



SHELL E&P

ROUTT COUNTY, COLORADO

GNAT HILL 1-29

GNAT HILL 1-29

GNAT HILL 1-29

Plan: Design #2

PORPOSAL

3 December, 2012



Weatherford®



Project: ROUNT COUNTY, COLORADO
Site: GNAT HILL 1-29
Well: GNAT HILL 1-29
Wellbore: GNAT HILL 1-29
Design: Design #2
Latitude: 40° 26' 44.660 N
Longitude: 107° 23' 33.022 W
GL: 6654.80
KB: WELL @ 6669.10ft (SAVANA 650)
RIG: SAVANA 650



Weatherford®

WELL DETAILS: GNAT HILL 1-29

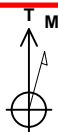
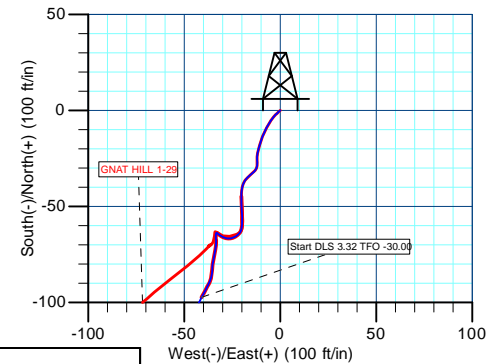
+N/-S	+E/-W	Northing	Ground Level: Easting	6654.80 Latitude	Longitude	Slot
0.00	0.00	1410843.56	2473313.08	40° 26' 44.660 N	107° 23' 33.022 W	

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSECT	Annotation
1960.00	6.21	207.93	1955.80	-97.39	-40.91	0.00	0.00	104.30	Start DLS 3.32 TFO -30.00
2757.65	32.00	183.05	2703.88	-351.09	-72.93	3.32	-30.00	336.60	Start DLS 1.00 TFO 103.12
4623.11	32.65	218.32	4294.28	-1247.43	-414.23	1.00	103.12	1277.93	Start 5101.98 hold at 4623.11 MD
9725.09	32.65	218.32	8590.00	-3407.18	-2120.84	0.00	0.00	4013.33	TD at 9725.09

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

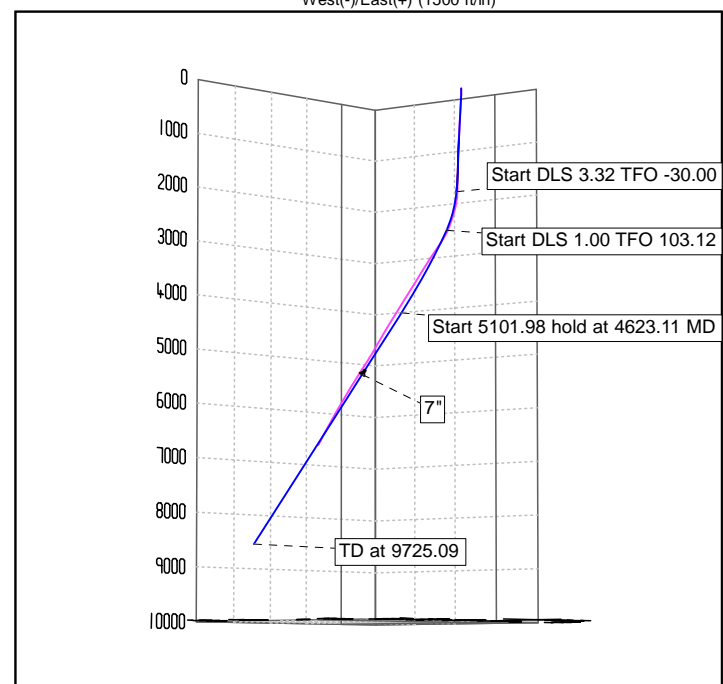
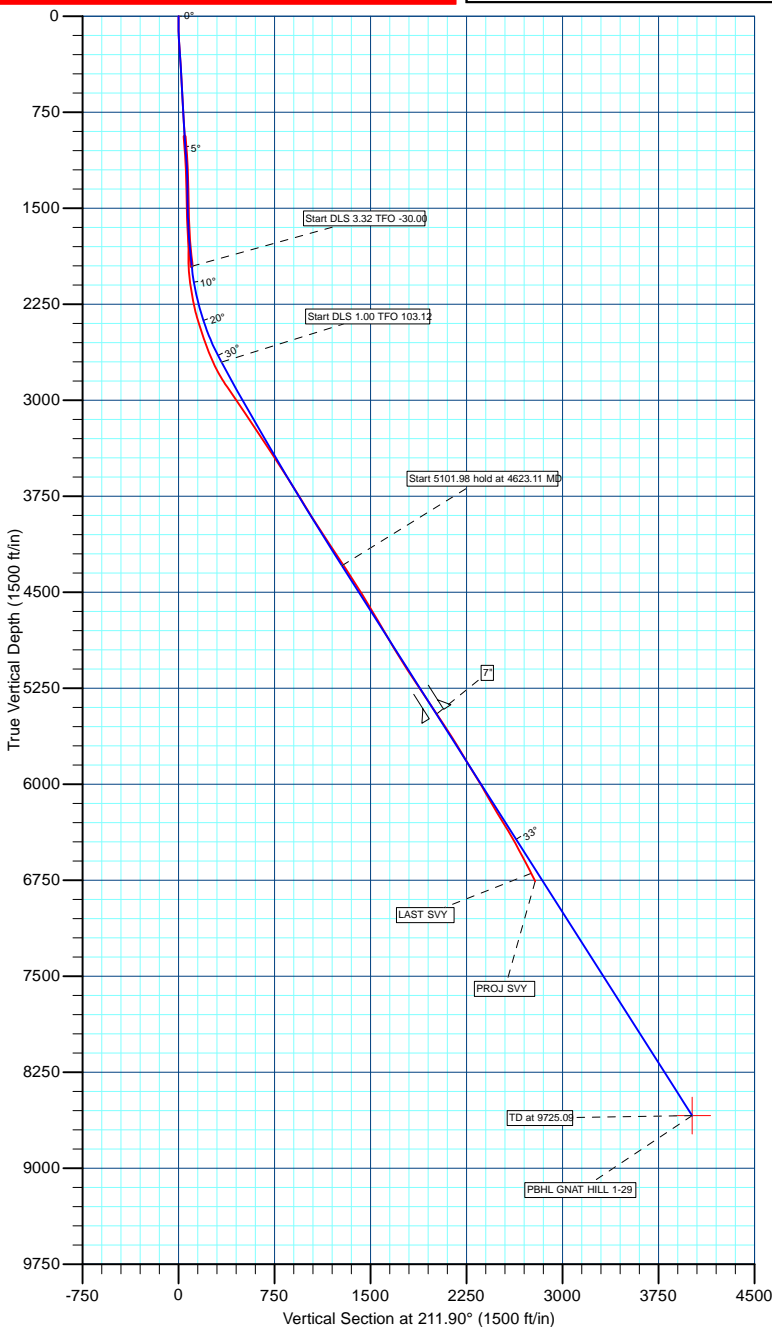
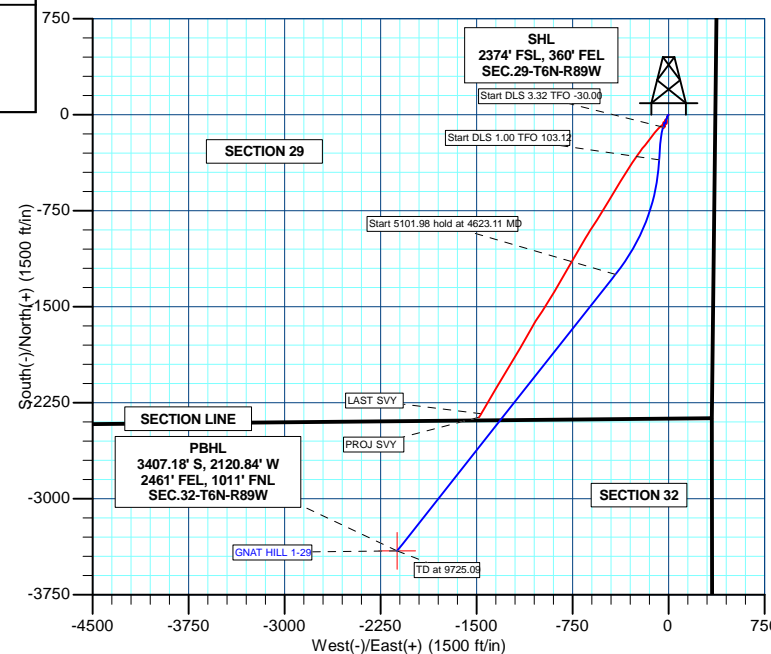
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
PBHL GNAT HILL 1-29	8590.00	-3407.18	-2120.84	1407482.43	2471120.02	40° 26' 10.990 N	107° 24' 0.450 W	Point



Azimuths to True North
Magnetic North: 10.03°
Magnetic Field
Strength: 52627.8nT
Dip Angle: 66.57°
Date: 10/23/2012
Model: BGGM2012

CASING DETAILS

TVD	MD	Name	Size
5453.58	6000.00		7"



Plan: Design #2 (GNAT HILL 1-29/GNAT HILL 1-29)

Created By: TRACY WILLIAMS

Date: 20:39, December 03 2012



SHELL E&P

ROUTT COUNTY, COLORADO

GNAT HILL 1-29

GNAT HILL 1-29

GNAT HILL 1-29

Plan: Design #2

Standard Planning Report

03 December, 2012



Weatherford®



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well GNAT HILL 1-29
Company:	SHELL E&P	TVD Reference:	WELL @ 6669.10ft (SAVANA 650)
Project:	ROUTT COUNTY, COLORADO	MD Reference:	WELL @ 6669.10ft (SAVANA 650)
Site:	GNAT HILL 1-29	North Reference:	True
Well:	GNAT HILL 1-29	Survey Calculation Method:	Minimum Curvature
Wellbore:	GNAT HILL 1-29		
Design:	Design #2		

Project	ROUTT COUNTY, COLORADO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		GNAT HILL 1-29			
Site Position:		Northing:	1,410,843.56 usft	Latitude:	40° 26' 44.660 N
From:	Lat/Long	Easting:	2,473,313.08 usft	Longitude:	107° 23' 33.022 W
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16"	Grid Convergence:	-1.22 °

Well	GNAT HILL 1-29					
Well Position	+N/-S	0.00 ft	Northing:	1,410,843.56 usft	Latitude:	40° 26' 44.660 N
	+E/-W	0.00 ft	Easting:	2,473,313.08 usft	Longitude:	107° 23' 33.022 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	6,654.80 ft

Wellbore	GNAT HILL 1-29				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2012	10/23/2012	10.03	66.57	52,628

Design	Design #2			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	1,960.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(ft)	(ft)	(ft)	(°)
	0.00	0.00	0.00	211.90

Plan Sections										
Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Dogleg Rate	Build Rate	Turn Rate	TFO	Target
(ft)	(°)	(°)	(ft)	(ft)	(ft)	(°/100usft)	(°/100usft)	(°/100usft)	(°)	
1,960.00	6.21	207.93	1,955.80	-97.39	-40.91	0.00	0.00	0.00	0.00	
2,757.65	32.00	183.05	2,703.88	-351.09	-72.93	3.32	3.23	-3.12	-30.00	
4,623.11	32.65	218.32	4,294.28	-1,247.43	-414.23	1.00	0.03	1.89	103.12	
9,725.09	32.65	218.32	8,590.00	-3,407.18	-2,120.84	0.00	0.00	0.00	0.00	PBHL GNAT HILL 1-2



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well GNAT HILL 1-29
Company:	SHELL E&P	TVD Reference:	WELL @ 6669.10ft (SAVANA 650)
Project:	ROUTT COUNTY, COLORADO	MD Reference:	WELL @ 6669.10ft (SAVANA 650)
Site:	GNAT HILL 1-29	North Reference:	True
Well:	GNAT HILL 1-29	Survey Calculation Method:	Minimum Curvature
Wellbore:	GNAT HILL 1-29		
Design:	Design #2		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	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
116.00	1.25	228.34	115.99	-0.84	-0.95	1.21	1.08	1.08	0.00
178.00	2.60	225.52	177.95	-2.28	-2.45	3.23	2.18	2.18	-4.55
240.00	4.25	214.53	239.84	-5.15	-4.76	6.89	2.85	2.66	-17.73
301.00	4.06	208.91	300.68	-8.91	-7.08	11.31	0.74	-0.31	-9.21
367.00	4.69	199.91	366.49	-13.49	-9.13	16.28	1.41	0.95	-13.64
428.00	4.38	196.41	427.30	-18.07	-10.64	20.96	0.68	-0.51	-5.74
490.00	3.69	192.78	489.15	-22.28	-11.75	25.13	1.19	-1.11	-5.85
551.00	3.06	176.91	550.04	-25.83	-12.10	28.32	1.84	-1.03	-26.02
612.00	2.56	182.03	610.97	-28.81	-12.06	30.83	0.92	-0.82	8.39
674.00	2.63	222.91	672.91	-31.24	-13.08	33.43	2.92	0.11	65.94
735.00	3.38	230.53	733.82	-33.41	-15.42	36.51	1.39	1.23	12.49
797.00	3.25	218.03	795.72	-35.95	-17.91	39.99	1.18	-0.21	-20.16
858.00	3.50	196.78	856.62	-39.10	-19.51	43.50	2.08	0.41	-34.84
919.00	4.13	182.91	917.48	-43.07	-20.16	47.22	1.82	1.03	-22.74
943.00	4.38	178.18	941.42	-44.85	-20.18	48.74	1.79	1.04	-19.71
1,028.00	5.06	177.66	1,026.13	-51.84	-19.92	54.54	0.80	0.80	-0.61
1,058.00	5.25	179.53	1,056.01	-54.54	-19.86	56.79	0.85	0.63	6.23
1,088.00	4.94	179.78	1,085.89	-57.20	-19.84	59.05	1.04	-1.03	0.83
1,117.00	4.56	182.28	1,114.79	-59.60	-19.88	61.11	1.49	-1.31	8.62
1,148.00	3.69	194.78	1,145.71	-61.80	-20.18	63.13	4.02	-2.81	40.32
1,178.00	3.06	212.78	1,175.66	-63.40	-20.86	64.85	4.08	-2.10	60.00
1,208.00	2.75	228.41	1,205.62	-64.56	-21.84	66.34	2.82	-1.03	52.10
1,238.00	2.69	235.78	1,235.59	-65.43	-22.96	67.68	1.18	-0.20	24.57
1,279.00	3.00	249.03	1,276.54	-66.35	-24.75	69.41	1.77	0.76	32.32
1,301.00	3.25	258.15	1,298.50	-66.69	-25.90	70.30	2.53	1.14	41.45
1,331.00	3.74	280.04	1,328.45	-66.69	-27.70	71.26	4.70	1.63	72.97
1,362.00	3.42	296.88	1,359.39	-66.10	-29.52	71.71	3.53	-1.03	54.32
1,394.00	3.44	303.78	1,391.33	-65.13	-31.17	71.77	1.29	0.06	21.56
1,428.00	1.81	309.40	1,425.30	-64.22	-32.43	71.66	4.85	-4.79	16.53
1,457.00	0.88	319.41	1,454.29	-63.76	-32.93	71.53	3.30	-3.21	34.52
1,491.00	1.06	214.53	1,488.28	-63.83	-33.28	71.77	4.53	0.53	-308.47
1,523.00	3.00	188.53	1,520.26	-64.90	-33.57	72.83	6.56	6.06	-81.25
1,555.00	3.31	169.29	1,552.22	-66.63	-33.52	74.28	3.43	0.97	-60.13
1,587.00	0.19	167.91	1,584.20	-67.59	-33.34	75.00	9.75	-9.75	-4.31
1,617.00	3.13	178.78	1,614.18	-68.46	-33.31	75.72	9.81	9.80	36.23
1,649.00	3.63	187.41	1,646.13	-70.34	-33.42	77.38	2.23	1.56	26.97
1,681.00	4.25	190.28	1,678.05	-72.51	-33.76	79.40	2.03	1.94	8.97
1,712.00	4.56	190.41	1,708.96	-74.85	-34.19	81.62	1.00	1.00	0.42
1,744.00	4.81	190.16	1,740.85	-77.42	-34.66	84.05	0.78	0.78	-0.78
1,776.00	5.19	189.16	1,772.73	-80.17	-35.13	86.63	1.22	1.19	-3.13
1,793.00	5.44	186.16	1,789.66	-81.73	-35.33	88.06	2.20	1.47	-17.65
1,807.00	5.63	187.00	1,803.59	-83.08	-35.49	89.28	1.48	1.36	6.00
1,839.00	5.69	184.41	1,835.43	-86.21	-35.80	92.11	0.82	0.19	-8.09
1,866.00	5.66	205.89	1,862.31	-88.75	-36.49	94.63	7.82	-0.11	79.56
1,896.00	5.90	206.98	1,892.15	-91.45	-37.83	97.63	0.88	0.80	3.63
1,929.00	5.95	207.26	1,924.98	-94.48	-39.39	101.03	0.18	0.15	0.85
Start DLS 3.32 TFO -30.00									
1,960.00	6.21	207.93	1,955.80	-97.39	-40.91	104.30	0.87	0.84	2.16
2,000.00	7.39	202.76	1,995.52	-101.68	-42.92	109.00	3.32	2.95	-12.92
2,100.00	10.49	195.08	2,094.30	-116.41	-47.77	124.07	3.32	3.10	-7.68
2,200.00	13.70	190.91	2,192.07	-136.83	-52.39	143.85	3.32	3.21	-4.16
2,300.00	16.95	188.31	2,288.50	-162.89	-56.74	168.27	3.32	3.25	-2.60
2,400.00	20.22	186.53	2,383.27	-194.49	-60.81	197.25	3.32	3.27	-1.78



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well GNAT HILL 1-29
Company:	SHELL E&P	TVD Reference:	WELL @ 6669.10ft (SAVANA 650)
Project:	ROUTT COUNTY, COLORADO	MD Reference:	WELL @ 6669.10ft (SAVANA 650)
Site:	GNAT HILL 1-29	North Reference:	True
Well:	GNAT HILL 1-29	Survey Calculation Method:	Minimum Curvature
Wellbore:	GNAT HILL 1-29		
Design:	Design #2		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,500.00	23.51	185.23	2,476.07	-231.53	-64.60	230.70	3.32	3.28	-1.30
2,600.00	26.80	184.23	2,566.57	-273.88	-68.08	268.49	3.32	3.29	-1.00
2,700.00	30.10	183.44	2,654.49	-321.40	-71.25	310.51	3.32	3.30	-0.79
Start DLS 1.00 TFO 103.12									
2,757.65	32.00	183.05	2,703.88	-351.09	-72.93	336.60	3.32	3.30	-0.68
2,800.00	31.91	183.83	2,739.81	-373.46	-74.27	356.30	1.00	-0.22	1.84
2,900.00	31.70	185.69	2,824.80	-425.98	-78.64	403.20	1.00	-0.20	1.86
3,000.00	31.53	187.57	2,909.96	-478.04	-84.69	450.59	1.00	-0.18	1.88
3,100.00	31.38	189.46	2,995.26	-529.65	-92.41	498.48	1.00	-0.15	1.90
3,200.00	31.26	191.37	3,080.69	-580.77	-101.80	546.85	1.00	-0.12	1.91
3,300.00	31.17	193.29	3,166.21	-631.40	-112.87	595.68	1.00	-0.09	1.92
3,400.00	31.11	195.22	3,251.81	-681.51	-125.60	644.96	1.00	-0.06	1.93
3,500.00	31.08	197.16	3,337.44	-731.10	-140.00	694.66	1.00	-0.03	1.94
3,600.00	31.07	199.10	3,423.09	-780.15	-156.06	744.79	1.00	0.00	1.94
3,700.00	31.10	201.03	3,508.74	-828.64	-173.77	795.31	1.00	0.02	1.94
3,800.00	31.15	202.96	3,594.34	-876.56	-193.13	846.22	1.00	0.05	1.93
3,900.00	31.23	204.89	3,679.89	-923.89	-214.13	897.51	1.00	0.08	1.92
4,000.00	31.34	206.80	3,765.35	-970.62	-236.77	949.15	1.00	0.11	1.91
4,100.00	31.48	208.70	3,850.70	-1,016.74	-261.04	1,001.12	1.00	0.14	1.90
4,200.00	31.65	210.59	3,935.90	-1,062.23	-286.93	1,053.42	1.00	0.17	1.88
4,300.00	31.84	212.45	4,020.94	-1,107.08	-314.43	1,106.03	1.00	0.19	1.86
4,400.00	32.06	214.29	4,105.79	-1,151.27	-343.54	1,158.93	1.00	0.22	1.84
4,500.00	32.31	216.11	4,190.43	-1,194.79	-374.25	1,212.11	1.00	0.25	1.82
4,600.00	32.58	217.90	4,274.82	-1,237.63	-406.54	1,265.54	1.00	0.27	1.79
Start 5101.98 hold at 4623.11 MD									
4,623.11	32.65	218.32	4,294.28	-1,247.43	-414.23	1,277.93	1.00	0.29	1.78
4,700.00	32.65	218.32	4,359.02	-1,279.98	-439.95	1,319.15	0.00	0.00	0.00
4,800.00	32.65	218.32	4,443.22	-1,322.31	-473.40	1,372.76	0.00	0.00	0.00
4,900.00	32.65	218.32	4,527.41	-1,364.64	-506.85	1,426.38	0.00	0.00	0.00
5,000.00	32.65	218.32	4,611.61	-1,406.97	-540.30	1,479.99	0.00	0.00	0.00
5,100.00	32.65	218.32	4,695.81	-1,449.31	-573.75	1,533.61	0.00	0.00	0.00
5,200.00	32.65	218.32	4,780.01	-1,491.64	-607.20	1,587.22	0.00	0.00	0.00
5,300.00	32.65	218.32	4,864.20	-1,533.97	-640.65	1,640.84	0.00	0.00	0.00
5,400.00	32.65	218.32	4,948.40	-1,576.30	-674.10	1,694.45	0.00	0.00	0.00
5,500.00	32.65	218.32	5,032.60	-1,618.63	-707.55	1,748.07	0.00	0.00	0.00
5,600.00	32.65	218.32	5,116.79	-1,660.96	-741.00	1,801.68	0.00	0.00	0.00
5,700.00	32.65	218.32	5,200.99	-1,703.30	-774.45	1,855.29	0.00	0.00	0.00
5,800.00	32.65	218.32	5,285.19	-1,745.63	-807.90	1,908.91	0.00	0.00	0.00
5,900.00	32.65	218.32	5,369.39	-1,787.96	-841.35	1,962.52	0.00	0.00	0.00
7"									
6,000.00	32.65	218.32	5,453.58	-1,830.29	-874.80	2,016.14	0.00	0.00	0.00
6,100.00	32.65	218.32	5,537.78	-1,872.62	-908.25	2,069.75	0.00	0.00	0.00
6,200.00	32.65	218.32	5,621.98	-1,914.95	-941.70	2,123.37	0.00	0.00	0.00
6,300.00	32.65	218.32	5,706.17	-1,957.28	-975.15	2,176.98	0.00	0.00	0.00
6,400.00	32.65	218.32	5,790.37	-1,999.62	-1,008.60	2,230.60	0.00	0.00	0.00
6,500.00	32.65	218.32	5,874.57	-2,041.95	-1,042.05	2,284.21	0.00	0.00	0.00
6,600.00	32.65	218.32	5,958.76	-2,084.28	-1,075.50	2,337.83	0.00	0.00	0.00
6,700.00	32.65	218.32	6,042.96	-2,126.61	-1,108.95	2,391.44	0.00	0.00	0.00
6,800.00	32.65	218.32	6,127.16	-2,168.94	-1,142.40	2,445.05	0.00	0.00	0.00
6,900.00	32.65	218.32	6,211.36	-2,211.27	-1,175.85	2,498.67	0.00	0.00	0.00
7,000.00	32.65	218.32	6,295.55	-2,253.60	-1,209.30	2,552.28	0.00	0.00	0.00
7,100.00	32.65	218.32	6,379.75	-2,295.94	-1,242.75	2,605.90	0.00	0.00	0.00
7,200.00	32.65	218.32	6,463.95	-2,338.27	-1,276.20	2,659.51	0.00	0.00	0.00



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Project:	ROUTT COUNTY, COLORADO	MD Reference:	WELL @ 6669.10ft (SAVANA 650)
Site:	GNAT HILL 1-29	North Reference:	True
Well:	GNAT HILL 1-29	Survey Calculation Method:	Minimum Curvature
Wellbore:	GNAT HILL 1-29		
Design:	Design #2		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,300.00	32.65	218.32	6,548.14	-2,380.60	-1,309.65	2,713.13	0.00	0.00	0.00
7,400.00	32.65	218.32	6,632.34	-2,422.93	-1,343.10	2,766.74	0.00	0.00	0.00
7,500.00	32.65	218.32	6,716.54	-2,465.26	-1,376.55	2,820.36	0.00	0.00	0.00
7,600.00	32.65	218.32	6,800.74	-2,507.59	-1,410.00	2,873.97	0.00	0.00	0.00
7,700.00	32.65	218.32	6,884.93	-2,549.92	-1,443.45	2,927.58	0.00	0.00	0.00
7,800.00	32.65	218.32	6,969.13	-2,592.26	-1,476.90	2,981.20	0.00	0.00	0.00
7,900.00	32.65	218.32	7,053.33	-2,634.59	-1,510.35	3,034.81	0.00	0.00	0.00
8,000.00	32.65	218.32	7,137.52	-2,676.92	-1,543.80	3,088.43	0.00	0.00	0.00
8,100.00	32.65	218.32	7,221.72	-2,719.25	-1,577.25	3,142.04	0.00	0.00	0.00
8,200.00	32.65	218.32	7,305.92	-2,761.58	-1,610.70	3,195.66	0.00	0.00	0.00
8,300.00	32.65	218.32	7,390.12	-2,803.91	-1,644.14	3,249.27	0.00	0.00	0.00
8,400.00	32.65	218.32	7,474.31	-2,846.25	-1,677.59	3,302.89	0.00	0.00	0.00
8,500.00	32.65	218.32	7,558.51	-2,888.58	-1,711.04	3,356.50	0.00	0.00	0.00
8,600.00	32.65	218.32	7,642.71	-2,930.91	-1,744.49	3,410.12	0.00	0.00	0.00
8,700.00	32.65	218.32	7,726.90	-2,973.24	-1,777.94	3,463.73	0.00	0.00	0.00
8,800.00	32.65	218.32	7,811.10	-3,015.57	-1,811.39	3,517.34	0.00	0.00	0.00
8,900.00	32.65	218.32	7,895.30	-3,057.90	-1,844.84	3,570.96	0.00	0.00	0.00
9,000.00	32.65	218.32	7,979.50	-3,100.23	-1,878.29	3,624.57	0.00	0.00	0.00
9,100.00	32.65	218.32	8,063.69	-3,142.57	-1,911.74	3,678.19	0.00	0.00	0.00
9,200.00	32.65	218.32	8,147.89	-3,184.90	-1,945.19	3,731.80	0.00	0.00	0.00
9,300.00	32.65	218.32	8,232.09	-3,227.23	-1,978.64	3,785.42	0.00	0.00	0.00
9,400.00	32.65	218.32	8,316.28	-3,269.56	-2,012.09	3,839.03	0.00	0.00	0.00
9,500.00	32.65	218.32	8,400.48	-3,311.89	-2,045.54	3,892.65	0.00	0.00	0.00
9,600.00	32.65	218.32	8,484.68	-3,354.22	-2,078.99	3,946.26	0.00	0.00	0.00
9,700.00	32.65	218.32	8,568.87	-3,396.55	-2,112.44	3,999.87	0.00	0.00	0.00
TD at 9725.09 - PBHL GNAT HILL 1-29									
9,725.09	32.65	218.32	8,590.00	-3,407.18	-2,120.84	4,013.33	0.00	0.00	0.00

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
PBHL GNAT HILL 1-29	0.00	0.00	8,590.00	-3,407.18	-2,120.84	1,407,482.43	2,471,120.02	40° 26' 10.990 N	107° 24' 0.450 W
- plan hits target center									
- Point									

Casing Points				
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
6,000.00	5,453.58	7"	7	8-3/4



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well GNAT HILL 1-29
Company:	SHELL E&P	TVD Reference:	WELL @ 6669.10ft (SAVANA 650)
Project:	ROUTT COUNTY, COLORADO	MD Reference:	WELL @ 6669.10ft (SAVANA 650)
Site:	GNAT HILL 1-29	North Reference:	True
Well:	GNAT HILL 1-29	Survey Calculation Method:	Minimum Curvature
Wellbore:	GNAT HILL 1-29		
Design:	Design #2		

Plan Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,960.00	1,955.80	-97.39	-40.91	Start DLS 3.32 TFO -30.00
2,757.65	2,703.88	-351.09	-72.93	Start DLS 1.00 TFO 103.12
4,623.11	4,294.28	-1,247.43	-414.23	Start 5101.98 hold at 4623.11 MD
9,725.09	8,590.00	-3,407.18	-2,120.84	TD at 9725.09



SHELL E&P

ROUTT COUNTY, COLORADO

GNAT HILL 1-29

GNAT HILL 1-29

GNAT HILL 1-29

Design #2

Anticollision Report

03 December, 2012



Weatherford®



Company:	SHELL E&P	Local Co-ordinate Reference:	Well GNAT HILL 1-29
Project:	ROUTT COUNTY, COLORADO	TVD Reference:	WELL @ 6669.10ft (SAVANA 650)
Reference Site:	GNAT HILL 1-29	MD Reference:	WELL @ 6669.10ft (SAVANA 650)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	GNAT HILL 1-29	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	GNAT HILL 1-29	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #2	Offset TVD Reference:	Offset Datum

Reference	Design #2		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.00ft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 2,332.03 ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program		Date	12/3/2012		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
116.00	943.00	Survey #1 (GNAT HILL 1-29)	MWD	MWD - Standard	
1,028.00	1,960.00	ST#1 Survey #2 (GNAT HILL 1-29)	MWD	MWD - Standard	
1,960.00	9,725.09	Design #2 (GNAT HILL 1-29)			

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
GNAT HILL 1-29						
GNAT HILL 1-29 - GNAT HILL 1-29 - Survey #1	900.00	900.00	0.00	-4.33	0.000	Level 1, CC, SF
GNAT HILL 1-29 - GNAT HILL 1-29 - Survey #1	1,531.27	1,531.28	0.61	-6.41	0.086	Level 1, ES

GNAT HILL 1-29 - GNAT HILL 1-29 - GNAT HILL 1-29 - Survey #1													Offset Site Error:	0.00 ft
Survey Program:													Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.24	0.24	0.000 Level 1		
100.00	99.99	100.00	99.99	0.11	0.15	0.00	-0.63	-0.70	0.00	-0.75	0.75	0.000 Level 1		
200.00	199.93	200.00	199.93	0.32	0.46	0.00	-3.09	-3.20	0.00	-1.27	1.27	0.000 Level 1		
300.00	299.68	300.00	299.68	0.56	0.78	0.00	-8.84	-7.05	0.00	-1.78	1.78	0.000 Level 1		
400.00	399.38	400.00	399.38	0.80	1.07	0.00	-15.99	-10.00	0.00	-2.28	2.28	0.000 Level 1		
500.00	499.13	500.00	499.13	1.03	1.35	0.00	-22.90	-11.88	0.00	-2.79	2.79	0.000 Level 1		
600.00	598.98	600.00	598.98	1.25	1.64	0.00	-28.27	-12.04	0.00	-3.30	3.30	0.000 Level 1		
700.00	698.88	700.00	698.88	1.47	1.94	0.00	-32.13	-13.97	0.00	-3.79	3.79	0.000 Level 1		
800.00	798.72	800.00	798.72	1.69	2.24	0.00	-36.09	-18.01	0.00	-4.33	4.33	0.000 Level 1, CC, SF		
900.00	898.53	900.00	898.53	1.93	2.55	0.00	-41.75	-20.05	0.00	-4.58	4.82	0.048 Level 1		
964.65	963.01	964.65	963.00	2.06	2.76	-73.57	-46.54	-20.11	0.23	-4.93	4.98	0.010 Level 1		
1,000.00	998.23	1,000.00	998.23	2.13	2.88	-86.16	-49.43	-19.97	0.05	-5.02	5.36	0.063 Level 1		
1,100.00	1,097.85	1,100.00	1,097.85	2.22	3.19	-98.82	-58.17	-19.51	0.34	-5.26	5.54	0.050 Level 1		
1,169.59	1,167.27	1,169.60	1,167.28	2.27	3.39	-138.04	-62.75	-20.46	0.28	-5.13	5.49	0.067 Level 1		
1,200.00	1,197.63	1,200.00	1,197.64	2.30	3.48	137.32	-63.92	-21.55	0.37	-4.52	6.12	0.261 Level 1		
1,300.00	1,297.51	1,299.97	1,297.44	2.38	3.77	49.12	-65.72	-27.12	1.60	-5.37	6.41	0.163 Level 1		
1,400.00	1,397.32	1,399.95	1,397.28	2.45	4.06	21.35	-64.08	-32.04	1.05	-6.03	6.88	0.123 Level 1		
1,500.00	1,497.28	1,500.00	1,497.29	2.53	4.35	102.58	-63.54	-34.07	0.84	-6.41	7.01	0.086 Level 1, ES		
1,531.27	1,528.54	1,531.28	1,528.55	2.57	4.45	101.09	-64.55	-34.17	0.61	-5.96	7.26	0.179 Level 1		
1,600.00	1,597.20	1,599.98	1,597.18	2.65	4.65	96.62	-67.68	-34.62	1.30	-3.38	7.67	0.559 Level 1		
1,700.00	1,697.00	1,699.87	1,697.00	2.80	4.95	132.03	-70.52	-36.63	4.29	3.82	7.95	1.481 Level 3		
1,800.00	1,796.62	1,799.41	1,796.53	2.98	5.24	163.57	-70.80	-37.40	11.77	8.32	2.633			
1,900.00	1,896.13	1,899.06	1,896.17	3.18	5.52	156.77	-69.97	-36.53	21.90					

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



Weatherford International Ltd.

Anticollision Report



Company:	SHELL E&P	Local Co-ordinate Reference:	Well GNAT HILL 1-29
Project:	ROUTT COUNTY, COLORADO	TVD Reference:	WELL @ 6669.10ft (SAVANA 650)
Reference Site:	GNAT HILL 1-29	MD Reference:	WELL @ 6669.10ft (SAVANA 650)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	GNAT HILL 1-29	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	GNAT HILL 1-29	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #2	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.00 ft
Survey Program:													Offset Well Error:	0.00 ft
GNAT HILL 1-29 - GNAT HILL 1-29 - GNAT HILL 1-29 - Survey #1														
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
2,000.00	1,995.52	2,000.31	1,997.33	3.41	5.83	165.05	-72.71	-38.94	29.29	20.54	8.75	3.348		
2,100.00	2,094.30	2,101.27	2,097.59	3.69	6.15	164.93	-80.41	-47.78	36.15	26.90	9.25	3.908		
2,200.00	2,192.07	2,201.52	2,196.43	4.05	6.49	158.63	-90.87	-60.80	46.93	37.09	9.85	4.767		
2,300.00	2,288.50	2,302.39	2,294.88	4.48	6.85	151.86	-105.27	-77.27	61.50	50.96	10.54	5.835		
2,400.00	2,383.27	2,404.35	2,393.06	5.00	7.26	146.46	-125.78	-95.47	77.58	66.25	11.33	6.845		
2,500.00	2,476.07	2,504.24	2,488.06	5.62	7.70	142.81	-150.33	-114.16	95.88	83.68	12.20	7.856		
2,600.00	2,566.57	2,601.59	2,579.83	6.34	8.16	140.56	-176.04	-134.03	118.73	105.59	13.14	9.034		
2,700.00	2,654.49	2,699.38	2,670.73	7.16	8.67	138.72	-204.22	-156.48	145.81	131.61	14.20	10.270		
2,800.00	2,739.81	2,797.66	2,759.49	8.04	9.26	135.53	-236.87	-183.12	175.76	160.25	15.51	11.329		
2,900.00	2,824.80	2,899.45	2,847.63	8.86	9.96	130.21	-276.93	-214.46	202.94	185.79	17.15	11.833		
3,000.00	2,909.96	3,001.43	2,932.57	9.72	10.72	124.45	-322.37	-247.89	226.67	207.72	18.96	11.957		
3,100.00	2,995.26	3,099.97	3,013.99	10.60	11.30	119.52	-367.80	-279.81	248.33	227.73	20.60	12.057		
3,200.00	3,080.69	3,206.57	3,101.83	11.50	12.01	115.04	-418.70	-312.29	266.49	244.13	22.36	11.920		
3,300.00	3,166.21	3,303.98	3,182.29	12.42	12.59	111.34	-465.79	-340.52	281.97	258.01	23.96	11.766		
3,400.00	3,251.81	3,402.54	3,264.16	13.34	13.17	108.08	-512.74	-368.90	296.36	270.79	25.57	11.592		
3,500.00	3,337.44	3,501.62	3,346.87	14.27	13.79	105.18	-559.43	-397.12	309.31	282.11	27.20	11.371		
3,600.00	3,423.09	3,600.21	3,429.45	15.20	14.45	102.54	-605.49	-425.05	320.78	291.93	28.85	11.118		
3,700.00	3,508.74	3,698.98	3,512.54	16.14	15.13	100.16	-651.13	-452.76	330.70	300.18	30.52	10.835		
3,800.00	3,594.34	3,796.23	3,594.53	17.08	15.81	97.96	-695.57	-480.33	339.47	307.28	32.19	10.546		
3,900.00	3,679.89	3,896.31	3,679.14	18.03	16.54	95.90	-740.82	-508.77	346.89	313.00	33.89	10.237		
4,000.00	3,765.35	3,995.33	3,763.15	18.98	17.26	94.02	-785.19	-536.69	352.63	317.05	35.57	9.912		
4,100.00	3,850.70	4,093.75	3,846.79	19.93	17.99	92.27	-828.95	-564.55	356.93	319.67	37.26	9.579		
4,200.00	3,935.90	4,192.88	3,931.15	20.89	18.73	90.63	-872.59	-592.90	360.01	321.05	38.96	9.241		
4,300.00	4,020.94	4,299.82	4,020.95	21.85	19.54	88.70	-922.00	-623.39	360.16	319.43	40.73	8.842		
4,400.00	4,105.79	4,398.23	4,103.17	22.81	20.30	86.76	-968.33	-651.29	358.03	315.57	42.46	8.432		
4,500.00	4,190.43	4,498.61	4,187.18	23.78	21.09	84.91	-1,015.23	-679.91	354.52	310.31	44.21	8.019		
4,600.00	4,274.82	4,602.76	4,274.11	24.76	21.90	83.06	-1,064.66	-709.02	348.45	302.47	45.98	7.579		
4,700.00	4,359.02	4,702.87	4,357.83	25.72	22.69	82.46	-1,112.26	-736.37	340.58	292.82	47.76	7.132		
4,800.00	4,443.22	4,803.81	4,442.64	26.67	23.48	82.30	-1,159.81	-763.48	332.50	282.95	49.54	6.711		
4,900.00	4,527.41	4,903.45	4,527.03	27.63	24.26	82.36	-1,205.99	-789.44	324.08	272.77	51.31	6.316		
5,000.00	4,611.61	5,003.24	4,612.22	28.60	25.05	82.67	-1,251.27	-814.90	315.67	262.59	53.08	5.947		
5,100.00	4,695.81	5,101.16	4,696.40	29.57	25.81	83.19	-1,294.75	-839.63	307.54	252.71	54.83	5.609		
5,200.00	4,780.01	5,199.98	4,781.77	30.56	26.57	83.89	-1,337.76	-864.70	299.98	243.41	56.57	5.303		
5,300.00	4,864.20	5,297.86	4,866.48	31.55	27.28	84.69	-1,379.98	-889.65	292.78	234.52	58.26	5.025		
5,400.00	4,948.40	5,394.85	4,950.08	32.55	27.97	85.38	-1,421.90	-915.32	286.41	226.47	59.93	4.779		
5,500.00	5,032.60	5,493.30	5,033.77	33.55	28.69	85.65	-1,465.75	-942.99	280.72	219.06	61.66	4.553		
5,600.00	5,116.79	5,591.11	5,115.82	34.56	29.45	85.49	-1,510.37	-972.03	275.78	212.31	63.47	4.345		
5,700.00	5,200.99	5,689.06	5,197.74	35.57	30.25	85.24	-1,555.01	-1,001.88	271.53	206.20	65.32	4.157		
5,800.00	5,285.19	5,796.08	5,287.68	36.59	31.11	85.12	-1,603.53	-1,033.66	266.77	199.55	67.22	3.968		
5,900.00	5,369.39	5,900.97	5,374.66	37.62	31.91	84.54	-1,654.32	-1,062.89	258.78	189.69	69.10	3.745		
6,000.00	5,453.58	6,000.19	5,457.01	38.64	32.71	83.99	-1,702.53	-1,090.08	250.36	179.40	70.97	3.528		
6,100.00	5,537.78	6,099.51	5,539.84	39.67	33.55	83.56	-1,750.19	-1,117.14	242.14	169.28	72.86	3.323		
6,200.00	5,621.98	6,199.54	5,623.91	40.71	34.37	83.40	-1,797.34	-1,143.87	233.91	159.17	74.74	3.130		
6,300.00	5,706.17	6,296.84	5,706.67	41.74	35.16	83.70	-1,841.70	-1,169.33	225.98	149.41	76.57	2.951		
6,400.00	5,790.37	6,394.92	5,790.42	42.79	35.94	84.17	-1,885.45	-1,195.66	219.15	140.77	78.38	2.796		
6,500.00	5,874.57	6,494.12	5,875.22	43.83	36.73	84.74	-1,929.28	-1,222.63	212.85	132.65	80.21	2.654		
6,600.00	5,958.77	6,593.92	5,960.47	44.87	37.49	85.30	-1,973.53	-1,249.78	206.50	124.51	81.99	2.518		
6,700.00	6,042.96	6,695.40	6,047.84	45.92	38.27	86.30	-2,017.70	-1,276.48	199.88	116.10	83.77	2.386		
6,800.00	6,127.16	6,795.81	6,134.56	46.97	39.00	87.53	-2,061.37	-1,302.05	192.65	107.18	85.48	2.254		
6,900.00	6,211.36	6,895.21	6,220.18	48.02	39.68	88.70	-2,104.96	-1,327.52	185.43	98.31	87.12	2.129		
7,000.00	6,295.55	6,995.18	6,305.71	49.08	40.40	89.62	-2,149.57	-1,353.74	178.30	89.50	88.80	2.008		
7,100.00	6,379.75	7,094.48	6,390.94	50.13	41.17	90.77	-2,193.52	-1,379.53	171.24	80.76	90.48	1.893		

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



Company:	SHELL E&P	Local Co-ordinate Reference:	Well GNAT HILL 1-29
Project:	ROUTT COUNTY, COLORADO	TVD Reference:	WELL @ 6669.10ft (SAVANA 650)
Reference Site:	GNAT HILL 1-29	MD Reference:	WELL @ 6669.10ft (SAVANA 650)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	GNAT HILL 1-29	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	GNAT HILL 1-29	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #2	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.00 ft
Survey Program:													Offset Well Error:	0.00 ft
GNAT HILL 1-29 - GNAT HILL 1-29 - GNAT HILL 1-29 - Survey #1														
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
7,200.00	6,463.95	7,193.78	6,477.33	51.19	41.93	92.82	-2,235.82	-1,404.19	164.49	72.49	91.99	1.788		
7,300.00	6,548.14	7,292.20	6,563.71	52.25	42.67	95.57	-2,276.49	-1,428.08	158.45	65.19	93.26	1.699		
7,400.00	6,632.34	7,390.59	6,650.75	53.31	43.41	99.00	-2,315.83	-1,451.67	153.62	59.44	94.18	1.631		
7,500.00	6,716.54	7,490.09	6,739.35	54.37	44.11	103.14	-2,354.70	-1,474.90	149.72	55.11	94.61	1.582		
7,519.84	6,733.24	7,509.73	6,756.88	54.58	44.25	104.02	-2,362.32	-1,479.40	149.04	54.41	94.63	1.575		
7,600.00	6,800.74	7,512.00	6,758.91	55.43	44.27	104.12	-2,363.20	-1,479.92	165.79	70.34	95.45	1.737		
7,700.00	6,884.93	7,512.00	6,758.91	56.50	44.27	104.12	-2,363.20	-1,479.92	228.20	131.71	96.50	2.365		
7,800.00	6,969.13	7,512.00	6,758.91	57.56	44.27	104.12	-2,363.20	-1,479.92	310.91	213.37	97.54	3.187		
7,900.00	7,053.33	7,512.00	6,758.91	58.63	44.27	104.12	-2,363.20	-1,479.92	401.57	302.98	98.59	4.073		
8,000.00	7,137.52	7,512.00	6,758.91	59.70	44.27	104.12	-2,363.20	-1,479.92	495.83	396.19	99.64	4.976		
8,100.00	7,221.72	7,512.00	6,758.91	60.77	44.27	104.12	-2,363.20	-1,479.92	591.98	491.29	100.69	5.879		
8,200.00	7,305.92	7,512.00	6,758.91	61.84	44.27	104.12	-2,363.20	-1,479.92	689.22	587.48	101.74	6.774		
8,300.00	7,390.12	7,512.00	6,758.91	62.91	44.27	104.12	-2,363.20	-1,479.92	787.16	684.37	102.79	7.658		
8,400.00	7,474.31	7,512.00	6,758.91	63.98	44.27	104.12	-2,363.20	-1,479.92	885.55	781.72	103.84	8.528		
8,500.00	7,558.51	7,512.00	6,758.91	65.05	44.27	104.12	-2,363.20	-1,479.92	984.27	879.38	104.89	9.384		
8,600.00	7,642.71	7,512.00	6,758.91	66.12	44.27	104.12	-2,363.20	-1,479.92	1,083.23	977.29	105.94	10.225		
8,700.00	7,726.90	7,512.00	6,758.91	67.20	44.27	104.12	-2,363.20	-1,479.92	1,182.36	1,075.37	107.00	11.051		
8,800.00	7,811.10	7,512.00	6,758.91	68.27	44.27	104.12	-2,363.20	-1,479.92	1,281.63	1,173.58	108.05	11.862		
8,900.00	7,895.30	7,512.00	6,758.91	69.34	44.27	104.12	-2,363.20	-1,479.92	1,381.00	1,271.90	109.10	12.658		
9,000.00	7,979.50	7,512.00	6,758.91	70.42	44.27	104.12	-2,363.20	-1,479.92	1,480.45	1,370.30	110.15	13.440		
9,100.00	8,063.69	7,512.00	6,758.91	71.50	44.27	104.12	-2,363.20	-1,479.92	1,579.98	1,468.77	111.21	14.207		
9,200.00	8,147.89	7,512.00	6,758.91	72.57	44.27	104.12	-2,363.20	-1,479.92	1,679.56	1,567.30	112.26	14.961		
9,300.00	8,232.09	7,512.00	6,758.91	73.65	44.27	104.12	-2,363.20	-1,479.92	1,779.19	1,665.87	113.32	15.701		
9,400.00	8,316.28	7,512.00	6,758.91	74.73	44.27	104.12	-2,363.20	-1,479.92	1,878.86	1,764.49	114.37	16.428		
9,500.00	8,400.48	7,512.00	6,758.91	75.81	44.27	104.12	-2,363.20	-1,479.92	1,978.56	1,863.13	115.43	17.141		
9,600.00	8,484.68	7,512.00	6,758.91	76.88	44.27	104.12	-2,363.20	-1,479.92	2,078.29	1,961.81	116.48	17.842		
9,700.00	8,568.88	7,512.00	6,758.91	77.96	44.27	104.12	-2,363.20	-1,479.92	2,178.04	2,060.50	117.54	18.530		
9,725.09	8,590.00	7,512.00	6,758.91	78.23	44.27	104.12	-2,363.20	-1,479.92	2,203.08	2,085.27	117.80	18.701		



Company:	SHELL E&P	Local Co-ordinate Reference:	Well GNAT HILL 1-29
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Site Error:	0.00 ft	North Reference:	True
Reference Well:	GNAT HILL 1-29	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	GNAT HILL 1-29	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #2	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 6669.10ft (SAVANA 650)

Offset Depths are relative to Offset Datum

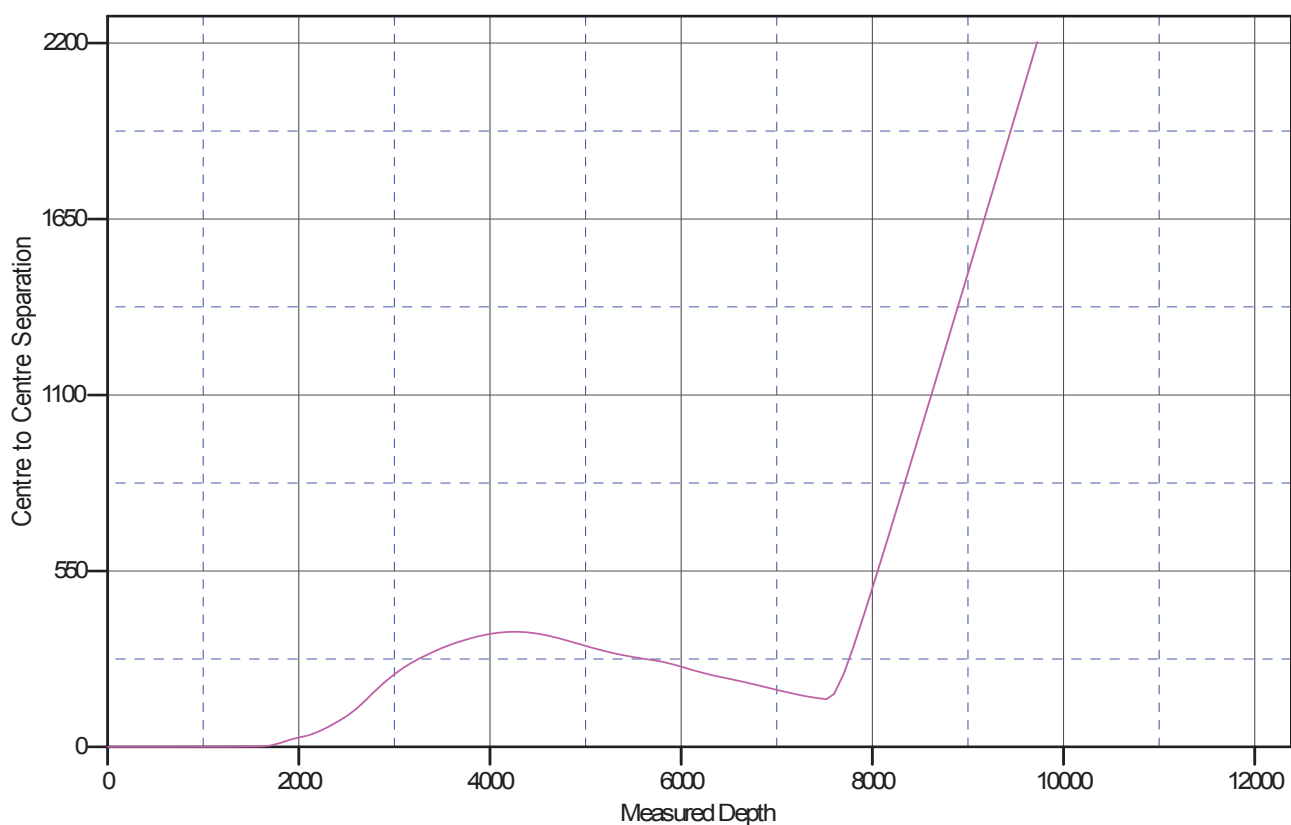
Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: GNAT HILL 1-29

Coordinate System is US State Plane 1983, Colorado Northern Zone

Grid Convergence at Surface is: -1.22°

Ladder Plot



LEGEND

— GNAT HILL 1-29, GNAT HILL 1-29, Survey#1



Company:	SHELL E&P	Local Co-ordinate Reference:	Well GNAT HILL 1-29
Project:	ROUTT COUNTY, COLORADO	TVD Reference:	WELL @ 6669.10ft (SAVANA 650)
Reference Site:	GNAT HILL 1-29	MD Reference:	WELL @ 6669.10ft (SAVANA 650)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	GNAT HILL 1-29	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	GNAT HILL 1-29	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #2	Offset TVD Reference:	Offset Datum

Reference Depths are relative to WELL @ 6669.10ft (SAVANA 650)

Offset Depths are relative to Offset Datum

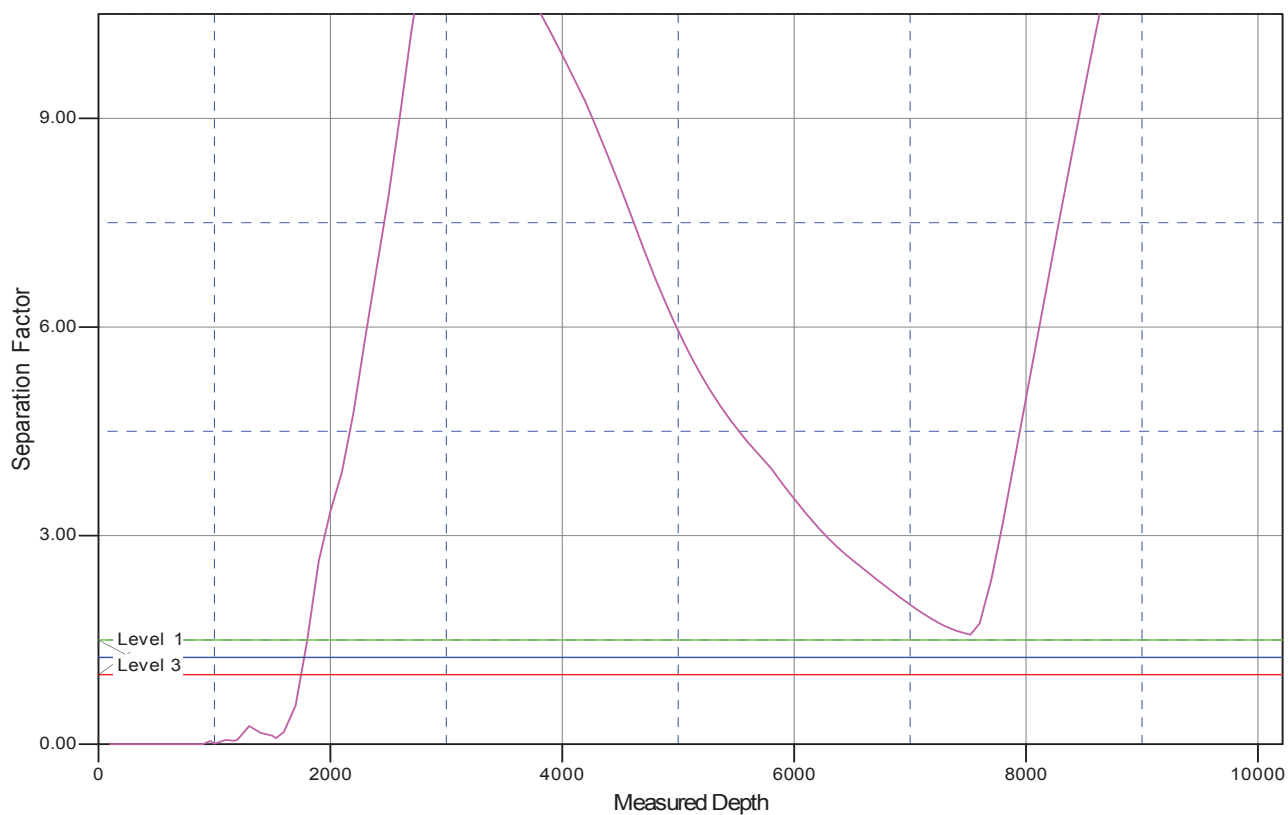
Central Meridian is 105° 30' 0.000 W

Coordinates are relative to: GNAT HILL 1-29

Coordinate System is US State Plane 1983, Colorado Northern Zone

Grid Convergence at Surface is: -1.22°

Separation Factor Plot



LEGEND

— GNAT HILL 1-29, GNAT HILL 1-29, Survey#1