



Red Willow Production Co.

**Archuleta County, CO NAD83
North Carracas 7F Pad
NC 32-4 7F-2**

**Pilot
Plan #3**

Anticollision Report

08 February, 2019





Scientific Drilling, Intl

Anticollision Report



Company:	Red Willow Production Co.	Local Co-ordinate Reference:	Well NC 32-4 7F-2 - Slot 7F-2
Project:	Archuleta County, CO NAD83	TVD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Reference Site:	North Carracas 7F Pad	MD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NC 32-4 7F-2	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Pilot	Database:	Grand Junction District
Reference Design:	Plan #3	Offset TVD Reference:	Offset Datum

Reference	Plan #3		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD + Stations Interval 100.00usft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 15,000.00 usft	Error Surface:	Sperry Type
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date 2/8/2019	
From (usft)	To (usft)	Survey (Wellbore)
0.00	3,525.23	Plan #3 (Pilot)
		Tool Name
		MWD+HDGM
		Description
		OWSG MWD + HDGM

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
North Carracas 7F Pad						
NC 32-4 7F-1 - Pilot - Plan #3	350.00	350.10	40.01	37.91	19.042	CC
NC 32-4 7F-1 - Pilot - Plan #3	400.00	400.16	40.24	37.79	16.424	ES
NC 32-4 7F-1 - Pilot - Plan #3	600.00	599.07	48.81	44.96	12.691	SF
NC 32-4 7F-2 - Lateral 1 - Plan #5	3,200.00	3,190.04	32.19	16.37	2.035	CC, ES, SF
NC 32-4 7F-2 - Lateral 2 - Plan #5	3,116.50	3,116.43	0.47	-12.74	0.035	Level 1, CC, ES, SF
NC 32-4 7F-2 - Lateral 3 - Plan #5	3,100.00	3,100.00	0.03	-8.34	0.003	Level 1, CC, ES, SF
NC 32-4 7F-2 - Lateral 4 - Plan #5	3,075.00	3,075.00	0.00	-12.11	0.000	Level 1, CC, ES, SF

Offset Design												
North Carracas 7F Pad - NC 32-4 7F-1 - Pilot - Plan #3												
Survey Program: 0-MWD+HDGM												
Offset Site Error: 0.00 usft												
Offset Well Error: 0.00 usft												
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)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor
												Warning
0.00	0.00	0.10	0.10	0.00	0.00	-37.12	31.90	-24.14	40.01			
100.00	100.00	100.10	100.10	0.15	0.15	-37.12	31.90	-24.14	40.01	39.70	0.31	129.621
200.00	200.00	200.10	200.10	0.51	0.51	-37.12	31.90	-24.14	40.01	38.98	1.03	39.009
300.00	300.00	300.10	300.10	0.87	0.87	-37.12	31.90	-24.14	40.01	38.26	1.74	22.959
350.00	350.00	350.10	350.10	1.05	1.05	-37.12	31.90	-24.14	40.01	37.91	2.10	19.042 CC
400.00	400.00	400.16	400.16	1.23	1.22	-127.93	31.74	-24.30	40.24	37.79	2.45	16.424 ES
500.00	499.93	500.06	500.01	1.57	1.56	-135.66	29.62	-26.42	42.41	39.27	3.13	13.529
600.00	599.68	599.07	598.81	1.93	1.91	-148.92	25.09	-30.96	48.81	44.96	3.85	12.691 SF
700.00	699.13	696.61	695.86	2.30	2.26	-162.60	18.26	-37.78	61.98	57.40	4.58	13.526
800.00	798.15	792.11	790.52	2.68	2.62	-173.33	9.33	-46.72	82.88	77.52	5.35	15.480
900.00	896.63	885.07	882.20	3.08	2.98	179.18	-1.51	-57.56	111.15	105.02	6.13	18.123
1,000.00	994.44	975.04	970.42	3.51	3.36	174.05	-14.00	-70.05	146.16	139.26	6.90	21.192
1,100.00	1,091.46	1,061.65	1,054.77	3.96	3.74	170.46	-27.87	-83.91	187.30	179.65	7.65	24.468
1,200.00	1,187.58	1,144.58	1,134.95	4.46	4.12	167.84	-42.83	-98.87	234.12	225.76	8.36	27.996
1,212.50	1,199.53	1,154.67	1,144.67	4.52	4.17	167.57	-44.76	-100.81	240.35	231.90	8.46	28.420
1,300.00	1,283.09	1,229.28	1,216.40	4.99	4.53	166.02	-59.29	-115.34	284.53	275.49	9.03	31.503
1,400.00	1,378.60	1,315.31	1,299.09	5.53	4.96	164.74	-76.06	-132.10	335.16	325.47	9.70	34.571
1,500.00	1,474.10	1,401.33	1,381.78	6.08	5.40	163.79	-92.83	-148.87	385.90	375.53	10.37	37.211
1,600.00	1,569.60	1,487.35	1,464.47	6.64	5.84	163.06	-109.59	-165.64	436.69	425.63	11.06	39.494
1,700.00	1,665.10	1,573.37	1,547.16	7.21	6.28	162.48	-126.36	-182.40	487.52	475.77	11.75	41.481
1,747.50	1,710.46	1,614.23	1,586.44	7.48	6.50	162.25	-134.32	-190.37	511.68	499.59	12.09	42.337

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



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Anticollision Report



Company:	Red Willow Production Co.	Local Co-ordinate Reference:	Well NC 32-4 7F-2 - Slot 7F-2
Project:	Archuleta County, CO NAD83	TVD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Reference Site:	North Carracas 7F Pad	MD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NC 32-4 7F-2	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Pilot	Database:	Grand Junction District
Reference Design:	Plan #3	Offset TVD Reference:	Offset Datum

Offset Design North Carracas 7F Pad - NC 32-4 7F-1 - Pilot - Plan #3													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HDMG													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	
1,750.00	1,712.85	1,616.39	1,588.50	7.49	6.51	162.06	-134.74	-190.79	512.95	500.84	12.10	42.382	
1,800.00	1,761.04	1,660.22	1,630.64	7.76	6.74	157.34	-143.29	-199.33	536.92	524.47	12.45	43.131	
1,850.00	1,809.90	1,705.44	1,674.11	8.00	6.97	149.92	-152.10	-208.14	558.17	545.38	12.79	43.629	
1,900.00	1,859.25	1,751.86	1,718.73	8.21	7.22	136.91	-161.15	-217.19	576.63	563.48	13.15	43.862	
1,950.00	1,908.91	1,799.33	1,764.36	8.39	7.47	112.54	-170.40	-226.44	592.22	578.72	13.50	43.860	
2,000.00	1,958.68	1,847.66	1,810.82	8.54	7.72	76.42	-179.82	-235.86	604.89	591.03	13.86	43.652	
2,050.00	2,008.39	1,907.27	1,868.32	8.67	8.03	47.90	-190.31	-247.47	614.30	600.03	14.28	43.024	
2,100.00	2,057.84	1,972.97	1,932.41	8.78	8.34	32.83	-197.08	-260.19	619.49	604.78	14.71	42.104	
2,150.00	2,106.86	2,038.23	1,996.43	8.89	8.62	25.17	-198.60	-272.67	620.39	605.27	15.12	41.041	
2,200.00	2,155.27	2,101.72	2,058.68	8.99	8.85	21.26	-195.10	-284.59	617.14	601.66	15.48	39.862	
2,216.88	2,171.44	2,122.55	2,079.03	9.02	8.92	20.48	-192.88	-288.44	615.14	599.55	15.60	39.439	
2,250.00	2,202.89	2,162.24	2,117.63	9.09	9.05	21.69	-187.20	-295.68	610.13	594.32	15.81	38.591	
2,300.00	2,249.64	2,211.36	2,164.98	9.19	9.19	23.64	-177.58	-304.49	600.30	584.23	16.07	37.353	
2,350.00	2,295.41	2,250.00	2,201.75	9.31	9.30	25.56	-168.48	-312.13	589.23	572.95	16.28	36.193	
2,400.00	2,340.06	2,277.07	2,227.20	9.43	9.38	27.20	-161.43	-318.04	577.40	560.98	16.42	35.154	
2,450.00	2,383.47	2,307.74	2,255.71	9.57	9.47	29.24	-152.78	-325.30	565.14	548.55	16.59	34.066	
2,500.00	2,425.52	2,336.86	2,282.45	9.72	9.55	31.41	-143.92	-332.73	552.69	535.94	16.75	32.996	
2,550.00	2,466.10	2,364.43	2,307.41	9.91	9.64	33.68	-134.97	-340.25	540.33	523.41	16.91	31.947	
2,600.00	2,505.10	2,390.40	2,330.61	10.14	9.72	36.02	-126.02	-347.75	528.37	511.29	17.09	30.924	
2,650.00	2,542.40	2,414.79	2,352.10	10.42	9.79	38.39	-117.19	-355.17	517.16	499.88	17.28	29.927	
2,700.00	2,577.92	2,437.61	2,371.93	10.76	9.87	40.74	-108.55	-362.41	507.04	489.56	17.48	29.009	
2,750.00	2,611.54	2,458.85	2,390.15	11.16	9.94	43.02	-100.18	-369.44	498.36	480.62	17.74	28.089	
2,800.00	2,643.18	2,478.56	2,406.83	11.63	10.01	45.19	-92.14	-376.19	491.46	473.40	18.06	27.211	
2,850.00	2,672.75	2,500.00	2,424.73	12.16	10.09	47.54	-83.10	-383.77	486.70	468.19	18.51	26.301	
2,900.00	2,700.17	2,513.46	2,435.82	12.77	10.14	49.03	-77.26	-388.67	484.32	465.43	18.89	25.641	
2,919.88	2,710.46	2,519.70	2,440.93	13.03	10.16	49.69	-74.52	-390.97	484.10	465.01	19.09	25.361	
2,950.00	2,725.37	2,528.71	2,448.27	13.43	10.19	50.62	-70.51	-394.34	484.61	465.21	19.39	24.986	
3,000.00	2,748.27	2,550.00	2,465.40	14.16	10.28	52.77	-60.82	-402.46	487.82	467.67	20.14	24.218	
3,012.72	2,753.72	2,550.00	2,465.40	14.35	10.28	52.71	-60.82	-402.46	489.02	468.81	20.21	24.200	
3,100.00	2,790.61	2,567.87	2,479.56	15.75	10.36	54.65	-52.47	-409.47	505.07	483.96	21.11	23.929	
3,200.00	2,832.87	2,600.00	2,504.49	17.44	10.51	58.08	-36.95	-422.49	538.92	516.53	22.39	24.066	
3,300.00	2,875.13	2,616.41	2,516.96	19.22	10.59	59.80	-28.78	-429.35	586.33	563.28	23.05	25.442	
3,400.00	2,917.39	2,639.65	2,534.30	21.05	10.71	62.18	-16.92	-439.30	644.57	620.78	23.78	27.102	
3,500.00	2,959.66	2,662.21	2,550.77	22.92	10.85	64.41	-5.11	-449.21	710.97	686.56	24.41	29.131	
3,525.23	2,970.32	2,667.80	2,554.79	23.39	10.88	64.96	-2.14	-451.70	728.76	704.21	24.55	29.684	



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Anticollision Report



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Reference Site:	North Carracas 7F Pad	MD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NC 32-4 7F-2	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Pilot	Database:	Grand Junction District
Reference Design:	Plan #3	Offset TVD Reference:	Offset Datum

Offset Design North Carracas 7F Pad - NC 32-4 7F-2 - Lateral 1 - Plan #5													Offset Site Error:	0.00 usft
Survey Program: 3135-MWD+HDGM													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		
0.00	0.00	3,135.00	2,805.40	0.00	0.00	-152.44	-396.23	-206.80	2,840.78					
100.00	100.00	3,135.00	2,805.40	0.15	0.00	-152.44	-396.23	-206.80	2,742.07	2,734.99	7.08	387.106		
200.00	200.00	3,135.00	2,805.40	0.51	0.00	-152.44	-396.23	-206.80	2,643.46	2,636.48	6.97	379.059		
300.00	300.00	3,135.00	2,805.40	0.87	0.00	-152.44	-396.23	-206.80	2,544.95	2,538.09	6.87	370.702		
350.00	350.00	3,135.00	2,805.40	1.05	0.00	-152.44	-396.23	-206.80	2,495.75	2,488.94	6.81	366.403		
400.00	400.00	3,135.00	2,805.40	1.23	0.00	122.17	-396.23	-206.80	2,446.61	2,439.85	6.76	362.064		
500.00	499.93	3,135.00	2,805.40	1.57	0.00	129.88	-396.23	-206.80	2,348.74	2,342.09	6.65	353.248		
600.00	599.68	3,135.00	2,805.40	1.93	0.00	135.92	-396.23	-206.80	2,251.57	2,245.03	6.54	344.254		
700.00	699.13	3,135.00	2,805.40	2.30	0.00	140.64	-396.23	-206.80	2,155.32	2,148.89	6.43	335.043		
800.00	798.15	3,135.00	2,805.40	2.68	0.00	144.38	-396.23	-206.80	2,060.25	2,053.92	6.33	325.590		
900.00	896.63	3,135.00	2,805.40	3.08	0.00	147.37	-396.23	-206.80	1,966.65	1,960.42	6.23	315.838		
1,000.00	994.44	3,135.00	2,805.40	3.51	0.00	149.79	-396.23	-206.80	1,874.86	1,868.73	6.13	305.696		
1,100.00	1,091.46	3,135.00	2,805.40	3.96	0.00	151.76	-396.23	-206.80	1,785.29	1,779.23	6.05	295.019		
1,200.00	1,187.58	3,135.00	2,805.40	4.46	0.00	153.38	-396.23	-206.80	1,698.39	1,692.40	5.99	283.604		
1,212.50	1,199.53	3,135.00	2,805.40	4.52	0.00	153.56	-396.23	-206.80	1,687.74	1,681.77	5.98	282.359		
1,300.00	1,283.09	3,135.00	2,805.40	4.99	0.00	153.56	-396.23	-206.80	1,614.05	1,608.10	5.96	270.971		
1,400.00	1,378.60	3,135.00	2,805.40	5.53	0.00	153.56	-396.23	-206.80	1,531.62	1,525.65	5.96	256.788		
1,500.00	1,474.10	3,135.00	2,805.40	6.08	0.00	153.56	-396.23	-206.80	1,451.39	1,445.38	6.01	241.366		
1,600.00	1,569.60	3,135.00	2,805.40	6.64	0.00	153.56	-396.23	-206.80	1,373.76	1,367.64	6.11	224.764		
1,700.00	1,665.10	3,135.00	2,805.40	7.21	0.00	153.56	-396.23	-206.80	1,299.19	1,292.92	6.27	207.189		
1,747.50	1,710.46	3,135.00	2,805.40	7.48	0.00	153.56	-396.23	-206.80	1,265.00	1,258.63	6.37	198.601		
1,750.00	1,712.85	3,135.00	2,805.40	7.49	0.00	153.36	-396.23	-206.80	1,263.22	1,256.84	6.38	198.127		
1,800.00	1,761.04	3,135.00	2,805.40	7.76	0.00	148.34	-396.23	-206.80	1,227.06	1,220.55	6.50	188.675		
1,850.00	1,809.90	3,135.00	2,805.40	8.00	0.00	140.51	-396.23	-206.80	1,189.78	1,183.14	6.65	179.038		
1,900.00	1,859.25	3,135.00	2,805.40	8.21	0.00	126.98	-396.23	-206.80	1,151.44	1,144.65	6.79	169.657		
1,950.00	1,908.91	3,135.00	2,805.40	8.39	0.00	101.97	-396.23	-206.80	1,112.06	1,105.13	6.93	160.573		
2,000.00	1,958.68	3,135.00	2,805.40	8.54	0.00	65.08	-396.23	-206.80	1,071.69	1,064.63	7.06	151.821		
2,050.00	2,008.39	3,135.00	2,805.40	8.67	0.00	35.54	-396.23	-206.80	1,030.37	1,023.19	7.19	143.393		
2,100.00	2,057.84	3,135.00	2,805.40	8.78	0.00	18.86	-396.23	-206.80	988.15	980.85	7.31	135.239		
2,150.00	2,106.86	3,135.00	2,805.40	8.89	0.00	8.90	-396.23	-206.80	945.08	937.65	7.42	127.321		
2,200.00	2,155.27	3,135.00	2,805.40	8.99	0.00	1.98	-396.23	-206.80	901.19	893.66	7.53	119.616		
2,216.88	2,171.44	3,135.00	2,805.40	9.02	0.00	0.00	-396.23	-206.80	886.21	878.63	7.58	116.969		
2,250.00	2,202.89	3,135.00	2,805.40	9.09	0.00	0.00	-396.23	-206.80	856.59	848.94	7.64	112.069		
2,300.00	2,249.64	3,135.00	2,805.40	9.19	0.00	0.00	-396.23	-206.80	811.38	803.64	7.74	104.777		
2,350.00	2,295.41	3,135.00	2,805.40	9.31	0.00	0.00	-396.23	-206.80	765.62	757.78	7.84	97.594		
2,400.00	2,340.06	3,135.00	2,805.40	9.43	0.00	0.00	-396.23	-206.80	719.34	711.39	7.94	90.552		
2,450.00	2,383.47	3,135.00	2,805.40	9.57	0.00	0.00	-396.23	-206.80	672.56	664.52	8.04	83.646		
2,500.00	2,425.52	3,135.00	2,805.40	9.72	0.00	0.00	-396.23	-206.80	625.33	617.19	8.13	76.869		
2,550.00	2,466.10	3,135.00	2,805.40	9.91	0.00	0.00	-396.23	-206.80	577.66	569.43	8.23	70.217		
2,600.00	2,505.10	3,135.00	2,805.40	10.14	0.00	0.00	-396.23	-206.80	529.60	521.28	8.32	63.685		
2,650.00	2,542.40	3,135.00	2,805.40	10.42	0.00	0.00	-396.23	-206.80	481.18	472.78	8.40	57.267		
2,700.00	2,577.92	3,135.00	2,805.40	10.76	0.00	0.00	-396.23	-206.80	432.43	423.94	8.49	50.960		
2,750.00	2,611.54	3,135.00	2,805.40	11.16	0.00	0.00	-396.23	-206.80	383.38	374.82	8.57	44.758		
2,800.00	2,643.18	3,135.00	2,805.40	11.63	0.00	0.00	-396.23	-206.80	334.08	325.44	8.64	38.660		
2,850.00	2,672.75	3,135.00	2,805.40	12.16	0.00	0.00	-396.23	-206.80	284.55	275.84	8.71	32.662		
2,900.00	2,700.17	3,135.00	2,805.40	12.77	0.00	0.00	-396.23	-206.80	234.83	226.06	8.78	26.761		
2,950.00	2,725.37	3,135.00	2,805.40	13.43	0.00	0.00	-396.23	-206.80	184.97	176.17	8.80	21.023		
3,000.00	2,748.27	3,135.00	2,805.40	14.16	0.00	0.00	-396.23	-206.80	135.00	126.19	8.81	15.317		
3,012.72	2,753.72	3,135.00	2,805.40	14.35	0.00	0.00	-396.23	-206.80	122.28	113.48	8.81	13.882		
3,100.00	2,790.61	3,135.00	2,805.40	15.75	0.00	0.00	-396.23	-206.80	35.00	26.35	8.65	4.045		
3,200.00	2,832.87	3,190.04	2,825.74	17.44	3.91	-90.32	-443.33	-226.63	32.19	16.37	15.82	2.035 CC, ES, SF		
3,300.00	2,875.13	3,262.61	2,843.22	19.22	3.90	-83.59	-510.16	-248.53	91.29	74.21	17.08	5.345		

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



Scientific Drilling, Intl

Anticollision Report



Company:	Red Willow Production Co.	Local Co-ordinate Reference:	Well NC 32-4 7F-2 - Slot 7F-2
Project:	Archuleta County, CO NAD83	TVD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Reference Site:	North Carracas 7F Pad	MD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NC 32-4 7F-2	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Pilot	Database:	Grand Junction District
Reference Design:	Plan #3	Offset TVD Reference:	Offset Datum

Offset Design North Carracas 7F Pad - NC 32-4 7F-2 - Lateral 1 - Plan #5												Offset Site Error:	0.00 usft
Survey Program: 3135-MWD+HDGM												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	
3,400.00	2,917.39	3,320.68	2,849.22	21.05	3.86	-79.12	-566.23	-262.18	160.21	142.49	17.72	9.040	
3,500.00	2,959.66	3,375.91	2,849.13	22.92	3.82	-75.67	-620.54	-272.16	235.98	217.36	18.62	12.671	
3,525.23	2,970.32	3,391.92	2,848.89	23.39	3.87	-74.95	-636.30	-274.94	255.39	236.36	19.02	13.425	



Scientific Drilling, Intl

Anticollision Report



Company:	Red Willow Production Co.	Local Co-ordinate Reference:	Well NC 32-4 7F-2 - Slot 7F-2
Project:	Archuleta County, CO NAD83	TVD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Reference Site:	North Carracas 7F Pad	MD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NC 32-4 7F-2	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Pilot	Database:	Grand Junction District
Reference Design:	Plan #3	Offset TVD Reference:	Offset Datum

Offset Design North Carracas 7F Pad - NC 32-4 7F-2 - Lateral 2 - Plan #5													Offset Site Error:	0.00 usft
Survey Program: 3115-MWD+HDGM													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		
0.00	0.00	3,115.00	2,796.95	0.00	0.00	-153.55	-385.83	-191.95	2,829.95					
100.00	100.00	3,115.00	2,796.95	0.15	0.00	-153.55	-385.83	-191.95	2,731.16	2,724.07	7.09	385.235		
200.00	200.00	3,115.00	2,796.95	0.51	0.00	-153.55	-385.83	-191.95	2,632.46	2,625.48	6.98	377.137		
300.00	300.00	3,115.00	2,796.95	0.87	0.00	-153.55	-385.83	-191.95	2,533.86	2,526.99	6.87	368.727		
350.00	350.00	3,115.00	2,796.95	1.05	0.00	-153.55	-385.83	-191.95	2,484.61	2,477.79	6.82	364.402		
400.00	400.00	3,115.00	2,796.95	1.23	0.00	121.26	-385.83	-191.95	2,435.42	2,428.65	6.76	360.034		
500.00	499.93	3,115.00	2,796.95	1.57	0.00	129.30	-385.83	-191.95	2,337.42	2,330.76	6.66	351.154		
600.00	599.68	3,115.00	2,796.95	1.93	0.00	135.57	-385.83	-191.95	2,240.09	2,233.54	6.55	342.088		
700.00	699.13	3,115.00	2,796.95	2.30	0.00	140.46	-385.83	-191.95	2,143.64	2,137.20	6.44	332.805		
800.00	798.15	3,115.00	2,796.95	2.68	0.00	144.31	-385.83	-191.95	2,048.34	2,042.00	6.34	323.277		
900.00	896.63	3,115.00	2,796.95	3.08	0.00	147.37	-385.83	-191.95	1,954.46	1,948.22	6.24	313.456		
1,000.00	994.44	3,115.00	2,796.95	3.51	0.00	149.84	-385.83	-191.95	1,862.35	1,856.20	6.14	303.253		
1,100.00	1,091.46	3,115.00	2,796.95	3.96	0.00	151.85	-385.83	-191.95	1,772.40	1,766.34	6.06	292.531		
1,200.00	1,187.58	3,115.00	2,796.95	4.46	0.00	153.50	-385.83	-191.95	1,685.08	1,679.08	5.99	281.096		
1,212.50	1,199.53	3,115.00	2,796.95	4.52	0.00	153.68	-385.83	-191.95	1,674.37	1,668.39	5.98	279.846		
1,300.00	1,283.09	3,115.00	2,796.95	4.99	0.00	153.68	-385.83	-191.95	1,600.27	1,594.31	5.96	268.477		
1,400.00	1,378.60	3,115.00	2,796.95	5.53	0.00	153.68	-385.83	-191.95	1,517.32	1,511.36	5.97	254.342		
1,500.00	1,474.10	3,115.00	2,796.95	6.08	0.00	153.68	-385.83	-191.95	1,436.55	1,430.54	6.01	238.990		
1,600.00	1,569.60	3,115.00	2,796.95	6.64	0.00	153.68	-385.83	-191.95	1,358.34	1,352.24	6.11	222.469		
1,700.00	1,665.10	3,115.00	2,796.95	7.21	0.00	153.68	-385.83	-191.95	1,283.16	1,276.90	6.26	204.974		
1,747.50	1,710.46	3,115.00	2,796.95	7.48	0.00	153.68	-385.83	-191.95	1,248.67	1,242.32	6.36	196.419		
1,750.00	1,712.85	3,115.00	2,796.95	7.49	0.00	153.48	-385.83	-191.95	1,246.88	1,240.52	6.36	195.947		
1,800.00	1,761.04	3,115.00	2,796.95	7.76	0.00	148.46	-385.83	-191.95	1,210.41	1,203.92	6.49	186.525		
1,850.00	1,809.90	3,115.00	2,796.95	8.00	0.00	140.63	-385.83	-191.95	1,172.84	1,166.21	6.63	176.913		
1,900.00	1,859.25	3,115.00	2,796.95	8.21	0.00	127.09	-385.83	-191.95	1,134.21	1,127.44	6.77	167.549		
1,950.00	1,908.91	3,115.00	2,796.95	8.39	0.00	102.08	-385.83	-191.95	1,094.56	1,087.66	6.91	158.475		
2,000.00	1,958.68	3,115.00	2,796.95	8.54	0.00	65.18	-385.83	-191.95	1,053.94	1,046.90	7.04	149.725		
2,050.00	2,008.39	3,115.00	2,796.95	8.67	0.00	35.63	-385.83	-191.95	1,012.39	1,005.22	7.17	141.293		
2,100.00	2,057.84	3,115.00	2,796.95	8.78	0.00	18.93	-385.83	-191.95	969.94	962.65	7.29	133.132		
2,150.00	2,106.86	3,115.00	2,796.95	8.89	0.00	8.95	-385.83	-191.95	926.65	919.25	7.40	125.203		
2,200.00	2,155.27	3,115.00	2,796.95	8.99	0.00	1.99	-385.83	-191.95	882.57	875.06	7.51	117.487		
2,216.88	2,171.44	3,115.00	2,796.95	9.02	0.00	0.00	-385.83	-191.95	867.52	859.97	7.55	114.838		
2,250.00	2,202.89	3,115.00	2,796.95	9.09	0.00	0.00	-385.83	-191.95	837.78	830.16	7.62	109.928		
2,300.00	2,249.64	3,115.00	2,796.95	9.19	0.00	0.00	-385.83	-191.95	792.41	784.69	7.72	102.623		
2,350.00	2,295.41	3,115.00	2,796.95	9.31	0.00	0.00	-385.83	-191.95	746.50	738.67	7.82	95.426		
2,400.00	2,340.06	3,115.00	2,796.95	9.43	0.00	0.00	-385.83	-191.95	700.07	692.15	7.92	88.372		
2,450.00	2,383.47	3,115.00	2,796.95	9.57	0.00	0.00	-385.83	-191.95	653.16	645.14	8.02	81.453		
2,500.00	2,425.52	3,115.00	2,796.95	9.72	0.00	0.00	-385.83	-191.95	605.81	597.69	8.11	74.666		
2,550.00	2,466.10	3,115.00	2,796.95	9.91	0.00	0.00	-385.83	-191.95	558.04	549.83	8.21	68.003		
2,600.00	2,505.10	3,115.00	2,796.95	10.14	0.00	0.00	-385.83	-191.95	509.89	501.59	8.30	61.462		
2,650.00	2,542.40	3,115.00	2,796.95	10.42	0.00	0.00	-385.83	-191.95	461.39	453.01	8.38	55.035		
2,700.00	2,577.92	3,115.00	2,796.95	10.76	0.00	0.00	-385.83	-191.95	412.57	404.11	8.47	48.721		
2,750.00	2,611.54	3,115.00	2,796.95	11.16	0.00	0.00	-385.83	-191.95	363.48	354.93	8.55	42.514		
2,800.00	2,643.18	3,115.00	2,796.95	11.63	0.00	0.00	-385.83	-191.95	314.13	305.51	8.63	36.411		
2,850.00	2,672.75	3,115.00	2,796.95	12.16	0.00	0.00	-385.83	-191.95	264.58	255.88	8.70	30.409		
2,900.00	2,700.17	3,115.00	2,796.95	12.77	0.00	0.00	-385.83	-191.95	214.84	206.10	8.74	24.573		
2,950.00	2,725.37	3,115.00	2,796.95	13.43	0.00	0.00	-385.83	-191.95	164.97	156.18	8.79	18.767		
3,000.00	2,748.27	3,115.00	2,796.95	14.16	0.00	0.00	-385.83	-191.95	115.00	106.19	8.81	13.059		
3,012.72	2,753.72	3,115.00	2,796.95	14.35	0.00	0.00	-385.83	-191.95	102.28	93.48	8.80	11.624		
3,100.00	2,790.61	3,115.00	2,796.95	15.75	0.00	0.00	-385.83	-191.95	15.00	6.65	8.35	1.797		
3,116.50	2,797.58	3,116.43	2,797.55	16.03	0.16	-94.02	-386.89	-192.69	0.47	-12.74	13.21	0.035 Level 1, CC, ES, SF		
3,200.00	2,832.87	3,195.71	2,825.64	17.44	3.93	-80.58	-446.85	-236.15	26.32	9.15	17.18	1.532		

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



Scientific Drilling, Intl

Anticollision Report



Company:	Red Willow Production Co.	Local Co-ordinate Reference:	Well NC 32-4 7F-2 - Slot 7F-2
Project:	Archuleta County, CO NAD83	TVD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Reference Site:	North Carracas 7F Pad	MD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NC 32-4 7F-2	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Pilot	Database:	Grand Junction District
Reference Design:	Plan #3	Offset TVD Reference:	Offset Datum

Offset Design North Carracas 7F Pad - NC 32-4 7F-2 - Lateral 2 - Plan #5												Offset Site Error:	0.00 usft
Survey Program: 3115-MWD+HDGM												Offset Well Error:	0.00 usft
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
3,300.00	2,875.13	3,287.30	2,844.62	19.22	3.90	-65.80	-517.64	-290.92	60.61	42.01	18.61	3.258	
3,400.00	2,917.39	3,372.40	2,849.05	21.05	4.53	-54.10	-583.22	-344.86	102.65	83.77	18.88	5.437	
3,500.00	2,959.66	3,459.94	2,849.05	22.92	6.30	-47.26	-650.28	-401.13	149.14	129.27	19.87	7.507	
3,525.23	2,970.32	3,482.03	2,849.05	23.39	6.75	-46.15	-667.20	-415.33	161.04	140.84	20.20	7.971	



Scientific Drilling, Intl

Anticollision Report



Company:	Red Willow Production Co.	Local Co-ordinate Reference:	Well NC 32-4 7F-2 - Slot 7F-2
Project:	Archuleta County, CO NAD83	TVD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Reference Site:	North Carracas 7F Pad	MD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NC 32-4 7F-2	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Pilot	Database:	Grand Junction District
Reference Design:	Plan #3	Offset TVD Reference:	Offset Datum

Offset Design North Carracas 7F Pad - NC 32-4 7F-2 - Lateral 3 - Plan #5													Offset Site Error:	0.00 usft
Survey Program: 3095-SDI MWD													Offset Well Error:	0.00 usft
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	
0.00	0.00	3,095.00	2,788.50	0.00	0.00	-154.75	-375.43	-177.10	2,819.22					
100.00	100.00	3,095.00	2,788.50	0.15	0.00	-154.75	-375.43	-177.10	2,720.35	2,713.26	7.10	383.394		
200.00	200.00	3,095.00	2,788.50	0.51	0.00	-154.75	-375.43	-177.10	2,621.57	2,614.58	6.99	375.246		
300.00	300.00	3,095.00	2,788.50	0.87	0.00	-154.75	-375.43	-177.10	2,522.88	2,516.00	6.88	366.785		
350.00	350.00	3,095.00	2,788.50	1.05	0.00	-154.75	-375.43	-177.10	2,473.58	2,466.75	6.82	362.434		
400.00	400.00	3,095.00	2,788.50	1.23	0.00	120.28	-375.43	-177.10	2,424.33	2,417.56	6.77	358.038		
500.00	499.93	3,095.00	2,788.50	1.57	0.00	128.68	-375.43	-177.10	2,326.21	2,319.55	6.66	349.094		
600.00	599.68	3,095.00	2,788.50	1.93	0.00	135.20	-375.43	-177.10	2,228.72	2,222.16	6.56	339.959		
700.00	699.13	3,095.00	2,788.50	2.30	0.00	140.26	-375.43	-177.10	2,132.08	2,125.64	6.45	330.603		
800.00	798.15	3,095.00	2,788.50	2.68	0.00	144.23	-375.43	-177.10	2,036.55	2,030.20	6.34	321.003		
900.00	896.63	3,095.00	2,788.50	3.08	0.00	147.38	-375.43	-177.10	1,942.39	1,936.15	6.24	311.111		
1,000.00	994.44	3,095.00	2,788.50	3.51	0.00	149.90	-375.43	-177.10	1,849.96	1,843.81	6.15	300.847		
1,100.00	1,091.46	3,095.00	2,788.50	3.96	0.00	151.95	-375.43	-177.10	1,759.64	1,753.58	6.07	290.080		
1,200.00	1,187.58	3,095.00	2,788.50	4.46	0.00	153.62	-375.43	-177.10	1,671.90	1,665.90	6.00	278.622		
1,212.50	1,199.53	3,095.00	2,788.50	4.52	0.00	153.81	-375.43	-177.10	1,661.14	1,655.15	5.99	277.366		
1,300.00	1,283.09	3,095.00	2,788.50	4.99	0.00	153.81	-375.43	-177.10	1,586.62	1,580.65	5.96	266.013		
1,400.00	1,378.60	3,095.00	2,788.50	5.53	0.00	153.81	-375.43	-177.10	1,503.16	1,497.19	5.97	251.924		
1,500.00	1,474.10	3,095.00	2,788.50	6.08	0.00	153.81	-375.43	-177.10	1,421.84	1,415.84	6.01	236.639		
1,600.00	1,569.60	3,095.00	2,788.50	6.64	0.00	153.81	-375.43	-177.10	1,343.05	1,336.95	6.10	220.198		
1,700.00	1,665.10	3,095.00	2,788.50	7.21	0.00	153.81	-375.43	-177.10	1,267.25	1,261.01	6.25	202.781		
1,747.50	1,710.46	3,095.00	2,788.50	7.48	0.00	153.81	-375.43	-177.10	1,232.46	1,226.12	6.34	194.258		
1,750.00	1,712.85	3,095.00	2,788.50	7.49	0.00	153.61	-375.43	-177.10	1,230.65	1,224.30	6.35	193.788		
1,800.00	1,761.04	3,095.00	2,788.50	7.76	0.00	148.59	-375.43	-177.10	1,193.86	1,187.39	6.47	184.396		
1,850.00	1,809.90	3,095.00	2,788.50	8.00	0.00	140.75	-375.43	-177.10	1,155.99	1,149.38	6.61	174.808		
1,900.00	1,859.25	3,095.00	2,788.50	8.21	0.00	127.21	-375.43	-177.10	1,117.08	1,110.33	6.75	165.461		
1,950.00	1,908.91	3,095.00	2,788.50	8.39	0.00	102.19	-375.43	-177.10	1,077.16	1,070.27	6.89	156.395		
2,000.00	1,958.68	3,095.00	2,788.50	8.54	0.00	65.28	-375.43	-177.10	1,036.28	1,029.26	7.02	147.647		
2,050.00	2,008.39	3,095.00	2,788.50	8.67	0.00	35.73	-375.43	-177.10	994.47	987.33	7.14	139.210		
2,100.00	2,057.84	3,095.00	2,788.50	8.78	0.00	19.01	-375.43	-177.10	951.80	944.53	7.26	131.040		
2,150.00	2,106.86	3,095.00	2,788.50	8.89	0.00	9.00	-375.43	-177.10	908.30	900.92	7.38	123.101		
2,200.00	2,155.27	3,095.00	2,788.50	8.99	0.00	2.01	-375.43	-177.10	864.02	856.53	7.49	115.371		
2,216.88	2,171.44	3,095.00	2,788.50	9.02	0.00	0.00	-375.43	-177.10	848.90	841.37	7.53	112.721		
2,250.00	2,202.89	3,095.00	2,788.50	9.09	0.00	0.00	-375.43	-177.10	819.04	811.44	7.60	107.801		
2,300.00	2,249.64	3,095.00	2,788.50	9.19	0.00	0.00	-375.43	-177.10	773.49	765.79	7.70	100.480		
2,350.00	2,295.41	3,095.00	2,788.50	9.31	0.00	0.00	-375.43	-177.10	727.41	719.62	7.80	93.269		
2,400.00	2,340.06	3,095.00	2,788.50	9.43	0.00	0.00	-375.43	-177.10	680.84	672.94	7.90	86.201		
2,450.00	2,383.47	3,095.00	2,788.50	9.57	0.00	0.00	-375.43	-177.10	633.80	625.80	8.00	79.269		
2,500.00	2,425.52	3,095.00	2,788.50	9.72	0.00	0.00	-375.43	-177.10	586.32	578.23	8.09	72.469		
2,550.00	2,466.10	3,095.00	2,788.50	9.91	0.00	0.00	-375.43	-177.10	538.45	530.26	8.18	65.796		
2,600.00	2,505.10	3,095.00	2,788.50	10.14	0.00	0.00	-375.43	-177.10	490.20	481.92	8.27	59.243		
2,650.00	2,542.40	3,095.00	2,788.50	10.42	0.00	0.00	-375.43	-177.10	441.62	433.25	8.36	52.808		
2,700.00	2,577.92	3,095.00	2,788.50	10.76	0.00	0.00	-375.43	-177.10	392.73	384.28	8.45	46.486		
2,750.00	2,611.54	3,095.00	2,788.50	11.16	0.00	0.00	-375.43	-177.10	343.58	335.05	8.53	40.272		
2,800.00	2,643.18	3,095.00	2,788.50	11.63	0.00	0.00	-375.43	-177.10	294.19	285.58	8.61	34.164		
2,850.00	2,672.75	3,095.00	2,788.50	12.16	0.00	0.00	-375.43	-177.10	244.61	235.92	8.69	28.158		
2,900.00	2,700.17	3,095.00	2,788.50	12.77	0.00	0.00	-375.43	-177.10	194.85	186.12	8.73	22.320		
2,950.00	2,725.37	3,095.00	2,788.50	13.43	0.00	0.00	-375.43	-177.10	144.97	136.19	8.78	16.511		
3,000.00	2,748.27	3,095.00	2,788.50	14.16	0.00	0.00	-375.43	-177.10	95.00	86.20	8.79	10.802		
3,012.72	2,753.72	3,095.00	2,788.50	14.35	0.00	0.00	-375.43	-177.10	82.28	73.50	8.79	9.366		
3,100.00	2,790.61	3,100.00	2,790.59	15.75	1.92	46.85	-378.02	-180.83	0.03	-8.34	8.36	0.003 Level 1, CC, ES, SF		
3,200.00	2,832.87	3,198.29	2,824.75	17.44	2.14	46.85	-423.79	-260.60	11.64	1.57	10.07	1.156 Level 2		
3,300.00	2,875.13	3,288.21	2,843.46	19.22	4.21	46.85	-456.05	-342.27	42.95	29.06	13.89	3.093		

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



Scientific Drilling, Intl

Anticollision Report



Company:	Red Willow Production Co.	Local Co-ordinate Reference:	Well NC 32-4 7F-2 - Slot 7F-2
Project:	Archuleta County, CO NAD83	TVD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Reference Site:	North Carracas 7F Pad	MD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NC 32-4 7F-2	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Pilot	Database:	Grand Junction District
Reference Design:	Plan #3	Offset TVD Reference:	Offset Datum

Offset Design	North Carracas 7F Pad - NC 32-4 7F-2 - Lateral 3 - Plan #5											Offset Site Error:	0.00 usft
Survey Program:	3095-SDI 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	
3,400.00	2,917.39	3,365.27	2,849.40	21.05	6.06	46.85	-475.45	-416.53	90.66	74.52	16.13	5.619	
3,500.00	2,959.66	3,443.18	2,848.55	22.92	7.94	46.85	-489.22	-493.20	148.13	129.56	18.58	7.975	
3,525.23	2,970.32	3,463.75	2,848.25	23.39	8.44	46.85	-492.79	-513.45	162.75	143.50	19.25	8.453	



Scientific Drilling, Intl

Anticollision Report



Company:	Red Willow Production Co.	Local Co-ordinate Reference:	Well NC 32-4 7F-2 - Slot 7F-2
Project:	Archuleta County, CO NAD83	TVD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Reference Site:	North Carracas 7F Pad	MD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NC 32-4 7F-2	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Pilot	Database:	Grand Junction District
Reference Design:	Plan #3	Offset TVD Reference:	Offset Datum

Offset Design North Carracas 7F Pad - NC 32-4 7F-2 - Lateral 4 - Plan #5													Offset Site Error:	0.00 usft
Survey Program: 3075-MWD+HDGM													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		
0.00	0.00	3,075.00	2,780.04	0.00	0.00	-156.04	-365.04	-162.25	2,808.60					
100.00	100.00	3,075.00	2,780.04	0.15	0.00	-156.04	-365.04	-162.25	2,709.65	2,702.55	7.10	381.583		
200.00	200.00	3,075.00	2,780.04	0.51	0.00	-156.04	-365.04	-162.25	2,610.79	2,603.79	6.99	373.387		
300.00	300.00	3,075.00	2,780.04	0.87	0.00	-156.04	-365.04	-162.25	2,512.01	2,505.12	6.88	364.876		
350.00	350.00	3,075.00	2,780.04	1.05	0.00	-156.04	-365.04	-162.25	2,462.66	2,455.83	6.83	360.500		
400.00	400.00	3,075.00	2,780.04	1.23	0.00	119.22	-365.04	-162.25	2,413.37	2,406.59	6.78	356.076		
500.00	499.93	3,075.00	2,780.04	1.57	0.00	128.01	-365.04	-162.25	2,315.12	2,308.45	6.67	347.070		
600.00	599.68	3,075.00	2,780.04	1.93	0.00	134.80	-365.04	-162.25	2,217.48	2,210.91	6.56	337.866		
700.00	699.13	3,075.00	2,780.04	2.30	0.00	140.05	-365.04	-162.25	2,120.65	2,114.19	6.46	328.439		
800.00	798.15	3,075.00	2,780.04	2.68	0.00	144.15	-365.04	-162.25	2,024.89	2,018.53	6.35	318.766		
900.00	896.63	3,075.00	2,780.04	3.08	0.00	147.38	-365.04	-162.25	1,930.46	1,924.21	6.25	308.805		
1,000.00	994.44	3,075.00	2,780.04	3.51	0.00	149.96	-365.04	-162.25	1,837.71	1,831.55	6.16	298.479		
1,100.00	1,091.46	3,075.00	2,780.04	3.96	0.00	152.05	-365.04	-162.25	1,747.02	1,740.95	6.07	287.664		
1,200.00	1,187.58	3,075.00	2,780.04	4.46	0.00	153.76	-365.04	-162.25	1,658.85	1,652.85	6.01	276.182		
1,212.50	1,199.53	3,075.00	2,780.04	4.52	0.00	153.95	-365.04	-162.25	1,648.04	1,642.04	5.99	274.920		
1,300.00	1,283.09	3,075.00	2,780.04	4.99	0.00	153.95	-365.04	-162.25	1,573.10	1,567.13	5.97	263.582		
1,400.00	1,378.60	3,075.00	2,780.04	5.53	0.00	153.95	-365.04	-162.25	1,489.13	1,483.17	5.97	249.535		
1,500.00	1,474.10	3,075.00	2,780.04	6.08	0.00	153.95	-365.04	-162.25	1,407.27	1,401.26	6.01	234.315		
1,600.00	1,569.60	3,075.00	2,780.04	6.64	0.00	153.95	-365.04	-162.25	1,327.88	1,321.79	6.09	217.951		
1,700.00	1,665.10	3,075.00	2,780.04	7.21	0.00	153.95	-365.04	-162.25	1,251.46	1,245.22	6.24	200.610		
1,747.50	1,710.46	3,075.00	2,780.04	7.48	0.00	153.95	-365.04	-162.25	1,216.36	1,210.03	6.33	192.119		
1,750.00	1,712.85	3,075.00	2,780.04	7.49	0.00	153.74	-365.04	-162.25	1,214.53	1,208.20	6.34	191.650		
1,800.00	1,761.04	3,075.00	2,780.04	7.76	0.00	148.72	-365.04	-162.25	1,177.43	1,170.97	6.46	182.288		
1,850.00	1,809.90	3,075.00	2,780.04	8.00	0.00	140.88	-365.04	-162.25	1,139.25	1,132.65	6.60	172.724		
1,900.00	1,859.25	3,075.00	2,780.04	8.21	0.00	127.34	-365.04	-162.25	1,100.04	1,093.31	6.73	163.392		
1,950.00	1,908.91	3,075.00	2,780.04	8.39	0.00	102.31	-365.04	-162.25	1,059.84	1,052.97	6.87	154.335		
2,000.00	1,958.68	3,075.00	2,780.04	8.54	0.00	65.39	-365.04	-162.25	1,018.69	1,011.70	7.00	145.587		
2,050.00	2,008.39	3,075.00	2,780.04	8.67	0.00	35.82	-365.04	-162.25	976.64	969.52	7.12	137.144		
2,100.00	2,057.84	3,075.00	2,780.04	8.78	0.00	19.09	-365.04	-162.25	933.73	926.49	7.24	128.965		
2,150.00	2,106.86	3,075.00	2,780.04	8.89	0.00	9.06	-365.04	-162.25	890.01	882.65	7.35	121.014		
2,200.00	2,155.27	3,075.00	2,780.04	8.99	0.00	2.02	-365.04	-162.25	845.52	838.06	7.46	113.271		
2,216.88	2,171.44	3,075.00	2,780.04	9.02	0.00	0.00	-365.04	-162.25	830.34	822.83	7.51	110.617		
2,250.00	2,202.89	3,075.00	2,780.04	9.09	0.00	0.00	-365.04	-162.25	800.35	792.78	7.57	105.687		
2,300.00	2,249.64	3,075.00	2,780.04	9.19	0.00	0.00	-365.04	-162.25	754.63	746.95	7.67	98.349		
2,350.00	2,295.41	3,075.00	2,780.04	9.31	0.00	0.00	-365.04	-162.25	708.39	700.61	7.77	91.124		
2,400.00	2,340.06	3,075.00	2,780.04	9.43	0.00	0.00	-365.04	-162.25	661.66	653.78	7.87	84.040		
2,450.00	2,383.47	3,075.00	2,780.04	9.57	0.00	0.00	-365.04	-162.25	614.48	606.51	7.97	77.095		
2,500.00	2,425.52	3,075.00	2,780.04	9.72	0.00	0.00	-365.04	-162.25	566.87	558.81	8.07	70.281		
2,550.00	2,466.10	3,075.00	2,780.04	9.91	0.00	0.00	-365.04	-162.25	518.88	510.72	8.16	63.595		
2,600.00	2,505.10	3,075.00	2,780.04	10.14	0.00	0.00	-365.04	-162.25	470.54	462.29	8.25	57.031		
2,650.00	2,542.40	3,075.00	2,780.04	10.42	0.00	0.00	-365.04	-162.25	421.87	413.53	8.34	50.585		
2,700.00	2,577.92	3,075.00	2,780.04	10.76	0.00	0.00	-365.04	-162.25	372.91	364.48	8.43	44.254		
2,750.00	2,611.54	3,075.00	2,780.04	11.16	0.00	0.00	-365.04	-162.25	323.70	315.19	8.51	38.033		
2,800.00	2,643.18	3,075.00	2,780.04	11.63	0.00	0.00	-365.04	-162.25	274.26	265.67	8.59	31.918		
2,850.00	2,672.75	3,075.00	2,780.04	12.16	0.00	0.00	-365.04	-162.25	224.64	215.97	8.67	25.907		
2,900.00	2,700.17	3,075.00	2,780.04	12.77	0.00	0.00	-365.04	-162.25	174.86	166.15	8.71	20.067		
2,950.00	2,725.37	3,075.00	2,780.04	13.43	0.00	0.00	-365.04	-162.25	124.97	116.21	8.77	14.256		
3,000.00	2,748.27	3,075.00	2,780.04	14.16	0.00	0.00	-365.04	-162.25	75.00	66.22	8.78	8.545		
3,012.72	2,753.72	3,075.00	2,780.04	14.35	0.00	0.00	-365.04	-162.25	62.28	53.52	8.76	7.109		
3,075.00	2,780.04	3,075.00	2,780.04	15.35	0.00	93.18	-365.04	-162.25	0.00	-12.11	12.11	0.000 Level 1, CC, ES, SF		
3,100.00	2,790.61	3,099.08	2,789.88	15.75	3.81	89.89	-372.18	-183.04	6.30	-8.21	14.51	0.434 Level 1		
3,200.00	2,832.87	3,189.77	2,820.55	17.44	3.92	80.79	-393.11	-265.65	40.33	22.47	17.86	2.258		

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



Scientific Drilling, Intl

Anticollision Report



Company:	Red Willow Production Co.	Local Co-ordinate Reference:	Well NC 32-4 7F-2 - Slot 7F-2
Project:	Archuleta County, CO NAD83	TVD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Reference Site:	North Carracas 7F Pad	MD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NC 32-4 7F-2	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Pilot	Database:	Grand Junction District
Reference Design:	Plan #3	Offset TVD Reference:	Offset Datum

Offset Design North Carracas 7F Pad - NC 32-4 7F-2 - Lateral 4 - Plan #5												Offset Site Error:	0.00 usft
Survey Program: 3075-MWD+HDGM												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	
3,300.00	2,875.13	3,269.17	2,838.64	19.22	4.88	75.57	-403.35	-342.21	87.66	67.64	20.02	4.379	
3,400.00	2,917.39	3,336.43	2,847.24	21.05	6.84	72.33	-405.95	-408.82	146.09	124.48	21.61	6.760	
3,500.00	2,959.66	3,392.44	2,849.59	22.92	8.51	70.18	-403.81	-464.72	213.23	190.49	22.75	9.375	
3,525.23	2,970.32	3,405.45	2,849.50	23.39	8.90	69.74	-402.76	-477.68	231.29	208.28	23.01	10.052	



Company:	Red Willow Production Co.	Local Co-ordinate Reference:	Well NC 32-4 7F-2 - Slot 7F-2
Project:	Archuleta County, CO NAD83	TVD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Reference Site:	North Carracas 7F Pad	MD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NC 32-4 7F-2	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Pilot	Database:	Grand Junction District
Reference Design:	Plan #3	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6159' & RKB 14' @ 6173.00usft

Offset Depths are relative to Offset Datum

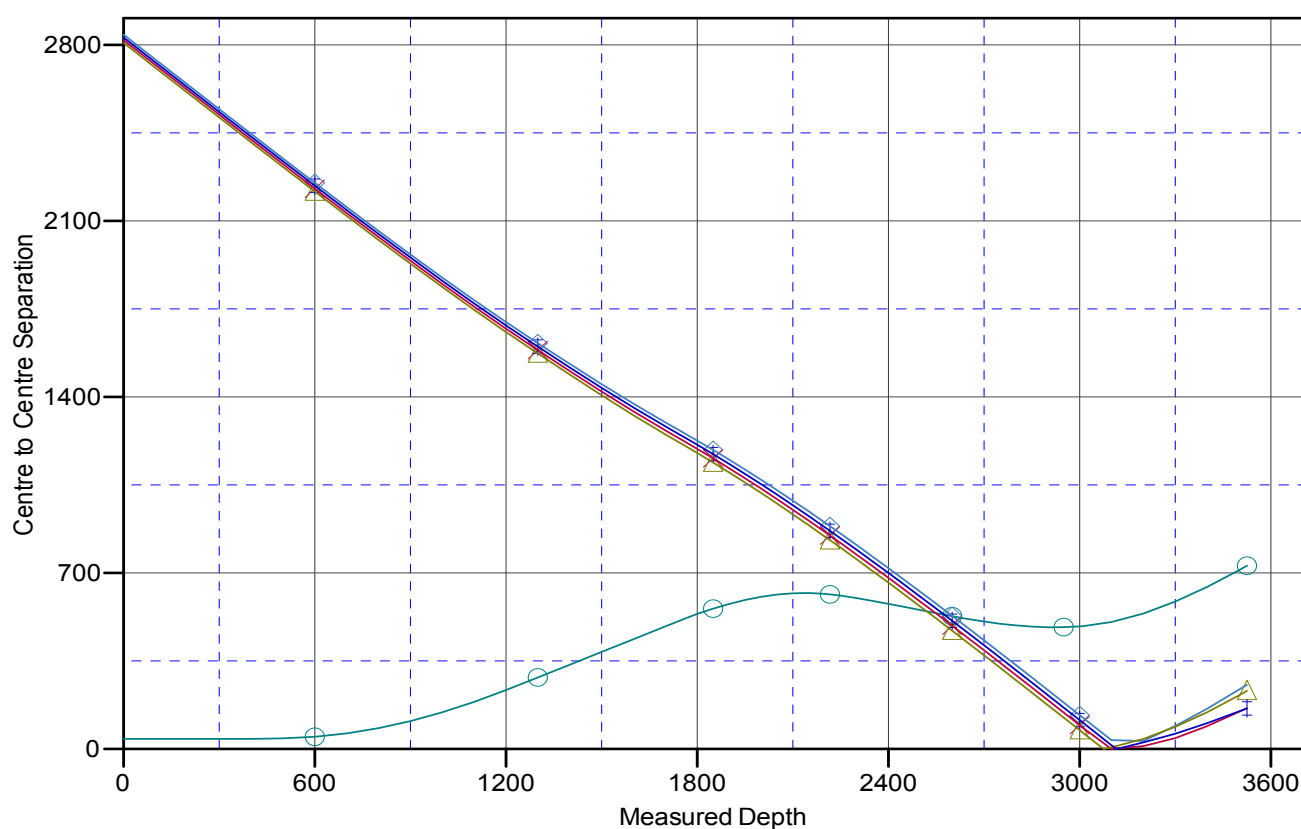
Central Meridian is -105.5000000

Coordinates are relative to: NC 32-4 7F-2 - Slot 7F-2

Coordinate System is US State Plane 1983, Colorado Southern Zone

Grid Convergence at Surface is: -1.12°

Ladder Plot



LEGEND

- NC 32-4 7F-1, Pilot, Plan #3 V0
- NC 32-4 7F-2, Lateral 3, Plan #5 V0
- NC 32-4 7F-2, Lateral 2, Plan #5 V0
- NC 32-4 7F-2, Lateral 1, Plan #5 V0
- NC 32-4 7F-2, Lateral 4, Plan #5 V0



Company:	Red Willow Production Co.	Local Co-ordinate Reference:	Well NC 32-4 7F-2 - Slot 7F-2
Project:	Archuleta County, CO NAD83	TVD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Reference Site:	North Carracas 7F Pad	MD Reference:	GL 6159' & RKB 14' @ 6173.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NC 32-4 7F-2	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Pilot	Database:	Grand Junction District
Reference Design:	Plan #3	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6159' & RKB 14' @ 6173.00usft

Offset Depths are relative to Offset Datum

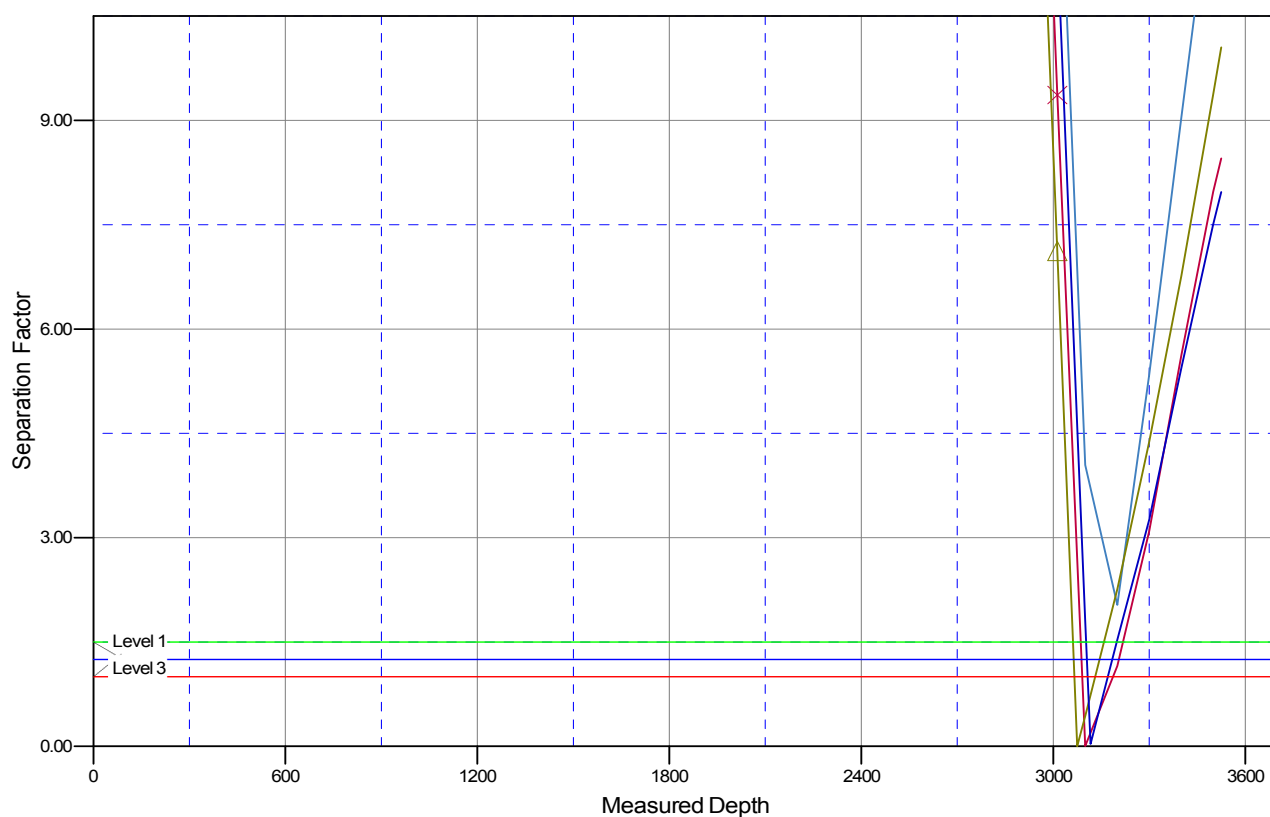
Central Meridian is -105.5000000

Coordinates are relative to: NC 32-4 7F-2 - Slot 7F-2

Coordinate System is US State Plane 1983, Colorado Southern Zone

Grid Convergence at Surface is: -1.12°

Separation Factor Plot



LEGEND

- NC 32-4 7F-1, Pilot, Plan #3 V0
- NC 32-4 7F-2, Lateral 1, Plan #5 V0
- NC 32-4 7F-2, Lateral 3, Plan #5 V0
- NC 32-4 7F-2, Lateral 4, Plan #5 V0
- NC 32-4 7F-2, Lateral 2, Plan #5 V0