

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Chesapeake Appalachia, LLC

Melvin Kahle OHI 3H

Marcellus

Ohio County WV

USA

NE-XX-0009587052

Measured Depth (feet)	Inclination (degrees)	Direction (deg. true)	Vertical Depth (feet)	Latitude (feet)	Longitude (feet)	Vertical Section (feet)	Dogleg (deg. /100ft)
5253.00	0.82	329.03	5251.96	21.56 N	56.40 W	45.87	TIE-IN
5305.00	0.75	348.48	5303.96	22.21 N	56.66 W	46.56	0.53
5369.00	0.93	347.79	5367.95	23.13 N	56.85 W	47.46	0.27
5432.00	1.14	343.21	5430.94	24.23 N	57.14 W	48.57	0.36
5495.00	1.25	344.60	5493.92	25.49 N	57.51 W	49.85	0.19
5558.00	1.30	335.55	5556.91	26.80 N	57.98 W	51.23	0.33
5622.00	1.19	318.02	5620.89	27.96 N	58.73 W	52.60	0.61
5685.00	1.26	322.51	5683.88	29.00 N	59.59 W	53.92	0.19
5748.00	3.30	311.82	5746.83	30.75 N	61.36 W	56.31	3.29
5779.00	7.49	310.22	5777.68	32.65 N	63.57 W	59.04	13.52
5810.00	11.13	308.84	5808.27	35.84 N	67.44 W	63.68	11.76
5842.00	14.44	306.20	5839.47	40.13 N	73.07 W	70.14	10.52
5874.00	17.28	307.45	5870.25	45.38 N	80.06 W	78.09	8.94
5905.00	20.24	314.02	5899.60	51.91 N	87.58 W	87.41	11.72
5937.00	21.45	318.49	5929.51	60.13 N	95.44 W	98.40	6.24
5968.00	24.06	319.97	5958.09	69.22 N	103.26 W	110.11	8.63
6000.00	28.00	319.82	5986.84	79.96 N	112.31 W	123.87	12.32
6031.00	32.03	319.77	6013.68	91.80 N	122.32 W	139.05	12.99
6063.00	34.60	323.24	6040.42	105.56 N	133.24 W	156.36	10.01
6094.00	36.83	329.51	6065.60	120.63 N	143.23 W	174.36	13.81
6126.00	40.86	332.53	6090.52	138.19 N	152.93 W	194.43	13.92
6156.00	44.24	332.54	6112.61	156.19 N	162.28 W	214.71	11.27
6188.00	48.51	330.01	6134.69	176.49 N	173.43 W	237.86	14.50
6220.00	52.42	328.91	6155.05	197.73 N	185.97 W	262.52	12.50
6252.00	55.41	328.39	6173.90	219.81 N	199.43 W	288.35	9.45
6283.00	59.41	328.39	6190.59	242.05 N	213.11 W	314.42	12.90
6315.00	61.99	328.89	6206.25	265.83 N	227.63 W	342.29	8.15
6347.00	64.43	329.15	6220.68	290.37 N	242.33 W	370.82	7.69
6379.00	66.66	329.22	6233.92	315.39 N	257.25 W	399.93	6.98
6411.00	68.96	329.20	6246.01	340.83 N	272.42 W	429.53	7.19
6442.00	70.79	329.39	6256.67	365.86 N	287.29 W	458.62	5.92
6473.00	72.39	330.11	6266.46	391.27 N	302.10 W	488.02	5.60
6505.00	73.89	331.38	6275.74	417.99 N	317.07 W	518.64	6.04
6536.00	77.49	331.17	6283.40	444.32 N	331.50 W	548.67	11.61
6568.00	79.01	331.00	6289.92	471.74 N	346.65 W	580.00	4.80
6599.00	80.11	331.59	6295.54	498.48 N	361.29 W	610.43	4.01
6631.00	82.66	331.61	6300.33	526.31 N	376.34 W	642.12	7.98
6663.00	86.23	330.81	6303.42	554.22 N	391.68 W	673.96	11.42
6694.00	88.89	330.41	6304.74	581.20 N	406.88 W	704.93	8.69
6756.00	89.63	330.27	6305.54	635.07 N	437.56 W	766.91	12.22
6883.00	90.17	330.28	6305.76	745.36 N	500.53 W	893.88	0.42
7009.00	90.60	331.04	6304.92	855.20 N	562.26 W	1019.87	0.69
7135.00	91.08	329.44	6303.07	964.56 N	624.80 W	1145.82	1.32
7262.00	91.34	327.75	6300.39	1072.93 N	690.96 W	1272.62	1.35
7388.00	90.87	328.07	6297.95	1179.66 N	757.89 W	1398.35	0.45
7514.00	91.72	327.00	6295.10	1285.93 N	825.51 W	1524.02	1.08
7640.00	90.20	328.84	6293.00	1392.67 N	892.42 W	1649.75	1.89
7766.00	88.32	328.68	6294.63	1500.38 N	957.75 W	1775.59	1.50
7894.00	88.79	328.85	6297.86	1609.80 N	1024.10 W	1903.40	0.39
8019.00	89.66	329.61	6299.55	1717.19 N	1088.04 W	2028.29	0.92

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8146.00	90.60	331.41	6299.26	1827.73 N	1150.56 W	2155.26	1.60
8273.00	92.19	328.46	6296.17	1937.60 N	1214.16 W	2282.16	2.63
8400.00	93.33	328.65	6290.05	2045.82 N	1280.32 W	2408.85	0.91
8526.00	92.32	328.96	6283.84	2153.47 N	1345.50 W	2534.55	0.84
8653.00	93.23	328.92	6277.68	2262.14 N	1410.94 W	2661.28	0.72

8781.00	89.87	327.48	6274.22	2370.87 N	1478.35 W	2789.00	2.86
8908.00	90.81	327.55	6273.47	2477.99 N	1546.56 W	2915.69	0.74
9035.00	90.27	327.98	6272.28	2585.41 N	1614.30 W	3042.41	0.54
9162.00	89.73	329.11	6272.28	2693.75 N	1680.57 W	3169.24	0.98
9287.00	91.34	329.81	6271.11	2801.40 N	1744.08 W	3294.16	1.41

9413.00	90.54	329.19	6269.04	2909.95 N	1808.02 W	3420.06	0.80
9540.00	89.56	329.34	6268.92	3019.11 N	1872.93 W	3546.96	0.78
9666.00	90.00	329.76	6269.40	3127.73 N	1936.78 W	3672.89	0.48
9794.00	90.54	332.80	6268.80	3239.96 N	1998.28 W	3800.87	2.41
9921.00	91.68	331.09	6266.34	3352.02 N	2058.00 W	3927.84	1.62

10047.00	90.51	328.12	6263.93	3460.87 N	2121.73 W	4053.73	2.54
10173.00	91.92	327.78	6261.27	3567.43 N	2188.58 W	4179.48	1.15
10301.00	89.29	328.02	6259.92	3675.85 N	2256.58 W	4307.19	2.06
10427.00	88.05	327.83	6262.84	3782.59 N	2323.47 W	4432.91	1.00
10553.00	89.06	327.44	6266.02	3888.98 N	2390.90 W	4558.58	0.86

10679.00	91.04	327.87	6265.91	3995.43 N	2458.30 W	4684.29	1.61
10804.00	92.02	327.53	6262.56	4101.05 N	2525.06 W	4808.97	0.83
10931.00	92.62	327.91	6257.42	4208.34 N	2592.83 W	4935.59	0.56
11058.00	91.14	325.08	6253.24	4314.17 N	2662.88 W	5062.03	2.52
11185.00	90.60	321.65	6251.31	4416.05 N	2738.64 W	5187.72	2.74

11311.00	90.47	325.60	6250.13	4517.47 N	2813.96 W	5312.50	3.14
11437.00	90.71	329.39	6248.84	4623.70 N	2881.06 W	5438.17	3.02
11563.00	90.64	330.60	6247.36	4732.80 N	2944.06 W	5564.11	0.96
11690.00	90.37	330.93	6246.24	4843.62 N	3006.09 W	5691.10	0.34
11816.00	91.92	331.03	6243.73	4953.78 N	3067.20 W	5817.06	1.23

11943.00	90.24	330.68	6241.35	5064.67 N	3129.04 W	5944.03	1.35
12069.00	88.39	330.67	6242.86	5174.52 N	3190.74 W	6070.00	1.47
12194.00	90.10	330.51	6244.51	5283.39 N	3252.11 W	6194.97	1.38
12321.00	93.06	332.21	6241.01	5394.80 N	3312.95 W	6321.90	2.68
12448.00	90.87	330.26	6236.65	5506.04 N	3374.03 W	6448.81	2.31

12576.00	91.92	331.87	6233.53	5618.08 N	3435.84 W	6576.77	1.57
12701.00	92.89	332.38	6229.29	5728.53 N	3494.71 W	6701.64	0.85
12706.00	92.75	332.77	6229.04	5732.96 N	3495.44 W	6706.84	8.31
12752.00	92.75	332.77	6225.83	5773.81 N	3517.46 W	6752.57	0.01

CALCULATION BASED ON MINIMUM CURVATURE METHOD

SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT

VERTICAL SECTION RELATIVE TO WELL HEAD

VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 341.49 DEGREES (GRID)

A TOTAL CORRECTION OF -7.96 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD

HORIZONTAL DISPLACEMENT (CLOSURE) AT 12752.00 FEET

IS 6760.88 FEET ALONG 328.65 DEGREES (GRID)

TIE-ON AT 5253 MD PROVIDED BY VAUGHN ENERGY SERVICES

SURVEYS FROM 5305 MD TO 12752 MD PROVIDED BY SPERRY DRILLING MMD

SURVEY AT 12706 MD HAS BEEN PROJECTED TO TD AT 12752 MD

SPERRY PERSONNEL: T. RUSSELL, J. CROWALL

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Hydraulic Fracturing Fluid Product Component Information Disclosure

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Fracture Date	7/27/2012
State	WEST VIRGINIA
County	OHIO
API Number	4706900124
Operator Name	CHESAPEAKE APPALACHIA LLC
Well Name and Number	MELVIN KAHLER OHI 3H
Longitude	-80.625495
Latitude	40.071793
Long/Lat Projection	NAD27
Production Type	GAS
True Vertical Depth (TVD)	6,305
Total Water Volume (gal)	4,579,890

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by Mass)**	Maximum Ingredient Concentration in HF Fluid (% by Mass)**	Comments
Fresh Water		Carrier/Base Fluid				74.54320%	
Recycled Produced Water		Carrier/Base Fluid				11.29939%	
Ottawa Sand		Proppant	Crystalline Silica (Quartz Sand, Silicon Dioxide)	014808-60-7	100.00%	9.11664%	
100 Mesh Sand		Proppant	Crystalline Silica (Quartz Sand, Silicon Dioxide)	014808-60-7	100.00%	3.93103%	
Acid, Hydrochloric 15pct	SCHLUMBE RGER	Acid	Water	007732-18-5	85.00%	0.85421%	
L058	SCHLUMBE RGER	Iron Control Agent	Hydrogen Chloride	007647-01-0	15.00%	0.15074%	
A264	SCHLUMBE RGER	Corrosion Inhibitor	Sodium Erythorbate	006381-77-7	100.00%	0.00073%	
EC6110A	NALCO	Anti-Bacterial Agent	Methanol (Methyl Alcohol)	000067-56-1	40.00%	0.00071%	
			Aliphatic acid	N/A	30.00%	0.00053%	
			Aliphatic alcohols, ethoxylated # 1	N/A	30.00%	0.00053%	
			Propargyl Alcohol (2-Propynol)	000107-19-7	10.00%	0.00018%	
			Glutaraldehyde	000111-30-8	60.00%	0.01664%	
			Quaternary Ammonium Compounds	N/A	10.00%	0.00277%	
			Ethanol	000064-17-5	5.00%	0.00139%	

EC6629A	NALCO	Scale Inhibitor	No Hazardous Components	NONE	0.00000%
J580	SCHLUMBE RGER	Gelling Agent	Carbohydrate polymer	N/A	0.01954%
B315	SCHLUMBE RGER	Friction Reducer	Petroleum Distillate Hydrotreated Light	064742-47-8	0.01448%
J218	SCHLUMBE RGER	Breaker	Aliphatic alcohol polyglycol ether Ammonium Persulfate	N/A 007727-54-0	0.00072% 0.00144%

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

"Additional Ingredients Not Listed on MSDS" component information were obtained directly from the supplier. As such, the Operator is not responsible for inaccurate and/or incomplete information. Any questions regarding the content of this information should be directed to the supplier who provided it.

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