



Project: Weld County, CO
Site: Sec 7-T9N-R57W
Well: Cottonwood #07M-1902
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: 7.69°
Magnetic Field
Strength: 52619.2nT
Dip Angle: 67.25°
Date: 3/3/2017
Model: MVHD

WELL DETAILS: Cottonwood #07M-1902

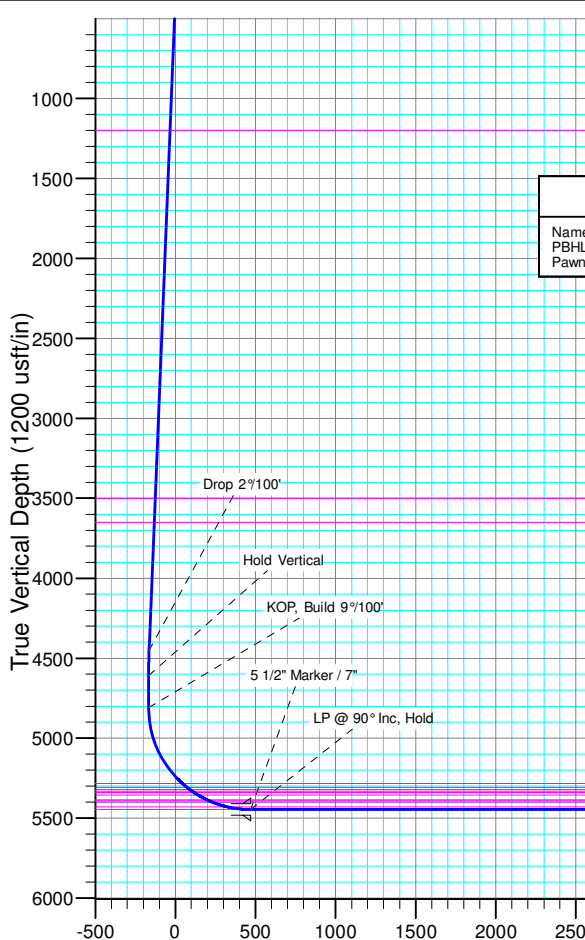
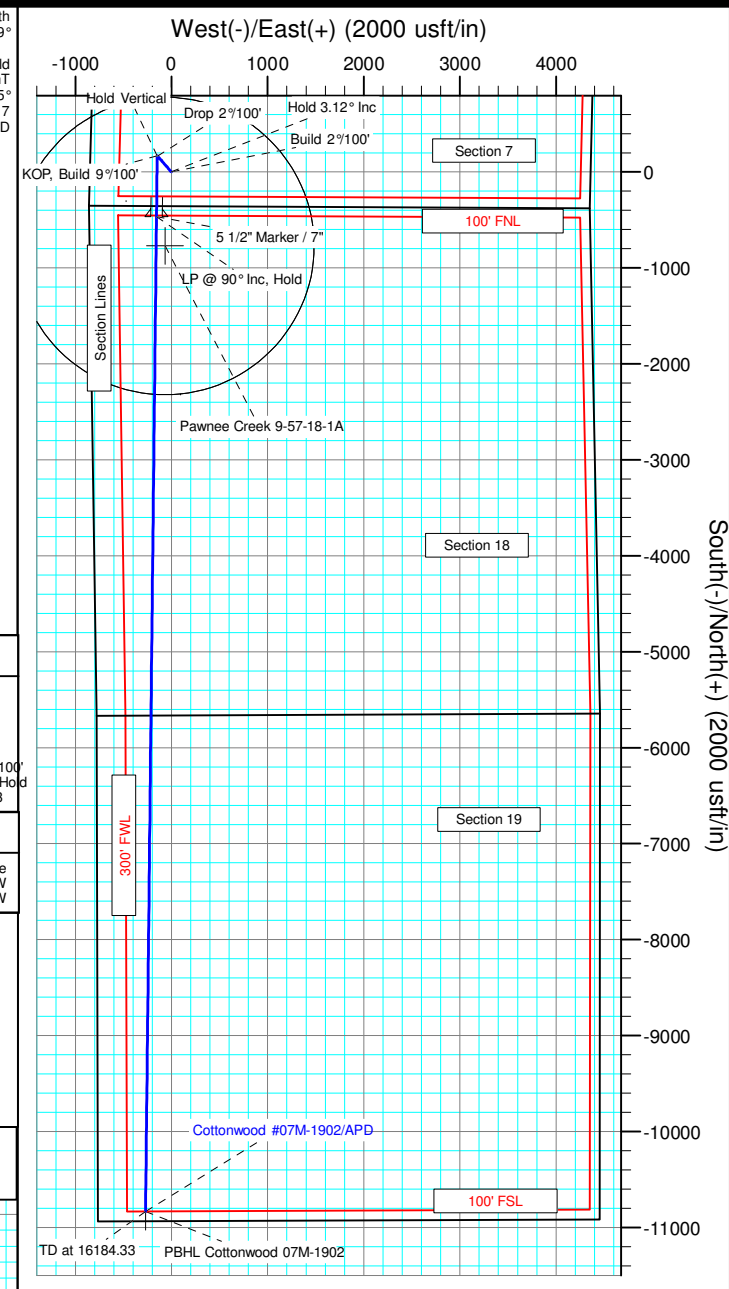
+N/-S	+E/-W	Northing	Easting	4628.00	Latitude	Longitude	Slot
0.00	0.00	1524172.42	3471007.05		40° 45' 35.440 N	103° 47' 58.940 W	

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	455.82	3.12	319.12	455.75	3.20	-2.77	2.00	319.12	-3.13	
4	4459.75	3.12	319.12	4453.75	167.80	-145.23	0.00	0.00	-164.14	
5	4615.58	0.00	0.00	4609.50	171.00	-148.00	2.00	180.00	-167.28	
6	4815.58	0.00	0.00	4809.50	171.00	-148.00	0.00	0.00	-167.28	
7	5815.39	90.00	180.63	5446.00	-465.46	-154.98	9.00	180.63	469.16	
8	16184.33	90.00	180.63	5446.00	-10833.78	-268.69	0.00	0.00	10837.11	PBHL Cottonwood 07M-1902

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
1200.00	1201.18	Upper Pierre
3500.00	3504.59	Hygiene
3650.00	3654.81	Lower Pierre
5282.00	5348.04	P200 Marker
5306.00	5385.08	P300 Marker
5321.00	5409.65	P350 Marker
5332.00	5428.51	Sharon Springs
5339.00	5440.94	Niobrara
5354.00	5468.90	Top A Chalk (N100)
5384.00	5532.12	Top A Marl (N200)
5391.00	5548.84	A Marl (N250)
5400.00	5571.92	Top Upper B (N400)
5429.00	5667.95	Base Upper B (N430)
5446.00	5815.39	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 1/2" 100'
455.82	3.12	319.12	455.75	3.20	-2.77	-3.13	4.24	Hold 3.12" Inc
4459.75	3.12	319.12	4453.75	167.80	-145.23	-164.14	221.92	Drop 2 1/2" 100'
4615.58	0.00	0.00	4609.50	171.00	-148.00	-167.28	226.15	Hold Vertical
4815.58	0.00	0.00	4809.50	171.00	-148.00	-167.28	226.15	KOP, Build 9 1/2" 100'
5815.39	90.00	180.63	5446.00	-465.46	-154.98	469.16	862.65	LP @ 90° Inc, Hold
16184.33	90.00	180.63	5446.00	-10833.78	-268.69	10837.11	11231.59	TD at 16184.33

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL Cottonwood 07M-1902	5446.00	-10833.78	-268.69	1513335.48	3470946.13	40° 43' 48.390 N	103° 48' 2.430 W
Pawnee Creek 9-57-18-1A	6023.00	-769.86	-66.03	1523401.43	3470955.79	40° 45' 27.833 N	103° 47' 59.798 W

SHL:
355' FSL, 847' FWL
Sec7-T9N-R57W

BHL:
100' FSL, 495' FWL
Sec19-T9N-R57W

5 1/2" Marker / 7" CSG:
110' FNL, 692' FWL
Sec18-T9N-R57W

Exit Pawnee Creek 9-57-18-1A
1550' Radius @ 7676' MD

PBHL Cottonwood 07M-1902 TD at 16184.33



Whiting Petroleum Corp.

Weld County, CO

Sec 7-T9N-R57W

Cottonwood #07M-1902

Hz

Plan: APD

Standard Planning Report

03 March, 2017



WOG

Planning Report

Database:	LandmarkEDM	Local Co-ordinate Reference:	Well Cottonwood #07M-1902
Company:	Whiting Petroleum Corp.	TVD Reference:	KBE @ 4649.00usft
Project:	Weld County, CO	MD Reference:	KBE @ 4649.00usft
Site:	Sec 7-T9N-R57W	North Reference:	True
Well:	Cottonwood #07M-1902	Survey Calculation Method:	Minimum Curvature
Wellbore:	Hz		
Design:	APD		

Project	Weld County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	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-1902					
Well Position	+N/-S	-120.18 usft	Northing:	1,524,172.42 usft	Latitude:	40° 45' 35.440 N
	+E/-W	-3,560.63 usft	Easting:	3,471,007.04 usft	Longitude:	103° 47' 58.940 W
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	4,628.00 usft

Wellbore	Hz				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	3/3/2017	7.69	67.25	52,619.16184168

Design	APD			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	181.42

Plan Survey Tool Program	Date	3/3/2017		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	16,184.26 APD (Hz)	OWSG Rev2 MWD+IFR1+SAI	
			OWSG MWD + IFR1 + Sag Co	

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	
455.82	3.12	319.12	455.75	3.20	-2.77	2.00	2.00	0.00	319.12	
4,459.75	3.12	319.12	4,453.75	167.80	-145.23	0.00	0.00	0.00	0.00	
4,615.58	0.00	0.00	4,609.50	171.00	-148.00	2.00	-2.00	0.00	180.00	
4,815.58	0.00	0.00	4,809.50	171.00	-148.00	0.00	0.00	0.00	0.00	
5,815.39	90.00	180.63	5,446.00	-465.46	-154.98	9.00	9.00	0.00	180.63	
16,184.33	90.00	180.63	5,446.00	-10,833.78	-268.69	0.00	0.00	0.00	0.00	PBHL Cottonwood 07



WOG Planning Report

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Company:	Whiting Petroleum Corp.	TVD Reference:	KBE @ 4649.00usft
Project:	Weld County, CO	MD Reference:	KBE @ 4649.00usft
Site:	Sec 7-T9N-R57W	North Reference:	True
Well:	Cottonwood #07M-1902	Survey Calculation Method:	Minimum Curvature
Wellbore:	Hz		
Design:	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
Build 2°/100'									
400.00	2.00	319.12	399.98	1.32	-1.14	-1.29	2.00	2.00	0.00
455.82	3.12	319.12	455.75	3.20	-2.77	-3.13	2.00	2.00	0.00
Hold 3.12° Inc									
500.00	3.12	319.12	499.86	5.02	-4.34	-4.91	0.00	0.00	0.00
600.00	3.12	319.12	599.71	9.13	-7.90	-8.93	0.00	0.00	0.00
700.00	3.12	319.12	699.56	13.24	-11.46	-12.95	0.00	0.00	0.00
800.00	3.12	319.12	799.41	17.35	-15.02	-16.97	0.00	0.00	0.00
900.00	3.12	319.12	899.27	21.46	-18.58	-21.00	0.00	0.00	0.00
1,000.00	3.12	319.12	999.12	25.57	-22.13	-25.02	0.00	0.00	0.00
1,100.00	3.12	319.12	1,098.97	29.68	-25.69	-29.04	0.00	0.00	0.00
1,200.00	3.12	319.12	1,198.82	33.80	-29.25	-33.06	0.00	0.00	0.00
1,201.18	3.12	319.12	1,200.00	33.84	-29.29	-33.11	0.00	0.00	0.00
Upper Pierre									
1,300.00	3.12	319.12	1,298.67	37.91	-32.81	-37.08	0.00	0.00	0.00
1,400.00	3.12	319.12	1,398.53	42.02	-36.37	-41.10	0.00	0.00	0.00
1,500.00	3.12	319.12	1,498.38	46.13	-39.92	-45.12	0.00	0.00	0.00
1,600.00	3.12	319.12	1,598.23	50.24	-43.48	-49.14	0.00	0.00	0.00
1,700.00	3.12	319.12	1,698.08	54.35	-47.04	-53.17	0.00	0.00	0.00
1,800.00	3.12	319.12	1,797.94	58.46	-50.60	-57.19	0.00	0.00	0.00
1,900.00	3.12	319.12	1,897.79	62.57	-54.15	-61.21	0.00	0.00	0.00
2,000.00	3.12	319.12	1,997.64	66.68	-57.71	-65.23	0.00	0.00	0.00
2,100.00	3.12	319.12	2,097.49	70.79	-61.27	-69.25	0.00	0.00	0.00
2,200.00	3.12	319.12	2,197.34	74.90	-64.83	-73.27	0.00	0.00	0.00
2,300.00	3.12	319.12	2,297.20	79.01	-68.39	-77.29	0.00	0.00	0.00
2,400.00	3.12	319.12	2,397.05	83.12	-71.94	-81.32	0.00	0.00	0.00
2,500.00	3.12	319.12	2,496.90	87.24	-75.50	-85.34	0.00	0.00	0.00
2,600.00	3.12	319.12	2,596.75	91.35	-79.06	-89.36	0.00	0.00	0.00
2,700.00	3.12	319.12	2,696.60	95.46	-82.62	-93.38	0.00	0.00	0.00
2,800.00	3.12	319.12	2,796.46	99.57	-86.18	-97.40	0.00	0.00	0.00
2,900.00	3.12	319.12	2,896.31	103.68	-89.73	-101.42	0.00	0.00	0.00
3,000.00	3.12	319.12	2,996.16	107.79	-93.29	-105.44	0.00	0.00	0.00
3,100.00	3.12	319.12	3,096.01	111.90	-96.85	-109.46	0.00	0.00	0.00
3,200.00	3.12	319.12	3,195.86	116.01	-100.41	-113.49	0.00	0.00	0.00
3,300.00	3.12	319.12	3,295.72	120.12	-103.96	-117.51	0.00	0.00	0.00
3,400.00	3.12	319.12	3,395.57	124.23	-107.52	-121.53	0.00	0.00	0.00
3,500.00	3.12	319.12	3,495.42	128.34	-111.08	-125.55	0.00	0.00	0.00
3,504.59	3.12	319.12	3,500.00	128.53	-111.24	-125.73	0.00	0.00	0.00
Hygiene									
3,600.00	3.12	319.12	3,595.27	132.45	-114.64	-129.57	0.00	0.00	0.00
3,654.81	3.12	319.12	3,650.00	134.71	-116.59	-131.77	0.00	0.00	0.00
Lower Pierre									
3,700.00	3.12	319.12	3,695.13	136.56	-118.20	-133.59	0.00	0.00	0.00
3,800.00	3.12	319.12	3,794.98	140.68	-121.75	-137.61	0.00	0.00	0.00
3,900.00	3.12	319.12	3,894.83	144.79	-125.31	-141.63	0.00	0.00	0.00
4,000.00	3.12	319.12	3,994.68	148.90	-128.87	-145.66	0.00	0.00	0.00
4,100.00	3.12	319.12	4,094.53	153.01	-132.43	-149.68	0.00	0.00	0.00
4,200.00	3.12	319.12	4,194.39	157.12	-135.99	-153.70	0.00	0.00	0.00
4,300.00	3.12	319.12	4,294.24	161.23	-139.54	-157.72	0.00	0.00	0.00



WOG Planning Report

Database:	LandmarkEDM	Local Co-ordinate Reference:	Well Cottonwood #07M-1902
Company:	Whiting Petroleum Corp.	TVD Reference:	KBE @ 4649.00usft
Project:	Weld County, CO	MD Reference:	KBE @ 4649.00usft
Site:	Sec 7-T9N-R57W	North Reference:	True
Well:	Cottonwood #07M-1902	Survey Calculation Method:	Minimum Curvature
Wellbore:	Hz		
Design:	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)	
4,400.00	3.12	319.12	4,394.09	165.34	-143.10	-161.74	0.00	0.00	0.00	
4,459.75	3.12	319.12	4,453.75	167.80	-145.23	-164.14	0.00	0.00	0.00	
Drop 2°/100'										
4,500.00	2.31	319.12	4,493.96	169.24	-146.47	-165.55	2.00	-2.00	0.00	
4,600.00	0.31	319.12	4,593.92	170.97	-147.97	-167.25	2.00	-2.00	0.00	
4,615.58	0.00	0.00	4,609.50	171.00	-148.00	-167.28	2.00	-2.00	0.00	
Hold Vertical										
4,700.00	0.00	0.00	4,693.92	171.00	-148.00	-167.28	0.00	0.00	0.00	
4,800.00	0.00	0.00	4,793.92	171.00	-148.00	-167.28	0.00	0.00	0.00	
4,815.58	0.00	0.00	4,809.50	171.00	-148.00	-167.28	0.00	0.00	0.00	
KOP, Build 9°/100'										
4,900.00	7.60	180.63	4,893.68	165.41	-148.06	-161.69	9.00	9.00	0.00	
5,000.00	16.60	180.63	4,991.36	144.47	-148.29	-140.75	9.00	9.00	0.00	
5,100.00	25.60	180.63	5,084.55	108.51	-148.69	-104.79	9.00	9.00	0.00	
5,200.00	34.60	180.63	5,170.98	58.40	-149.23	-54.69	9.00	9.00	0.00	
5,300.00	43.61	180.63	5,248.49	-4.60	-149.93	8.32	9.00	9.00	0.00	
5,348.04	47.93	180.63	5,282.00	-39.02	-150.30	42.73	9.00	9.00	0.00	
P200 Marker										
5,385.08	51.26	180.63	5,306.00	-67.21	-150.61	70.93	9.00	9.00	0.00	
P300 Marker										
5,400.00	52.61	180.63	5,315.20	-78.96	-150.74	82.68	9.00	9.00	0.00	
5,409.65	53.48	180.63	5,321.00	-86.67	-150.83	90.38	9.00	9.00	0.00	
P350 Marker										
5,428.51	55.17	180.63	5,332.00	-101.99	-150.99	105.70	9.00	9.00	0.00	
Sharon Springs										
5,440.94	56.29	180.63	5,339.00	-112.27	-151.11	115.98	9.00	9.00	0.00	
Niobrara										
5,468.90	58.81	180.63	5,354.00	-135.86	-151.37	139.57	9.00	9.00	0.00	
Top A Chalk (N100)										
5,500.00	61.61	180.63	5,369.45	-162.84	-151.66	166.55	9.00	9.00	0.00	
5,532.12	64.50	180.63	5,384.00	-191.47	-151.98	195.18	9.00	9.00	0.00	
Top A Marl (N200)										
5,548.84	66.01	180.63	5,391.00	-206.65	-152.14	210.36	9.00	9.00	0.00	
A Marl (N250)										
5,571.92	68.08	180.63	5,400.00	-227.90	-152.37	231.61	9.00	9.00	0.00	
Top Upper B (N400)										
5,600.00	70.61	180.63	5,409.90	-254.17	-152.66	257.88	9.00	9.00	0.00	
5,667.95	76.73	180.63	5,429.00	-319.35	-153.38	323.05	9.00	9.00	0.00	
Base Upper B (N430)										
5,700.00	79.61	180.63	5,435.57	-350.71	-153.72	354.42	9.00	9.00	0.00	
5,800.00	88.61	180.63	5,445.81	-450.08	-154.81	453.78	9.00	9.00	0.00	
5,815.39	90.00	180.63	5,446.00	-465.46	-154.98	469.16	9.00	9.00	0.00	
LP @ 90° Inc, Hold - Top Lower B (N460) - 5 1/2" Marker / 7"										
5,900.00	90.00	180.63	5,446.00	-550.07	-155.91	553.77	0.00	0.00	0.00	
6,000.00	90.00	180.63	5,446.00	-650.06	-157.00	653.76	0.00	0.00	0.00	
6,100.00	90.00	180.63	5,446.00	-750.06	-158.10	753.75	0.00	0.00	0.00	
6,200.00	90.00	180.63	5,446.00	-850.05	-159.20	853.74	0.00	0.00	0.00	
6,300.00	90.00	180.63	5,446.00	-950.05	-160.29	953.73	0.00	0.00	0.00	
6,400.00	90.00	180.63	5,446.00	-1,050.04	-161.39	1,053.72	0.00	0.00	0.00	
6,500.00	90.00	180.63	5,446.00	-1,150.03	-162.49	1,153.71	0.00	0.00	0.00	
6,600.00	90.00	180.63	5,446.00	-1,250.03	-163.58	1,253.70	0.00	0.00	0.00	
6,700.00	90.00	180.63	5,446.00	-1,350.02	-164.68	1,353.69	0.00	0.00	0.00	



WOG

Planning Report

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Company:	Whiting Petroleum Corp.	TVD Reference:	KBE @ 4649.00usft
Project:	Weld County, CO	MD Reference:	KBE @ 4649.00usft
Site:	Sec 7-T9N-R57W	North Reference:	True
Well:	Cottonwood #07M-1902	Survey Calculation Method:	Minimum Curvature
Wellbore:	HZ		
Design:	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)	
6,800.00	90.00	180.63	5,446.00	-1,450.02	-165.78	1,453.68	0.00	0.00	0.00	
6,900.00	90.00	180.63	5,446.00	-1,550.01	-166.87	1,553.67	0.00	0.00	0.00	
7,000.00	90.00	180.63	5,446.00	-1,650.00	-167.97	1,653.66	0.00	0.00	0.00	
7,100.00	90.00	180.63	5,446.00	-1,750.00	-169.07	1,753.65	0.00	0.00	0.00	
7,200.00	90.00	180.63	5,446.00	-1,849.99	-170.16	1,853.64	0.00	0.00	0.00	
7,300.00	90.00	180.63	5,446.00	-1,949.99	-171.26	1,953.63	0.00	0.00	0.00	
7,400.00	90.00	180.63	5,446.00	-2,049.98	-172.36	2,053.62	0.00	0.00	0.00	
7,500.00	90.00	180.63	5,446.00	-2,149.97	-173.45	2,153.61	0.00	0.00	0.00	
7,600.00	90.00	180.63	5,446.00	-2,249.97	-174.55	2,253.60	0.00	0.00	0.00	
7,700.00	90.00	180.63	5,446.00	-2,349.96	-175.65	2,353.59	0.00	0.00	0.00	
7,800.00	90.00	180.63	5,446.00	-2,449.96	-176.74	2,453.58	0.00	0.00	0.00	
7,900.00	90.00	180.63	5,446.00	-2,549.95	-177.84	2,553.57	0.00	0.00	0.00	
8,000.00	90.00	180.63	5,446.00	-2,649.94	-178.94	2,653.57	0.00	0.00	0.00	
8,100.00	90.00	180.63	5,446.00	-2,749.94	-180.03	2,753.56	0.00	0.00	0.00	
8,200.00	90.00	180.63	5,446.00	-2,849.93	-181.13	2,853.55	0.00	0.00	0.00	
8,300.00	90.00	180.63	5,446.00	-2,949.93	-182.23	2,953.54	0.00	0.00	0.00	
8,400.00	90.00	180.63	5,446.00	-3,049.92	-183.32	3,053.53	0.00	0.00	0.00	
8,500.00	90.00	180.63	5,446.00	-3,149.91	-184.42	3,153.52	0.00	0.00	0.00	
8,600.00	90.00	180.63	5,446.00	-3,249.91	-185.52	3,253.51	0.00	0.00	0.00	
8,700.00	90.00	180.63	5,446.00	-3,349.90	-186.61	3,353.50	0.00	0.00	0.00	
8,800.00	90.00	180.63	5,446.00	-3,449.90	-187.71	3,453.49	0.00	0.00	0.00	
8,900.00	90.00	180.63	5,446.00	-3,549.89	-188.81	3,553.48	0.00	0.00	0.00	
9,000.00	90.00	180.63	5,446.00	-3,649.88	-189.90	3,653.47	0.00	0.00	0.00	
9,100.00	90.00	180.63	5,446.00	-3,749.88	-191.00	3,753.46	0.00	0.00	0.00	
9,200.00	90.00	180.63	5,446.00	-3,849.87	-192.10	3,853.45	0.00	0.00	0.00	
9,300.00	90.00	180.63	5,446.00	-3,949.87	-193.19	3,953.44	0.00	0.00	0.00	
9,400.00	90.00	180.63	5,446.00	-4,049.86	-194.29	4,053.43	0.00	0.00	0.00	
9,500.00	90.00	180.63	5,446.00	-4,149.85	-195.39	4,153.42	0.00	0.00	0.00	
9,600.00	90.00	180.63	5,446.00	-4,249.85	-196.48	4,253.41	0.00	0.00	0.00	
9,700.00	90.00	180.63	5,446.00	-4,349.84	-197.58	4,353.40	0.00	0.00	0.00	
9,800.00	90.00	180.63	5,446.00	-4,449.84	-198.68	4,453.39	0.00	0.00	0.00	
9,900.00	90.00	180.63	5,446.00	-4,549.83	-199.77	4,553.38	0.00	0.00	0.00	
10,000.00	90.00	180.63	5,446.00	-4,649.82	-200.87	4,653.37	0.00	0.00	0.00	
10,100.00	90.00	180.63	5,446.00	-4,749.82	-201.96	4,753.36	0.00	0.00	0.00	
10,200.00	90.00	180.63	5,446.00	-4,849.81	-203.06	4,853.35	0.00	0.00	0.00	
10,300.00	90.00	180.63	5,446.00	-4,949.81	-204.16	4,953.35	0.00	0.00	0.00	
10,400.00	90.00	180.63	5,446.00	-5,049.80	-205.25	5,053.34	0.00	0.00	0.00	
10,500.00	90.00	180.63	5,446.00	-5,149.79	-206.35	5,153.33	0.00	0.00	0.00	
10,600.00	90.00	180.63	5,446.00	-5,249.79	-207.45	5,253.32	0.00	0.00	0.00	
10,700.00	90.00	180.63	5,446.00	-5,349.78	-208.54	5,353.31	0.00	0.00	0.00	
10,800.00	90.00	180.63	5,446.00	-5,449.78	-209.64	5,453.30	0.00	0.00	0.00	
10,900.00	90.00	180.63	5,446.00	-5,549.77	-210.74	5,553.29	0.00	0.00	0.00	
11,000.00	90.00	180.63	5,446.00	-5,649.76	-211.83	5,653.28	0.00	0.00	0.00	
11,100.00	90.00	180.63	5,446.00	-5,749.76	-212.93	5,753.27	0.00	0.00	0.00	
11,200.00	90.00	180.63	5,446.00	-5,849.75	-214.03	5,853.26	0.00	0.00	0.00	
11,300.00	90.00	180.63	5,446.00	-5,949.74	-215.12	5,953.25	0.00	0.00	0.00	
11,400.00	90.00	180.63	5,446.00	-6,049.74	-216.22	6,053.24	0.00	0.00	0.00	
11,500.00	90.00	180.63	5,446.00	-6,149.73	-217.32	6,153.23	0.00	0.00	0.00	
11,600.00	90.00	180.63	5,446.00	-6,249.73	-218.41	6,253.22	0.00	0.00	0.00	
11,700.00	90.00	180.63	5,446.00	-6,349.72	-219.51	6,353.21	0.00	0.00	0.00	
11,800.00	90.00	180.63	5,446.00	-6,449.71	-220.61	6,453.20	0.00	0.00	0.00	
11,900.00	90.00	180.63	5,446.00	-6,549.71	-221.70	6,553.19	0.00	0.00	0.00	
12,000.00	90.00	180.63	5,446.00	-6,649.70	-222.80	6,653.18	0.00	0.00	0.00	
12,100.00	90.00	180.63	5,446.00	-6,749.70	-223.90	6,753.17	0.00	0.00	0.00	



WOG

Planning Report

Database:	LandmarkEDM	Local Co-ordinate Reference:	Well Cottonwood #07M-1902
Company:	Whiting Petroleum Corp.	TVD Reference:	KBE @ 4649.00usft
Project:	Weld County, CO	MD Reference:	KBE @ 4649.00usft
Site:	Sec 7-T9N-R57W	North Reference:	True
Well:	Cottonwood #07M-1902	Survey Calculation Method:	Minimum Curvature
Wellbore:	Hz		
Design:	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)	
12,200.00	90.00	180.63	5,446.00	-6,849.69	-224.99	6,853.16	0.00	0.00	0.00	
12,300.00	90.00	180.63	5,446.00	-6,949.68	-226.09	6,953.15	0.00	0.00	0.00	
12,400.00	90.00	180.63	5,446.00	-7,049.68	-227.19	7,053.14	0.00	0.00	0.00	
12,500.00	90.00	180.63	5,446.00	-7,149.67	-228.28	7,153.13	0.00	0.00	0.00	
12,600.00	90.00	180.63	5,446.00	-7,249.67	-229.38	7,253.13	0.00	0.00	0.00	
12,700.00	90.00	180.63	5,446.00	-7,349.66	-230.48	7,353.12	0.00	0.00	0.00	
12,800.00	90.00	180.63	5,446.00	-7,449.65	-231.57	7,453.11	0.00	0.00	0.00	
12,900.00	90.00	180.63	5,446.00	-7,549.65	-232.67	7,553.10	0.00	0.00	0.00	
13,000.00	90.00	180.63	5,446.00	-7,649.64	-233.77	7,653.09	0.00	0.00	0.00	
13,100.00	90.00	180.63	5,446.00	-7,749.64	-234.86	7,753.08	0.00	0.00	0.00	
13,200.00	90.00	180.63	5,446.00	-7,849.63	-235.96	7,853.07	0.00	0.00	0.00	
13,300.00	90.00	180.63	5,446.00	-7,949.62	-237.06	7,953.06	0.00	0.00	0.00	
13,400.00	90.00	180.63	5,446.00	-8,049.62	-238.15	8,053.05	0.00	0.00	0.00	
13,500.00	90.00	180.63	5,446.00	-8,149.61	-239.25	8,153.04	0.00	0.00	0.00	
13,600.00	90.00	180.63	5,446.00	-8,249.61	-240.35	8,253.03	0.00	0.00	0.00	
13,700.00	90.00	180.63	5,446.00	-8,349.60	-241.44	8,353.02	0.00	0.00	0.00	
13,800.00	90.00	180.63	5,446.00	-8,449.59	-242.54	8,453.01	0.00	0.00	0.00	
13,900.00	90.00	180.63	5,446.00	-8,549.59	-243.64	8,553.00	0.00	0.00	0.00	
14,000.00	90.00	180.63	5,446.00	-8,649.58	-244.73	8,652.99	0.00	0.00	0.00	
14,100.00	90.00	180.63	5,446.00	-8,749.58	-245.83	8,752.98	0.00	0.00	0.00	
14,200.00	90.00	180.63	5,446.00	-8,849.57	-246.93	8,852.97	0.00	0.00	0.00	
14,300.00	90.00	180.63	5,446.00	-8,949.56	-248.02	8,952.96	0.00	0.00	0.00	
14,400.00	90.00	180.63	5,446.00	-9,049.56	-249.12	9,052.95	0.00	0.00	0.00	
14,500.00	90.00	180.63	5,446.00	-9,149.55	-250.22	9,152.94	0.00	0.00	0.00	
14,600.00	90.00	180.63	5,446.00	-9,249.55	-251.31	9,252.93	0.00	0.00	0.00	
14,700.00	90.00	180.63	5,446.00	-9,349.54	-252.41	9,352.92	0.00	0.00	0.00	
14,800.00	90.00	180.63	5,446.00	-9,449.53	-253.51	9,452.92	0.00	0.00	0.00	
14,900.00	90.00	180.63	5,446.00	-9,549.53	-254.60	9,552.91	0.00	0.00	0.00	
15,000.00	90.00	180.63	5,446.00	-9,649.52	-255.70	9,652.90	0.00	0.00	0.00	
15,100.00	90.00	180.63	5,446.00	-9,749.52	-256.79	9,752.89	0.00	0.00	0.00	
15,200.00	90.00	180.63	5,446.00	-9,849.51	-257.89	9,852.88	0.00	0.00	0.00	
15,300.00	90.00	180.63	5,446.00	-9,949.50	-258.99	9,952.87	0.00	0.00	0.00	
15,400.00	90.00	180.63	5,446.00	-10,049.50	-260.08	10,052.86	0.00	0.00	0.00	
15,500.00	90.00	180.63	5,446.00	-10,149.49	-261.18	10,152.85	0.00	0.00	0.00	
15,600.00	90.00	180.63	5,446.00	-10,249.49	-262.28	10,252.84	0.00	0.00	0.00	
15,700.00	90.00	180.63	5,446.00	-10,349.48	-263.37	10,352.83	0.00	0.00	0.00	
15,800.00	90.00	180.63	5,446.00	-10,449.47	-264.47	10,452.82	0.00	0.00	0.00	
15,900.00	90.00	180.63	5,446.00	-10,549.47	-265.57	10,552.81	0.00	0.00	0.00	
16,000.00	90.00	180.63	5,446.00	-10,649.46	-266.66	10,652.80	0.00	0.00	0.00	
16,100.00	90.00	180.63	5,446.00	-10,749.46	-267.76	10,752.79	0.00	0.00	0.00	
16,184.33	90.00	180.63	5,446.00	-10,833.78	-268.69	10,837.11	0.00	0.00	0.00	
TD at 16184.33 - PBHL Cottonwood 07M-1902										

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										
PBHL Cottonwood 07M-	0.00	0.00	5,446.00	-10,833.78	-268.69	1,513,335.48	3,470,946.13	40° 43' 48.390 N		103° 48' 2.430 W
- plan hits target center										
- Point										



WOG Planning Report

Database:	LandmarkEDM	Local Co-ordinate Reference:	Well Cottonwood #07M-1902
Company:	Whiting Petroleum Corp.	TVD Reference:	KBE @ 4649.00usft
Project:	Weld County, CO	MD Reference:	KBE @ 4649.00usft
Site:	Sec 7-T9N-R57W	North Reference:	True
Well:	Cottonwood #07M-1902	Survey Calculation Method:	Minimum Curvature
Wellbore:	Hz		
Design:	APD		

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (in)	Hole Diameter (in)	
5,815.39	5,446.00	5 1/2" Marker / 7"	7.000	8.750	

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
1,201.18	1,200.00	Upper Pierre				
3,504.59	3,500.00	Hygiene				
3,654.81	3,650.00	Lower Pierre				
5,348.04	5,282.00	P200 Marker				
5,385.08	5,306.00	P300 Marker				
5,409.65	5,321.00	P350 Marker				
5,428.51	5,332.00	Sharon Springs				
5,440.94	5,339.00	Niobrara				
5,468.90	5,354.00	Top A Chalk (N100)				
5,532.12	5,384.00	Top A Marl (N200)				
5,548.84	5,391.00	A Marl (N250)				
5,571.92	5,400.00	Top Upper B (N400)				
5,667.95	5,429.00	Base Upper B (N430)				
5,815.39	5,446.00	Top Lower B (N460)				

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
300.00	300.00	0.00	0.00	Build 2°/100'	
455.82	455.75	3.20	-2.77	Hold 3.12° Inc	
4,459.75	4,453.75	167.80	-145.23	Drop 2°/100'	
4,615.58	4,609.50	171.00	-148.00	Hold Vertical	
4,815.58	4,809.50	171.00	-148.00	KOP, Build 9°/100'	
5,815.39	5,446.00	-465.46	-154.98	LP @ 90° Inc, Hold	
16,184.33	5,446.00	-10,833.78	-268.69	TD at 16184.33	