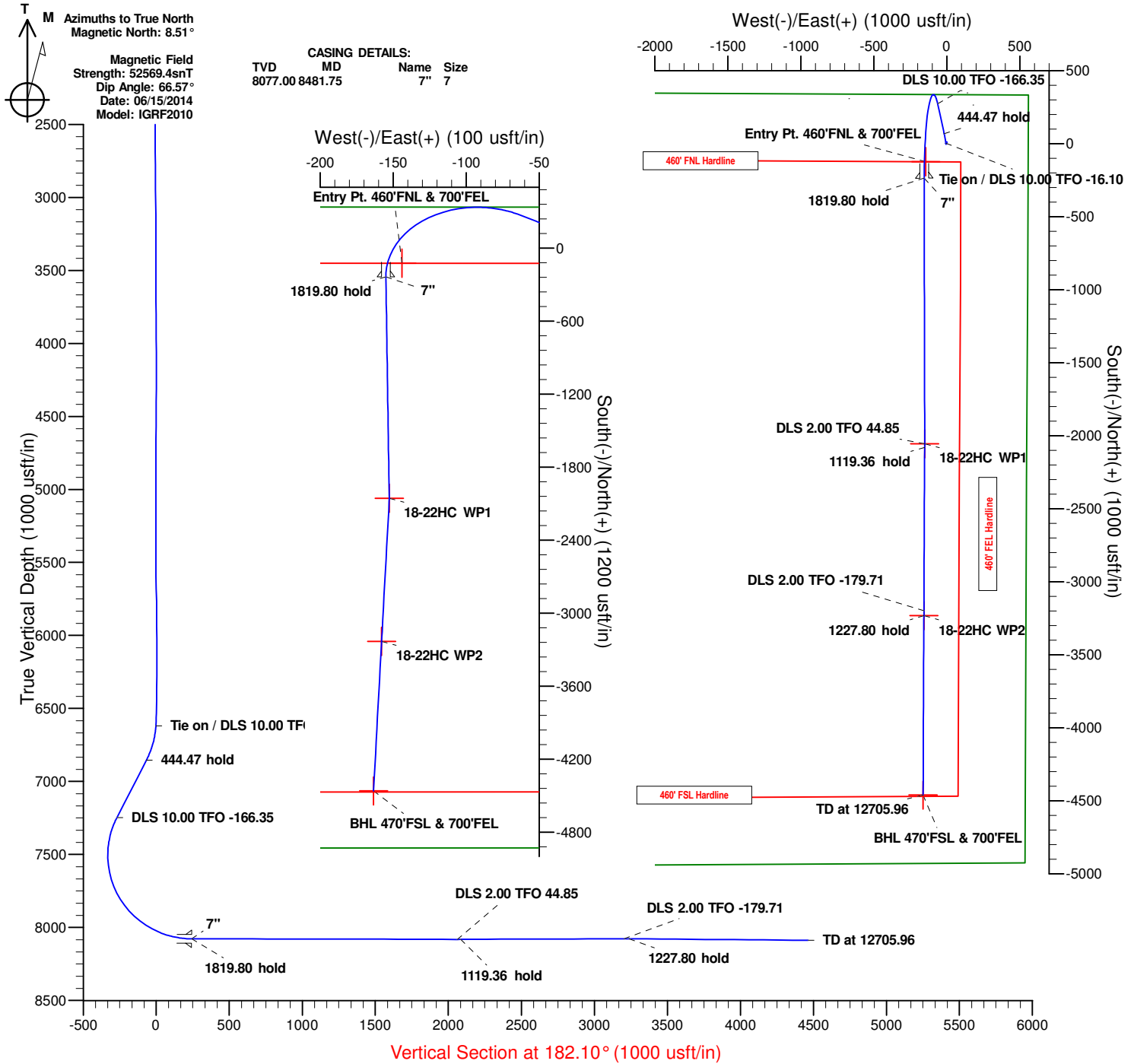




Project: Adams Co., CO  
 Site: Sec.18-T1S-R67W  
 Well: Willow Bend LD 18-22HC  
 Wellbore: Wellbore #2 ST1  
 Design: ST1 Design #1  
 Lat: 39° 58' 15.459 N  
 Long: 104° 55' 26.360 W  
 GL: 5230.80  
 KB: WELL @ 5247.30usft (Original Well Elev)



**Precision**  
 Directional Services



#### WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
18-22HC WP2	8077.00	-3232.39	-157.95	39° 57' 43.515 N	104° 55' 28.389 W	
Entry Pt. 460'FNL & 700'FEL	8077.00	-123.47	-144.06	39° 58' 14.239 N	104° 55' 28.211 W	Point
18-22HC WP1	8081.00	-2055.79	-152.69	39° 57' 55.143 N	104° 55' 28.321 W	Point
BHL 470'FSL & 700'FEL	8087.00	-4460.13	-163.43	39° 57' 31.381 N	104° 55' 28.459 W	Point

#### SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
6620.00	3.60	2.00	6619.46	3.39	-7.05	0.00	0.00	-3.13	Tie on / DLS 10.00 TFO -16.10
6865.09	27.98	347.81	6853.56	68.27	-19.11	10.00	-16.10	-67.53	444.47 hold
7309.56	27.98	347.81	7246.06	272.13	-63.16	0.00	0.00	-269.63	DLS 10.00 TFO -166.35
8481.75	89.87	179.93	8077.00	-236.00	-155.00	10.00	-166.35	241.52	1819.80 hold
10301.54	89.87	179.93	8081.00	-2055.79	-152.69	0.00	0.00	2060.00	DLS 2.00 TFO 44.85
10325.08	90.21	180.26	8080.98	-2079.33	-152.73	2.00	44.85	2083.52	1119.36 hold
11444.44	90.21	180.26	8076.92	-3198.67	-157.79	0.00	0.00	3202.30	DLS 2.00 TFO -179.71
11478.16	89.53	180.26	8077.00	-3232.39	-157.95	2.00	-179.71	3236.00	1227.80 hold
12705.96	89.53	180.26	8087.00	-4460.13	-163.43	0.00	0.00	4463.13	TD at 12705.96

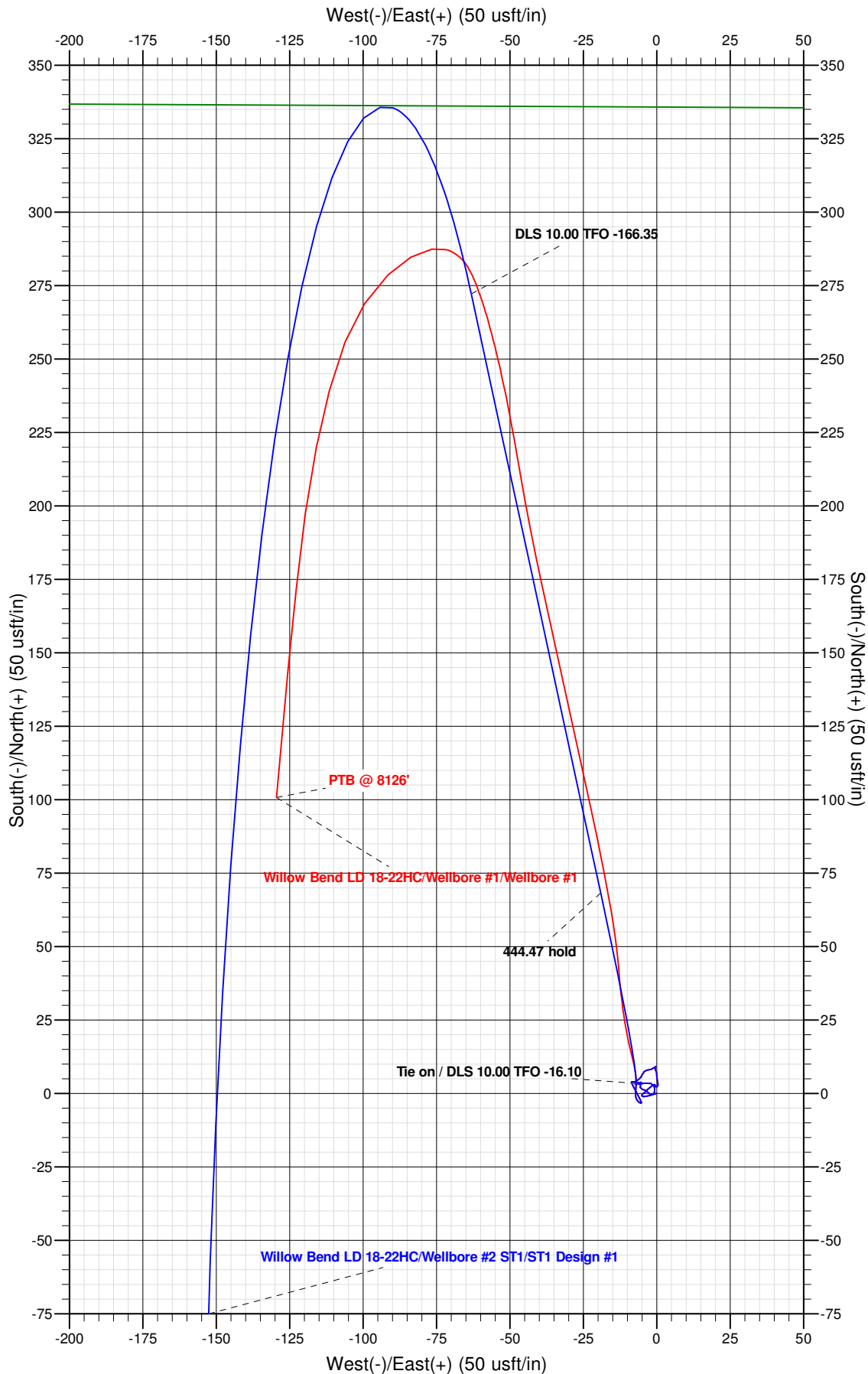


Project: Adams Co., CO  
Site: Sec.18-T1S-R67W  
Well: Willow Bend LD 18-22HC  
Wellbore: Wellbore #2 ST1  
Design: ST1 Design #1  
Lat: 39° 58' 15.459 N  
Long: 104° 55' 26.360 W  
GL: 5230.80

KB: WELL @ 5247.30usft (Original Well Elev)



Precision  
Directional Services





## **Great Western Oil & Gas**

**Adams Co., CO**

**Sec.18-T1S-R67W**

**Willow Bend LD 18-22HC**

**Wellbore #2 ST1**

**Plan: ST1 Design #1**

## **Standard Planning Report**

**15 June, 2014**



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well Willow Bend LD 18-22HC
<b>Company:</b>	Great Western Oil & Gas	<b>TVD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Project:</b>	Adams Co., CO	<b>MD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Site:</b>	Sec.18-T1S-R67W	<b>North Reference:</b>	True
<b>Well:</b>	Willow Bend LD 18-22HC	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #2 ST1		
<b>Design:</b>	ST1 Design #1		

<b>Project</b>	Adams Co., 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.18-T1S-R67W			
Site Position:		Northing:	1,232,792.52 usft	Latitude:	39° 58' 15.449 N
From:	Lat/Long	Easting:	3,161,528.82 usft	Longitude:	104° 55' 25.208 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.37

Well	Willow Bend LD 18-22HC					
Well Position	+N/-S	1.07 usft	Northing:	1,232,793.01 usft	Latitude:	39° 58' 15.459 N
	+E/-W	-89.69 usft	Easting:	3,161,439.13 usft	Longitude:	104° 55' 26.360 W
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	5,230.80 usft

<b>Wellbore</b>	Wellbore #2 ST1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	06/15/14	8.51	66.57	52,569

<b>Design</b>	ST1 Design #1				
<b>Audit Notes:</b>					
<b>Version:</b>	<b>Phase:</b>	PROTOTYPE	<b>Tie On Depth:</b>	6,620.00	
<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	182.10	

<b>Plan Sections</b>										
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
6,620.00	3.60	2.00	6,619.46	3.39	-7.05	0.00	0.00	0.00	0.00	
6,865.09	27.98	347.81	6,853.56	68.27	-19.11	10.00	9.95	-5.79	-16.10	
7,309.56	27.98	347.81	7,246.06	272.13	-63.16	0.00	0.00	0.00	0.00	
8,481.75	89.87	179.93	8,077.00	-236.00	-155.00	10.00	5.28	-14.32	-166.35	Entry Pt. 460'FNL & 7
10,301.54	89.87	179.93	8,081.00	-2,055.79	-152.69	0.00	0.00	0.00	0.00	18-22HC WP1
10,325.08	90.21	180.26	8,080.98	-2,079.33	-152.73	2.00	1.42	1.41	44.85	
11,444.44	90.21	180.26	8,076.92	-3,198.67	-157.79	0.00	0.00	0.00	0.00	
11,478.16	89.53	180.26	8,077.00	-3,232.39	-157.95	2.00	-2.00	-0.01	-179.71	18-22HC WP2
12,705.96	89.53	180.26	8,087.00	-4,460.13	-163.43	0.00	0.00	0.00	0.00	BHL 470'FSL & 700'F

<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well Willow Bend LD 18-22HC
<b>Company:</b>	Great Western Oil & Gas	<b>TVD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Project:</b>	Adams Co., CO	<b>MD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Site:</b>	Sec.18-T1S-R67W	<b>North Reference:</b>	True
<b>Well:</b>	Willow Bend LD 18-22HC	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #2 ST1		
<b>Design:</b>	ST1 Design #1		

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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140.00	1.10	254.50	139.99	-0.36	-1.29	0.41	0.79	0.79	0.00
233.00	1.10	254.10	232.97	-0.84	-3.01	0.95	0.01	0.00	-0.43
326.00	0.70	267.80	325.96	-1.11	-4.44	1.27	0.49	-0.43	14.73
418.00	0.40	347.50	417.96	-0.82	-5.07	1.00	0.81	-0.33	86.63
511.00	0.30	32.10	510.96	-0.29	-5.01	0.48	0.30	-0.11	47.96
604.00	0.30	77.80	603.96	-0.04	-4.64	0.21	0.25	0.00	49.14
697.00	0.50	43.40	696.95	0.31	-4.13	-0.16	0.33	0.22	-36.99
790.00	0.50	35.80	789.95	0.93	-3.61	-0.80	0.07	0.00	-8.17
883.00	0.50	59.40	882.95	1.47	-3.02	-1.36	0.22	0.00	25.38
975.00	0.60	40.70	974.94	2.04	-2.37	-1.95	0.22	0.11	-20.33
1,068.00	0.80	59.50	1,067.94	2.74	-1.49	-2.68	0.32	0.22	20.22
1,161.00	0.10	68.10	1,160.93	3.10	-0.85	-3.06	0.75	-0.75	9.25
1,255.00	0.20	154.60	1,254.93	2.98	-0.71	-2.95	0.23	0.11	92.02
1,354.00	0.30	147.80	1,353.93	2.61	-0.49	-2.59	0.11	0.10	-6.87
1,447.00	0.20	132.70	1,446.93	2.29	-0.25	-2.28	0.13	-0.11	-16.24
1,539.00	0.20	75.30	1,538.93	2.22	0.03	-2.22	0.21	0.00	-62.39
1,629.00	0.30	18.90	1,628.93	2.48	0.26	-2.49	0.28	0.11	-62.67
1,721.00	0.30	16.30	1,720.93	2.94	0.40	-2.96	0.01	0.00	-2.83
1,813.00	0.50	340.10	1,812.93	3.55	0.33	-3.56	0.34	0.22	-39.35
1,905.00	0.80	356.80	1,904.92	4.57	0.16	-4.57	0.38	0.33	18.15
1,997.00	0.70	350.40	1,996.91	5.77	0.03	-5.76	0.14	-0.11	-6.96
2,090.00	1.00	357.30	2,089.90	7.14	-0.10	-7.13	0.34	0.32	7.42
2,181.00	0.60	300.90	2,180.89	8.17	-0.55	-8.15	0.92	-0.44	-61.98
2,266.00	0.50	39.80	2,265.89	8.69	-0.69	-8.66	0.99	-0.12	116.35
2,351.00	0.40	42.70	2,350.89	9.19	-0.25	-9.18	0.12	-0.12	3.41
2,436.00	0.90	229.70	2,435.89	8.98	-0.56	-8.95	1.53	0.59	-203.53
2,522.00	1.10	249.90	2,521.87	8.26	-1.85	-8.18	0.47	0.23	23.49
2,607.00	1.10	263.30	2,606.86	7.88	-3.43	-7.75	0.30	0.00	15.76
2,692.00	0.50	193.80	2,691.85	7.43	-4.33	-7.26	1.22	-0.71	-81.76
2,777.00	0.40	229.30	2,776.85	6.87	-4.64	-6.70	0.34	-0.12	41.76
2,863.00	0.40	207.40	2,862.85	6.41	-5.01	-6.22	0.18	0.00	-25.47
2,948.00	0.90	204.50	2,947.84	5.54	-5.42	-5.34	0.59	0.59	-3.41
3,033.00	1.00	247.60	3,032.83	4.65	-6.38	-4.41	0.83	0.12	50.71
3,119.00	0.60	224.90	3,118.82	4.04	-7.40	-3.77	0.58	-0.47	-26.40
3,204.00	0.30	111.60	3,203.82	3.65	-7.50	-3.37	0.91	-0.35	-133.29
3,289.00	0.40	92.60	3,288.82	3.55	-7.00	-3.29	0.18	0.12	-22.35
3,374.00	0.30	172.60	3,373.82	3.32	-6.67	-3.07	0.54	-0.12	94.12
3,460.00	0.90	85.90	3,459.81	3.14	-5.97	-2.92	1.08	0.70	-100.81
3,545.00	1.60	75.20	3,544.79	3.49	-4.16	-3.34	0.86	0.82	-12.59
3,630.00	1.40	110.50	3,629.77	3.43	-2.04	-3.36	1.09	-0.24	41.53
3,716.00	1.10	163.80	3,715.75	2.27	-0.82	-2.24	1.34	-0.35	61.98
3,801.00	0.20	237.60	3,800.74	1.41	-0.72	-1.38	1.25	-1.06	86.82
3,886.00	0.40	165.30	3,885.74	1.04	-0.77	-1.01	0.46	0.24	-85.06
3,971.00	0.60	203.10	3,970.74	0.35	-0.87	-0.31	0.44	0.24	44.47
4,057.00	0.40	247.40	4,056.73	-0.18	-1.32	0.23	0.49	-0.23	51.51
4,142.00	0.40	231.80	4,141.73	-0.48	-1.83	0.55	0.13	0.00	-18.35
4,227.00	0.20	336.70	4,226.73	-0.53	-2.12	0.61	0.58	-0.24	123.41
4,313.00	0.80	316.90	4,312.73	0.05	-2.59	0.05	0.72	0.70	-23.02
4,398.00	1.00	301.20	4,397.72	0.87	-3.63	-0.73	0.37	0.24	-18.47
4,484.00	1.20	288.90	4,483.70	1.55	-5.13	-1.36	0.36	0.23	-14.30
4,569.00	0.50	49.50	4,568.70	2.07	-5.69	-1.87	1.78	-0.82	141.88
4,655.00	1.10	350.40	4,654.69	3.13	-5.54	-2.93	1.10	0.70	-68.72
4,740.00	0.30	123.30	4,739.68	3.81	-5.49	-3.61	1.56	-0.94	156.35

<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well Willow Bend LD 18-22HC
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<b>Project:</b>	Adams Co., CO	<b>MD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Site:</b>	Sec.18-T1S-R67W	<b>North Reference:</b>	True
<b>Well:</b>	Willow Bend LD 18-22HC	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #2 ST1		
<b>Design:</b>	ST1 Design #1		

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)
4,826.00	0.40	124.40	4,825.68	3.52	-5.05	-3.33	0.12	0.12	1.28
4,911.00	0.50	285.20	4,910.68	3.45	-5.17	-3.26	1.04	0.12	189.18
4,996.00	1.20	275.00	4,995.67	3.63	-6.41	-3.39	0.84	0.82	-12.00
5,082.00	0.50	215.80	5,081.66	3.40	-7.53	-3.12	1.21	-0.81	-68.84
5,167.00	0.40	70.00	5,166.66	3.20	-7.47	-2.93	1.01	-0.12	-171.53
5,253.00	0.40	55.00	5,252.66	3.48	-6.94	-3.22	0.12	0.00	-17.44
5,338.00	0.10	307.00	5,337.66	3.69	-6.75	-3.44	0.52	-0.35	-127.06
5,424.00	1.00	282.90	5,423.65	3.90	-7.55	-3.62	1.06	1.05	-28.02
5,510.00	0.40	247.40	5,509.65	3.96	-8.55	-3.64	0.83	-0.70	-41.28
5,595.00	1.30	149.90	5,594.64	3.01	-8.34	-2.70	1.66	1.06	-114.71
5,681.00	2.00	153.40	5,680.60	0.82	-7.18	-0.56	0.82	0.81	4.07
5,766.00	1.10	150.80	5,765.57	-1.22	-6.12	1.44	1.06	-1.06	-3.06
5,851.00	0.40	165.30	5,850.56	-2.22	-5.65	2.42	0.85	-0.82	17.06
5,937.00	0.40	147.60	5,936.56	-2.76	-5.41	2.96	0.14	0.00	-20.58
6,022.00	0.20	140.70	6,021.56	-3.13	-5.16	3.31	0.24	-0.24	-8.12
6,108.00	0.30	260.40	6,107.56	-3.28	-5.28	3.47	0.51	0.12	139.19
6,193.00	0.20	286.80	6,192.56	-3.27	-5.65	3.48	0.18	-0.12	31.06
6,279.00	0.60	307.70	6,278.56	-2.95	-6.15	3.18	0.49	0.47	24.30
6,364.00	0.70	329.90	6,363.55	-2.23	-6.76	2.48	0.32	0.12	26.12
6,449.00	0.80	344.30	6,448.55	-1.21	-7.18	1.48	0.25	0.12	16.94
6,534.00	0.90	8.40	6,533.54	0.02	-7.24	0.25	0.43	0.12	28.35
6,620.00	3.60	2.00	6,619.46	3.39	-7.05	-3.13	3.15	3.14	-7.44
<b>Tie on / DLS 10.00 TFO -16.10</b>									
6,650.00	6.54	354.67	6,649.34	6.03	-7.18	-5.76	10.00	9.78	-24.42
6,700.00	11.50	350.84	6,698.71	13.79	-8.23	-13.48	10.00	9.93	-7.67
6,750.00	16.49	349.30	6,747.21	25.69	-10.35	-25.29	10.00	9.97	-3.07
6,800.00	21.48	348.46	6,794.47	41.64	-13.50	-41.12	10.00	9.99	-1.67
6,850.00	26.48	347.93	6,840.14	61.52	-17.66	-60.83	10.00	9.99	-1.07
6,865.09	27.98	347.81	6,853.56	68.27	-19.11	-67.53	10.00	9.99	-0.83
<b>444.47 hold</b>									
6,900.00	27.98	347.81	6,884.39	84.28	-22.57	-83.40	0.00	0.00	0.00
7,000.00	27.98	347.81	6,972.70	130.15	-32.48	-128.87	0.00	0.00	0.00
7,100.00	27.98	347.81	7,061.00	176.01	-42.39	-174.34	0.00	0.00	0.00
7,200.00	27.98	347.81	7,149.31	221.88	-52.30	-219.81	0.00	0.00	0.00
7,309.56	27.98	347.81	7,246.06	272.13	-63.16	-269.63	0.00	0.00	0.00
<b>DLS 10.00 TFO -166.35</b>									
7,350.00	24.07	345.47	7,282.39	289.39	-67.24	-286.74	10.00	-9.67	-5.78
7,400.00	19.31	341.36	7,328.84	307.11	-72.44	-304.25	10.00	-9.53	-8.21
7,450.00	14.69	334.76	7,376.65	320.68	-77.79	-317.62	10.00	-9.24	-13.22
7,500.00	10.42	322.61	7,425.45	330.02	-83.24	-326.75	10.00	-8.54	-24.29
7,550.00	7.15	297.22	7,474.88	335.03	-88.76	-331.56	10.00	-6.54	-50.78
7,600.00	6.59	254.69	7,524.55	335.70	-94.30	-332.02	10.00	-1.12	-85.05
7,650.00	9.25	223.12	7,574.09	332.01	-99.81	-328.13	10.00	5.31	-63.14
7,700.00	13.32	208.01	7,623.12	323.99	-105.26	-319.92	10.00	8.14	-30.24
7,750.00	17.86	200.15	7,671.28	311.70	-110.61	-307.44	10.00	9.08	-15.71
7,800.00	22.59	195.45	7,718.19	295.24	-115.82	-290.80	10.00	9.46	-9.40
7,850.00	27.41	192.32	7,763.49	274.73	-120.83	-270.12	10.00	9.64	-6.26
7,900.00	32.28	190.07	7,806.85	250.32	-125.63	-245.55	10.00	9.74	-4.50
7,950.00	37.19	188.36	7,847.93	222.21	-130.16	-217.29	10.00	9.81	-3.43
8,000.00	42.11	187.00	7,886.41	190.60	-134.41	-185.55	10.00	9.84	-2.73
8,050.00	47.04	185.87	7,922.02	155.74	-138.32	-150.57	10.00	9.87	-2.25
8,100.00	51.99	184.91	7,954.47	117.89	-141.88	-112.61	10.00	9.89	-1.92
8,150.00	56.94	184.07	7,983.52	77.34	-145.06	-71.97	10.00	9.90	-1.67

<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well Willow Bend LD 18-22HC
<b>Company:</b>	Great Western Oil & Gas	<b>TVD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Project:</b>	Adams Co., CO	<b>MD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Site:</b>	Sec.18-T1S-R67W	<b>North Reference:</b>	True
<b>Well:</b>	Willow Bend LD 18-22HC	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #2 ST1		
<b>Design:</b>	ST1 Design #1		

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)	
8,200.00	61.90	183.33	8,008.96	34.40	-147.83	-28.96	10.00	9.91	-1.50	
8,250.00	66.86	182.64	8,030.57	-10.61	-150.17	16.10	10.00	9.92	-1.36	
8,300.00	71.82	182.01	8,048.21	-57.34	-152.06	62.87	10.00	9.93	-1.27	
8,350.00	76.79	181.41	8,061.73	-105.44	-153.50	110.99	10.00	9.93	-1.20	
8,400.00	81.75	180.84	8,071.04	-154.54	-154.46	160.09	10.00	9.93	-1.15	
8,450.00	86.72	180.28	8,076.06	-204.27	-154.94	209.81	10.00	9.93	-1.12	
8,481.75	89.87	179.93	8,077.00	-236.00	-155.00	241.52	10.00	9.94	-1.11	
1819.80 hold										
8,500.00	89.87	179.93	8,077.04	-254.25	-154.98	259.76	0.00	0.00	0.00	
8,600.00	89.87	179.93	8,077.26	-354.25	-154.85	359.69	0.00	0.00	0.00	
8,700.00	89.87	179.93	8,077.48	-454.25	-154.72	459.61	0.00	0.00	0.00	
8,800.00	89.87	179.93	8,077.70	-554.25	-154.60	559.54	0.00	0.00	0.00	
8,900.00	89.87	179.93	8,077.92	-654.25	-154.47	659.47	0.00	0.00	0.00	
9,000.00	89.87	179.93	8,078.14	-754.25	-154.34	759.40	0.00	0.00	0.00	
9,100.00	89.87	179.93	8,078.36	-854.25	-154.22	859.33	0.00	0.00	0.00	
9,200.00	89.87	179.93	8,078.58	-954.25	-154.09	959.25	0.00	0.00	0.00	
9,300.00	89.87	179.93	8,078.80	-1,054.25	-153.96	1,059.18	0.00	0.00	0.00	
9,400.00	89.87	179.93	8,079.02	-1,154.25	-153.83	1,159.11	0.00	0.00	0.00	
9,500.00	89.87	179.93	8,079.24	-1,254.25	-153.71	1,259.04	0.00	0.00	0.00	
9,600.00	89.87	179.93	8,079.46	-1,354.25	-153.58	1,358.97	0.00	0.00	0.00	
9,700.00	89.87	179.93	8,079.68	-1,454.25	-153.45	1,458.89	0.00	0.00	0.00	
9,800.00	89.87	179.93	8,079.90	-1,554.25	-153.33	1,558.82	0.00	0.00	0.00	
9,900.00	89.87	179.93	8,080.12	-1,654.25	-153.20	1,658.75	0.00	0.00	0.00	
10,000.00	89.87	179.93	8,080.34	-1,754.25	-153.07	1,758.68	0.00	0.00	0.00	
10,100.00	89.87	179.93	8,080.56	-1,854.25	-152.95	1,858.61	0.00	0.00	0.00	
10,200.00	89.87	179.93	8,080.78	-1,954.25	-152.82	1,958.53	0.00	0.00	0.00	
10,301.54	89.87	179.93	8,081.00	-2,055.79	-152.69	2,060.00	0.00	0.00	0.00	
DLS 2.00 TFO 44.85										
10,325.08	90.21	180.26	8,080.98	-2,079.33	-152.73	2,083.52	2.00	1.42	1.41	
1119.36 hold										
10,400.00	90.21	180.26	8,080.71	-2,154.25	-153.07	2,158.41	0.00	0.00	0.00	
10,500.00	90.21	180.26	8,080.35	-2,254.24	-153.52	2,258.35	0.00	0.00	0.00	
10,600.00	90.21	180.26	8,079.99	-2,354.24	-153.97	2,358.30	0.00	0.00	0.00	
10,700.00	90.21	180.26	8,079.62	-2,454.24	-154.43	2,458.25	0.00	0.00	0.00	
10,800.00	90.21	180.26	8,079.26	-2,554.24	-154.88	2,558.20	0.00	0.00	0.00	
10,900.00	90.21	180.26	8,078.90	-2,654.24	-155.33	2,658.15	0.00	0.00	0.00	
11,000.00	90.21	180.26	8,078.54	-2,754.24	-155.78	2,758.09	0.00	0.00	0.00	
11,100.00	90.21	180.26	8,078.17	-2,854.23	-156.24	2,858.04	0.00	0.00	0.00	
11,200.00	90.21	180.26	8,077.81	-2,954.23	-156.69	2,957.99	0.00	0.00	0.00	
11,300.00	90.21	180.26	8,077.45	-3,054.23	-157.14	3,057.94	0.00	0.00	0.00	
11,400.00	90.21	180.26	8,077.09	-3,154.23	-157.59	3,157.88	0.00	0.00	0.00	
11,444.44	90.21	180.26	8,076.92	-3,198.67	-157.79	3,202.30	0.00	0.00	0.00	
DLS 2.00 TFO -179.71										
11,478.16	89.53	180.26	8,077.00	-3,232.39	-157.95	3,236.00	2.00	-2.00	-0.01	
1227.80 hold										
11,500.00	89.53	180.26	8,077.18	-3,254.23	-158.04	3,257.83	0.00	0.00	0.00	
11,600.00	89.53	180.26	8,077.99	-3,354.22	-158.49	3,357.78	0.00	0.00	0.00	
11,700.00	89.53	180.26	8,078.81	-3,454.22	-158.94	3,457.72	0.00	0.00	0.00	
11,800.00	89.53	180.26	8,079.62	-3,554.21	-159.38	3,557.67	0.00	0.00	0.00	
11,900.00	89.53	180.26	8,080.44	-3,654.21	-159.83	3,657.61	0.00	0.00	0.00	
12,000.00	89.53	180.26	8,081.25	-3,754.21	-160.28	3,757.56	0.00	0.00	0.00	
12,100.00	89.53	180.26	8,082.06	-3,854.20	-160.72	3,857.50	0.00	0.00	0.00	
12,200.00	89.53	180.26	8,082.88	-3,954.20	-161.17	3,957.45	0.00	0.00	0.00	

<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well Willow Bend LD 18-22HC
<b>Company:</b>	Great Western Oil & Gas	<b>TVD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Project:</b>	Adams Co., CO	<b>MD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Site:</b>	Sec.18-T1S-R67W	<b>North Reference:</b>	True
<b>Well:</b>	Willow Bend LD 18-22HC	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #2 ST1		
<b>Design:</b>	ST1 Design #1		

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)
12,300.00	89.53	180.26	8,083.69	-4,054.19	-161.62	4,057.39	0.00	0.00	0.00
12,400.00	89.53	180.26	8,084.51	-4,154.19	-162.06	4,157.34	0.00	0.00	0.00
12,500.00	89.53	180.26	8,085.32	-4,254.18	-162.51	4,257.28	0.00	0.00	0.00
12,600.00	89.53	180.26	8,086.14	-4,354.18	-162.96	4,357.23	0.00	0.00	0.00
12,705.96	89.53	180.26	8,087.00	-4,460.13	-163.43	4,463.13	0.00	0.00	0.00
TD at 12705.96									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Entry Pt. 460'FNL & 700 - hit/miss target - Shape - plan misses target center by 14.88usft at 8370.37usft MD (8066.04 TVD, -125.35 N, -153.95 E) - Point	0.00	0.00	8,077.00	-123.47	-144.06	1,232,668.61	3,161,295.87	39° 58' 14.239 N	104° 55' 28.211 W
18-22HC WP2 - plan hits target center - Point	0.00	0.00	8,077.00	-3,232.39	-157.95	1,229,559.66	3,161,302.18	39° 57' 43.515 N	104° 55' 28.389 W
18-22HC WP1 - plan hits target center - Point	0.00	0.00	8,081.00	-2,055.79	-152.69	1,230,736.27	3,161,299.80	39° 57' 55.143 N	104° 55' 28.321 W
BHL 470'FSL & 700'FEL - plan hits target center - Point	0.00	0.00	8,087.00	-4,460.13	-163.43	1,228,331.91	3,161,304.68	39° 57' 31.381 N	104° 55' 28.459 W

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
8,481.75	8,077.00	7"	7	7-1/2	

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates	Comment	
		+N/-S (usft)	+E/-W (usft)	
6,620.00	6,619.46	3.39	-7.05	Tie on / DLS 10.00 TFO -16.10
6,865.09	6,853.56	68.27	-19.11	444.47 hold
7,309.56	7,246.06	272.13	-63.16	DLS 10.00 TFO -166.35
8,481.75	8,077.00	-236.00	-155.00	1819.80 hold
10,301.54	8,081.00	-2,055.79	-152.69	DLS 2.00 TFO 44.85
10,325.08	8,080.98	-2,079.33	-152.73	1119.36 hold
11,444.44	8,076.92	-3,198.67	-157.79	DLS 2.00 TFO -179.71
11,478.16	8,077.00	-3,232.39	-157.95	1227.80 hold
12,705.96	8,087.00	-4,460.13	-163.43	TD at 12705.96





**Precision**  
Directional Services

## **Great Western Oil & Gas**

Adams Co., CO  
Sec.18-T1S-R67W  
Willow Bend LD 18-22HC

Wellbore #2 ST1  
ST1 Design #1

## **Anticollision Report**

15 June, 2014



<b>Company:</b>	Great Western Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Willow Bend LD 18-22HC
<b>Project:</b>	Adams Co., CO	<b>TVD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Reference Site:</b>	Sec.18-T1S-R67W	<b>MD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Site Error:</b>	0.00 usft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Willow Bend LD 18-22HC	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 usft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #2 ST1	<b>Database:</b>	EDM 5000.1 Single User Db
<b>Reference Design:</b>	ST1 Design #1	<b>Offset TVD Reference:</b>	Offset Datum

<b>Reference</b>	ST1 Design #1		
<b>Filter type:</b>	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
<b>Interpolation Method:</b>	Stations	<b>Error Model:</b>	ISCWSA
<b>Depth Range:</b>	Unlimited	<b>Scan Method:</b>	Closest Approach 3D
<b>Results Limited by:</b>	Maximum center-center distance of 9,999.98 usft	<b>Error Surface:</b>	Elliptical Conic
<b>Warning Levels Evaluated at:</b>	2.00 Sigma	<b>Casing Method:</b>	Not applied

<b>Survey Tool Program</b>	<b>Date</b> 06/15/14				
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
140.00	6,620.00	Precision MWD Survey (Wellbore #1)	MWD	Std MWD	
6,620.00	12,705.96	ST1 Design #1 (Wellbore #2 ST1)	MWD	Std MWD	

<b>Summary</b>						
<b>Site Name</b>	<b>Reference Measured Depth (usft)</b>	<b>Offset Measured Depth (usft)</b>	<b>Distance Between Centres (usft)</b>	<b>Distance Between Ellipses (usft)</b>	<b>Separation Factor</b>	<b>Warning</b>
<b>Offset Well - Wellbore - Design</b>						
Sec.18-T1S-R67W						
Willow Bend LD 18-22HC - Wellbore #1 - Wellbore #1	6,620.00	6,620.00	0.00	0.00	10,000.000	CC, ES
Willow Bend LD 18-22HC - Wellbore #1 - Wellbore #1	6,634.40	6,634.40	0.15	0.06	1.743	SF

<b>Offset Design</b> Sec.18-T1S-R67W - Willow Bend LD 18-22HC - Wellbore #1 - Wellbore #1													<b>Offset Site Error:</b> 0.00 usft
<b>Survey Program:</b> 140-MWD													<b>Offset Well Error:</b> 0.00 usft
<b>Reference</b>	<b>Offset</b>	<b>Semi Major Axis</b>		<b>Distance</b>									<b>Warning</b>
<b>Measured Depth (usft)</b>	<b>Vertical Depth (usft)</b>	<b>Measured Depth (usft)</b>	<b>Vertical Depth (usft)</b>	<b>Reference (usft)</b>	<b>Offset (usft)</b>	<b>Highside Toolface (°)</b>	<b>Offset Wellbore Centre +N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Between Centres (usft)</b>	<b>Between Ellipses (usft)</b>	<b>Minimum Separation (usft)</b>	<b>Separation Factor</b>	
6,620.00	6,619.46	6,620.00	6,619.46	0.00	0.00	0.00	3.39	-7.05	0.00	0.00	0.00	N/A	CC, ES
6,634.40	6,633.83	6,634.40	6,633.84	0.04	0.04	175.64	4.32	-7.04	0.15	0.06	0.09	1.743	SF
6,650.00	6,649.34	6,649.99	6,649.39	0.08	0.08	178.36	5.39	-7.10	0.65	0.46	0.18	3.515	
6,700.00	6,698.71	6,699.86	6,699.10	0.21	0.21	-177.82	9.23	-7.68	4.60	4.05	0.56	8.267	
6,750.00	6,747.21	6,749.26	6,748.31	0.34	0.34	-177.19	13.46	-8.64	12.39	11.40	0.99	12.537	
6,800.00	6,794.47	6,797.94	6,796.79	0.48	0.47	-177.50	17.74	-9.66	24.31	22.85	1.46	16.634	
6,850.00	6,840.14	6,846.53	6,845.08	0.62	0.60	-178.09	23.00	-10.69	39.46	37.49	1.96	20.110	
6,865.09	6,853.56	6,861.11	6,859.54	0.66	0.63	-178.30	24.87	-11.00	44.56	42.45	2.12	21.061	
6,900.00	6,884.39	6,895.58	6,893.63	0.76	0.72	-179.05	29.90	-11.72	56.22	53.79	2.43	23.103	
7,000.00	6,972.70	6,999.98	6,995.40	1.04	1.00	178.84	52.82	-14.10	82.66	79.32	3.34	24.763	
7,100.00	7,061.00	7,109.54	7,098.69	1.33	1.30	178.37	88.58	-20.67	97.65	93.39	4.26	22.904	
7,200.00	7,149.31	7,217.86	7,196.58	1.61	1.60	178.48	133.81	-30.50	102.30	97.12	5.18	19.759	
7,309.56	7,246.06	7,331.55	7,296.52	1.93	1.92	178.50	186.77	-42.00	101.39	95.27	6.12	16.562	
7,350.00	7,282.39	7,374.51	7,333.47	2.05	2.05	179.91	208.29	-46.06	98.16	91.89	6.27	15.651	
7,400.00	7,328.84	7,421.19	7,373.46	2.19	2.18	-178.05	232.00	-50.29	90.13	83.82	6.31	14.290	
7,450.00	7,376.65	7,462.44	7,410.08	2.33	2.30	-173.82	250.53	-54.24	81.20	75.02	6.19	13.124	
7,500.00	7,425.45	7,503.34	7,448.17	2.46	2.41	-164.44	264.87	-58.01	73.46	67.51	5.95	12.348	
7,550.00	7,474.88	7,546.06	7,489.39	2.60	2.53	-142.49	275.44	-61.56	67.10	61.46	5.63	11.915	
7,600.00	7,524.55	7,591.08	7,533.67	2.73	2.65	-104.24	282.62	-65.27	61.19	55.90	5.29	11.571	
7,650.00	7,574.09	7,638.00	7,580.15	2.86	2.78	-77.49	286.66	-70.14	54.53	49.54	4.99	10.929	
7,700.00	7,623.12	7,685.00	7,626.68	2.98	2.90	-67.52	287.35	-76.64	46.63	41.83	4.80	9.707	
7,750.00	7,671.28	7,732.08	7,672.98	3.10	3.03	-65.52	284.23	-84.51	37.93	33.12	4.81	7.880	
7,800.00	7,718.19	7,779.25	7,718.70	3.23	3.15	-68.12	276.79	-93.32	29.10	24.00	5.10	5.702	
7,850.00	7,763.49	7,826.64	7,763.73	3.34	3.27	-76.74	264.89	-101.94	21.30	15.48	5.82	3.659	

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

<b>Company:</b>	Great Western Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Willow Bend LD 18-22HC
<b>Project:</b>	Adams Co., CO	<b>TVD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Reference Site:</b>	Sec.18-T1S-R67W	<b>MD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Site Error:</b>	0.00 usft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Willow Bend LD 18-22HC	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 usft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #2 ST1	<b>Database:</b>	EDM 5000.1 Single User Db
<b>Reference Design:</b>	ST1 Design #1	<b>Offset TVD Reference:</b>	Offset Datum

Offset Design													Offset Site Error:	0.00 usft
Survey Program: 140-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
7,900.00	7,806.85	7,874.71	7,808.43	3.46	3.39	-96.46	248.61	-108.74	17.04	10.20	6.85	2.489		
7,919.81	7,823.41	7,894.12	7,826.07	3.51	3.44	-106.49	240.88	-111.06	16.66	9.61	7.05	2.363		
7,950.00	7,847.93	7,924.04	7,852.71	3.58	3.51	-121.21	227.65	-114.31	17.43	10.46	6.97	2.502		
8,000.00	7,886.41	7,974.22	7,895.54	3.69	3.63	-138.83	201.97	-119.01	21.20	14.81	6.40	3.314		
8,050.00	7,922.02	8,025.37	7,936.46	3.80	3.74	-148.40	171.57	-122.85	26.43	20.31	6.11	4.323		
8,100.00	7,954.47	8,077.25	7,974.82	3.91	3.86	-153.94	136.83	-126.28	31.88	25.69	6.19	5.153		
8,150.00	7,983.52	8,126.00	8,007.42	4.03	3.97	-157.47	100.76	-129.51	36.90	30.45	6.44	5.725		
8,200.00	8,008.96	8,126.00	8,007.42	4.16	3.97	-154.57	100.76	-129.51	68.86	62.01	6.85	10.051		
8,250.00	8,030.57	8,126.00	8,007.42	4.31	3.97	-145.81	100.76	-129.51	115.61	108.01	7.60	15.218		
8,300.00	8,048.21	8,126.00	8,007.42	4.47	3.97	-122.43	100.76	-129.51	164.83	156.07	8.76	18.814		
8,350.00	8,061.73	8,126.00	8,007.42	4.63	3.97	-73.46	100.76	-129.51	214.58	206.89	7.68	27.932		
8,400.00	8,071.04	8,126.00	8,007.42	4.78	3.97	-38.90	100.76	-129.51	264.29	258.56	5.73	46.134		
8,450.00	8,076.06	8,126.00	8,007.42	4.94	3.97	-25.13	100.76	-129.51	313.69	308.15	5.53	56.675		
8,481.75	8,077.00	8,126.00	8,007.42	5.04	3.97	-20.63	100.76	-129.51	344.81	339.14	5.67	60.777		
8,500.00	8,077.04	8,126.00	8,007.42	5.10	3.97	-20.63	100.76	-129.51	362.67	356.88	5.79	62.611		
8,600.00	8,077.26	8,126.00	8,007.42	5.43	3.97	-20.63	100.76	-129.51	461.04	454.61	6.43	71.691		
8,700.00	8,077.48	8,126.00	8,007.42	5.75	3.97	-20.63	100.76	-129.51	559.98	552.93	7.05	79.417		
8,800.00	8,077.70	8,126.00	8,007.42	6.08	3.97	-20.63	100.76	-129.51	659.25	651.59	7.66	86.092		
8,900.00	8,077.92	8,126.00	8,007.42	6.41	3.97	-20.63	100.76	-129.51	758.71	750.45	8.25	91.934		
9,000.00	8,078.14	8,126.00	8,007.42	6.75	3.97	-20.63	100.76	-129.51	858.29	849.45	8.84	97.102		
9,100.00	8,078.36	8,126.00	8,007.42	7.10	3.97	-20.63	100.76	-129.51	957.96	948.54	9.42	101.718		
9,200.00	8,078.58	8,126.00	8,007.42	7.46	3.97	-20.63	100.76	-129.51	1,057.69	1,047.70	9.99	105.873		
9,300.00	8,078.80	8,126.00	8,007.42	7.82	3.97	-20.63	100.76	-129.51	1,157.47	1,146.91	10.56	109.638		
9,400.00	8,079.02	8,126.00	8,007.42	8.19	3.97	-20.63	100.76	-129.51	1,257.29	1,246.17	11.12	113.070		
9,500.00	8,079.24	8,126.00	8,007.42	8.57	3.97	-20.63	100.76	-129.51	1,357.13	1,345.45	11.68	116.214		
9,600.00	8,079.46	8,126.00	8,007.42	8.95	3.97	-20.63	100.76	-129.51	1,456.99	1,444.76	12.23	119.108		
9,700.00	8,079.68	8,126.00	8,007.42	9.34	3.97	-20.63	100.76	-129.51	1,556.87	1,544.09	12.78	121.783		
9,800.00	8,079.90	8,126.00	8,007.42	9.74	3.97	-20.63	100.76	-129.51	1,656.77	1,643.43	13.33	124.263		
9,900.00	8,080.12	8,126.00	8,007.42	10.15	3.97	-20.63	100.76	-129.51	1,756.67	1,742.79	13.88	126.571		
10,000.00	8,080.34	8,126.00	8,007.42	10.56	3.97	-20.63	100.76	-129.51	1,856.59	1,842.17	14.42	128.725		
10,100.00	8,080.56	8,126.00	8,007.42	10.98	3.97	-20.63	100.76	-129.51	1,956.52	1,941.55	14.96	130.740		
10,200.00	8,080.78	8,126.00	8,007.42	11.41	3.97	-20.63	100.76	-129.51	2,056.45	2,040.94	15.51	132.629		
10,301.54	8,081.00	8,126.00	8,007.42	11.85	3.97	-20.63	100.76	-129.51	2,157.93	2,141.88	16.05	134.433		
10,325.08	8,080.98	8,126.00	8,007.42	11.95	3.97	-9.31	100.76	-129.51	2,181.45	2,164.79	16.66	130.907		
10,400.00	8,080.71	8,126.00	8,007.42	12.28	3.97	-9.31	100.76	-129.51	2,256.32	2,239.25	17.07	132.155		
10,500.00	8,080.35	8,126.00	8,007.42	12.72	3.97	-9.31	100.76	-129.51	2,356.25	2,338.64	17.62	133.743		
10,600.00	8,079.99	8,126.00	8,007.42	13.17	3.97	-9.31	100.76	-129.51	2,456.20	2,438.04	18.16	135.248		
10,700.00	8,079.62	8,126.00	8,007.42	13.62	3.97	-9.31	100.76	-129.51	2,556.14	2,537.44	18.70	136.676		
10,800.00	8,079.26	8,126.00	8,007.42	14.08	3.97	-9.31	100.76	-129.51	2,656.09	2,636.85	19.24	138.035		
10,900.00	8,078.90	8,126.00	8,007.42	14.54	3.97	-9.31	100.76	-129.51	2,756.04	2,736.26	19.78	139.328		
11,000.00	8,078.54	8,126.00	8,007.42	15.00	3.97	-9.31	100.76	-129.51	2,856.00	2,835.68	20.32	140.562		
11,100.00	8,078.17	8,126.00	8,007.42	15.47	3.97	-9.31	100.76	-129.51	2,955.96	2,935.11	20.85	141.740		
11,200.00	8,077.81	8,126.00	8,007.42	15.95	3.97	-9.31	100.76	-129.51	3,055.92	3,034.53	21.39	142.866		
11,300.00	8,077.45	8,126.00	8,007.42	16.42	3.97	-9.31	100.76	-129.51	3,155.89	3,133.96	21.92	143.943		
11,400.00	8,077.09	8,126.00	8,007.42	16.90	3.97	-9.31	100.76	-129.51	3,255.85	3,233.40	22.46	144.975		
11,444.44	8,076.92	8,126.00	8,007.42	17.12	3.97	-9.31	100.76	-129.51	3,300.28	3,277.58	22.69	145.420		
11,478.16	8,077.00	8,126.00	8,007.42	17.28	3.97	-17.71	100.76	-129.51	3,333.99	3,311.48	22.52	148.067		
11,500.00	8,077.18	8,126.00	8,007.42	17.39	3.97	-17.71	100.76	-129.51	3,355.83	3,333.20	22.63	148.276		
11,600.00	8,077.99	8,126.00	8,007.42	17.87	3.97	-17.71	100.76	-129.51	3,455.82	3,432.66	23.16	149.210		
11,700.00	8,078.81	8,126.00	8,007.42	18.36	3.97	-17.71	100.76	-129.51	3,555.82	3,532.13	23.69	150.105		
11,800.00	8,079.62	8,126.00	8,007.42	18.86	3.97	-17.71	100.76	-129.51	3,655.81	3,631.59	24.22	150.965		
11,900.00	8,080.44	8,126.00	8,007.42	19.35	3.97	-17.71	100.76	-129.51	3,755.80	3,731.06	24.74	151.791		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

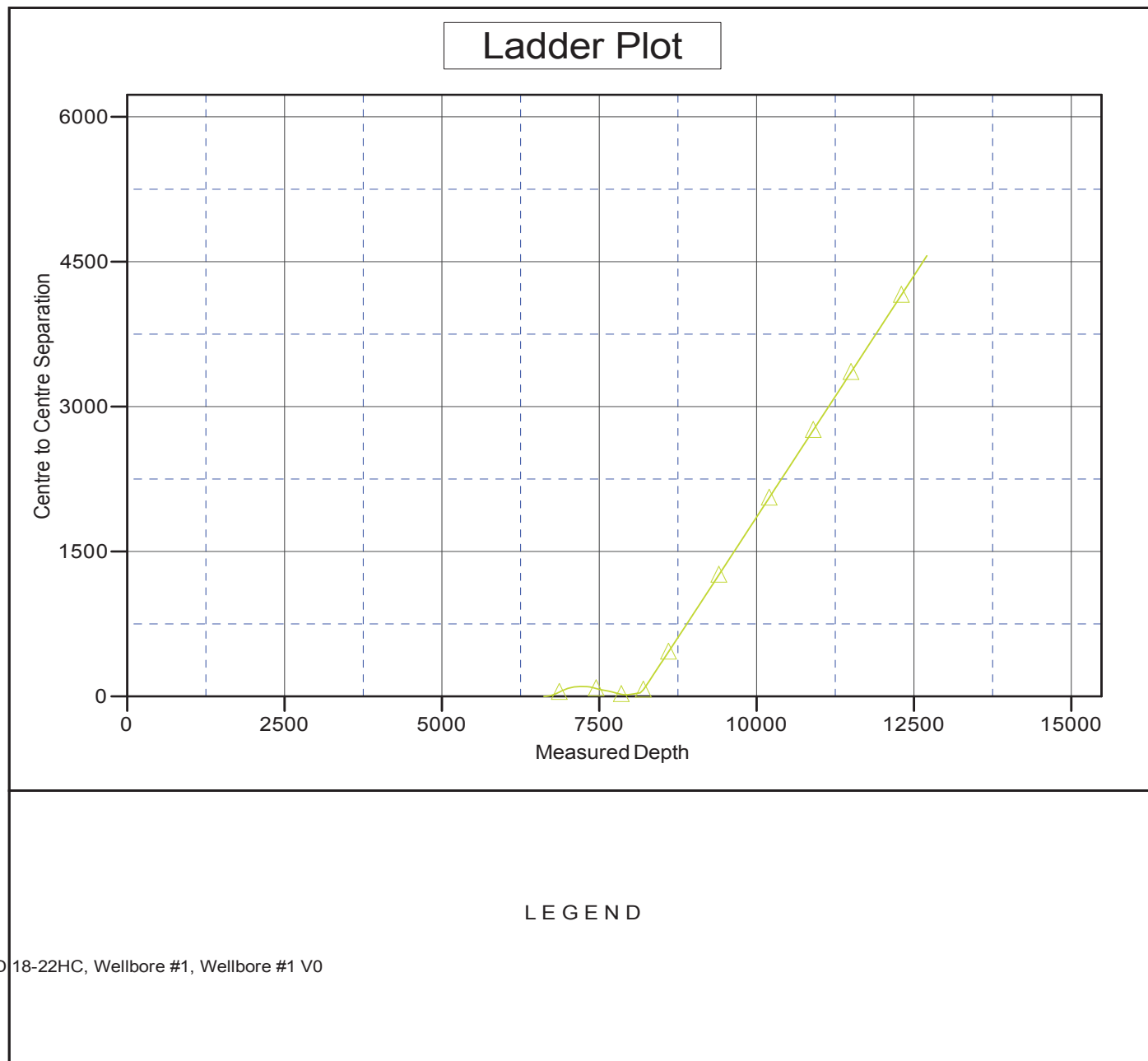
<b>Company:</b>	Great Western Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Willow Bend LD 18-22HC
<b>Project:</b>	Adams Co., CO	<b>TVD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Reference Site:</b>	Sec.18-T1S-R67W	<b>MD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Site Error:</b>	0.00 usft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Willow Bend LD 18-22HC	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 usft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #2 ST1	<b>Database:</b>	EDM 5000.1 Single User Db
<b>Reference Design:</b>	ST1 Design #1	<b>Offset TVD Reference:</b>	Offset Datum

<b>Offset Design</b>												<b>Offset Site Error:</b>	0.00 usft
Sec.18-T1S-R67W - Willow Bend LD 18-22HC - Wellbore #1 - Wellbore #1												<b>Offset Well Error:</b>	0.00 usft
Survey Program: 140-MWD													
Reference		Offset		Semi Major Axis			Distance						
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
12,000.00	8,081.25	8,126.00	8,007.42	19.85	3.97	-17.71	100.76	-129.51	3,855.79	3,830.52	25.27	152.585	
12,100.00	8,082.06	8,126.00	8,007.42	20.35	3.97	-17.71	100.76	-129.51	3,955.79	3,929.99	25.80	153.349	
12,200.00	8,082.88	8,126.00	8,007.42	20.85	3.97	-17.71	100.76	-129.51	4,055.78	4,029.46	26.32	154.084	
12,300.00	8,083.69	8,126.00	8,007.42	21.36	3.97	-17.71	100.76	-129.51	4,155.78	4,128.93	26.85	154.793	
12,400.00	8,084.51	8,126.00	8,007.42	21.87	3.97	-17.71	100.76	-129.51	4,255.77	4,228.40	27.37	155.477	
12,500.00	8,085.32	8,126.00	8,007.42	22.38	3.97	-17.71	100.76	-129.51	4,355.76	4,327.87	27.90	156.137	
12,600.00	8,086.14	8,126.00	8,007.42	22.89	3.97	-17.71	100.76	-129.51	4,455.76	4,427.34	28.42	156.774	
12,705.96	8,087.00	8,126.00	8,007.42	23.43	3.97	-17.71	100.76	-129.51	4,561.71	4,532.74	28.98	157.425	

<b>Company:</b>	Great Western Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Willow Bend LD 18-22HC
<b>Project:</b>	Adams Co., CO	<b>TVD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Reference Site:</b>	Sec.18-T1S-R67W	<b>MD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Site Error:</b>	0.00 usft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Willow Bend LD 18-22HC	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 usft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #2 ST1	<b>Database:</b>	EDM 5000.1 Single User Db
<b>Reference Design:</b>	ST1 Design #1	<b>Offset TVD Reference:</b>	Offset Datum

Reference Depths are relative to WELL @ 5247.30usft (Original Well E  
Offset Depths are relative to Offset Datum  
Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: Willow Bend LD 18-22HC  
Coordinate System is US State Plane 1983, Colorado Northern Zone  
Grid Convergence at Surface is: 0.37°



<b>Company:</b>	Great Western Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well Willow Bend LD 18-22HC
<b>Project:</b>	Adams Co., CO	<b>TVD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Reference Site:</b>	Sec.18-T1S-R67W	<b>MD Reference:</b>	WELL @ 5247.30usft (Original Well Elev)
<b>Site Error:</b>	0.00 usft	<b>North Reference:</b>	True
<b>Reference Well:</b>	Willow Bend LD 18-22HC	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Well Error:</b>	0.00 usft	<b>Output errors are at</b>	2.00 sigma
<b>Reference Wellbore</b>	Wellbore #2 ST1	<b>Database:</b>	EDM 5000.1 Single User Db
<b>Reference Design:</b>	ST1 Design #1	<b>Offset TVD Reference:</b>	Offset Datum

Reference Depths are relative to WELL @ 5247.30usft (Original Well E

Offset Depths are relative to Offset Datum

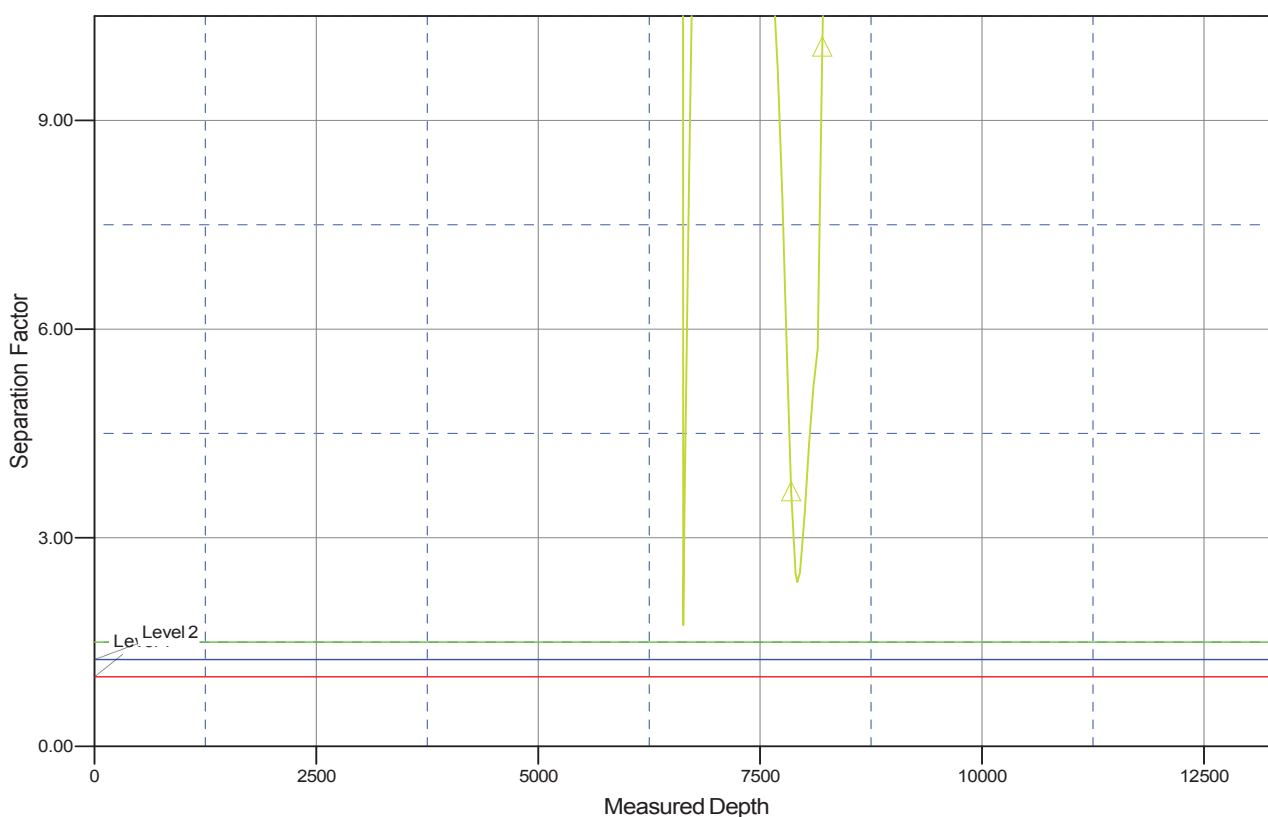
Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: Willow Bend LD 18-22HC

Coordinate System is US State Plane 1983, Colorado Northern Zone

Grid Convergence at Surface is: 0.37°

## Separation Factor Plot



## LEGEND

D 18-22HC, Wellbore #1, Wellbore #1 V0