BAKER HUGHES

Realtime Logs

Natural Fomation Evaluation
Gamma Ray

Company:	Anadarko
Well:	Butterball 4N-15HZ
Field:	Weld County
Country	Continental US State Colorado

Scale: 1:240
TRUE VERTICAL DEPTH

Status: Field Print

API Number: 051233786900

Surface Location:
Latitude: 40° 8' 47.911" N
Longitude: 104° 53' 1.856" W
Section:10 TWN: 2N Range67W

Other Services: Directional

Permanent Datum (P.D.): Ground Level Elevation: 4996.00 ft.
Log Measured From: Kelly Bushing 17.00 ft. Above P.D.
Depth Reference: Driller's Depth

Elevations:
KB: 17.00 ft.
DF: 5013.00 ft.
GL: 4996.00 ft.

Interval Logged	Dates	Magnetic Field Reference
Top: 6750.0 ft.	Date From: 14/Nov/13	Dip Angle: 66.73° Azi Reference North: True
Bottom: 12450.0 ft.	Date To: 19/Nov/13	Total Mag to Reference
	Spud Date: 12/Nov/13	Field Strength: 52696.7 nT North Correction: 8.62°

Borehole Record

Hole Size	From	To
13.500 in.	Surface	1018.0 ft.
8.750 in.	1018.0 ft.	7745.0 ft.
6.125 in.	7745.0 ft.	12506.0 ft.

Casing Record

Size	Weight	From	To
9.000 in.	36.00 lb/ft	Surface	1008.0 ft.
7.000 in.	26.00 lb/ft	Surface	7729.0 ft.

Mud Record

Type	From	To
Water Based	Surface	12506.0 ft.

Deviation Record

Hole Size	Interval	Inc / Az (Start)	Inc / Az (End)
13.500 in.	Surface	0.0° / 0.0°	0.1° / 304.4°
8.500 in.	Vertical/ Curve	0.4° / 175.4°	82.8° / 179.7°
6.125 in.	Lateral	82.8° / 179.7°	90.9° / 179.2°
		/	/
		/	/
		/	/

Acquisition System	Software Version	Other	
Advantage	2.20U4	Rig: / Contractor:	Xtreme 8 / Anadarko
PATS	6.4.1.34	Job No:	5828637
		District: / Unit:	RMD /

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Log Run Summary

LWD Run No.	BHA Run No.	Bit Run No.	Bit Size (in.)	Bit Type	Bit Gauge Length (in.)	Assembly Type	Logged Interval Top (ft.)	Logged Interval Bottom (ft.)	Bit Depth Interval From (ft.)	Bit Depth Interval To (ft.)	Date / Time Start	Date / Time End	Circ. Time (hrs.)
2	2	3	8.750	PDC	3.500	Mud Motor	6750.0	7703.0	6572.0	7745.0	14/Nov/2013 20:43	15/Nov/2013 11:07	10.37
3	3	4	6.125	PDC	6.000	Mud Motor	7703.0	12450.0	7745.0	12506.0	18/Nov/2013 01:32	19/Nov/2013 13:30	29.02

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Shirley Arimah	12/Nov/2013	20/Nov/2013	Matthew Dickey	17/Nov/2013	20/Nov/2013			

Mud Properties Record

Date / Time	LWD Run No.	Measured Depth (ft.)	Mud Type	Density (sg)	Viscosity (cp)	pH	Fluid Loss (cc)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
14/Nov/2013 19:00	2	6723.0	Water Base	9.9	40	9.0	4.5	1/91	Flowline	1900	N/A
15/Nov/2013 20:00	2	7745.0	Water Base	10.4	45	8.5	3.1	4/87	Flowline	1800	N/A
17/Nov/2013 19:00	3	7745.0	Water Base	9.4	38	8.5	3.0	2/93	Flowline	1600	N/A
18/Nov/2013 19:00	3	13090.0	Water Base	9.5	45	9.0	2.8	5/89	Flowline	1800	N/A

Mnemonics

Curve	Description	Units
GRAX	Gamma Ray Apparent, 0.5 ft. Avg	API
TCDX	Downhole Temperature	degF
ROP_AVG	Rate of Penetration, 3.0 ft. Avg	ft/hr
WOB_AVG	Surface Weight on Bit, 1.0 ft. Avg	klbs

Equipment and Service Data

LWD Run No.	Tool	Serial Number	Measurement	Bit Offset (ft.)	Max O.D. (in.)	Min I.D. (in.)
1	DIR	13031158	Directional	48.90	6.750	3.250
1	SRIG	12131378	Gamma	45.52	6.750	3.250
2	DIR	13031158	Directional	43.53	6.750	3.200
2	SRIG	12131378	Gamma	40.15	6.750	3.200
3	DIR	12546344	Directional	54.07	5.070	2.625
3	SRIG	11932890	Gamma	50.69	2.625	2.625

Service and Tool Mnemonics

Mnemonic	Name	Description
DIR	Directional	Wellbore directional survey
SRIG	Inclination and Gamma	Probe based gamma ray and inclination module

Comments

(1) Baker Hughes INTEQ run 1 and run 2 utilized 6 1/2 inch NaviTrak services (Gamma Ray and Directional) behind an 8 3/4 inch bit and steerable assembly from 1018 to 7745 feet MD (1018 to 7399 feet TVD)

(2) Baker Hughes INTEQ run 3 utilized 4 3/4 inch NaviTrak services (Gamma Ray and Directional) behind an 6 1/8 inch bit and steerable assembly from 7745 to 12506 feet MD (7399 to 7394 feet TVD)

Remarks

Number	Measured Depth (ft.)	Hole Section (in.)	LWD Run No.	Remark
1	6750	8.750	2	The interval from Surface to 6750 feet MD (6710 feet TVD) was logged not logged due to Baker Hughes logging services began at the top of the curve section.
2	12450	6.125	3	The interval from 12450 to 12506 feet MD (7394 to 7393 feet TVD) was not logged due to sensor offsets to bit at TD.

BAKER HUGHES

Company : Anadarko
Well : Butterball 4N-15HZ
Interval : 6685.00 - 7420.00 feet
Created : 19/Nov/2013 9:57:17 AM

Gamma Ray Apparent 0.5 ft Avg [GRAX]
0
150
API
TVD feet 1:240
Rate of Penetration 3.0 ft Avg [ROP_AVG]
1000
0
ft/hr
Surface Weight On Bit 1.0 ft Avg [WOB_AVG]
0
100
klbf
Downhole Temperature [TCDX]
150
350
degF
6700
7240
7260
7280
7300
7320
7340
7360
7380
7400
7420
GRAX
See Remark 1
ROP_AVG
TCDX
WOB_AVG
See Remark 2

ADVANTAGE Final Survey Listing

Operator	: Anadarko	Field	: Weld County	API No	: 051233786900
Well	: Butterball 4N-15HZ	Rig	: Xtreme 8	Job	: 5828637
Wellbore	: Butterball 4N-15HZ Orig Hole				

Well Origin

Latitude	40.1466 deg	Longitude	-104.8838 deg
North Reference	True	Drill Depth Zero	Kelly Bushing
Vertical Datum is	Mean Sea Level	Vertical Datum to DDZ	17.00 ft
Vertical Section North	0.00 ft	Vertical Section East	0.00 ft
Vertical Section Azimuth	180.4000 deg	Vertical Section Depth	0.00ft
Grid Convergence	0.0000 deg	Magnetic Declination	8.6207 deg
Total Correction	8.6207 deg	TVD Calculation Method	Minimal Curvature
D-Raw Calculation	Magcorr1	Local Magnetic Field	52697 nT
Local Magnetic Dip Angle	66.7328 deg	Local Gravity Field	9.802 m/s^2

Tie	MD ft	Incl deg	Azim deg	North ft	East ft	TVD ft	VS ft	Incr VS ft	Crs Len ft	DLS deg/100ft	Build deg/100ft	Turn deg/100ft
U	974.00	0.0700	304.4100	4.53	-0.27	973.98	-4.53	0.59		0.01	0.01	-5.71
	1064.00	0.3300	308.6600	4.72	-0.52	1063.98	-4.72	0.91	90.00	0.29	0.29	4.72
	1155.00	0.2700	279.3300	4.92	-0.93	1154.98	-4.91	1.37	91.00	0.18	-0.07	-32.23
	1247.00	1.8000	29.6300	6.21	-0.43	1246.96	-6.21	2.75	92.00	2.08	1.66	119.89
	1339.00	2.8900	45.1700	9.10	1.93	1338.89	-9.12	6.49	92.00	1.36	1.18	16.89
	1431.00	4.6000	57.8200	12.70	6.69	1430.69	-12.75	12.46	92.00	2.05	1.86	13.75
	1522.00	5.9200	64.0200	16.70	14.00	1521.30	-16.80	20.79	91.00	1.58	1.45	6.81
	1613.00	7.8200	66.7900	21.20	23.91	1611.65	-21.37	31.67	91.00	2.12	2.09	3.04
	1704.00	9.3500	54.1000	27.97	35.59	1701.63	-28.22	45.18	91.00	2.67	1.68	-13.95
	1796.00	10.3900	51.5100	37.52	48.14	1792.27	-37.86	60.94	92.00	1.23	1.13	-2.82
	1888.00	12.5500	51.6300	48.89	62.47	1882.43	-49.32	79.23	92.00	2.35	2.35	0.13
	1973.00	12.8400	56.6200	59.82	77.60	1965.35	-60.36	97.90	85.00	1.33	0.34	5.87
	2058.00	13.5800	60.7200	69.90	94.19	2048.10	-70.55	117.31	85.00	1.40	0.87	4.82
	2144.00	16.8100	63.3300	80.42	114.11	2131.09	-81.21	139.84	86.00	3.84	3.76	3.03
	2229.00	16.5900	66.8400	90.71	136.25	2212.50	-91.66	164.26	85.00	1.21	-0.26	4.13
	2314.00	16.3900	74.5400	98.68	158.97	2294.02	-99.79	188.33	85.00	2.58	-0.24	9.06
	2399.00	15.7800	72.5300	105.35	181.55	2375.69	-106.61	211.88	85.00	0.97	-0.72	-2.36
	2485.00	14.0100	72.3900	112.01	202.63	2458.80	-113.42	233.98	86.00	2.06	-2.06	-0.16
	2570.00	13.6800	72.7100	118.11	222.04	2541.33	-119.65	254.32	85.00	0.40	-0.39	0.38
	2655.00	13.5300	72.0300	124.16	241.09	2623.94	-125.84	274.32	85.00	0.26	-0.18	-0.80
	2740.00	12.5300	70.1300	130.36	259.22	2706.75	-132.17	293.48	85.00	1.28	-1.18	-2.24
	2825.00	11.4700	69.9800	136.39	275.83	2789.89	-138.31	311.15	85.00	1.25	-1.25	-0.18
	2911.00	10.6500	67.7400	142.33	291.22	2874.30	-144.36	327.65	86.00	1.08	-0.95	-2.60
	2996.00	8.6400	64.6500	148.04	304.26	2958.09	-150.16	341.88	85.00	2.44	-2.36	-3.64
	3081.00	6.9400	65.8200	152.87	314.72	3042.30	-155.07	353.40	85.00	2.01	-2.00	1.38
	3166.00	5.5500	67.1900	156.57	323.19	3126.80	-158.82	362.65	85.00	1.64	-1.64	1.61
	3252.00	3.7900	73.2700	159.00	329.75	3212.51	-161.30	369.64	86.00	2.12	-2.05	7.07
	3337.00	2.6400	68.5100	160.53	334.26	3297.37	-162.86	374.40	85.00	1.39	-1.35	-5.60
	3422.00	1.1100	54.7400	161.72	336.75	3382.33	-164.07	377.17	85.00	1.86	-1.80	-16.20
	3592.00	0.4400	27.4400	163.25	338.40	3552.31	-165.61	379.41	170.00	0.44	-0.39	-16.06
	3847.00	1.2200	209.3000	161.75	337.52	3807.30	-164.10	381.15	255.00	0.65	0.31	-69.86
	4103.00	0.2100	303.4300	159.63	335.80	4063.28	-161.97	383.88	256.00	0.49	-0.39	36.77
	4359.00	1.2000	230.9300	158.20	333.32	4319.26	-160.53	386.74	256.00	0.45	0.39	-28.32
	4614.00	1.8600	232.0500	153.97	327.99	4574.16	-156.26	393.55	255.00	0.26	0.26	0.44
	4784.00	1.3500	202.6100	150.43	325.04	4744.10	-152.69	398.16	170.00	0.56	-0.30	-17.32
	5040.00	2.0100	204.3000	143.55	322.04	4999.99	-145.80	405.66	256.00	0.26	0.26	0.66
	5125.00	1.0700	205.4200	141.48	321.08	5084.96	-143.72	407.95	85.00	1.11	-1.11	1.32
	5211.00	0.6100	337.8000	141.18	320.56	5170.95	-143.41	408.54	86.00	1.80	-0.53	153.93
	5466.00	0.4700	279.0600	142.60	319.02	5425.94	-144.82	410.64	255.00	0.21	-0.05	-23.04
	5722.00	0.7300	288.8200	143.29	316.44	5681.93	-145.50	413.32	256.00	0.11	0.10	3.81
	5807.00	0.9000	271.7000	143.48	315.26	5766.92	-145.68	414.51	85.00	0.35	0.20	-20.14
	5892.00	0.1100	312.4400	143.56	314.53	5851.91	-145.75	415.24	85.00	0.96	-0.93	47.93
	6148.00	1.4900	291.6700	144.95	311.26	6107.88	-147.12	418.80	256.00	0.54	0.54	-8.11
	6233.00	0.4600	355.1800	145.70	310.20	6192.87	-147.86	420.10	85.00	1.59	-1.21	74.72
	6318.00	0.5800	346.8500	146.46	310.07	6277.87	-148.62	420.87	85.00	0.17	0.14	-9.80
	6404.00	0.5900	157.9200	146.47	310.14	6363.87	-148.64	420.93	86.00	1.36	0.01	198.92
	6489.00	0.3900	175.4500	145.78	310.33	6448.86	-147.94	421.65	85.00	0.29	-0.24	20.62
	6562.00	0.3100	154.4900	145.35	310.43	6521.86	-147.52	422.09	73.00	0.21	-0.11	-28.71
	6648.00	0.4700	132.6700	144.91	310.79	6607.86	-147.07	422.67	86.00	0.25	0.19	-25.37
	6733.00	0.3700	184.7300	144.40	311.03	6692.86	-146.56	423.23	85.00	0.45	-0.12	61.25
	6775.00	3.6400	164.4500	142.98	311.37	6734.83	-145.15	424.69	42.00	7.85	7.79	-48.29
	6818.00	7.0300	170.2800	139.07	312.18	6777.64	-141.24	428.68	43.00	7.97	7.88	13.56
	6861.00	11.0300	171.1400	132.41	313.26	6820.09	-134.59	435.43	43.00	9.31	9.30	2.00
	6903.00	14.1800	172.0700	123.34	314.59	6861.08	-125.53	444.59	42.00	7.52	7.50	2.21
	6946.00	16.9500	176.1800	111.86	315.73	6902.50	-114.07	456.12	43.00	6.93	6.44	9.56
	6988.00	19.3900	176.1200	98.80	316.61	6942.40	-101.01	469.22	42.00	5.81	5.81	-0.14
	7031.00	22.5900	175.2600	83.44	317.78	6982.54	-85.66	484.62	43.00	7.48	7.44	-2.00
	7074.00	25.5700	177.2200	65.94	318.91	7021.79	-68.16	502.16	43.00	7.17	6.93	4.56
	7116.00	29.0300	177.5900	46.70	319.78	7059.11	-48.93	521.42	42.00	8.25	8.24	0.88
	7159.00	32.8400	178.6200	24.61	320.50	7095.99	-26.85	543.52	43.00	8.95	8.86	2.40
	7201.00	36.4800	179.0800	0.73	320.98	7130.53	-2.97	567.40	42.00	8.69	8.67	1.10
	7244.00	39.7600	179.5500	-25.81	321.29	7164.35	23.56	593.94	43.00	7.66	7.63	1.09
	7287.00	43.5700	179.8900	-54.39	321.43	7196.47	52.14	622.52	43.00	8.88	8.86	0.79
	7329.00	46.8300	180.5200	-84.18	321.31	7226.06	81.94	652.32	42.00	7.83	7.76	1.50
	7372.00	50.5100	181.1900	-116.46	320.83	7254.45	114.22	684.60	43.00	8.64	8.56	1.56
	7414.00	53.8400	181.4200	-149.62	320.07	7280.21	147.39	717.77	42.00	7.94	7.93	0.55
	7457.00	56.2500	180.7800	-184.86	319.40	7304.84	182.62	753.01	43.00	5.74	5.60	-1.49
	7500.00	59.2100	179.9100	-221.21	319.18	7327.80	218.98	789.37	43.00	7.09	6.88	-2.02
	7542.00	62.9200	177.8300	-257.95	319.92	7348.12	255.71	826.12	42.00	9.84	8.83	-4.95
	7585.00	67.9400	179.5100	-297.03	320.82	7365.99	294.79	865.21	43.00	12.20	11.67	3.91
	7628.00	73.3100	179.4000	-337.58	321.20	7380.25	335.33	905.76	43.00	12.49	12.49	-0.26
	7670.00	78.6500	179.8500	-378.32	321.47	7390.42	376.06	946.49	42.00	12.76	12.71	1.07
	7699.00	82.8000	179.7400	-406.93	321.57	7395.09	404.67	975.11	29.00	14.32	14.31	-0.38
	7780.00	88.9800	178.7800	-487.67	322.61	7400.90	485.41	1055.86	81.00	7.72	7.63	-1.19
	7865.00	89.4700	178.8800	-572.65	324.35	7402.05	570.37	1140.85	85.00	0.59	0.58	0.12
	7950.00	90.0600	178.7600	-657.63	326.10	7402.40	655.34	1225.85	85.00	0.71	0.69	-0.14
	8035.00	89.6600	178.5700	-742.61	328.08	7402.60	740.30	1310.85	85.00	0.52	-0.47	-0.22
	8120.00	90.0000	179.4700	-827.59	329.53	7402.86	825.27	1395.85	85.00	1.13	0.40	1.06
	8205.00	90.9500	180.2300	-912.59	329.76	7402.15	910.26	1480.84	85.00	1.43	1.12	0.89
	8376.00	90.6700	179.4100	-1083.57	330.29	7399.73	1081.24	1651.82	171.00	0.51	-0.16	-0.48
	8461.00	90.8900	178.9000	-1168.55	331.55	7398.58	1166.21	1736.82	85.00	0.65	0.26	-0.60
	8546.00	90.2700	179.0700	-1253.53	333.05	7397.72	1251.18	1821.81	85.00	0.76	-0.73	0.20
	8631.00	90.6100	180.4100	-1338.53	333.44	7397.06	1336.17	1906.81	85.00	1.63	0.40	1.58
	8716.00	89.6300	178.3100	-1423.52	334.39	7396.88	1421.15	1991.80	85.00	2.73	-1.15	-2.47
	8801.00	89.7200	180.8600	-1508.50	335.00	7397.37	1506.13	2076.79	85.00	3.00	0.11	3.00
	8886.00	89.9000	183.4600	-1593.44	331.80	7397.65	1591.08	2161.78	85.00	3.07	0.21	3.06
	9056.00	89.2600	184.7600	-1762.99	319.62	7398.90	1760.72	2331.78	170.00	0.85	-0.38	0.76
	9142.00	89.5900	185.1200	-1848.67	312.21	7399.76	1846.44	2417.77	86.00	0.57	0.38	0.42
	9227.00	90.0300	183.6300	-1933.42	305.73	7400.04	1931.23	2502.77	85.00	1.83	0.52	-1.75
	9312.00	90.1500	181.8800	-2018.31	301.64	7399.91	2016.16	2587.76	85.00	2.06	0.14	-2.06
	9397.00	89.6900	181.9000	-2103.27	298.84	7400.03	2101.13	2672.76	85.00	0.54	-0.54	0.02
	9568.00	88.8200	179.2600	-2274.23	297.11	7402.25	2272.10	2843.73	171.00	1.63	-0.51	-1.54
	9653.00	89.9000	179.4300	-2359.22	298.08	7403.20	2357.08	2928.73	85.00	1.29	1.27	0.20
	9738.00	90.3400	180.0200	-2444.21	298.49	7403.02	2442.07	3013.73	85.00	0.87	0.52	0.69
	9909.00	90.5800	179.3000	-2615.20	299.50	7401.65	2613.05	3184.72	171.00	0.44	0.14	-0.42
	9994.00	91.7200	179.2800	-2700.18	300.56	7399.94	2698.01	3269.70	85.00	1.34	1.34	-0.02
	10079.00	91.0900	179.1500	-2785.14	301.72	7397.86	2782.97	3354.67	85.00	0.76	-0.74	-0.15
	10164.00	90.9200	179.1500	-2870.12	302.98	7396.37	2867.94	3439.66	85.00	0.20	-0.20	0.00
	10249.00	89.7800	179.2500	-2955.11	304.17	7395.85	2952.92	3524.66	85.00	1.35	-1.34	0.12
	10419.00	90.4000	179.8800	-3125.10	305.46	7395.58	3122.90	3694.66	170.00	0.52	0.36	0.37
	10590.00	90.2700	179.7900	-3296.10	305.95	7394.58	3293.88	3865.65	171.00	0.09	-0.08	-0.05
	10761.00	91.2000	179.9800	-3467.08	306.29	7392.39	3464.86	4036.64	171.00	0.56	0.54	0.11
	10845.00	90.5500	180.0700	-3551.07	306.26	7391.10	3548.85	4120.63	84.00	0.78	-0.77	0.11
	10931.00	89.7200	180.4500	-3637.07	305.87	7390.90	3634.85	4206.63	86.00	1.06	-0.97	0.44
	11016.00	90.4300	180.5600	-3722.07	305.12	7390.79	3719.85	4291.63	85.00	0.85	0.84	0.13
	11101.00	90.0900	180.7900	-3807.06	304.12	7390.40	3804.84	4376.62	85.00	0.48	-0.40	0.27
	11186.00	89.9300	180.7600	-3892.05	302.97	7390.39	3889.84	4461.62	85.00	0.19	-0.19	-0.04
	11271.00	89.9600	180.9200	-3977.04	301.72	7390.47	3974.84	4546.62	85.00	0.19	0.04	0.19
	11356.00	88.4900	180.3500	-4062.03	300.78	7391.62	4059.83	4631.61	85.00	1.85	-1.73	-0.67
	11526.00	90.1500	180.1000	-4232.01	300.11	7393.64	4229.81	4801.60	170.00	0.99	0.98	-0.15
	11611.00	90.4900	179.8800	-4317.01	300.13	7393.16	4314.81	4886.59	85.00	0.48	0.40	-0.26
	11696.00	90.3300	180.2600	-4402.00	300.02	7392.56	4399.80	4971.59	85.00	0.49	-0.19	0.45
	11781.00	89.2600	179.5500	-4487.00	300.16	7392.86	4484.80	5056.59	85.00	1.51	-1.26	-0.84
	11951.00	91.2700	180.9500	-4656.99	299.42	7392.07	4654.78	5226.57	170.00	1.44	1.18	0.82
	12036.00	90.8300	180.6700	-4741.96	298.22	7390.52	4739.77	5311.56	85.00	0.61	-0.52	-0.33
	12122.00	88.6100	180.1600	-4827.95	297.60	7390.94	4825.76	5397.55	86.00	2.65	-2.58	-0.59
	12292.00	89.3500	179.5000	-4997.92	298.10	7393.96	4995.72	5567.52	170.00	0.58	0.44	-0.39
	12450.00	90.8600	179.2200	-5155.91	299.87	7393.67	5153.69	5725.52	158.00	0.97	0.96	-0.18
Projection to TD:												
	12506.00	90.8600	179.2200	-5211.90	300.63	7392.83	5209.67	5781.51	56.00	0.00	0.00	0.00