00	3577.07	Hygiene
3650.00	3731.27	Lower Pierre
5282.00	5437.60	P200 Marker
5306.00	5474.63	P300 Marker
5321.00	5499.20	P350 Marker
5332.00	5518.07	Sharon Springs
5339.00	5530.50	Niobrara
5354.00	5558.46	Top A Chalk (N100)
5384.00	5621.67	Top A Marl (N200)
5391.00	5638.40	A Marl (N250)
5400.00	5661.47	Top Upper B (N400)
5429.00	5757.50	Base Upper B (N430)
5446.00	5904.94	Top Lower B (N460)

#### ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSec	Departure	Annotation
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	Build 2°/100'
970.01	13.40	195.95	963.92	-74.99	-21.43	-74.17	77.99	Hold 13.40° Inc
4035.12	13.40	195.95	3945.58	-758.01	-216.57	-749.68	788.34	Drop 2°/100'
4705.13	0.00	0.00	4609.50	-833.00	-238.00	-823.85	866.33	Hold Vertical
4905.13	0.00	0.00	4809.50	-833.00	-238.00	-823.85	866.33	KOP, Build 9°/100'
5904.94	90.00	360.00	5446.00	-196.50	-238.00	-187.77	1502.83	LP @ 90° Inc, Hold
10996.44	90.00	360.00	5446.00	4895.00	-238.00	4900.40	6594.33	Turn 2°/100'
11067.28	90.00	358.58	5446.00	4965.83	-238.88	4971.22	6665.17	End Turn, Hold
16245.71	90.00	358.58	5446.00	10142.68	-366.92	10149.31	11843.60	TD at 16245.71

#### DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL Cottonwood 07M-0602	5446.00	10142.68	-366.92	1534256.59	3470445.14	40° 47' 15.170 N	103° 48' 3.730 W
Pawnee Creek 9-57-18-1A	6023.00	-720.27	-64.49	1523401.43	3470955.79	40° 45' 27.833 N	103° 47' 59.798 W
Motis 1-6	6325.00	8296.50	-102.44	1532415.82	3470744.97	40° 46' 56.928 N	103° 48' 0.292 W

#### SHL:

306' FSL, 847' FWL  
Sec7-T9N-R57W

#### BHL:

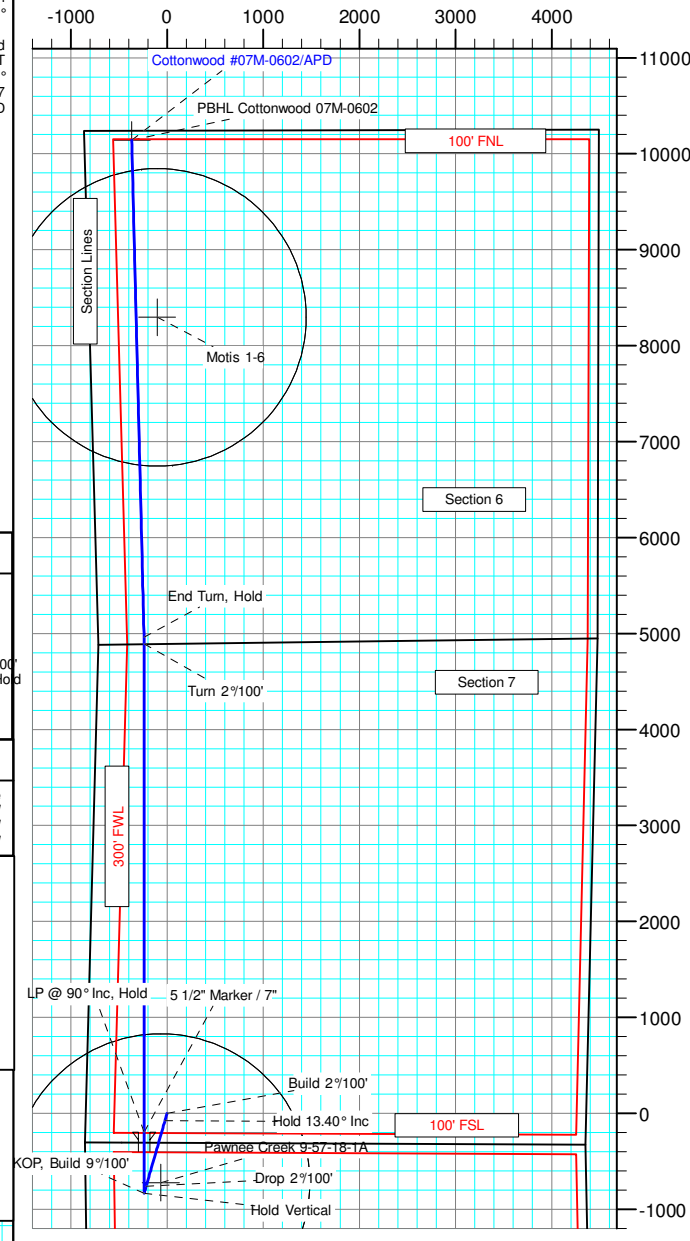
100' FNL, 495' FWL  
Sec6-T9N-R57W

#### 5 1/2" Marker / 7" CSG:

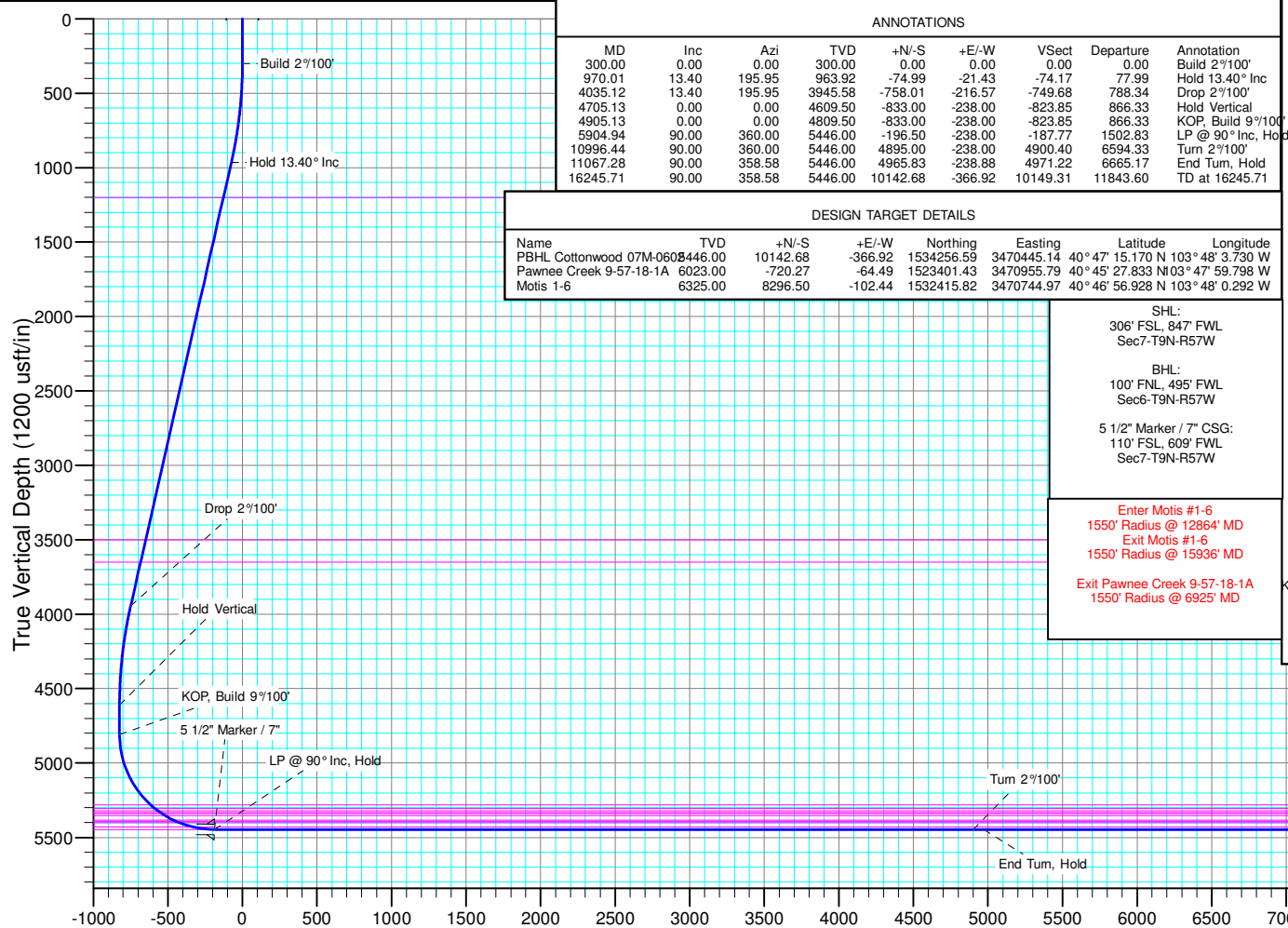
110' FSL, 609' FWL  
Sec7-T9N-R57W

Enter Motis #1-6  
1550' Radius @ 12864' MD  
Exit Motis #1-6  
1550' Radius @ 15936' MD  
Exit Pawnee Creek 9-57-18-1A  
1550' Radius @ 6925' MD

West(-)/East(+) (2000 usft/in)



South(-)/North(+) (2000 usft/in)



Vertical Section at 357.93° (1200 usft/in)



# **Whiting Petroleum Corp.**

**Weld County, CO**

**Sec 7-T9N-R57W**

**Cottonwood #07M-0602**

**Hz**

**Plan: APD**

## **Standard Planning Report**

**26 January, 2017**



# WOG

## Planning Report

<b>Database:</b>	LandmarkEDM	<b>Local Co-ordinate Reference:</b>	Well Cottonwood #07M-0602
<b>Company:</b>	Whiting Petroleum Corp.	<b>TVD Reference:</b>	KBE @ 4649.00usft
<b>Project:</b>	Weld County, CO	<b>MD Reference:</b>	KBE @ 4649.00usft
<b>Site:</b>	Sec 7-T9N-R57W	<b>North Reference:</b>	True
<b>Well:</b>	Cottonwood #07M-0602	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Hz		
<b>Design:</b>	APD		

<b>Project</b>	Weld County, CO		
<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		Sec 7-T9N-R57W			
Site Position:		Northing:	1,524,361.37 usft	Latitude:	40° 45' 36.630 N
From:	Lat/Long	Easting:	3,474,564.69 usft	Longitude:	103° 47' 12.670 W
Position Uncertainty:	0.00 usft	Slot Radius:	13.200 in	Grid Convergence:	1.11 °

Well	Cottonwood #07M-0602					
Well Position	+N/-S	-169.77 usft	Northing:	1,524,122.81 usft	Latitude:	40° 45' 34.950 N
	+E/-W	-3,562.18 usft	Easting:	3,471,006.46 usft	Longitude:	103° 47' 58.960 W
Position Uncertainty	0.00 usft		Wellhead Elevation:		Ground Level:	4,628.00 usft

<b>Wellbore</b>	Hz				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	MVHD	1/26/2017	7.70	67.25	52,630.30000460

<b>Design</b>	APD				
<b>Audit Notes:</b>					
<b>Version:</b>		<b>Phase:</b>	PROTOTYPE	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	357.93	

<b>Plan Survey Tool Program</b>	<b>Date</b>	1/26/2017			
<b>Depth From (usft)</b>	<b>Depth To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Remarks</b>	
1	0.00	16,245.37 APD (Hz)	OWSG Rev2 MWD+IFR1+MS		
			OWSG MWD + IFR1 + Multi-St		



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<b>Project:</b>	Weld County, CO	<b>MD Reference:</b>	KBE @ 4649.00usft
<b>Site:</b>	Sec 7-T9N-R57W	<b>North Reference:</b>	True
<b>Well:</b>	Cottonwood #07M-0602	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Hz		
<b>Design:</b>	APD		

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	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	
970.01	13.40	195.95	963.92	-74.99	-21.43	2.00	2.00	0.00	195.95	
4,035.12	13.40	195.95	3,945.58	-758.01	-216.57	0.00	0.00	0.00	0.00	
4,705.13	0.00	0.00	4,609.50	-833.00	-238.00	2.00	-2.00	0.00	180.00	
4,905.13	0.00	0.00	4,809.50	-833.00	-238.00	0.00	0.00	0.00	0.00	
5,904.94	90.00	360.00	5,446.00	-196.50	-238.00	9.00	9.00	0.00	360.00	
10,996.44	90.00	360.00	5,446.00	4,895.00	-238.00	0.00	0.00	0.00	0.00	
11,067.28	90.00	358.58	5,446.00	4,965.83	-238.88	2.00	0.00	-2.00	-90.00	PBHL Cottonwood 07
16,245.71	90.00	358.58	5,446.00	10,142.68	-366.92	0.00	0.00	0.00	0.00	PBHL Cottonwood 07



# WOG

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<b>Company:</b>	Whiting Petroleum Corp.	<b>TVD Reference:</b>	KBE @ 4649.00usft
<b>Project:</b>	Weld County, CO	<b>MD Reference:</b>	KBE @ 4649.00usft
<b>Site:</b>	Sec 7-T9N-R57W	<b>North Reference:</b>	True
<b>Well:</b>	Cottonwood #07M-0602	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Hz		
<b>Design:</b>	APD		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	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
<b>Build 2°/100'</b>									
400.00	2.00	195.95	399.98	-1.68	-0.48	-1.66	2.00	2.00	0.00
500.00	4.00	195.95	499.84	-6.71	-1.92	-6.64	2.00	2.00	0.00
600.00	6.00	195.95	599.45	-15.09	-4.31	-14.92	2.00	2.00	0.00
700.00	8.00	195.95	698.70	-26.81	-7.66	-26.51	2.00	2.00	0.00
800.00	10.00	195.95	797.47	-41.85	-11.96	-41.39	2.00	2.00	0.00
900.00	12.00	195.95	895.62	-60.19	-17.20	-59.53	2.00	2.00	0.00
970.01	13.40	195.95	963.92	-74.99	-21.43	-74.17	2.00	2.00	0.00
<b>Hold 13.40° Inc</b>									
1,000.00	13.40	195.95	993.09	-81.68	-23.34	-80.78	0.00	0.00	0.00
1,100.00	13.40	195.95	1,090.37	-103.96	-29.70	-102.82	0.00	0.00	0.00
1,200.00	13.40	195.95	1,187.65	-126.24	-36.07	-124.86	0.00	0.00	0.00
1,212.70	13.40	195.95	1,200.00	-129.07	-36.88	-127.65	0.00	0.00	0.00
<b>Upper Pierre</b>									
1,300.00	13.40	195.95	1,284.92	-148.53	-42.44	-146.90	0.00	0.00	0.00
1,400.00	13.40	195.95	1,382.20	-170.81	-48.80	-168.93	0.00	0.00	0.00
1,500.00	13.40	195.95	1,479.48	-193.09	-55.17	-190.97	0.00	0.00	0.00
1,600.00	13.40	195.95	1,576.76	-215.38	-61.54	-213.01	0.00	0.00	0.00
1,700.00	13.40	195.95	1,674.03	-237.66	-67.90	-235.05	0.00	0.00	0.00
1,800.00	13.40	195.95	1,771.31	-259.94	-74.27	-257.09	0.00	0.00	0.00
1,900.00	13.40	195.95	1,868.59	-282.23	-80.64	-279.13	0.00	0.00	0.00
2,000.00	13.40	195.95	1,965.87	-304.51	-87.00	-301.17	0.00	0.00	0.00
2,100.00	13.40	195.95	2,063.14	-326.79	-93.37	-323.21	0.00	0.00	0.00
2,200.00	13.40	195.95	2,160.42	-349.08	-99.74	-345.24	0.00	0.00	0.00
2,300.00	13.40	195.95	2,257.70	-371.36	-106.10	-367.28	0.00	0.00	0.00
2,400.00	13.40	195.95	2,354.98	-393.64	-112.47	-389.32	0.00	0.00	0.00
2,500.00	13.40	195.95	2,452.25	-415.93	-118.84	-411.36	0.00	0.00	0.00
2,600.00	13.40	195.95	2,549.53	-438.21	-125.20	-433.40	0.00	0.00	0.00
2,700.00	13.40	195.95	2,646.81	-460.50	-131.57	-455.44	0.00	0.00	0.00
2,800.00	13.40	195.95	2,744.09	-482.78	-137.94	-477.48	0.00	0.00	0.00
2,900.00	13.40	195.95	2,841.36	-505.06	-144.30	-499.52	0.00	0.00	0.00
3,000.00	13.40	195.95	2,938.64	-527.35	-150.67	-521.55	0.00	0.00	0.00
3,100.00	13.40	195.95	3,035.92	-549.63	-157.04	-543.59	0.00	0.00	0.00
3,200.00	13.40	195.95	3,133.20	-571.91	-163.40	-565.63	0.00	0.00	0.00
3,300.00	13.40	195.95	3,230.47	-594.20	-169.77	-587.67	0.00	0.00	0.00
3,400.00	13.40	195.95	3,327.75	-616.48	-176.14	-609.71	0.00	0.00	0.00
3,500.00	13.40	195.95	3,425.03	-638.76	-182.50	-631.75	0.00	0.00	0.00
3,577.07	13.40	195.95	3,500.00	-655.94	-187.41	-648.73	0.00	0.00	0.00
<b>Hygiene</b>									
3,600.00	13.40	195.95	3,522.31	-661.05	-188.87	-653.79	0.00	0.00	0.00
3,700.00	13.40	195.95	3,619.58	-683.33	-195.24	-675.83	0.00	0.00	0.00
3,731.27	13.40	195.95	3,650.00	-690.30	-197.23	-682.72	0.00	0.00	0.00
<b>Lower Pierre</b>									
3,800.00	13.40	195.95	3,716.86	-705.61	-201.60	-697.86	0.00	0.00	0.00
3,900.00	13.40	195.95	3,814.14	-727.90	-207.97	-719.90	0.00	0.00	0.00
4,000.00	13.40	195.95	3,911.42	-750.18	-214.34	-741.94	0.00	0.00	0.00
4,035.12	13.40	195.95	3,945.58	-758.01	-216.57	-749.68	0.00	0.00	0.00
<b>Drop 2°/100'</b>									
4,100.00	12.10	195.95	4,008.86	-771.78	-220.51	-763.30	2.00	-2.00	0.00



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<b>Project:</b>	Weld County, CO	<b>MD Reference:</b>	KBE @ 4649.00usft
<b>Site:</b>	Sec 7-T9N-R57W	<b>North Reference:</b>	True
<b>Well:</b>	Cottonwood #07M-0602	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Hz		
<b>Design:</b>	APD		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
4,200.00	10.10	195.95	4,106.98	-790.29	-225.80	-781.61	2.00	-2.00	0.00	
4,300.00	8.10	195.95	4,205.72	-805.50	-230.14	-796.66	2.00	-2.00	0.00	
4,400.00	6.10	195.95	4,304.95	-817.39	-233.54	-808.41	2.00	-2.00	0.00	
4,500.00	4.10	195.95	4,404.54	-825.94	-235.98	-816.87	2.00	-2.00	0.00	
4,600.00	2.10	195.95	4,504.39	-831.15	-237.47	-822.02	2.00	-2.00	0.00	
4,700.00	0.10	195.95	4,604.37	-833.00	-238.00	-823.85	2.00	-2.00	0.00	
4,705.13	0.00	0.00	4,609.50	-833.00	-238.00	-823.85	2.00	-2.00	0.00	
<b>Hold Vertical</b>										
4,800.00	0.00	0.00	4,704.37	-833.00	-238.00	-823.85	0.00	0.00	0.00	
4,900.00	0.00	0.00	4,804.37	-833.00	-238.00	-823.85	0.00	0.00	0.00	
4,905.13	0.00	0.00	4,809.50	-833.00	-238.00	-823.85	0.00	0.00	0.00	
<b>KOP, Build 9°/100'</b>										
5,000.00	8.54	360.00	4,904.02	-825.94	-238.00	-816.80	9.00	9.00	0.00	
5,100.00	17.54	360.00	5,001.34	-803.40	-238.00	-794.27	9.00	9.00	0.00	
5,200.00	26.54	360.00	5,093.93	-765.91	-238.00	-756.81	9.00	9.00	0.00	
5,300.00	35.54	360.00	5,179.52	-714.39	-238.00	-705.32	9.00	9.00	0.00	
5,400.00	44.55	360.00	5,256.00	-650.12	-238.00	-641.09	9.00	9.00	0.00	
5,437.60	47.93	360.00	5,282.00	-622.97	-238.00	-613.96	9.00	9.00	0.00	
<b>P200 Marker</b>										
5,474.63	51.26	360.00	5,306.00	-594.77	-238.00	-585.78	9.00	9.00	0.00	
<b>P300 Marker</b>										
5,499.20	53.48	360.00	5,321.00	-575.31	-238.00	-566.33	9.00	9.00	0.00	
<b>P350 Marker</b>										
5,500.00	53.55	360.00	5,321.47	-574.67	-238.00	-565.69	9.00	9.00	0.00	
5,518.07	55.17	360.00	5,332.00	-559.99	-238.00	-551.02	9.00	9.00	0.00	
<b>Sharon Springs</b>										
5,530.50	56.29	360.00	5,339.00	-549.72	-238.00	-540.75	9.00	9.00	0.00	
<b>Niobrara</b>										
5,558.46	58.81	360.00	5,354.00	-526.12	-238.00	-517.18	9.00	9.00	0.00	
<b>Top A Chalk (N100)</b>										
5,600.00	62.55	360.00	5,374.34	-489.91	-238.00	-480.99	9.00	9.00	0.00	
5,621.67	64.50	360.00	5,384.00	-470.51	-238.00	-461.60	9.00	9.00	0.00	
<b>Top A Marl (N200)</b>										
5,638.40	66.01	360.00	5,391.00	-455.32	-238.00	-446.42	9.00	9.00	0.00	
<b>A Marl (N250)</b>										
5,640.91	66.23	360.00	5,392.02	-453.02	-238.00	-444.12	9.00	9.00	0.00	
<b>Pawnee Creek 9-57-18-1A</b>										
5,661.47	68.08	360.00	5,400.00	-434.08	-238.00	-425.19	9.00	9.00	0.00	
<b>Top Upper B (N400)</b>										
5,700.00	71.55	360.00	5,413.29	-397.92	-238.00	-389.06	9.00	9.00	0.00	
5,757.50	76.73	360.00	5,429.00	-342.62	-238.00	-333.80	9.00	9.00	0.00	
<b>Base Upper B (N430)</b>										
5,800.00	80.55	360.00	5,437.37	-300.97	-238.00	-292.17	9.00	9.00	0.00	
5,900.00	89.56	360.00	5,445.98	-201.44	-238.00	-192.71	9.00	9.00	0.00	
5,904.94	90.00	360.00	5,446.00	-196.50	-238.00	-187.77	9.00	9.00	0.00	
<b>LP @ 90° Inc, Hold - Top Lower B (N460) - 5 1/2" Marker / 7"</b>										
6,000.00	90.00	360.00	5,446.00	-101.44	-238.00	-92.77	0.00	0.00	0.00	
6,100.00	90.00	360.00	5,446.00	-1.44	-238.00	7.16	0.00	0.00	0.00	
6,200.00	90.00	360.00	5,446.00	98.56	-238.00	107.10	0.00	0.00	0.00	
6,300.00	90.00	360.00	5,446.00	198.56	-238.00	207.03	0.00	0.00	0.00	
6,400.00	90.00	360.00	5,446.00	298.56	-238.00	306.97	0.00	0.00	0.00	
6,500.00	90.00	360.00	5,446.00	398.56	-238.00	406.90	0.00	0.00	0.00	



# WOG Planning Report

<b>Database:</b>	LandmarkEDM	<b>Local Co-ordinate Reference:</b>	Well Cottonwood #07M-0602
<b>Company:</b>	Whiting Petroleum Corp.	<b>TVD Reference:</b>	KBE @ 4649.00usft
<b>Project:</b>	Weld County, CO	<b>MD Reference:</b>	KBE @ 4649.00usft
<b>Site:</b>	Sec 7-T9N-R57W	<b>North Reference:</b>	True
<b>Well:</b>	Cottonwood #07M-0602	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	HZ		
<b>Design:</b>	APD		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
6,600.00	90.00	360.00	5,446.00	498.56	-238.00	506.84	0.00	0.00	0.00	
6,700.00	90.00	360.00	5,446.00	598.56	-238.00	606.77	0.00	0.00	0.00	
6,800.00	90.00	360.00	5,446.00	698.56	-238.00	706.70	0.00	0.00	0.00	
6,900.00	90.00	360.00	5,446.00	798.56	-238.00	806.64	0.00	0.00	0.00	
7,000.00	90.00	360.00	5,446.00	898.56	-238.00	906.57	0.00	0.00	0.00	
7,100.00	90.00	360.00	5,446.00	998.56	-238.00	1,006.51	0.00	0.00	0.00	
7,200.00	90.00	360.00	5,446.00	1,098.56	-238.00	1,106.44	0.00	0.00	0.00	
7,300.00	90.00	360.00	5,446.00	1,198.56	-238.00	1,206.38	0.00	0.00	0.00	
7,400.00	90.00	360.00	5,446.00	1,298.56	-238.00	1,306.31	0.00	0.00	0.00	
7,500.00	90.00	360.00	5,446.00	1,398.56	-238.00	1,406.25	0.00	0.00	0.00	
7,600.00	90.00	360.00	5,446.00	1,498.56	-238.00	1,506.18	0.00	0.00	0.00	
7,700.00	90.00	360.00	5,446.00	1,598.56	-238.00	1,606.12	0.00	0.00	0.00	
7,800.00	90.00	360.00	5,446.00	1,698.56	-238.00	1,706.05	0.00	0.00	0.00	
7,900.00	90.00	360.00	5,446.00	1,798.56	-238.00	1,805.99	0.00	0.00	0.00	
8,000.00	90.00	360.00	5,446.00	1,898.56	-238.00	1,905.92	0.00	0.00	0.00	
8,100.00	90.00	360.00	5,446.00	1,998.56	-238.00	2,005.86	0.00	0.00	0.00	
8,200.00	90.00	360.00	5,446.00	2,098.56	-238.00	2,105.79	0.00	0.00	0.00	
8,300.00	90.00	360.00	5,446.00	2,198.56	-238.00	2,205.72	0.00	0.00	0.00	
8,400.00	90.00	360.00	5,446.00	2,298.56	-238.00	2,305.66	0.00	0.00	0.00	
8,500.00	90.00	360.00	5,446.00	2,398.56	-238.00	2,405.59	0.00	0.00	0.00	
8,600.00	90.00	360.00	5,446.00	2,498.56	-238.00	2,505.53	0.00	0.00	0.00	
8,700.00	90.00	360.00	5,446.00	2,598.56	-238.00	2,605.46	0.00	0.00	0.00	
8,800.00	90.00	360.00	5,446.00	2,698.56	-238.00	2,705.40	0.00	0.00	0.00	
8,900.00	90.00	360.00	5,446.00	2,798.56	-238.00	2,805.33	0.00	0.00	0.00	
9,000.00	90.00	360.00	5,446.00	2,898.56	-238.00	2,905.27	0.00	0.00	0.00	
9,100.00	90.00	360.00	5,446.00	2,998.56	-238.00	3,005.20	0.00	0.00	0.00	
9,200.00	90.00	360.00	5,446.00	3,098.56	-238.00	3,105.14	0.00	0.00	0.00	
9,300.00	90.00	360.00	5,446.00	3,198.56	-238.00	3,205.07	0.00	0.00	0.00	
9,400.00	90.00	360.00	5,446.00	3,298.56	-238.00	3,305.01	0.00	0.00	0.00	
9,500.00	90.00	360.00	5,446.00	3,398.56	-238.00	3,404.94	0.00	0.00	0.00	
9,600.00	90.00	360.00	5,446.00	3,498.56	-238.00	3,504.87	0.00	0.00	0.00	
9,700.00	90.00	360.00	5,446.00	3,598.56	-238.00	3,604.81	0.00	0.00	0.00	
9,800.00	90.00	360.00	5,446.00	3,698.56	-238.00	3,704.74	0.00	0.00	0.00	
9,900.00	90.00	360.00	5,446.00	3,798.56	-238.00	3,804.68	0.00	0.00	0.00	
10,000.00	90.00	360.00	5,446.00	3,898.56	-238.00	3,904.61	0.00	0.00	0.00	
10,100.00	90.00	360.00	5,446.00	3,998.56	-238.00	4,004.55	0.00	0.00	0.00	
10,200.00	90.00	360.00	5,446.00	4,098.56	-238.00	4,104.48	0.00	0.00	0.00	
10,300.00	90.00	360.00	5,446.00	4,198.56	-238.00	4,204.42	0.00	0.00	0.00	
10,400.00	90.00	360.00	5,446.00	4,298.56	-238.00	4,304.35	0.00	0.00	0.00	
10,500.00	90.00	360.00	5,446.00	4,398.56	-238.00	4,404.29	0.00	0.00	0.00	
10,600.00	90.00	360.00	5,446.00	4,498.56	-238.00	4,504.22	0.00	0.00	0.00	
10,700.00	90.00	360.00	5,446.00	4,598.56	-238.00	4,604.16	0.00	0.00	0.00	
10,800.00	90.00	360.00	5,446.00	4,698.56	-238.00	4,704.09	0.00	0.00	0.00	
10,900.00	90.00	360.00	5,446.00	4,798.56	-238.00	4,804.02	0.00	0.00	0.00	
10,996.44	90.00	360.00	5,446.00	4,895.00	-238.00	4,900.40	0.00	0.00	0.00	
Turn 2°/100'										
11,000.00	90.00	359.93	5,446.00	4,898.56	-238.00	4,903.96	2.00	0.00	-2.00	
11,067.28	90.00	358.58	5,446.00	4,965.83	-238.88	4,971.22	2.00	0.00	-2.00	
End Turn, Hold										
11,100.00	90.00	358.58	5,446.00	4,998.54	-239.68	5,003.94	0.00	0.00	0.00	
11,200.00	90.00	358.58	5,446.00	5,098.51	-242.16	5,103.93	0.00	0.00	0.00	
11,300.00	90.00	358.58	5,446.00	5,198.48	-244.63	5,203.92	0.00	0.00	0.00	
11,400.00	90.00	358.58	5,446.00	5,298.45	-247.10	5,303.92	0.00	0.00	0.00	
11,500.00	90.00	358.58	5,446.00	5,398.42	-249.58	5,403.91	0.00	0.00	0.00	



# WOG

## Planning Report

<b>Database:</b>	LandmarkEDM	<b>Local Co-ordinate Reference:</b>	Well Cottonwood #07M-0602
<b>Company:</b>	Whiting Petroleum Corp.	<b>TVD Reference:</b>	KBE @ 4649.00usft
<b>Project:</b>	Weld County, CO	<b>MD Reference:</b>	KBE @ 4649.00usft
<b>Site:</b>	Sec 7-T9N-R57W	<b>North Reference:</b>	True
<b>Well:</b>	Cottonwood #07M-0602	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Hz		
<b>Design:</b>	APD		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
11,600.00	90.00	358.58	5,446.00	5,498.39	-252.05	5,503.91	0.00	0.00	0.00
11,700.00	90.00	358.58	5,446.00	5,598.36	-254.52	5,603.90	0.00	0.00	0.00
11,800.00	90.00	358.58	5,446.00	5,698.33	-256.99	5,703.89	0.00	0.00	0.00
11,900.00	90.00	358.58	5,446.00	5,798.30	-259.47	5,803.89	0.00	0.00	0.00
12,000.00	90.00	358.58	5,446.00	5,898.27	-261.94	5,903.88	0.00	0.00	0.00
12,100.00	90.00	358.58	5,446.00	5,998.23	-264.41	6,003.87	0.00	0.00	0.00
12,200.00	90.00	358.58	5,446.00	6,098.20	-266.88	6,103.87	0.00	0.00	0.00
12,300.00	90.00	358.58	5,446.00	6,198.17	-269.36	6,203.86	0.00	0.00	0.00
12,400.00	90.00	358.58	5,446.00	6,298.14	-271.83	6,303.85	0.00	0.00	0.00
12,500.00	90.00	358.58	5,446.00	6,398.11	-274.30	6,403.85	0.00	0.00	0.00
12,600.00	90.00	358.58	5,446.00	6,498.08	-276.77	6,503.84	0.00	0.00	0.00
12,700.00	90.00	358.58	5,446.00	6,598.05	-279.25	6,603.83	0.00	0.00	0.00
12,800.00	90.00	358.58	5,446.00	6,698.02	-281.72	6,703.83	0.00	0.00	0.00
12,900.00	90.00	358.58	5,446.00	6,797.99	-284.19	6,803.82	0.00	0.00	0.00
13,000.00	90.00	358.58	5,446.00	6,897.96	-286.66	6,903.81	0.00	0.00	0.00
13,100.00	90.00	358.58	5,446.00	6,997.93	-289.14	7,003.81	0.00	0.00	0.00
13,200.00	90.00	358.58	5,446.00	7,097.90	-291.61	7,103.80	0.00	0.00	0.00
13,300.00	90.00	358.58	5,446.00	7,197.87	-294.08	7,203.79	0.00	0.00	0.00
13,400.00	90.00	358.58	5,446.00	7,297.84	-296.55	7,303.79	0.00	0.00	0.00
13,500.00	90.00	358.58	5,446.00	7,397.81	-299.03	7,403.78	0.00	0.00	0.00
13,600.00	90.00	358.58	5,446.00	7,497.78	-301.50	7,503.77	0.00	0.00	0.00
13,700.00	90.00	358.58	5,446.00	7,597.75	-303.97	7,603.77	0.00	0.00	0.00
13,800.00	90.00	358.58	5,446.00	7,697.71	-306.44	7,703.76	0.00	0.00	0.00
13,900.00	90.00	358.58	5,446.00	7,797.68	-308.92	7,803.75	0.00	0.00	0.00
14,000.00	90.00	358.58	5,446.00	7,897.65	-311.39	7,903.75	0.00	0.00	0.00
14,100.00	90.00	358.58	5,446.00	7,997.62	-313.86	8,003.74	0.00	0.00	0.00
14,200.00	90.00	358.58	5,446.00	8,097.59	-316.33	8,103.74	0.00	0.00	0.00
14,300.00	90.00	358.58	5,446.00	8,197.56	-318.81	8,203.73	0.00	0.00	0.00
14,393.56	90.00	358.58	5,446.00	8,291.10	-321.12	8,297.28	0.00	0.00	0.00
<b>Motis 1-6</b>									
14,400.00	90.00	358.58	5,446.00	8,297.53	-321.28	8,303.72	0.00	0.00	0.00
14,500.00	90.00	358.58	5,446.00	8,397.50	-323.75	8,403.72	0.00	0.00	0.00
14,600.00	90.00	358.58	5,446.00	8,497.47	-326.23	8,503.71	0.00	0.00	0.00
14,700.00	90.00	358.58	5,446.00	8,597.44	-328.70	8,603.70	0.00	0.00	0.00
14,800.00	90.00	358.58	5,446.00	8,697.41	-331.17	8,703.70	0.00	0.00	0.00
14,900.00	90.00	358.58	5,446.00	8,797.38	-333.64	8,803.69	0.00	0.00	0.00
15,000.00	90.00	358.58	5,446.00	8,897.35	-336.12	8,903.68	0.00	0.00	0.00
15,100.00	90.00	358.58	5,446.00	8,997.32	-338.59	9,003.68	0.00	0.00	0.00
15,200.00	90.00	358.58	5,446.00	9,097.29	-341.06	9,103.67	0.00	0.00	0.00
15,300.00	90.00	358.58	5,446.00	9,197.26	-343.53	9,203.66	0.00	0.00	0.00
15,400.00	90.00	358.58	5,446.00	9,297.23	-346.01	9,303.66	0.00	0.00	0.00
15,500.00	90.00	358.58	5,446.00	9,397.20	-348.48	9,403.65	0.00	0.00	0.00
15,600.00	90.00	358.58	5,446.00	9,497.16	-350.95	9,503.64	0.00	0.00	0.00
15,700.00	90.00	358.58	5,446.00	9,597.13	-353.42	9,603.64	0.00	0.00	0.00
15,800.00	90.00	358.58	5,446.00	9,697.10	-355.90	9,703.63	0.00	0.00	0.00
15,900.00	90.00	358.58	5,446.00	9,797.07	-358.37	9,803.62	0.00	0.00	0.00
16,000.00	90.00	358.58	5,446.00	9,897.04	-360.84	9,903.62	0.00	0.00	0.00
16,100.00	90.00	358.58	5,446.00	9,997.01	-363.31	10,003.61	0.00	0.00	0.00
16,200.00	90.00	358.58	5,446.00	10,096.98	-365.79	10,103.60	0.00	0.00	0.00
16,245.71	90.00	358.58	5,446.00	10,142.68	-366.92	10,149.31	0.00	0.00	0.00
<b>TD at 16245.71 - PBHL Cottonwood 07M-0602</b>									





# WOG Planning Report

<b>Database:</b>	LandmarkEDM	<b>Local Co-ordinate Reference:</b>	Well Cottonwood #07M-0602
<b>Company:</b>	Whiting Petroleum Corp.	<b>TVD Reference:</b>	KBE @ 4649.00usft
<b>Project:</b>	Weld County, CO	<b>MD Reference:</b>	KBE @ 4649.00usft
<b>Site:</b>	Sec 7-T9N-R57W	<b>North Reference:</b>	True
<b>Well:</b>	Cottonwood #07M-0602	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Hz		
<b>Design:</b>	APD		

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 Cottonwood 07M-	0.00	0.00	5,446.00	10,142.68	-366.92	1,534,256.59	3,470,445.14	40° 47' 15.170 N	103° 48' 3.730 W
- plan hits target center									
- Point									
Pawnee Creek 9-57-18-	0.00	0.00	6,023.00	-720.27	-64.49	1,523,401.43	3,470,955.79	40° 45' 27.833 N	103° 47' 59.798 W
- plan misses target center by 706.87usft at 5640.91usft MD (5392.02 TVD, -453.02 N, -238.00 E)									
- Circle (radius 1,550.00)									
Motis 1-6	0.00	0.00	6,325.00	8,296.50	-102.44	1,532,415.83	3,470,744.97	40° 46' 56.928 N	103° 48' 0.292 W
- plan misses target center by 905.81usft at 14393.56usft MD (5446.00 TVD, 8291.09 N, -321.12 E)									
- Circle (radius 1,550.00)									

Casing Points				
Measured Depth	Vertical Depth	Name	Casing Diameter	Hole Diameter
(usft)	(usft)		(in)	(in)
5,904.94	5,446.00	5 1/2" Marker / 7"	7.000	8.750

Formations						
Measured Depth	Vertical Depth	Name	Lithology	Dip	Dip Direction	
(usft)	(usft)			(°)	(°)	
1,212.70	1,200.00	Upper Pierre				
3,577.07	3,500.00	Hygiene				
3,731.27	3,650.00	Lower Pierre				
5,437.60	5,282.00	P200 Marker				
5,474.63	5,306.00	P300 Marker				
5,499.20	5,321.00	P350 Marker				
5,518.07	5,332.00	Sharon Springs				
5,530.50	5,339.00	Niobrara				
5,558.46	5,354.00	Top A Chalk (N100)				
5,621.67	5,384.00	Top A Marl (N200)				
5,638.40	5,391.00	A Marl (N250)				
5,661.47	5,400.00	Top Upper B (N400)				
5,757.50	5,429.00	Base Upper B (N430)				
5,904.94	5,446.00	Top Lower B (N460)				

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)	
300.00	300.00	0.00	0.00	Build 2°/100'
970.01	963.92	-74.99	-21.43	Hold 13.40° Inc
4,035.12	3,945.58	-758.01	-216.57	Drop 2°/100'
4,705.13	4,609.50	-833.00	-238.00	Hold Vertical
4,905.13	4,809.50	-833.00	-238.00	KOP, Build 9°/100'
5,904.94	5,446.00	-196.50	-238.00	LP @ 90° Inc, Hold
10,996.44	5,446.00	4,895.00	-238.00	Turn 2°/100'
11,067.28	5,446.00	4,965.83	-238.88	End Turn, Hold
16,245.71	5,446.00	10,142.68	-366.92	TD at 16245.71