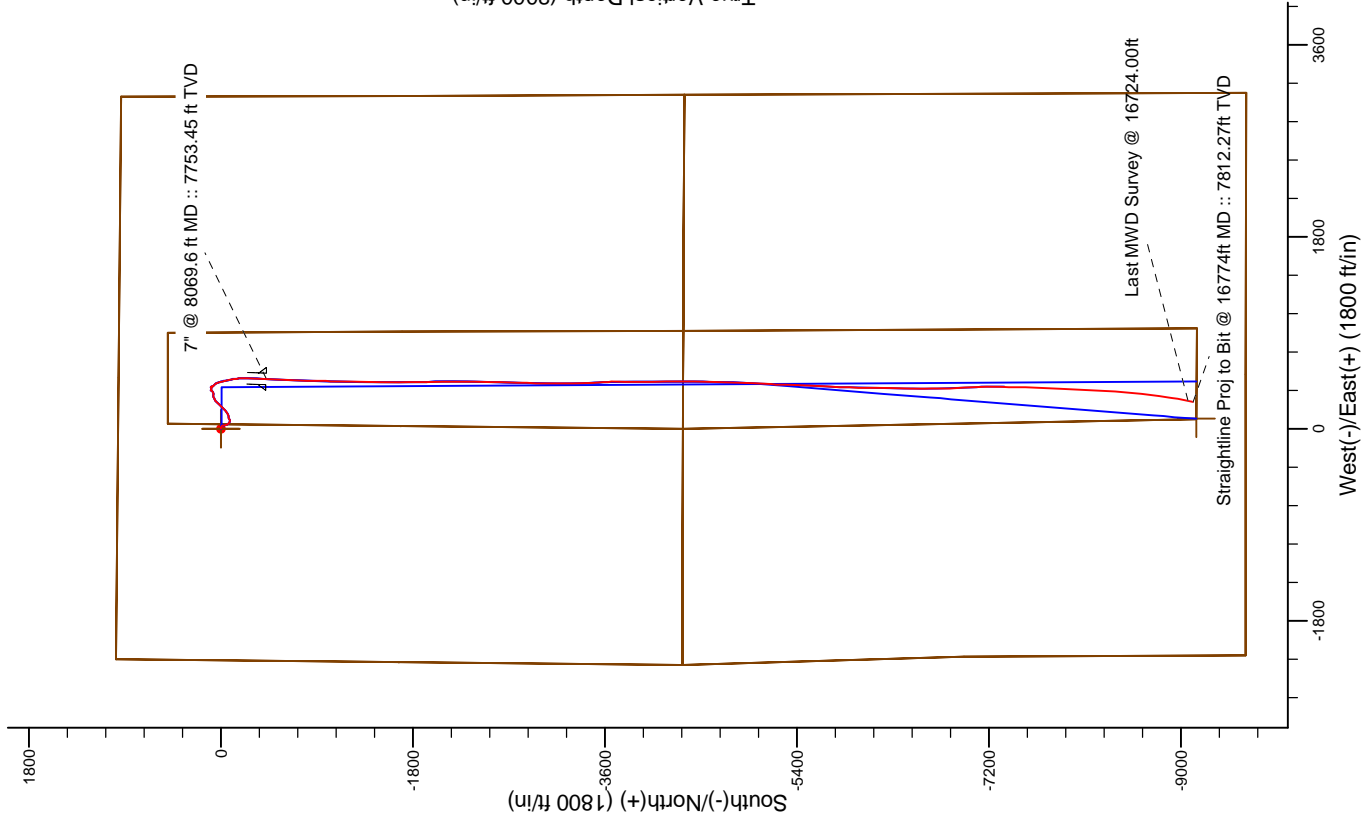
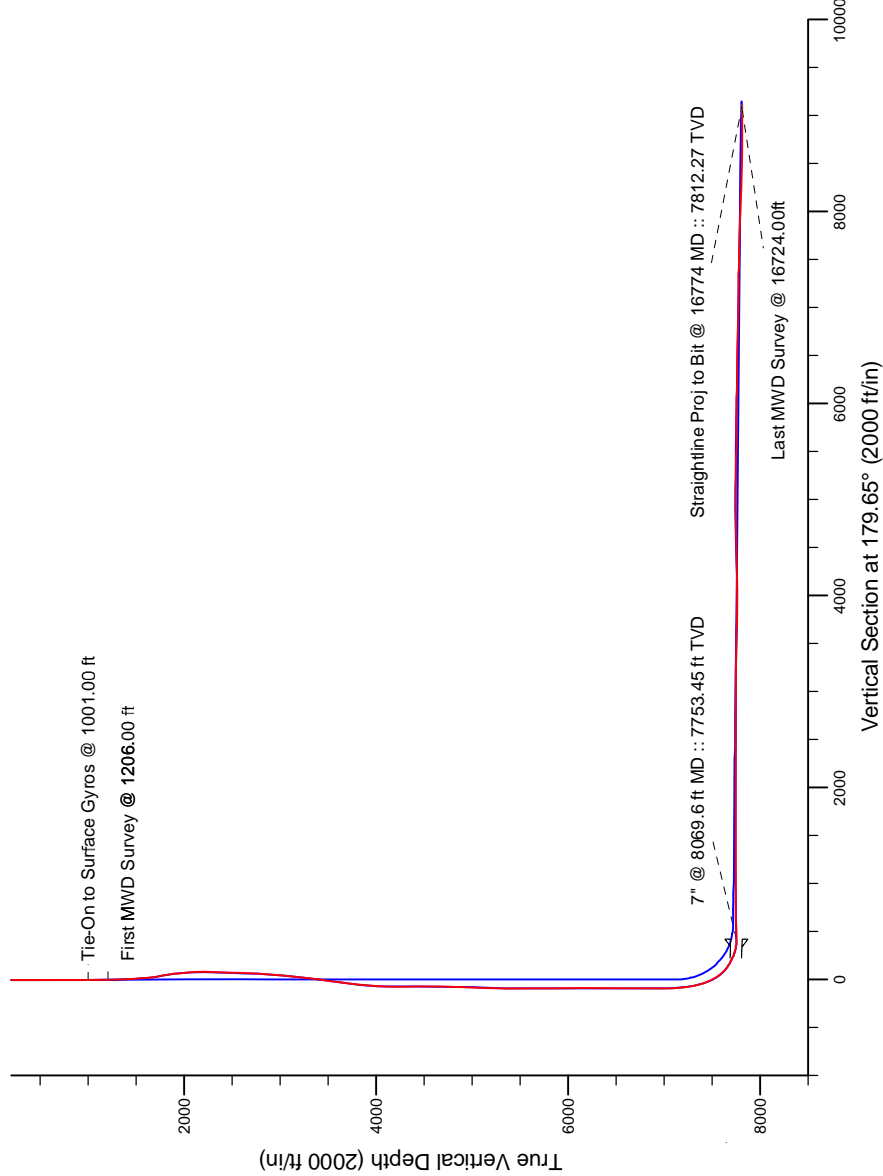


Project: Weld County, CO (NAD 83)
Site: Sec. 17-T1N-R67W
Well: Griffiths 36C-20HZ
Wellbore: Plan C 0
Design: Actual Field Surveys



LEGEND

- Griffiths 36C-20HZ, Plan A, Rev A0 - PROPOSAL V0
- Griffiths 36C-20HZ, Plan C 0, Plan C0 - Proposal V0
- Actual Field Surveys



7" Casing: ~1383.65' FNL, ~2644.01' FWL
Lat/Long: 40.054533 N, -104.914554 E
State Planes - CO Northern: 1,263,252.93' N, 3,163,882.46' E
Location: Sec. 17-T1N-R67W

BHL: ~490.77' FSL, ~2378.51' FWL
Lat/Long: 40.030674 N, -104.915327 E
State Planes - CO Northern: 1,254,560.48' N, 3,163,723.32' E
Location: Sec. 17-T1N-R67W

WELL DETAILS: Griffiths 36C-20HZ

Ground Level: 5060.00
RKB=16 @ 5076.00ft (Xtreme Z2)

Design: Actual Field Surveys (Griffiths 36C-20HZ/Plan C 0)

Created By: Clint Eshelman Date: 07/29/2013

Reviewed: Date: _____

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 17-T1N-R67W

Griffiths 36C-20HZ

Plan C 0

Design: Actual Field Surveys

Sperry Drilling Services Standard Report

29 July, 2013

Well Coordinates: 1,263,673.36 N, 3,163,410.52 E (40° 03' 20.51" N, 104° 54' 58.43" W)

Ground Level: 5,060.00 ft

Local Coordinate Origin:

Centered on Well Griffiths 36C-20HZ

Viewing Datum:

RKB=16 @ 5076.00ft (Xtreme 22)

TVDs to System:

N

North Reference:

True

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 43I

HALLIBURTON

Design Report for Griffiths 36C-20HZ - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16.00	0.00	0.00	16.00	0.00	0.00	0.00	0.00
116.00	0.33	69.27	116.00	0.10	0.27	-0.10	0.33
216.00	1.03	72.07	215.99	0.48	1.39	-0.47	0.70
316.00	0.79	90.41	315.98	0.75	2.94	-0.73	0.37
416.00	0.67	47.47	415.97	1.14	4.06	-1.12	0.55
516.00	0.81	68.98	515.96	1.79	5.15	-1.76	0.31
616.00	1.65	86.16	615.94	2.14	7.25	-2.10	0.91
716.00	1.49	89.38	715.90	2.25	9.98	-2.19	0.18
816.00	1.47	98.53	815.87	2.08	12.55	-2.00	0.24
916.00	1.48	100.12	915.84	1.66	15.09	-1.57	0.04
1,001.00	1.46	107.44	1,000.81	1.14	17.20	-1.04	0.22
Tie-On to Gyro Surveys @ 1001.00ft							
1,206.00	1.80	123.63	1,205.73	-1.42	22.37	1.56	0.28
First MWD Survey @ 1206.00ft							
1,492.00	2.73	161.14	1,491.51	-10.35	28.31	10.52	0.60
1,587.00	5.23	160.36	1,586.28	-16.57	30.49	16.76	2.63
1,682.00	7.45	171.37	1,680.69	-26.74	32.87	26.94	2.65
1,773.00	10.44	171.07	1,770.58	-40.72	35.04	40.93	3.29
1,865.00	10.00	154.12	1,861.14	-56.14	39.82	56.39	3.29
1,957.00	8.69	140.34	1,951.93	-68.68	47.74	68.97	2.81
2,048.00	8.00	118.82	2,041.98	-77.03	57.68	77.38	3.49
2,140.00	8.72	97.48	2,133.03	-81.03	70.21	81.45	3.44
2,232.00	7.66	75.49	2,224.11	-80.40	83.06	80.90	3.57
2,414.00	6.59	74.21	2,404.70	-74.52	104.86	75.16	0.59
2,506.00	5.77	80.54	2,496.17	-72.32	114.50	73.02	1.16
2,689.00	6.06	62.85	2,678.21	-66.40	132.17	67.21	1.00
2,872.00	7.61	54.94	2,859.91	-55.03	150.68	55.95	0.99
3,054.00	8.02	53.19	3,040.22	-40.50	170.71	41.54	0.26
3,238.00	7.81	40.82	3,222.48	-23.35	189.16	24.50	0.93
3,421.00	9.88	45.40	3,403.29	-2.91	208.47	4.18	1.19
3,696.00	11.78	43.15	3,673.38	34.14	244.47	-32.64	0.71
3,880.00	9.12	59.04	3,854.35	55.35	269.83	-53.70	2.12
4,062.00	7.04	67.96	4,034.54	66.96	292.54	-65.17	1.33
4,245.00	5.94	95.84	4,216.41	70.20	312.36	-68.29	1.80
4,422.00	4.02	94.10	4,392.74	68.83	327.66	-66.83	1.09
4,594.00	2.66	60.73	4,564.46	70.35	337.16	-68.29	1.35
4,851.00	2.42	48.42	4,821.21	76.87	346.42	-74.75	0.23
5,022.00	2.16	43.18	4,992.07	81.61	351.33	-79.46	0.20
5,193.00	2.34	27.31	5,162.94	87.06	355.13	-84.89	0.38
5,365.00	1.95	40.12	5,334.82	92.42	358.63	-90.23	0.36
5,536.00	2.03	112.07	5,505.74	93.51	363.31	-91.29	1.37
5,708.00	1.67	102.92	5,677.65	91.80	368.58	-89.55	0.27
5,879.00	1.21	104.62	5,848.60	90.79	372.75	-88.51	0.27
6,051.00	1.04	97.77	6,020.56	90.12	376.06	-87.82	0.13
6,222.00	0.95	95.10	6,191.54	89.78	379.01	-87.47	0.06
6,479.00	0.57	58.84	6,448.51	90.26	382.22	-87.92	0.23
6,736.00	0.72	65.31	6,705.50	91.59	384.79	-89.24	0.06
6,908.00	0.80	63.95	6,877.48	92.57	386.85	-90.21	0.05
6,993.00	0.94	64.84	6,962.47	93.13	388.01	-90.76	0.17

Design Report for Griffiths 36C-20HZ - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
7,036.00	1.10	72.84	7,005.47	93.40	388.72	-91.02	0.50
7,079.00	2.34	111.89	7,048.45	93.19	389.93	-90.81	3.81
7,122.00	4.52	136.51	7,091.37	91.64	391.91	-89.24	6.01
7,162.00	6.76	147.22	7,131.17	88.51	394.27	-86.10	6.16
7,205.00	8.10	154.21	7,173.81	83.66	396.96	-81.23	3.75
7,251.00	8.80	148.13	7,219.32	77.75	400.23	-75.31	2.47
7,293.00	11.46	136.65	7,260.66	71.99	404.79	-69.51	7.92
7,337.00	15.05	133.55	7,303.48	64.87	411.93	-62.35	8.31
7,380.00	17.44	141.03	7,344.77	56.01	420.04	-53.45	7.38
7,423.00	17.09	154.87	7,385.85	45.28	426.77	-42.67	9.57
7,466.00	20.74	160.65	7,426.52	32.37	431.98	-29.73	9.53
7,508.00	23.45	162.87	7,465.43	17.36	436.91	-14.69	6.75
7,551.00	28.05	165.39	7,504.16	-0.61	441.98	3.31	10.99
7,594.00	33.59	166.47	7,541.07	-21.97	447.32	24.70	12.95
7,637.00	38.52	167.31	7,575.82	-46.61	453.05	49.38	11.52
7,680.00	43.81	169.10	7,608.18	-74.31	458.81	77.11	12.60
7,723.00	49.95	170.01	7,637.56	-105.17	464.48	108.00	14.36
7,765.00	55.56	171.92	7,662.97	-138.17	469.71	141.04	13.84
7,808.00	61.46	174.75	7,685.43	-174.57	473.93	177.47	14.82
7,851.00	64.01	179.76	7,705.13	-212.73	475.75	215.64	11.93
7,894.00	68.18	182.04	7,722.55	-252.03	475.12	254.93	10.84
7,937.00	73.55	181.73	7,736.65	-292.62	473.78	295.50	12.51
7,980.00	79.55	181.52	7,746.64	-334.40	472.60	337.28	13.96
8,032.00	87.63	182.38	7,752.44	-386.00	470.84	388.87	15.62
8,069.60	89.29	182.66	7,753.45	-423.55	469.19	426.41	4.48
7" @ 8069.6 ft MD :: 7753.45 ft TVD							
8,115.00	91.30	182.99	7,753.22	-468.89	466.95	471.74	4.48
8,201.00	91.85	182.68	7,750.85	-554.75	462.70	557.57	0.73
8,287.00	91.73	182.04	7,748.17	-640.64	459.16	643.43	0.76
8,372.00	91.73	181.51	7,745.60	-725.56	456.53	728.33	0.62
8,458.00	91.29	182.18	7,743.34	-811.48	453.76	814.24	0.93
8,544.00	90.37	181.85	7,742.09	-897.42	450.73	900.16	1.14
8,629.00	89.69	182.35	7,742.04	-982.36	447.62	985.08	0.99
8,715.00	89.69	181.24	7,742.51	-1,068.32	444.93	1,071.02	1.29
8,801.00	89.63	180.16	7,743.02	-1,154.31	443.88	1,157.00	1.26
8,887.00	90.00	180.21	7,743.30	-1,240.31	443.60	1,242.99	0.43
8,972.00	89.81	181.11	7,743.44	-1,325.30	442.62	1,327.98	1.08
9,058.00	89.57	181.59	7,743.90	-1,411.28	440.59	1,413.94	0.62
9,144.00	90.00	181.01	7,744.23	-1,497.25	438.64	1,499.90	0.84
9,230.00	90.00	180.43	7,744.23	-1,583.25	437.56	1,585.89	0.67
9,315.00	90.25	180.14	7,744.04	-1,668.24	437.14	1,670.88	0.45
9,401.00	90.99	179.22	7,743.11	-1,754.24	437.62	1,756.88	1.37
9,487.00	90.06	179.45	7,742.32	-1,840.23	438.62	1,842.87	1.11
9,572.00	90.74	178.69	7,741.73	-1,925.21	440.00	1,927.86	1.20
9,658.00	90.25	178.90	7,740.99	-2,011.19	441.80	2,013.85	0.62
9,744.00	89.38	179.64	7,741.26	-2,097.18	442.90	2,099.85	1.33
9,830.00	89.94	179.64	7,741.77	-2,183.18	443.44	2,185.84	0.65
9,915.00	89.44	179.73	7,742.23	-2,268.17	443.91	2,270.84	0.60
10,001.00	88.52	181.37	7,743.77	-2,354.15	443.08	2,356.81	2.19
10,087.00	89.44	180.68	7,745.30	-2,440.12	441.54	2,442.77	1.34
10,172.00	89.44	181.74	7,746.13	-2,525.10	439.75	2,527.74	1.25

Design Report for Griffiths 36C-20HZ - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
10,258.00	90.31	181.04	7,746.32	-2,611.07	437.66	2,613.70	1.30
10,344.00	90.87	181.73	7,745.43	-2,697.04	435.59	2,699.65	1.03
10,429.00	90.19	181.69	7,744.64	-2,782.00	433.05	2,784.59	0.80
10,515.00	89.32	181.91	7,745.01	-2,867.96	430.35	2,870.53	1.04
10,601.00	89.75	181.55	7,745.71	-2,953.91	427.75	2,956.47	0.65
10,687.00	88.70	180.75	7,746.87	-3,039.89	426.03	3,042.43	1.53
10,772.00	89.20	180.31	7,748.43	-3,124.87	425.24	3,127.41	0.78
10,858.00	89.63	179.52	7,749.31	-3,210.86	425.37	3,213.40	1.05
10,944.00	90.31	179.14	7,749.35	-3,296.86	426.37	3,299.40	0.91
11,029.00	88.70	177.86	7,750.09	-3,381.82	428.60	3,384.37	2.42
11,093.00	89.14	178.14	7,751.29	-3,445.77	430.83	3,448.34	0.81
11,184.00	89.13	175.83	7,752.67	-3,536.63	435.62	3,539.22	2.54
11,276.00	87.96	177.41	7,755.00	-3,628.43	441.04	3,631.06	2.14
11,368.00	88.82	179.55	7,757.59	-3,720.36	443.48	3,723.00	2.51
11,458.00	89.81	180.38	7,758.66	-3,810.35	443.53	3,812.99	1.44
11,549.00	90.00	179.94	7,758.82	-3,901.35	443.28	3,903.98	0.53
11,641.00	90.06	180.01	7,758.77	-3,993.35	443.32	3,995.98	0.10
11,733.00	90.19	178.77	7,758.57	-4,085.34	444.30	4,087.98	1.36
11,824.00	91.11	180.16	7,757.53	-4,176.33	445.15	4,178.97	1.83
11,910.00	91.73	179.36	7,755.40	-4,262.30	445.51	4,264.94	1.18
11,996.00	91.42	181.27	7,753.04	-4,348.26	445.03	4,350.90	2.25
12,081.00	91.79	180.65	7,750.66	-4,433.22	443.61	4,435.84	0.85
12,167.00	89.75	180.76	7,749.50	-4,519.20	442.55	4,521.82	2.38
12,253.00	90.93	181.66	7,748.99	-4,605.17	440.74	4,607.78	1.73
12,338.00	91.17	180.93	7,747.43	-4,690.14	438.82	4,692.73	0.90
12,424.00	90.00	181.33	7,746.56	-4,776.11	437.12	4,778.69	1.44
12,510.00	90.37	182.11	7,746.28	-4,862.07	434.54	4,864.64	1.00
12,595.00	90.37	183.00	7,745.73	-4,946.99	430.75	4,949.53	1.05
12,681.00	90.56	183.08	7,745.03	-5,032.86	426.19	5,035.37	0.24
12,767.00	90.43	183.52	7,744.29	-5,118.72	421.24	5,121.19	0.53
12,853.00	90.19	182.28	7,743.82	-5,204.60	416.89	5,207.05	1.47
12,938.00	89.20	181.39	7,744.28	-5,289.56	414.17	5,291.99	1.57
13,024.00	88.21	181.50	7,746.22	-5,375.51	412.00	5,377.92	1.16
13,110.00	87.65	180.92	7,749.33	-5,461.43	410.18	5,463.83	0.94
13,195.00	89.44	182.74	7,751.48	-5,546.35	407.47	5,548.74	3.00
13,281.00	90.62	183.47	7,751.44	-5,632.22	402.81	5,634.58	1.61
13,367.00	90.37	183.94	7,750.70	-5,718.04	397.25	5,720.36	0.62
13,453.00	90.49	182.89	7,750.05	-5,803.88	392.13	5,806.17	1.23
13,538.00	88.21	181.51	7,751.02	-5,888.81	388.87	5,891.07	3.14
13,624.00	88.27	180.84	7,753.66	-5,974.75	387.11	5,977.00	0.78
13,709.00	88.89	180.33	7,755.76	-6,059.72	386.24	6,061.97	0.94
13,793.00	89.44	180.47	7,756.99	-6,143.71	385.65	6,145.95	0.68
13,881.00	88.82	180.83	7,758.32	-6,231.69	384.65	6,233.92	0.81
13,966.00	90.00	182.27	7,759.20	-6,316.65	382.36	6,318.87	2.19
14,052.00	90.25	182.42	7,759.01	-6,402.58	378.84	6,404.77	0.34
14,137.00	89.38	180.86	7,759.29	-6,487.54	376.40	6,489.72	2.10
14,223.00	88.52	179.70	7,760.86	-6,573.52	375.98	6,575.70	1.68
14,309.00	87.90	178.92	7,763.55	-6,659.47	377.02	6,661.65	1.16
14,395.00	88.03	178.36	7,766.60	-6,745.39	379.06	6,747.58	0.67
14,481.00	88.52	178.25	7,769.19	-6,831.32	381.60	6,833.52	0.58
14,566.00	88.77	177.29	7,771.20	-6,916.23	384.91	6,918.45	1.17

Design Report for Griffiths 36C-20HZ - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
14,652.00	88.21	177.81	7,773.47	-7,002.12	388.58	7,004.36	0.89
14,738.00	89.81	177.76	7,774.95	-7,088.04	391.91	7,090.30	1.86
14,823.00	90.56	178.80	7,774.68	-7,173.00	394.46	7,175.28	1.51
14,909.00	90.06	180.65	7,774.21	-7,258.99	394.87	7,261.27	2.23
14,995.00	88.33	181.15	7,775.42	-7,344.97	393.52	7,347.24	2.09
15,080.00	88.02	180.13	7,778.13	-7,429.92	392.57	7,432.18	1.25
15,166.00	88.76	180.75	7,780.54	-7,515.88	391.91	7,518.14	1.12
15,252.00	88.76	183.08	7,782.41	-7,601.81	389.04	7,604.04	2.71
15,337.00	89.13	183.15	7,783.97	-7,686.67	384.42	7,688.87	0.44
15,423.00	88.76	183.34	7,785.55	-7,772.52	379.55	7,774.69	0.48
15,509.00	88.33	183.00	7,787.74	-7,858.36	374.80	7,860.50	0.64
15,594.00	87.96	181.26	7,790.49	-7,943.25	371.64	7,945.37	2.09
15,680.00	87.10	181.29	7,794.20	-8,029.15	369.73	8,031.26	1.00
15,766.00	87.90	183.19	7,797.95	-8,115.00	366.37	8,117.08	2.40
15,852.00	88.27	182.41	7,800.82	-8,200.84	362.17	8,202.90	1.00
15,938.00	87.22	182.76	7,804.21	-8,286.69	358.30	8,288.72	1.29
16,023.00	88.83	183.66	7,807.13	-8,371.50	353.54	8,373.51	2.17
16,109.00	88.83	185.00	7,808.89	-8,457.24	347.05	8,459.20	1.56
16,195.00	89.20	185.76	7,810.37	-8,542.84	338.99	8,544.76	0.98
16,280.00	89.32	186.75	7,811.47	-8,627.33	329.73	8,629.18	1.17
16,366.00	89.20	186.77	7,812.58	-8,712.72	319.60	8,714.51	0.14
16,452.00	89.51	188.18	7,813.55	-8,797.99	308.42	8,799.71	1.68
16,537.00	89.69	189.02	7,814.14	-8,882.03	295.71	8,883.67	1.01
16,623.00	90.62	190.33	7,813.91	-8,966.80	281.25	8,968.35	1.87
16,724.00	90.62	191.12	7,812.81	-9,066.03	262.46	9,067.46	0.78
Last MWD Survey @ 16724.00ft							
16,774.00	90.62	191.12	7,812.27	-9,115.09	252.82	9,116.46	0.00
Straightline Proj to Bit @ 16774 MD :: 7812.27 TVD							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,001.00	1,000.81	1.14	17.20	Tie-On to Gyro Surveys @ 1001.00ft
1,206.00	1,205.73	-1.42	22.37	First MWD Survey @ 1206.00ft
16,724.00	7,812.81	-9,066.03	262.46	Last MWD Survey @ 16724.00ft
16,774.00	7,812.27	-9,115.09	252.82	Straightline Proj to Bit @ 16774 MD :: 7812.27 TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
User	No Target (Freehand)	179.65	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
16.00	1,001.00	MS Energy Services - Surface Gyros	NS-GYRO-MS
1,206.00	8,032.00	MWD Surveys - Vert/Build	MWD+SC
8,115.00	16,724.00	MWD Surveys - Lateral	MWD+SC

Design Report for Griffiths 36C-20HZ - Actual Field Surveys**Casing Details**

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
8,069.60	7,753.45	7" @ 8069.6 ft MD :: 7753.45 ft TVD	7	8-3/4

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Griffiths 36C-20HZ_! - actual wellpath hits target center - Point	0.00	0.00	0.00	0.01	0.00	1,263,673.38	3,163,410.52	40.055696	-104.916230
Griffiths 36C-20HZ_I - actual wellpath misses target center by 160.85ft at 16774.00ft MD (7812.27 TVD, -9115.09 N, 252.82 E) - Point	0.00	0.00	7,804.00	-9,141.83	94.42	1,254,532.69	3,163,565.11	40.030601	-104.915893
Griffiths 36C-20HZ_I - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.01	0.00	1,263,673.38	3,163,410.52	40.055696	-104.916230
Point 1				49.07	502.91	1,264,176.57	3,163,456.27		
Point 2				25.43	-1,684.42	1,261,989.21	3,163,447.03		
Point 3				-1.29	-4,329.19	1,259,344.42	3,163,437.73		
Point 4				92.46	-9,143.15	1,254,531.36	3,163,563.16		
Point 5				942.04	-9,148.75	1,254,531.36	3,164,412.73		
Point 6				917.87	-4,335.24	1,259,344.42	3,164,356.87		
Point 7				911.38	-1,699.26	1,261,980.21	3,164,333.03		
Point 8				902.68	497.29	1,264,176.57	3,164,309.87		
Point 9				49.07	502.91	1,264,176.57	3,163,456.27		
Griffiths 36C-20HZ_! - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.01	0.00	1,263,673.38	3,163,410.52	40.055696	-104.916230
Point 1				-2,160.90	983.92	1,264,643.00	3,161,243.27		
Point 2				-2,187.61	-1,670.89	1,261,988.17	3,161,234.03		
Point 3				-2,214.40	-4,326.40	1,259,332.64	3,161,224.73		
Point 4				-2,134.96	-6,966.14	1,256,693.58	3,161,321.54		
Point 5				-2,123.72	-9,605.61	1,254,054.34	3,161,350.16		
Point 6				513.18	-9,605.91	1,254,071.40	3,163,986.90		
Point 7				3,151.14	-9,609.62	1,254,085.06	3,166,624.73		
Point 8				3,129.94	-4,343.58	1,259,350.65	3,166,568.87		
Point 9				457.80	-4,332.22	1,259,344.42	3,163,896.81		
Point 10				-2,214.40	-4,326.50	1,259,332.54	3,161,224.73		
Point 11				457.80	-4,332.22	1,259,344.42	3,163,896.81		
Point 12				3,129.94	-4,343.58	1,259,350.65	3,166,568.87		
Point 13				3,123.48	-1,703.78	1,261,990.25	3,166,545.03		
Point 14				3,117.68	936.50	1,264,630.33	3,166,521.85		
Point 15				478.03	960.12	1,264,636.58	3,163,882.20		
Point 16				-2,160.90	983.92	1,264,643.00	3,161,243.27		