



Directional Survey

30-015-41535

Well Name COTTON-HILLS 23-26-27 FED COM 001H	Lease Cotton Hills	Field Name Hay Hollow	Business Unit Mid-Continent
Ground Elevation (ft)	Original RKB (ft)	Current RKB Elevation	Mud Line Elevation (ft) Water Depth (ft)

Wellbore Name Original Hole	Parent Wellbore Original Hole	Kick Off Depth (ftKB) 8:753	Vertical Section Direction (°) 179.75
UTM Northing (Y) (ft)	UTM Easting (X) (ft)	UTM Grid Zone	
Date 9/5/2013	Definitive? Y	Description MWD - Curve	Planned? N
MD Tie In (ftKB) 8:757.00	TVD Tie In (ftKB) 8:754.00	Inclination Tie In (°) 1:10	Azimuth Tie In (°) 1:18.70
NS Tie In (ft) -14.37	EW Tie In (ft) -29.09		

MD (ftKB)	Inc (°)	Azm (°)	TVD (ftKB)	NS (ft)	EW (ft)	VS (ft)	DLS (°/100ft)	Method	Survey Company	Build (°/100ft)	Depth (ft)	Turn (°/100ft)	Unuse d data
8:801	5:10	188.80	8:797.93	-16.51	-29.02	16.38	10.99	Magn MWD	Phoenix Directional	9.09	33.38	159.32	N
8:846	8:10	190.50	8:842.63	-21.60	-29.90	21.47	6.68	Magn MWD	Phoenix Directional	6.67	36.89	3:78	N
8:891	10:60	199.30	8:887.03	-28.63	-31.85	28.49	6.38	Magn MWD	Phoenix Directional	5.56	42.82	19:56	N
8:935	12:70	206.80	8:930.13	-36:76	-35:37	36.61	5.87	Magn MWD	Phoenix Directional	4.77	51.01	17:05	N
8:980	14:20	212.90	8:973.89	-45:82	-40:60	45.64	4:58	Magn MWD	Phoenix Directional	3:33	61.21	13:56	N
9:025	18:70	203.40	9:017.05	-57:08	-46:46	56.87	11.62	Magn MWD	Phoenix Directional	10:00	73.60	-21:11	N
9:070	24:30	194.70	9:058.91	-72:67	-51:68	72.44	14.29	Magn MWD	Phoenix Directional	12:44	89:17	-19:33	N
9:115	30:60	189.00	9:098.83	-92:96	-55:83	92.72	15.15	Magn MWD	Phoenix Directional	14.00	108.44	-12:67	N
9:159	35:90	185:30	9:135.62	-116:89	-58:78	116.63	12.89	Magn MWD	Phoenix Directional	12:05	130.83	-8:41	N
9:204	41:00	179.00	9:170.86	-144:81	-59:74	144.55	14.28	Magn MWD	Phoenix Directional	11.33	156.65	-14:00	N
9:249	45:80	175.30	9:203.55	-175:67	-58:16	175.42	12.07	Magn MWD	Phoenix Directional	10.67	185.05	-8:22	N
9:293	51:00	174.00	9:232.76	-208:42	-55:08	208.18	12.02	Magn MWD	Phoenix Directional	11:82	215:57	-2:95	N
9:338	57:10	173.50	9:259.16	-244:61	-51:11	244.39	13.59	Magn MWD	Phoenix Directional	13.56	249.89	-1:11	N
9:398	63:40	172:20	9:288.92	-296:27	-44:61	296.07	10.67	Magn MWD	Phoenix Directional	10.50	299.61	-2:17	N
9:429	65:00	173.20	9:302.41	-323:95	-41:06	323.77	5.92	Magn MWD	Phoenix Directional	5.16	326.54	3:23	N
9:461	68:70	174.60	9:314.99	-353:20	-37:94	353.03	12.24	Magn MWD	Phoenix Directional	11.56	355.23	4:38	N
9:493	72:10	173.30	9:325.73	-383.18	-34:76	383.02	11.29	Magn MWD	Phoenix Directional	10.63	384.75	-4:06	N
9:525	75:20	172.00	9:334.73	-413.62	-30:83	413.49	10.44	Magn MWD	Phoenix Directional	9.69	414.77	-4:06	N
9:556	75:40	171.50	9:342.60	-443.30	-26:53	443.18	1.69	Magn MWD	Phoenix Directional	0.65	444.09	-1:61	N
9:588	77:00	171.20	9:350.23	-474.02	-21:85	473.92	5.08	Magn MWD	Phoenix Directional	5.00	474.52	-0:94	N
9:620	79:70	171.20	9:356.69	-504.99	-17:06	504.91	8.44	Magn MWD	Phoenix Directional	8.44	505.28	0:00	N
9:651	83:20	170.40	9:361.30	-535.25	-12:16	535.19	11.58	Magn MWD	Phoenix Directional	11:29	535.38	-2:58	N
9:683	87:10	169.10	9:364.01	-566.62	-6:48	566.58	12.84	Magn MWD	Phoenix Directional	12.19	566.65	-4:06	N
9:715	88:60	168.80	9:365.21	-598.00	-0:36	597.99	4.78	Magn MWD	Phoenix Directional	4.69	598.00	-0:94	N
9:744	88.00	169.60	9:366.07	-626.47	5.08	626.49	3.45	Magn MWD	Phoenix Directional	-2.07	626.49	2:76	N
9:776	87.90	170.60	9:367.21	-657.98	10.57	658.02	3.14	Magn MWD	Phoenix Directional	-0.31	658.06	3:13	N



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Survey Data													
MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	NS (ft)	EW (ft)	VS (ft)	DLS (°/100ft)	Method	Survey Company	Bulk (°/100ft)	Depth (ft)	Turn (°/100ft)	Unuse d data
9,814	91.40	174.90	9,367.45	-695.66	15.37	695.72	14.59	Magn MWD	Phoenix Directional	9.21	695.83	11.32	N
9,838	91.60	176.00	9,366.82	-719.57	17.27	719.64	4.66	Magn MWD	Phoenix Directional	0.83	719.78	4.58	N
9,933	93.40	178.30	9,362.67	-814.35	21.99	814.44	3.07	Magn MWD	Phoenix Directional	1.89	814.65	2.42	N
10,028	93.90	178.80	9,356.63	-909.13	24.39	909.23	0.74	Magn MWD	Phoenix Directional	0.53	909.46	0.53	N
10,124	93.30	178.20	9,350.60	-1,004.91	26.90	1,005.01	0.88	Magn MWD	Phoenix Directional	-0.63	1,005.27	-0.63	N
10,218	93.20	178.70	9,345.27	-1,098.72	29.44	1,098.84	0.54	Magn MWD	Phoenix Directional	-0.11	1,099.12	0.53	N
10,313	93.00	177.60	9,340.13	-1,193.53	32.50	1,193.66	1.18	Magn MWD	Phoenix Directional	-0.21	1,193.97	-1.16	N
10,408	93.80	178.70	9,334.50	-1,288.31	35.56	1,288.46	1.43	Magn MWD	Phoenix Directional	0.84	1,288.80	1.16	N
10,503	92.40	180.70	9,329.36	-1,383.16	36.06	1,383.31	2.57	Magn MWD	Phoenix Directional	-1.47	1,383.63	2.11	N
10,598	93.00	180.10	9,324.88	-1,478.06	35.39	1,478.20	0.89	Magn MWD	Phoenix Directional	0.63	1,478.48	-0.63	N
10,693	91.00	181.40	9,321.57	-1,572.98	34.15	1,573.12	2.51	Magn MWD	Phoenix Directional	-2.11	1,573.35	1.37	N
10,788	90.40	179.30	9,320.41	-1,667.97	33.57	1,668.10	2.30	Magn MWD	Phoenix Directional	-0.63	1,668.31	-2.21	N
10,883	91.00	178.60	9,319.25	-1,762.94	35.31	1,763.08	0.97	Magn MWD	Phoenix Directional	0.63	1,763.30	-0.74	N
10,977	90.20	178.40	9,318.26	-1,856.91	37.77	1,857.05	0.88	Magn MWD	Phoenix Directional	-0.85	1,857.29	-0.21	N
11,073	90.90	177.70	9,317.34	-1,952.85	41.04	1,953.01	1.03	Magn MWD	Phoenix Directional	0.73	1,953.28	-0.73	N
11,168	93.30	180.60	9,313.86	-2,047.75	42.45	2,047.92	3.96	Magn MWD	Phoenix Directional	2.53	2,048.19	3.05	N
11,263	93.70	180.00	9,308.06	-2,142.57	41.95	2,142.74	0.76	Magn MWD	Phoenix Directional	0.42	2,142.99	-0.63	N
11,358	94.20	180.60	9,301.51	-2,237.35	41.46	2,237.51	0.82	Magn MWD	Phoenix Directional	0.53	2,237.73	0.63	N
11,453	94.40	180.20	9,294.39	-2,332.08	40.79	2,332.23	0.47	Magn MWD	Phoenix Directional	0.21	2,332.43	-0.42	N
11,548	94.30	180.40	9,287.19	-2,426.80	40.30	2,426.95	0.23	Magn MWD	Phoenix Directional	-0.11	2,427.14	0.21	N
11,643	93.10	182.30	9,281.06	-2,521.57	38.06	2,521.71	2.36	Magn MWD	Phoenix Directional	-1.26	2,521.86	2.00	N
11,738	91.20	182.20	9,277.49	-2,616.43	34.34	2,616.55	2.00	Magn MWD	Phoenix Directional	-2.00	2,616.65	-0.11	N
11,833	90.20	180.80	9,276.33	-2,711.38	31.85	2,711.50	1.81	Magn MWD	Phoenix Directional	-1.05	2,711.57	-1.47	N
11,928	89.40	179.90	9,276.66	-2,806.38	31.27	2,806.49	1.27	Magn MWD	Phoenix Directional	-0.84	2,806.55	-0.95	N
12,023	93.20	181.00	9,274.51	-2,901.33	30.52	2,901.44	4.16	Magn MWD	Phoenix Directional	4.00	2,901.49	1.16	N
12,118	93.50	180.80	9,268.96	-2,996.16	29.03	2,996.26	0.38	Magn MWD	Phoenix Directional	0.32	2,996.30	-0.21	N
12,212	93.20	180.50	9,263.46	-3,089.99	27.97	3,090.09	0.45	Magn MWD	Phoenix Directional	-0.32	3,090.12	-0.32	N
12,307	90.90	181.10	9,260.07	-3,184.92	26.64	3,185.00	2.50	Magn MWD	Phoenix Directional	-2.42	3,185.03	0.63	N
12,403	89.40	179.40	9,259.81	-3,280.91	26.23	3,280.99	2.36	Magn MWD	Phoenix Directional	-1.56	3,281.01	-1.77	N



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Ground Elevation (ft)	Original RKB (ft)	Current RKB Elevation		Mud Line Elevation (ft)	Water Depth (ft)

Survey Data													
MD (ftKB)	Incl (°)	Azin (°)	TVD (ftKB)	NS (ft)	EW (ft)	VS (ft)	DLS (°/100ft)	Method	Survey Company	Build (°/100ft)	Depart (ft)	Turn (°/100ft)	Unuse d data
12,497	89.70	175.60	9,260.55	-3,374.80	30.33	3,374.90	4.06	Magn MWD	Phoenix Directional	0.32	3,374. 93	-4.04	N
12,592	90.00	176.10	9,260.80	-3,469.55	37.20	3,469.68	0.61	Magn MWD	Phoenix Directional	0.32	3,469. 75	-0.53	N
12,687	91.30	179.20	9,259.72	-3,564.45	41.09	3,564.59	3.54	Magn MWD	Phoenix Directional	1.37	3,564. 69	3.26	N
12,783	89.20	177.30	9,259.30	-3,660.39	44.03	3,660.55	2.95	Magn MWD	Phoenix Directional	-2.19	3,660. 66	-1.98	N
12,878	88.30	178.60	9,261.38	-3,755.31	47.42	3,755.48	1.66	Magn MWD	Phoenix Directional	-0.95	3,755. 61	1.37	N
12,973	89.10	179.80	9,263.53	-3,850.27	48.75	3,850.45	1.52	Magn MWD	Phoenix Directional	0.84	3,850. 58	-1.26	N